

VF-W Series

IE2-IE3

Wormgears



PRODUCTS &
SOLUTIONS

eVOX
PLATFORM

INCLUDED



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Revisions

Refer to page 348 for the catalogue revision index. Visit www.bonfiglioli.com to search for catalogues with up-to-date revisions.



GENERAL INFORMATION

1 SYMBOLS AND UNITS OF MEASUREMENT

Symbols	Units of Measure	Description	Symbols	Units of Measure	Description
$A_{N\ 1,2}$	[N]	Permissible axial force	$n_{1,2}$	[min ⁻¹]	Speed
f_s	—	Service factor	$P_{1,2}$	[kW]	Power
f_T	—	Thermal factor	$P_{N\ 1,2}$	[kW]	Rated power
f_{TP}	—	Temperature factor	$P_{R\ 1,2}$	[kW]	Power demand
i	—	Gear ratio	$R_{C\ 1,2}$	[N]	Calculated radial force
I	—	Cyclic duration factor	$R_{N\ 1,2}$	[N]	Permissible overhung load
J_C	[Kgm ²]	Mass moment of inertia to be driven	S	—	Safety factor
J_M	[Kgm ²]	Motor mass moment of inertia	t_a	[°C]	Ambient temperature
J_R	[Kgm ²]	Mass moment of inertia for the gear unit	t_s	[°C]	Surface temperature
K	—	Mass acceleration factor	t_o	[°C]	Oil temperature
K_r	—	Transmission element factor	t_f	[min]	Work time under constant load
$M_{1,2}$	[Nm]	Torque	t_r	[min]	Rest time
$M_{c\ 1,2}$	[Nm]	Calculated torque	η_d	—	Dynamic efficiency
$M_{n\ 1,2}$	[Nm]	Rated torque	η_s	—	Static efficiency
$M_{r\ 1,2}$	[Nm]	Torque demand	<u>1</u> value applies to input shaft		
			<u>2</u> value applies to output shaft		



This symbol indicates important technical information.



This symbol refers to the angle the overhung load applies (viewing from drive end).



This symbol indicates situations of danger which, if ignored, may result in risks to personal health and safety.



Symbol refers to weight of gearmotors and speed reducers. Figure for gearmotors incorporates the weight of the 4-pole motor and for life lubricated units, where applicable, the weight of the oil.



The symbol shows the page the information can be sorted from.

2 DEFINITIONS

2.1 TORQUE

Rated torque M_{n2} [Nm]

The torque that can be transmitted continuously through the output shaft, with the gear unit operated under a service factor $f_s = 1$.

Rating is speed sensitive.

Required torque M_{r2} [Nm]

The torque demand based on application requirement. It is recommended to be equal to or less than torque M_{n2} the gearbox under study is rated for.

Calculated torque M_{c2} [Nm]

Computational torque value to be used when selecting the gearbox.

It is calculated considering the required torque M_{r2} and service factor f_s , as per the relationship here after:

$$M_{c2} = M_{r2} \times f_s \leq M_{n2} \quad (1)$$

2.2 POWER

Rated input power P_{n1} [kW]

The parameter can be found in the gearbox rating charts and represents the kW that can be safely transmitted to the gearbox, based on input speed n_1 and service factor $f_s = 1$.



2.3 EFFICIENCY

Dynamic efficiency [η_d]

The dynamic efficiency is the relationship of power delivered at output shaft P_2 to power applied at input shaft P_1 :

$$\eta_d = \frac{P_2}{P_1} \quad (2)$$

It may be worth highlighting that values of rated torque M_{n2} given in the catalogue take the dynamic efficiency into consideration. Values of η_d are calculated for gearboxes after a sufficiently long running-in period.

After the running-in period the surface temperature in operation reduces and finally stabilises.

The operating temperature is affected by both the duty and the ambient temperature, refer to chapter "ALLOWED TEMPERATURE LIMITS" for information about the permitted values. If however, surface temperatures are to be expected near the upper limit, it is recommended that oil seals in Fluoro elastomer compound are specified at the time of order through option **PV**.

Static efficiency [η_s]

Efficiency applicable at start-up of the gearbox. Although this is generally not a significant factor for helical gears, it may be instead critical when selecting worm gearmotors operating under intermittent duty (e.g. Hoisting).

2.4 GEAR RATIO [i]

The value for the gear ratio is referred to with the letter [i] and calculated through the relationship of the input speed n_1 to the output speed n_2 :

$$i = \frac{n_1}{n_2} \quad (3)$$

2.5 MOMENT OF INERTIA J_r [kgm²]

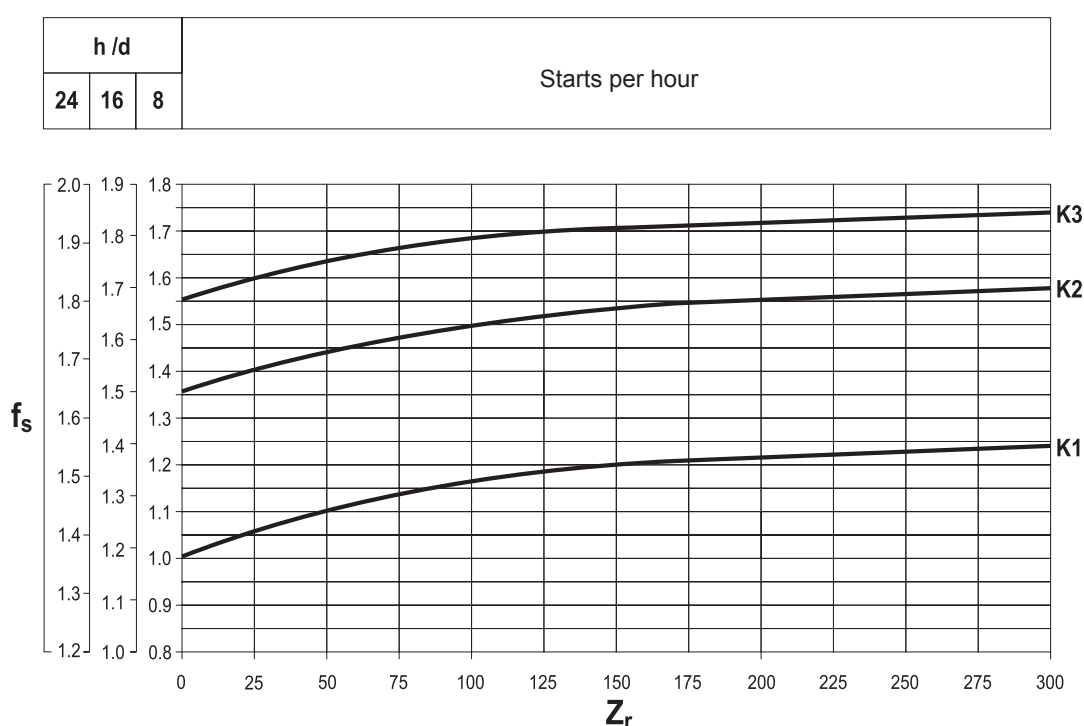
Moments of inertia specified in the catalogue refer to the input shaft of the gear unit and, as such, they can be simply added to the inertia of the motor, when this is combined.



2.6 SERVICE FACTOR [f_s]

This factor is the numeric value describing reducer service duty. It takes into consideration, with unavoidable approximation, daily operating conditions, load variations and overloads connected with reducer application. In the graph below, after selecting proper “daily working hours” column, the service factor is given by intersecting the number of starts per hour and one of the K1, K2 or K3 curves. $K_{_}$ curves are linked with the service nature (approximately: uniform, medium and heavy) through the acceleration factor of masses K , connected to the ratio between driven masses and motor inertia values. Regardless to the value given for the service factor, we would like to remind that in some applications, which for example involve lifting of parts, failure of the reducer may expose the operators to the risk of injuries.

If in doubt, please contact Bonfiglioli's Technical Service.



Acceleration factor of masses, [K]

This parameter serves for selecting the right curve for the type of load. The value is given by the following ratio:

$$K = \frac{J_c}{J_m} \quad (4)$$


$K = \frac{J_c}{J_m}$	$J_c =$ Moment of inertia of driven masses referred to motor drive shaft
	$J_m =$ Motor moment of inertia

$K \leq 0,25$	→ K1	Uniform load
$0,25 < K \leq 3$	→ K2	Moderate shock load
$3 < K \leq 10$	→ K3	Heavy shock load
$K > 10$	→	please contact Bonfiglioli's Technical Service




3 ALLOWED TEMPERATURE LIMITS

Symbols	Description / Condition	Value (*)	
		Synthetic Oil	Mineral Oil
t_a	Ambient temperature		
$t_{au \text{ min}}$	Minimum operating ambient temperature	-30°C	-10°C
$t_{au \text{ Max}}$	Maximum operating ambient temperature	+50°C	+40°C
$t_{as \text{ min}}$	Minimum storage ambient temperature	-40°C	-10°C
$t_{as \text{ Max}}$	Maximum storage ambient temperature	+50°C	+50°C
t_s	Surface temperature		
$t_{s \text{ min}}$	Minimum gearbox surface temperature starting with partial load (#)	-25°C	-10°C
$t_{sc \text{ min}}$	Minimum gearbox surface temperature starting with full load	-10°C	-5°C
$t_{s \text{ Max}}$	Maximum casing surface temperature during continuous operation (measured next to the gearbox input)	+100°C	+100°C (@)
t_o	Oil temperature		
$t_{o \text{ Max}}$	Maximum oil temperature during continuous operation	+95°C	+95°C (@)

(*) = Refer to the table "Selection of the optimal oil viscosity" for further information about minimum and maximum values of different oil viscosity. For values of $t_a < -20^\circ\text{C}$ and $t_s, t_o > 80^\circ\text{C}$, choose (as permitted in the product configuration stage) the sealing type of the most suitable material to the type of application. If needed contact Bonfiglioli Technical Service. 

(@) = Continuous operation it is not advised if t_s and t_o range is 80°C to 95°C .

(#) = For full load start-up it is recommended to ramp-up and provide for greater absorption of the motor. If needed, contact Bonfiglioli Technical Service. 



4 SELECTION

4.1 Selecting a gearmotor

a) Determine service factor f_s as formerly specified.

b) Determine power required at gearbox input shaft:

$$P_{r1} = \frac{M_{r2} \times n_2}{9550 \times \eta_d} \quad [\text{kW}] \quad (5)$$

c) Consult the gearmotor rating charts and locate the table corresponding to normalised power P_n :

$$P_n \geq P_{r1} \quad (6)$$

Unless otherwise specified, power P_n of motors indicated in the catalogue refers to continuous duty S1.

For motors used in conditions other than S1, the type of duty required by reference to CEI 2-3/IEC 34-1 Standards must be mentioned. For duties from S2 to S8 in particular and for motor frame 132 or smaller, extra power output can be obtained with respect to continuous duty.

Accordingly the following condition must be satisfied:

$$P_n \geq \frac{P_{r1}}{f_m} \quad (7)$$

The adjusting factor f_m can be obtained from table here after.

Intermittence ratio

$$I = \frac{t_f}{t_f + t_r} \times 100 \quad (8)$$

t_f = work time at constant load

t_r = rest time

	DUTY						
	S2			S3*			S4 - S8
	Cycle duration [min]			Cyclic duration factor (I)			Please contact us
	10	30	60	25%	40%	70%	
f _m	1.35	1.15	1.05	1.25	1.15	1.1	

* Cycle duration, in any event, must be 10 minutes or less. If it is longer, please contact our Technical Service.



Next, refer to the appropriate **P_n** section within the gearmotor selection charts and locate the unit that features the desired output speed **n₂**, or closest to, along with a safety factor **S** that meets or exceeds the applicable service factor **f_s**.

$$S \geq f_s \quad (9)$$

The safety factor is so defined:

$$S = \frac{M_{n2}}{M_2} = \frac{P_{n1}}{P_1} \quad (10)$$

As standard, gear and motor Combinations are implemented with 2, 4 and 6 pole motors, 50 Hz supplied.

Should the drive speed be different from 2800, 1400 or 900 min⁻¹, base the selection on the gear unit nominal rating.

4.2 Selecting a speed reducer

a) Determine service factor **f_s**.

b) Determine the computational torque **M_{c2}**:

$$M_{c2} = M_{r2} \times f_s \quad (11)$$

c) Determine the required gear ratio:

$$i = \frac{n_1}{n_2} \quad (12)$$

d) Consult the «Speed reducer rating charts» and locate the frame size that, for drive speed **n₁** and gear ratio closest to **[i]** features a rated torque **M_{n2}** that satisfies the following condition:

$$M_{n2} \geq M_{c2} \quad (13)$$

Check applicability of the electric motor selected at chapter: «Motor availability».



5 VERIFICATION

After the selection of the speed reducer, or gearmotor, is complete it is recommended that the following verifications are Conducted:

a) Maximum torque

The maximum torque (intended as instantaneous peak load) applicable to the gearbox must not, in general, exceed 150% of rated torque M_{n2} . Upon evaluation and approval of Bonfiglioli Technical Service peak values up to 300% may be admitted.

For three-phase switch-pole motors, it is recommended to pay attention to the switching torque which is generated when switching from high to low speed, because it could be significantly higher than maximum torque.

A simple, economical way to minimize overloading is to power only two phases of the motor during switch-over (power-up time on two phases can be controlled with a time-relay):

Switching torque	
$Mg_2 = 0.5 \times Mg_3$	
Mg_2	Switching torque with two phase power-up
Mg_3	Switching torque with three-phase power-up

b) Radial loads

Make sure that radial forces applying on input and/or output shaft are within permittend catalogue values. If they were higher consider designing a different bearing arrangement before switching to a larger gear unit.

Catalogue values for rated overhung loads refer to mid-point of shaft under study.

Should application point of the overhung load be localised further out the revised loading capability must be adjusted as per instructions given in this manual.

c) Thrust loads

Actual thrust load must be found within 20% of the equivalent overhung load capacity.

Should an extremely high thrust, or a combination of radial and axial load apply, consult Bonfiglioli Technical Service.

d) Starts per hour

For duties featuring a high number of switches the actual starting capability in loaded condition [Z] must be calculated.

Actual number of starts per hour must be lower than value so calculated.

6 INSTALLATION

6.1 General instructions

a) Make sure that the gearbox is securely bolted to avoid vibrations in operation. If shocks or overloads are expected, fit hydraulic couplings, clutches, torque limiters, etc.



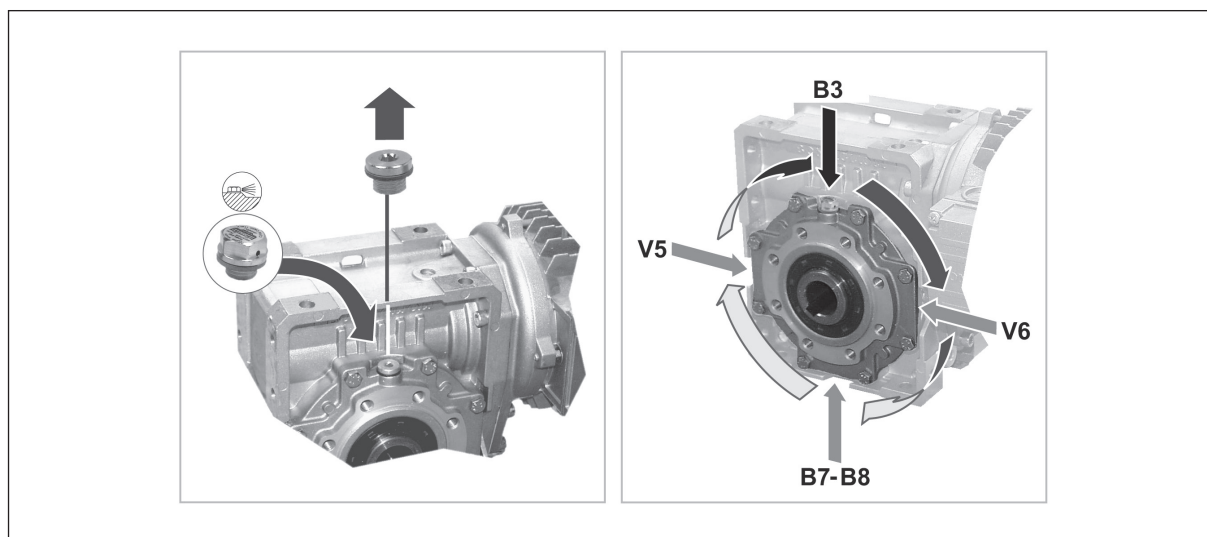
- b) Before being paint coated, any machined surfaces and the outer face of the oil seals must be protected to prevent paint drying out the rubber and jeopardising the sealing function.
- c) Parts fitted on the gearbox output shaft must be machined to ISO H7 tolerance to prevent interference fits that could damage the gearbox itself. Further, to mount or remove such parts, use suitable pullers or extraction devices using the tapped hole located at the top of the shaft extension.
- d) Mating surfaces must be cleaned and treated with suitable protective products before mounting to avoid oxidation and, as a result, seizure of parts.
- e) Prior to putting the gear unit into operation make sure that the equipment that incorporates the same complies with the current revision of the Machines Directive 2006/42/CE.
- f) Before starting up the machine, make sure that oil level is suitable for the mounting position specified for the gear unit and the viscosity is adequate.
- g) For outdoor installation provide adequate guards in order to protect the drive from rainfalls as well as direct sun radiation.

6.2 Commissioning of W gear units

Gear units type W63, W75 and W86 feature a side cover carrying a blank plug for transportation purposes.

Prior to putting the gearbox into service the blank plug must be replaced by the breather plug that is supplied with each unit.

See figure below:



Note that the blind plug MUST BE LEFT IN PLACE when the reducer is fitted in mounting position B6.



7 LUBRICATION

Life lubricated gearboxes do not require any periodical oil changes.




Refer to the User's Manual available at www.bonfiglioli.com for indications about checking the oil level and its replacement for other types of gearboxes.

Do not mix mineral oils with synthetic oils and/or different brands.

However, oil level should be checked at regular intervals and topped up as required.

Check monthly if unit operates under intermittent duty, more frequently if duty is continuous.

7.1 Selection of the optimal oil viscosity (data relating to Shell Oils)

Splash lubrication		Operating ambient temperature [C°]																		
		-40	-35	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50
		suitability seals check				standard seals provided in the catalog														
Synthetic oil (PAG)	150 VG		*	*																
	220 VG			*	*															
	320 VG ^[1]				*															
	460 VG ^[2]				*															

Recommended operating limits

Allowed operating limits.

Forbidden operating limits.

* = It is recommended to ramp-up and to provide for greater absorption of the motor.

If needed and in the event of impulse loads, contact Bonfiglioli Technical Service.

[1] For the VF - VFR - VF_EP - W - WR - W_EP reducers we suggest viscosity 320.
For different needs, contact the Bonfiglioli technical service.

[2] For VFL - WL reducers the use of viscosity 460 is mandatory.

7.2 Lubrication for W and VF

Frame sizes VF 27 ... VF 49, W 63 ... W 86 are supplied by the factory, or by authorized dealers, already filled with "long life" synthetic oil. On request, these units can be supplied unlubricated, in which case, the option **SO** must be specified on the order. The applicability of the option is described in the chapter "GEARBOX OPTIONS". Unless otherwise specified, units type VF 130 ... VF 250 and W 110 are generally supplied unlubricated at it is the customer' responsibility to fill them with oil prior to putting them into operation. By requesting the **LUBRICATION** option at the time of order, these units will be factory filled with different types of synthetic lubricant (PAG or for food use) in the quantity relevant to the mounting position that was specified in the purchase order. The applicability of the option is described in the chapter "GEARBOX OPTIONS".

Double worm gears type VF/VF, VF/W and W/VF consist of two separate units, independently lubricated. For the reference charts of oil plugs placement and quantity of lubricant, refer to the Installation, Operation and Maintenance Manual (available on www.bonfiglioli.com).

In the absence of contamination, the "long life" synthetic lubricant supplied by the factory (OMALA S4 WE 320), does not require periodical changes throughout the lifetime of the gear unit.



8 STORAGE

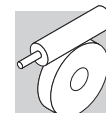
Observe the following instructions to ensure correct storage of the products:

- a) Do not store outdoors, in areas exposed to weather or with excessive humidity.
- b) Always place boards, wood or other material between the products and the floor.
The gearboxes should not have direct contact with the floor.
- c) In case of long-term storage all machined surfaces such as flanges, shafts and couplings must be coated with a suitable rust inhibiting product (Mobilarma 248 or equivalent).
Furthermore gear units must be placed with the fill plug in the highest position and filled up with oil.
Before putting the units into operation the appropriate quantity, and type, of oil must be restored.

9 CONDITIONS OF SUPPLY

Gear units are supplied as follows:

- a) configured for installation in the mounting position specified at the time of order;
- b) tested to manufacturer specifications;
- c) mating machined surfaces come unpainted;
- d) nuts and bolts for mounting motors are provided;
- e) shafts are protected during transportation by plastic caps;
- f) supplied with lifting lug (where applicable).



WORMGEARS

10 DESIGN FEATURES

10.1 Key features common to all Bonfiglioli worm gears

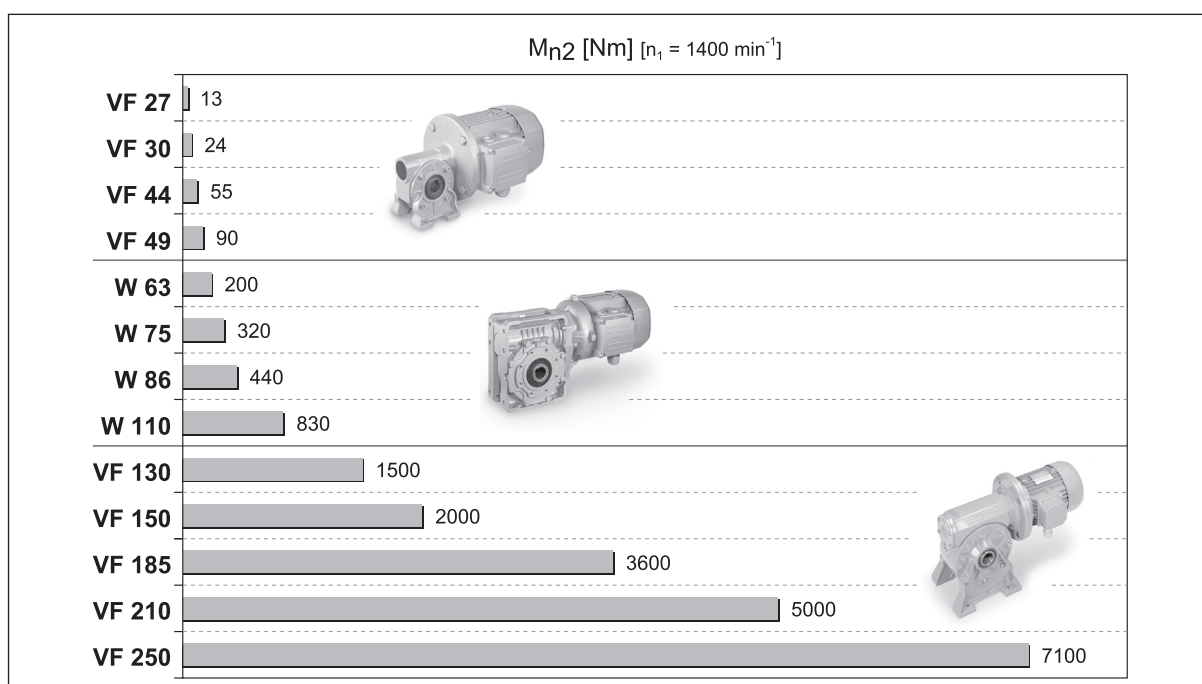
- Symmetrical hollow output shaft for facilitated mounting of the gear unit and plug-in shafts (after-sales kit only) on either side.
- Ground finished wormshafts and precise machining lend optimal efficiency and extremely low noise in operation.
- Numerous product configurations allow for foot, flange or shaft mounting. Torque arm is available as an option.
- Extensive customisation possible through the range of standard options available.

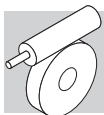
10.2 Key features of VF-style worm gears

- Die cast aluminium gear cases for VF27, VF30, VF44 and VF49. Sturdy cast iron for VF130 through VF250. The latter group is paint coated with thermo setting epoxy powder.

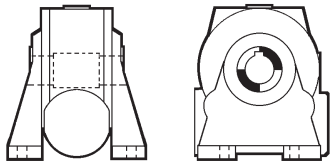
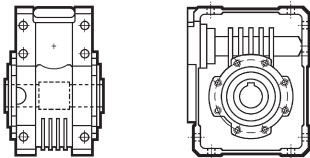
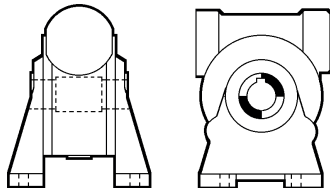
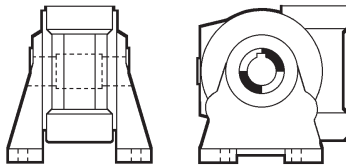
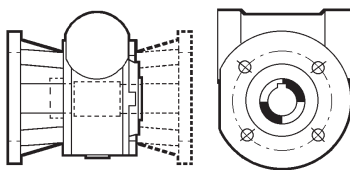
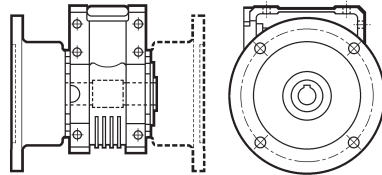
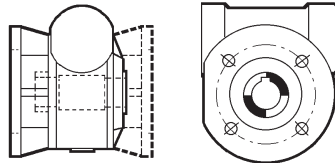
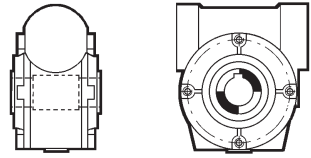
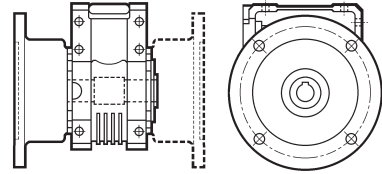
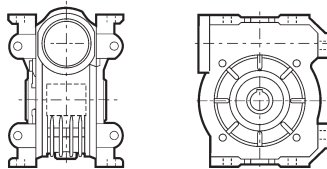
10.3 Key features of W-style worm gears

- Rigid monobloc gear case made from Aluminium.
- The cubic shape of the gear case and machining of all sides lend extreme flexibility for the installation of the gearbox and ancillary devices.
- The integral gearmotor configuration is lightweight, compact and price effective.
- Input shaft oil seal of W63, W75 and W86 units is located internally, and made from a Fluoro elastomer compound for improved durability and extended lifetime.

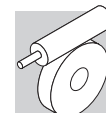




11 VERSIONS

VF_	W_
 <p>N VF 27 ... VF 250 Foot mounted, underdriven</p>	 <p>U W 63 ... W 110 Universal gear case</p>
 <p>A VF 27 ... VF 250 Foot mounted, overdriven</p>	
 <p>V VF 27 ... VF 250 Foot mounted, wormshaft vertical</p>	
 <p>F VF 27 ... VF 185 Standard flange</p> <p>F1 F2 FA1 FA2</p> <p>FA VF 44 ... VF 49 Extended output flange</p>	 <p>UF 1 UF 2</p> <p>UF W 63 ... W 110 Standard mounting flange</p>
 <p>FC VF 130 ... VF 185 Short flange</p> <p>FR VF 130 ... VF 185 Short flange and reinforced bearings</p> <p>FC 1 FC 2 FR 1 FR 2</p>	
 <p>P VF 30 ... VF 250 Side cover for shaft mounting</p> <p>P1 = P2 VF 30 ... VF 49 VF 210, VF 250</p> <p>P1 P2 (VF 30...VF 250) (VF 130...VF 185)</p>	 <p>UFC 1 UFC 2 UFCR 1 UFCR 2</p> <p>UFC W 63 ... W 110 Mounting flange reduced in length</p> <p>UFCR W 75 Mounting flange reduced in length and diameter</p>
 <p>U VF 30 ... VF 49 Foot mount</p>	

For combined gearboxes VF/VF, VF/W and W/VF, the versions refer to the second gearbox (machine side).

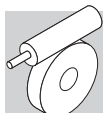


12 ARRANGEMENTS

For combined worm gear units, unless otherwise specified at the time of ordering, the arrangements highlighted in grey in the diagrams below will be configured at the factory.

	CW1	CCW1	CW2	CCW2	CW3	CCW3	CW4	CCW4
U								
UF_ UFC_ UFR1_								
N								
A								
V								
F1 FA1 FC1 FR1								
F2 FA2 FC2 FR2								
P1								
P2								

Shaft-mount cover

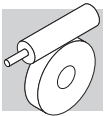


For units with the HS input (free shaft), all the mounting options shown are available.

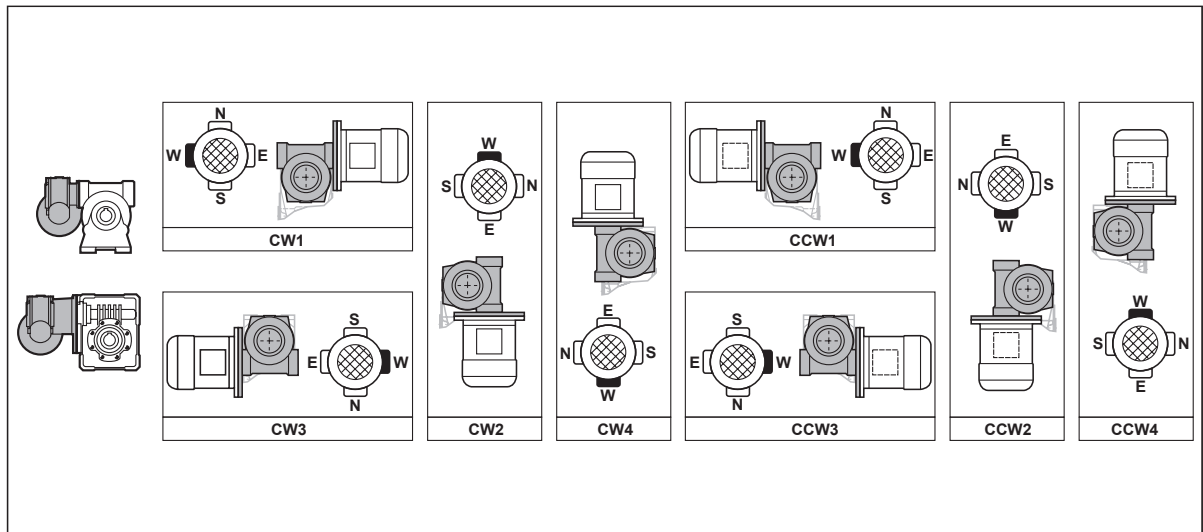
For units with the P (IEC), certain mounting options can be obtained only by using IEC flanges (B5 or B14) of the same size or smaller than those shown in following table.

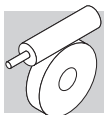
		CW1 CCW1	CW2 CCW2	CW3	CCW3	CW4 CCW4
VF/VF30/44	A, N, V, P1 F-FA,U	63B14	63B14	63B14	63B14	63B14
VF/VF30/49	A, N, V, P1, F-FA,U	63B14	63B14	63B14	63B14	63B14
VF/W30/63	U, UF-UFC	63B5-63B14	63B5-63B14	63B5-63B14	63B5-63B14	63B5-63B14
VF/W44/75	U, UF-UFC-UFCR	71B5-71B14	71B5-71B14	71B5-71B14	71B5-71B14	71B5-71B14
VF/W44/86	U, UF-UFC	71B5-71B14	71B5-71B14	71B5-71B14	71B5-71B14	71B5-71B14
VF/W49/110	U, UF-UFC	80B5-80B14	80B5-80B14	80B5-80B14	80B5-80B14	80B5-80B14
W/VF63/130	N	71B5-90B14	90B5-90B14	71B5-90B14	71B5-90B14	71B5-90B14
	A	90B5-90B14	71B5-90B14	90B5-90B14	90B5-90B14	90B5-90B14
	V		90B5-90B14			—
	F1	90B5-90B14	71B5-90B14	90B5-90B14	71B5-90B14	90B5-90B14
	FC1-FR1				90B5-90B14	
	P1					90B5-90B14
	F2	90B5-90B14	71B5-90B14	71B5-90B14	90B5-90B14	90B5-90B14
	FC2-FR2					
P2		90B5-90B14				
W/VF86/150	N	112B5-112B14	112B5-112B14	71B5-112B14	71B5-112B14	71B5-112B14
	A	112B5-112B14	90B5-112B14	112B5-112B14	112B5-112B14	112B5-112B14
	V	112B5-90B14	112B5-90B14			71B5-112B14
	F1	112B5-112B14	71B5-90B14	112B5-112B14	71B5-90B14	112B5-112B14
	FC1-FR1		90B5-112B14		112B5-112B14	
	P1					
	F2	112B5-112B14	71B5-90B14	71B5-90B14	112B5-112B14	112B5-112B14
	FC2-FR2		90B5-112B14			
P2		90B5-112B14	112B5-112B14			
W/VF86/185	N	112B5-112B14	112B5-112B14	90B5-112B14	90B5-112B14	90B5-112B14
	A	90B5-112B14		112B5-112B14	112B5-112B14	112B5-112B14
	V	112B5-90B14	90B5-112B14			90B5-112B14
	F1	112B5-112B14	90B5-112B14	112B5-112B14	90B5-112B14	112B5-112B14
	FC1-FR1				112B5-112B14	
	P1					
	F2	112B5-112B14	90B5-112B14	90B5-112B14	112B5-112B14	112B5-112B14
	FC2-FR2					
P2		112B5-112B14				
VF/VF130/210	N	#	132B5	#	#	#
	A	132B5	#	132B5	132B5	132B5
	V					
	P					
VF/VF130/250	N	#	132B5	#	#	#
	A	132B5	#	132B5	132B5	132B5
	V		132B5			
	P		#			

Consult our Technical Service



12.1 Terminal box position





13 DESIGNATION

GEAR UNIT


W 63 L1 UF1 — 24 S2 — B3

OPTIONS

MOUNTING ARRANGEMENT

VF/VF, VF/W, W/VF	CW (1, 2, 3, 4) CCW (1, 2, 3, 4)
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
















MOUNTING POSITION

VF 27...VF 49 VFR 44, VFR 49	B3
W, WR VF 130...VF 250 VFR 130...VFR 250	B3 (default), B6, B7, B8, V5, V6
VF/VF VF/W W/VF 	B3 (default), B6, B7, B8, V5, V6

MOTOR MOUNTING

B5	(VF 30...VF 250, VFR 49...VFR 250, W, WR)
B14	(VF 30...VF 49, W)

INPUT CONFIGURATION

	VF	VFR	W	WR	VF/VF	VF/W	W/VF
P(IEC)	 P27 (VF 27 only), P56...P225	 P63, P80...P160	 P71...P132	 P63...P112	 P56, P63, P90...P132	 P56...P80	 P71...P112
S₋		 S44 (VFR 44 only)	 S1...S3 S10...S30				 S1...S3 S10...S30
HS							

GEAR RATIO

SHAFT BORE

W 75 VF/W 44/75	D30 (default), D28 (on request)
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VERSION

TORQUE LIMITER

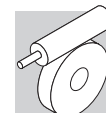
VF, VFR W, WR	L1, L2	VF/VF	LF
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GEAR FRAME SIZE

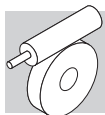
VF	27, 30, 44, 49, 130, 150, 185, 210, 250	VF/VF	30/44, 30/49, 130/210, 130/250
VFR	44, 49, 130, 150, 185, 210, 250	VF/W	30/63, 44/75, 44/86, 49/110
W, WR	63, 75, 86, 110	W/VF	63/130, 86/150, 86/185

GEAR TYP

VF, W	Worm gearbox
VFR, WR	Helical-worm gear unit
VF/VF, VF/W, W/VF	Combined gearbox



MOTOR										BRAKE			
BN 63A 4										230/400-50 IP54 CLF W FD 3.5 R SB 220 SA			
										OPTIONS			
										BRAKE SUPPLY			
										RECTIFIER TYPE AC/DC NB, SB, NBR, SBR			
										BRAKE HAND RELEASE R, RM			
										BRAKE TORQUE			
										BRAKE TYPE FD (d.c. brake) FA (a.c. brake)			
										TERMINAL BOX POSITION W (default), N, E, S			
										MOTOR MOUNTING — (compact motor) B5, B14 (IEC - motor)			
										INSULATION CLASS CL F standard CL H option			
										DEGREE OF PROTECTION IP55 standard (IP54 - brake motor)			
										VOLTAGE - FREQUENCY			
										POLE NUMBER 2, 4, 6, 2/4, 2/6, 2/8, 2/12, 4/6, 4/8			
										MOTOR SIZE 1SC ... 3LB (compact motor) 56A ... 180L (IEC motor) BN 27, BN 44 (special motors)			
										MOTOR TYPE MX - MXN = compact 3-phase, class IE3 BX - BXN = IEC 3-phase, class IE3 ME = compact 3-phase, class IE2 BE = IEC 3-phase, class IE2 M = compact 3-phase, class IE1 BN = IEC 3-phase, class IE1			



14 GEARBOX OPTIONS



LUBRICATION

Gearboxes VF 27, VF 30, VF 44, VF 49 and W 63, W 75, W 86 are usually factory filled with oil in the standard version. Gearboxes VF 130, VF 150, VF 185, VF 210, VF 250 and W 110 are usually supplied unlubricated in the standard version.

However, for all sizes of gearbox factory filled with oil, it is possible to request the supply with more types of oil, selectable according to what is defined in the table (LUB. 01).

The applicability of the LUBRICATION option is described in the table (LUB. 02).

(LUB. 01)

LUBRICATION	Type	Designation	Producer
LH	Polyglycole (PAG)	OMALA S4 WE 150	
LS	Polyglycole (PAG)	OMALA S4 WE 220	
LO* [1]	Polyglycole (PAG)	OMALA S4 WE 320	
LK* [2]	Polyglycole (PAG)	OMALA S4 WE 460	
LA	Food grade	KLUBERSYNTH UH1 6-150	
LB	Food grade	KLUBERSYNTH UH1 6-220	
LC [1]	Food grade	KLUBERSYNTH UH1 6-320	
LD [1]	Food grade	KLUBERSYNTH UH1 6-460	

* unless otherwise specified, the gearboxes VF 27, VF 30, VF 44 e VF 49 supplied with lubricant use OMALA S4 WE 320 oil.

[1] Suggested use for type gearboxes VF, VFR, VF_EP, W, WR, W_EP.

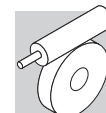
[2] Mandatory duty for gearboxes type VFL, WL.

(LUB. 02)

	LUBRICATION					
	Mounting position					
	B3	B6	B7	B8	V5	V6
W 110 U-UF-UFC	X	X	X	X	⊖	⊖
VF 130 A-N-P-F-FC	X	X	X	X	⊖	⊖
VF 130 V	⊖	X	X	⊖	X	X
VF 130 FR	X	⊖	⊖	X	⊖	⊖
VF 150 A-N-P-F-FC	X	X	X	X	⊖	⊖
VF 150 V	⊖	X	X	⊖	X	X
VF 150 FR	X	⊖	⊖	X	⊖	⊖
VF 185 A-N-P-F-FC	X	X	X	X	⊖	⊖
VF 185 V	⊖	X	X	⊖	X	X
VF 185 FR	X	⊖	⊖	X	⊖	⊖
VF 210 A-N-P	X	⊖	⊖	X	⊖	⊖
VF 210 V	⊖	⊖	⊖	⊖	X	X
VF 250 A-N-P	X	⊖	⊖	X	⊖	⊖
VF 250 V	⊖	⊖	⊖	⊖	X	X

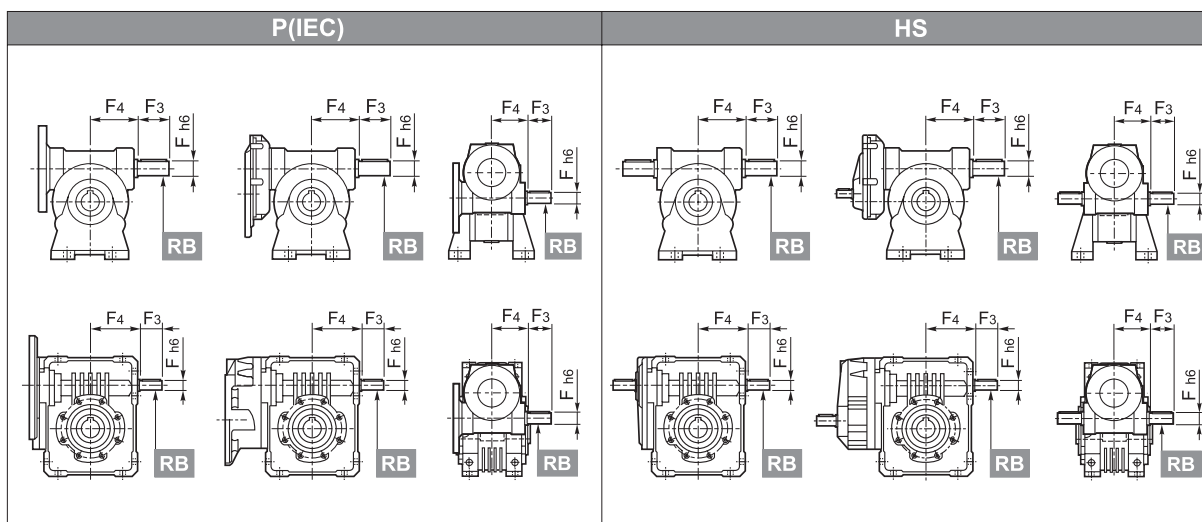
SO

Gear units VF 27 ... VF 49, W 63 ... W 86, usually factory filled with oil, are, in this case, supplied unlubricated.



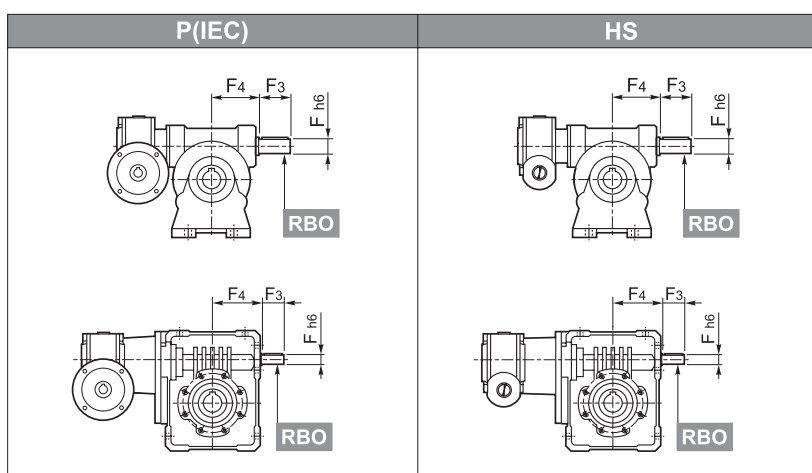
RB

Double-ended input shaft at non-drive- end (with the exception of VF 27).



RBO

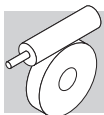
Double-ended input shaft at N.D.E. of 2nd gearbox (combined execution only)



Extended input shaft dimensions (options RB and RBO)

		F	F ₁	F ₂	F ₃	F ₄	V
 VF 44, VFR 44	VF	30	9	10.2	3	20	—
	VFR	44	11	12.5	4	30	—
	VF/VF	49	16	18	5	40	M6
		63	18	20.5	6	40	M6
	W	75	19	21.5	6	40	M6
	WR	86	25	28	8	50	M8
	VF/W	110	25	28	8	60	M8
		130	30	33	8	60	M8
	VF	150	35	38	10	65	M8
	VFR	185	40	43	12	70	M8
	W/VF	210	48	51.5	14	82	M16x40
		250	55	59	16	82	M16x40

A and **P** versions of VF 210 and VF 250 feature the fan cooling as a standard, however forced ventilation is not feasible should the **RB** option be specified.



VV

Fluoro elastomer oil seal on input shaft. The option is available for W110 and for units of the VF series, barring all VF 30's c/w option RB and VF 30_HS.

PV

Oil seals from Fluoro elastomer compound on both the input and the output shaft, barring all VF 30's c/w option RB and VF 30_HS.

KA

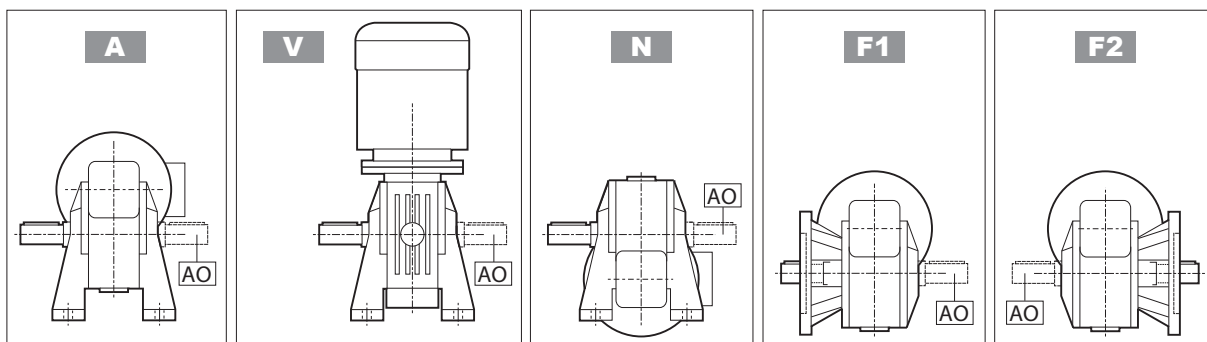
VF_A interchangeability kit. Option is available for units W 63 to W 110.

KV

VF_V interchangeability kit (barring W + option RB and W 110 in B6 mounting position). Option is available for units W 63 to W 110.

AO

Output shaft on side opposite to standard (VF 27).



BP

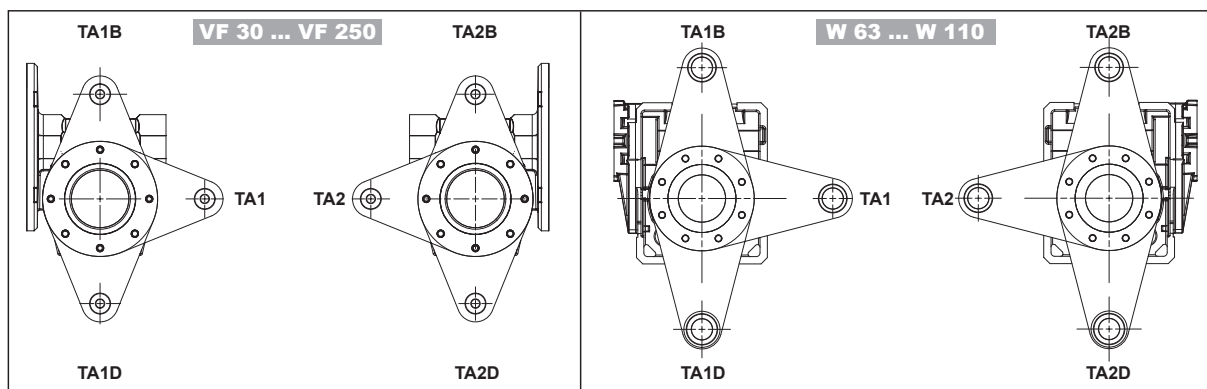
Gearboxes, usually supplied with open breather plug, are supplied with a valve breather plug. The calibration of the valve can vary from 0,10 to 0,15 bar depending on the plug type. The valve opens at intervals and allows venting of internal pressure keeping out foreign bodies. For option availability see chapter "Mounting positions and service plugs" of the Installation, Operation and Maintenance Manual (available at: www.bonfiglioli.com).

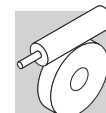
If needed contact Bonfiglioli Technical Service.

TORQUE ARM

Gearboxes VF 30...VF 250 and W 63...W 110 are supplied with the torque arm assembled

It is possible to request the torque arm mounted at several position as shown (TA1, TA2, TA1B, TA2B, TA1D, TA2D).





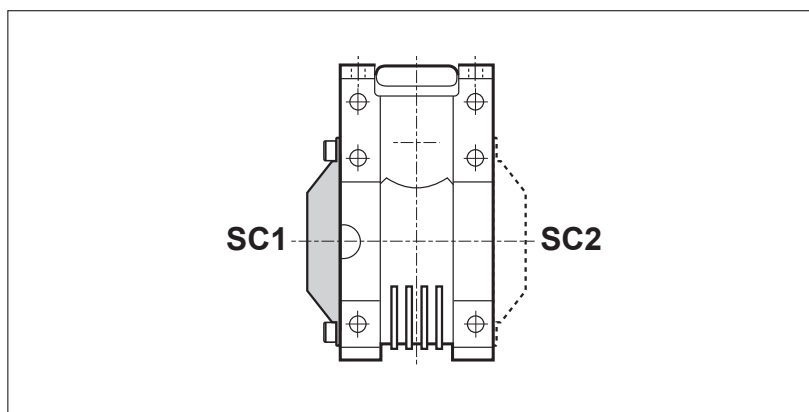
The applicability of the option TORQUE ARM is described in the following table.

		TORQUE ARM	
		TA1 - TA1B - TA1D	TA2 - TA2B - TA2D
VF VFR VF/VF W/VF	VF 30 ... VF 49 F1	⊖	X
	VF 30 ... VF 49 F2	X	⊖
	VF 44 - VF 49 FA1	⊖	X
	VF 44 - VF 49 FA2	X	⊖
	VF 30 ... VF 49 P1	X	X
	VF 210 - VF 250 P1	X	X
	VF 130 ... VF 185 P1	X	⊖
	VF 130 ... VF 185 P2	⊖	X
W WR VF/W	W 63 ... W 110 U	X	X
	W 63 ... W 110 UF1 - UFC1	⊖	X
	W 63 ... W 110 UF2 - UFC2	X	⊖
	W 75 UFCR1	⊖	X
	W 75 UFCR2	X	⊖

The option cannot be assembled on gearboxes VFL - WL on the side where the torque limiter is provided.
The option is not compatible with the PROTECTION CAP if provided on the same side.

PROTECTION CAP

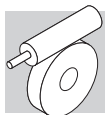
Gearboxes W-WR 63-75-86-110 are supplied with a protection cap for the output axis (in plastic material).
It is possible to request the torque arm mounted at several position as shown (SC1, SC2).



The applicability of the option PROTECTION CAP is described in the following table.

		PROTECTION CAP	
		SC1	SC2
W WR VF/W	W 63 ... W 110 U	X	X
	W 63 ... W 110 UF1 - UFC1	⊖	X
	W 63 ... W 110 UF2 - UFC2	X	⊖
	W 75 UFCR1	⊖	X
	W 75 UFCR2	X	⊖

The option cannot be assembled on gearboxes VFL - WL on the side where the torque limiter is provided.
The option is not compatible with the TORQUE ARM if provided on the same side.



SURFACE PROTECTION

When no specific protection class is requested, the painted (ferrous) surfaces of gearboxes are protected to at least corrosivity class C2 (UNI EN ISO 12944-2). For improved resistance to atmospheric corrosion, gearboxes can be delivered with **C3** and **C4** surface protection, obtained by painting the complete gearbox.

SURFACE PROTECTION	Typical environments	Maximum surface temperature	Corrosivity class according to UNI EN ISO 12944-2
C3	Urban and industrial environments with up to 100% relative humidity (medium air pollution)	120°C	C3
C4	Industrial areas, coastal areas, chemical plant, with up to 100% relative humidity (high air pollution)	120°C	C4

Gearboxes with optional protection to class **C3** or **C4** are available in a choice of colours. If no specific colour is requested (see the “PAINTING” option) gearboxes are finished in RAL 7042. Gearboxes can also be supplied with surface protection for corrosivity class **C5** according to UNI EN ISO 12944-2. Contact our Technical Service for further details.

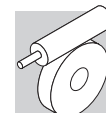
PAINTING

Gearboxes with optional protection to class C3 or C4 are available in the colours listed in the following table.

PAINTING	Colour	RAL number
RAL7042*	Traffic Grey A	7042
RAL5010	Gentian Blue	5010
RAL9005	Jet Black	9005
RAL9006	White Aluminium	9006
RAL9010	Pure White	9010
RAL7035	Light Grey	7035
RAL7001	Silver Grey	7001
RAL5015	Sky Blue	5015
RAL7037	Dusty Grey	7037
RAL5024	Pastel Blue	5024

* Gearboxes are supplied in this standard colour if no other colour is specified.

NOTE – “PAINTING” options can only be specified in conjunction with “SURFACE PROTECTION” options.



CERTIFICATES

AC - Certificate of compliance

The document certifies the compliance of the product with the purchase order and the construction in conformity with the applicable procedures of the Bonfiglioli Quality System.

CC - Inspection certificate

The document entails checking on order compliance, the visual inspection of external conditions and of mating dimensions. Checking on main functional parameters in unloaded conditions is also performed along with oil seal proofing, both in static and in running conditions. Units inspected are sampled within the shipping batch and marked individually.

Motor options

For more detailed information please consult the Electric Motor section in this book.

15 MOUNTING POSITION AND TERMINAL BOX ANGULAR LOCATION

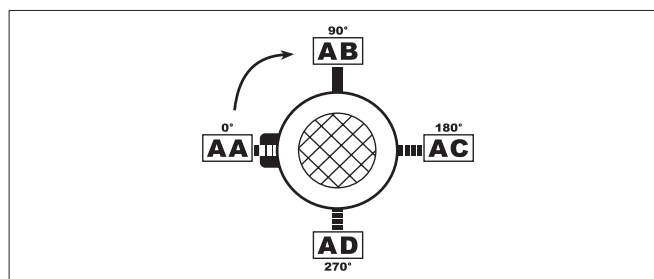
Location of motor terminal box can be specified by viewing the motor from the fan side; standard location is shown in black (W).

The terminal box positions indicated do not apply to VFR 44. Please refer to page 21 and pages 112-113 for designation and identification of design version.

Angular location of the brake release lever.

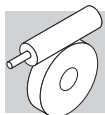
Unless otherwise specified, brake motors have the manual device side located, 90° apart from terminal box.

Different angles can be specified through the relevant options available.



The following pages describe the mounting positions of VF and W series gearboxes.

In the case of VF/VF, VF/W and W/VF gearbox combinations, mounting positions refer to the second (machine side) gearbox. Refer to the “Mounting version” chapter for details of the first (input side) gearbox.



VF 27 _ ... VF 49 _

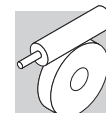
VFR 44 _ , VFR 49 _

				_HS	_S - _P (IEC)
A	B3	B7	V5		 Terminal box: N (top), S (bottom), W (left), E (right) → VF
	B6	B8	V6		 Terminal box: W (top), S (bottom), S (left), N (right) → VFR*
N	B3	B7	V5		 Terminal box: N (top), S (bottom), W (left), E (right) → VF
	B6	B8	V6		 Terminal box: W (top), S (bottom), S (left), N (right) → VFR*
V	B3	B7	V5	 VF	 VF
	B6	B8	V6	 VFR	 VFR*
P	B3	B7	V5		 Terminal box: E (top), N (left), S (right), W (bottom) → VF
	B6	B8	V6		 Terminal box: W (top), S (bottom), S (left), N (right) → VFR*
F	B3	B7	V5		 Terminal box: E (top), N (left), S (right), W (bottom) → VF
	B6	B8	V6		 Terminal box: W (top), S (bottom), S (left), N (right) → VFR*
U	B3	B7	V5		 Terminal box: N (top), W (left), S (right), E (bottom) → VF
	B6	B8	V6		 Terminal box: W (top), S (bottom), S (left), N (right) → VFR*

Base mounting position.

Gearboxes are plated only for base mounting position (B3). They can nevertheless also be installed in any of the derived positions (B6, B7, B8, V5, V6). Mounting position may not be changed after installation.

* The terminal box positions indicated do not apply to VFR 44. Please refer to page 21 and pages 126-127 for designation and identification of design version.



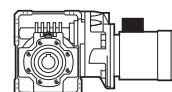
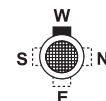
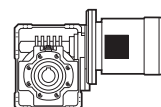
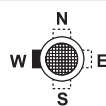
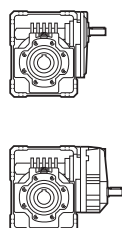
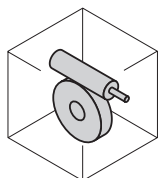
W 63 U ... W 110 U

WR 63 U ... WR 110 U

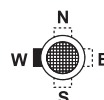
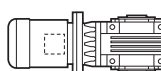
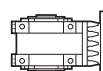
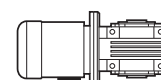
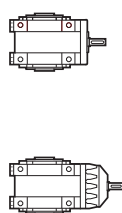
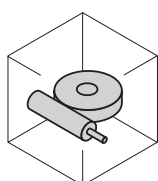
_HS

_S - _P (IEC)

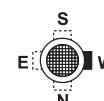
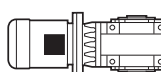
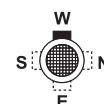
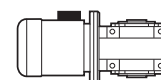
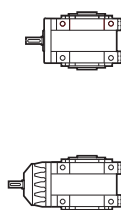
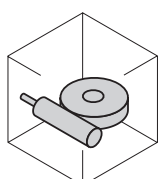
B3



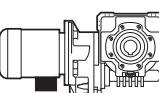
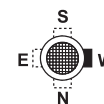
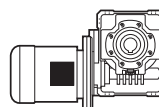
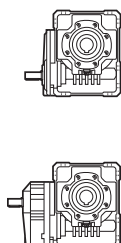
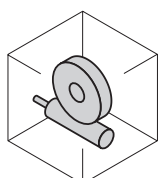
B6



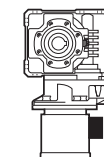
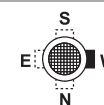
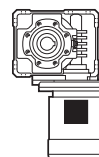
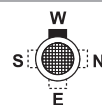
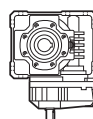
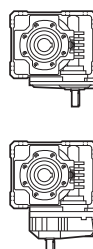
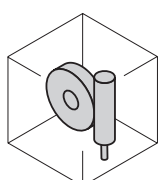
B7



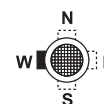
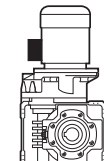
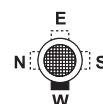
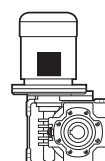
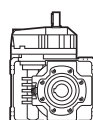
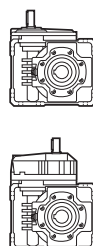
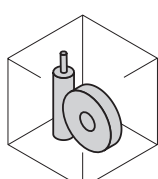
B8

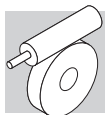


V5



V6



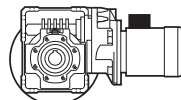
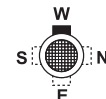
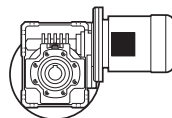
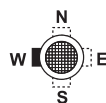
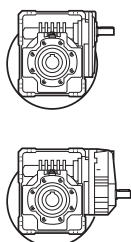
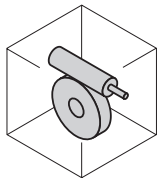


W 63 UF/UFC ... W 110 UF/UFC WR 63 UF/UFC ... WR 110 UF/UFC

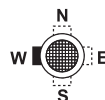
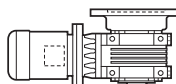
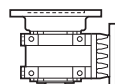
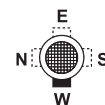
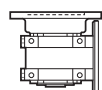
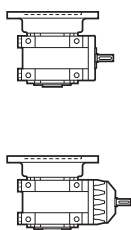
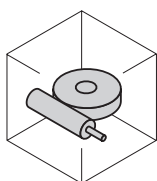
_HS

_S - _P (IEC)

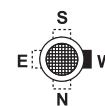
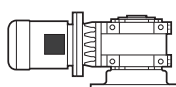
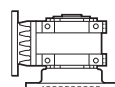
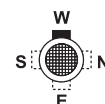
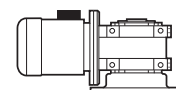
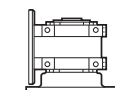
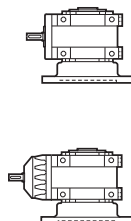
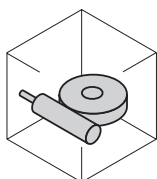
B3



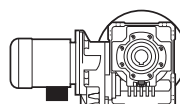
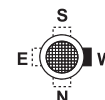
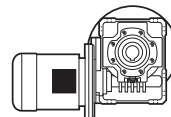
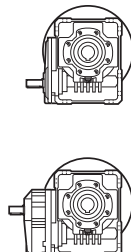
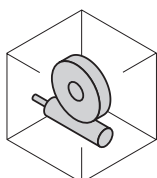
B6



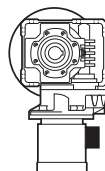
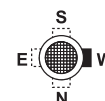
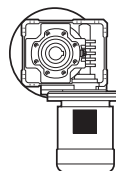
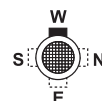
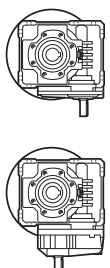
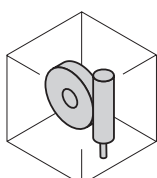
B7



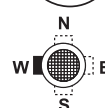
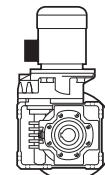
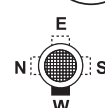
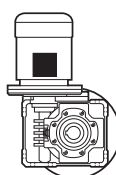
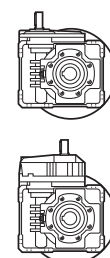
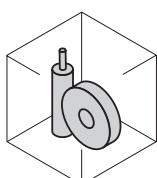
B8

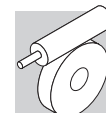


V5



V6





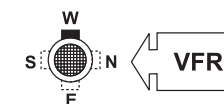
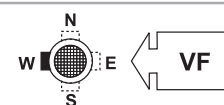
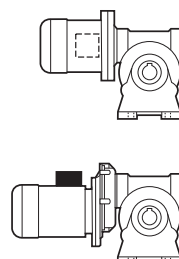
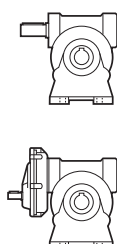
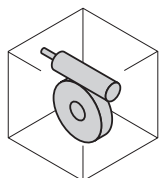
VF 130 A ... VF 250 A

VFR 130 A ... VFR 250 A

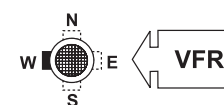
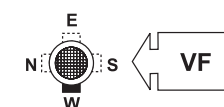
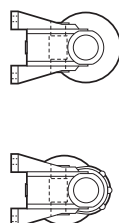
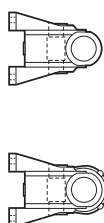
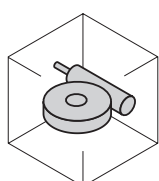
_HS

_P (IEC)

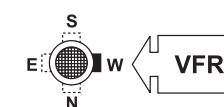
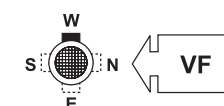
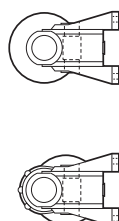
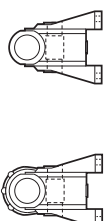
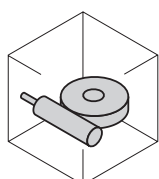
B3



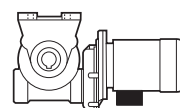
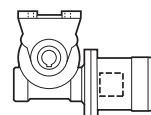
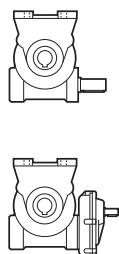
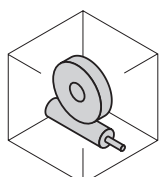
B6



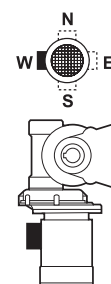
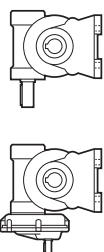
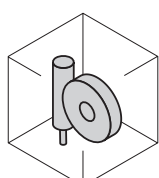
B7



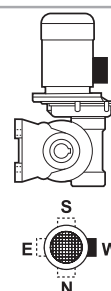
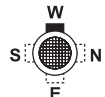
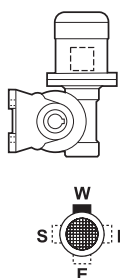
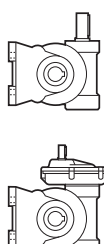
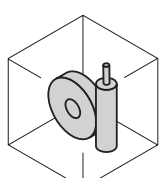
B8

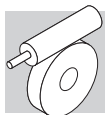


V5



V6





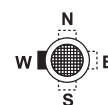
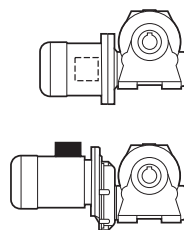
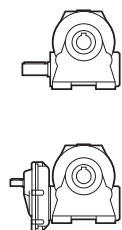
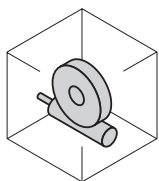
VF 130 N ... VF 250 N

VFR 130 N ... VFR 250 N

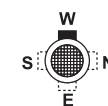
_HS

_P (IEC)

B3

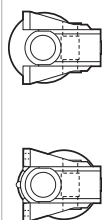
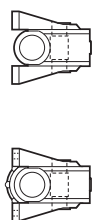
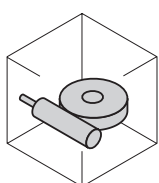


VF

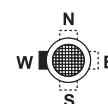


VFR

B6

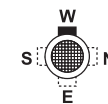
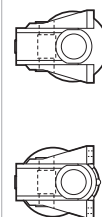
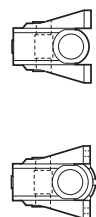
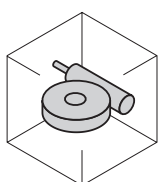


VF

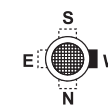


VFR

B7

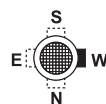
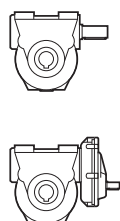
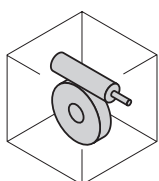


VF



VFR

B8

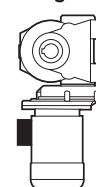
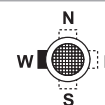
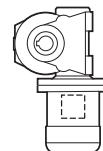
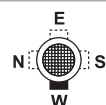
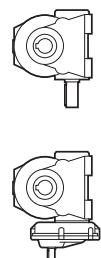
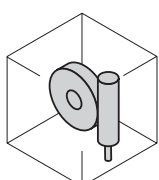


VF

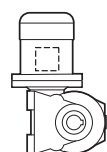
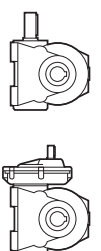
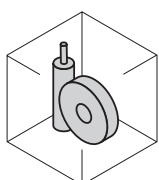


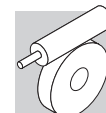
VFR

V5



V6





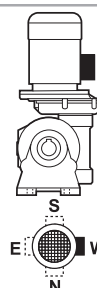
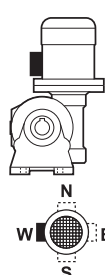
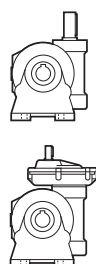
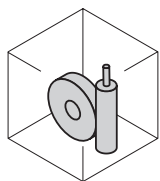
VF 130 V ... VF 250 V

VFR 130 V ... VFR 250 V

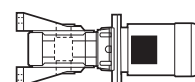
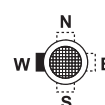
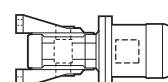
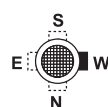
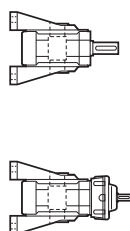
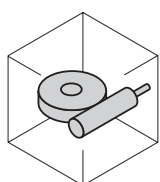
_HS

_P (IEC)

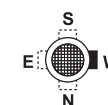
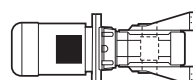
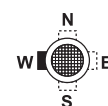
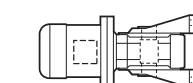
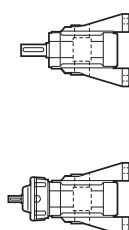
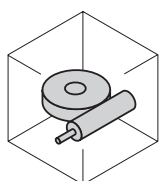
B3



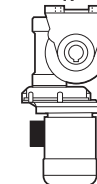
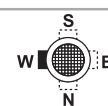
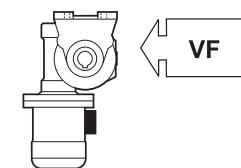
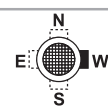
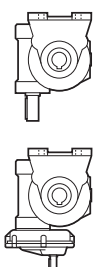
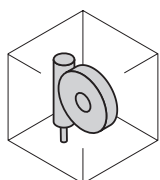
B6



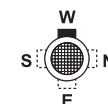
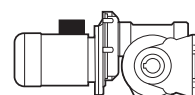
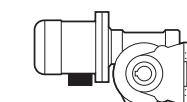
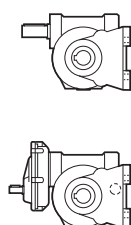
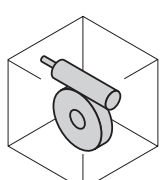
B7



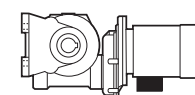
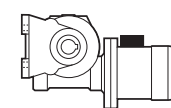
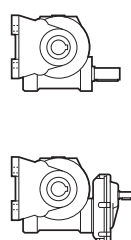
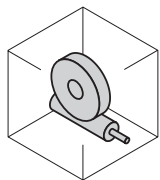
B8

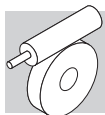


V5



V6





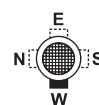
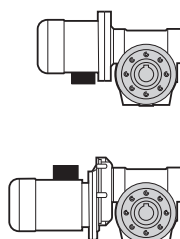
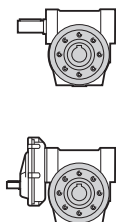
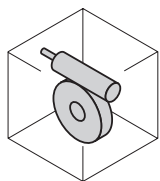
VF 130 P ... VF 250 P

VFR 130 P ... VFR 250 P

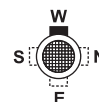
_HS

_P (IEC)

B3

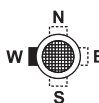
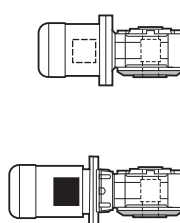
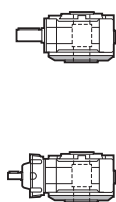
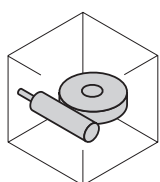


VF

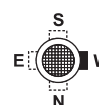


VFR

B6

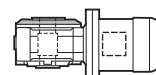
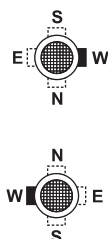
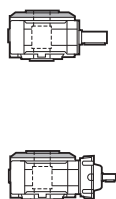
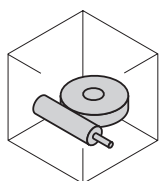


VF

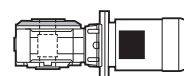


VFR

B7

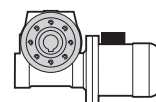
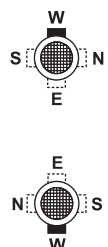
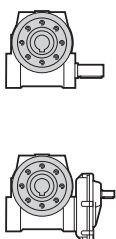
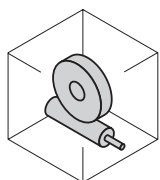


VF

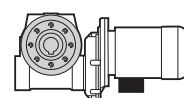


VFR

B8

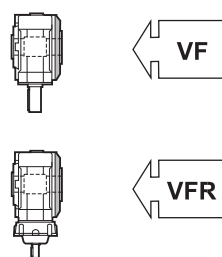
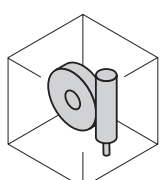


VF

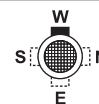
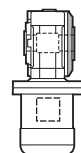


VFR

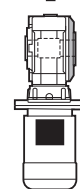
V5



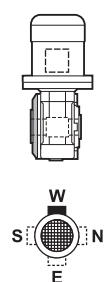
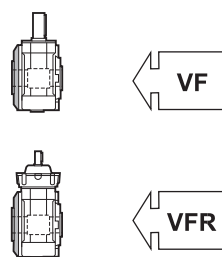
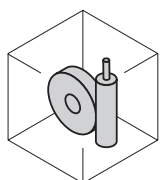
VF



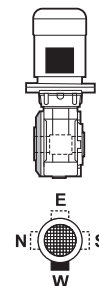
VFR



V6

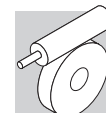


VF



VFR





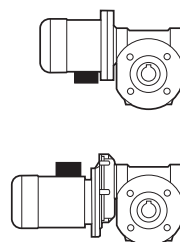
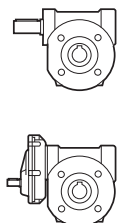
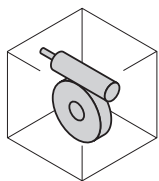
VF 130 F ... VF 250 F

VFR 130 F ... VFR 250 F

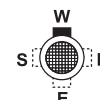
_HS

_P (IEC)

B3

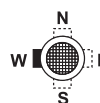
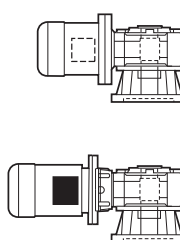
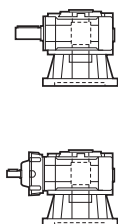
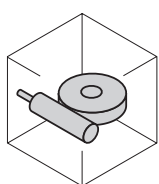


VF

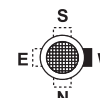


VFR

B6

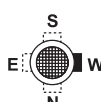
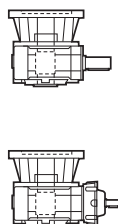
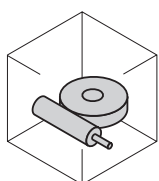


VF

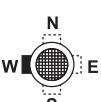


VFR

B7

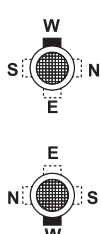
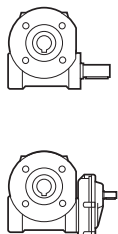
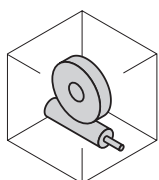


VF



VFR

B8

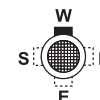
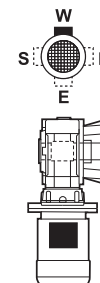
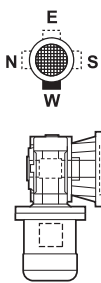
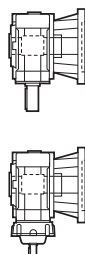
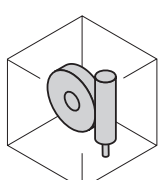


VF

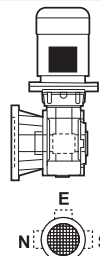
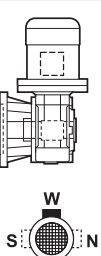
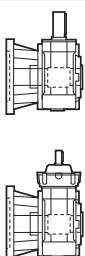
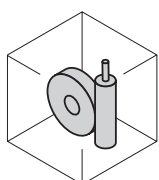


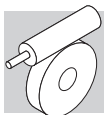
VFR

V5



V6





16 OVERHUNG LOADS

16.1 Calculating the resulting overhung load

External transmissions keyed onto input and/or output shaft generate loads that act radially onto same shaft.

Resulting shaft loading must be compatible with both the bearing and the shaft capacity.

Namely shaft loading (R_{c1} for input shaft, R_{c2} for output shaft), must be equal or lower than admissible overhung load capacity for shaft under study (R_{n1} for input shaft, R_{n2} for output shaft). OHL capability listed in the rating chart section.

In the formulas given below, index (1) applies to parameters relating to input shaft, whereas index (2) refers to output shaft.

The load generated by an external transmission can be calculated with close approximation by the following equation:

$$R_c = \frac{2000 \times M \times K_r}{d}$$

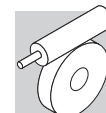
$K_r = 1$		M [Nm]	
$K_r = 1.25$		d [mm]	
$K_r = 1.5 - 2.0$			

16.2 Overhung loading verification

$$R_c \leq R_n$$

$$R_x = R_n \times \frac{a}{b + x}$$

$$R_c \leq R_x$$



16.3 Load location factor

	Output shaft		$R_{n2} \text{ max}$ [N]
	a	b	
VF 27	56	44	600
VF 30	60	45	1700
VF 44 - VFR 44 - VF/VF 30/44	71	51	2500
VF 49 - VFR 49 - VF/VF 30/49	99	69	3450
W 63 - WR 63 - VF/W 30/63	132	102	5000
W 75 - WR 75 - VF/W 44/75	139	109	6200
W 86 - WR 86 - VF/W 44/86	149	119	7000
W 110 - WR 110 - VF/W 49/110	173	136	8000
VF 130 - VFR 130 - W/VF 63/130	182	142	13800
VF 150 - VFR 150 - W/VF 86/150	198	155	16000
VF 185 - VFR 185 - W/VF 86/185	220	170	19500
VF 210 - VFR 210 - W/VF 130/210	268	203	34500
VF 250 - VFR 250 - W/VF 130/250	334	252	52000

17 THRUST LOADS

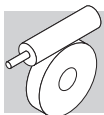
Permissible thrust loads on input $[A_{n1}]$ and output $[A_{n2}]$ shafts are obtained from the radial loading for the shaft under consideration $[R_{n1}]$ and $[R_{n2}]$ through the following equation:

$$\begin{aligned} A_{n1} &= R_{n1} \times 0,2 \\ A_{n2} &= R_{n2} \times 0,2 \end{aligned} \quad (14)$$

The thrust loads calculated through these formulas apply to thrust forces occurring at the same time as rated radial loads.

In the only case that no overhung load acts on the shaft the value of the admissible thrust load $[A_n]$ amounts to 50% of rated OHL $[R_n]$ on same shaft.

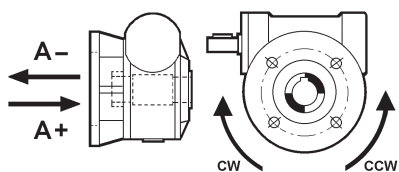
Where thrust loads exceed permissible value or largely prevail over radial loads, contact Bonfiglioli Riduttori for an in-depth analysis of the application.



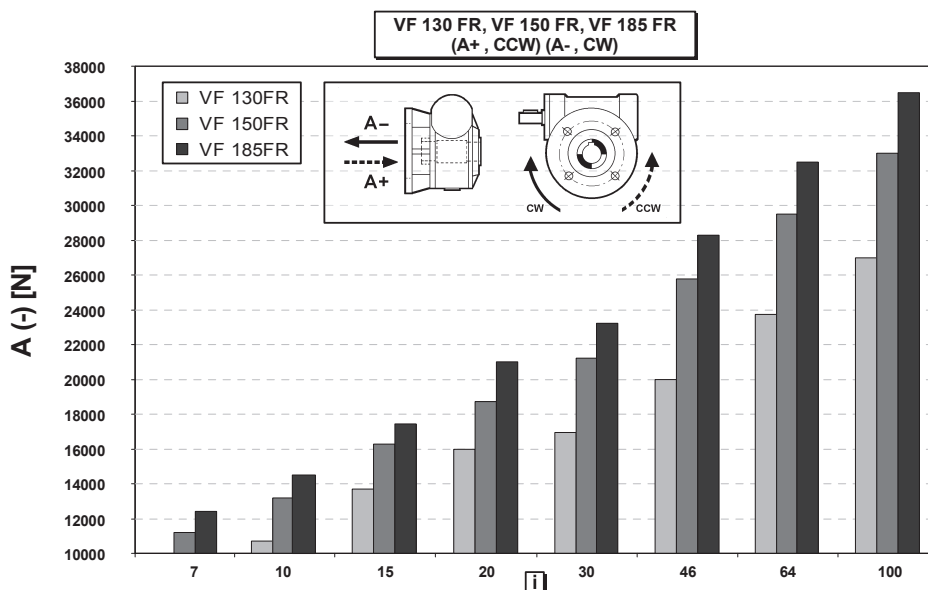
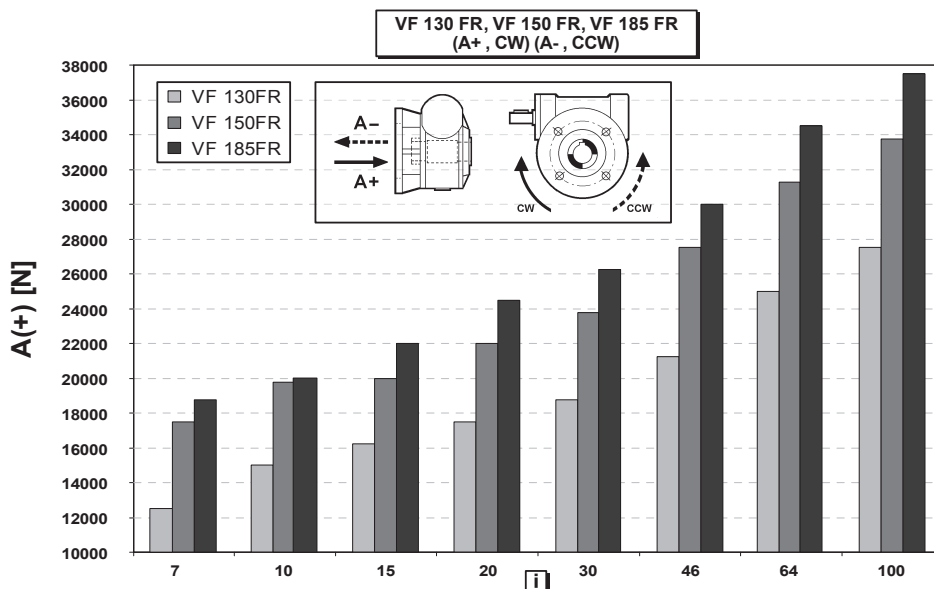
17.1 Maximum axial loading for FR version

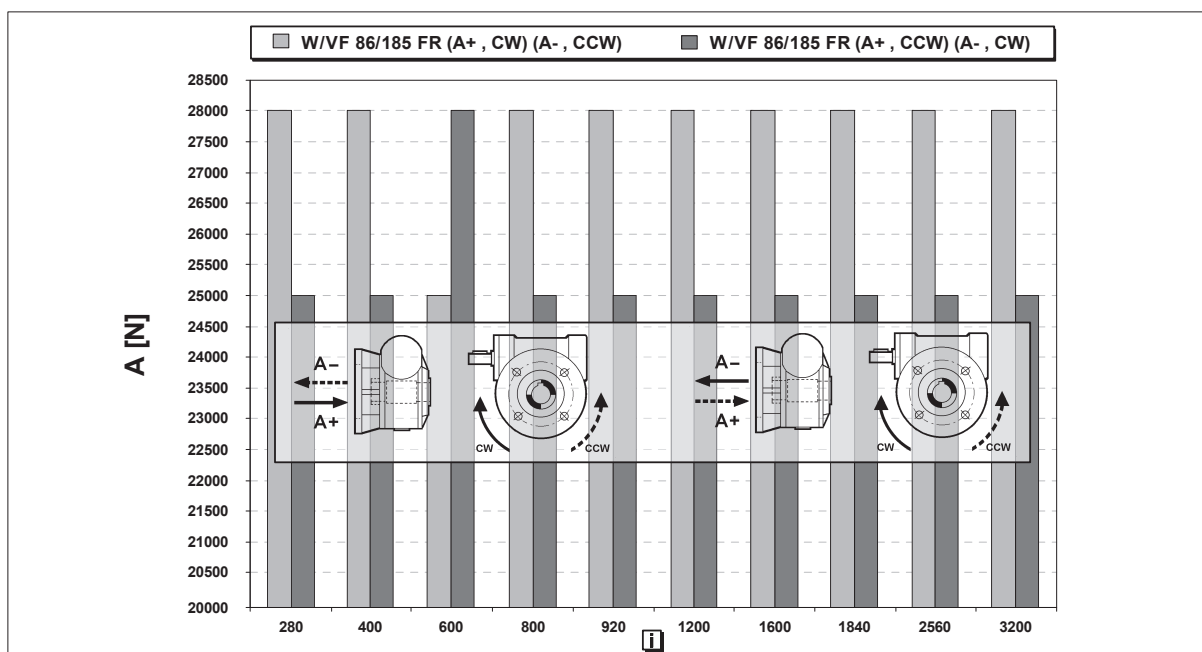
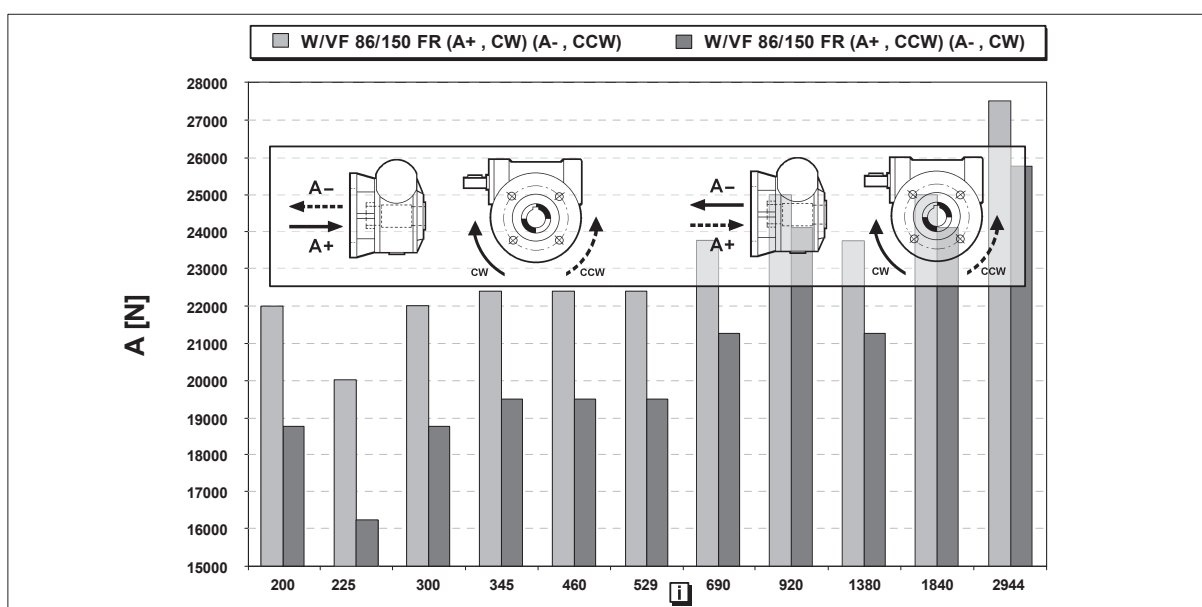
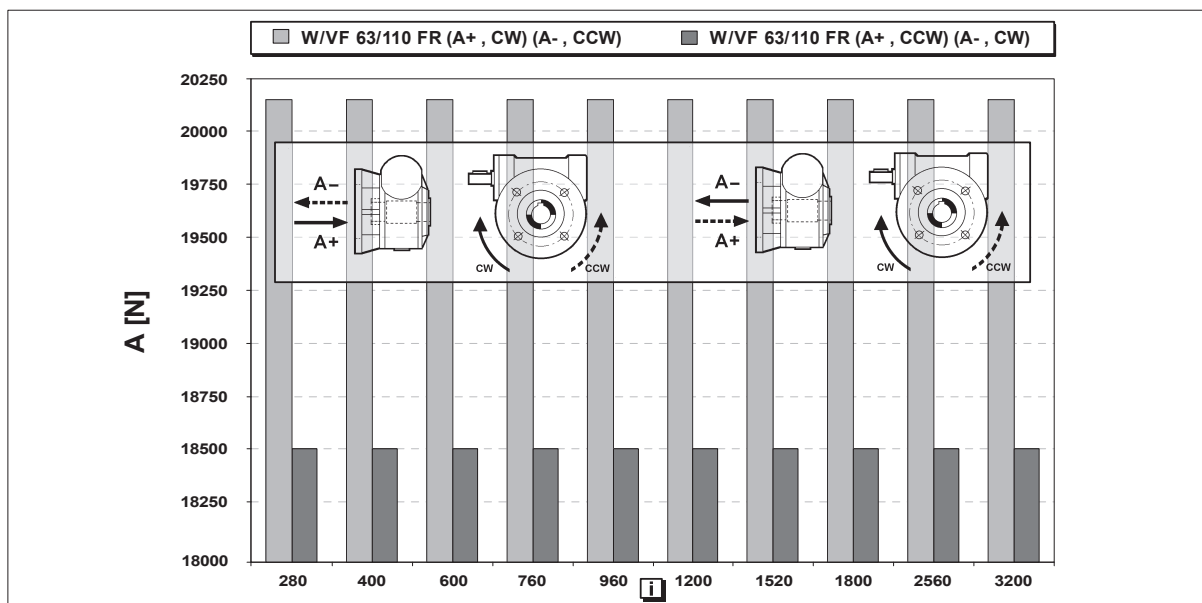
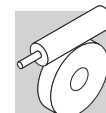
The FR version is designed to meet the requirements of applications entailing very high axial loads. It is available for units size 130, 150 and 185.

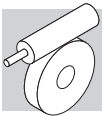
This version, within the same external dimensions as the FC version, is capable of bearing axial loads (well above those of the standard versions) indicated in the table below referred to the output shaft, gear ratio [i] and +/- direction of rotation.



A+ = Compressive load
A- = Pull load
CW = Clockwise rotation
CCW = Counterclockwise rotation







18 EFFICIENCY

Efficiency [η] depends on the following parameters:

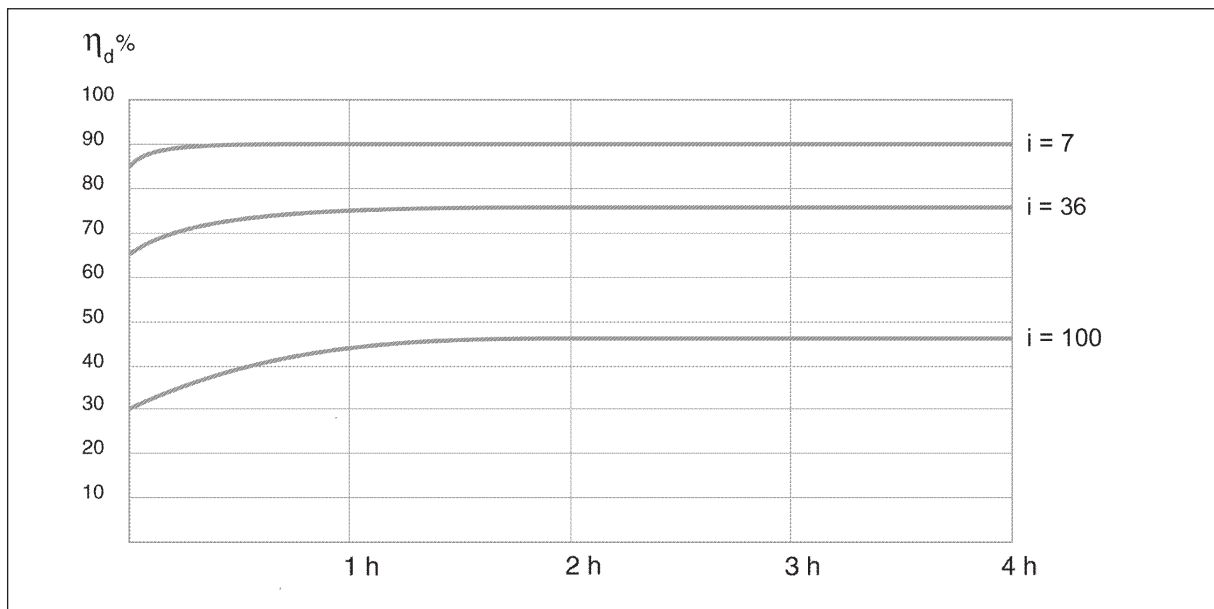
- helix angle of gearing
- driving speed
- running-in of gearing

In this connection, remember that the optimum value is reached after several hours of running-in and is reached later on in steady-state operating gearboxes as shown in the table below.

Therefore, in applications calling for intermittent duty (e.g. hoisting, drives, etc.), motor power must be adequately increased to compensate for the gearbox's low efficiency at start-up.

Torque values M_{n2} indicated in the catalogue are calculated by considering the steady-state performance of the gearboxes.

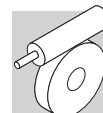
The diagram shows indicatively the time required to reach the maximum value of dynamic efficiency.



19 NON-REVERSING

Some applications may require occasionally the gearbox to be back-driven by the load through the output shaft, some others instead require the gearbox to lock and hold the load when electric power switches off.

The factor affecting reversibility of worm gears the most is the efficiency with more precisely static efficiency η_s affecting static reversibility and dynamic efficiency η_d affecting dynamic reversibility. Generally only gear ratios $i=64$ and higher offer locking properties with the grater ratios being totally non reversible.



19.1 Static non-reversing

In this condition the gear units cannot be driven back from the output shaft, however slow running-back may still occur if the worm gears are subject to vibrations.

The theoretical condition for the static non-reversing to occur is:

$$\eta_s < 0.4 - 0.5 \quad (15)$$

the η_s value for each worm gear can be found in the respective rating chart.

The opposite situation, i.e. static reversibility applies, theoretically when:

$$\eta_s > 0.5 \quad (16)$$

19.2 Dynamic non-reversing

The load-holding capability is dependent on drive speed, dynamic efficiency and, if any, vibrations.

The result of non-reversibility is the locking of the output shaft is no longer driven. Partial or total non reversibility should be taken into consideration particularly when high inertia loads are driven, because of the considerable overloads that may apply to the gearbox.

$$\eta_d < 0.5 \quad (17)$$

Where η_d is the value for the dynamic efficiency of the gear unit in the actual operating conditions.

Value can be found in the speed reducer rating chart.

The opposite condition, i.e. dynamic reversing is physically possible when:

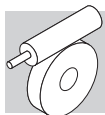
$$\eta_d > 0.5 \quad (18)$$

Table below is a guideline to the various degrees of reversibility for each drive size and gear ratio (data refer to the worm gearing only).

Values for reversibility are indicative as this may be affected by vibrations, operating temperature, lubricating conditions, gear wear, etc.



As it is virtually impossible to provide and guarantee total non reversing, we recommend the use of an external brake with sufficient capability to prevent vibrations induced starting, where these circumstances are required.



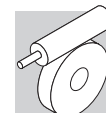
		Backdriving												
		VF				W				VF				
Static reversing	Dynamic reversing	27	30	44	49	63	75	86	110	130	150	185	210	250
yes	yes	—	—	7	7	7	7	7	7	7	7	7	7	7
yes	yes	7 10	7 10	10 14	10 14	10 12 15	10 15	10 15 20 23	10 15 20 23	10 15 20 23	10 15 20 23	10 15 20 23	10 15 20 23	10 15 20 23
uncertain	yes	15 20 30	15 20 30	20 28 35	18 24 28 36	19 24 30 38	20 25 30 40	30 40 46 56	30 40 46 56	30 40 46 56 64	30 40 46 56 64	30 40 50 60	30 40 50 60	30 40 50 60
no	low	40 60	40 60	46 60 70	45 60 70	45 64 80	50 60 80	64 80 100	64 80 100	80 100	80 100	80 100	60 80 100	80 100
no	no	70	70	100	80 100	100	100	—	—	—	—	—	—	—

20 ANGULAR BACKLASH

The following chart shows indicative values for the angular backlash at output shaft of W gear units (input blocked).

Measurement is taken with 5 Nm torque applying to output shaft.

Angular backlash (input shaft locked)		
	$\Delta\gamma$ [']	$\Delta\gamma$ [rad]
VF 30	33' ± 10'	0.00873 ± 0.00291
VF 44	25' ± 7'	0.00728 ± 0.00145
VFR 44	30' ± 10'	0.00873 ± 0.00291
VF 49	22' ± 7'	0.00728 ± 0.00145
VFR 49	30' ± 10'	0.00873 ± 0.00291
W 63	20' ± 4'	0.00582 ± 0.00145
WR 63	25' ± 5'	0.00728 ± 0.00145
W 75	18' ± 4'	0.00582 ± 0.00145
WR 75	22' ± 5'	0.00640 ± 0.00145
W 86	15' ± 4'	0.00436 ± 0.00145
WR 86	20' ± 5'	0.00582 ± 0.00145
W 110	9' ± 2'	0.00436 ± 0.00145
WR 110	18' ± 5'	0.00524 ± 0.00145
VF 130	12' ± 3'	0.00349 ± 0.00087
VFR 130	15' ± 3'	0.00436 ± 0.00087
VF 150	12' ± 3'	0.00349 ± 0.00087
VFR 150	15' ± 3'	0.00436 ± 0.00087
VF 185	10' ± 3'	0.00291 ± 0.00087
VFR 185	13' ± 3'	0.00378 ± 0.00087
VF 210	Consult factory	
VFR 210		
VF 250		
VFR 250		










21 GEARMOTOR RATING CHARTS










The selection of motors without brake takes into account the requirements of Regulation EC 640/2009 (see section **M** of this catalogue). When the motor rated power is below 0.75kW, BN/M motors can be provided.

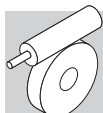
Considering that the Regulation EC 640/2009 shall not apply to the motors equipped with brake, the brakemotor selection takes into account BN/M motors only, without taking into account the rated power BX, BE, MX and ME brakemotors are available on request.

0.04 kW








n2 min ⁻¹	M2 Nm	S	i	Rn2 N	  IE1		  IEC 			
19.3	9	1.0	70	600			VF 27_70	P27	BN27A4	121
22.5	8	1.1	60	600			VF 27_60	P27	BN27A4	121
34	6	1.4	40	600			VF 27_40	P27	BN27A4	121
45	5	1.7	30	600			VF 27_30	P27	BN27A4	121
68	4	2.2	20	600			VF 27_20	P27	BN27A4	121
90	3	2.8	15	600			VF 27_15	P27	BN27A4	121
135	2	3.8	10	600			VF 27_10	P27	BN27A4	121
193	2	5.5	7	600			VF 27_7	P27	BN27A4	121

0.06 kW








n2 min-1	M2 Nm	S	i	Rn2 N	  IE1	 IE1	   IEC IE1	 IE1		
0.59	203	1.0	2280	5000			VF/W 30/63_2280	P56	BN56A4	139
0.89	155	1.4	1520	5000			VF/W 30/63_1520	P56	BN56A4	139
1.1	122	1.7	1200	5000			VF/W 30/63_1200	P56	BN56A4	139
1.5	115	1.8	900	5000			VF/W 30/63_900	P56	BN56A4	139
1.9	113	1.9	720	5000			VF/W 30/63_720	P56	BN56A4	139
2.5	85	1.1	540	3450			VF/VF 30/49_540	P56	BN56A4	134
2.8	50	1.0	500	5000			VFR 44_500	S44	BN44B4	126
3.2	73	1.3	420	3450			VF/VF 30/49_420	P56	BN56A4	134
4.0	54	1.0	350	5000			VFR 44_350	S44	BN44B4	126
4.3	53	1.8	315	3450			VF/VF 30/49_315	P56	BN56A4	134
4.5	59	1.0	300	2500			VFR 44_300	S44	BN44B4	126
5.8	50	1.2	230	2500			VFR 44_230	S44	BN44B4	126
7.7	42	1.5	175	2500			VFR 44_175	S44	BN44B4	126
9.6	36	1.4	140	2500			VFR 44_140	S44	BN44B4	126
13.4	29	1.8	100	2500			VFR 44_100	S44	BN44B4	126
19.1	22	1.8	70	2500			VFR 44_70	S44	BN44B4	126
19.3	14	1.1	70	1600			VF 30_70	P56	BN56A4	122
22.5	13	1.5	60	1600			VF 30_60	P56	BN56A4	122
34	10	0.9	40	600			VF 27_40	P27	BN27B4	121
34	10	1.9	40	1650			VF 30_40	P56	BN56A4	122
45	8	1.1	30	600			VF 27_30	P27	BN27B4	121
45	8	2.4	30	1340			VF 30_30	P56	BN56A4	122
68	6	1.5	20	600			VF 27_20	P27	BN27B4	121
68	6	2.9	20	1180			VF 30_20	P56	BN56A4	122

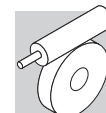


0.06 kW








n2 min-1	M2 Nm	S	i	Rn2 N	   IE1	  IEC  IE1			
90	5	1.9	15	600		VF 27_15	P27	BN27B4	121
90	5	3.7	15	1080		VF 30_15	P56	BN56A4	122
135	4	2.6	10	590		VF 27_10	P27	BN27B4	121
135	3	4.7	10	950		VF 30_10	P56	BN56A4	122
193	2	3.6	7	530		VF 27_7	P27	BN27B4	121
193	2	6.4	7	840		VF 30_7	P56	BN56A4	122

0.09 kW








n2 min-1	M2 Nm	S	i	Rn2 N	  	  IEC 			
0.31	574	1.8	2800	8000		VF/W 49/110_2800	P63	BN63A6	151
0.42	579	1.0	2116	7000		VF/W 44/86_2116	P63	BN63A6	147
0.43	505	2.1	2070	8000		VF/W 49/110_2070	P63	BN63A6	151
0.48	503	1.1	1840	7000		VF/W 44/86_1840	P63	BN63A6	147
0.53	485	2.2	1656	8000		VF/W 49/110_1656	P63	BN63A6	151
0.64	377	1.5	1380	7000		VF/W 44/86_1380	P63	BN63A6	147
0.65	369	2.8	1350	8000		VF/W 49/110_1350	P63	BN63A6	151
0.73	363	1.1	1200	5750		VF/W 44/75_1200	P63	BN63A6	143
0.81	316	3.3	1080	8000		VF/W 49/110_1080	P63	BN63A6	151
0.89	232	0.9	1520	5000		VF/W 30/63_1520	P56	BN56B4	139
0.96	323	1.2	920	5750		VF/W 44/75_920	P63	BN63A6	143
0.96	332	1.7	920	7000		VF/W 44/86_920	P63	BN63A6	147
0.98	255	0.9	900	5000		VF/W 30/63_900	P63	BN63A6	139
1.1	183	1.1	1200	5000		VF/W 30/63_1200	P56	BN56B4	139
1.2	225	1.0	720	5000		VF/W 30/63_720	P63	BN63A6	139
1.3	267	1.5	700	5750		VF/W 44/75_700	P63	BN63A6	143
1.3	253	2.2	700	7000		VF/W 44/86_700	P63	BN63A6	147
1.5	172	1.2	900	5000		VF/W 30/63_900	P56	BN56B4	139
1.7	210	1.9	525	5750		VF/W 44/75_525	P63	BN63A6	143
1.7	200	2.8	525	7000		VF/W 44/86_525	P63	BN63A6	147
1.9	170	1.2	720	5000		VF/W 30/63_720	P56	BN56B4	139
2.2	164	2.4	400	5750		VF/W 44/75_400	P63	BN63A6	143
2.2	160	3.4	400	7000		VF/W 44/86_400	P63	BN63A6	147
2.4	145	1.4	570	5000		VF/W 30/63_570	P56	BN56B4	139
2.9	111	1.2	300	5000		WR 63_300	P63	BN63A6	138
2.9	120	1.7	300	6200		WR 75_300	P63	BN63A6	142
2.9	132	2.4	300	7000		WR 86_300	P63	BN63A6	146
3.0	117	1.8	450	5000		VF/W 30/63_450	P56	BN56B4	139
3.2	110	0.9	420	3450		VF/VF 30/49_420	P56	BN56B4	134
3.7	101	1.4	240	5000		WR 63_240	P63	BN63A6	138
3.7	105	2.1	240	6200		WR 75_240	P63	BN63A6	142
3.7	117	2.6	240	7000		WR 86_240	P63	BN63A6	146
4.2	84	0.9	210	3450		VFR 49_210	P63	BN63A6	132
4.3	80	1.2	315	3450		VF/VF 30/49_315	P56	BN56B4	134
4.3	84	2.5	315	5000		VF/W 30/63_315	P56	BN56B4	139
4.6	88	1.7	192	5000		WR 63_192	P63	BN63A6	138
4.9	79	0.9	180	3450		VFR 49_180	P63	BN63A6	132
4.9	90	3.1	180	6200		WR 75_180	P63	BN63A6	142
5.2	94	4.2	168	7000		WR 86_168	P63	BN63A6	146
5.5	62	1.0	245	2500		VF/VF 30/44_245	P56	BN56B4	128
6.5	66	1.2	135	3450		VFR 49_135	P63	BN63A6	132
6.5	71	2.5	135	5000		WR 63_135	P63	BN63A6	138
7.7	63	1.0	175	2900		VFR 44_175	S44	BN44C4	126
7.7	65	3.1	114	5000		WR 63_114	P63	BN63A6	138
8.1	58	1.4	108	3450		VFR 49_108	P63	BN63A6	132
8.8	41	1.3	100	3300		VF 49_100	P63	BN63A6	130
9.6	54	0.9	140	2900		VFR 44_140	S44	BN44C4	126
9.8	55	3.8	90	5000		WR 63_90	P63	BN63A6	138
10.5	48	1.9	84	3450		VFR 49_84	P63	BN63A6	132
11.0	37	1.6	80	3300		VF 49_80	P63	BN63A6	130
12.2	45	1.8	72	3450		VFR 49_72	P63	BN63A6	132
12.2	48	4.0	72	5000		WR 63_72	P63	BN63A6	138
12.6	35	1.1	70	2300		VF 44_70	P63	BN63A6	124
12.6	34	1.8	70	3300		VF 49_70	P63	BN63A6	130
13.4	43	1.2	100	2900		VFR 44_100	S44	BN44C4	126
14.7	32	1.4	60	2300		VF 44_60	P63	BN63A6	124
14.7	34	1.7	60	3300		VF 49_60	P63	BN63A6	130
16.3	36	2.2	54	3450		VFR 49_54	P63	BN63A6	132
19.1	33	1.2	70	2900		VFR 44_70	S44	BN44C4	126
19.1	27	1.8	46	2300		VF 44_46	P63	BN63A6	124

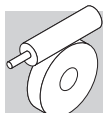


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






n2 min ⁻¹	M2 Nm	S	i	Rn2 N	   IE1	  IEC  IE1			
19.6	26	2.7	45	3300		VF 49_45	P63	BN63A6	130
21.0	30	2.8	42	3360		VFR 49_42	P63	BN63A6	132
22.0	22	0.9	40	1560		VF 30_40	P63	BN63A6	122
22.5	19	1.0	60	1600		VF 30_60	P56	BN56B4	122
24.4	22	3.4	36	3300		VF 49_36	P63	BN63A6	130
25.1	22	2.2	35	2300		VF 44_35	P63	BN63A6	124
29.3	18	1.2	30	1440		VF 30_30	P63	BN63A6	122
31	18	2.7	28	2300		VF 44_28	P63	BN63A6	124
34	15	1.2	40	1410		VF 30_40	P56	BN56B4	122
44	14	1.5	20	1230		VF 30_20	P63	BN63A6	122
44	14	3.1	20	2300		VF 44_20	P63	BN63A6	124
45	12	1.6	30	1290		VF 30_30	P56	BN56B4	122
59	11	1.8	15	1170		VF 30_15	P63	BN63A6	122
68	9	1.9	20	1140		VF 30_20	P56	BN56B4	122
69	9	1.0	20	600		VF 27_20	P27	BN27C4	121
88	8	2.3	10	1050		VF 30_10	P63	BN63A6	122
90	7	2.5	15	1050		VF 30_15	P56	BN56B4	122
92	7	1.3	15	600		VF 27_15	P27	BN27C4	121
126	6	3.2	7	920		VF 30_7	P63	BN63A6	122
135	5	3.1	10	920		VF 30_10	P56	BN56B4	122
138	5	1.7	10	565		VF 27_10	P27	BN27C4	121
193	4	4.3	7	820		VF 30_7	P56	BN56B4	122
197	4	2.5	7	510		VF 27_7	P27	BN27C4	121

0.12 kW








n2	M2	S	i	Rn2						IEC 		
min-1	Nm			N	IE1	IE2		IE1	IE2			
0.31	775	1.4	2800	8000				VF/W 49/110_2800	P63	BN63B6	151	
0.47	588	1.7	2800	8000				VF/W 49/110_2800	P63	BN63A4	BE63A4	151
0.53	654	1.6	1656	8000				VF/W 49/110_1656	P63	BN63B6		151
0.62	518	1.0	2116	7000				VF/W 44/86_2116	P63	BN63A4	BE63A4	147
0.63	507	2.0	2070	8000				VF/W 49/110_2070	P63	BN63A4	BE63A4	151
0.71	483	1.0	1840	7000				VF/W 44/86_1840	P63	BN63A4	BE63A4	147
0.79	435	2.3	1656	8000				VF/W 49/110_1656	P63	BN63A4	BE63A4	151
0.95	386	1.3	1380	7000				VF/W 44/86_1380	P63	BN63A4	BE63A4	147
0.97	354	2.8	1350	8000				VF/W 49/110_1350	P63	BN63A4	BE63A4	151
1.2	293	3.4	1080	8000				VF/W 49/110_1080	P63	BN63A4	BE63A4	151
1.4	322	1.1	920	5750				VF/W 44/75_920	P63	BN63A4	BE63A4	143
1.4	322	1.6	920	7000				VF/W 44/86_920	P63	BN63A4	BE63A4	147
1.5	236	0.9	900	5000				VF/W 30/63_900	P63	BN63A4	BE63A4	139
1.8	233	0.9	720	5000				VF/W 30/63_720	P63	BN63A4	BE63A4	139
1.9	257	1.4	700	5750				VF/W 44/75_700	P63	BN63A4	BE63A4	143
1.9	239	2.1	700	7000				VF/W 44/86_700	P63	BN63A4	BE63A4	147
2.3	199	1.1	570	5000				VF/W 30/63_570	P63	BN63A4	BE63A4	139
2.5	202	1.8	525	5750				VF/W 44/75_525	P63	BN63A4	BE63A4	143
2.5	193	2.6	525	7000				VF/W 44/86_525	P63	BN63A4	BE63A4	147
2.9	150	0.9	300	5000				WR 63_300	P63	BN63B6		138
2.9	162	1.2	300	6200				WR 75_300	P63	BN63B6		142
2.9	178	1.7	300	7000				WR 86_300	P63	BN63B6		146
2.9	161	1.3	450	5000				VF/W 30/63_450	P63	BN63A4	BE63A4	139
3.3	161	2.3	400	5750				VF/W 44/75_400	P63	BN63A4	BE63A4	143
3.3	143	3.5	400	7000				VF/W 44/86_400	P63	BN63A4	BE63A4	147
3.6	136	1.0	240	5000				WR 63_240	P63	BN63B6		138
3.6	142	1.5	240	6200				WR 75_240	P63	BN63B6		142
3.6	142	1.6	240	5000				VF/W 30/63_240	P63	BN63B6		139
3.6	158	2.0	240	7000				WR 86_240	P63	BN63B6		146
4.2	110	0.9	315	3450				VF/VF 30/49_315	P63	BN63A4	BE63A4	134
4.2	116	1.8	315	5000				VF/W 30/63_315	P63	BN63A4	BE63A4	139
4.4	108	1.2	300	5000				WR 63_300	P63	BN63A4	BE63A4	138
4.4	115	1.6	300	6200				WR 75_300	P63	BN63A4	BE63A4	142
4.4	129	2.1	300	7000				WR 86_300	P63	BN63A4	BE63A4	146
4.4	134	2.8	300	5750				VF/W 44/75_300	P63	BN63A4	BE63A4	143
4.8	121	2.3	180	6200				WR 75_180	P63	BN63B6		142
5.2	126	3.1	168	7000				WR 86_168	P63	BN63B6		146
5.2	125	3.0	250	5750				VF/W 44/75_250	P63	BN63A4	BE63A4	143
5.5	94	1.0	240	3450				VF/VF 30/49_240	P63	BN63A4	BE63A4	134
5.5	97	1.4	240	5000				WR 63_240	P63	BN63A4	BE63A4	138
5.5	103	2.1	240	6200				WR 75_240	P63	BN63A4	BE63A4	142
5.5	99	2.1	240	5000				VF/W 30/63_240	P63	BN63A4	BE63A4	139
5.5	111	2.7	240	7000				WR 86_240	P63	BN63A4	BE63A4	146
5.8	109	2.9	150	6200				WR 75_150	P63	BN63B6		142

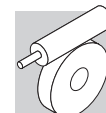


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




n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 		  IEC 	
6.4	89	0.9	135	3300			VFR 49_135 P63 BN63B6	132
6.4	96	1.9	135	5000			WR 63_135 P63 BN63B6	138
6.8	86	1.8	192	5000			WR 63_192 P63 BN63A4 BE63A4	138
7.3	76	0.9	180	3300			VFR 49_180 P63 BN63A4 BE63A4	132
7.3	87	2.7	180	6200			WR 75_180 P63 BN63A4 BE63A4	142
8.7	55	0.9	100	3300			VF 49_100 P63 BN63B6	130
9.7	64	1.4	135	3450			VFR 49_135 P63 BN63A4 BE63A4	132
9.7	68	2.5	135	5000			WR 63_135 P63 BN63A4 BE63A4	138
10.9	50	1.2	80	3300			VF 49_80 P63 BN63B6	130
11.5	61	3.0	114	5000			WR 63_114 P63 BN63A4 BE63A4	138
12.1	55	1.5	108	3450			VFR 49_108 P63 BN63A4 BE63A4	132
13.1	41	1.2	100	3150			VF 49_100 P63 BN63A4 BE63A4	130
14.5	43	1.1	60	2300			VF 44_60 P63 BN63B6	124
15.3	53	3.6	57	5000			WR 63_57 P63 BN63B6	138
15.6	46	1.9	84	3450			VFR 49_84 P63 BN63A4 BE63A4	132
16.4	36	1.5	80	3150			VF 49_80 P63 BN63A4 BE63A4	130
18.2	42	1.8	72	3430			VFR 49_72 P63 BN63A4 BE63A4	132
18.7	34	0.9	70	3300			VF 44_70 P63 BN63A4 BE63A4	124
18.7	33	1.7	70	3150			VF 49_70 P63 BN63A4 BE63A4	130
21.8	30	1.3	60	2300			VF 44_60 P63 BN63A4 BE63A4	124
21.8	30	1.9	60	3150			VF 49_60 P63 BN63A4 BE63A4	130
24.3	34	2.2	54	3140			VFR 49_54 P63 BN63A4 BE63A4	132
28.5	25	1.5	46	2300			VF 44_46 P63 BN63A4 BE63A4	124
29.0	24	0.9	30	1360			VF 30_30 P63 BN63B6	122
29.1	25	2.6	45	3040			VF 49_45 P63 BN63A4 BE63A4	130
31	27	2.9	42	2920			VFR 49_42 P63 BN63A4 BE63A4	132
33	21	0.9	40	1360			VF 30_40 P63 BN63A4 BE63A4	122
36	21	3.3	36	2830			VF 49_36 P63 BN63A4 BE63A4	130
37	21	1.9	35	2300			VF 44_35 P63 BN63A4 BE63A4	124
44	17	1.2	30	1250			VF 30_30 P63 BN63A4 BE63A4	122
47	17	2.2	28	2300			VF 44_28 P63 BN63A4 BE63A4	124
58	15	1.4	15	1130			VF 30_15 P63 BN63B6	122
62	14	2.7	14	2150			VF 44_14 P63 BN63B6	124
66	13	1.4	20	1110			VF 30_20 P63 BN63A4 BE63A4	122
66	13	2.9	20	2100			VF 44_20 P63 BN63A4 BE63A4	124
87	10	1.8	15	1020			VF 30_15 P63 BN63A4 BE63A4	122
94	10	2.9	14	1870			VF 44_14 P63 BN63A4 BE63A4	124
124	8	2.4	7	900			VF 30_7 P63 BN63B6	122
131	7	2.3	10	900			VF 30_10 P63 BN63A4 BE63A4	122
138	6	1.1	20	560			VF 27_20 P27 BN27C2	121
138	7	2.2	20	840			VF 30_20 P56 BN56B2	122
183	5	1.4	15	520			VF 27_15 P27 BN27C2	121
187	5	3.1	7	810			VF 30_7 P63 BN63A4 BE63A4	122
275	4	2.0	10	460			VF 27_10 P27 BN27C2	121
275	4	3.4	10	740			VF 30_10 P56 BN56B2	122
393	3	2.8	7	410			VF 27_7 P27 BN27C2	121
393	3	4.7	7	660			VF 30_7 P56 BN56B2	122

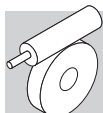
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 		  IEC 	
0.31	775	1.4	2800	8000			VF/W 49/110_2800 P63 BXN63MA4	151
0.47	588	1.7	2800	8000			VF/W 44/86_2116 P63 BXN63MA4	147
0.53	654	1.6	1656	8000			VF/W 49/110_2070 P63 BXN63MA4	151
0.62	518	1.0	2116	7000			VF/W 44/86_1840 P63 BXN63MA4	147
0.63	507	2.0	2070	8000			VF/W 49/110_1656 P63 BXN63MA4	151
0.71	483	1.0	1840	7000			VF/W 44/86_1380 P63 BXN63MA4	147
0.79	435	2.3	1656	8000			VF/W 49/110_1350 P63 BXN63MA4	151
0.95	386	1.3	1380	7000			VF/W 44/86_1080 P63 BXN63MA4	151
0.97	354	2.8	1350	8000			VF/W 49/110_920 P63 BXN63MA4	143
1.2	293	3.4	1080	8000			VF/W 44/75_920 P63 BXN63MA4	147
1.4	322	1.1	920	5750			VF/W 44/86_920 P63 BXN63MA4	139
1.4	322	1.6	920	7000			VF/W 30/63_900 P63 BXN63MA4	139
1.5	236	0.9	900	5000			VF/W 30/63_720 P63 BXN63MA4	143
1.8	233	0.9	720	5000			VF/W 44/75_700 P63 BXN63MA4	147
1.9	257	1.4	700	5750			VF/W 44/86_700 P63 BXN63MA4	139
1.9	239	2.1	700	7000			VF/W 30/63_570 P63 BXN63MA4	143
2.3	199	1.1	570	5000			VF/W 44/75_525 P63 BXN63MA4	147
2.5	202	1.8	525	5750			VF/W 44/86_525 P63 BXN63MA4	143
2.5	193	2.6	525	7000				
2.9	150	0.9	300	5000				









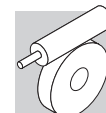
0.12 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	   IE3	 IEC 	
2.9	162	1.2	300	6200			
2.9	178	1.7	300	7000			146
2.9	161	1.3	450	5000		VF/W 30/63_450 P63 BXN63MA4	139
3.3	161	2.3	400	5750		VF/W 44/75_400 P63 BXN63MA4	143
3.3	143	3.5	400	7000		VF/W 44/86_400 P63 BXN63MA4	147
3.6	136	1.0	240	5000			
3.6	142	1.5	240	6200			
3.6	142	1.6	240	5000			
3.6	158	2.0	240	7000			
4.2	110	0.9	315	3450		VF/VF 30/49_315 P63 BXN63MA4	134
4.2	116	1.8	315	5000		VF/W 30/63_315 P63 BXN63MA4	139
4.4	108	1.2	300	5000		WR 63_300 P63 BXN63MA4	138
4.4	115	1.6	300	6200		WR 75_300 P63 BXN63MA4	142
4.4	129	2.1	300	7000		WR 86_300 P63 BXN63MA4	146
4.4	134	2.8	300	5750		VF/W 44/75_300 P63 BXN63MA4	143
4.8	121	2.3	180	6200			
5.2	126	3.1	168	7000			
5.2	125	3.0	250	5750		VF/W 44/75_250 P63 BXN63MA4	143
5.5	94	1.0	240	3450		VF/VF 30/49_240 P63 BXN63MA4	134
5.5	97	1.4	240	5000		WR 63_240 P63 BXN63MA4	138
5.5	103	2.1	240	6200		WR 75_240 P63 BXN63MA4	142
5.5	99	2.1	240	5000		VF/W 30/63_240 P63 BXN63MA4	139
5.5	111	2.7	240	7000		WR 86_240 P63 BXN63MA4	146
5.8	109	2.9	150	6200			
6.4	89	0.9	135	3300			
6.4	96	1.9	135	5000			
6.8	86	1.8	192	5000		WR 63_192 P63 BXN63MA4	138
7.3	76	0.9	180	3300		VFR 49_180 P63 BXN63MA4	132
7.3	87	2.7	180	6200		WR 75_180 P63 BXN63MA4	142
8.7	55	0.9	100	3300			
9.7	64	1.4	135	3450		VFR 49_135 P63 BXN63MA4	132
9.7	68	2.5	135	5000		WR 63_135 P63 BXN63MA4	138
10.9	50	1.2	80	3300			
11.5	61	3.0	114	5000		WR 63_114 P63 BXN63MA4	138
12.1	55	1.5	108	3450		VFR 49_108 P63 BXN63MA4	132
13.1	41	1.2	100	3150		VF 49_100 P63 BXN63MA4	130
14.5	43	1.1	60	2300			
15.3	53	3.6	57	5000			
15.6	46	1.9	84	3450		VFR 49_84 P63 BXN63MA4	132
16.4	36	1.5	80	3150		VF 49_80 P63 BXN63MA4	130
18.2	42	1.8	72	3430		VFR 49_72 P63 BXN63MA4	132
18.7	34	0.9	70	3300		VF 44_70 P63 BXN63MA4	124
18.7	33	1.7	70	3150		VF 49_70 P63 BXN63MA4	130
21.8	30	1.3	60	2300		VF 44_60 P63 BXN63MA4	124
21.8	30	1.9	60	3150		VF 49_60 P63 BXN63MA4	130
24.3	34	2.2	54	3140		VFR 49_54 P63 BXN63MA4	132
28.5	25	1.5	46	2300		VF 44_46 P63 BXN63MA4	124
29.0	24	0.9	30	1360			
29.1	25	2.6	45	3040		VF 49_45 P63 BXN63MA4	130
31	27	2.9	42	2920		VFR 49_42 P63 BXN63MA4	132
33	21	0.9	40	1360		VF 30_40 P63 BXN63MA4	122
36	21	3.3	36	2830		VF 49_36 P63 BXN63MA4	130
37	21	1.9	35	2300		VF 44_35 P63 BXN63MA4	124
44	17	1.2	30	1250		VF 30_30 P63 BXN63MA4	122
47	17	2.2	28	2300		VF 44_28 P63 BXN63MA4	124
58	15	1.4	15	1130			
62	14	2.7	14	2150			
66	13	1.4	20	1110		VF 30_20 P63 BXN63MA4	122
66	13	2.9	20	2100		VF 44_20 P63 BXN63MA4	124
87	10	1.8	15	1020		VF 30_15 P63 BXN63MA4	122
94	10	2.9	14	1870		VF 44_14 P63 BXN63MA4	124
124	8	2.4	7	900			
131	7	2.3	10	900		VF 30_10 P63 BXN63MA4	122
138	6	1.1	20	560			
138	7	2.2	20	840			
183	5	1.4	15	520			
187	5	3.1	7	810		VF 30_7 P63 BXN63MA4	122
275	4	2.0	10	460			
275	4	3.4	10	740			
393	3	2.8	7	410			
393	3	4.7	7	660			










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






n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE1	 IE2		 IE1	 IE2	
0.28	978	1.9	3200	13800			W/VF 63/130_3200	P71	BN71A6	158
0.28	1345	3.3	3200	19500			W/VF 86/185_3200	P71	BN71A6	174
0.31	1406	1.9	2944	16000			W/VF 86/150_2944	P71	BN71A6	166
0.35	1027	1.8	2560	13800			W/VF 63/130_2560	P71	BN71A6	158
0.35	1320	3.3	2560	19500			W/VF 86/185_2560	P71	BN71A6	174
0.47	875	1.1	2800	8000			VF/W 49/110_2800	P63	BN63B4	151
0.49	1265	2.1	1840	16000			W/VF 86/150_1840	P71	BN71A6	166
0.50	894	2.1	1800	13800			W/VF 63/130_1800	P71	BN71A6	158
0.54	949	1.1	1656	8000			VF/W 49/110_1656	P71	BN71A6	151
0.59	871	2.1	1520	13800			W/VF 63/130_1520	P71	BN71A6	158
0.64	755	1.3	2070	8000			VF/W 49/110_2070	P63	BN63B4	151
0.65	1054	2.6	1380	16000			W/VF 86/150_1380	P71	BN71A6	166
0.75	733	2.5	1200	13800			W/VF 63/130_1200	P71	BN71A6	158
0.80	647	1.5	1656	8000			VF/W 49/110_1656	P63	BN63B4	151
0.94	642	2.9	960	13800			W/VF 63/130_960	P71	BN71A6	158
0.98	527	1.9	1350	8000			VF/W 49/110_1350	P63	BN63B4	151
0.98	756	3.6	920	16000			W/VF 86/150_920	P71	BN71A6	166
1.2	537	3.4	760	13800			W/VF 63/130_760	P71	BN71A6	158
1.2	436	2.3	1080	8000			VF/W 49/110_1080	P63	BN63B4	151
1.4	479	1.0	920	7000			VF/W 44/86_920	P63	BN63B4	147
1.7	391	1.4	525	7000			VF/W 44/86_525	P71	BN71A6	147
1.8	375	2.7	720	8000			VF/W 49/110_720	P63	BN63B4	151
1.9	356	1.4	700	7000			VF/W 44/86_700	P63	BN63B4	147
2.3	321	1.2	400	5750			VF/W 44/75_400	P71	BN71A6	143
2.3	313	1.8	400	7000			VF/W 44/86_400	P71	BN71A6	147
2.3	344	3.1	400	8000			VF/W 49/110_400	P71	BN71A6	151
2.4	288	3.5	540	8000			VF/W 49/110_540	P63	BN63B4	151
2.5	301	1.2	525	5750			VF/W 44/75_525	P63	BN63B4	143
2.5	287	1.7	525	7000			VF/W 44/86_525	P63	BN63B4	147
3.0	258	1.2	300	7000			WR 86_300	P71	BN71A6	146
3.0	264	1.5	300	5750			VF/W 44/75_300	P71	BN71A6	143
3.0	275	2.1	300	8000			WR 110_300	P71	BN71A6	150
3.0	241	2.3	300	7000			VF/W 44/86_300	P71	BN71A6	147
3.0	269	3.9	300	8000			VF/W 49/110_300	P71	BN71A6	151
3.3	240	1.5	400	5750			VF/W 44/75_400	P63	BN63B4	143
3.3	214	2.3	400	7000			VF/W 44/86_400	P63	BN63B4	147
3.8	206	1.1	240	6200			WR 75_240	P71	BN71A6	142
3.8	229	1.4	240	7000			WR 86_240	P71	BN71A6	146
3.8	243	2.4	240	8000			WR 110_240	P71	BN71A6	150
3.9	233	2.4	230	7000			VF/W 44/86_230	P71	BN71A6	147
4.2	172	1.2	315	5000			VF/W 30/63_315	P63	BN63B4	139
4.4	172	1.0	300	6200			WR 75_300	P63	BN63B4	142
4.4	191	1.4	300	7000			WR 86_300	P63	BN63B4	146
4.4	199	1.9	300	5750			VF/W 44/75_300	P63	BN63B4	143
4.4	176	2.8	300	7000			VF/W 44/86_300	P63	BN63B4	147
4.7	202	1.9	192	7000			WR 86_192	P71	BN71A6	146
5.0	175	1.6	180	6200			WR 75_180	P71	BN71A6	142
5.3	186	2.0	250	5750			VF/W 44/75_250	P63	BN63B4	143
5.4	183	2.1	168	7000			WR 86_168	P71	BN71A6	146
5.5	144	0.9	240	5000			WR 63_240	P63	BN63B4	138
5.5	153	1.4	240	6200			WR 75_240	P63	BN63B4	142
5.5	147	1.4	240	5000			VF/W 30/63_240	P63	BN63B4	139
5.5	166	1.8	240	7000			WR 86_240	P63	BN63B4	146
5.7	162	3.1	230	7000			VF/W 44/86_230	P63	BN63B4	147
6.0	158	2.0	150	6200			WR 75_150	P71	BN71A6	142
6.5	161	2.7	138	7000			WR 86_138	P71	BN71A6	146
6.9	128	1.2	192	5000			WR 63_192	P63	BN63B4	138
6.9	145	2.3	192	7000			WR 86_192	P63	BN63B4	146
7.3	129	1.8	180	6200			WR 75_180	P63	BN63B4	142
7.5	138	2.4	120	6200			WR 75_120	P71	BN71A6	142
7.9	131	2.7	168	7000			WR 86_168	P63	BN63B4	146
7.9	126	1.6	114	5000			WR 63_114	P71	BN71A6	138
8.8	113	2.3	150	6200			WR 75_150	P63	BN63B4	142
9.0	88	1.4	100	5000	W 63_100 S1 M1SC6	136	W 63_100	P71	BN71A6	138
9.0	96	1.7	100	6200	W 75_100 S1 M1SC6	140	W 75_100	P71	BN71A6	141
9.0	105	2.4	100	7000	W 86_100 S1 M1SC6	144	W 86_100	P71	BN71A6	145
9.8	102	1.7	135	5000			WR 63_135	P63	BN63B4	138
10.0	107	1.9	90	5000			WR 63_90	P71	BN71A6	138
11.0	98	3.1	120	6200			WR 75_120	P63	BN63B4	142
11.3	79	1.6	80	5000	W 63_80 S1 M1SC6	136	W 63_80	P71	BN71A6	138
11.3	83	2.4	80	6200	W 75_80 S1 M1SC6	140	W 75_80	P71	BN71A6	141
11.3	90	3.1	80	7000	W 86_80 S1 M1SC6	144	W 86_80	P71	BN71A6	145
11.6	91	2.0	114	5000			WR 63_114	P63	BN63B4	138
12.0	100	3.3	75	6200			WR 75_75	P71	BN71A6	142
12.2	82	1.0	108	3450			VFR 49_108	P63	BN63B4	132
14.7	75	2.5	90	5000			WR 63_90	P63	BN63B4	138

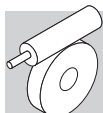


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






n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	 		  IEC 	
					IE1	IE2	IE1	IE2
15.0	61	1.1	60	3000			VF 49_60 P71 BN71A6	130
15.0	60	1.1	180	3300			VFR 49_180 P63 BN63A2	132
15.7	68	1.3	84	3420			VFR 49_84 P63 BN63B4 BE63B4	132
16.5	54	1.0	80	3150			VF 49_80 P63 BN63B4 BE63B4	130
18.3	63	1.2	72	3270			VFR 49_72 P63 BN63B4 BE63B4	132
18.3	66	2.8	72	5000			WR 63_72 P63 BN63B4 BE63B4	138
18.9	49	1.1	70	3150			VF 49_70 P63 BN63B4 BE63B4	130
20.0	50	1.4	135	3280			VFR 49_135 P63 BN63A2	132
20.0	54	2.9	45	5000			W 63_45 P71 BN71A6	138
22.0	45	0.9	60	2300			VF 44_60 P63 BN63B4 BE63B4	124
22.0	45	1.3	60	3150			VF 49_60 P63 BN63B4 BE63B4	130
23.2	54	3.3	57	4910			WR 63_57 P63 BN63B4 BE63B4	138
24.4	50	1.5	54	3010			VFR 49_54 P63 BN63B4 BE63B4	132
28.7	38	1.0	46	2500			VF 44_46 P63 BN63B4 BE63B4	124
29.3	37	1.8	45	2300			VF 49_45 P63 BN63B4 BE63B4	130
31	40	1.9	42	2810			VFR 49_42 P63 BN63B4 BE63B4	132
32	36	1.4	28	2290			VF 44_28 P71 BN71A6	124
37	31	2.2	36	2760			VF 49_36 P63 BN63B4 BE63B4	130
38	31	1.3	35	2430			VF 44_35 P63 BN63B4 BE63B4	124
47	26	1.5	28	2270			VF 44_28 P63 BN63B4 BE63B4	124
47	26	2.9	28	2560			VF 49_28 P63 BN63B4 BE63B4	130
55	23	2.7	24	2430			VF 49_24 P63 BN63B4 BE63B4	130
66	19	0.9	20	1040			VF 30_20 P63 BN63B4 BE63B4	122
66	20	1.9	20	2040			VF 44_20 P63 BN63B4 BE63B4	124
73	18	3.2	18	2230			VF 49_18 P63 BN63B4 BE63B4	130
77	16	1.8	35	1970			VF 44_35 P63 BN63A2	124
88	15	1.2	15	960			VF 30_15 P63 BN63B4 BE63B4	122
94	15	2.0	14	1830			VF 44_14 P63 BN63B4 BE63B4	124
132	11	1.5	10	860			VF 30_10 P63 BN63B4 BE63B4	122
132	11	2.7	10	1640			VF 44_10 P63 BN63B4 BE63B4	124
189	8	2.1	7	770			VF 30_7 P63 BN63B4 BE63B4	122
193	7	2.9	14	1470			VF 44_14 P63 BN63A2	124
270	5	2.2	10	710			VF 30_10 P63 BN63A2	122
386	4	3.1	7	640			VF 30_7 P63 BN63A2	122

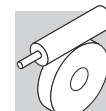
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n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	 		  IEC 	
					IE3		IE3	
0.28	978	1.9	3200	13800				
0.28	1345	3.3	3200	19500				
0.31	1406	1.9	2944	16000				
0.35	1027	1.8	2560	13800				
0.35	1320	3.3	2560	19500				
0.47	875	1.1	2800	8000			VF/W 49/110_2800 P63 BXN63MB4	151
0.49	1265	2.1	1840	16000				
0.50	894	2.1	1800	13800				
0.54	949	1.1	1656	8000				
0.59	871	2.1	1520	13800				
0.64	755	1.3	2070	8000			VF/W 49/110_2070 P63 BXN63MB4	151
0.65	1054	2.6	1380	16000				
0.75	733	2.5	1200	13800				
0.80	647	1.5	1656	8000			VF/W 49/110_1656 P63 BXN63MB4	151
0.94	642	2.9	960	13800				
0.98	527	1.9	1350	8000			VF/W 49/110_1350 P63 BXN63MB4	151
0.98	756	3.6	920	16000				
1.2	537	3.4	760	13800				
1.2	436	2.3	1080	8000			VF/W 49/110_1080 P63 BXN63MB4	151
1.4	479	1.0	920	7000			VF/W 44/86_920 P63 BXN63MB4	147
1.7	391	1.4	525	7000				
1.8	375	2.7	720	8000			VF/W 49/110_720 P63 BXN63MB4	151
1.9	356	1.4	700	7000			VF/W 44/86_700 P63 BXN63MB4	147
2.3	321	1.2	400	5750				
2.3	313	1.8	400	7000				
2.3	344	3.1	400	8000				
2.4	288	3.5	540	8000			VF/W 49/110_540 P63 BXN63MB4	151
2.5	301	1.2	525	5750			VF/W 44/75_525 P63 BXN63MB4	143
2.5	287	1.7	525	7000			VF/W 44/86_525 P63 BXN63MB4	147
3.0	258	1.2	300	7000				
3.0	264	1.5	300	5750				
3.0	275	2.1	300	8000				
3.0	241	2.3	300	7000				









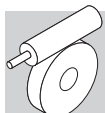
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	   IE3	  IEC  IE3	
3.0	269	3.9	300	8000			
3.3	240	1.5	400	5750		VF/W 44/75_400 P63 BXN63MB4	143
3.3	214	2.3	400	7000		VF/W 44/86_400 P63 BXN63MB4	147
3.8	206	1.1	240	6200			
3.8	229	1.4	240	7000			
3.8	243	2.4	240	8000			
3.9	233	2.4	230	7000			
4.2	172	1.2	315	5000		VF/W 30/63_315 P63 BXN63MB4	139
4.4	172	1.0	300	6200		WR 75_300 P63 BXN63MB4	142
4.4	191	1.4	300	7000		WR 86_300 P63 BXN63MB4	146
4.4	199	1.9	300	5750		VF/W 44/75_300 P63 BXN63MB4	143
4.4	176	2.8	300	7000		VF/W 44/86_300 P63 BXN63MB4	147
4.7	202	1.9	192	7000			
5.0	175	1.6	180	6200			
5.3	186	2.0	250	5750		VF/W 44/75_250 P63 BXN63MB4	143
5.4	183	2.1	168	7000			
5.5	144	0.9	240	5000		WR 63_240 P63 BXN63MB4	138
5.5	153	1.4	240	6200		WR 75_240 P63 BXN63MB4	142
5.5	147	1.4	240	5000		VF/W 30/63_240 P63 BXN63MB4	139
5.5	166	1.8	240	7000		WR 86_240 P63 BXN63MB4	146
5.7	162	3.1	230	7000		VF/W 44/86_230 P63 BXN63MB4	147
6.0	158	2.0	150	6200			
6.5	161	2.7	138	7000			
6.9	128	1.2	192	5000		WR 63_192 P63 BXN63MB4	138
6.9	145	2.3	192	7000		WR 86_192 P63 BXN63MB4	146
7.3	129	1.8	180	6200		WR 75_180 P63 BXN63MB4	142
7.5	138	2.4	120	6200			
7.9	131	2.7	168	7000		WR 86_168 P63 BXN63MB4	146
7.9	126	1.6	114	5000			
8.8	113	2.3	150	6200		WR 75_150 P63 BXN63MB4	142
9.0	88	1.4	100	5000			
9.0	96	1.7	100	6200			
9.0	105	2.4	100	7000			
9.8	102	1.7	135	5000		WR 63_135 P63 BXN63MB4	138
10.0	107	1.9	90	5000			
11.0	98	3.1	120	6200		WR 75_120 P63 BXN63MB4	142
11.3	79	1.6	80	5000			
11.3	83	2.4	80	6200			
11.3	90	3.1	80	7000			
11.6	91	2.0	114	5000		WR 63_114 P63 BXN63MB4	138
12.0	100	3.3	75	6200			
12.2	82	1.0	108	3450		VFR 49_108 P63 BXN63MB4	132
14.7	75	2.5	90	5000		WR 63_90 P63 BXN63MB4	138
15.0	61	1.1	60	3000			
15.0	60	1.1	180	3300			
15.7	68	1.3	84	3420		VFR 49_84 P63 BXN63MB4	132
16.5	54	1.0	80	3150		VF 49_80 P63 BXN63MB4	130
18.3	63	1.2	72	3270		VFR 49_72 P63 BXN63MB4	132
18.3	66	2.8	72	5000		WR 63_72 P63 BXN63MB4	138
18.9	49	1.1	70	3150		VF 49_70 P63 BXN63MB4	130
20.0	50	1.4	135	3280			
20.0	54	2.9	45	5000			
22.0	45	0.9	60	2300		VF 44_60 P63 BXN63MB4	124
22.0	45	1.3	60	3150		VF 49_60 P63 BXN63MB4	130
23.2	54	3.3	57	4910		WR 63_57 P63 BXN63MB4	138
24.4	50	1.5	54	3010		VFR 49_54 P63 BXN63MB4	132
28.7	38	1.0	46	2500		VF 44_46 P63 BXN63MB4	124
29.3	37	1.8	45	2300		VF 49_45 P63 BXN63MB4	130
31	40	1.9	42	2810		VFR 49_42 P63 BXN63MB4	132
32	36	1.4	28	2290			
37	31	2.2	36	2760		VF 49_36 P63 BXN63MB4	130
38	31	1.3	35	2430		VF 44_35 P63 BXN63MB4	124
47	26	1.5	28	2270		VF 44_28 P63 BXN63MB4	124
47	26	2.9	28	2560		VF 49_28 P63 BXN63MB4	130
55	23	2.7	24	2430		VF 49_24 P63 BXN63MB4	130
66	19	0.9	20	1040		VF 30_20 P63 BXN63MB4	122
66	20	1.9	20	2040		VF 44_20 P63 BXN63MB4	124
73	18	3.2	18	2230		VF 49_18 P63 BXN63MB4	130
77	16	1.8	35	1970			
88	15	1.2	15	960		VF 30_15 P63 BXN63MB4	122
94	15	2.0	14	1830		VF 44_14 P63 BXN63MB4	124
132	11	1.5	10	860		VF 30_10 P63 BXN63MB4	122
132	11	2.7	10	1640		VF 44_10 P63 BXN63MB4	124
189	8	2.1	7	770		VF 30_7 P63 BXN63MB4	122
193	7	2.9	14	1470			
270	5	2.2	10	710			
386	4	3.1	7	640			










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






n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE1	 IE2		 IE1	 IE2		
0.28	1358	1.4	3200	13800			W/VF 63/130_3200	P71	BN71B6	158	
0.28	1868	2.4	3200	19500			W/VF 86/185_3200	P71	BN71B6	174	
0.31	1952	1.4	2944	16000			W/VF 86/150_2944	P71	BN71B6	166	
0.43	945	1.9	3200	13800			W/VF 63/130_3200	P71	BN71A4	BE71A4	158
0.43	1334	3.1	3200	19500			W/VF 86/185_3200	P71	BN71A4	BE71A4	174
0.47	1380	1.9	2944	16000			W/VF 86/150_2944	P71	BN71A4	BE71A4	166
0.49	1562	2.8	1840	19500			W/VF 86/185_1840	P71	BN71B6		174
0.54	1022	1.8	2560	13800			W/VF 63/130_2560	P71	BN71A4	BE71A4	158
0.54	1289	3.3	2560	19500			W/VF 86/185_2560	P71	BN71A4	BE71A4	174
0.65	1464	1.8	1380	16000			W/VF 86/150_1380	P71	BN71B6		166
0.66	1006	1.0	2070	8000			VF/W 49/110_2070	P71	BN71A4	BE71A4	151
0.75	1214	2.1	1840	16000			W/VF 86/150_1840	P71	BN71A4	BE71A4	166
0.75	1019	1.8	1200	13800			W/VF 63/130_1200	P71	BN71B6		158
0.76	875	2.1	1800	13800			W/VF 63/130_1800	P71	BN71A4	BE71A4	158
0.83	863	1.2	1656	8000			VF/W 49/110_1656	P71	BN71A4	BE71A4	151
0.90	845	2.1	1520	13800			W/VF 63/130_1520	P71	BN71A4	BE71A4	158
0.98	1049	2.6	920	16000			W/VF 86/150_920	P71	BN71B6		166
1.0	1006	2.6	1380	16000			W/VF 86/150_1380	P71	BN71A4	BE71A4	166
1.0	703	1.4	1350	8000			VF/W 49/110_1350	P71	BN71A4	BE71A4	151
1.1	708	2.5	1200	13800			W/VF 63/130_1200	P71	BN71A4	BE71A4	158
1.2	746	2.5	760	13800			W/VF 63/130_760	P71	BN71B6		158
1.3	581	1.7	1080	8000			VF/W 49/110_1080	P71	BN71A4	BE71A4	151
1.3	860	3.1	690	16000			W/VF 86/150_690	P71	BN71B6		166
1.4	617	2.9	960	13800			W/VF 63/130_960	P71	BN71A4	BE71A4	158
1.7	544	1.9	540	8000			VF/W 49/110_540	P71	BN71B6		151
1.7	543	1.0	525	7000			VF/W 44/86_525	P71	BN71B6		147
1.8	515	3.5	760	13800			W/VF 63/130_760	P71	BN71A4	BE71A4	158
1.9	500	2.0	720	8000			VF/W 49/110_720	P71	BN71A4	BE71A4	151
2.0	474	1.1	700	7000			VF/W 44/86_700	P71	BN71A4	BE71A4	147
2.5	384	2.6	540	8000			VF/W 49/110_540	P71	BN71A4	BE71A4	151
2.6	383	1.3	525	7000			VF/W 44/86_525	P71	BN71A4	BE71A4	147
3.0	366	1.1	300	5750			VF/W 44/75_300	P71	BN71B6		143
3.0	382	1.5	300	8000			WR 110_300	P71	BN71B6		150
3.0	374	2.8	300	8000			VF/W 49/110_300	P71	BN71B6		151
3.4	319	1.2	400	5750			VF/W 44/75_400	P71	BN71A4	BE71A4	143
3.4	285	1.8	400	7000			VF/W 44/86_400	P71	BN71A4	BE71A4	147
3.4	313	3.2	400	8000			VF/W 49/110_400	P71	BN71A4	BE71A4	151
3.8	318	1.0	240	7000			WR 86_240	P71	BN71B6		146
3.8	337	1.7	240	8000			WR 110_240	P71	BN71B6		150
3.9	323	1.7	230	7000			VF/W 44/86_230	P71	BN71B6		147
3.9	311	3.4	230	8000			VF/W 49/110_230	P71	BN71B6		151
4.6	255	1.1	300	7000			WR 86_300	P71	BN71A4	BE71A4	146
4.6	266	1.4	300	5750			VF/W 44/75_300	P71	BN71A4	BE71A4	143
4.6	266	2.1	300	8000			WR 110_300	P71	BN71A4	BE71A4	150
4.6	234	2.1	300	7000			VF/W 44/86_300	P71	BN71A4	BE71A4	147
4.7	280	1.4	192	7000			WR 86_192	P71	BN71B6		146
5.5	247	1.5	250	5750			VF/W 44/75_250	P71	BN71A4	BE71A4	143
5.7	204	1.1	240	6200			WR 75_240	P71	BN71A4	BE71A4	142
5.7	221	1.4	240	7000			WR 86_240	P71	BN71A4	BE71A4	146
5.7	233	2.4	240	8000			WR 110_240	P71	BN71A4	BE71A4	150
6.0	216	2.3	230	7000			VF/W 44/86_230	P71	BN71A4	BE71A4	147
6.0	219	1.4	150	6200			WR 75_150	P71	BN71B6		142
6.7	193	0.9	135	5000			WR 63_135	P71	BN71B6		138
7.2	193	1.7	192	7000			WR 86_192	P71	BN71A4	BE71A4	146
7.2	200	3.1	192	8000			WR 110_192	P71	BN71A4	BE71A4	150
7.6	172	1.4	180	6200			WR 75_180	P71	BN71A4	BE71A4	142
7.9	175	1.1	114	5000			WR 63_114	P71	BN71B6		138
8.2	175	2.0	168	7000			WR 86_168	P71	BN71A4	BE71A4	146
9.0	122	1.0	100	5000	W 63_100 S1 M1SD6	136					
9.0	133	1.2	100	6200	W 75_100 S1 M1SD6	140	W 75_100	P71	BN71B6		141
9.0	146	1.7	100	7000	W 86_100 S1 M1SD6	144	W 86_100	P71	BN71B6		145
9.2	151	1.7	150	6200			WR 75_150	P71	BN71A4	BE71A4	142
10.0	151	2.7	138	7000			WR 86_138	P71	BN71A4	BE71A4	146
10.0	160	2.3	90	6200			WR 75_90	P71	BN71B6		142
10.2	136	1.3	135	5000			WR 63_135	P71	BN71A4	BE71A4	138
11.3	110	1.1	80	5000	W 63_80 S1 M1SD6	136					
11.3	115	1.7	80	6200	W 75_80 S1 M1SD6	140	W 75_80	P71	BN71B6		141
11.3	125	2.2	80	7000	W 86_80 S1 M1SD6	144	W 86_80	P71	BN71B6		145
11.5	131	2.3	120	6200			WR 75_120	P71	BN71A4	BE71A4	142
11.5	138	2.8	120	7000			WR 86_120	P71	BN71A4	BE71A4	146
12.1	121	1.5	114	5000			WR 63_114	P71	BN71A4	BE71A4	138
13.8	89	1.3	100	5000			W 63_100	P71	BN71A4	BE71A4	138
13.8	96	1.6	100	6200			W 75_100	P71	BN71A4	BE71A4	141
13.8	102	2.2	100	7000			W 86_100	P71	BN71A4	BE71A4	145
15.3	100	1.9	90	5000			WR 63_90	P71	BN71A4	BE71A4	138
15.3	108	3.0	90	6200			WR 75_90	P71	BN71A4	BE71A4	142

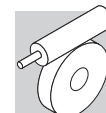


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






n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 		  IEC 	
					IE1	IE2	IE1	IE2
17.2	78	1.5	80	5000			W 63_80 P71 BN71A4 BE71A4	138
17.2	82	2.2	80	6200			W 75_80 P71 BN71A4 BE71A4	141
17.2	89	2.9	80	7000			W 86_80 P71 BN71A4 BE71A4	145
18.3	95	3.1	75	6200			WR 75_75 P71 BN71A4 BE71A4	142
19.1	88	2.1	72	5000			WR 63_72 P71 BN71A4 BE71A4	138
21.5	68	1.8	64	5000			W 63_64 P71 BN71A4 BE71A4	138
22.9	68	3.0	60	6200			W 75_60 P71 BN71A4 BE71A4	141
24.1	72	2.5	57	4780			WR 63_57 P71 BN71A4 BE71A4	138
31	52	2.8	45	4550			W 63_45 P71 BN71A4 BE71A4	138
31	59	3.0	45	4460			WR 63_45 P71 BN71A4 BE71A4	138
32	50	1.0	28	2300			VF 44_28 P71 BN71B6	124
36	46	3.4	38	4320			W 63_38 P71 BN71A4 BE71A4	138
37	44	1.6	36	2670			VF 49_36 P71 BN71A4 BE71A4	130
38	43	0.9	35	2300			VF 44_35 P71 BN71A4 BE71A4	124
38	49	3.3	36	4160			WR 63_36 P71 BN71A4 BE71A4	138
45	39	1.1	20	2190			VF 44_20 P71 BN71B6	124
47	36	1.1	28	2190			VF 44_28 P71 BN71A4 BE71A4	124
47	36	2.1	28	2480			VF 49_28 P71 BN71A4 BE71A4	130
55	33	1.9	24	2360			VF 49_24 P71 BN71A4 BE71A4	130
64	29	1.3	14	1980			VF 44_14 P71 BN71B6	124
64	29	2.5	14	2260			VF 49_14 P71 BN71B6	130
66	28	1.4	20	1970			VF 44_20 P71 BN71A4 BE71A4	124
73	25	2.3	18	2170			VF 49_18 P71 BN71A4 BE71A4	130
77	23	1.3	35	1930			VF 44_35 P63 BN63B2	124
90	22	1.8	10	1780			VF 44_10 P71 BN71B6	124
90	22	2.9	10	2040			VF 49_10 P71 BN71B6	130
94	21	1.4	14	1770			VF 44_14 P71 BN71A4 BE71A4	124
94	21	3.2	14	2010			VF 49_14 P71 BN71A4 BE71A4	130
113	17	2.8	24	1930			VF 49_24 P63 BN63B2	130
129	16	2.5	7	1590			VF 44_7 P71 BN71B6	124
132	15	1.9	10	1590			VF 44_10 P71 BN71A4 BE71A4	124
135	14	1.0	20	840			VF 30_20 P63 BN63B2	122
180	11	1.3	15	780			VF 30_15 P63 BN63B2	122
189	11	2.7	7	1420			VF 44_7 P71 BN71A4 BE71A4	124
270	8	1.6	10	690			VF 30_10 P63 BN63B2	122
270	8	2.9	10	1300			VF 44_10 P63 BN63B2	124
386	5	2.2	7	620			VF 30_7 P63 BN63B2	122

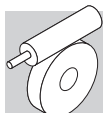
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 		  IEC 	
					IE3		IE3	
0.28	1358	1.4	3200	13800				
0.28	1868	2.4	3200	19500				
0.31	1952	1.4	2944	16000				
0.43	945	1.9	3200	13800	W/VF 63/130_3200 S10 MXN10MA4	158	W/VF 63/130_3200 P71 BXN71MA4	158
0.43	1334	3.1	3200	19500	W/VF 86/185_3200 S10 MXN10MA4	174	W/VF 86/185_3200 P71 BXN71MA4	174
0.47	1380	1.9	2944	16000	W/VF 86/150_2944 S10 MXN10MA4	166	W/VF 86/150_2944 P71 BXN71MA4	166
0.49	1562	2.8	1840	19500				
0.54	1022	1.8	2560	13800	W/VF 63/130_2560 S10 MXN10MA4	158	W/VF 63/130_2560 P71 BXN71MA4	158
0.54	1289	3.3	2560	19500	W/VF 86/185_2560 S10 MXN10MA4	174	W/VF 86/185_2560 P71 BXN71MA4	174
0.65	1464	1.8	1380	16000				
0.66	1006	1.0	2070	8000			VF/W 49/110_2070 P71 BXN71MA4	151
0.75	1214	2.1	1840	16000	W/VF 86/150_1840 S10 MXN10MA4	166	W/VF 86/150_1840 P71 BXN71MA4	166
0.75	1019	1.8	1200	13800				
0.76	875	2.1	1800	13800	W/VF 63/130_1800 S10 MXN10MA4	158	W/VF 63/130_1800 P71 BXN71MA4	158
0.83	863	1.2	1656	8000			VF/W 49/110_1656 P71 BXN71MA4	151
0.90	845	2.1	1520	13800	W/VF 63/130_1520 S10 MXN10MA4	158	W/VF 63/130_1520 P71 BXN71MA4	158
0.98	1049	2.6	920	16000				
1.0	1006	2.6	1380	16000	W/VF 86/150_1380 S10 MXN10MA4	166	W/VF 86/150_1380 P71 BXN71MA4	166
1.0	703	1.4	1350	8000			VF/W 49/110_1350 P71 BXN71MA4	151
1.1	708	2.5	1200	13800	W/VF 63/130_1200 S10 MXN10MA4	158	W/VF 63/130_1200 P71 BXN71MA4	158
1.2	746	2.5	760	13800				
1.3	581	1.7	1080	8000			VF/W 49/110_1080 P71 BXN71MA4	151
1.3	860	3.1	690	16000				
1.4	617	2.9	960	13800	W/VF 63/130_960 S10 MXN10MA4	158	W/VF 63/130_960 P71 BXN71MA4	158
1.7	544	1.9	540	8000				
1.7	543	1.0	525	7000				
1.8	515	3.5	760	13800	W/VF 63/130_760 S10 MXN10MA4	158	W/VF 63/130_760 P71 BXN71MA4	158
1.9	500	2.0	720	8000			VF/W 49/110_720 P71 BXN71MA4	151
2.0	474	1.1	700	7000			VF/W 44/86_700 P71 BXN71MA4	147
2.5	384	2.6	540	8000			VF/W 49/110_540 P71 BXN71MA4	151










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






n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	   IE3	  IEC  IE3	
2.6	383	1.3	525	7000		VF/W 44/86_525 P71 BXN71MA4	147
3.0	366	1.1	300	5750			
3.0	382	1.5	300	8000			
3.0	374	2.8	300	8000			
3.4	319	1.2	400	5750		VF/W 44/75_400 P71 BXN71MA4	143
3.4	285	1.8	400	7000		VF/W 44/86_400 P71 BXN71MA4	147
3.4	313	3.2	400	8000		VF/W 49/110_400 P71 BXN71MA4	151
3.8	318	1.0	240	7000			
3.8	337	1.7	240	8000			
3.9	323	1.7	230	7000			
3.9	311	3.4	230	8000			
4.6	255	1.1	300	7000		WR 86_300 P71 BXN71MA4	146
4.6	266	1.4	300	5750		VF/W 44/75_300 P71 BXN71MA4	143
4.6	266	2.1	300	8000		WR 110_300 P71 BXN71MA4	150
4.6	234	2.1	300	7000		VF/W 44/86_300 P71 BXN71MA4	147
4.7	280	1.4	192	7000			
5.5	247	1.5	250	5750		VF/W 44/75_250 P71 BXN71MA4	143
5.7	204	1.1	240	6200		WR 75_240 P71 BXN71MA4	142
5.7	221	1.4	240	7000		WR 86_240 P71 BXN71MA4	146
5.7	233	2.4	240	8000		WR 110_240 P71 BXN71MA4	150
6.0	216	2.3	230	7000		VF/W 44/86_230 P71 BXN71MA4	147
6.0	219	1.4	150	6200			
6.7	193	0.9	135	5000			
7.2	193	1.7	192	7000		WR 86_192 P71 BXN71MA4	146
7.2	200	3.1	192	8000		WR 110_192 P71 BXN71MA4	150
7.6	172	1.4	180	6200		WR 75_180 P71 BXN71MA4	142
7.9	175	1.1	114	5000			
8.2	175	2.0	168	7000		WR 86_168 P71 BXN71MA4	146
9.0	122	1.0	100	5000			
9.0	133	1.2	100	6200			
9.0	146	1.7	100	7000			
9.2	151	1.7	150	6200		WR 75_150 P71 BXN71MA4	142
10.0	151	2.7	138	7000		WR 86_138 P71 BXN71MA4	146
10.0	160	2.3	90	6200			
10.2	136	1.3	135	5000		WR 63_135 P71 BXN71MA4	138
11.3	110	1.1	80	5000			
11.3	115	1.7	80	6200			
11.3	125	2.2	80	7000			
11.5	131	2.3	120	6200		WR 75_120 P71 BXN71MA4	142
11.5	138	2.8	120	7000		WR 86_120 P71 BXN71MA4	146
12.1	121	1.5	114	5000		WR 63_114 P71 BXN71MA4	138
13.8	89	1.3	100	5000	W 63_100 S10 MXN10MA4	138 W 63_100 P71 BXN71MA4	138
13.8	96	1.6	100	6200	W 75_100 S10 MXN10MA4	141 W 75_100 P71 BXN71MA4	141
13.8	102	2.2	100	7000	W 86_100 S10 MXN10MA4	145 W 86_100 P71 BXN71MA4	145
15.3	100	1.9	90	5000		WR 63_90 P71 BXN71MA4	138
15.3	108	3.0	90	6200		WR 75_90 P71 BXN71MA4	142
17.2	78	1.5	80	5000	W 63_80 S10 MXN10MA4	138 W 63_80 P71 BXN71MA4	138
17.2	82	2.2	80	6200	W 75_80 S10 MXN10MA4	141 W 75_80 P71 BXN71MA4	141
17.2	89	2.9	80	7000	W 86_80 S10 MXN10MA4	145 W 86_80 P71 BXN71MA4	145
18.3	95	3.1	75	6200		WR 75_75 P71 BXN71MA4	142
19.1	88	2.1	72	5000		WR 63_72 P71 BXN71MA4	138
21.5	68	1.8	64	5000	W 63_64 S10 MXN10MA4	138 W 63_64 P71 BXN71MA4	138
22.9	68	3.0	60	6200	W 75_60 S10 MXN10MA4	141 W 75_60 P71 BXN71MA4	141
24.1	72	2.5	57	4780		WR 63_57 P71 BXN71MA4	138
31	52	2.8	45	4550	W 63_45 S10 MXN10MA4	138 W 63_45 P71 BXN71MA4	138
31	59	3.0	45	4460		WR 63_45 P71 BXN71MA4	138
32	50	1.0	28	2300			
36	46	3.4	38	4320	W 63_38 S10 MXN10MA4	138 W 63_38 P71 BXN71MA4	138
37	44	1.6	36	2670		VF 49_36 P71 BXN71MA4	130
38	43	0.9	35	2300		VF 44_35 P71 BXN71MA4	124
38	49	3.3	36	4160		WR 63_36 P71 BXN71MA4	138
45	39	1.1	20	2190			
47	36	1.1	28	2190		VF 44_28 P71 BXN71MA4	124
47	36	2.1	28	2480		VF 49_28 P71 BXN71MA4	130
55	33	1.9	24	2360		VF 49_24 P71 BXN71MA4	130
64	29	1.3	14	1980			
64	29	2.5	14	2260			
66	28	1.4	20	1970		VF 44_20 P71 BXN71MA4	124
73	25	2.3	18	2170		VF 49_18 P71 BXN71MA4	130
77	23	1.3	35	1930			
90	22	1.8	10	1780			
90	22	2.9	10	2040			
94	21	1.4	14	1770		VF 44_14 P71 BXN71MA4	124
94	21	3.2	14	2010		VF 49_14 P71 BXN71MA4	130
113	17	2.8	24	1930			
129	16	2.5	7	1590			

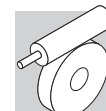


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





n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	  	  IEC 	
132	15	1.9	10	1590		VF 44_10 P71 BXN71MA4	124
135	14	1.0	20	840			
180	11	1.3	15	780			
189	11	2.7	7	1420		VF 44_7 P71 BXN71MA4	124
270	8	1.6	10	690			
270	8	2.9	10	1300			
386	5	2.2	7	620			

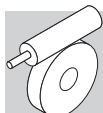
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	  	  IEC 	
0.28	2734	1.6	3200	19500		W/VF 86/185_3200 P80 BN80A6	174
0.31	2858	0.9	2944	16000		W/VF 86/150_2944 P80 BN80A6	166
0.36	2684	1.6	2560	19500		W/VF 86/185_2560 P80 BN80A6	174
0.43	1403	1.3	3200	13800		W/VF 63/130_3200 P71 BN71B4 BE71B4	158
0.43	1981	2.1	3200	19500		W/VF 86/185_3200 P71 BN71B4 BE71B4	174
0.47	2050	1.3	2944	16000		W/VF 86/150_2944 P71 BN71B4 BE71B4	166
0.54	1519	1.2	2560	13800		W/VF 63/130_2560 P71 BN71B4 BE71B4	158
0.54	1915	2.2	2560	19500		W/VF 86/185_2560 P71 BN71B4 BE71B4	174
0.60	1771	1.0	1520	13800		W/VF 63/130_1520 P80 BN80A6	158
0.66	2143	1.3	1380	16000		W/VF 86/150_1380 P80 BN80A6	166
0.74	1803	1.4	1840	16000		W/VF 86/150_1840 P71 BN71B4 BE71B4	166
0.74	1614	2.6	1840	19500		W/VF 86/185_1840 P71 BN71B4 BE71B4	174
0.76	1300	1.4	1800	13800		W/VF 63/130_1800 P71 BN71B4 BE71B4	158
0.86	1444	2.9	1600	19500		W/VF 86/185_1600 P71 BN71B4 BE71B4	174
0.90	1255	1.4	1520	13800		W/VF 63/130_1520 P71 BN71B4 BE71B4	158
0.99	1357	3.2	920	19500		W/VF 86/185_920 P80 BN80A6	174
1.0	1495	1.7	1380	16000		W/VF 86/150_1380 P71 BN71B4 BE71B4	166
1.0	1045	1.0	1350	8000		VF/W 49/110_1350 P71 BN71B4 BE71B4	151
1.1	1052	1.7	1200	13800		W/VF 63/130_1200 P71 BN71B4 BE71B4	158
1.3	864	1.2	1080	8000		VF/W 49/110_1080 P71 BN71B4 BE71B4	151
1.3	1259	2.1	690	16000		W/VF 86/150_690 P80 BN80A6	166
1.4	916	2.0	960	13800		W/VF 63/130_960 P71 BN71B4 BE71B4	158
1.5	1068	2.4	920	16000		W/VF 86/150_920 P71 BN71B4 BE71B4	166
1.7	797	1.3	540	8000		VF/W 49/110_540 P80 BN80A6	151
1.7	1068	2.5	529	16000		W/VF 86/150_529 P80 BN80A6	166
1.8	764	2.4	760	13800		W/VF 63/130_760 P71 BN71B4 BE71B4	158
1.9	743	1.3	720	8000		VF/W 49/110_720 P71 BN71B4 BE71B4	151
2.0	890	2.9	690	16000		W/VF 86/150_690 P71 BN71B4 BE71B4	166
2.3	619	2.9	600	13800		W/VF 63/130_600 P71 BN71B4 BE71B4	158
2.5	571	1.8	540	8000		VF/W 49/110_540 P71 BN71B4 BE71B4	151
2.6	750	3.5	529	16000		W/VF 86/150_529 P71 BN71B4 BE71B4	166
3.0	559	1.0	300	8000		WR 110_300 P80 BN80A6	150
3.0	571	1.8	300	13800		VFR 130_300 P80 BN80A6	154
3.0	547	1.9	300	8000		VF/W 49/110_300 P80 BN80A6	151
3.4	423	1.2	400	7000		VF/W 44/86_400 P71 BN71B4 BE71B4	147
3.4	464	2.2	400	8000		VF/W 49/110_400 P71 BN71B4 BE71B4	151
3.8	494	1.2	240	8000		WR 110_240 P80 BN80A6	150
3.8	503	2.4	240	13800		VFR 130_240 P80 BN80A6	154
4.0	455	2.3	230	8000		VF/W 49/110_230 P80 BN80A6	151
4.6	395	1.4	300	8000		WR 110_300 P71 BN71B4 BE71B4	150
4.6	348	1.4	300	7000		VF/W 44/86_300 P71 BN71B4 BE71B4	147
4.6	371	2.7	300	8000		VF/W 49/110_300 P71 BN71B4 BE71B4	151
4.7	410	1.0	192	7000		WR 86_192 P80 BN80A6	146
4.7	425	1.6	192	8000		WR 110_192 P80 BN80A6	150
4.7	432	3.0	192	13800		VFR 130_192 P80 BN80A6	154
5.4	372	1.0	168	7000		WR 86_168 P80 BN80A6	146
5.4	391	2.0	168	8000		WR 110_168 P80 BN80A6	150
5.4	391	3.4	168	13800		VFR 130_168 P80 BN80A6	154
5.7	328	0.9	240	7000		WR 86_240 P71 BN71B4 BE71B4	146
5.7	347	1.6	240	8000		WR 110_240 P71 BN71B4 BE71B4	150
6.0	320	1.6	230	7000		VF/W 44/86_230 P71 BN71B4 BE71B4	147
6.0	308	3.2	230	8000		VF/W 49/110_230 P71 BN71B4 BE71B4	151
6.1	320	1.0	150	6200		WR 75_150 P80 BN80A6	142
6.6	327	1.3	138	7000		WR 86_138 P80 BN80A6	146
6.6	338	2.4	138	8000		WR 110_138 P80 BN80A6	150
7.1	287	1.1	192	7000		WR 86_192 P71 BN71B4 BE71B4	146









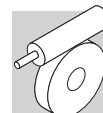
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE1			 IE2		 IE1			 IE2	
7.1	297	2.1	192	8000						WR 110_192	P71	BN71B4	BE71B4	150
7.6	294	1.5	120	7000						WR 86_120	P80	BN80A6		146
7.6	303	2.9	120	8000						WR 110_120	P80	BN80A6		150
7.6	255	0.9	180	6200						WR 75_180	P71	BN71B4	BE71B4	142
8.2	260	1.4	168	7000						WR 86_168	P71	BN71B4	BE71B4	146
8.2	273	2.6	168	8000						WR 110_168	P71	BN71B4	BE71B4	150
9.1	214	1.2	100	7000	W 86_100 S1	M1LA6		144	W 86_100	P80	BN80A6		145	
9.1	224	1.2	150	6200					WR 75_150	P71	BN71B4	BE71B4	142	
9.9	224	1.8	138	7000					WR 86_138	P71	BN71B4	BE71B4	146	
9.9	235	3.0	138	8000					WR 110_138	P71	BN71B4	BE71B4	150	
10.1	234	1.6	90	6200						WR 75_90	P80	BN80A6		142
11.4	168	1.2	80	6200	W 75_80 S1	M1LA6		140	W 75_80	P80	BN80A6		141	
11.4	183	1.5	80	7000					W 86_80 S1	M1LA6		144	W 86_80	P80
11.4	195	1.6	120	6200						WR 75_120	P71	BN71B4	BE71B4	142
11.4	204	1.9	120	7000						WR 86_120	P71	BN71B4	BE71B4	146
12.0	179	1.0	114	5000						WR 63_114	P71	BN71B4	BE71B4	138
12.1	204	1.6	75	6200						WR 75_75	P80	BN80A6	BN80A6	142
13.2	196	2.0	69	7000						WR 86_69	P80	BN80A6		146
13.7	142	1.1	100	6200	W 75_100 S1	M1SD4	ME1SB4	140	W 75_100	P71	BN71B4	BE71B4	141	
13.7	152	1.5	100	7000	W 86_100 S1	M1SD4	ME1SB4	144	W 86_100	P71	BN71B4	BE71B4	145	
14.2	139	1.0	64	5000	W 63_64 S1	M1LA6		136	W 63_64	P80	BN80A6		138	
15.2	140	1.5	60	6200	W 75_60 S1	M1LA6		140	W 75_60	P80	BN80A6		141	
15.2	149	1.3	90	5000						WR 63_90	P71	BN71B4	BE71B4	138
15.2	160	2.0	90	6200						WR 75_90	P71	BN71B4	BE71B4	142
15.2	156	2.8	90	7000						WR 86_90	P71	BN71B4	BE71B4	146
16.3	144	2.3	56	7000	W 86_56 S1	M1LA6		144	W 86_56	P80	BN80A6		145	
17.1	116	1.0	80	5000	W 63_80 S1	M1SD4	ME1SB4	136	W 63_80	P71	BN71B4	BE71B4	138	
17.1	122	1.5	80	6200	W 75_80 S1	M1SD4	ME1SB4	140	W 75_80	P71	BN71B4	BE71B4	141	
17.1	132	1.9	80	7000	W 86_80 S1	M1SD4	ME1SB4	144	W 86_80	P71	BN71B4	BE71B4	145	
18.3	141	2.1	75	6200						WR 75_75	P71	BN71B4	BE71B4	142
19.0	130	1.4	72	4830						WR 63_72	P71	BN71B4	BE71B4	138
19.9	133	2.8	69	7000						WR 86_69	P71	BN71B4	BE71B4	146
20.2	136	2.6	45	6200						WR 75_45	P80	BN80A6		142
21.4	101	1.2	64	4870	W 63_64 S1	M1SD4	ME1SB4	136	W 63_64	P71	BN71B4	BE71B4	138	
21.4	112	2.5	64	7000	W 86_64 S1	M1SD4	ME1SB4	144	W 86_64	P71	BN71B4	BE71B4	145	
22.8	101	2.0	60	6200	W 75_60 S1	M1SD4	ME1SB4	140	W 75_60	P71	BN71B4	BE71B4	141	
22.8	119	2.5	60	6200						WR 75_60	P71	BN71B4	BE71B4	142
22.8	119	3.2	60	7000						WR 86_60	P71	BN71B4	BE71B4	146
24.0	107	1.7	57	4540						WR 63_57	P71	BN71B4	BE71B4	138
24.5	101	3.0	56	7000	W 86_56 S1	M1SD4	ME1SB4	144	W 86_56	P71	BN71B4	BE71B4	145	
27.4	88	2.5	50	6200	W 75_50 S1	M1SD4	ME1SB4	140	W 75_50	P71	BN71B4	BE71B4	141	
30	73	0.9	45	2680						VF 49_45	P71	BN71B4	BE71B4	130
30	78	1.9	45	4400	W 63_45 S1	M1SD4	ME1SB4	136	W 63_45	P71	BN71B4	BE71B4	138	
30	88	2.0	45	4250						WR 63_45	P71	BN71B4	BE71B4	138
30	93	3.2	45	5880						WR 75_45	P71	BN71B4	BE71B4	142
34	74	3.4	40	5820	W 75_40 S1	M1SD4	ME1SB4	140	W 75_40	P71	BN71B4	BE71B4	141	
36	69	2.3	38	4180	W 63_38 S1	M1SD4	ME1SB4	136	W 63_38	P71	BN71B4	BE71B4	138	
38	62	1.1	36	2530						VF 49_36	P71	BN71B4	BE71B4	130
38	73	2.2	36	3980						WR 63_36	P71	BN71B4	BE71B4	138
46	57	2.8	30	3900	W 63_30 S1	M1SD4	ME1SB4	136	W 63_30	P71	BN71B4	BE71B4	138	
49	51	1.4	28	2360						VF 49_28	P71	BN71B4	BE71B4	130
57	46	1.4	24	2250						VF 49_24	P71	BN71B4	BE71B4	130
57	48	3.2	24	3650	W 63_24 S1	M1SD4	ME1SB4	136	W 63_24	P71	BN71B4	BE71B4	138	
65	42	1.7	14	1940						VF 49_14	P80	BN80A6		130
69	40	1.0	20	1870						VF 44_20	P71	BN71B4	BE71B4	124
72	40	3.8	19	3400	W 63_19 S1	M1SD4	ME1SB4	136	W 63_19	P71	BN71B4	BE71B4	138	
76	36	1.6	18	2080						VF 49_18	P71	BN71B4	BE71B4	130
79	33	0.9	35	1860						VF 44_35	P71	BN71A2		124
91	32	2.0	10	1930						VF 49_10	P80	BN80A6		130
98	29	1.0	14	1690						VF 44_14	P71	BN71B4	BE71B4	124
98	29	2.2	14	1940						VF 49_14	P71	BN71B4	BE71B4	130
117	24	2.0	24	1880						VF 49_24	P71	BN71A2		130
137	22	1.3	10	1520						VF 44_10	P71	BN71B4	BE71B4	124
137	22	2.7	10	1750						VF 49_10	P71	BN71B4	BE71B4	130
138	21	1.4	20	1570						VF 44_20	P71	BN71A2		124
153	19	2.3	18	1720						VF 49_18	P71	BN71A2		130
196	16	1.9	7	1360						VF 44_7	P71	BN71B4	BE71B4	124
196	16	3.5	7	1570						VF 49_7	P71	BN71B4	BE71B4	130
275	11	2.0	10	1260						VF 44_10	P71	BN71A2		124
393	8	2.8	7	1120						VF 44_7	P71	BN71A2		124










0.37 kW

n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	  IE3			 IEC	  IE3							
0.28	2734	1.6	3200	19500	W/VF 63/130_3200 S10 MXN10MB4	S10	MXN10MB4	158	W/VF 63/130_3200	P71	BXN71MB4	158				
0.31	2858	0.9	2944	16000					W/VF 86/185_3200	P71	BXN71MB4	174				
0.36	2684	1.6	2560	19500					W/VF 63/130_2560	P71	BXN71MB4	158				
0.43	1403	1.3	3200	13800					W/VF 86/185_2560	P71	BXN71MB4	174				
0.43	1981	2.1	3200	19500	W/VF 63/130_3200	S10	MXN10MB4	166	W/VF 86/150_2944	P71	BXN71MB4	166				
0.47	2050	1.3	2944	16000	W/VF 63/130_2560	S10	MXN10MB4	158	W/VF 63/130_2560	P71	BXN71MB4	158				
0.54	1519	1.2	2560	13800	W/VF 86/185_2560	S10	MXN10MB4	174	W/VF 86/185_2560	P71	BXN71MB4	174				
0.54	1915	2.2	2560	19500	W/VF 86/150_1840 S10 MXN10MB4	S10	MXN10MB4	166	W/VF 86/150_1840	P71	BXN71MB4	166				
0.60	1771	1.0	1520	13800					W/VF 86/185_1840	P71	BXN71MB4	174				
0.66	2143	1.3	1380	16000					W/VF 63/130_1800	P71	BXN71MB4	158				
0.74	1803	1.4	1840	16000					W/VF 86/185_1600	P71	BXN71MB4	174				
0.74	1614	2.6	1840	19500	W/VF 63/130_1520	S10	MXN10MB4	158	W/VF 63/130_1520	P71	BXN71MB4	158				
0.76	1300	1.4	1800	13800	W/VF 86/150_1380 S10 MXN10MB4	S10	MXN10MB4	166	W/VF 86/150_1380	P71	BXN71MB4	166				
0.86	1444	2.9	1600	19500					VF/W 49/110_1350	P71	BXN71MB4	151				
0.90	1255	1.4	1520	13800					W/VF 63/130_1200	P71	BXN71MB4	158				
0.99	1357	3.2	920	19500					VF/W 49/110_1080	P71	BXN71MB4	151				
1.0	1495	1.7	1380	16000	W/VF 63/130_960 S10 MXN10MB4	S10	MXN10MB4	158	W/VF 86/150_920	P71	BXN71MB4	166				
1.0	1045	1.0	1350	8000					W/VF 86/150_920	P71	BXN71MB4	166				
1.1	1052	1.7	1200	13800					W/VF 63/130_760 S10 MXN10MB4	S10	MXN10MB4	158	W/VF 63/130_760	P71	BXN71MB4	158
1.3	864	1.2	1080	8000									VF/W 49/110_720	P71	BXN71MB4	151
1.3	1259	2.1	690	16000	W/VF 86/150_690	P71	BXN71MB4	166								
1.4	916	2.0	960	13800	W/VF 63/130_600	P71	BXN71MB4	158								
1.5	1068	2.4	920	16000	W/VF 63/130_600	S10	MXN10MB4	158	VF/W 49/110_540	P71	BXN71MB4	151				
1.7	797	1.3	540	8000	W/VF 86/150_529 S10 MXN10MB4	S10	MXN10MB4	166	W/VF 86/150_529	P71	BXN71MB4	166				
1.7	1068	2.5	529	16000					VF/W 44/86_400 P71 BXN71MB4	P71	BXN71MB4	147				
1.8	764	2.4	760	13800									VF/W 49/110_400 P71 BXN71MB4	P71	BXN71MB4	151
1.9	743	1.3	720	8000												
2.0	890	2.9	690	16000												
2.3	619	2.9	600	13800												
2.5	571	1.8	540	8000	WR 110_300 P71 BXN71MB4	P71	BXN71MB4	150								
2.6	750	3.5	529	16000					VF/W 44/86_300 P71 BXN71MB4	P71	BXN71MB4	147				
3.0	559	1.0	300	8000									VF/W 49/110_300 P71 BXN71MB4	P71	BXN71MB4	151
3.0	571	1.8	300	13800												
3.0	547	1.9	300	8000												
3.4	423	1.2	400	7000												
3.4	464	2.2	400	8000	WR 86_240 P71 BXN71MB4	P71	BXN71MB4	146								
3.8	494	1.2	240	8000					WR 110_240 P71 BXN71MB4	P71	BXN71MB4	150				
3.8	503	2.4	240	13800												
4.0	455	2.3	230	8000												
4.6	395	1.4	300	8000												
4.6	348	1.4	300	7000	VF/W 44/86_230 P71 BXN71MB4	P71	BXN71MB4	147								
4.6	371	2.7	300	8000					VF/W 49/110_230 P71 BXN71MB4	P71	BXN71MB4	151				
4.7	410	1.0	192	7000												
4.7	425	1.6	192	8000												
4.7	432	3.0	192	13800												
5.4	372	1.0	168	7000	WR 86_192 P71 BXN71MB4	P71	BXN71MB4	146								
5.4	391	2.0	168	8000					WR 110_192 P71 BXN71MB4	P71	BXN71MB4	150				
5.4	391	3.4	168	13800												
5.7	328	0.9	240	7000												
5.7	347	1.6	240	8000												
6.0	320	1.6	230	7000	WR 75_180 P71 BXN71MB4	P71	BXN71MB4	142								
6.0	308	3.2	230	8000					WR 86_168 P71 BXN71MB4	P71	BXN71MB4	146				
6.1	320	1.0	150	6200									WR 110_168 P71 BXN71MB4	P71	BXN71MB4	150
6.6	327	1.3	138	7000												
6.6	338	2.4	138	8000												
7.1	287	1.1	192	7000												
7.1	297	2.1	192	8000	WR 75_150 P71 BXN71MB4	P71	BXN71MB4	142								
7.6	294	1.5	120	7000					WR 86_138 P71 BXN71MB4	P71	BXN71MB4	146				
7.6	303	2.9	120	8000												
7.6	255	0.9	180	6200												
8.2	260	1.4	168	7000	WR 110_138 P71 BXN71MB4	P71	BXN71MB4	150								
8.2	273	2.6	168	8000					WR 75_120 P71 BXN71MB4	P71	BXN71MB4	142				
9.1	214	1.2	100	7000									WR 86_120 P71 BXN71MB4	P71	BXN71MB4	146
9.1	224	1.2	150	6200												
9.9	224	1.8	138	7000												
9.9	235	3.0	138	8000												
10.1	234	1.6	90	6200	WR 110_90 P71 BXN71MB4	P71	BXN71MB4	142								
11.4	168	1.2	80	6200					WR 75_80 P71 BXN71MB4	P71	BXN71MB4	146				
11.4	183	1.5	80	7000									WR 86_80 P71 BXN71MB4	P71	BXN71MB4	150
11.4	195	1.6	120	6200												
11.4	204	1.9	120	7000												

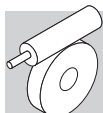


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





n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	  IE3				   IE3			
12.0	179	1.0	114	5000	W 75_100 W 86_100	S10 S10	MXN10MB4 MXN10MB4	140 144	WR 63_114	P71	BXN71MB4	138
12.1	204	1.6	75	6200								
13.2	196	2.0	69	7000								
13.7	142	1.1	100	6200								
13.7	152	1.5	100	7000	W 63_80 W 75_80 W 86_80	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	136 140 144	W 75_100	P71	BXN71MB4	141
14.2	139	1.0	64	5000					W 86_100	P71	BXN71MB4	145
15.2	140	1.5	60	6200								
15.2	149	1.3	90	5000					WR 63_90	P71	BXN71MB4	138
15.2	160	2.0	90	6200	W 63_80 W 75_80 W 86_80	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	136 140 144	WR 75_90	P71	BXN71MB4	142
15.2	156	2.8	90	7000					WR 86_90	P71	BXN71MB4	146
16.3	144	2.3	56	7000								
17.1	116	1.0	80	5000					W 63_80	P71	BXN71MB4	138
17.1	122	1.5	80	6200	W 63_64 W 86_64 W 75_60	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	136 144 140	W 75_80	P71	BXN71MB4	141
17.1	132	1.9	80	7000					W 86_80	P71	BXN71MB4	145
18.3	141	2.1	75	6200					WR 75_75	P71	BXN71MB4	142
19.0	130	1.4	72	4830					WR 63_72	P71	BXN71MB4	138
19.9	133	2.8	69	7000	W 63_64 W 86_64 W 75_60	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	136 144 140	WR 86_69	P71	BXN71MB4	146
20.2	136	2.6	45	6200								
21.4	101	1.2	64	4870					W 63_64	P71	BXN71MB4	138
21.4	112	2.5	64	7000					W 86_64	P71	BXN71MB4	145
22.8	101	2.0	60	6200	W 63_64 W 86_64 W 75_60	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	136 144 140	W 75_60	P71	BXN71MB4	141
22.8	119	2.5	60	6200					WR 75_60	P71	BXN71MB4	142
22.8	119	3.2	60	7000					WR 86_60	P71	BXN71MB4	146
24.0	107	1.7	57	4540					WR 63_57	P71	BXN71MB4	138
24.5	101	3.0	56	7000	W 86_56 W 75_50 W 63_45	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	144 140 136	W 86_56	P71	BXN71MB4	145
27.4	88	2.5	50	6200					W 75_50	P71	BXN71MB4	141
30	73	0.9	45	2680					VF 49_45	P71	BXN71MB4	130
30	78	1.9	45	4400					W 63_45	P71	BXN71MB4	138
30	88	2.0	45	4250	W 75_40 W 63_38 W 63_30	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	140 136 136	WR 63_45	P71	BXN71MB4	138
30	93	3.2	45	5880					WR 75_45	P71	BXN71MB4	142
34	74	3.4	40	5820					W 75_40	P71	BXN71MB4	141
36	69	2.3	38	4180					W 63_38	P71	BXN71MB4	138
38	62	1.1	36	2530	W 63_30 W 63_24 W 63_19	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	136 136 136	VF 49_36	P71	BXN71MB4	130
38	73	2.2	36	3980					WR 63_36	P71	BXN71MB4	138
46	57	2.8	30	3900					W 63_30	P71	BXN71MB4	138
49	51	1.4	28	2360					VF 49_28	P71	BXN71MB4	130
57	46	1.4	24	2250	W 63_24 W 63_19 W 63_18	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	136 136 136	VF 49_24	P71	BXN71MB4	130
57	48	3.2	24	3650					W 63_24	P71	BXN71MB4	138
65	42	1.7	14	1940								
69	40	1.0	20	1870					VF 44_20	P71	BXN71MB4	124
72	40	3.8	19	3400	W 63_19 W 63_18 W 63_17	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	136 136 136	W 63_19	P71	BXN71MB4	138
76	36	1.6	18	2080					VF 49_18	P71	BXN71MB4	130
79	33	0.9	35	1860								
91	32	2.0	10	1930								
98	29	1.0	14	1690	W 63_18 W 63_17 W 63_16	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	136 136 136	VF 44_14	P71	BXN71MB4	124
98	29	2.2	14	1940					VF 49_14	P71	BXN71MB4	130
117	24	2.0	24	1880								
137	22	1.3	10	1520					VF 44_10	P71	BXN71MB4	124
137	22	2.7	10	1750	W 63_16 W 63_15 W 63_14	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	136 136 136	VF 49_10	P71	BXN71MB4	130
138	21	1.4	20	1570								
153	19	2.3	18	1720								
196	16	1.9	7	1360					VF 44_7	P71	BXN71MB4	124
196	16	3.5	7	1570	W 63_14 W 63_13 W 63_12	S10 S10 S10	MXN10MB4 MXN10MB4 MXN10MB4	136 136 136	VF 49_7	P71	BXN71MB4	130
275	11	2.0	10	1260								
393	8	2.8	7	1120								

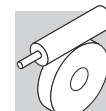
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE1 IE2		 IEC		 IE3
0.29	4019	1.1	3200	19500	W/VF 86/185_3200 W/VF 86/185_2560 W/VF 86/185_3200 W/VF 86/150_2944 W/VF 86/185_1840	P80 P80 P80 P80 P80	BN80B6 BN80B6 BN80A4 BN80A4 BN80B6		174
0.36	3946	1.1	2560	19500					174
0.43	2902	1.4	3200	19500					174
0.47	3004	0.9	2944	16000					166
0.50	3362	1.3	1840	19500	W/VF 86/185_2560 W/VF 86/150_1840 W/VF 86/185_1840 W/VF 86/185_1840	P80 P80 P80 P80	BN80A4 BN80A4 BN80A4 BN80A4	BE80A4 BE80A4 BE80A4 BE80A4	174
0.54	2805	1.5	2560	19500					174
0.76	2642	1.0	1840	16000					166
0.76	2364	1.8	1840	19500					174










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






n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE1  IE2			 IE1  IE2					
0.77	1905	0.9	1800	13800				W/VF 63/130_1800	P80	BN80A4	BE80A4	158	
0.87	2116	2.0	1600	19500				W/VF 86/185_1600	P80	BN80A4	BE80A4	174	
0.91	1838	1.0	1520	13800				W/VF 63/130_1520	P80	BN80A4	BE80A4	158	
1.0	1996	2.2	920	19500				W/VF 86/185_920	P80	BN80B6		174	
1.0	2190	1.2	1380	16000				W/VF 86/150_1380	P80	BN80A4	BE80A4	166	
1.2	1542	1.2	1200	13800				W/VF 63/130_1200	P80	BN80A4	BE80A4	158	
1.2	1542	2.7	1200	19500				W/VF 86/185_1200	P80	BN80A4	BE80A4	174	
1.3	1852	1.5	690	16000				W/VF 86/150_690	P80	BN80B6		166	
1.4	1342	1.3	960	13800				W/VF 63/130_960	P80	BN80A4	BE80A4	158	
1.5	1564	1.7	920	16000				W/VF 86/150_920	P80	BN80A4	BE80A4	166	
1.5	1460	2.9	920	19500				W/VF 86/185_920	P80	BN80A4	BE80A4	174	
1.5	1473	3.0	600	19500				W/VF 86/185_600	P80	BN80B6		174	
1.7	1300	3.2	800	19500				W/VF 86/185_800	P80	BN80A4	BE80A4	174	
1.7	1570	1.7	529	16000				W/VF 86/150_529	P80	BN80B6		166	
1.8	1120	1.6	760	13800				W/VF 63/130_760	P80	BN80A4	BE80A4	158	
2.0	1304	2.0	690	16000				W/VF 86/150_690	P80	BN80A4	BE80A4	166	
2.3	1028	1.0	400	8000				VF/W 49/110_400	P80	BN80B6		151	
2.3	907	2.0	600	13800				W/VF 63/130_600	P80	BN80A4	BE80A4	158	
2.6	837	1.2	540	8000				VF/W 49/110_540	P80	BN80A4	BE80A4	151	
2.6	1099	2.4	529	16000				W/VF 86/150_529	P80	BN80A4	BE80A4	166	
3.0	956	2.7	460	16000				W/VF 86/150_460	P80	BN80A4	BE80A4	166	
3.1	839	1.2	300	13800				VFR 130_300	P80	BN80B6		154	
3.1	805	1.3	300	8000				VF/W 49/110_300	P80	BN80B6		151	
3.5	680	1.5	400	8000				VF/W 49/110_400	P80	BN80A4	BE80A4	151	
3.5	665	2.7	400	13800				W/VF 63/130_400	P80	BN80A4	BE80A4	158	
3.8	740	1.6	240	13800				VFR 130_240	P80	BN80B6		154	
4.0	670	1.6	230	8000				VF/W 49/110_230	P80	BN80B6		151	
4.0	756	3.4	345	16000				W/VF 86/150_345	P80	BN80A4	BE80A4	166	
4.6	578	0.9	300	8000				WR 110_300	P80	BN80A4	BE80A4	150	
4.6	601	1.5	300	13800				VFR 130_300	P80	BN80A4	BE80A4	154	
4.6	544	1.8	300	8000				VF/W 49/110_300	P80	BN80A4	BE80A4	151	
4.8	625	1.1	192	8000				WR 110_192	P80	BN80B6		150	
5.0	529	3.4	280	13800				W/VF 63/130_280	P80	BN80A4	BE80A4	158	
5.8	508	1.1	240	8000				WR 110_240	P80	BN80A4	BE80A4	150	
5.8	517	2.2	240	13800				VFR 130_240	P80	BN80A4	BE80A4	154	
6.0	452	2.2	230	8000				VF/W 49/110_230	P80	BN80A4	BE80A4	151	
6.7	504	3.0	138	13800				VFR 130_138	P80	BN80B6		154	
7.2	435	1.4	192	8000				WR 110_192	P80	BN80A4	BE80A4	150	
7.2	443	2.7	192	13800				VFR 130_192	P80	BN80A4	BE80A4	154	
7.7	432	1.0	120	7000				WR 86_120	P80	BN80B6		146	
8.3	381	0.9	168	7000				WR 86_168	P80	BN80A4	BE80A4	146	
8.3	400	1.8	168	8000				WR 110_168	P80	BN80A4	BE80A4	150	
8.3	406	3.0	168	13800	W 110_100 S2	M2SA6	148	VFR 130_168	P80	BN80A4	BE80A4	154	
9.2	325	1.5	100	8000				W 110_100	P80	BN80B6		149	
10.1	329	1.2	138	7000				WR 86_138	P80	BN80A4	BE80A4	146	
10.1	344	2.1	138	8000				WR 110_138	P80	BN80A4	BE80A4	150	
10.2	344	1.1	90	6200	W 86_80 S2	M2SA6	144	WR 75_90	P80	BN80B6		142	
11.5	269	1.0	80	7000				W 86_80	P80	BN80B6		145	
11.6	286	1.1	120	6200				WR 75_120	P80	BN80A4	BE80A4	142	
11.6	299	1.3	120	7000				WR 86_120	P80	BN80A4	BE80A4	146	
11.6	308	2.6	120	8000				WR 110_120	P80	BN80A4	BE80A4	150	
12.3	300	1.1	75	6200				WR 75_75	P80	BN80B6		142	
13.3	288	1.4	69	7000	W 86_100 S1	M1LA4	ME2SA4	144	WR 86_69	P80	BN80B6		146
13.3	295	2.5	69	8000					WR 110_69	P80	BN80B6		150
13.8	225	1.0	100	7000					W 86_100	P80	BN80A4	BE80A4	145
15.4	235	1.4	90	6200					WR 75_90	P80	BN80A4	BE80A4	142
15.4	228	1.9	90	7000				WR 86_90	P80	BN80A4	BE80A4	146	
15.4	238	3.5	90	8000	W 86_56 S2	M2SA6	144	WR 110_90	P80	BN80A4	BE80A4	150	
16.4	211	1.5	56	7000				W 86_56	P80	BN80B6		145	
17.3	180	1.0	80	6200				W 75_80	P80	BN80A4	BE80A4	141	
17.3	195	1.3	80	7000				W 86_80	P80	BN80A4	BE80A4	145	
18.5	207	1.4	75	6200	W 86_80 S1	M1LA4	ME2SA4	144	WR 75_75	P80	BN80A4	BE80A4	142
20.1	196	1.9	69	7000	W 63_45 S2	M2SA6	136	WR 86_69	P80	BN80A4	BE80A4	146	
20.1	201	3.2	69	8000				WR 110_69	P80	BN80A4	BE80A4	150	
20.4	162	1.0	45	4540				W 63_45	P80	BN80B6		138	
21.6	166	1.7	64	7000				W 86_64 S1	M1LA4	ME2SA4	144	W 86_64	P80
23.0	148	1.3	60	6200	W 75_60 S1	M1LA4	ME2SA4	140	W 75_60	P80	BN80A4	BE80A4	141
23.0	162	2.2	40	7000	W 86_40 S2	M2SA6	144	W 86_40	P80	BN80B6		145	
23.2	175	1.7	60	6040				WR 75_60	P80	BN80A4	BE80A4	142	
23.2	175	2.2	60	7000				WR 86_60	P80	BN80A4	BE80A4	146	
24.2	143	1.2	38	4340				W 63_38 S2	M2SA6	136	W 63_38	P80	BN80B6
24.6	149	2.0	56	7000	W 86_56 S1	M1LA4	ME2SA4	144	W 86_56	P80	BN80A4	BE80A4	145
27.6	129	1.7	50	5960	W 75_50 S1	M1LA4	ME2SA4	140	W 75_50	P80	BN80A4	BE80A4	141
30	128	2.7	46	7000	W 86_46 S1	M1LA4	ME2SA4	144	W 86_46	P80	BN80A4	BE80A4	145
31	115	1.3	45	4140	W 63_45 S1	M1LA4	ME2SA4	136	W 63_45	P80	BN80A4	BE80A4	138
31	136	2.2	45	5580					WR 75_45	P80	BN80A4	BE80A4	142

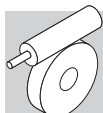


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





n2 min ⁻¹	M2 Nm	S	i	Rn2 N	 					  IEC 				
					IE1 IE2					IE1 IE2				
31	133	2.9	45	7000						WR 86_45	P80	BN80A4	BE80A4	146
35	110	2.3	40	5610	W 75_40	S1	M1LA4	ME2SA4	140	W 75_40	P80	BN80A4	BE80A4	141
35	114	2.9	40	7000	W 86_40	S1	M1LA4	ME2SA4	144	W 86_40	P80	BN80A4	BE80A4	145
36	101	1.5	38	3950	W 63_38	S1	M1LA4	ME2SA4	136	W 63_38	P80	BN80A4	BE80A4	138
40	105	3.3	23	7000	W 86_23	S2	M2SA6		144	W 86_23	P80	BN80B6		145
46	84	1.9	30	3700	W 63_30	S1	M1LA4	ME2SA4	136	W 63_30	P80	BN80A4	BE80A4	138
46	88	3.1	30	5150	W 75_30	S1	M1LA4	ME2SA4	140	W 75_30	P80	BN80A4	BE80A4	141
46	95	2.9	30	4950						WR 75_30	P80	BN80A4	BE80A4	142
49	76	1.0	28	2170						VF 49_28	P80	BN80A4	BE80A4	130
55	76	3.3	25	4880	W 75_25	S1	M1LA4	ME2SA4	140	W 75_25	P80	BN80A4	BE80A4	141
58	69	0.9	24	2080						VF 49_24	P80	BN80A4	BE80A4	130
58	71	2.2	24	3480	W 63_24	S1	M1LA4	ME2SA4	136	W 63_24	P80	BN80A4	BE80A4	138
66	62	1.1	14	1960						VF 49_14	P80	BN80B6		130
73	59	2.6	19	3260	W 63_19	S1	M1LA4	ME2SA4	136	W 63_19	P80	BN80A4	BE80A4	138
77	53	1.1	18	1930						VF 49_18	P80	BN80A4	BE80A4	130
92	47	1.4	10	1800						VF 49_10	P80	BN80B6		130
92	47	3.2	15	3050	W 63_15	S1	M1LA4	ME2SA4	136	W 63_15	P80	BN80A4	BE80A4	138
99	43	1.5	14	1810						VF 49_14	P80	BN80A4	BE80A4	130
115	39	3.6	12	2850	W 63_12	S1	M1LA4	ME2SA4	136	W 63_12	P80	BN80A4	BE80A4	138
117	35	1.3	24	1800						VF 49_24	P71	BN71B2		130
131	35	3.7	7	2700	W 63_7	S2	M2SA6		136	W 63_7	P80	BN80B6		138
138	32	1.8	10	1650						VF 49_10	P80	BN80A4	BE80A4	130
141	30	1.0	20	1490						VF 44_20	P71	BN71B2		124
156	28	1.6	18	1650						VF 49_18	P71	BN71B2		130
197	23	2.4	7	1480						VF 49_7	P80	BN80A4	BE80A4	130
281	16	1.4	10	1210						VF 44_10	P71	BN71B2		124
281	16	2.7	10	1390						VF 49_10	P71	BN71B2		130
401	12	1.9	7	1080						VF 44_7	P71	BN71B2		124

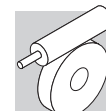
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 		  IEC 	
					IE3		IE3	
0.29	4019	1.1	3200	19500				
0.36	3946	1.1	2560	19500				
0.43	2902	1.4	3200	19500	W/VF 86/185_3200 S20 MXN20MA4	174	W/VF 86/185_3200 P80 BXN80MA4	174
0.47	3004	0.9	2944	16000	W/VF 86/150_2944 S20 MXN20MA4	166	W/VF 86/150_2944 P80 BXN80MA4	166
0.50	3362	1.3	1840	19500				
0.54	2805	1.5	2560	19500	W/VF 86/185_2560 S20 MXN20MA4	174	W/VF 86/185_2560 P80 BXN80MA4	174
0.76	2642	1.0	1840	16000	W/VF 86/150_1840 S20 MXN20MA4	166	W/VF 86/150_1840 P80 BXN80MA4	166
0.76	2364	1.8	1840	19500	W/VF 86/185_1840 S20 MXN20MA4	174	W/VF 86/185_1840 P80 BXN80MA4	174
0.77	1905	0.9	1800	13800	W/VF 63/130_1800 S20 MXN20MA4	158	W/VF 63/130_1800 P80 BXN80MA4	158
0.87	2116	2.0	1600	19500	W/VF 86/185_1600 S20 MXN20MA4	174	W/VF 86/185_1600 P80 BXN80MA4	174
0.91	1838	1.0	1520	13800	W/VF 63/130_1520 S20 MXN20MA4	158	W/VF 63/130_1520 P80 BXN80MA4	158
1.0	1996	2.2	920	19500				
1.0	2190	1.2	1380	16000	W/VF 86/150_1380 S20 MXN20MA4	166	W/VF 86/150_1380 P80 BXN80MA4	166
1.2	1542	1.2	1200	13800	W/VF 63/130_1200 S20 MXN20MA4	158	W/VF 63/130_1200 P80 BXN80MA4	158
1.2	1542	2.7	1200	19500	W/VF 86/185_1200 S20 MXN20MA4	174	W/VF 86/185_1200 P80 BXN80MA4	174
1.3	1852	1.5	690	16000				
1.4	1342	1.3	960	13800	W/VF 63/130_960 S20 MXN20MA4	158	W/VF 63/130_960 P80 BXN80MA4	158
1.5	1564	1.7	920	16000	W/VF 86/150_920 S20 MXN20MA4	166	W/VF 86/150_920 P80 BXN80MA4	166
1.5	1460	2.9	920	19500	W/VF 86/185_920 S20 MXN20MA4	174	W/VF 86/185_920 P80 BXN80MA4	174
1.5	1473	3.0	600	19500				
1.7	1300	3.2	800	19500	W/VF 86/185_800 S20 MXN20MA4	174	W/VF 86/185_800 P80 BXN80MA4	174
1.7	1570	1.7	529	16000				
1.8	1120	1.6	760	13800	W/VF 63/130_760 S20 MXN20MA4	158	W/VF 63/130_760 P80 BXN80MA4	158
2.0	1304	2.0	690	16000	W/VF 86/150_690 S20 MXN20MA4	166	W/VF 86/150_690 P80 BXN80MA4	166
2.3	1028	1.0	400	8000				
2.3	907	2.0	600	13800	W/VF 63/130_600 S20 MXN20MA4	158	W/VF 63/130_600 P80 BXN80MA4	158
2.6	837	1.2	540	8000			VF/W 49/110_540 P80 BXN80MA4	151
2.6	1099	2.4	529	16000	W/VF 86/150_529 S20 MXN20MA4	166	W/VF 86/150_529 P80 BXN80MA4	166
3.0	956	2.7	460	16000	W/VF 86/150_460 S20 MXN20MA4	166	W/VF 86/150_460 P80 BXN80MA4	166
3.1	839	1.2	300	13800				
3.1	805	1.3	300	8000				
3.5	680	1.5	400	8000				
3.5	665	2.7	400	13800	W/VF 63/130_400 S20 MXN20MA4	158	W/VF 63/130_400 P80 BXN80MA4	158
3.8	740	1.6	240	13800				
4.0	670	1.6	230	8000				
4.0	756	3.4	345	16000	W/VF 86/150_345 S20 MXN20MA4	166	W/VF 86/150_345 P80 BXN80MA4	166
4.6	578	0.9	300	8000			WR 110_300 P80 BXN80MA4	150
4.6	601	1.5	300	13800			VFR 130_300 P80 BXN80MA4	154









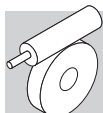
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	  IE3	 IEC	  IE3	 IEC
4.6	544	1.8	300	8000			VF/W 49/110_300 P80 BXN80MA4	151
4.8	625	1.1	192	8000				
5.0	529	3.4	280	13800	W/VF 63/130_280 S20 MXN20MA4	158	W/VF 63/130_280 P80 BXN80MA4	158
5.8	508	1.1	240	8000			WR 110_240 P80 BXN80MA4	150
5.8	517	2.2	240	13800			VFR 130_240 P80 BXN80MA4	154
6.0	452	2.2	230	8000			VF/W 49/110_230 P80 BXN80MA4	151
6.7	504	3.0	138	13800				
7.2	435	1.4	192	8000			WR 110_192 P80 BXN80MA4	150
7.2	443	2.7	192	13800			VFR 130_192 P80 BXN80MA4	154
7.7	432	1.0	120	7000				
8.3	381	0.9	168	7000			WR 86_168 P80 BXN80MA4	146
8.3	400	1.8	168	8000			WR 110_168 P80 BXN80MA4	150
8.3	406	3.0	168	13800			VFR 130_168 P80 BXN80MA4	154
9.2	325	1.5	100	8000				
10.1	329	1.2	138	7000			WR 86_138 P80 BXN80MA4	146
10.1	344	2.1	138	8000			WR 110_138 P80 BXN80MA4	150
10.2	344	1.1	90	6200				
11.5	269	1.0	80	7000				
11.6	286	1.1	120	6200			WR 75_120 P80 BXN80MA4	142
11.6	299	1.3	120	7000			WR 86_120 P80 BXN80MA4	146
11.6	308	2.6	120	8000			WR 110_120 P80 BXN80MA4	150
12.3	300	1.1	75	6200				
13.3	288	1.4	69	7000				
13.3	295	2.5	69	8000	W 86_100 S20 MXN20MA4	144	W 86_100 P80 BXN80MA4	145
13.8	225	1.0	100	7000			WR 75_90 P80 BXN80MA4	142
15.4	235	1.4	90	6200			WR 86_90 P80 BXN80MA4	146
15.4	228	1.9	90	7000			WR 110_90 P80 BXN80MA4	150
15.4	238	3.5	90	8000				
16.4	211	1.5	56	7000				
17.3	180	1.0	80	6200	W 75_80 S20 MXN20MA4	140	W 75_80 P80 BXN80MA4	141
17.3	195	1.3	80	7000	W 86_80 S20 MXN20MA4	144	W 86_80 P80 BXN80MA4	145
18.5	207	1.4	75	6200			WR 75_75 P80 BXN80MA4	142
20.1	196	1.9	69	7000			WR 86_69 P80 BXN80MA4	146
20.1	201	3.2	69	8000			WR 110_69 P80 BXN80MA4	150
20.4	162	1.0	45	4540				
21.6	166	1.7	64	7000	W 86_64 S20 MXN20MA4	144	W 86_64 P80 BXN80MA4	145
23.0	148	1.3	60	6200	W 75_60 S20 MXN20MA4	140	W 75_60 P80 BXN80MA4	141
23.0	162	2.2	40	7000				
23.2	175	1.7	60	6040			WR 75_60 P80 BXN80MA4	142
23.2	175	2.2	60	7000			WR 86_60 P80 BXN80MA4	146
24.2	143	1.2	38	4340				
24.6	149	2.0	56	7000	W 86_56 S20 MXN20MA4	144	W 86_56 P80 BXN80MA4	145
27.6	129	1.7	50	5960	W 75_50 S20 MXN20MA4	140	W 75_50 P80 BXN80MA4	141
30	128	2.7	46	7000	W 86_46 S20 MXN20MA4	144	W 86_46 P80 BXN80MA4	145
31	115	1.3	45	4140	W 63_45 S20 MXN20MA4	136	W 63_45 P80 BXN80MA4	138
31	136	2.2	45	5580			WR 75_45 P80 BXN80MA4	142
31	133	2.9	45	7000			WR 86_45 P80 BXN80MA4	146
35	110	2.3	40	5610	W 75_40 S20 MXN20MA4	140	W 75_40 P80 BXN80MA4	141
35	114	2.9	40	7000	W 86_40 S20 MXN20MA4	144	W 86_40 P80 BXN80MA4	145
36	101	1.5	38	3950	W 63_38 S20 MXN20MA4	136	W 63_38 P80 BXN80MA4	138
40	105	3.3	23	7000				
46	84	1.9	30	3700	W 63_30 S20 MXN20MA4	136	W 63_30 P80 BXN80MA4	138
46	88	3.1	30	5150	W 75_30 S20 MXN20MA4	140	W 75_30 P80 BXN80MA4	141
46	95	2.9	30	4950			WR 75_30 P80 BXN80MA4	142
49	76	1.0	28	2170			VF 49_28 P80 BXN80MA4	130
55	76	3.3	25	4880	W 75_25 S20 MXN20MA4	140	W 75_25 P80 BXN80MA4	141
58	69	0.9	24	2080			VF 49_24 P80 BXN80MA4	130
58	71	2.2	24	3480	W 63_24 S20 MXN20MA4	136	W 63_24 P80 BXN80MA4	138
66	62	1.1	14	1960				
73	59	2.6	19	3260	W 63_19 S20 MXN20MA4	136	W 63_19 P80 BXN80MA4	138
77	53	1.1	18	1930			VF 49_18 P80 BXN80MA4	130
92	47	1.4	10	1800				
92	47	3.2	15	3050	W 63_15 S20 MXN20MA4	136	W 63_15 P80 BXN80MA4	138
99	43	1.5	14	1810			VF 49_14 P80 BXN80MA4	130
115	39	3.6	12	2850	W 63_12 S20 MXN20MA4	136	W 63_12 P80 BXN80MA4	138
117	35	1.3	24	1800				
131	35	3.7	7	2700				
138	32	1.8	10	1650			VF 49_10 P80 BXN80MA4	130
141	30	1.0	20	1490				
156	28	1.6	18	1650				
197	23	2.4	7	1480			VF 49_7 P80 BXN80MA4	130
281	16	1.4	10	1210				
281	16	2.7	10	1390				
401	12	1.9	7	1080				










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






n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE2	 IE3		 IE2	 IE3		
0.29	4867	1.3	3200	34500				VF/VF 130/210_3200	P90	BE90S6	180
0.29	4623	1.9	3200	52000				VF/VF 130/250_3200	P90	BE90S6	186
0.37	4672	1.4	2560	34500				VF/VF 130/210_2560	P90	BE90S6	180
0.37	4478	2.0	2560	52000				VF/VF 130/250_2560	P90	BE90S6	186
0.45	3852	1.1	3200	19500				W /VF 86/185_3200	P80	BE80B4 BX80B4	174
0.51	4478	1.0	1840	19500				W /VF 86/185_1840	P90	BE90S6	174
0.51	3918	1.6	1840	34500				VF/VF 130/210_1840	P90	BE90S6	180
0.51	4058	2.3	1840	52000				VF/VF 130/250_1840	P90	BE90S6	186
0.56	3724	1.1	2560	19500				W /VF 86/185_2560	P80	BE80B4 BX80B4	174
0.78	3138	1.3	1840	19500				W /VF 86/185_1840	P80	BE80B4 BX80B4	174
0.90	2809	1.5	1600	19500				W /VF 86/185_1600	P80	BE80B4 BX80B4	174
1.0	2659	1.6	920	19500				W /VF 86/185_920	P90	BE90S6	174
1.2	2046	0.9	1200	13800				W /VF 63/130_1200	P80	BE80B4 BX80B4	158
1.2	2046	2.0	1200	19500				W /VF 86/185_1200	P80	BE80B4 BX80B4	174
1.4	2466	1.1	690	16000				W /VF 86/150_690	P90	BE90S6	166
1.5	1781	1.0	960	13800				W /VF 63/130_960	P80	BE80B4 BX80B4	158
1.5	2076	1.2	920	16000				W /VF 86/150_920	P80	BE80B4 BX80B4	166
1.5	1938	2.1	920	19500				W /VF 86/185_920	P80	BE80B4 BX80B4	174
1.8	2092	1.3	529	16000				W /VF 86/150_529	P90	BE90S6	166
1.8	1725	2.4	800	19500				W /VF 86/185_800	P80	BE80B4 BX80B4	174
1.8	1486	1.2	760	13800				W /VF 63/130_760	P80	BE80B4 BX80B4	158
2.0	1730	1.5	690	16000				W /VF 86/150_690	P80	BE80B4 BX80B4	166
2.3	1204	1.5	600	13800				W /VF 63/130_600	P80	BE80B4 BX80B4	158
2.3	1354	3.1	600	19500				W /VF 86/185_600	P80	BE80B4 BX80B4	174
2.7	1460	1.7	529	16000				W /VF 86/150_529	P80	BE80B4 BX80B4	166
3.1	1269	2.0	460	16000				W /VF 86/150_460	P80	BE80B4 BX80B4	166
3.1	1140	1.2	300	16000				VFR 150_300	P90	BE90S6	162
3.1	1141	2.1	300	19500				VFR 185_300	P90	BE90S6	170
3.6	903	1.1	400	8000				VF/W 49/110_400	P80	BE80B4 BX80B4	151
3.6	882	2.0	400	13800				W /VF 63/130_400	P80	BE80B4 BX80B4	158
3.9	986	1.2	240	13800				VFR 130_240	P90	BE90S6	154
3.9	986	1.7	240	16000				VFR 150_240	P90	BE90S6	162
3.9	986	2.9	240	19500				VFR 185_240	P90	BE90S6	170
4.2	1004	2.6	345	16000				W /VF 86/150_345	P80	BE80B4 BX80B4	166
4.8	797	1.1	300	13800				VFR 130_300	P80	BE80B4 BX80B4	154
4.8	723	1.4	300	8000				VF/W 49/110_300	P80	BE80B4 BX80B4	151
4.8	873	3.0	300	16000				W /VF 86/150_300	P80	BE80B4 BX80B4	166
4.9	862	2.3	192	16000				VFR 150_192	P90	BE90S6	162
5.1	702	2.6	280	13800				W /VF 63/130_280	P80	BE80B4 BX80B4	158
5.6	767	1.0	168	8000				WR 110_168	P90	BE90S6	150
5.6	661	1.2	168	16000				VFR 150_168	P90	BE90S6	162
5.9	394	1.9	240	13800				VFR 130_240	P80	BE80B4 BX80B4	154
6.2	267	1.3	230	8000				VF/W 49/110_230	P80	BE80B4 BX80B4	151
6.8	661	1.2	138	8000				WR 110_138	P90	BE90S6	150
6.8	672	2.3	138	13800				VFR 130_138	P90	BE90S6	154
7.4	577	1.1	192	8000				WR 110_192	P80	BE80B4 BX80B4	150
7.5	587	2.0	192	13800				VFR 130_192	P80	BE80B4 BX80B4	154
8.5	530	1.3	168	8000				WR 110_168	P80	BE80B4 BX80B4	150
8.5	539	2.2	168	13800				VFR 130_168	P80	BE80B4 BX80B4	154
9.4	434	1.1	100	8000	W110_100 S3	ME3SA6	148	W 110_100	P90	BE90S6	149
9.4	448	1.7	100	13200				VF 130_100	P90	BE90S6	152
10.4	436	0.9	138	7000				WR 86_138	P80	BE80B4 BX80B4	146
10.4	455	1.6	138	8000				WR 110_138	P80	BE80B4 BX80B4	150
10.3	464	3.0	138	13800				VFR 130_138	P80	BE80B4 BX80B4	154
11.8	372	1.4	80	8000	W110_80 S3	ME3SA6	148	W 110_80	P90	BE90S6	149
11.8	390	2.5	80	13200				VF 130_80	P90	BE90S6	152
12.0	397	1.0	120	7000				WR 86_120	P80	BE80B4 BX80B4	146
12.0	409	1.9	120	8000				WR 110_120	P80	BE80B4 BX80B4	150
12.0	403	3.5	120	13800				VFR 130_120	P80	BE80B4 BX80B4	154
13.6	394	1.9	69	8000				WR 110_69	P90	BE90S6	150
14.3	311	1.5	100	8000	W110_100 S2	ME2SB4 MX2SB4	148	W 110_100	P80	BE80B4 BX80B4	149
14.7	307	1.0	64	7000	W86_64 S3	ME3SA6	144	W 86_64	P90	BE90S6	145
14.7	331	3.2	64	13200				VF 130_64	P90	BE90S6	152
15.9	312	1.0	90	6200				WR 75_90	P80	BE80B4 BX80B4	142
15.9	302	1.5	90	7000				WR 86_90	P80	BE80B4 BX80B4	146
15.9	316	2.6	90	8000				WR 110_90	P80	BE80B4 BX80B4	150
16.8	281	1.2	56	7000	W86_56 S3	ME3SA6	144	W 86_56	P90	BE90S6	145
16.8	289	2.2	56	8000	W110_56 S3	ME3SA6	148	W 110_56	P90	BE90S6	149
17.9	257	1.0	80	7000	W86_80 S2	ME2SB4 MX2SB4	144	W 86_80	P80	BE80B4 BX80B4	145
17.9	265	1.8	80	8000	W110_80 S2	ME2SB4 MX2SB4	148	W 110_80	P80	BE80B4 BX80B4	149
18.8	239	1.0	50	6200	W75_50 S3	ME3SA6	140	W 75_50	P90	BE90S6 BE90S6	141
19.1	275	1.1	75	5980				WR 75_75	P80	BE80B4 BX80B4	142

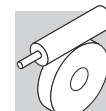


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






n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 					  IEC 				
				N	IE2IE3					IE2IE3				
20.7	260	1.5	69	7000						WR 86_69	P80	BE80B4	BX80B4	146
20.7	267	2.4	69	8000						WR 110_69	P80	BE80B4	BX80B4	150
20.9	267	1.3	45	6010						WR 75_45	P90	BE90S6		142
22.4	219	1.3	64	7000	W86_64	S2	ME2SB4	MX2SB4	144	W 86_64	P80	BE80B4	BX80B4	145
22.4	225	2.4	64	8000	W110_64	S2	ME2SB4	MX2SB4	148	W 110_64	P80	BE80B4	BX80B4	149
23.5	207	1.3	40	5930	W75_40	S3	ME3SA6		140	W 75_40	P90	BE90S6		141
23.8	196	1.0	60	5960	W75_60	S2	ME2SB4	MX2SB4	140	W 75_60	P80	BE80B4	BX80B4	141
23.8	231	1.3	60	5640						WR 75_60	P80	BE80B4	BX80B4	142
23.8	231	1.6	60	7000						WR 86_60	P80	BE80B4	BX80B4	146
23.8	238	2.8	60	8000						WR 110_60	P80	BE80B4	BX80B4	150
25.5	197	1.5	56	7000	W86_56	S2	ME2SB4	MX2SB4	144	W 86_56	P80	BE80B4	BX80B4	145
25.5	202	3.0	56	8000	W110_56	S2	ME2SB4	MX2SB4	148	W 110_56	P80	BE80B4	BX80B4	149
28.6	171	1.3	50	5670	W75_50	S2	ME2SB4	MX2SB4	140	W 75_50	P80	BE80B4	BX80B4	141
30.6	169	2.0	46	7000	W86_46	S2	ME2SB4	MX2SB4	144	W 86_46	P80	BE80B4	BX80B4	145
30.6	171	3.5	46	8000	W110_46	S2	ME2SB4	MX2SB4	148	W 110_46	P80	BE80B4	BX80B4	149
32	151	1.0	45	3860	W63_45	S2	ME2SB4	MX2SB4	136	W 63_45	P80	BE80B4	BX80B4	138
32	180	1.6	45	5250						WR 75_45	P80	BE80B4	BX80B4	142
32	176	2.2	45	7000						WR 86_45	P80	BE80B4	BX80B4	146
36	144	1.8	40	5370	W75_40	S2	ME2SB4	MX2SB4	140	W 75_40	P80	BE80B4	BX80B4	141
36	150	2.2	40	7000	W86_40	S2	ME2SB4	MX2SB4	144	W 86_40	P80	BE80B4	BX80B4	145
38	133	1.2	38	3700	W63_38	S2	ME2SB4	MX2SB4	136	W 63_38	P80	BE80B4	BX80B4	138
41	140	2.5	23	7000	W86_23	S3	ME3SA6		144	W 86_23	P90	BE90S6		145
48	112	1.4	30	3490	W63_30	S2	ME2SB4	MX2SB4	136	W 63_30	P80	BE80B4	BX80B4	138
48	126	2.2	30	4680						WR 75_30	P80	BE80B4	BX80B4	142
48	116	2.3	30	4950	W75_30	S2	ME2SB4	MX2SB4	140	W 75_30	P80	BE80B4	BX80B4	141
48	115	3.3	30	7000	W86_30	S2	ME2SB4	MX2SB4	144	W 86_30	P80	BE80B4	BX80B4	145
57	100	2.5	25	4700	W75_25	S2	ME2SB4	MX2SB4	140	W 75_25	P80	BE80B4	BX80B4	141
60	94	1.7	24	3290	W63_24	S2	ME2SB4	MX2SB4	136	W 63_24	P80	BE80B4	BX80B4	138
62	94	3.4	23	7000	W86_23	S2	ME2SB4	MX2SB4	144	W 86_23	P80	BE80B4	BX80B4	145
72	83	3.0	20	4400	W75_20	S2	ME2SB4	MX2SB4	140	W 75_20	P80	BE80B4	BX80B4	141
75	77	1.9	19	3100	W63_19	S2	ME2SB4	MX2SB4	136	W 63_19	P80	BE80B4	BX80B4	138
95	63	2.4	15	2910	W63_15	S2	ME2SB4	MX2SB4	136	W 63_15	P80	BE80B4	BX80B4	138
102	57	1.1	14	1690						VF 49_14	P80	BE80B4	BX80B4	130
119	47	1.0	24	1710						VF 49_24	P80	BE80A2		130
119	51	2.7	12	2740	W63_12	S2	ME2SB4	MX2SB4	136	W 63_12	P80	BE80B4	BX80B4	138
134	46	2.8	7	2590						W 63_7	P90	BE90S6		138
143	42	1.4	10	1540						VF 49_10	P80	BE80B4	BX80B4	130
143	43	3.3	10	2600	W63_10	S2	ME2SB4	MX2SB4	136	W 63_10	P80	BE80B4	BX80B4	138
190	32	3.9	15	2440	W 63_15	S2	ME2SA2		136	W 63_15	P80	BE80A2		138
204	30	1.8	7	1400						VF 49_7	P80	BE80B4	BX80B4	130
204	31	3.9	7	2340	W63_7	S2	ME2SB4	MX2SB4	136	W 63_7	P80	BE80B4	BX80B4	138
285	21	2.1	10	1340						VF 49_10	P80	BE80A2		130
407	15.5	2.7	7	1200						VF 49_7	P80	BE80A2		130

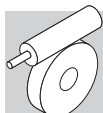
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	  IE3		  IEC  IE3	
0.29	4867	1.3	3200	34500	W /VF 86/185_3200 S20 MXN20MB4	174	W /VF 86/185_3200 P80 BXN80MB4	174
0.29	4623	1.9	3200	52000				
0.37	4672	1.4	2560	34500				
0.37	4478	2.0	2560	52000				
0.45	3852	1.1	3200	19500				
0.51	4478	1.0	1840	19500	W /VF 86/185_2560 S20 MXN20MB4 W /VF 86/185_1840 S20 MXN20MB4	174	W /VF 86/185_2560 P80 BXN80MB4 W /VF 86/185_1840 P80 BXN80MB4	174
0.51	3918	1.6	1840	34500				
0.51	4058	2.3	1840	52000				
0.56	3724	1.1	2560	19500				
0.78	3138	1.3	1840	19500				
0.90	2809	1.5	1600	19500	W /VF 86/185_1600 S20 MXN20MB4 W /VF 63/130_1200 S20 MXN20MB4 W /VF 86/185_1200 S20 MXN20MB4	174	W /VF 86/185_1600 P80 BXN80MB4 W /VF 63/130_1200 P80 BXN80MB4 W /VF 86/185_1200 P80 BXN80MB4	174
1.0	2659	1.6	920	19500				
1.2	2046	0.9	1200	13800				
1.2	2046	2.0	1200	19500				
1.4	2466	1.1	690	16000				
1.5	1781	1.0	960	13800	W /VF 63/130_960 S20 MXN20MB4 W /VF 86/150_920 S20 MXN20MB4 W /VF 86/185_920 S20 MXN20MB4	158 166 174	W /VF 63/130_960 P80 BXN80MB4 W /VF 86/150_920 P80 BXN80MB4 W /VF 86/185_920 P80 BXN80MB4	158 166 174
1.5	2076	1.2	920	16000				
1.5	1938	2.1	920	19500				
1.8	2092	1.3	529	16000				









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






n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	  IE3	 IE3	  IEC  IE3	 IE3
1.8	1725	2.4	800	19500	W /VF 86/185_800 S20 MXN20MB4	174	W /VF 86/185_800 P80 BXN80MB4	174
1.8	1486	1.2	760	13800	W /VF 63/130_760 S20 MXN20MB4	158	W /VF 63/130_760 P80 BXN80MB4	158
2.0	1730	1.5	690	16000	W /VF 86/150_690 S20 MXN20MB4	166	W /VF 86/150_690 P80 BXN80MB4	166
2.3	1204	1.5	600	13800	W /VF 63/130_600 S20 MXN20MB4	158	W /VF 63/130_600 P80 BXN80MB4	158
2.3	1354	3.1	600	19500	W /VF 86/185_600 S20 MXN20MB4	174	W /VF 86/185_600 P80 BXN80MB4	174
2.7	1460	1.7	529	16000	W /VF 86/150_529 S20 MXN20MB4	166	W /VF 86/150_529 P80 BXN80MB4	166
3.1	1269	2.0	460	16000	W /VF 86/150_460 S20 MXN20MB4	166	W /VF 86/150_460 P80 BXN80MB4	166
3.1	1140	1.2	300	16000				
3.1	1141	2.1	300	19500				
3.6	903	1.1	400	8000			VF/W 49/110_400 P80 BXN80MB4	151
3.6	882	2.0	400	13800	W /VF 63/130_400 S20 MXN20MB4	158	W /VF 63/130_400 P80 BXN80MB4	158
3.9	986	1.2	240	13800				
3.9	986	1.7	240	16000				
3.9	986	2.9	240	19500				
4.2	1004	2.6	345	16000	W /VF 86/150_345 S20 MXN20MB4	166	W /VF 86/150_345 P80 BXN80MB4	166
4.8	797	1.1	300	13800			VFR 130_300 P80 BXN80MB4	154
4.8	723	1.4	300	8000			VF/W 49/110_300 P80 BXN80MB4	151
4.8	873	3.0	300	16000	W /VF 86/150_300 S20 MXN20MB4	166	W /VF 86/150_300 P80 BXN80MB4	166
4.9	862	2.3	192	16000				
5.1	702	2.6	280	13800	W /VF 63/130_280 S20 MXN20MB4	158	W /VF 63/130_280 P80 BXN80MB4	158
5.6	767	1.0	168	8000				
5.6	661	1.2	168	16000			VFR 130_240 P80 BXN80MB4	154
5.9	394	1.9	240	13800			VF/W 49/110_230 P80 BXN80MB4	151
6.2	267	1.3	230	8000				
6.8	661	1.2	138	8000				
6.8	672	2.3	138	13800				
7.4	577	1.1	192	8000			WR 110_192 P80 BXN80MB4	150
7.5	587	2.0	192	13800			VFR 130_192 P80 BXN80MB4	154
8.5	530	1.3	168	8000			WR 110_168 P80 BXN80MB4	150
8.5	539	2.2	168	13800			VFR 130_168 P80 BXN80MB4	154
9.4	434	1.1	100	8000				
9.4	448	1.7	100	13200				
10.4	436	0.9	138	7000			WR 86_138 P80 BXN80MB4	146
10.4	455	1.6	138	8000			WR 110_138 P80 BXN80MB4	150
10.3	464	3.0	138	13800			VFR 130_138 P80 BXN80MB4	154
11.8	372	1.4	80	8000				
11.8	390	2.5	80	13200				
12.0	397	1.0	120	7000			WR 86_120 P80 BXN80MB4	146
12.0	409	1.9	120	8000			WR 110_120 P80 BXN80MB4	150
12.0	403	3.5	120	13800			VFR 130_120 P80 BXN80MB4	154
13.6	394	1.9	69	8000				
14.3	311	1.5	100	8000			W 110_100 P80 BXN80MB4	149
14.7	307	1.0	64	7000				
14.7	331	3.2	64	13200				
15.9	312	1.0	90	6200			WR 75_90 P80 BXN80MB4	142
15.9	302	1.5	90	7000			WR 86_90 P80 BXN80MB4	146
15.9	316	2.6	90	8000			WR 110_90 P80 BXN80MB4	150
16.8	281	1.2	56	7000				
16.8	289	2.2	56	8000				
17.9	257	1.0	80	7000	W86_80 S20 MXN20MB4	144	W 86_80 P80 BXN80MB4	145
17.9	265	1.8	80	8000			W 110_80 P80 BXN80MB4	149
18.8	239	1.0	50	6200				
19.1	275	1.1	75	5980			WR 75_75 P80 BXN80MB4	142
20.7	260	1.5	69	7000			WR 86_69 P80 BXN80MB4	146
20.7	267	2.4	69	8000			WR 110_69 P80 BXN80MB4	150
20.9	267	1.3	45	6010				
22.4	219	1.3	64	7000	W86_64 S20 MXN20MB4	144	W 86_64 P80 BXN80MB4	145
22.4	225	2.4	64	8000			W 110_64 P80 BXN80MB4	149
23.5	207	1.3	40	5930				
23.8	196	1.0	60	5960	W75_60 S20 MXN20MB4	140	W 75_60 P80 BXN80MB4	141
23.8	231	1.3	60	5640			WR 75_60 P80 BXN80MB4	142
23.8	231	1.6	60	7000			WR 86_60 P80 BXN80MB4	146
23.8	238	2.8	60	8000			WR 110_60 P80 BXN80MB4	150
25.5	197	1.5	56	7000	W86_56 S20 MXN20MB4	144	W 86_56 P80 BXN80MB4	145
25.5	202	3.0	56	8000			W 110_56 P80 BXN80MB4	149
28.6	171	1.3	50	5670	W75_50 S20 MXN20MB4	140	W 75_50 P80 BXN80MB4	141
30.6	169	2.0	46	7000	W86_46 S20 MXN20MB4	144	W 86_46 P80 BXN80MB4	145
30.6	171	3.5	46	8000			W 110_46 P80 BXN80MB4	149
32	151	1.0	45	3860	W63_45 S20 MXN20MB4	136	W 63_45 P80 BXN80MB4	138
32	180	1.6	45	5250			WR 75_45 P80 BXN80MB4	142
32	176	2.2	45	7000			WR 86_45 P80 BXN80MB4	146
36	144	1.8	40	5370	W75_40 S20 MXN20MB4	140	W 75_40 P80 BXN80MB4	141

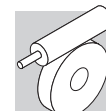


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





n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 		 IEC 					
IE3												
36	150	2.2	40	7000	W86_40	S20	MXN20MB4	144	W 86_40	P80	BXN80MB4	145
38	133	1.2	38	3700	W63_38	S20	MXN20MB4	136	W 63_38	P80	BXN80MB4	138
41	140	2.5	23	7000								
48	112	1.4	30	3490	W63_30	S20	MXN20MB4	136	W 63_30	P80	BXN80MB4	138
48	126	2.2	30	4680					WR 75_30	P80	BXN80MB4	142
48	116	2.3	30	4950	W75_30	S20	MXN20MB4	140	W 75_30	P80	BXN80MB4	141
48	115	3.3	30	7000	W86_30	S20	MXN20MB4	144	W 86_30	P80	BXN80MB4	145
57	100	2.5	25	4700	W75_25	S20	MXN20MB4	140	W 75_25	P80	BXN80MB4	141
60	94	1.7	24	3290	W63_24	S20	MXN20MB4	136	W 63_24	P80	BXN80MB4	138
62	94	3.4	23	7000	W86_23	S20	MXN20MB4	144	W 86_23	P80	BXN80MB4	145
72	83	3.0	20	4400	W75_20	S20	MXN20MB4	140	W 75_20	P80	BXN80MB4	141
75	77	1.9	19	3100	W63_19	S20	MXN20MB4	136	W 63_19	P80	BXN80MB4	138
95	63	2.4	15	2910	W63_15	S20	MXN20MB4	136	W 63_15	P80	BXN80MB4	138
102	57	1.1	14	1690					VF 49_14	P80	BXN80MB4	130
119	47	1.0	24	1710								
119	51	2.7	12	2740	W63_12	S20	MXN20MB4	136	W 63_12	P80	BXN80MB4	138
134	46	2.8	7	2590								
143	42	1.4	10	1540					VF 49_10	P80	BXN80MB4	130
143	43	3.3	10	2600	W63_10	S20	MXN20MB4	136	W 63_10	P80	BXN80MB4	138
190	32	3.9	15	2440								
204	30	1.8	7	1400					VF 49_7	P80	BXN80MB4	130
204	31	3.9	7	2340	W63_7	S20	MXN20MB4	136	W 63_7	P80	BXN80MB4	138
285	21	2.1	10	1340								
407	15.5	2.7	7	1200								

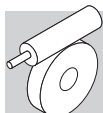
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N								
					IE2	IE3		IE2			IE3	
0.30	7126	0.9	3200	34500				VF/VF 130/210_3200	P100	BE100M6		180
0.30	6769	1.3	3200	52000				VF/VF 130/250_3200	P100	BE100M6		186
0.37	6841	0.9	2560	34500				VF/VF 130/210_2560	P100	BE100M6		180
0.37	6555	1.4	2560	52000				VF/VF 130/250_2560	P100	BE100M6		186
0.45	5213	1.2	3200	34500				VF/VF 130/210_3200	P90	BE90S4	BX90S4	180
0.45	4975	1.8	3200	52000				VF/VF 130/250_3200	P90	BE90S4	BX90S4	186
0.51	6965	0.9	1840	34500				VF/VF 130/210_1840	P100	BE100M6		180
0.51	5941	1.5	1840	52000				VF/VF 130/250_1840	P100	BE100M6		186
0.56	4549	1.4	2560	34500				VF/VF 130/210_2560	P90	BE90S4	BX90S4	180
0.56	4738	1.9	2560	52000				VF/VF 130/250_2560	P90	BE90S4	BX90S4	186
0.78	4631	0.9	1840	19500				W /VF 86/185_1840	P90	BE90S4	BX90S4	174
0.78	4768	1.3	1840	34500				VF/VF 130/210_1840	P90	BE90S4	BX90S4	180
0.78	4223	2.1	1840	52000				VF/VF 130/250_1840	P90	BE90S4	BX90S4	186
0.90	4146	1.0	1600	19500				W /VF 86/185_1600	P90	BE90S4	BX90S4	174
1.0	3892	1.1	920	19500				W /VF 86/185_920	P100	BE100M6		174
1.2	3020	1.4	1200	19500				W /VF 86/185_1200	P90	BE90S4	BX90S4	174
1.5	2860	1.4	920	19500				W /VF 86/185_920	P90	BE90S4	BX90S4	174
1.8	2547	1.6	800	19500				W /VF 86/185_800	P90	BE90S4	BX90S4	174
2.0	2554	1.0	690	16000				W /VF 86/150_690	P90	BE90S4	BX90S4	166
2.3	1777	1.0	600	13800				W /VF 63/130_600	P90	BE90S4	BX90S4	158
2.3	1999	2.1	600	19500				W /VF 86/185_600	P90	BE90S4	BX90S4	174
2.7	2154	1.2	529	16000				W /VF 86/150_529	P90	BE90S4	BX90S4	166
3.1	1873	1.4	460	16000				W /VF 86/150_460	P90	BE90S4	BX90S4	166
3.2	1670	1.4	300	19500				VFR 185_300	P100	BE100M6		170
3.6	1303	1.4	400	13800				W /VF 63/130_400	P90	BE90S4	BX90S4	158
3.6	1422	2.9	400	19500				W /VF 86/185_400	P90	BE90S4	BX90S4	174
3.9	1443	1.1	240	16000				VFR 150_240	P100	BE100M6		162
3.9	1443	1.9	240	19500				VFR 185_240	P100	BE100M6		170
4.2	1481	1.7	345	16000				W /VF 86/150_345	P90	BE90S4	BX90S4	166
4.8	1206	1.1	300	16000				VFR 150_300	P90	BE90S4	BX90S4	162
4.8	1221	1.9	300	19500				VFR 185_300	P90	BE90S4	BX90S4	170
4.8	1289	2.0	300	16000				W /VF 86/150_300	P90	BE90S4	BX90S4	166
4.9	1240	1.0	192	13800				VFR 130_192	P100	BE100M6		154
5.1	1037	1.7	280	13800				W /VF 63/130_280	P90	BE90S4	BX90S4	158
5.9	1012	1.1	240	13800				VFR 130_240	P90	BE90S4	BX90S4	154
5.9	1030	1.5	240	16000				VFR 150_240	P90	BE90S4	BX90S4	162
5.9	1049	2.6	240	19500				VFR 185_240	P90	BE90S4	BX90S4	170
6.3	1050	2.4	225	16000				W /VF 86/150_225	P90	BE90S4	BX90S4	166










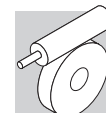
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	  IE2IE3				   IE2IE3					
6.8	983	1.5	138	13800					VFR 130_138	P100	BE100M6	154		
6.8	983	2.3	138	16000					VFR 150_138	P100	BE100M6	162		
7.2	947	2.7	200	16000					W /VF 86/150_200	P90	BE90S4	BX90S4	166	
7.5	867	1.4	192	13800					VFR 130_192	P90	BE90S4	BX90S4	154	
7.5	881	1.9	192	16000					VFR 150_192	P90	BE90S4	BX90S4	162	
7.9	869	1.0	120	8000					WR 110_120	P100	BE100M6		150	
8.0	866	3.4	180	19500					VFR 185_180	P90	BE90S4	BX90S4	170	
8.5	796	1.5	168	13800					VFR 130_168	P90	BE90S4	BX90S4	154	
8.5	808	2.1	168	16000					VFR 150_168	P90	BE90S4	BX90S4	162	
9.5	657	1.2	100	13200					VF 130_100	P100	BE100M6		152	
10.3	674	1.1	138	8000					WR 110_138	P90	BE90S4	BX90S4	150	
10.3	685	1.9	138	13800					VFR 130_138	P90	BE90S4	BX90S4	154	
10.3	695	2.8	138	16000					VFR 150_138	P90	BE90S4	BX90S4	162	
10.5	661	1.4	90	8000					WR 110_90	P100	BE100M6		150	
11.8	570	1.6	80	13200					VF 130_80	P100	BE100M6		152	
12.0	604	1.3	120	8000					WR 110_120	P90	BE90S4	BX90S4	150	
12.0	595	2.3	120	13800					VFR 130_120	P90	BE90S4	BX90S4	154	
12.0	604	3.3	120	16000	W110_100	S3	ME3SA4	MX3SA4	148	VFR 150_120	P90	BE90S4	BX90S4	162
14.3	459	1.0	100	8000						W 110_100	P90	BE90S4	BX90S4	149
14.3	518	1.1	100	12600						VF 130_100	P90	BE90S4	BX90S4	152
15.9	467	1.8	90	8000						WR 110_90	P90	BE90S4	BX90S4	150
15.9	473	3.1	90	13800						VFR 130_90	P90	BE90S4	BX90S4	154
17.9	391	1.2	80	8000	W110_80	S3	ME3SA4	MX3SA4	148	W 110_80	P90	BE90S4	BX90S4	149
17.9	403	2.2	80	12600	W86_46	S3	ME3LA6		144	VF 130_80	P90	BE90S4	BX90S4	152
20.5	353	1.0	46	7000						W 86_46	P100	BE100M6		145
20.5	373	3.1	46	13200						VF 130_46	P100	BE100M6		152
20.7	383	1.0	69	7000						WR 86_69	P90	BE90S4	BX90S4	146
20.7	394	1.6	69	8000	W110_64	S3	ME3SA4	MX3SA4	148	WR 110_69	P90	BE90S4	BX90S4	150
20.7	388	3.3	69	13800						VFR 130_69	P90	BE90S4	BX90S4	154
22.4	332	1.6	64	8000						W 110_64	P90	BE90S4	BX90S4	149
22.4	336	2.7	64	12600						VF 130_64	P90	BE90S4	BX90S4	152
23.6	316	1.1	40	7000	W86_40	S3	ME3LA6		144	W 86_40	P100	BE100M6		145
23.8	342	1.1	60	7000	W86_56	S3	ME3SA4	MX3SA4	144	WR 86_60	P90	BE90S4	BX90S4	146
23.8	351	1.9	60	8000						WR 110_60	P90	BE90S4	BX90S4	150
25.5	290	1.0	56	7000						W 86_56	P90	BE90S4	BX90S4	145
25.5	299	2.0	56	8000						W 110_56	P90	BE90S4	BX90S4	149
25.5	303	3.1	56	12600	W110_56	S3	ME3SA4	MX3SA4	148	VF 130_56	P90	BE90S4	BX90S4	152
31	249	1.4	46	7000	W86_46	S3	ME3SA4	MX3SA4	144	W 86_46	P90	BE90S4	BX90S4	145
31	252	2.4	46	8000	W110_46	S3	ME3SA4	MX3SA4	148	W 110_46	P90	BE90S4	BX90S4	149
32	266	1.1	45	5010						WR 75_45	P90	BE90S4	BX90S4	142
32	259	1.5	45	7000						WR 86_45	P90	BE90S4	BX90S4	146
32	266	2.7	45	8000						WR 110_45	P90	BE90S4	BX90S4	150
36	213	1.2	40	4980						W75_40	P90	BE90S4	BX90S4	141
36	222	1.5	40	7000	W86_40	S3	ME3SA4	MX3SA4	144	W 86_40	P90	BE90S4	BX90S4	145
36	225	3.0	40	8000	W110_40	S3	ME3SA4	MX3SA4	148	W 110_40	P90	BE90S4	BX90S4	149
38	214	1.3	38	4790	W86_23	S3	ME3LA6		144	WR 75_37.5	P90	BE90S4	BX90S4	142
41	205	1.6	23	7000						W 86_23	P100	BE100M6		145
41	204	1.7	35	7000	W75_30	S3	ME3SA4	MX3SA4	140	WR 86_34.5	P90	BE90S4	BX90S4	146
48	165	1.0	30	3130						W 63_30	P90	BE90S4	BX90S4	138
48	186	1.5	30	4530						WR 75_30	P90	BE90S4	BX90S4	142
48	171	1.6	30	4640						W 75_30	P90	BE90S4	BX90S4	141
48	183	1.9	30	7000						WR 86_30	P90	BE90S4	BX90S4	146
48	169	2.2	30	7000	W86_30	S3	ME3SA4	MX3SA4	144	W 86_30	P90	BE90S4	BX90S4	145
57	148	1.7	25	4420	W75_25	S3	ME3SA4	MX3SA4	140	W 75_25	P90	BE90S4	BX90S4	141
59	138	1.1	24	2990	W86_23	S3	ME3SA4	MX3SA4	144	W 63_24	P90	BE90S4	BX90S4	138
62	140	2.3	23	7000						W 86_23	P90	BE90S4	BX90S4	145
72	123	2.0	20	4160	W75_20	S3	ME3SA4	MX3SA4	140	W 75_20	P90	BE90S4	BX90S4	141
72	124	2.6	20	7000	W86_20	S3	ME3SA4	MX3SA4	144	W 86_20	P90	BE90S4	BX90S4	145
76	113	1.3	19	2840						W 63_19	P90	BE90S4	BX90S4	138
95	92	1.6	15	2690						W 63_15	P90	BE90S4	BX90S4	138
95	95	2.6	15	3850						W 75_15	P90	BE90S4	BX90S4	141
95	95	3.4	15	6820						W 86_15	P90	BE90S4	BX90S4	145
119	75	1.9	12	2550	W75_10	S3	ME3SA4	MX3SA4	140	W 63_12	P90	BE90S4	BX90S4	138
143	64	2.2	10	2440						W 63_10	P90	BE90S4	BX90S4	138
143	65	3.5	10	3420						W 75_10	P90	BE90S4	BX90S4	141
189	47	2.6	15	2330						W 63_15	P80	BE80B2		138
204	45	2.6	7	2210						W 63_7	P90	BE90S4	BX90S4	138
236	38	3.3	12	2190	W63_12	S2	ME2SB2		136	W 63_12	P80	BE80B2		138
283	32	3.9	10	2080	W63_10	S2	ME2SB2		136	W 63_10	P80	BE80B2		138










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






n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	   IE3	  IEC  IE3	
0.30	7126	0.9	3200	34500			
0.30	6769	1.3	3200	52000			
0.37	6841	0.9	2560	34500			
0.37	6555	1.4	2560	52000			
0.45	5213	1.2	3200	34500		VF/VF 130/210_3200 P90 BXN90S4	180
0.45	4975	1.8	3200	52000		VF/VF 130/250_3200 P90 BXN90S4	186
0.51	6965	0.9	1840	34500			
0.51	5941	1.5	1840	52000			
0.56	4549	1.4	2560	34500		VF/VF 130/210_2560 P90 BXN90S4	180
0.56	4738	1.9	2560	52000		VF/VF 130/250_2560 P90 BXN90S4	186
0.78	4631	0.9	1840	19500		W /VF 86/185_1840 P90 BXN90S4	174
0.78	4768	1.3	1840	34500		VF/VF 130/210_1840 P90 BXN90S4	180
0.78	4223	2.1	1840	52000		VF/VF 130/250_1840 P90 BXN90S4	186
0.90	4146	1.0	1600	19500		W /VF 86/185_1600 P90 BXN90S4	174
1.0	3892	1.1	920	19500			
1.2	3020	1.4	1200	19500		W /VF 86/185_1200 P90 BXN90S4	174
1.5	2860	1.4	920	19500		W /VF 86/185_920 P90 BXN90S4	174
1.8	2547	1.6	800	19500		W /VF 86/185_800 P90 BXN90S4	174
2.0	2554	1.0	690	16000		W /VF 86/150_690 P90 BXN90S4	166
2.3	1777	1.0	600	13800		W /VF 63/130_600 P90 BXN90S4	158
2.3	1999	2.1	600	19500		W /VF 86/185_600 P90 BXN90S4	174
2.7	2154	1.2	529	16000		W /VF 86/150_529 P90 BXN90S4	166
3.1	1873	1.4	460	16000		W /VF 86/150_460 P90 BXN90S4	166
3.2	1670	1.4	300	19500			
3.6	1303	1.4	400	13800		W /VF 63/130_400 P90 BXN90S4	158
3.6	1422	2.9	400	19500		W /VF 86/185_400 P90 BXN90S4	174
3.9	1443	1.1	240	16000			
3.9	1443	1.9	240	19500			
4.2	1481	1.7	345	16000		W /VF 86/150_345 P90 BXN90S4	166
4.8	1206	1.1	300	16000		VFR 150_300 P90 BXN90S4	162
4.8	1221	1.9	300	19500		VFR 185_300 P90 BXN90S4	170
4.8	1289	2.0	300	16000		W /VF 86/150_300 P90 BXN90S4	166
4.9	1240	1.0	192	13800			
5.1	1037	1.7	280	13800		W /VF 63/130_280 P90 BXN90S4	158
5.9	1012	1.1	240	13800		VFR 130_240 P90 BXN90S4	154
5.9	1030	1.5	240	16000		VFR 150_240 P90 BXN90S4	162
5.9	1049	2.6	240	19500		VFR 185_240 P90 BXN90S4	170
6.3	1050	2.4	225	16000		W /VF 86/150_225 P90 BXN90S4	166
6.8	983	1.5	138	13800			
6.8	983	2.3	138	16000			
7.2	947	2.7	200	16000		W /VF 86/150_200 P90 BXN90S4	166
7.5	867	1.4	192	13800		VFR 130_192 P90 BXN90S4	154
7.5	881	1.9	192	16000		VFR 150_192 P90 BXN90S4	162
7.9	869	1.0	120	8000			
8.0	866	3.4	180	19500		VFR 185_180 P90 BXN90S4	170
8.5	796	1.5	168	13800		VFR 130_168 P90 BXN90S4	154
8.5	808	2.1	168	16000		VFR 150_168 P90 BXN90S4	162
9.5	657	1.2	100	13200			
10.3	674	1.1	138	8000		WR 110_138 P90 BXN90S4	150
10.3	685	1.9	138	13800		VFR 130_138 P90 BXN90S4	154
10.3	695	2.8	138	16000		VFR 150_138 P90 BXN90S4	162
10.5	661	1.4	90	8000			
11.8	570	1.6	80	13200			
12.0	604	1.3	120	8000		WR 110_120 P90 BXN90S4	150
12.0	595	2.3	120	13800		VFR 130_120 P90 BXN90S4	154
12.0	604	3.3	120	16000		VFR 150_120 P90 BXN90S4	162
14.3	459	1.0	100	8000		W 110_100 P90 BXN90S4	149
14.3	518	1.1	100	12600		VF 130_100 P90 BXN90S4	152
15.9	467	1.8	90	8000		WR 110_90 P90 BXN90S4	150
15.9	473	3.1	90	13800		VFR 130_90 P90 BXN90S4	154
17.9	391	1.2	80	8000		W 110_80 P90 BXN90S4	149
17.9	403	2.2	80	12600		VF 130_80 P90 BXN90S4	152
20.5	353	1.0	46	7000			
20.5	373	3.1	46	13200			
20.7	383	1.0	69	7000		WR 86_69 P90 BXN90S4	146
20.7	394	1.6	69	8000		WR 110_69 P90 BXN90S4	150
20.7	388	3.3	69	13800		VFR 130_69 P90 BXN90S4	154
22.4	332	1.6	64	8000		W 110_64 P90 BXN90S4	149
22.4	336	2.7	64	12600		VF 130_64 P90 BXN90S4	152
23.6	316	1.1	40	7000			

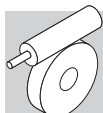


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






n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	   IE3	  IEC  IE3	
23.8	342	1.1	60	7000		WR 86_60 P90 BXN90S4	146
23.8	351	1.9	60	8000		WR 110_60 P90 BXN90S4	150
25.5	290	1.0	56	7000		W 86_56 P90 BXN90S4	145
25.5	299	2.0	56	8000		W 110_56 P90 BXN90S4	149
25.5	303	3.1	56	12600		VF 130_56 P90 BXN90S4	152
31	249	1.4	46	7000		W 86_46 P90 BXN90S4	145
31	252	2.4	46	8000		W 110_46 P90 BXN90S4	149
32	266	1.1	45	5010		WR 75_45 P90 BXN90S4	142
32	259	1.5	45	7000		WR 86_45 P90 BXN90S4	146
32	266	2.7	45	8000		WR 110_45 P90 BXN90S4	150
36	213	1.2	40	4980		W 75_40 P90 BXN90S4	141
36	222	1.5	40	7000		W 86_40 P90 BXN90S4	145
36	225	3.0	40	8000		W 110_40 P90 BXN90S4	149
38	214	1.3	38	4790		WR 75_37.5 P90 BXN90S4	142
41	205	1.6	23	7000			
41	204	1.7	35	7000		WR 86_34.5 P90 BXN90S4	146
48	165	1.0	30	3130		W 63_30 P90 BXN90S4	138
48	186	1.5	30	4530		WR 75_30 P90 BXN90S4	142
48	171	1.6	30	4640		W 75_30 P90 BXN90S4	141
48	183	1.9	30	7000		WR 86_30 P90 BXN90S4	146
48	169	2.2	30	7000		W 86_30 P90 BXN90S4	145
57	148	1.7	25	4420		W 75_25 P90 BXN90S4	141
59	138	1.1	24	2990		W 63_24 P90 BXN90S4	138
62	140	2.3	23	7000		W 86_23 P90 BXN90S4	145
72	123	2.0	20	4160		W 75_20 P90 BXN90S4	141
72	124	2.6	20	7000		W 86_20 P90 BXN90S4	145
76	113	1.3	19	2840		W 63_19 P90 BXN90S4	138
95	92	1.6	15	2690		W 63_15 P90 BXN90S4	138
95	95	2.6	15	3850		W 75_15 P90 BXN90S4	141
95	95	3.4	15	6820		W 86_15 P90 BXN90S4	145
119	75	1.9	12	2550		W 63_12 P90 BXN90S4	138
143	64	2.2	10	2440		W 63_10 P90 BXN90S4	138
143	65	3.5	10	3420		W 75_10 P90 BXN90S4	141
189	47	2.6	15	2330			
204	45	2.6	7	2210		W 63_7 P90 BXN90S4	138
236	38	3.3	12	2190			
283	32	3.9	10	2080			

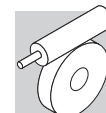
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	   IE2 IE3	  IEC  IE2 IE2	
0.30	9240	1.0	3200	52000		VF/VF 130/250_3200 P100 BE100LA6	172
0.37	8948	1.0	2560	52000		VF/VF 130/250_2560 P100 BE100LA6	172
0.45	7012	0.9	3200	34500		VF/VF 130/210_3200 P90 BE90LA4 BX90LA4	166
0.45	6693	1.3	3200	52000		VF/VF 130/250_3200 P90 BE90LA4 BX90LA4	172
0.51	8109	1.1	1840	52000		VF/VF 130/250_1840 P100 BE100LA6	172
0.56	6120	1.0	2560	34500		VF/VF 130/210_2560 P90 BE90LA4 BX90LA4	166
0.56	6375	1.4	2560	52000		VF/VF 130/250_2560 P90 BE90LA4 BX90LA4	172
0.78	6415	1.0	1840	34500		VF/VF 130/210_1840 P90 BE90LA4 BX90LA4	166
0.78	5681	1.6	1840	52000		VF/VF 130/250_1840 P90 BE90LA4 BX90LA4	172
1.0	4893	1.3	920	34500		VF/VF 130/210_920 P100 BE100LA6	166
1.0	4893	1.9	920	52000		VF/VF 130/250_920 P100 BE100LA6	172
1.2	4064	1.0	1200	19500		W /VF 86/185_1200 P90 BE90LA4 BX90LA4	160
1.2	4620	1.4	800	34500		VF/VF 130/210_800 P100 BE100LA6	166
1.2	4863	1.9	800	52000		VF/VF 130/250_800 P100 BE100LA6	172
1.5	3849	1.1	920	19500		W /VF 86/185_920 P90 BE90LA4 BX90LA4	160
1.6	3921	1.7	600	34500		VF/VF 130/210_600 P100 BE100LA6	166
1.6	3921	2.3	600	52000		VF/VF 130/250_600 P100 BE100LA6	172
1.8	3426	1.2	800	19500		W /VF 86/185_800 P90 BE90LA4 BX90LA4	160
2.4	2689	1.5	600	19500		W /VF 86/185_600 P90 BE90LA4 BX90LA4	160
2.4	2918	2.2	400	34500		VF/VF 130/210_400 P100 BE100LA6	166
2.4	2857	3.2	400	52000		VF/VF 130/250_400 P100 BE100LA6	172










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





n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 		  IEC 	
2.7	2898	0.9	529	16000			W /VF 86/150_529 P90 BE90LA4 BX90LA4	152
3.1	2520	1.0	460	16000			W /VF 86/150_460 P90 BE90LA4 BX90LA4	152
3.2	2280	1.0	300	19500			VFR 185_300 P100 BE100LA6	156
3.2	2234	1.6	300	34500			VFR 210_300 P100 BE100LA6	164
3.2	2370	2.2	300	52000			VFR 250_300 P100 BE100LA6	170
3.4	2128	3.0	280	34500			VF/VF 130/210_280 P100 BE100LA6	166
3.5	1753	1.0	400	13800			W /VF 63/130_400 P90 BE90LA4 BX90LA4	144
3.5	1913	2.2	400	19500			W /VF 86/185_400 P90 BE90LA4 BX90LA4	160
3.9	1969	0.9	240	16000			VFR 150_240 P100 BE100LA6	148
3.9	1969	1.4	240	19500			VFR 185_240 P100 BE100LA6	156
3.9	1969	2.2	240	34500			VFR 210_240 P100 BE100LA6	164
4.2	1993	1.3	345	16000			W /VF 86/150_345 P90 BE90LA4 BX90LA4	152
4.8	1643	1.4	300	19500			VFR 185_300 P90 BE90LA4 BX90LA4	156
4.8	1733	1.5	300	16000			W /VF 86/150_300 P90 BE90LA4 BX90LA4	152
4.9	1721	1.1	192	16000			VFR 150_192 P100 BE100LA6	148
5.1	1394	1.3	280	13800			W /VF 63/130_280 P90 BE90LA4 BX90LA4	144
5.1	1450	2.9	280	19500			W /VF 86/185_280 P90 BE90LA4 BX90LA4	160
5.3	1641	2.0	180	19500			VFR 185_180 P100 BE100LA6	156
5.3	1477	3.3	180	34500			VFR 210_180 P100 BE100LA6	164
5.6	1532	0.9	168	13800			VFR 130_168 P100 BE100LA6	140
6.0	1386	1.1	240	16000			VFR 150_240 P90 BE90LA4 BX90LA4	148
6.0	1411	1.9	240	19500			VFR 185_240 P90 BE90LA4 BX90LA4	156
6.4	1412	1.8	225	16000			W /VF 86/150_225 P90 BE90LA4 BX90LA4	152
7.2	1275	2.0	200	16000			W /VF 86/150_200 P90 BE90LA4 BX90LA4	152
7.4	1167	1.0	192	13800			VFR 130_192 P90 BE90LA4 BX90LA4	140
7.4	1185	1.4	192	16000			VFR 150_192 P90 BE90LA4 BX90LA4	148
7.9	1166	2.6	180	19500			VFR 185_180 P90 BE90LA4 BX90LA4	156
8.5	1071	1.1	168	13800			VFR 130_168 P90 BE90LA4 BX90LA4	140
8.5	1087	1.6	168	16000			VFR 150_168 P90 BE90LA4 BX90LA4	148
9.5	927	1.2	100	15500			VF 150_100 P100 BE100LA6	146
9.5	942	2.1	100	19500			VF 185_100 P100 BE100LA6	154
9.5	1001	3.3	150	16000			VFR 185_150 P90 BE90LA4 BX90LA4	156
10.3	921	1.4	138	13800			VFR 130_138 P90 BE90LA4 BX90LA4	140
10.3	934	2.1	138	16000			VFR 150_138 P90 BE90LA4 BX90LA4	148
10.5	902	1.0	90	8000			WR 110_90 P100 BE100LA6	136
10.5	998	3.2	90	19500			VFR 185_90 P100 BE100LA6	156
11.8	778	1.2	80	13200			VF 130_80 P100 BE100LA6	138
11.8	790	1.7	80	15500			VF 150_80 P100 BE100LA6	146
11.9	816	1.0	120	8000			WR 110_120 P90 BE90LA4 BX90LA4	136
12.0	801	1.7	120	13800			VFR 130_120 P90 BE90LA4 BX90LA4	140
12.0	813	2.4	120	16000			VFR 150_120 P90 BE90LA4 BX90LA4	148
13.7	787	1.0	69	8000			WR 110_69 P100 BE100LA6	136
13.7	776	1.9	69	13800			VFR 130_69 P100 BE100LA6	140
13.7	776	2.6	69	16000			VFR 150_69 P100 BE100LA6	148
14.8	671	2.2	64	15500			VF 150_64 P100 BE100LA6	146
15.9	627	1.3	90	8000			WR 110_90 P90 BE90LA4 BX90LA4	136
15.9	636	2.3	90	13800			VFR 130_90 P90 BE90LA4 BX90LA4	140
15.9	645	3.1	90	16000			VFR 150_90 P90 BE90LA4 BX90LA4	148
16.9	578	1.1	56	8000	W110_56 S3 ME3LB6	148	W 110_56 P100 BE100LA6	135
16.9	595	1.8	56	13200			VF 130_56 P100 BE100LA6	138
16.9	604	2.5	56	15500			VF 150_56 P100 BE100LA6	146
17.8	542	1.6	80	12600			VF 130_80 P90 BE90LA4 BX90LA4	138
20.5	497	1.3	46	8000	W110_46 S3 ME3LB6	148	W 110_46 P100 BE100LA6	135
20.5	518	3.4	46	15500			VF 150_46 P100 BE100LA6	146
20.7	529	1.2	69	8000			WR 110_69 P90 BE90LA4 BX90LA4	136
20.7	523	2.4	69	13800			VFR 130_69 P90 BE90LA4 BX90LA4	140
20.7	529	3.5	69	16000			VFR 150_69 P90 BE90LA4 BX90LA4	148
22.3	446	1.2	64	8000	W110_64 S3 ME3SB4 MX3SB4	148	W 110_64 P90 BE90LA4 BX90LA4	135
22.3	453	2.0	64	12600			VF 130_64 P90 BE90LA4 BX90LA4	138
23.6	444	2.7	40	13200			VF 130_40 P100 BE100LA6	138

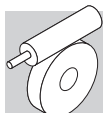


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






n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 					  				
						IE2	IE3			IE2	IE2			
23.8	473	1.4	60	8000	W110_56	S3	ME3SB4	MX3SB4	148	WR 110_60	P90	BE90LA4	BX90LA4	136
23.8	466	2.9	60	13800						VFR 130_60	P90	BE90LA4	BX90LA4	140
25.6	402	1.5	56	8000						W 110_56	P90	BE90LA4	BX90LA4	135
25.6	407	2.3	56	12600						VF 130_56	P90	BE90LA4	BX90LA4	138
31	334	1.0	46	7000	W86_46	S3	ME3SB4	MX3SB4	144	W 86_46	P90	BE90LA4	BX90LA4	131
31	339	1.8	46	8000	W110_46	S3	ME3SB4	MX3SB4	148	W 110_46	P90	BE90LA4	BX90LA4	135
31	348	3.1	46	12600						VF 130_46	P90	BE90LA4	BX90LA4	138
32	350	1.1	45	7000						WR 86_45	P90	BE90LA4	BX90LA4	132
32	359	2.0	45	8000						WR 110_45	P90	BE90LA4	BX90LA4	136
35	299	1.1	40	7000	W86_40	S3	ME3SB4	MX3SB4	144	W 86_40	P90	BE90LA4	BX90LA4	131
35	303	2.2	40	8000	W110_40	S3	ME3SB4	MX3SB4	148	W 110_40	P90	BE90LA4	BX90LA4	135
38	292	0.9	25	4330	W75_25	S3	ME3LB6		140	W 75_25	P100	BE100LA6		127
38	287	0.9	38	4330						WR 75_37.5	P90	BE90LA4	BX90LA4	128
41	279	1.2	23	7000	W86_23	S3	ME3LB6		144	W 86_23	P100	BE100LA6		131
41	275	1.3	35	7000						WR 86_34.5	P90	BE90LA4	BX90LA4	132
48	251	1.1	30	4130						WR 75_30	P90	BE90LA4	BX90LA4	128
48	230	1.2	30	4270	W75_30	S3	ME3SB4	MX3SB4	140	W 75_30	P90	BE90LA4	BX90LA4	127
48	245	1.4	30	7000						WR 86_30	P90	BE90LA4	BX90LA4	132
48	227	1.6	30	7000	W86_30	S3	ME3SB4	MX3SB4	144	W 86_30	P90	BE90LA4	BX90LA4	131
48	230	3.1	30	8000	W110_30	S3	ME3SB4	MX3SB4	148	W 110_30	P90	BE90LA4	BX90LA4	135
57	199	1.3	25	4100	W75_25	S3	ME3SB4	MX3SB4	140	W 75_25	P90	BE90LA4	BX90LA4	127
62	188	1.7	23	7000	W86_23	S3	ME3SB4	MX3SB4	144	W 86_23	P90	BE90LA4	BX90LA4	131
62	190	2.8	23	8000	W110_23	S3	ME3SB4	MX3SB4	148	W 110_23	P90	BE90LA4	BX90LA4	135
72	166	1.5	20	3880	W75_20	S3	ME3SB4	MX3SB4	140	W 75_20	P90	BE90LA4	BX90LA4	127
72	168	1.9	20	7000	W86_20	S3	ME3SB4	MX3SB4	144	W 86_20	P90	BE90LA4	BX90LA4	131
72	168	3.4	20	8000	W110_20	S3	ME3SB4	MX3SB4	148	W 110_20	P90	BE90LA4	BX90LA4	135
75	153	1.0	19	2550						W 63_19	P90	BE90LA4	BX90LA4	124
95	124	1.2	15	2450						W 63_15	P90	BE90LA4	BX90LA4	124
95	127	2.0	15	3630	W75_15	S3	ME3SB4	MX3SB4	140	W 75_15	P90	BE90LA4	BX90LA4	127
95	128	2.4	15	6520						WR 86_15	P90	BE90LA4	BX90LA4	132
95	127	2.6	15	6610	W86_15	S3	ME3SB4	MX3SB4	144	W 86_15	P90	BE90LA4	BX90LA4	131
120	102	1.4	12	2340						W 63_12	P90	BE90LA4	BX90LA4	124
135	94	2.2	7	3150	W75_7	S3	ME3LB6		140	W 75_7	P100	BE100LA6		127
143	85	1.6	10	2250						W 63_10	P90	BE90LA4	BX90LA4	124
143	87	2.6	10	3250	W75_10	S3	ME3SB4	MX3SB4	140	W 75_10	P90	BE90LA4	BX90LA4	127
143	87	3.3	10	5850	W86_10	S3	ME3SB4	MX3SB4	144	W 86_10	P90	BE90LA4	BX90LA4	131
190	65	1.9	15	2200						W 63_15	P90	BE90SA2		124
190	67	3.4	15	3120	W75_15	S3	ME3SA2		140	W 75_15	P90	BE90SA2		127
204	62	1.9	7	2060						W 63_7	P90	BE90LA4	BX90LA4	124
204	63	3.1	7	2920	W75_7	S3	ME3SB4	MX3SB4	140	W 75_7	P90	BE90LA4	BX90LA4	127
204	62	4.0	7	5240	W86_7	S3	ME3SB4	MX3SB4	144	W 86_7	P90	BE90LA4	BX90LA4	131
238	52	2.4	12	2080						W 63_12	P90	BE90SA2		124
286	44	2.8	10	1980	W63_10	S3	ME3SA2		136	W 63_10	P90	BE90SA2		124

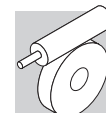
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	  IE3		  IEC  IE3		
0.30	9240	1.0	3200	52000					
0.37	8948	1.0	2560	52000					
0.45	7012	0.9	3200	34500			VF/VF 130/210_3200	P90 BXN90L4	180
0.45	6693	1.3	3200	52000			VF/VF 130/250_3200	P90 BXN90L4	186
0.51	8109	1.1	1840	52000					
0.56	6120	1.0	2560	34500			VF/VF 130/210_2560	P90 BXN90L4	180
0.56	6375	1.4	2560	52000			VF/VF 130/250_2560	P90 BXN90L4	186
0.78	6415	1.0	1840	34500			VF/VF 130/210_1840	P90 BXN90L4	180
0.78	5681	1.6	1840	52000			VF/VF 130/250_1840	P90 BXN90L4	186










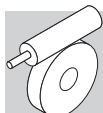
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n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	   IE3	  IEC  IE3	
1.0	4893	1.3	920	34500			
1.0	4893	1.9	920	52000			
1.2	4064	1.0	1200	19500		W /VF 86/185_1200 P90 BXN90L4	174
1.2	4620	1.4	800	34500			
1.2	4863	1.9	800	52000			
1.5	3849	1.1	920	19500		W /VF 86/185_920 P90 BXN90L4	174
1.6	3921	1.7	600	34500			
1.6	3921	2.3	600	52000			
1.8	3426	1.2	800	19500		W /VF 86/185_800 P90 BXN90L4	174
2.4	2689	1.5	600	19500		W /VF 86/185_600 P90 BXN90L4	174
2.4	2918	2.2	400	34500			
2.4	2857	3.2	400	52000			
2.7	2898	0.9	529	16000		W /VF 86/150_529 P90 BXN90L4	166
3.1	2520	1.0	460	16000		W /VF 86/150_460 P90 BXN90L4	166
3.2	2280	1.0	300	19500			
3.2	2234	1.6	300	34500			
3.2	2370	2.2	300	52000			
3.4	2128	3.0	280	34500			
3.5	1753	1.0	400	13800		W /VF 63/130_400 P90 BXN90L4	158
3.5	1913	2.2	400	19500		W /VF 86/185_400 P90 BXN90L4	174
3.9	1969	0.9	240	16000			
3.9	1969	1.4	240	19500			
3.9	1969	2.2	240	34500			
4.2	1993	1.3	345	16000		W /VF 86/150_345 P90 BXN90L4	166
4.8	1643	1.4	300	19500		VFR 185_300 P90 BXN90L4	170
4.8	1733	1.5	300	16000		W /VF 86/150_300 P90 BXN90L4	166
4.9	1721	1.1	192	16000			
5.1	1394	1.3	280	13800		W /VF 63/130_280 P90 BXN90L4	158
5.1	1450	2.9	280	19500		W /VF 86/185_280 P90 BXN90L4	174
5.3	1641	2.0	180	19500			
5.3	1477	3.3	180	34500			
5.6	1532	0.9	168	13800			
6.0	1386	1.1	240	16000		VFR 150_240 P90 BXN90L4	162
6.0	1411	1.9	240	19500		VFR 185_240 P90 BXN90L4	170
6.4	1412	1.8	225	16000		W /VF 86/150_225 P90 BXN90L4	166
7.2	1275	2.0	200	16000		W /VF 86/150_200 P90 BXN90L4	166
7.4	1167	1.0	192	13800		VFR 130_192 P90 BXN90L4	154
7.4	1185	1.4	192	16000		VFR 150_192 P90 BXN90L4	162
7.9	1166	2.6	180	19500		VFR 185_180 P90 BXN90L4	170
8.5	1071	1.1	168	13800		VFR 130_168 P90 BXN90L4	154
8.5	1087	1.6	168	16000		VFR 150_168 P90 BXN90L4	162
9.5	927	1.2	100	15500			
9.5	942	2.1	100	19500			
9.5	1001	3.3	150	16000		VFR 185_150 P90 BXN90L4	170
10.3	921	1.4	138	13800		VFR 130_138 P90 BXN90L4	154
10.3	934	2.1	138	16000		VFR 150_138 P90 BXN90L4	162
10.5	902	1.0	90	8000			
10.5	998	3.2	90	19500			
11.8	778	1.2	80	13200			
11.8	790	1.7	80	15500			
11.9	816	1.0	120	8000		WR 110_120 P90 BXN90L4	150
12.0	801	1.7	120	13800		VFR 130_120 P90 BXN90L4	154
12.0	813	2.4	120	16000		VFR 150_120 P90 BXN90L4	162
13.7	787	1.0	69	8000			
13.7	776	1.9	69	13800			
13.7	776	2.6	69	16000			
14.8	671	2.2	64	15500			
15.9	627	1.3	90	8000		WR 110_90 P90 BXN90L4	150
15.9	636	2.3	90	13800		VFR 130_90 P90 BXN90L4	154
15.9	645	3.1	90	16000		VFR 150_90 P90 BXN90L4	162









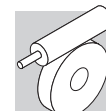
1.5 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	   IE3	  IEC  IE3	
16.9	578	1.1	56	8000			
16.9	595	1.8	56	13200			
16.9	604	2.5	56	15500			
17.8	542	1.6	80	12600		VF 130_80	P90 BXN90L4 152
20.5	497	1.3	46	8000			
20.5	518	3.4	46	15500			
20.7	529	1.2	69	8000		WR 110_69	P90 BXN90L4 150
20.7	523	2.4	69	13800		VFR 130_69	P90 BXN90L4 154
20.7	529	3.5	69	16000		VFR 150_69	P90 BXN90L4 162
22.3	446	1.2	64	8000		W 110_64	P90 BXN90L4 149
22.3	453	2.0	64	12600		VF 130_64	P90 BXN90L4 152
23.6	444	2.7	40	13200			
23.8	473	1.4	60	8000		WR 110_60	P90 BXN90L4 150
23.8	466	2.9	60	13800		VFR 130_60	P90 BXN90L4 154
25.6	402	1.5	56	8000		W 110_56	P90 BXN90L4 149
25.6	407	2.3	56	12600		VF 130_56	P90 BXN90L4 152
31	334	1.0	46	7000		W 86_46	P90 BXN90L4 145
31	339	1.8	46	8000		W 110_46	P90 BXN90L4 149
31	348	3.1	46	12600		VF 130_46	P90 BXN90L4 152
32	350	1.1	45	7000		WR 86_45	P90 BXN90L4 146
32	359	2.0	45	8000		WR 110_45	P90 BXN90L4 150
35	299	1.1	40	7000		W 86_40	P90 BXN90L4 145
35	303	2.2	40	8000		W 110_40	P90 BXN90L4 149
38	292	0.9	25	4330			
38	287	0.9	38	4330		WR 75_37.5	P90 BXN90L4 142
41	279	1.2	23	7000			
41	275	1.3	35	7000		WR 86_34.5	P90 BXN90L4 146
48	251	1.1	30	4130		WR 75_30	P90 BXN90L4 142
48	230	1.2	30	4270		W 75_30	P90 BXN90L4 141
48	245	1.4	30	7000		WR 86_30	P90 BXN90L4 146
48	227	1.6	30	7000		W 86_30	P90 BXN90L4 145
48	230	3.1	30	8000		W 110_30	P90 BXN90L4 149
57	199	1.3	25	4100		W 75_25	P90 BXN90L4 141
62	188	1.7	23	7000		W 86_23	P90 BXN90L4 145
62	190	2.8	23	8000		W 110_23	P90 BXN90L4 149
72	166	1.5	20	3880		W 75_20	P90 BXN90L4 141
72	168	1.9	20	7000		W 86_20	P90 BXN90L4 145
72	168	3.4	20	8000		W 110_20	P90 BXN90L4 149
75	153	1.0	19	2550		W 63_19	P90 BXN90L4 138
95	124	1.2	15	2450		W 63_15	P90 BXN90L4 138
95	127	2.0	15	3630		W 75_15	P90 BXN90L4 141
95	128	2.4	15	6520		WR 86_15	P90 BXN90L4 146
95	127	2.6	15	6610		W 86_15	P90 BXN90L4 145
120	102	1.4	12	2340		W 63_12	P90 BXN90L4 138
135	94	2.2	7	3150			
143	85	1.6	10	2250		W 63_10	P90 BXN90L4 138
143	87	2.6	10	3250		W 75_10	P90 BXN90L4 141
143	87	3.3	10	5850		W 86_10	P90 BXN90L4 145
190	65	1.9	15	2200			
190	67	3.4	15	3120			
204	62	1.9	7	2060		W 63_7	P90 BXN90L4 138
204	63	3.1	7	2920		W 75_7	P90 BXN90L4 141
204	62	4.0	7	5240		W 86_7	P90 BXN90L4 145
238	52	2.4	12	2080			
286	44	2.8	10	1980			










2.2 kW








n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE2	 IE3		 IE2	 IE3		
0.45	9879	0.9	3200	52000				VF/VF 130/250_3200	P100	BE100LA4 BX100LA4	186
0.56	9408	0.9	2560	52000				VF/VF 130/250_2560	P100	BE100LA4 BX100LA4	186
0.78	8385	1.1	1840	52000				VF/VF 130/250_1840	P100	BE100LA4 BX100LA4	186
0.89	7527	1.2	1600	52000				VF/VF 130/250_1600	P100	BE100LA4 BX100LA4	186
1.0	6884	0.9	920	34500				VF/VF 130/210_920	P112	BE112M6	180
1.0	6884	1.4	920	52000				VF/VF 130/250_920	P112	BE112M6	186
1.2	6174	1.0	1200	34500				VF/VF 130/210_1200	P100	BE100LA4 BX100LA4	180
1.2	6174	1.4	1200	52000				VF/VF 130/250_1200	P100	BE100LA4 BX100LA4	186
1.5	5004	1.2	920	34500				VF/VF 130/210_920	P100	BE100LA4 BX100LA4	180
1.5	5004	1.8	920	52000				VF/VF 130/250_920	P100	BE100LA4 BX100LA4	186
1.8	4821	1.3	800	34500				VF/VF 130/210_800	P100	BE100LA4 BX100LA4	180
1.8	4940	1.8	800	52000				VF/VF 130/250_800	P100	BE100LA4 BX100LA4	186
2.4	3969	1.0	600	19500				W /VF 86/185_600	P100	BE100LA4 BX100LA4	174
2.4	3792	1.6	600	34500				VF/VF 130/210_600	P100	BE100LA4 BX100LA4	180
2.4	3881	2.3	600	52000				VF/VF 130/250_600	P100	BE100LA4 BX100LA4	186
3.2	3143	1.2	300	34500				VFR 210_300	P112	BE112M6	178
3.2	3335	1.6	300	52000				VFR 250_300	P112	BE112M6	184
3.5	2823	1.5	400	19500				W /VF 86/185_400	P100	BE100LA4 BX100LA4	174
3.5	2940	2.1	400	34500				VF/VF 130/210_400	P100	BE100LA4 BX100LA4	180
3.5	2882	3.1	400	52000				VF/VF 130/250_400	P100	BE100LA4 BX100LA4	186
4.0	2771	1.0	240	19500				VFR 185_240	P112	BE112M6	170
4.0	2771	1.6	240	34500				VFR 210_240	P112	BE112M6	178
4.0	2873	2.0	240	52000				VFR 250_240	P112	BE112M6	184
4.8	2426	0.9	300	19500				VFR 185_300	P100	BE100LA4 BX100LA4	170
4.8	2426	1.4	300	34500				VFR 210_300	P100	BE100LA4 BX100LA4	178
4.8	2514	2.0	300	52000				VFR 250_300	P100	BE100LA4 BX100LA4	184
5.1	2141	1.9	280	19500				W /VF 86/185_280	P100	BE100LA4 BX100LA4	174
5.1	2141	2.9	280	34500				VF/VF 130/210_280	P100	BE100LA4 BX100LA4	180
5.7	2191	0.9	168	16000				VFR 150_168	P112	BE112M6	162
6.0	2082	1.3	240	19500				VFR 185_240	P100	BE100LA4 BX100LA4	170
6.0	2082	1.8	240	34500				VFR 210_240	P100	BE100LA4 BX100LA4	178
6.0	2152	2.5	240	52000				VFR 250_240	P100	BE100LA4 BX100LA4	184
7.4	1750	1.0	192	16000				VFR 150_192	P100	BE100LA4 BX100LA4	162
7.9	1720	1.7	180	19500				VFR 185_180	P100	BE100LA4 BX100LA4	170
7.9	1694	2.5	180	34500				VFR 210_180	P100	BE100LA4 BX100LA4	178
7.9	1773	3.5	180	52000				VFR 250_180	P100	BE100LA4 BX100LA4	184
8.0	1616	0.9	120	13800				VFR 130_120	P112	BE112M6	154
8.5	1605	1.1	168	16000				VFR 150_168	P100	BE100LA4 BX100LA4	162
9.5	1478	2.2	150	19500				VFR 185_150	P100	BE100LA4 BX100LA4	170
9.5	1478	3.0	150	34500				VFR 210_150	P100	BE100LA4 BX100LA4	178
9.6	1326	1.5	100	19000				VF 185_100	P112	BE112M6	168
10.3	1360	1.0	138	13800				VFR 130_138	P100	BE100LA4 BX100LA4	154
10.3	1379	1.4	138	16000				VFR 150_138	P100	BE100LA4 BX100LA4	162
10.6	1404	2.3	90	19500				VFR 185_90	P112	BE112M6	170
10.6	1385	3.3	90	34500				VFR 210_90	P112	BE112M6	178
11.9	1111	1.3	80	15500				VF 150_80	P112	BE112M6	160
11.9	1129	2.1	80	19000				VF 185_80	P112	BE112M6	168
12.0	1182	1.2	120	13800				VFR 130_120	P100	BE100LA4 BX100LA4	154
12.0	1200	1.6	120	16000				VFR 150_120	P100	BE100LA4 BX100LA4	162
12.0	1235	2.9	120	19500				VFR 185_120	P100	BE100LA4 BX100LA4	170
12.0	1235	4.1	120	34500				VFR 210_120	P100	BE100LA4 BX100LA4	178
13.8	1091	1.4	69	13800				VFR 130_69	P112	BE112M6	154
13.8	1091	1.9	69	16000				VFR 150_69	P112	BE112M6	162
14.3	956	1.2	100	14700				VF 150_100	P100	BE100LA4 BX100LA4	160
14.3	956	2.0	100	18000				VF 185_100	P100	BE100LA4 BX100LA4	168
14.9	931	1.2	64	13200				VF 130_64	P112	BE112M6	152
15.9	939	1.6	90	13800				VFR 130_90	P100	BE100LA4 BX100LA4	154
15.9	953	2.0	90	16000				VFR 150_90	P100	BE100LA4 BX100LA4	162
15.9	911	2.8	60	19000				VF 185_60	P112	BE112M6	168
15.9	1005	2.7	90	19500				VFR 185_90	P100	BE100LA4 BX100LA4	170
17.1	838	1.3	56	13200				VF 130_56	P112	BE112M6	152
17.8	800	1.1	80	12600				VF 130_80	P100	BE100LA4 BX100LA4	152
17.8	812	1.5	80	14700				VF 150_80	P100	BE100LA4 BX100LA4	160

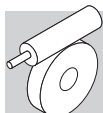


2.2 kW







n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 		  IEC 	
17.8	812	2.6	80	18000			VF 185_80 P100 BE100LA4 BX100LA4	168
20.7	771	1.7	69	13800			VFR 130_69 P100 BE100LA4 BX100LA4	154
20.7	781	2.3	69	16000			VFR 150_69 P100 BE100LA4 BX100LA4	162
20.8	718	1.6	46	13200			VF 130_46 P112 BE112M6	152
20.8	728	2.4	46	15500			VF 150_46 P112 BE112M6	160
21.2	762	1.1	45	8000			WR 110_45 P112 BE112M6	150
22.3	668	1.4	64	12600			VF 130_64 P100 BE100LA4 BX100LA4	152
22.3	678	1.9	64	14700			VF 150_64 P100 BE100LA4 BX100LA4	160
23.8	697	1.0	60	8000			WR 110_60 P100 BE100LA4 BX100LA4	150
23.8	688	1.9	60	13800			VFR 130_60 P100 BE100LA4 BX100LA4	154
23.8	697	2.7	60	16000			VFR 150_60 P100 BE100LA4 BX100LA4	162
23.8	653	3.4	60	18000			VF 185_60 P100 BE100LA4 BX100LA4	168
23.9	631	1.2	40	8000			W 110_40 P112 BE112M6 BE112M6	149
25.6	593	1.0	56	8000	W110_56 S3 ME3LA4 MX3LA4	148	P100 BE100LA4 BX100LA4	149
25.6	601	1.6	56	12600			VF 130_56 P100 BE100LA4 BX100LA4	152
25.6	609	2.2	56	14200			VF 150_56 P100 BE100LA4 BX100LA4	160
31	500	1.2	46	8000	W110_46 S3 ME3LA4 MX3LA4	148	W 110_46 P100 BE100LA4 BX100LA4	149
31	514	2.0	46	12600			VF 130_46 P100 BE100LA4 BX100LA4	152
31	521	2.9	46	14700			VF 150_46 P100 BE100LA4 BX100LA4	160
32	529	1.3	45	8000			WR 110_45 P100 BE100LA4 BX100LA4	150
31	543	3.1	45	16000			VFR 150_45 P100 BE100LA4 BX100LA4	162
35	447	1.5	40	8000	W110_40 S3 ME3LA4 MX3LA4	148	W 110_40 P100 BE100LA4 BX100LA4	149
35	447	2.4	40	12600			VF 130_40 P100 BE100LA4 BX100LA4	152
35	453	3.4	40	14700			VF 150_40 P100 BE100LA4 BX100LA4	160
42	398	2.6	23	13200			VF 130_23 P112 BE112M6	152
48	335	1.1	30	7000	W86_30 S3 ME3LA4 MX3LA4	144	W 86_30 P100 BE100LA4 BX100LA4	145
48	339	2.1	30	8000	W110_30 S3 ME3LA4 MX3LA4	148	W 110_30 P100 BE100LA4 BX100LA4	149
48	348	3.0	30	12600			VF 130_30 P100 BE100LA4 BX100LA4	152
62	277	1.2	23	6990	W86_23 S3 ME3LA4 MX3LA4	144	W 86_23 P100 BE100LA4 BX100LA4	145
62	280	1.9	23	8000	W110_23 S3 ME3LA4 MX3LA4	148	W 110_23 P100 BE100LA4 BX100LA4	149
62	280	3.1	23	12600			VF 130_23 P100 BE100LA4 BX100LA4	152
72	244	1.0	20	3410	W75_20 S3 ME3LA4 MX3LA4	140	W 75_20 P100 BE100LA4 BX100LA4	141
72	247	1.3	20	6730	W86_20 S3 ME3LA4 MX3LA4	144	W 86_20 P100 BE100LA4 BX100LA4	145
72	247	2.3	20	8000	W110_20 S3 ME3LA4 MX3LA4	148	W 110_20 P100 BE100LA4 BX100LA4	149
95	187	1.3	15	3240	W75_15 S3 ME3LA4 MX3LA4	140	W 75_15 P100 BE100LA4 BX100LA4	141
95	187	1.8	15	6270	W86_15 S3 ME3LA4 MX3LA4	144	W 86_15 P100 BE100LA4 BX100LA4	145
95	185	3.2	15	8000	W110_15 S3 ME3LA4 MX3LA4	148	W 110_15 P100 BE100LA4 BX100LA4	149
136	133	1.6	7	2780			W 75_7 P112 BE112M6	141
136	133	2.0	7	5540			W 86_7 P112 BE112M6	145
143	129	1.8	10	2940	W75_10 S3 ME3LA4 MX3LA4	140	W 75_10 P100 BE100LA4 BX100LA4	141
143	129	2.2	10	5590	W86_10 S3 ME3LA4 MX3LA4	144	W 86_10 P100 BE100LA4 BX100LA4	145
191	98	2.3	15	2920	W75_15 S3 ME3LA2	140	W 75_15 P90 BE90L2	141
191	93	1.3	15	1980			W 63_15 P90 BE90L2	138
204	93	2.1	7	2660	W75_7 S3 ME3LA4 MX3LA4	140	W 75_7 P100 BE100LA4 BX100LA4	141
204	92	2.7	7	5030	W86_7 S3 ME3LA4 MX3LA4	144	W 86_7 P100 BE100LA4 BX100LA4	145
239	75	1.6	12	1890			W 63_12 P90 BE90L2	138
287	66	3.0	10	2610	W75_10 S3 ME3LA2	140	W 75_10 P90 BE90L2	141
287	63	1.9	10	1820			W 63_10 P90 BE90L2	138
409	48	3.6	7	2350	W75_7 S3 ME3LA2	140	W 75_7 P90 BE90L2	141
409	46	2.3	7	1660			W 63_7 P90 BE90L2	138

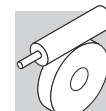
3 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 		  IEC 	
0.90	10403	0.9	1600	52000			VF/VF 130/250_1600 P100 BE100LB4 BX100LB4	186
1.0	9813	0.9	920	52000			VF/VF 130/250_920 P132 BE132S6	186
1.2	8534	1.1	1200	52000			VF/VF 130/250_1200 P100 BE100LB4 BX100LB4	186
1.5	6917	0.9	920	34500			VF/VF 130/210_920 P100 BE100LB4 BX100LB4	180
1.5	6917	1.3	920	52000			VF/VF 130/250_920 P100 BE100LB4 BX100LB4	186










3 kW







n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE2	 IE3		 IE2	 IE3		
1.8	6665	0.9	800	34500				VF/VF 130/210_800	P100	BE100LB4 BX100LB4	180
1.8	6827	1.3	800	52000				VF/VF 130/250_800	P100	BE100LB4 BX100LB4	186
2.5	5242	1.2	600	34500				VF/VF 130/210_600	P100	BE100LB4 BX100LB4	180
2.5	5364	1.7	600	52000				VF/VF 130/250_600	P100	BE100LB4 BX100LB4	186
3.2	4755	1.1	300	52000				VFR 250_300	P132	BE132S6	184
3.6	3901	1.1	400	19500				W /VF 86/185_400	P100	BE100LB4 BX100LB4	174
3.6	4064	1.6	400	34500				VF/VF 130/210_400	P100	BE100LB4 BX100LB4	180
3.6	3983	2.3	400	52000				VF/VF 130/250_400	P100	BE100LB4 BX100LB4	186
4.0	3950	1.1	240	34500				VFR 210_240	P132	BE132S6	178
4.0	4096	1.4	240	52000				VFR 250_240	P132	BE132S6	184
4.8	3353	1.0	300	34500				VFR 210_300	P100	BE100LB4 BX100LB4	178
4.8	3475	1.4	300	52000				VFR 250_300	P100	BE100LB4 BX100LB4	184
5.1	2958	1.4	280	19500				W /VF 86/185_280	P100	BE100LB4 BX100LB4	174
5.1	2958	2.1	280	34500				VF/VF 130/210_280	P100	BE100LB4 BX100LB4	180
5.1	3015	3.0	280	52000				VF/VF 130/250_280	P100	BE100LB4 BX100LB4	186
6.0	2877	1.0	240	19500				VFR 185_240	P100	BE100LB4 BX100LB4	170
6.0	2877	1.4	240	34500				VFR 210_240	P100	BE100LB4 BX100LB4	178
6.0	2975	1.8	240	52000				VFR 250_240	P100	BE100LB4 BX100LB4	184
8.0	2377	1.3	180	19500				VFR 185_180	P100	BE100LB4 BX100LB4	170
8.0	2341	1.8	180	34500				VFR 210_180	P100	BE100LB4 BX100LB4	178
8.0	2450	2.6	180	52000				VFR 250_180	P100	BE100LB4 BX100LB4	184
9.6	2042	1.6	150	19500				VFR 185_150	P100	BE100LB4 BX100LB4	170
9.6	1859	1.6	100	33000				VF 210_100	P132	BE132S6	176
9.6	2042	2.2	150	34500				VFR 210_150	P100	BE100LB4 BX100LB4	178
9.6	1920	2.5	100	50000				VF 250_100	P132	BE132S6	182
9.6	2042	3.2	150	52000				VFR 250_150	P100	BE100LB4 BX100LB4	184
10.4	1907	1.0	138	16000				VFR 150_138	P100	BE100LB4 BX100LB4	162
11.9	1609	1.5	80	19000				VF 185_80	P132	BE132S6	168
11.9	1585	2.1	80	33000				VF 210_80	P132	BE132S6	176
12.1	1634	0.9	120	13800				VFR 130_120	P100	BE100LB4 BX100LB4	154
12.1	1658	1.2	120	16000				VFR 150_120	P100	BE100LB4 BX100LB4	162
12.1	1707	2.1	120	19500				VFR 185_120	P100	BE100LB4 BX100LB4	170
12.1	1707	2.9	120	34500				VFR 210_120	P100	BE100LB4 BX100LB4	178
12.1	1731	4.0	120	52000				VFR 250_120	P100	BE100LB4 BX100LB4	184
14.4	1321	0.9	100	14700				VF 150_100	P100	BE100LB4 BX100LB4	160
14.4	1321	1.4	100	18000				VF 185_100	P100	BE100LB4 BX100LB4	168
15.9	1298	2.0	60	19000				VF 185_60	P132	BE132S6	168
15.9	1280	2.9	60	33000				VF 210_60	P132	BE132S6	176
16.0	1298	1.2	90	13800				VFR 130_90	P100	BE100LB4 BX100LB4	154
16.0	1317	1.5	90	16000				VFR 150_90	P100	BE100LB4 BX100LB4	162
16.0	1390	2.0	90	19500				VFR 185_90	P100	BE100LB4 BX100LB4	170
16.0	1390	2.9	90	34500				VFR 210_90	P100	BE100LB4 BX100LB4	178
18.0	1122	1.1	80	14700				VF 150_80	P100	BE100LB4 BX100LB4	160
18.0	1122	1.9	80	18000				VF 185_80	P100	BE100LB4 BX100LB4	168
20.8	1066	1.2	69	13800				VFR 130_69	P100	BE100LB4 BX100LB4	154
20.8	1080	1.7	69	16000				VFR 150_69	P100	BE100LB4 BX100LB4	162
22.5	923	1.0	64	12600				VF 130_64	P100	BE100LB4 BX100LB4	152
22.5	936	1.4	64	14700				VF 150_64	P100	BE100LB4 BX100LB4	160
24.0	951	1.4	60	13800				VFR 130_60	P100	BE100LB4 BX100LB4	154
24.0	963	2.0	60	16000				VFR 150_60	P100	BE100LB4 BX100LB4	162
24.0	902	2.5	60	18000				VF 185_60	P100	BE100LB4 BX100LB4	168
25.7	831	1.2	56	12600				VF 130_56	P100	BE100LB4 BX100LB4	152
25.7	842	1.6	56	14700				VF 150_56	P100	BE100LB4 BX100LB4	160
28.8	772	3.2	50	18000				VF 185_50	P100	BE100LB4 BX100LB4	168
32	710	1.5	46	12600				VF 130_46	P100	BE100LB4 BX100LB4	152
32	720	2.2	46	14700				VF 150_46	P100	BE100LB4 BX100LB4	160
32	720	1.0	45	8000				WR 110_45	P100	BE100LB4 BX100LB4	150
32	750	2.3	45	16000				VFR 150_45	P100	BE100LB4 BX100LB4	162
36	608	1.1	40	8000	W110_40 S3	ME3LB4	MX3LB4	W 110_40	P100	BE100LB4 BX100LB4	149
36	618	1.8	40	12600				VF 130_40	P100	BE100LB4 BX100LB4	152
36	626	2.5	40	14700				VF 150_40	P100	BE100LB4 BX100LB4	160
42	568	1.0	23	8000				W 110_23	P132	BE132S6	149
42	568	1.8	23	13200				VF 130_23	P132	BE132S6	152

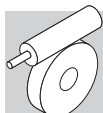


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






n2 min ⁻¹	M2 Nm	S	i	Rn2 N	  IE2IE3					   IE2IE3				
48	462	1.5	30	8000	W110_30	S3	ME3LB4	MX3LB4	148	W 110_30	P100	BE100LB4	BX100LB4	149
48	482	2.2	30	12600						VF 130_30	P100	BE100LB4	BX100LB4	152
48	488	2.8	30	14700						VF 150_30	P100	BE100LB4	BX100LB4	160
48	518	2.9	30	16000						VFR 150_30	P100	BE100LB4	BX100LB4	162
62	382	1.4	23	8000	W110_23	S3	ME3LB4	MX3LB4	148	W 110_23	P100	BE100LB4	BX100LB4	149
62	388	2.3	23	12600						VF 130_23	P100	BE100LB4	BX100LB4	152
62	388	3.3	23	14700						VF 150_23	P100	BE100LB4	BX100LB4	160
72	336	1.0	20	6240	W86_20	S3	ME3LB4	MX3LB4	144	W 86_20	P100	BE100LB4	BX100LB4	145
72	336	1.7	20	8000	W110_20	S3	ME3LB4	MX3LB4	148	W 110_20	P100	BE100LB4	BX100LB4	149
73	341	2.6	20	12600						VF 130_20	P100	BE100LB4	BX100LB4	152
96	259	1.0	15	2800	W75_15	S3	ME3LB4	MX3LB4	140	W 75_15	P100	BE100LB4	BX100LB4	141
96	259	1.3	15	5890	W86_15	S3	ME3LB4	MX3LB4	144	W 86_15	P100	BE100LB4	BX100LB4	145
96	256	2.4	15	8000	W110_15	S3	ME3LB4	MX3LB4	148	W 110_15	P100	BE100LB4	BX100LB4	149
96	262	3.5	15	11800						VF 130_15	P100	BE100LB4	BX100LB4	152
125	197	3.4	23	11000						VF 130_23	P100	BE100L2		152
144	179	1.3	10	2600	W75_10	S3	ME3LB4	MX3LB4	140	W 75_10	P100	BE100LB4	BX100LB4	141
144	179	1.6	10	5300	W86_10	S3	ME3LB4	MX3LB4	144	W 86_10	P100	BE100LB4	BX100LB4	145
144	177	3.1	10	8000	W110_10	S3	ME3LB4	MX3LB4	148	W 110_10	P100	BE100LB4	BX100LB4	149
192	131	1.7	15	2680	W75_15	S3	ME3LB2		140	W 75_15	P100	BE100L2		141
192	130	2.3	15	5070	W86_15	S3	ME3LB2		144	W 86_15	P100	BE100L2		145
206	128	1.5	7	2380	W75_7	S3	ME3LB4	MX3LB4	140	W 75_7	P100	BE100LB4	BX100LB4	141
206	127	2.0	7	4780	W86_7	S3	ME3LB4	MX3LB4	144	W 86_7	P100	BE100LB4	BX100LB4	145
288	90	2.3	10	2430	W75_10	S3	ME3LB2		140	W 75_10	P100	BE100L2		141
288	90	2.9	10	4510	W86_10	S3	ME3LB2		144	W 86_10	P100	BE100L2		145
411	64	2.7	7	2190	W75_7	S3	ME3LB2		140	W 75_7	P100	BE100L2		141
411	64	3.5	7	4040	W86_7	S3	ME3LB2		144	W 86_7	P100	BE100L2		145

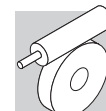
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE2	 IE3		 IE2	 IE3		
1.5	9157	1.0	920	52000			VF/VF 130/250_920	P112	BE112M4	BX112M4	186
1.9	9039	1.0	800	52000			VF/VF 130/250_800	P112	BE112M4	BX112M4	186
2.5	6941	0.9	600	34500			VF/VF 130/210_600	P112	BE112M4	BX112M4	180
2.5	7102	1.3	600	52000			VF/VF 130/250_600	P112	BE112M4	BX112M4	186
3.7	5380	1.2	400	34500			VF/VF 130/210_400	P112	BE112M4	BX112M4	180
3.7	5273	1.7	400	52000			VF/VF 130/250_400	P112	BE112M4	BX112M4	186
4.0	5348	1.1	240	52000			VFR 250_240	P132	BE132MA6		184
4.8	4600	1.1	300	52000			VFR 250_300	P112	BE112M4	BX112M4	184
5.2	3917	1.1	280	19500			W /VF 86/185_280	P112	BE112M4	BX112M4	174
5.2	3917	1.6	280	34500			VF/VF 130/210_280	P112	BE112M4	BX112M4	180
5.2	3992	2.3	280	52000			VF/VF 130/250_280	P112	BE112M4	BX112M4	186
5.4	3867	1.3	180	34500			VFR 210_180	P132	BE132MA6		178
5.4	4440	1.5	180	52000			VFR 250_180	P132	BE132MA6		184
6.1	3809	1.0	240	34500			VFR 210_240	P112	BE112M4	BX112M4	178
6.1	3938	1.4	240	52000			VFR 250_240	P112	BE112M4	BX112M4	184
8.1	3147	1.0	180	19500			VFR 185_180	P112	BE112M4	BX112M4	170
8.1	3099	1.4	180	34500			VFR 210_180	P112	BE112M4	BX112M4	178
8.1	3244	1.9	180	52000			VFR 250_180	P112	BE112M4	BX112M4	184
9.7	2427	1.2	100	33000			VF 210_100	P132	BE132MA6		176
9.7	2507	1.9	100	50000			VF 250_100	P132	BE132MA6		182
9.8	2704	1.2	150	19500			VFR 185_150	P112	BE112M4	BX112M4	170
9.8	2704	1.7	150	34500			VFR 210_150	P112	BE112M4	BX112M4	178
9.8	2704	2.4	150	52000			VFR 250_150	P112	BE112M4	BX112M4	184
12.1	2195	0.9	120	16000			VFR 150_120	P112	BE112M4	BX112M4	162
12.1	2260	1.6	120	19500			VFR 185_120	P112	BE112M4	BX112M4	170
12.1	2260	2.2	120	34500			VFR 210_120	P112	BE112M4	BX112M4	178
12.1	2292	3.1	120	52000			VFR 250_120	P112	BE112M4	BX112M4	184
14.6	1749	1.1	100	18000			VF 185_100	P112	BE112M4	BX112M4	168
16.1	1695	1.5	60	19000			VF 185_60	P132	BE132MA6		168
16.1	1671	2.2	60	33000			VF 210_60	P132	BE132MA6		176










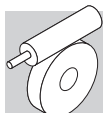
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 		  IEC 	
16.1	1719	3.2	60	50000			VF 250_60 P132 BE132MA6	182
16.3	1719	0.9	90	13800			VFR 130_90 P112 BE112M4 BX112M4	154
16.3	1743	1.1	90	16000			VFR 150_90 P112 BE112M4 BX112M4	162
16.3	1840	1.5	90	19500			VFR 185_90 P112 BE112M4 BX112M4	170
16.3	1840	2.2	90	34500			VFR 210_90 P112 BE112M4 BX112M4	178
16.3	1888	3.2	90	52000			VFR 250_90 P112 BE112M4 BX112M4	184
18.3	1485	1.4	80	18000			VF 185_80 P112 BE112M4 BX112M4	168
21.0	1355	1.3	46	15500			VF 150_46 P132 BE132MA6	160
21.2	1411	0.9	69	13800			VFR 130_69 P112 BE112M4 BX112M4	154
21.2	1429	1.3	69	16000			VFR 150_69 P112 BE112M4 BX112M4	162
21.4	1433	3.4	45	34500			VFR 210_45 P132 BE132MA6	178
22.8	1240	1.1	64	14700			VF 150_64 P112 BE112M4 BX112M4	160
24.1	1162	1.0	40	13200			VF 130_40 P132 BE132MA6	152
24.1	1193	3.6	40	33000			VF 210_40 P132 BE132MA6	176
24.4	1259	1.1	60	13800			VFR 130_60 P112 BE112M4 BX112M4	154
24.4	1275	1.5	60	16000			VFR 150_60 P112 BE112M4 BX112M4	162
24.4	1194	1.9	60	18000			VF 185_60 P112 BE112M4 BX112M4	168
24.4	1307	2.5	60	19500			VFR 185_60 P112 BE112M4 BX112M4	170
24.4	1291	3.6	60	34500			VFR 210_60 P112 BE112M4 BX112M4	178
26.1	1100	0.9	56	12500			VF 130_56 P112 BE112M4 BX112M4	152
26.1	1115	1.2	56	14700			VF 150_56 P112 BE112M4 BX112M4	160
29.2	1022	2.4	50	18000			VF 185_50 P112 BE112M4 BX112M4	168
32	940	1.1	46	12600			VF 130_46 P112 BE112M4 BX112M4	152
32	953	1.6	46	14700			VF 150_46 P112 BE112M4 BX112M4	160
32	967	2.5	30	19000			VF 185_30 P132 BE132MA6	168
32	955	3.5	30	33000			VF 210_30 P132 BE132MA6	176
33	993	1.7	45	16000			VFR 150_45 P112 BE112M4 BX112M4	162
33	1017	2.8	45	19500			VFR 185_45 P112 BE112M4 BX112M4	170
36	762	0.9	80	12600			VF 130_80 P112 BE112M2	152
37	818	1.3	40	12600			VF 130_40 P112 BE112M4 BX112M4	152
37	829	1.9	40	14700			VF 150_40 P112 BE112M4 BX112M4	160
42	741	1.4	23	13200			VF 130_23 P132 BE132MA6	152
42	750	2.0	23	13200			VF 150_23 P132 BE132MA6	160
45	635	1.1	64	12600			VF 130_64 P112 BE112M2	152
48	624	1.1	30	8000			W 110_30 P112 BE112M4 BX112M4	149
48	638	1.6	30	12600			VF 130_30 P112 BE112M4 BX112M4	152
48	646	2.1	30	14700			VF 150_30 P112 BE112M4 BX112M4	160
48	686	2.2	30	16000			VFR 150_30 P112 BE112M4 BX112M4	162
63	515	1.0	23	8000			W 110_23 P112 BE112M4 BX112M4	149
63	480	1.6	46	12600			VF 130_46 P112 BE112M2	152
64	514	1.7	23	12600			VF 130_23 P112 BE112M4 BX112M4	152
64	514	2.5	23	14700			VF 150_23 P112 BE112M4 BX112M4	160
72	454	1.3	20	8000			W 110_20 P112 BE112M4 BX112M4	149
73	452	2.0	20	12400			VF 130_20 P112 BE112M4 BX112M4	152
96	344	1.0	15	5410			W 86_15 P112 BE112M4 BX112M4	145
96	340	1.8	15	8000			W 110_15 P112 BE112M4 BX112M4	149
97	346	3.4	10	12700			VF 150_10 P132 BE132MA6	160
98	347	2.7	15	11400			VF 130_15 P112 BE112M4 BX112M4	152
144	238	1.0	10	2160			W 75_10 P112 BE112M4 BX112M4	141
144	238	1.2	10	4940			W 86_10 P112 BE112M4 BX112M4	145
144	235	2.3	10	7840			W 110_10 P112 BE112M4 BX112M4	149
146	237	3.3	10	10100			VF 130_10 P112 BE112M4 BX112M4	152
193	174	1.3	15	2400			W 75_15 P112 BE112M2	141
193	172	1.7	15	4820			W 86_15 P112 BE112M2	145
206	173	1.1	7	1900			W 75_7 P112 BE112M4 BX112M4	141
206	171	1.5	7	4490			W 86_7 P112 BE112M4 BX112M4	145
206	171	3.0	7	7040			W 110_7 P112 BE112M4 BX112M4	149
290	119	1.7	10	2210			W 75_10 P112 BE112M2	141
290	119	2.2	10	4320			W 86_10 P112 BE112M2	145
414	84	2.0	7	2010			W 75_7 P112 BE112M2	141
414	84	2.7	7	3890			W 86_7 P112 BE112M2	145









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







n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE2	 IE3		 IE2	 IE3			
2.4	9630	0.9	600	52000				VF/VF 130/250_600	P132	BE132S4	BX132S4	186
3.4	7714	1.2	280	52000				VF/VF 130/250_280	P160	BE160MA6		186
3.7	7295	0.9	400	34500				VF/VF 130/210_400	P132	BE132S4	BX132S4	180
3.7	7149	1.3	400	52000				VF/VF 130/250_400	P132	BE132S4	BX132S4	186
5.2	5311	1.2	280	34500				VF/VF 130/210_280	P132	BE132S4	BX132S4	180
5.2	5413	1.7	280	52000				VF/VF 130/250_280	P132	BE132S4	BX132S4	186
5.4	6029	1.1	180	52000				VFR 250_180	P160	BE160MA6		184
6.4	5024	1.0	150	34500				VFR 210_150	P160	BE160MA6		178
6.4	5105	1.3	150	52000				VFR 250_150	P160	BE160MA6		184
8.1	4202	1.0	180	34500				VFR 210_180	P132	BE132S4	BX132S4	178
8.1	4399	1.4	180	52000				VFR 250_180	P132	BE132S4	BX132S4	184
9.7	3296	0.9	100	33000				VF 210_100	P160	BE160MA6		176
9.7	3666	1.2	150	34500				VFR 210_150	P132	BE132S4	BX132S4	178
9.7	3666	1.8	150	52000				VFR 250_150	P132	BE132S4	BX132S4	184
12.1	2809	1.1	80	33000				VF 210_80	P160	BE160MA6		176
12.1	2895	1.7	80	50000				VF 250_80	P160	BE160MA6		182
12.2	3064	1.6	120	34500				VFR 210_120	P132	BE132S4	BX132S4	178
12.2	3108	2.3	120	52000				VFR 250_120	P132	BE132S4	BX132S4	184
14.6	2371	1.1	100	31500				VF 210_100	P132	BE132S4	BX132S4	176
14.6	2590	1.4	100	19500				VFR 185_100	P132	BE132S4	BX132S4	170
14.6	2480	1.5	100	47000				VF 250_100	P132	BE132S4	BX132S4	182
16.1	2301	1.1	60	19000				VF 185_60	P160	BE160MA6		168
16.1	2268	1.6	60	33000				VF 210_60	P160	BE160MA6		176
16.1	2334	2.4	60	50000				VF 250_60	P160	BE160MA6		182
16.2	2495	1.6	90	34500				VFR 210_90	P132	BE132S4	BX132S4	178
16.2	2561	2.3	90	52000				VFR 250_90	P132	BE132S4	BX132S4	184
18.3	2013	1.1	80	18000				VF 185_80	P132	BE132S4	BX132S4	168
18.3	2013	1.4	80	31500				VF 210_80	P132	BE132S4	BX132S4	176
18.3	2072	1.9	80	47000				VF 250_80	P132	BE132S4	BX132S4	182
19.5	2106	1.3	75	19500				VFR 185_75	P132	BE132S4	BX132S4	170
21.0	1839	0.9	46	15500				VF 150_46	P160	BE160MA6		160
21.4	1945	2.5	45	34500				VFR 210_45	P160	BE160MA6		178
21.4	1993	3.4	45	52000				VFR 250_45	P160	BE160MA6		184
24.1	1599	1.1	40	15500				VF 150_40	P160	BE160MA6		160
24.3	1620	1.4	60	18000				VF 185_60	P132	BE132S4	BX132S4	168
24.3	1598	1.9	60	31500				VF 210_60	P132	BE132S4	BX132S4	176
24.3	1751	2.7	60	34500				VFR 210_60	P132	BE132S4	BX132S4	178
24.3	1663	2.7	60	47000				VF 250_60	P132	BE132S4	BX132S4	182
24.3	1773	4.0	60	52000				VFR 250_60	P132	BE132S4	BX132S4	184
29.2	1430	1.3	50	15940				VFR 150_50	P132	BE132S4	BX132S4	162
29.2	1386	1.8	50	18000				VF 185_50	P132	BE132S4	BX132S4	168
29.2	1477	2.2	50	19500				VFR 185_50	P132	BE132S4	BX132S4	170
29.2	1386	2.4	50	31500				VF 210_50	P132	BE132S4	BX132S4	176
29.2	1386	3.2	50	47000				VF 250_50	P132	BE132S4	BX132S4	182
31	1292	1.2	46	14700				VF 150_46	P132	BE132S4	BX132S4	160
32	1248	1.0	30	13200				VF 130_30	P160	BE160MA6		152
32	1362	3.0	45	34500				VFR 210_45	P132	BE132S4	BX132S4	178
37	1109	1.0	40	12600				VF 130_40	P132	BE132S4	BX132S4	152
37	1123	1.4	40	14700				VF 150_40	P132	BE132S4	BX132S4	160
37	1138	2.3	40	18000				VF 185_40	P132	BE132S4	BX132S4	168
37	1138	3.1	40	31500				VF 210_40	P132	BE132S4	BX132S4	176
39	1101	1.5	38	15400				VFR 150_37.5	P132	BE132S4	BX132S4	162
39	1149	2.4	38	19500				VFR 185_37.5	P132	BE132S4	BX132S4	170
42	1006	1.0	23	13000				VF 130_23	P160	BE160MA6		152
42	1019	1.4	23	15300				VF 150_23	P160	BE160MA6		160
49	864	1.2	30	12600				VF 130_30	P132	BE132S4	BX132S4	152
49	875	1.6	30	14700				VF 150_30	P132	BE132S4	BX132S4	160
49	908	2.2	30	18000				VF 185_30	P132	BE132S4	BX132S4	168
49	908	3.4	30	31500				VF 210_30	P132	BE132S4	BX132S4	176
59	775	1.9	25	13400				VFR 150_25	P132	BE132S4	BX132S4	162
59	784	3.3	25	19500				VFR 185_25	P132	BE132S4	BX132S4	170
64	673	0.9	15	8000				W 110_15	P160	BE160MA6		149
64	696	1.3	23	12100				VF 130_23	P132	BE132S4	BX132S4	152
64	696	1.8	23	14000				VF 150_23	P132	BE132S4	BX132S4	160
73	605	0.9	20	8000				W 110_20	P132	BE132S4	BX132S4	149

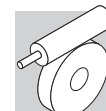


5.5 kW








n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE2	 IE3		 IE2	 IE3		
73	613	1.5	20	11700				VF 130_20	P132	BE132S4 BX132S4	152
73	613	2.1	20	13500				VF 150_20	P132	BE132S4 BX132S4	160
97	454	1.3	15	8000				W 110_15	P132	BE132S4 BX132S4	149
97	471	2.0	15	12800				VF 130_15	P132	BE132S4 BX132S4	152
97	476	2.4	15	12400				VF 150_15	P132	BE132S4 BX132S4	160
127	354	1.9	23	10400				VF 130_23	P132	BE132SA2	152
127	354	2.7	23	11800				VF 150_23	P132	BE132SA2	160
146	313	1.8	10	7330				W 110_10	P132	BE132S4 BX132S4	149
146	321	2.5	10	9680				VF 130_10	P132	BE132S4 BX132S4	152
146	321	3.3	10	11000				VF 150_10	P132	BE132S4 BX132S4	160
195	234	2.3	15	7060				W 110_15	P132	BE132SA2	149
209	227	2.2	7	6600				W 110_7	P132	BE132S4 BX132S4	149
209	227	3.3	7	8650				VF 130_7	P132	BE132S4 BX132S4	152
293	160	3.0	10	6290				W 110_10	P132	BE132SA2	149
293	162	3.6	10	8110				VF 130_10	P132	BE132SA2	152
418	113	4.0	7	5640				W 110_7	P132	BE132SA2	149
418	114	4.9	7	7230				VF 130_7	P132	BE132SA2	152

7.5 kW








n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	 IE2	 IE3		 IE2	 IE3	IEC 	 IE2	
3.6	9554	0.9	400	52000				VF/VF 130/250_400	P132	BE132MA4	BX132MA4	186
5.2	7097	0.9	280	34500				VF/VF 130/210_280	P132	BE132MA4	BX132MA4	180
5.2	7233	1.2	280	52000				VF/VF 130/250_280	P132	BE132MA4	BX132MA4	186
6.4	7014	1.0	150	52000				VFR 250_150	P160	BE160MB6		184
8.0	5878	1.0	120	34500				VFR 210_120	P160	BE160MB6		178
8.1	5879	1.1	180	52000				VFR 250_180	P132	BE132MA4	BX132MA4	184
9.7	4676	1.0	100	50000				VF 250_100	P160	BE160MB6		182
9.7	4899	1.3	150	52000				VFR 250_150	P132	BE132MA4	BX132MA4	184
10.7	4809	0.9	90	34500				VFR 210_90	P160	BE160MB6		178
12.1	3978	1.3	80	50000				VF 250_80	P160	BE160MB6		182
12.1	4094	1.2	120	34500				VFR 210_120	P132	BE132MA4	BX132MA4	178
12.1	4153	1.7	120	52000				VFR 250_120	P132	BE132MA4	BX132MA4	184
14.6	3461	1.0	100	19500				VFR 185_100	P132	BE132MA4	BX132MA4	170
14.6	3314	1.1	100	47000				VF 250_100	P132	BE132MA4	BX132MA4	182
16.1	3117	1.2	60	33000				VF 210_60	P160	BE160MB6		176
16.2	3334	1.2	90	34500				VFR 210_90	P132	BE132MA4	BX132MA4	178
16.2	3422	1.7	90	52000				VFR 250_90	P132	BE132MA4	BX132MA4	184
18.2	2691	1.1	80	31500				VF 210_80	P132	BE132MA4	BX132MA4	176
18.2	2769	1.4	80	47000				VF 250_80	P132	BE132MA4	BX132MA4	182
19.4	2815	1.0	75	19500				VFR 185_75	P132	BE132MA4	BX132MA4	170
21.4	2672	1.8	45	34500				VFR 210_45	P160	BE160MB6		178
21.4	2739	2.5	45	52000				VFR 250_45	P160	BE160MB6		184
24.3	2164	1.0	60	18000				VF 185_60	P132	BE132MA4	BX132MA4	168
24.3	2135	1.4	60	31500				VF 210_60	P132	BE132MA4	BX132MA4	176
24.3	2340	2.0	60	31500				VFR 210_60	P132	BE132MA4	BX132MA4	178
24.3	2223	2.0	60	47000				VF 250_60	P132	BE132MA4	BX132MA4	182
24.3	2369	3.0	60	52000				VFR 250_60	P132	BE132MA4	BX132MA4	184
29.1	1911	1.0	50	14100				VFR 150_50	P132	BE132MA4	BX132MA4	162
29.1	1852	1.3	50	18000				VF 185_50	P132	BE132MA4	BX132MA4	168
29.1	1974	1.6	50	19500				VFR 185_50	P132	BE132MA4	BX132MA4	170
29.1	1852	1.7	50	31500				VF 210_50	P132	BE132MA4	BX132MA4	176
29.1	1852	2.4	50	47000				VF 250_50	P132	BE132MA4	BX132MA4	182
31	1727	0.9	46	14700				VF 150_46	P132	BE132MA4	BX132MA4	160
32	1821	2.2	45	34500				VFR 210_45	P132	BE132MA4	BX132MA4	178
32	1842	3.5	45	48800				VFR 250_45	P132	BE132MA4	BX132MA4	184
36	1501	1.0	40	14700				VF 150_40	P132	BE132MA4	BX132MA4	160
36	1521	1.7	40	18000				VF 185_40	P132	BE132MA4	BX132MA4	168
36	1521	2.3	40	31500				VF 210_40	P132	BE132MA4	BX132MA4	176
36	1541	3.2	40	47000				VF 250_40	P132	BE132MA4	BX132MA4	182
38	1471	1.1	38	13200				VFR 150_37.5	P132	BE132MA4	BX132MA4	162
38	1536	1.8	38	18300				VFR 185_37.5	P132	BE132MA4	BX132MA4	170
49	1155	0.9	30	11900				VF 130_30	P132	BE132MA4	BX132MA4	152
49	1170	1.1	30	14200				VF 150_30	P132	BE132MA4	BX132MA4	160
49	1214	1.6	30	18000				VF 185_30	P132	BE132MA4	BX132MA4	168
49	1214	2.6	30	31500				VF 210_30	P132	BE132MA4	BX132MA4	176

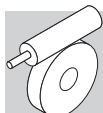


7.5 kW








n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	 IE2	 IE3		 IE2	 IE3		
49	1257	3.1	30	33400			VFR 210_30	P132	BE132MA4	BX132MA4	178
49	1228	3.3	30	4440			VF 250_30	P132	BE132MA4	BX132MA4	182
59	1036	1.4	25	11000			VFR 150_25	P132	BE132MA4	BX132MA4	162
59	1048	2.4	25	16700			VFR 185_25	P132	BE132MA4	BX132MA4	170
64	931	0.9	23	11200			VF 130_23	P132	BE132MA4	BX132MA4	152
64	931	1.3	23	13200			VF 150_23	P132	BE132MA4	BX132MA4	160
64	958	2.3	15	16700			VF 185_15	P160	BE160MB6		168
73	819	1.1	20	10800			VF 130_20	P132	BE132MA4	BX132MA4	152
73	819	1.6	20	12700			VF 150_20	P132	BE132MA4	BX132MA4	160
97	614	1.0	15	7370			W 110_15	P132	BE132MA4	BX132MA4	149
97	629	1.4	15	10200			VF 130_15	P132	BE132MA4	BX132MA4	152
97	636	1.8	15	11700			VF 150_15	P132	BE132MA4	BX132MA4	160
127	479	1.4	23	9900			VF 130_23	P132	BE132SB2		152
127	479	2.0	23	11400			VF 150_23	P132	BE132SB2		160
138	462	2.5	7	10200			VF 150_7	P160	BE160MB6		160
146	424	1.3	10	6720			W 110_10	P132	BE132MA4	BX132MA4	149
146	429	1.8	10	9150			VF 130_10	P132	BE132MA4	BX132MA4	152
146	429	2.4	10	10500			VF 150_10	P132	BE132MA4	BX132MA4	160
195	320	1.7	15	6660			W 110_15	P132	BE132SB2		149
208	304	1.6	7	6100			W 110_7	P132	BE132MA4	BX132MA4	149
208	304	2.4	7	8210			VF 130_7	P132	BE132MA4	BX132MA4	152
208	307	3.3	7	9400			VF 150_7	P132	BE132MA4	BX132MA4	160
293	215	2.2	10	5980			W 110_10	P132	BE132SB2		149
293	217	2.8	10	7840			VF 130_10	P132	BE132SB2		152
418	153	2.9	7	5380			W 110_7	P132	BE132SB2		149
418	154	3.6	7	7010			VF 130_7	P132	BE132SB2		152

9.2 kW








n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	 IE2	 IE3		 IE2	 IE3		
5.1	9054	1.0	280	52000			VF/VF 130/250_280	P132	BE132MB4		186
9.7	6132	1.1	150	52000			VFR 250_150	P132	BE132MB4	BX160MA4	184
12.1	5198	1.3	120	52000			VFR 250_120	P132	BE132MB4	BX160MA4	184
14.5	4149	0.9	100	47000			VF 250_100	P132	BE132MB4	BX160MA4	182
16.1	4173	1.0	90	34500			VFR 210_90	P132	BE132MB4	BX160MA4	178
16.1	4283	1.4	90	52000			VFR 250_90	P132	BE132MB4	BX160MA4	184
18.1	3368	0.9	80	31500			VF 210_80	P132	BE132MB4	BX160MA4	176
18.1	3466	1.1	80	47000			VF 250_80	P132	BE132MB4	BX160MA4	182
24.2	2672	1.1	60	31500			VF 210_60	P132	BE132MB4	BX160MA4	176
24.2	2929	1.6	60	34500			VFR 210_60	P132	BE132MB4	BX160MA4	178
24.2	2782	1.6	60	47000			VF 250_60	P132	BE132MB4	BX160MA4	182
24.2	2965	2.4	60	51900			VFR 250_60	P132	BE132MB4	BX160MA4	184
29.0	2319	1.1	50	18000			VF 185_50	P132	BE132MB4	BX160MA4	168
29.0	2471	1.3	50	18600			VFR 185_50	P132	BE132MB4		170
29.0	2319	1.4	50	31500			VF 210_50	P132	BE132MB4	BX160MA4	176
29.0	2319	1.9	50	47000			VF 250_50	P132	BE132MB4	BX160MA4	182
32	2279	1.8	45	34500			VFR 210_45	P132	BE132MB4	BX160MA4	178
32	2306	2.8	45	48000			VFR 250_45	P132	BE132MB4	BX160MA4	184
36	1904	1.4	40	18000			VF 185_40	P132	BE132MB4	BX160MA4	168
36	1904	1.8	40	31500			VF 210_40	P132	BE132MB4	BX160MA4	176
36	1928	2.5	40	47000			VF 250_40	P132	BE132MB4	BX160MA4	182
38	1884	0.9	38	11900			VFR 150_37.5	P132	BE132MB4		162
38	1922	1.5	38	17200			VFR 185_37.5	P132	BE132MB4		170
48	1464	0.9	30	11300			VF 150_30	P132	BE132MB4	BX160MA4	160
48	1519	1.3	30	17900			VF 185_30	P132	BE132MB4	BX160MA4	168
48	1519	2.0	30	31500			VF 210_30	P132	BE132MB4	BX160MA4	176
48	1574	2.4	30	32600			VFR 210_30	P132	BE132MB4	BX160MA4	178
48	1538	2.6	30	43900			VF 250_30	P132	BE132MB4	BX160MA4	182
48	1574	3.8	30	42800			VFR 250_30	P132	BE132MB4	BX160MA4	184
58	1297	1.2	25	11200			VFR 150_25	P132	BE132MB4		162
58	1312	2.0	25	15800			VFR 185_25	P132	BE132MB4		170
63	1165	1.1	23	12500			VF 150_23	P132	BE132MB4	BX160MA4	160
73	1025	0.9	20	10100			VF 130_20	P132	BE132MB4	BX160MA4	152
73	1025	1.3	20	12100			VF 150_20	P132	BE132MB4		160
73	1037	3.0	20	30400			VF 210_20	P132	BE132MB4	BX160MA4	176
97	787	1.2	15	9560			VF 130_15	P132	BE132MB4		152
97	796	1.4	15	11200			VF 150_15	P132	BE132MB4	BX160MA4	160
127	601	1.1	23	9510			VF 130_23	P132	BE132MB2		152










9.2 kW

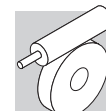
n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N						IEC 		
					IE2	IE3				IE2	IE3	
127	601	1.6	23	11000				VF 150_23	P132	BE132MB2		160
145	531	1.0	10	6210				W 110_10	P132	BE132MB4		149
145	537	1.5	10	8690				VF 130_10	P132	BE132MB4	BX160MA4	152
145	537	2.0	10	16100				VF 150_10	P132	BE132MB4		160
195	396	1.4	15	6320				W 110_15	P132	BE132MB2		149
207	380	1.3	7	5670				W 110_7	P132	BE132MB4		149
207	380	1.9	7	7820				VF 130_7	P132	BE132MB4		152
207	384	2.6	7	9030				VF 150_7	P132	BE132MB4	BX160MA4	160
292	271	1.8	10	5720				W 110_10	P132	BE132MB2		149
292	274	2.2	10	7620				VF 130_10	P132	BE132MB2		152
292	274	2.9	10	8690				VF 150_10	P132	BE132MB2		160
417	192	2.3	7	5170				W 110_7	P132	BE132MB2		149
417	194	2.9	7	6820				VF 130_7	P132	BE132MB2		152

11 kW








n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N				  IEC 	
					IE2	IE3		IE2	IE2
12.3	6130	1.1	120	52000			VFR 250_120	P160	BE160M4
16.3	5051	1.2	90	52000			VFR 250_90	P160	BE160M4
18.4	4087	0.9	80	47000			VF 250_80	P160	BE160M4
24.5	3151	0.9	60	31500			VF 210_60	P160	BE160M4
24.5	3454	1.3	60	34500			VFR 210_60	P160	BE160M4
24.5	3281	1.4	60	47000			VF 250_60	P160	BE160M4
24.5	3496	2.0	60	50900			VFR 250_60	P160	BE160M4
29.4	2734	1.2	50	31500			VF 210_50	P160	BE160M4
29.4	2734	1.6	50	47000			VF 250_50	P160	BE160M4
33	2688	1.5	45	34500			VFR 210_45	P160	BE160M4
33	2720	2.3	45	47100			VFR 250_45	P160	BE160M4
37	2245	1.2	40	18500			VF 185_40	P160	BE160M4
37	2245	1.5	40	31500			VF 210_40	P160	BE160M4
37	2273	2.1	40	47000			VF 250_40	P160	BE160M4
49	1791	1.1	30	17200			VF 185_30	P160	BE160M4
49	1791	1.7	30	31500			VF 210_30	P160	BE160M4
49	1856	2.0	30	31800			VFR 210_30	P160	BE160M4
49	1813	2.2	30	43400			VF 250_30	P160	BE160M4
49	1856	3.2	30	42100			VFR 250_30	P160	BE160M4
74	1209	1.1	20	11400			VF 150_20	P160	BE160M4
74	1223	1.8	20	15600			VF 185_20	P160	BE160M4
74	1223	2.5	20	30000			VF 210_20	P160	BE160M4
98	939	1.2	15	10600			VF 150_15	P160	BE160M4
98	950	1.9	15	14200			VF 185_15	P160	BE160M4
98	950	3.0	15	27700			VF 210_15	P160	BE160M4
147	630	2.7	20	13300			VF 185_20	P160	BE160MA2
147	633	1.6	10	9670			VF 150_10	P160	BE160M4
196	478	2.9	15	12200			VF 185_15	P160	BE160MA2
210	454	2.2	7	8660			VF 150_7	P160	BE160M4
294	323	2.4	10	8440			VF 150_10	P160	BE160MA2
420	228	3.3	7	7530			VF 150_7	P160	BE160MA2

15 kW








n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N						IEC 		
					IE2	IE3				IE2	IE3	
24.5	4474	1.0	60	47000				VF 250_60	P160	BE160L4	BX160LA4	182
24.5	4768	1.5	60	48700				VFR 250_60	P160	BE160L4	BX160LA4	184
29.4	3728	0.9	50	31500				VF 210_50	P160	BE160L4	BX160LA4	176
29.4	3728	1.2	50	47000				VF 250_50	P160	BE160L4	BX160LA4	182
32	3665	1.1	45	33200				VFR 210_45	P160	BE160L4	BX160LA4	178
32	3709	1.7	45	45200				VFR 250_45	P160	BE160L4	BX160LA4	184
37	3061	0.9	40	16600				VF 185_40	P160	BE160L4	BX160LA4	168
37	3061	1.1	40	31500				VF 210_40	P160	BE160L4	BX160LA4	176
37	3100	1.5	40	45900				VF 250_40	P160	BE160L4	BX160LA4	182
49	2443	1.2	30	31500				VF 210_30	P160	BE160L4	BX160LA4	176










15 kW

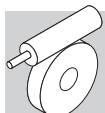
n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	 IE2	 IE3		 IE2	 IE3		
49	2531	1.5	30	30000			VFR 210_30	P160	BE160L4	BX160LA4	178
49	2473	1.6	30	42400			VF 250_30	P160	BE160L4	BX160LA4	182
49	2531	2.4	30	40600			VFR 250_30	P160	BE160L4	BX160LA4	184
74	1668	1.4	20	14300			VF 185_20	P160	BE160L4	BX160LA4	168
74	1668	1.9	20	29100			VF 210_20	P160	BE160L4	BX160LA4	176
74	1688	2.6	20	38100			VF 250_20	P160	BE160L4	BX160LA4	182
98	1280	0.9	15	9360			VF 150_15	P160	BE160L4	BX160LA4	160
98	1295	1.4	15	13200			VF 185_15	P160	BE160L4	BX160LA4	168
98	1295	2.2	15	27000			VF 210_15	P160	BE160L4	BX160LA4	176
98	1295	3.1	15	35100			VF 250_15	P160	BE160L4	BX160LA4	182
147	855	2.0	20	12700			VF 185_20	P160	BE160MB2		168
147	863	1.2	10	8720			VF 150_10	P160	BE160L4	BX160LA4	160
147	873	3.0	10	24000			VF 210_10	P160	BE160L4	BX160LA4	176
196	649	2.1	15	11600			VF 185_15	P160	BE160MB2		168
196	649	3.3	15	22700			VF 210_15	P160	BE160MB2		176
210	618	1.6	7	7840			VF 150_7	P160	BE160L4	BX160LA4	160
294	437	1.8	10	7960			VF 150_10	P160	BE160MB2		160
420	309	2.4	7	7120			VF 150_7	P160	BE160MB2		160

18.5 kW





n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE2	 IE3		 IE2	 IE2		
29.4	4560	1.0	50	47000			VF 250_50	P180	BE180M4	BX180M4	182
37	3745	0.9	40	31500			VF 210_40	P180	BE180M4	BX180M4	176
37	3792	1.3	40	44900			VF 250_40	P180	BE180M4	BX180M4	182
49	2988	1.0	30	31200			VF 210_30	P180	BE180M4	BX180M4	176
49	3024	1.3	30	41500			VF 250_30	P180	BE180M4	BX180M4	182
74	2040	1.1	20	13200			VF 185_20	P180	BE180M4	BX180M4	168
74	2040	1.5	20	28300			VF 210_20	P180	BE180M4	BX180M4	176
74	2064	2.1	20	37400			VF 250_20	P180	BE180M4	BX180M4	182
98	1584	1.2	15	12200			VF 185_15	P180	BE180M4	BX180M4	168
98	1584	1.8	15	26200			VF 210_15	P180	BE180M4	BX180M4	176
98	1584	2.5	15	34500			VF 250_15	P180	BE180M4	BX180M4	182
147	1068	1.7	10	11400			VF 185_10	P180	BE180M4	BX180M4	168
147	1068	2.5	10	23400			VF 210_10	P180	BE180M4	BX180M4	176
147	1080	3.4	10	37800			VF 250_10	P180	BE180M4	BX180M4	182
196	805	1.1	15	8260			VF 150_15	P160	BE160L2		160
210	756	2.3	7	10100			VF 185_7	P180	BE180M4	BX180M4	168
210	756	3.0	7	21200			VF 210_7	P180	BE180M4	BX180M4	176
295	543	1.5	10	7550			VF 150_10	P160	BE160L2		160
421	384	2.0	7	6760			VF 150_7	P160	BE160L2		160

22 kW








n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE2	 IE3		 IE2	 IE3		
37	4501	1.1	40	43900			VF 250_40	P180	BE180L4	BX180L4	182
49	3546	0.9	30	30200			VF 210_30	P180	BE180L4	BX180L4	176
49	3589	1.1	30	44700			VF 250_30	P180	BE180L4	BX180L4	182
74	2421	0.9	20	12200			VF 185_20	P180	BE180L4	BX180L4	168
74	2421	1.3	20	27500			VF 210_20	P180	BE180L4	BX180L4	176
74	2450	1.8	20	36700			VF 250_20	P180	BE180L4	BX180L4	182
99	1880	1.0	15	11300			VF 185_15	P180	BE180L4	BX180L4	168
99	1880	1.5	15	25500			VF 210_15	P180	BE180L4	BX180L4	176
99	1880	2.1	15	33900			VF 250_15	P180	BE180L4	BX180L4	182
148	1267	1.4	10	10700			VF 185_10	P180	BE180L4	BX180L4	168
148	1267	2.1	10	22900			VF 210_10	P180	BE180L4	BX180L4	176
148	1282	2.9	10	30300			VF 250_10	P180	BE180L4	BX180L4	182
210	898	1.9	7	9510			VF 185_7	P180	BE180L4	BX180L4	168
210	898	2.5	7	20800			VF 210_7	P180	BE180L4	BX180L4	176
210	908	3.5	7	27500			VF 250_7	P180	BE180L4	BX180L4	182










30 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE...		 IEC		
147	1754	2,1	10	29200			VF 250_10	P200 IEC200L4	182
210	1228	1,9	7	19700			VF 210_7	P200 IEC200L4	176
210	1242	2,6	7	26600			VF 250_7	P200 IEC200L4	182
295	874	2,3	10	19000			VF 210_10	P200 IEC200LA2	176
421	619	2,8	7	17200			VF 210_7	P200 IEC200LA2	176

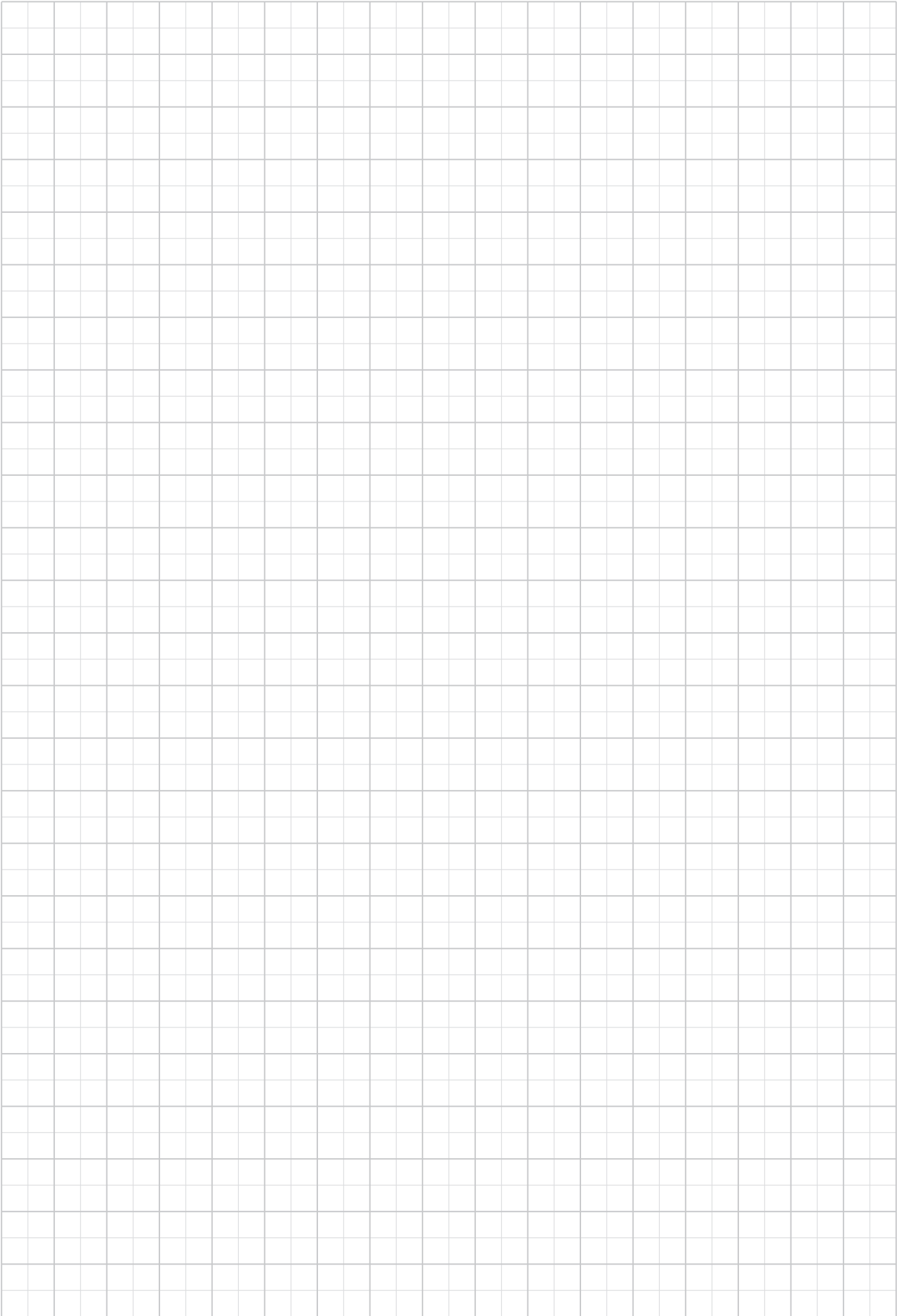
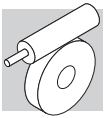
37 kW

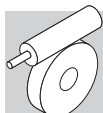
n2 min-1	M2 Nm	S	i	Rn2 N	  IE...		  IEC			
74	4107	1,1	20	22800			VF 250_20	P225	IEC225S4	182
99	3152	0,9	15	22600			VF 210_15	P225	IEC225S4	176
99	3152	1,3	15	31400			VF 250_15	P225	IEC225S4	182
148	2125	1,2	10	20500			VF 210_10	P225	IEC225S4	176
148	2149	1,7	10	28300			VF 250_10	P225	IEC225S4	182
211	1504	1,5	7	18800			VF 210_7	P225	IEC225S4	176
211	1521	2,1	7	25800			VF 250_7	P225	IEC225S4	182
296	1074	1,9	10	18400			VF 210_10	P200	IEC200L2	176
296	1086	2,6	10	24500			VF 250_10	P200	IEC200L2	182
423	760	2,3	7	16800			VF 210_7	P200	IEC200L2	176

45 kW

n2 min-1	M2 Nm	S	i	Rn2 N	  IE...	 IEC	   IEC	
74	4994	0,9	20	32300		VF 250_20	P225 IEC225M4	182
99	3833	1	15	30100		VF 250_15	P225 IEC225M4	182
148	2584	1	10	19200		VF 210_10	P225 IEC225M4	176
148	2613	1,4	10	27300		VF 250_10	P225 IEC225M4	182
211	1829	1,3	7	17800		VF 210_7	P225 IEC225M4	176
211	1850	1,7	7	25000		VF 250_7	P225 IEC225M4	182
296	1307	1,5	10	17800		VF 210_10	P200 IEC225M2	176
296	1321	2,1	10	24000		VF 250_10	P200 IEC225M2	182
423	925	1,9	7	16200		VF 210_7	P200 IEC225M2	176
423	935	2,6	7	21800		VF 250_7	P200 IEC225M2	182

The technical information shall be considered as indicative, the configurations should be matching the data provided by motors manufacturers on rated powers greater than 22 kW.







22 SPEED REDUCER RATING CHARTS



VF 27

13 Nm

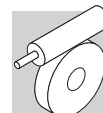
		i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %		
$n_1 = 2800 \text{ min}^{-1}$									$n_1 = 1400 \text{ min}^{-1}$								
VF 27	VF 27_7	7	67	400	7	0.34	—	330	86	200	9	0.23	35	410	83	187	
	VF 27_10	10	62	280	7	0.24	—	400	84	140	9	0.16	30	500	80		
	VF 27_15	15	54	187	7	0.17	—	480	79	93	9	0.12	—	600	75		
	VF 27_20	20	49	140	7	0.14	—	540	76	70	9	0.09	—	600	71		
	VF 27_30	30	38	93	7	0.10	—	600	69	47	9	0.07	—	600	62		
	VF 27_40	40	33	70	7	0.08	—	600	64	35	9	0.06	—	600	57		
	VF 27_60	60	26	47	7	0.06	—	600	56	23.3	9	0.04	—	600	49		
	VF 27_70	70	24	40	7	0.06	—	600	53	20.0	9	0.04	—	600	45		
	$n_1 = 900 \text{ min}^{-1}$									$n_1 = 500 \text{ min}^{-1}$							
	VF 27_7	7	67	129	10	0.17	90	480	81	71	11	0.11	90	600	79	187	
	VF 27_10	10	62	90	11	0.13	20	570	78	50	12	0.08	90	600	76		
	VF 27_15	15	54	60	11	0.09	—	600	72	33	12	0.06	90	600	69		
	VF 27_20	20	49	45	11	0.08	—	600	68	25.0	12	0.05	90	600	65		
	VF 27_30	30	38	30.0	11	0.06	—	600	59	16.7	13	0.04	—	600	55		
	VF 27_40	40	33	22.5	11	0.05	—	600	54	12.5	13	0.04	—	600	50		
	VF 27_60	60	26	15.0	11	0.04	—	600	45	8.3	12	0.02	—	600	41		
	VF 27_70	70	24	12.9	10	0.03	—	600	42	7.1	11	0.02	—	600	38		

VF 30

24 Nm



		i	η_s %	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	
				min ⁻¹	Nm	kW	N	N	%	min ⁻¹	Nm	kW	N	N	%	
				$n_1 = 2800 \text{ min}^{-1}$						$n_1 = 1400 \text{ min}^{-1}$						
VF 30	VF 30_7	7	69	400	12	0.58	120	510	87	200	16	0.41	140	630	84	188
	VF 30_10	10	64	280	12	0.41	70	620	85	140	16	0.30	80	770	81	
	VF 30_15	15	56	187	14	0.34	—	720	81	93	18	0.24	—	910	76	
	VF 30_20	20	51	140	14	0.26	—	820	78	70	18	0.19	—	1030	73	
	VF 30_30	30	41	93	15	0.21	—	960	71	47	20	0.15	—	1200	65	
	VF 30_40	40	36	70	14	0.16	—	1090	66	35	19	0.12	—	1360	60	
	VF 30_60	60	29	47	14	0.12	—	1270	59	23.3	19	0.09	—	1590	51	
	VF 30_70	70	26	40	11	0.08	—	1380	55	20.0	15	0.07	—	1600	48	
	$n_1 = 900 \text{ min}^{-1}$						$n_1 = 500 \text{ min}^{-1}$									
	VF 30_7	7	69	129	18	0.30	150	730	82	71	20	0.19	150	920	81	188
	VF 30_10	10	64	90	18	0.22	150	900	79	50	20	0.14	150	1120	77	
	VF 30_15	15	56	60	20	0.17	—	1060	74	33	22	0.11	150	1320	71	
	VF 30_20	20	51	45	20	0.14	—	1200	70	25.0	22	0.09	150	1490	67	
	VF 30_30	30	41	30	22	0.12	—	1400	61	16.7	24	0.07	—	1700	58	
	VF 30_40	40	36	23	20	0.09	—	1590	56	12.5	22	0.06	—	1700	53	
	VF 30_60	60	29	15	20	0.07	—	1650	48	8.3	22	0.05	—	1700	44	
	VF 30_70	70	26	13	17	0.05	—	1700	45	7.0	19	0.04	—	1700	41	

(-) Contact our technical service department advising radial load data (rotation direction, load angle, offset)





VF 44 - VF/VF 30/44

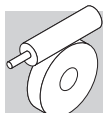
55 Nm

	i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %			
			$n_1 = 2800 \text{ min}^{-1}$							$n_1 = 1400 \text{ min}^{-1}$							
VF 44	VF 44_7	7	71	400	22	1.1	220	950	88	200	29	0.71	220	1180	86	188	
	VF 44_10	10	66	280	22	0.74	220	1150	87	140	29	0.51	220	1430	84		
	VF 44_14	14	60	200	22	0.55	220	1340	84	100	29	0.37	220	1680	81		
	VF 44_20	20	55	140	29	0.52	220	1490	81	70	39	0.37	220	1860	77		
	VF 44_28	28	45	100	29	0.40	220	1710	76	50	39	0.29	220	2140	71		
	VF 44_35	35	42	80	29	0.33	220	1870	73	40	39	0.25	220	2300	68		
	VF 44_46	46	37	61	29	0.27	220	2080	69	30.0	39	0.19	220	2300	63		
	VF 44_60	60	32	47	29	0.22	220	2290	65	23.3	39	0.16	220	2300	58		
	VF 44_70	70	30	40	22	0.15	220	2300	62	20.0	29	0.11	220	2300	55		
	VF 44_100	100	24	28	21	0.11	220	2300	55	14.0	28	0.09	220	2300	47		
				$n_1 = 900 \text{ min}^{-1}$						$n_1 = 500 \text{ min}^{-1}$						188	
	VF 44_7	7	71	129	39	0.63	220	1300	85	71	45	0.41	220	1610	83		
	VF 44_10	10	66	90	39	0.45	220	1610	82	50	45	0.29	220	1980	80		
	VF 44_14	14	60	64	39	0.34	220	1890	78	36	50	0.25	220	2280	76		
	VF 44_20	20	55	45	45	0.29	220	2160	74	25.0	50	0.18	220	2500	72		
	VF 44_28	28	45	32	49	0.24	220	2300	67	17.9	55	0.16	220	2500	64		
	VF 44_35	35	42	25.7	49	0.20	220	2300	64	14.3	55	0.14	220	2500	60		
VF 44_46	46	37	19.6	49	0.17	220	2300	59	10.9	50	0.10	220	2500	55			
VF 44_60	60	32	15.0	45	0.13	200	2300	54	8.3	50	0.09	220	2500	50			
VF 44_70	70	30	12.9	39	0.10	220	2300	51	7.1	45	0.07	220	2500	47			
VF 44_100	100	24	9.0	30	0.06	220	2300	43	5.0	32	0.04	220	2500	39			

70 Nm



		i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
$n_1 = 1400 \text{ min}^{-1}$						$n_1 = 900 \text{ min}^{-1}$										
VF/VF 30/44	VF/VF 30/44_245	245	29	5.7	60	0.09	140	2500	40	3.7	70	0.07	150	2500	38	190
	VF/VF 30/44_350	350	27	4.0	60	0.07	80	2500	36	2.6	70	0.05	150	2500	38	
	VF/VF 30/44_420	420	25	3.3	60	0.06	—	2500	35	2.1	70	0.04	—	2500	39	
	VF/VF 30/44_560	560	23	2.5	60	0.05	—	2500	31	1.6	70	0.04	—	2500	29	
	VF/VF 30/44_700	700	21	2.0	60	0.04	—	2500	31	1.3	70	0.03	—	2500	31	
	VF/VF 30/44_840	840	18	1.7	60	0.04	—	2500	26	1.1	70	0.03	—	2500	26	
	VF/VF 30/44_1120	1120	16	1.3	60	0.03	—	2500	26	0.80	70	0.02	—	2500	29	
	VF/VF 30/44_1680	1680	13	0.83	60	0.02	—	2500	26	0.54	70	0.02	—	2500	20	
VF/VF 30/44_2100	2100	12	0.67	60	0.02	—	2500	21	0.43	70	0.02	—	2500	16		

(-) Contact our technical service department advising radial load data (rotation direction, load angle, offset)





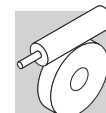
VF 49 - VFR 49

88 Nm

	i	η_s %	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d		
			min ⁻¹	Nm	kW	N	N	%	min ⁻¹	Nm	kW	N	N	%		
			$n_1 = 2800 \text{ min}^{-1}$							$n_1 = 1400 \text{ min}^{-1}$						
VF 49	VF 49_7	7	70	400	41	2.0	400	950	88	200	54	1.3	400	1170	86	188
	VF 49_10	10	65	280	44	1.5	400	1140	86	140	59	1.0	400	1410	84	
	VF 49_14	14	59	200	49	1.2	400	1310	84	100	65	0.90	400	1630	81	
	VF 49_18	18	55	156	44	0.87	400	1520	82	78	59	0.60	400	1890	78	
	VF 49_24	24	50	117	47	0.73	400	1670	79	58	63	0.50	400	2110	75	
	VF 49_28	28	43	100	56	0.78	400	1740	75	50	74	0.55	400	2170	71	
	VF 49_36	36	39	78	52	0.59	400	1970	72	39	69	0.42	400	2460	67	
	VF 49_45	45	35	62	49	0.46	400	2180	69	31	65	0.33	400	2725	63	
	VF 49_60	60	30	47	44	0.34	400	2480	64	23.3	59	0.25	400	3100	58	
	VF 49_70	70	28	40	41	0.28	400	2650	61	20.0	55	0.21	400	3150	54	
	VF 49_80	80	25	35	41	0.25	400	2780	59	17.5	54	0.19	400	3150	52	
	VF 49_100	100	22	28.0	37	0.20	400	3050	54	14.0	49	0.13	400	3150	47	
	$n_1 = 900 \text{ min}^{-1}$									$n_1 = 500 \text{ min}^{-1}$						188
	VF 49_7	7	70	129	61	0.97	400	1370	85	71	74	0.67	400	1670	83	
	VF 49_10	10	65	90	64	0.75	400	1670	82	50	74	0.49	400	2060	80	
	VF 49_14	14	59	64	71	0.61	400	1920	78	36	78	0.39	400	2400	75	
	VF 49_18	18	55	50	68	0.47	400	2190	75	27.8	74	0.30	400	2730	72	
	VF 49_24	24	50	38	68	0.36	400	2480	71	20.8	74	0.24	400	3090	68	
	VF 49_28	28	43	32	82	0.41	400	2540	67	17.9	88	0.26	400	3180	63	
	VF 49_36	36	39	25.0	75	0.31	400	2880	63	13.9	80	0.20	400	3450	59	
	VF 49_45	45	35	20.0	71	0.25	400	3190	59	11.1	78	0.17	400	3450	55	
	VF 49_60	60	30	15.0	64	0.19	400	3300	53	8.3	69	0.12	400	3450	49	
VF 49_70	70	28	12.9	60	0.16	400	3300	50	7.1	69	0.11	400	3450	46		
VF 49_80	80	25	11.3	58	0.14	400	3300	47	6.3	59	0.09	400	3450	43		
VF 49_100	100	22	9.0	52	0.11	400	3300	42	5.0	59	0.08	400	3450	38		



95 Nm

	i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %			
			$n_1 = 2800 \text{ min}^{-1}$							$n_1 = 1400 \text{ min}^{-1}$							
VFR 49	VFR 49_42	42	58	67	71	0.65	230	1920	76	33	78	0.37	230	2500	74	189	
	VFR 49_54	54	54	52	68	0.50	230	2180	74	25.9	74	0.28	230	2830	71		
	VFR 49_72	72	49	39	68	0.40	230	2470	70	19.4	74	0.22	230	3190	67		
	VFR 49_84	84	42	33	82	0.44	230	2520	66	16.6	88	0.25	230	3290	62		
	VFR 49_108	108	38	25.9	75	0.33	230	2860	62	12.9	80	0.19	230	3450	58		
	VFR 49_135	135	34	20.7	71	0.27	230	3160	58	10.3	88	0.18	230	3450	54		
	VFR 49_180	180	29	15.6	64	0.20	230	3300	52	7.7	69	0.12	230	3450	48		
	VFR 49_210	210	27	13.3	60	0.17	230	3300	49	6.6	69	0.11	230	3450	45		
	VFR 49_240	240	25	11.7	58	0.15	230	3300	46	5.8	59	0.09	230	3450	42		
	VFR 49_300	300	22	9.3	52	0.12	230	3300	41	4.7	59	0.08	230	3450	37		
																189	

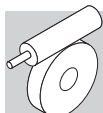


VF/VF 30/49

100 Nm



		i	η_s %	$n_1 = 1400 \text{ min}^{-1}$						$n_1 = 900 \text{ min}^{-1}$						
n_2 min ⁻¹	M_{n2} Nm			P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %			
VF/VF 30/49	VF/VF 30/49_240	240	32	5.8	95	0.13	80	3450	45	3.8	100	0.09	150	3450	44	190
	VF/VF 30/49_315	315	24	4.4	95	0.11	140	3450	40	2.9	100	0.07	150	3450	43	
	VF/VF 30/49_420	420	24	3.3	95	0.08	—	3450	41	2.1	100	0.06	—	3450	37	
	VF/VF 30/49_540	540	22	2.6	95	0.07	—	3450	37	1.7	100	0.05	—	3450	35	
	VF/VF 30/49_720	720	20	1.9	95	0.05	—	3450	39	1.3	100	0.04	—	3450	33	
	VF/VF 30/49_900	900	18	1.6	95	0.05	—	3450	31	1.0	100	0.04	—	3450	26	
	VF/VF 30/49_1120	1120	15	1.3	95	0.04	—	3450	31	0.80	100	0.03	—	3450	28	
	VF/VF 30/49_1440	1440	14	0.97	95	0.04	—	3450	24	0.63	100	0.03	—	3450	22	
	VF/VF 30/49_2160	2160	11	0.65	95	0.03	—	3450	21	0.42	100	0.02	—	3450	22	
VF/VF 30/49_2700	2700	10	0.52	95	0.03	—	3450	17	0.33	100	0.02	—	3450	17		

(-) Contact our technical service department advising radial load data (rotation direction, load angle, offset)

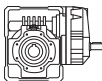



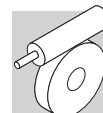
W 63 - WR 63

190 Nm

	i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %			
			$n_1 = 2800 \text{ min}^{-1}$							$n_1 = 1400 \text{ min}^{-1}$							
W 63	W 63_7	7	70	400	105	4.9	480	1010	90	200	120	2.9	480	1550	88	188	
	W 63_10	10	66	280	125	4.2	370	1360	88	140	140	2.4	480	1840	86		
	W 63_12	12	63	233	125	3.5	435	1540	87	117	140	2.0	480	2070	85		
	W 63_15	15	59	187	125	2.8	410	1770	86	93	150	1.8	480	2280	83		
	W 63_19	19	55	147	130	2.4	310	1990	84	74	150	1.4	480	2600	81		
	W 63_24	24	52	117	130	1.9	370	2250	82	58	155	1.2	480	2890	78		
	W 63_30	30	44	93	125	1.6	440	2540	78	47	160	1.1	460	3170	74		
	W 63_38	38	40	74	130	1.3	330	2800	75	37	155	0.85	480	3580	70		
	W 63_45	45	37	62	130	1.2	380	3020	73	31	145	0.71	480	3920	67		
	W 63_64	64	31	44	110	0.75	480	3650	67	21.9	125	0.47	480	4680	61		
	W 63_80	80	27	35	100	0.59	480	4050	62	17.5	115	0.38	480	5000	56		
	W 63_100	100	23	28	100	0.51	480	4420	58	14.0	115	0.33	480	5000	51		
																188	
	$n_1 = 900 \text{ min}^{-1}$									$n_1 = 500 \text{ min}^{-1}$							
	W 63_7	7	70	129	130	2.0	480	1870	87	71	140	1.2	480	2420	84		
	W 63_10	10	66	90	150	1.7	480	2220	84	50	165	1.1	480	2830	81		
	W 63_12	12	63	75	150	1.4	480	2480	82	42	165	0.92	480	3140	79		
	W 63_15	15	59	60	160	1.3	480	2740	80	33	180	0.83	480	3430	76		
	W 63_19	19	55	47	160	1.0	480	3100	78	26.3	180	0.68	480	3860	73		
	W 63_24	24	52	38	165	0.86	480	3440	75	20.8	185	0.58	480	4280	70		
	W 63_30	30	44	30	170	0.76	480	3770	70	16.7	190	0.52	480	4690	64		
	W 63_38	38	40	23.7	165	0.62	480	4240	66	13.2	185	0.42	480	5000	61		
	W 63_45	45	37	20.0	155	0.52	480	4630	63	11.1	170	0.34	480	5000	58		
W 63_64	64	31	14.1	135	0.35	480	5000	56	7.8	150	0.24	480	5000	51			
W 63_80	80	27	11.3	125	0.28	480	5000	52	6.3	135	0.19	480	5000	46			
W 63_100	100	23	9.0	120	0.25	480	5000	46	5.0	130	0.17	480	5000	41			



220 Nm

		i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
$n_1 = 2800 \text{ min}^{-1}$						$n_1 = 1400 \text{ min}^{-1}$										
WR 63	WR 63_21	21	69	133	130	2.1	180	1840	87	67	140	1.2	320	2510	84	189
	WR 63_30	30	65	93	150	1.7	300	2180	84	47	165	1.0	320	2920	81	
	WR 63_36	36	62	78	150	1.5	320	2430	82	39	165	0.85	320	3240	79	
	WR 63_45	45	58	62	160	1.3	320	2690	80	31	180	0.77	320	3540	76	
	WR 63_57	57	54	49	160	1.1	320	3050	78	24.6	180	0.63	320	3980	73	
	WR 63_72	72	51	39	165	0.90	320	3390	75	19.4	185	0.54	320	4410	70	
	WR 63_90	90	44	31	170	0.79	320	3710	70	15.6	190	0.48	320	4830	64	
	WR 63_114	114	39	24.6	165	0.62	320	4170	68	12.3	185	0.39	320	5000	61	
	WR 63_135	135	36	20.7	155	0.53	320	4560	63	10.4	170	0.32	320	5000	58	
	WR 63_192	192	30	14.6	135	0.37	320	5000	56	7.3	150	0.22	320	5000	51	
	WR 63_240	240	26	11.7	125	0.29	320	5000	52	5.8	135	0.18	320	5000	46	
	WR 63_300	300	22	9.3	120	0.25	320	5000	46	4.7	130	0.15	320	5000	41	
					$n_1 = 900 \text{ min}^{-1}$					$n_1 = 500 \text{ min}^{-1}$						
	WR 63_21	21	69	43	155	0.85	320	2960	82	23.8	170	0.53	320	3750	80	189
	WR 63_30	30	65	30	180	0.72	320	3470	79	16.7	200	0.45	320	4360	77	
	WR 63_36	36	62	25.0	180	0.61	320	3830	77	14.0	200	0.40	320	4790	74	
	WR 63_45	45	58	20.0	190	0.54	320	4230	74	11.1	200	0.33	320	5000	71	
	WR 63_57	57	54	15.8	190	0.44	320	4740	71	8.8	200	0.27	320	5000	68	
	WR 63_72	72	51	12.5	190	0.37	320	5000	68	6.9	190	0.22	320	5000	64	
	WR 63_90	90	44	10.0	205	0.35	320	5000	62	5.6	220	0.22	320	5000	58	
	WR 63_114	114	39	7.9	200	0.29	320	5000	58	4.4	210	0.18	320	5000	54	
	WR 63_135	135	36	6.7	180	0.23	320	5000	54	3.7	190	0.15	320	5000	50	
WR 63_192	192	30	4.7	150	0.16	320	5000	47	2.6	150	0.10	320	5000	43		
WR 63_240	240	26	3.8	140	0.13	320	5000	43	2.1	140	0.08	320	5000	39		
WR 63_300	300	22	3.0	130	0.11	320	5000	38	1.7	130	0.07	320	5000	34		



VF/W 30/63



230 Nm

		i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %		
$n_1 = 1400 \text{ min}^{-1}$									$n_1 = 900 \text{ min}^{-1}$								
VF/W 30/63	VF/W 30/63_240	240	33	5.8	210	0.27	80	5000	47	3.8	230	0.20	150	5000	45	190	
	VF/W 30/63_315	315	26	4.4	210	0.23	140	5000	42	2.9	230	0.17	150	5000	41		
	VF/W 30/63_450	450	25	3.1	210	0.17	—	5000	41	2.0	230	0.11	—	5000	42		
	VF/W 30/63_570	570	22	2.5	210	0.14	—	5000	40	1.6	230	0.11	—	5000	36		
	VF/W 30/63_720	720	21	1.9	210	0.12	—	5000	37	1.3	230	0.09	—	5000	32		
	VF/W 30/63_900	900	18	1.6	210	0.11	—	5000	30	1.0	230	0.08	—	5000	29		
	VF/W 30/63_1200	1200	16	1.2	210	0.11	—	5000	24	0.75	230	0.07	—	5000	25		
	VF/W 30/63_1520	1520	14	0.92	210	0.08	—	5000	24	0.59	230	0.06	—	5000	23		
	VF/W 30/63_2280	2280	12	0.61	210	0.06	—	5000	21	0.39	230	0.04	—	5000	23		
VF/W 30/63_2700	2700	11	0.52	210	0.05	—	5000	22	0.33	230	0.04	—	5000	19			

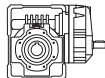
(-) Contact our technical service department advising radial load data (rotation direction, load angle, offset)

W 75 - WR 75

320 Nm

	i	ηs %	n ₂ min ⁻¹	M _{n2} Nm	P _{n1} kW	R _{n1} N	R _{n2} N	η _d %	n ₂ min ⁻¹	M _{n2} Nm	P _{n1} kW	R _{n1} N	R _{n2} N	η _d %		
			n ₁ = 2800 min ⁻¹						n ₁ = 1400 min ⁻¹							
W 75	W 75_7	7	71	400	170	7.8	750	700	91	200	190	4.4	750	1530	90	188
	W 75_10	10	67	280	205	6.7	750	1610	90	140	230	3.8	750	2240	88	
	W 75_15	15	60	187	225	5.0	750	2120	88	93	250	2.9	750	2870	85	
	W 75_20	20	56	140	225	3.8	750	2550	86	70	250	2.2	750	3410	83	
	W 75_25	25	52	112	225	3.2	750	2900	83	56	250	1.8	750	3840	80	
	W 75_30	30	45	93	240	2.9	750	3100	81	47	270	1.7	750	4090	77	
	W 75_40	40	40	70	225	2.1	750	3660	77	35	255	1.3	750	4770	72	
	W 75_50	50	36	56	195	1.6	750	4180	73	28.0	220	0.95	750	5410	68	
	W 75_60	60	33	47	180	1.3	750	4610	70	23.3	200	0.75	750	5960	65	
	W 75_80	80	28	35	160	0.90	750	5310	65	17.5	180	0.56	750	6200	59	
	W 75_100	100	25	28.0	135	0.65	750	5960	61	14.0	150	0.40	750	6200	55	
																188
	n ₁ = 900 min ⁻¹									n ₁ = 500 min ⁻¹						
	W 75_7	7	71	129	205	3.1	750	2120	88	71	225	2.0	750	2940	86	
	W 75_10	10	67	90	250	2.7	750	2700	86	50	275	1.7	750	3480	84	
	W 75_15	15	60	60	270	2.0	750	3440	83	33	295	1.3	750	4380	80	
	W 75_20	20	56	45	270	1.6	750	4050	80	25.0	295	1.0	750	5120	77	
	W 75_25	25	52	36	270	1.3	750	4550	77	20.0	295	0.85	750	5720	73	
	W 75_30	30	45	30	290	1.2	750	4860	74	16.7	320	0.81	750	6080	69	
W 75_40	40	40	22.5	275	1.0	750	5630	68	12.5	305	0.63	750	6200	63		
W 75_50	50	36	18.0	235	0.70	750	6200	63	10.0	260	0.47	750	6200	58		
W 75_60	60	33	15.0	215	0.56	750	6200	60	8.3	235	0.37	750	6200	55		
W 75_80	80	28	11.3	195	0.43	750	6200	54	6.3	215	0.29	750	6200	49		
W 75_100	100	25	9.0	160	0.30	750	6200	50	5.0	180	0.21	750	6200	44		

420 Nm



i

η_s
%

n_2
min⁻¹

M_{n2}
Nm

P_{n1}
kW

R_{n1}
N

R_{n2}
N

η_d
%

n_2
min⁻¹

M_{n2}
Nm

P_{n1}
kW

R_{n1}
N

R_{n2}
N

η_d
%

$n_1 = 2800 \text{ min}^{-1}$

$n_1 = 1400 \text{ min}^{-1}$

WR 75

WR 75_21

WR 75_30

WR 75_45

WR 75_60

WR 75_75

WR 75_90

WR 75_120

WR 75_150

WR 75_180

WR 75_240

WR 75_300

21

30

45

60

75

90

120

150

180

240

300

70

66

59

55

51

44

39

35

32

27

24

133

93

62

47

37

31

23.3

18.7

15.6

11.7

9.3

205

250

270

270

270

290

275

235

215

195

160

3.3

2.8

2.1

1.6

1.4

1.3

1.0

0.73

0.58

0.44

0.31

500

500

500

500

500

500

500

500

500

500

500

2030

2640

3380

3980

4480

4780

5540

6200

6200

6200

6200

88

86

83

80

77

74

68

63

60

54

50

67

47

31

23.3

18.7

15.6

11.7

9.3

7.8

5.8

4.7

225

275

295

295

295

320

305

260

235

215

180

1.8

1.6

1.2

0.94

0.79

0.76

0.59

0.44

0.35

0.27

0.20

500

500

500

500

500

500

500

500

500

500

500

3060

3610

4530

5280

5890

6200

6200

6200

6200

6200

6200

86

84

80

77

73

69

63

58

55

49

44

$n_1 = 900 \text{ min}^{-1}$

$n_1 = 500 \text{ min}^{-1}$

WR 75_21

WR 75_30

WR 75_45

WR 75_60

WR 75_75

WR 75_90

WR 75_120

WR 75_150

WR 75_180

WR 75_240

WR 75_300

21

30

45

60

75

90

120

150

180

240

300

70

66

59

55

51

44

39

35

32

27

24

43

30

20.0

15.0

12.0

10.0

7.5

6.0

5.0

3.8

3.0

245

330

350

330

330

370

330

310

280

220

200

1.3

1.3

0.94

0.69

0.59

0.58

0.43

0.35

0.29

0.19

0.15

500

500

500

500

500

500

500

500

500

500

500

3660

4070

5180

6180

6200

6200

6200

6200

6200

6200

6200

85

82

78

75

70

67

60

55

51

45

41

23.8

16.7

11.1

8.3

6.7

5.6

4.2

3.3

2.8

2.1

1.7

270

370

400

370

350

420

380

350

320

280

260

0.82

0.81

0.62

0.45

0.37

0.39

0.30

0.24

0.20

0.15

0.12

500

500

500

500

500

500

500

500

500

500

500

4660

5160

6200

6200

6200

6200

6200

6200

6200

6200

6200

82

80

75

71

66

63

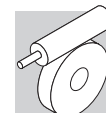
56

51

47



41

37





WR 75 - VF/W 44/75

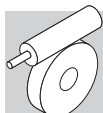
370 Nm

<div></div>																	<div></div>	
i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %					
		$n_1 = 2800 \text{ min}^{-1}$							$n_1 = 1400 \text{ min}^{-1}$									
WR 75_P90 B5	WR 75_15	15	66	187	220	4.9	—	1960	89	93	250	2.9	—	2640	86	189		
	WR 75_22.5	22.5	59	124	240	3.7	—	2530	86	62	270	2.1	—	3380	83			
	WR 75_30	30	55	93	240	2.8	—	3020	84	47	270	1.7	—	3980	80			
	WR 75_37.5	37.5	51	75	240	2.3	—	3410	81	37	270	1.4	—	4480	77			
	WR 75_45	45	44	62	255	2.1	—	3660	79	31	290	1.3	—	4780	74			
	WR 75_60	60	39	47	240	1.6	—	4290	74	23.3	275	1.0	—	5540	68			
	WR 75_75	75	35	37	210	1.2	—	4860	70	18.7	235	0.74	—	6200	63			
	WR 75_90	90	32	31	190	0.93	—	4460	67	15.6	215	0.59	—	6200	60			
	WR 75_120	120	27	23.3	170	0.69	—	4960	61	11.7	195	0.44	—	6200	54			
	WR 75_150	150	24	18.7	145	0.49	—	5150	58	9.3	160	0.32	—	6200	50			
				$n_1 = 900 \text{ min}^{-1}$							$n_1 = 500 \text{ min}^{-1}$							189
	WR 75_15	15	66	60	275	2.1	—	3150	84	33	330	1.4	—	3850	82			
	WR 75_22.5	22.5	59	40	295	1.6	—	4010	80	22.2	350	1.0	—	4920	78			
	WR 75_30	30	55	30	295	1.2	—	4710	77	16.7	330	0.77	—	5890	75			
	WR 75_37.5	37.5	51	24	295	1.0	—	5280	73	13.3	330	0.66	—	6200	70			
	WR 75_45	45	44	20	320	0.98	—	5610	69	11.1	370	0.64	—	6200	67			
	WR 75_60	60	39	15	305	0.77	—	6200	63	8.3	330	0.48	—	6200	60			
	WR 75_75	75	35	12	260	0.57	—	6200	58	6.7	310	0.39	—	6200	55			
	WR 75_90	90	32	10	235	0.45	—	6200	55	5.6	280	0.32	—	6200	52			
	WR 75_120	120	27	7.5	215	0.35	—	6200	49	4.2	220	0.21	—	6200	46			
	WR 75_150	150	24	6.0	180	0.26	—	6200	44	3.3	200	0.17	—	6200	41			

400 Nm



		i	η_s %	n_2 min ⁻¹ M_{n2} Nm P_{n1} kW R_{n1} N R_{n2} N η_d %						n_2 min ⁻¹ M_{n2} Nm P_{n1} kW R_{n1} N R_{n2} N η_d %										
$n_1 = 1400$ min ⁻¹												$n_1 = 900$ min ⁻¹								
VF/W 44/75	VF/W 44/75_250	250	34	5.6	370	0.38	220	4560	57	3.6	400	0.29	220	4660	52	190				
	VF/W 44/75_300	300	30	4.7	370	0.35	220	5160	51	3.0	400	0.27	220	5150	46					
	VF/W 44/75_400	400	26	3.5	370	0.29	220	6200	46	2.3	400	0.22	220	6200	42					
	VF/W 44/75_525	525	25	2.7	370	0.23	220	6200	44	1.7	400	0.18	220	6200	41					
	VF/W 44/75_700	700	24	2.0	370	0.18	220	6200	42	1.3	400	0.14	220	6200	39					
	VF/W 44/75_920	920	21	1.5	370	0.15	—	6200	40	1.0	400	0.11	60	6200	36					
	VF/W 44/75_1200	1200	18	1.2	370	0.12	—	6200	37	0.75	400	0.10	220	6200	31					
	VF/W 44/75_1500	1500	17	0.93	370	0.10	220	6200	37	0.60	400	0.09	220	6200	29					
	VF/W 44/75_2100	2100	14	0.67	370	0.09	220	6200	30	0.43	400	0.07	220	6200	24					
VF/W 44/75_2800	2800	12	0.50	370	0.07	220	6200	26	0.32	400	0.06	220	6200	22						

(-) Contact our technical service department advising radial load data (rotation direction, load angle, offset)

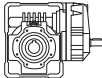



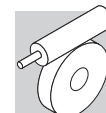
W 86 - WR 86

440 Nm

	i	η_s %	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d		
			min ⁻¹	Nm	kW	N	N	%	min ⁻¹	Nm	kW	N	N	%		
			$n_1 = 2800 \text{ min}^{-1}$						$n_1 = 1400 \text{ min}^{-1}$							
W 86	W 86_7	7	71	400	225	10.4	850	2930	91	200	250	5.9	850	3920	89	188
	W 86_10	10	67	280	260	8.5	850	3490	90	140	290	4.8	850	4620	88	
	W 86_15	15	60	187	295	6.6	850	4200	87	93	330	3.8	850	5510	85	
	W 86_20	20	60	140	285	4.9	850	4900	86	70	320	2.8	850	6380	84	
	W 86_23	23	58	122	285	4.3	850	5250	85	61	320	2.5	850	6800	82	
	W 86_30	30	45	93	320	3.9	850	5740	81	47	370	2.4	850	7000	76	
	W 86_40	40	45	70	295	2.7	850	6670	79	35	330	1.6	850	7000	75	
	W 86_46	46	43	61	305	2.5	850	7000	77	30	340	1.5	850	7000	73	
	W 86_56	56	39	50	265	1.8	850	7000	75	25.0	300	1.1	850	7000	70	
	W 86_64	64	37	44	250	1.6	850	7000	73	21.9	280	0.94	850	7000	68	
	W 86_80	80	33	35	225	1.2	850	7000	69	17.5	255	0.73	850	7000	64	
	W 86_100	100	29	28.0	205	0.92	850	7000	65	14.0	230	0.57	850	7000	59	
	$n_1 = 900 \text{ min}^{-1}$						$n_1 = 500 \text{ min}^{-1}$									
	W 86_7	7	71	129	270	4.1	850	4670	88	71	295	2.6	850	5890	85	188
	W 86_10	10	67	90	310	3.4	850	5500	86	50	345	2.2	850	6860	82	
	W 86_15	15	60	60	355	2.7	850	6520	82	33	390	1.7	850	7000	78	
	W 86_20	20	60	45	345	2.0	850	7000	81	25.0	380	1.3	850	7000	77	
	W 86_23	23	58	39	345	1.8	850	7000	80	21.7	380	1.2	850	7000	75	
	W 86_30	30	45	30	400	1.7	850	7000	73	16.7	440	1.1	850	7000	67	
	W 86_40	40	45	22.5	355	1.2	850	7000	71	12.5	390	0.77	850	7000	66	
	W 86_46	46	43	19.6	365	1.1	850	7000	69	10.9	405	0.73	850	7000	63	
	W 86_56	56	39	16.1	325	0.83	850	7000	66	8.9	355	0.55	850	7000	60	
	W 86_64	64	37	14.1	300	0.70	850	7000	63	7.8	330	0.47	850	7000	58	
	W 86_80	80	33	11.3	275	0.55	850	7000	59	6.3	305	0.38	850	7000	53	
	W 86_100	100	29	9.0	250	0.43	850	7000	55	5.0	275	0.29	850	7000	49	



550 Nm

		i	η_s %	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d																							
min ⁻¹						Nm						kW						N						N						%								
$n_1 = 2800 \text{ min}^{-1}$												$n_1 = 1400 \text{ min}^{-1}$																										
WR 86	WR 86_21	21	70	133	270	4.3	500	4590	88	67	295	2.4	500	6070	85	189																						
	WR 86_30	30	66	93	310	3.5	500	5410	86	47	345	2.1	500	7000	82																							
	WR 86_45	45	59	62	355	2.8	500	6420	82	31	390	1.6	500	7000	78																							
	WR 86_60	60	59	47	345	2.1	500	7000	81	23.3	380	1.2	500	7000	77																							
	WR 86_69	69	57	41	345	1.8	500	7000	80	20.3	380	1.1	500	7000	75																							
	WR 86_90	90	44	31	400	1.8	500	7000	73	15.6	440	1.1	500	7000	67																							
	WR 86_120	120	44	23.3	355	1.2	500	7000	71	11.7	390	0.72	500	7000	66																							
	WR 86_138	138	42	20.3	365	1.1	500	7000	69	10.1	405	0.68	500	7000	63																							
	WR 86_168	168	38	16.7	325	0.86	500	7000	66	8.3	355	0.52	500	7000	60																							
	WR 86_192	192	36	14.6	300	0.73	500	7000	63	7.3	330	0.43	500	7000	58																							
	WR 86_240	240	32	11.7	275	0.57	500	7000	59	5.8	305	0.35	500	7000	53																							
	WR 86_300	300	28	9.3	250	0.44	500	7000	55	4.7	275	0.27	500	7000	49																							
					$n_1 = 900 \text{ min}^{-1}$						$n_1 = 500 \text{ min}^{-1}$																											
	WR 86_21	21	70	43	325	1.8	500	7000	83	23.8	355	1.1	500	7000	81	189																						
	WR 86_30	30	66	30	375	1.5	500	7000	81	16.7	415	0.93	500	7000	78																							
	WR 86_45	45	59	20.0	450	1.2	500	7000	76	11.1	500	0.80	500	7000	73																							
	WR 86_60	60	59	15.0	430	0.90	500	7000	75	8.3	440	0.53	500	7000	72																							
	WR 86_69	69	57	13.0	390	0.73	500	7000	73	7.2	400	0.43	500	7000	70																							
	WR 86_90	90	44	10.0	500	0.82	500	7000	64	5.6	550	0.53	500	7000	60																							
	WR 86_120	120	44	7.5	440	0.55	500	7000	63	4.2	470	0.35	500	7000	59																							
	WR 86_138	138	42	6.5	430	0.48	500	7000	61	3.6	440	0.30	500	7000	56																							
	WR 86_168	168	38	5.4	390	0.38	500	7000	57	3.0	410	0.24	500	7000	53																							
	WR 86_192	192	36	4.7	390	0.35	500	7000	55	2.6	410	0.22	500	7000	50																							
	WR 86_240	240	32	3.8	310	0.24	500	7000	50	2.1	320	0.15	500	7000	46																							
	WR 86_300	300	28	3.0	310	0.22	500	7000	45	1.7	320	0.14	500	7000	41																							





WR 86 - VF/W 44/86

500 Nm

	i	η_s %	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d		
			min ⁻¹	Nm	kW	N	N	%	min ⁻¹	Nm	kW	N	N	%		
			$n_1 = 2800 \text{ min}^{-1}$						$n_1 = 1400 \text{ min}^{-1}$							
WR 86_P90 B5	WR 86_15	15	66	187	275	6.1	—	4130	88	93	310	3.5	—	5410	86	189
	WR 86_22.5	22.5	59	124	315	4.8	—	4920	86	62	355	2.8	—	6420	82	
	WR 86_30	30	59	93	305	3.5	—	5720	85	47	345	2.1	—	7000	81	
	WR 86_34.5	34.5	57	81	305	3.1	—	6110	84	41	345	1.8	—	7000	80	
	WR 86_45	45	44	62	350	3.0	—	6640	77	31	400	1.8	—	7000	73	
	WR 86_60	60	44	47	315	2.0	—	7000	77	23.3	355	1.2	—	7000	71	
	WR 86_69	69	42	41	325	1.8	—	7000	75	20.3	365	1.1	—	7000	69	
	WR 86_84	84	38	33	285	1.4	—	7000	72	16.7	325	0.86	—	7000	66	
	WR 86_96	96	36	29.2	265	1.2	—	7000	70	14.6	300	0.73	—	7000	63	
	WR 86_120	120	32	23.3	240	0.88	—	7000	67	11.7	275	0.57	—	7000	59	
	WR 86_150	150	28	18.7	220	0.69	—	7000	62	9.3	250	0.44	—	7000	55	
				$n_1 = 900 \text{ min}^{-1}$						$n_1 = 500 \text{ min}^{-1}$						189
	WR 86_15	15	66	60	345	2.6	—	6330	82	33	375	1.6	—	7000	81	
	WR 86_22.5	22.5	59	40	390	2.1	—	7000	78	22.2	450	1.4	—	7000	76	
	WR 86_30	30	59	30	380	1.6	—	7000	77	16.7	430	1.0	—	7000	75	
	WR 86_34.5	34.5	57	26.1	380	1.4	—	7000	75	14.5	390	0.81	—	7000	73	
	WR 86_45	45	44	20.0	440	1.4	—	7000	67	11.1	500	0.91	—	7000	64	
	WR 86_60	60	44	15.0	390	0.93	—	7000	66	8.3	440	0.61	—	7000	63	
	WR 86_69	69	42	13.0	405	0.88	—	7000	63	7.2	430	0.53	—	7000	61	
	WR 86_84	84	38	10.7	355	0.66	—	7000	60	6.0	390	0.43	—	7000	57	
	WR 86_96	96	36	9.4	330	0.56	—	7000	58	5.2	390	0.39	—	7000	55	
	WR 86_120	120	32	7.5	305	0.45	—	7000	53	4.2	310	0.27	—	7000	50	
	WR 86_150	150	28	6.0	275	0.35	—	7000	49	3.3	310	0.24	—	7000	46	

550 Nm

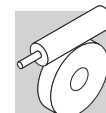
		i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
$n_1 = 1400 \text{ min}^{-1}$						$n_1 = 900 \text{ min}^{-1}$										
VF/W 44/86	VF/W 44/86_230	230	38	6.1	500	0.59	220	7000	54	3.9	550	0.43	220	7000	53	190
	VF/W 44/86_300	300	30	4.7	500	0.54	220	7000	45	3.0	550	0.41	220	7000	42	
	VF/W 44/86_400	400	30	3.5	500	0.45	220	7000	41	2.3	550	0.32	220	7000	41	
	VF/W 44/86_525	525	25	2.7	500	0.33	220	7000	42	1.7	550	0.25	220	7000	39	
	VF/W 44/86_700	700	25	2.0	500	0.27	220	7000	39	1.3	550	0.20	220	7000	37	
	VF/W 44/86_920	920	22	1.5	500	0.20	220	7000	40	1.0	550	0.15	—	7000	37	
	VF/W 44/86_1380	1380	17	1.0	500	0.17	220	7000	32	0.65	550	0.13	—	7000	28	
	VF/W 44/86_1840	1840	17	0.76	500	0.13	220	7000	30	0.49	550	0.10	—	7000	28	
	VF/W 44/86_2116	2116	16	0.66	500	0.12	220	7000	28	0.43	550	0.09	220	7000	28	
VF/W 44/86_2760	2760	14	0.51	500	0.11	—	7000	24	0.33	550	0.08	220	7000	24		

(-) Contact our technical service department advising radial load data (rotation direction, load angle, offset)





W 110

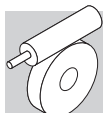
WR 110



VF/W 49/110



1050 Nm

		i	η_s %	$n_2 = 1400 \text{ min}^{-1}$							$n_2 = 900 \text{ min}^{-1}$							
				n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %			
VF/W 49/110	VF/W 49/110_230	230	38	6.1	1000	1.2	400	8000	52	3.9	1050	0.84	400	8000	51	190		
	VF/W 49/110_300	300	29	4.7	1000	1.0	400	8000	48	3.0	1050	0.70	400	8000	47			
	VF/W 49/110_400	400	30	3.5	1000	0.81	400	8000	45	2.3	1050	0.55	400	8000	45			
	VF/W 49/110_540	540	25	2.6	1000	0.66	400	8000	41	1.7	1050	0.48	400	8000	38			
	VF/W 49/110_720	720	24	1.9	1000	0.51	400	8000	40	1.3	1050	0.36	400	8000	38			
	VF/W 49/110_1080	1080	18	1.3	1000	0.44	400	8000	31	0.83	1050	0.28	400	8000	30			
	VF/W 49/110_1350	1350	16	1.0	1000	0.36	400	8000	30	0.67	1050	0.26	400	8000	28			
	VF/W 49/110_1656	1656	17	0.85	1000	0.30	400	8000	30	0.54	1050	0.20	400	8000	30			
	VF/W 49/110_2070	2070	15	0.68	1000	0.25	400	8000	28	0.43	1050	0.19	400	8000	25			
VF/W 49/110_2800	2800	13	0.50	1000	0.22	400	8000	24	0.32	1050	0.17	400	8000	21				





VF 130 - VFR 130

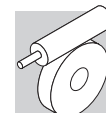
1500 Nm

	i	η_s %	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d		
			min ⁻¹	Nm	kW	N	N	%	min ⁻¹	Nm	kW	N	N	%		
			$n_1 = 2800 \text{ min}^{-1}$						$n_1 = 1400 \text{ min}^{-1}$							
VF 130	VF 130_7	7	71	400	555	25	1500	4930	91	200	740	17.4	1500	5990	89	188
	VF 130_10	10	67	280	593	19.3	1500	6210	90	140	790	13.3	1500	7620	88	
	VF 130_15	15	63	187	690	15.3	1500	7390	88	93	920	10.6	1500	9100	86	
	VF 130_20	20	59	140	675	11.4	1500	8670	87	70	900	8.0	1500	10700	84	
	VF 130_23	23	57	122	668	9.9	1500	9300	86	61	890	6.9	1500	11500	83	
	VF 130_30	30	49	93	788	9.3	1040	10100	83	47	1050	6.6	—	12500	79	
	VF 130_40	40	44	70	825	7.6	—	11400	80	35	1100	5.4	—	12600	76	
	VF 130_46	46	45	61	788	6.3	1290	12200	80	30.0	1050	4.5	—	12600	76	
	VF 130_56	56	42	50	720	4.8	1500	12600	78	25.0	960	3.4	940	12600	73	
	VF 130_64	64	39	44	698	4.2	1500	12600	76	21.9	930	3.0	1220	12600	71	
	VF 130_80	80	35	35	660	3.3	1500	12600	73	17.5	880	2.4	1500	12600	68	
	VF 130_100	100	31	28	585	2.5	1500	12600	70	14.0	780	1.8	1500	12600	64	
																188
	$n_1 = 900 \text{ min}^{-1}$								$n_1 = 500 \text{ min}^{-1}$							
	VF 130_7	7	71	129	850	13.0	1500	6980	88	71	1000	8.8	1500	8670	86	
	VF 130_10	10	67	90	900	9.9	1500	8900	87	50	1100	6.9	1500	10800	84	
	VF 130_15	15	63	60	1080	8.1	1500	10490	84	33	1350	5.9	1500	12600	81	
	VF 130_20	20	59	45	1050	6.1	1500	12400	82	25.0	1350	4.6	1500	13800	79	
	VF 130_23	23	57	39	1050	5.4	1500	13200	81	21.7	1300	3.9	1500	13800	77	
	VF 130_30	30	49	30.0	1250	5.2	—	13200	77	16.7	1500	3.7	—	13800	72	
	VF 130_40	40	44	22.5	1200	3.9	—	13200	73	12.5	1400	2.8	—	13800	68	
	VF 130_46	46	45	19.6	1150	3.3	490	13200	73	10.9	1350	2.3	1270	13800	68	
	VF 130_56	56	42	16.1	1080	2.7	1500	13200	70	8.9	1200	1.8	1500	13800	65	
	VF 130_64	64	39	14.1	1050	2.4	1500	13200	68	7.8	1200	1.6	1500	13800	62	
	VF 130_80	80	35	11.3	950	1.8	1500	13200	64	6.3	1150	1.3	1500	13800	58	
	VF 130_100	100	31	9.0	800	1.3	1500	13200	59	5.0	900	0.91	1500	13800	54	

1800 Nm



		i	η_s %	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d		
$n_1 = 2800 \text{ min}^{-1}$									$n_1 = 1400 \text{ min}^{-1}$								
				min ⁻¹	Nm	kW	N	N	%	min ⁻¹	Nm	kW	N	N	%		
VFR 130	VFR 130_60	60	58	47	1050	6.4	1000	12400	81	23.3	1350	4.3	1000	13800	78	189	
	VFR 130_69	69	56	41	1050	5.6	1000	13200	80	20.3	1300	3.7	1000	13800	76		
	VFR 130_90	90	48	31	1250	5.4	1000	13200	76	15.6	1500	3.5	1000	13800	71		
	VFR 130_120	120	43	23.3	1200	4.1	1000	13200	72	11.7	1400	2.6	1000	13800	67		
	VFR 130_138	138	44	20.3	1150	3.4	1000	13200	72	10.1	1350	2.2	1000	13800	67		
	VFR 130_168	168	41	16.7	1080	2.7	1000	13200	69	8.3	1200	1.6	1000	13800	64		
	VFR 130_192	192	38	14.6	1050	2.4	1000	13200	67	7.3	1200	1.5	1000	13800	61		
	VFR 130_240	240	34	11.7	950	1.9	1000	13200	63	5.8	1150	1.2	1000	13800	57		
	VFR 130_300	300	30	9.3	800	1.4	1000	13200	58	4.7	900	0.83	1000	13800	53		

(-) Contact our technical service department advising radial load data (rotation direction, load angle, offset)



W/VF 63/130

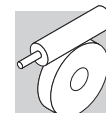
1850 Nm

		i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
$n_1 = 1400 \text{ min}^{-1}$									$n_1 = 900 \text{ min}^{-1}$							
W/VF 63/130	W/VF 63/130_280	280	31	5.0	1800	1.9	480	13800	50	3.2	1850	1.3	480	13800	48	190
	W/VF 63/130_400	400	29	3.5	1800	1.5	480	13800	44	2.3	1850	0.99	480	13800	44	
	W/VF 63/130_600	600	26	2.3	1800	1.1	480	13800	40	1.5	1850	0.73	480	13800	40	
	W/VF 63/130_760	760	24	1.8	1800	0.89	480	13800	39	1.2	1850	0.62	480	13800	37	
	W/VF 63/130_960	960	23	1.5	1800	0.74	480	13800	37	0.94	1850	0.52	480	13800	35	
	W/VF 63/130_1200	1200	19	1.2	1800	0.65	—	13800	34	0.75	1850	0.45	—	13800	32	
	W/VF 63/130_1520	1520	18	0.92	1800	0.55	—	13800	32	0.59	1850	0.38	—	13800	30	
	W/VF 63/130_1800	1800	16	0.78	1800	0.52	—	13800	28	0.50	1850	0.37	—	13800	26	
	W/VF 63/130_2560	2560	14	0.55	1800	0.45	—	13800	23	0.35	1850	0.32	—	13800	21	
	W/VF 63/130_3200	3200	12	0.44	1800	0.49	—	13800	17	0.28	1850	0.34	480	13800	16	

(-) Contact our technical service department advising radial load data (rotation direction, load angle, offset)



VF 150

VFR 150



W/VF 86/150

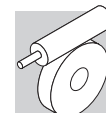
2700 Nm

		i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
$n_1 = 1400 \text{ min}^{-1}$									$n_1 = 900 \text{ min}^{-1}$							
W/VF 86/150	W/VF 86/150_200	200	29	7.0	2600	3.0	850	16000	64	4.5	2700	2.1	850	16000	61	190
	W/VF 86/150_225	225	26	6.2	2600	2.7	850	16000	63	4.0	2700	1.9	850	16000	60	
	W/VF 86/150_300	300	26	4.7	2600	2.2	850	16000	58	3.0	2700	1.5	850	16000	57	
	W/VF 86/150_345	345	26	4.1	2600	1.9	850	16000	58	2.6	2700	1.3	850	16000	57	
	W/VF 86/150_460	460	26	3.0	2600	1.5	850	16000	55	2.0	2700	1.0	850	16000	55	
	W/VF 86/150_529	529	26	2.6	2600	1.3	850	16000	55	1.7	2700	0.93	850	16000	52	
	W/VF 86/150_690	690	26	2.0	2600	1.1	850	16000	50	1.3	2700	0.78	850	16000	47	
	W/VF 86/150_920	920	26	1.5	2600	0.92	850	16000	45	0.98	2700	0.64	850	16000	43	
	W/VF 86/150_1380	1380	19	1.0	2600	0.66	850	16000	42	0.65	2700	0.46	850	16000	40	
	W/VF 86/150_1840	1840	19	0.76	2600	0.55	850	16000	38	0.49	2700	0.38	850	16000	36	
W/VF 86/150_2944	2944	16	0.48	2600	0.48	850	16000	27	0.31	2700	0.35	850	16000	25		

VF 185



VFR 185

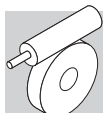
Bonfiglioli
Biduttori



W/VF 86/185



4400 Nm

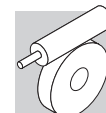
		i	η_s %	$n_1 = 1400 \text{ min}^{-1}$							$n_1 = 900 \text{ min}^{-1}$							
				n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %			
W/VF 86/185	W/VF 86/185_280	280	31	5.0	4200	4.2	850	19500	52	3.2	4400	3.0	850	19500	49	190		
	W/VF 86/185_400	400	29	3.5	4200	3.2	850	19500	48	2.3	4400	2.3	850	19500	45			
	W/VF 86/185_600	600	26	2.3	4200	2.3	850	19500	45	1.5	4400	1.6	850	19500	43			
	W/VF 86/185_800	800	26	1.8	4200	1.8	850	19500	43	1.1	4400	1.3	850	19500	40			
	W/VF 86/185_920	920	26	1.5	4200	1.6	850	19500	42	1.0	4400	1.2	850	19500	38			
	W/VF 86/185_1200	1200	20	1.2	4200	1.5	850	19500	34	0.75	4400	0.99	850	19500	35			
	W/VF 86/185_1600	1600	20	0.88	4200	1.1	850	19500	35	0.56	4400	0.79	850	19500	33			
	W/VF 86/185_1840	1840	19	0.76	4200	0.98	850	19500	34	0.49	4400	0.70	850	19500	32			
	W/VF 86/185_2560	2560	16	0.55	4200	0.83	850	19500	29	0.35	4400	0.60	850	19500	27			
	W/VF 86/185_3200	3200	15	0.44	4200	0.80	850	19500	24	0.28	4400	0.59	850	19500	22			



VF 210 - VFR 210



5000 Nm

		i	η_s %	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	
min ⁻¹						min ⁻¹										
$n_1 = 2800 \text{ min}^{-1}$									$n_1 = 1400 \text{ min}^{-1}$							
VF 210	VF 210_7	7	71	400	1725	79	5300	14000	91	200	2300	54	5300	16700	90	188
	VF 210_10	10	69	280	1988	65	5300	16300	90	140	2650	44	5300	19500	89	
	VF 210_15	15	63	187	2138	47	5300	19700	89	93	2850	32	5300	23700	88	
	VF 210_20	20	57	140	2325	39	4970	22000	87	70	3100	27	1100	26600	85	
	VF 210_30	30	51	93	2288	26	5300	25900	85	47	3050	18.5	1760	31500	83	
	VF 210_40	40	42	70	2625	23	—	28300	81	35	3500	17.0	—	31500	78	
	VF 210_50	50	39	56	2475	18.4	—	31000	79	28.0	3300	13.0	—	31500	76	
	VF 210_60	60	36	47	2363	15.0	—	31500	77	23.3	3015	10.0	—	31500	73	
	VF 210_80	80	31	35	2175	10.9	—	31500	73	17.5	2900	7.7	—	31500	69	
	VF 210_100	100	27	28	2025	8.5	950	31500	70	14.0	2700	6.0	—	31500	65	



VF/VF 130/210

6500 Nm

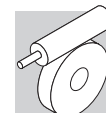
		i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %		
$n_1 = 1400 \text{ min}^{-1}$									$n_1 = 900 \text{ min}^{-1}$								
VF/VF 130/210	VF/VF 130/210_280	280	30	5.0	6300	6.3	1500	34500	52	3.2	6500	4.4	1500	34500	50	190	
	VF/VF 130/210_400	400	28	3.5	6300	4.6	1500	34500	50	2.3	6500	3.2	1500	34500	48		
	VF/VF 130/210_600	600	26	2.3	6300	3.6	1500	34500	43	1.5	6500	2.4	1500	34500	43		
	VF/VF 130/210_800	800	25	1.8	6300	2.8	1500	34500	41	1.1	6500	2.0	1500	34500	38		
	VF/VF 130/210_920	920	24	1.5	6300	2.7	1500	34500	37	1.0	6500	1.9	1500	34500	35		
	VF/VF 130/210_1200	1200	21	1.2	6300	2.2	—	34500	35	0.75	6500	1.5	—	34500	34		
	VF/VF 130/210_1600	1600	18	0.88	6300	1.8	—	34500	32	0.56	6500	1.2	—	34500	32		
	VF/VF 130/210_1840	1840	19	0.76	6300	1.7	—	34500	30	0.49	6500	1.2	490	34500	28		
	VF/VF 130/210_2560	2560	16	0.55	6300	1.5	1220	34500	24	0.35	6500	1.0	1500	34500	24		
VF/VF 130/210_3200	3200	15	0.44	6300	1.3	1500	34500	22	0.28	6500	0.96	1500	34500	20			

(-) Contact our technical service department advising radial load data (rotation direction, load angle, offset)

VF 250



VFR 250

Bonfiglioli
Biduttori

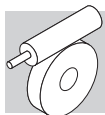


VF/VF 130/250

9200 Nm

		i	η_s %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min ⁻¹	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %			
				$n_1 = 1400 \text{ min}^{-1}$								$n_1 = 900 \text{ min}^{-1}$						
VF/VF 130/250	VF/VF 130/250_280	280	29	5.0	9000	8.9	1500	52000	53	3.2	9200	6.1	1500	52000	51	190		
	VF/VF 130/250_400	400	27	3.5	9000	6.7	1500	52000	49	2.3	9200	4.6	1500	52000	47			
	VF/VF 130/250_600	600	26	2.3	9000	5.0	1500	52000	44	1.5	9200	3.4	1500	52000	43			
	VF/VF 130/250_800	800	24	1.8	9000	3.9	1500	52000	42	1.1	9200	2.7	1500	52000	40			
	VF/VF 130/250_920	920	23	1.5	9000	3.9	1500	52000	37	0.98	9200	2.7	1500	52000	35			
	VF/VF 130/250_1200	1200	20	1.2	9000	3.1	—	52000	35	0.75	9200	2.2	—	52000	33			
	VF/VF 130/250_1600	1600	18	0.88	9000	2.6	—	52000	32	0.56	9200	1.8	—	52000	30			
	VF/VF 130/250_1840	1840	18	0.76	9000	2.3	—	52000	31	0.49	9200	1.6	490	52000	29			
	VF/VF 130/250_2560	2560	16	0.55	9000	2.1	1500	52000	25	0.35	9200	1.5	1500	52000	23			
	VF/VF 130/250_3200	3200	14	0.44	9000	2.0	1500	52000	21	0.28	9200	1.4	1500	52000	19			

(-) Contact our technical service department advising radial load data (rotation direction, load angle, offset)

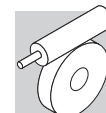


23 RATIO DISTRIBUTION FOR VF/VF, VF/W, W/VF SERIES GEARBOXES

	Ratios											i max
VF/VF 30/44	245	350	420	560	700	840	1120	1680	2100			6000
VF 30	7	10	15	20	20	30	40	60	60			60
VF 44	35	35	28	28	35	28	28	28	35			100
VF/VF 30/49	240	315	420	540	720	900	1120	1440	2160	2700		6000
VF 30	10	7	15	15	20	20	40	40	60	60		60
VF 49	24	45	28	36	36	45	28	36	36	45		100
VF/W 30/63	240	315	450	570	720	900	1200	1520	2280	2700		7000
VF 30	10	7	15	15	30	30	40	40	60	60		70
W 63	24	45	30	38	24	30	30	38	38	45		100
VF/W 44/75	250	300	400	525	700	920	1200	1500	2100	2800		10000
VF 44	10	10	10	35	35	46	60	60	70	70		100
W 75	25	30	40	15	20	20	20	25	30	40		100
VF/W 44/86	230	300	400	525	700	920	1380	1840	2116	2760		10000
VF 44	10	10	10	35	35	46	46	46	46	60		100
W 86	23	30	40	15	20	20	30	40	46	46		100
VF/W 49/110	230	300	400	540	720	1080	1350	1656	2070	2800		10000
VF 49	10	10	10	18	36	36	45	36	45	70		100
W 110	23	30	40	30	20	30	30	46	46	40		100
W/VF 63/130	280	400	600	760	960	1200	1520	1800	2560	3200		10000
W 63	7	10	15	19	24	30	38	45	64	80		100
VF 130	40	40	40	40	40	40	40	40	40	40		100
W/VF 86/150	200	225	300	345	460	529	690	920	1380	1840	2944	10000
W 86	10	15	15	15	20	23	23	23	46	46	64	100
VF 150	20	15	20	23	23	23	30	40	30	40	46	100
W/VF 86/185	280	400	600	800	920	1200	1600	1840	2560	3200		10000
W 86	7	10	15	20	23	30	40	46	64	80		100
VF 185	40	40	40	40	40	40	40	40	40	40		100
VF/VF 130/210	280	400	600	800	920	1200	1600	1840	2560	3200		10000
VF 130	7	10	15	20	23	30	40	46	64	80		100
VF 210	40	40	40	40	40	40	40	40	40	40		100
VF/VF 130/250	280	400	600	800	920	1200	1600	1840	2560	3200		10000
VF 130	7	10	15	20	23	30	40	46	64	80		100
VF 250	40	40	40	40	40	40	40	40	40	40		100

The ratio combinations that are listed in the chart are those recommended by the manufacturer.

If requested, the Bonfiglioli Technical Service will consider feasibility of combinations that are not listed, as long as these are lower in value than maximum ratio listed in the chart.

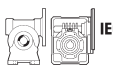


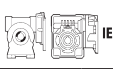
24 MOTOR AVAILABILITY

24.1 Motors to IEC standard

Motor-gearbox combinations resulting from charts are purely based on geometrical compatibility.

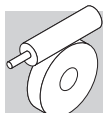
When selecting a gearmotor, refer to procedure specified at para: “Selection” and observe particularly the condition $S \geq f_s$.

 IEC	VF 27	VF 30	VF 44	VF 49	W 63	W 75	W 86	W 110	VF 130	VF 150	VF 185	VF 210	VF 250
P27 —	7...70	—	—	—	—	—	—	—	—	—	—	—	—
P56 $\frac{B5}{B14}$	—	7...70	—	—	—	—	—	—	—	—	—	—	—
P63 $\frac{B5}{B14}$	—	7...60	7...100	7...100	—	—	—	—	—	—	—	—	—
P71 $\frac{B5}{B14}$	—	—	7...35	7...60	7...100	7...100	7...100	—	—	—	—	—	—
P80 $\frac{B5}{B14}$	—	—	—	7...28	7...100	7...100	7...100	7...100	—	—	—	—	—
P90 $\frac{B5}{B14}$	—	—	—	—	7...30	7...100	7...100	7...100	46...100	—	—	—	—
P100 $\frac{B5}{B14}$	—	—	—	—	—	7...100	7...100	7...100	7...80	23...100	50...100	—	—
P112 $\frac{B5}{B14}$	—	—	—	—	—	7...100	7...100	7...100	7...80	23...100	50...100	—	—
P132 B5	—	—	—	—	—	—	—	7...100	7...40 #	7...46	30...80	7...100	7...100
P160 B5	—	—	—	—	—	—	—	—	—	7...20 #	15...40	7...100	7...100
P180 B5	—	—	—	—	—	—	—	—	—	—	7...20 #	7...100	7...100
P200 B5	—	—	—	—	—	—	—	—	—	—	—	7...100	7...100
P225 B5	—	—	—	—	—	—	—	—	—	—	—	7...100	7...100

 IEC	VFR 44	VFR 49	WR 63	WR 75	WR 86	WR 110	VFR 130	VFR 150	VFR 185	VFR 210	VFR 250
S44 —	70...500	—	—	—	—	—	—	—	—	—	—
P63 B5	—	30...300	21...300	21...300	21...300	—	—	—	—	—	—
P71 B5	—	—	21...300	21...300	21...300	21...300	—	—	—	—	—
P80 B5	—	—	—	21...300	21...300	21...300	30...300	—	—	—	—
P90 B5	—	—	—	15...150	15...150	21...300	30...300	30...300 ⊖ (37.5;50)	30...300 (37.5;50) (75;100)	—	—
P100 B5	—	—	—	—	—	21...300	30...300 #	30...300 ⊖ (37.5;50)	30...300 (37.5;50) (75;100)	30...300	30...300
P112 B5	—	—	—	—	—	21...300	30...300 #	30...300 ⊖ (37.5;50)	30...300 (37.5;50) (75;100)	30...300	30...300
P132 B5	—	—	—	—	—	—	—	25...50 # ⊖ (30;45)	25...100 # (30;45) (60;90)	30...300	30...300
P160 B5	—	—	—	—	—	—	—	—	—	30...300 #	30...300 #

■ Gear ratio of the helical pre-stage $i = 1.5$

Motor-gearbox combinations marked with [#] feature a lowered key, supplied with the gearbox.



IEC		VF/VF 30/44	VF/VF 30/49	VF/W 30/63	VF/W 44/75	VF/W 44/86	VF/W 49/110	W/VF 63/130	W/VF 86/150	W/VF 86/185	VF/VF 130/210	VF/VF 130/250
P56	B5 B14	245...2100	240...2700	240...2700	—	—	—	—	—	—	—	—
P63	B5 B14	245...2100	240...2700	240...2700	250...2800	230...2760	230...2800	—	—	—	—	—
P71	B5 B14	—	—	—	250...700	230...700	230...2400	280...3200	200...2944	280...3200	—	—
P80	B5 B14	—	—	—	—	—	230...540	280...3200	200...2944	280...3200	—	—
P90	B5 B14	—	—	—	—	—	—	280...1200	200...2944	280...3200	280...3200	280...3200
P100	B5 B14	—	—	—	—	—	—	—	200...2944	280...3200	280...3200	280...3200
P112	B5 B14	—	—	—	—	—	—	—	200...2944	280...3200	280...3200	280...3200
P132	B5	—	—	—	—	—	—	—	—	—	280...1600 #	280...1600 #

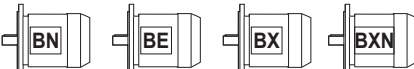
Motor-gearbox combinations marked with [#] feature a lowered key, supplied with the reducer.

24.2 Compact motor

	M1 - ME1 MXN10	M2 - ME2 MX2 - MXN20	ME3 MX3
W 63	7 ... 100	7 ... 100	—
W 75	7 ... 100	7 ... 100	7 ... 100
W 86	7 ... 100	7 ... 100	7 ... 100
W 110	—	7 ... 100	7 ... 100

	M1 - ME1 MXN10	M2 - ME2 MX2 - MXN20	ME3 MX3
W/VF 63/130	280 ... 3200	280 ... 3200	—
W/VF 86/150	200 ... 2944	200 ... 2944	200 ... 2944
W/VF 86/185	280 ... 3200	280 ... 3200	280 ... 3200

24.3 Maximum installable power on input P_

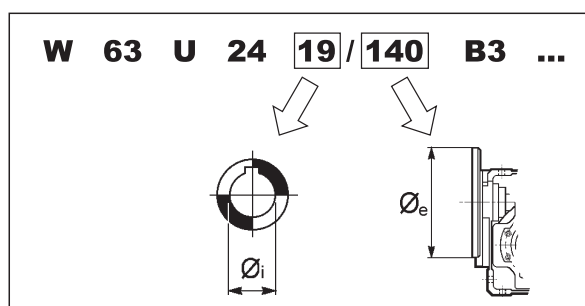
		<div>IEC_  (IM B5) (IM B14)</div>																			
		P63			P71			P80				P90				P100			P112		
		BN	BE	BXN	BN	BE	BXN	BN	BE	BX	BXN	BN	BE	BX	BXN	BN	BE	BX	BN	BE	BX
[kW]	2p	0.37	—	—	0.75	—	—	1.5	1.1	—	—	2.2	2.2	—	—	4	3	—	4	4	—
	4p	0.25	0.18	0.18	0.55	0.37	0.37	1.1	0.75	0.75	0.75	1.85	1.5	1.5	1.5	3	3	3	4	4	4
	6p	0.12	—	—	0.37	—	—	0.75	—	—	—	1.1	0.75	—	—	1.85	1.5	—	2.2	2.2	—

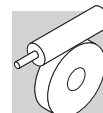
		P132			P160			P180			P200	P225
		BN	BE	BX	BN	BE	BX	BN	BE	BX	BN	IEC
[kW]	2p	9.2	9.2	—	18.5	18.5	—	22	—	—	30	45
	4p	9.2	9.2	7.5	15	15	15	22	22	22	30	45
	6p	5.5	4	—	11	7.5	—	15	—	—	18.5	30

24.4 Motors not to IEC standard

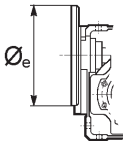

For coupling with non-normalized electric motors, the motor coupling end of VF and W speed reducers may be configured with hybrid (i.e., non IEC) input shaft and flange combinations.

Shaft and flange combinations are illustrated below. The table shows the diameters in millimetres for each selection.





The following table lists available configurations, as well as their limited ranges of gear ratios.

								
		80	90	105	120	140	160	200
VF 30	9		7 ≤ i ≤ 70	⊖		7 ≤ i ≤ 70	⊖	⊖
	11	7 ≤ i ≤ 60		⊖	7 ≤ i ≤ 60		⊖	⊖
VF 44	HS	⊖	7 ≤ i ≤ 100	7 ≤ i ≤ 100	⊖	7 ≤ i ≤ 100	7 ≤ i ≤ 100	⊖
	11	⊖		7 ≤ i ≤ 100	⊖		7 ≤ i ≤ 100	⊖
	14	⊖	7 ≤ i ≤ 35		⊖	7 ≤ i ≤ 35		⊖
VF 49	HS	⊖	7 ≤ i ≤ 100	7 ≤ i ≤ 100	7 ≤ i ≤ 100	7 ≤ i ≤ 100	7 ≤ i ≤ 100	7 ≤ i ≤ 100
	11	⊖		7 ≤ i ≤ 100	7 ≤ i ≤ 100		7 ≤ i ≤ 100	7 ≤ i ≤ 100
	14	⊖	7 ≤ i ≤ 60		7 ≤ i ≤ 60	7 ≤ i ≤ 60		7 ≤ i ≤ 60
	19	⊖	7 ≤ i ≤ 28	7 ≤ i ≤ 28		7 ≤ i ≤ 28	7 ≤ i ≤ 28	
W 63	19	⊖	⊖	⊖	⊖	7 ≤ i ≤ 100	⊖	
W 75	14	⊖	⊖	⊖	⊖	⊖		7 ≤ i ≤ 100
	19	⊖	⊖	⊖		7 ≤ i ≤ 100	7 ≤ i ≤ 100	
	24	⊖	⊖	⊖	7 ≤ i ≤ 100		7 ≤ i ≤ 100	
W 86	14	⊖	⊖	⊖	⊖	⊖		7 ≤ i ≤ 100
	19	⊖	⊖	⊖		7 ≤ i ≤ 100	7 ≤ i ≤ 100	
	24	⊖	⊖	⊖	7 ≤ i ≤ 100		7 ≤ i ≤ 100	
W 110	19	⊖	⊖	⊖		7 ≤ i ≤ 100	⊖	⊖
	24	⊖	⊖	⊖	7 ≤ i ≤ 100		⊖	⊖

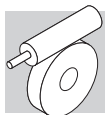
 Standard arrangement

Some hybrid shaft/flange combinations are also possible for VF reduction units with center distance greater than 130 mm. Please contact Bonfiglioli Technical Service.

The table above report possible configurations strictly based on geometric criteria.

To determine the compatibility of a motor-gear unit assembly in terms of mechanical factors, double-check the selected configuration against the rating charts for power/speed.

Be sure to avoid those combinations that yield a safety factor $S < 0.9$.

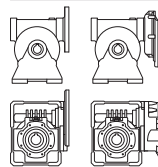


25 MOMENT OF INERTIA

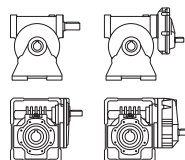
The following charts indicate the mass moment of inertia J_r [Kgm²] referred to gear unit with high speed solid shaft. A key to the symbols used follows:



Values of the moment of inertia refer to compact gearmotors, less the motor inertia. To obtain the overall moment of inertia for the gearmotor just add the value of the inertia for the specific compact motor, given in the relevant rating chart.





Values refer to gearmotors, IEC style, less the motor.





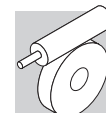
Values refer to speed reducers (solid input shaft).

VF 27



		i	J (•10 ⁻⁴) [kgm²]					
								
			P27					HS
VF 27	VF 27_7	7	0.02	—	—	—	—	0.02
	VF 27_10	10	0.01	—	—	—	—	0.01
	VF 27_15	15	0.01	—	—	—	—	0.01
	VF 27_20	20	0.01	—	—	—	—	0.01
	VF 27_30	30	0.01	—	—	—	—	0.01
	VF 27_40	40	0.01	—	—	—	—	0.01
	VF 27_60	60	0.01	—	—	—	—	0.01
	VF 27_70	70	0.01	—	—	—	—	0.01

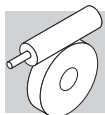
VF 30

		i	J (•10 ⁻⁴) [kgm²]					
								
			P56	P63				HS
VF 30	VF 30_7	7	0.08	0.07	—	—	—	0.04
	VF 30_10	10	0.07	0.06	—	—	—	0.03
	VF 30_15	15	0.07	0.06	—	—	—	0.03
	VF 30_20	20	0.06	0.06	—	—	—	0.03
	VF 30_30	30	0.06	0.06	—	—	—	0.03
	VF 30_40	40	0.06	0.06	—	—	—	0.03
	VF 30_60	60	0.06	0.05	—	—	—	0.02
	VF 30_70	70	0.06	—	—	—	—	0.02



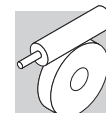
VF 44 - VFR 44

		i	J (•10 ⁻⁴) [kgm ²]				
			 S44	P63	P71	 HS	
VF 44	VF 44_7	7	—	0.29	0.27	—	0.18
	VF 44_10	10	—	0.24	0.22	—	0.14
	VF 44_14	14	—	0.23	0.21	—	0.12
	VF 44_20	20	—	0.19	0.18	—	0.09
	VF 44_28	28	—	0.21	0.19	—	0.11
	VF 44_35	35	—	0.19	0.18	—	0.09
	VF 44_46	46	—	0.18	—	—	0.08
	VF 44_60	60	—	0.17	—	—	0.07
	VF 44_70	70	—	0.17	—	—	0.07
	VF 44_100	100	—	0.17	—	—	0.07
VFR 44	VFR 44_70	70	0.21	—	—	—	—
	VFR 44_100	100	0.20	—	—	—	—
	VFR 44_140	140	0.20	—	—	—	—
	VFR 44_175	175	0.20	—	—	—	—
	VFR 44_230	230	0.20	—	—	—	—
	VFR 44_300	300	0.20	—	—	—	—
	VFR 44_350	350	0.20	—	—	—	—
	VFR 44_500	500	0.20	—	—	—	—








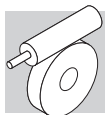
VF 49 - VFR 49

		i	J (•10 ⁻⁴) [kgm ²]					 HS
			P63	P71	P80			
VF 49	VF 49_7	7	0.69	0.67	0.61	—	—	0.42
	VF 49_10	10	0.61	0.60	0.53	—	—	0.34
	VF 49_14	14	0.58	0.57	0.5	—	—	0.31
	VF 49_18	18	0.54	0.53	0.46	—	—	0.27
	VF 49_24	24	0.52	0.5	0.44	—	—	0.24
	VF 49_28	28	0.56	0.54	0.48	—	—	0.28
	VF 49_36	36	0.53	0.51	—	—	—	0.25
	VF 49_45	45	0.51	0.49	—	—	—	0.24
	VF 49_60	60	0.50	0.48	—	—	—	0.23
	VF 49_70	70	0.50	—	—	—	—	0.22
	VF 49_80	80	0.49	—	—	—	—	0.22
	VF 49_100	100	0.49	—	—	—	—	0.22
VFR 49	VFR 49_30	30	0.74	—	—	—	—	0.94
	VFR 49_42	42	0.73	—	—	—	—	0.93
	VFR 49_54	54	0.73	—	—	—	—	0.93
	VFR 49_72	72	0.73	—	—	—	—	0.93
	VFR 49_84	84	0.73	—	—	—	—	0.93
	VFR 49_108	108	0.73	—	—	—	—	0.93
	VFR 49_135	135	0.73	—	—	—	—	0.93
	VFR 49_180	180	0.73	—	—	—	—	0.93
	VFR 49_210	210	0.72	—	—	—	—	0.92
	VFR 49_240	240	0.72	—	—	—	—	0.92
	VFR 49_300	300	0.72	—	—	—	—	0.92













W 63 - WR 63

			J (•10 ⁻⁴) [kgm²]									
						 						 
			S1	S2	S3	P63	P71	P80	P90			HS
W 63	W 63_7	7	3.4	3.6	—	—	3.5	3.5	3.5	—	—	3.6
	W 63_10	10	3.1	3.3	—	—	3.2	3.3	3.2	—	—	3.3
	W 63_12	12	3.1	3.3	—	—	3.1	3.2	3.1	—	—	3.3
	W 63_15	15	3.0	3.2	—	—	3.0	3.1	3.0	—	—	3.2
	W 63_19	19	2.9	3.1	—	—	2.9	3.0	2.9	—	—	3.1
	W 63_24	24	2.8	3.1	—	—	2.9	3.0	2.9	—	—	3.0
	W 63_30	30	2.9	3.1	—	—	2.9	3.0	2.9	—	—	3.1
	W 63_38	38	2.8	3.1	—	—	2.9	3.0	2.9	—	—	3.0
	W 63_45	45	2.8	3.0	—	—	2.9	2.9	2.9	—	—	3.0
	W 63_64	64	2.8	3.0	—	—	2.8	2.9	2.8	—	—	3.0
	W 63_80	80	2.8	3.0	—	—	2.8	2.9	2.8	—	—	3.0
	W 63_100	100	2.8	3.0	—	—	2.8	2.9	2.8	—	—	2.9
WR 63	WR 63_21	21	—	—	—	0.84	0.83	—	—	—	—	0.81
	WR 63_30	30	—	—	—	0.81	0.80	—	—	—	—	0.78
	WR 63_36	36	—	—	—	0.81	0.80	—	—	—	—	0.77
	WR 63_45	45	—	—	—	0.80	0.79	—	—	—	—	0.76
	WR 63_57	57	—	—	—	0.79	0.78	—	—	—	—	0.75
	WR 63_72	72	—	—	—	0.78	0.77	—	—	—	—	0.74
	WR 63_90	90	—	—	—	0.79	0.78	—	—	—	—	0.75
	WR 63_114	114	—	—	—	0.78	0.77	—	—	—	—	0.74
	WR 63_135	135	—	—	—	0.78	0.77	—	—	—	—	0.74
	WR 63_192	192	—	—	—	0.77	0.76	—	—	—	—	0.74
	WR 63_240	240	—	—	—	0.77	0.76	—	—	—	—	0.74
	WR 63_300	300	—	—	—	0.77	0.76	—	—	—	—	0.73



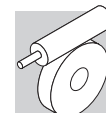
W 75 - WR 75

		i	J (•10 ⁻⁴) [kgm ²]									
												
W 75	W 75_7	7	6.9	6.6	6.6	—	6.9	7.0	6.9	6.9	6.9	7.3
	W 75_10	10	6.4	6.1	6.1	—	6.4	6.4	6.3	5.7	5.7	6.8
	W 75_15	15	6.1	5.8	5.8	—	6.1	6.1	6.0	5.3	5.3	6.5
	W 75_20	20	5.9	5.6	5.6	—	5.9	5.9	5.9	5.2	5.2	6.3
	W 75_25	25	5.9	5.6	5.6	—	6.0	6.0	5.9	5.2	5.2	6.3
	W 75_30	30	5.9	5.6	5.6	—	5.9	5.9	5.9	5.2	5.2	6.3
	W 75_40	40	5.9	5.6	5.6	—	5.9	5.9	5.8	5.2	5.2	6.3
	W 75_50	50	5.9	5.6	5.6	—	5.9	5.9	5.8	5.1	5.1	6.2
	W 75_60	60	5.8	5.5	5.5	—	5.8	5.9	5.8	5.1	5.1	6.2
	W 75_80	80	5.8	5.5	5.5	—	5.8	5.8	5.8	5.1	5.1	6.2
	W 75_100	100	5.8	5.5	5.5	—	5.8	5.8	5.7	5.0	5.0	6.2

WR 75	WR 75_21	21	—	—	—	1.2	1.2	2.1	—	—	—	1.9
	WR 75_30	30	—	—	—	1.1	1.1	2.1	—	—	—	1.1
	WR 75_45	45	—	—	—	1.1	1.1	2.0	—	—	—	1.1
	WR 75_60	60	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_75	75	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_90	90	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_120	120	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_150	150	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_180	180	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_240	240	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_300	300	—	—	—	1.1	1.1	2.0	—	—	—	1.0

		i	J (•10 ⁻⁴) [kgm ²]
			 P90

WR 75_P90 B5	WR 75_15	15	6.0
	WR 75_22.5	22.5	5.9
	WR 75_30	30	5.8
	WR 75_37.5	37.5	5.8
	WR 75_45	45	5.8
	WR 75_60	60	5.8
	WR 75_75	75	5.8
	WR 75_90	90	5.7
	WR 75_120	120	5.7
	WR 75_150	150	5.7



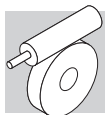
W 86 - WR 86

		i	J (•10 ⁻⁴) [kgm ²]									
			S1	S2	S3	P63	P71	P80	P90	P100	HS	
W 86	W 86_7	7	9.7	9.4	9.4	—	9.7	9.7	9.6	9.6	—	10.1
	W 86_10	10	8.4	8.1	8.1	—	8.4	8.4	8.3	7.7	—	8.9
	W 86_15	15	7.7	7.4	7.4	—	7.7	7.7	7.7	7.0	—	8.2
	W 86_20	20	6.9	6.6	6.6	—	6.9	7.0	6.9	6.2	—	7.4
	W 86_23	23	6.8	6.5	6.5	—	6.8	6.9	6.8	6.1	—	7.3
	W 86_30	30	7.3	7.0	7.0	—	7.3	7.3	7.3	6.6	—	7.8
	W 86_40	40	6.7	6.4	6.4	—	6.7	6.7	6.6	6.0	—	7.2
	W 86_46	46	6.7	6.4	6.4	—	6.7	6.7	6.6	5.9	—	7.1
	W 86_56	56	6.6	6.3	6.3	—	6.6	6.7	6.6	5.9	—	7.1
	W 86_64	64	6.6	6.3	6.3	—	6.6	6.6	6.5	5.9	—	7.1
	W 86_80	80	6.6	6.3	6.3	—	6.6	6.6	6.5	5.9	—	7.1
	W 86_100	100	6.4	6.1	6.1	—	6.4	6.5	6.4	5.7	—	6.9






WR 86	WR 86_21	21	—	—	—	1.5	1.5	2.4	—	—	—	2.2
	WR 86_30	30	—	—	—	1.4	1.3	2.3	—	—	—	1.3
	WR 86_45	45	—	—	—	1.3	1.3	2.2	—	—	—	1.2
	WR 86_60	60	—	—	—	1.2	1.2	2.1	—	—	—	1.2
	WR 86_69	69	—	—	—	1.2	1.2	2.1	—	—	—	1.1
	WR 86_90	90	—	—	—	1.2	1.2	2.2	—	—	—	1.2
	WR 86_120	120	—	—	—	1.2	1.2	2.1	—	—	—	1.1
	WR 86_138	138	—	—	—	1.2	1.2	2.1	—	—	—	1.1
	WR 86_168	168	—	—	—	1.2	1.2	2.1	—	—	—	1.1
	WR 86_192	192	—	—	—	1.2	1.1	2.1	—	—	—	1.1
	WR 86_240	240	—	—	—	1.2	1.1	2.1	—	—	—	1.1
	WR 86_300	300	—	—	—	1.1	1.1	2.1	—	—	—	1.1

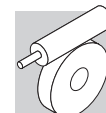
		i	J (•10 ⁻⁴) [kgm ²]
			 P90

WR 86_P90 B5	WR 86_15	15	6.9
	WR 86_22.5	22.5	6.6
	WR 86_30	30	6.3
	WR 86_34.5	34.5	6.2
	WR 86_45	45	6.4
	WR 86_60	60	6.2
	WR 86_69	69	6.1
	WR 86_84	84	6.1
	WR 86_96	96	6.0
	WR 86_120	120	6.0
	WR 86_150	150	5.9



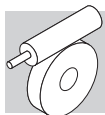
W 110 - WR 110

		i	J (•10 ⁻⁴) [kgm ²]									
						 					 	
			S1	S2	S3	P63	P71	P80	P90	P100	P132	HS
W 110	W 110_7	7	—	22	22	—	—	23	23	23	28	23
	W 110_10	10	—	19	19	—	—	19	19	24	24	20
	W 110_15	15	—	17	17	—	—	17	17	22	22	17
	W 110_20	20	—	14	14	—	—	14	14	19	19	15
	W 110_23	23	—	14	14	—	—	14	14	19	19	15
	W 110_30	30	—	15	15	—	—	16	16	20	20	16
	W 110_40	40	—	13	13	—	—	14	14	19	19	14
	W 110_46	46	—	13	13	—	—	13	13	18	18	14
	W 110_56	56	—	13	13	—	—	13	13	18	18	14
	W 110_64	64	—	13	13	—	—	13	13	18	18	14
	W 110_80	80	—	13	13	—	—	13	13	18	18	14
	W 110_100	100	—	13	13	—	—	13	13	18	18	14
WR 110	WR 110_21	21	—	—	—	—	3.0	9.0	8.8	8.9	—	9.2
	WR 110_30	30	—	—	—	—	2.5	8.6	8.4	8.4	—	8.8
	WR 110_45	45	—	—	—	—	2.3	8.3	8.2	8.2	—	8.5
	WR 110_60	60	—	—	—	—	2.0	8.1	7.9	7.9	—	8.3
	WR 110_69	69	—	—	—	—	2.0	8.0	7.9	7.9	—	8.2
	WR 110_90	90	—	—	—	—	2.2	8.2	8.1	8.1	—	8.4
	WR 110_120	120	—	—	—	—	1.9	8.0	7.8	7.9	—	8.2
	WR 110_138	138	—	—	—	—	1.9	8.0	7.8	7.8	—	8.2
	WR 110_168	168	—	—	—	—	1.9	8.0	7.8	7.8	—	8.1
	WR 110_192	192	—	—	—	—	1.9	7.9	7.8	7.8	—	8.1
	WR 110_240	240	—	—	—	—	1.9	7.9	7.8	7.8	—	8.1
	WR 110_300	300	—	—	—	—	1.9	7.9	7.8	7.8	—	8.1



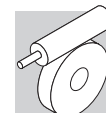
VF 130 - VFR 130

		i	J (•10 ⁻⁴) [kgm ²]					
			P80	P90	P100	P112	P132	HS
VF 130	VF 130_7	7	—	—	36	36	35	31
	VF 130_10	10	—	—	27	27	25	22
	VF 130_15	15	—	—	20	20	18	15
	VF 130_20	20	—	—	17	17	15	11
	VF 130_23	23	—	—	16	16	14	11
	VF 130_30	30	—	—	17	17	15	12
	VF 130_40	40	—	—	15	15	14	9.9
	VF 130_46	46	—	14	14	14	—	8.2
	VF 130_56	56	—	13	13	13	—	7.8
	VF 130_64	64	—	13	13	13	—	7.4
	VF 130_80	80	—	13	12	12	—	7.0
	VF 130_100	100	—	13	—	—	—	8.9
VFR 130	VFR 130_30	30	5.3	5.3	5.2	5.2	—	5.7
	VFR 130_45	45	4.5	4.5	4.4	4.4	—	4.9
	VFR 130_60	60	4.2	4.1	4.1	4.1	—	4.6
	VFR 130_69	69	4.1	4.0	4.0	4.0	—	4.5
	VFR 130_90	90	4.2	4.1	4.1	4.1	—	4.6
	VFR 130_120	120	4.0	3.9	4.0	4.0	—	4.4
	VFR 130_138	138	3.8	3.8	3.7	3.7	—	4.2
	VFR 130_168	168	3.8	3.7	3.7	3.7	—	4.1
	VFR 130_192	192	3.7	3.7	3.6	3.6	—	4.1
	VFR 130_240	240	3.7	3.6	3.6	3.6	—	4.1
	VFR 130_300	300	3.9	3.8	3.8	3.8	—	4.3



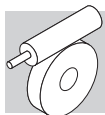
VF 150 - VFR 150

		i	J ($\cdot 10^{-4}$) [kgm ²]				
			P90	P100	P112	P132	HS
VF 150	VF 150_7	7	—	—	—	58	50
	VF 150_10	10	—	—	—	44	35
	VF 150_15	15	—	—	—	29	21
	VF 150_20	20	—	—	—	27	19
	VF 150_23	23	—	28	28	26	17
	VF 150_30	30	—	31	31	29	21
	VF 150_40	40	—	26	26	24	16
	VF 150_46	46	—	24	24	22	13
	VF 150_56	56	25	24	24	—	13
	VF 150_64	64	24	23	23	—	12
	VF 150_80	80	23	22	22	—	11
	VF 150_100	100	23	22	22	—	11
VFR 150	VFR 150_25	25	—	—	—	15	—
	VFR 150_30	30	10	10	10	—	11
	VFR 150_37.5	37.5	—	—	—	13	—
	VFR 150_45	45	8.8	8.8	8.8	—	9.7
	VFR 150_50	50	—	—	—	12	—
	VFR 150_60	60	8.3	8.3	8.3	—	9.2
	VFR 150_69	69	8.4	8.4	8.4	—	9.3
	VFR 150_90	90	8.7	8.7	8.7	—	9.7
	VFR 150_120	120	8.2	8.2	8.2	—	9.2
	VFR 150_138	138	7.9	7.9	7.9	—	8.9
	VFR 150_168	168	7.9	7.9	7.9	—	8.9
	VFR 150_192	192	7.8	7.8	7.8	—	8.8
	VFR 150_240	240	7.7	7.7	7.7	—	8.6
	VFR 150_300	300	7.7	7.7	7.7	—	8.6



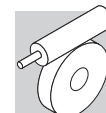
VF 185 - VFR 185

		i	J (•10 ⁻⁴) [kgm ²]						
			P90	P100	P112	P132	P160	P180	HS
VF 185	VF 185_7	7	—	—	—	—	—	146	128
	VF 185_10	10	—	—	—	—	—	108	91
	VF 185_15	15	—	—	—	—	70	88	50
	VF 185_20	20	—	—	—	—	69	66	48
	VF 185_30	30	—	—	—	58	54	—	34
	VF 185_40	40	—	—	—	63	61	—	41
	VF 185_50	50	—	59	59	58	—	—	35
	VF 185_60	60	—	55	55	53	—	—	31
	VF 185_80	80	—	52	52	51	—	—	28
	VF 185_100	100	—	51	51	—	—	—	27
VFR 185	VFR 185_25	25	—	—	—	24	—	—	—
	VFR 185_30	30	17	17	17	—	—	—	18
	VFR 185_37.5	37.5	—	—	—	17	—	—	—
	VFR 185_45	45	12	12	12	—	—	—	13
	VFR 185_50	50	—	—	—	17	—	—	—
	VFR 185_60	60	12	12	12	—	—	—	13
	VFR 185_75	75	—	—	—	15	—	—	—
	VFR 185_90	90	10	10	10	—	—	—	11
	VFR 185_100	100	—	—	—	16	—	—	—
	VFR 185_120	120	11	11	11	—	—	—	12
	VFR 185_150	150	10	10	10	—	—	—	11
	VFR 185_180	180	9.9	9.9	9.9	—	—	—	11
	VFR 185_240	240	9.6	9.6	9.6	—	—	—	11
	VFR 185_300	300	9.5	9.4	9.4	—	—	—	10



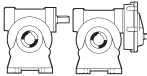


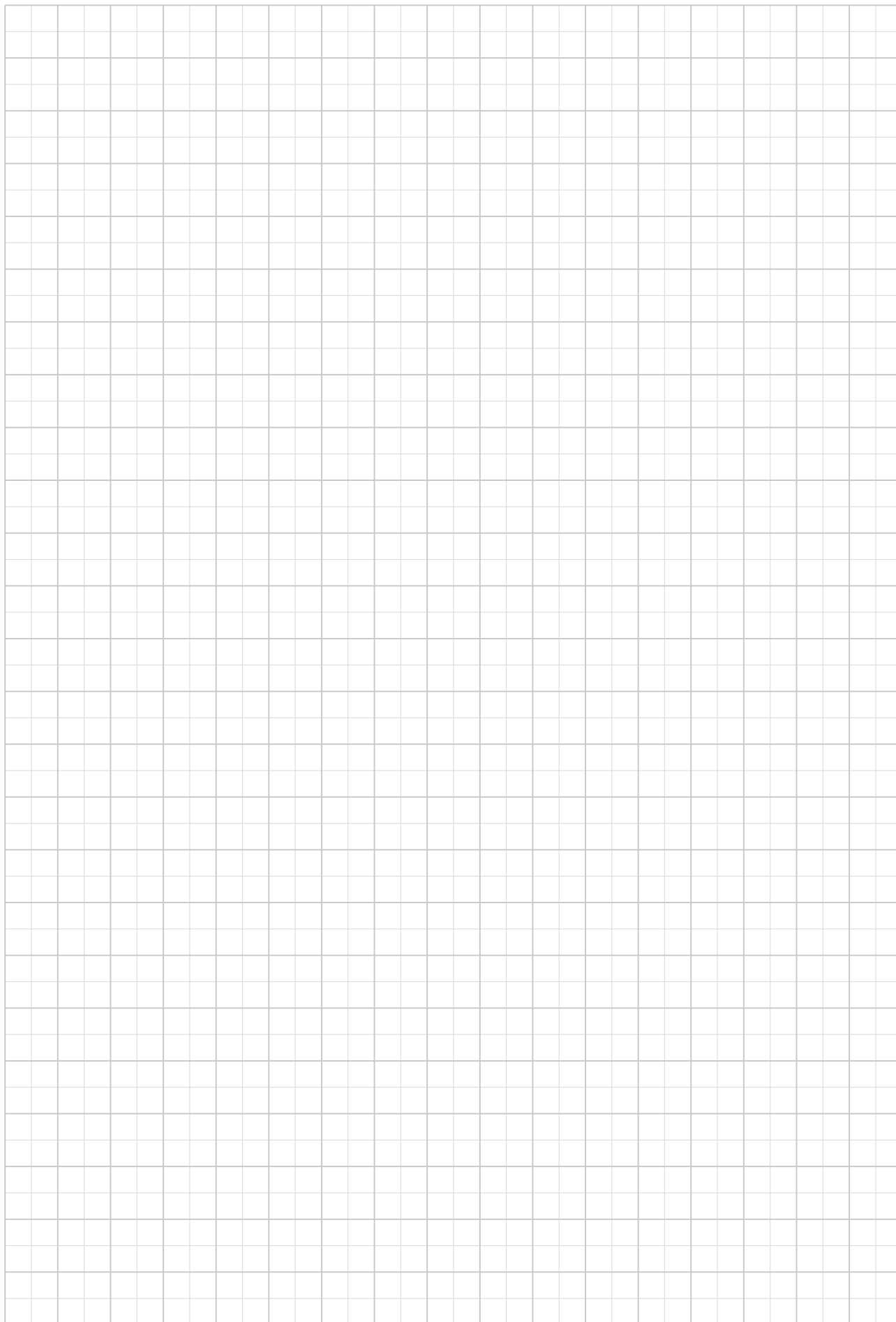
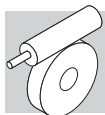
VF 210 - VFR 210

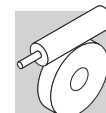
		i	J (•10 ⁻⁴) [kgm ²]							HS
			P100	P112	P132	P160	P180	P200	P225	
VF 210	VF 210_7	7	—	—	286	286	286	286	286	286
	VF 210_10	10	—	—	177	177	177	177	177	177
	VF 210_15	15	—	—	120	120	120	120	120	120
	VF 210_20	20	—	—	116	116	116	116	116	116
	VF 210_30	30	—	—	81	81	81	81	81	81
	VF 210_40	40	—	—	98	98	98	98	98	98
	VF 210_50	50	—	—	84	84	84	84	84	84
	VF 210_60	60	—	—	75	75	75	75	75	75
	VF 210_80	80	—	—	68	68	68	68	68	68
	VF 210_100	100	—	—	63	63	63	63	63	63
VFR 210	VFR 210_30	30	48	48	47	47	—	—	—	51
	VFR 210_45	45	41	41	41	41	—	—	—	45
	VFR 210_60	60	41	41	41	40	—	—	—	45
	VFR 210_90	90	37	37	37	36	—	—	—	41
	VFR 210_120	120	39	39	39	38	—	—	—	43
	VFR 210_150	150	37	37	37	37	—	—	—	41
	VFR 210_180	180	36	36	36	36	—	—	—	40
	VFR 210_240	240	36	36	36	35	—	—	—	39
	VFR 210_300	300	35	35	35	34	—	—	—	39



VF 250 - VFR 250

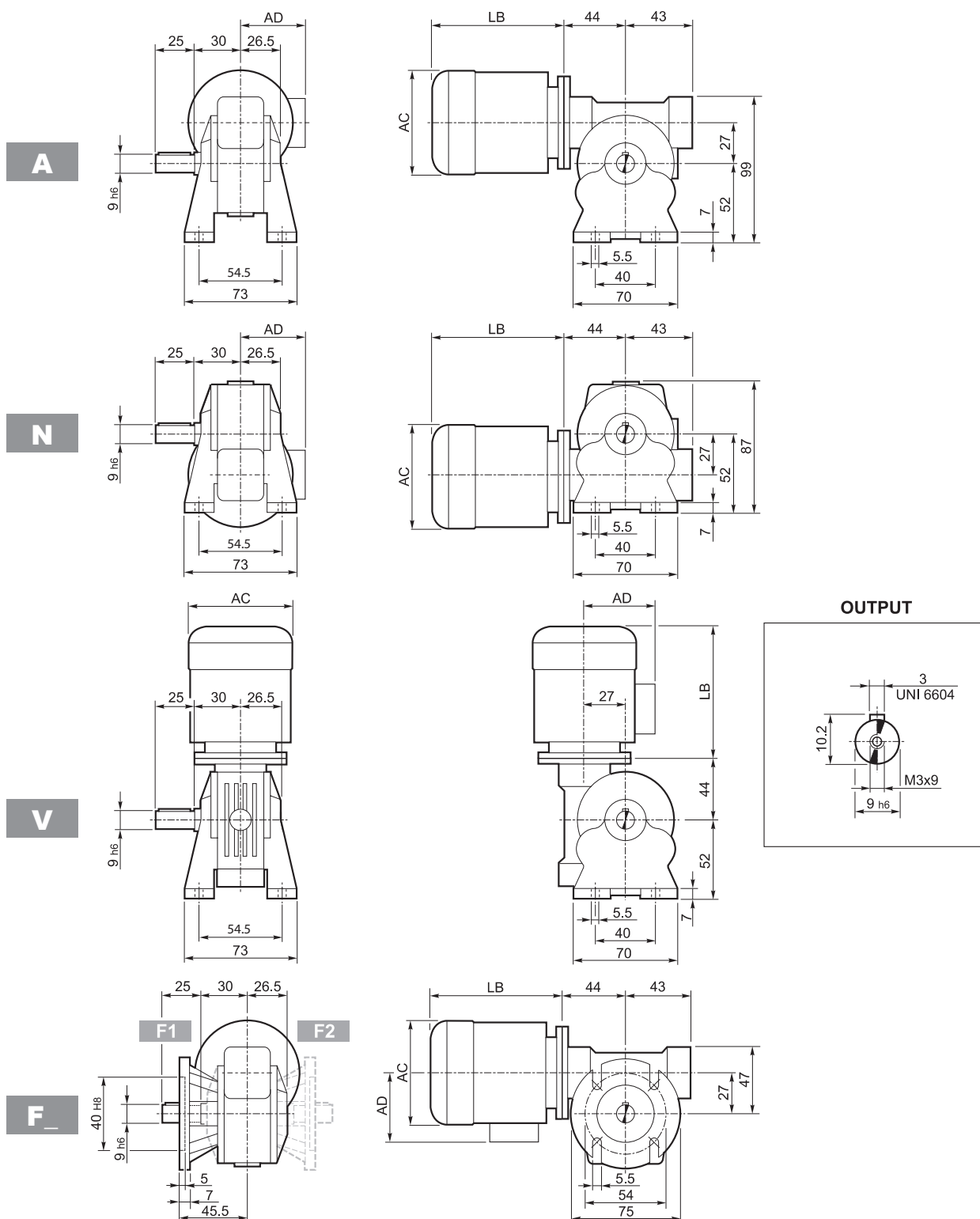
			J (•10 ⁻⁴) [kgm ²]							
			 							
VF 250	VF 250_7	7	—	—	620	620	620	620	620	620
	VF 250_10	10	—	—	387	387	387	387	387	387
	VF 250_15	15	—	—	266	266	266	266	266	266
	VF 250_20	20	—	—	242	242	242	242	242	242
	VF 250_30	30	—	—	184	184	184	184	184	184
	VF 250_40	40	—	—	241	241	241	241	241	241
	VF 250_50	50	—	—	240	240	240	240	240	240
	VF 250_60	60	—	—	158	158	158	158	158	158
	VF 250_80	80	—	—	160	160	160	160	160	160
	VF 250_100	100	—	—	149	149	149	149	149	149
VFR 250	VFR 250_30	30	71	71	71	70	—	—	—	75
	VFR 250_45	45	58	58	57	57	—	—	—	61
	VFR 250_60	60	55	55	55	54	—	—	—	58
	VFR 250_90	90	48	48	48	48	—	—	—	52
	VFR 250_120	120	55	55	54	54	—	—	—	58
	VFR 250_150	150	55	55	54	54	—	—	—	58
	VFR 250_180	180	46	46	45	45	—	—	—	49
	VFR 250_240	240	46	46	45	45	—	—	—	49
	VFR 250_300	300	45	45	44	44	—	—	—	48



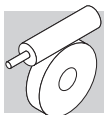


26 DIMENSIONS FOR GEARMOTORS AND GEAR UNITS WITH IEC MOTOR INTERFACE

VF 27...BN27

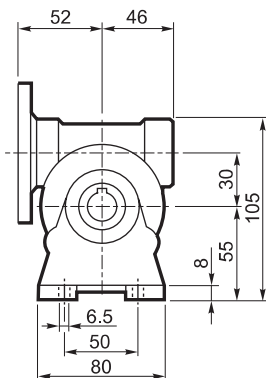
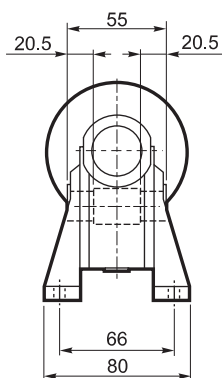


	P _n kW	n min ⁻¹	M _n Nm	η %	COSφ	I _n A (400V)	I _s I _n	M _s M _n	M _a M _n	J _m (·10 ⁻⁴) kgm ²	Kg	LB	AC	AD
BN 27A4	0.04	1350	0.28	36	0.57	0.28	2.3	2.0	1.8	0.56	2.8	152	103	76
BN 27B4	0.06	1360	0.42	39	0.57	0.39	2.5	2.2	1.9	0.76	3.1	152	103	76
BN 27C4	0.09	1380	0.63	46	0.65	0.43	2.8	2.3	1.9	1.49	3.3	175	112	94

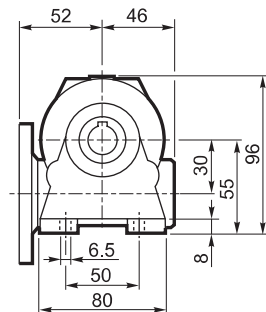
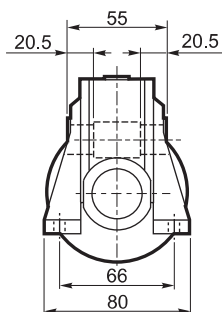


VF 30...P (IEC)

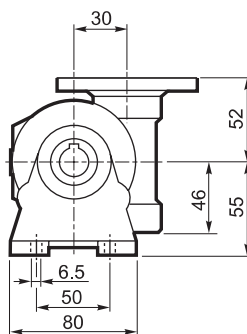
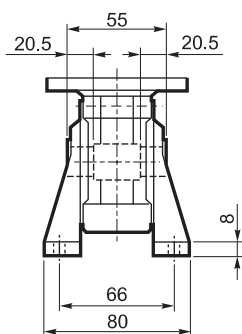
A



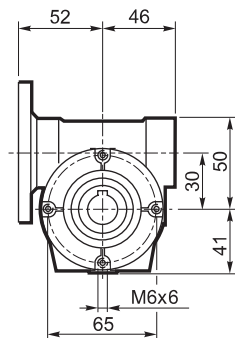
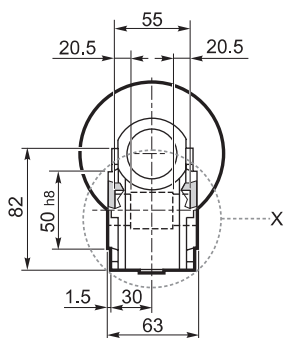
N



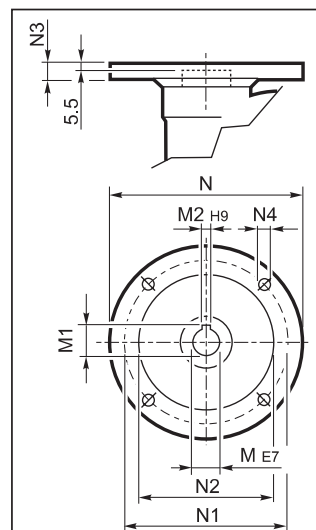
V



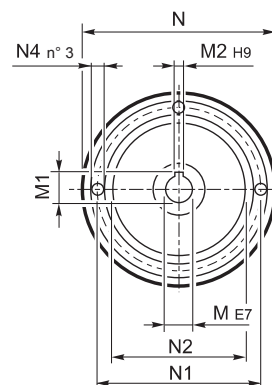
P



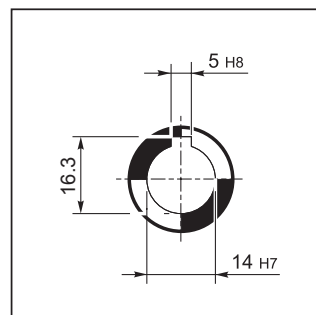
INPUT



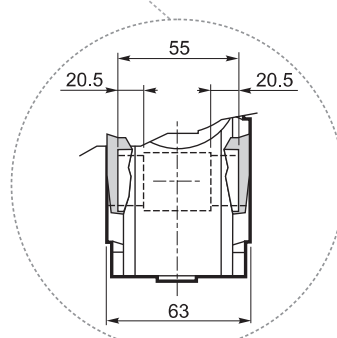
P56 B14

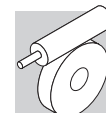


OUTPUT



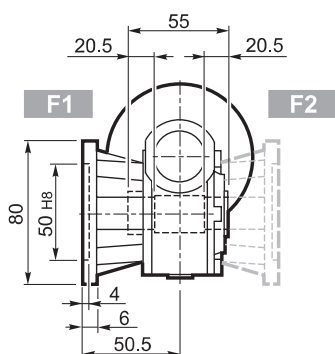
X



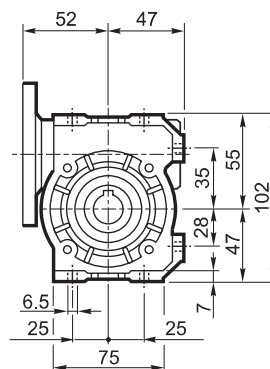
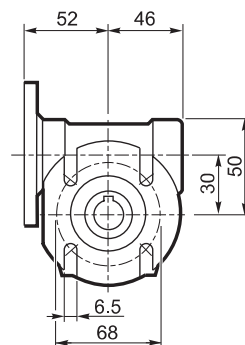
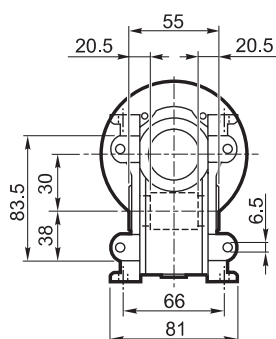


VF 30...P (IEC)

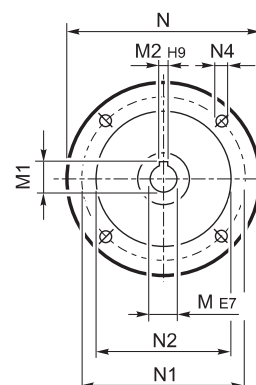
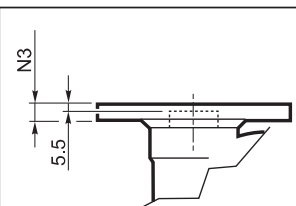
F₋



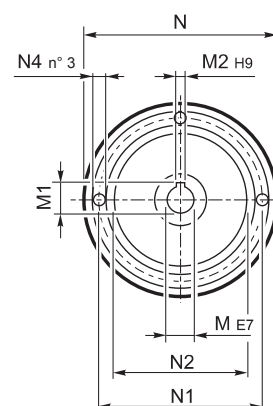
U



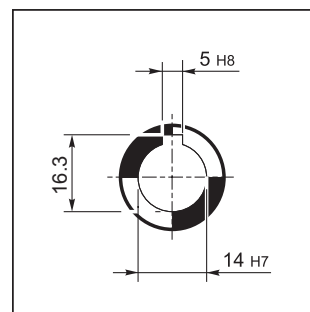
INPUT





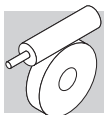
P56 B14



OUTPUT

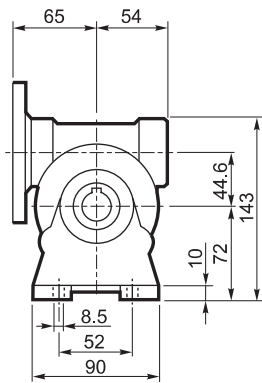
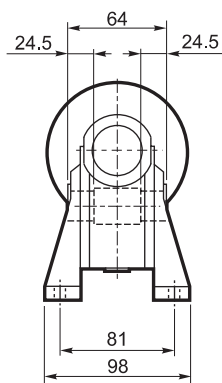


		M	M1	M2	N	N1	N2	N3	N4	Kg
										
VF 30	P56 B5	9	10.4	3	120	100	80	7	7	1.1
VF 30	P56 B14	9	10.4	3	80	65	50	7	5.5	
VF 30	P63 B5	11	12.8	4	140	115	95	8	9.5	
VF 30	P63 B14	11	12.8	4	90	75	60	6	5.5	

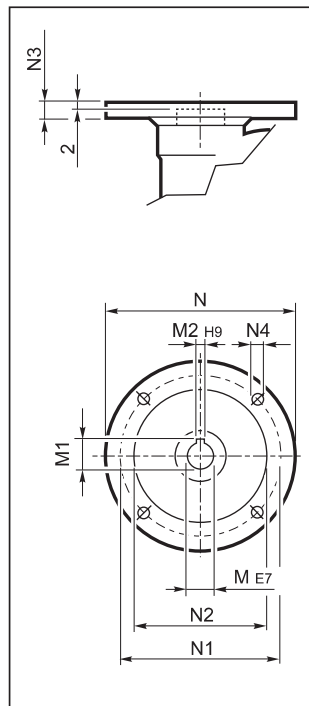


VF 44...P (IEC)

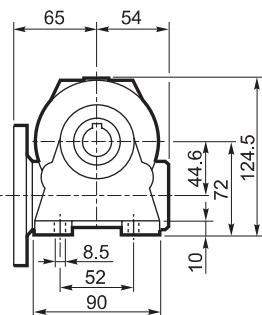
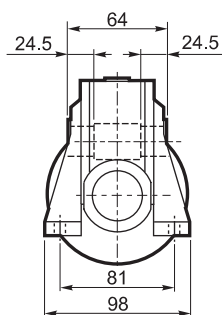
A



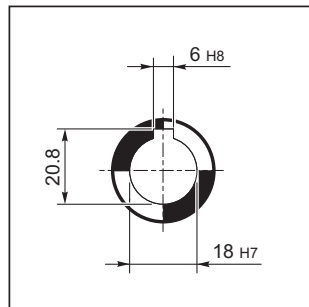
INPUT



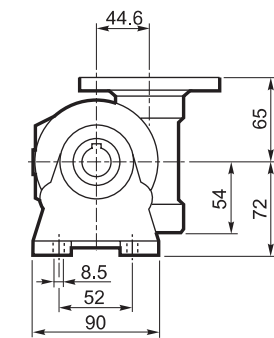
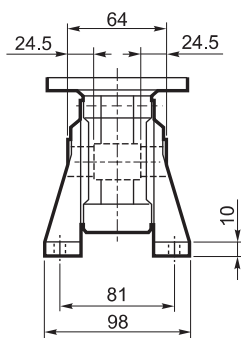
N



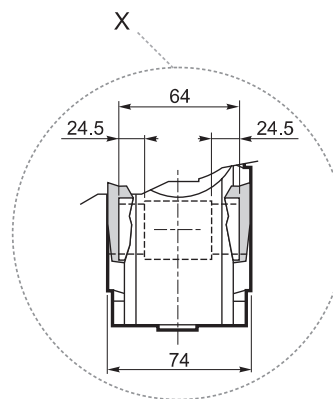
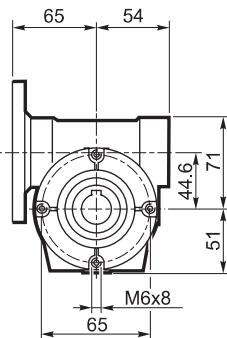
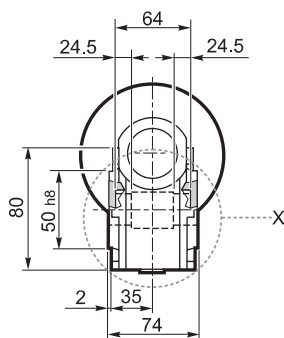
OUTPUT

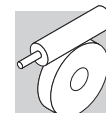


V

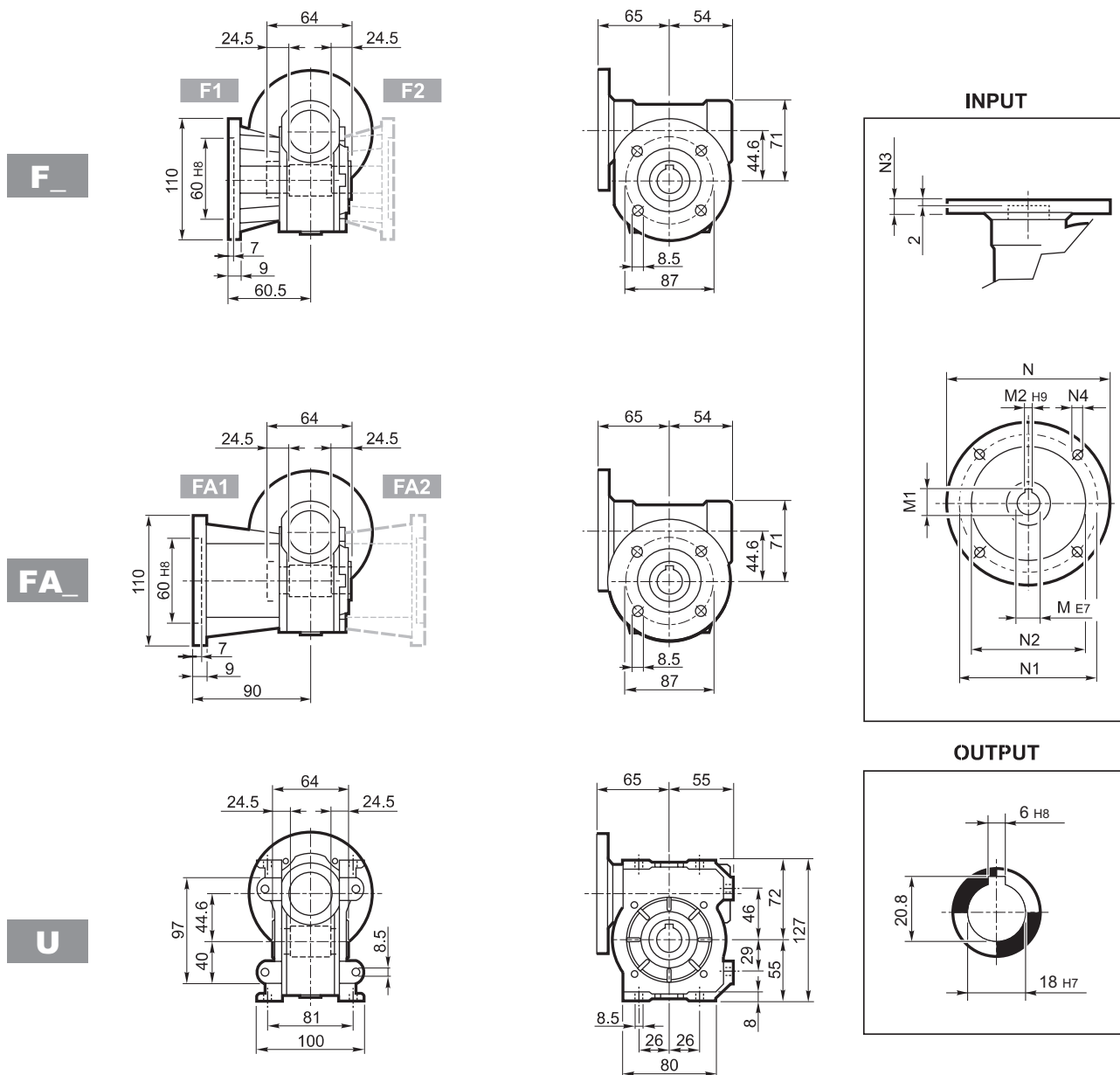





P

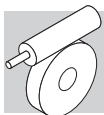




VF 44...P (IEC)

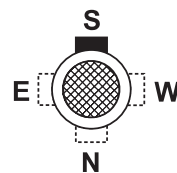
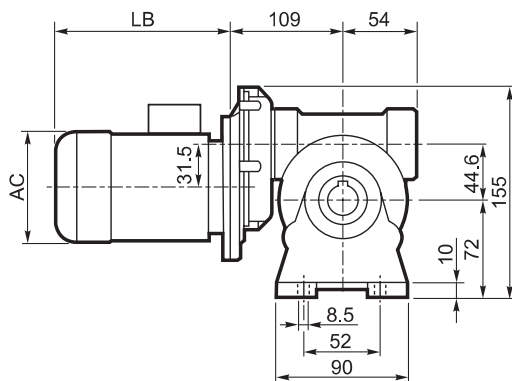
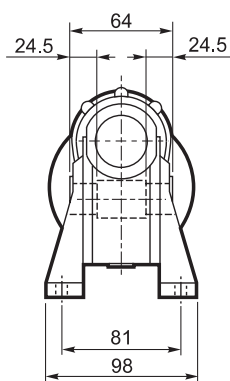


		M	M1	M2	N	N1	N2	N3	N4	
VF 44	P63 B5	11	12.8	4	140	115	95	10	9.5	2.0
VF 44	P71 B5	14	16.3	5	160	130	110	10	9.5	
VF 44	P63 B14	11	12.8	4	90	75	60	8	5.5	
VF 44	P71 B14	14	16.3	5	105	85	70	10	7	

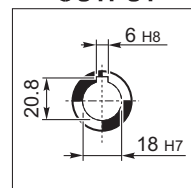


VFR 44...BN 44

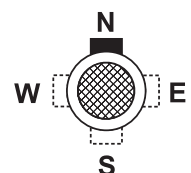
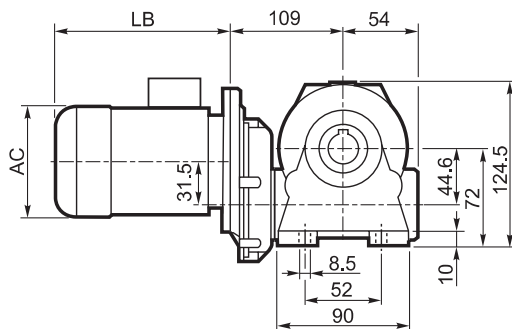
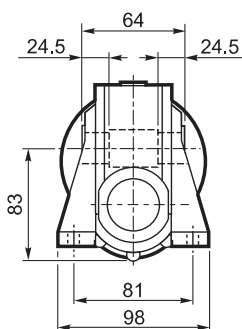
A



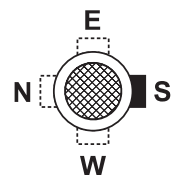
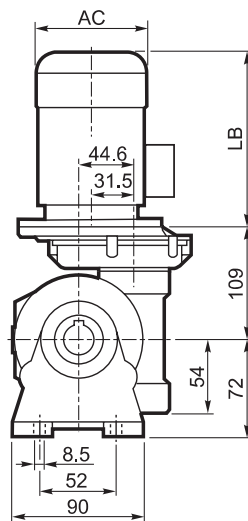
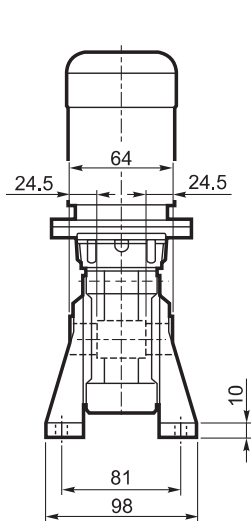
OUTPUT



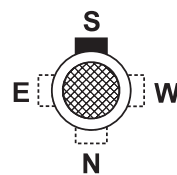
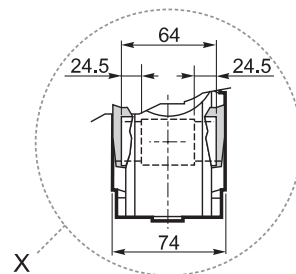
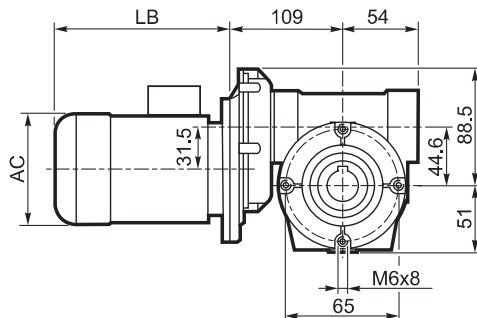
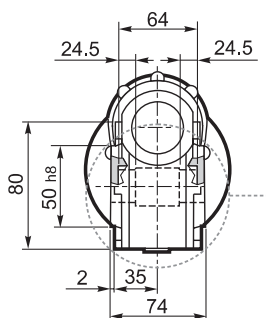
N

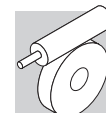


V



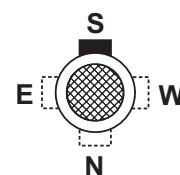
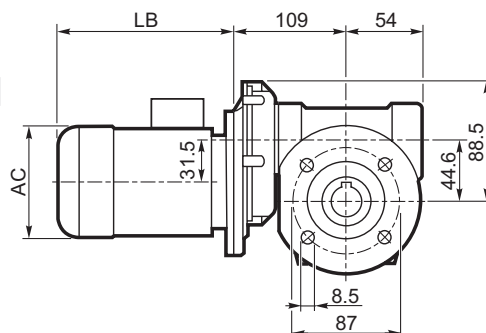
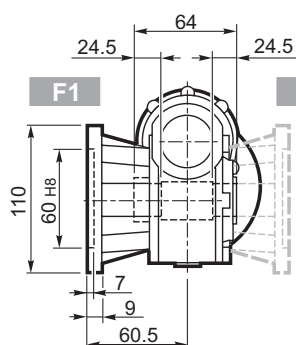
P



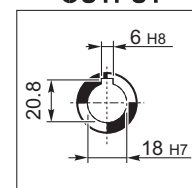


VFR 44...BN 44

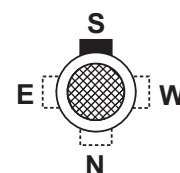
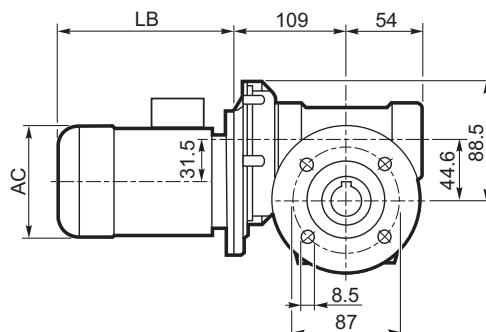
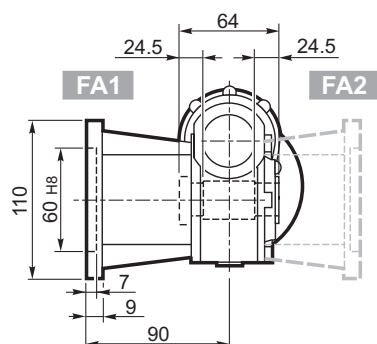
F₋



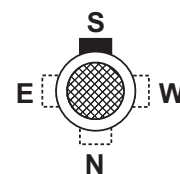
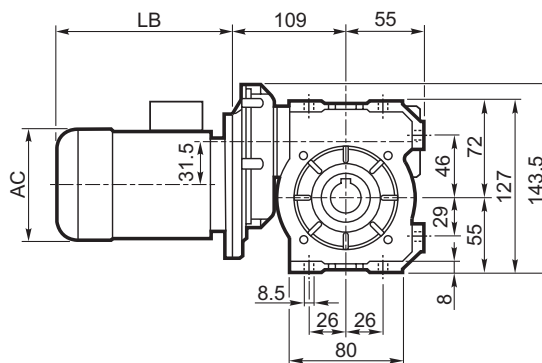
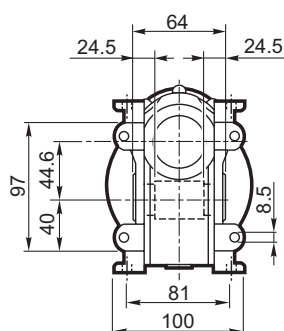
OUTPUT





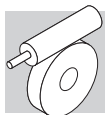
FA₋



U

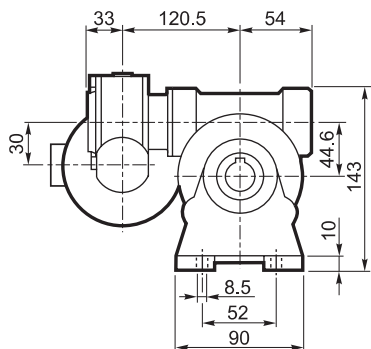


	P_n kW	n min ⁻¹	M_n Nm	η %	COSφ	I_n A (400V)	I_s I _n	M_s M _n	M_a M _n	J_m (·10 ⁻⁴) kgm ²		LB	AC	AD
BN 44B4	0.06	1380	0.42	40	0.58	0.38	2.4	2.3	1.9	1.22	4.7	168	112	94
BN 44C4	0.09	1380	0.63	46	0.65	0.43	2.8	2.3	2	1.49	4.6	168	112	94

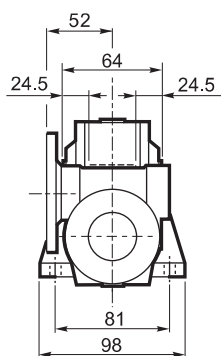


VF/VF 30/44...P (IEC)

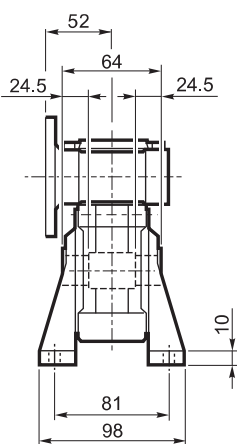
A



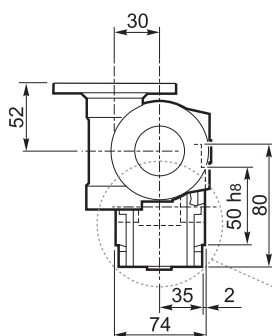
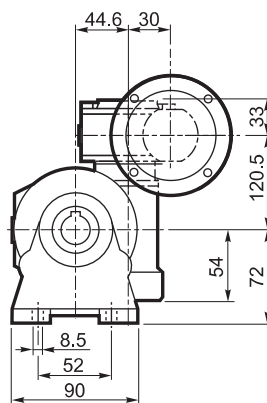
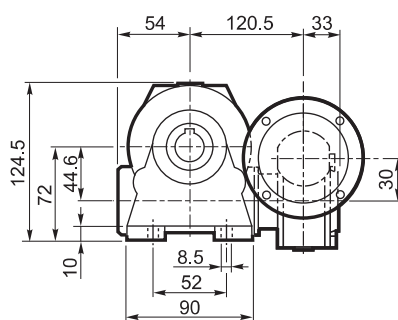
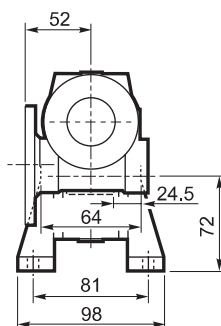
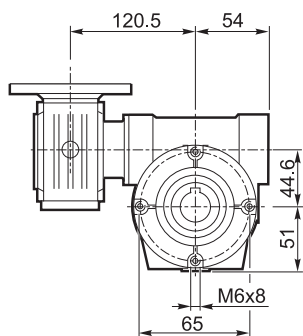
N



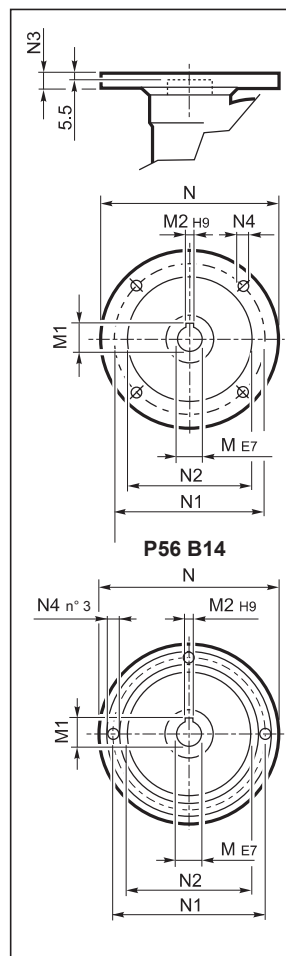
V



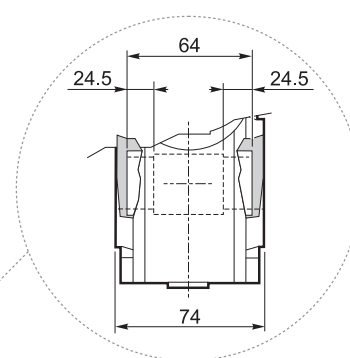
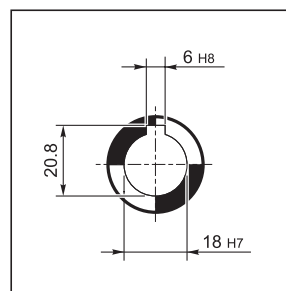
P

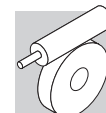


INPUT



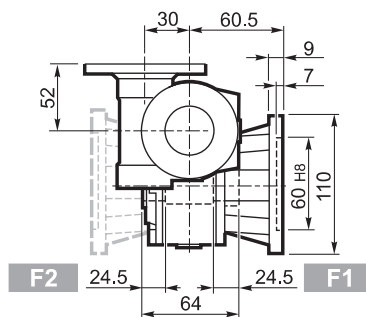
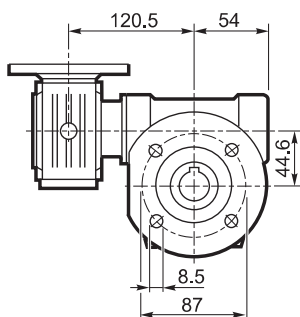
OUTPUT



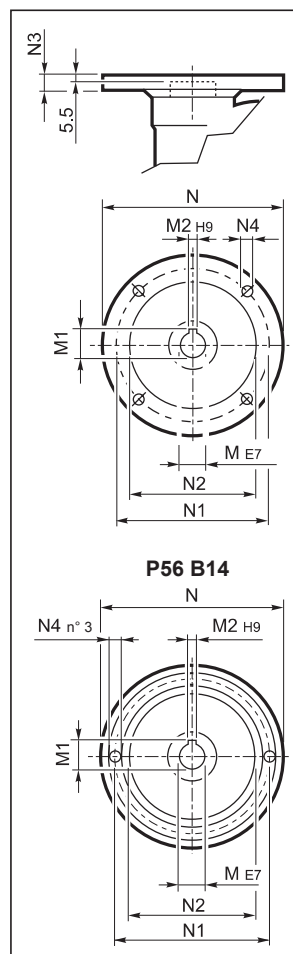


VF/VF 30/44...P (IEC)

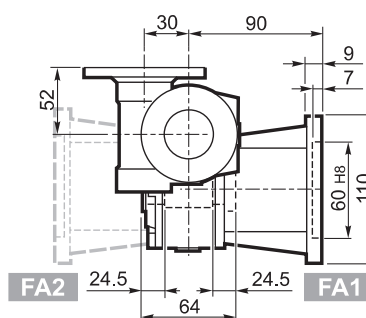
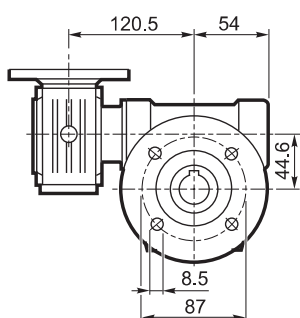
F₋



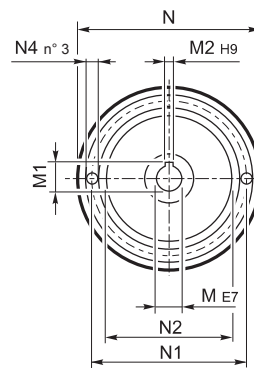
INPUT



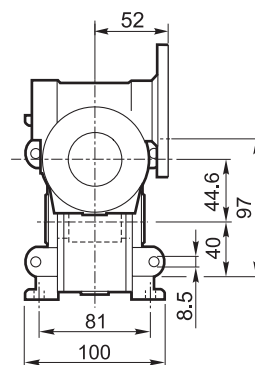
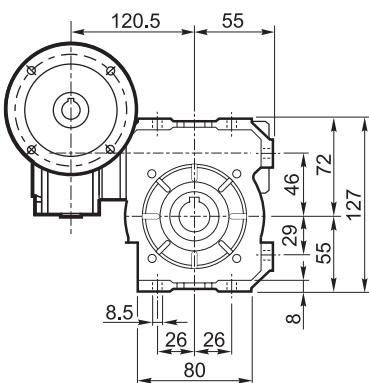
FA₋



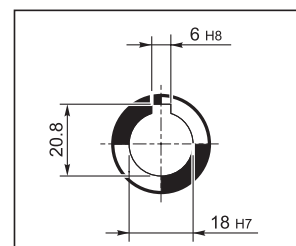
P56 B14



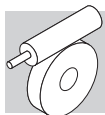
U



OUTPUT

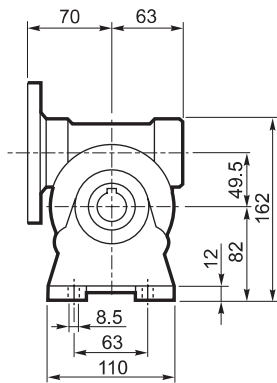
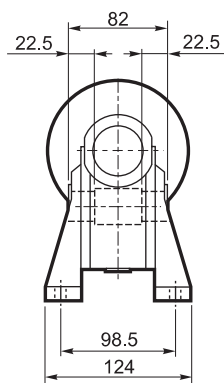


		M	M1	M2	N	N1	N2	N3	N4	
VF/VF 30/44	P56 B14	9	10.4	3	80	65	50	7	5.5	3.5
VF/VF 30/44	P63 B14	11	12.8	4	90	75	60	6	5.5	

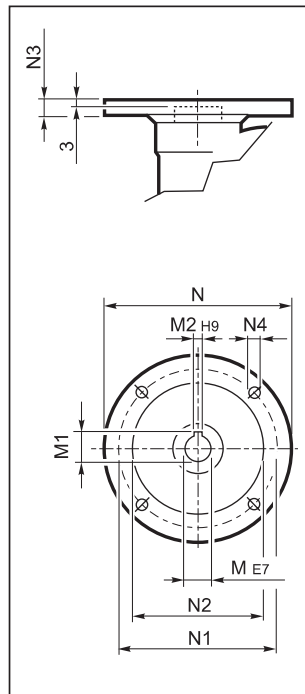


VF 49...P (IEC)

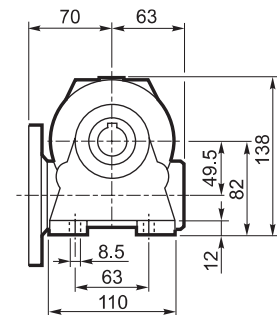
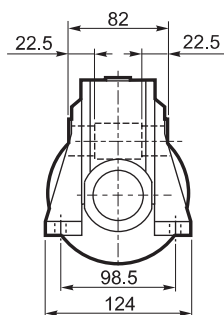
A



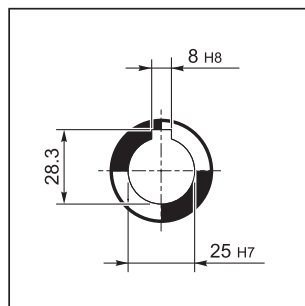
INPUT



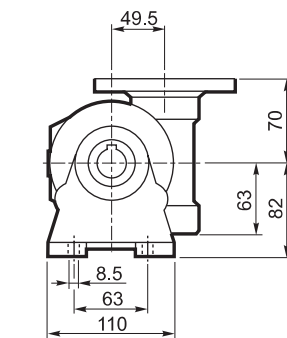
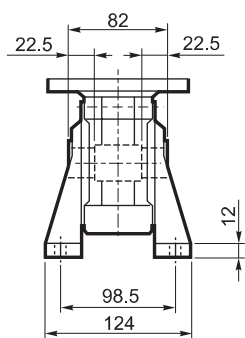
N



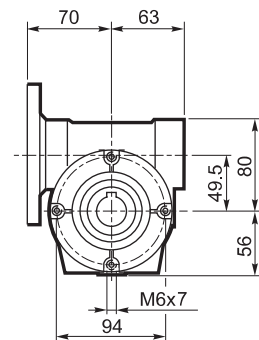
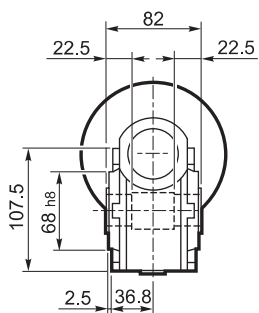
OUTPUT

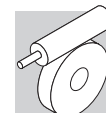


V



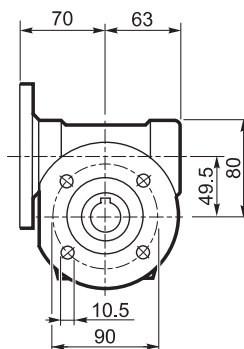
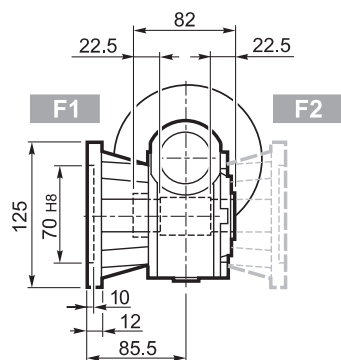
P



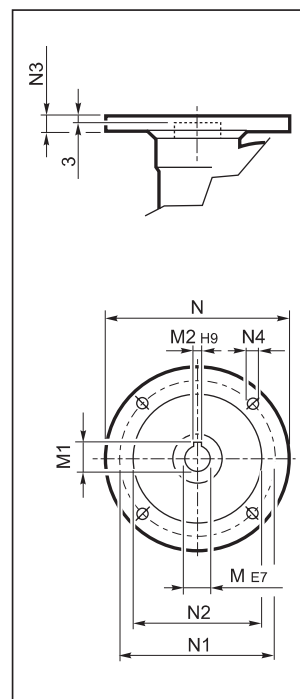


VF 49...P (IEC)

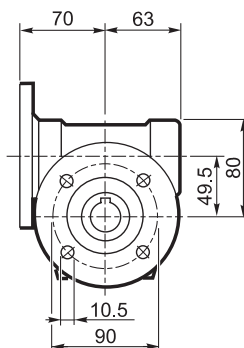
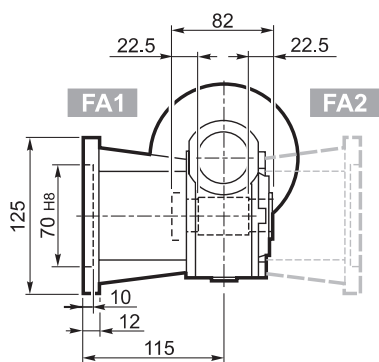
F



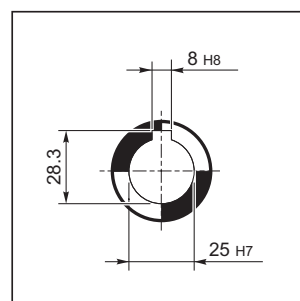
INPUT



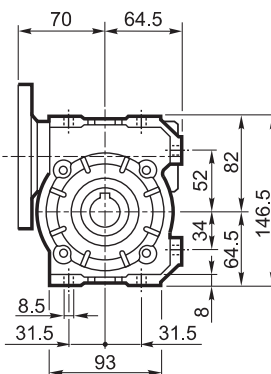
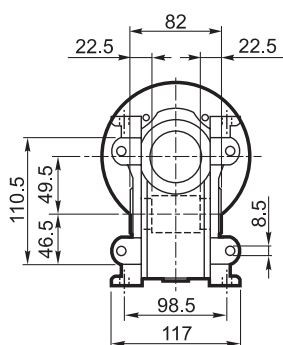
FA



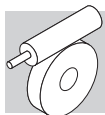
OUTPUT



U

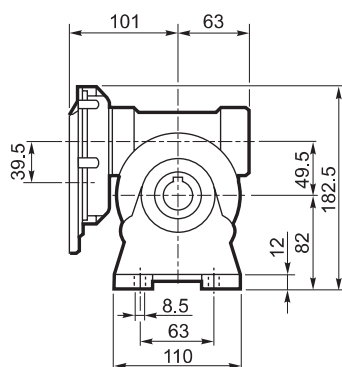
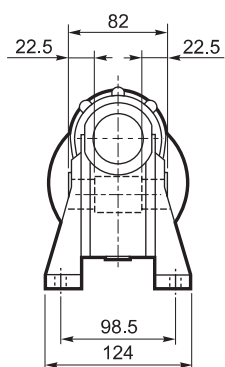


		M	M1	M2	N	N1	N2	N3	N4	kg
VF 49	P63 B5	11	12.8	4	140	115	95	10.5	9.5	3.0
VF 49	P71 B5	14	16.3	5	160	130	110	10.5	9.5	
VF 49	P80 B5	19	21.8	6	200	165	130	10	11.5	
VF 49	P63 B14	11	12.8	4	90	75	60	7	6	
VF 49	P71 B14	14	16.3	5	105	85	70	10.5	6.5	
VF 49	P80 B14	19	21.8	6	120	100	80	10	7	

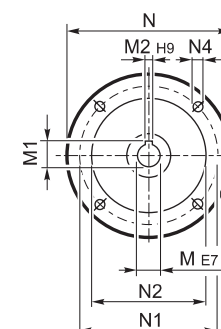
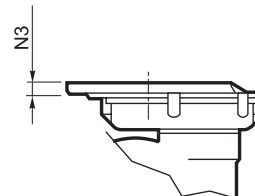


VFR 49...P (IEC)

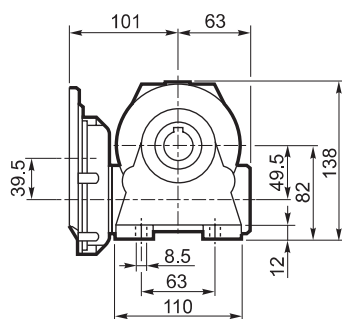
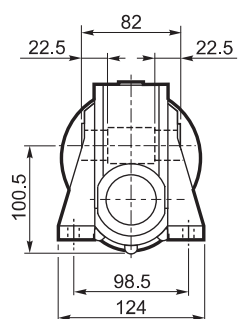
A



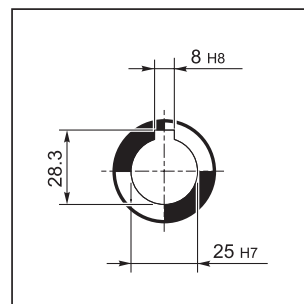
INPUT



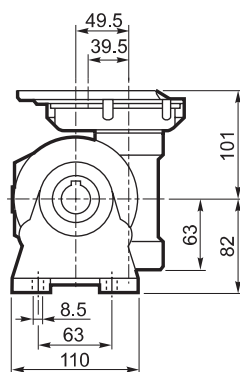
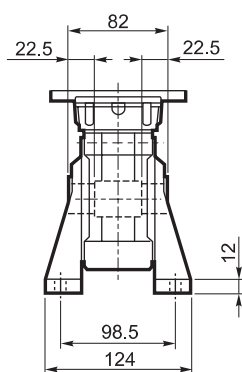
N



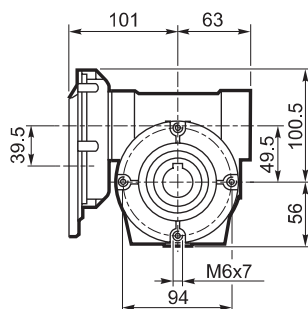
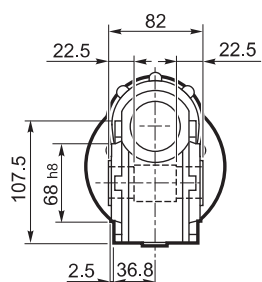
OUTPUT

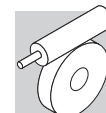


V

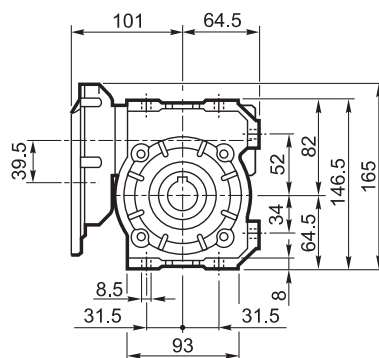
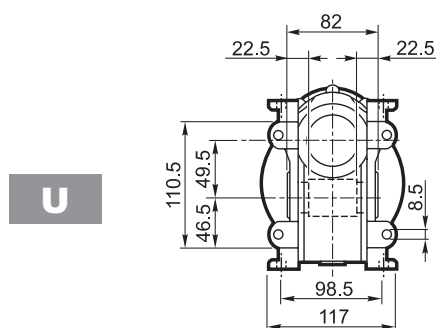
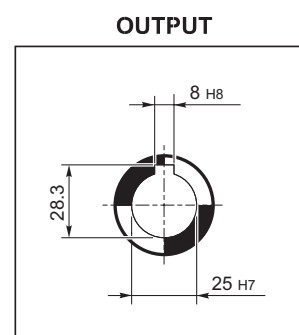
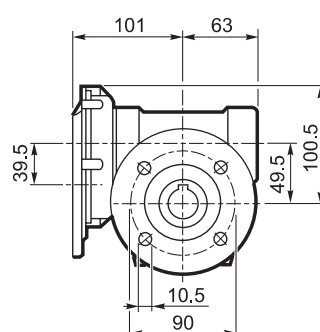
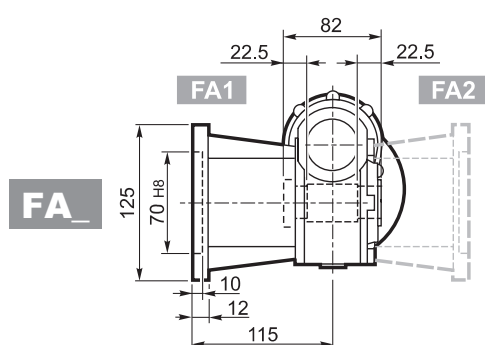
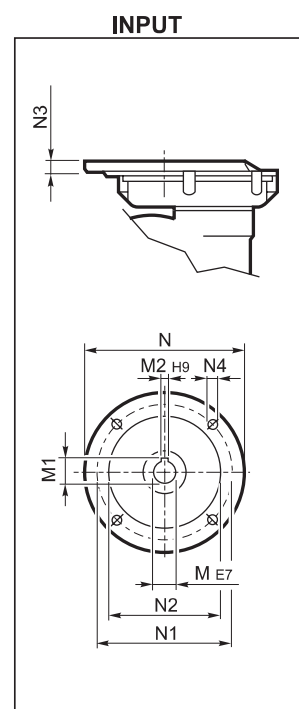
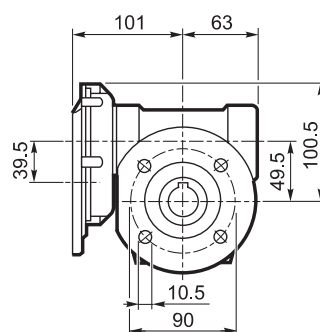
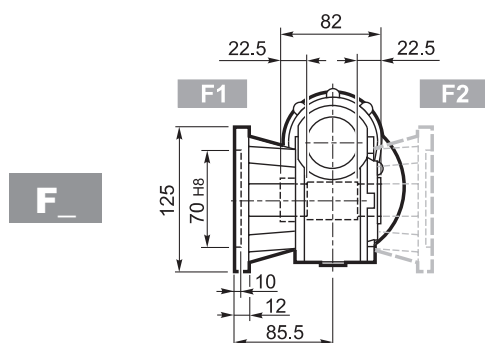





P

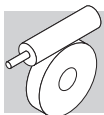




VFR 49...P (IEC)

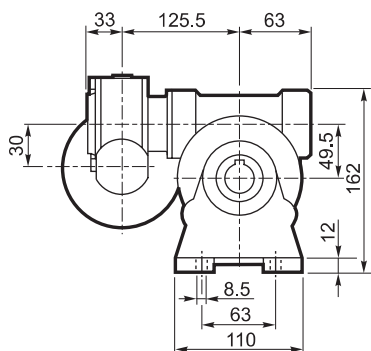


		M	M1	M2	N	N1	N2	N3	N4	 Kg
VFR 49	P63 B5	11	12.8	4	140	115	95	11	M8 x 19	5.0

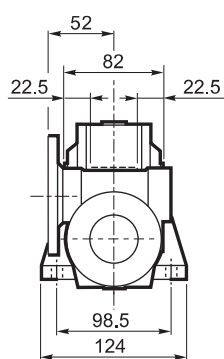


VF/VF 30/49...P (IEC)

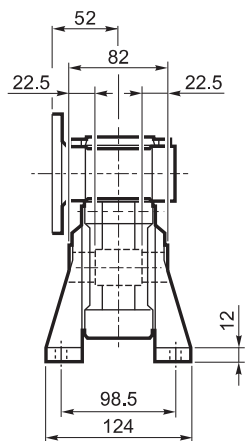
A



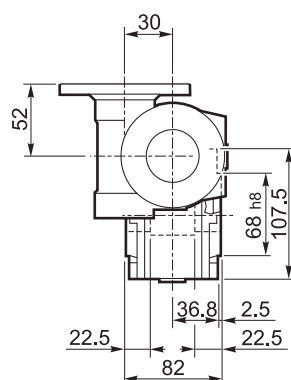
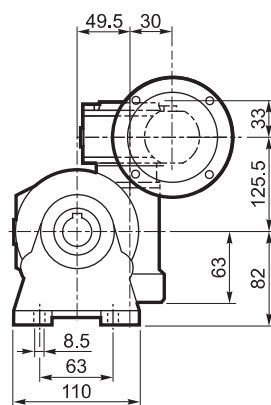
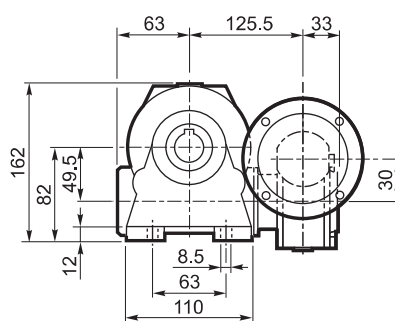
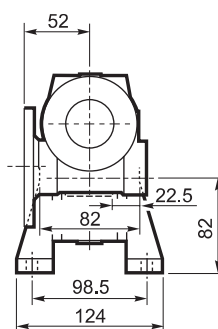
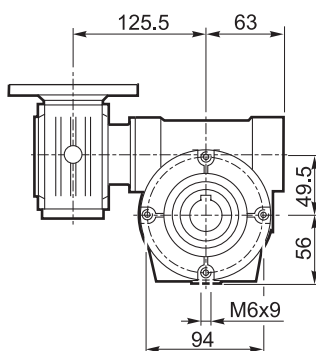
N



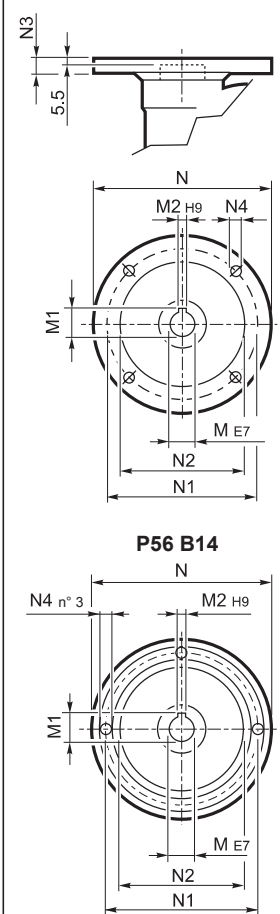
V



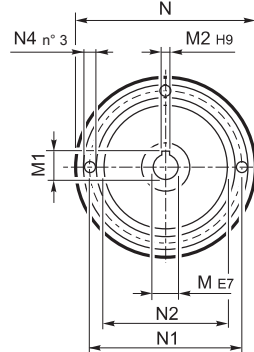
P



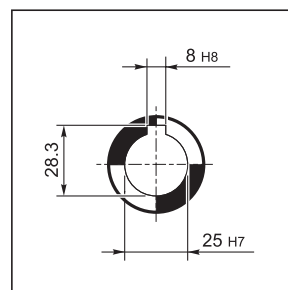
INPUT

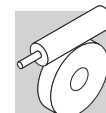


P56 B14



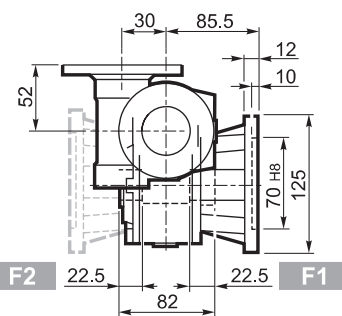
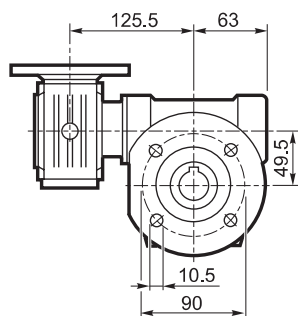
OUTPUT



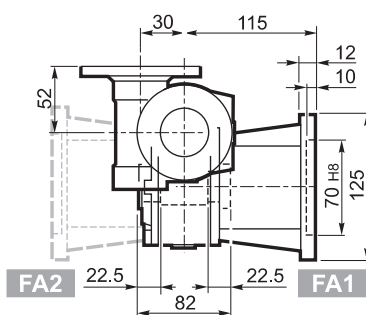
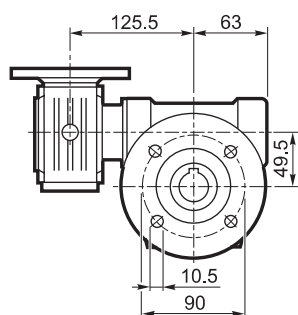


VF/VF 30/49...P (IEC)

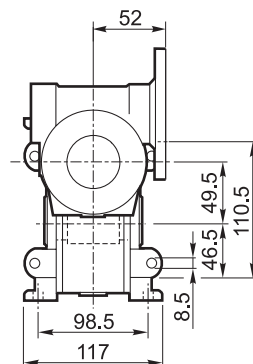
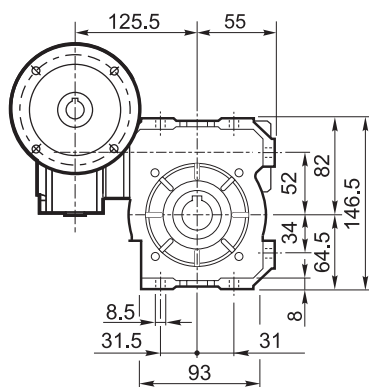
F



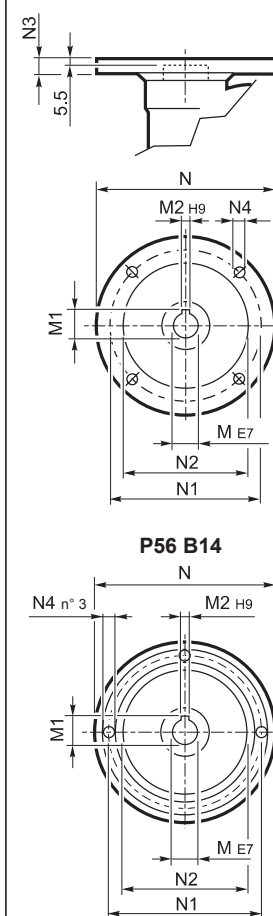
FA



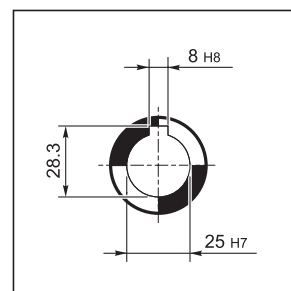
U



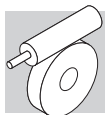
INPUT



OUTPUT

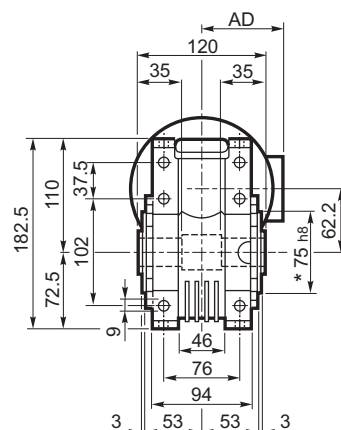
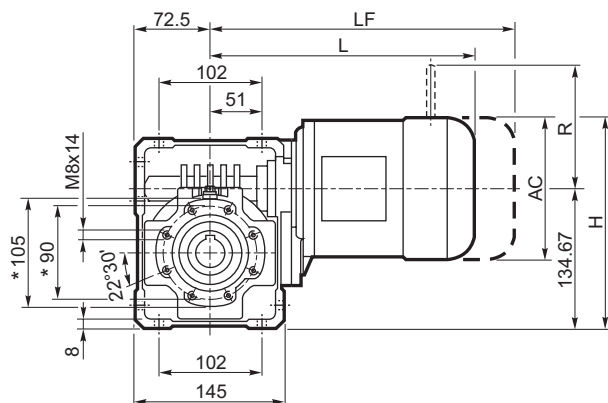


		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/VF 30/49	P56 B14	9	10.4	3	80	65	50	7	5.5	4.5
VF/VF 30/49	P63 B14	11	12.8	4	90	75	60	6	5.5	

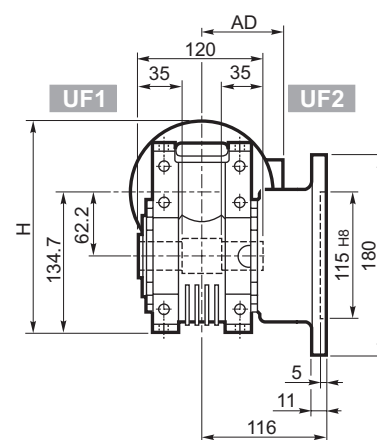
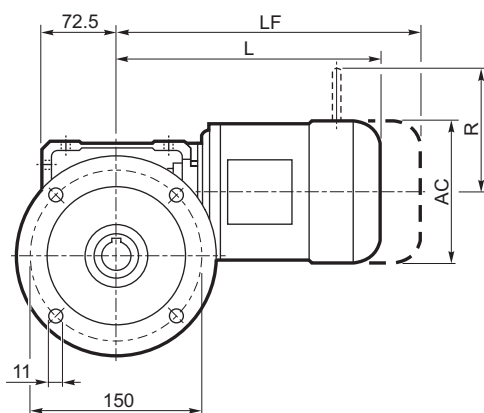


W 63...M/ME/MX/MXN

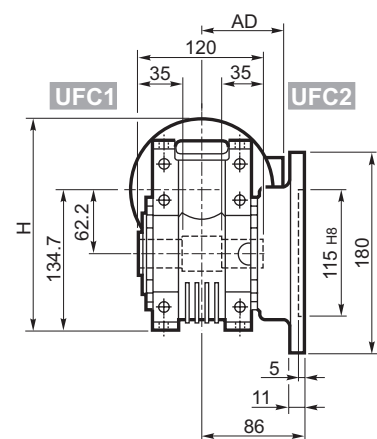
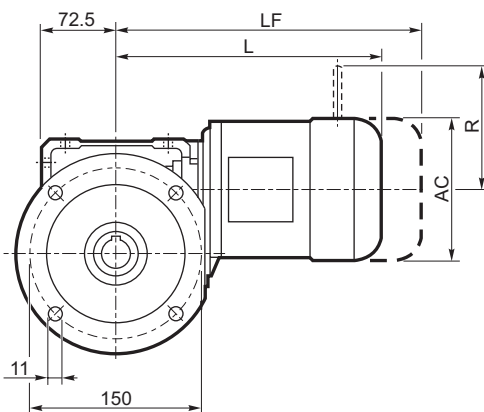
U








UF

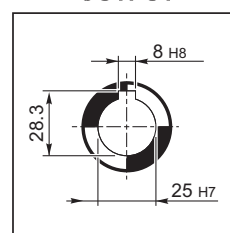


UFC

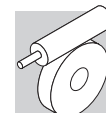


			M/ME/MX/MXN					M...FD M...FA		M...FD		M...FA	
			AC	H	L	AD	 Kg	LF	 Kg	R	AD	R	AD
W 63	S1	M1	138	204	289	108	13	350	15	103	135	124	108
W 63	S1	ME1	138	204	289	108	13	411	15	103	135	124	135
W 63	S10	MXN10	138	204	318	138	15.4	409	17.4	103	138	1214	138
W 63	S2	M2S	156	213	317	119	17	393	20	129	146	134	119
W 63	S2	ME2S	156	213	317	119	18.6	463	21.6	129	143	134	143
W 63	S2	MX2S	156	213	361	119	22.4	465	25.4	129	143	134	143
W 63	S20	MXN20	158	214	370.5	146	24.6	464	27.6	129	148	131	148

OUTPUT

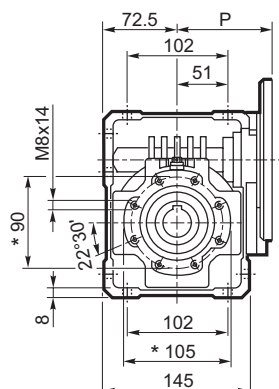


* On both sides

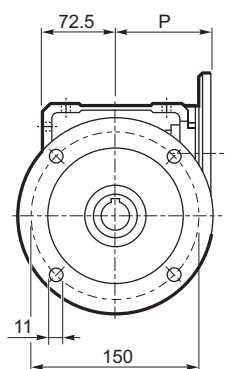


W 63...P (IEC)

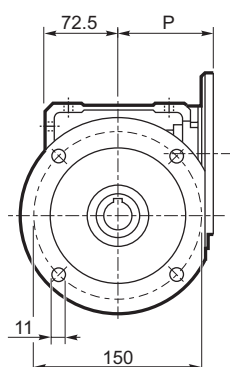
U



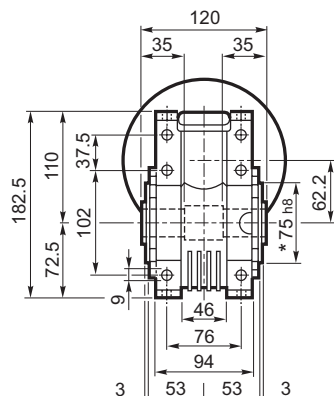
UF_



UFC_

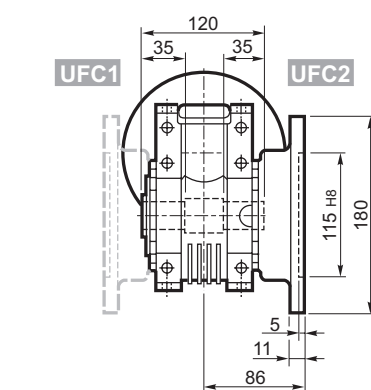


UF1



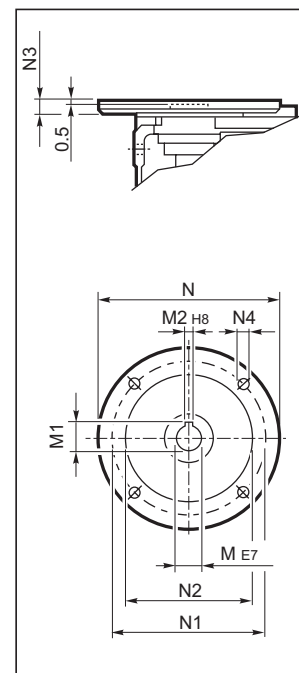
UF2

UFC1

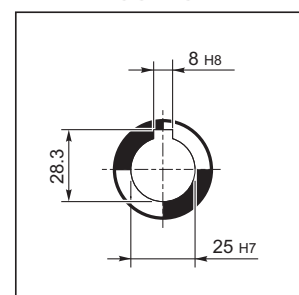





UFC2

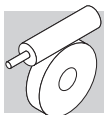
INPUT



OUTPUT

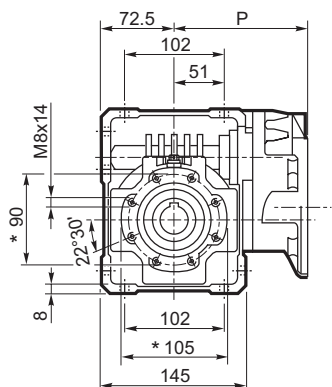


		M	M1	M2	N	N1	N2	N3	N4	P	 Kg
W 63	P71 B5	14	16.3	5	160	130	110	11	9	95	6.3
W 63	P80 B5	19	21.8	6	200	165	130	12	11.5	102	6.5
W 63	P90 B5	24	27.3	8	200	165	130	12	11.5	102	6.4
W 63	P71 B14	14	16.3	5	105	85	70	11	6.5	95	6.1
W 63	P80 B14	19	21.8	6	120	100	80	11	6.5	102	6.3
W 63	P90 B14	24	27.3	8	140	115	95	11	8.5	102	6.3

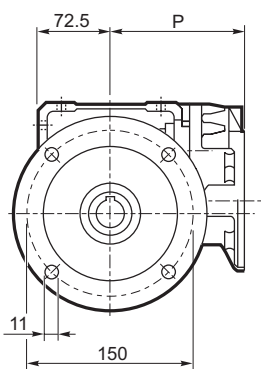


WR 63...P (IEC)

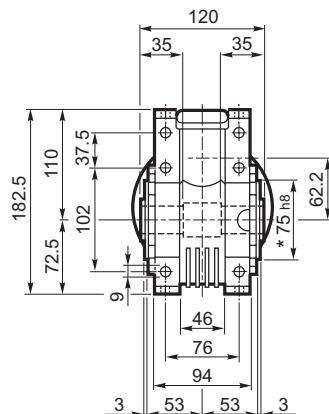
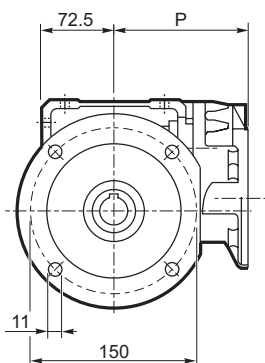
U



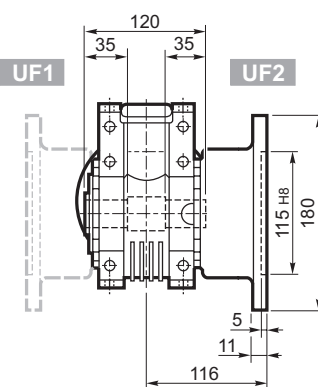
UF



UFC

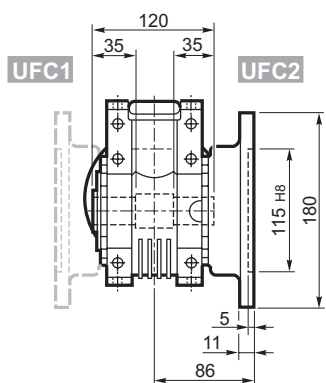


UF1



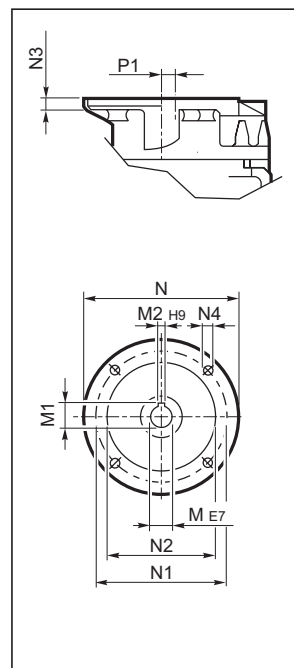
UF2

UFC1

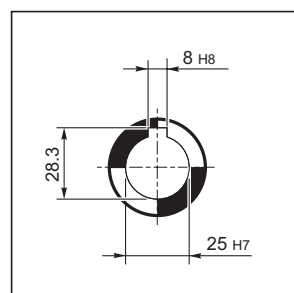





UFC2

INPUT

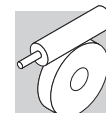


OUTPUT



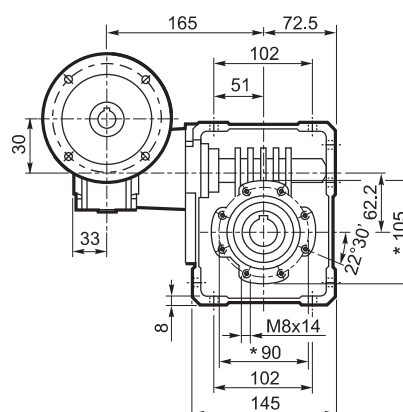
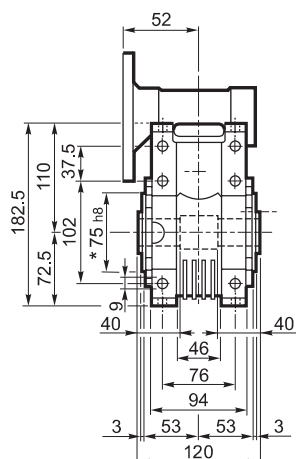
		M	M1	M2	N	N1	N2	N3	N4	P	P1	
WR 63	P63 B5	11	12.8	4	140	115	95	10	M8x10	133.5	11.42	7.1
WR 63	P71 B5	14	16.3	5	160	130	110	10	M8x10	133.5	11.42	

* On both sides

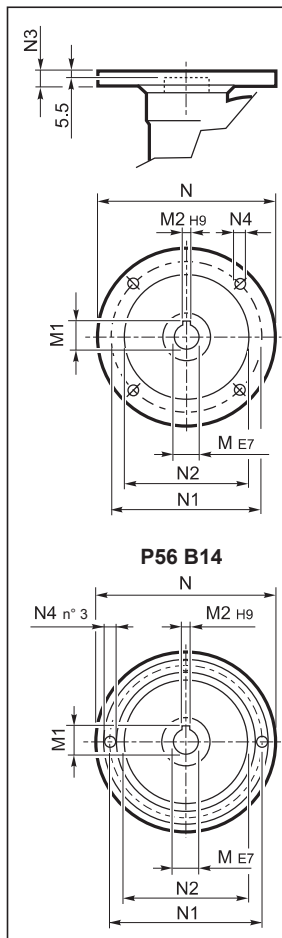


VF/W 30/63...P (IEC)

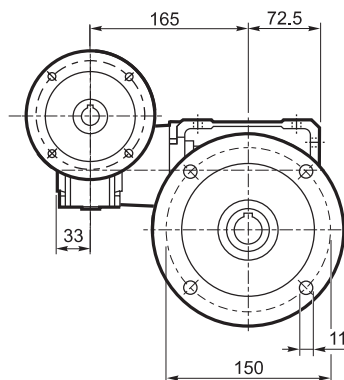
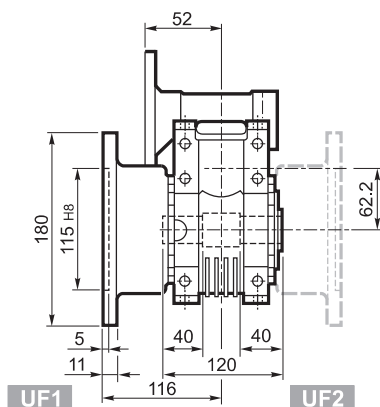
U



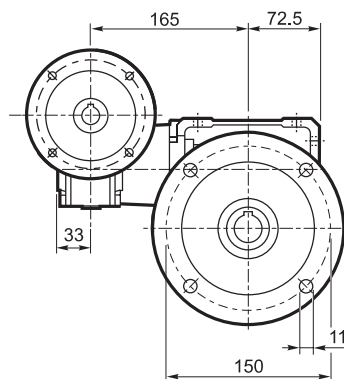
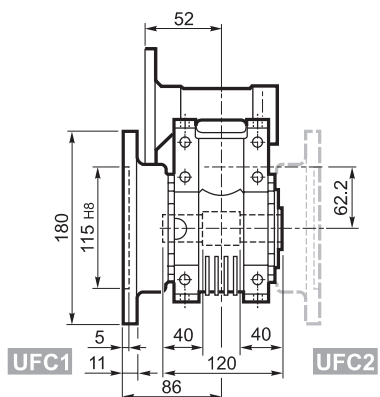
INPUT



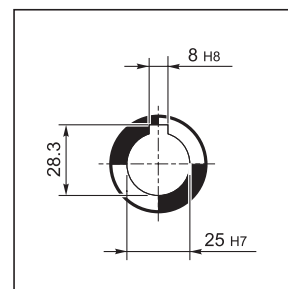
UF_



UFC_

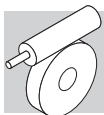


OUTPUT



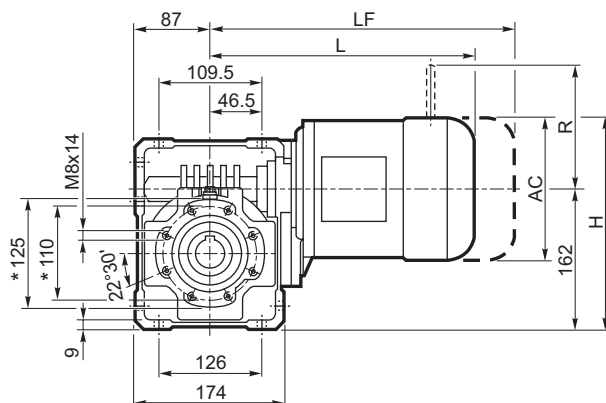
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/W 30/63	P56 B5	9	10.4	3	120	100	80	7	7	8.0
VF/W 30/63	P63 B5	11	12.8	4	140	115	95	8	9.5	
VF/W 30/63	P56 B14	9	10.4	3	80	65	50	7	5.5	
VF/W 30/63	P63 B14	11	12.8	4	90	75	60	6	5.5	

* On both sides

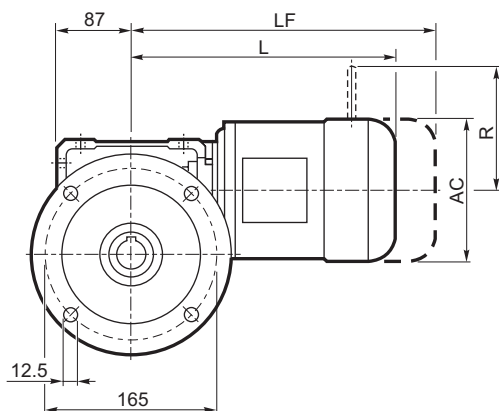


W 75...M/ME/MX/MXN

U

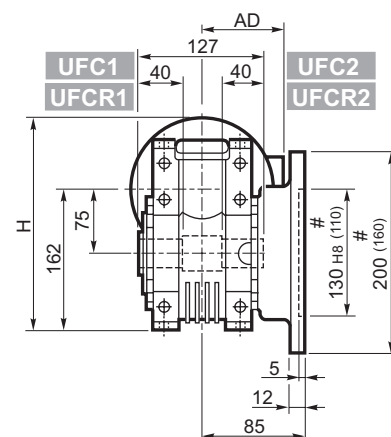
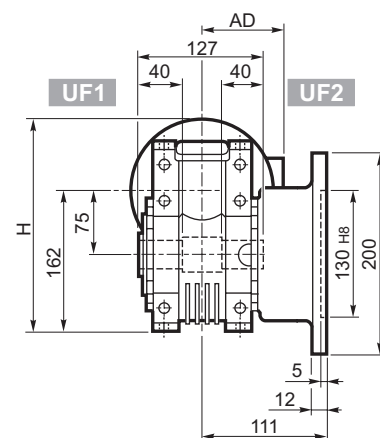
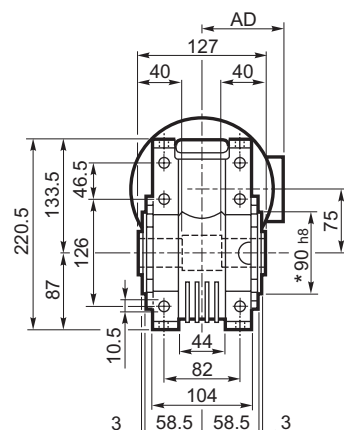
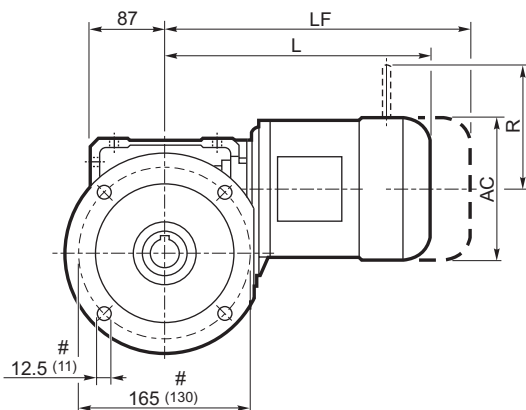


UF_

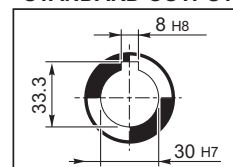


UFC_

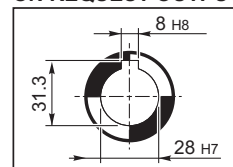
UFCR_#



STANDARD OUTPUT



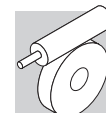
ON REQUEST OUTPUT



			M/ME/MX/MXN					M...FD M...FA			M...FD		M...FA	
			AC	H	L	AD	Kg	LF	Kg		R	AD	R	AD
W 75	S1	M1	138	231	308	108	16.0	369	18.2		103	135	124	108
W 75	S1	ME1	138	231	308	108	16.0	369	18.2		103	135	124	135
W 75	S10	MXN10	138	231	337	137	18.4	396	20.8		103	138	121	138
W 75	S2	ME2S	156	240	333	119	18.5	393	20.1		129	143	134	143
W 75	S2	MX2S	156	240	377	119	23.6	465	27.4		129	143	134	143
W 75	S20	MXN20	158	241	386.5	146	25.8	457.5	28		129	148	131	148
W 75	S3	ME3S	195	258.5	376	142	27.1	447	33.1		160	155	160	155
W 75	S3	MX3S	195	258.5	408	142	31.1	476	38.1		160	155	160	155
W 75	S3	ME3L	195	258.5	408	142	32.6	474	38.6		160	155	160	155
W 75	S3	MX3L	195	258.5	452	142	38.6	518	45.6		160	155	160	155

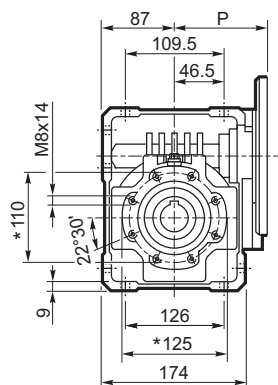
* On both sides

Reduced flange

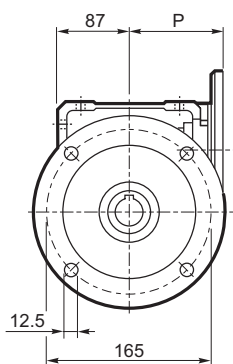


W 75...P (IEC)

U

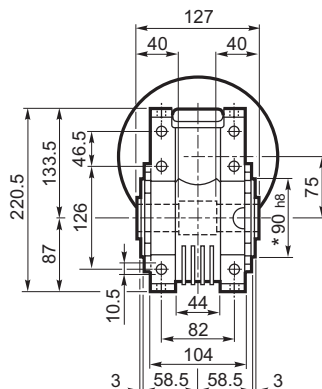
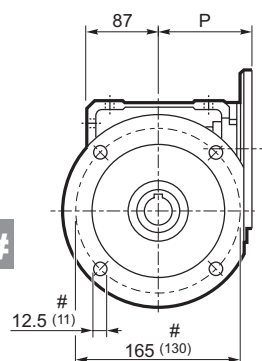


UF_



UFC_

UFCR_#

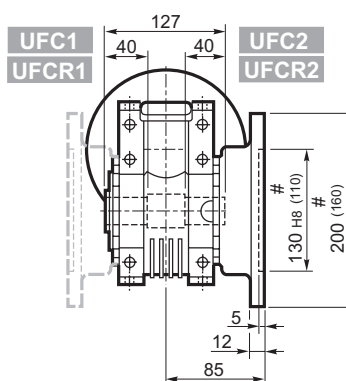


UF1

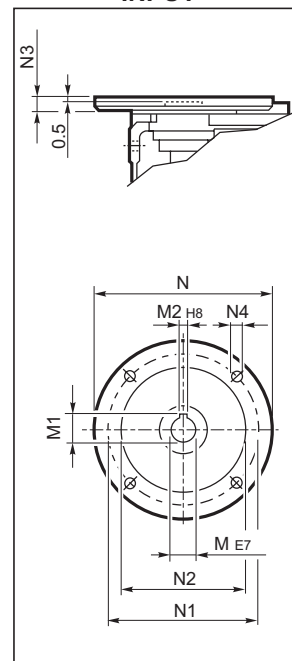
UF2

UFC1
UFCR1

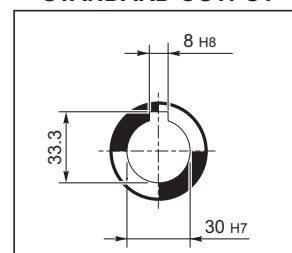
UFC2
UFCR2



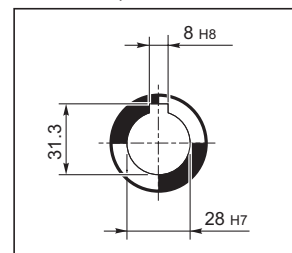
INPUT



STANDARD OUTPUT



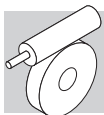
ON REQUEST OUTPUT



		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W 75	P71 B5	14	16.3	5	160	130	110	11	9	112	9.5
W 75	P80 B5	19	21.8	6	200	165	130	12	11.5	112	9.7
W 75	P90 B5	24	27.3	8	200	165	130	12	11.5	112	9.6
W 75	P100 B5	28	31.3	8	250	215	180	13	12.5	120	9.7
W 75	P112 B5	28	31.3	8	250	215	180	13	12.5	120	9.7
W 75	P80 B14	19	21.8	6	120	100	80	7.5	6.5	112	9.4
W 75	P90 B14	24	27.3	8	140	115	95	7.5	8.5	112	9.4
W 75	P100 B14	28	31.3	8	160	130	110	10	8.5	120	9.5
W 75	P112 B14	28	31.3	8	160	130	110	10	8.5	120	9.5

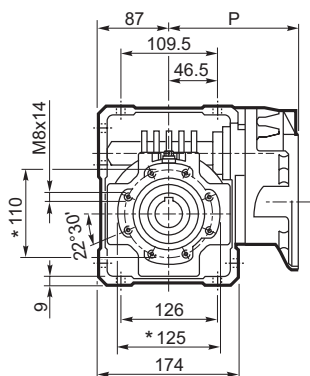
* On both sides

Reduced flange

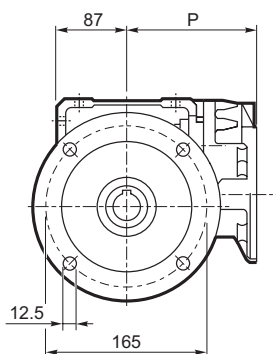


WR 75...P (IEC)

U

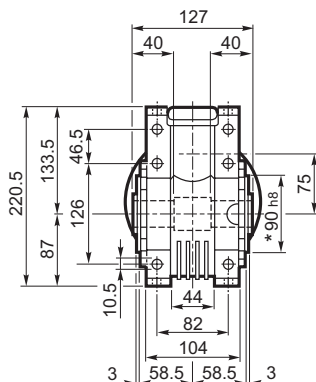
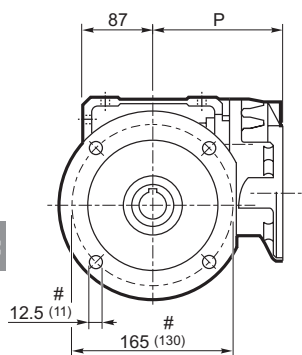


UF



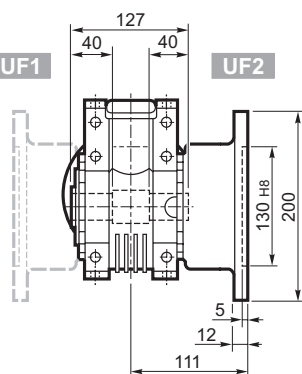
UFC

UFCR



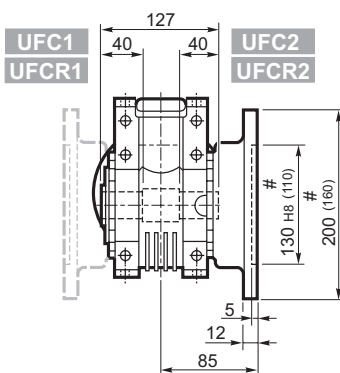
UF1

UF2

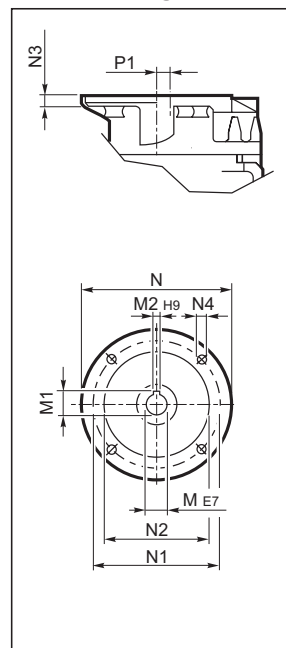


UFC1
UFCR1

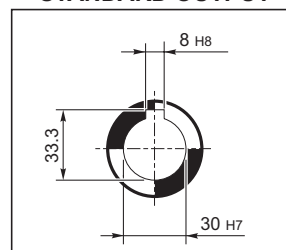
UFC2
UFCR2



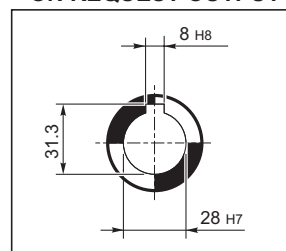
INPUT



STANDARD OUTPUT



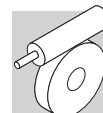
ON REQUEST OUTPUT



		M	M1	M2	N	N1	N2	N3	N4	P	P1	Kg
WR 75	P63 B5	11	12.8	4	140	115	95	10	M8x10	152	23.53	10.6
WR 75	P71 B5	14	16.3	5	160	130	110	10	M8x10	152	23.53	10.7
WR 75	P80 B5	19	21.8	6	200	165	130	12	M10x13	163.5	11	11.5
WR 75	P90 B5	24	27.3	8	200	165	130	12	M10x13	163.5	11	11.6

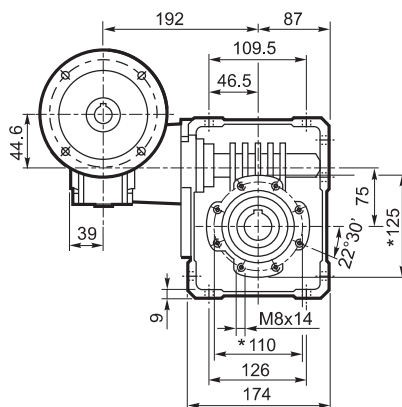
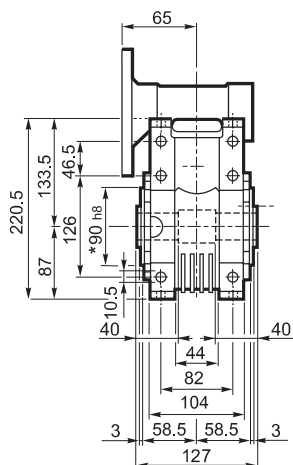
* On both sides

Reduced flange

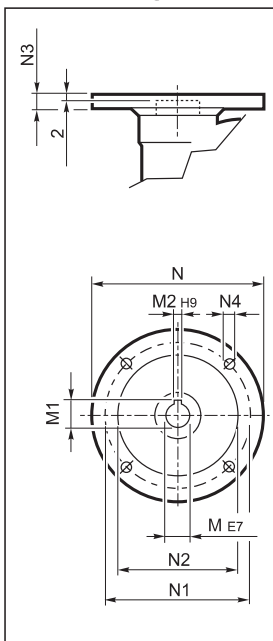


VF/W 44/75...P (IEC)

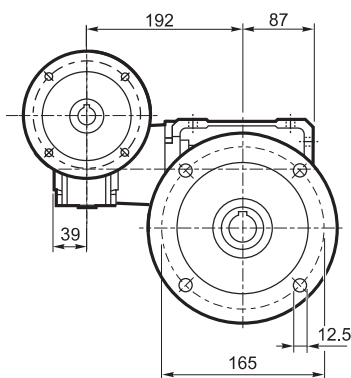
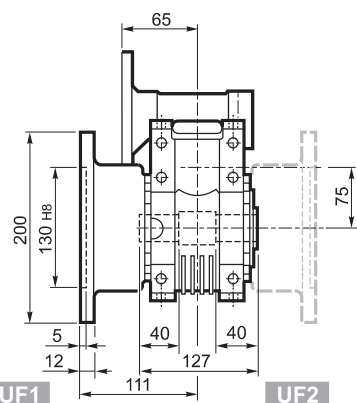
U



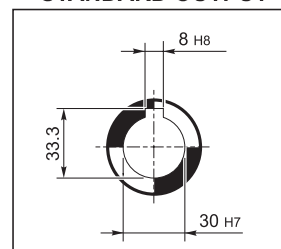
INPUT



UF

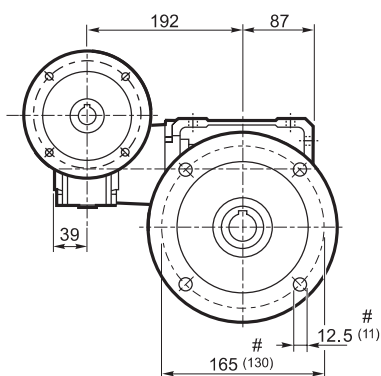
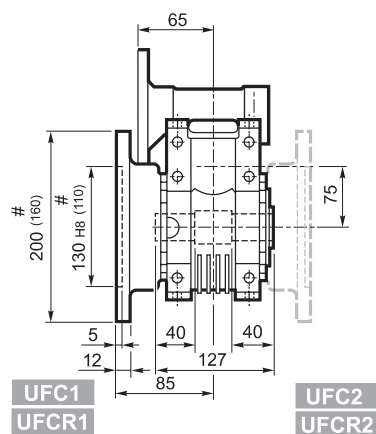


STANDARD OUTPUT

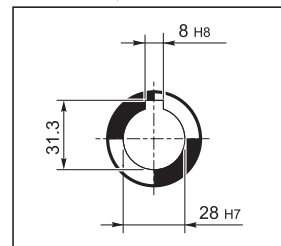


UFC

UFCR #



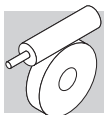
ON REQUEST OUTPUT



		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/W 44/75	P63 B5	11	12.8	4	140	115	95	10	9.5	12.5
VF/W 44/75	P71 B5	14	16.3	5	160	130	110	10	9.5	
VF/W 44/75	P63 B14	11	12.8	4	90	75	60	8	5.5	
VF/W 44/75	P71 B14	14	16.3	5	105	85	70	10	7	

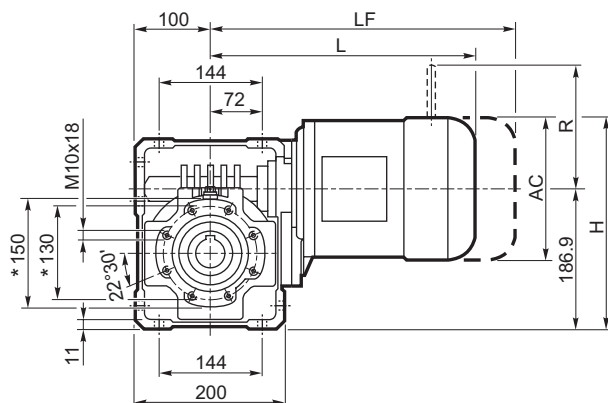
* On both sides

Reduced flange

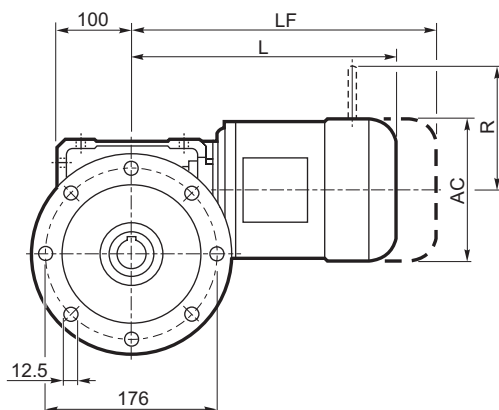


W 86...M/ME/MX/MXN

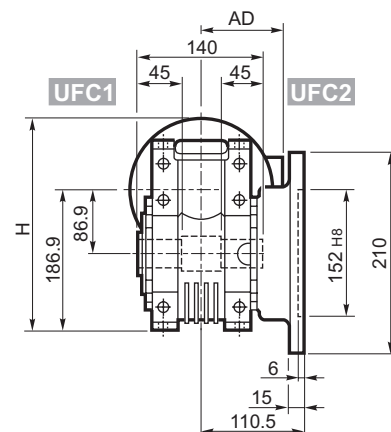
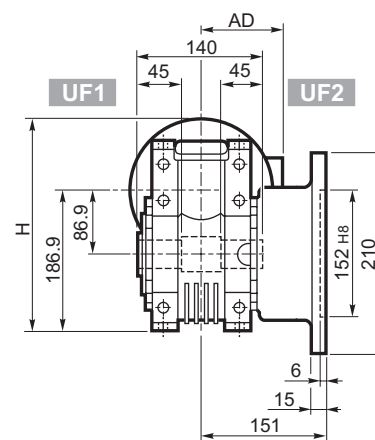
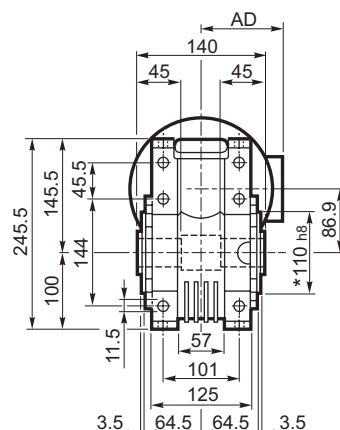
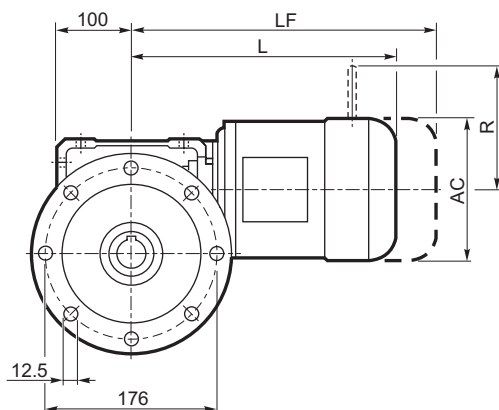
U



UF



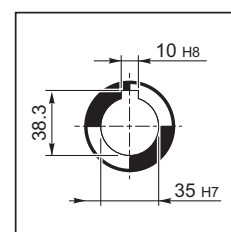
UFC

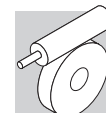


			M/ME/MX/MXN					M...FD M...FA		M...FD		M...FA	
			AC	H	L	AD	Kg	LF	Kg	R	AD	R	AD
W 86	S1	M1	138	256	324	108	20.1	385	22.3	103	135	124	108
W 86	S1	ME1	138	256	324	108	20.1	385	22.3	103	135	124	135
W 86	S10	MXN10	138	256	353	137	22.5	412	25.2	103	138	121	138
W 86	S2	M2S	156	265	349	119	22.6	425	25.7	129	146	134	119
W 86	S2	ME2S	156	265	349	119	24.2	410	25.8	129	143	134	143
W 86	S2	MX2S	156	265	393	119	27.7	465	31.5	129	143	134	143
W 86	S20	MXN20	158	266	402.5	146	29.9	473.5	33.8	129	148	131	148
W 86	S3	ME3S	195	283.5	392	142	31.2	488	37.8	160	155	160	155
W 86	S3	MX3S	195	283.5	424	142	34.2	514	41.2	160	155	160	155
W 86	S3	ME3L	195	283.5	424	142	36.7	515	42.7	160	155	160	155
W 86	S3	MX3L	195	283.5	468	142	42.7	560	49.7	160	155	160	155

* On both sides

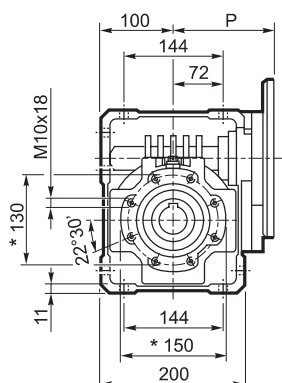
OUTPUT



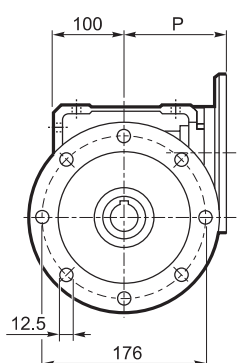


W 86...P (IEC)

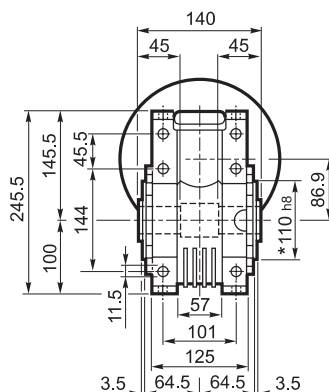
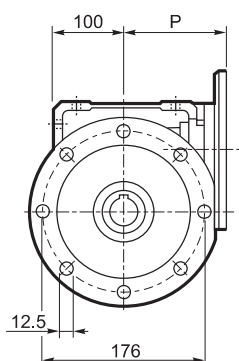
U



UF_

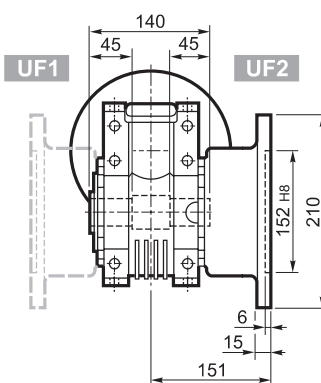


UFC_



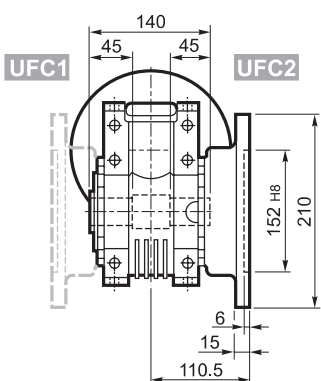
UF1

UF2

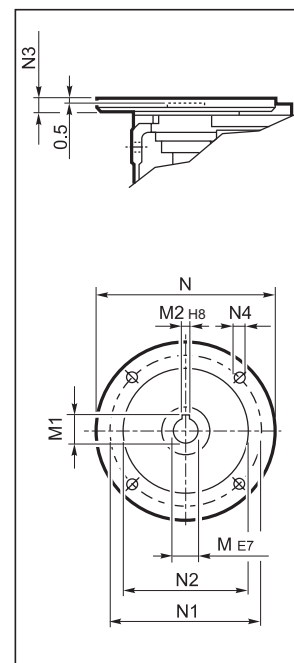


UFC1

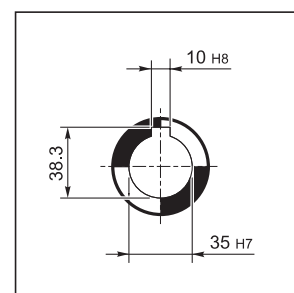
UFC2



INPUT

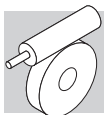


OUTPUT



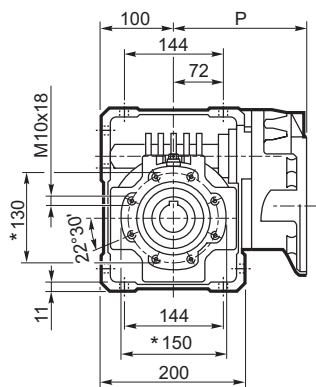
		M	M1	M2	N	N1	N2	N3	N4	P	
W 86	P71 B5	14	16.3	5	160	130	110	11	9	128	13.6
W 86	P80 B5	19	21.8	6	200	165	130	12	11.5	128	13.8
W 86	P90 B5	24	27.3	8	200	165	130	12	11.5	128	13.7
W 86	P100 B5	28	31.3	8	250	215	180	13	12.5	136	13.8
W 86	P112 B5	28	31.3	8	250	215	180	13	12.5	136	13.8
W 86	P80 B14	19	21.8	6	120	100	80	7.5	6.5	128	13.5
W 86	P90 B14	24	27.3	8	140	115	95	7.5	8.5	128	13.5
W 86	P100 B14	28	31.3	8	160	130	110	10	8.5	136	13.6
W 86	P112 B14	28	31.3	8	160	130	110	10	8.5	136	13.6

* On both sides

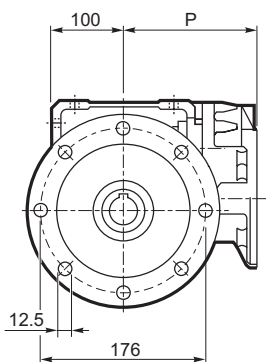


WR 86...P (IEC)

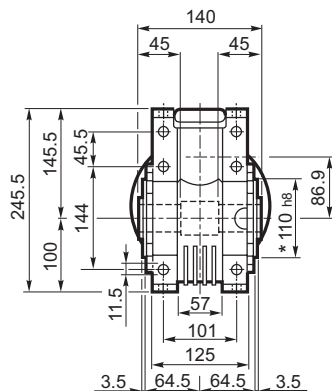
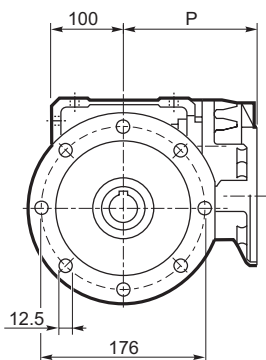
U



UF

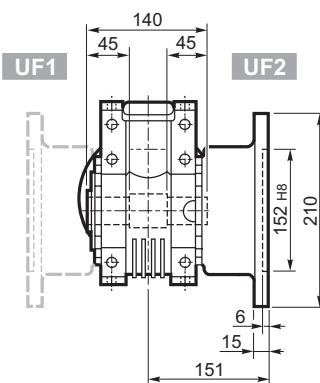


UFC



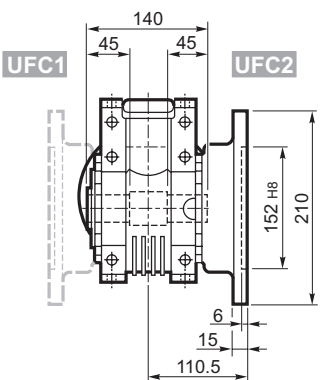
UF1

UF2

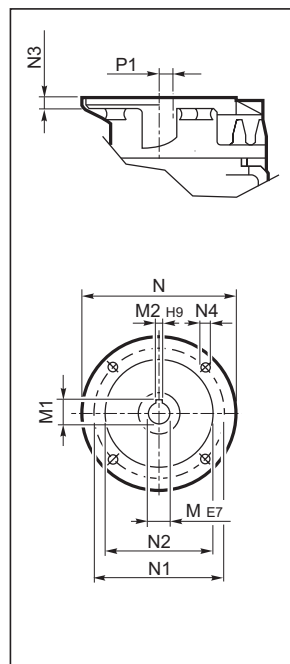


UFC1

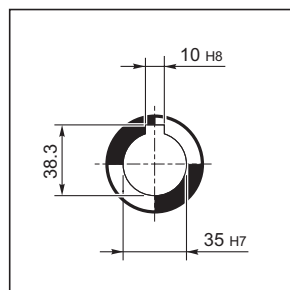
UFC2



INPUT

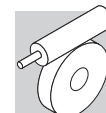


OUTPUT



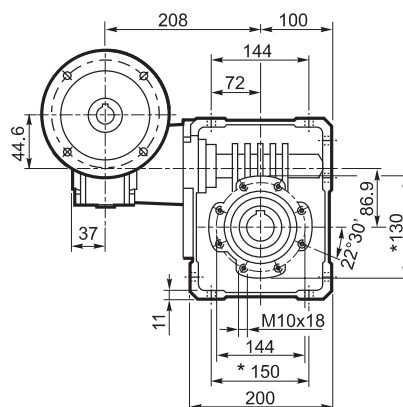
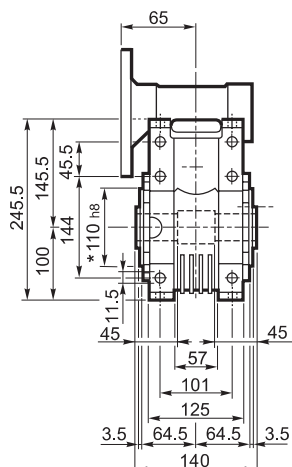
		M	M1	M2	N	N1	N2	N3	N4	P	P1	kg
WR 86	P63 B5	11	12.8	4	140	115	95	10	M8x10	168	35.4	14.3
WR 86	P71 B5	14	16.3	5	160	130	110	10	M8x10	168	35.4	14.4
WR 86	P80 B5	19	21.8	6	200	165	130	12	M10x13	179.5	22.9	15.2
WR 86	P90 B5	24	27.3	8	200	165	130	12	M10x13	179.5	22.9	15.3

* On both sides

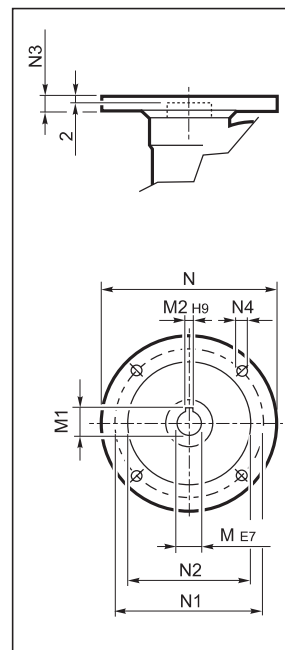


VF/W 44/86... P (IEC)

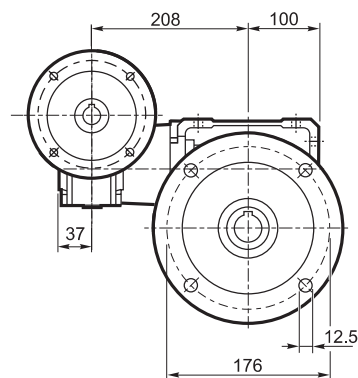
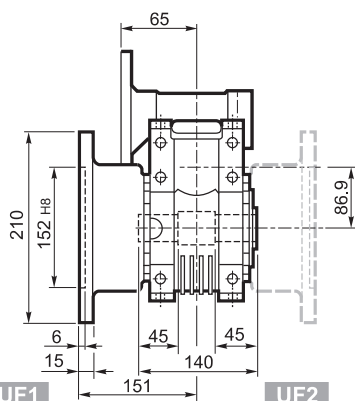
U



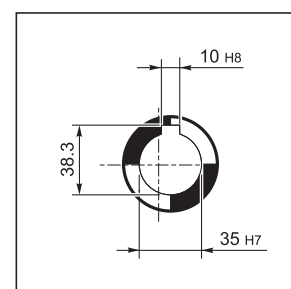
INPUT



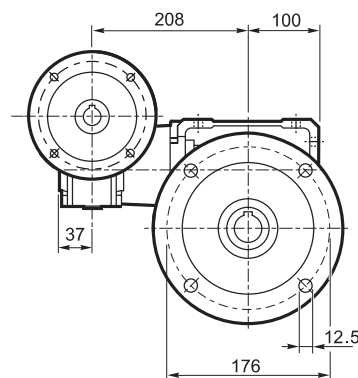
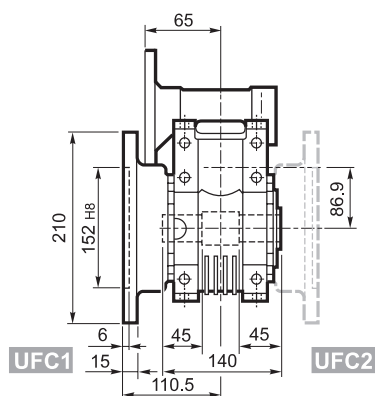
UF



OUTPUT

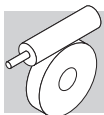


UFC



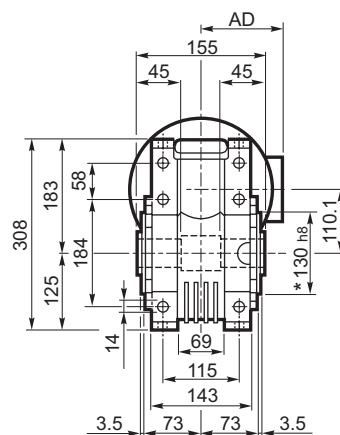
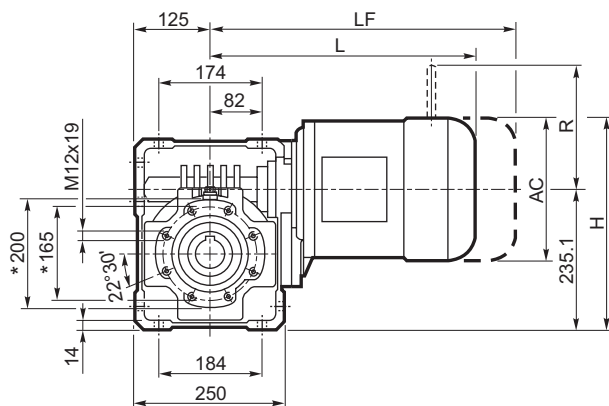
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/W 44/86	P63 B5	11	12.8	4	140	115	95	10	9.5	16.6
VF/W 44/86	P71 B5	14	16.3	5	160	130	110	10	9.5	
VF/W 44/86	P63 B14	11	12.8	4	90	75	60	8	5.5	
VF/W 44/86	P71 B14	14	16.3	5	105	85	70	10	7	

* On both sides

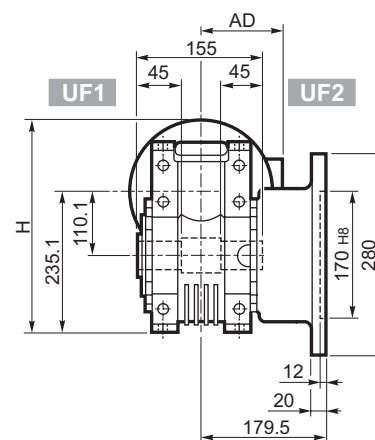
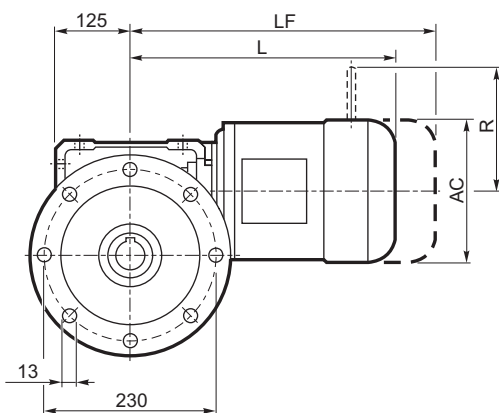


W 110...M/ME/MX

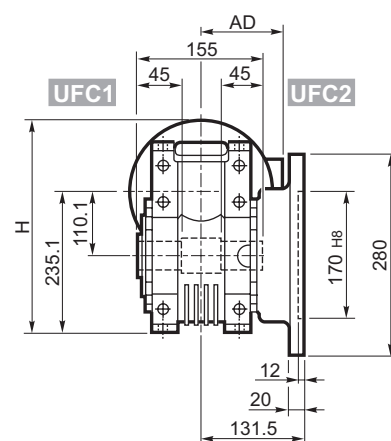
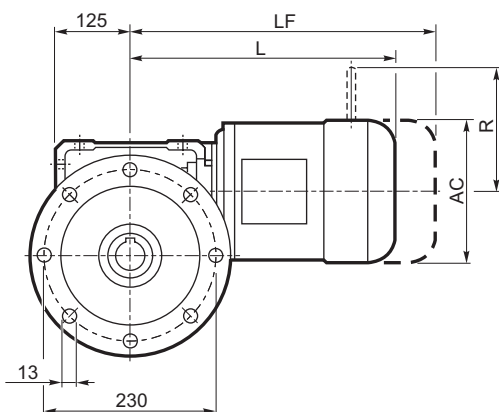
U








UF



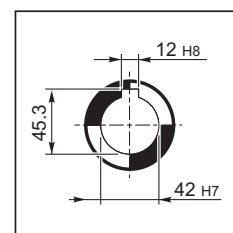
UFC

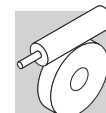


			M/ME/MX					M...FD M...FA		M...FD		M...FA	
			AC	H	L	AD		LF		R	AD	R	AD
W 110	S2	M2S	156	313	364	119	38	440	41	129	146	134	119
W 110	S2	ME2S	156	313	364	119	38	440	39.6	129	143	134	143
W 110	S2	MX2S	156	313	408	119	43.1	480	46.9	129	143	134	143
W 110	S3	ME3S	195	332	407	142	47.5	503	53.5	160	155	160	155
W 110	S3	MX3S	195	332	440	142	50.5	530	57.5	160	155	160	155
W 110	S3	ME3L	195	332	439	142	53	530	59	160	155	160	155
W 110	S3	MX3L	195	332	483	142	59	575	66	160	155	160	155

* On both sides

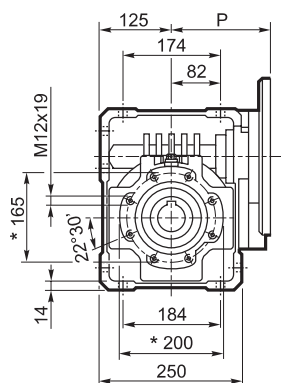
OUTPUT



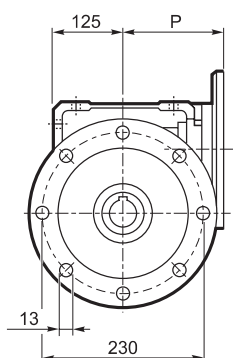


W 110...P (IEC)

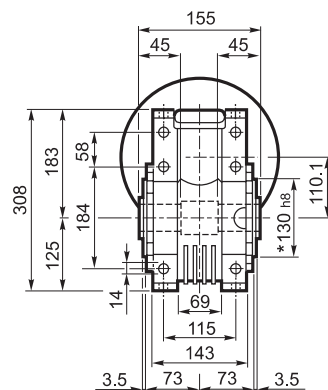
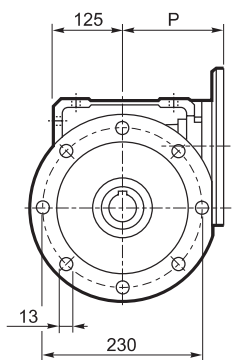
U



UF_

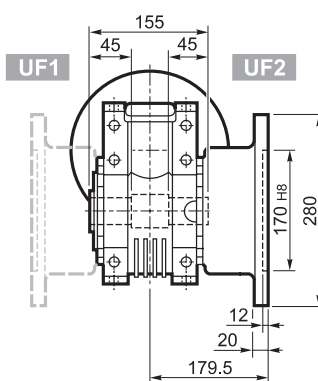


UFC_



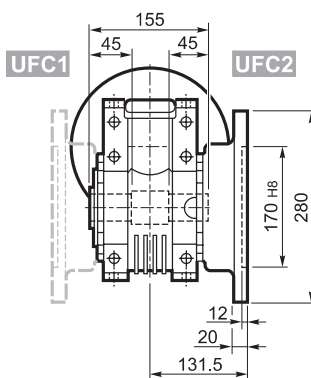
UF1

UF2

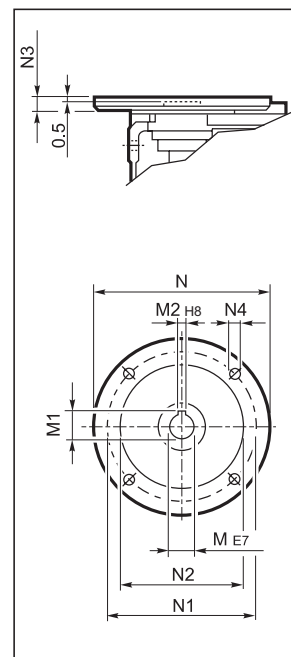


UFC1

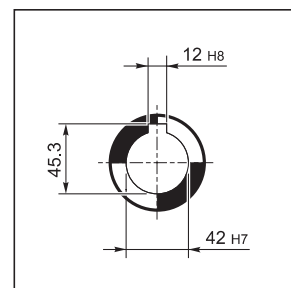
UFC2



INPUT

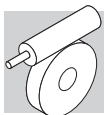


OUTPUT



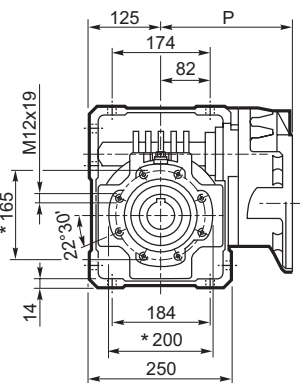
		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W 110	P80 B5	19	21.8	6	200	165	130	—	M10x12	143	28
W 110	P90 B5	24	27.3	8	200	165	130	—	M10x12	143	28
W 110	P100 B5	28	31.3	8	250	215	180	13	13	151	29
W 110	P112 B5	28	31.3	8	250	215	180	13	13	151	29
W 110	P132 B5	38	41.3	10	300	265	230	16	14	226	31
W 110	P80 B14	19	21.8	6	120	100	80	7.5	7	143	27.5
W 110	P90 B14	24	27.3	8	140	115	95	6.5	9	143	27.5
W 110	P100 B14	28	31.3	8	160	130	110	13	9	151	27
W 110	P112 B14	28	31.3	8	160	130	110	13	9	151	27

* On both sides

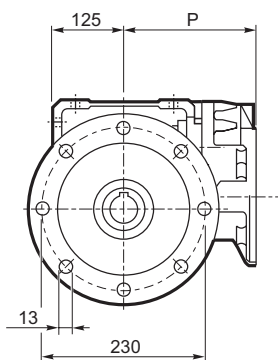


WR 110...P (IEC)

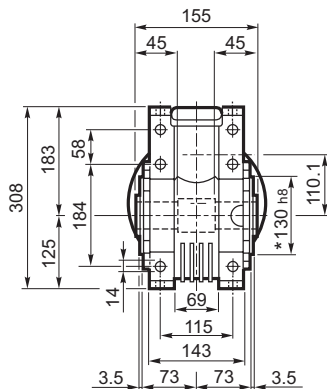
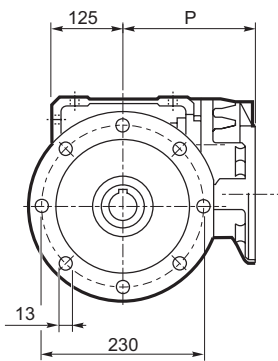
U



UF

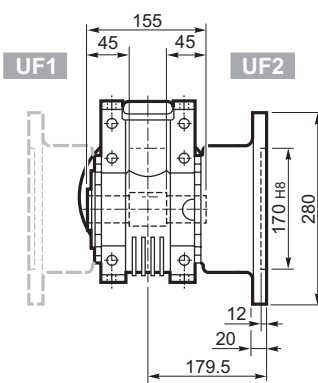


UFC



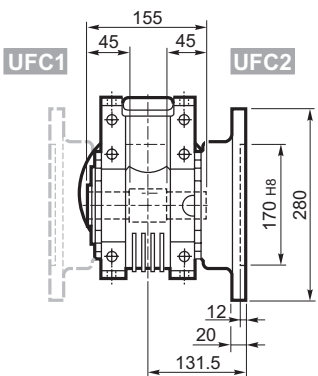
UF1

UF2

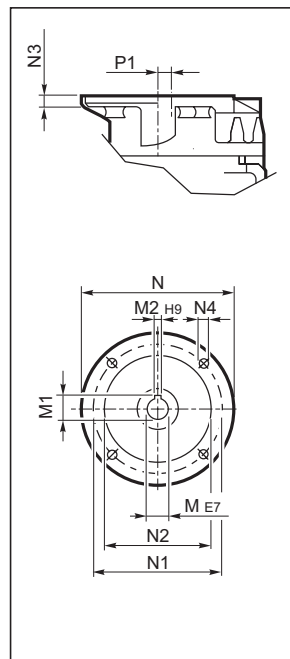


UFC1

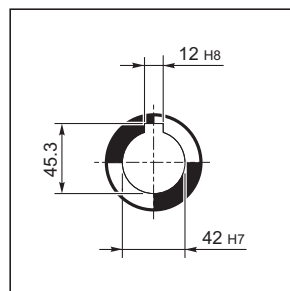
UFC2



INPUT

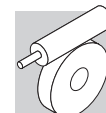


OUTPUT



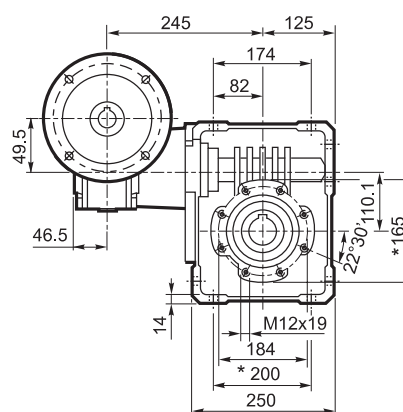
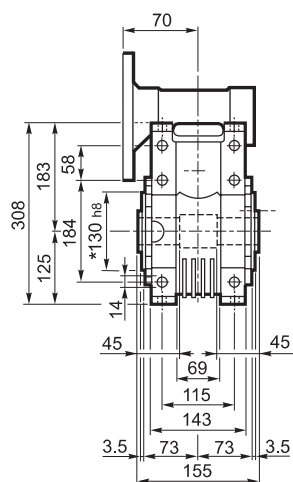
		M	M1	M2	N	N1	N2	N3	N4	P	P1	kg
WR 110	P71 B5	14	16.3	5	160	130	110	10	M8x14	185	58.6	30.5
WR 110	P80 B5	19	21.8	6	200	165	130	14	M10x15	204	21.1	31
WR 110	P90 B5	24	27.3	8	200	165	130	14	M10x15	204	21.1	31
WR 110	P100 B5	28	31.3	8	250	215	180	14	M12x13	213	21.1	32
WR 110	P112 B5	28	31.3	8	250	215	180	14	M12x13	213	21.1	32

* On both sides

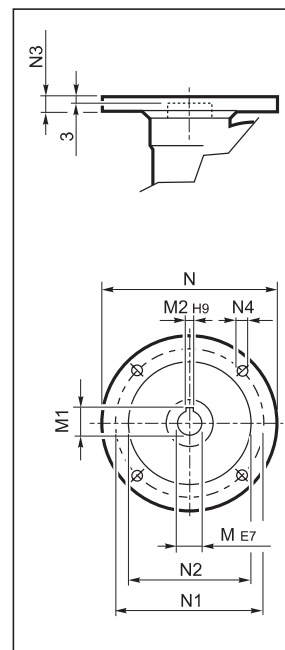


VF/W 49/110...P (IEC)

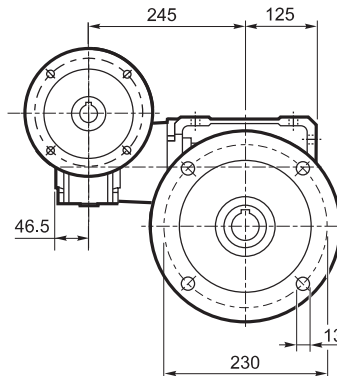
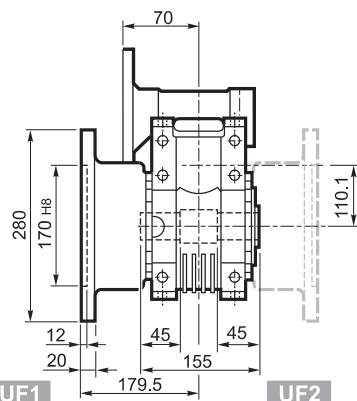
U



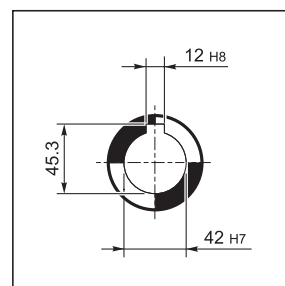
INPUT



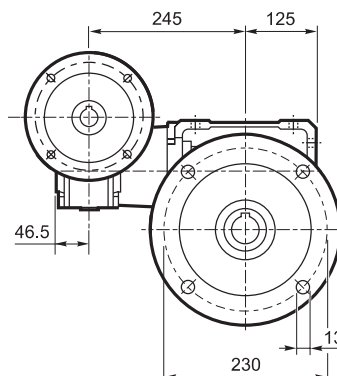
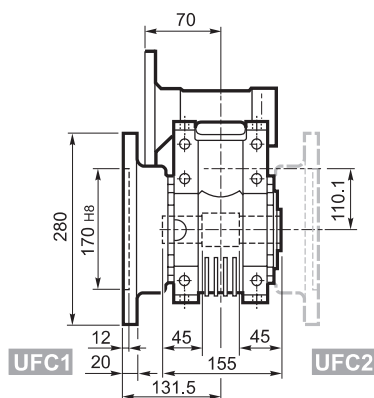
UF



OUTPUT

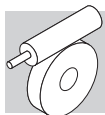


UFC



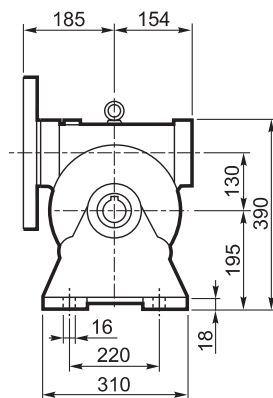
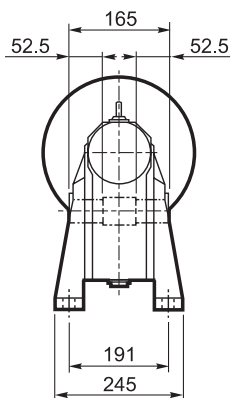
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/W 49/110	P63 B5	11	12.8	4	140	115	95	10.5	9.5	33
VF/W 49/110	P71 B5	14	16.3	5	160	130	110	10.5	9.5	
VF/W 49/110	P80 B5	19	21.8	6	200	165	130	10	11.5	
VF/W 49/110	P63 B14	11	12.8	4	90	75	60	7	6	
VF/W 49/110	P71 B14	14	16.3	5	105	85	70	10.5	6.5	
VF/W 49/110	P80 B14	19	21.8	6	120	100	80	10	7	

* On both sides

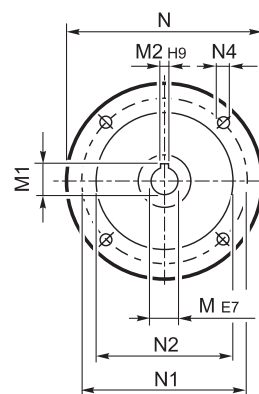
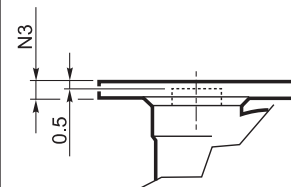


VF 130...P (IEC)

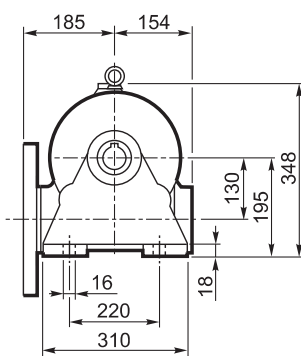
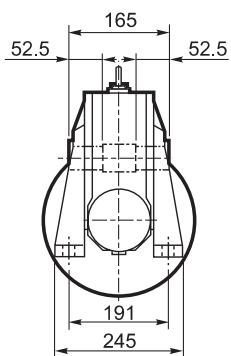
A



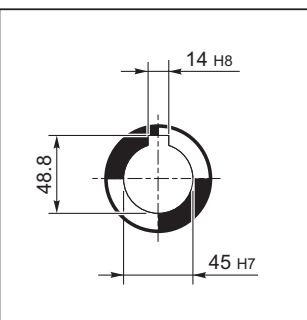
INPUT



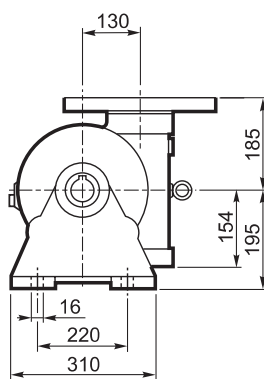
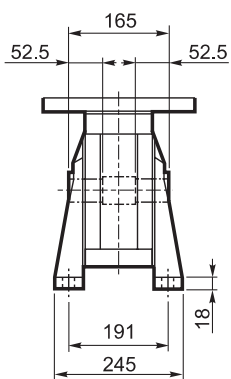
N

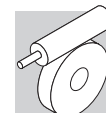


OUTPUT

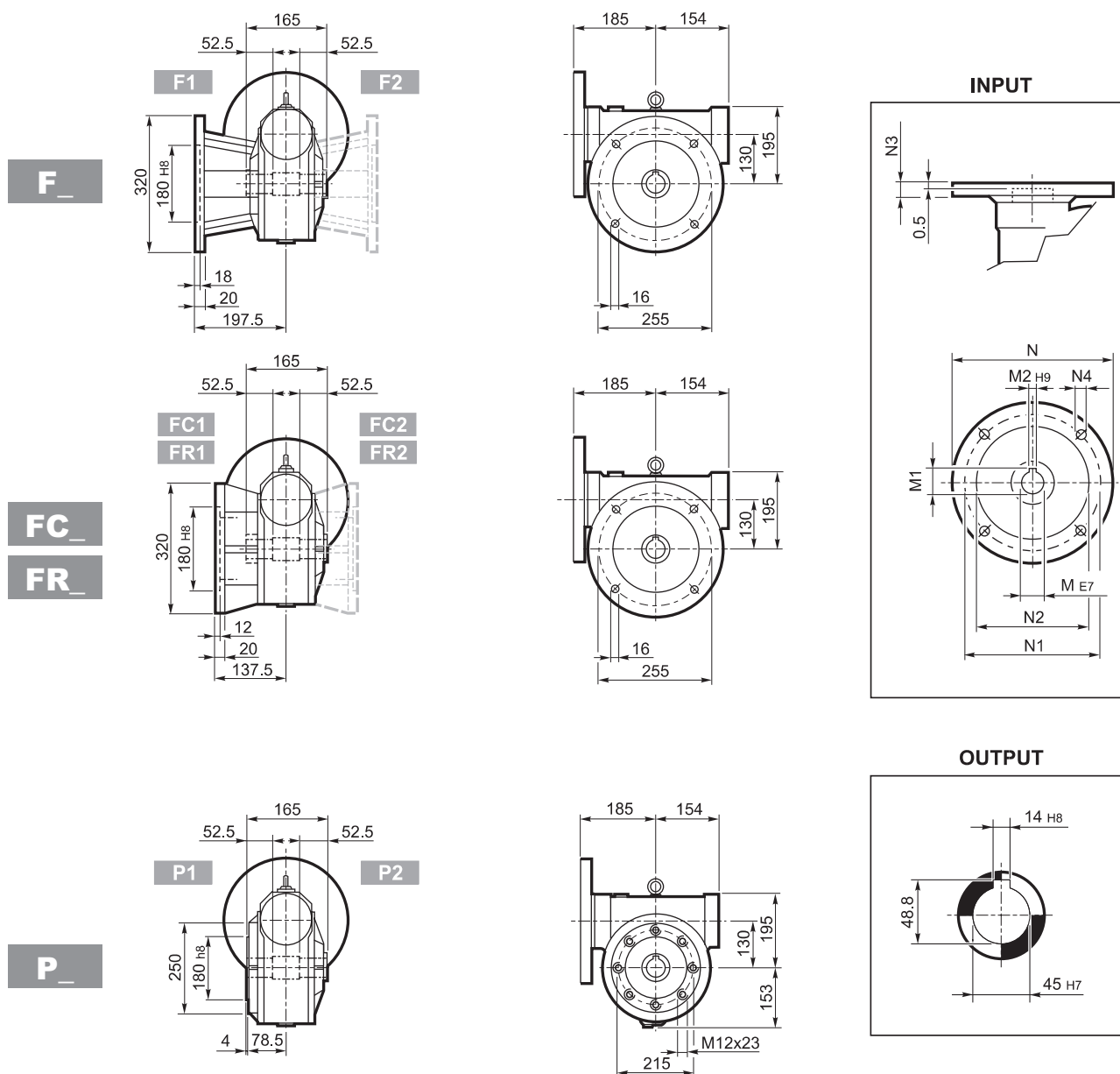




V



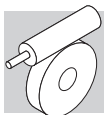


VF 130...P (IEC)



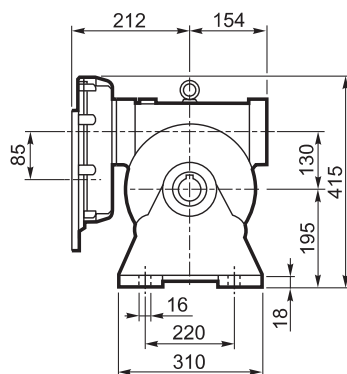
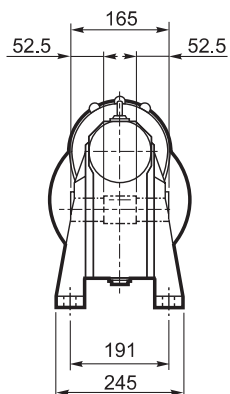
		M	M1	M2	N	N1	N2	N3	N4	 Kg
										
VF130	P90 B5	24	27.3	8	200	165	130	17	11	49
VF130	P100 B5	28	31.3	8	250	215	180	17	13	
VF130	P112 B5	28	31.3	8	250	215	180	17	13	
VF130	P132 B5	38	40.1#	10	300	265	230	17	13	

Lowered key

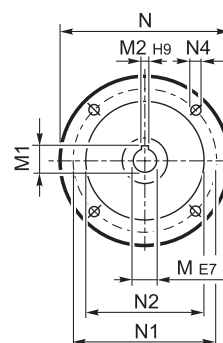
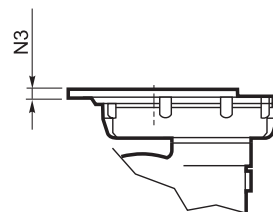


VFR 130...P (IEC)

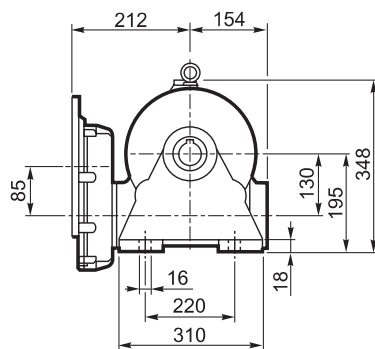
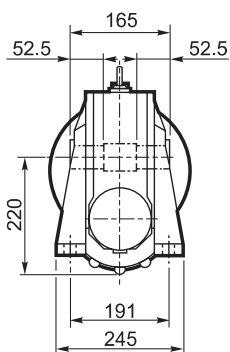
A



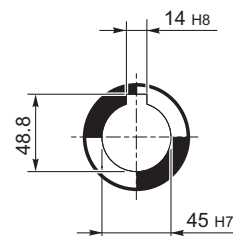
INPUT



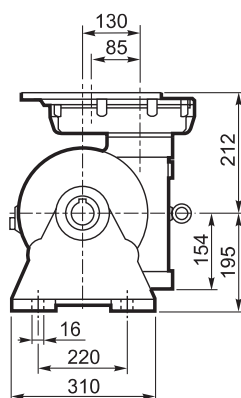
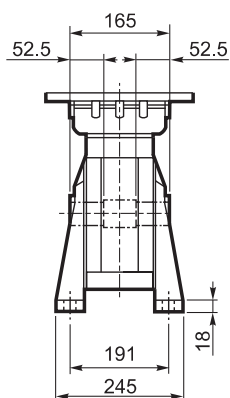
N

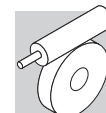


OUTPUT

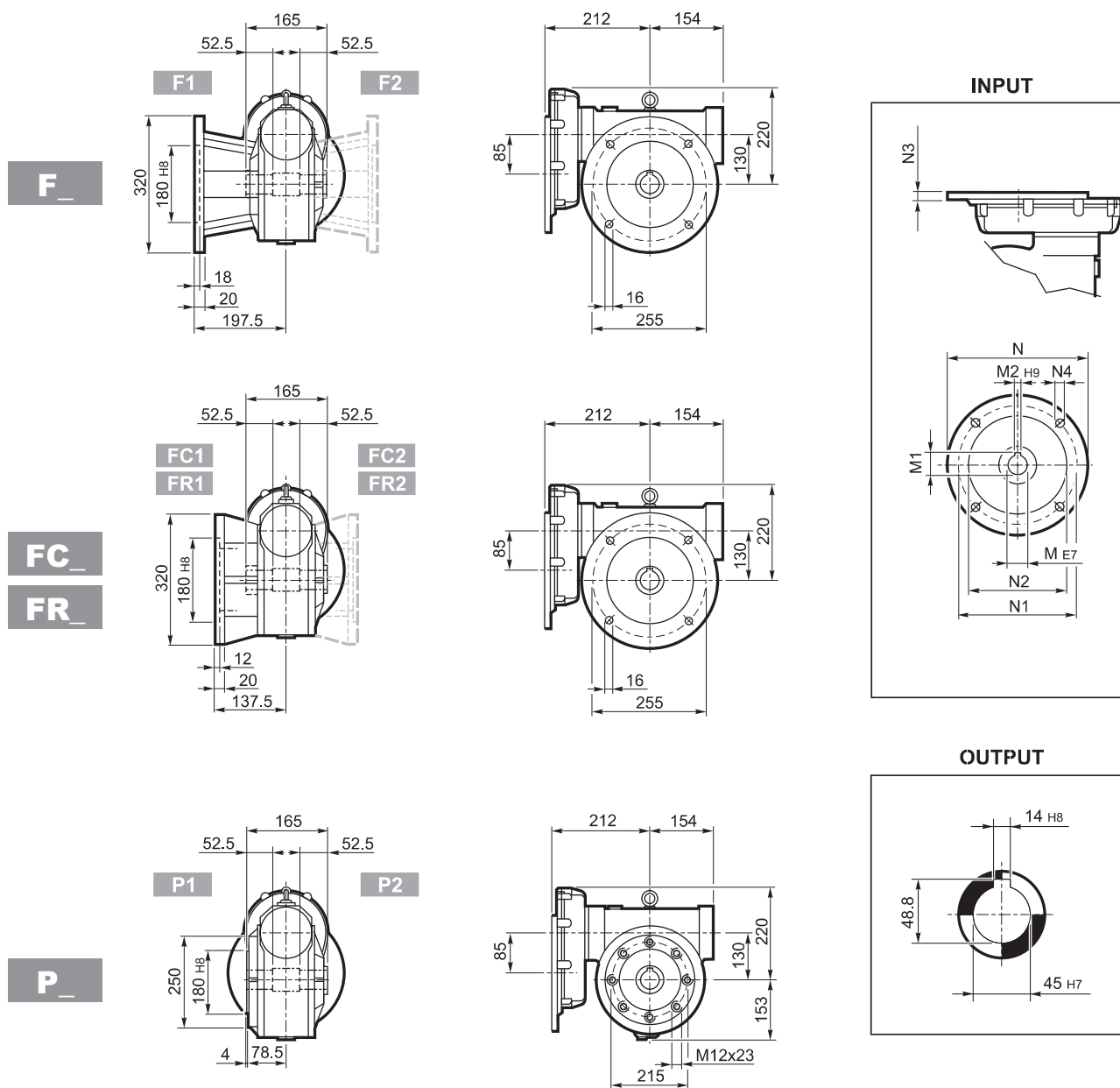


V



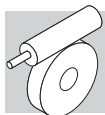


VFR 130...P (IEC)



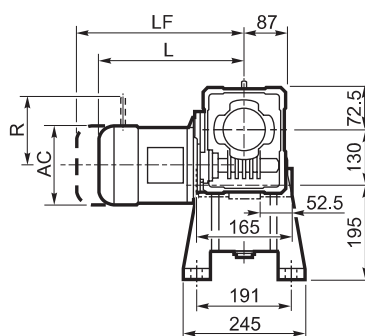
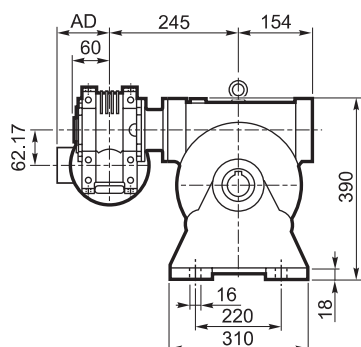
		M	M1	M2	N	N1	N2	N3	N4	Kg
VFR 130	P80 B5	19 K6	21.8	6	200	165	130	12	M10x25	57
VFR 130	P90 B5	24 K6	27.3	8	200	165	130	12	M10x25	
VRF 130	P100 B5	28 J6	29.1#	8	250	215	180	13	M12x35	
VRF 130	P112 B5	28 J6	29.1#	8	250	215	180	13	M12x35	

Lowered key

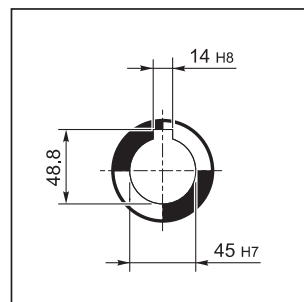


W/VF 63/130...M/ME/MX/MXN

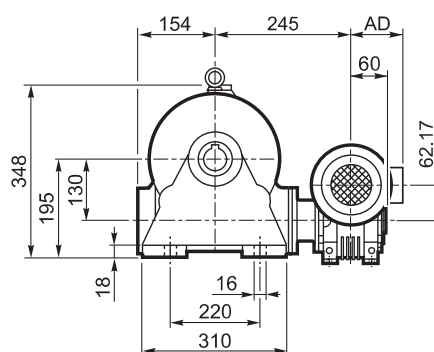
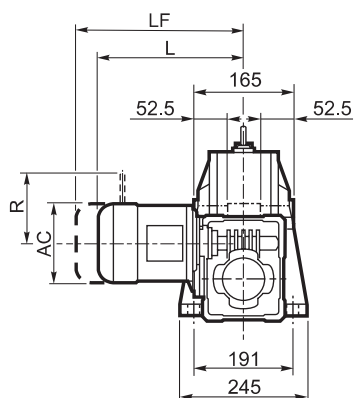
A



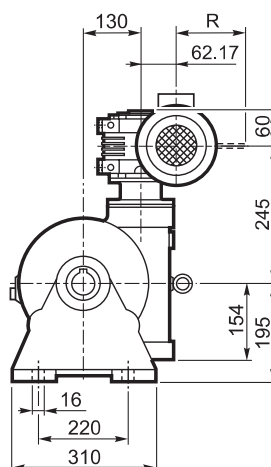
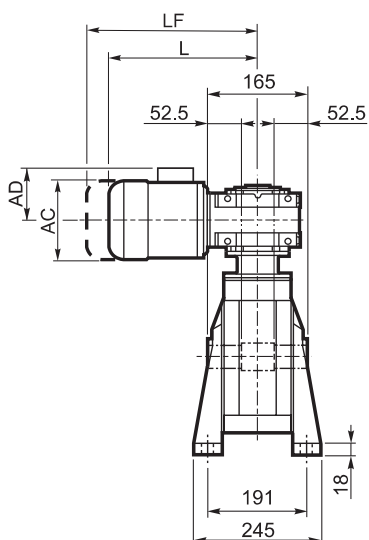
OUTPUT

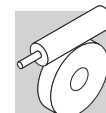


N



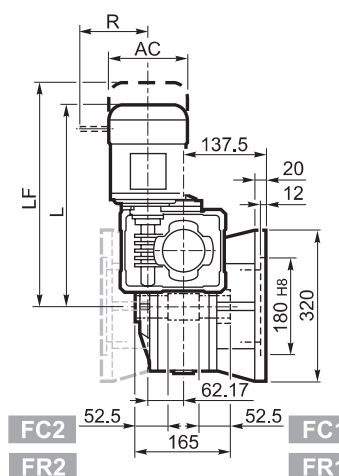
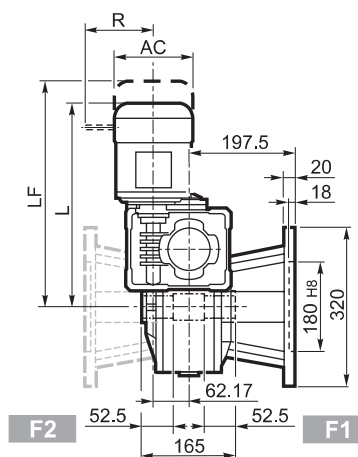
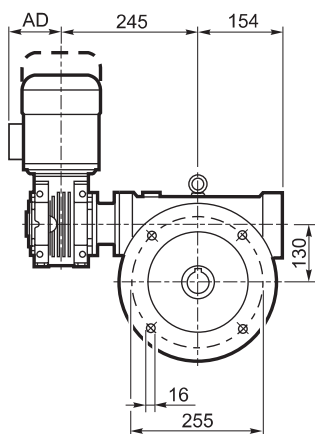
V



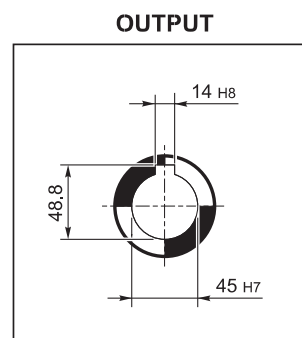
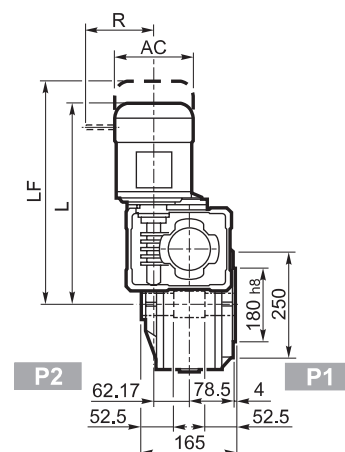
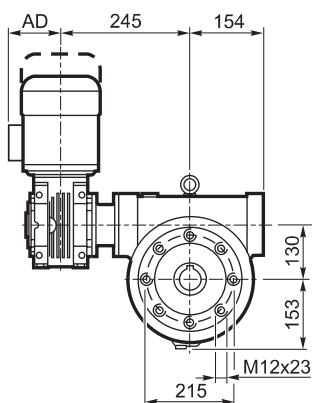


W/VF 63/130...M/ME/MX/MXN

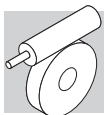
F_
FC_
FR_



P_

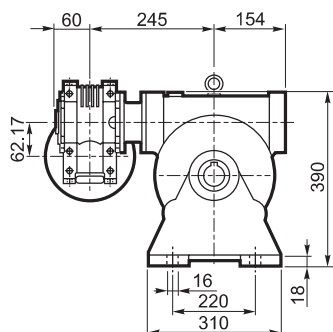


			M/ME/MX/MXN				M...FD M...FA		M...FD		M...FA	
			AC	L	AD	kg	LF	kg	R	AD	R	AD
W/VF 63/130	S1	M1	138	419	108	63	480	65	103	135	124	108
W/VF 63/130	S1	ME1	138	419	108	63	480	65	103	135	124	108
W/VF 63/130	S10	MXN10	138	448	137	65.4	507	67.7	103	138	121	138
W/VF 63/130	S2	ME2S	156	447	119	68	517	69.6	129	143	134	143
W/VF 63/130	S2	MX2S	156	491	119	73.1	563	76.9	129	143	134	143
W/VF 63/130	S20	MXN20	158	500.5	146	73.1	571.5	77	129	148	131	148

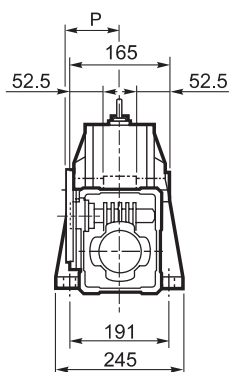


W/VF 63/130...P (IEC)

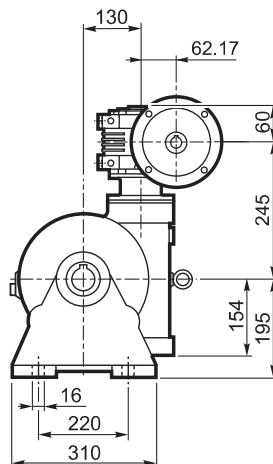
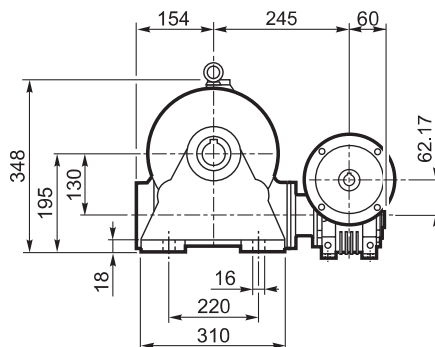
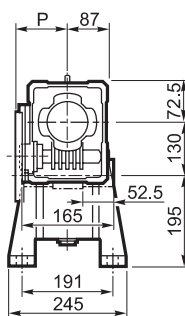
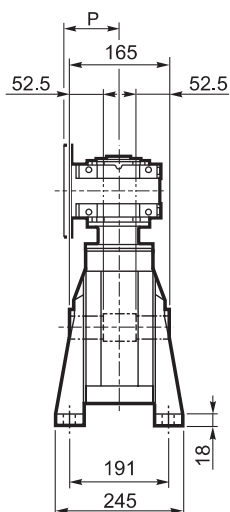
A



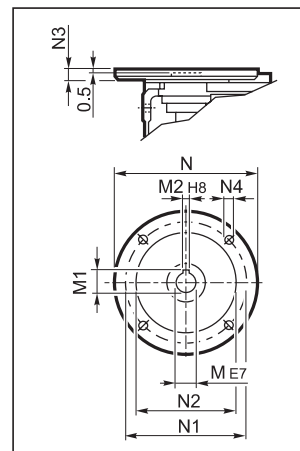
N



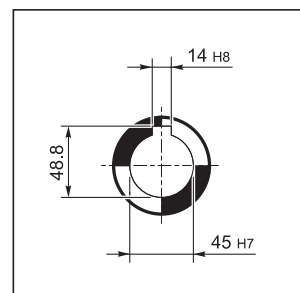
V

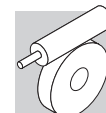


INPUT



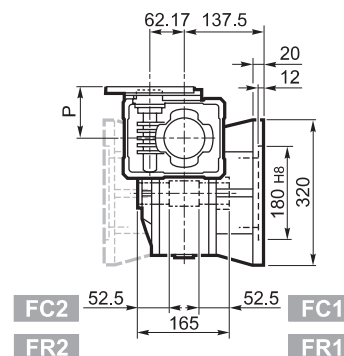
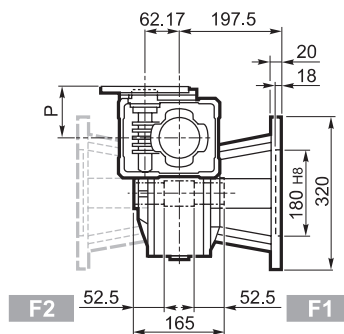
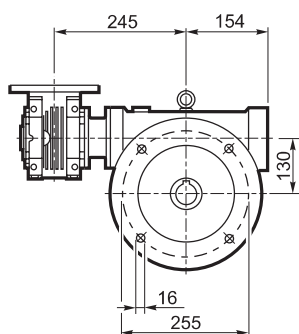
OUTPUT



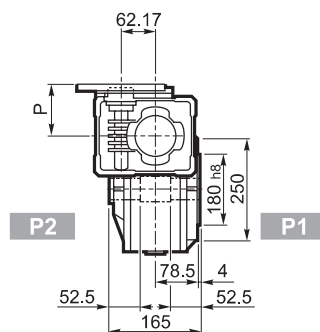
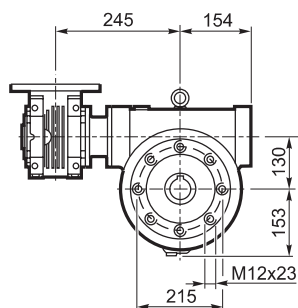


W/VF 63/130...P (IEC)

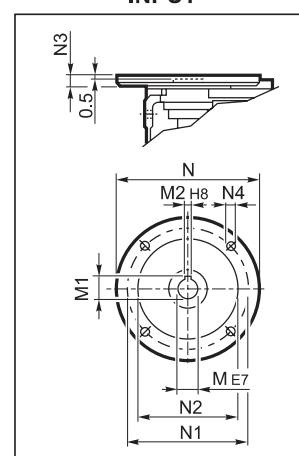
F_
FC_
FR_



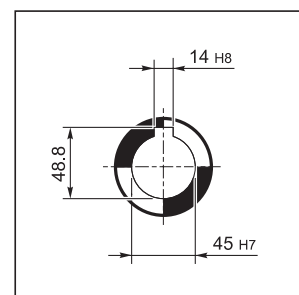
P_





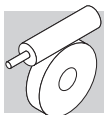
INPUT



OUTPUT

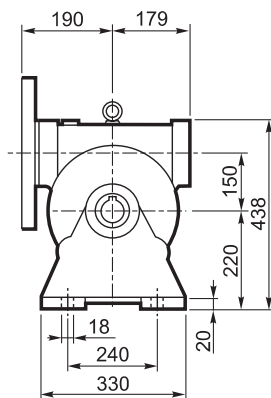
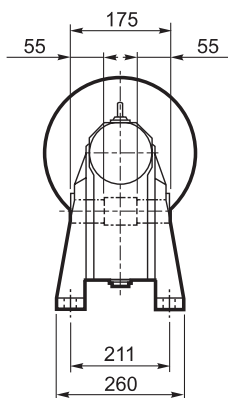


		M	M1	M2	N	N1	N2	N3	N4	P	Kg
											
W/VF 63/130	P71 B5	14	16.3	5	160	130	110	11	9	95	57
W/VF 63/130	P80 B5	19	21.8	6	200	165	130	12	11.5	102	
W/VF 63/130	P90 B5	24	27.3	8	200	165	130	12	11.5	102	
W/VF 63/130	P71 B14	14	16.3	5	105	85	70	11	6.5	95	
W/VF 63/130	P80 B14	19	21.8	6	120	100	80	11	6.5	102	
W/VF 63/130	P90 B14	24	27.3	8	140	115	95	11	8.5	102	

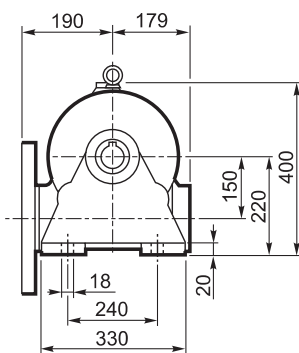
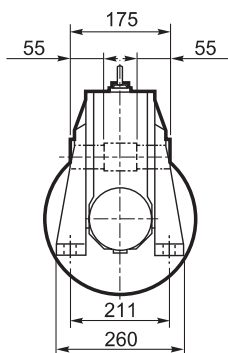


VF 150...P (IEC)

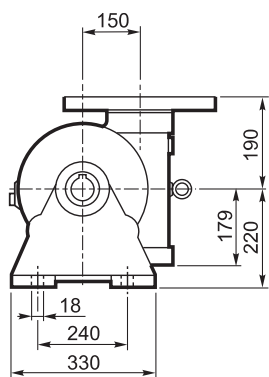
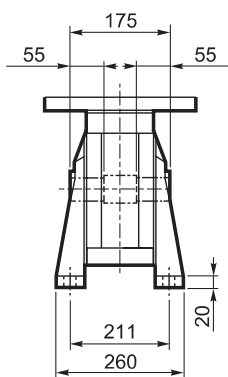
A



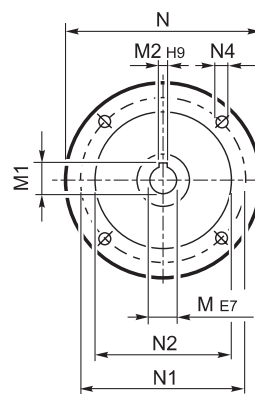
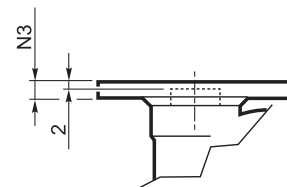
N



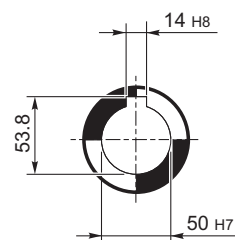
V

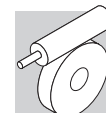


INPUT



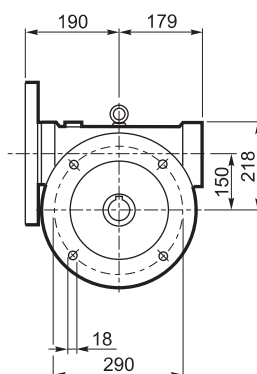
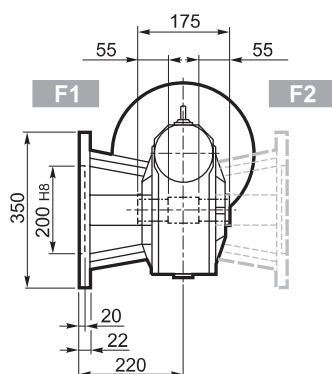
OUTPUT



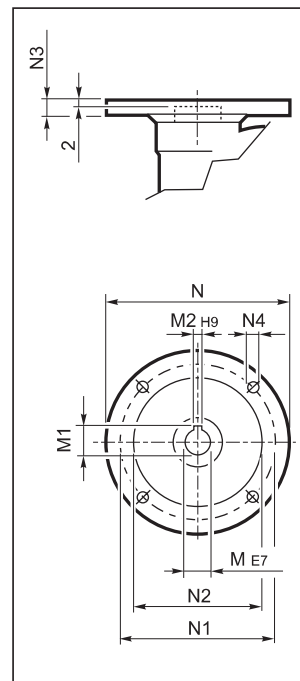


VF 150...P (IEC)

F_

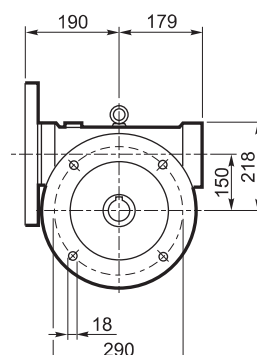
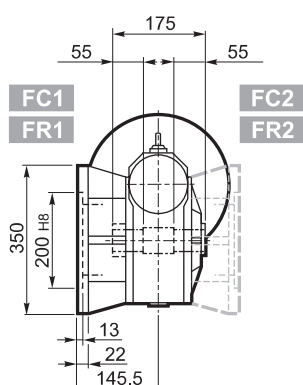


INPUT

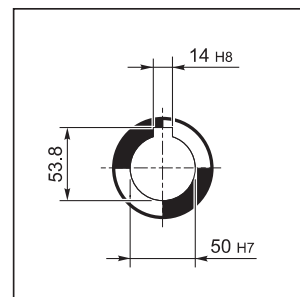


FC_

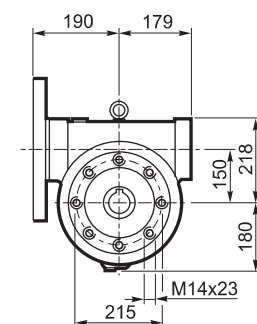
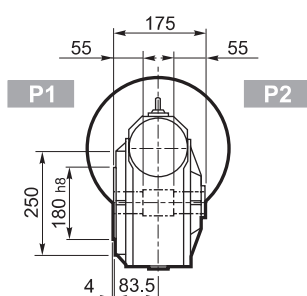
FR_





OUTPUT

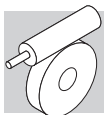


P_



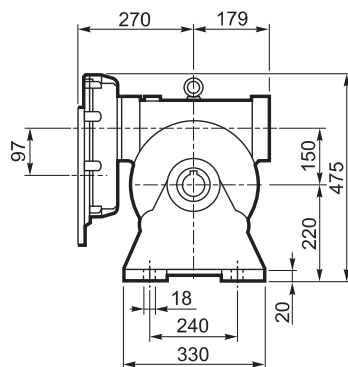
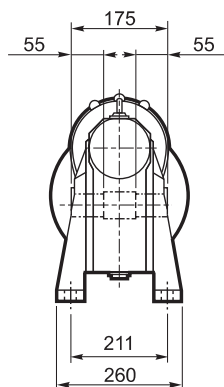
		M	M1	M2	N	N1	N2	N3	N4	kg
										
VF 150	P100 B5	28	31.3	8	250	215	180	11	13	60
VF 150	P112 B5	28	31.3	8	250	215	180	11	13	
VF 150	P132 B5	38	41.3	10	300	265	230	16	13	
VF 150	P160 B5	42	44.6#	12	350	300	250	18	18	

Lowered key

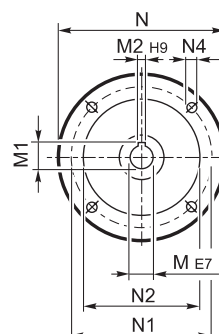
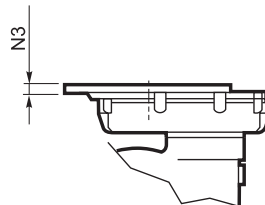


VFR 150...P (IEC)

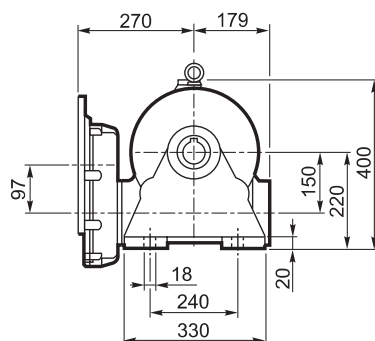
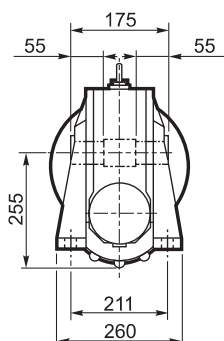
A



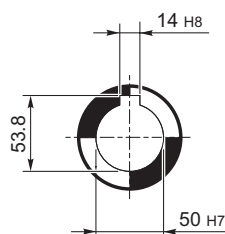
INPUT



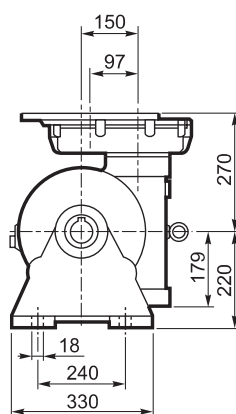
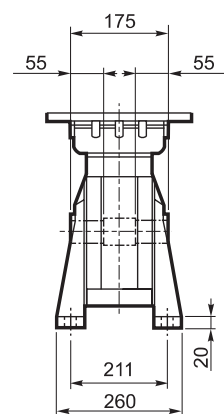
N

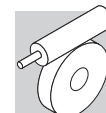


OUTPUT

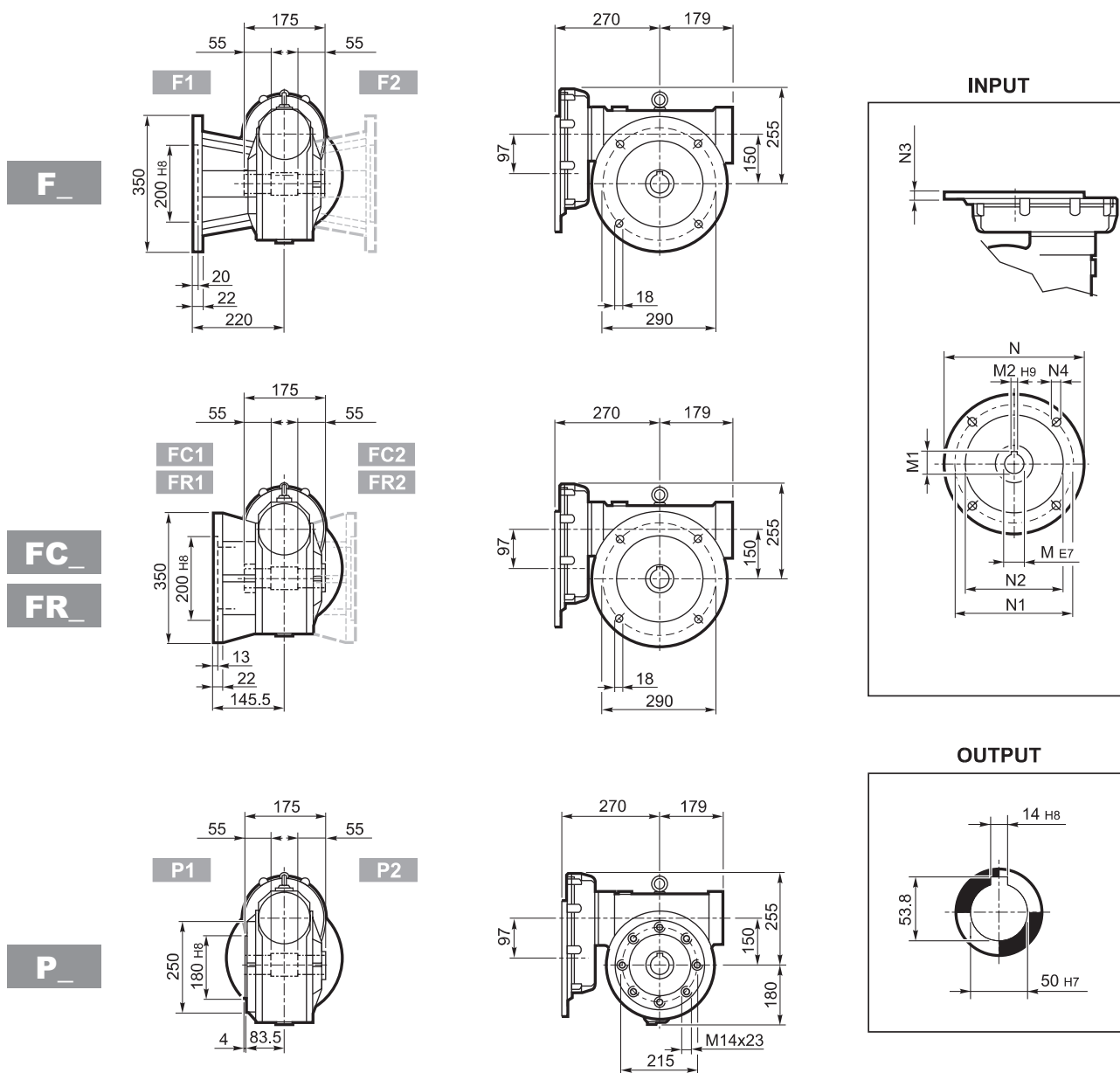


V



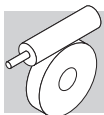


VFR 150...P (IEC)



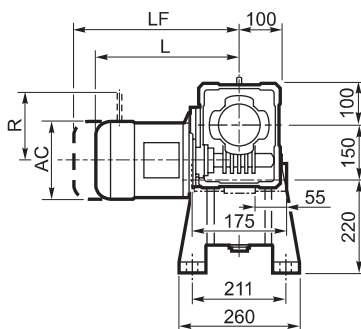
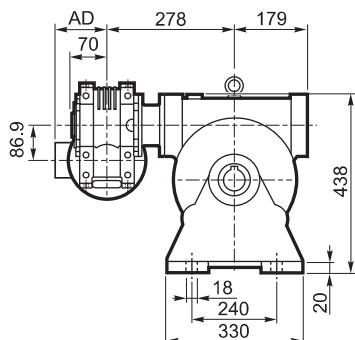
		M	M1	M2	N	N1	N2	N3	N4	Kg
VFR 150	P90 B5	24 K6	27.3	8	200	165	130	13	M10x25	71
VRF 150	P100 B5	28 K6	31.3	8	250	215	180	13	M12x35	
VRF 150	P112 B5	28 J6	31.3	8	250	215	180	13	M12x35	
VFR 150	P132 B5	38 J6	39.6#	10	300	265	230	13	M12x35	

Lowered key

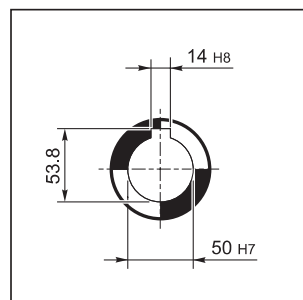


W/VF 86/150...M/ME/MX/MXN

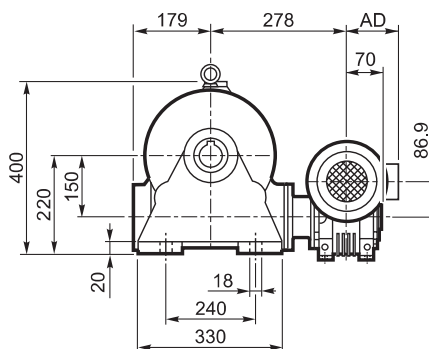
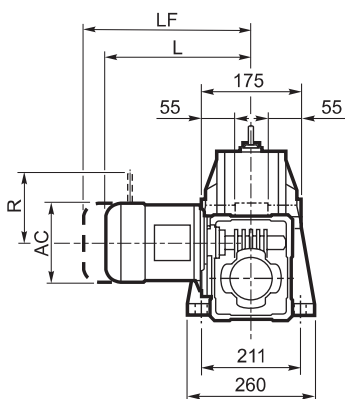
A



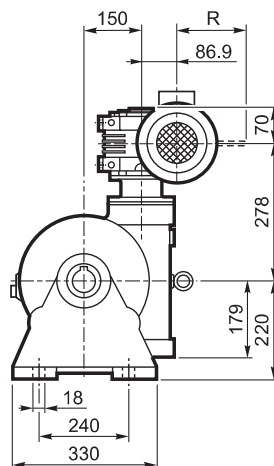
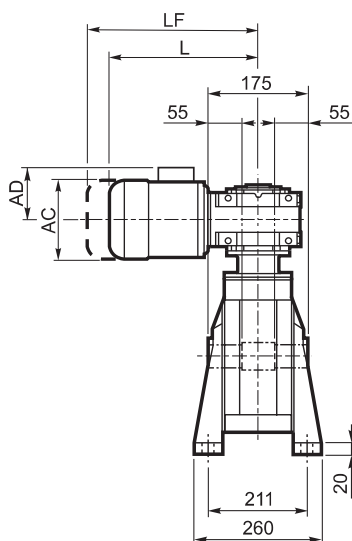
OUTPUT

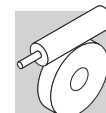


N



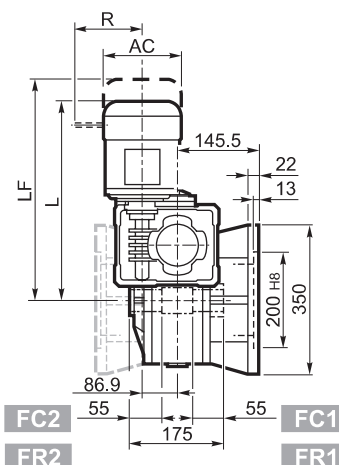
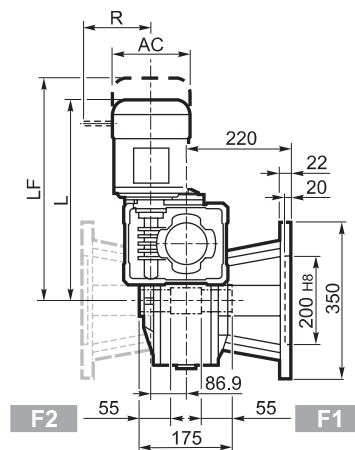
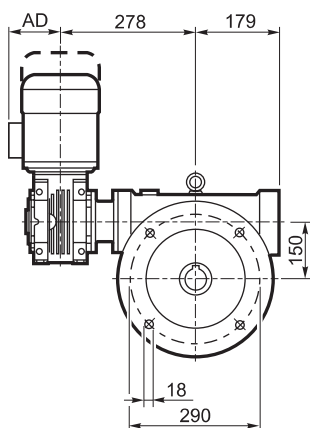
V



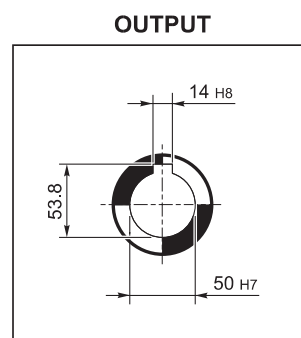
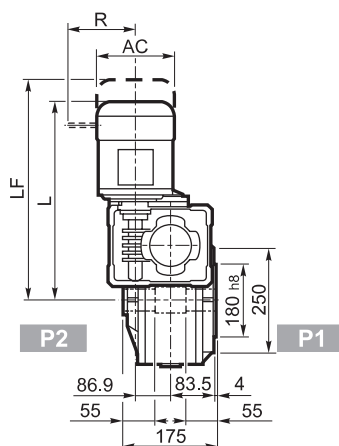
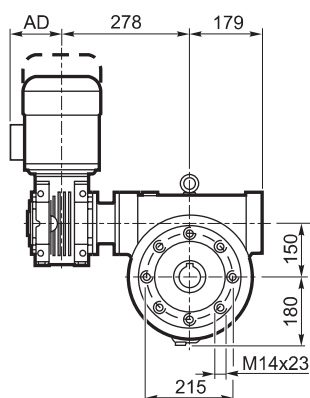


W/VF 86/150...M/ME/MX/MXN

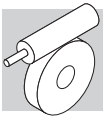
F_
FC_
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P_

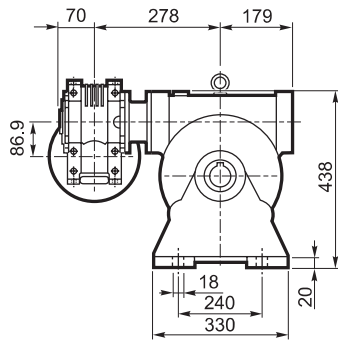


			M/ME/MX/MXN				M...FD M...FA		M...FD		M...FA	
			AC	L	AD	Kg	LF	Kg	R	AD	R	AD
W/VF 86/150	S1	M1	138	474	108	82	385	84	103	135	124	108
W/VF 86/150	S1	ME1	138	474	108	82	534	84	103	135	124	135
W/VF 86/150	S10	MXN10	138	503	137	84.4	562	86.8	103	138	121	138
W/VF 86/150	S2	ME2S	156	499	119	86	569	87.6	129	143	134	143
W/VF 86/150	S2	MX2S	156	543	119	91.1	615	94.9	129	143	134	143
W/VF 86/150	S20	MXN20	158	596.5	146	91.1	667.5	95	129	148	131	148
W/VF 86/150	S3	ME3S	195	542	142	92.5	638	98.5	160	155	160	155
W/VF 86/150	S3	MX3S	195	574	142	95.5	664	102.5	160	155	160	155
W/VF 86/150	S3	ME3L	195	574	142	98	665	104	160	155	160	155
W/VF 86/150	S3	MX3L	195	618	142	104	710	111	160	155	160	155

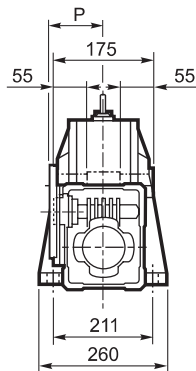


W/VF 86/150...P (IEC)

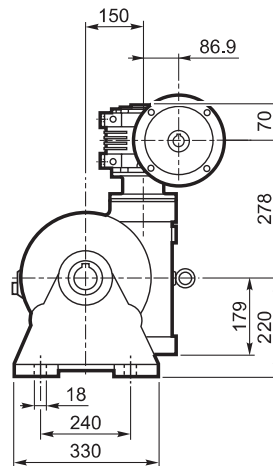
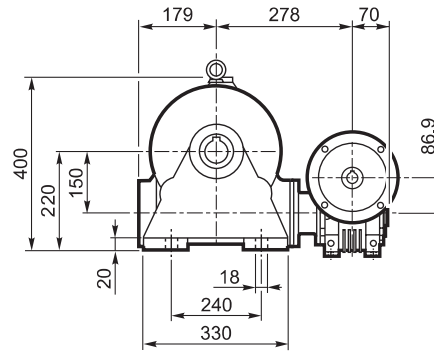
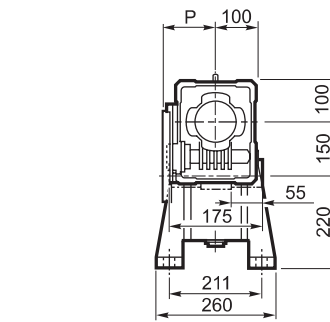
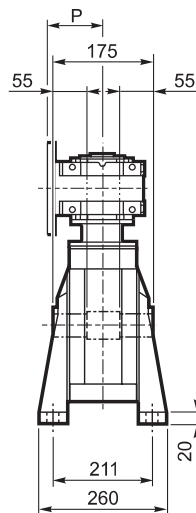
A



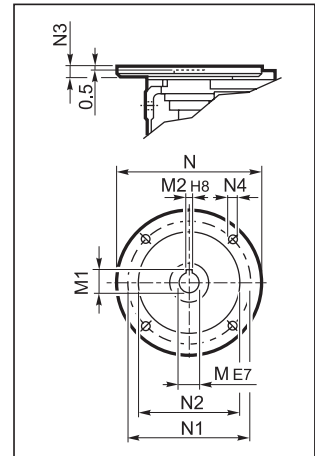
N



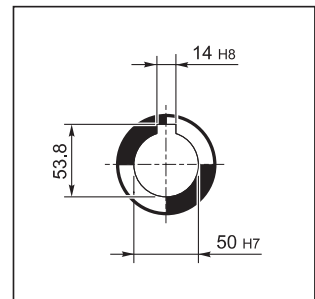
V

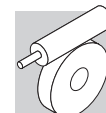


INPUT



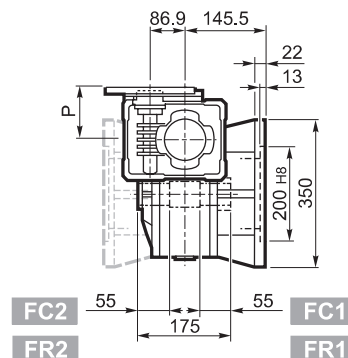
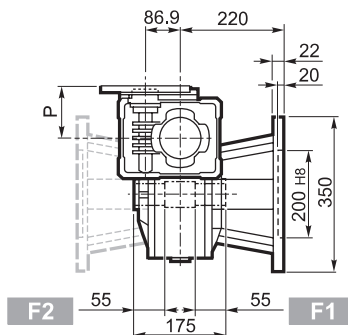
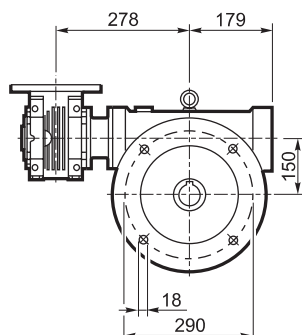
OUTPUT



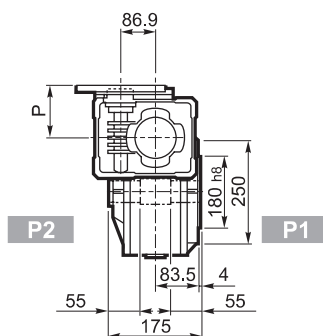
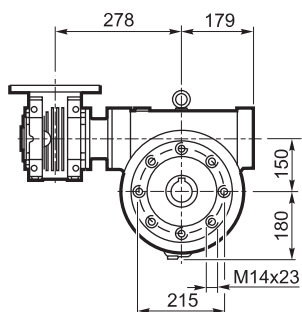


W/VF 86/150...P (IEC)

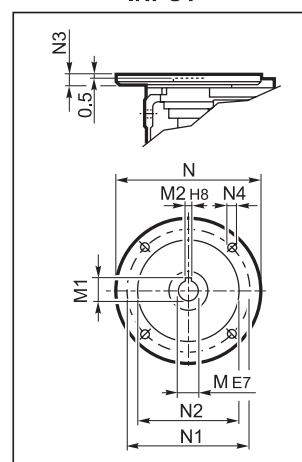
F_
FC_
FR_



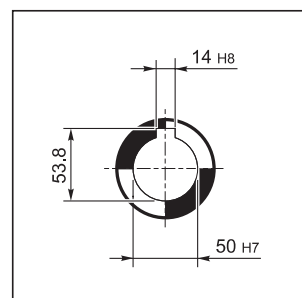
P_





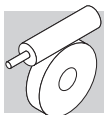
INPUT



OUTPUT

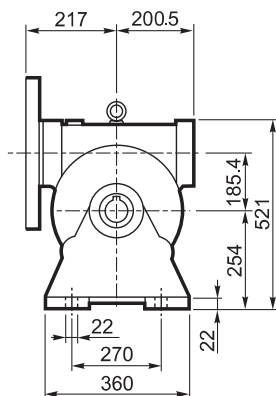
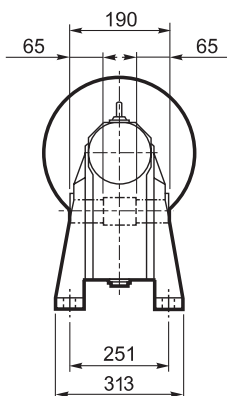


		M	M1	M2	N	N1	N2	N3	N4	P	Kg
											
W/VF 86/150	P71 B5	14	16.3	5	160	130	110	11	9	128	75
W/VF 86/150	P80 B5	19	21.8	6	200	165	130	12	11.5	128	
W/VF 86/150	P90 B5	24	27.3	8	200	165	130	12	11.5	128	
W/VF 86/150	P100 B5	28	31.3	8	250	215	180	13	12.5	136	
W/VF 86/150	P112 B5	28	31.3	8	250	215	180	13	12.5	136	
W/VF 86/150	P80 B14	19	21.8	6	120	100	80	7.5	6.5	128	
W/VF 86/150	P90 B14	24	27.3	8	140	115	95	7.5	8.5	128	
W/VF 86/150	P100 B14	28	31.3	8	160	130	110	10	8.5	136	
W/VF 86/150	P112 B14	28	31.3	8	160	130	110	10	8.5	136	

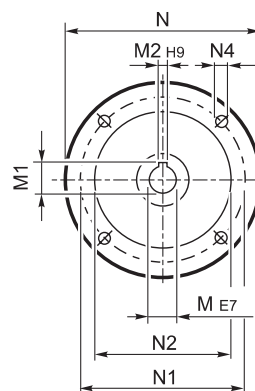
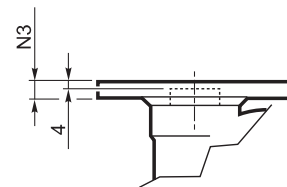


VF 185...P (IEC)

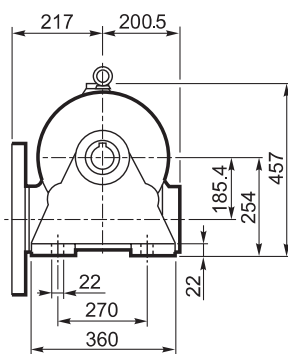
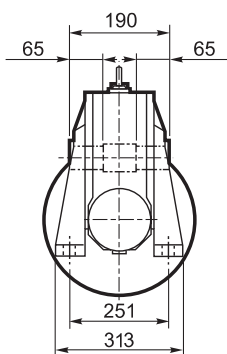
A



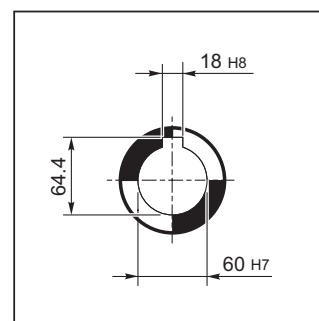
INPUT



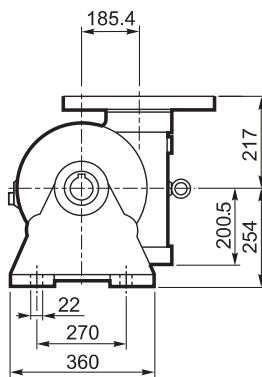
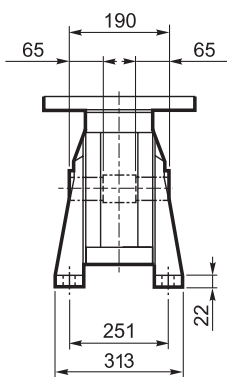
N

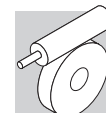


OUTPUT

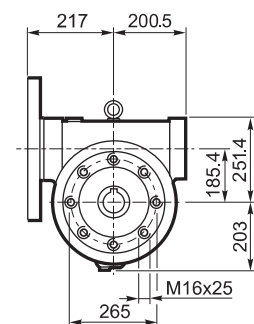
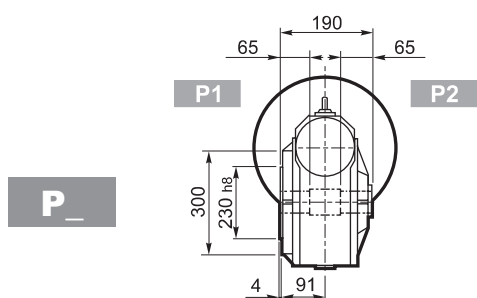
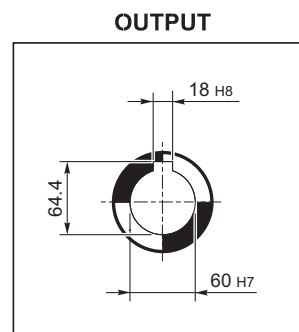
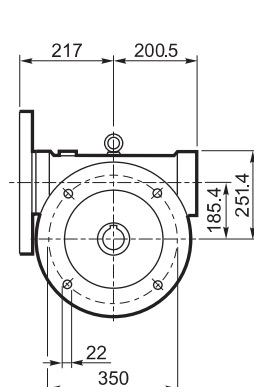
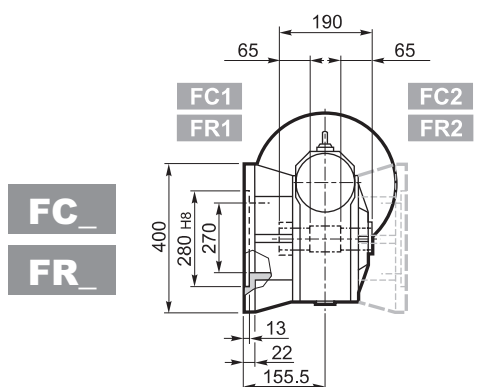
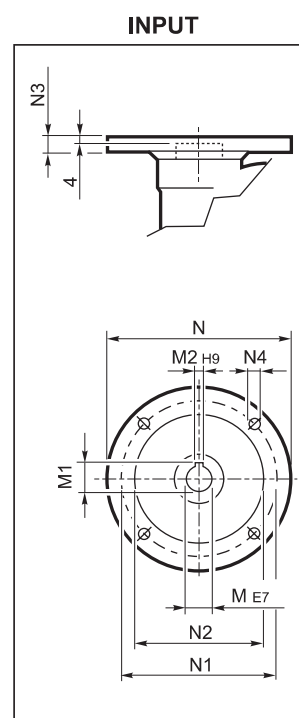
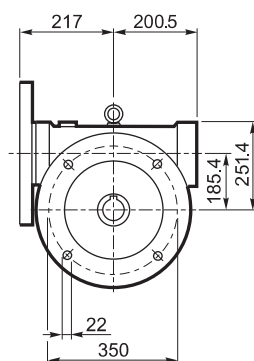
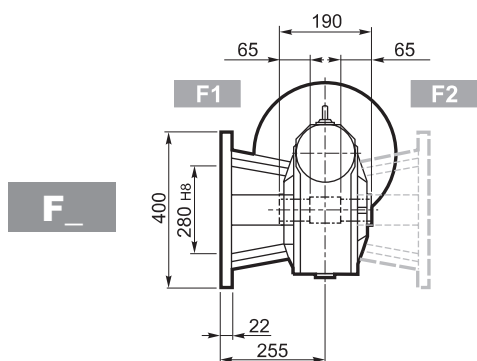


V



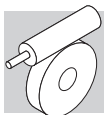


VF 185...P (IEC)



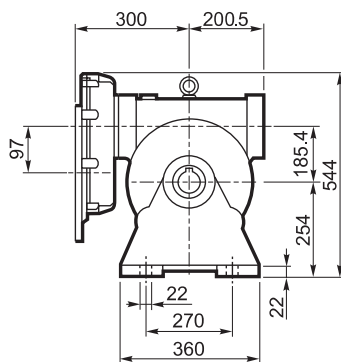
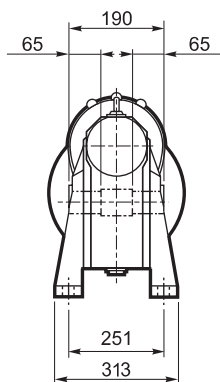
		M	M1	M2	N	N1	N2	N3	N4	kg
VF 185	P100 B5	28	31.3	8	250	215	180	16	13	94
VF 185	P112 B5	28	31.3	8	250	215	180	16	13	
VF 185	P132 B5	38	41.3	10	300	265	230	16	13	
VF 185	P160 B5	42	45.3	12	350	300	250	18	18	
VF 185	P180 B5	48	51.2#	14	350	300	250	18	18	

Lowered key

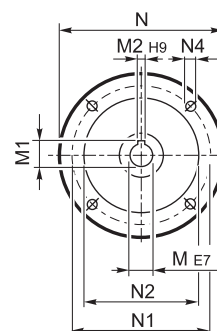
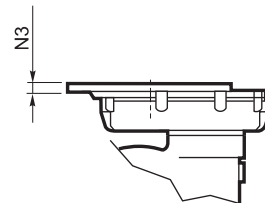


VFR 185...P (IEC)

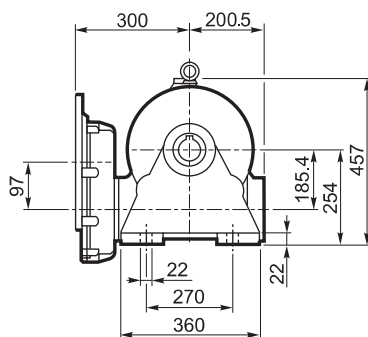
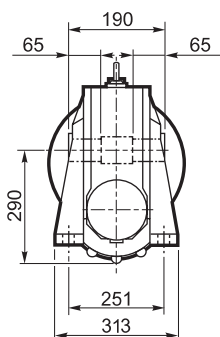
A



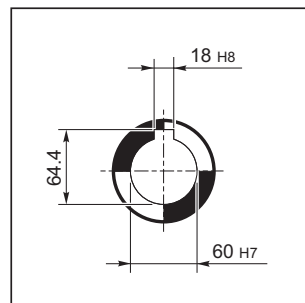
INPUT



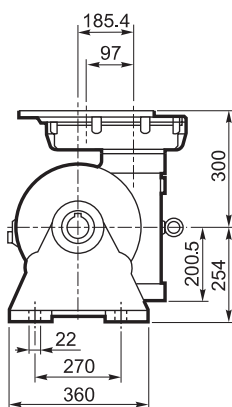
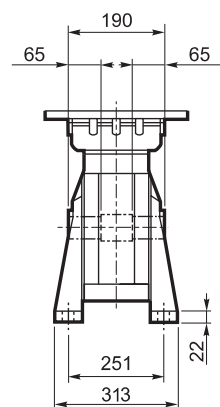
N

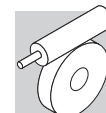


OUTPUT

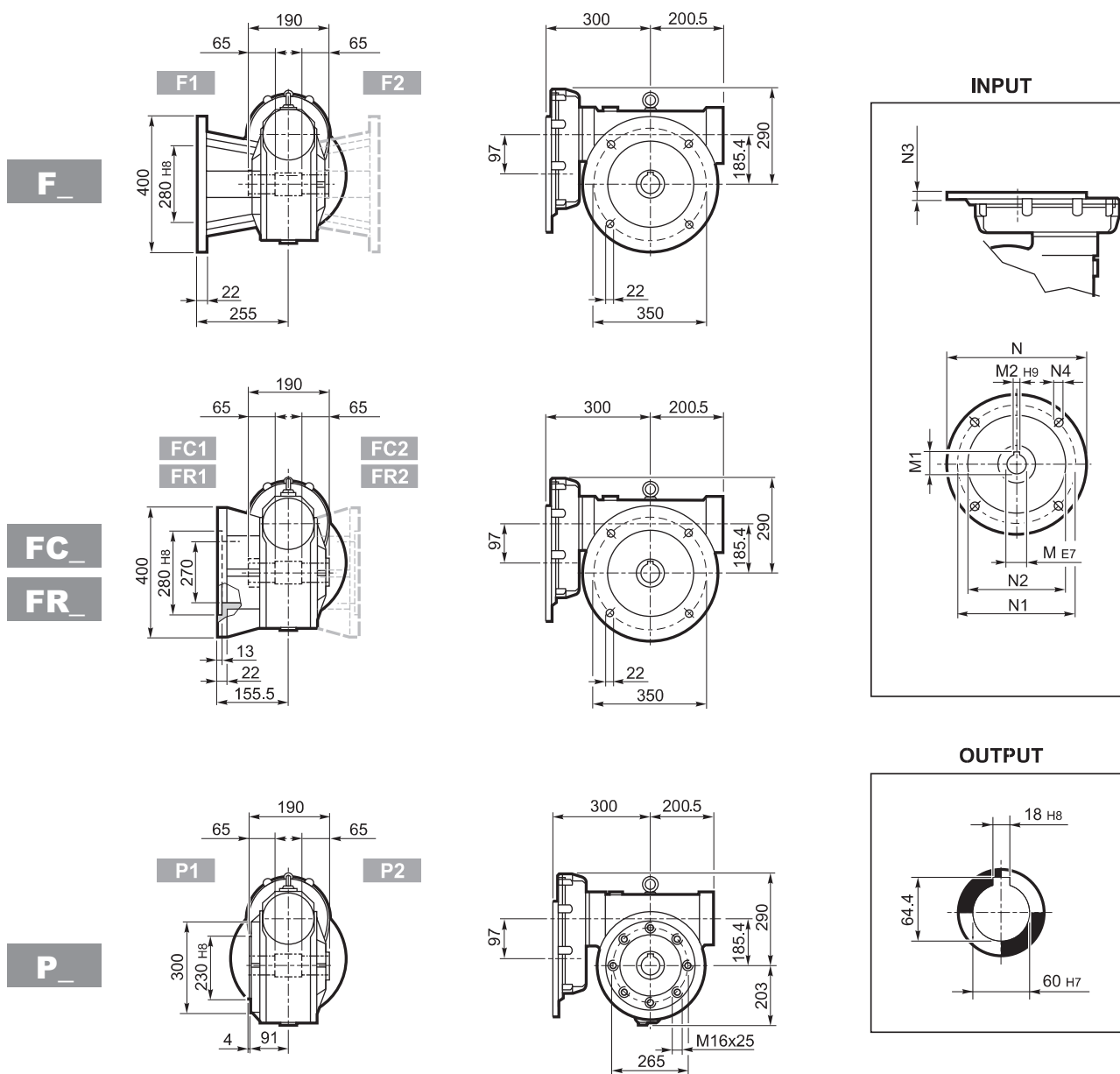





V



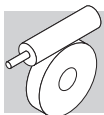


VFR 185...P (IEC)



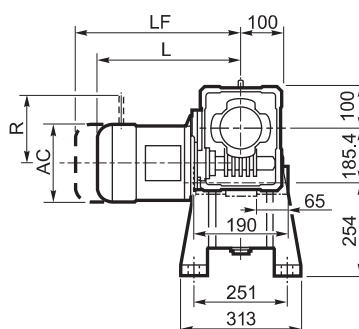
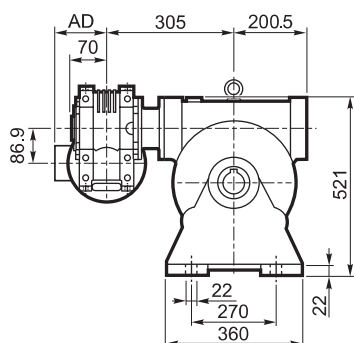
		M	M1	M2	N	N1	N2	N3	N4	
VFR 185	P90 B5	24 K6	27.3	8	200	165	130	13	M10x25	110
VRF 185	P100 B5	28 K6	31.3	8	250	215	180	13	M12x35	
VRF 185	P112 B5	28 K6	31.3	8	250	215	180	13	M12x35	
VFR 185	P132 B5	38 J6	39.6#	10	300	265	230	13	M12x35	

Lowered key

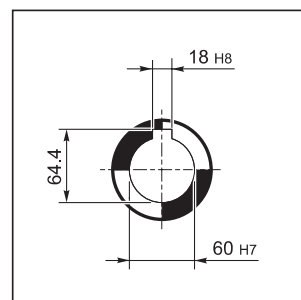


W/VF 86/185...M/ME/MX/MXN

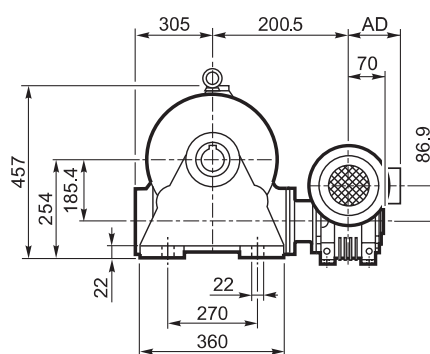
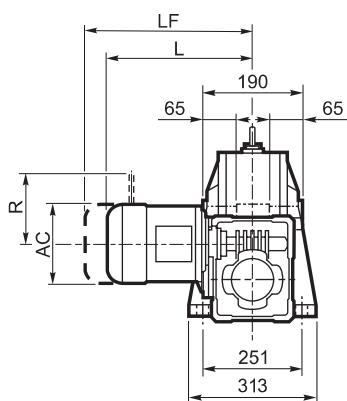
A



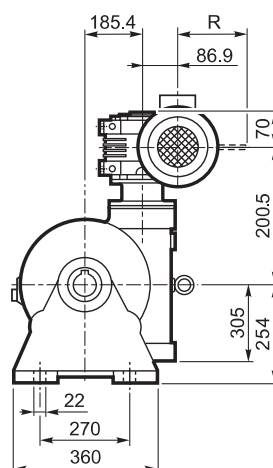
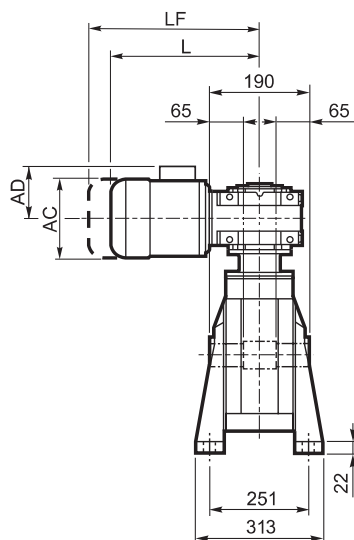
OUTPUT

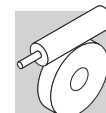


N



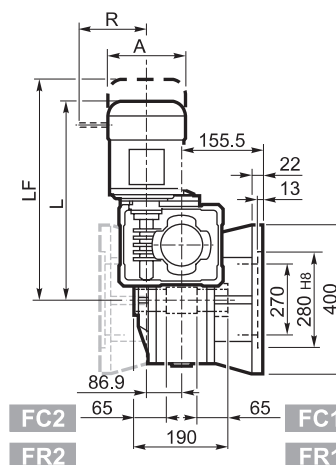
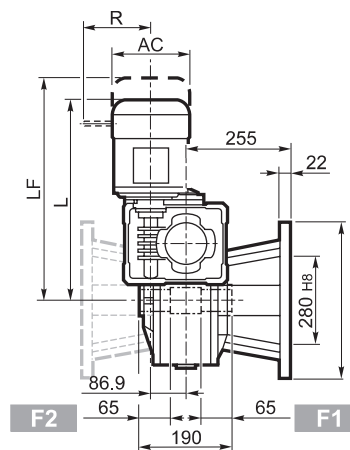
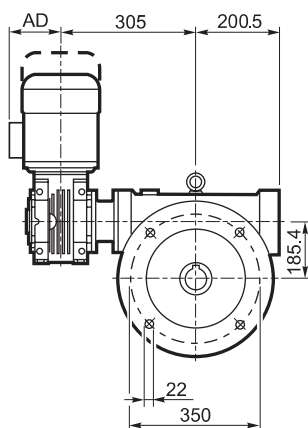
V



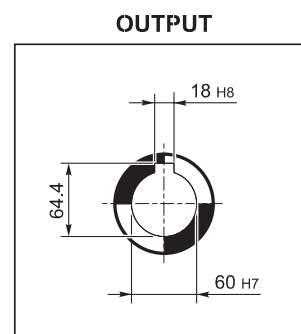
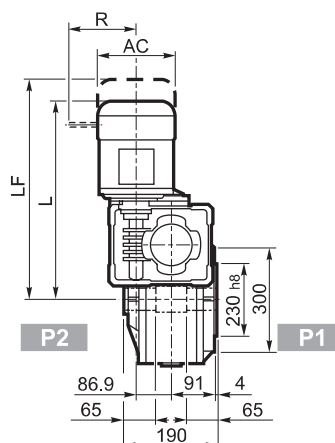
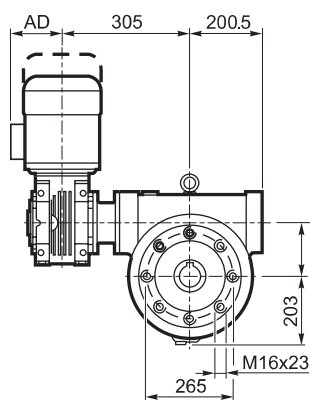


W/VF 86/185...M/ME/MX/MXN

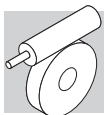
F_
FC_
FR_



P_

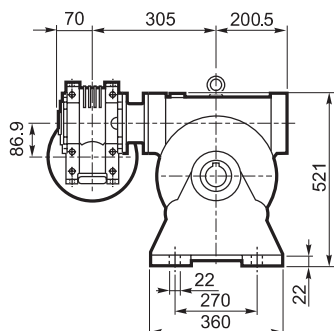


			M/ME/MX/MXN				M...FD M...FA		M...FD		M...FA	
			AC	L	AD	Kg	LF	Kg	R	AD	R	AD
W/VF 86/185	S1	M1	138	509	108	116	570	118	103	135	124	108
W/VF 86/185	S1	ME1	138	509	108	116	599	118	103	135	124	135
W/VF 86/185	S10	MXN10	138	538	137	118.4	597	120.8	103	138	121	138
W/VF 86/185	S2	ME2S	156	534	119	120	604	121.6	129	143	134	143
W/VF 86/185	S2	MX2S	156	578	119	125.1	650	128.9	129	143	134	143
W/VF 86/185	S20	MXN20	158	631.5	146	125.1	702.5	127.3	129	148	131	148
W/VF 86/185	S3	ME3S	195	577	142	126.5	673	132.5	160	155	160	155
W/VF 86/185	S3	MX3S	195	609	142	129.5	699	136.5	160	155	160	155
W/VF 86/185	S3	ME3L	195	609	142	132	700	138	160	155	160	155
W/VF 86/185	S3	MX3L	195	653	142	138	745	145	160	155	160	155

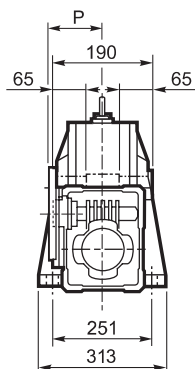


W/VF 86/185...P (IEC)

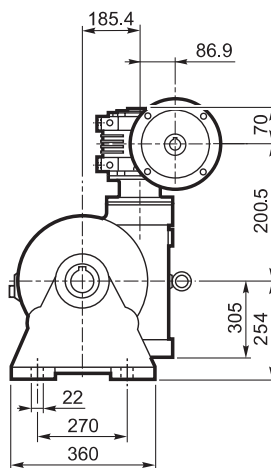
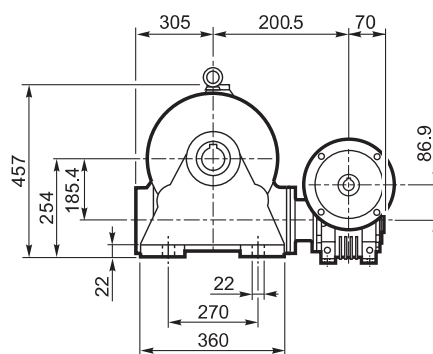
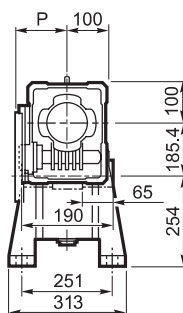
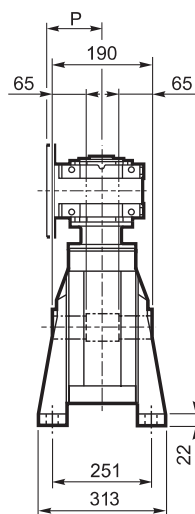
A



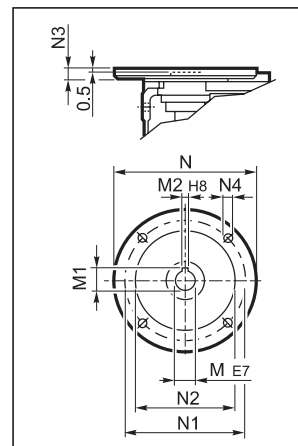
N



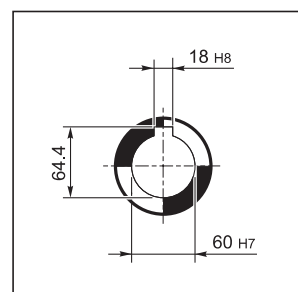
V

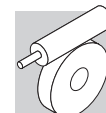


INPUT



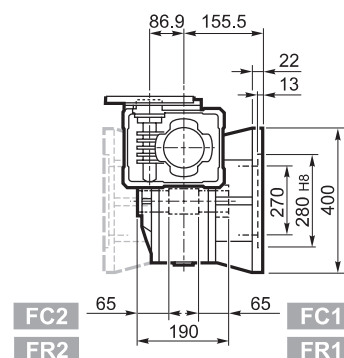
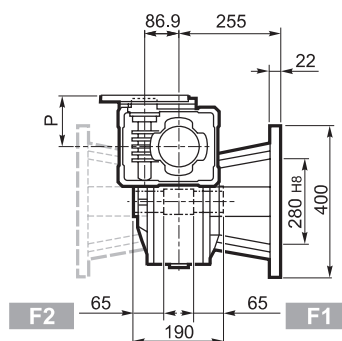
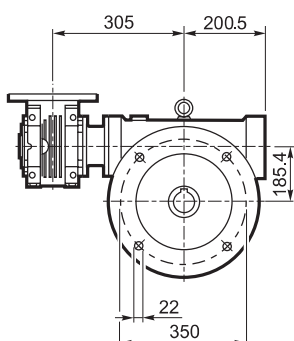
OUTPUT



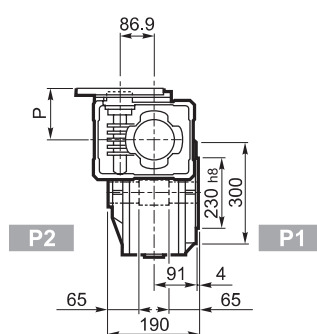
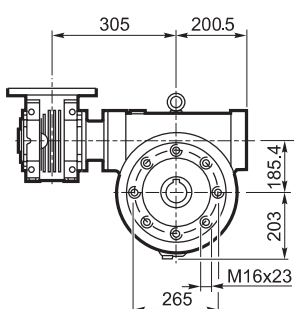


W/VF 86/185...P (IEC)

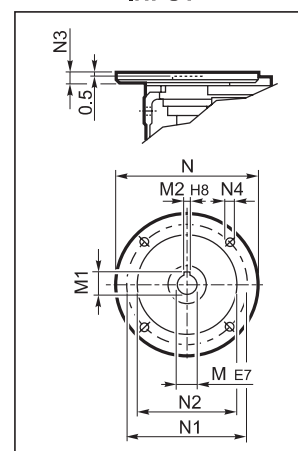
F_
FC_
FR_



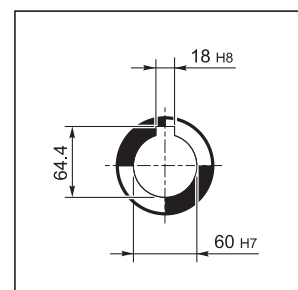
P_



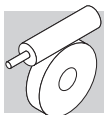
INPUT



OUTPUT

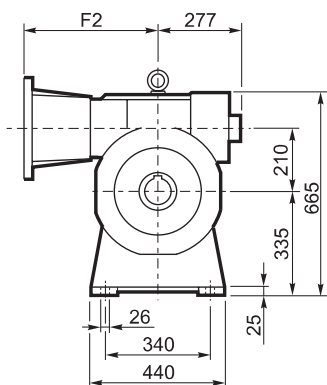
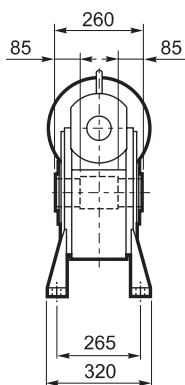


		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W/VF 86/185	P71 B5	14	16.3	5	160	130	110	11	9	128	109
W/VF 86/185	P80 B5	19	21.8	6	200	165	130	12	11.5	128	
W/VF 86/185	P90 B5	24	27.3	8	200	165	130	12	11.5	128	
W/VF 86/185	P100 B5	28	31.3	8	250	215	180	13	12.5	136	
W/VF 86/185	P112 B5	28	31.3	8	250	215	180	13	12.5	136	
W/VF 86/185	P80 B14	19	21.8	6	120	100	80	7.5	6.5	128	
W/VF 86/185	P90 B14	24	27.3	8	140	115	95	7.5	8.5	128	
W/VF 86/185	P100 B14	28	31.3	8	160	130	110	10	8.5	136	
W/VF 86/185	P112 B14	28	31.3	8	160	130	110	10	8.5	136	

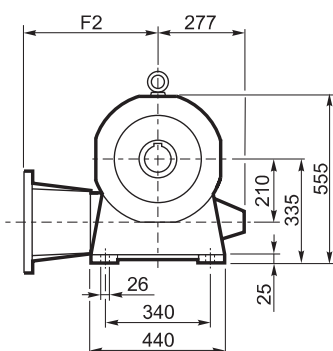
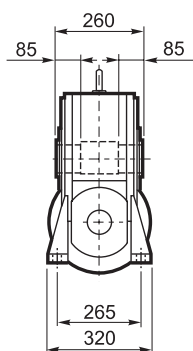


VF 210...P (IEC)

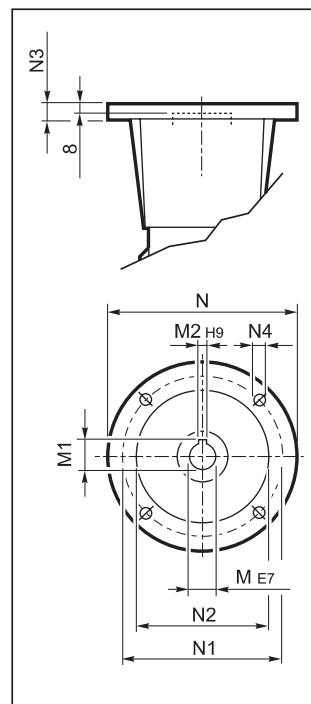
A



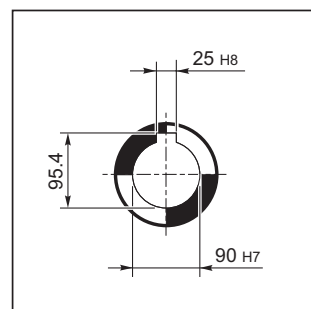
N

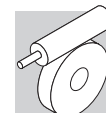


INPUT



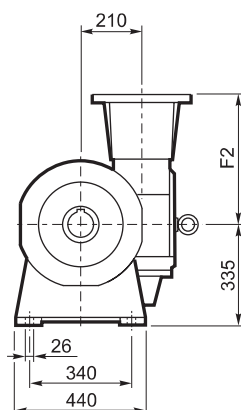
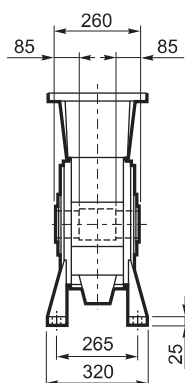
OUTPUT



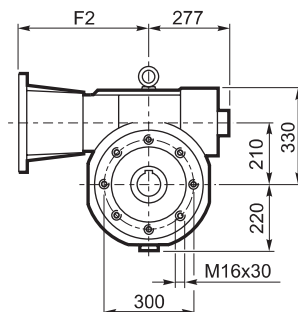
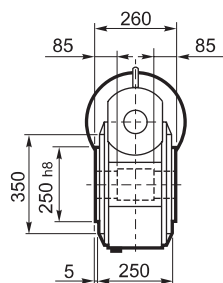


VF 210...P (IEC)

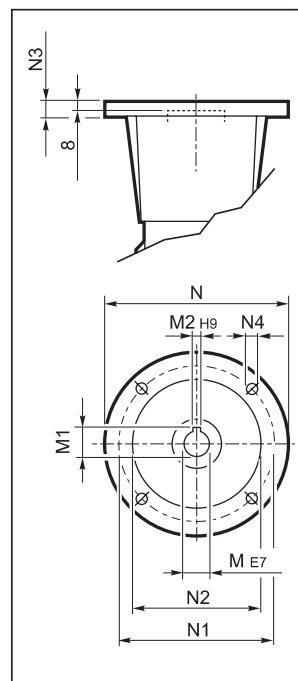
V



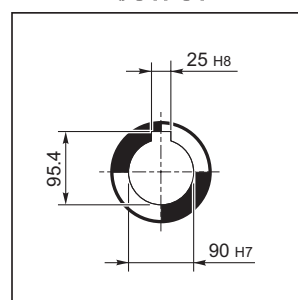
P



INPUT



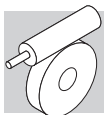
OUTPUT



Fan cooling as standard on versions A and P.
P(IEC) arrangements come complete with gear coupling enclosed in the bell housing.

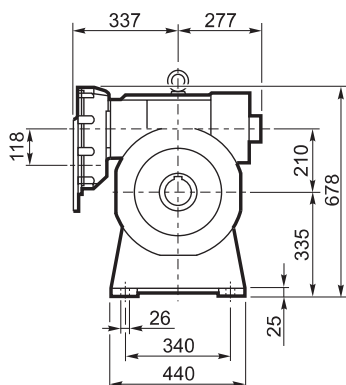
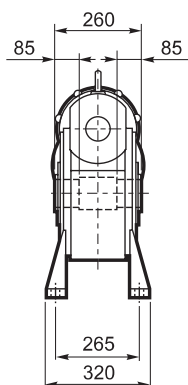
		F2	M	M1	M2	N	N1	N2	N3	N4	Kg
		485	38	41.3	10	300	265	230	25	M12	210
VF 210	P160 B5	460	42	45.3	12	350	300	250	22	18	
VF 210	P180 B5	460	48	51.8	14	350	300	250	22	18	
VF 210	P200 B5	485	55	59.3	16	400	350	300	25	M16	
VF 210	P225 B5	490	60	64.4	18	450	400	350	22	18 #	

N° 8 holes at 45°

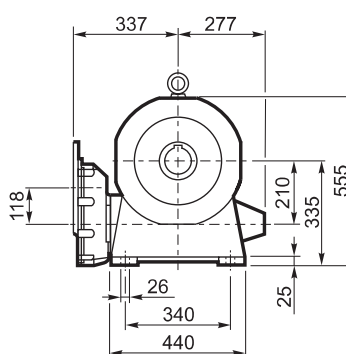
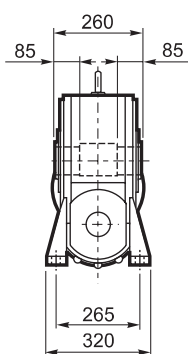


VFR 210...P (IEC)

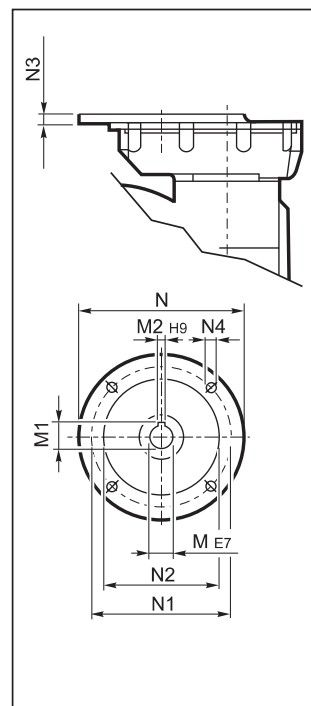
A



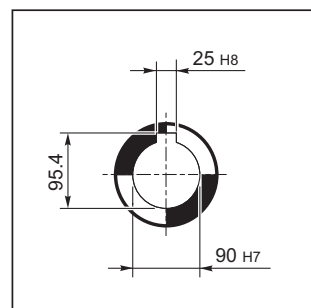
N

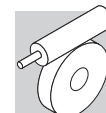


INPUT



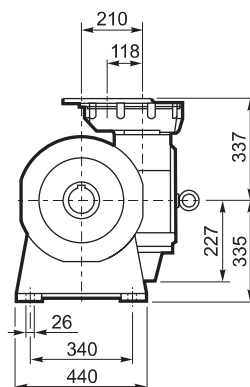
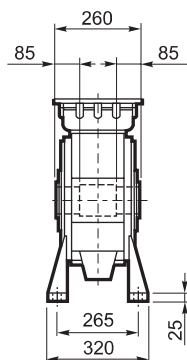
OUTPUT



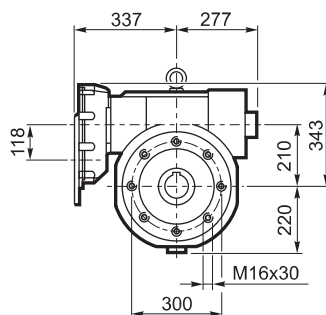
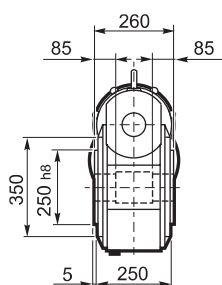


VFR 210...P (IEC)

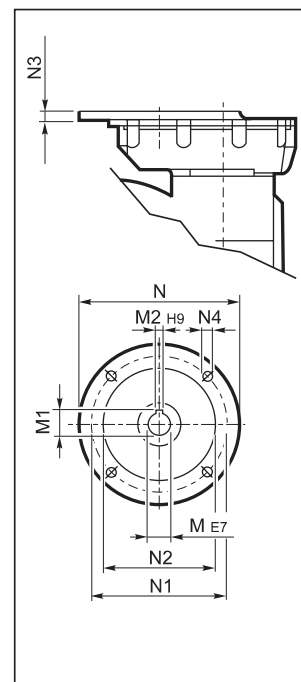
V



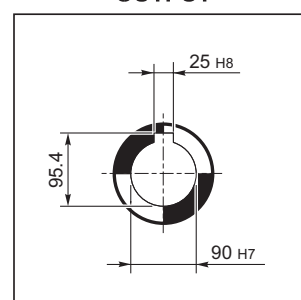
P



INPUT



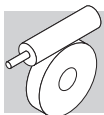
OUTPUT



Fan cooling as standard on versions A and P.

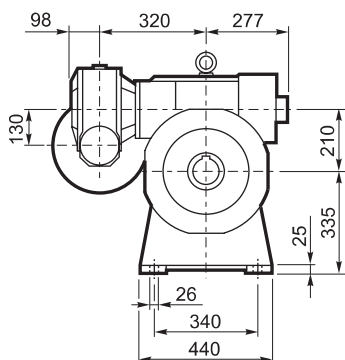
		M	M1	M2	N	N1	N2	N3	N4	Kg
		28 K6	31.3	8	250	215	180	13	M12x35	185
VRF 210	P112 B5	28 K6	31.3	8	250	215	180	13	M12x35	
VFR 210	P132 B5	38 J6	41.3	10	300	265	230	13	M12x35	
VFR 210	P160 B5	42 J6	44.3#	12	350	300	250	18	M16x60	

Lowered key

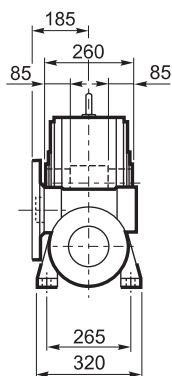


VF/VF 130/210...P (IEC)

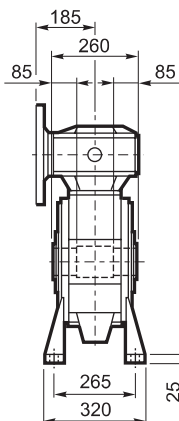
A



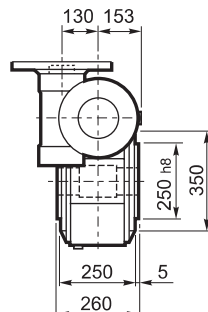
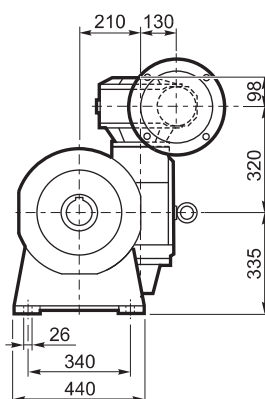
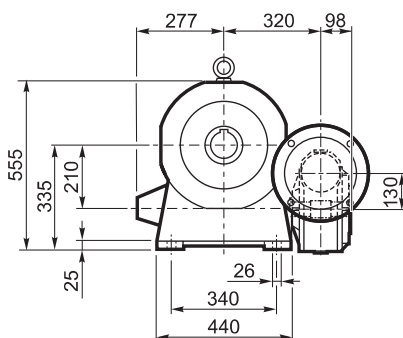
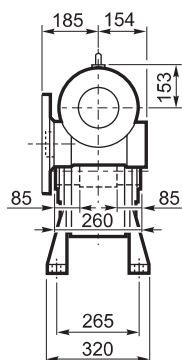
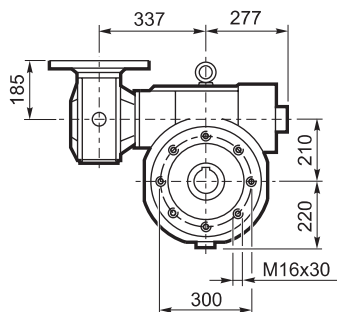
N



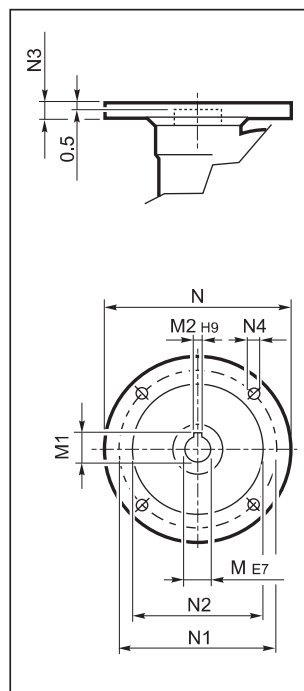
V



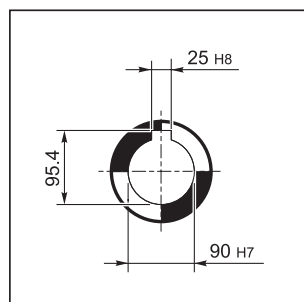
P



INPUT



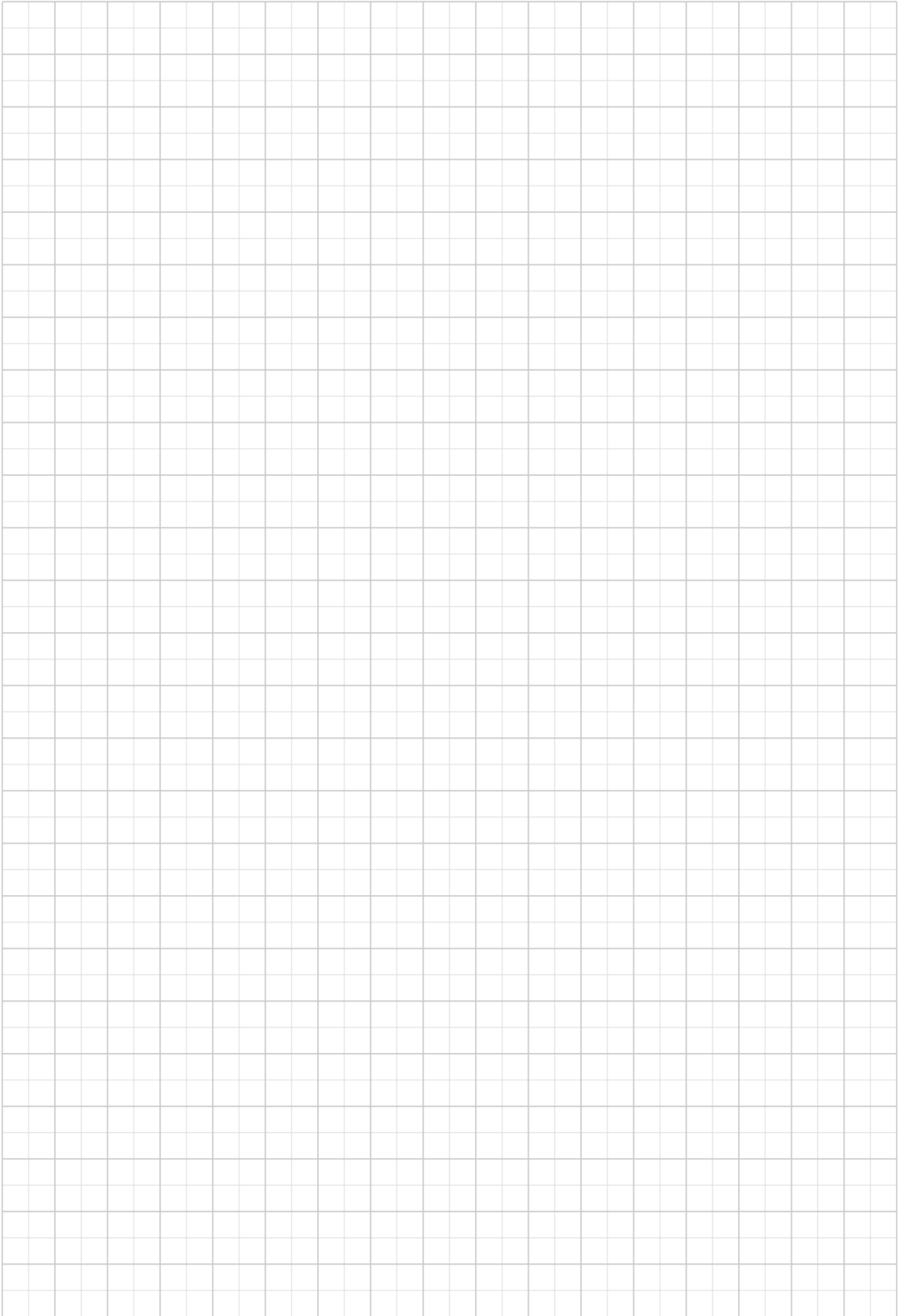
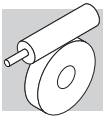
OUTPUT

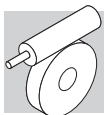


Fan cooling as standard
on versions A and P.

		M	M1	M2	N	N1	N2	N3	N4	
VF/VF 130/210	P90 B5	24	27.3	8	200	165	130	17	11	225
VF/VF 130/210	P100 B5	28	31.3	8	250	215	180	17	13	
VF/VF 130/210	P112 B5	28	31.3	8	250	215	180	17	13	
VF/VF 130/210	P132 B5	38	40.1#	10	300	265	230	17	13	

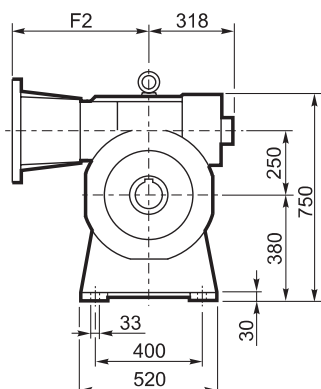
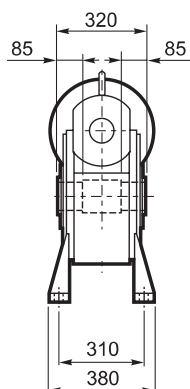
Lowered key



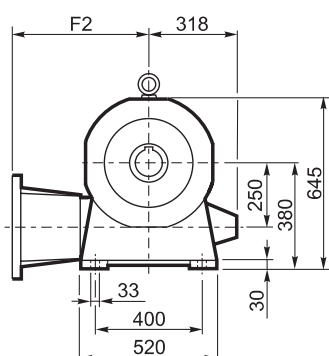
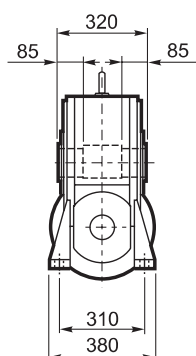


VF 250...P (IEC)

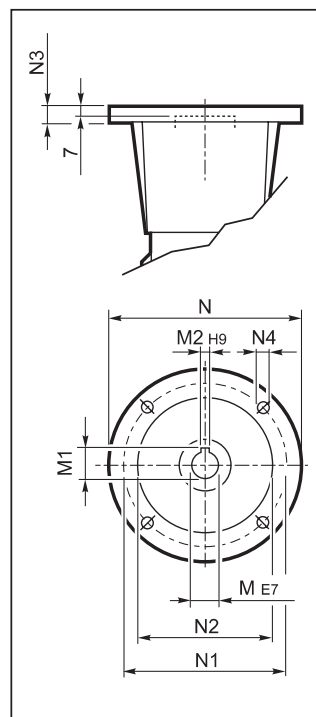
A



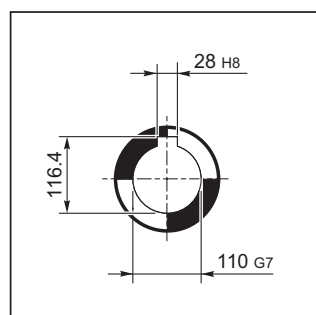
N

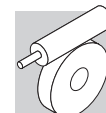


INPUT



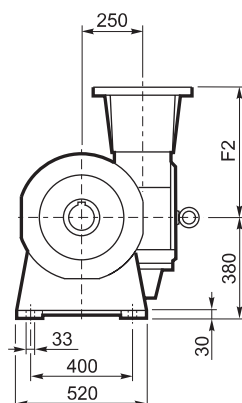
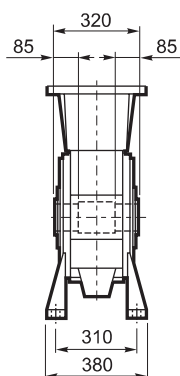
OUTPUT



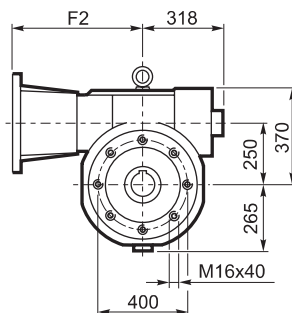
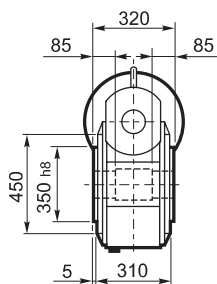


VF 250...P (IEC)

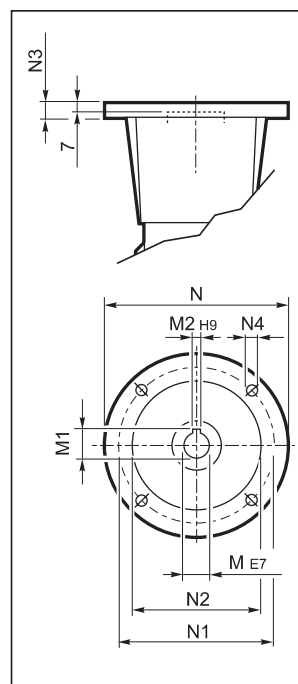
V



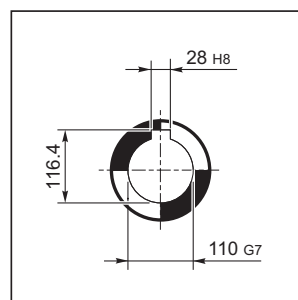
P



INPUT



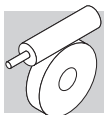
OUTPUT



Fan cooling as standard on versions A and P.
P(IEC) arrangements come complete with gear coupling enclosed in the bell housing.

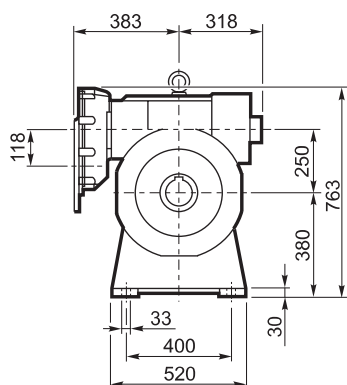
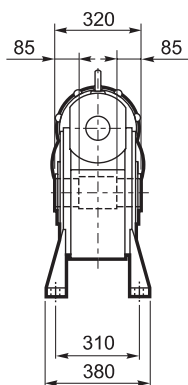
		F2	M	M1	M2	N	N1	N2	N3	N4	
VF 250	P132 B5	531	38	41.3	10	300	265	230	25	M12	310
VF 250	P160 B5	506	42	45.3	12	350	300	250	22	18	
VF 250	P180 B5	506	48	51.8	14	350	300	250	22	18	
VF 250	P200 B5	531	55	59.3	16	400	350	300	25	M16	
VF 250	P225 B5	536	60	64.4	18	450	400	350	22	18#	

N° 8 holes at 45°

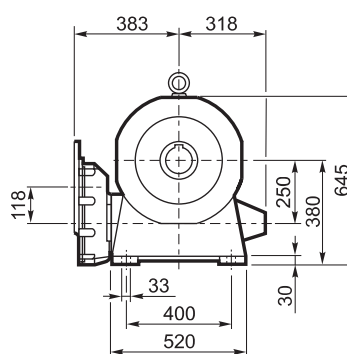
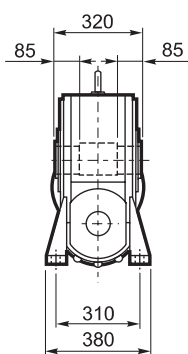


VFR 250...P (IEC)

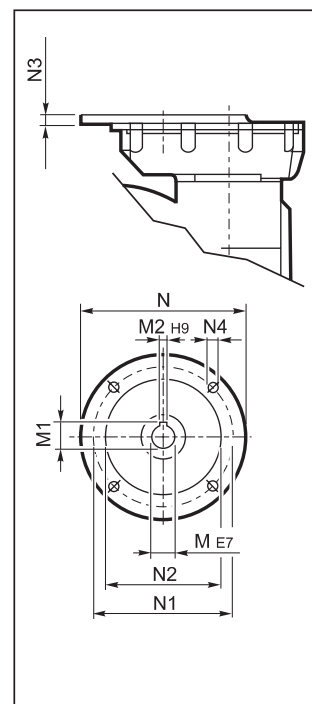
A



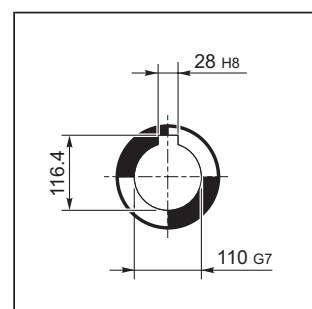
N

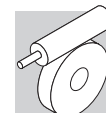


INPUT



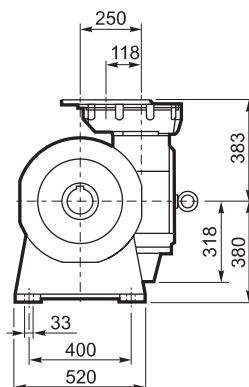
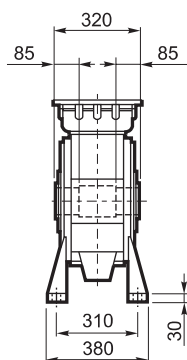
OUTPUT



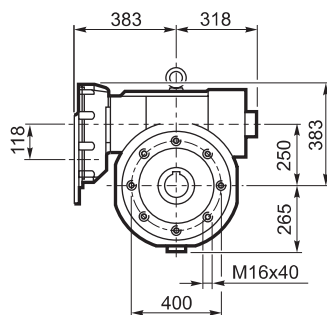
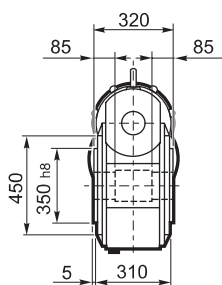


VFR 250...P (IEC)

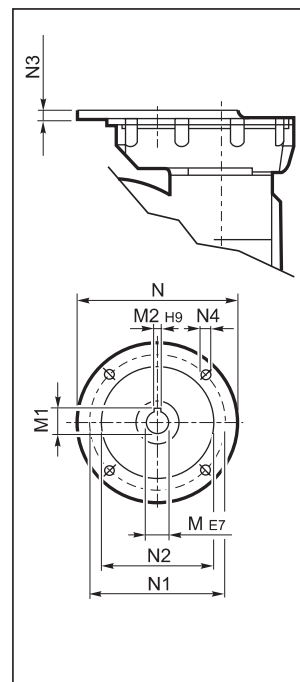
V



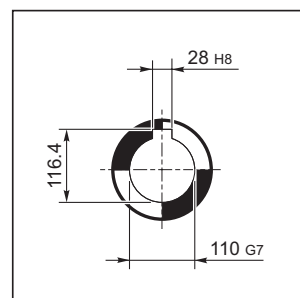
P



INPUT



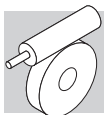
OUTPUT



Fan cooling as standard on versions A and P.

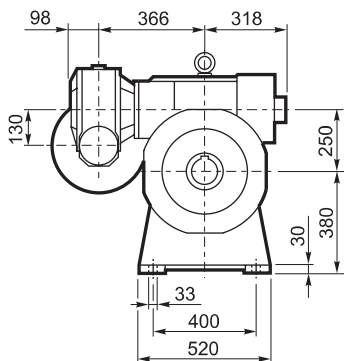
		M	M1	M2	N	N1	N2	N3	N4	Kg
VRF 250	P100 B5	28 K6	31.3	8	250	215	180	13	M12x35	295
VRF 250	P112 B5	28 K6	31.3	8	250	215	180	13	M12x35	
VFR 250	P132 B5	38 J6	41.3	10	300	265	230	13	M12x35	
VFR 250	P160 B5	42 J6	44.3#	12	350	300	250	18	M16x60	

Lowered key

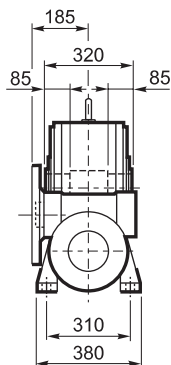


VF/VF 130/250...P (IEC)

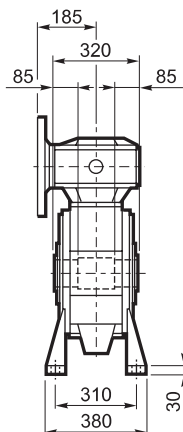
A



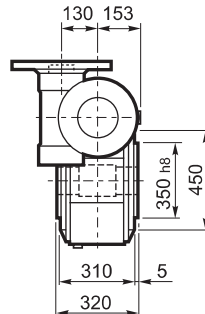
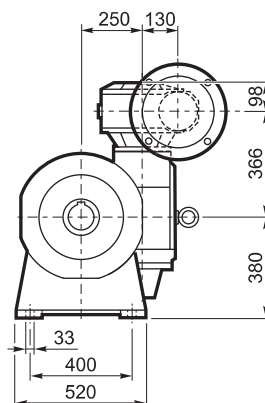
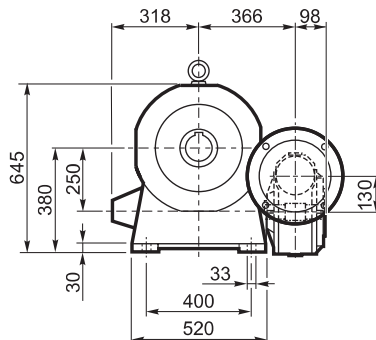
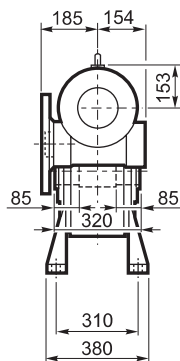
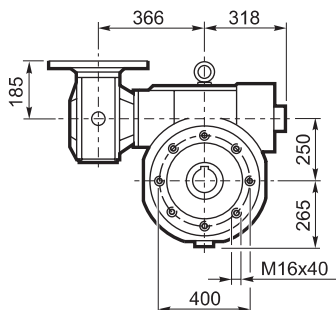
N



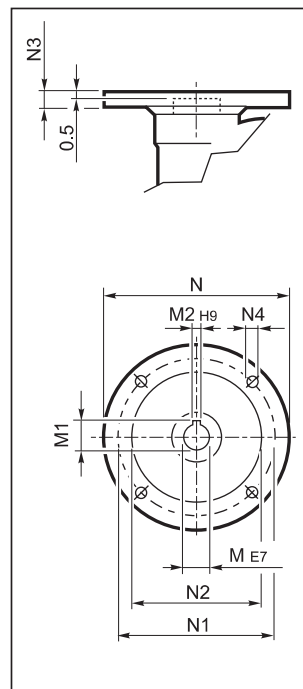
V



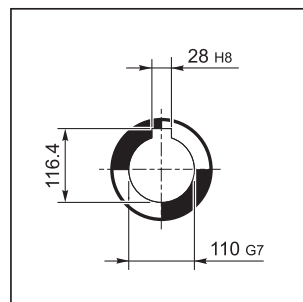
P



INPUT



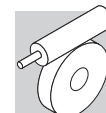
OUTPUT



Fan cooling as standard
on versions A and P.

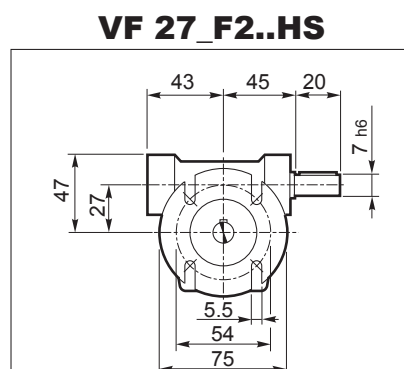
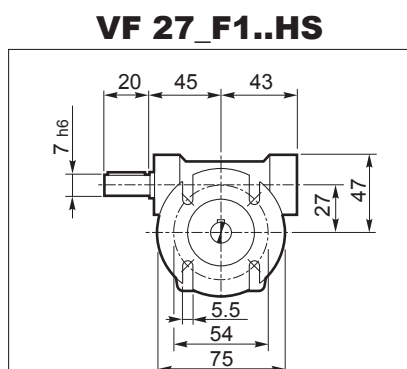
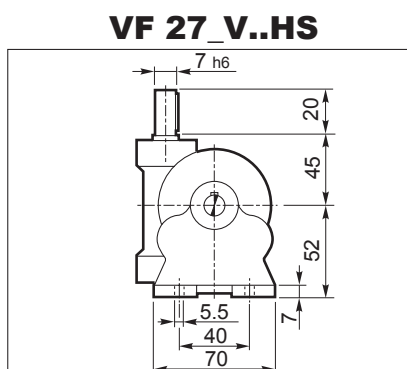
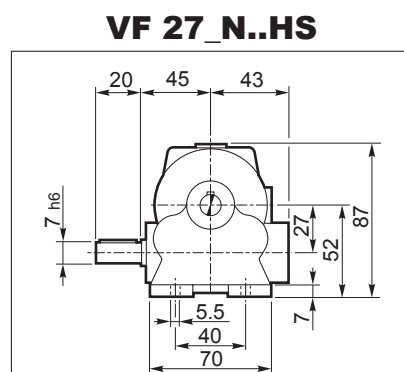
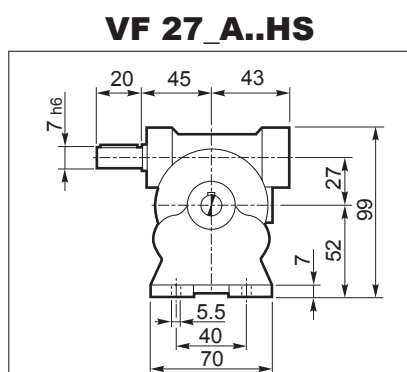
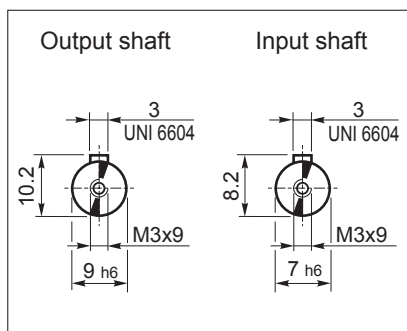
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/VF 130/250	P 90 B5	24	27.3	8	200	165	130	17	11	325
VF/VF 130/250	P100 B5	28	31.3	8	250	215	180	17	13	
VF/VF 130/250	P112 B5	28	31.3	8	250	215	180	17	13	
VF/VF 130/250	P132 B5	38	40.1#	10	300	265	230	17	13	

Lowered key



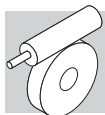
27 DIMENSIONS FOR GEAR UNITS WITH SOLID INPUT SHAFT

VF 27...HS



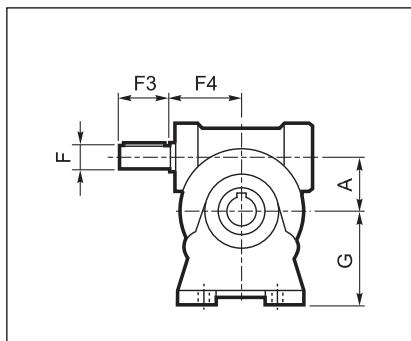
VF 27_HS	0.73

Dimensions common to the other configurations can be found at page 121.

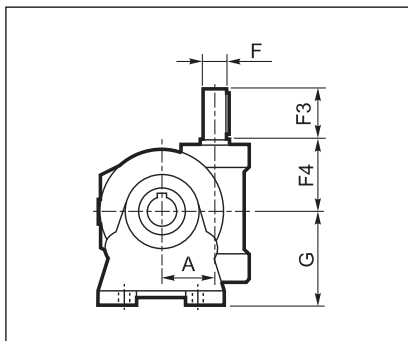


VF...HS - W...HS

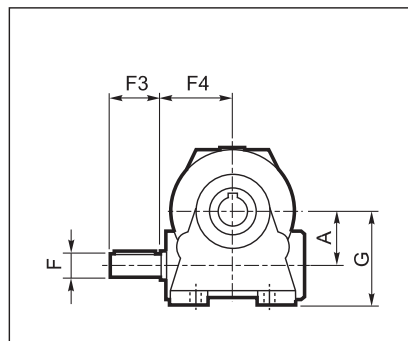
VF_A..HS



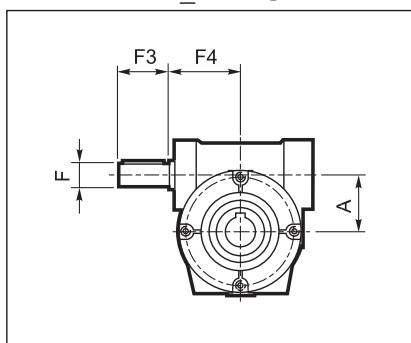
VF_V..HS



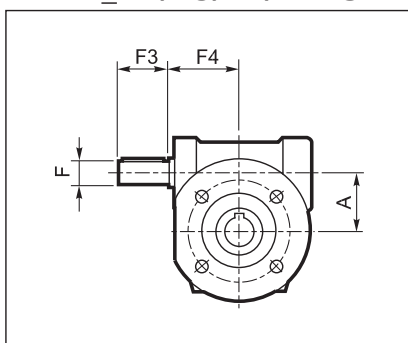
VF_N..HS



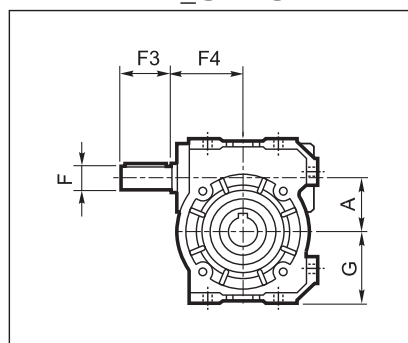
VF_P..HS



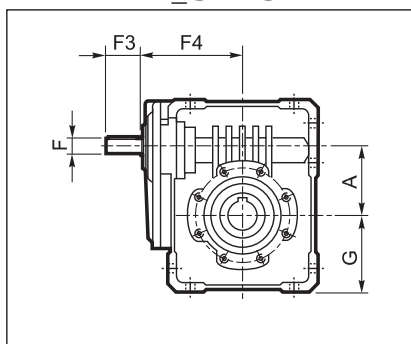
VF_FA/FC/FR/F..HS



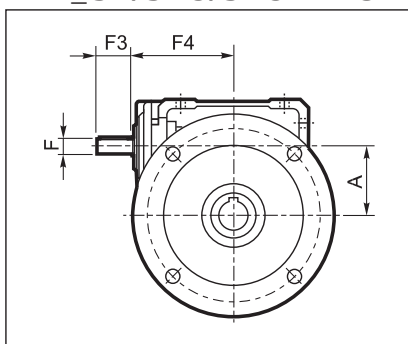
VF_U..HS



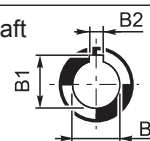
W_U..HS



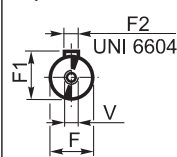
W_UF/UFC/UFCR..HS



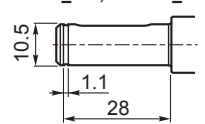
Output shaft



Input shaft

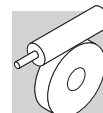


VF 44_HS, VF 44_U_HS



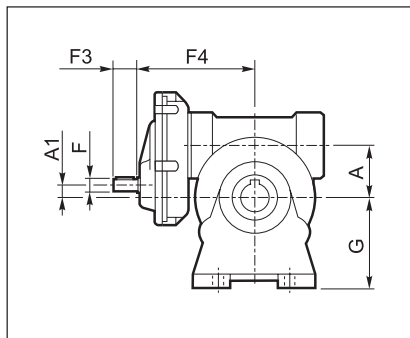
	A	B	B1	B2	F	F1	F2	F3	F4	G	V	kg
VF 30_HS	30	14 H7	16.3	5 H8	9 h6	10.2	3	20	50	55	—	1.1
VF 30_U_HS										47		
VF 44_HS	44.6	18 H7	20.8	6 H8	11 h6	12.5	4	30	54	72	—	2.0
VF 44_U_HS										55		
VF 49_HS	49.5	25 H7	28.3	8 H8	16 h6	18	5	40	65	82	M6x16	3.0
VF 49_U_HS										64.5		
W 63_HS	62.17	25 H7	28.3	8 H8	18 h6	20.5	6	40	110.5	72.5	M6x16	6.4
W 75_HS	75	30(28) H7	33.3(31.3)	8 H8	19 h6	21.5	6	40	128	87	M6x16	10.0
W 86_HS	86.9	35 H7	38.3	10 H8	25 h6	28	8	50	144	100	M8x19	14.1
W 110_HS	110.1	42 H7	45.3	12 H8	25 h6	28	8	60	168	125	M8x19	27
VF 130_HS	130	45 H7	48.8	14 H8	30 h6	33	8	60	160	195	M8x20	49
VF 150_HS	150	50 H7	53.8	14 H8	35 h6	38	10	65	185	220	M8x20	60
VF 185_HS	185.4	60 H7	64.4	18 H8	40 h6	43	12	70	214.5	254	M8x20	94
VF 210_HS	210	90 H7	95.4	25 H8	48 h6	51.5	14	110	230	335	M16x40	175
VF 250_HS	250	110 G7	116.4	28 H8	55 h6	59	16	110	275.5	380	M16x40	275

Dimensions common to the other configurations can be found from page 122 to 183.

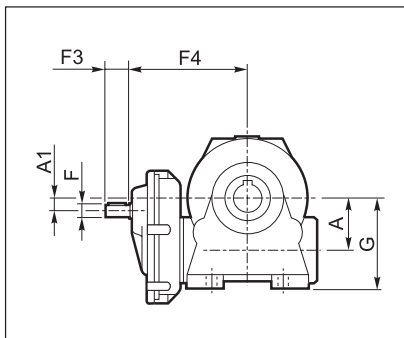


VFR...HS - WR...HS

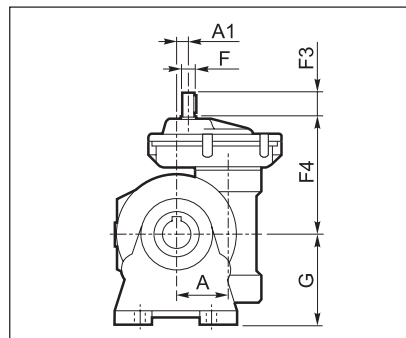
VFR_A..HS



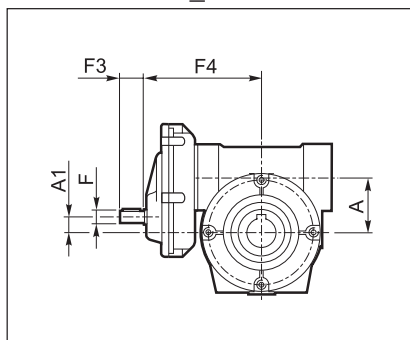
VFR_N..HS



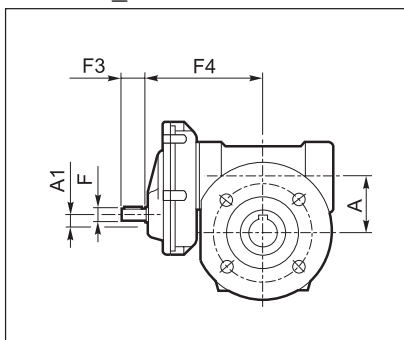
VFR_V..HS



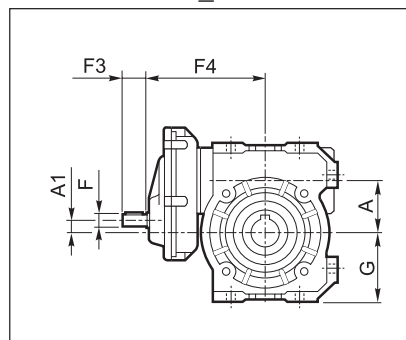
VFR_P..HS



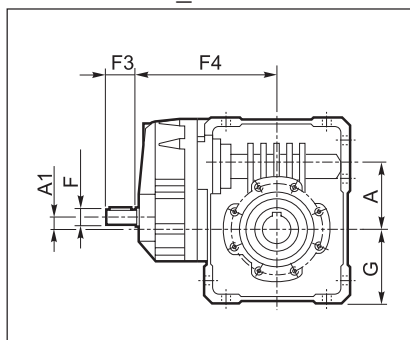
VFR_FA/FC/FR/F..HS



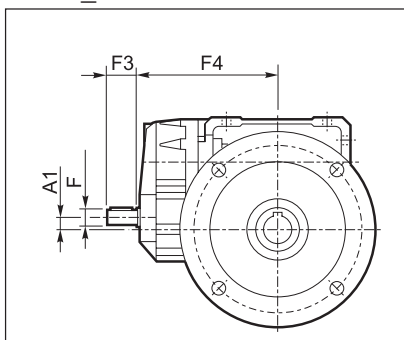
VFR_U..HS



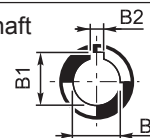
WR_U..HS



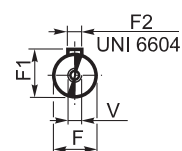
WR_UF/UFC/UFCR..HS




Output shaft

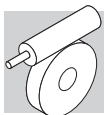


Input shaft



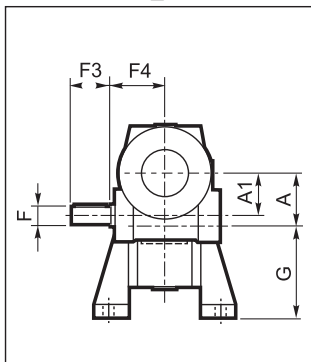
	A	A1	B	B1	B2	F	F1	F2	F3	F4	G	V	
VFR 49_HS	49.5	10	25 H7	28.3	8 H8	11 h6	12.5	4	23	110	82	M4x10	5
VFR 49 U_HS											64.5		
WR 63_HS	62.17	11.42	25 H7	28.3	8 H8	14 h6	16	5	30	138	72.5	M5x12.5	7.1
WR 75_HS	75	11	30(28) H7	33.3(31.3)	8 H8	19 h6	21.5	6	40	162	87	M6x16	11.1
WR 86_HS	86.9	22.9	35 H7	38.3	10 H8	19 h6	21.5	6	40	178	100	M6x16	14.7
WR 110_HS	110.1	21.1	42 H7	45.3	12 H8	24 h6	27	8	50	201	125	M8x19	34
VFR 130_HS	130	45	45 H7	48.8	14 H8	24 h6	27	8	50	228	195	M8x20	57
VFR 150_HS	150	53	50 H7	53.8	14 H8	28 h6	31	8	60	280	220	M8x20	71
VFR 185_HS	185.4	88.4	60 H7	64.4	18 H8	28 h6	31	8	60	310	254	M8x20	110
VFR 210_HS	210	92	90 H7	95.4	25 H8	38 h6	41	10	80	335	335	M10x25	185
VFR 250_HS	250	132	110 G7	116.4	28 H8	38 h6	41	10	80	383	380	M10x25	295

Dimensions common to the other configurations can be found from page 132 to 185.

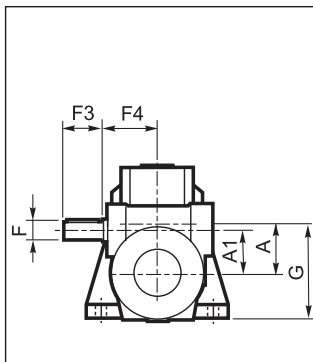


VF/VF...HS - VF/W...HS - W/VF...HS

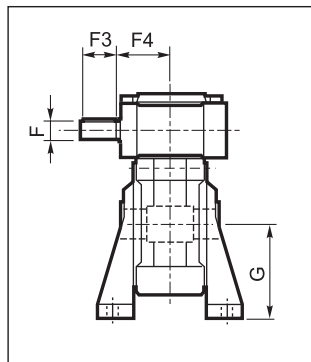
**VF/VF_A..HS
W/VF_A..HS**



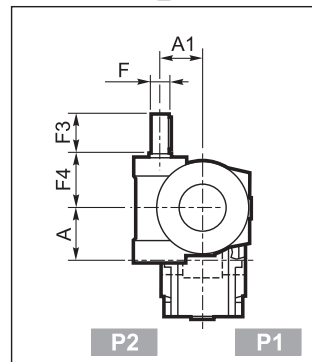
**VF/VF_N..HS
W/VF_N..HS**



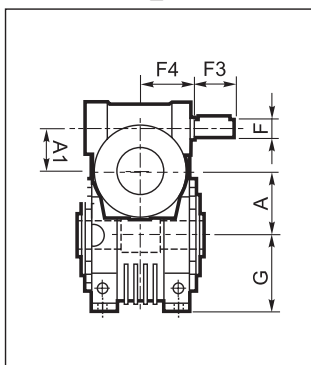
**VF/VF_V..HS
W/VF_V..HS**



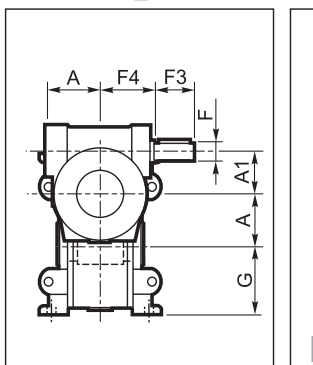
**VF/VF_P..HS
W/VF_P..HS**



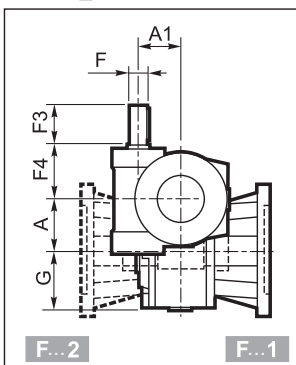
VF/W_U..HS



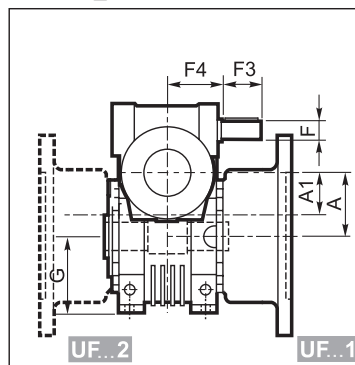
VF/VF_U..HS



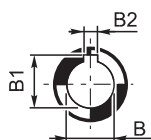
**VF/VF_F/FA/FC/FR..HS
W/VF_F/FA/FC/FR..HS**



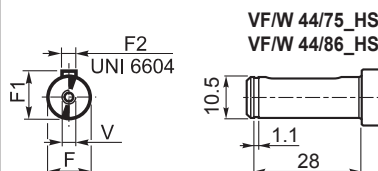
VF/W_UF/UFC/UFCR..HS



Output shaft

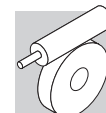


Input shaft



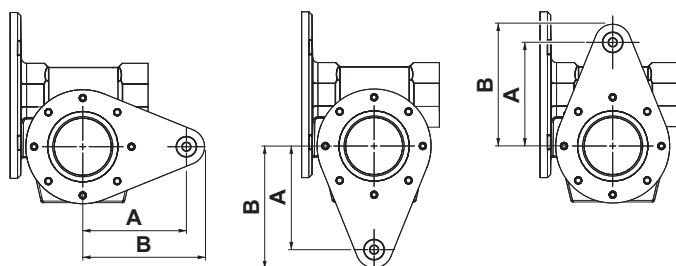
	A	A1	B	B1	B2	F	F1	F2	F3	F4	G	V	kg
VF/VF 30/44_HS	44.6	30	18 H7	20.8	6 H8	9 h6	10.2	3	20	50	72	—	3.5
VF/VF 30/44 U_HS											55		
VF/VF 30/49_HS	49.5	30	25 H7	28.3	8 H8	9 h6	10.2	3	20	50	82	—	4.5
VF/VF 30/49 U_HS											64.5		
VF/W 30/63_HS	62.17	30	25 H7	28.3	8 H8	9 h6	10.2	3	20	50	100	—	7.5
VF/W 44/75_HS	75	44.6	30 (28) H7	33.3 (31.3)	8 H8	11 h6	12.5	4	30	54	115	—	16.1
VF/W 44/86_HS	86.9	44.6	35 H7	38.3	10 H8	11 h6	12.5	4	30	54	142	—	42
VF/W 49/110_HS	110.0	49.5	42 H7	45.3	12 H8	16 h6	18	5	40	65	170	M6x16	46
W/VF 63/130_HS	130	62.17	45 H7	48.8	14 H8	18 h6	20.5	6	40	110.5	72.5	M6x16	74
W/VF 86/150_HS	150	86.9	50 H7	53.8	14 H8	25 h6	28	8	50	144	100	M8x19	108
W/VF 86/185_HS	185.4	86.9	60 H7	64.4	18 H8	25 h6	28	8	50	144	100	M8x19	109
VF/VF 130/210_HS	210	130	90 H7	95.4	25 H8	30 h6	33	8	60	160	335	M8	225
VF/VF 130/250_HS	250	130	110 G7	116.4	28 H8	30 h6	33	8	60	160	380	M8	325

Dimensions common to the other configurations can be found from page 128 to 186.

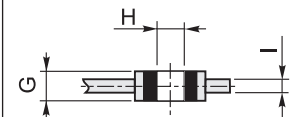


28 DIMENSIONS FOR GEAR UNITS WITH TORQUE ARM

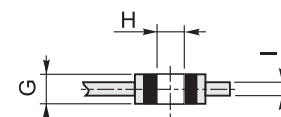
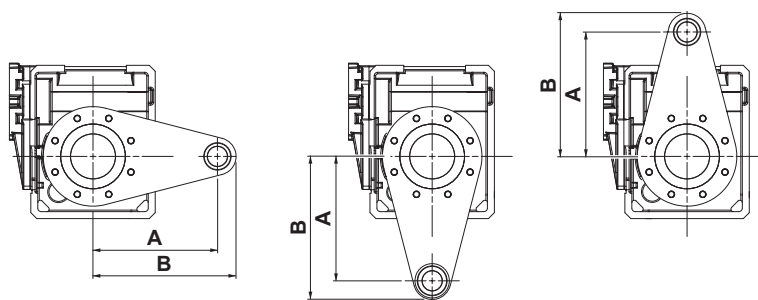
VF - VFR - VF/VF - W/VF



VF 30 - VF 44 - VF 49



W - WR - VF/W

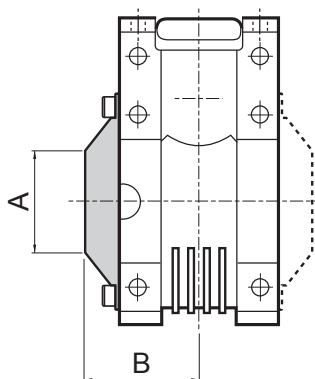


		A	B	G	H	I
VF	30	100	117.5	14	8	4
VFR	44	100	117.5	14	8	4
VF/VF	49	100	117.5	14	8	4
W	63	150	178	20	10	6
WR	75	200	237	25	20	6
VF/W	86	200	238	25	20	6
	110	250	288	25	20	6
	130	300	345	30	25	6
VF	150	300	345	30	25	6
VFR	185	350	395	30	25	6
W/VF	210	350	450	60	50	8
	250	400	500	60	50	10

Dimensions common to the other configurations can be found from page 122 to 185.

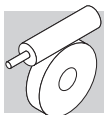
29 DIMENSIONS FOR GEAR UNITS WITH PROTECTION CAP

W - WR - VF/W



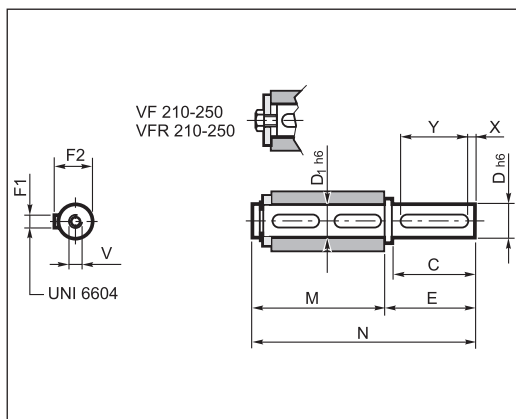
		A	B
W	63	Ø 35	82
WR	75	Ø 54	85.5
VF/W	86	Ø 71	93.5
	110	Ø 89	103

Dimensions common to the other configurations can be found from page 136 to 150.

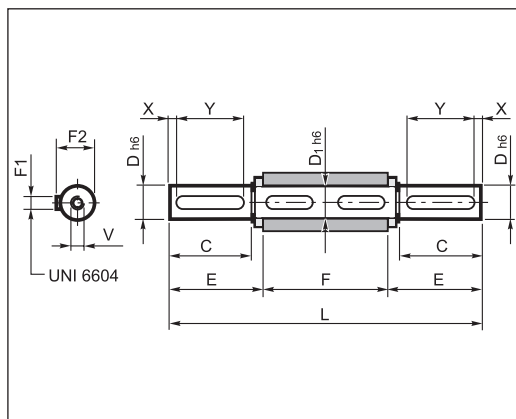


30 ACCESSORIES

30.1 Plug-in output shaft

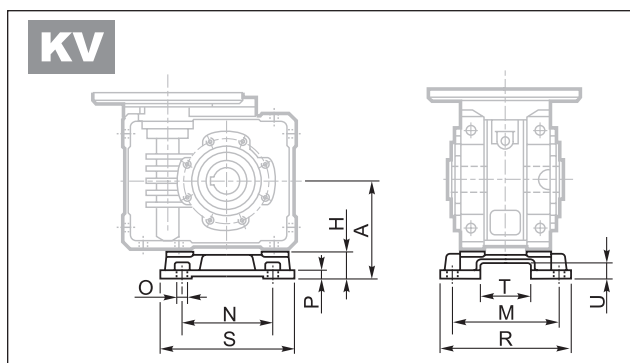
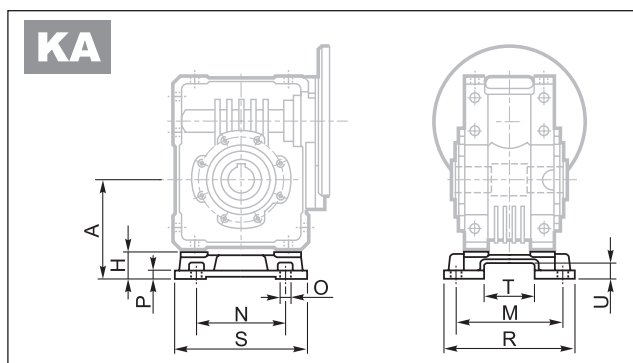


		C	D	D1	E	F1	F2	M	N	V	X	Y
VF	30	30	14	14	35	5	16	61	96	M5x13	5	20
VFR	44	40	18	18	45	6	20.5	70	115	M6x16	5	30
VF/VF	49	60	25	25	65	8	28	89	154	M8x19	5	50
	63	60	25	25	65	8	28	127	192	M8x19	5	50
W	75_D28	60	28	30	65	8	31	134	199	M8x20	5	50
WR	75_D30	60	30	30	65	8	33	134	199	M10x22	5	50
VF/W	86	60	35	35	65	10	38	149	214	M10x22	5	50
	110	75	42	42	80	12	45	164	244	M12x28	7.5	60
	130	80	45	45	85	14	48.5	176	261	M12x32	5	70
VF	150	85	50	50	93	14	53.5	185	278	M16x40	7.5	70
VFR	185	100	60	60	110	18	64	200	310	M16x40	10	80
W/VF	210	130	90	90	140	25	95	255	395	M20x50	5	120
	250	165	110	110	175	28	116	315	490	M24x64	15	140

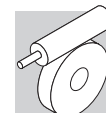


		C	D	D1	E	F	F1	F2	L	V	X	Y
VF	30	30	14	14	32.5	55	5	16	120	M5x13	5	20
VFR	44	40	18	18	42.7	64	6	20.5	149.4	M6x16	5	30
VF/VF	49	60	25	25	63.2	82	8	28	208.4	M8x19	5	50
	63	60	25	25	63.2	120	8	28	246.4	M8x19	5	50
W	75_D28	60	28	30	64	127	8	31	255	M8x20	5	50
WR	75_D30	60	30	30	64	127	8	33	255	M10x22	5	50
VF/W	86	60	35	35	64	140	10	38	268	M10x22	5	50
	110	75	42	42	79.3	155	12	45	313.5	M12x28	7.5	60
	130	80	45	45	84.7	165	14	48.5	334.5	M12x32	5	70
VF	150	85	50	50	90	175	14	53.5	355	M16x40	7.5	70
VFR	185	100	60	60	105	190	18	64	400	M16x40	10	80
W/VF	210	130	90	90	140	260	25	95	540	M20x50	5	120
	250	165	110	110	175	320	28	116	670	M24x64	15	140

30.2 VF-interchangeable foot kits KA, KV



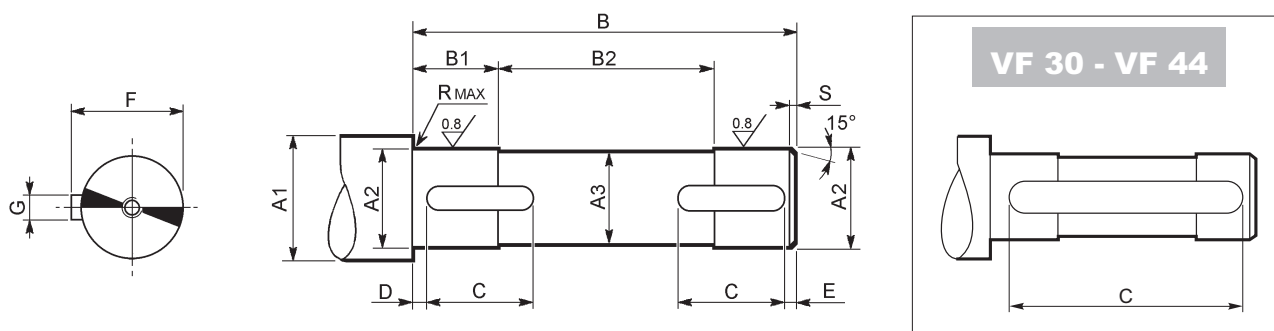
	A	H	M	N	O	P	R	S	T	U
W 63 - WR 63	100	27.5	111	95	11	8	135	145	56.5	15.5
W 75 - WR 75	115	28	115	120	11	9	139	174	56.5	15.5
W 86 - WR 86	142	42	146	140	11	11	170	200	69	20
W 110 - WR 110	170	45	181	200	13	14	210	250	69	20




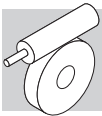
31 CUSTOMER'S SHAFT

Make the driven shaft to be coupled to the gear unit's output shaft from a good quality steel, respecting the dimensions given in the table.

A device such as that illustrated below should also be installed to secure the shaft axially. Take care to verify and dimension the various components to suit the needs of the application.



	A1	A2	A3	B	B1	B2	C	D	E	F	G	R	S	 UNI 6604
VF 30	≥ 19	14 f7	13	53	18.5	16	40	6.5	6.5	16	5 h9	0.5	1.5	5x5x40 A
VF 44	≥ 23	18 f7	17	62	22.5	17	50	6	6	20.5	6 h9	0.5	1.5	6x6x50 A
VF 49	≥ 30	25 f7	24	80	20.5	39	20	2	2	28	8 h9	1	1.5	8x7x20 A
W 63	≥ 30	25 f7	24	118	38	42	35	2	2	28	8 h9	1	1.5	8x7x35 A
W 75	≥ 35	28 f7	27	125	38	49	40	2	2	31	8 h9	1	1.5	8x7x40 A
	≥ 35	30 f7	29	125	38	49	40	2	2	33	8 h9	1	1.5	8x7x40 A
W 86	≥ 42	35 f7	34	138	43	52	40	2	2	38	10 h9	1.5	1.5	10x8x40 A
W 110	≥ 48	42 f7	41	153	43	67	50	2	2	45	12 h9	1.5	2	12x8x50 A
VF 130	≥ 52	45 f7	44	163	50.5	62	60	2.5	2.5	48.5	14 h9	2.5	2	14x9x60 A
VF 150	≥ 57	50 f7	49	173	53	67	70	2.5	2.5	53.5	14 h9	2.5	2	14x9x70 A
VF 185	≥ 68	60 f7	59	188	63	62	80	2.5	2.5	64	18 h9	2.5	2	18x11x80 A
VF 210	≥ 99	90 f7	89	258	83	92	80	3	3	95	25 h9	2.5	2.5	25x14x80 A
VF 250	≥ 121	110 h7	109	318	83	152	80	3	3	116	28 h9	2.5	2.5	28x16x80 A



32 TORQUE LIMITER

32.1 Description

The friction-based torque limiter, available for wormgears type **VF44 - VF49** and **W63...W110**, is designed to protect the transmission from accidental overloads which could damage the drive elements. Against conventional external torque limiters, this versatile solution lends the following advantages:

- unchanged external dimensions against standard same model standard units
- maintenance-free, as the system is permanently lubed
- slip torque can be easily adjusted by means of a simple manual operation from the outside of the gearbox
- slipping, even if continuous, does not create any damage or wear to the mechanical parts, since slipping parts are constantly separated by an oil film.



We advise against installing this device to lifting equipment.

32.2 Operating principle

The torque limiter basically consists of a double tapered clutch with active surfaces machined on (bronze) worm wheel and hub of output shaft (nodular cast iron GS400/12). Bore of output shaft allows shaft mounting of gear unit onto driven machine.

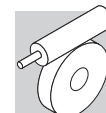
Active surfaces of the torque limiter are pressed against each other by thrust generated by adequately proportioned spring washers. Transmissible torque is proportional to axial force applied by the springs and adjustment of torque setting is easily conducted manually through an external ring nut.

32.3 Protection of the machine from overloads















The torque limiter, properly adjusted in function of the torque necessary for the driven equipment, protects all mechanical components of the transmission avoiding any damage due to overloads.

32.4 Reversing of a self-locking unit















In some applications it may be desired to rotate the output shaft while machine is not operating. Such a situation is not always possible with high-ratio self-locking worm gears. Using the torque limiter it is possible to conduct such operation untightening the ring nut.



32.5 VF...L, W...L

L1							
	N	A	V	U	F1 FC1 FR1 FA1	F2 FC2 FR2 FA2**	P1 P2
VF VF/VF*							
	U	UF1 UFC1	UF2 UFC2	UFCR1	UFCR2		
W VF/W*							

** ⇨ VF 49

L2							
	N	A	V	U	F1 FC1 FR1 FA1**	F2 FC2 FR2 FA2	P1 P2
VF VF/VF*							
	U	UF1 UFC1	UF2 UFC2	UFCR1	UFCR2		
W VF/W*							

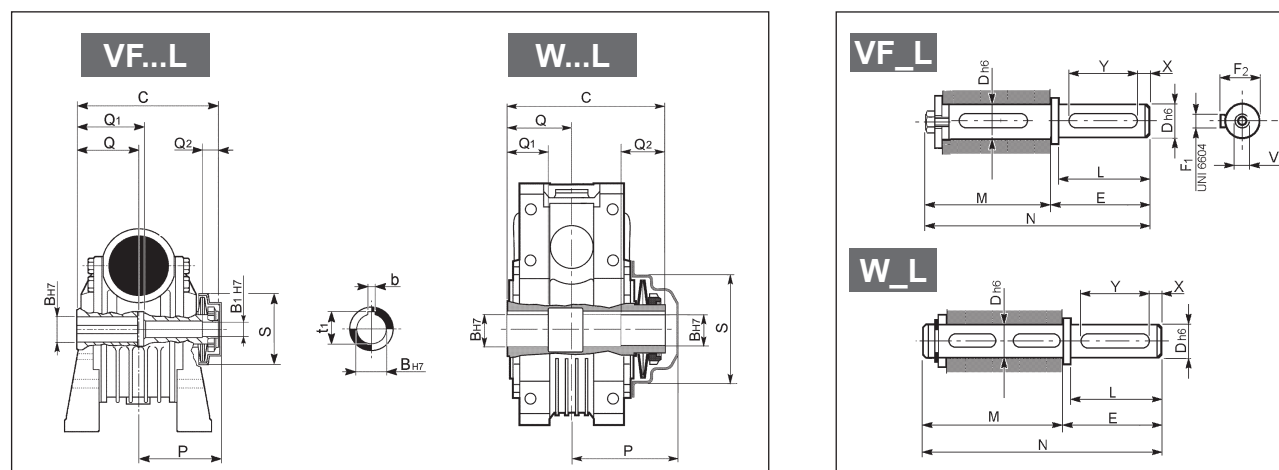
** ⇨ VF 49

* On double worm gear units the torque limiter is fitted on 2nd reducer (larger size) for the L1 or L2 configurations. Same is fitted on 1st reducer (smaller) when the LF configuration is specified.

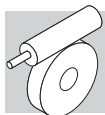
LF				
	VF/W	44/75	44/86	49/110
	W/VF	63/130	86/150	86/185

Unless otherwise specified VF...L gear units are supplied with ring nut on the left hand side (L1), viewing from the electric motor and gearbox in the B3 mounting position.

32.6 Dimensions



	Torque limiter										Single output shaft									
	C	Q	Q1	Q2	P	S	B _{H7}	B _{1 H7}	t ₁	b	L	D _{h6}	E	F1	F2	M	N	V	X	Y
VF 44L	79	32	32	12	48	42.5	18	11	20.8	6	40	18	45	6	20.5	86	131	M6x16	5	30
VF 49L	105	41	51	15	63.5	66.5	25	14	28.3	8	60	25	65	8	28	114.5	179.5	M8x19	5	40
W 63L	145	60	40	40	100	77	25	-	28.3	8	60	25	65	8	28	152	217	M8x19	5	50
W 75L_D30	154.5	63.5	40	40	104	100	30	-	33.3	8	60	30	65	8	33	161.5	226.5	M10x22	5	50
W 86L	170	70	50	45	113	119	35	-	38.3	10	60	35	65	10	38	179	244	M10x22	5	50
W 110L	191	77.5	55	45	133	134	42	-	45.3	12	75	42	80	12	45	200	280	M12x28	7.5	60



32.7 Slip torque setting

A preliminary slip torque setting is conducted at the factory. Reference is made to torque rating Mn_2 [$n_1=1400$] of the captioned VF or W gear unit.

Here below the operations performed at the factory for the initial adjustment are listed.

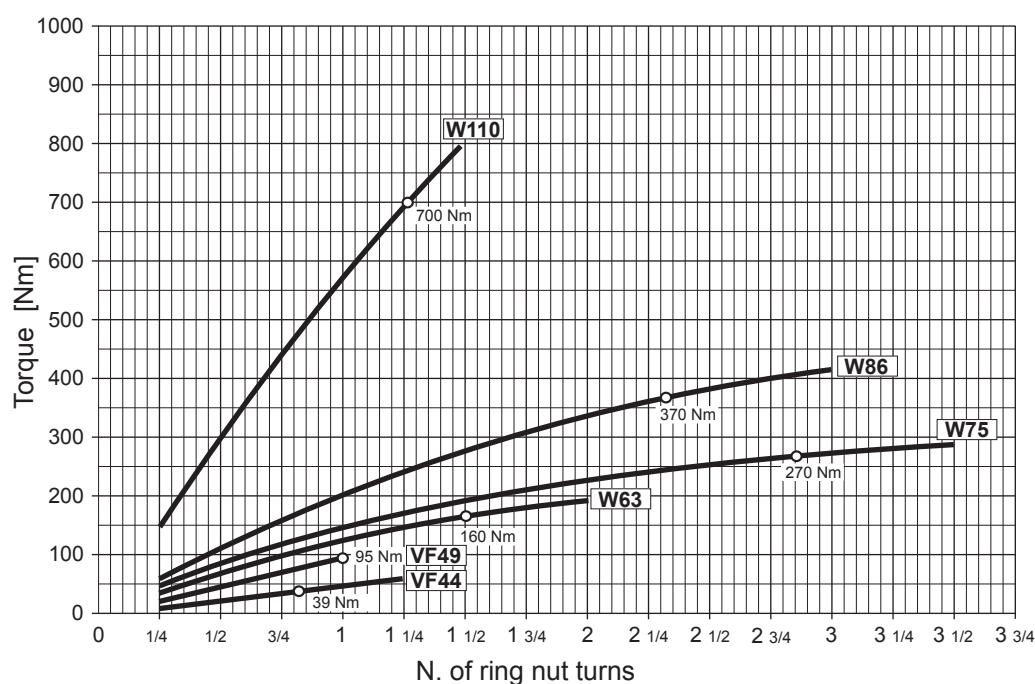
Same steps, with the exception of step (2), must be followed when a different torque setting is required.

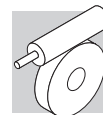
1. Ring nut is tightened until spring washers are sufficiently loaded that manual rotation is hardly possible.

2. By means of an engraver marks are made, in identical (angular) position, on both the ring nut and the hollow shaft.

Setting will then be referred to as the zero-point for the consequent slip torque adjustment, through turning of the ring nut.

3. Ring nut is then turned of the number of turns, or fraction of, corresponding to nominal torque rating Mn_2 of the captioned gear unit. In this case the diagram shown here under refers as to the proportion between number of turns and transmissible torque. Same diagram comes handy for customised torque adjustments, should these be required with time.









VF-EP / W-EP - GEARBOXES AND GEARMOTORS FOR CORROSIVE AND ASEPTIC ENVIRONMENTS

33 MAIN BENEFITS OF THE EP (Enhanced Protection) SERIES




All companies involved in food and beverage, chemical and pharma industries can now rely on a newly designed range of gearmotors tailored to effectively operate in the extremely hygienic and harsh environments characterizing these sectors.

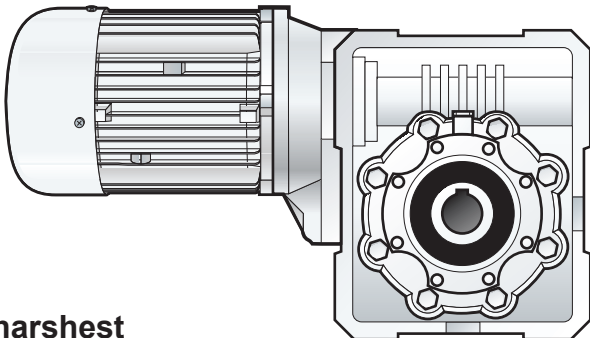
Perfectly suited for the food & beverage industries

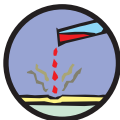





Corrosion resistant








Resisting the harshest environments

Can be cleaned/sanitized with most detergents



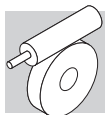
MAIN FEATURES

Standard:

- Stainless steel hollow shaft, mounting hardware and tag
- Completely sealed gearbox (unvented)
- Unused tapped holes closed with button plugs
- Specific vents for water draining
- Motor protection IP56
- C5 Corrosion protection or FDA&NSF approved food grade paintings

Main Options:

- Wash down duty oil seals
- NSF (H1) and FDA approved food grade lubricant



MAIN BENEFITS OF THE EP VERSION

Thanks to the completely sealed gearbox housing, surface paintings and protection, gearmotors of the EP series ensures risk free operation in harsh and hygienic environments and facilitate the gearmotor sanitizing processes.

The whole gearmotor, indeed, is protected through a high performances multi-layered epoxy coating with elevated resistance to corrosion and abrasion.

Two different finishing coatings can be selected:

- The first one guarantee C5 corrosion protection class according to ISO 9223 and it is available as standard in RAL9006
- The second one is specifically dedicated to the food&beverage industry and registered by NSF and FDA as compatible for the utilization in incidental food contact areas as well as for drinking water contact. Furthermore, besides an improved corrosion resistance, this painting is also resistant to most of the detergents commonly used in food&beverage industries.

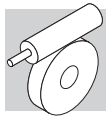
NOTE: This finishing is automatically selected when the specified colors for the gearmotor is Light Blue*(PLB) or White*(PWH).

*Note: No RAL color can be specified as painting is organic based.

Finally, the EP Gearmotor can be further tailored to specific requirements through various options and mounting accessories.

Frame sizes available in EP version: 44 (excepted VFR), 49, 63, 75, 86.

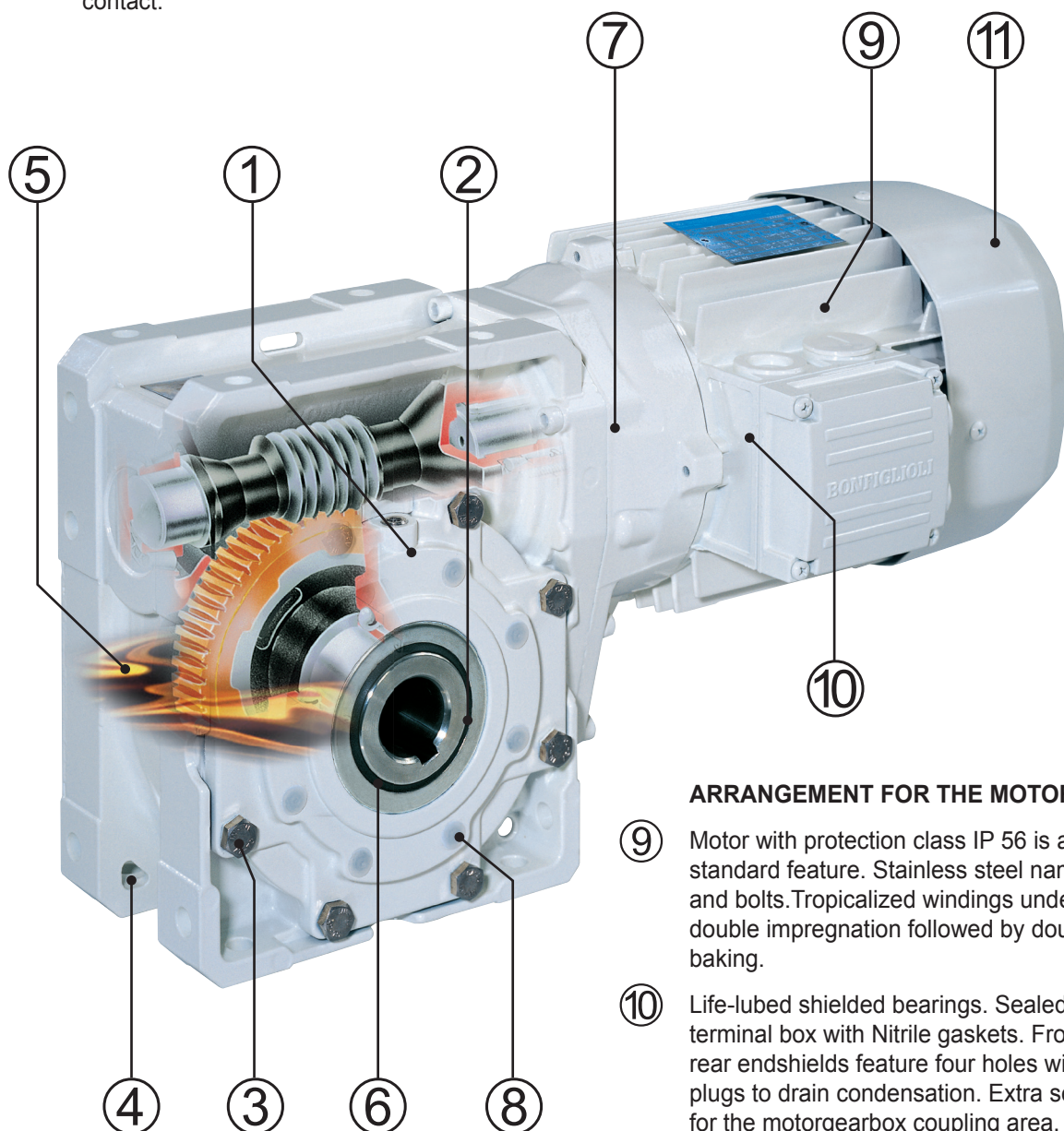
Available EP motors: 0,12 to 4 kW, both compact type and IEC, 2, 4 and 6 poles.



ARRANGEMENT FOR THE GEAR UNIT

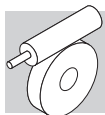
- ① The speed reducer is fully sealed to minimise contamination of the environment.
- ② Stainless steel output shaft - AISI 316.
- ③ Stainless steel nameplate and bolts.
- ④ Dedicated housing design to facilitate water draining
- ⑤ In option is available lubricant H1-class synthetic oil registered by NSF for the food-processing and pharmaceutical industries . In compliance with FDA for incidental food contact.

- ⑥ Availability of washdown duty double lip oil seals with stainless steel frame.
- ⑦ Exterior surfaces are primed and paint finished with a two-part epoxy coating, FDA and NSF approved (depending on color choice) for incidental food contact.
- ⑧ Button plugs for unused mounting holes.



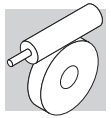
ARRANGEMENT FOR THE MOTOR

- ⑨ Motor with protection class IP 56 is a standard feature. Stainless steel nameplate and bolts. Tropicalized windings undergo double impregnation followed by double baking.
- ⑩ Life-lubed shielded bearings. Sealed terminal box with Nitrile gaskets. Front and rear endshields feature four holes with screw plugs to drain condensation. Extra sealing for the motorgearbox coupling area.
- ⑪ Chemically inert fan.



GEAR UNIT									
W-EP	—	63	U	30	P90	B14	B3	PWH
									OPTIONS
									PAINTING
									NP* unpainted
									PWH (FDA & NSF Compliant)
									PLB (FDA & NSF Compliant)
									RAL9006 (Highly corrosion resistant C5)
									MOUNTING POSITION
									VF-EP 44 VF-EP 49
									B3
									W-EP 63 W-EP 75 W-EP 86
									B3 (default), B6, B7, B8, V5, V6
									MOTOR MOUNTING
									B5, B14 (IEC standard)
									INPUT CONFIGURATION
									VF-EP
									VF-EP R
									W-EP
									W-EP R
P(IEC)									
	P63...P80	P63	P71...P112	P63...P90					
S_									
	S1...S3								
									GEAR RATIO
									VERSION
									GEAR FRAME SIZE
									VF-EP: 44, 49 W-EP: 63, 75, 86
									— (blank) R (helical-worm gear unit VF-EP 44)
									GEAR TYPE
									VF-EP W-EP

* Note: If the gearbox is requested in NP (Unpainted) version with torque arm, the latter is provided coated with a light grey primer completely over-paintable.



MOTOR

BE-EP 80B 4 B14 230/400-50 CLF PWH

OPTIONS

PAINTING

NP* unpainted

PWH

(FDA & NSF
Compliant)

PLB

(FDA & NSF
Compliant)

RAL9006

(Highly corrosion
resistant C5)

TERMINAL BOX POSITION
W (default), **N**, **E**, **S**

INSULATION CLASS

CL F standard

CL H option

VOLTAGE-FREQUENCY

VERSION

— (integral motor)

B5, B14 (IEC motor)

POLE NUMBER

2, 4, 6,

MOTOR SIZE

1SC ... 3LC (integral motors)

63 ... 112 (IEC motors)

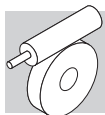
MOTOR TYPE

M-EP = 3-phase integral

BN-EP = 3-phase IEC

ME-EP = 3-phase integral, class IE2

BE-EP = 3-phase IEC, class IE2



35 GEARBOX OPTIONS

PX

Wash down duty oil seals for the output shaft. The particular oil seals, offered as an option, make the gearmotor suitable for arduous environments where frequent washdowns occur, often with high-pressure hot water, together with sanitizing agents. The stainless steel screen and the low friction PTFE double lip design provide an extended life and improved sealing function even under extreme conditions with the presence of aggressive media.

PV

Fluoro elastomer rings on output shaft. Stainless steel loading spring.

UH1

Food grade synthetic lubricant. The gearbox is factory filled with “long life” lubricant, approved for incidental food contact and registered as H1 by the NSF for the food and pharma industry, it also satisfy the FDA 21 CFR Sec. 178.3570 norms.

It's polyglycol-based synthetic nature, not only extends the application range from temperatures of -25°C to $+150^{\circ}\text{C}$, but does not require periodical oil change thus, with the absence of contamination, the gearbox is virtually maintenance-free.

CERTIFICATES

AC - Certificate of compliance

The document certifies the compliance of the product with the purchase order and the construction in conformity with the applicable procedures of the Bonfiglioli Quality System.

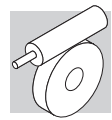
CC - Inspection certificate

The document entails checking on order compliance, the visual inspection of external conditions and of mating dimensions. Checking on main functional parameters in unloaded conditions is also performed along with oil seal proofing, both in static and in running conditions. Units inspected are sampled within the shipping batch and marked individually.

36 MOTOR OPTIONS

The available options for for all EP motors are: D3, E3, K1, H1, NH1, RC, RV, ACM, CC, CUS, S2, S3, S9.

For more detailed information please consult the Electric Motor section in this book.



37 OTHERS INFORMATION ABOUT GEARBOX AND GEARMOTOR

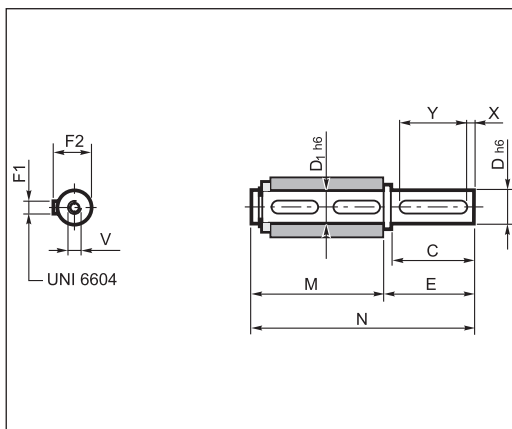
Mounting positions, technical data, motor availability, moments of inertia and dimensions of **VF-EP** e **W-EP** series don't change among equivalent **VF** and **W** product series. In the same way, information about all **EP** motors don't change among equivalent series motors. All of these information can be obtained in the related chapters of this catalogue.

38 THE ACCESSORIES FOR THE _EP SERIES

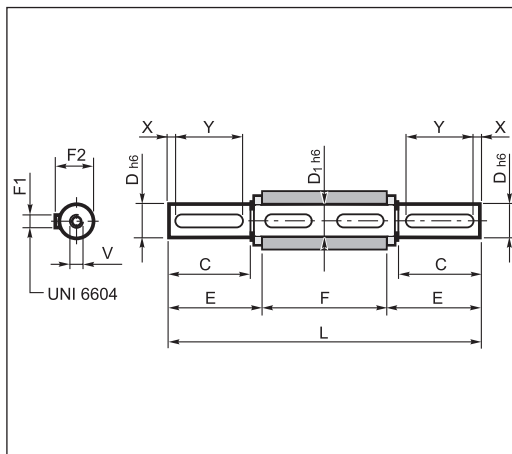
Depending on the mounting pattern, the gearbox can be complemented with the following pieces of equipment:

- AISI 316 stainless steel plug-in solid shaft, both single and double projection
- epoxy paint coated torque arm (specify the acronym among those shown in the related figure)
- safety cover for the unused hollow shaft area – plastic type for W63, W75 and W86 units, metal type nitrile coated for VF 44 and VF 49, with stainless steel fasteners. IP 56 protection achieved after assembling.

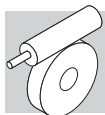
38,1 Plug-in output shaft



	C	D	D1	E	F1	F2	M	N	V	X	Y
VF-EP 44	40	18	18	45	6	20.5	70	115	M6x16	5	30
VF-EP 49 VF-EP R 49	60	25	25	65	8	28	89	154	M8x19	5	50
W-EP 63 W-EP R 63	60	25	25	65	8	28	127	192	M8x19	5	50
W-EP 75 W-EP R 75	60	30	30	65	8	33	134	199	M10x22	5	50
W-EP 86 W-EP R 86	60	35	35	65	10	38	149	214	M10x22	5	50

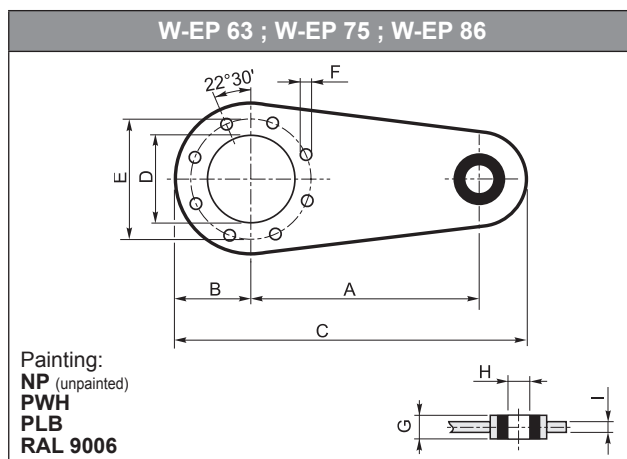
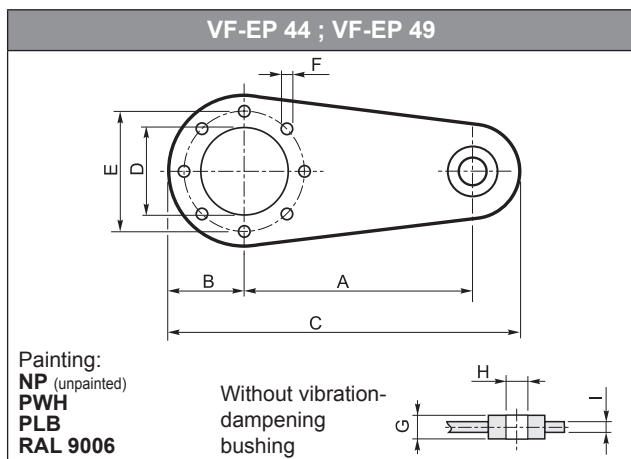


	C	D	D1	E	F	F1	F2	L	V	X	Y
VF-EP 44	40	18	18	42.7	64	6	20.5	149.4	M6x16	5	30
VF-EP 49 VF-EP R 49	60	25	25	63.2	82	8	28	208.4	M8x19	5	50
W-EP 63 W-EP R 63	60	25	25	63.2	120	8	28	246.4	M8x19	5	50
W-EP 75 W-EP R 75	60	30	30	64	127	8	33	255	M10x22	5	50
W-EP 86 W-EP R 86	60	35	35	64	140	10	38	268	M10x22	5	50



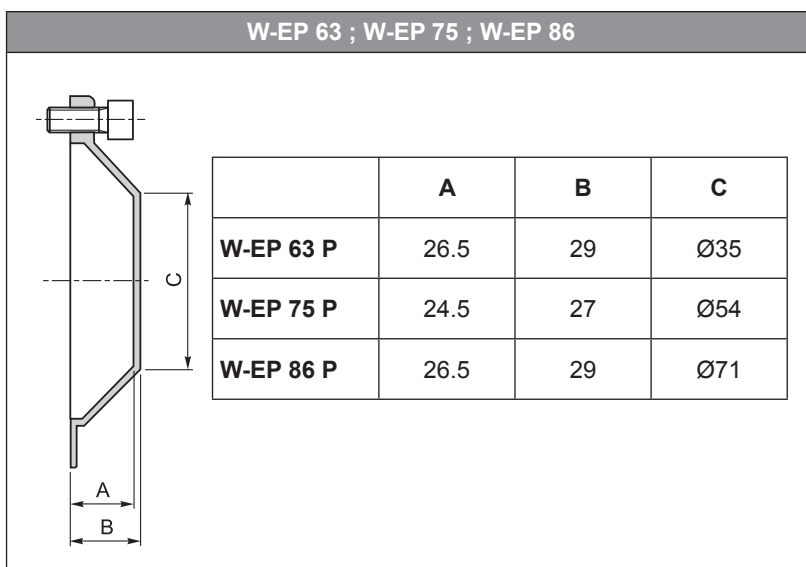
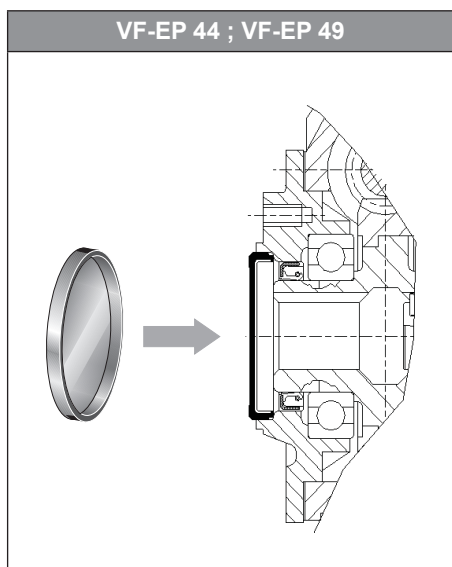
VF-EP | W-EP

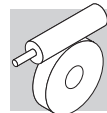
38,2 Torque arm



	A	B	C	D	E	F	G	H	I
VF-EP 44	100	40	157.5	50	65	7	14	8	4
VF-EP 49 VF-EP R 49	100	55	172.5	68	94	7	14	8	4
W-EP 63 W-EP R 63	150	55	233	75	90	9	20	10	6
W-EP 75 W-EP R 75	200	63	300	90	110	9	25	20	6
W-EP 86 W-EP R 86	200	80	318	110	130	11	25	20	6

38.3 Safety cover





RVS LIMIT-STOP DEVICE

39 GENERAL INFORMATION

The limit-stop device type RVS has been designed to fit Bonfiglioli Riduttori worm gearmotors to operate:

- Green house windows and shades
- Remote-controlled gates
- Hopper frame windows
- Dosing devices for the livestock farming industry
- Butterfly valves

Worm gearmotors equipped with the RVS limit switch device are suitable for linear and rotary intermittent duty applications requiring accurate and repetitive positioning.

For the applications listed above, typically light duty, worm gear-motors should only be selected from relevant selection charts, given at paragraph 40.

The drive selection will then comply with both the application duty and the max. peripheral speed constraints of the limit-switch device.

The configuration is complete when the limit-switch device RVS is flanged onto the gearmotor through the relevant assembly kit (see next page).

Configuration kits are available for worm gears type VF 49, W 63, W 75, and W 86 only.

Please note that **RVS** devices will only fit F-flanged VF 49 and FC-flanged W worm gears.

RVS mounting side is opposite to flange.

39.1 Technical features

The working principle of the limit-stop device is based on the differential movement of two pairs of wheels – each equipped with a cam – and the relative operation of precision micro-switches that stop and reverse motion through relays (to be fitted by the installer).

Travel end positions, normally the open and closed positions of application frame, are easily set using a common Allen key after gearmotor installation.

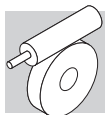
Once adjusted, the unit will retain its settings over time for guaranteed motion repeatability.

In its basic version, the **RVS** limit-stop unit comes with a pair of approx. 1-m long cables. Internal wiring is made at the factory.

The RVS unit is available in the following variants:

RVS ME: the limit switch features a 6-stud terminal box for external wiring of cables wiring of cables to main relays.

RVS DM: features a double set of micro-switches, connected in series, for absolute reliability where applicable regional standards or regulations call for a redundant design.



RVS



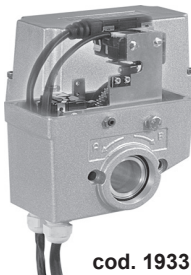
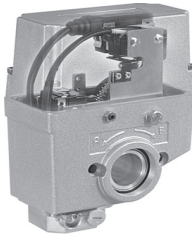
RVS ME DM: features the combination of the two options described above.

Regardless to the variant the RVS limit switch device offers the following features:

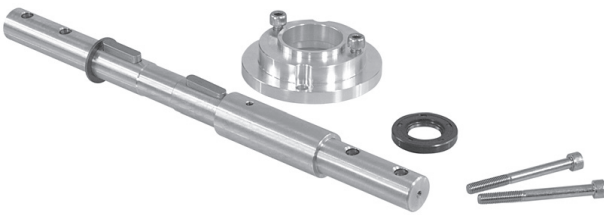
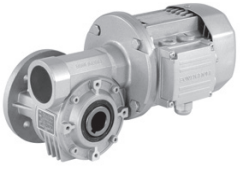
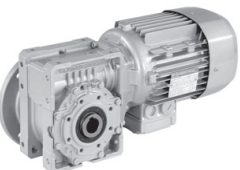
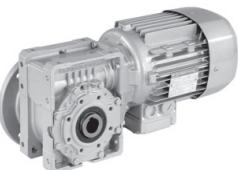
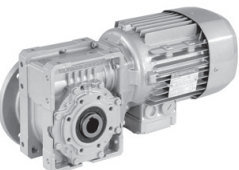
- Extremely quiet operation
- Space efficiency
- Ease of installation and setting
- Overall protection IP55
- Adjustment range within a maximum of 43 revolutions of drive shaft.

40 ORDERING CODES

Determine which device or variant best suits the specific application and locate the part number in the table below:

RVS	RVS ME	RVS DM	RVS ME DM
			
cod. 193312025	cod. 193312026	cod. 193312027	cod. 193312028

Select also the part number of the specific configuration kit for the speed reducer the limit-stop device is to be installed to:

			
cod. 192860001	cod. 192860002	cod. 192860003	cod. 192860004
			
VF 49 F - VFR 49 F	W 63 UFC - WR 63 UFC	W 75 UFC - WR 75 UFC	W 86 UFC - WR 86 UFC

OPTIONS

MOUNTING POSITION

B3 (default), B6, B7, B8, V5, V6

IEC MOTOR MOUNTING

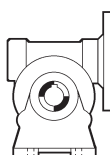
B5

B14

INPUT TYPE

VF: **P** (IEC)

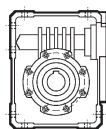
W: **S**_, **P** (IEC)



P63, P71

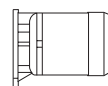


BN - BE
BX - BXN

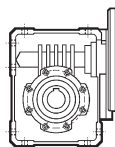


S1 ... S3

S10 ... S20



**M - ME -
MX - MXN**



P63 ... P90



BN - BE
BX - BXN

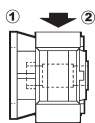
GEAR RATIO

SHAFT BORE
D30 (W75 alone)

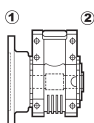
VERSION

VF: **F**

W: UFC



F (1, 2)



UFC (1, 2)

FRAME SIZE

VF: 49

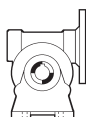
W: 63, 75, 86

HELICAL REDUCTION

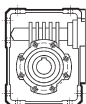
/

R

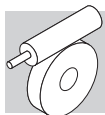
GEAR TYPE

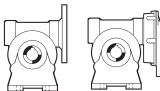


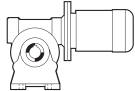


VF

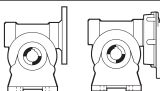


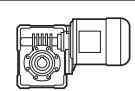


W

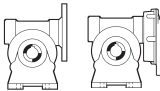


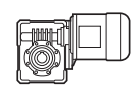
**RVS****42 GEARMOTOR SELECTION****0.12 kW**

n_2 min ⁻¹	M_2 Nm	i			IEC 					
					IE1	IE2	IE3	IE1	IE2	IE3
4.7	98	300	VFR 49_300	P63	BN63A4	BE63A4	BXN63MA4			
5.8	89	240	VFR 49_240	P63	BN63A4	BE63A4	BXN63MA4			
6.7	83	210	VFR 49_210	P63	BN63A4	BE63A4	BXN63MA4			
7.8	76	180	VFR 49_180	P63	BN63A4	BE63A4	BXN63MA4			
10.4	64	135	VFR 49_135	P63	BN63A4	BE63A4	BXN63MA4			
14.0	41	100	VF 49_100	P63	BN63A4	BE63A4	BXN63MA4			
17.5	37	80	VF 49_80	P63	BN63A4	BE63A4	BXN63MA4			
20.0	34	70	VF 49_70	P63	BN63A4	BE63A4	BXN63MA4			
23.3	31	60	VF 49_60	P63	BN63A4	BE63A4	BXN63MA4			

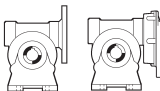


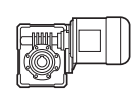
0.18 kW

n_2 min ⁻¹	M_2 Nm	i			IEC 					
					IE1	IE2	IE3	IE1	IE2	IE3
7.8	112	180	VFR 49_180	P63	BN63B4	BE63B4	BXN63MB4			
10.4	95	135	VFR 49_135	P63	BN63B4	BE63B4	BXN63MB4			
14.0	61	100	VF 49_100	P63	BN63B4	BE63B4	BXN63MB4			
17.5	54	80	VF 49_80	P63	BN63B4	BE63B4	BXN63MB4			
20.0	49	70	VF 49_70	P63	BN63B4	BE63B4	BXN63MB4			
23.3	45	60	VF 49_60	P63	BN63B4	BE63B4	BXN63MB4			


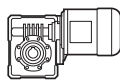
0.25 kW

n_2 min ⁻¹	M_2 Nm	i			IEC 					
					IE1	IE2	IE3	IE1	IE2	IE3
4.7	214	300	WR 63_300	P71	BN71A4	BE71A4	BXN71MA4			
5.8	192	240	WR 63_240	P71	BN71A4	BE71A4	BXN71MA4			
7.3	170	192	WR 63_192	P71	BN71A4	BE71A4	BXN71MA4			
10.4	136	135	WR 63_135	P71	BN71A4	BE71A4	BXN71MA4			
12.3	121	114	WR 63_114	P71	BN71A4	BE71A4	BXN71MA4			
14.0	82	100	VF 49_100	P71	BN71A4	BE71A4	BXN71MA4			
17.5	72	80	VF 49_80	P71	BN71A4	BE71A4	BXN71MA4			
20.0	66	70	VF 49_70	P71	BN71A4	BE71A4	BXN71MA4			
23.3	61	60	VF 49_60	P71	BN71A4	BE71A4	BXN71MA4			


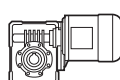
0.37 kW

n_2 min ⁻¹	M_2 Nm	i			IEC 					
					IE1	IE2	IE3	IE1	IE2	IE3
4.7	382	300	WR 86_300	P71	BN71B4	BE71B4	BXN71MB4			
5.8	306	240	WR 75_240	P71	BN71B4	BE71B4	BXN71MB4			
7.3	290	192	WR 86_192	P71	BN71B4	BE71B4	BXN71MB4			
7.8	257	180	WR 75_180	P71	BN71B4	BE71B4	BXN71MB4			
9.3	226	150	WR 75_150	P71	BN71B4	BE71B4	BXN71MB4			
10.4	204	135	WR 63_135	P71	BN71B4	BE71B4	BXN71MB4			
12.3	181	114	WR 63_114	P71	BN71B4	BE71B4	BXN71MB4			
14.0	133	100	W 63_100	P71	BN71B4	BE71B4	BXN71MB4	S1 M1SD4	S1 ME1SB4	S10 MXN10MB4
17.5	108	80	VF 49_80	P71	BN71B4	BE71B4	BXN71MB4			
20.0	98.3	70	VF 49_70	P71	BN71B4	BE71B4	BXN71MB4			
23.3	90.5	60	VF 49_60	P71	BN71B4	BE71B4	BXN71MB4			


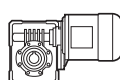
0.55 kW

n ₂ min ⁻¹	M ₂ Nm	i	IEC 					
			WR	P80	BN80A4	BE80A4	BXN80MA4	
4.7	559	300	WR 86_300	P80	BN80A4	BE80A4	BXN80MA4	
5.8	483	240	WR 86_240	P80	BN80A4	BE80A4	BXN80MA4	
7.3	423	192	WR 86_192	P80	BN80A4	BE80A4	BXN80MA4	
7.8	376	180	WR 75_180	P80	BN80A4	BE80A4	BXN80MA4	
8.3	383	168	WR 86_168	P80	BN80A4	BE80A4	BXN80MA4	
9.3	331	150	WR 75_150	P80	BN80A4	BE80A4	BXN80MA4	
10.1	330	138	WR 86_138	P80	BN80A4	BE80A4	BXN80MA4	
11.7	287	120	WR 75_120	P80	BN80A4	BE80A4	BXN80MA4	
14.0	194	100	W 63_100	P80	BN80A4	BE80A4	BXN80MA4	S1 M1LA4
17.5	170	80	W 63_80	P80	BN80A4	BE80A4	BXN80MA4	S1 M1LA4
21.9	148	64	W 63_64	P80	BN80A4	BE80A4	BXN80MA4	S1 M1LA4
23.3	148	60	W 75_60	P80	BN80A4	BE80A4	BXN80MA4	S1 M1LA4


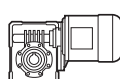
0.75 kW

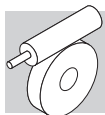
n ₂ min ⁻¹	M ₂ Nm	i	IEC 					
			WR	P80	BE80B4	BX90SR4	BXN80MB4	
7.4	557	192	WR 86_192	P80	BE80B4	BX90SR4	BXN80MB4	
8.5	504	168	WR 86_168	P80	BE80B4	BX90SR4	BXN80MB4	
9.5	435	150	WR 75_150	P80	BE80B4	BX90SR4	BXN80MB4	
10.3	436	138	WR 86_138	P80	BE80B4	BX90SR4	BXN80MB4	
11.9	378	120	WR 75_120	P80	BE80B4	BX90SR4	BXN80MB4	
14.3	275	100	W 75_100	P80	BE80B4	BX90SR4	BXN80MB4	S2 ME2SB4
17.9	236	80	W 75_80	P80	BE80B4	BX90SR4	BXN80MB4	S2 ME2SB4
22.3	195	64	W 63_64	P80	BE80B4	BX90SR4	BXN80MB4	S2 ME2SB4
23.8	196	60	W 75_60	P80	BE80B4	BX90SR4	BXN80MB4	S2 ME2SB4

1.1 kW

n ₂ min ⁻¹	M ₂ Nm	i	IEC 					
			WR	P90	BE90S4	BX90S4	BXN90S4	
10.4	643	138	WR 86_138	P90	BE90S4	BX90S4	BXN90S4	
11.9	586	120	WR 86_120	P90	BE90S4	BX90S4	BXN90S4	
14.3	437	100	W 86_100	P90	BE90S4	BX90S4	BXN90S4	S3 ME2SA4
17.9	379	80	W 86_80	P90	BE90S4	BX90S4	BXN90S4	S3 ME3SA4
22.3	322	64	W 86_64	P90	BE90S4	BX90S4	BXN90S4	S3 ME3SA4

1.5 kW

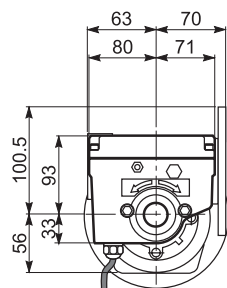
n ₂ min ⁻¹	M ₂ Nm	i	IEC 					
			WR	P90	BX90LA4			
11.9	792	120	WR 86_120	P90	BX90LA4			
17.9	512	80	W 86_80	P90	BX90LA4		S3 MX3SB4	
22.3	435	64	W 86_64	P90	BX90LA4		S3 MX3SB4	



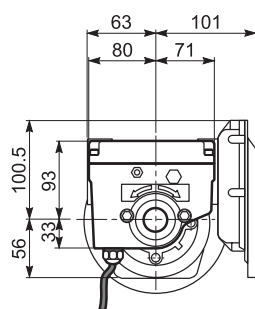
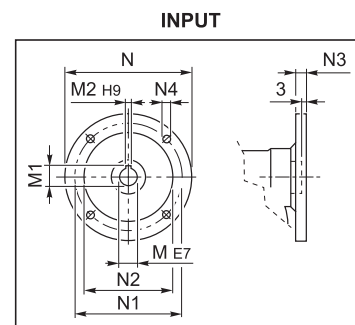
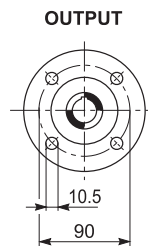
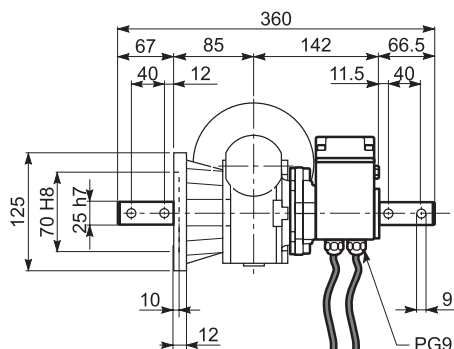
RVS

43 DIMENSIONS

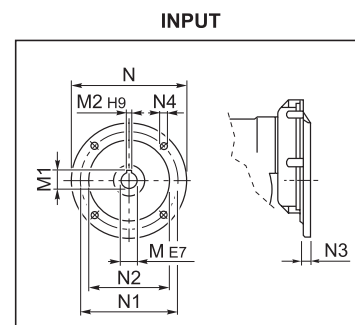
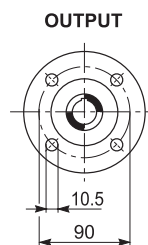
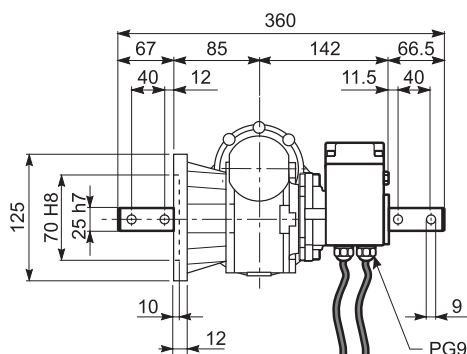
VF 49_F - VFR 49_F



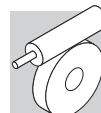
VF 49_F



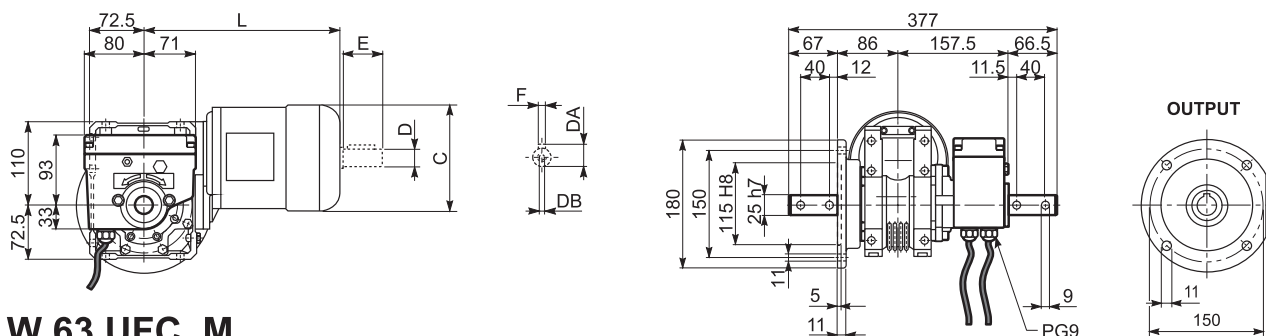
VFR 49_F



	M	M1	M2	N	N1	N2	N3	N4
VF 49_P 63	11	12.8	4	140	115	95	10.5	9.5
VF 49_P 71	14	16.3	5	160	130	110	10.5	9.5
VFR 49_P 63	11	12.8	4	140	115	95	11	M8x19

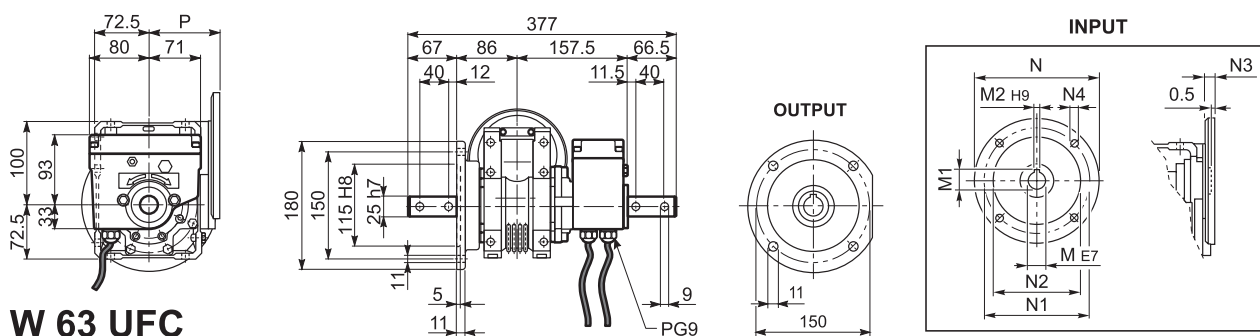


W 63 UFC_M - W 63 UFC - WR 63 UFC

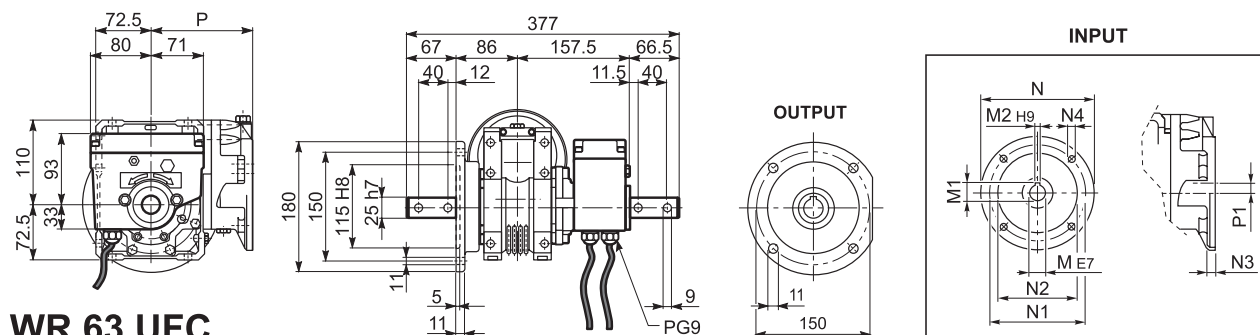


W 63 UFC_M

	C	D	DA	DB	E	F	L
W 63_S1 M1L	138	14	16	M5	30	5	289
W 63_S10 MXN10M	138	11	12.5	M4	23	4	341
W 63_S2 M2S	156	19	21.5	M6	40	6	317
W 63_S20 MXN20M	158	14	16	M5	30	5	370

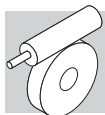


W 63 UFC



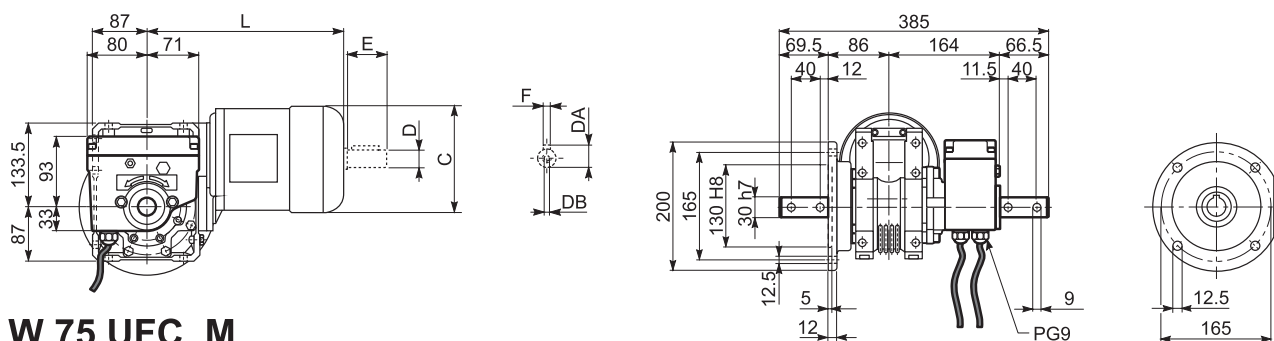
WR 63 UFC

	M	M1	M2	N	N1	N2	N3	N4	P	P1
W 63_P 71	14	16.3	5	160	130	110	11	9	95	-
W 63_P 80	19	21.8	6	200	165	130	12	11.5	102	-
W 63_P 90	24	27.3	8	200	165	130	12	11.5	102	-
WR 63_P 63	11	12.8	4	140	115	95	10	M8x10	133.5	11.42
WR 63_P 71	14	16.3	5	160	130	110	10	M8x10	133.5	11.42



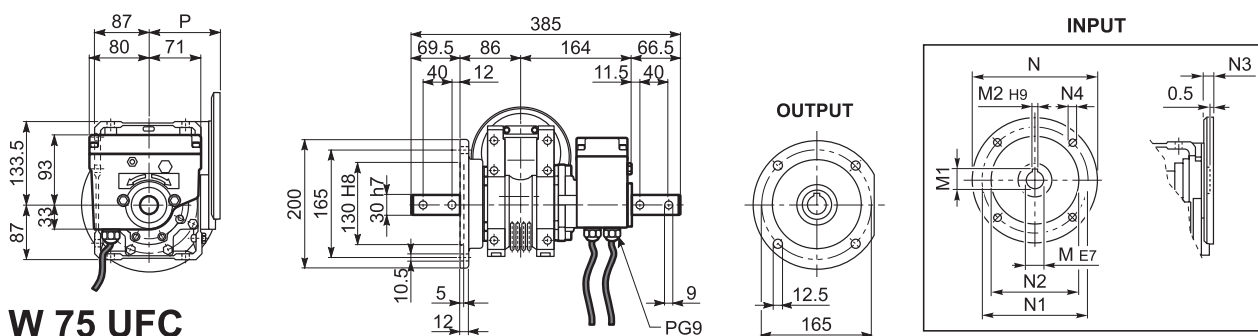
RVS

W 75 UFC_M - W 75 UFC - WR 75 UFC

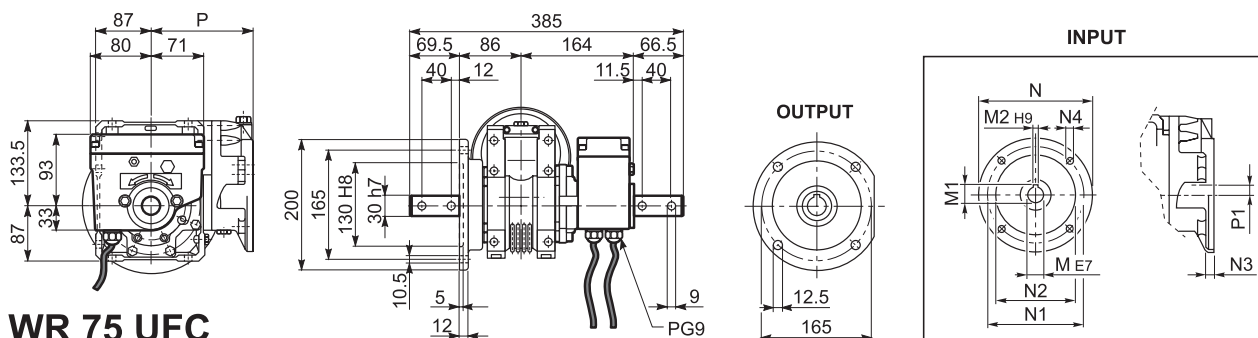


W 75 UFC_M

	C	D	DA	DB	E	F	L
W 75_S1 M1L	138	14	16	M5	30	5	308
W 75_S2 M2S	156	19	21.5	M6	40	6	333
W 75_S2 ME2S	156	19	21.5	M6	40	6	333
W 75_S2 MX2S	156	14	16	M5	30	5	377
W 75_S20 MXN20M	158	14	16	M5	30	5	386
W 75_S3 M3S	193	28	31	M10	60	8	376
W 75_S3 M3L	193	28	31	M10	60	8	408

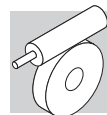


W 75 UFC

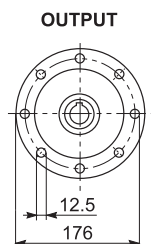
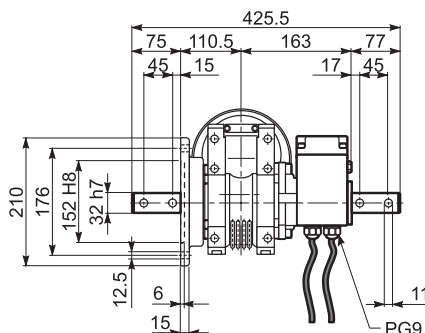
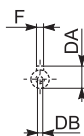
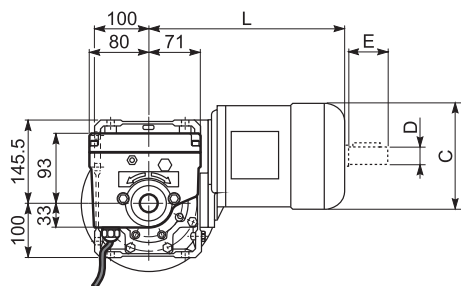


WR 75 UFC

	M	M1	M2	N	N1	N2	N3	N4	P	P1
W 75_P 71	14	16.3	5	160	130	110	11	9	112	-
W 75_P 80	19	21.8	6	200	165	130	12	11.5	112	-
W 75_P 90	24	27.3	8	200	165	130	12	11.5	112	-
WR 75_P 63	11	12.8	4	140	115	95	10	M8x10	152	23.53
WR 75_P 71	14	16.3	5	160	130	110	10	M8x10	152	23.53
WR 75_P 80	19	21.8	6	200	165	130	12	M10x13	163.5	11
WR 75_P 90	24	27.3	8	200	165	130	12	M10x13	163.5	11

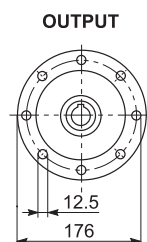
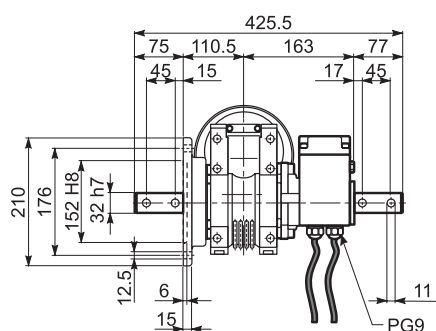
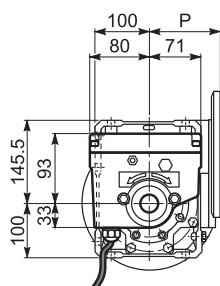


W 86 UFC_M - W 86 UFC - WR 86 UFC

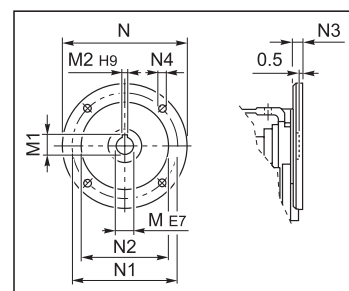


W 86 UFC_M

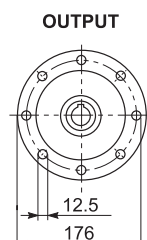
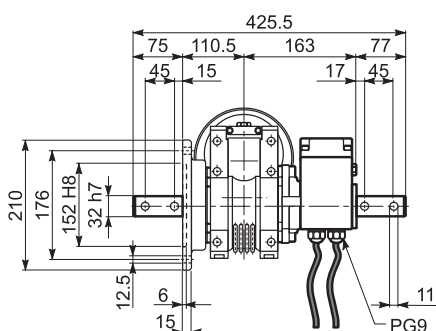
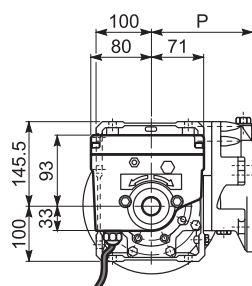
	C	D	DA	DB	E	F	L
W 86_S1 M1L	138	14	16	M5	30	5	324
W 86_S2 M2S	156	19	21.5	M6	40	6	349
W 86_S3 M3S	193	28	31	M10	60	8	392
W 86_S3 M3L	193	28	31	M10	60	8	424
W 86_S3 MX3S	195	24	27	M8	50	8	459



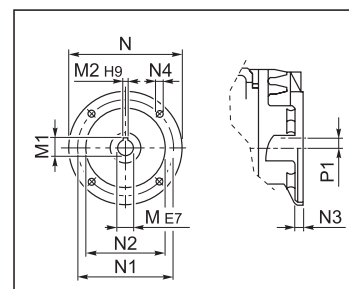
INPUT



W 86 UFC

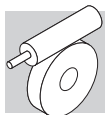
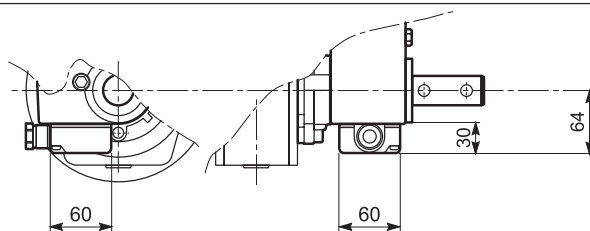


INPUT

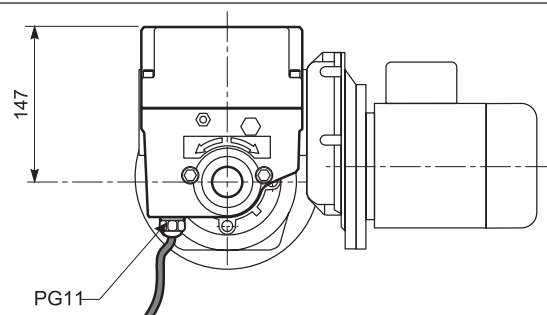


WR 86 UFC

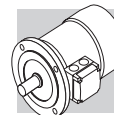
	M	M1	M2	N	N1	N2	N3	N4	P	P1
W 86_P 71	14	16.3	5	160	130	110	11	9	128	-
W 86_P 80	19	21.8	6	200	165	130	12	11.5	128	-
W 86_P 90	24	27.3	8	200	165	130	12	11.5	128	-
WR 86_P 63	11	12.8	4	140	115	95	10	M8x10	168	35.4
WR 86_P 71	14	16.3	5	160	130	110	10	M8x10	168	35.4
WR 86_P 80	19	21.8	6	200	165	130	12	M10x13	179.5	22.9
WR 86_P 90	24	27.3	8	200	165	130	12	M10x13	179.5	22.9

**44 OPTIONS****Limit switch modifications****ME**

Version with terminal box

DM

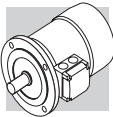
Four microswitch version



ELECTRIC MOTORS

M1 SYMBOLS AND UNITS OF MEASUREMENT

Symbols	Units of Measure	Description	Symbols	Units of Measure	Description
$\cos\varphi$	–	Power factor	n	$[\text{min}^{-1}]$	Rated speed
η	–	Efficiency	P_B	$[\text{W}]$	Power drawn by the brake at 20°C
f_m	–	Power adjusting factor	P_n	$[\text{kW}]$	Motor rated power
I	–	Cyclic duration factor	P_r	$[\text{kW}]$	Required power
I_N	$[\text{A}]$	Rated current	t_1	$[\text{ms}]$	Brake response time with one-way rectifier
I_s	$[\text{A}]$	Locked rotor current	t_{1s}	$[\text{ms}]$	Brake response time with electronic-controlled rectifier
J_C	$[\text{Kgm}^2]$	Load moment of inertia	t_2	$[\text{ms}]$	Brake reaction time with a.c. disconnect
J_M	$[\text{Kgm}^2]$	Moment of inertia	t_{2c}	$[\text{ms}]$	Brake reaction time with a.c. and d.c. disconnect
K_c	–	Torque factor	t_a	$[\text{°C}]$	Ambient temperature
K_d	–	Load factor	t_f	$[\text{min}]$	Work time at constant load
K_J	–	Inertia factor	t_r	$[\text{min}]$	Rest time
M_A	$[\text{Nm}]$	Mean breakaway torque	W	$[\text{J}]$	Braking work between service interval
M_B	$[\text{Nm}]$	Brake torque	W_{max}	$[\text{J}]$	Maximum brake work for each braking
M_N	$[\text{Nm}]$	Rated torque	Z	$[\text{1/h}]$	Permissible starting frequency, loaded
M_L	$[\text{Nm}]$	Counter-torque during acceleration	Z_0	$[\text{1/h}]$	Max. permissible unloaded starting frequency ($I = 50\%$)
M_s	$[\text{Nm}]$	Starting torque			



M2 INTRODUCTION

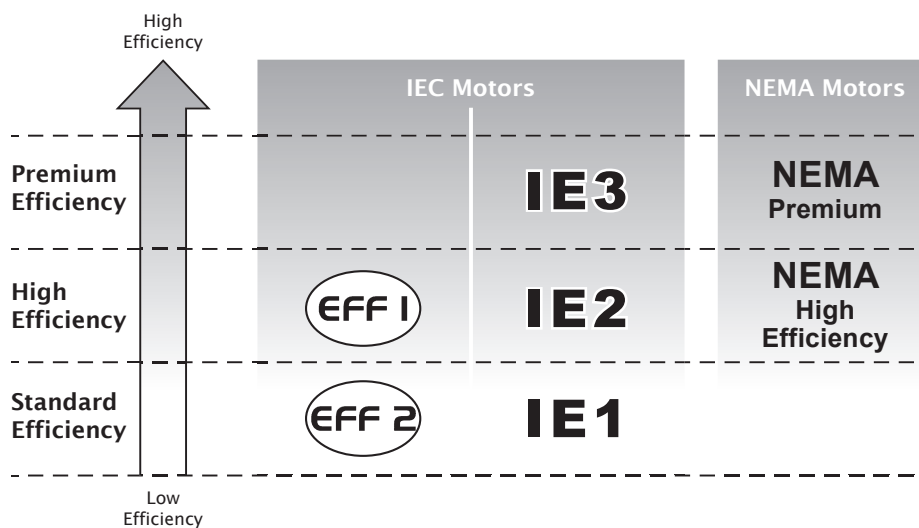
Efficiency classes and test methods

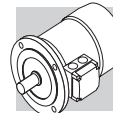
Efficiency classes characterise the efficiency with which an electric motor converts electrical energy into mechanical energy. In Europe, the energy efficiency of low voltage electric motors used to be classified using the voluntary Eff1/Eff2/Eff3 system. Outside Europe, other countries used to apply their own national systems, often very different to the European system. This uncertainty in standards led manufacturers to develop a harmonised international standard, and push for the issue of IEC (International Electrotechnical Commission) standard IEC 60034-30-1, "Efficiency classes of single-speed, three-phase, cage-induction motors (IE code)".

This new standard:

- defines new classes of efficiency
- **IE1** (standard efficiency)
- **IE2** (high efficiency)
- **IE3** (premium efficiency)
- provides a common, international reference system for the classification of electric motors
- and for national legislation
- introduces a new efficiency measurement method in conformity with standard IEC 60034-1-2:2007

The following table shows the correspondence among the main classes.





European Commission regulation 640/2009

IEC standard 60034-30-1 establishes technical guidelines for efficiency classification but does not impose any legal requirements for the adoption of any particular efficiency class. These are laid down by European Directives and national laws.

The EC Regulation applying Directive 2005/32/EC was adopted on the 22nd July 2009. This establishes the legal requirements and eco-compatible design criteria for electric motors, and imposes minimum efficiency limits according to the following schedule:

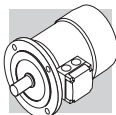
- **16/06/2011:** Electric motors must have a minimum efficiency level equivalent to class **IE2**
- **01/01/2015:** Electric motors with a rated power output between 7.5 kW and 375 kW must have a minimum efficiency level corresponding to **IE3**, or to **IE2** if controlled by an inverter.
- **01/01/2017:** Electric motors with a rated power output between 0.75 kW and 375 kW must have a minimum efficiency level corresponding to **IE3**, or to **IE2** if controlled by an inverter.

Scope and exclusions

EC Regulation 640/2009 applies to 2, 4, and 6 pole, single-speed, three-phase, 50 Hz or 60 Hz, cage-induction motors with rated outputs of 0.75 kW to 375 kW, and rated voltage up to 1000 V, designed for continuous duty (S1).

The regulation does not apply to:

- brakemotors
- motors designed to function immersed in liquid
- motors that are fully integrated in a product (like a gearbox, pump, fan), so that it is not possible to test the performance of the motor independently of that of the product.
- motors expressly designed to function:
 - at altitudes above 4000 metres a.s.l.;
 - in ambient temperatures above 60 °C;
 - at maximum operating temperatures above 400 °C;
 - in ambient temperatures below -30 °C (all motors) or below 0 °C (water-cooled motors);
 - with incoming liquid coolants at temperatures below 0 °C or above 32 °C;
 - in potentially explosive atmospheres as defined by Directive 2014/34/EU.



M3 GENERAL CHARACTERISTICS

M3.1 Production range

The asynchronous three-phase electric motors BXN, BX, BE, BN, MXN, MX, ME and M of BONFIGLIOLI RIDUTTORI's production, are available in basic design IMB5 and derived versions. Motors are the enclosed type with outer fan and cage-type rotor for use in industrial environments. Standard versions of BX-BE/MX-ME motors are 230/400V Δ/Y (400/690V Δ/Y in sizes BX-BE 160 and BX- BE 180), 50 Hz motors, with a tolerance of $\pm 10\%$. Standard BN/M motors are designed to operate from a rated voltage 230/400V Δ/Y (400/690V Δ/Y for frame sizes BN 160 through BN 200) 50 Hz, with $\pm 10\%$ tolerance. On the BXN/MXN motors, it is present a terminal box with 9 PIN connection + 12 wires winding that makes it easy to obtain the right voltage for most countries as standard. The Standard versions is identified as WD1 and makes it possible to obtain the following voltages/frequency (115/200/230/400V-50Hz and 132/230/265/460V-60Hz). For the BXN/MXN motors the voltage tolerance is reduced to $\pm 5\%$.

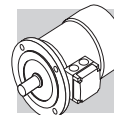
M3.2 Standards

The motors described in this catalogue are manufactured to the applicable standards shown in the following table.

(F01)	Title	CEI	IEC
	General requirements for rotating electrical machines	CEI EN 60034-1	IEC 60034-1
	Terminal markings and direction of rotation of rotating machines	CEI 2-8	IEC 60034-8
	Methods of cooling for electrical machines	CEI EN 60034-6	IEC 60034-6
	Dimensions and output ratings for rotating electrical machines	EN 50347	IEC 60072
	Classification of degree of protection provided by enclosures for rotating machines	CEI EN 60034-5	IEC 60034-5
	Noise limits	CEI EN 60034-9	IEC 60034-9
	Classification of type of construction and mounting arrangements	CEI EN 60034-7	IEC 60034-7
	Rated voltage for low voltage mains power	CEI 8-6	IEC 60038
	Vibration level of electric machines	CEI EN 60034-14	IEC 60034-14
	Efficiency classes of single-speed, three-phase, cage-induction motors (IE code)	CEI EN 60034-30-1	IEC 60034-30-1
	Standard method for determining losses and efficiency from tests	CEI EN 60034-2-1	IEC 60034-2-1

The motors also comply with foreign standards adapted to IEC 60034-1 as shown here below.

(F02)	DIN VDE 0530	Germany
	BS5000 / BS4999	Great Britain
	AS 1359	Australia
	NBNC 51 - 101	Belgium
	NEK - IEC 34	Norway
	NF C 51	France
	OEVE M 10	Austria
	SEV 3009	Switzerland
	NEN 3173	Netherlands
	SS 426 01 01	Sweden



M3.3 Directives 2006/95/EC (LVD) and 2004/108/EC (EMC)

BXN, BX, BE, BN, MXN, MX, ME and M motors meet the requirements of Directives 2014/35/UE (LVD - Low Voltage Directive), the 2014/30/UE (EMC - Electromagnetic Compatibility Directive), the 2009/125/CE (ERP - Energy Related Products Directive) and 2011/65/UE (RoHS – Restriction of Hazardous Substances) and their nameplates bear the CE mark.

As for the EMC Directive, construction is in accordance with standards CEI EN 60034-1 (Rotating electrical machines Part 1: Rating and performance), CEI EN 61000-6-2 (Generic standards - Immunity for industrial environments), CEI EN 61000-6-4 (Generic standards - Emission standard for industrial environments).

Motors with FD brakes, when fitted with the suitable capacitive filter at rectifier input (option **CF**), meet the emission limits required by Standards CEI EN 61000-6-3 and CEI EN 60204-1.

The responsibility for final product safety and compliance with applicable directives rests with the manufacturer or the assembler who incorporate the motors as component parts.

UKCA mark as standard In UK, the CE mark will be replaced by the UKCA (United Kingdom Conformity Assessed mark) mark, due to Brexit, starting from 1st January 2022. All Bonfiglioli motors are already compliant with UKCA requirements.

M3.4 EU Directive 2012/19/EU - Information on disposal



This product should not be mixed with general household waste. Disposal has to be carried out in conformity with EU Directive 2012/19/EU where established, and in accordance to national regulations.

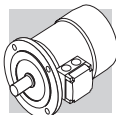
Fulfill disposal in accordance with any other legislation in force throughout the country.

M3.5 Tolerances

As per the Norms CEI EN 60034-1, applicable the tolerances here below apply to the following quantities.

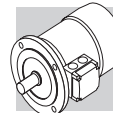
(F03)	-0.15 (1 - η) $P \leq 50\text{kW}$	Efficiency
	$-(1 - \cos\phi)/6$ min 0.02 max 0.07	Power factor
	$\pm 20\%$ *	Slip
	+20%	Locked rotor current
	-15% +25%	Locked rotor torque
	-10%	Max. torque

(*) $\pm 30\%$ for motors with $P_n < 1\text{ kW}$

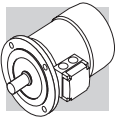


M4 MOTOR DESIGNATION

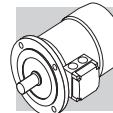
MOTOR						BRAKE								
BXN	80	4	WD1 60	IP55	CLF	B5	W	FD	7.5	R	AA	SB	SA 220
														OPTIONS
														BRAKE SUPPLY
														RECTIFIER TYPE AC/DC NB, SB
														RELEASE LEVER ORIENTATION AA, AB (standard), AC, AD
														BRAKE HAND RELEASE R, RM
														BRAKE TORQUE
														BRAKE TYPE FD (d.c. brake) FA (a.c. brake)
														TERMINAL BOX POSITION W (default), N, E, S
														MOTOR MOUNTING – compact motor IM B5 - IEC motor IM B14 - IM V18, IM V19
														INSULATION CLASS CL F standard CL H option
														DEGREE OF PROTECTION IP55 standard (IP56 - option) IP54, IP55 brake motor
														VOLTAGE - FREQUENCY (See Paragraph M7.1)
														POLE NUMBER 4
														MOTOR SIZE 63MA ... 90L (IEC motor) 05MA...25L (Compact motor)
MOTOR TYPE BXN = IEC 3-phase, class IE3 MXN = compact 3-phase, class IE3														



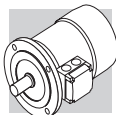
MOTOR						BRAKE					
BX 132SB 4	230/400-50	IP55	CLF	B5	W FD 7.5 R AA SB SA 220						
										OPTIONS	
										BRAKE SUPPLY	
										RECTIFIER TYPE AC/DC NB, SB, NBR, SBR	
										RELEASE LEVER ORIENTATION AA, AB (standard), AC, AD	
										BRAKE HAND RELEASE R, RM	
										BRAKE TORQUE	
										BRAKE TYPE FD (d.c. brake) FA (a.c. brake)	
										TERMINAL BOX POSITION (compact motor only) W (default), N, E, S	
										MOTOR MOUNTING – compact motor IM B5 - IEC motor IM B14 - IM V18, IM V19	
										INSULATION CLASS CL F standard CL H option	
										DEGREE OF PROTECTION IP55 standard (IP56 - option) IP54, IP55 brake motor	
										VOLTAGE - FREQUENCY (See Paragraph M7.1)	
										POLE NUMBER 4	
										MOTOR SIZE 80B ... 355 (IEC motor) 2SB ... 5LA (compact motor)	
MOTOR TYPE											
BX = IEC 3-phase, class IE3						MX = compact 3-phase, class IE3					



MOTORE										BRAKE				
BE	90LA	4	230/400-50	IP55	CLF	B5	W	FD	7.5	R	AA	SB	SA	220 OPTIONS
														BRAKE SUPPLY
														RECTIFIER TYPE AC/DC NB, SB, NBR, SBR
														RELEASE LEVER ORIENTATION AA, AB (standard), AC, AD
														BRAKE HAND RELEASE R, RM
														BRAKE TORQUE
														BRAKE TYPE FD (d.c. brake) FA (a.c. brake)
														TERMINAL BOX POSITION (compact motor only) W (default), N, E, S
														MOTOR MOUNTING – compact motor IM B5 - IEC motor IM B14 - IM V18, IM V19
														INSULATION CLASS CL F standard CL H option
														DEGREE OF PROTECTION IP55 standard (IP56 - option) IP54, IP55 brake motor
														VOLTAGE - FREQUENCY (See Paragraph M7.1)
														POLE NUMBER 2, 4, 6
														MOTOR SIZE 63A ... 180L (IEC motor) 05A ... 5L (compact motor)
														MOTOR TYPE BE = IEC 3-phase, class IE2 ME = compact 3-phase, class IE2



MOTOR										BRAKE									
BN 90LA 4										230/400-50 IP55 CLF B5 W FD 7.5 R AA SB SA 220									
										OPTIONS									
										BRAKE SUPPLY									
										RECTIFIER TYPE AC/DC NB, SB, NBR, SBR									
										RELEASE LEVER ORIENTATION AA, AB (standard), AC, AD									
										BRAKE HAND RELEASE R, RM									
										BRAKE TORQUE									
										BRAKE TYPE FD (d.c. brake) FA (a.c. brake)									
										TERMINAL BOX POSITION (compact motor only) W (default), N, E, S									
										MOTOR MOUNTING – compact motor IM B5 - IEC motor IM B14 - IM V18, IM V19									
										INSULATION CLASS CL F standard CL H option									
										DEGREE OF PROTECTION IP55 standard (IP56 - option) IP54, IP55 brake motor									
										VOLTAGE - FREQUENCY (See Paragraph M7.1)									
										POLE NUMBER 2, 4, 6, 2/4, 2/6, 2/8, 2/12, 4/6, 4/8									
										MOTOR SIZE 56A ... 200LA (IEC motor) 0B ... 5SB (compact motor)									
										MOTOR TYPE BN = IEC 3-phase M = IEC compact 3-phase									



M5 VARIANTS AND OPTIONS

M5.1 Variants

(F04)

Description		Default	Option	Page
Voltage (BN - BE - BX) ≤ 132		230/400/50		232
Voltage (BN - BE - BX) ≥ 160		400/690/50		
Voltage (BXN)		WD1		EVOX*
Protection class	BXN - BX - BE - BN - MXN - MX - ME - M	IP 55	IP 56	228
	BXN - BX - BE - BN/FA-FD MXN - MX - ME - M/FA-FD	IP 54	IP 55	
	BX_FD ≥ 200	IP 55		
	BX...K - BX... K_FDK	IP 55	IP 56	
Insulation class		CLF	CLH	239
Design version	BX - BE - BN	B5 B5 R	B14 B14 R	227
	BXN	B5	B14	EVOX*

Default values.

* See EVOX specific catalogue

M5.2 Options

(F05)

Description	Catalogue numbers								Availability	Page
Thermal protective devices	D3	K1	E3	PT1000°					BXN-BX-BE-BN-MXN-MX-ME-M	257-258
50 Hz normalized power	PN								BN - M	235
Feedback devices	EN1	EN2	EN3	EN4	EN5	EN6	EN7*	EN8*	BXN-BX-BE-BN-MX-ME-M	267
Anti-condensate heaters	H1	NH1							BXN-BX-BE-BN-MXN-MX-ME-M	261
Tropicalized windings	TP								BXN-BX-BE-BN-MXN-MX-ME-M	262
Double-extended shaft	PS								BXN-BX-BE-BN-MXN-MX-ME-M	262
Rotor balancing grade B	RV								BX - BE - BN MX - ME - M	263
External mechanical protections	RC	TC***	EC°						BXN-BX-BE-BN-MXN-MX-ME-M	265-268
Forced ventilation	U1	U2**							BX - BE - BN MX - ME - M	264-265
Insulated Bearings	IB*								BX - MX	269
Certification CSA/UL	CUS°								BXN-BX-BE-BN-MXN-MX-ME-M	236
Bureau of Indian Standard Certification	BIS								BE - ME	237
China Compulsory Certification	CCC								BX - BE - BN MX - ME - M	237
China Energy Label	CEL								BX - MX	237
NBR Certification	NBR								BX - MX	238
EECA Certification	EECA								BX - MX	238
Plug connector	CON								BX - BE - BN MX - ME - M	239
Surface protection	C_								BXN-BX-BE-BN-MXN-MX-ME-M	258
Painting	RAL								BXN-BX-BE-BN-MXN-MX-ME-M	269
Certificates	ACM								BXN-BX-BE-BN-MXN-MX-ME-M	270
Inspection certificate	CC								BXN-BX-BE-BN-MXN-MX-ME-M	270
Vertical Mounting	VM*								BX - MX	270
Backstop device	AL	AR							MX - ME - M	263
Type of duty	S2	S3	S9						BN - M	240
	S2-10	S2-30	S2-60	S3=25%	S3=40%	S3=70%			BXN - MXN	

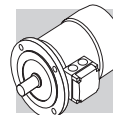
*Only for BX ≥ 280 and BX ≥ 280K

** Only for motors BN

*** Not for motors BX - MX

° Standard on BXN/MXN not an option

°° Only for motors BXN/MXN



M5.3 Brake-related options

(F06)	Description	Catalogue numbers				Availability	Page
	Brake torque	Refer to the specific brake type					249-252
	Manual release lever	R	RM			BXN - BX - BE - BN MXN - MX - ME - M	255
	Release lever orientation	AB	AA	AC	AD	BXN - BX - BE - BN MXN - MX - ME - M	256
	DC brake rectifier	NB	NBR°	SB	SBR°	BXN - BX - BE - BN MXN - MX - ME - M	248
	Soft-start flywheel	F1				BE - BN ME - M	257
	Capacitive filter	CF				BXN - BX - BE - BN MXN - MX - ME - M	257
	Brake separate power supply (*)	...SA	...SD	DIR°°		BXN - BX - BE - BN MXN - MX - ME - M	256
	Brake functionality check	MSW				BX - BE - BN MX - ME - M	261
	Additional cable entry for brake motors	IC				BN M	261

(*) Specify voltage. (°) Not for BXN/MXN (°°) Only for BXN/MXN - means "without separate power supply"

Default values.

M5.4 Example of identification nameplate for legacy motors (BX - BE - BN)

1	IEC EN 60034	Bonfiglioli Riduttori	CE	4
	3~Mot BE 90LA 4	Cod. 8U09030001		
2	No 1003001 - 6954785	S1	IM B5 15,1 kg	5
	kW 1,5	CL F IP 55	Amb 40 °C	
	Hz	V ± 10%	A	min ⁻¹
	50	230/400 Δ/Y	6,1/3,5	1430
3	60	265/460 Δ/Y	5,4/3,1	1730
	50Hz-IE2	83.5(100%) - 83.0(75%) - 80.0(50%)		0.74
	60Hz-IE2	84.5(100%) - 83.9(75%) - 80.7(50%)		0.73

① BONFIGLIOLI
Motor type

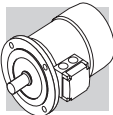
② Serial number

③ Rated voltage

④ Motor code

⑤ Type of duty: S1
Continuous duty

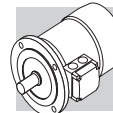
⑥ IE Class, Efficiency at:
4/4 - 3/4 - 2/4 load



M5.4.1 Example of identification nameplate for EVOX motors (BXN)

1					
	3~Mot BXN 90L 4 FD		TEFC	IMB14 IP55	22,6 kg
2	Cod. xxxxxxxxxxxx		No xxxxxxxx - xxxxxxxx		
	kW 1.5 HP 2		Amb 40 °C	CLF	S1
3	Hz	V	A	min ⁻¹	cos φ
	50	115/200 ΔΔ/YY	11.9/6.88	1441	0.75
	50	230/400 Δ/Y	5.96/3.44	1441	0.75
4	60	132/230 ΔΔ/YY	10.1/5.84	1750	0.74
	60	265/460 Δ/Y	5.6/2.92	1750	0.74
5	50Hz IE3 - 85.3 (100%) 84.3 (75%) 81.7 (50%) - KWA code J				
	60Hz IE3 - 86.5 (100%) 86.5 (75%) 83.4 (50%) - KWA code L				
6	H1 1~ 230V ± 10% 10W				
7	VB = 230V MB = 26Nm NB SA				
8		IEC EN 60034			
					CC320B
	Bonfiglioli Riduttori S.p.A.			Made in Italy	
				9	10

- ① Motor designation and general information
- ② Serial codes
- ③ Environment & application compliancy
- ④ Rated performances function of voltages/frequencies
- ⑤ Motor performances @ 50 Hz
- ⑥ Motor performances @ 60 Hz
- ⑦ Thermal protection and Servo ventilation information
- ⑧ Brake information
- ⑨ Certifications
- ⑩ Manufactory information



M6 MECHANICAL FEATURES

M6.1 Versions

EC-normalised BXN, BX, BE and BN motors are available in the design versions as indicated in the table below here after as per Standards EN 60034-7 (BX/BE), CEI EN 60034-14 (BN).

Mounting versions are:

IM B5 (basic)

IM V1, IM V3 (derived)

IM B14 (basic)

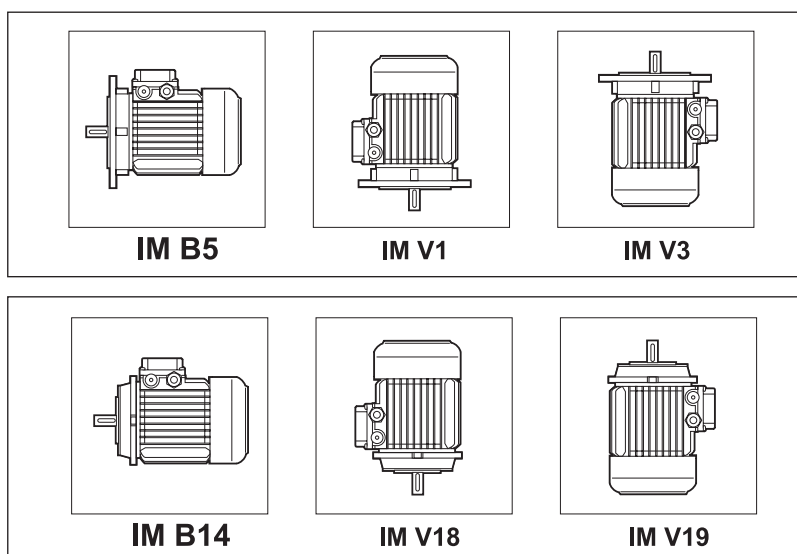
IM V18, IM V19 (derived)

IM B5 design motors can be installed in positions IM V1 and IM V3; IM B14 design motors can be installed in positions IM V18 and IM V19.

In such cases, the basic design IM B5 or IM B14 is indicated on the motor name plate.

In design versions with a vertically located motor and shaft downwards, it is recommended to request the drip cover (always necessary for brake motors). This facility, included in the option list should be specified when ordering as it does not come as a standard device

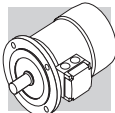
(F07)



For Motor BX \geq 200 and BX \geq 200K it is necessary to select VM options when vertically mounted.

If the motor will be mounted with DE facing downwards, selection of RC option is recommended. This has to be specified during the ordering phase because not present in standard motor version.

Flange output motors are also available with reduced coupling dimensions, as indicated in the table below - executions **B5R**, **B14R**. Their use in combination with gearboxes must be however coherent with the maximum installable power on gearboxes themselves (see chapters "Motors availability"). In case this condition is not met need to contact the Technical Service for the checking of the combination.



(F08)

	BN/BE 71	BX/BE/BN 80	BX/BE/BN 90	BX/BE/BN 100	BX/BE/BN 112	BX/BE/BN 132
	DxE - Ø					
B5R ⁽¹⁾	11x23 - 140	14x30 - 160	19x40 - 200	24x50 - 200	24x50 - 200	28x60 - 250
B14R ⁽²⁾	11x23 - 90	14x30 - 105	19x40 - 120	24x50 - 140	—	—

(1) flange with through holes

(2) flange with threaded holes

M6.2 Degree of protection

IP..

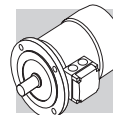
The following chart provides an overview of the degrees of protection available.























In addition to the degree of protection specified when ordering, motors to be installed outdoors require protection against direct sunlight and also – when they are to be installed vertically down – a drip cover to prevent the ingress of water and solid particles (option **RC**).

(F09)

		IP 54	IP 55	IP 56
BXN- BX-BE-BN	MXN-MX-ME-M	⊖	standard	 on request
BXN-BX-BE-BN/ FD*-FA	MXN-MX-ME-M/ FD-FA	standard	 on request	⊖
BX ≥ 200_FD BX ≥ 200K_FD		⊖	standard	⊖
BX ≥ 280K_FD		⊖	standard	 on request

(*) BX ≤ 180_FD



IP			5			5		
↓								
0		Not protected	0		Not protected	0		Not protected
1		Protected against extraneous solid bodies having $\varnothing \geq 50$ mm	1		Protected against vertical water drips	1		Protected against vertical water drips
2		Protected against extraneous solid bodies having $\varnothing \geq 12.5$ mm	2		Protected against vertical water drips inclined up to 15°	2		Protected against vertical water drips inclined up to 15°
3		Protected against extraneous solid bodies having $\varnothing \geq 2.5$ mm	3		Protected against rain	3		Protected against rain
4		Protected against extraneous solid bodies having $\varnothing \geq 1.0$ mm	4		Protected against water splashes	4		Protected against water splashes
5		Protected against dust	5		Protected against jets of water	5		Protected against jets of water
6		No dust ingress	6		Protected against powerful jets of water	6		Protected against powerful jets of water
			7		Protected against the effects of temporary immersion	7		Protected against the effects of temporary immersion
			8		Protected against the effects of continuous immersion	8		Protected against the effects of continuous immersion

M6.3 Cooling

The motors are externally ventilated (IC 411 to CEI EN 60034-6) and are equipped with a plastic fan working in both directions.

The motors must be installed allowing sufficient space between fan cowl and the nearest wall to ensure free air intake and allow access for maintenance purposes on motor and brake, if supplied. Independent, forced air ventilation (IC 416) can be supplied on request (option **U1**).

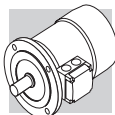
This solution enables to increase the motor duty factor when driven by an inverter and operating at reduced speed.

M6.4 Direction of rotation

Rotation is possible in both directions. If terminals U1, V1 and W1 are connected to line phases L1, L2 and L3, clockwise rotation (looking from drive end) is obtained. For counterclockwise rotation, switch two phases.

M6.5 Noise

Noise levels, measured using the method prescribed by ISO 1680 Standards, are within the maximum levels specified by Standards CEI EN 60034-9.





M6.6 Vibrations and balancing

Rotor shafts are balanced with half key fitted and fall within the vibration class N, as per Standard CEI EN 60034-14.

M6.7 Terminal box

Legacy motors (BN/M - BE/ME - BX/MX) terminal board features 6 studs for eyelet terminal connection while EVOX BXN and MXN motors have always 9 studs as standard. When a legacy motor have UL option active the terminal board features 9 studs execution (for US voltage "Dual Voltage"). A ground terminal is also supplied for earthing of the equipment. Terminals number and type are shown in the following table. For brake power supply, please read par. M9 (brake FD), M10 (brake FA). Brakemotors house the a.c./d.c. rectifier (factory pre-wired) inside the terminal box. Wiring instructions are provided either in the box or in the user manual.



(F10)

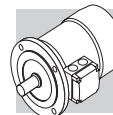
		No. of terminals	Terminal threads
BXN 63 ... BXN 90	MXN05 ... MXN25	9	M4
BX 80, BX 90 BE 63 ... BE 90 BN 56 ... BN 90	MX2, MX3 ME05 ... ME3 M05 ... M2	6	M4
BX 100 ... BX 132 BE 100 ... BE 132 BN 100 ... BN 160MR	MX3, MX4 ME3, ME4 M3 ... M4	6	M5
BX 160 - BE 160 ... BE 180M BN 160M ... BN 180M	ME5 MX5 - M5	6	M6
BX 180 - BE 180L BN 180L ... BN 200L	—	6	M8
BX 200 ... BX 250 BX 200K ... BX 250K	—	6	M10
BX 280 ... BX 355 BX 280K ... BX 355K	—	6	M12
BX 80 ... BX 132 BE 71 ... BE 132 BN 63 ... BN 160MR	MX2 ... MX4 ME2 ... ME4 M05 ... M4	9	M4
BX 160 ... BX 180 BE 160 ... BE 180 BN 160M ... BN 200L	MX5 ME5 M5	9	M6

M6.8 Cable entry

The holes used to bring cables to terminal boxes use metric threads in accordance with standard EN 50262 as indicated in the table here after.

(F11)

		Cable gland and dimensions		Maximum cable diameter allowed [mm]
BXN 63	MXN 05	2 x M20 x 1.5	1+1 Hole on each side	13
		2 x M16 x 1.5		11
BXN 71 ... BXN 90	MXN 10 ... MXN 25	2 x M25 x 1.5	1 Hole on each side	17
		2 x M16 x 1.5		11
BN 63 - BE 63	M05 - ME05	2 x M20 x 1.5	1 Hole on each side	13
BN71 ... BN90, BE71 ... BE90, BX80 ... BX90	M1 - M2, ME1 - ME2, MX2	2 x M25 x 1.5		17
BN100 - BN112, BE100 - BE112, BX100 - BX112	MX3, MX4 - ME3 M3	2 x M32 x 1.5	2 Holes on each side	21
		2 x M25 x 1.5		17
BN132 ... BN160MR, BE132, BX132	M4, ME4, MX4	4 x M32 x 1.5	2 Holes on each side	21
BN160M ... BN200L, BE160 - BE180, BX160 - BX180	M5, ME5, MX5	2 x M40 x 1.5	Pivoting, 4 x 90°	28
BX 200 ... BX 355 BX 200K ... BX 355K	—	2 x M63 x 1.5	Pivoting, 4 x 90°	45




M6.9 Bearings


Life lubricated preloaded radial ball bearings are used, types are shown in the chart here under. Calculated endurance lifetime L_{10h} , as per ISO 281, in unloaded condition, exceeds 40000 hrs.


DE = drive end

NDE = non drive end

(F12)

	DE	NDE	
		Without Brake	With Brake
MXN 05 - ME05 - M05	6004 2Z C3	6201 2Z C3	6201 2RS C3
MXN 10 - ME1 - M1	6004 2Z C3	6202 2Z C3	6202 2RS C3
MXN 20 - MX2 - ME2 - M2	6007 2Z C3	6204 2Z C3	6204 2RS C3
MXN 25 - MX3 - ME3 - M3	6207 2Z C3	6206 2Z C3	6206 2RS C3
MX4 - ME4 - M4	6309 2Z C3	6308 2Z C3	6308 2RS C3
MX5 - ME5 - M5	6309 2Z C3	6309 2Z C3	6309 2RS C3

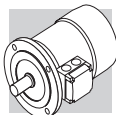
	DE	NDE	
		Without Brake	With Brake
BN 56	6201 2Z C3	6201 2Z C3	—
BXN 63 - BE 63 BN 63	6201 2Z C3	6201 2Z C3	6201 2RS C3
BXN 71 - BE 71 BN 71	6202 2Z C3	6202 2Z C3	6202 2RS C3
BXN 80 - BX 80 BE 80 - BN 80	6204 2Z C3	6204 2Z C3	6204 2RS C3
BXN 90 - BX 90 BE 90 - BN 90	6205 2Z C3	6205 2Z C3	6305 2RS C3
BX 100 - BE 100 - BN 100	6206 2Z C3	6206 2Z C3	6206 2RS C3
BX 112 - BE 112 - BN 112	6306 2Z C3	6306 2Z C3	6306 2RS C3
BX 132 - BE 132 - BN 132	6308 2Z C3	6308 2Z C3	6308 2RS C3
BN 160MR	6309 2Z C3	6308 2Z C3	6308 2RS C3
BX 160M/L - BE 160M/L - BN 160M/L	6309 2Z C3	6309 2Z C3	6309 2RS C3
BN 180M	6310 2Z C3	6309 2Z C3	6309 2RS C3
BX 180M/L - BE 180M/L - BN 180L	6310 2Z C3	6310 2Z C3	6310 2RS C3

	DE	NDE	
		Without Brake	With Brake
BN 200L - BX 200 - BX 200K	6312 2Z C3 6312/C3	6310 2Z C3 6210/C3*	6310 2RS C3
BX 225 - BX 225K	6313/C3*	6212/C3*	—
BX 250 - BX 250K	6315/C3*	6213/C3*	—
BX 280 - BX 280K	6316/C3*	6316/C3*	—
BX 315 - BX 315K	6319/C3**	6316/C3**	—
BX 355 - BX 355K	6322/C3**	6316/C3**	—

*Regreasable bearings with M6x1 Greasing Device

**Regreasable bearings with M10x1 Greasing Device

Note: BX and BXN motors have high efficiency bearings



M7 ELECTRICAL CHARACTERISTICS

M7.1 Voltage

Single speed motors are provided in standard execution either for nominal voltage 230 / 400 V Δ/Y , 50 Hz, or 400 / 690 V Δ/Y , 50 Hz, with a voltage tolerance of $\pm 10\%$.

Note: Motor nominal voltage/frequency also depends on the selection of options related to energy certifications for specific markets. Table below, then, has to be intended only as a guideline, for more details on the available Voltages/Frequencies as a function of the selected certification, please refer to paragraph M7.5 - M7.10.

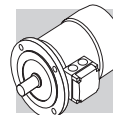
On all the motors, whose voltage / frequency configuration is not as indicated above, the voltage tolerance is reduced down to $\pm 5\%$. For the operation out of the tolerance boundaries, the temperature may exceed by 10 K the limit provided by the adopted insulation class.

The motors are suitable for operation on distribution European grid with voltage complying with the publication IEC 60038.

The table below shows the wiring options available.

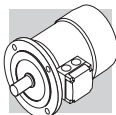
(F13)

IE1 motor power supply voltages BN - M				
Single speed motors at 50Hz				
Motor power supply voltage	— (CE)		CCC	CUS
	STD	FD / FA		
220/380 - 50	✗	✓	✗	✓
230/400 - 50	✓	✓	✓	✓
240/415 - 50	✗	✓	✗	✓
290/500 - 50	✓	✓	✗	✓
380/660 - 50	✗	✓	✗	✓
400/690 - 50	✓	✓	✗	✓
415/720 - 50	✗	✓	✗	✓
500/865 - 50	✓	✓	✗	✓
Double speed motors at 50Hz				
Motor power supply voltage	— (CE)		CCC	CUS
	STD	FD / FA		
380 - 50	✓	✗	✗	✓
400 - 50	✓	✓	✓	✓
415 - 50	✓	✗	✗	✓
500 - 50	✓	✗	✗	✓
Single speed motors at 60Hz				
Motor power supply voltage	— (CE)		CCC	CUS
	STD	FD / FA		
208/360 - 60	✓	✓	✗	✓
220/380 - 60	✓	✓	✗	✓
230/400 - 60	✓	✓	✗	✓
255/440 - 60	✗	✓	✗	✓
265/460 - 60	✗	✓	✓	✓
280/480 - 60	✗	✓	✗	✓
330/575 - 60	✓	✓	✗	✓
380/660 - 60	✓	✓	✗	✓
400/690 - 60	✓	✓	✗	✓
440/760 - 60	✗	✓	✗	✓
460/800 - 60	✗	✓	✗	✓
480/830 - 60	✗	✓	✗	✓
575/995 - 60	✓	✓	✗	✓
220/440 - 60	✓	✓	✗	✓
230/460 - 60	✓	✓	✗	✓
240/480 - 60	✓	✓	✗	✓
Double speed motors at 60Hz				
Motor power supply voltage	— (CE)		CCC	CUS
	STD	FD / FA		
208 - 60	✓	✗	✗	✓
220 - 60	✓	✗	✗	✓
230 - 60	✓	✗	✗	✓
240 - 60	✓	✗	✗	✓
380 - 60	✓	✗	✗	✓
400 - 60	✓	✗	✗	✓
440 - 60	✓	✗	✗	✓
460 - 60	✓	✗	✗	✓
480 - 60	✓	✗	✗	✓
575 - 60	✓	✗	✗	✓



(F14)

IE2 motor power supply voltages BE - ME					
Single speed motors at 50Hz					
Motor power supply voltage	— (CE)	CCC	BIS	CUS	
220/380 - 50	✓	✗	✓	✓	
230/400 - 50	✓	✓	✓	✓	
240/415 - 50	✓	✗	✓	✓	
290/500 - 50	✓	✗	✓	✓	
380/660 - 50	✓	✗	✓	✓	
400/690 - 50	✓	✗	✓	✓	
415/720 - 50	✓	✗	✓	✓	
500/865 - 50	✓	✗	✓	✓	
Single speed motors at 60Hz					
Motor power supply voltage	— (CE)		CCC	BIS	CUS
	STD	FD / FA			
208/360 - 60	✓	✓	✗	✗	✓
220/380 - 60	✓	✓	✗	✗	✓
230/400 - 60	✓	✓	✗	✗	✓
255/440 - 60	✓	✓	✗	✗	✓
265/460 - 60	✗	✓	✗	✗	✓
280/480 - 60	✓	✓	✗	✗	✓
330/575 - 60	✗	✓	✗	✗	✓
380/660 - 60	✓	✓	✗	✗	✓
400/690 - 60	✓	✓	✗	✗	✓
440/760 - 60	✓	✓	✗	✗	✓
460/800 - 60	✗	✓	✗	✗	✓
480/830 - 60	✓	✓	✗	✗	✓
575/995 - 60	✓	✓	✗	✗	✓
220/440 - 60	✓	✓	✗	✗	✓
230/460 - 60	✓	✓	✗	✗	✓
240/480 - 60	✓	✓	✗	✗	✓



M7.2 Frequency

(F15)

Number of poles			Winding connection
2	BE 80 ... BE 160, BN 63 ... BN 200	ME2 ... ME5, M05 ... M5	$\Delta / Y^{(2)}$
4	BXN 63 ... BXN 90, BX 80 ... BX 355 BX 200LAK ... BX 355MCK BE 63 ... BE 180, BN 56 ... BN 200	MXN05 ... MXN25, MX2 ... MX5 — ME05 ... ME5, M05 ... M5	
6	BE 90 ... BE 160, BN 63 ... BN 200	ME3 ... ME5, M05 ... M5	
8	BN 71 ... BN 132	M1 ... M4	
2/4	BN 63 ... BN 132	M05 ... M4	Δ / YY (Dahlander)
2/6	BN 71 ... BN 132	M1 ... M4	Y / Y (Two windings)
2/8	BN 71 ... BN 132	M1 ... M4	
2/12	BN 80 ... BN 132	M2 ... M4	
4/6	BN 71 ... BN 132	M1 ... M4	
4/8	BN 80 ... BN 132	M2 ... M4	Δ / YY (Dahlander)

⁽²⁾ Motors with voltage in ratio 2 (ex. 230/460 - 60) will be equipped with a 9 pin terminal box with winding connection either Δ / Δ or YY / Y (except 6 pole BN 63 Δ / Y)

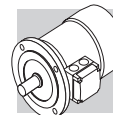
NOTE: For BXN and MXN motors refer to EVOX specific catalogue

Rated output power BN / M for 60 Hz operation is shown in the following diagram.

(F16)

		P_n [kW]						P_n [kW]			
		2P	4P	6P	8P (*)			2P	4P	6P	8P (*)
BN 56A	—	—	0.07	—	—	BN 100L	M3LA	3.5	—	—	—
BN 56B	M0B	—	0.1	—	—	BN 100LA	M3LA	—	2.5	1.8	0.9
BN 63A	M05A	0.21	0.14	0.1	—	BN 100LB	M3LB	4.7	3.5	2.2	1.3
BN 63B	M05B	0.3	0.21	0.14	—	BN 112M	—	4.7	4.7	2.5	1.8
BN 63C	M05C	0.45	0.3	—	—	—	M3LC	—	4.7	2.5	—
BN 71A	—	0.45	0.3	0.21	0.1	BN 132S	M4SA	—	6.5	3.5	2.5
—	M1SC	—	—	0.21	—	BN 132SA	M4SA	6.5	—	—	—
BN 71B	M05SD	0.65	0.45	0.3	0.14	BN 132SB	M4SB	8.7	—	—	—
BN 71C	M1LA	0.9	0.65	0.45	—	BN 132M	M4LA	11	—	—	3.5
BN 80A	—	0.9	0.65	0.45	0.21	BN 132MA	M4LA	—	8.7	4.7	—
BN 80B	M2SA	1.3	0.9	0.65	0.30	BN 132MB	M4LB	—	11	6.5	—
BN 80C	M2SB	1.8	1.3	0.9	—	BN 160MR	M4LC	12.5	12.5	—	—
BN 90S	—	—	1.3	0.9	0.45	BN 160M	M5SA	—	—	8.7	—
BN 90SA	—	1.8	—	—	—	BN 160MB	—	17.5	—	—	—
BN 90SB	—	2.2	—	—	—	—	M5SB	17.5	17.5	—	—
BN 90L	M3SA	2.5	—	1.3	0.65	BN 160L	—	21.5	17.5	12.5	—
BN 90LA	—	—	1.8	—	—	—	M5SC	21.5	—	—	—
BN 90LB	—	—	2.2	—	—	BN 180M	M5LA	24.5	21.5	—	—
						BN 180L	—	—	25.3	17.5	—
						BN 200L	—	—	34	—	—
						BN 200LA	—	34	—	22	—

(*) Excluded M_— motors



BXN / BX / BE / MXN / MX / ME motors are available at 60 Hz on a 4 pole configuration only, and their power rating is the same as their 50 Hz counterpart. Double speed BN / M motors supplied at 60 Hz will have an increase of nominal power, referred to 50 Hz, equal to 15%, whereas double speed BXN / BX / BE / MXN / MX / ME motors are not available. If a nominal power rating, equal to the normalised nominal power rating at 50 Hz, was requested to be on a nameplate of a motor meant to be voltage supplied at 60 Hz, the PN option shall be specified on the motor designation. Motors normally designed for a 50 Hz frequency may be used on a 60 Hz operating grid, but the related data shall be updated according to the following table. Motors designated for 50 Hz operation show on the nameplate also the values for 60 Hz operation (excluding motors in CUS execution and brake motors). See the following table.

(F17)

	50 Hz	60 Hz			
	V - 50 Hz	V - 60 Hz	P _n - 60 Hz	M _n , M _a /M _n - 60 Hz	n [min ⁻¹] - 60 Hz
BXN / MXN BX / MX BE / ME	230/400 Δ/Y	265 - 460 Δ Y	1	0.83	1.2
	400/690 Δ/Y	460 Δ			
BN / M	230/400 Δ/Y	220 - 240 Δ			
		380 - 415 Y			
	400/690 Δ/Y	380 - 415 Δ			
BN / M	230/400 Δ/Y	265 - 280 Δ	1.15	1	1.2
		440 - 480 Y			
	400/690 Δ/Y	440 - 480 Δ			

NOTE: For BXN and MXN motors refer to EVOX specific catalogue

M7.3 Ambient temperature

Catalogue rating values are calculated for 50 Hz operation and for standard ambient conditions (temperature 40 °C; elevation ≤ 1000 m a.s.l.) as per the CEI EN 60034-1 Standards. The motors can be used within the 40 - 60 °C temperature range with rated power output adjusted by factors given in the table below.

(F18)

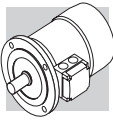
Ambient temperature (°C)	40°	45°	50°	55°	60°
Permitted power as a % of rated power	100%	95%	90%	85%	80%

Should a derating factor higher than 15% apply please consult factory.

M7.4 50 HZ normalized power

PN

With this option, motor name plate includes 50 Hz normalized power information even when motor is designated for operation with 60 Hz power mains. For 60 Hz supplies along with voltages 230/460V and 575V the PN option is applied by default.



M7.5 Motors for USA and Canada

CUS

CUS option is available in NEMA Design C execution for BN, BE, M, ME motors, and NEMA Design B for BX motors, with regards to the electrical features. The BXN and MXN motors are CUS certified as standard. Motors are certified in compliance with CSA (Canadian Standard) C22.2 N° 100 and UL (Underwriters Laboratory) UL 1004-1 standards, as stated on UL file E308649.

All powers BN-BE-M-ME and BXN-MXN with powers between 0,12 and 0,55kW included motors nameplates show the below marks:



BXN/MXN $\geq 0,75$ kW and BX/MX $\geq 0,75$ kW motors nameplates show the below marks and are certified in compliance with the energy efficiency standards in effect in the USA and Canada, respectively provided by DOE (10 CFR Part 431) and NRCAN (Energy Efficiency Regulations), tested according to CSA C390 standard.



BX 100 motors are available for the USA only and not for Canada, and the related marks reported on the nameplates are the following:



BX ≥ 200 K motors shows on nameplate the logo reported below and are compliant to energy efficiency regulations of USA and Canada, respectively established from DOE (10 CFR Part 431) and from NRCAN (Energy Efficiency Regulations), and tested in accordance to CSA C390.



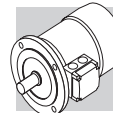
NOTES:

Starting from **June, 1st 2016**, CUS motors whose efficiency is below IE3 (i.e. “Premium Efficiency”) cannot be any longer sold in the USA and Canada, unless one or more of the following conditions apply:

- Double speed motors;
- Motors plated for a non - continuous duty ($<80\%$);
- Motors intended to be operated through variable frequency drive only (properly equipped with “Inverter Duty Only” label, or similar).

CUS option is selectable in combination to U1 or U2 only for BX ≥ 200 K.

US power mains voltages and the corresponding rated voltages to be specified for the motor are indicated in the following table:




(F19)

Frequency	Mains voltage	V_{mot}
60 Hz	208 V	200 V
	240 V	230 V
	480 V	460 V
	600 V	575 V

BX motor with CUS option are available with the following nominal Voltage/Frequency combinations:

(F20)

	V_{mot}
BX \leq 132	265/460 - 60 Hz
BX \leq 180	230/460 - 60 Hz 330/575 - 60 Hz
BX \geq 160 BX \geq 200K	460/800 - 60 Hz

CUS option is applicable onto 50 Hz operating motors as well (motors BX, MX excluded).

M7.6 Motors certified for India

BIS

Low voltage motors ≥ 0.12 kW manufactured or imported in India must be certified from Bureau of Indian Standard and provided with a mark certifying motor compliance to IS 12615 standard. BE - ME motors with power up to 3.7 kW included, are available with the above mentioned certification and, when BIS option is selected, are provided with the nameplate reporting the following logo:



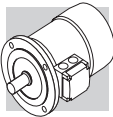
M7.7 China Compulsory Certification

CCC

Electric motors destined for sale in the People's Republic of China have to be certified under the CCC (China Compulsory Certification) system. BN/M and BE/ME motors of up to 7 Nm in rated torque are available with CCC certification and a special nameplate bearing the mark shown below:



CCC option is not currently available for IE3 motors and will be available starting from end 2021.
CCC option is not currently available for servo - ventilated motors.

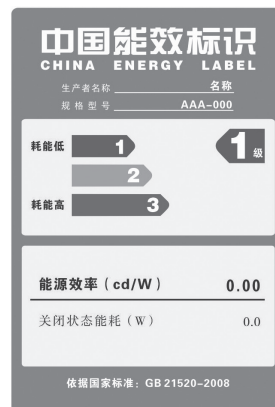


M7.8 Motor certified for China (China Energy Label)


CEL

Low voltage motors $\geq 0.75\text{kW}$ manufactured or imported in China must be certified and registered by the label office and provided with an energy label certifying they meet the energy efficiency levels as defined in GB18613-2012.

BX motors with power from 30 to 355kW included are available with the above mentioned certification and, when CEL option is selected, are provided with the following sticker applied to the motor:



BX motors with CEL option are available with the following nominal Voltage/Frequency combinations:

(F21)		V_{mot}
	$BX \geq 200$	380/660 - 50 Hz

M7.9 Motors certified for Brazil

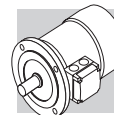
NBR

Brazilian laws regulamentates the manufacturing and importation of electric motor in the country. These have to be approved by NBR trough a declaration of the motor efficiency level at INMETRO. Motor compliant to NBR must report the declared efficiency value and have to be provided with a specific NBR nameplate and the additional mark shown in picture below.




The NBR option is available for motors:

- BX with powers from 0.75 to 22 kW included
- BX... K with powers from 30 to 355 kW included



BX motors with NBR option are available with the following nominal Voltage/Frequency combinations:

(F22)

	V_{mot}
BX90SR ... BX160	220/380 - 60 Hz 220/440 - 60 Hz
BX 180	220/380 - 60 Hz 220/440 - 60 Hz 380/660 - 60 Hz
BX \geq 200K	440/760 - 60 HZ

M7.10 Motors certified for Australia


EECA

Electric motor covered by Australian/NewZeland's energy regulation must be listed in the national database Energyratig. Motor with EECA option are registered in the previously mentioned database and can be sold in Australia and New Zeland.

EECA option is available for BX ... K motor with power from 30 to 355kW included.

BX motors with EECA option are available with the following nominal Voltage/Frequency combinations:

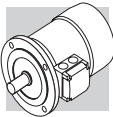
(F23)

	V_{mot}
BX \geq 200K	400/690 - 50 Hz

M7.11 Insulation class

CL F

Bonfiglioli motors use class **F** insulating materials (enamelled wire, insulators, impregnation resins) as compare to the standard motor. In standard motors, stator windings over temperature normally stays below the 80 K limit corresponding to class B over temperature. A careful selection of insulating components makes the motors compatible with tropical climates and normal vibration. For applications involving the presence of aggressive chemicals or high humidity, contact Bonfiglioli Engineering for assistance with product selection.



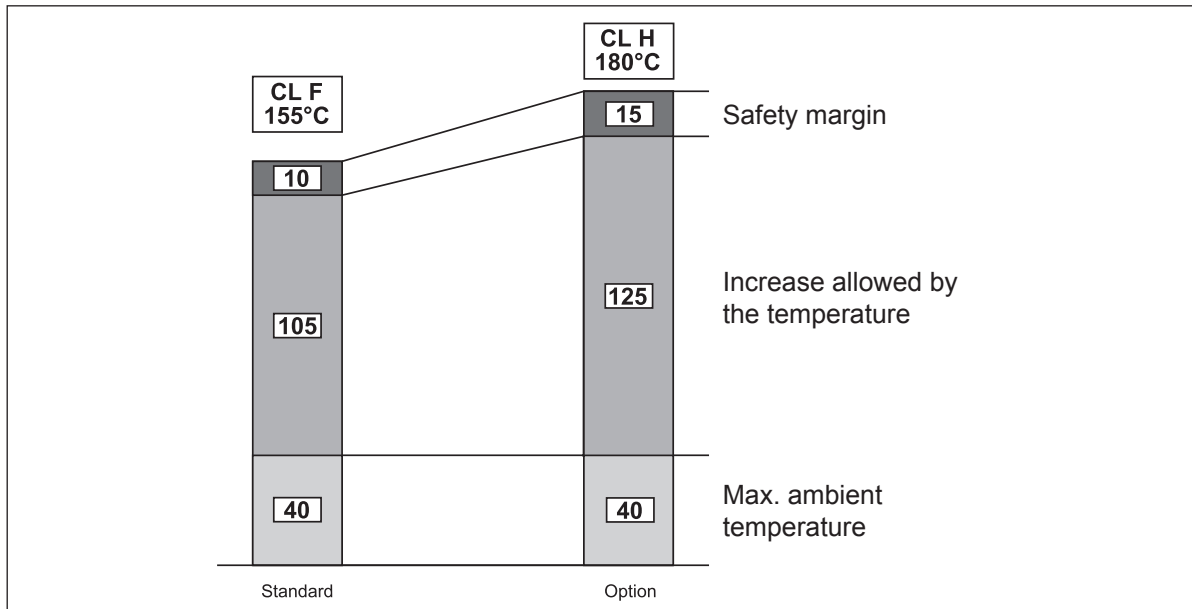
CL H

Motors manufactured in insulation class **H** are available at request.

This option can be selected for motors compliant with CSA and UL standards (CUS option), only for BX \geq 200 and BX \geq 200K.

CLH can't be selected on BXN motors because are CUS standard. If necessary contact technical office.

(F25)



M7.12 Type of duty

Unless otherwise specified, catalogue motor power refers to continuous duty S1. Any operating conditions other than S1 duty must be identified in accordance with duty cycle definitions laid down in standards CEI EN 60034-1. For duty cycles S2 and S3, the power increase co-efficient reported in the following table may be used. Please note that the table provided below applies to single-speed motors. As an alternative to S1 continuous duty, one of the following values can be specified at the product configuration stage (single speed motors only): S2, S3 or S9. The motor nameplate will be marked with an increased power rating to suit the type of duty, and with specific electrical data and a duty type of S2-30 min, S3-70% or S9 respectively. For further details, contact Bonfiglioli's Technical Service. Please contact Bonfiglioli Engineering for the power increase coefficients applicable to switch-pole motors.

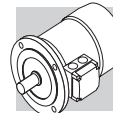
BN and M motors can be configured for operation at duty cycle S2(30min) and S3(70%) as standard option, Other requests which are different in terms of % or min are considered a speciality. BXN and MXN motors can be configured as standard at S2=10min, S2=30min, S2=60min or S3=25%, S3=40%, S3=70%.

(F24)

	Type of duty						Contact us	
	S2			S3 *				S4 - S9
	Duration (min)			Intermittence (I)				
	10	30 (*)	60	25%	40%	70% (*)		
f _m	1.35	1.15	1.05	1.25	1.15	1.1		

* Cycle duration must, in any event, be equal to or less than 10 minutes; if this time is exceeded, please contact our Technical Service.

(*) Default values from options (tab. F05).



M7.12.1 Cyclic duration factor:

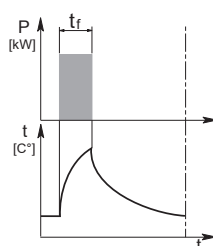
$$I = \frac{t_f}{t_f + t_r} \cdot 100 \quad (01)$$

t_f = work time under constant load

t_r = rest time

M7.12.2 Limited duration duty S2

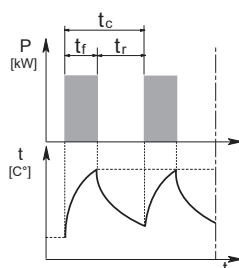
This type of duty is characterized by operation at constant load for a limited time, which is shorter than the time required to reach thermal equilibrium, followed by a rest period of sufficient duration to restore ambient temperature in the motor.



M7.12.3 Periodical intermittent duty S3:

This type of duty is characterized by a sequence of identical operation cycles, each including a constant load operation period and a rest period.

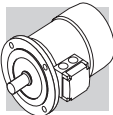
For this type of duty, the starting current does not significantly influence overtemperature.



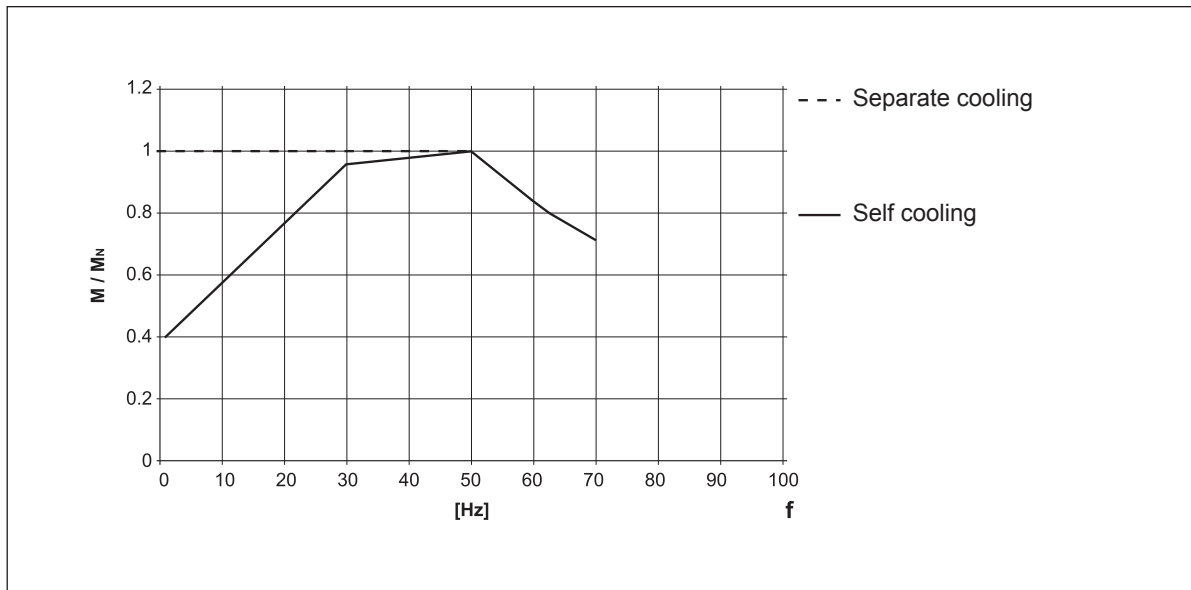
M7.13 Inverter-controlled motors

The electric motors Bonfiglioli may be used in combination with PWM inverters with rated voltage at transformer input up to 500 V. Standard motors use a phase insulating system with separators, class 2 enamelled wire and class H impregnation resins (1600V peak-to-peak voltage pulse capacity and rise edge $t_s > 0.1\mu s$ at motor terminals). Typical torque/speed curves referred to S1 duty for motors with base frequency $f_b = 50$ Hz is reported in the table below. Because ventilation is somewhat impaired in operation at lower frequencies (about 30 Hz), standard motors with incorporated fan (IC411) require adequate torque derating or - alternately - the addition of a separate supply fan cooling.

Above base frequency, upon reaching the maximum output voltage of the inverter, the motor enters a steady-power field of operation, and shaft torque drops with ratio (f/f_b) . As motor maximum torque decreases with $(f/f_b)^2$, the allowed overloading must be reduced progressively.



(F26)



The following table reports the mechanical speed limit for motors operating above rated frequency:

(F27)

		n [min ⁻¹]		
		2p	4p	6p
≤ BE 112 - BN 112	ME2, ME3 M05 ... M3	5200	4000	3000
≥ BE 132 - BN 132	ME4, ME5 M4, M5	4500	4000	3000
BXN 63 ... BXN 90	MXN 05 ... MXN 25		4000	
BX 80 ... BX 180	MX2 ... MX5		4000	

Above rated speed, motors generate increased mechanical vibration and fan noise. Class B rotor balancing is highly recommended in these applications. Installing a separate supply fan cooling may also be advisable. Remote-controlled fan and brake (if fitted) must always be connected direct to mains power supply.

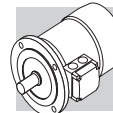
M7.14 Permissible starts per hour, Z

The rating charts of brakemotors lend the permitted number of starts Z_0 , based on 50% intermittence and for unloaded operation.

The catalogue value represents the maximum number of starts per hour for the motor without exceeding the rated temperature for the insulation class F.

To give a practical example for an application characterized by inertia J_c , drawing power P_r and requiring mean torque at start-up M_L the actual number of starts per hour for the motor can be calculated approximately through the following equation:

$$Z = \frac{Z_0 \cdot K_c \cdot K_d}{K_J} \quad (02)$$



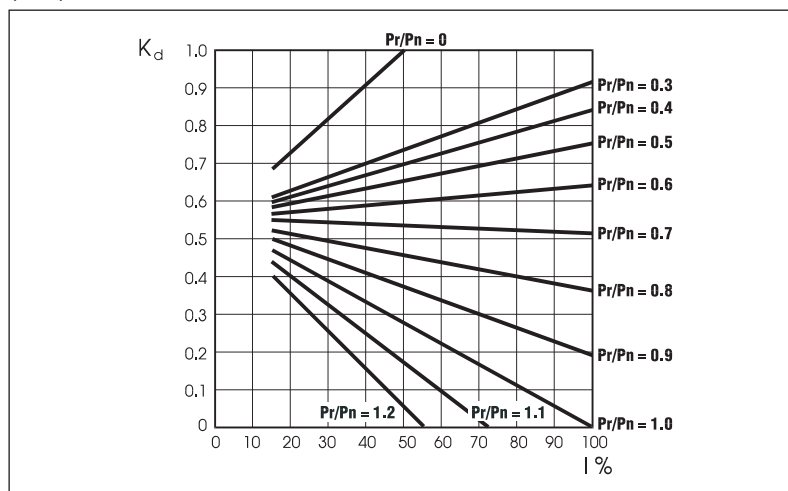
where:

$$K_J = \frac{J_m + J_c}{J_m} \quad \text{inertia factor}$$

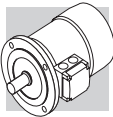
$$K_c = \frac{M_a - M_L}{M_a} \quad \text{torque factor}$$

$$K_d = \quad \text{load factor, see the following table}$$

(F28)



If actual starts per hour is within permitted value (Z) it may be worth checking that braking work is compatible with brake (thermal) capacity Wmax also given in tables (F38), (F41) and dependent on the number of switches (c/h).

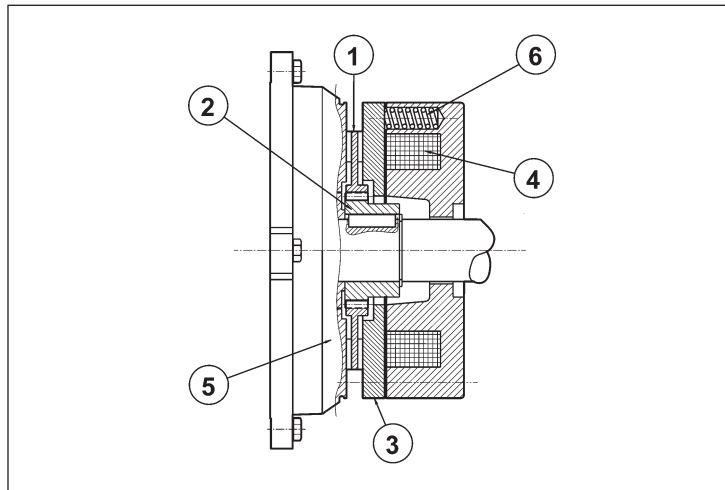


M8 ASYNCHRONOUS BRAKE MOTORS

M8.1 Operation

Versions with incorporated brake use spring-applied DC (FD option) or AC (FA options) brakes. All brakes are designed to provide fail-safe operation, meaning that they are applied by spring-action in the event of power failure.

(F29)



Key:

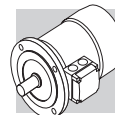
- ① brake disc
- ② disc carrier
- ③ pressure plate
- ④ brake coil
- ⑤ motor rear shield
- ⑥ brake springs

When voltage is interrupted, pressure springs push the armature plate against the brake disc. The disc becomes trapped between the armature plate and motor shield and stops the shaft from rotation.

When the coil is energized, a magnetic field strong enough to overcome spring action attracts the armature plate, so that the brake disc – which is integral with the motor shaft – is released.

M8.2 Most significant features

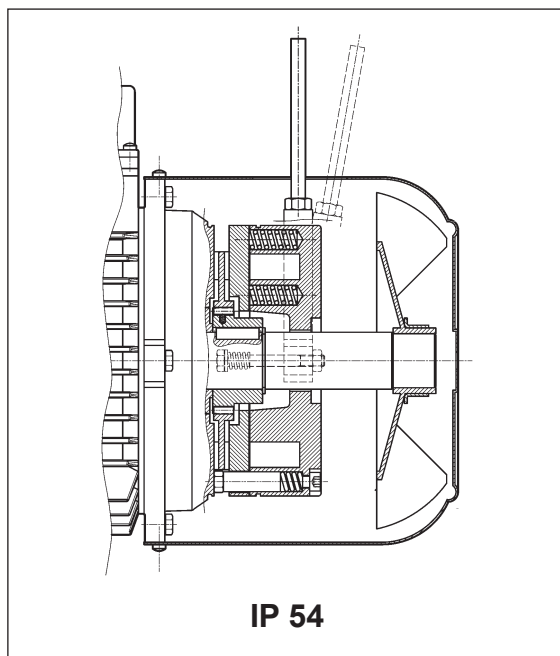
- High braking torques (normally $M_b \approx 2 M_n$), braking torque adjustment.
- Steel brake disc with double friction lining (low-wear, asbestos-free lining).
- Hexagonal seat on motor shaft fan end (N.D.E.) for manual rotation (not compatible with options PS, RC, TC, U1, U2, EN1, EN2, EN3, EN4, EN5, EN6).
- Manual release lever (options **R** and **RM** for FD; option **R** for FA).
- Corrosion-proof treatment on all brake surfaces.
- Insulation class F.



M9 DC BRAKE MOTORS TYPE BXN-BX-BE-BN_FD and MXN-MX-ME-M_FD

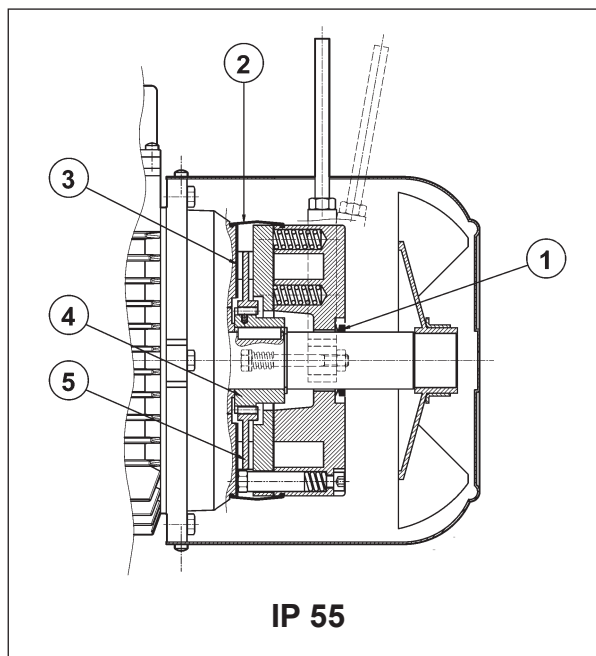
Frame sizes: BXN 63 ... BXN 90, BX 80 ... BX 355M, BX200LAK ... BX 355MCK - BE 63 ... BE 180L - BN 63 ... BN 200L / MXN 05 ... MXN 25 - MX2SB ... MX5LA - ME05 ... ME5 - M05 ... M5

(F30)



IP 54

(F31)



IP 55

Direct current toroidal-coil electromagnetic brake bolted onto motor shield. Preloading springs provide axial positioning of magnet body.

Brake disc slides axially on steel hub shrunk onto motor shaft with anti-vibration device.

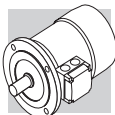
Brake torque factory setting is indicated in the corresponding motor rating charts. Braking torque may be modified by changing the type and/or number of springs.

At request, motors may be equipped with manual release lever with automatic return (**R**) or system for holding brake in the released position (**RM**).

See variant at paragraph "BRAKE RELEASE SYSTEMS" for available release lever locations.

FD brakes ensure excellent dynamic performance with low noise. DC brake operating characteristics may be optimized to meet application requirements by choosing from the various rectifier/power supply and wiring connection options available.

For applications involving lifting and/or high hourly energy dissipation, contact Bonfiglioli's Technical Service.



M9.1 Degree of protection

The standard protection degree for BN - M, BE - ME, BX \leq 180 - MX \leq 5 and BXN - MXN, while for BX \geq 200 and BX \geq 200K standard protection degree is IP55.

BN - M, BE - ME, BX \leq 180 - MX \leq 5 and BXN - MXN brakemotor with a standard protection degree IP54 can be requested with a protection degree IP55. If **IP55** is selected the following construction variants will be applied:

- ① V-ring at N.D.E. of motor shaft
- ② dust and water-proof rubber boot
- ③ stainless steel ring placed between motor shield and brake disc
- ④ stainless steel hub
- ⑤ stainless steel brake disc

M9.2 FD brake power supply

A rectifier accommodated inside the terminal box feeds the DC brake coil. Wiring connection across rectifier and brake coil is performed at the factory.

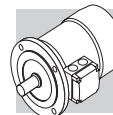
Brake power supply voltage V_B is as indicated in the following table, regardless of mains frequency:

(F32)

Brake power supply voltage V	FD brake supply voltages		
	Power supply from the motor with rectifier	Separate power supply with rectifier	Power supply without rectifier
24	X	X	✓
100	X	X	✓
110	X	✓	X
115	X	✓	X
120	X	✓	X
127	X	✓	X
180	X	X	✓
208	✓	✓	X
220	✓	✓	X
230	✓	✓	✓
240	✓	✓	X
255	✓	X	X
265	✓	X	X
280	✓	X	X
290	✓	X	X
330	✓	X	X
380	✓	✓	X
400	✓	✓	X
415	✓	✓	X
440	✓	✓	X
460	✓	✓	X
480	✓	✓	X
500	✓	✓	X

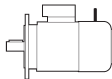



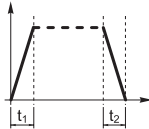
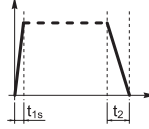
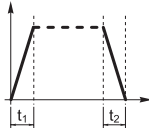
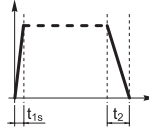
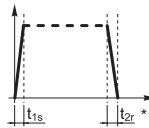
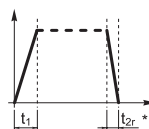
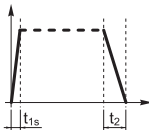
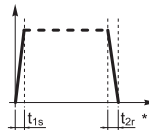
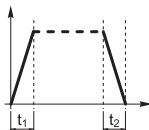
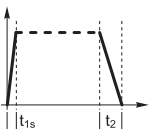

NOTE: For BXN and MXN motors refer to EVOX specific catalogue

For switch-pole motors the brake power supply is compulsorily from a separate line:



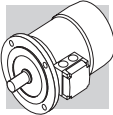
The diode half-wave rectifier ($V_{DC} \approx 0,45 \times V_{AC}$) is available in versions **NB**, **SB**, **NBR** e **SBR**, as detailed in the table below:

(F33)

		brake	 standard	 on request
BXN 63	MXN05	FD 02	NB 	SB 
BXN 71	MXN10	FD 53		
BXN 80	MXN20	FD 04		
BXN 90	—	FD 05		
BE 63 - BN 63	ME05 - M05	FD 02	NB 	SB 
BE 71 - BN 71	ME1 - M1	FD 03 FD 53		SBR 
BX 80 - BE 80 - BN 80	MX2 - ME2 - M2	FD 04		NBR 
BX 90S - BE 90S - BN 90S	—	FD 14		
BX 90L - BE 90L - BN 90L	—	FD 05		
BX 100 - BE 100 - BN 100	MX3 - ME3 - M3	FD 15		
—		FD 55		
BX 112 - BE 112 - BN 112	—	FD 06S	SB 	SBR 
BX 132 - BE 132 - BN 132 - BN 160MR	MX4 - ME4 - M4	FD 56 FD 06 FD 07		
BX 160 - BE 160L - BN 160L - BN 180M	MX5 - ME5 - M5	FD 08		
BX 180 - BE 180L - BN 180L - BN 200M	—	FD 09		
BX 200LA	—	FD 20	NB 	SB 
BX 225SA	—	FD 25		
BX 250M - BX 315SA	—	FD 30		
BX 315SB - BX 315SC	—	FD 160		
BX 315MA - BX 355MA	—	FD 250		
BX 355MB - BX 355MC	—	FD 400		
BX 200LAK	—	FD 8		
BX 225SAK - BX 225SBK	—	FD 9		
BX 250MAK	—	FD 10		
BX 280SAK - BX 315SAK	—	FD 1000		
BX 315SBK - BX 315SCK	—	FD 1600		
BX 355SAK - BX 355MCK	—	FD 2500		

(*) $t_{2c} < t_{2r} < t_2$

For BXN motors see the “Brake section” on the EVOX catalogue.



Rectifier **SB** with electronic energizing control over-energizes the electromagnet upon power-up to cut brake release response time and then switches to normal half-wave operation once the brake has been released.

Use of the **SB** rectifier is mandatory in the event of:

- high number of operations per hour
- reduced brake release response time
- brake is exposed to extreme thermal stress

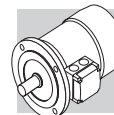
Rectifiers **NBR** or **SBR** are available for applications requiring quick brake intervention (braking condition reinstatement) response.

These rectifiers complement the **NB** and **SB** types as their electronic circuit incorporates a static switch that de-energizes the brake quickly in the event voltage is missing.

This arrangement ensures short brake release response time with no need for additional external wiring and contacts.

Optimum performance of rectifiers **NBR** and **SBR** is achieved with separate brake power supply.

Versions available: 230Vac $\pm 10\%$, 400Vac $\pm 10\%$, 50/60 Hz (with power supply); 100Vdc $\pm 10\%$, 180Vdc $\pm 10\%$ (with SD option).



M9.3 FD brake technical specifications

The table below reports the technical specifications of DC brakes FD.

(F34)

Brake	Brake torque M_b [Nm] springs			Release		Braking		W_{max} per brake operation [J]			W	P
	6	4	2	t_1	t_{1s}	t_2	t_{2c}				[MJ]	[W]
				[ms]	[ms]	[ms]	[ms]	10 s/h	100 s/h	1000 s/h		
FD02	–	3.5	1.75	30	15	80	9	4500	1400	180	15	17
FD03	5	3.5	1.75	50	20	100	12	7000	1900	230	25	24
FD53	7.5	5	2.5	60	30	100	12					
FD04	15	10	5	80	35	140	15	10000	3100	350	30	33
FD14												
FD05	40	26	13	130	65	170	20	18000	4500	500	50	45
FD15	40	26	13	130	65	170	20					
FD06S	60	40	20	–	80	220	25	20000	4800	550	70	55
FD56	–	75	37	–	90	250	20	29000	7400	800	80	65
FD06		100	50		100	250	20					
FD07	150	100	50	–	120	200	25	40000	9300	1000	130	65
FD08*	250	200	170	–	140	350	30	60000	14000	1500	230	100
FD09**	400	300	200	–	200	450	40	70000	15000	1700	230	120
FD20	260			100	170	340	–	80000	1700	1800	–	100
FD25	400			120	195	390	–	120000	19000	2000	–	110
FD30	1000			180	210	420	–	200000	28000	2900	–	200
FD160	1600			360	245	490	–	240000	36000	2600	–	336
FD250	2500			420	343	685	–	280000	47000	3700	–	400
FD400	4000			530	455	910	–	325000	51000	4500	–	420
FD8	400			176	78	236	–	65000	7000	650	–	85
FD9	600			324	138	176	–	120000	12000	1200	–	100
FD10	800			480	194	172	–	100000	16000	2000	–	150
FD1000	1000			252	–	375	–	220000	27000	2700	–	300
FD1600	1600			366	–	498	–	230000	35000	3500	–	340
FD2500	2500			660	–	880	–	590000	61000	6100	–	530

* brake torque values obtained with 9, 7 and 6 springs, respectively

t_1 = brake release time with half-wave rectifier

t_{1s} = brake release time with over-energizing rectifier

t_2 = brake engagement time with AC line interruption and separate power supply

** brake torque values obtained with 12, 9 and 6 springs, respectively

t_{2c} = brake engagement time with AC and DC line interruption – Values for t_1 , t_{1s} , t_2 , t_{2c} indicated in the tab. (F34) are referred to brake set at maximum torque, medium air gap and rated voltage

W_{max} = max energy per brake operation

W = braking energy between two successive air gap adjustments

P_b = brake power absorption at 20 °C

M_b = static braking torque ($\pm 15\%$)

s/h = starts per hour

The brake pad wear depends on the operating/ambient conditions (temperature, humidity, angular speed, specific pressure); Therefore the declared wear rate must be considered as indicative.

M9.4 FD brake connections

On standard single-pole motors, the rectifier is connected to the motor terminal board at the factory. For switch-pole motors and where a separate brake power supply is required, connection to rectifier must comply with brake voltage VB stated in motor name plate.

Because the load is of the inductive type, brake control and DC line interruption must use contacts from the usage class AC-3 to IEC 60947-4-1.

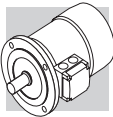


Table (F35+F39) – Brake coil with power supply from motor terminals (DIR) and AC line interruption. Delayed stop time t_2 and function of motor time constants.

Mandatory when soft-start/stops are required.

Table (F36+F40) – Brake coil with separate power supply (SA) and AC line interruption.

Normal stop time independent of motor.

Achieved stop times t_2 are indicated in the table (F34).

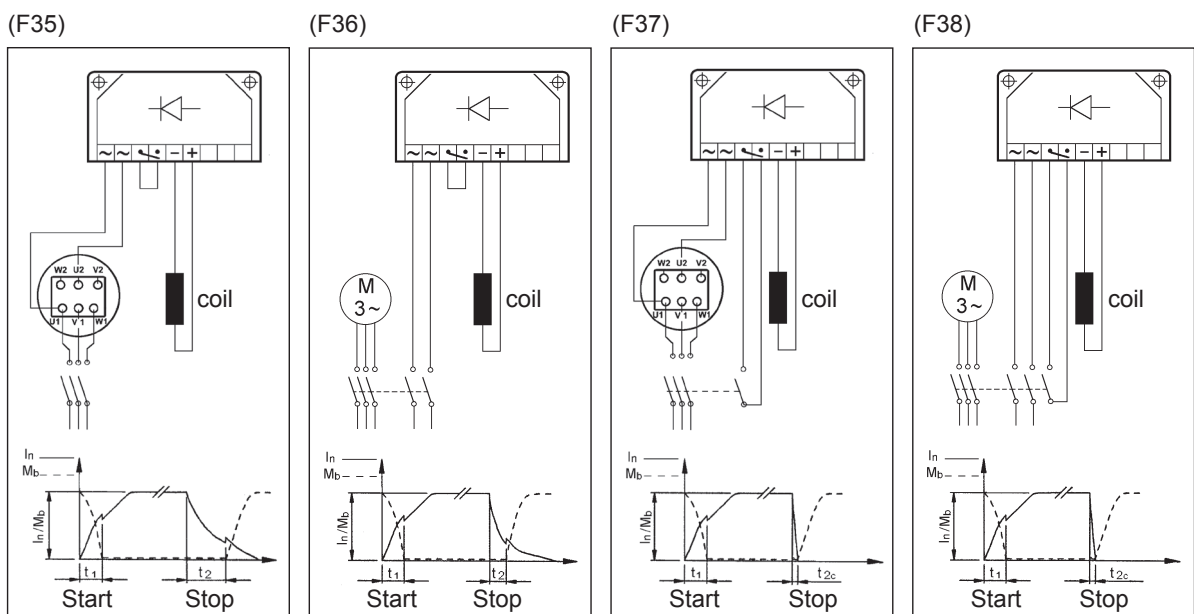
Table (F37+F41) – Brake coil with power supply from motor terminals (DIR) and AC/DC line interruption.

Quick stop with operation times t_{2c} as per table (F34).

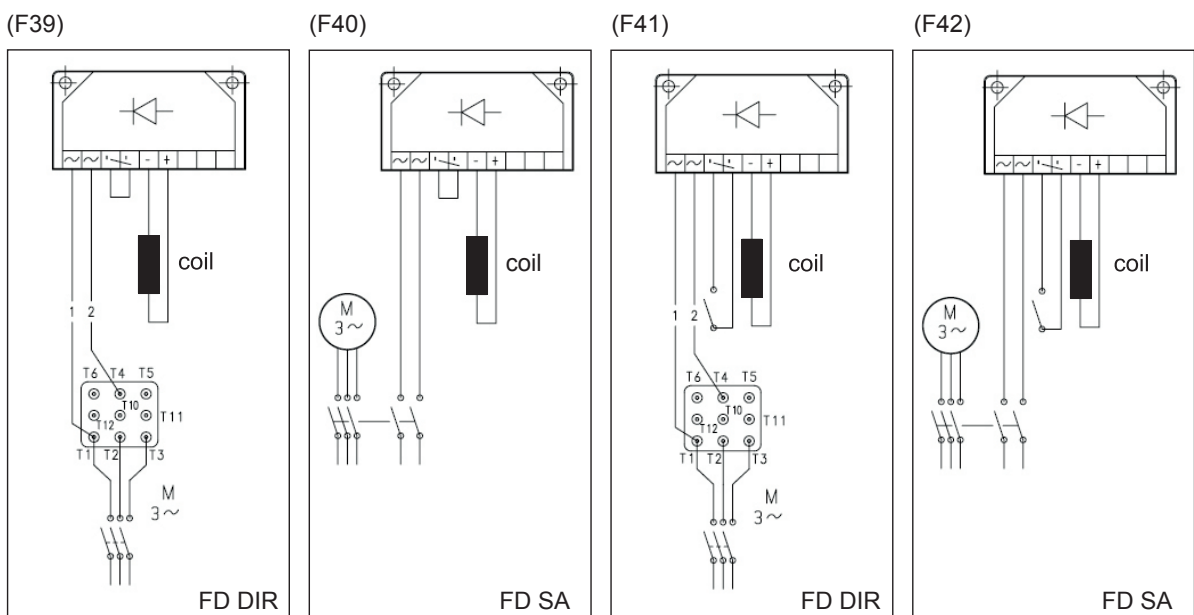
Table (F38+F42) – Brake coil with separate power supply (SA) and AC/DC line interruption.

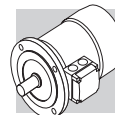
Stop time decreases by values t_{2c} indicated in the table (F34).

The brake may be voltage supplied directly from the motor terminal box (tab. F35-F39 and tab. F37-F41) only if the nominal voltage of the brake is the same as the smaller voltage of the motor.



For BXN and MXN motors the FD brake connection scheme is as follows:

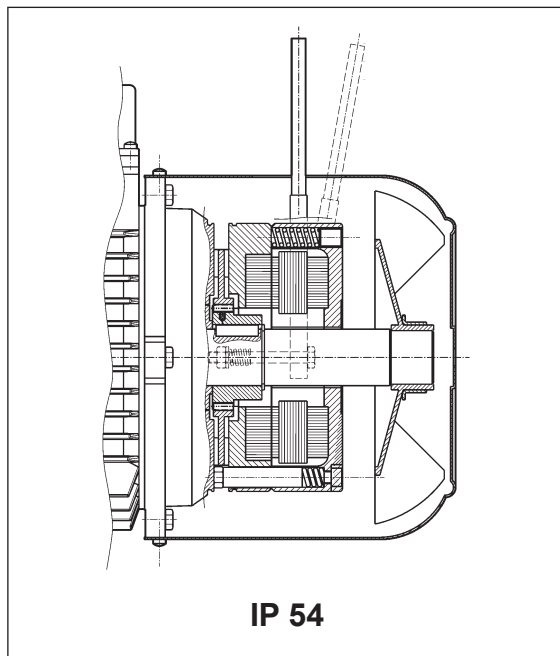




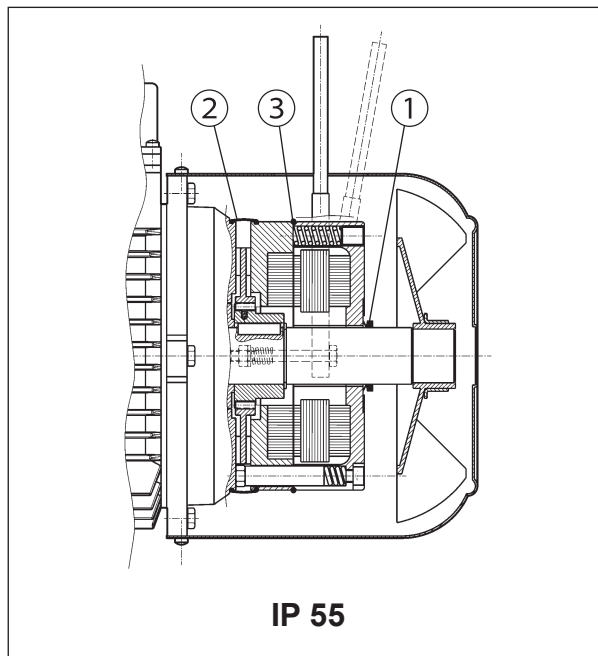
M10 AC BRAKE MOTORS TYPE BXN-BX-BE-BN_FA and MXN-MX-ME-M_FA

Frame sizes: BXN 63 ... BXN 90, BX 80 ... BX 160L - BE 63 ... BE 160L - BN 63 ... BN 180M / MXN 05 ... MXN 25 - MX2SB ... MX5LA - ME05 ... ME5 - M05 ... M5

(F43)



(F44)



Electromagnetic brake operates from three-phase alternated current power supply and is bolted onto conveyor shield. Preloading springs provide axial positioning of magnet body. Steel brake disc slides axially on steel hub shrunk onto motor shaft with anti-vibration device. Brake torque factory setting is indicated in the corresponding motor rating charts. Spring preloading screws provide stepless braking torque adjustment. Torque adjustment range is $30\% M_{bMAX} < M_b < M_{bMAX}$ (where M_{bMAX} is maximum braking torque as shown in tab. (F45).

Thanks to their high dynamic characteristics, FA brakes are ideal for heavy-duty applications as well as applications requiring frequent stop/starts and very fast response time.

Motors may be equipped with manual release lever with automatic return (R) at request. See variant at paragraph "BRAKE RELEASE SYSTEMS" for available release lever locations.

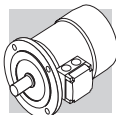
For applications involving lifting and/or high hourly energy dissipation, contact Bonfiglioli's Technical Service.

M10.1 Degree of protection

Standard protection class is IP54.

Brake motor FA is also available in protection class **IP55**, which mandates the following variants:

- ① V-ring at N.D.E. of motor shaft
- ② dust and water-proof rubber boot
- ③ O-ring



M10.2 FA brake power supply

In single speed motors, power supply may be brought to the brake coil direct from the motor terminal box. As a result, brake voltage and motor voltage are the same. Switch-pole motors and motors with separate brake power supply feature an auxiliary terminal board with 6 terminals for connection to brake line. In all cases, brake voltage indication in the designation is mandatory. The following table reports standard AC brake power supply ratings for single- and switch-pole motors:

(F45)

FA brake supply voltages		
Brake power supply voltage V	FA brake	
	Motor power supply at 50Hz	Motor power supply at 60Hz
208	✗	✓
220	✗	✓
230	✓	✓
240	✗	✓
380	✓	✓
400	✓	✓
415	✓	✗
440	✗	✓
460	✗	✓
480	✗	✓
500	✓	✗
575	✗	✓

NOTE: For BXN and MXN motors refer to EVOX specific catalogue

Special voltages are available at request.

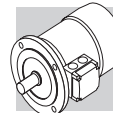
M10.3 Technical specifications of FA brakes

(F46)

Brake	Brake torque M_b [Nm]	Release t_1 [ms]	Braking t_2 [ms]	W_{max} [J]			W [MJ]	P [VA]
				10 s/h	100 s/h	1000 s/h		
FA 02	3.5	4	20	4500	1400	180	15	60
FA 03	7.5	4	40	7000	1900	230	25	80
FA 04	15	6	60	10000	3100	350	30	110
FA 14								
FA 05	40	8	90	18000	4500	500	50	250
FA 15								
FA 06S	60	16	120	20000	4800	550	70	470
FA 06	75	16	140	29000	7400	800	80	550
FA 07	150	16	180	40000	9300	1000	130	600
FA 08	250	20	200	60000	14000	1500	230	1200

M_b = max static braking torque ($\pm 15\%$)
 t_1 = brake release time
 t_2 = brake engagement time
 W_{max} = max energy per brake operation (brake thermal capacity)
 W = braking energy between two successive air gap adjustments
 P_b = power drawn by brake at 20° (50 Hz)
s/h = starts per hour

NOTE
Values t_1 and t_2 in the table refer to a brake set at rated torque, medium air gap and rated voltage.

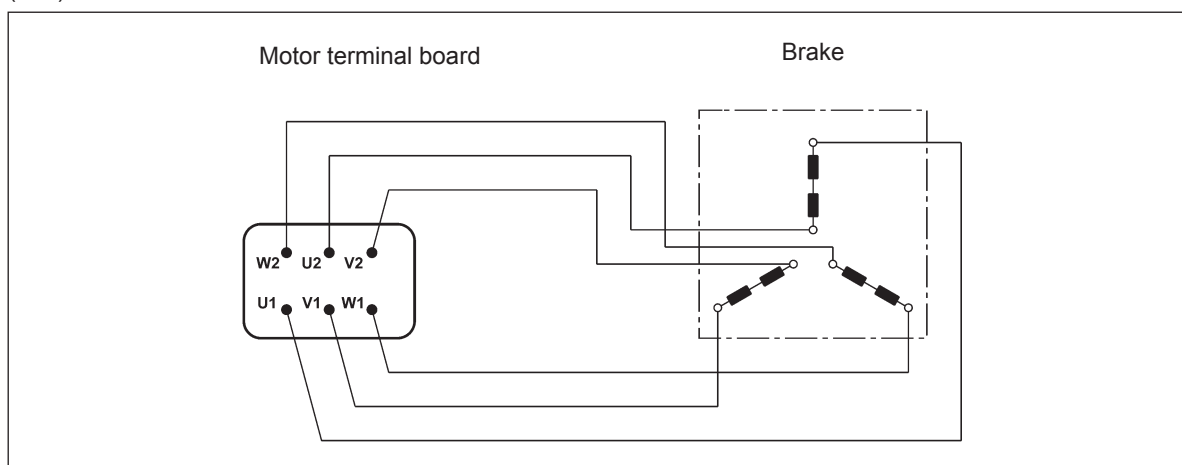


The brake pad wear depends on the operating/ambient conditions (temperature, humidity, angular speed, specific pressure); Therefore the declared wear rate must be considered as indicative.

M10.4 FA brake connections

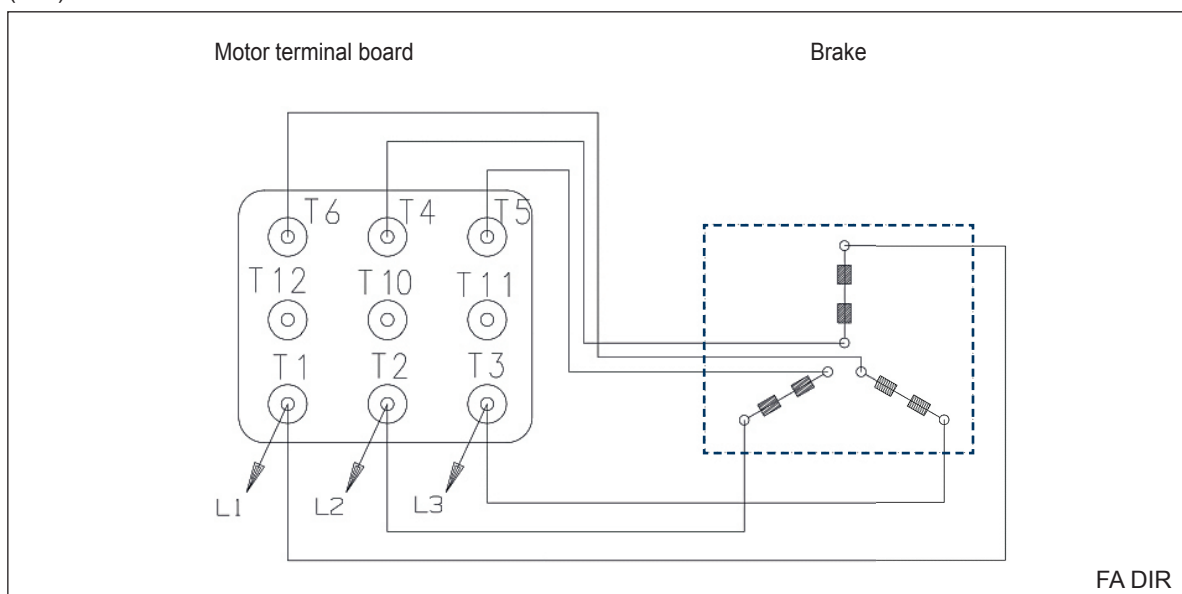
The diagram below shows the wiring when brake is connected directly to same power supply of the motor:

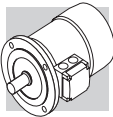
(F47)



For BXN and MXN motors the FA brake connection scheme is as follows:

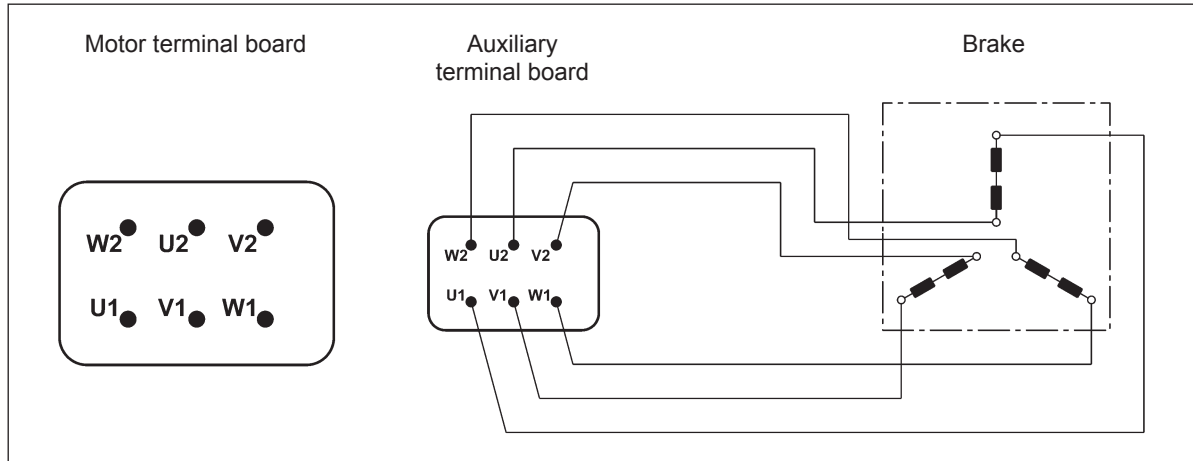
(F48)





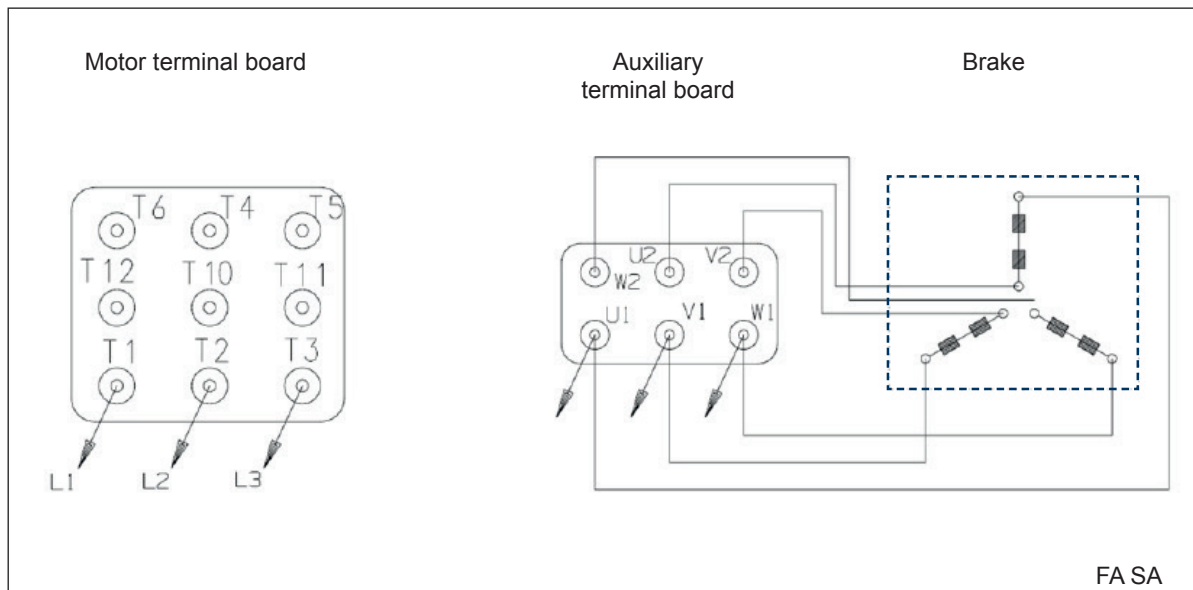
Switch-pole motors and, at request, single-pole motors with separate power supply are equipped with an auxiliary terminal board with 6 terminals for brake connection. In this version, motors feature a larger terminal box. See diagram below:

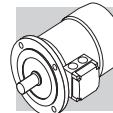
(F49)



For BXN and MXN motors the FA brake connection scheme is as follows:

(F50)



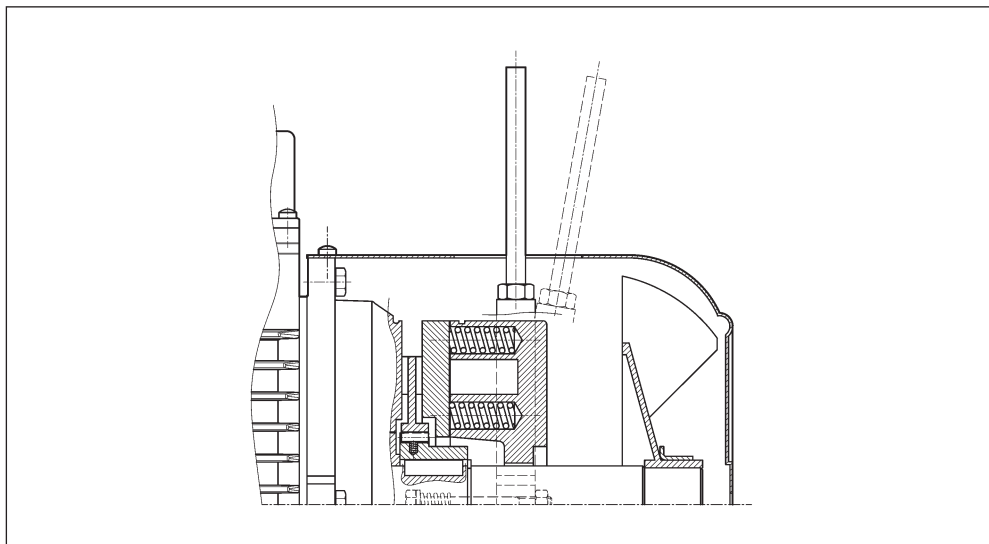


M11 BRAKE RELEASE SYSTEMS

Spring-applied brakes type FD and FA may be equipped with optional manual release devices. These are typically used for manually releasing the brake before servicing any machine or plant parts operated by the motor.

R

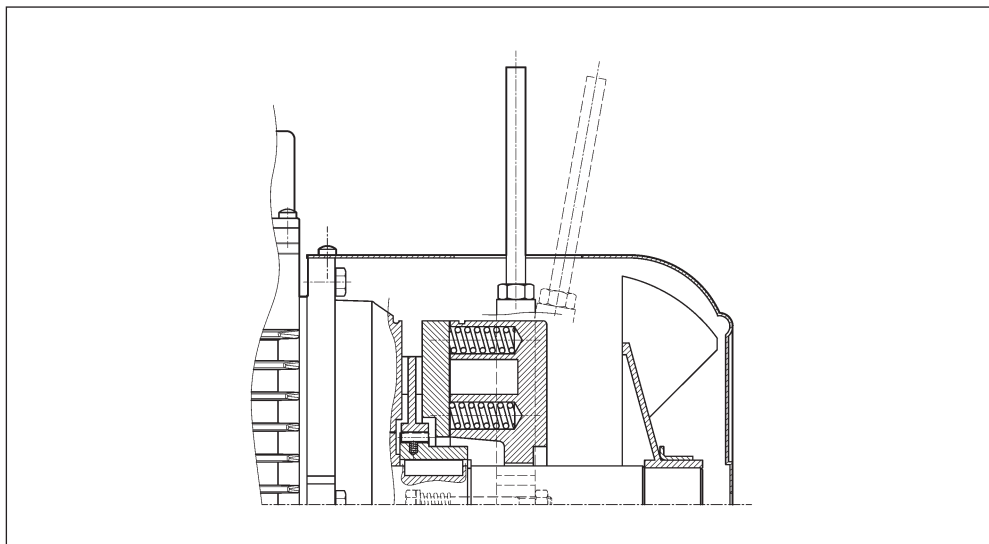
(F51)



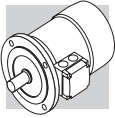
A return spring brings the release lever back in the original position.

RM

(F52)



On brake motors type FD, if the option RM is specified, the release device may be locked in the "release" position by tightening the lever until its end becomes engaged with a brake housing projection. The availability for the various disengagement devices is charted here below:



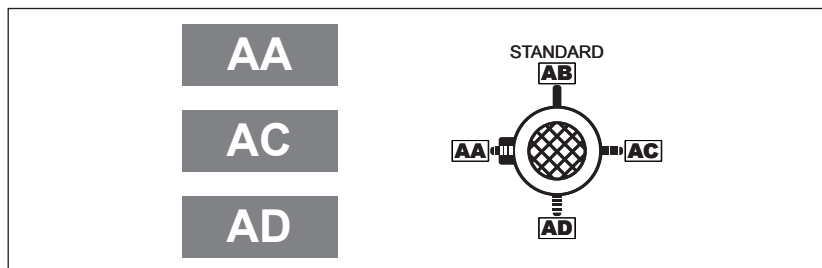
(F53)

	R	RM
BXN_FD BX_FD BE_FD BN_FD	BXN 63 ... BXN 90 BX 80 ... BX 180 BX 200K ... BX 315K BE 63 ... BE 180 BN 63 ... BN 200	BXN 63 ... BXN 90 BX 80 ... BX 132 BE 63 ... BE 132 BN 63 ... BN 132 FD07
MXN_FD MX_FD ME_FD M_FD	MXN05 ... MXN20 MX2 ... MX5 ME05 ... ME5 M05 ... M5	MXN05 ... MXN20 MX2 ... MX4 ME05 ... ME4 M05 ... M4LA
BXN_FA BX_FA BE_FA BN_FA	BXN 63 ... BXN 90 BX 80 ... BX 160 BE 63 ... BE 160L BN 63 ... BN 180M	
MXN_FA MX_FA ME_FA M_FA	MXN05 ... MXN20 MX2 ... MX5 ME05 ... ME5 M05 ... M5	

M11.1 Release lever orientation

Unless otherwise specified, the release lever is located 90° away from the terminal box – identified by letters [AB] in the diagram below – in a clockwise direction on both options **R** and **RM**. Alternative lever positions [AA], [AC] and [AD] are also possible when the corresponding option is specified:

(F54)



M11.2 Separate brake supply

DIR

Direct brake supply

The brake system is directly powered through the electric motor terminal board power supply. When a legacy motor is configured with a direct brake supply no option need to be selected, while for EVOX motors DIR option must be selected.

...SA

Separate AC brake supply

The brake coil is directly powered through an independent line, separated from the motor one.

FA-SA: the rated AC voltage must be specified. SA 230 (V AC). **FD-NB/SB-SA**: the rated AC voltage which power the rectifier must be specified. E.G. SA 400 (V AC).

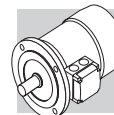
...SD

Separate DC brake supply

The brake coil is directly powered with a DC current and the rectifier is not present.

The rated coil voltage must be specified, E.G. SD 24 (V DC).

Note: for BX≥200 and BX≥200K it is not possible to directly feed the brake from the motor terminal box, it is then necessary to select option SA or SD.





M12 OPTIONS

M12.1 Soft-start / stop

F1

An optional flywheel - option F1 - is available for applications requiring soft starting or stopping. The flywheel's added inertia uses up kinetic energy during starting and returns it back during braking, thus catering for more progressive and gradual shock loads. The optional flywheel is available for brake motors type BN-BE_FD and M-ME_FD with specific characteristics as detailed in the table below:

(F55)

Main data for flywheel of motore type: BN-BE_FD, M-ME_FD			
		Fly-wheel weight [Kg]	Fly-wheel inertia [Kgm ²]
BN 63 - BE 63	M05 - ME05	0.69	0.00063
BN 71 - BE 71	M1 - ME1	1.13	0.00135
BN 80 - BE 80	M2 - ME2	1.67	0.00270
BN 90 S - BN 90 L BE 90 S - BE 90 LA	—	2.51	0.00530
BN 100 - BE 100	M3 - ME3	3.48	0.00840
BN 112 - BE 112	—	4.82	0.01483
BN 132 S - BN 132 M BE 132 S - BE 132 M	M4 - ME4	6.19	0.02580

M12.2 Capacitive filter

CF

An optional capacitive filter is available for brake motors type FD only. When the suitable capacitive filter is installed upstream of the rectifier (option CF), motors comply with the emission limits required by standard EN61000-6-3:2007 "Electromagnetic Compatibility – Generic Emission Standard – Part 6-3: Residential, commercial and light industrial environment".

BX≥200LA and BX≥200LAK motors comply with the emission limits required by standard EN 61000-6-3:2007 "Electromagnetic Compatibility - Generic Emission Standard - Part 6-3: residential, commercial and light industrial environment."

M12.3 Thermal protective devices

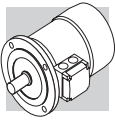
In addition to the standard protection provided by the magneto-thermal device, motors can be supplied with built-in thermal probes to protect the winding against overheating caused, by insufficient ventilation or by an intermittent duty.

This additional protection should always be specified for servoventilated motors (IC416).

M12.4 Thermistors

E3

These are semi-conductors having rapid resistance variation when they are close to the rated switch off temperature (150 °C). Variations of the $R = f(T)$ characteristic are specified under DIN 44081, IEC 34-11 Standards. Positive temperature coefficient thermistors are normally used (also known as PTC "cold conductor resistors"). Thermistors cannot control relays directly and must be connected to a suitable disconnect device. Thus protected, three PTCs connected in series are installed in the winding, the terminals of which are located on the auxiliary terminal-board.



K1

The design characteristics of this sub-group of PTC thermistors allow them to be used as positive temperature coefficient sensors with variable resistance.

Functioning temperature range: 0°C ... +260°C.

Thermistors cannot control relays directly and must be connected to a suitable disconnect device.

Terminals (polarised) for 1 x KTY 84-130 are provided on an auxiliary terminal strip.

M12.5 Bimetallic thermostates

D3

These types of protective devices house a bimetal disk. When the rated switch off temperature (150 °C) is reached, the disk switches the contacts from their initial rest position.

As temperature falls, the disk and the contacts automatically return to rest position.

Three bimetallic thermostates connected in series are usually employed, with normally closed contacts. The terminals are located on an auxiliary terminal-board.

M12.6 Resistance thermometer

Pt1000

The resistance thermometer has a chip for a temperature sensor, the resistance of which changes in relation to temperature according to a series of reproducible basic values. The changes in resistance are transferred as changes in current.

At 0°C, the measurement resistances are adjusted to 1000 ohm for the Pt1000 and correspond to the accuracy class B (i.e. the relationship between resistance and temperature). The limit deviation is $\pm 0,3^{\circ}\text{C}$, and the admissible deviations are defined in EN 60751. The Pt1000 resistance thermometer will, in the future, gradually replace the KTY84-130 temperature available today. The relationship between the temperature and the electrical resistance of conductors is utilized in the Pt1000 to measure the temperature, just like with the additional resistance thermometers described above. Pure metals undergo larger changes in resistance than alloys and have a relatively constant temperature coefficient.

M12.7 Plug connector

CON

Three types of connectors (CON 1, CON 2, CON 3) are provided; they can be mounted in two different positions: right side of terminal box cover (C1D, C2D, C3D); left side of terminal box cover (C1S, C2S, C3S).

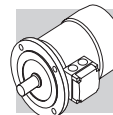
The option CON is applicable to single speed BN and M motors (2, 4, 6, 8 poles), and BX / BE and MX / ME motors on the sizes specified on the following table. All double speed motors are excluded. The connectors CON 1 / CON 2 are available for BX-BE/MX-ME and BN/M motors without brake and for brakemotors equipped with DC brake type FD, for the motor sizes listed below.

The male connector (with pins) is mounted on the motor, the female connector is not provided. With CON option, the winding connection is always Y.

With option U1 "forced ventilation", the fan unit supply is available inside the separate terminal box fixed to fan cover. With options EN1...EN6, the encoder connection is made by a cable not connected to the motor plug connector.

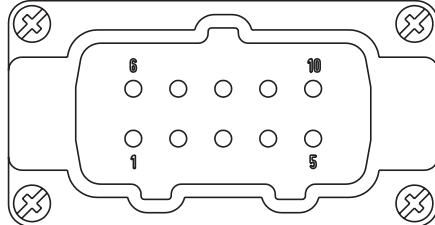
The CON option is not applicable to brakemotors equipped with AC brake type FA.

The CON option is not available when at least one of the next options are selected: the U2, CUS, IC.

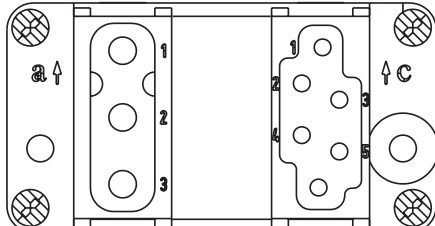


Specifications

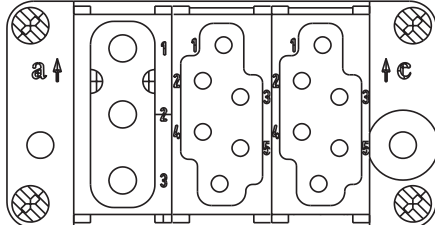
(F56)

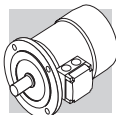
Option	CON 1
Motor size	BX 80 ... BX 112 / MX2, MX3 / BE 63 ... BE 112 / ME05 ... ME4 BN 63 ... BN 112 / M05 ... M3
Connector view	
Type of connector	Harting Han 10ES
Housing	Han EMC 10B with 2 levers
Numbers of pins - nominal current	10 x 16A
Voltage	500 Vac
Contact connection	Screw terminals

(F57)

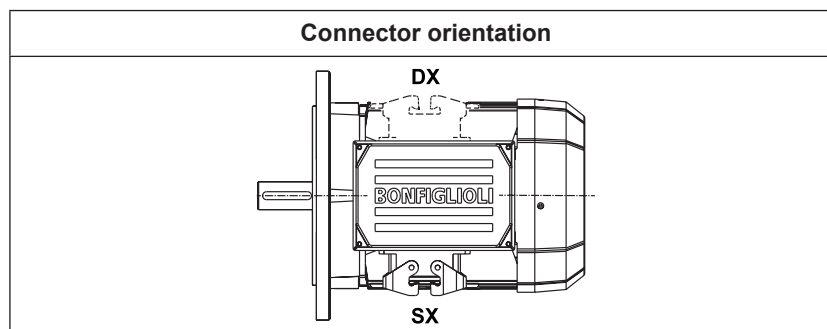
Option	CON 2
Motor size	BX 80 ... BX 132 / MX2, MX3 / BE 63 ... BE 132 / ME05 ... ME4 BN 63 ... BN 160MR / M05 ... M4
Connector view	
Type of connector	Harting Han Modular
Housing	Han EMC 10B with 2 levers
Module type	Module C + Module E + Module E
Numbers of pins - nominal current	3 x 36A / 6 x 16A
Voltage	500 Vac
Contact connection	Crimping contacts

(F58)

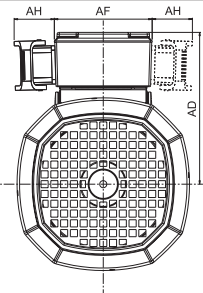
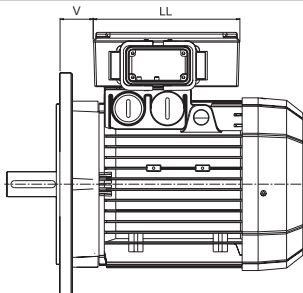


Option	CON 3
Motor size	BX 80 ... BX 132M / MX2, MX3 / BE 63 ... BE 132 / ME05 ... ME4 / BN 63 ... BN 160MR / M05 ... M4
Connector view	
Type of connector	Harting Han Modular
Housing	Han EMC 10B with 2 levers
Module type	Module C + Module E + Module E
Numbers of pins - nominal current	3 x 36A / 6 + 6 x 16A
Voltage	500 Vac
Contact connection	Crimping contacts



(F59)

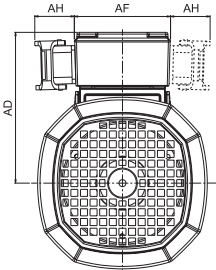
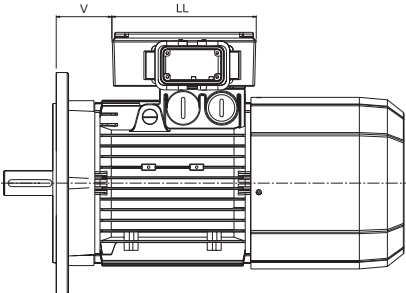
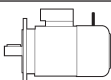



(F60)

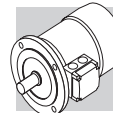
Motors without brake dimensions						
 						
		AD (mm)	AF (mm)	AH (mm)	LL (mm)	V ^(*) (mm)
BE 63 - BN 63	ME05 - M05	136	110	45	165	4.5
BE 71 - BN 71	ME1 - M1	149	110	45	165	15.5
BX 80 - BE 80 - BN 80	MX2 - ME2 - M2	160	110	45	165	16.5
BX 90 - BE 90 - BN 90	MX3	162	110	45	165	31.5
BX 100 - BE 100 - BN 100	MX3 - ME3 - M3	171	110	45	165	37.5
BX 112 - BE 112 - BN 112	MX4	186	110	45	165	39
BX 132 - BE 132 - BN 132	MX4 - ME4 - M4	210	140	45	188	45.5
BN 160MR	—	210	140	45	188	161

(*) Dimension valid only for motors BX, BE and BN.

(F61)

Motors with FD brake dimensions						
 						
		AD (mm)	AF (mm)	AH (mm)	LL (mm)	V ^(*) (mm)
BE 63 - BN 63	ME05 - M05	136	110	45	165	4.5
BE 71 - BN 71	ME1 - M1	149	110	45	165	1.5
BX 80 - BE 80 - BN 80	MX2 - ME2 - M2	160	110	45	165	18.5
BX 90 - BE 90 - BN 90	—	162	110	45	165	39.5
BX 100 - BE 100 - BN 100	MX3 - ME3 - M3	171	110	45	165	63.5
BX 112 - BE 112 - BN 112	—	186	110	45	165	75
BX 132 - BE 132 - BN 132	MX4 - ME4 - M4	210	140	45	188	122
BN 160MR	—	210	140	45	188	161

(*) Dimension valid only for motors BN and BX



M12.8 Control of brake operation

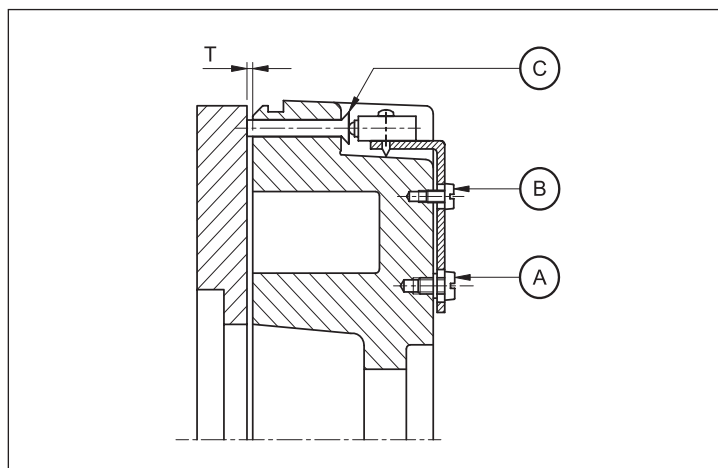
MSW

The microswitch can be set in order to obtain from it a signal related to the attraction/release of anchor plate, or it can be set in order to give feedback when the air gap reaches the maximum value.

MSW option is available for brakes FD03...FD09.

The microswitch is provided with three lead wires (NC, NO, COM). The next figure shown the main components of the brake equipped with microswitch.

(F62)



- A: Plate fixing screws
- B: Setting screws
- C: Actuator control pin

M12.9 Additional cable entry for brakemotors

IC

The terminal box cover of brakemotors BN 63 ... BN 160MR - M05 ... M4L is provided with two additional cable entry M16 x 1.5 (one cable entry per side).

The terminal box cover of brakemotors BN 160 ... BN 200 - M5 is provided with an additional cable entry M16 x 1.5 next to the cable entry used for the brake.

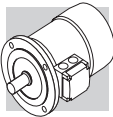
M12.10 Anti-condensation heaters

H1


NH1

Where an application involves high humidity or extreme temperature fluctuation, motors may be equipped with an anti-condensate heater.

A single-phase power supply is available in the auxiliary terminal board inside the main terminal box. Values for the absorbed power are listed here below:



(F63)

	H1	NH1
	1~ 230V ± 10% P [W]	1~ 115V ± 10% P [W]
BXN 63 ... BXN 80 BX 80 BE 63 ... BE 80 BN 56 ... BN 80	10	10
BXN 90 BX 90 ... BX 132 BE 90 ... BE 132MB BN 90 ... BN 160MR	25	25
BX 160...BX 250 BX 160 ... BX 250K BX 160, BX 180 BE 160, BE 180 BN 160, BN 200	50	50
BX 280 BX 280K	60	60
BX 315 ... BX 355 BX 315K ... BX 355K	120	120

Warning!

Always remove power supply to the anti-condensante heater before operating the motor.

M12.11 Tropicalization

TP

When option **TP** is specified, motor windings receive additional protection for operation in high humidity and temperature conditions.

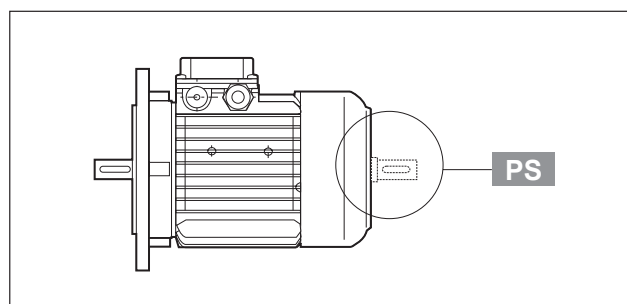
M12.12 Second shaft extension

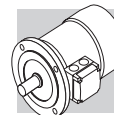
PS

This option is not compatible with variants RC, TC, U1, U2, EN1, EN2, EN3, EN4, EN5, EN6, EN7, EN8.

For shaft dimensions please see motor dimensions tables.

(F64)






M12.13 Backstop device

AL

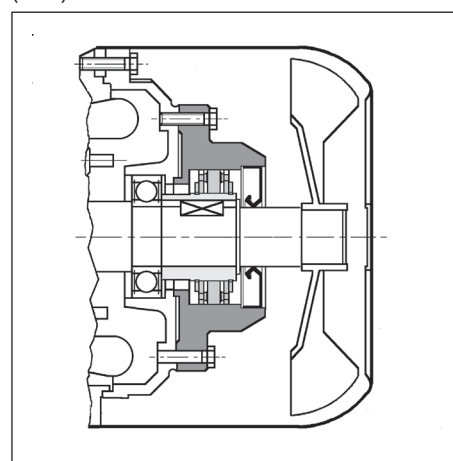
AR

For applications where backdriving must be avoided, motors equipped with an anti run-back device can be used (available for the MX/ME and M series only). While allowing rotation in the direction required, this device operates instantaneously in case of a power failure, preventing the shaft from running back. The anti run-back device is life lubricated with special grease for this specific application. When ordering, customers should indicate the required rotation direction, AL or AR. Never use the anti run-back device to prevent reverse rotation caused by faulty electrical connection. Table (F62) shows rated and maximum locking torques for the anti run-back devices. A diagram of the device can be seen in Table (F63). Overall dimensions are same as the corresponding brake motor. The direction of free rotation is described in the "MOTOR OPTIONS" section of specifically dedicated sections to gear units.

(F65)

	Rated locking torque [Nm]	Max. locking torque [Nm]	Release speed [min ⁻¹]
ME1 - M1	6	10	750
MX2 - ME2 M2	16	27	650
MX3 - ME3 M3	54	92	520
MX4 - ME4 M4	110	205	430

(F66)



M12.14 Rotor balancing

RV

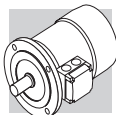
Where low noise is a priority requirement, the option RV ensures reduced vibration in accordance with vibration class B.

The table below reports effective velocity of vibration for normal (A) and B grade balancing.

(F67)

Vibration level	Angular velocity n [min ⁻¹]	Limits of the vibration velocity (mm/s) BX 80 ≤ H ≤ BX 335M ≤ BX 355MK BE 63 ≤ H ≤ BE 180L BN 56 ≤ H ≤ BN 200
A	600 < n < 3600	1.6
B	600 < n < 3600	0.70

Values are obtained from measurements on freely suspended motor during noload operation; tolerance ±10%.



M12.15 Ventilation

Motors are cooled through outer air blow (IC 411 according to CEI EN 60034-6) and are equipped with a plastic radial fan, which operates in both directions.

Ensure that fan cover is installed at a suitable distance from the closest wall so to allow air circulation and servicing of motor and brake, if fitted.



Motor is cooled by an axial fan with independent power supply and fitted on the fan cover (IC 416 cooling system).

This version is used in case of motor driven by inverter so that steady torque operation is possible even at low speed or when high starting frequencies are needed.

Brake motors of motors with rear shaft projection (PS option) are excluded.

This variant has two different models, called **U1** and **U2**, having the same longitudinal size. Longer side of fan cover (**DL**) is specified for both models in the table below. Overall dimension can be reckoned from motor size table.

(F68)

Extra length for servoventilated motors			
		ΔL_1	ΔL_2
BE 71 - BN 71	ME1 - M1	93	32
BX 80 - BE 80 - BN 80	MX2 - ME2 - M2	127	55
BX 90 - BE 90 - BN 90	—	131	48
BX 100 - BE 100 - BN 100	MX3 - ME3 - M3	119	28
BX 112 - BE 112 - BN 112	—	130	31
BX 132 - BE 132 - BN 132	MX4 - ME4 - M4	161	51
BX 160 ... BX 180 BE 160 ... BE 180 BN 160 ... BN 200L	MX5 ME5 M5	184	184
BX 200	—	250	260
BX 225 - BX 250	—	320	320
BX 280 - BX 315	—	430	430
BX 355	—	640	640

ΔL_1 = extra length to LB value of corresponding standard motor.

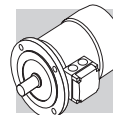
ΔL_2 = extra length to LB value of corresponding brake motor.

U1

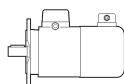
Fan wiring terminals are housed in a separate terminal box.



In brake motors of size BX 132 ... BX 160 - BE 71 ... BE 160 - BN 71 ... BN 160MR, MX4, MX5 - ME05 ... ME5 - M05 ... M5 with **U1** model, the release lever cannot be positioned to AA.

This option can be selected for motors compliant with CSA and UL standards (CUS option), only for BX \geq 200 and BX \geq 200K.



(F69)



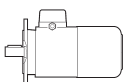
		V a.c. ±10%	Hz	P [W]	I [A]
BN 71 - BE 71	ME1 - M1	1 ~ 230	50 / 60	22	0.12
BX 80 - BE 80 BN 80	MX2 - ME2 M2			22	0.12
BX 90 - BE 90 BN 90	—			40	0.30
BX 100 - BE 100 BN 100	MX3 - ME3 M3			50	0.25
BX 112 - BE 112 BN 112	—	3 ~ 230Δ / 400Y	50	50	0.26 / 0.15
BX 132 - BE 132 BN 132 ... BN 160MR	MX4 - ME4 M4L			110	0.38 / 0.22
BX 160 - BE 160 BN 160M ... BN 180M	MX5 - ME5 M5			180	1.25 / 0.72
BX 180 - BE 180 BN 180L ... BN 200L	—			250	1.51 / 0.87
BX 200 ... BX 250 BX 200K ... BX 250K	—	3 ~ 400Δ / 690Y	50	250	0.64
BX 280 ... BX 315M BX 280K ... BX 315MK	—			750	1.7
BX 315 ... BX 355S BX 315LK ... BX 355SK	—			1500	3.3
BX 355M BX 355MK	—			3000	6.1



U2

Fan terminals are wired in the motor terminal box.

The **U2** option does not apply to motors BX, BE, MX, ME and to motors with option CUS (compliant to norms CSA and UL).

(F70)



		V a.c. ±10%	Hz	P [W]	I [A]
BN 71	M1	1 ~ 230	50 / 60	22	0.12
BN 80	M2			22	0.12
BN 90	—			40	0.30
BN 100	M3	3 ~ 230Δ / 400Y		40	0.26 / 0.09
BN 112	—			50	0.26 / 0.15
BN 132 ... BN 160MR	M4L			110	0.38 / 0.22

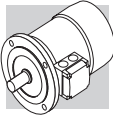
M12.16 Rain canopy

RC



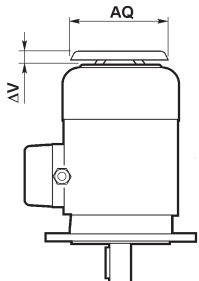
The rain canopy protects the motor from dripping and avoids the ingress of solid bodies. It is recommended when motor is installed in a vertical position with the shaft downwards.

Relevant dimensions are indicated in the table below.

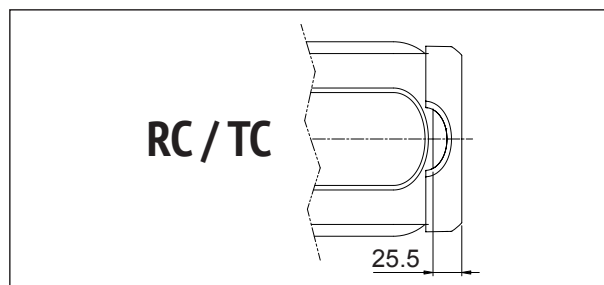
The drip cover is not compatible with variants PS, EN1, EN2, EN3, EN4, EN5, EN6.



(F71)

		AQ	ΔV	
BE 63 - BN 63	ME05 - M05	118	24	
BN 71 - BE 71	ME1 - M1	134	27	
BX 80 - BE 80 BN 80	MX2 - ME2 M2	152	25	
BX 90 - BE 90 BN 90	—	168	30	
BX 100 - BE 100 BN 100	MX3 - ME3 M3	190	28	
BX 112 - BE 112 BN 112	—	211	32	
BX 132 - BE 132 BN 132 ... BN 160MR	MX4 - ME4 M4	254	32	
BX 160 - BE 160 BN 160M ... BN 180M	MX5 - ME5 M5	302	36	
BX 180 - BE 180 BN 180L ... BN 200L	—	340	36	
BX 200	—	423	55	
BX 225	—	465	55	
BX 250	—	514	55	
BX 280	—	567	100	
BX 315	—	645	100	
BX 355	—	740	120	

For RC/TC on BXN/MXN motors see the scheme below.



M12.17 Textile canopy

TC

Option TC is a cover variant for textile industry environments, where lint may obstruct the fan grid and prevent a regular flow of cooling air.

This option is not compatible with variants EN1, EN2, EN3, EN4, EN5, EN6, PS, U1, U2.

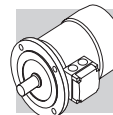
Overall dimensions are the same as drip cover type RC.

TC option is not available for BX motors.

M12.18 Feedback units

Motors may be combined with six different types of encoders to achieve feedback circuits.

Configurations with double-extended shaft (PS) and rain canopy (RC, TC) are not compatible with encoder installation.



EN1

Incremental encoder, $V_{IN} = 5\text{ V}$, line-driver output RS 422.

EN2

Incremental encoder, $V_{IN} = 10\text{--}30\text{ V}$, line-driver output RS 422.

EN3

Incremental encoder, $V_{IN} = 12\text{--}30\text{ V}$, push-pull output 12-30 V

EN4

Encoder sin/cos, $V_{IN} = 4.5\text{--}5.5\text{ V}$, output Sinus $0.5V_{PP}$.

EN5

Absolute encoder singleturn, HIPERFACE® interface, $V_{IN} = 7\text{--}12\text{ V}$.

EN6

Absolute encoder multiturn, HIPERFACE® interface, $V_{IN} = 7\text{--}12\text{ V}$.

EN7

Incremental encoder Heavy Duty, $V_{IN} = 12\text{--}30\text{ V}$, push-pull output 12-30 V.

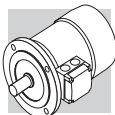
EN8

Incremental encoder Heavy Duty, $V_{IN} = 12\text{--}30\text{ V}$, push-pull output 9-30 V.

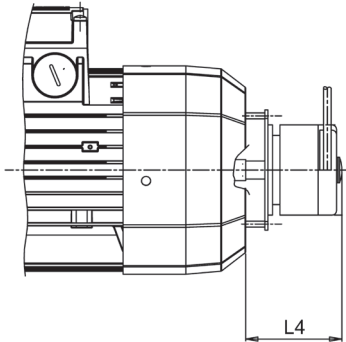
Note: EN7 and EN8 available only for $BX \geq 200$

(F72)

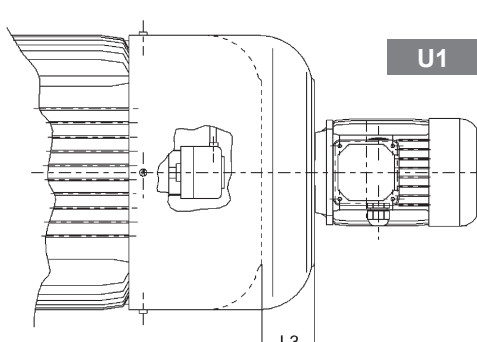
	EN1	EN2	EN3	EN4	EN5	EN6	EN7	EN8
Interface	TTL/RS 422	TTL/RS 422	HTL push-pull	Sinus 0.5 VPP	HIPERFACE®	HIPERFACE®	HTL push-pull	HTL push-pull
Power supply voltage [V]	4...6	10...30	12...30	4.4...5.5	7...12	7...12	9...30	
Output voltage [V]	5	5	12...30	—	—	—	9...30	
No-load operating current [mA]	120	100	100	40	80	80	80	
No. of pulses per revolution	1024							2048
Steps per revolution	—	—	—	—	15 bit	15 bit	-	-
Revolutions	—	—	—	—	—	12 bit	-	-
No. of signals	6 (A, B, Z + inverted signals)			6 (cos-, cos+, sin-, sin+, Z, \overline{Z})	—	—	6	6
Max. output frequency [kHz]	600			200			200	
Max. speed [min ⁻¹]	6000 (9000 min ⁻¹ for 10 s)							6000
Temperature range [°C]	-30 ... +100							-20 ... +85
Protection class	IP 65							IP67



(F73)

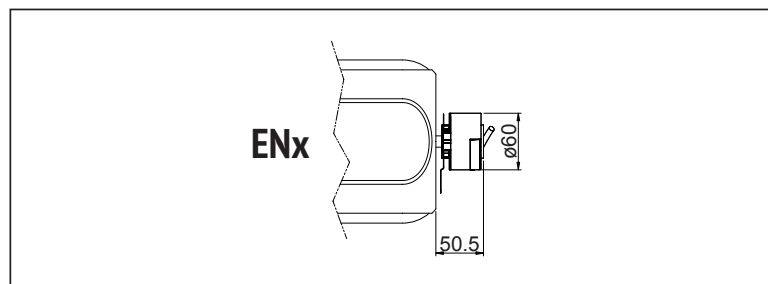
EN1, EN2, EN3, EN4, EN5, EN6, EN7, EN8		
		
		L4
BN 63 ... BN 200	M05 ... M5	65
BE 63... BE180	ME05 ... ME5L	65
BX 80 ... BX 180	MX2 ... MX5L	65
BX 200 ... BX 280	—	100
BX 315 ... BX 355	—	100

(F74)

EN_ + U1		
		
		L3
BX 160 - BE 160 BN 160M...BN 180M	MX5 - ME5 M5	72
BX 160 - BE 180 BN 180L...BN 200L	—	82
BX 160_FD BN 160M_FD...BN 180M_FD	MX5_FD M5_FD	35
BX 180_FD BN 180L_FD...BN 200L_FD	—	41
BX 200 - BX 225 - BX 250	—	100
BX 280 - BX 315 - BX 355	—	150

If the encoder device (option EN_) is specified on motors BX 80 ... BX 132 - MX2 ... MX4 - BE 63 ... BE 132 - ME05 ... ME4 - BN 71 ... BN 160MR - M1 ... M4, along with the independent fan cooling (options U1, U2), the extra length of motor is coincident with that of the correspondent U1 and U2 execution.

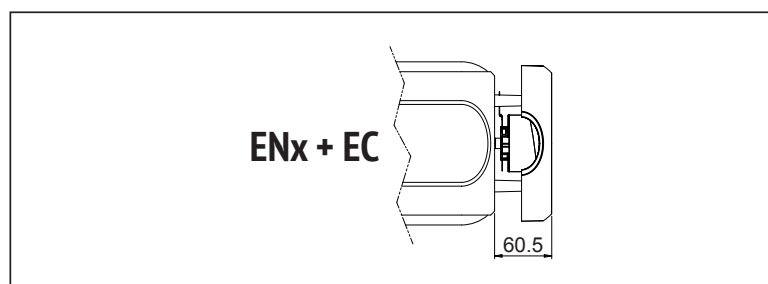
For EN on BXN/MXN motors see the scheme below.

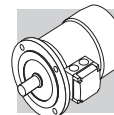


M12.19 EC - Encoder canopy

EC

Option EC is a cover variant specifically made for our encoders. It protects them from impacts and may help in prolonging their productive life.





M12.20 Insulated Bearings

IB

NOTE: This option is available for BX and BX K \geq 280, and it is mandatory when the motor is operated through a variable speed drive.

When IB option is selected the motor is equipped with insulated bearings at drive end. This prevents early bearings failures due to high frequency circulation currents.

M12.21 Vertical Mounting

VM

NOTE: This option is mandatory for BX \geq 200 and BX \geq 200K, when vertically mounted.

When VM is selected the motor is delivered with specific arrangements.

Furthermore, the vertical mounting position will also be reported on motor nameplate.

M12.22 Surface protection

C_

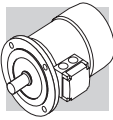
When no specific protection class is requested, the painted (ferrous) surfaces of motors are protected to at least corrosivity class C2 (UNI EN ISO 12944-2). For improved resistance to atmospheric corrosion, motors can be delivered with C3 and C4 surface protection.

(F75)

SURFACE PROTECTION	Typical environments	Maximum surface temperature	Corrosivity class according to UNI EN ISO 12944-2
C3	Urban and industrial environments with up to 100% relative humidity (medium air pollution)	120°C	C3
C4	Industrial areas, coastal areas, chemical plant, with up to 100% relative humidity (high air pollution)	120°C	C4
C5M	Coast and offshore areas with high salt content.	120°C	C5M

Motors with optional protection to class C3 or C4 are available in a choice of colours. If no specific colour is requested (see the "PAINTING" option) motors are finished in RAL 7042 for BN/M, BE/ME and BX \leq 180/MX and in Munsell blue 8B 4.5/3.25 for BX \geq 200.

Motors can also be supplied with surface protection for corrosivity class C5 according to UNI EN ISO 12944-2. Contact our Technical Service for further details.



M12.23 Painting

RAL

Gearboxes with optional protection to class C3 or C4 are available in the colours listed in the following table.

(F76)

PAINTING	Colour	RAL number
RAL7042	Traffic Grey A	7042
RAL5010	Gentian Blue	5010
RAL9005	Jet Black	9005
RAL9006	White Aluminium	9006
RAL9010	Pure White	9010
Munsell blue 8B* 4.5/3.25	Blue	MUNSELL 8B 4.5/3.25
RAL7035	Light Grey	7035
RAL7001	Silver Grey	7001
RAL5015	Sky Blue	5015
RAL7037	Dusty Grey	7037
RAL5024	Pastel Blue	5024

* BX \geq 200 and BX \geq 200K Motors are standardly supplied in this colour with C3 protection unless specified differently.

NOTE – “PAINTING” options can only be specified in conjunction with “SURFACE PROTECTION” options.

M12.24 Certificates

ACM

Certificate of compliance of motors

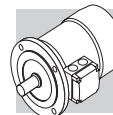
The document certifies the compliance of the product with the purchase order and the construction in conformity with the applicable procedures of the Bonfiglioli Quality System.

Note: Not available for BX \geq 200 and BX \geq 200K

CC

Inspection certificate



The document entails checking on order compliance, the visual inspection of external conditions and instrumental testing of the electrical characteristics in unloaded conditions. Units inspected are sampled within the shipping batch and marked individually.





M13 TABLES OF MOTORS CORRELATION

M13.1 50 Hz Motors

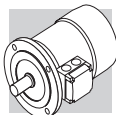
(F77)

2 pole							
Efficiency class		IE1	IE2	IE3	IE1	IE2	IE3
Pn [kW]	0.06						
	0.09						
	0.12						
	0.18	BN 63A 2			M 05A 2		
	0.25	BN 63B 2			M 05B 2		
	0.37	BN 71A 2			M 05C 2		
	0.55	BN 71B 2			M 1SD 2		
	0.75	BN 71C 2 BN 80A 2	BE 80A 2		M 1LA 2	ME 2SA 2	
	1.1	BN 80B 2	BE 80B 2		M 2SA 2	ME 2SB 2	
	1.5	BN 90SA 2	BE 90SA 2		M 2SB 2		
	1.85	BN 90SB 2					
	2.2	BN 90L 2	BE 90L 2		M 3SA 2		
	3	BN 100L 2	BE 100L 2		M 3LA 2	ME 3LB 2	
	4	BN 112M 2	BE 112M 2		M 3LB 2		
	5.5	BN 132SA 2	BE 132SA 2		M 4SA 2	ME 4SA 2	
	7.5	BN 132SB 2	BE 132SB 2		M 4SB 2	ME 4LA 2	
	9.2	BN 132M 2	BE 132MB 2		M 4LA 2	ME 4LB 2	
	11	BN 160MR 2 BN 160M 2	BE 160MA 2		M 4LC 2	ME 5SA 2	
	15	BN 160MB 2	BE 160MB 2		M 5SB 2	ME 5SB 2	
	18.5	BN 160L 2	BE 160L 2		M 5SC 2	ME 5LA 2	
	22	BN 180M 2			M 5LA 2		
	30	BN 200LA 2					



(F78)

4 pole							
Efficiency class		IE1	IE2	IE3	IE1	IE2	IE3
Pn [kW]	0.06	BN 56A 4					
	0.09	BN 56B 4			M 0B 4		
	0.12	BN 63A 4	BE 63A 4	BXN 63MA 4	M 05A 4	ME 05A 4	MXN 05MA 4
	0.18	BN 63B 4	BE 63B 4	BXN 63MB 4	M 05B 4	ME 05B 4	MXN 05MB 4
	0.25	BN 63C 4			M 05C 4		
		BN 71A 4	BE 71A 4	BXN 71MA 4		ME 1SA 4	MXN 10MA 4
	0.37	BN 71B 4	BE 71B 4	BXN 71MB 4	M 1SD 4	ME 1SB 4	MXN 10MB 4
		BN 71C 4					
	0.55	BN 80A 4	BE 80A 4	BXN 80MA 4	M 1LA 4		MXN 20MA 4
	0.75	BN 80B 4	BE 80B 4	BX 80B 4 BXN 80MB 4	M 2SA 4	ME 2SB 4	MX 2SB 4 MXN 20MB 4
	1.1	BN 80C 4 BN 90S 4	BE 90S 4	BX 90S 4 BXN 90S 4	M 2SB 4	ME 3SA 4	MX 3SA 4
	1.5	BN 90LA 4	BE 90LA 4	BX 90LA 4	M 3SA 4	ME 3SB 4	MX 3SB 4
	1.85	BN 90LB 4					
	2.2	BN 100LA 4	BE 100LA 4	BX 100LA 4	M 3LA 4	ME 3LA 4	MX 3LA 4
	3	BN 100LB 4	BE 100LB 4	BX 100LB 4	M 3LB 4	ME 3LB 4	MX 3LB 4
	4	BN 112M 4	BE 112M 4	BX 112M 4	M 3LC 4	ME 4SA 4	MX 4SA 4
	5.5	BN 132S 4	BE 132S 4	BX 132SB 4	M 4SA 4	ME 4SB 4	MX 4SB 4
	7.5	BN 132MA 4	BE 132MA 4	BX 132MA 4	M 4LA 4	ME 4LA 4	MX 4LA 4
	9.2	BN 132MB 4	BE 132MB 4	BX 160MA 4	M 4LB 4	ME 4LB 4	MX 5SA 4
	11	BN 160MR 4 BN 160M 4	BE 160M 4	BX 160MB 4	M 4LC 4	ME 5SA 4	MX 5SB 4
	15	BN 160L 4	BE 160L 4	BX 160L 4	M 5SB 4	ME 5LA 4	MX 5LA 4
	18.5	BN 180M 4	BE 180M 4	BX 180M 4	M 5LA 4		
	22	BN 180L 4	BE 180L 4	BX 180L 4			
	30	BN 200L 4		BX 200LA 4*			
	37			BX 225SA 4*			
	45			BX 225SB 4*			
	55			BX 250MA 4*			
	75			BX 280SA 4*			
	90			BX 280SB 4*			
	110			BX 315SA 4*			
	132			BX 315SB 4*			
	160			BX 315SC 4*			
	200			BX 315MA 4*			
	250			BX 355MA 4*			
	315			BX 355MB 4*			
	355			BX 355MC 4*			

Note: For the Australian market these motor has to be selected in the BX ... K 4 Version





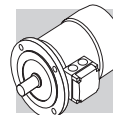
(F79)

6 pole							
Efficiency class		IE1	IE2	IE3	IE1	IE2	IE3
Pn [kW]	0.06						
	0.09	BN 63A 6			M 05A 6		
	0.12	BN 63B 6			M 05B 6		
	0.18	BN 71A 6			M 1SC 6		
	0.25	BN 71B 6			M 1SD 6		
		BN 71C 6					
	0.37	BN 80A 6			M 1LA 6		
	0.55	BN 80B 6			M 2SA 6		
	0.75	BN 80C 6	BE 90S 6		M 2SB 6		
		BN 90S 6					
	1.1	BN 90L 6	BE 100M 6		M 3SA 6	ME 3LA 6	
	1.5	BN 100LA 6	BE 100LA 6		M 3LA 6	ME 3LB 6	
	1.85	BN 100LB 6			M 3LB 6		
	2.2	BN 112M 6	BE 112M 6		M 3LC 6		
	3	BN 132S 6	BE 132S 6		M 4SA 6	ME 4SB 6	
	4	BN 132MA 6	BE 132MA 6		M 4LA 6	ME 4LA 6	
	5.5	BN 132MB 6	BE 160MA 6		M 4LB 6	ME 5SA 6	
	7.5	BN 160M 6	BE 160MB 6		M 5SA 6	ME 5SB 6	
	9.2						
	11	BN 160L 6			M 5SB 6		
	15	BN 180L 6					
	18.5	BN 200LA 6					
	22						
	30						



M13.2 60 Hz Motors

(F80)



2 pole							
Efficiency class		IE1	IE2	IE3	IE1	IE2	IE3
Pn [kW]	0.06						
	0.09						
	0.12						
	0.18	BN 63A 2			M 05A 2		
	0.25	BN 63B 2			M 05B 2		
	0.37	BN 71A 2			M 05C 2		
	0.55	BN 71B 2			M 1SD 2		
	0.75	BN 71C 2			M 1LA 2		
		BN 80A 2					
	1.1	BN 80B 2			M 2SA 2		
	1.5	BN 90SA 2			M 2SB 2		
	1.85	BN 90SB 2					
	2.2	BN 90L 2			M 3SA 2		
	3	BN 100L 2			M 3LA 2		
	3.7	BN 112M 2			M 3LB 2		
	5.5	BN 132SA 2			M 4SA 2		
	7.5	BN 132SB 2			M 4SB 2		
	9.2	BN 132M 2			M 4LA 2		
	11	BN 160MR 2			M 4LC 2		
		BN 160M 2					
	15	BN 160MB 2			M 5SB 2		
	18.5	BN 160L 2			M 5SC 2		
	22	BN 180M 2			M 5LA 2		
	30	BN 200LA 2					

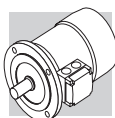


(F81)








4 pole							
Efficiency class		IE1	IE2	IE3	IE1	IE2	IE3
Pn [kW]	0.06	BN 56A 4					
	0.09	BN 56B 4			M 0B 4		
	0.12	BN 63A 4	BE 63A 4	BXN 63MA 4	M 05A 4		MXN 05MA 4
	0.18	BN 63B 4	BE 63B 4	BXN 63MB 4	M 05B 4		MXN 05MB 4
	0.25	BN 63C 4			M 05C 4		
		BN 71A 4	BE 71A 4	BXN 71MA 4			MXN 10MA 4
	0.37	BN 71B 4	BE 71B 4	BXN 71MB 4	M 1SD 4		MXN 10MB 4
	0.55	BN 71C 4			M 1LA 4		
		BN 80A 4	BE 80A 4	BXN 80MA 4			MXN 20MA 4
	0.75	BN 80B 4	BE 80B 4	BX 90SR 4	M 2SA 4	ME 2SB 4	MX 2SB 4
		BN 80C 4					
	1.1	BN 90S 4	BE 90S 4	BX 90S 4	M 2SB 4	ME 3SA 4	MX 3SA 4
				BXN 90S 4			
	1.5	BN 90LA 4	BE 90LA 4	BX 90LA 4	M 3SA 4	ME 3SB 4	MX 3SB 4
	1.85	BN 90LB 4					
	2.2	BN 100LA 4	BE 100LA 4	BX 100LA 4	M 3LA 4	ME 3LA 4	MX 3LA 4
	3	BN 100LB 4	BE 100LB 4	BX 100LB 4	M 3LB 4	ME 3LB 4	MX 3LB 4
	3.7	BN 112M 4	BE 112M 4	BX 112M 4	M 3LC 4	ME 4SA 4	MX 4SA 4
	5.5	BN 132S 4	BE 132S 4	BX 132SB 4	M 4SA 4	ME 4SB 4	MX 4SB 4
	7.5	BN 132MA 4	BE 132MA 4	BX 132MA 4	M 4LA 4	ME 4LA 4	MX 4LA 4
	9.2	BN 132MB 4	BE 132MB 4	BX 160MA 4	M 4LB 4	ME 4LB 4	MX 5SA 4
	11	BN 160MR 4					
		BN 160M 4	BE 160M 4	BX 160MB 4	M 4LC 4	ME 5SA 4	MX 5SB 4
	15	BN 160L 4	BE 160L 4	BX 160L 4	M 5SB 4	ME 5LA 4	MX 5LA 4
	18.5	BN 180M 4	BE 180M 4	BX 180M 4	M 5LA 4		
	22	BN 180L 4	BE 180L 4	BX 180L 4			
	30	BN 200L 4		BX 200LAK 4			
	37			BX 225SAK 4			
	45			BX 225SBK 4			
	55			BX 280SAK 4			
	75			BX 280SBK 4			
	90			BX 315SAK 4			
	110			BX 315SBK 4			
	132			BX 315SCK 4			
	160			BX 355SAK 4			
	200			BX 355SBK 4			
	250			BX 355SCK 4			
	315			BX 355MBK 4			
	355			BX 355MCK 4			

(F82)

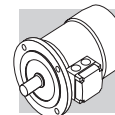
6 pole							
Efficiency class		IE1	IE2	IE3	IE1	IE2	IE3
Pn [kW]	0.06						
	0.09	BN 63A 6			M 05A 6		
	0.12	BN 63B 6			M 05B 6		
	0.18	BN 71A 6			M 1SC 6		
	0.25	BN 71B 6			M 1SD 6		
		BN 71C 6					
	0.37	BN 80A 6			M 1LA 6		
	0.55	BN 80B 6			M 2SA 6		
	0.75	BN 80C 6			M 2SB 6		
		BN 90S 6					
	1.1	BN 90L 6			M 3SA 6		
	1.5	BN 100LA 6			M 3LA 6		
	1.85	BN 100LB 6			M 3LB 6		
	2.2	BN 112M 6			M 3LC 6		
	3	BN 132S 6			M 4SA 6		
	3.7	BN 132MA 6			M 4LA 6		
	5.5	BN 132MB 6			M 4LB 6		
	7.5	BN 160M 6			M 5SA 6		
	9.2						
	11	BN 160L 6			M 5SB 6		
	15	BN 180L 6					
	18.5	BN 200LA 6					
	22						
	30						







M14 MOTOR RATING CHARTS BXN-MXN

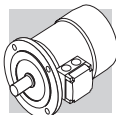
4 P		1500 min ⁻¹ - S1														50 Hz - IE3									
<div>CE</div>		d.c. brake														a.c. brake									
		FD														FA									
		P _n		n	M _n	I _n 400V	η%	cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	KVA code	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	
kW		min ⁻¹	Nm	A	100%	75%	50%								Nm	NB	SB	kgm ²			Nm	1/h	kgm ²		
0.12	BXN 63MA 4	1407	0.8	0.47	64.8	60.3	52.5	0.58	3.4	2.9	1.7	H	1.82	4.6	FD 02	1.8	8900	11000	2.4	6.3	FA 02	1.8	11000	2.4	6.1
0.18	BXN 63MB 4	1373	1.3	0.61	69.9	68.8	63.3	0.61	3.5	3.1	1.8	G	2.92	5.7	FD 02	3.5	7000	9000	3.5	7.4	FA 02	3.5	9000	3.5	7.2
0.25	BXN 71MA 4	1388	1.7	0.67	73.5	72.8	67.9	0.74	4.8	1.6	2.4	H	6.28	6.5	FD 53	5	5700	8100	7.4	9.2	FA 03	5	8100	7.4	8.9
0.37	BXN 71MB 4	1429	2.5	1.05	77.3	76.0	70.8	0.66	6.3	2.6	2.5	L	9.70	8.3	FD 53	5	6400	9900	10.8	11.0	FA 03	5	9900	10.8	10.7
0.55	BXN 80MA 4	1447	3.6	1.31	80.8	80.9	77.4	0.75	6.1	1.9	1.6	J	17.78	10.7	FD 04	10	2500	5200	19.8	14.6	FA 04	10	5200	19.8	14.5
0.75	BXN 80MB 4	1451	4.9	1.63	82.5	85.1	82.5	0.78	7.4	2.4	2.0	K	28.89	14.4	FD 04	15	2000	4100	30.8	18.3	FA 04	15	4100	30.8	18.2
1.1	BXN 90S 4	1448	7.3	2.38	84.1	85.9	83.5	0.78	7.3	2.4	3.4	J	31.76	15.6	FD 05	26	2800	6600	35.8	21.6	FA 05	26	6600	35.8	22.3
1.5	BXN 90L 4	1441	9.9	3.44	85.3	84.3	81.7	0.75	6.7	2.6	2.4	J	34.96	16.6	FD 05	26	1400	3100	39.1	22.6	FA 05	26	3100	39.1	23.3

Note: for more details on the available energy certifications look at the catalog's dedicated section.



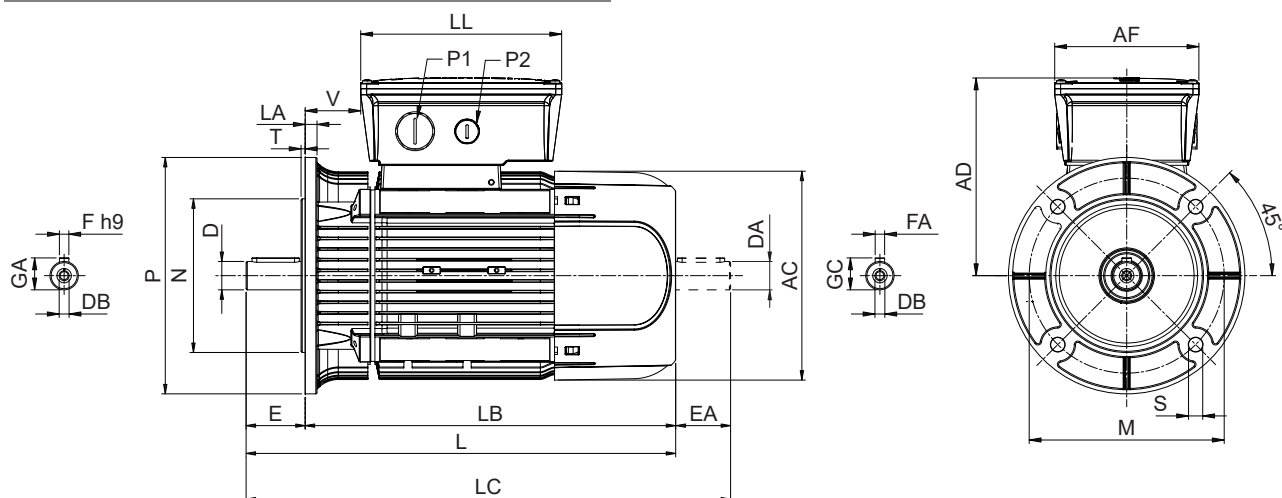
4 P		1500 min ⁻¹ - S1												50 Hz - IE3													
<div>CE</div>		d.c. brake																	a.c. brake								
		FD												FA													
		P _n		n	M _n	In 400V	η%			cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	KVA code	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	Z ₀ 1/h NB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	
kW		min ⁻¹	Nm	A	100%	75%	50%										Nm		SB				Nm				
0.12	MXN 05MA 4	1407	0.8	0.47	64.8	60.3	52.5	0.58	3.4	2.9	1.7	H	1.82	4.6	FD 02	1.8	8900	11000	2.4	6.3	FA 02	1.8	11000	2.4	6.1		
0.18	MXN 05MB 4	1373	1.3	0.61	69.9	68.8	63.3	0.61	3.5	3.1	1.8	G	2.92	5.7	FD 02	3.5	7000	9000	3.5	7.4	FA 02	3.5	9000	3.5	7.2		
0.25	MXN 10MA 4	1388	1.7	0.67	73.5	72.8	67.9	0.74	4.8	1.6	2.4	H	6.28	6.5	FD 53	5	5700	8100	7.4	9.2	FA 03	5	8100	7.4	8.9		
0.37	MXN 10MB 4	1429	2.5	1.05	77.3	76.0	70.8	0.66	6.3	2.6	2.5	L	9.70	8.3	FD 53	5	6400	9900	10.8	11.0	FA 03	5	9900	10.8	10.7		
0.55	MXN 20MA 4	1447	3.6	1.31	80.8	80.9	77.4	0.75	6.1	1.9	1.6	J	17.78	10.7	FD 04	10	2500	5200	19.8	14.6	FA 04	10	5200	19.8	14.5		
0.75	MXN 20MB 4	1451	4.9	1.63	82.5	85.1	82.5	0.78	7.4	2.4	2.0	K	28.89	14.4	FD 04	15	2000	4100	30.8	18.3	FA 04	15	4100	30.8	18.2		

Note: for more details on the available energy certifications look at the catalog's dedicated section.



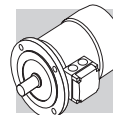
M15 MOTORS DIMENSIONS BXN-MXN

BXN - IM B5 - CE CUS/UKCA



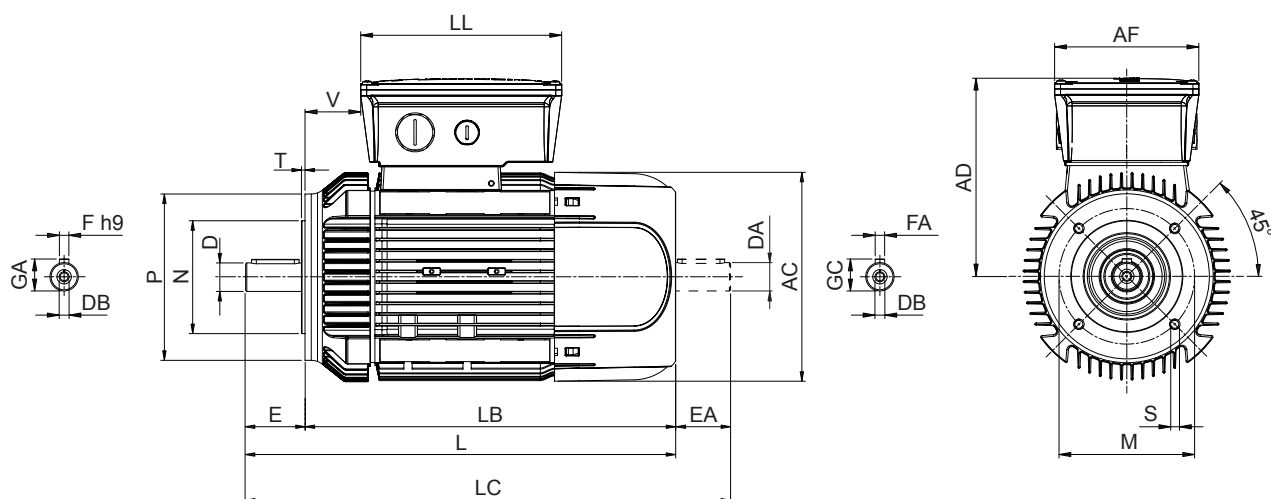
	Shaft					Housing						Motor								
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	
BXN 63	11 9 ⁽¹⁾	23 20 ⁽¹⁾	M4 M3 ⁽¹⁾	12.5 10.2 ⁽¹⁾	4 3 ⁽¹⁾	115	95	140	9.5	3	9	122	281	258	301	136	112	165	37	
BXN 71	14 11 ⁽¹⁾	30 23 ⁽¹⁾	M5 M4 ⁽¹⁾	16 12.5 ⁽¹⁾	5 4 ⁽¹⁾	130	110	160		3.5		10	138	292	262	315			138	34
BXN 80	19 14 ⁽¹⁾	40 30 ⁽¹⁾	M6 M5 ⁽¹⁾	21.5 16 ⁽¹⁾	6 5 ⁽¹⁾	165	130	200	11.5		158		346	306	376	148			40	
BXN 90	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾						177		365	315	405	170			170	43

N.B.: 1) These values refer to the rear shaft end (PS).



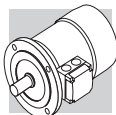
BXN - IM B14 - CE CUS/UKCA

BXN-MXN

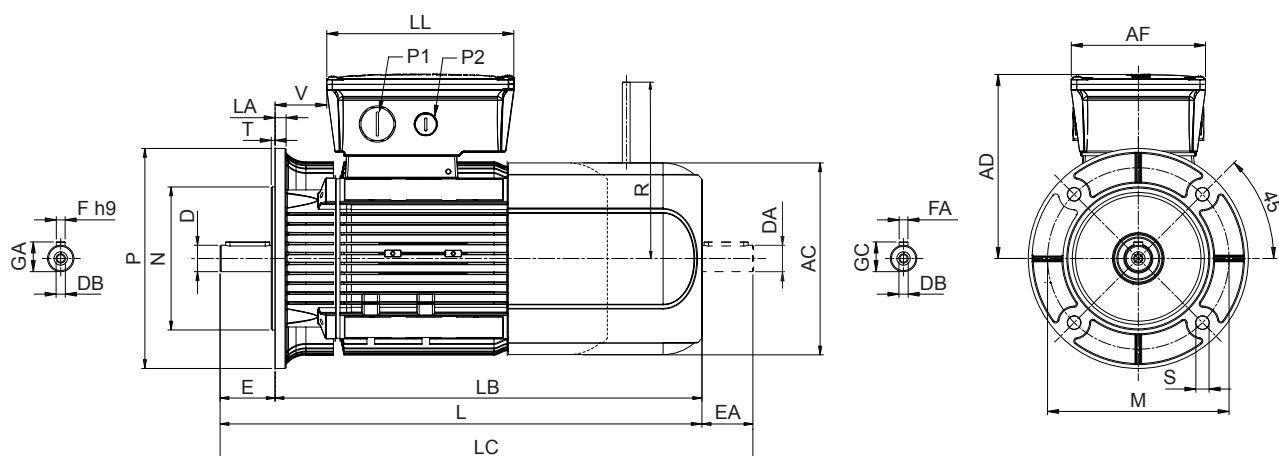


	Shaft					Housing					Motor							
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V
BXN 63	11 9 ⁽¹⁾	23 20 ⁽¹⁾	M4 M3 ⁽¹⁾	12.5 10.2 ⁽¹⁾	4 3 ⁽¹⁾	75	60	90	M5	2.5	122	281	258	301	136	112	165	37
BXN 71	14 11 ⁽¹⁾	30 23 ⁽¹⁾	M5 M4 ⁽¹⁾	16 12.5 ⁽¹⁾	5 4 ⁽¹⁾	85	70	105	M6		138	292	262	315	138			34
BXN 80	19 14 ⁽¹⁾	40 30 ⁽¹⁾	M6 M5 ⁽¹⁾	21.5 16 ⁽¹⁾	6 5 ⁽¹⁾	100	80	120		3	158	346	306	376	148			40
BXN 90	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	115	95	140	M8			177	365	315	405	170		170

N.B.: 1) These values refer to the rear shaft end (PS).

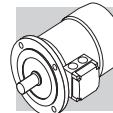


BXN - IM B5 - FD/FA - CE - CUS/UKCA

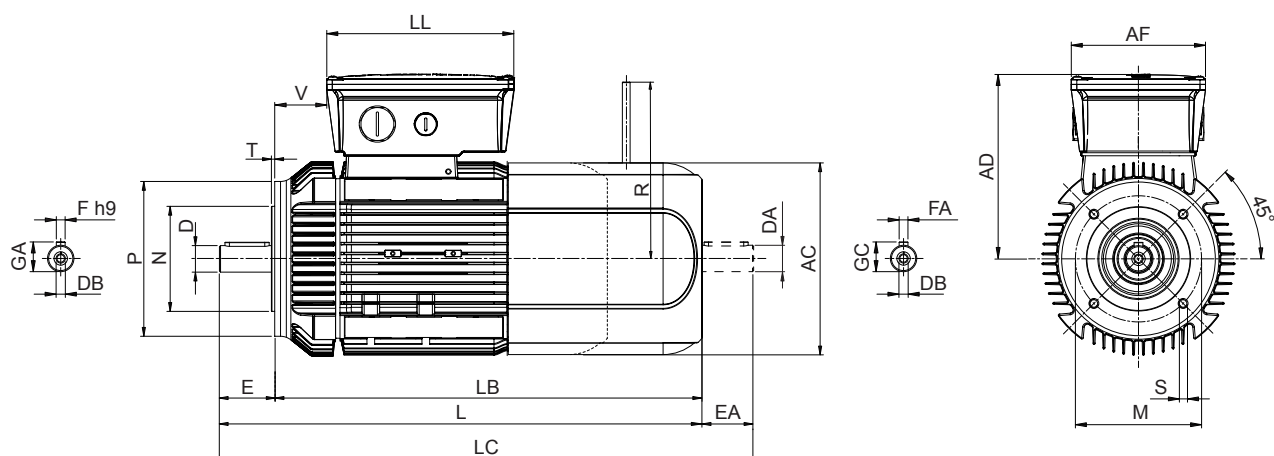


	Shaft					Housing						Motor									
	D	E	DB	GA	F	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R	
	DA	EA		GC	FA															FD	FA
BXN 63	11 9 ⁽¹⁾	23 20 ⁽¹⁾	M4 M3 ⁽¹⁾	12.5 10.2 ⁽¹⁾	4 3 ⁽¹⁾	115	95	140	9.5	3	9	122	328	305	352	136	112	165	37	96	116
BXN 71	14 11 ⁽¹⁾	30 23 ⁽¹⁾	M5 M4 ⁽¹⁾	16 12.5 ⁽¹⁾	5 4 ⁽¹⁾	130	110	160		138		351	321	380	138	34			103	121	
BXN 80	19 14 ⁽¹⁾	40 30 ⁽¹⁾	M6 M5 ⁽¹⁾	21.5 16 ⁽¹⁾	6 5 ⁽¹⁾	165	130	200	11.5	3.5	10	158	417	377	448	148			40	129	131
BXN 90	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾							177	433	383	451	170		170	43	160	160

N.B.: 1) These values refer to the rear shaft end (PS).

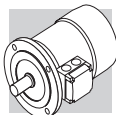


BXN - IM B14 - FD/FA - CE - CUS/UKCA

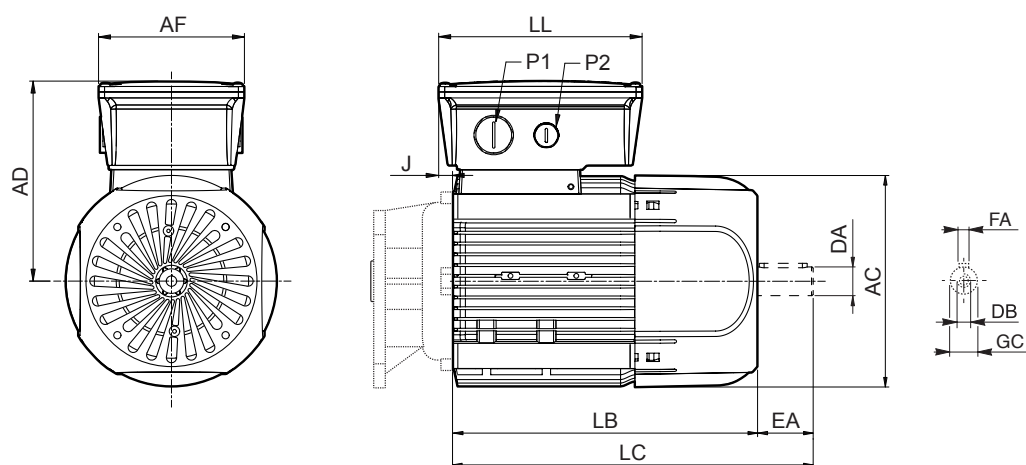


	Shaft					Housing					Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R	
																			FD	FA
BXN 63	11 9 ⁽¹⁾	23 20 ⁽¹⁾	M4 M3 ⁽¹⁾	12.5 10.2 ⁽¹⁾	4 3 ⁽¹⁾	75	60	90	M5	2.5	122	328	305	352	136	112	165	37	96	116
BXN 71	14 11 ⁽¹⁾	30 23 ⁽¹⁾	M5 M4 ⁽¹⁾	16 12.5 ⁽¹⁾	5 4 ⁽¹⁾	85	70	105	M6		138	351	321	380	138			34	103	121
BXN 80	19 14 ⁽¹⁾	40 30 ⁽¹⁾	M6 M5 ⁽¹⁾	21.5 16 ⁽¹⁾	6 5 ⁽¹⁾	100	80	120		3	158	417	377	448	148			40	129	131
BXN 90	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	115	95	140	M8		177	433	383	451	170			170	43	160

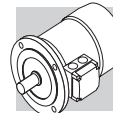
N.B.: 1) These values refer to the rear shaft end (PS).



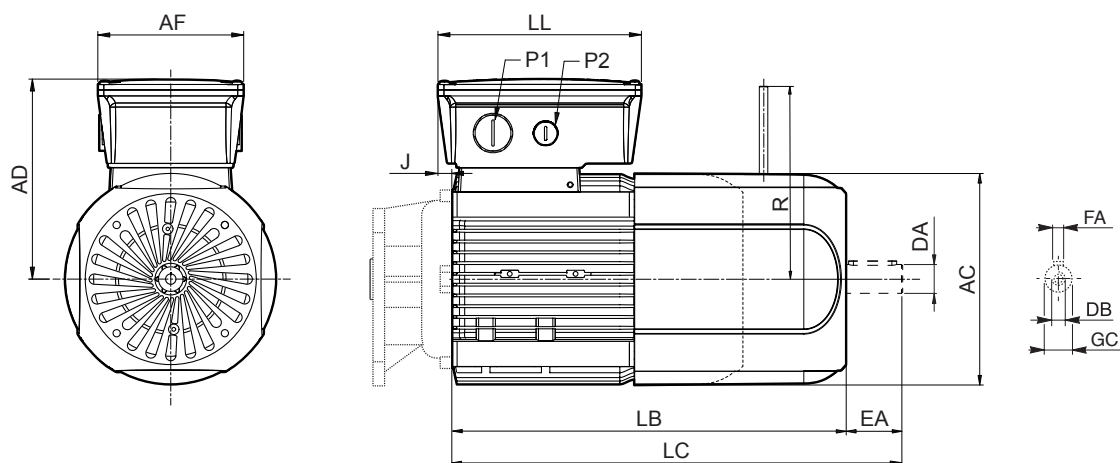
MXN



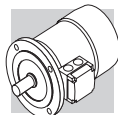
	Rear shaft end					Motor						
	DA	EA	DB	FA	GC	AC	LB	LC	AF	LL	J	AD
MXN 05	9	20	M3	3	10.2	123	211.5	231.5	112	165	9.5	136
MXN 10	11	23	M4	4	12.5	138	216	239	112	165	11.5	137
MXN 20	14	30	M5	5	16	158	255.5	285.5	112	165	10.5	146






MXN_FD/FA



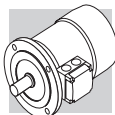
	Rear shaft end					Motor								
	DA	EA	DB	FA	GC	AC	LB	LC	AF	LL	J	AD	R	
													FD	FA
MXN 05	9	20	M3	3	10.2	122	211.5	258.5	112	165	9.5	136	96	116
MXN 10	11	23	M4	4	12.5	138	216	275	112	165	11.5	138	103	121
MXN 20	14	30	M5	5	16	158	255.5	326.5	112	165	10.5	148	129	131







M16 MOTOR RATING CHARTS BX-MX

4 P		1500 min ⁻¹ - S1												50 Hz - IE3									
<div>CE</div>		d.c. brake																		a.c. brake			
		FD												FA									
		Mod	M _b Nm	J _m x 10 ⁻⁴ kgm ²	IM B5 	KVA code	J _m x 10 ⁻⁴ kgm ²	$\frac{M_a}{M_n}$	$\frac{M_s}{M_n}$	$\frac{I_s}{I_n}$	cos φ	η%		I _n 400V	M _n Nm	n min ⁻¹		P _n kW					
0.75	BX 80B	4	1425	5.0	1.61	82.5	83.9	83.2	0.81	6.5	2.0	1.8	J	35	16	FD 04	15	37	19.9	IM B5 	J _m x 10 ⁻⁴ kgm ²	M _b Nm	
1.1	BX 90S	4	1425	7.4	2.44	84.1	84.1	82.0	0.77	6.9	3.4	2.2	J	27	16	FD 14	15	29	20.2	FA 14	15	29	20.1
1.5	BX 90LA	4	1420	10.1	3.3	85.3	86.2	84.9	0.78	6.3	3.1	1.9	J	31	17	FD 05	26	35	23	FA 05	26	35	23.7
2.2	BX 100LA	4	1445	14.5	5.1	86.7	86.2	84.0	0.72	7.2	3.6	2.4	K	58	24	FD 15	40	62	31	FA 15	40	62	31
3	BX 100LB	4	1445	19.8	6.7	87.7	87.7	86.0	0.74	7.6	3.9	2.6	K	73	29	FD 15	40	77	36	FA 15	40	77	36
4	BX 112M	4	1445	26	8.1	88.6	88.9	87.6	0.8	8.1	3.8	2.5	J	130	38	FD 06S	60	139	48	FA 06S	60	139	50
5.5	BX 132SB	4	1460	36	10.6	89.6	89.2	88.8	0.83	8.2	3.6	2.3	J	310	57	FD 56	75	320	70	FA 06	75	320	71
7.5	BX 132MA	4	1460	49	15.0	90.4	90.9	90.2	0.80	8.4	3.8	2.5	K	360	67	FD 06	100	370	80	FA 07	100	370	85
9.2	BX 160MA	4	1465	60	17.8	91.0	92.1	91.7	0.82	7.9	3.6	2.1	J	650	95	FD 08	170	725	125	FA 08	170	725	124
11	BX 160MB	4	1465	72	20.5	91.4	92.9	92.5	0.84	7.8	3.4	1.9	J	780	110	FD 08	170	855	140	FA 08	170	855	139
15	BX 160L	4	1465	98	28.1	92.1	93.2	92.6	0.82	9.0	4.1	2.3	K	890	121	FD 08	200	965	151	FA 08	200	965	150
18.5	BX 180M	4	1480	119	32.9	92.6	94.1	93.1	0.85	11.3	2.6	2.3	M	1560	155	FD 09	300	1760	195				
22	BX 180L	4	1475	142	38.2	93.0	93.6	92.8	0.88	10.2	2.5	2.0	L	1660	163	FD 09	300	1860	203				

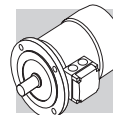
Note: for more details on the available energy certifications look at the catalog's dedicated section.








4 P		1500 min ⁻¹ - S1										50 Hz - IE3											
<div>EECA</div>																d.c. brake				a.c. brake			
P _n		n	M _n	In 400V	η%			cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	KVA code	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	J _m x 10 ⁻⁴ kgm ²	IM B5 	
					100%	75%	50%																
30	BX 200LAK 4	1483	193	55.7	94.7	95.1	95	0.82	8.3	3	3.3	N/A	3660	319	FD 8	400	3940	337					
37	BX 225SAK 4	1482	238	65.9	95.1	95.5	95.4	0.85	7.7	2.8	3.1	N/A	5360	398	FD 9	600	5720	426					
45	BX 225SBK 4	1481	290	80.4	95.2	95.6	95.6	0.85	7.9	2.8	3.2	N/A	5360	398	FD 9	600	5720	426					
55	BX 250MAK 4	1485	354	98.9	95.6	95.8	95.5	0.84	7.9	3	3.3	N/A	9330	476	FD 10	800	10080	521					
75	BX 280SAK 4	1487	482	134	95.9	96.2	96.1	0.84	7.3	2.5	2.8	N/A	15000	665	FD 1000	1000	15360	771					
90	BX 280SBK 4	1487	578	161	96.2	96.4	96.1	0.84	7.9	2.9	3	N/A	18500	725	FD 1000	1000	18860	831					
110	BX 315SAK 4	1491	704	194	96.8	97	96.7	0.84	8.3	2.4	3.1	N/A	29000	1000	FD 1000	1000	29360	1106					
132	BX 315SBK 4	1490	846	234	96.9	97.1	96.8	0.84	8.1	2.6	3.2	N/A	32000	1065	FD 1600	1600	32500	1233					
160	BX 315SCK 4	1490	1025	279	96.7	96.9	96.6	0.86	8.2	2.7	3	N/A	39000	1220	FD 1600	1600	39500	1388					
200	BX 355SAK 4	1491	1281	345	96.6	96.7	96.4	0.87	7.3	2.1	2.7	N/A	59000	1610	FD 2500	2500	59500	1778					
250	BX 355MAK 4	1491	1601	435	96	96	95.6	0.86	6.4	2.1	2.9	N/A	69000	1780	FD 2500	2500	69500	1948					
315	BX 355MBK 4	1491	2017	550	96	96.1	95.7	0.85	7.3	2.4	3.3	N/A	72000	1820	FD 2500	2500	72500	1988					
355	BX 355MCK 4	1490	2275	616	96	96.2	95.8	0.86	6.3	2.3	2.8	N/A	84000	2140	FD 2500	2500	84500	2308					

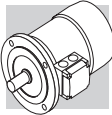


Note: for more details on the available energy certifications look at the catalog's dedicated section.



4 P		1800 min ⁻¹ - S1											60 Hz - Nema Premium																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
<div>ENERGY EFFICIENT NEMA PREMIUM US</div> <div> NEMA - 17984-1</div>			n	M _n	In 460V	η%		cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	KVA code	J _m x 10 ⁻⁴ kgm ²	IM B5 	d.c. brake						a.c. brake																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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															Mod	M _b	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	J _m x 10 ⁻⁴ kgm ²	IM B5 																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
kW			min ⁻¹	Nm	A	100%	75%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													</

Note: for more details on the available energy certifications look at the catalog's dedicated section.

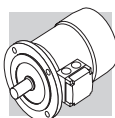




4 P		1800 min ⁻¹ - S1												60 Hz - Nema Premium			

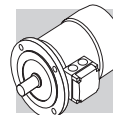


Note: for more details on the available energy certifications look at the catalog's dedicated section.

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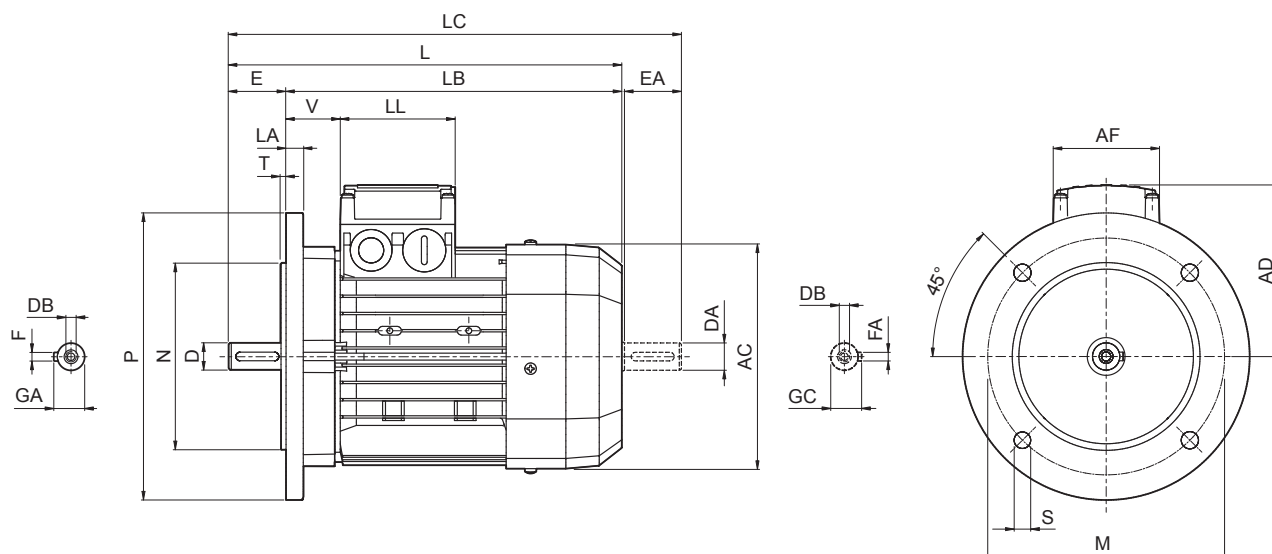


4 P		1800 min ⁻¹ - S1										60 Hz - IE3													
P _n		n	M _n	In 460V	η%			cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	KVA code	J _m x 10 ⁻⁴ kgm ²	IM B5 	d.c. brake			a.c. brake							
					100%	75%	50%								FD			FA							
															Mod	M _b	J _m x 10 ⁻⁴ kgm ²	Mod	M _b	J _m x 10 ⁻⁴ kgm ²	Mod	M _b	J _m x 10 ⁻⁴ kgm ²		
kW		min ⁻¹	Nm	A								Nm	Nm	kgm ²	kgm ²	Nm	Nm	kgm ²	kgm ²	Nm	Nm	kgm ²	kgm ²	kgm ²	kgm ²
0.75	MX 2SB	4	1755	4.1	1.48	85.5	86.4	83.9	0.73	8.0	3.7	2.5	L	27	16	FD 14	15	29	20.2	FA 14	15	29	20.1		
1.1	MX 3SA	4	1755	6.0	2.19	86.5	86.0	83.0	0.73	7.9	3.3	2.5	L	35	17	FD 15	15	26	24	FA 15	15	26	24		
1.5	MX 3SB	4	1755	8.2	2.96	86.5	87.2	85.0	0.72	8.5	3.7	2.9	L	43	20	FD 15	26	47	27	FA 15	26	47	27		
2.2	MX 3LA	4	1760	11.9	4.4	89.5	88.6	86.2	0.71	9.9	4.8	3.6	N	73	29	FD 15	40	77	36	FA 15	40	77	36		
3	MX 3LB	4	1750	16.4	5.9	89.5	88.9	86.7	0.71	9.1	4.4	3.3	M	73	29	FD 15	40	77	36	FA 15	40	77	36		
3.7	MX 4SA	4	1770	20.0	6.6	89.5	89.8	87.7	0.78	9.9	4.7	3.4	M	225	45	FD 56	75	235	58	FA 06	75	235	59		
5.5	MX 4SB	4	1770	30	9.9	91.7	92.0	90.2	0.76	10.7	5.1	4.6	N	410	77	FD 56	75	420	90	FA 06	75	420	91		
7.5	MX 4LA	4	1770	41	13.4	91.7	91.3	89.7	0.76	11.0	4.9	4.4	N	410	77	FD 06	100	420	90	FA 07	100	420	95		
9.2	MX 5SA	4	1770	50	15.6	92.4	92.5	91.6	0.8	9.1	4.1	2.6	L	650	95	FD 08	170	725	125	FA 08	170	725	124		
11	MX 5SB	4	1770	59	18.2	92.4	92.9	92.0	0.82	9.3	4.0	2.4	L	780	110	FD 08	170	855	140	FA 08	170	855	139		
15	MX 5LA	4	1770	81	24.5	93.0	93.5	92.5	0.81	10.9	4.8	2.8	M	890	121	FD 08	200	965	151	FA 08	200	965	150		



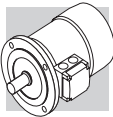
M17 MOTORS DIMENSIONS BX-MX

BX - IM B5 - CE/CCC



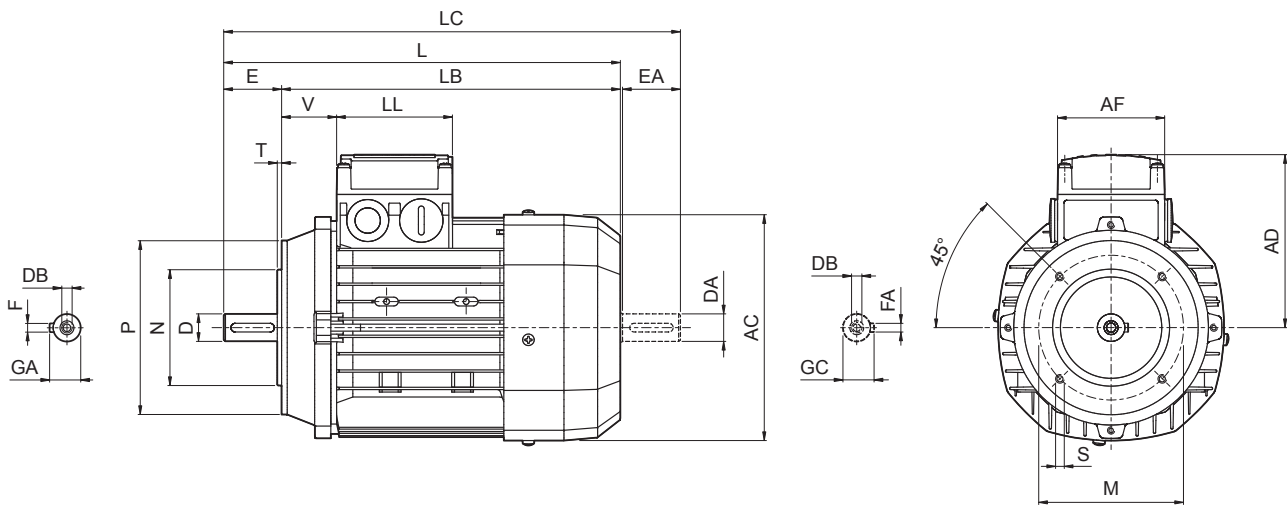
	Shaft					Flange						Motor															
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V								
BX 80 B	19 14 ⁽¹⁾	40 30 ⁽¹⁾	M6 M5 ⁽¹⁾	21.5 16 ⁽¹⁾	6 5 ⁽¹⁾	165	130	200	11.5	3.5	11.5	156	320	280	351	119	74	80	38								
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾							176	326	276	368	133	98	98	44								
BX 90 LA																											
BX 100 LA	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	215	180	250	14	4	14	195	410	350	462	142	98	98	50								
BX 100 LB											15	219	430	370	482	157			193	118	118	58					
BX 112 M																											
BX 132 SB	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	265	230	300			20	258	493 528	413 448	556 591	193	118	118	58								
BX 132 MA																											
BX 160 MA	42 38 ⁽¹⁾	110 80 ⁽¹⁾	M16 M12 ⁽¹⁾	45 41 ⁽¹⁾	12 10 ⁽¹⁾	300	250	350	18.5	5	15	310	596	486	680					245	187	187	51				
BX 160 MB													640	530	724												
BX 160 L																											
BX 180 M	48 42 ⁽¹⁾	110 110 ⁽¹⁾	M16 M16 ⁽¹⁾	51.5 45 ⁽¹⁾	14 12 ⁽¹⁾	300	250	350	18.5	5	18	348	708	598	823	261	187	187	52								
BX 180 L																											
BX 200LA	55 45 ⁽¹⁾																		140 110 ⁽¹⁾	M20 M20 ⁽¹⁾	59 48.5 ⁽¹⁾	16 14 ⁽¹⁾	350	300	400	19	5
BX 225SA	60 55 ⁽¹⁾	64 59 ⁽¹⁾	18 16 ⁽¹⁾	400	350	450	465	879	739	1001	348	300	311	48													
BX 225SB																											
BX 250MA	65 55 ⁽¹⁾			69 59 ⁽¹⁾					18	5	24	514	884	744	1010	376	434	306			43						
BX 280SA	75 65 ⁽¹⁾	140 140 ⁽¹⁾		79.5 69 ⁽¹⁾	20 18 ⁽¹⁾	500	450	550				600	550	660	645	1204						1034	1352	537	473	347	42
BX 280SB																											
BX 315SA	80 75 ⁽¹⁾	170 140 ⁽¹⁾	M24 M20 ⁽¹⁾	85 79.5 ⁽¹⁾	22 20 ⁽¹⁾	740	680	800	23	6	25						1315	1145	1463	603	694						
BX 315SB																											
BX 315SC																											
BX 315MA	90 75 ⁽¹⁾			95 79.5 ⁽¹⁾	25 20 ⁽¹⁾																						
BX 355MA	100 75 ⁽¹⁾	210 170 ⁽¹⁾	M24 M20 ⁽¹⁾	106 79.5 ⁽¹⁾	28 20 ⁽¹⁾	740	680	800	23	6	25	740	1479	1269	1659	603	694	413	50								
BX 355MB																											
BX 355MC																											

N.B.: 1) These values refer to the rear shaft end (PS).



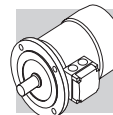
BX - IM B14 - CE/CCC

BX-MX

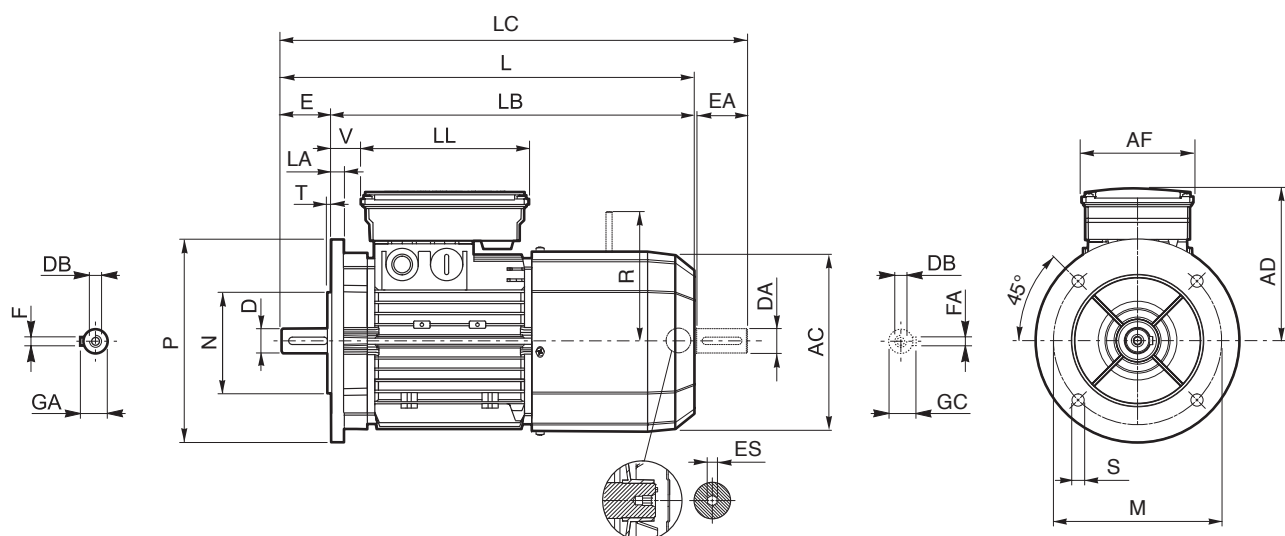


	Shaft					Housing					Motor							
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V
BX 80 B	19 14 ⁽¹⁾	40 30 ⁽¹⁾	M6 M5 ⁽¹⁾	21.5 16 ⁽¹⁾	6 5 ⁽¹⁾	100	80	120	M6		156	320	280	351	119	74	80	38
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	115	95	140	M8	3	176	326	276	368	133	98	98	44
BX 90 LA																		
BX 100 LA																		
BX 100 LB	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	130	110	160		3.5	195	410	350	462	142	98	98	50
BX 112 M											219	430	370	482	157			52
BX 132 SB	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	165	130	200	M10	4	258	493	413	556	193	118	118	58

N.B.: 1) These values refer to the rear shaft end (PS).



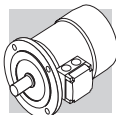
BX - IM B5 - FD/FA - CE/CCC



BX-MX

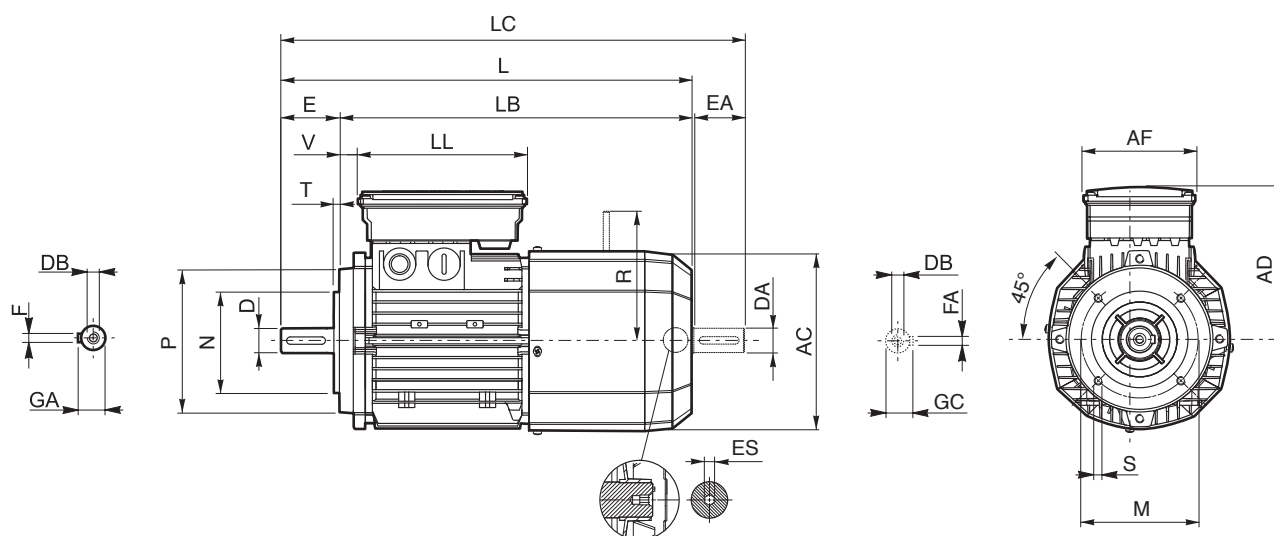
	Shaft					Flange						Motor										ES (2)										
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R												
																				FD	FA											
BX 80 B	19 14 ⁽¹⁾	40 30 ⁽¹⁾	M6 M5 ⁽¹⁾	21.5 16 ⁽¹⁾	6 5 ⁽¹⁾	165	130	200	11.5	3.5	11.5	156	392	352	423	143	98	133	25	129	134	5										
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾							176	410	360	452	146	32	110	165	37	160		160	39	199	198						
BX 90 LA																																
BX 100 LA																																
BX 100 LB	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	215	180	250	14	4	14	195	502	442	554	155	140	188	46	204	200 226	6										
BX 112 M											15	219	527	467	579	170							603 627	523 547	667 690	210	187	187	51	266	247	
BX 132 SB	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	265	230	300			16	258	736 780	626 670	820 864	245							187	187	52							305
BX 132 MA																																
BX 160 MA																																
BX 160 MB	42 38 ⁽¹⁾	110 80 ⁽¹⁾	M16 M12 ⁽¹⁾	45 41 ⁽¹⁾	12 10 ⁽¹⁾	300	250	350	18.5	5	15	310	780	670	864	245	187	187	51	266	247											
BX 160 L																																
BX 180 M	48 42 ⁽¹⁾	110 110 ⁽¹⁾	M16 M16 ⁽¹⁾	51.5 45 ⁽¹⁾	14 12 ⁽¹⁾																		18	348	866	756	981	261				
BX 180 L																																
BX 200LA	55 45 ⁽¹⁾			M20 M20 ⁽¹⁾	59 48.5 ⁽¹⁾	16 14 ⁽¹⁾	350	300	400	19	5	20	423	982	872	1095	328	300	311	48	445 832	—										
BX 225SA	60 55 ⁽¹⁾	140 110 ⁽¹⁾	64 59 ⁽¹⁾		18 16 ⁽¹⁾	400	350	450	24				514	1099	959	1225	376															
BX 225SB																																
BX 250MA	65 55 ⁽¹⁾				69 59 ⁽¹⁾																											
BX 280SA	75 65 ⁽¹⁾	140 140 ⁽¹⁾	79.5 69 ⁽¹⁾		20 18 ⁽¹⁾	500	450	550	18			23	567	1340	1200	1490	482	434	306	43	832											
BX 280SB																																
BX 315SA						600	550	660	23	6	25	645	1452	1282	1600	537	473	347	42	832	—											
BX 315SB	80 75 ⁽¹⁾	170 140 ⁽¹⁾	85 79.5 ⁽¹⁾	22 20 ⁽¹⁾											1497							1327	1645									
BX 315SC																																
BX 315MA	90 75 ⁽¹⁾			95 79.5 ⁽¹⁾	25 20 ⁽¹⁾				23	6	25	1607	1437	1755	603	694	413	50	—													
BX 355MA																																
BX 355MB	100 75 ⁽¹⁾	210 170 ⁽¹⁾	M24 M20 ⁽¹⁾	106 79.5 ⁽¹⁾	28 20 ⁽¹⁾	740	680	800				740	1790	1580						1970												
BX 355MC													1825	1615	2005																	

N.B.: 1) These values refer to the rear shaft end (PS). 2) "ES" hexagon is not present with PS option



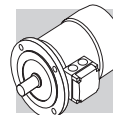
BX - IM B14 - FD/FA - CE/CCC

BX-MX



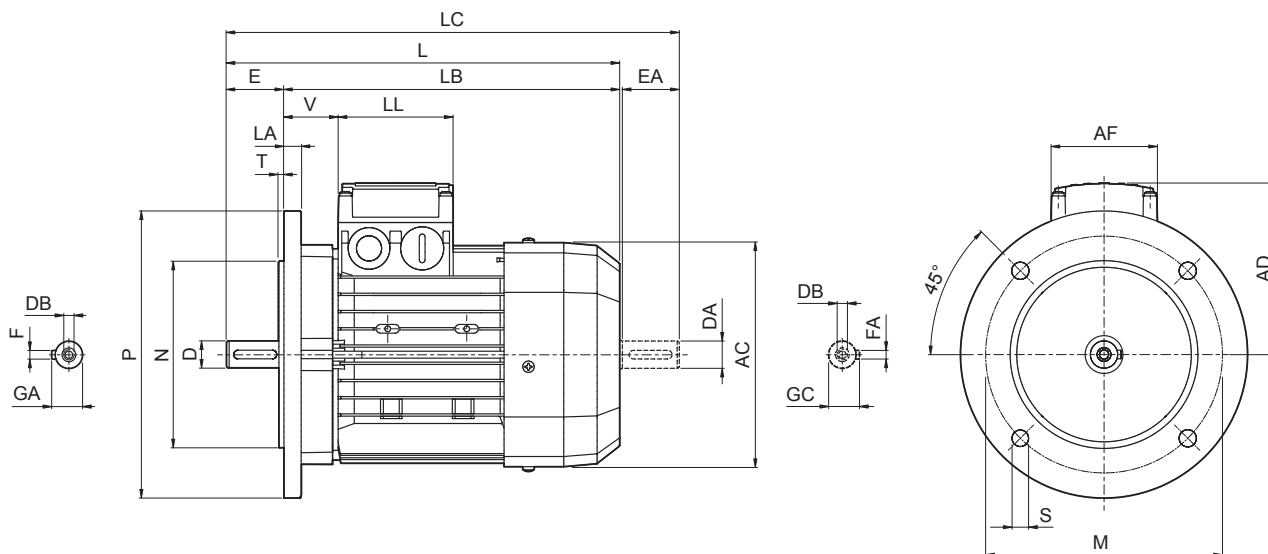
	Shaft					Housing					Motor																					
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R		ES (2)											
																			FD	FA												
BX 80 B	19 14 ⁽¹⁾	40 30 ⁽¹⁾	M6 M5 ⁽¹⁾	21.5 16 ⁽¹⁾	6 5 ⁽¹⁾	100	80	120	M6	3	156	392	352	423	143	98	133	25	129	134	6											
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	115	95	140	M8		3.5	176	410	360	452	146	110	165				32										
BX 90 LA																																
BX 100 LA	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	130	110	160	M10	4	258	195	502	442	554	155	140	188	37	160		160										
BX 100 LB																																
BX 112 M																																
BX 132 SB	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	165	130	200	M10	4	258	603	523	667	210	140	188	46	204	200												
BX 132 MA																																

N.B.: 1) These values refer to the rear shaft end (PS). 2) "ES" hexagon is not present with PS option



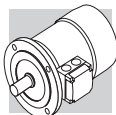
BX - IM B5 - CUS/NBR/EECA

BX-MX



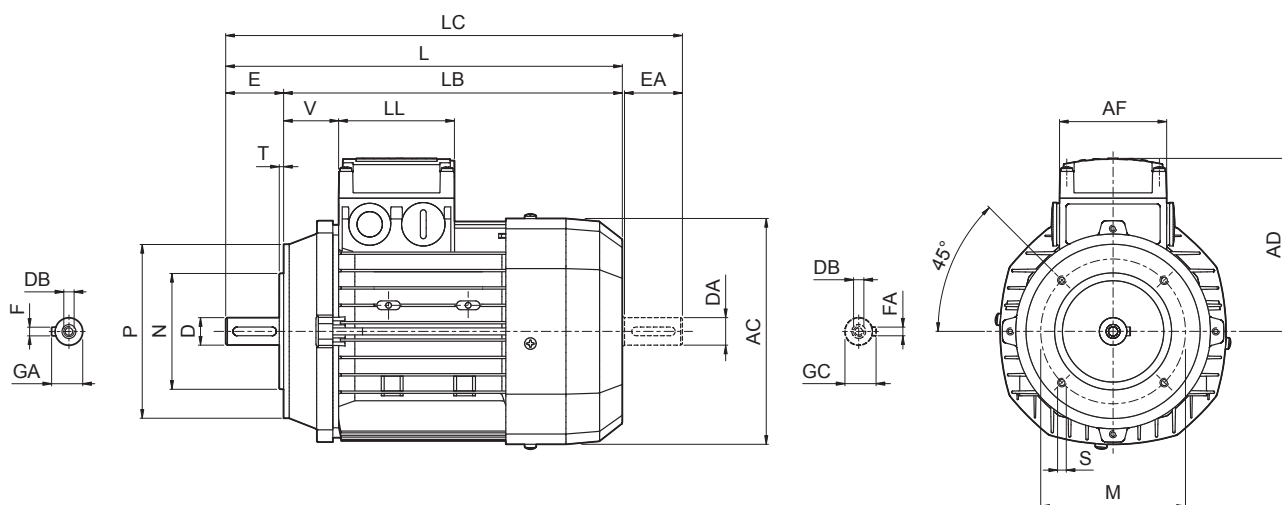
	Shaft					Flange						Motor							
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V
BX 90 SR	19 19 ⁽¹⁾	40 40 ⁽¹⁾	M6 M6 ⁽¹⁾	21.5 21.5 ⁽¹⁾	6 6 ⁽¹⁾								316		358				
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	165	130	200	11.5	3.5	11.5	176	326	276	368	133			44
BX 90 LA																	98	98	
BX 100 LA	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	215	180	250			14	195	410	350	462	142			50
BX 100 LB									14	4									
BX 112 M											15	219	430	370	482	157			52
BX 132 SB	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	265	230	300			20	258	552	472	615	193	118	118	58
BX 132 MA																			
BX 160 MA	42 38 ⁽¹⁾	110 80 ⁽¹⁾	M16 M12 ⁽¹⁾	45 41 ⁽¹⁾	12 10 ⁽¹⁾						15	310	596	486	680				51
BX 160 MB													640	530	724	245			
BX 160 L						300	250	350	18.5	5							187	187	
BX 180 M	48 42 ⁽¹⁾	110 110 ⁽¹⁾	M16 M16 ⁽¹⁾	51.5 45 ⁽¹⁾	14 12 ⁽¹⁾						18	348	708	598	823	261			52
BX 180 L																			
BX 200LAK	55 45 ⁽¹⁾	110 110 ⁽¹⁾	M20 M20 ⁽¹⁾	59 48.5 ⁽¹⁾	16 14 ⁽¹⁾	350	300	400	19	5	20	423	821	711	934	328	300	311	55
BX 225SAK	60 55 ⁽¹⁾	140 110 ⁽¹⁾	M20 M20 ⁽¹⁾	64 59 ⁽¹⁾	18 16 ⁽¹⁾	400	350	450	19	5	20	465	879	739	1001	348	300	311	48
BX 225SBK																			
BX 250MAK	65 55 ⁽¹⁾	140 110 ⁽¹⁾	M20 M20 ⁽¹⁾	69 59 ⁽¹⁾	18 16 ⁽¹⁾	500	450	550	19	5	24	514	884	744	1010	376	300	311	
BX 280SAK	75 65 ⁽¹⁾	140 140 ⁽¹⁾	M20 M20 ⁽¹⁾	79.5 69 ⁽¹⁾	20 18 ⁽¹⁾	500	450	550	18	5	23	567	1088	948	1238	482	434	306	43
BX 280SBK																			
BX 315SAK	80 75 ⁽¹⁾	170 140 ⁽¹⁾	M20 M20 ⁽¹⁾	85 79.5 ⁽¹⁾	22 20 ⁽¹⁾	600	550	660	23	6	25	645	1204	1034	1352	537	473	347	42
BX 315SBK													1315	1145	1453				
BX 315SCK																			
BX 355SAK	100 75 ⁽¹⁾	210 170 ⁽¹⁾	M24 M20 ⁽¹⁾	106 79.5 ⁽¹⁾	28 20 ⁽¹⁾	740	680	800	23	6	25	740	1479	1269	1659	603	694	413	50
BX 355MAK																			
BX 355MBK													1584	1374	1764				
BX 355MCK																			

N.B.: 1) These values refer to the rear shaft end (PS).



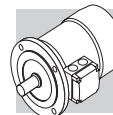
BX - IM B14 - CUS

BX-MX

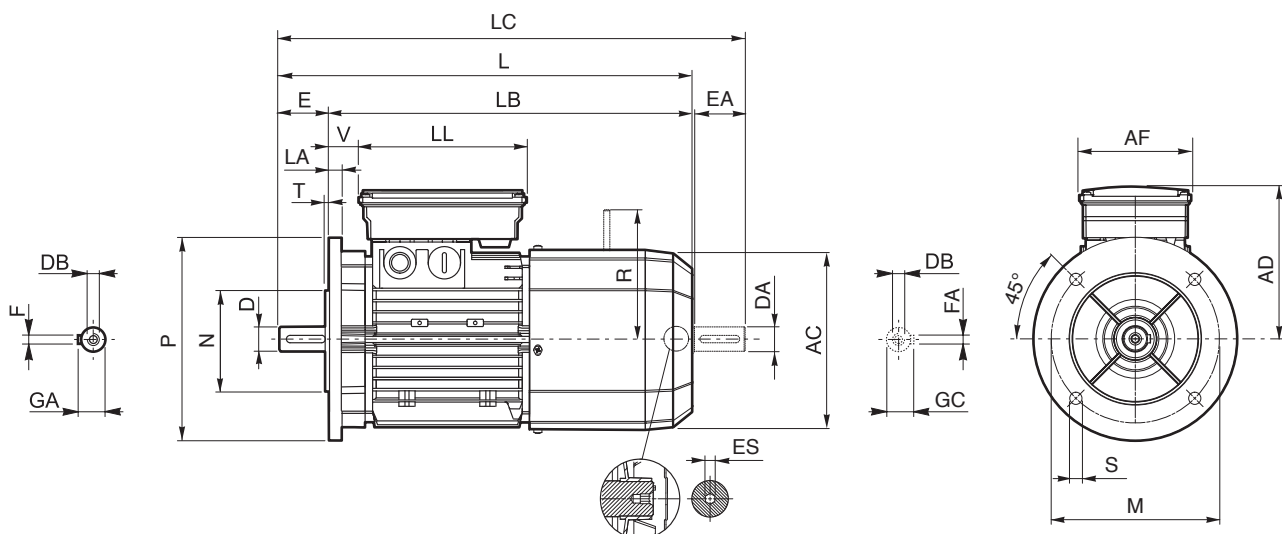


	Shaft					Housing					Motor											
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V				
BX 90 SR	19 19 ⁽¹⁾	40 40 ⁽¹⁾	M6 M6 ⁽¹⁾	21.5 21.5 ⁽¹⁾	6 6 ⁽¹⁾	100	80	120	M6	3	176	316	276	358	133	98	98	44				
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	115	95	140	M8			3.5		195					326	368	142	52
BX 90 LA																						
BX 100 LA	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	130	110	160		M10	4		258		410	350	462	118	118	58		
BX 100 LB									219			430		370	482	157						
BX 112 M																						
BX 132 SB	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	165	130	200	M10	4	258	552	472	615	193	118	118	58				
BX 132 MA																						

N.B.: 1) These values refer to the rear shaft end (PS).

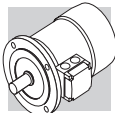


BX - IM B5 - FD/FA - CUS/NBR/EECA



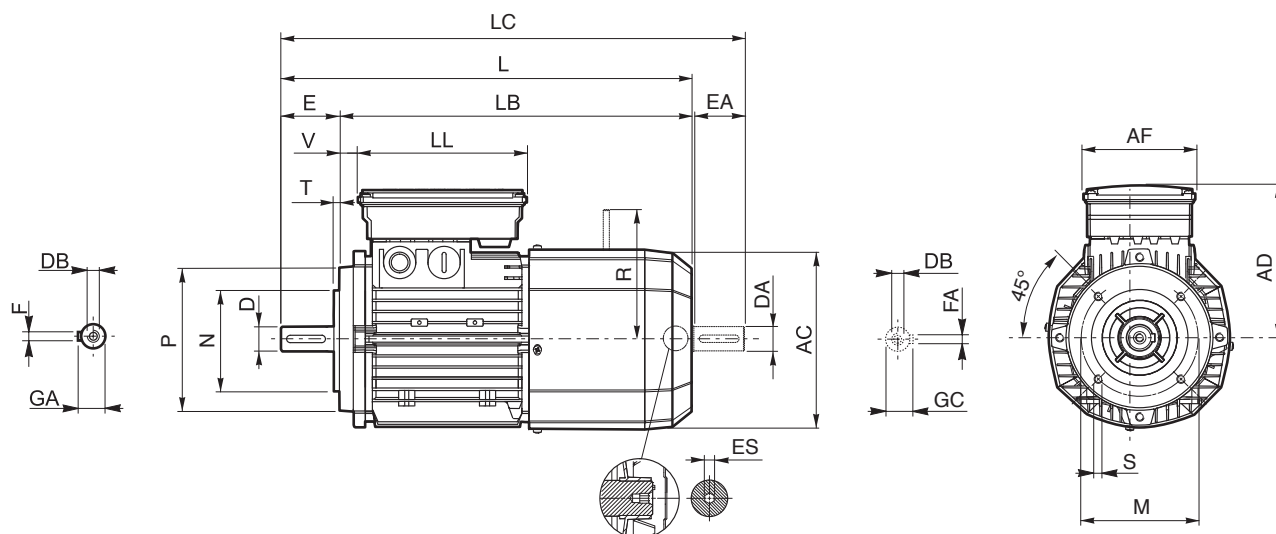
	Shaft					Flange						Motor										
	D	E	DB	GA	F	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R		ES
	DA	EA	M	GC	FA															FD	FA	(2)
BX 90 SR	19 19 ⁽¹⁾	40 40 ⁽¹⁾	M6 M6 ⁽¹⁾	21.5 21.5 ⁽¹⁾	6 6 ⁽¹⁾								400		442							
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	165	130	200	11.5	3.5	11.5	176	410	360	452	146			32	129	134	
BX 90 LA																	110	165				
BX 100 LA																						
BX 100 LB	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	215	180	250			14	195	502	442	554	155			37	160	160	6
BX 112 M									14	4	15	219	527	467	579	170			39	199	198	
BX 132 SB	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	265	230	300			16	258	661	581	724	210	140	188	46	204	200	
BX 132 MA																				226		
BX 160 MA														736	626	820						
BX 160 MB	42 38 ⁽¹⁾	110 80 ⁽¹⁾	M16 M12 ⁽¹⁾	45 41 ⁽¹⁾	12 10 ⁽¹⁾						15	310	780	670	864	245			51	266	247	
BX 160 L						300	250	350	18.5	5							187	187				
BX 180 M	48 42 ⁽¹⁾	110 110 ⁽¹⁾	M16 M16 ⁽¹⁾	51.5 45 ⁽¹⁾	14 12 ⁽¹⁾						18	348	866	756	981	261			52	305		
BX 180 L																						
BX 200LAK	55 45 ⁽¹⁾		M20 M16 ⁽¹⁾	59 48.5 ⁽¹⁾	16 14 ⁽¹⁾	350	300	400				417	967	857	1082	328			55	323		
BX 225SAK	60 55 ⁽¹⁾	140 110 ⁽¹⁾		64 59 ⁽¹⁾	18 16 ⁽¹⁾	400	350	450	19		20	460	1065	925	1180	348	300	311	48	308		
BX 225SBK																						
BX 250MAK	65 55 ⁽¹⁾			69 59 ⁽¹⁾							24	510	1070	930	1240	376				363		
BX 280SAK	75 65 ⁽¹⁾	140 140 ⁽¹⁾	M20 M20 ⁽¹⁾	79.5 69 ⁽¹⁾	20 18 ⁽¹⁾	500	450	550	18		23	564	1284	1144	1379	482	434	306	43	500		
BX 280SBK																						
BX 315SAK													1493	1323	1643							
BX 315SBK	80 75 ⁽¹⁾	170 140 ⁽¹⁾		85 79.5 ⁽¹⁾	22 20 ⁽¹⁾	600	550	660				639	1530	1360	1680	537	473	347	42	678		
BX 315SCK													1604	1434	1791							
BX 355SAK									23	6	25											
BX 355MAK	100 90 ⁽¹⁾	210 170 ⁽¹⁾	M24 M24 ⁽¹⁾	106 95 ⁽¹⁾	28 25 ⁽¹⁾	740	680	800				725	1722	1512	1902	603	694	413	50	—		
BX 355MBK																						
BX 355MCK													1827	1617	2082							

N.B.: 1) These values refer to the rear shaft end (PS). 2) "ES" hexagon is not present with PS option



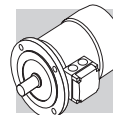
BX - IM B14 - FD/FA - CUS

BX-MX

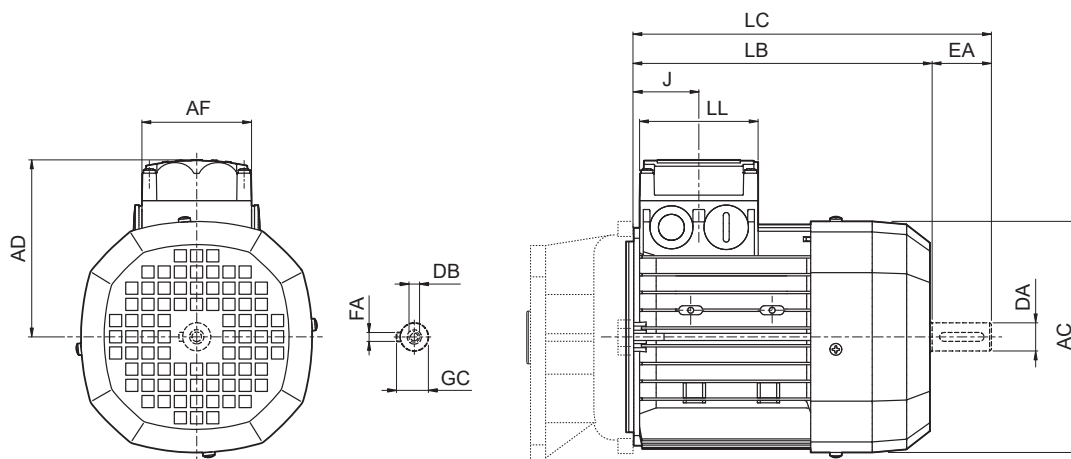


	Shaft					Housing					Motor										
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R		ES ⁽²⁾
																			FD	FA	
BX 90 SR	19 19 ⁽¹⁾	40 40 ⁽¹⁾	M6 M6 ⁽¹⁾	21.5 21.5 ⁽¹⁾	6 6 ⁽¹⁾	100	80	120	M6	3	176	400	360	442	146	110	165	32	129	134	6
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	115	95	140	M8			410		452					155	160	
BX 90 LA										3.5	195		502		442	554	37	160			
BX 100 LA											219	527	467	579	170	39	199	198			
BX 100 LB	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	130	110	160													
BX 112 M																					
BX 132 SB	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	165	130	200	M10	4	258	661	581	724	210	140	188	46	204	200	
BX 132 MA																			226		

N.B.: 1) These values refer to the rear shaft end (PS). 2) "ES" hexagon is not present with PS option

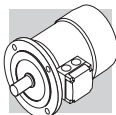


MX



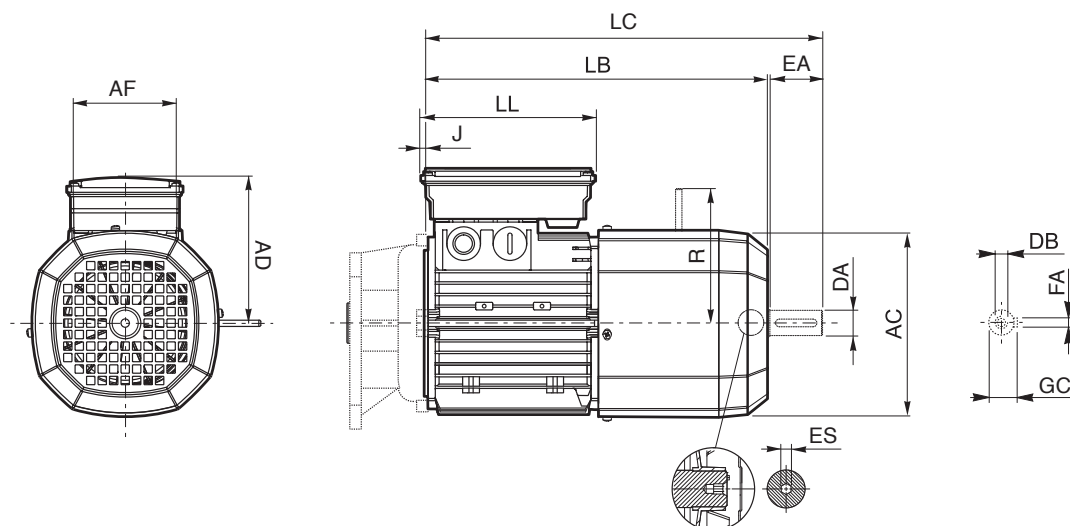
BX-MX

	Rear shaft end					Motor							
	DA	EA	DB	GC	FA	AC	LB	LC	AF	LL	J	AD	
MX 2SB	14	30	M5	16	5	156	246	278	74	80	44	119	
MX 3SA	24	50	M8	27	8	195	265	317	98	98	53.5	142	
MX 3SB							305	357					
MX 3LA													
MX 3LB						MX 4SA	28	60	M10	31	258	361	424
MX 4SB	396	459											
MX 4LA													
MX 5SA	38	80	M12	41		10	310	418	502	187	187	77	245
MX 5SB					462			546					
MX 5LA													



MX_FD/FA

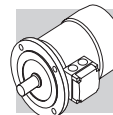
BX-MX



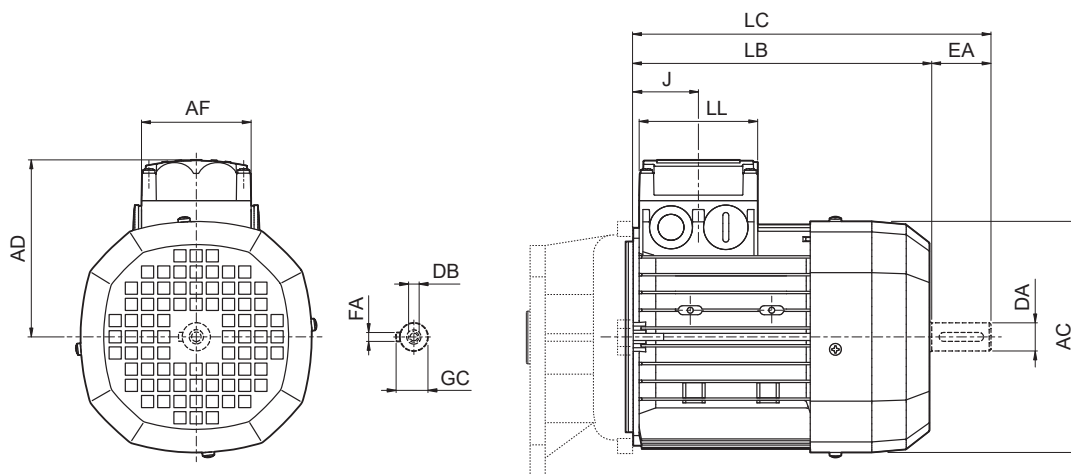
	Rear shaft end					Motor										
	DA	EA	DB	GC	FA	AC	LB	LC	AF	LL	J	AD	R FD FA	ES ⁽¹⁾		
MX 2SB	14	30	M5	16	5	156	318	349	98	133	9	143	129	134	5	
MX 3SA	24	50	M8	27	8	195	355	407	110	165	7	155	160	160	6	
MX 3SB							397	450								
MX 3LA																
MX 3LB						MX 4SA	28	60	M10	31		258	470	534		140
MX 4SB	494	558	226													
MX 4LA																
MX 5SA	38	80	M12	41		10	310	558	644	187		187	17	245		266
MX 5SB					602			686								
MX 5LA																

N.B.:

1) "ES" hexagon is not present with PS option

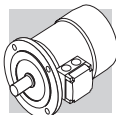


MX CUS



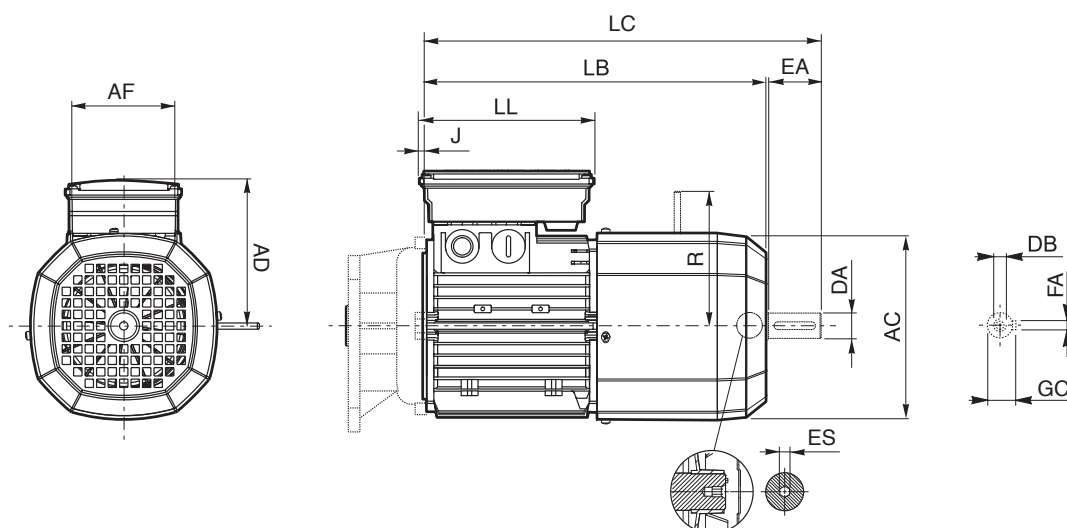
BX-MX

	Rear shaft end					Motor										
	DA	EA	DB	GC	FA	AC	LB	LC	AF	LL	J	AD				
MX 2SB	14	30	M5	16	5	176	262	293	98	98	79	133				
MX 3SA	24	50	M8	27	8	195	265	317			53.5	142				
MX 3SB							305	357								
MX 3LA																
MX 3LB																
MX 4SA	28	60	M10	31		258	361	424	118	118	64.5	193				
MX 4SB							420	483								
MX 4LA																
MX 5SA	38	80	M12	41	10	310	418	502	187	187	77	245				
MX 5SB							462	546								
MX 5LA																



MX_FD/FA CUS

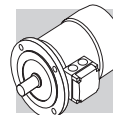
BX-MX








	Rear shaft end					Motor										
	DA	EA	DB	GC	FA	AC	LB	LC	AF	LL	J	AD	R FD FA	ES ⁽¹⁾		
MX 2SB	14	30	M5	16	5	176	347	379	110	165	-17	146	129	134	6	
MX 3SA	24	50	M8	27	8	195	355	407			7	155	160	160		
MX 3SB							397	450								
MX 3LA																
MX 3LB																
MX 4SA	28	60	M10	31	10	258	470	534	140	188	210	204	200	—		
MX 4SB							528	592					226			
MX 4LA																
MX 5SA	38	80	M12	41	10	310	558	644	187	187	17	245	266	247	—	
MX 5SB							602	686								
MX 5LA																

N.B.:

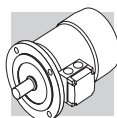
1) "ES" hexagon is not present with PS option



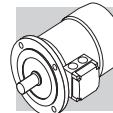
M18 MOTOR RATING CHARTS BE-ME








2 P		3000 min ⁻¹ - S1												50 Hz - IE2								
<div><div>A068744</div><div></div></div>		d.c. brake												a.c. brake								
		FD												FA								
		P _n	n	M _n	In 400V	η%	cos φ	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴	IM B5	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴	IM B5	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴	IM B5
kW	min ⁻¹	Nm	A	100%	75%	50%			kgm ²			Nm	NB	SB	kgm ²			Nm	1/h	kgm ²		
0.75	BE 80A	2	2860	2.5	1.65	80	79.6	76.4	0.83	6.8	3.5	9	9.5	1700	3200	9.4	13.4	FA 04	5	3200	9.4	13.3
1.1	BE 80B	2	2845	3.7	2.35	81.5	82.2	79.9	0.83	6.9	3.1	11.4	11.3	1500	3000	10.6	15.2	FA 04	10	3000	10.6	15.1
1.5	BE 90SA	2	2865	5	3.2	81.3	80.7	78.1	0.82	6.8	2.8	12.5	12.3	900	2200	14.1	16.5	FA 14	15	2200	14.1	16.4
2.2	BE 90L	2	2870	7.3	4.7	83.2	83.1	80.8	0.82	6.9	3.1	16.7	14	900	2200	21	20	FA 05	26	2200	21	20.7
3	BE 100L	2	2880	9.9	6.2	84.6	84.6	83.7	0.83	7.3	3.5	39	23	700	1600	35	29	FA 15	26	1600	35	30
4	BE 112M	2	2920	13.1	8.2	85.8	85.5	84.3	0.82	7.9	3.5	57	28	—	950	66	39	FA 06S	40	950	66	40
5.5	BE 132SA	2	2925	18	10.6	87	85	81.7	0.86	8.5	3.6	145	42	—	600	112	55	FA 06	50	600	112	56
7.5	BE 132SB	2	2935	24	14.3	88.1	87.4	84.7	0.86	8.8	3.9	178	53	—	550	154	66	FA 06	50	550	154	67
9.2	BE 132MB	2	2920	30	16.4	88.8	86.5	84.2	0.91	8.4	3.7	210	65	—	430	189	78	FA 06	75	430	189	79
11	BE 160MA	2	2940	36	20	89.4	89.5	88	0.89	8.1	3	340	84	—	—	—	—	—	—	—	—	—
15	BE 160MB	2	2950	49	27.2	90.5	90.5	89.5	0.88	8.5	3	420	97	—	—	—	—	—	—	—	—	—
18.5	BE 160L	2	2945	60	32	90.9	90.5	89.8	0.91	7.7	2.9	490	109	—	—	—	—	—	—	—	—	—



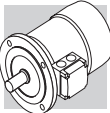











4 P		1500 min ⁻¹ - S1										50 Hz - IE2				
<div><div><div><div><div><div></div></div></div><div><div><div></div></div></div></div><div><div>CE</div><div>A068744</div></div></div><div><div><div><div><div></div></div><div><div></div></div></div><div><div><div></div></div><div><div></div></div></div></div><div><div><div></div></div><div><div></div></div></div></div><div><div><div></div></div><div><div></div></div></div></div> <div><div><div></div></div><div><div></div></div></div> <div><div><div></div></div><div><div></div></div></div> <div><div><div></div></div><div><div></div></div></div> <div><div><div></div></div><div><div></div></div></div> <div><div><div></div></div><div><div></div></div></div> <div><div><div></div></div><div><div></div></div></div> <div><div><div></div></div><div><div></div></div></div> <div><div><div></div></div><div><div></div></div></div> <div><div><div></div></div><div><div></div></div></div> <div><div><div></div></div><div><div></div></div></div> <div><div><div></div></div><div><div></div></div></div> 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6 P		1000 min ⁻¹ - S1										50 Hz - IE2											
<div><div><div></div><div></div><div></div></div><div>A068744</div></div>		d.c. brake												a.c. brake									
		FD						FA															
		Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 							
P _n		n	M _n	In 400V	η%	cos φ	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 		
kW		min ⁻¹	Nm	A	100%	75%	50%																
0.75	BE 90S 6	935	7.7	2.06	75.9	73	0.69	5.1	3.1	2.9	33	15	FD 14	15	3400	6500	28	19.2	FA 14	15	6500	28	19.1
1.1	BE 100M 6 (*)	945	11.1	2.75	78.1	73	0.74	4.9	2.2	1.9	82	22	FD 15	26	2500	4800	58	30	FA 15	26	4800	58	31
1.5	BE 100LA 6	945	15.2	3.9	79.8	74	0.72	5.6	2.5	2.3	95	24	FD 15	40	1900	4100	86	30	FA 15	40	4100	86	31
2.2	BE 112M 6	950	22	5.2	81.8	79.3	0.74	5.2	2.6	2.3	168	32	FD 06S	60	—	2100	177	42	FA 06S	60	2100	177	44
3	BE 132S 6	955	30	6.6	83.3	82.4	0.79	6.1	2.1	1.9	295	44	FD 56	75	—	1400	226	57	FA 06	75	1400	226	58
4	BE 132MA 6	965	40	8.7	84.6	83.1	0.79	6.9	2.2	2	383	56	FD 06	100	—	1200	305	69	FA 07	100	1200	318	74
5.5	BE 160MA 6 (*)	965	54	11.6	87	86.4	0.79	6.6	2.5	2.3	740	83	FD 08	170	—	1000	700	112	FA 08	170	1000	700	113
7.5	BE 160MB 6 (*)	965	74	15	88	87.2	0.82	6.6	2.3	2.1	970	103	FD 08	170	—	900	815	132	FA 08	170	900	815	133

(*) Power /size relation not standardized



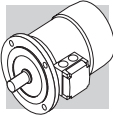
2 P		3000 min ⁻¹ - S1										50 Hz - IE2													
		d.c. brake																	a.c. brake						
		FD												FA											
		IM B5 	Mod	M _b Nm	NB	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 							
P _n kW		n min ⁻¹	M _n Nm	I _n 400V A	η%		cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b Nm	NB	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 		
0.75	BE 80A	2	2860	2.5	1.65	80	79.6	76.4	0.83	6.8	3.8	3.5	9	9.5	FD 04	5	1700	3200	9.4	12.5	FA 04	5	3200	9.4	12.4
1.1	BE 80B	2	2845	3.7	2.35	81.5	82.2	79.9	0.83	6.9	3.8	3.1	11.4	11.3	FD 04	10	1500	3000	10.6	13.4	FA 04	10	3000	10.6	13.3
1.5	BE 90SA	2	2865	5	3.2	81.3	80.7	78.1	0.82	6.8	3.6	2.8	12.5	12.3	FD 14	15	900	2200	14.1	16.5	FA 14	15	2200	14.1	16.4
2.2	BE 90L	2	2870	7.3	4.7	83.2	83.1	80.8	0.82	6.9	3.1	2.9	16.7	14	FD 05	26	900	2200	21	20	FA 05	26	2200	21	20.7
3.7	BE 112M	2	2930	12.1	7.8	84.7	83	81.2	0.79	7.9	3.5	3.1	57	28	FD 06S	40	—	950	66	39	FA 06S	40	950	66	40










(*) Power /size relation not standardized



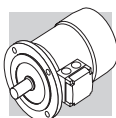
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Riduttori







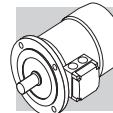
2 P		3000 min ⁻¹ - S1										50 Hz - IE2													
<div><div><div><div><div></div></div></div><div><div><div></div></div></div><div><div><div></div></div></div></div><div>A068744</div></div>		d.c. brake															a.c. brake								
		FD										FA													
		P _n		n	M _n	In 400V	η%		cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	Z ₀ 1/h NB	Z ₀ 1/h SB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 
kW		min ⁻¹	Nm	A	100%	75%	50%							Nm	Nm						Nm				
0.75	ME 2SA	2	2860	2.5	1.63	80	79.6	76.4	0.83	6.8	3.8	3.5	9	8.8	FD 04	5	1700	3200	9.4	12.7	FA 04	5	3200	9.4	12.6
1.1	ME 2SB	2	2845	3.7	2.35	81.5	82.2	79.9	0.83	6.9	3.8	3.1	11.4	10.6	FD 04	10	1500	3000	13	14.5	FA 04	10	3000	13	14.4
1.5	ME 3SA	2	2845	5.0	3.2	81.3	79	76	0.81	6.1	2.9	2.7	24	15.5	FD 15	13	1300	2600	22	22	FA 15	26	2600	22	23
2.2	ME 3LA	2	2895	7.3	4.7	83.2	83.1	80.8	0.82	6.9	2.7	2.5	31	18.7	FD 15	26	1100	2400	28	25.2	FA 15	26	2400	28	26.2
3	ME 3LB	2	2880	9.9	6.2	84.6	84.6	83.7	0.83	7.3	3.5	3.1	39	22	FD 15	26	700	1600	35	28.5	FA 15	26	1600	35	29.5
4	ME 4SA	2	2900	13.2	7.8	85.8	84.5	82.2	0.87	7.0	2.9	2.8	101	33	FD 06	50	—	1400	107	46	FA 06	50	2100	107	47
5.5	ME 4SB	2	2925	18.0	10.6	87.0	85.0	81.7	0.86	8.5	3.6	3.3	145	40	FD 06	50	—	600	112	48	FA 06	50	600	112	49
7.5	ME 4LA	2	2935	24	14.3	88.1	87.4	84.7	0.86	8.8	3.9	3.6	178	51	FD 06	50	—	550	154	55	FA 06	50	550	154	56
9.2	ME 4LB	2	2920	30	16.4	88.8	86.5	84.2	0.91	8.4	3.7	3.3	210	60	FD 56	75	—	430	189	66	FA 06	75	430	189	67
11	ME 5SA	2	2940	36	20.0	90.5	90.5	88.0	0.89	8.1	3.0	2.9	340	70											
15	ME 5SB	2	2950	49	27.2	90.9	90.5	89.5	0.88	8.5	3.0	2.8	420	83											
18.5	ME 5LA	2	2945	60	32	90.4	90.1	89.8	0.91	7.7	2.9	2.7	490	95											








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Riduttori

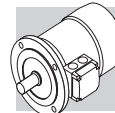










6 P		1000 min ⁻¹ - S1										50 Hz - IE2																					
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P _n		n	M _n	I _n 400V	η%		cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m x 10 ⁻⁴ kgm ²		FD				FA																
					100%	75%							Mod	M _b	Z ₀ 1/h NB	SB	IM B5 	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 											
0.75	ME 3SA	6	7.6	1.98	75.9	70.7	0.72	4.7	2.2	2	33	17	FD 15	26	3400	6500	28	21	FA 15	26	6500	28	22										
1.1	ME 3LA	6 (*)	11.1	2.75	78.1	73.0	0.74	4.9	2.2	1.9	82	21	FD 15	26	2700	5000	37	27	FA 15	26	5000	37	28										
1.5	ME 3LB	6	15.2	3.8	79.8	74.0	0.72	5.6	2.5	2.3	95	23	FD 15	40	1900	4100	86	29	FA 15	40	4100	86	30										
2.2	ME 4SA	6	22	4.9	81.8	80.0	0.80	5.7	1.9	1.7	216	34	FD 06	50	—	2100	177	47	FA 06	50	2100	177	48										
3	ME 4SB	6	30	6.6	83.3	82.4	0.79	6.1	2.1	1.9	295	43	FD 56	75	—	1400	226	56	FA 06	75	1400	226	57										
4	ME 4LA	6	40	8.6	84.6	83.1	0.79	6.9	2.2	2.0	383	54	FD 06	100	—	1200	305	70	FA 07	100	1200	305	72										
5.5	ME 5SA	6 (*)	54	11.6	87.0	86.4	0.79	6.6	2.5	2.3	740	69	FD 08	170	—	1050	406	99	FA 08	170	1050	406	98										
7.5	ME 5SB	6 (*)	74	15.0	88.0	87.2	0.82	6.6	2.3	2.1	970	89	FD 08	170	—	900	815	119	FA 08	170	900	815	118										

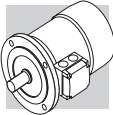







2 P		3000 min ⁻¹ - S1										50 Hz - IE2												
<div></div>																								
		FD										FA												
P _n		n	M _n	In 400V	η%		cos φ	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	Z ₀ 1/h NB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 		
kW		min ⁻¹	Nm	A	100%	75%	50%								Nm					Nm				
0.75	ME 2SA	2	2.5	1.63	80	79.6	76.4	0.83	6.8	3.8	3.5	9	8.8	FD 04	5	1700	3200	9.4	12.7	FA 04	5	3200	9.4	12.6
1.1	ME 2SB	2	3.7	2.35	81.5	82.2	79.9	0.83	6.9	3.8	3.1	11.4	10.6	FD 04	10	1500	3000	10.6	14.5	FA 04	10	3000	10.6	14.4
1.5	ME 3SA	2	5	3.2	81.3	79	76	0.81	6.1	2.9	2.7	24	15.5	FD 15	13	4800	8000	32	22.5	FA 15	26	8000	32	22.5
2.2	ME 3LA	2	7.3	4.7	83.2	83.1	80.8	0.82	6.9	3.1	2.9	16.7	18.7	FD 15	26	3400	6000	34	25.7	FA 15	26	6000	34	25.7
3.7	ME 4SA	2	12.1	7.8	84.7	83	81.2	0.79	7.9	3.5	3.1	57	33	FD 56	75	—	1400	107	46	FA 06	75	2100	107	47



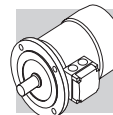


6 P		1000 min ⁻¹ - S1										50 Hz - IE2													
<div></div>																									
		FD										FA													
		P _n		n	M _n	In 400V	η%		cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m x 10 ⁻⁴	IM B5 	Mod	M _b	Z ₀ 1/h		J _m x 10 ⁻⁴	IM B5 	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴	IM B5 
kW		min ⁻¹	Nm	A	100%	75%	50%					kgm ²			Nm	NB	SB	kgm ²			Nm			kgm ²	
0.75	ME 3SA	6	940	7.6	1.98	75.9	75	70.7	0.72	4.7	2.2	2	33	17	FD 15	26	3400	6500	28	21	FA 15	26	6500	28	22
1.1	ME 3LA	6 (*)	945	11.1	2.75	78.1	76.2	73	0.74	4.9	2.2	1.9	82	21	FD 15	26	2700	5000	37	27	FA 15	26	5000	37	28
1.5	ME 3LB	6	945	15.2	3.8	79.8	77.5	74	0.72	5.6	2.5	2.3	95	23	FD 15	40	1900	4100	86	29	FA 15	40	4100	86	30
2.2	ME 4SA	6	955	22	4.9	81.8	81.8	80	0.8	5.7	1.9	1.7	216	34	FD 56	75	—	2100	177	47	FA 06	60	2100	177	48
3.7	ME 4LA	6	970	36.1	8.3	83.5	83.6	81.3	0.76	6.9	2.2	2	383	54	FD 06	100	—	1200	305	70	FA 06	100	1200	305	72



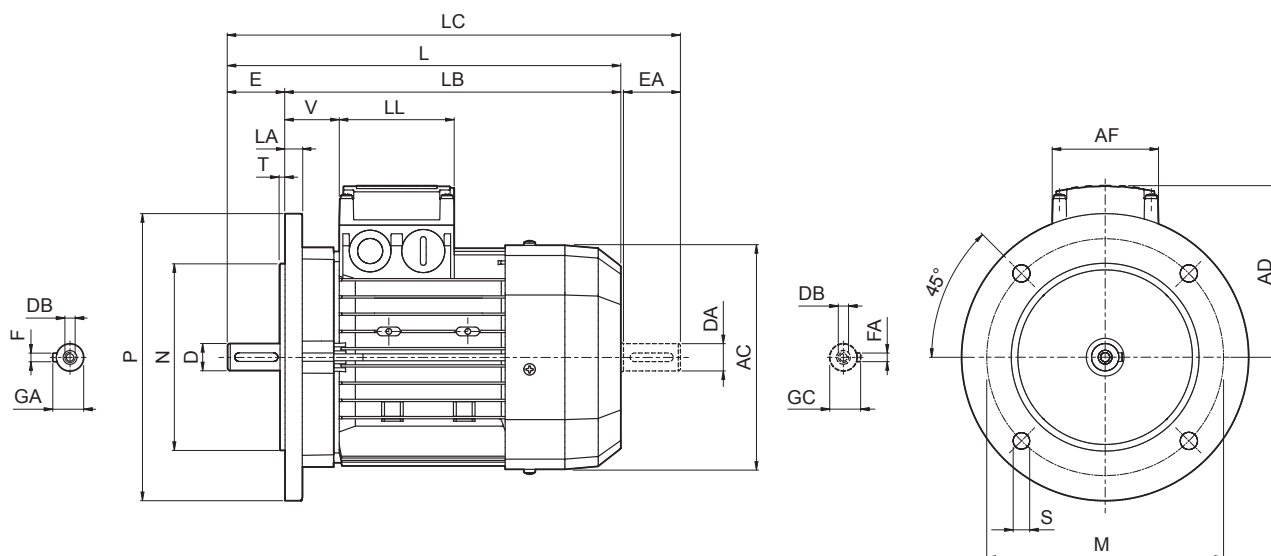
4 P		1800 min ⁻¹ - S1										60 Hz - IE2													
<div> IEC [®] US</div>																									
P _n	<div></div>	n	M _n	I _n 400V	η%		cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	KVA Code	J _m x 10 ⁻⁴ kgm ²	IM B5 <div></div>	Mod	M _b	Z ₀ 1/h		J _m x 10 ⁻⁴ kgm ²	IM B5 <div></div>	Mod	M _b	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 <div></div>	
					100%	75%										NB	SB								
0.75	0.55	ME 2SA	4	3	1.23	75.5	73.1	0.74	8.7	3.8	3.0	N	19	9.9	FD 04	10	4100	8000	16.6	13.8	FA 04	10	8000	16.6	13.7
1	0.75	ME 2SB	4	4.1	1.46	82.5	81.1	0.78	7.6	3.5	3.2	K	28	12.2	FD 04	15	4100	7800	22	16.1	FA 04	15	7800	22	16
1.5	1.1	ME 3SA	4	6	2.25	84	82.7	0.73	7.7	3.5	3.2	J	28	15.5	FD 15	26	4800	8000	32	21.5	FA 15	26	8000	32	22.5
2	1.5	ME 3SB	4	8.2	3.1	84.5	83.9	0.73	7.1	3.6	3.4	K	34	17	FD 15	26	3400	6000	34	23	FA 15	26	6000	34	24
3	2.2	ME 3LA	4	12	4.2	87.5	85.5	0.76	7	3.3	2.9	J	54	21	FD 15	40	2600	4700	44	27	FA 15	40	4700	44	28
4	3	ME 3LB	4	16.5	5.9	87.5	87.7	0.76	7	3.2	2.9	K	61	23	FD 15	40	2400	4400	58	29	FA 15	40	4400	58	30
5	3.7	ME 4SA	4	20	6.6	87.5	87.5	0.8	7.8	3.3	3.2	J	105	42	FD 56	75	—	1400	107	55	FA 06	75	2100	107	56
7.5	5.5	ME 4SB	4	30	9.3	89.5	89.5	0.83	8.7	3.5	3.5	K	270	51	FD 56	75	—	1050	223	64	FA 06	75	1200	223	65
10	7.5	ME 4LA	4	43	12.7	89.5	89.5	0.83	8	3.4	3.3	K	319	57	FD 06	100	—	950	280	70	FA 07	100	1000	280	75
12.5	9.2	ME 4LB	4	50	15.6	90	90	0.82	8.3	3.5	3.6	K	360	65	FD 07	150	—	900	342	81	FA 07	150	900	342	83
15	11	ME 5SA	4	60	18.7	91	91	0.81	7.7	2.9	2.8	J	650	85	FD 08	170	—	800	655	115	FA 08	170	800	655	114
20	15	ME 5LA	4	81	25.5	91	90.5	0.81	7.1	3.1	2.7	J	790	101	FD 08	200	—	750	725	131	FA 08	200	750	710	130





M19 MOTORS DIMENSIONS BE-ME

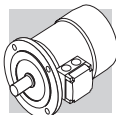
BE - IM B5- CE/CUS/BIS/CCC



	Shaft					Flange						Motor																	
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V										
BE 63	11	23	M4	12.5	4	115	95	140	9.5	3	10	121	207	184	232	95	74	80	26										
BE 71	14	30	M5	16	5	130	110	160		3.5		11.5	138	249	219	281			108	37									
BE 80	19	40	M6	21.5	6	165	130	200					11.5	156	274	234			315	119	38								
BE 90 S	24	50	M8	27	8				165		130		200	11.5	11.5	176	326	276	378	133	98	98	44						
BE 90 L										28		60				M10	31	215	180	250			14	195	367	307	429	142	50
BE 100	28	60	M10	31	215	180	250	14	195		367		307	429	142						157	98							98
BE 112										28		60				M10	31	215	180	250			14	195	367	307	429	142	
BE 132 S	38	80	M12	41	10	265	230	300	14		4		20	258	493						413	576							193
BE 132 MA										528		448			611														
BE 132 MB										528		448			611														
BE 160 M	42	110	M16	45	12	300	250	350	18.5	5	15	310	596	486	680	245	187	187	51										
BE 160 L	38 ⁽¹⁾	80 ⁽¹⁾	M12 ⁽¹⁾	41 ⁽¹⁾	10 ⁽¹⁾								640	530	724				51										
BE 180 M	48	110	M16	51.5	14								300	250	350				18.5	5	18	348	708	598	823	261	187	187	52
BE 180 L	42 ⁽¹⁾	110 ⁽¹⁾	M16 ⁽¹⁾	45 ⁽¹⁾	12 ⁽¹⁾																								52

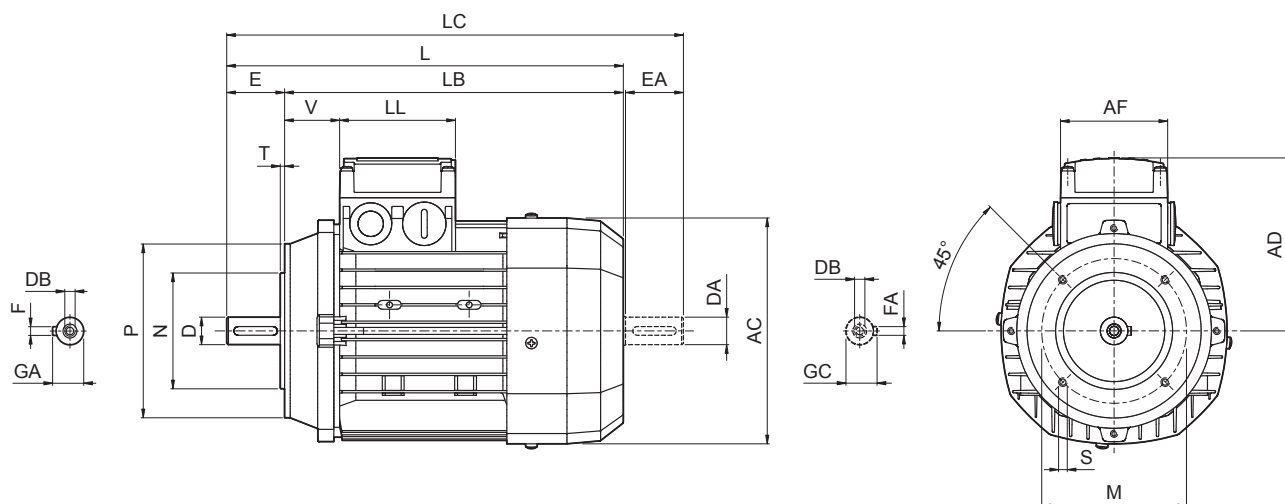
N.B.:

1) These values refer to the rear shaft end.

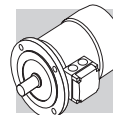


BE - IM B14- CE/CUS/BIS/CCC

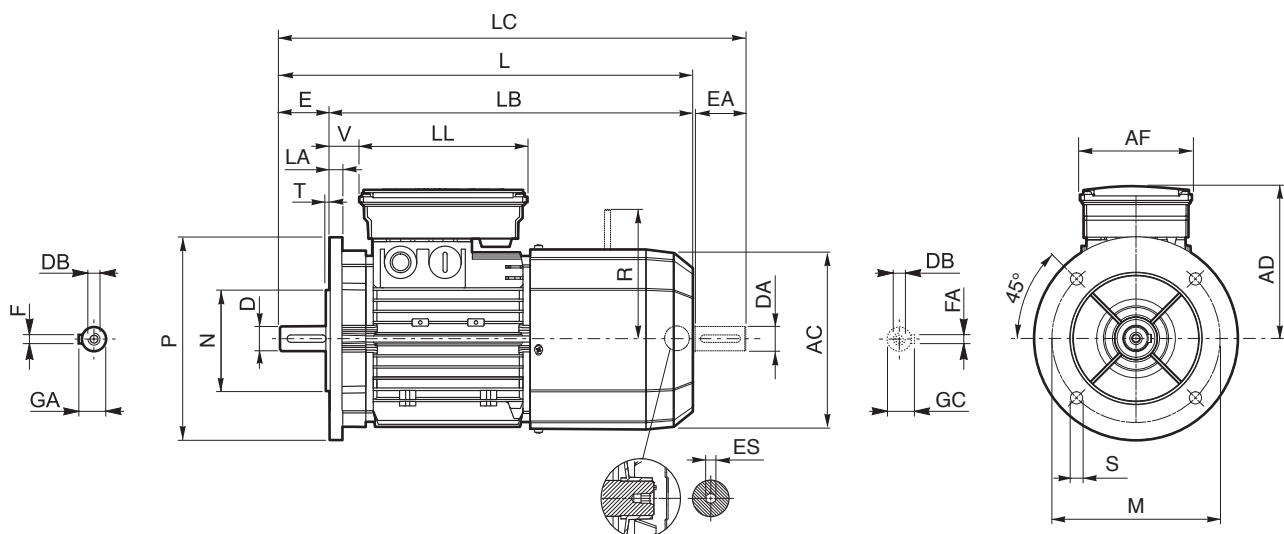
BE-ME



	Shaft					Flange					Motor											
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V				
BE 63	11	23	M4	12.5	4	75	60	90	M5	2.5	121	207	184	232	95	74	80	37				
BE 71	14	30	M5	16	5	85	70	105	M6	3	138	249	219	281	108			38				
BE 80	19	40	M6	21.5	6	100	80	120			156	274	234	315	119							
BE 90 S	24	50	M8	27	8	115	95	140	M8		3.5	176	326	276	378	133	98		98	44		
BE 90 L						130	110	160		195		367	307	429	142	50						
BE 100	28	60	M10	31						219		385	325	448	157	52						
BE 112									219	385	325	448	157	52								
BE 132 S	38	80	M12	41	10	165	130	200	M10	4	258	493	413	576	193	118	118	58				
BE 132 MA												528	448	611								
BE 132 MB																						



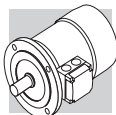
BE - IM B5 - FD/FA - CE/CUS/BIS



	Shaft					Flange						Motor																			
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R		ES (2)									
																				FD	FA										
BE 63	11	23	M4	12.5	4	115	95	140	9.5	3	10	121	272	249	297	122	98	133	14	96	116	5									
BE 71	14	30	M5	16	5	130	110	160		138		313	283	345	135	24			103	124											
BE 80	19	40	M6	21.5	6	165	130	200		11.5		156	348	308	390	143			25	129	134										
BE 90 S	24	50	M8	27	8				215		180	250	11.5	176	411	361	463	146	32	160	160										
BE 90 L														28	60	M10	31	37	199			198									
BE 100	38	80	M12	41		10	265	230		300								14	4			20	258	603	523	686	193	140	188	46	204
BE 112					15				219		484	424	547	170	39	199	198														
BE 132 S																				628	548										
BE 132 MA	736	626	820	245	51	266	247																								
BE 132 MB								780	670	864	187	187	52	305	—																
BE 160 M	42 ⁽¹⁾	110 ⁽¹⁾	M16 ⁽¹⁾	51.5 ⁽¹⁾	14 ⁽¹⁾	300	250									350	18.5	5	15	310	348	866	756	981	261	187	187	52	305	—	
BE 160 L																															
BE 180 M	48 ⁽¹⁾	110 ⁽¹⁾	M16 ⁽¹⁾	51.5 ⁽¹⁾	14 ⁽¹⁾	300	250	350	18.5	5	15	310	348	866	756	981	261	187	187	52	305	—									
BE 180 L																															

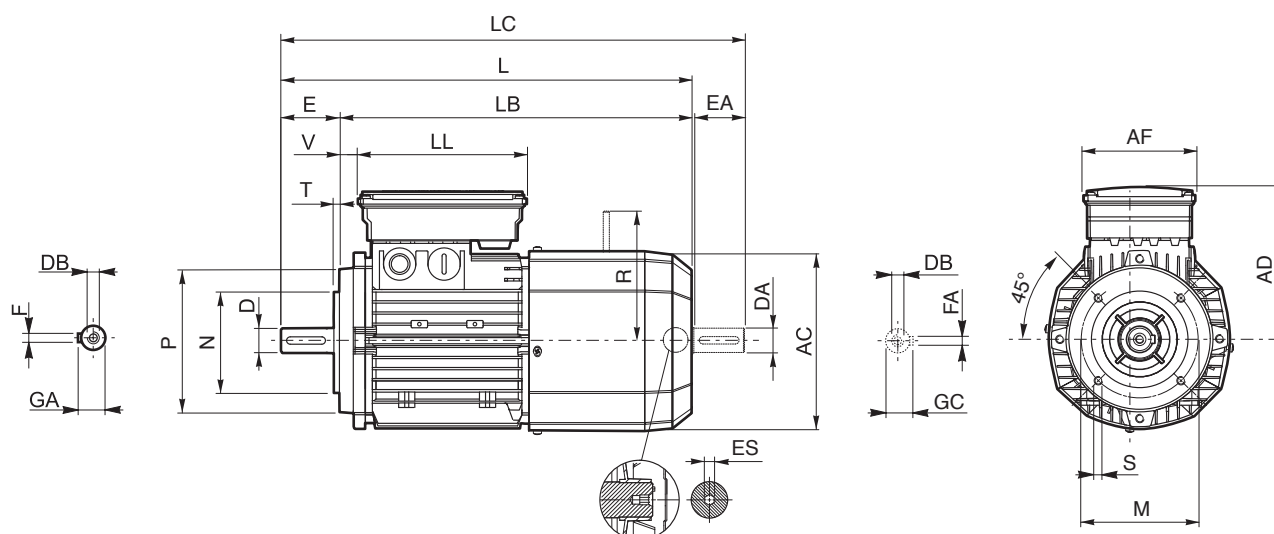
N.B.: 1) These values refer to the rear shaft end (PS).

2) "ES" hexagon is not present with PS option



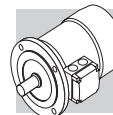
BE - IM B14 - FD/FA - CE/CUS/BIS

BE-ME

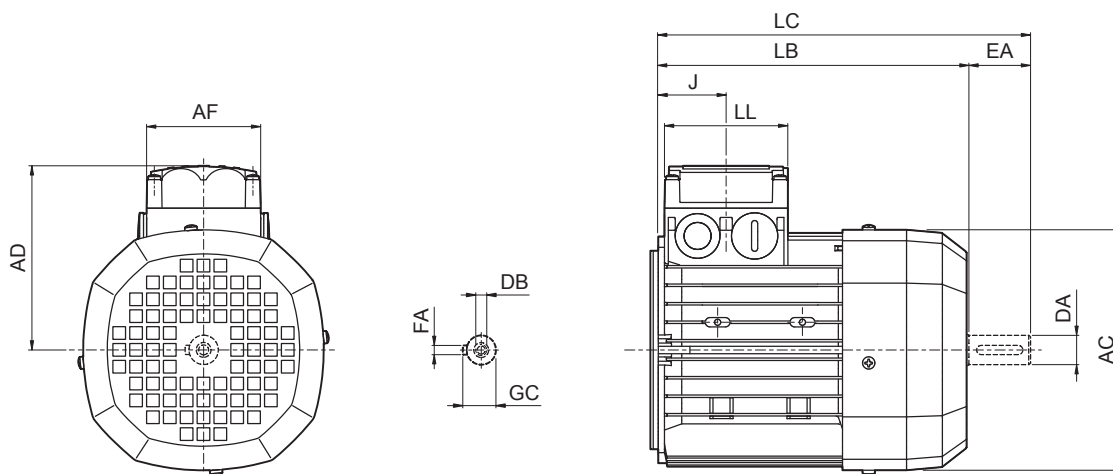


	Shaft					Flange					Motor										
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R		ES (2)
																			FD	FA	
BE 63	11	23	M4	12.5	4	75	60	90	M5	2.5	121	272	249	297	122	98	133	14	96	116	5
BE 71	14	30	M5	16	5	85	70	105	M6	3	138	313	283	345	135			24	103	124	
BE 80	19	40	M6	21.5	6	100	80	120			156	348	308	390	143			25	129	134	
BE 90 S	24	50	M8	27	8	115	95	140	M8	3.5	176	411	361	463	146	110	165	32	160	160	6
BE 90 L						130	110	160			195	458	398	521	155			37			
BE 100	28	60	M10	31		130	110	160			219	484	424	547	170			39	199	198	
BE 112																					
BE 132 S	38	80	M12	41	10	165	130	200	M10	4	258	603	523	686	193	140	188	46	204	200	
BE 132 MA																					
BE 132 MB												628	548	711					226	217	—

N.B.: 2) "ES" hexagon is not present with PS option

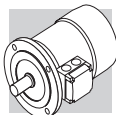


ME - CE/CUS/BIS/CCC



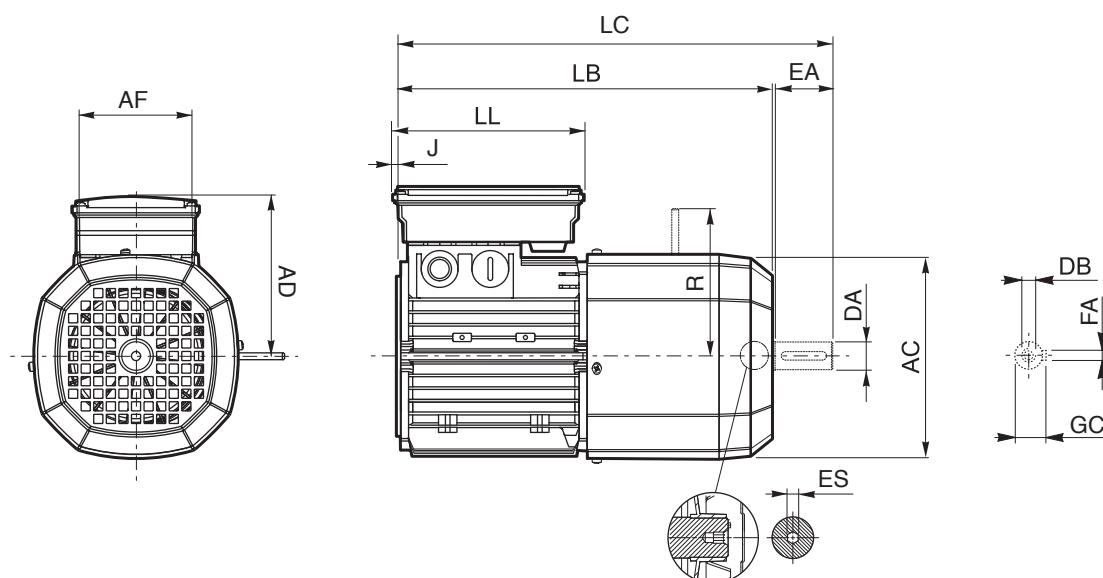
BE-ME

	Rear shaft end					Motor						
	DA	EA	DB	FA	GC	AC	LB	LC	AF	LL	J	AD
ME 05	11	23	M4	12.5	4	121	165	191	74	80	48	95
ME 1S	14	30	M5	16	5	138	187	219			45	108
ME 2S	19	40	M6	21.5	6	156	202	245			44	119
ME 3S	28	60	M10	31	8	195	230	293	98	98	53.5	142
ME 3L							262	325				
ME 4S	38	80	M12	41	10	258	361	444	118	118	64.5	193
ME 4L							396	479				
ME 4LB												
ME 5S	38	80	M12	41	10	310	418	502	187	187	77	245
ME 5L							462	546				



ME_FD/FA - CE/CUS/BIS

BE-ME






	Rear shaft end					Motor									
	DA	EA	DB	GC	FA	AC	LB	LC	AF	LL	J	AD	R FD FA		ES ⁽¹⁾
ME 05	11	23	M4	12.5	4	121	231	256	98	133	-4.5	119	96	116	5
ME 1S	14	30	M5	16	5	138	248	280			-8	135	103	124	
ME 2S	19	40	M6	21.5	6	156	272	314			-17	143	129	134	
ME 3S	28	60	M10	31	8	195	326	389	110	165	7	155	160	160	6
ME 3L							353	416							
ME 4S	38	80	M12	41	10	258	470	553	140	188	7	210	204	200	
ME 4LA							495	578					226	217	
ME 4LB															
ME 5S	38	80	M12	41	10	310	558	642	187	187	17	245	266	247	---
ME 5L							602	686							

N.B.: 1) "ES" hexagon is not present with PS option

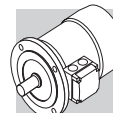


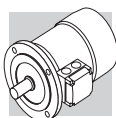
$\bullet = |E|$





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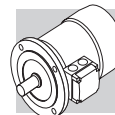
d.c. brake															a.c. brake										
P _n kW		n min ⁻¹	M _n Nm	IE1	η (100%) %	η (75%) %	η (50%) %	cosφ	In 400V A	Is In	Ms Mn	Ma Mn	J _m x 10 ⁻⁴ kgm ²	IM B5 	FD				FA						
															Mod	Mb Nm	Z ₀ 1/h	NB	SB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²
0.09	BN 63A	6	0.98	○	41.0	41.0	32.9	0.53	0.60	2.1	2.1	1.8	3.4	4.6	FD 02	3.5	9000	14000	4.0	6.3	FA 02	3.5	14000	4.0	6.1
0.12	BN 63B	6	1.32	○	45.0	44.0	41.8	0.60	0.64	2.1	1.9	1.7	3.7	4.9	FD 02	3.5	9000	14000	4.3	6.6	FA 02	3.5	14000	4.3	6.4
0.18	BN 71A	6	1.91	○	55.0	55.5	51.0	0.69	0.68	2.6	1.9	1.7	8.4	5.5	FD 03	5	8100	13500	9.5	8.2	FA 03	5.0	13500	9.5	7.9
0.25	BN 71B	6	2.70	○	62.0	58.5	51.4	0.71	0.82	2.6	1.9	1.7	10.9	6.7	FD 03	5	7800	13000	12	9.4	FA 03	5.0	13000	12	9.1
0.37	BN 71C	6	3.9	○	66.0	60.0	53.3	0.69	1.17	3.0	2.4	2.0	12.9	7.7	FD 53	7.5	5100	9500	14	10.4	FA 03	7.5	9500	14	10.1
0.37	BN 80A	6	3.9	○	68.0	67.4	63.3	0.68	1.15	3.2	2.2	2.0	21	9.9	FD 04	10	5200	8500	23	13.8	FA 04	10	8500	23	13.7
0.55	BN 80B	6	5.7	○	70.0	69.8	64.3	0.68	1.67	3.9	2.6	2.2	25	11.3	FD 04	15	4800	7200	27	15.2	FA 04	15	7200	27	15.1
0.75	BN 80C	6	7.8	●	70.0	70.0	64.4	0.65	2.38	3.8	2.5	2.2	28	12.2	FD 04	15	3400	6400	30	16.1	FA 04	15	6400	30	16.0
0.75	BN 90S	6	7.8	●	70.0	69.0	64.2	0.68	2.27	3.8	2.4	2.2	26	12.6	FD 14	15	3400	6500	28	16.8	FA 14	15	6500	28	16.7
1.1	BN 90L	6	11.4	●	72.9	72.6	69.1	0.69	3.2	3.9	2.3	2.0	33	15	FD 05	26	2700	5000	37	21	FA 05	26	5000	37	22
1.5	BN 100LA	6	15.2	●	75.2	74.2	70.3	0.72	4.0	4.1	2.1	2.0	82	22	FD 15	40	1900	4100	86	28	FA 15	40	4100	86	29
1.85	BN 100LB	6	19.0	●	76.6	72.8	62.6	0.73	4.8	4.6	2.1	2.0	95	24	FD 15	40	1700	3600	99	30	FA 15	40	3600	99	31
2.2	BN 112M	6	22	●	78.5	79.0	76.5	0.73	5.5	4.8	2.2	2.0	168	32	FD 06S	60	—	2100	177	42	FA 06S	60	2100	177	44
3	BN 132S	6	30	●	79.7	77.0	75.1	0.76	7.1	5.1	1.9	1.8	216	36	FD 56	75	—	1400	226	49	FA 06	75	1400	226	50
4	BN 132MA	6	40	●	81.4	81.5	79.5	0.77	9.2	5.5	2.0	1.8	295	45	FD 06	100	—	1200	305	58	FA 07	100	1200	318	63
5.5	BN 132MB	6	56	●	83.1	80.9	79.1	0.78	12.2	6.1	2.1	1.9	383	56	FD 07	150	—	1050	406	72	FA 07	150	1050	406	74
7.5	BN 160M	6	75	●	85.0	85.0	84.8	0.81	15.7	5.9	2.2	2.0	740	83	FD 08	170	—	900	815	112	FA 08	170	900	815	113
11	BN 160L	6	109	●	86.4	86.5	85.9	0.81	22.7	6.6	2.5	2.3	970	103	FD 08	200	—	800	1045	133	FA 08	200	800	1045	133
15	BN 180L	6	148	●	87.7	88.0	87.3	0.82	30	6.2	2.0	2.4	1550	130	FD 09	300	—	600	1750	170	—	—	—	—	—
18.5	BN 200LA	6	184	●	88.6	88.0	87.3	0.81	37	5.9	2.0	2.3	1700	145	FD 09	400	—	450	1900	185	—	—	—	—	—





○ = n.a. ● = IE1

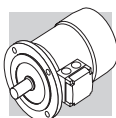











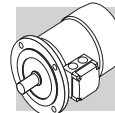
750 min ⁻¹ - S1													50 Hz									
d.c. brake													a.c. brake									
P _n		n min ⁻¹	M _n Nm	η %	cosφ	I _n 400V A	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m x 10 ⁻⁴ kgm ²	IM B5  Kg	FD				FA						
												Mod	Mb Nm	Z _o 1/h NB SB	J _m x 10 ⁻⁴ kgm ²	IM B5  Kg	Mod	Mb Nm	Z _o 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5  Kg	
0.09	BN 71A	8	1.26	47	0.59	0.47	2.3	2.4	2.3	10.9	6.7	FD 03	3.5	9000	16000	12.0	9.4	FA 03	3.5	16000	12.0	9.1
0.12	BN 71B	8	1.69	51	0.59	0.58	2.1	2.3	2.2	12.9	7.7	FD 03	5.0	9000	16000	14.0	10.4	FA 03	5.0	16000	14.0	10.1
0.18	BN 80A	8	2.49	51	0.60	0.85	2.4	2.2	2.2	15	8.2	FD 04	5.0	6500	11000	16.6	12.1	FA 04	5.0	11000	16.6	12.0
0.25	BN 80B	8	3.51	54	0.63	1.06	2.4	2.0	1.9	20	9.9	FD 04	10.0	6000	10000	22	13.8	FA 04	10.0	10000	23	13.7
0.37	BN 90S	8	5.2	58	0.60	1.53	2.6	2.3	2.1	26	12.6	FD 14	15.0	4800	7500	28	16.8	FA 14	15.0	7500	28	16.7
0.55	BN 90L	8	7.8	62	0.60	2.13	2.6	2.2	2.0	33	15	FD 05	26	4000	6400	37	21	FA 05	26	6400	37	22
0.75	BN 100LA	8	10.2	68	0.63	2.53	3.4	1.9	1.7	82	22	FD 15	26	2800	4800	86	28	FA 15	26	4800	86	29
1.1	BN 100LB	8	15.0	68	0.64	3.65	3.2	1.7	1.7	95	24	FD 15	40	2500	4000	99	30	FA 15	40	4000	99	31
1.5	BN 112M	8	20.2	71	0.66	4.6	3.7	1.8	1.9	168	32	FD 06S	60	—	3000	177	42	FA 06S	60	3000	177	44
2.2	BN 132S	8	29.6	75	0.66	6.4	3.8	1.8	2.0	295	45	FD 56	75	—	2300	305	58	FA 06	75	2300	305	56
3	BN 132MA	8	40.4	76	0.69	8.3	3.9	1.6	1.8	370	53	FD 06	100	—	1900	394	69	FA 07	100	1900	406	74




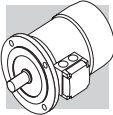
3000/1500 min ⁻¹ - S1																					50 Hz				
2/4P		d.c. brake														a.c. brake									
		FD														FA									
		IM B5 	J _m x 10 ⁻⁴ kgm ²	M _a M _n	M _s M _n	I _s I _n	cosφ	In 400V A	η	M _n	n min ⁻¹		P _n kW	Mod	Mb Nm	Z _o 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm	Z _o 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 		
0.20 0.15	BN 63B 4	2 4	2700 1350	55 49	0.82 0.67	0.64 0.66	3.5 2.6	2.1 1.8	1.9 1.7	2.9	4.4	FD 02	3.5	2200 4000	2600 5100	6.1	FA 02	3.5	2600 5100	3.5	5.9				
0.28 0.20	BN 71A 4	2 4	2700 1370	56 59	0.82 0.72	0.88 0.68	2.9 3.1	1.9 1.8	1.7 1.7	4.7	4.4	FD 03	3.5	2100 3800	2400 4800	7.1	FA 03	3.5	2400 4800	5.8	6.8				
0.37 0.25	BN 71B 4	2 4	2740 1390	56 60	0.82 0.73	1.16 0.82	3.5 3.3	1.8 2.0	1.8 1.9	5.8	5.1	FD 03	5.0	1400 2900	2100 4200	7.8	FA 03	5.0	2100 4200	6.9	7.5				
0.45 0.30	BN 71C 4	2 4	2780 1400	63 63	0.85 0.73	1.21 0.94	3.8 3.6	1.8 2.0	1.8 1.9	6.9	5.9	FD 03	5.0	1400 2900	2100 4200	8.6	FA 03	5.0	2100 4200	8.0	8.3				
0.55 0.37	BN 80A 4	2 4	2800 1400	63 67	0.85 0.79	1.48 1.01	3.9 4.1	1.7 1.8	1.7 1.9	15	8.2	FD 04	5.0	1600 3000	2300 4000	12.1	FA 04	5.0	2300 4000	16.6	12.0				
0.75 0.55	BN 80B 4	2 4	2780 1400	65 68	0.85 0.81	1.96 1.44	3.8 3.9	1.9 1.7	1.8 1.7	20	9.9	FD 04	10	1400 2700	1600 3600	13.8	FA 04	10	1600 3600	22	13.7				
1.1 0.75	BN 90S 4	2 4	2790 1390	71 66	0.82 0.79	2.73 2.08	4.7 4.6	2.3 2.4	2.0 2.2	21	12.2	FD 14	10	1500 2300	1600 2800	16.4	FA 14	10	1600 2800	23	16.3				
1.5 1.1	BN 90L 4	2 4	2780 1390	70 73	0.85 0.81	3.64 2.69	4.5 4.7	2.4 2.5	2.1 2.2	28	14.0	FD 05	26	1050 1600	1200 2000	20	FA 05	26	1200 2000	32	21				
2.2 1.5	BN 100LA 4	2 4	2800 1410	72 73	0.85 0.79	5.2 3.8	4.5 4.7	2.0 2.0	1.9 2.0	40	18.3	FD 15	26	600 1300	900 2300	25	FA 15	26	900 2300	44	25				
3.5 2.5	BN 100LB 4	2 4	2850 1420	80 82	0.84 0.80	7.5 5.5	5.4 5.2	2.2 2.2	2.1 2.2	61	25	FD 15	40	500 1000	900 2100	31	FA 15	40	900 2100	65	32				
4 3.3	BN 112M 4	2 4	2880 1420	79 80	0.83 0.80	8.8 7.4	6.1 5.1	2.4 2.1	2.0 2.0	98	30	FD 06S	60	— —	700 1200	40	FA 06S	60	700 1200	107	42				
5.5 4.4	BN 132S 4	2 4	2890 1440	80 82	0.87 0.84	11.4 9.2	5.9 5.3	2.4 2.2	2.0 2.0	213	44	FD 56	75	— —	350 900	57	FA 06	75	350 900	223	58				
7.5 6	BN 132MA 4	2 4	2900 1430	82 84	0.87 0.85	15.2 12.1	6.5 5.8	2.4 2.3	2.0 2.1	270	53	FD 06	100	— —	350 900	66	FA 07	100	350 900	293	71				
9.2 7.3	BN 132MB 4	2 4	2920 1440	83 85	0.86 0.85	18.6 14.6	6.0 5.5	2.6 2.3	2.2 2.1	319	59	FD 07	150	— —	300 800	75	FA 07	150	300 800	342	77				







2/6P													3000/1000 min ⁻¹ - S3 60/40%													50 Hz				
													d.c. brake													a.c. brake				
													FD													FA				
P _n		n	M _n	η	cosφ	I _n 400V	Is In	Ms Mn	Ma Mn	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb	Z _o 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb	Z _o 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 									
kW		min ⁻¹	Nm	%		A							Nm					Nm												
0.25	BN 71A	2	0.84	60	0.82	0.73	4.3	1.9	1.8	6.9	5.9	FD 03	1.75	1500	8.0	8.6	FA 03	2.5	1700	8.0	8.3									
0.08	6	910	0.84	43	0.70	0.38	2.1	1.4	1.5					10000					13000											
0.37	BN 71B	2	1.23	62	0.80	1.08	4.4	1.9	1.8	9.1	7.3	FD 03	3.5	1000	10.2	10.0	FA 03	3.5	1300	10.2	9.7									
0.12	6	900	1.27	44	0.73	0.54	2.4	1.4	1.5					9000					11000											
0.55	BN 80A	2	1.88	63	0.86	1.47	4.5	1.9	1.7	20	9.9	FD 04	5.0	1500	22	13.8	FA 04	5.0	1800	22	13.7									
0.18	6	930	1.85	52	0.65	0.77	3.3	2.0	1.9					4100					6300											
0.75	BN 80B	2	2.6	66	0.87	1.89	4.3	1.8	1.6	25	11.3	FD 04	5.0	1700	27	15.2	FA 04	5.0	1900	27	15.1									
0.25	6	930	2.6	54	0.67	1.00	3.2	1.7	1.8					3800					6000											
1.10	BN 90L	2	3.7	67	0.84	2.82	4.7	2.1	1.9	28	14.0	FD 05	13	1400	32	20	FA 05	13	1600	32	21									
0.37	6	920	3.8	59	0.71	1.27	3.3	1.6	1.6					3400					5200											
1.5	BN 100LA	2	5	73	0.84	3.53	5.1	1.9	2.0	40	18.3	FD 15	13	1000	44	24	FA 15	13	1200	44	25									
0.55	6	940	5.6	64	0.67	1.85	3.5	1.7	1.8					2900					4000											
2.2	BN 100LB	2	7.2	77	0.85	4.9	5.9	2.0	2.0	61	25	FD 15	26	700	65	31	FA 15	26	900	65	32									
0.75	6	950	7.5	67	0.64	2.5	3.3	1.9	1.8					2100					3000											
3	BN 112M	2	9.9	78	0.87	6.4	6.3	2.0	2.1	98	30	FD 06S	40	—	107	40	FA 06S	40	1000	107	32									
1.1	6	950	11.1	72	0.64	3.4	3.9	1.8	1.8					—					2600											
4.5	BN 132S	2	14.8	78	0.84	9.9	5.8	1.9	1.8	213	44	FD 56	37	—	223	57	FA 06	37	500	223	58									
1.5	6	960	14.9	74	0.67	4.4	4.2	1.9	2.0					—					2100											
5.5	BN 132M	2	18.0	78	0.87	11.7	6.2	2.1	1.9	270	53	FD 56	50	—	280	66	FA 06	50	400	280	67									
2.2	6	960	22	77	0.71	5.8	4.3	2.1	2.0					—					1900											

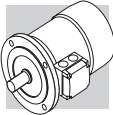






2/8P															3000/750 min ⁻¹ - S3 60/40%										50 Hz				
															d.c. brake										a.c. brake				
															FD										FA				
P _n					n	M _n	η	cos φ	In	Is	Ms	Ma	J _m	IM B5	Mod	Mb	Z ₀	J _m	IM B5	Mod	Mb	Z ₀	J _m	IM B5	Mod	Mb	Z ₀	J _m	IM B5
kW					min ⁻¹	Nm	%		A			Mn	kgm ²	kg		Nm	1/h	kgm ²	kg		Nm	1/h	kgm ²	kg		Nm	1/h	kgm ²	kg
0.25	BN 71A				2	2790	0.86	0.87	0.68	3.9	1.8	1.9	10.9	6.7	FD 03	1.75	1300	12	9.4	FA 03	2.5	1400	12	9.1					
0.06					8	680	0.84	0.61	0.46	2.0	1.8	1.9					10000					13000							
0.37	BN 71B				2	2800	1.26	0.86	0.99	3.9	1.8	1.9	12.9	7.7	FD 03	3.5	1200	14	10.4	FA 03	3.5	1300	14	10.1					
0.09					8	670	1.28	0.75	0.51	1.8	1.4	1.5					9500					13000							
0.55	BN 80A				2	2830	1.86	0.86	1.40	4.4	2.1	2.0	20	9.9	FD 04	5.0	1500	22	13.8	FA 04	5.0	1800	22	13.7					
0.13					8	690	1.80	0.64	0.72	2.3	1.6	1.7					5600					8000							
0.75	BN 80B				2	2800	2.6	0.88	1.81	4.6	2.1	2.0	25	11.3	FD 04	10	1700	27	15.2	FA 04	10	1900	27	15.1					
0.18					8	690	2.5	0.66	0.92	2.3	1.6	1.7					4800					7300							
1.10	BN 90L				2	2830	3.7	0.84	3.00	4.5	2.1	1.9	28	14.0	FD 05	13	1400	32	20	FA 05	13	1600	32	21					
0.28					8	690	3.9	0.63	1.34	2.4	1.8	1.9					3400					5100							
1.5	BN 100LA				2	2880	5.0	0.85	3.69	4.7	1.9	1.8	40	18.3	FD 15	13	1000	44	25	FA 15	13	1200	44	25					
0.37					8	690	5.1	0.63	1.84	2.1	1.6	1.6					3300					5000							
2.4	BN 100LB				2	2900	7.9	0.82	5.6	5.4	2.1	2.0	61	25	FD 15	26	550	65	31	FA 15	26	700	65	32					
0.55					8	700	7.5	0.58	2.5	2.6	1.8	1.8					2000					3500							
3	BN 112M				2	2900	9.9	0.87	6.5	6.3	2.1	1.9	98	30	FD 06S	40	—	107	40	FA 06S	40	900	107	42					
0.75					8	690	10.4	0.65	2.8	2.5	1.6	1.6					—					2900							
4	BN 132S				2	2870	13.3	0.84	9.4	5.6	2.3	2.4	213	44	FD 66	37	—	223	57	FA 06	37	500	223	58					
1					8	690	13.8	0.62	3.5	2.9	1.9	1.8					—					3500							
5.5	BN 132M				2	2870	18.3	0.84	12.6	6.1	2.4	2.5	270	53	FD 06	50	—	280	66	FA 06	50	400	280	67					
1.5					8	690	21	0.63	5.1	2.9	1.9	1.9					—					2400							

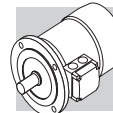









3000/500 min ⁻¹ - S3 60/40%													50 Hz									
d.c. brake													a.c. brake									
													FD						FA			
P _n kW		n min ⁻¹	M _n Nm	η %	cosφ	I _n 400V A	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mlb Nm	Z _o 1/h NB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mlb Nm	Z _o 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	
0.55 0.09	BN 80B 12	2820 430	1.86 2.0	64 30	0.89 0.63	1.39 0.69	4.2 1.8	1.6 1.9	1.7 1.8	25	11.3	FD 04	5.0	1000 8000	1300 12000	27	15.2	FA 04	5.0	1300 12000	27	15.1
0.75 0.12	BN 90L 12	2790 430	2.6 2.7	56 26	0.89 0.63	2.17 1.06	4.2 1.7	1.8 1.4	1.7 1.6	26	12.6	FD 05	13	1000 4600	1150 6300	30	18.6	FA 05	13	1150 6300	30	19.3
1.10 0.18	BN 100LA 12	2850 430	3.7 4.0	65 26	0.85 0.54	2.87 1.85	4.5 1.5	1.6 1.3	1.8 1.5	40	18.3	FD 15	13	700 4000	900 6000	44	25	FA 15	13	900 6000	44	25
1.5 0.25	BN 100LB 12	2900 440	4.9 5.4	67 36	0.86 0.46	3.76 2.18	5.6 1.8	1.9 1.7	1.9 1.8	54	22	FD 15	13	700 3800	900 5000	58	28	FA 15	13	900 5000	58	29
2 0.3	BN 112M 12	2900 460	6.6 6.2	74 46	0.88 0.43	4.43 2.19	6.5 2.0	2.1 2.1	2.0 2.0	98	30	FD 06S	20	— —	800 3400	107	40	FA 06S	20	800 3400	107	42
3 0.5	BN 132S 12	2920 470	9.8 10.2	74 51	0.87 0.43	6.7 3.3	6.8 2.0	2.3 1.7	1.9 1.6	213	44	FD 56	37	— —	450 3000	223	57	FA 06	37	450 3000	223	58
4 0.7	BN 132M 12	2920 460	13.1 14.5	75 53	0.89 0.44	8.6 4.3	5.9 1.9	2.4 1.7	2.3 1.6	270	53	FD 56	37	— —	400 2800	280	66	FA 06	37	400 2800	280	67

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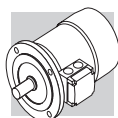






4/8P															1500/750 min ⁻¹ - S1															50 Hz														
d.c. brake																									a.c. brake																			
FD																									FA																			
P _n		n	M _n	η	cosφ	In	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb	Z _o 1/h	NB	SB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb	Z _o 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 																					
0.37	BN 80A	4	2.5	63	0.82	1.03	3.3	1.4	1.4	15	8.2	FD 04	10	2300	3500		16.6	12.1	FA 04	10	3500	16.6	12.0																					
0.18		8	2.5	44	0.60	0.98	2.2	1.5	1.6					4500	7000																													
0.55	BN 80B	4	3.8	65	0.86	1.42	3.8	1.7	1.6	20	9.9	FD 04	10	2200	2900		22	13.8	FA 04	10	2900	22	13.7																					
0.30		8	4.3	49	0.65	1.36	2.3	1.7	1.8					4200	6500																													
0.65	BN 90S	4	4.5	73	0.85	1.51	4.0	1.9	1.9	28	13.6	FD 14	15	2300	2800		30	17.8	FA 14	15	2800	30	17.7																					
0.35		8	4.8	49	0.57	1.81	2.5	2.1	2.2					3500	6000																													
0.9	BN 90L	4	6.3	73	0.87	2.05	3.8	1.8	1.8	30	15.1	FD 05	26	1700	2100		34	21	FA 05	26	2100	34	22																					
0.5		8	7.1	57	0.62	2.04	2.4	2.1	2.0					2500	4200																													
1.30	BN 100LA	4	8.7	72	0.83	3.14	4.3	1.7	1.8	82	22	FD 15	40	1300	1700		86	28	FA 15	40	1700	86	29																					
0.70		8	9.6	58	0.64	2.72	2.8	1.8	1.8					2000	3400																													
1.8	BN 100LB	4	12.1	69	0.87	4.3	4.2	1.6	1.7	95	25	FD 15	40	1200	1700		99	31	FA 15	40	1700	99	32																					
0.9		8	12.3	62	0.63	3.3	3.2	1.7	1.8					1600	2600																													
2.2	BN 112M	4	14.6	77	0.85	4.9	5.3	1.8	1.8	168	32	FD 06S	60	—	1200		177	42	FA 06S	60	1200	177	43																					
1.2		8	16.1	70	0.63	3.9	3.3	1.9	1.8					—	2000																													
3.6	BN 132S	4	24	80	0.82	7.9	6.5	2.1	1.9	295	45	FD 56	75	—	1000		305	58	FA 06	75	1000	305	59																					
1.8		8	24	72	0.55	6.6	4.6	1.9	2.0					—	1400																													
4.6	BN 132M	4	30	81	0.83	9.9	6.5	2.2	1.9	383	56	FD 06	100	—	1000		393	69	FA 07	100	1000	406	74																					
2.3		8	31	73	0.54	8.4	4.4	2.3	2.0					—	1300																													



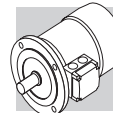
2P														3000 min ⁻¹ - S1														50 Hz													
														d.c. brake														a.c. brake													
														FD														FA													
														P _n		n	M _n	IE1	η (100%)	η (75%)	η (50%)	cosφ	I _n 400V	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb	Z _o 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb	Z _o 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 			
kW		min ⁻¹	Nm		%	%	%		A					kgm ²			Nm	NB	SB	kgm ²			Nm	1/h	kgm ²																
0.18	M 05A	2	0.63	○	59.9	56.9	51.9	0.77	0.56	3.0	2.1	2.0	2.0	3.2	FD 02	1.75	3900	4800	2.6	4.9	FA 02	1.75	4800	2.6	4.7																
0.25	M 05B	2	0.87	○	66.0	64.8	64.8	0.76	0.72	3.3	2.3	2.3	2.3	3.6	FD 02	1.75	3900	4800	3.0	5.3	FA 02	1.75	4800	3.0	5.1																
0.37	M 05C	2	1.26	○	69.1	66.8	66.8	0.78	0.99	3.9	2.6	2.6	3.3	4.8	FD 02	3.5	3600	4500	3.9	6.5	FA 02	3.5	4500	3.9	6.3																
0.55	M 1SD	2	1.86	○	76.0	75.8	74.8	0.76	1.37	5.0	2.9	2.8	4.1	5.8	FD 03	5	2900	4200	5.3	8.5	FA 03	5	4200	5.3	8.2																
0.75	M 1LA	2	2.6	○	76.6	76.2	76.2	0.76	1.86	5.1	3.1	2.8	5.0	6.9	FD 03	5	1900	3300	6.1	9.6	FA 03	5	3300	6.1	9.3																
1.1	M 2SA	2	3.8	●	76.4	76.2	75.0	0.81	2.57	4.8	2.8	2.4	9.0	8.8	FD 04	10	1500	3000	10.6	11.9	FA 04	10	3000	10.6	12.6																
1.5	M 2SB	2	5.1	●	79.1	79.5	77.2	0.81	3.4	4.9	2.7	2.4	11.4	10.6	FD 04	15	1300	2600	13.0	9.9	FA 04	15	2600	13.0	14.4																
2.2	M 3SA	2	7.3	●	82.7	82.1	81.0	0.80	4.8	6.3	2.9	2.7	24	15.5	FD 15	26	1100	2400	28	22	FA 15	26	2400	28	23																
3	M 3LA	2	10.0	●	81.5	81.3	77.4	0.79	6.7	5.6	2.6	2.2	31	18.7	FD 15	26	700	1600	35	25	FA 15	26	1600	35	26																
4	M 3LB	2	13.3	●	83.1	83.0	77.8	0.80	8.7	5.8	2.7	2.5	39	22	FD 15	40	450	900	43	28	FA 15	40	900	43	29																
5.5	M 4SA	2	18.2	●	84.7	84.5	81.2	0.84	11.2	5.9	2.6	2.2	101	33	FD 06	50	—	600	112	46	FA 06	50	600	112	47																
7.5	M 4SB	2	25	●	86.5	86.3	84.4	0.85	14.7	6.4	2.6	2.2	145	40	FD 06	50	—	550	154	53	FA 06	50	550	154	54																
9.2	M 4LA	2	30	●	87.0	86.5	83.6	0.86	17.7	6.7	2.8	2.3	178	51	FD 56	75	—	430	189	64	FA 06	75	430	189	65																
11	M 4LC	2	36	●	87.6	87.0	86.0	0.88	20.6	6.9	2.9	2.5	210	60																											
15	M 5SB	2	49	●	89.6	89.4	88.0	0.86	28.1	7.1	2.6	2.3	340	70																											
18.5	M 5SC	2	60	●	90.4	90.1	89.0	0.86	34	7.6	2.7	2.3	420	83																											
22	M 5LA	2	72	●	89.9	89.7	89.5	0.88	40	7.8	2.6	2.4	490	95																											




○ = n.a. ● = IE1



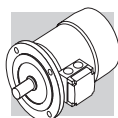
4P																1500 min ⁻¹ - S1										50 Hz				
																d.c. brake										a.c. brake				
																FD										FA				
P _n		n	M _n	IE1	η (100%)	η (75%)	η (50%)	cosφ	I _n 400V	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb	Z ₀ 1/h SB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 						
0.09	M 0B	4	0.64	○	51.7	47.6	42.9	0.60	0.42	2.6	2.5	2.4	1.5	2.9			1.75	10000	13000	2.6	4.9	FA 02	1.75	13000	2.6	4.7				
0.12	M 05A	4	0.85	○	59.8	56.2	47.0	0.62	0.47	2.6	1.9	1.8	2.0	3.2	FD 02		3.5	10000	13000	3.0	5.3	FA 02	3.5	13000	3.0	5.1				
0.18	M 05B	4	1.30	○	54.8	52.9	52.5	0.67	0.71	2.6	2.2	2.0	2.3	3.6	FD 02		3.5	7800	10000	3.9	6.5	FA 02	3.5	10000	3.9	6.3				
0.25	M 05C	4	1.78	○	65.3	65.0	57.9	0.69	0.80	2.7	2.1	1.9	3.3	4.8	FD 02		5	6000	9400	8.0	8.2	FA 03	5	9400	8.0	7.9				
0.37	M 1SD	4	2.6	○	66.8	66.7	63.0	0.76	1.05	3.7	2.0	1.9	6.9	5.5	FD 03		7.5	4300	8700	10.2	9.6	FA 03	7.5	8700	10.2	9.3				
0.55	M 1LA	4	3.8	○	69.0	68.9	68.8	0.74	1.55	4.1	2.3	2.3	9.1	6.9	FD 53		15	2600	5300	27	14.5	FA 04	15	5300	27	14.4				
0.75	M 2SA	4	5.1	●	75.0	74.5	69.3	0.78	1.85	4.9	2.7	2.5	20	9.2	FD 04		26	2800	4900	38	22	FA 15	26	4900	38	23				
1.1	M 2SB	4	7.5	●	76.4	76.2	70.4	0.78	2.66	5.1	2.8	2.5	25	10.6	FD 04		40	2600	4700	44	24	FA 15	40	4700	44	24				
1.5	M 3SA	4	10.2	●	79.6	80.5	79.3	0.77	3.5	4.6	2.1	2.1	34	15.5	FD 15		40	2400	4400	58	27	FA 15	40	4400	58	28				
2.2	M 3LA	4	14.9	●	81.1	81.4	79.9	0.75	5.2	4.5	2.2	2.0	40	17	FD 15		55	—	1300	65	29	FA 15	40	1300	65	30				
3	M 3LB	4	20	●	82.6	83.8	83.7	0.77	6.8	5.0	2.3	2.2	54	21	FD 15		75	—	1050	223	55	FA 06	75	1050	223	56				
4	M 3LC	4	27	○	82.7	83.1	80.5	0.78	9.0	4.7	2.3	2.2	61	23	FD 55		100	—	950	280	64	FA 07	100	950	280	65				
5.5	M 4SA	4	36	●	84.7	84.8	82.5	0.81	11.6	5.5	2.3	2.2	213	42	FD 56		150	—	900	342	73	FA 07	150	900	342	75				
7.5	M 4LA	4	50	●	86.0	86.3	85.3	0.81	15.5	5.7	2.5	2.4	270	51	FD 06		150	—	850	382	81	FA 07	150	850	382	83				
9.2	M 4LB	4	61	●	88.4	88.6	87.5	0.81	18.8	5.9	2.7	2.5	319	57	FD 07		200	—	750	725	115	FA 08	200	750	725	114				
11	M 4LC	4	73	●	87.6	87.8	86.0	0.81	22.4	6.0	2.7	2.5	360	65	FD 07		250	—	700	865	131	FA 08	250	700	865	130				
15	M 5SB	4	98	●	88.7	88.5	88.4	0.81	30.1	6.0	2.3	2.1	650	85	FD 08															
18.5	M 5LA	4	121	●	89.3	89.5	89.2	0.81	37	6.2	2.6	2.5	790	101	FD 08															





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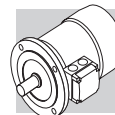






6P														1000 min ⁻¹ - S1														50 Hz													
														d.c. brake														a.c. brake													
														FD														FA													
														P _n		n	M _n	IE1	η (100%)	η (75%)	η (50%)	cosφ	I _n 400V	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 			
0.09	M 05A	6	0.98	○	41.0	41.0	32.9	0.53	0.60	2.1	2.1	1.8	3.4	4.3	FD 02	3.5	9000	14000	4.0	6.0	FA 02	3.5	14000	4.0	5.8																
0.12	M 05B	6	1.32	○	45.0	44.0	41.8	0.60	0.64	2.1	1.9	1.7	3.7	4.6	FD 02	3.5	9000	14000	4.3	6.3	FA 02	3.5	14000	4.3	6.1																
0.18	M 15C	6	1.91	○	55.0	55.5	51.0	0.69	0.68	2.6	1.9	1.7	8.4	5.1	FD 03	5	8100	13500	9.5	7.8	FA 03	5	13500	9.5	7.5																
0.25	M 15D	6	2.7	○	62.0	58.5	51.4	0.71	0.82	2.6	1.9	1.7	10.9	6.3	FD 03	5	7800	13000	12	9.0	FA 03	5	13000	12	8.7																
0.37	M 1LA	6	3.9	○	66.0	60.0	53.3	0.69	1.17	3.0	2.4	2.0	12.9	7.3	FD 53	7.5	5100	9500	14	10.0	FA 03	7.5	9500	14	9.7																
0.55	M 25A	6	5.7	○	70.0	69.8	64.3	0.68	1.67	3.9	2.6	2.2	25	10.6	FD 04	15	4800	7200	27	14.5	FA 04	15	7200	27	14.4																
0.75	M 25B	6	7.8	●	70.0	70.0	64.4	0.65	2.38	3.8	2.5	2.2	28	11.5	FD 04	15	3400	6400	30	15.4	FA 04	15	6400	30	15.3																
1.1	M 35A	6	11.4	●	75.0	74.0	72.0	0.72	2.9	4.3	2.0	1.8	33	17	FD 15	26	2700	5000	37	23	FA 15	26	5000	37	24																
1.5	M 3LA	6	15.2	●	75.2	74.2	70.3	0.72	4.0	4.1	2.1	2.0	82	21	FD 15	40	1900	4100	86	27	FA 15	40	4100	86	28																
1.85	M 3LB	6	19.0	●	76.6	72.8	62.6	0.73	4.8	4.6	2.1	2.0	95	23	FD 15	40	1700	3600	99	29	FA 15	40	3600	99	30																
2.2	M 3LC	6	23	●	77.7	76.8	72.4	0.71	5.8	4.7	2.3	2.1	95	23	FD 55	55	—	1900	99	29	FA 15	40	1900	99	30																
3	M 45A	6	30	●	79.7	77.0	75.1	0.76	7.1	5.1	1.9	1.8	216	34	FD 56	75	—	1400	226	47	FA 06	75	1400	226	48																
4	M 4LA	6	40	●	81.4	81.5	79.5	0.77	9.2	5.5	2.0	1.8	295	43	FD 06	100	—	1200	305	56	FA 07	100	1200	305	57																
5.5	M 4LB	6	56	●	83.1	80.9	79.1	0.78	12.2	6.1	2.1	1.9	383	54	FD 07	150	—	1050	406	70	FA 07	150	1050	406	72																
7.5	M 55A	6	75	●	85.0	85.0	84.8	0.81	15.7	5.9	2.2	2.0	740	69	FD 08	170	—	900	815	98	FA 08	170	900	800	98																
11	M 55B	6	109	●	86.4	86.5	85.9	0.81	22.7	6.6	2.5	2.3	970	89	FD 08	200	—	800	1045	119	FA 08	200	800	1030	118																

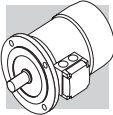
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





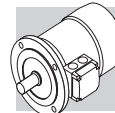
2/4P															3000/1500 min ⁻¹ - S1															50 Hz														
															d.c. brake										a.c. brake																			
															FD										FA																			
P _n		n	M _n	η	cosφ	In	Is	Ms	Ma	J _m	IM B5	Mod	Mb	Z ₀	J _m	IM B5	Mod	Mb	Z ₀	J _m	IM B5																							
kW		min ⁻¹	Nm	%		A		Mn	Mn	x 10 ⁻⁴ kgm ²			Nm	1/h	x 10 ⁻⁴ kgm ²			Nm	1/h	x 10 ⁻⁴ kgm ²																								
0.20	M 05A	2	2700	0.71	55	0.82	0.64	3.5	2.1	1.9	4.1	2.9	3.5	2200	2600	3.5	5.8	FA 02	3.5	2600	3.5	5.6																						
0.15		4	1350	1.06	49	0.67	0.66	2.6	1.8	1.7				4000	5100				5100																									
0.28	M 1SB	2	2700	0.99	56	0.82	0.88	2.9	1.9	1.7	4.0	4.7	3.5	2100	2400	5.8	6.7	FA 03	3.5	2400	5.8	6.4																						
0.20		4	1370	1.39	59	0.68	1.02	3.1	1.8	1.7				3800	4800				4800																									
0.37	M 1SC	2	2740	1.29	56	0.82	1.16	3.5	1.8	1.8	4.7	5.8	5	1400	2100	6.9	7.4	FA 03	5	2100	6.9	7.1																						
0.25		4	1390	1.72	60	0.73	0.82	3.3	2.0	1.9				2900	4200				4200																									
0.45	M 1SD	2	2780	1.55	63	0.85	1.21	3.8	1.8	1.8	5.5	6.9	5	1400	2100	8.0	8.2	FA 03	5	2100	8.0	7.9																						
0.30		4	1400	2.0	63	0.74	0.93	3.8	2.1	1.9				2900	4200				4200																									
0.55	M 1LA	2	2800	1.9	73	0.79	1.38	4.2	2.0	1.8	6.9	9.1	5	1600	2200	10.2	9.6	FA 03	5	2200	10.2	9.3																						
0.37		4	1400	2.5	68	0.72	1.09	3.9	2.2	2.0				3300	4600				4600																									
0.75	M 2SA	2	2780	2.6	65	0.85	1.96	3.8	1.9	1.8	9.2	20	10	1400	1600	22	13.1	FA 04	10	1600	22	13.0																						
0.55		4	1400	3.8	68	0.81	1.44	3.9	1.7	1.7				2700	3600				3600																									
1.1	M 2SB	2	2730	3.9	65	0.86	2.84	3.9	2.0	1.9	10.7	25	10	1200	1500	27	14.5	FA 04	10	1500	27	14.5																						
0.75		4	1410	5.1	75	0.81	1.78	4.5	2.1	2.0				2300	3100				3100																									
1.5	M 3SA	2	2830	5.1	74	0.83	3.5	4.7	2.1	2.0	15.5	34	26	700	1000	38	22	FA 15	26	1000	38	23																						
1.1		4	1420	7.4	77	0.78	2.6	4.3	2.1	2.0				1600	2600				2600																									
2.2	M 3LA	2	2800	7.5	72	0.85	5.2	4.5	2.0	1.9	17	40	26	600	900	44	24	FA 15	26	900	44	24																						
1.5		4	1410	10.2	73	0.79	3.8	4.7	2.0	2.0				1300	2300				2300																									
3.5	M 3LB	2	2850	11.7	80	0.84	7.5	5.4	2.2	2.1	23	61	40	500	900	65	29	FA 15	40	900	65	30																						
2.5		4	1420	16.8	82	0.80	5.5	5.2	2.2	2.2				1000	2100				2100																									
4.8	M 4 SA	2	2900	15.8	81	0.88	9.7	6.0	2.0	1.9	42	213	50	—	400	233	55	FA 06	50	400	233	56																						
3.8		4	1430	25.4	81	0.84	8.1	5.2	2.1	2.1				—	950				950																									
5.5	M 4SB	2	2890	18.2	80	0.87	11.4	5.9	2.4	2.0	42	213	75	—	350	223	55	FA 06	75	350	223	56																						
4.4		4	1440	29	82	0.84	9.2	5.3	2.2	2.0				—	900				900																									
7.5	M 4LA	2	2900	25	82	0.87	15.2	6.5	2.4	2.0	51	270	100	—	350	280	64	FA 07	100	350	280	65																						
6		4	1430	40	84	0.85	12.1	5.8	2.3	2.1				—	950				950																									
9.2	M 4LB	2	2920	30	83	0.86	18.6	6.0	2.6	2.2	57	319	150	—	300	342	73	FA 07	150	300	342	75																						
7.3		4	1440	48	85	0.85	14.6	5.5	2.3	2.1				—	800				800																									






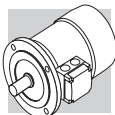
2/6P															3000/1000 min ⁻¹ - S3 60/40%															50 Hz				
															d.c. brake										a.c. brake									
															FD										FA									
P _n		n	M _n	η	cosφ	I _n 400V	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5  Kg	Mod	Mb	Z ₀ 1/h	NB	SB	J _m x 10 ⁻⁴ kgm ²	IM B5  Kg	Mod	Mb	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5  Kg											
0.25	M 1SA	2	2850	60	0.82	0.73	4.3	1.9	1.8	6.9	5.5	FD 03	1.75	1500	1700		8.0	8.2	FA 03	1.75	1700		8.0	7.9										
0.08		6	910	43	0.70	0.38	2.1	1.4	1.5					10000	13000						13000													
0.37	M 1LA	2	2880	62	0.80	1.08	4.4	1.9	1.8	9.1	6.9	FD 03	3.5	1000	1300		10.2	9.6	FA 03	3.5	1300		10.2	9.3										
0.12		6	900	44	0.73	0.54	2.4	1.4	1.5					9000	11000						11000													
0.55	M 2SA	2	2800	63	0.86	1.47	4.5	1.9	1.7	20	9.2	FD 04	5	1500	1800		22	13.1	FA 04	5	1800		22	13.0										
0.18		6	930	52	0.65	0.77	3.3	2.0	1.9					4100	6300						6300													
0.75	M 2SB	2	2800	66	0.87	1.89	4.3	1.8	1.6	25	10.6	FD 04	5	1700	1900		27	14.5	FA 04	5	1900		27	14.4										
0.25		6	930	54	0.67	1.00	3.2	1.7	1.8					3800	6000						6000													
1.1	M 3SA	2	2870	71	0.82	2.73	4.9	1.8	1.9	34	15.5	FD 15	13	1000	1300		38	22	FA 15	13	1300		38	23										
0.37		6	930	63	0.70	1.21	3.1	1.5	1.8					3500	5000						5000													
1.5	M 3LA	2	2880	73	0.84	3.53	5.1	1.9	2.0	40	17	FD 15	13	1000	1200		44	24	FA 15	13	1200		44	24										
0.55		6	940	64	0.67	1.85	3.5	1.7	1.8					2900	4000						4000													
2.2	M 3LB	2	2900	77	0.85	4.9	5.9	2.0	2.0	61	23	FD 15	26	700	900		65	29	FA 15	26	900		65	30										
0.75		6	950	67	0.64	2.5	3.3	1.9	1.8					2100	3000						3000													
3	M 4SA	2	2910	74	0.88	6.6	5.6	2.0	2.1	170	36	FD 56	37	—	600		182	48	FA 06	37	600		182	50										
1.1		6	960	73	0.68	3.2	4.5	2.2	2.0					—	2200						2200													
4.5	M 4SB	2	2910	78	0.84	9.9	5.8	1.9	1.8	213	42	FD 56	37	—	500		223	55	FA 06	37	500		223	56										
1.5		6	960	74	0.67	4.4	4.2	1.9	2.0					—	2100						2100													
5.5	M 4LA	2	2920	78	0.87	11.7	6.2	2.1	1.9	270	51	FD 06	50	—	400		280	64	FA 06	50	400		280	65										
2.2		6	960	77	0.71	5.8	4.3	2.1	2.0					—	1900						1900													



2/8P														3000/750 min ⁻¹ – S3 60/40%														50 Hz																							
d.c. brake																										a.c. brake																									
FD													FA																																						
P _n		n	M _n	η	cosφ	I _n	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m	IM B5	Mod	M _b	Z _o	J _m	IM B5	Mod	M _b	Z _o	J _m	IM B5	Mod	M _b	Z _o	J _m	IM B5																									
kW		min ⁻¹	Nm	%		A				kgm ²			Nm	NB	SB	kgm ²			Nm	1/h	kgm ²			Nm	1/h	kgm ²																									
0.37	M 1LA	2	1.26	63	0.86	0.99	3.9	1.8	1.9	12.9	7.3	FD 03	3.5	1200	1300	14	10.0	FA 03	3.5	1300	14	9.7																													
0.09		8	1.28	34	0.75	0.51	1.8	1.4	1.5					9500	13000					13000																															
0.55	M 2SA	2	1.86	66	0.86	1.40	4.4	2.1	2.0	20	9.2	FD 04	5	1500	1800	22	13.1	FA 04	5	1800	22	13.0																													
0.13		8	1.80	41	0.64	0.72	2.3	1.6	1.7					5600	8000					8000																															
0.75	M 2SB	2	2.6	68	0.88	1.81	4.6	2.1	2.0	25	10.6	FD 04	10	1700	1900	27	14.5	FA 04	10	1900	27	14.4																													
0.18		8	2.5	43	0.66	0.92	2.3	1.6	1.7					4800	7300					7300																															
1.1	M 3SA	2	3.7	69	0.84	2.74	4.6	1.8	1.7	34	15.5	FD 15	13	1000	1300	38	22	FA 15	13	1300	38	23																													
0.28		8	3.9	44	0.56	1.64	2.3	1.4	1.7					3400	5000					5000																															
1.5	M 3LA	2	5.0	69	0.85	3.69	4.7	1.9	1.8	40	17	FD 15	13	1000	1200	44	24	FA 15	13	1200	44	24																													
0.37		8	5.1	46	0.63	1.84	2.1	1.6	1.6					3300	5000					5000																															
2.4	M 3LB	2	7.9	75	0.82	5.6	5.4	2.1	2.0	61	23	FD 15	26	550	700	65	29	FA 15	26	700	65	30																													
0.55		8	7.5	54	0.58	2.5	2.6	1.8	1.8					2000	3500					3500																															
3	M 4SA	2	9.8	72	0.85	7.1	5.6	2.0	1.8	162	36	FD 56	37	—	600	182	48	FA 06	37	600	182	50																													
0.75		8	10.1	61	0.64	2.8	3.0	1.7	1.8					—	3400					3400																															
4	M 4SB	2	13.3	73	0.84	9.4	5.6	2.3	2.4	213	42	FD 56	37	—	500	223	55	FA 06	37	500	223	56																													
1		8	13.8	66	0.62	3.5	2.9	1.9	1.8					—	3500					3500																															
5.5	M 4LA	2	18.3	75	0.84	12.6	6.1	2.4	2.5	270	51	FD 06	50	—	400	280	64	FA 06	50	400	280	65																													
1.5		8	21	68	0.63	5.1	2.9	1.9	1.9					—	2400					2400																															

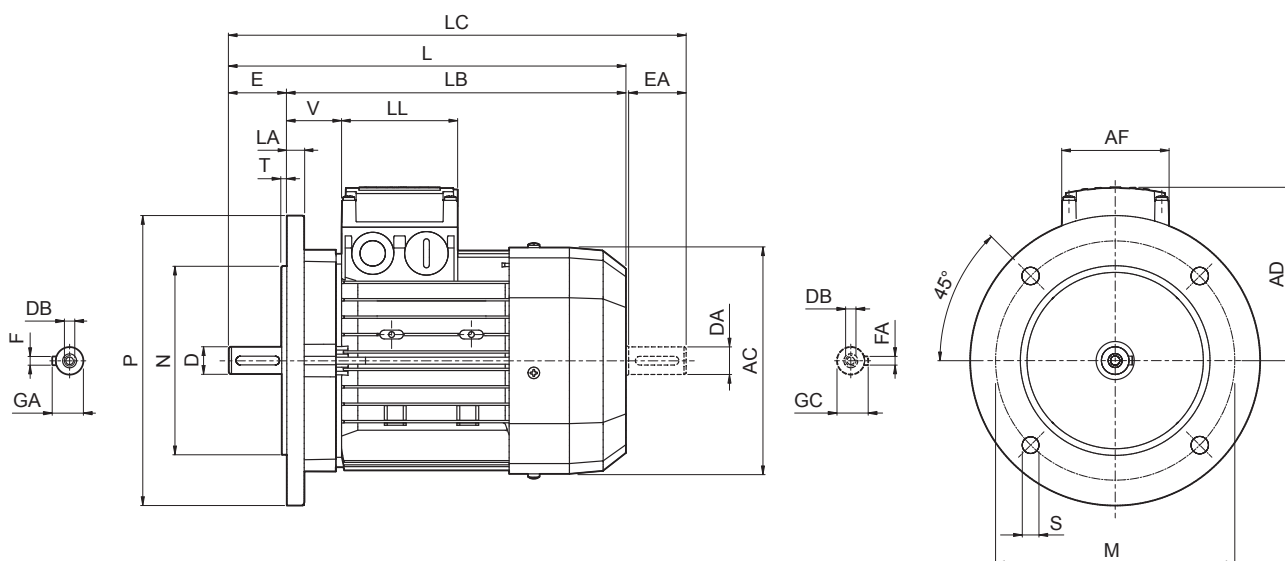


2/12P															3000/500 min ⁻¹ - S3 60/40%										50 Hz				
<div><div></div><div>P_n kW</div></div>															d.c. brake										a.c. brake				
															FD										FA				
			n min ⁻¹	M _n Nm	η	cosφ	In 400V A	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{Ma}{Mn}$	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm	Z _o 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm	Z _o 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 							
0.55	M 2SA	2	2820	1.86	64	0.89	1.39	4.2	1.6	1.7	25	10.6	FD 04	5	1000	1300	27	14.5	FA 04	5	1300	27	14.4						
0.09		12	430	2.0	30	0.63	0.69	1.8	1.9	1.8					8000	12000					12000								
0.75	M 3SA	2	2900	2.5	65	0.81	2.06	5.2	1.9	2.1	34	15.5	FD 15	13	700	900	38	22	FA 15	13	900	38	23						
0.12		12	460	2.5	33	0.43	1.22	1.9	1.3	1.6					5000	7000					7000								
1.1	M 3LA	2	2850	3.7	65	0.85	2.87	4.5	1.6	1.8	40	17	FD 15	13	700	900	44	24	FA 15	13	900	44	24						
0.18		12	430	4.0	26	0.54	1.85	1.5	1.3	1.5					4000	6000					6000								
1.5	M 3LB	2	2900	4.9	67	0.86	3.76	5.6	1.9	1.9	54	21	FD 15	13	700	900	58	27	FA 15	13	900	58	28						
0.25		12	440	5.4	36	0.46	2.18	1.8	1.7	1.8					3800	5000					5000								
2	M 3LC	2	2850	6.7	70	0.84	4.9	4.9	1.8	1.7	61	23	FD 55	18	—	700	65	29	FA 15	18	700	65	30						
0.3		12	450	6.4	38	0.47	2.4	1.7	1.6	1.7					—	3500					3500								
3	M 4SA	2	2920	9.8	74	0.87	6.7	6.8	2.3	1.9	213	42	FD 56	37	—	450	223	55	FA 06	37	450	223	56						
0.5		12	470	10.2	51	0.43	3.3	2.0	1.7	1.6					—	3000					3000								
4	M 4LA	2	2920	13.1	75	0.89	8.6	5.9	2.4	2.3	270	51	FD 56	37	—	400	280	64	FA 06	37	400	280	65						
0.7		12	460	14.5	53	0.44	4.3	1.9	1.7	1.6					—	2800					2800								



M21 MOTORS DIMENSIONS BN-M

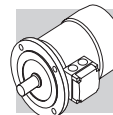
BN - IM B5



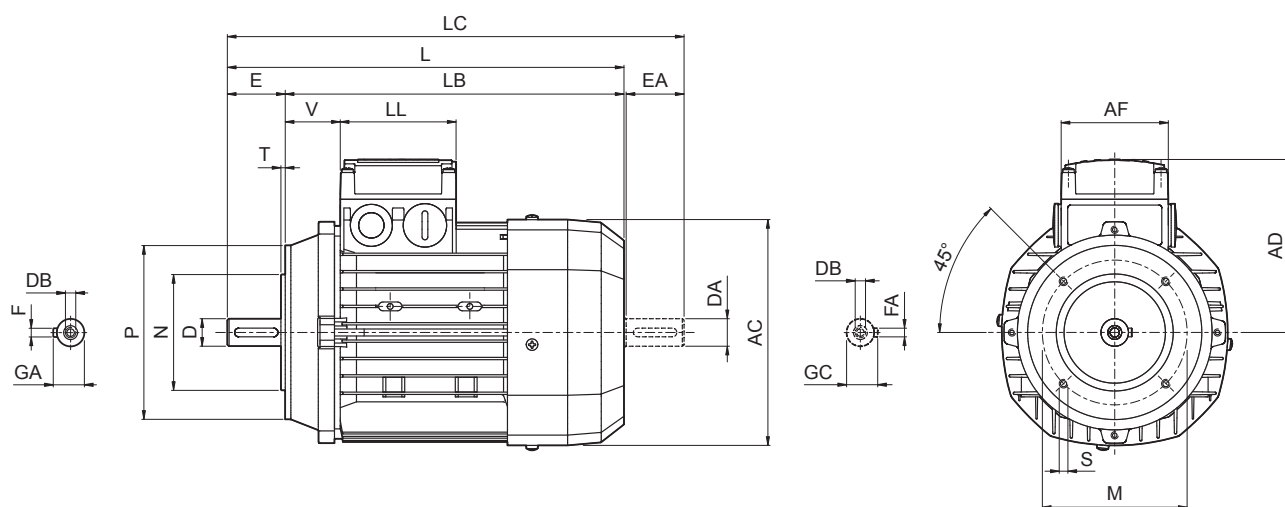
	Shaft					Flange						Motor								
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	
BN 56	9	20	M3	10.2	3	100	80	120	7	3	8	110	185	165	207	91	74	80	34	
BN 63	11	23	M4	12.5	4	115	95	140	9.5		10	121	207	184	232	95			26	
BN 71	14	30	M5	16	5	130	110	160				138	249	219	281	108			37	
BN 80	19	40	M6	21.5	6	165	130	200	11.5	3.5	11.5	156	274	234	315	119	98	98	38	
BN 90	24	50	M8	27	8							176	326	276	378	133			44	
BN 100	28	60	M10	31		215	180	250	14	4	14	195	367	307	429	142			50	
BN 112					15						219	385	325	448	157	52				
BN 132	38	80	M12	41	10	265	230	300			20	258	493	413	576	193	118	118	58	
BN 160 MR	42 38 ⁽¹⁾	110 80 ⁽¹⁾	M16 M12 ⁽¹⁾	45 41 ⁽¹⁾	12 10 ⁽¹⁾	300	250	350	18.5	5	562		452	645	245	218				
BN 160 M											15	310	596	486	680	51				
BN 160 L												310	640	530	724					
BN 180 M	48 38 ⁽¹⁾	110 110 ⁽¹⁾	M16 M16 ⁽¹⁾	51.5 41 ⁽¹⁾	14 10 ⁽¹⁾	350	300	400	18	348	708	598	823	261	187	187	52			
BN 180 L	48 42 ⁽¹⁾			M16 M16 ⁽¹⁾	51.5 45 ⁽¹⁾						14 12 ⁽¹⁾	722	612	837			66			
BN 200 L	55 42 ⁽¹⁾		M20 M16 ⁽¹⁾	59 45 ⁽¹⁾	16 12 ⁽¹⁾															

NOTE:

1) These values refer to the rear shaft end.

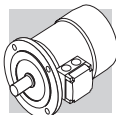


BN - IM B14

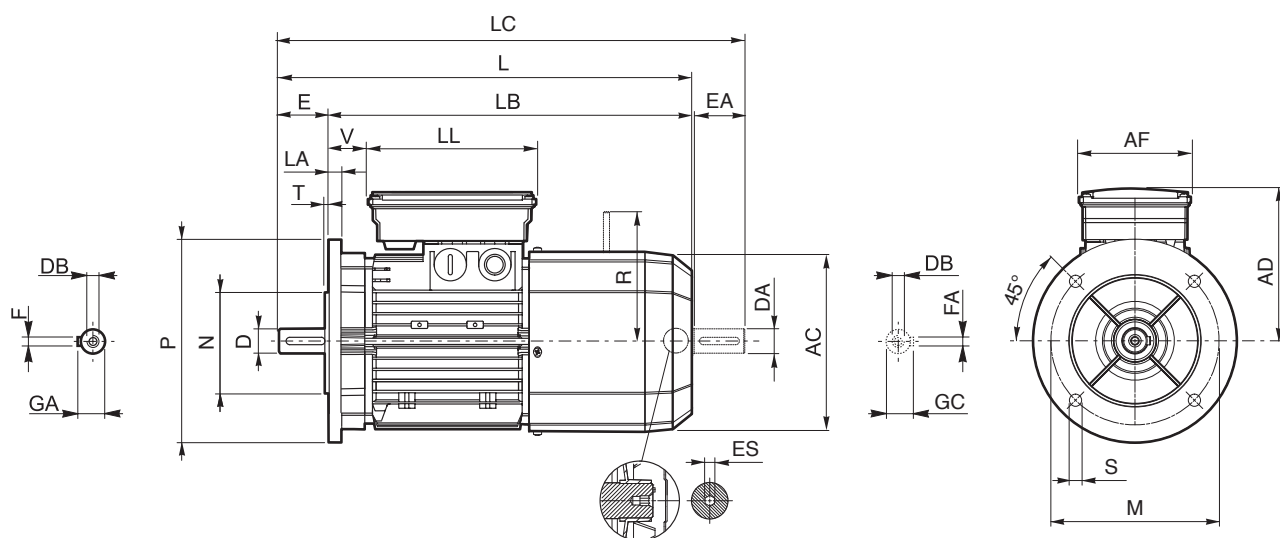


BN-M

	Shaft					Flange					Motor								
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	
BN 56	9	20	M3	10.2	3	65	50	80	M5	2.5	110	185	165	207	91	74	80	34	
BN 63	11	23	M4	12.5	4	75	60	90			121	207	184	232	95			26	
BN 71	14	30	M5	16	5	85	70	105	M6		138	249	219	281	108			37	
BN 80	19	40	M6	21.5	6	100	80	120		3	156	274	234	315	119	38			
BN 90	24	50	M8	27	8	115	95	140	M8		3.5	176	326	276	378	133	98	98	44
BN 100	28	60	M10	31		130	110	160				195	367	307	429	142			50
BN 112									219	385		325	448	157	52				
BN 132	38	80	M12	41	10	165	130	200	M10	4	258	493	413	576	193	118	118	58	



BN_FD ; IM B5



BN-M

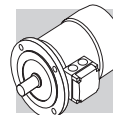
	Shaft					Flange						Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	11	23	M4	12.5	4	115	95	140	9.5	3	10	121	272	249	297	122	98	133	14	96	5
BN 71	14	30	M5	16	5	130	110	160	9.5	3.5		138	310	280	342	135			25	103	
BN 80	19	40	M6	21.5	6	165	130	200	11.5		11.5	156	346	306	388	146			41	129	
BN 90 S	24	50	M8	27	8					176		409	359	461	149	110	165	39	160		
BN 90 L															146						
BN 100	28	60	M10	31	215	180	250	14	4	14		195	458	398	521					158	165
BN 112										15	219	484	424	547	173	165	73	199			
BN 132	38	80	M12	41	10	265	230	300	14	4	20	258	603	523	686	210	140	188	46	204 ⁽²⁾	6
BN 160 MR	42 38 ⁽¹⁾	110 80 ⁽¹⁾	M16 M12 ⁽¹⁾	45 41 ⁽¹⁾	12 10 ⁽¹⁾	300	250	350			18.5		5	672	562				755	161	
BN 160 M												310		736	626	820	51	266			
BN 160 L	42 38 ⁽¹⁾			110 110 ⁽¹⁾	M16 M16 ⁽¹⁾				51.5 41 ⁽¹⁾	14 10 ⁽¹⁾		350		300	400	18.5	18	348	780	670	864
BN 180 M	48 38 ⁽¹⁾	866	756			981	64														
BN 180 L	48 42 ⁽¹⁾	878	768			993															
BN 200 L	55 42 ⁽¹⁾		M20 M16 ⁽¹⁾	59 45 ⁽¹⁾	16 12 ⁽¹⁾																

NOTE:

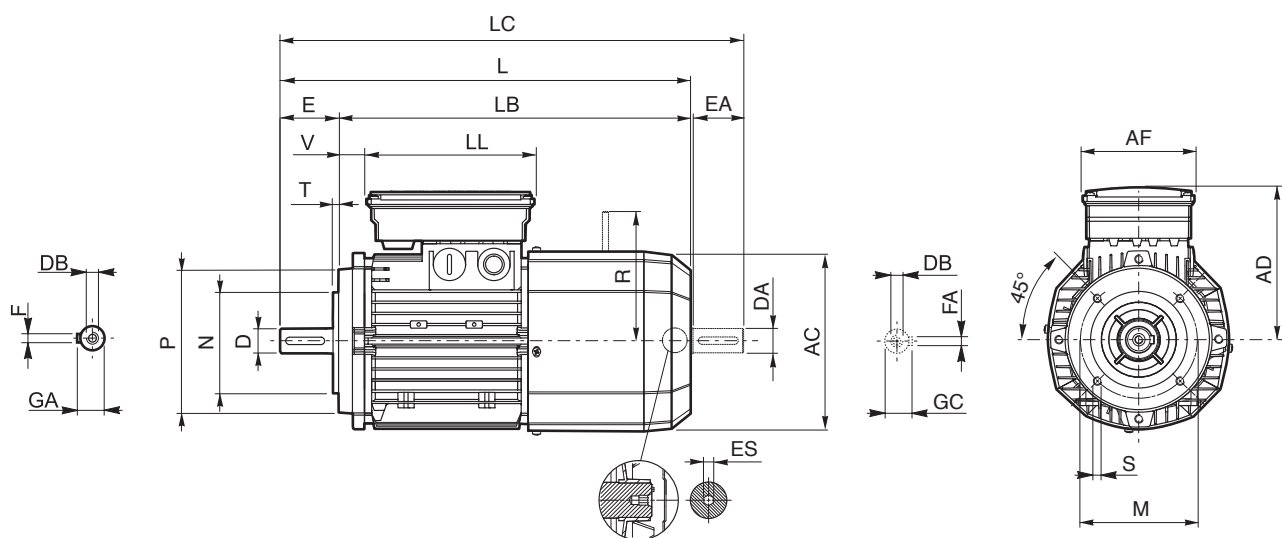
1) These values refer to the rear shaft end.

2) For FD07 brake value R=226.

ES hexagon is not supplied with PS option.



BN_FD ; IM B14



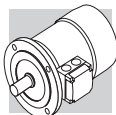
BN-M

	Shaft					Flange					Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	11	23	M4	12.5	4	75	60	90	M5	2.5	121	272	249	297	122	98	133	14	96	5
BN 71	14	30	M5	16	5	85	70	105	M6		138	310	280	342	135			25	103	
BN 80	19	40	M6	21.5	6	100	80	120			156	346	306	388	146			41	129	
BN 90 S	24	50	M8	27	8	115	95	140	M8	3	176	409	359	461	149	110	165	39	129	6
BN 90 L															146				160	
BN 100	28	60	M10	31		130	110	160	3.5	195	458	398	521	158	62					
BN 112										219	484	424	547	173	73			199		
BN 132	38	80	M12	41	10	165	130	200	M10	4	258	603	523	686	210	140	188	46	204 ⁽¹⁾	

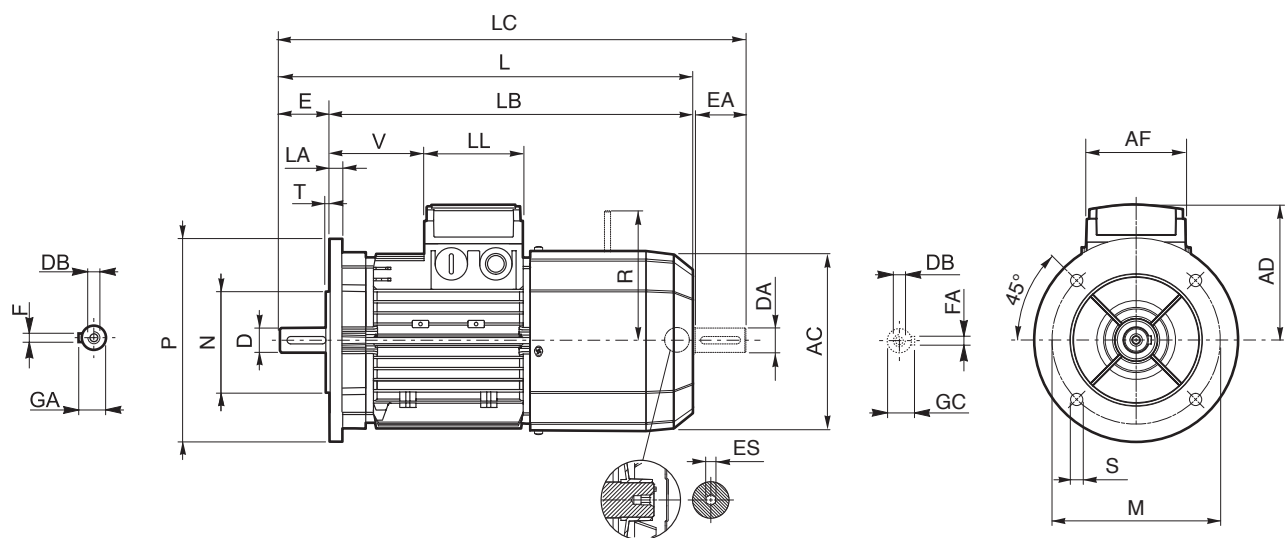
NOTE:

1) For FD07 brake value R=226.

ES hexagon is not supplied with PS option.



BN_FA - IM B5



BN-M

	Shaft					Flange						Motor												
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R	ES			
BN 63	11	23	M4	12.5	4	115	95	140	9.5	3	10	121	272	249	297	95	74	80	26	116	5			
BN 71	14	30	M5	16	5	130	110	160		3.5		11.5	138	310	280	342			108	68		124		
BN 80	19	40	M6	21.5	6	165	130	200	11.5		14		156	346	306	388			119	83		134	6	
BN 90	24	50	M8	27	8					215		180	250	14	4	176	409	359	461	133	98	98		95
BN 100	28	60	M10	31		14	15	195	458		398					521	142	119	198					
BN 112								20	258		603					523	686	210	140	188			46	200 ⁽²⁾
BN 132	38	80	M12	41	10	265	230	300		18.5	5	15	310	672	562	755	193	118	118	218	217	—		
BN 160 MR	42 38 ⁽¹⁾	110 80 ⁽¹⁾	M16 M12 ⁽¹⁾	45 41 ⁽¹⁾	12 10 ⁽¹⁾	300	250	350	14					15	310	736	626	820	245	187	187		51	247
BN 160 M																780	670	864						
BN 160 L																								
BN 180 M	48 38 ⁽¹⁾			51.5 41 ⁽¹⁾	14 10 ⁽¹⁾																			

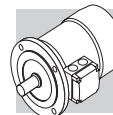
NOTE:

1) These values refer to the rear shaft end.

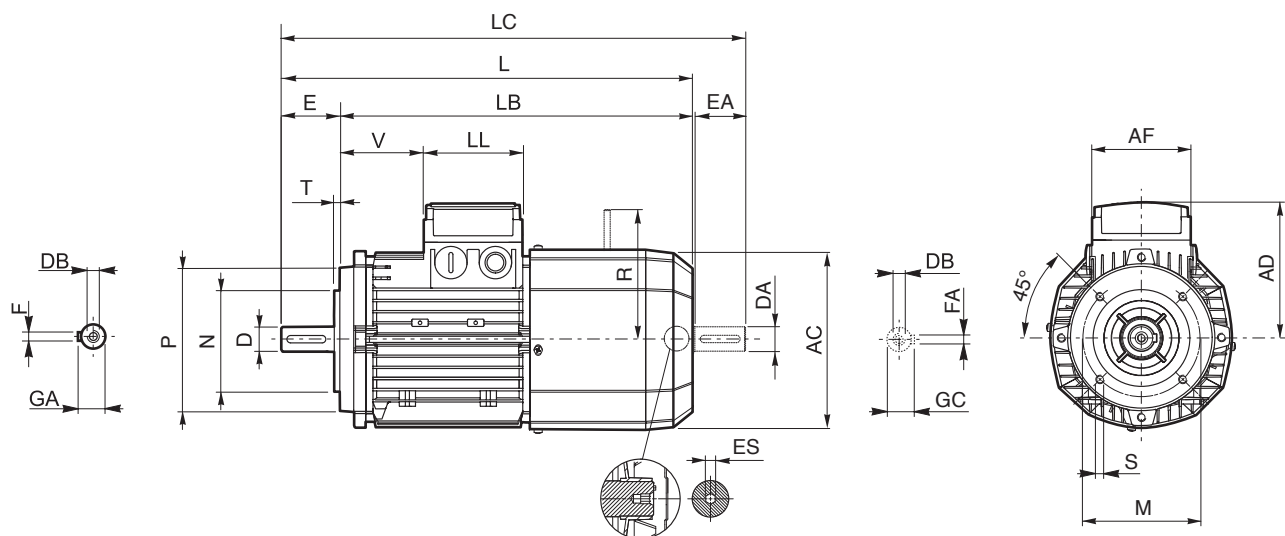
2) For FA07 brake value R=217.

Dimensions AD, AF, LL and V, relevant to terminal box of motors BN...FA featuring the separate brake supply (option SA), are coincident with corresponding dimensions of same-size BN...FD motors

ES hexagon is not supplied with PS option.



BN_FA - IM B14



BN-M

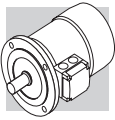
	Shaft					Flange					Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	11	23	M4	12.5	4	75	60	90	M5	2.5	121	272	249	119	95	74	80	26	116	5
BN 71	14	30	M5	16	5	85	70	105	M6		138	310	280	342	108			68	124	
BN 80	19	40	M6	21.5	6	100	80	120		3	156	346	306	388	119			83	134	
BN 90	24	50	M8	27	8	115	95	140	M8		4	176	409	359	461	133	98	98	95	160
BN 100	28	60	M10	31		130	110	160		3.5		195	458	398	521	142			119	
BN 112											219	484	424	547	157	128			198	
BN 132	38	80	M12	41	10	165	130	200	M10	4	258	603	523	686	210	140	188	46	200 ⁽¹⁾	

NOTE:

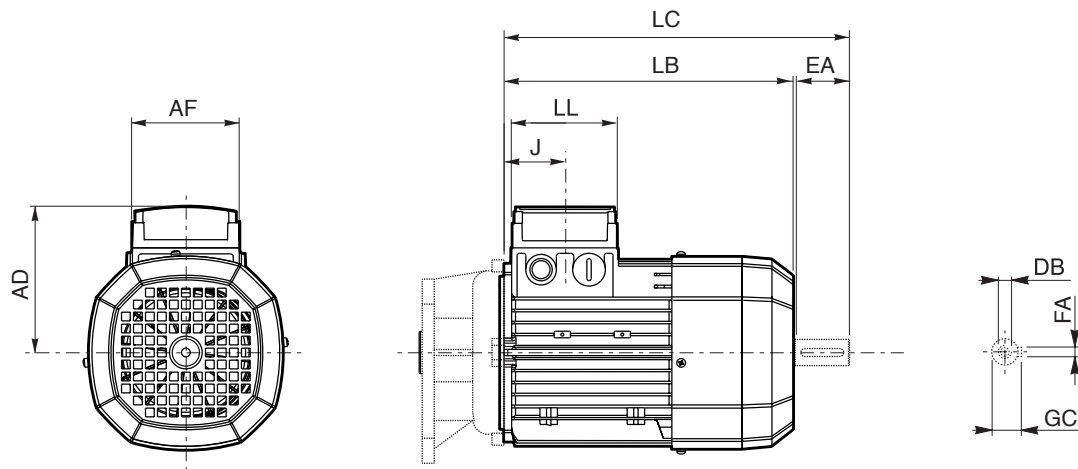
1) For FA07 brake value R=217.

Dimensions AD, AF, LL and V, relevant to terminal box of motors BN...FA featuring the separate brake supply (option SA), are coincident with corresponding dimensions of same-size BN...FD motors

ES hexagon is not supplied with PS option.

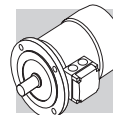


M

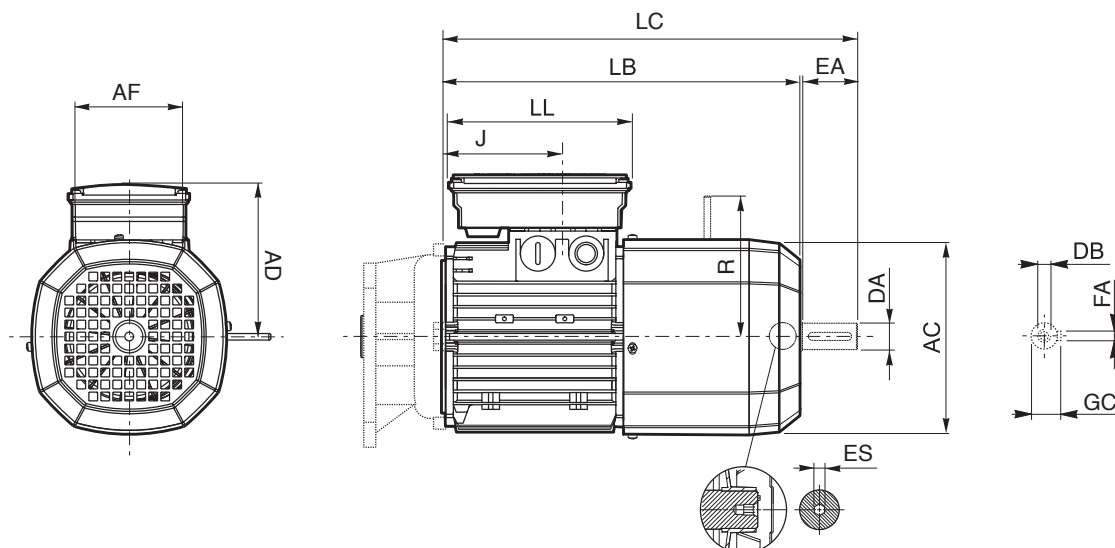


BN-M

	Rear shaft end					Motor						
	DA	EA	DB	FA	GC	AC	LB	LC	AF	LL	J	AD
M 0	9	20	M3	3	10.2	110	133	155	74	80	42	91
M 05	11	23	M4	4	12.5	121	165	191			48	95
M 1	14	30	M5	5	16	138	187	219			45	108
M 2 S	19	40	M6	6	21.5	156	202	245			44	119
M 3 S	28	60	M10	8	31	195	230	293	98	98	53.5	142
M 3 L							262	325				
M 4	38	80	M12	10	41	258	361	444	118	118	64.5	193
M 4 LC							396	479				
M 5 S						310	418	502	187	187	77	245
M 5 L							462	546				



M_FD



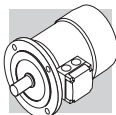
BN-M

	Rear shaft end					Motor								
	DA	EA	DB	FA	GC	AC	LB	LC	AF	LL	J	AD	R	ES
M 05	11	23	M4	4	12.5	121	231	256	98	133	48	122	96	5
M 1	14	30	M5	5	16	138	248	280			73	135	103	
M 2 S	19	40	M6	6	21.5	156	272	314			88	146	129	
M 3 S	28	60	M10	8	31	195	326	389	110	165	124.5	158	160	6
M 3 L							353	416						
M 4	38	80	M12	10	41	258	470	553	140	188	185.5	210	204 (1)	
M 4 LC							495	578			64.5		226	
M 5 S						310	558	642	187	187	77	245	266	—
M 5 L							602	686						

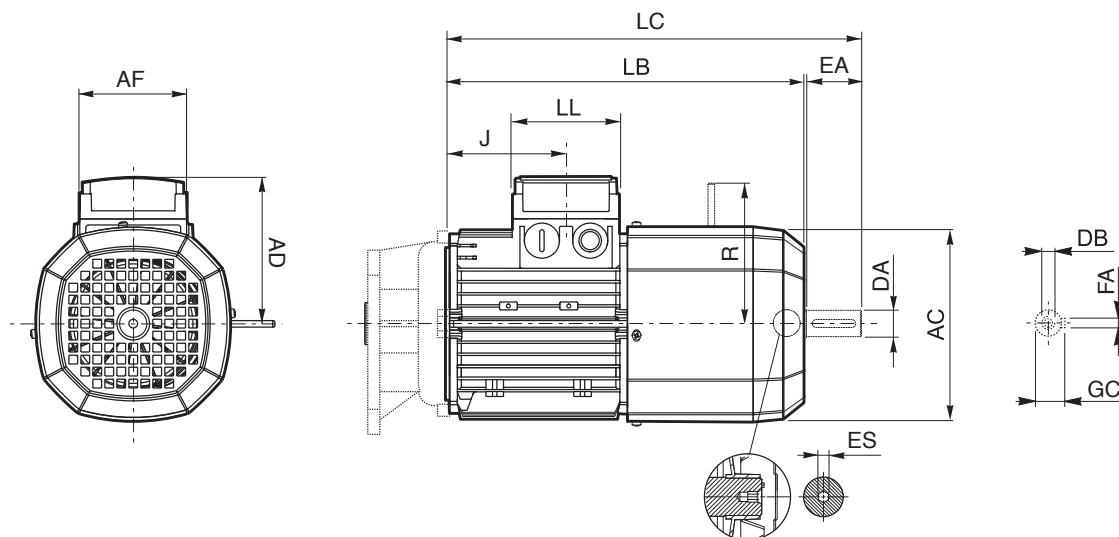
NOTE:

1) For FD07 brake value R=226.

ES hexagon is not supplied with PS option.



M_FA



BN-M

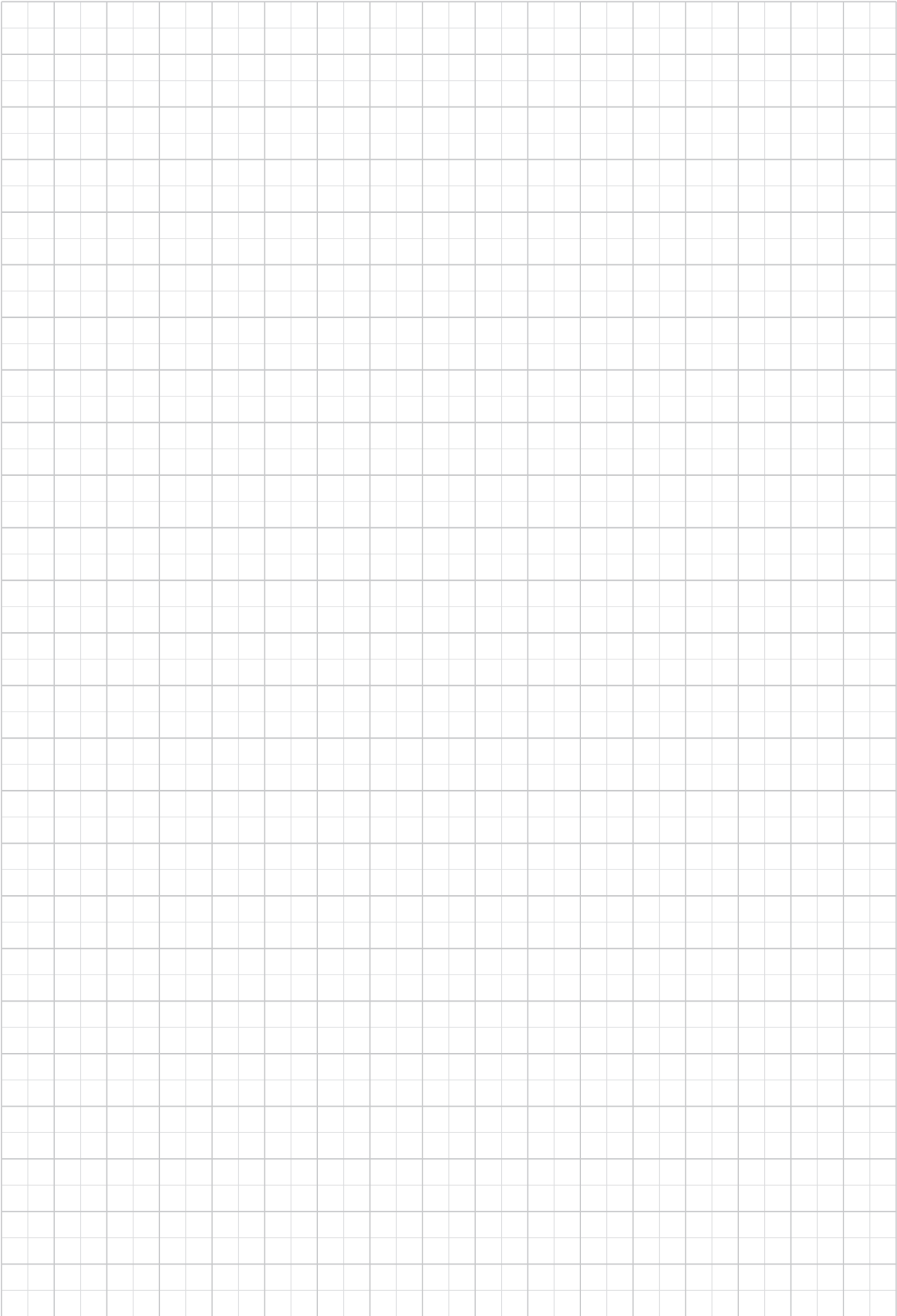
	Rear shaft end					Motor								
	DA	EA	DB	FA	GC	AC	LB	LC	AF	LL	J	AD	R	ES
M 05	11	23	M4	4	12.5	121	231	256	74	80	48	95	116	5
M 1	14	30	M5	5	16	138	248	280			73	108	124	
M 2 S	19	40	M6	6	21.5	156	272	314			88	119	134	
M 3 S	28	60	M10	8	31	195	326	389	98	98	124.5	142	160	6
M 3 L							353	416						
M 4	38	80	M14	10	41	258	470	553	140	188	185.5	210	200 (1)	
M 4 LC							495	578			64.5		217	
M 5 S			M12			310	558	642	187	187	77	245	247	
M 5 L							602	686						

NOTE:

1) For FA07 brake value R=217.


Dimensions AD, AF, LL and V, relevant to terminal box of motors M...FA featuring the separate brake supply (option SA), are coincident with corresponding dimensions of same-size M...FD motors

ES hexagon is not supplied with PS option.





INDEX OF REVISIONS

BR_CAT_VFW_IE2-IE3_ENG_R11_1	
	Description
...	Added availability of BXN and MXN electric motors.
215...344	Electric motors section updated.

2021 12 21

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We have a relentless commitment to excellence, innovation & sustainability. Our team creates, distributes and services world-class power transmission & drive solutions to keep the world in motion.

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