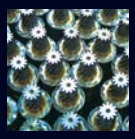
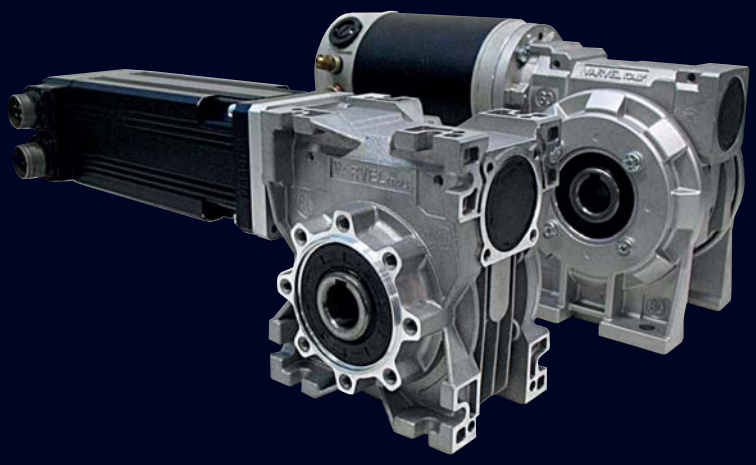


VARVEL®

MOTION CONTROL SINCE 1955

technology made in Italy



GB

RS/RT

Since 1955 Varvel has been making speed reducers and variators for light industry applications. Reliable partner in power transmission equipment offers also customized solutions always according to a socially responsible company values. Modularity and flexibility lead Varvel products by a unique kit form, common to all gearbox series. This feature allows distributors an easier job to set up required products in few minutes.

Technology Made in Italy

* VS made in China

RS & RT

SERVO, IEC & NEMA GEARHEADS
Worm speed reducers

VARVEL®
MOTION CONTROL SINCE 1955

Servo Gearheads - RS & RT

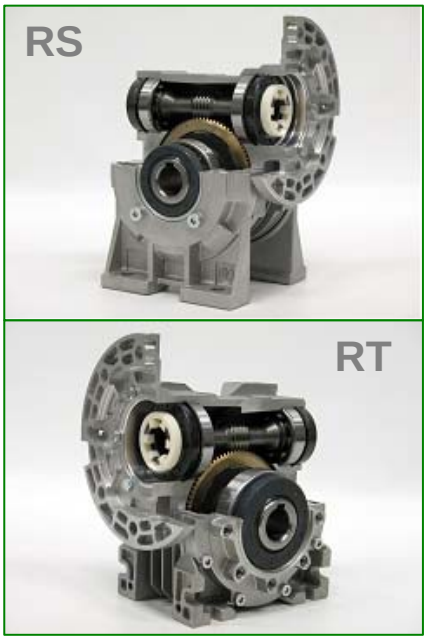
Product Description

Multipurpose mounting
Aluminium die cast (up to size 85)
and Cast iron (from size 110 up)

Wormshafts
ZI profile,
Hardened and ground.
Alloy steel.

Wormwheels
Bronze alloy cast
onto a cast iron hub.

Bearings
Ball or roller types.
Tapered roller bearings
For heavy duty operation.



Input
Servo , IEC and NEMA
motor adapters and
Universal Flexible Coupling

Oil seals
Nitrile Butadiene Rubber - NBR
as standard;
Viton and Silicone on request.

Output
Hollow bore as standard;
Single or Double solid shaft
on request.

Modular attachments
Helical one stage gearbox,
Output Flange, Torque Arm and Torque Limiter.

Single worm gear boxes RS and RT

The worm gearboxes, RS and RT series, specifically designed for universal mounting, are manufactured with aluminium die cast housings and covers up to size 85 and cast iron from the size 110.

Torque values listed in selection tables are output torque values for the specific gearbox size, and motor powers are always referred to 1440 rpm. Please refer to comprehensive RS-RT catalogue for full technical information.

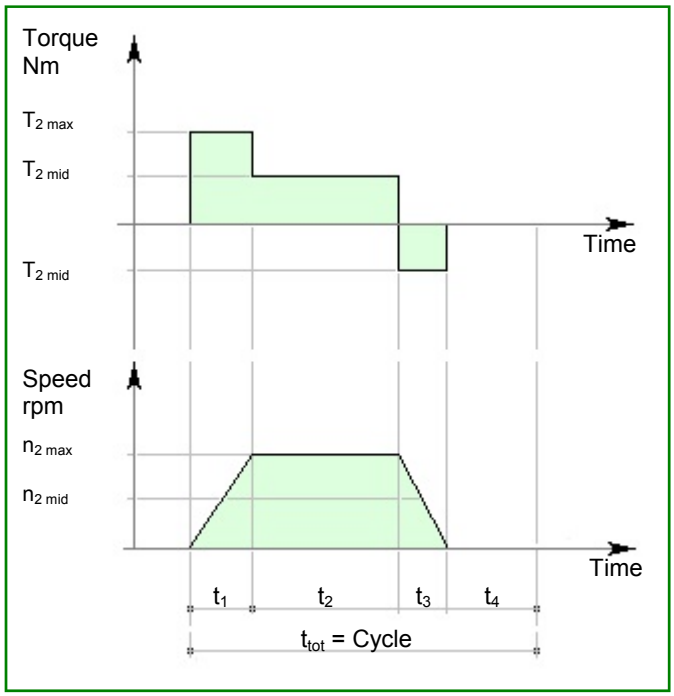
Input Viton oil seals recommended with 3000 rpm motors, and Silicone oil seals for low temperatures are fitted on request.

Gearboxes are delivered filled with synthetic long-life oil (without plugs).

Selection table data are intended for service factor SF1.0, i.e. 8-10 running hours per day, uniform load, less than 6 start/ stops per hour, and room temperature from 15 to 35 °C (-27 to +145 °F).

Duty Cycle

Actual duty cycle investigation is the basic rule in servo gearhead selection.
A basic operational duty cycle can be pictured as follows:



where:

$n_{2\ max}$	[rpm]	- Max. speed
$n_{2\ mid}$	[rpm]	- Average speed
t_1	[s]	- Acceleration time
t_2	[s]	- Working time
t_3	[s]	- Deceleration time
t_4	[s]	- Pause time
$T_{2\ max}$	[Nm]	- Max. acceleration torque
$T_{2\ mid}$	[Nm]	- Working torque
$T_{2\ dec}$	[Nm]	- Deceleration torque

The duty cycle fixed up, then operation has to selected as:

- **Continuous (S1)** - if S_p> 60%
  - or S_t > 20 minutes

or

- **Intermittent (S5)** - if S_p< 60%
  - or S_t < 20 minutes

where:

S_P - per cent duty time
S_t - duration duty time
min - minutes

$$S_p = \frac{t_1 + t_2 + t_3 + t_4}{t_{tot}} * 100 \quad [Nm]$$

$$S_t = \frac{t_1 + t_2 + t_3 + t_4}{60} \quad [min]$$

Servo Gearheads - RS & RT

Duty Cycle

Continuous duty - S1

Duty is meant continuous when per cent working time is greater than 60%, or duration longer than 20 minutes.
In such cases, gearbox selection is made according the formulas:

$$T_{2\,nom} = \frac{T_{1\,nom} * i * \eta}{0.65}$$

$T_{2\,nom}$ must be

$$T_{2\,nom} > T_{2\,ISO}$$

and also $n_{2\,eqv}$

$$n_{2\,eqv} = n_{2\,nom}$$

where:

$T_{2\,nom}$	[Nm]	- Nominal output torque
$T_{1\,nom}$	[Nm]	- Nominal motor torque
$T_{2\,ISO}$	[Nm]	- Nominal output torque according to ISO 6336
$n_{2\,eqv}$	[rpm]	- Equivalent speed resulting from single speeds coming from duty cycle

Intermittent duty - S5

Duty is meant intermittent when per cent working time is lower than 60%, or duration shorter than 20 minutes.
In such cases, gearbox selection is made according the formulas:

$$T_{2\,acc} \geq T_{1\,acc} * i * f_s * \eta$$

$$Z_h \geq \frac{3600}{t_1 + t_2 + t_3 + t_4}$$

$$T_{2\,eqv} = \sqrt[3]{\frac{T_{2\,max1}^3 * n_{2\,mid1} * t_1 + \cdots + T_{2\,maxn}^3 * n_{2\,midn} * t_{1n}}{t_1 * n_{2\,mid1} + \cdots + t_n * n_{2\,midn}}} \quad [Nm]$$

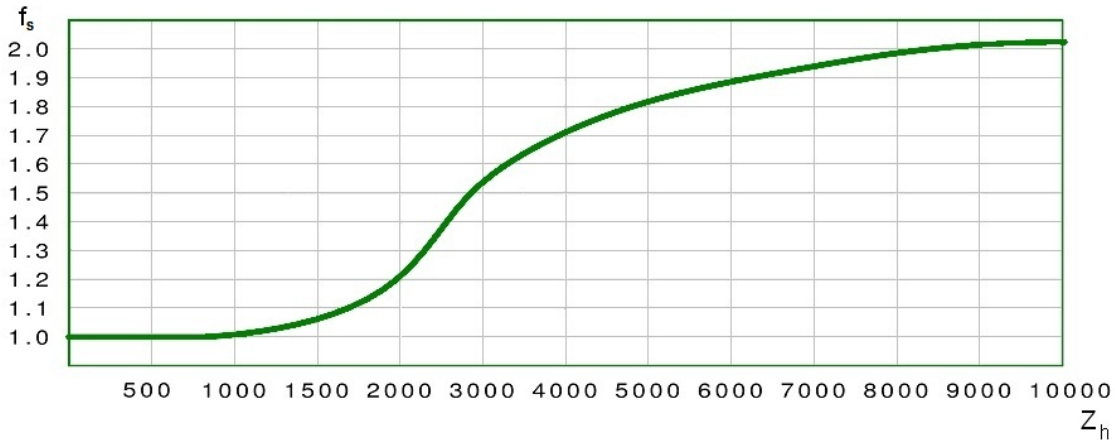
$$n_{2\,eqv} = \frac{n_{21} * t_1 + \cdots + n_{2n} * t_{1n}}{t_1 + \cdots + t_n} \quad [rpm]$$

where:

$T_{2\,acc}$	[Nm]	- Max. output acceleration torque
$T_{1\,acc}$	[Nm]	- Max. input acceleration torque
i		- Reduction ratio
f_s		- Shock factor (see overleaf)
η		- Gearbox efficiency
Z_h		- Cycle number per hour
t_1 , t_2 , t_3 , t_4	[s]	- Acceleration, working, deceleration, pause times
$T_{2\,eqv}$	[Nm]	- Equivalent torque resulting from single torques coming from duty cycle
$T_{2\,max}$	[Nm]	- Max. torque
$n_{2\,mid}$	[rpm]	- Average speed

Shock Factor

Shock factor is a service factor keeping into account rapid motion inversions associated with quick acceleration times; it is very important to consider this service factor when sizing the gearbox.



f_s - Shock service factor
Z_h - Number of cycles per hour

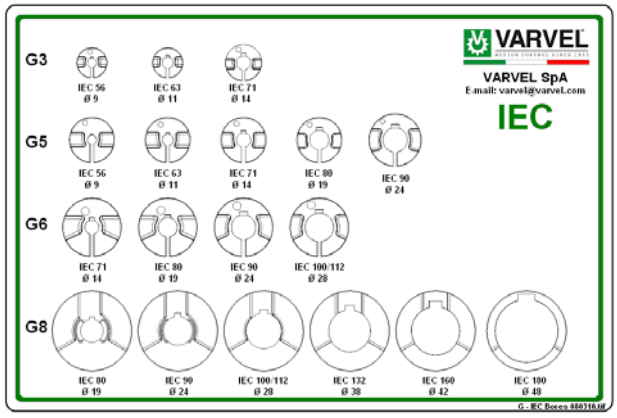
Servo Gearheads - RS & RT

Flexible Coupling

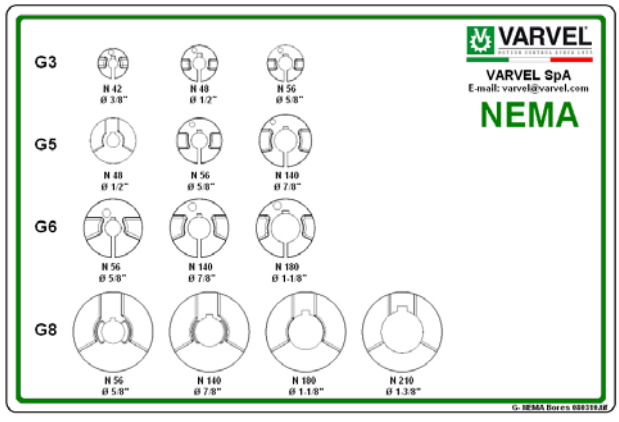
Reducer half-coupling
- Material: steel 20MnCr5
- Input shaft built-in
- Two bearing set
- Unchanged casing dimensions

Spider
- External tooth connection
- Material: Thermoplastic Elastomer
  - Elastollan ® TPU - Polyurethane
  - Hytrel ® TPE - Polyester
- Hardness
  - TPU 98 Shore A
  - TPE 72 Shore D
- Temperature
  - TPU -20/+75°C (-4 / +167°F)
  - TPE -30/+100°C (-22 / +212°F)

Motor half-coupling
- Material:
  - Aluminium die cast (G3, G5, G6)
  - Steel 36SMnPb14 (GS8)
  - Steel C43 on demand (GS3, GS5, GS6)
- Dynamic balancing
- Fitting:
  - Clamp (G3, G5, G6)
  - Key (GS3, GS5, GS6, GS8)
- Bores
  - IEC 72 / N42948: ø9 to ø28
  - NEMA C and TC: ø3/8" to ø1-1/8"



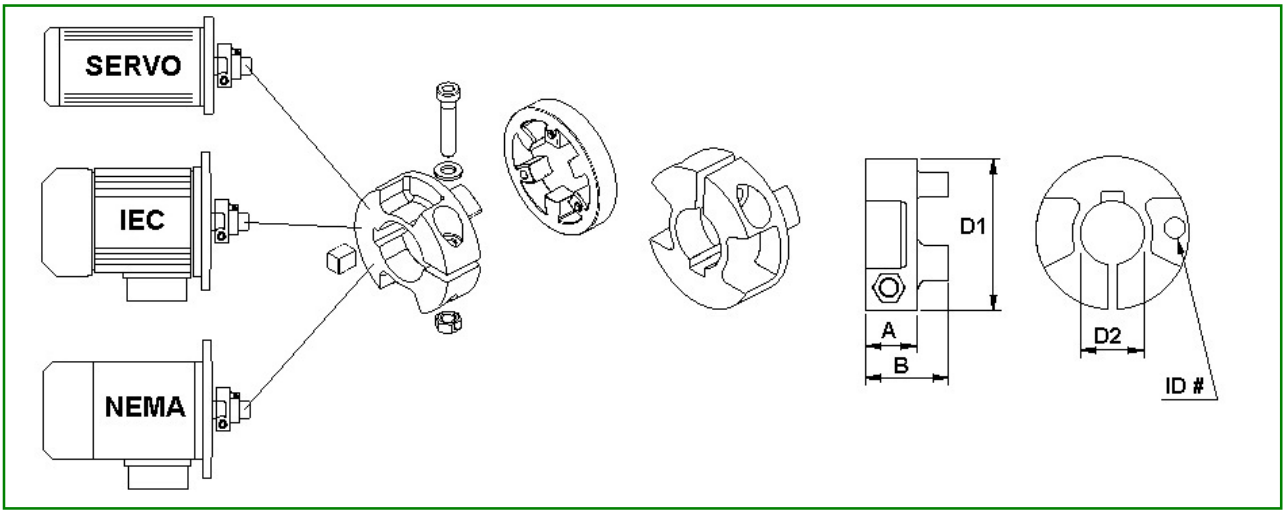
Advantages:
- One gearbox only at input for each reduction ratio
- Greater flexibility
- Increased stock rotation
- Fretting corrosion elimination between key and keyway
- Zero backlash in gearbox/motor connection
- Allowed angular misalignment 1° max
- Torsional rigidity
- High vibration damping



Input flanges:
- Material:
  - Aluminium up to IEC112 and NEMA TC180
  - Cast iron from IEC 132 and NEMA TC200
  - Mainly aluminium for Servo: ask for confirmation

RS & RT - Servo Gearhead

Flexible Coupling



Type	IEC NEMA	Kit Part No.	RS - RT	Mt [Nm]	Mt1 [Nm]	Mt2 [Nm]	A [mm]	B [mm	D1 [mm	D2 [mm/inch]	ID#
G3	IEC	KG3.009 KG3.011 KG3.014	28-40 28-40 40	4.5 - 6 4.5 - 6 7 - 8.5	15 15 28	8 - 10 8 - 10 18 - 22	11	19	30 30 36	9 11 14	309 311 314
	NEMA	KG3.N42 KG3.N48 KG3.N56	28-40 28-40 40	4.5 - 6 4.5 - 6 7 - 8.5	16 18 30	8 - 10 10 - 12 20 - 24			30 36 36	3/8" 1/2" 5/8"	3N42 3N48 3N56
G5	IEC	KG5.011 KG5.014 KG5.019 KG5.024	50-60 50-60 50-60 60	8.9 - 10	15 30 40 70	8 - 10 12 - 17 20 - 25 30 - 40	14.5	23	45 45 45 52	11 14 19 24	311 314 319 324
	NEMA	KG5.N56 KG5.N140	50-60 60		45 60	30 - 35 40 - 45			45 52	5/8" 7/8"	5N56 5N140
G6	IEC	KG6.014 KG6.019 KG6.024 KG6.028	70 70-85-110 70-85-110 70-85-110	15.3 - 18	60 90 130 180	30 – 40 50 – 65 85 - 100 100 - 120	19.5	31.5	58	14 19 24 28	614 619 624 628
	NEMA	KG6.N56 KG6.N140 KG6.N180	70-85-110 70-85-110 70-85-110		50 85 200	- - - - - - - - -				5/8" 7/8" 1-1/8"	6N56 6N140 6N180

Mt - Screw locking torque
Mt1 - Transmissible torque with key
Mt2 - Transmissible torque without key

Servo bore availability: ask for confirmation
Servo flange: see by reducer size on following pages

Servo Gearheads - RS & RT

Order Designation

F	RT	50	/B3	20	N56	AC
INPUT TYPE	TYPE	SIZE	MOUNTING POSITION Catalogue RS-RT	RATIO i =	MOTOR ADAPTER SERVO - NEMA - IEC	OUTPUT SHAFT
M - Motorized Unit	**RS**	28	RS - see page 14	5	See pages 12 to 23	AC - Hollow, throughout
F - Motor Flange	**RT**	40	RT - see page 16	7		Catalogue RS-RT:
S - Without Motor Flange		50		10		AS - Solid, one sided
		60		15		AD - Solid, two sided
		70		20		Dims pages 43 & 51
		85		28		
		110		40		
				56		
				70		
				80		
				100		

OPTIONS

AS/AD - Single / double sided solid output shaft
BR/BRV - Plain / Vulkollan-bush torque arm
CS - Not standard output bearings
F - Additional output flange
GRM - Reduced end play
LNS - Not standard lubrication
TLE/TLI - Internal / external torque limiter
VB - NDE (not drive end) worm shaft extension

Unless otherwise requested, the fitting side of output flanges and optional items is as standard the right side of the gearbox when seen from input.

NOTES

Self-locking units (with lead angle lower than 3 degrees) may become reversible under load vibrations.

Efficiency values are achieved after a running-in period of 30 hour full load operation.

Spacer adapter is supplied together with some input motor flanges according to motor shaft dimensions.

VARSIZE by VARVEL

Modularity and flexibility have been leading the design of Varvel products since 2000.

The gearbox-kit concept was carried out allowing anyone to assemble the unit in a few minutes with standard tooling.

This feature provides the highest flexibility to Varvel's distributors and resellers who - thanks to a limited kit selection - are able to immediately configure the required product.

VARSIZE® selection programme, available from our site

www.varvel.com

allows easy sizing selection from the Varvel product range.

2D/3D Drawings

A guided selection allows 2D/3D models to be downloaded for the most popular CAD systems.

Guided selection

This service returns a list of applicable product configurations upon a given sequence of application parameters (power, output torque, rpm, service factor etc.); a PDF data sheet featuring performance data and dimensional drawings is generated for each configuration, as well as the 3D model and 2D drawings .

Servo Gearheads - RS & RT

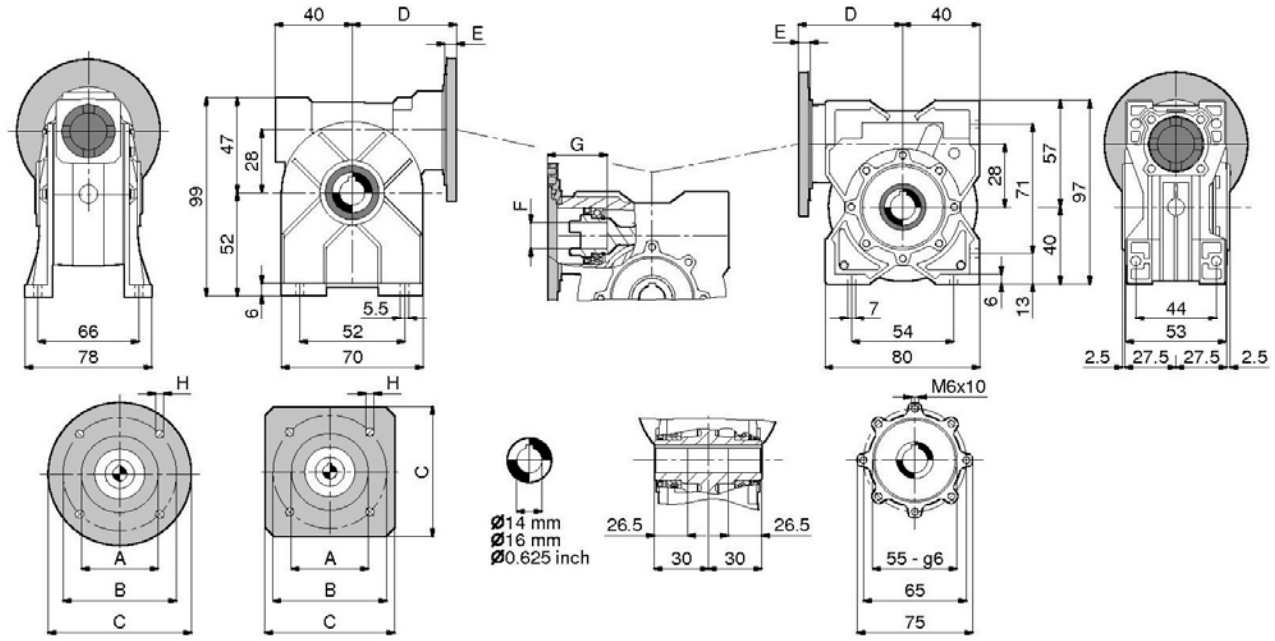
Selection

RS RT	i	T_{2acc} [Nm]	T_{2ISO} [Nm]	T_{2max} [Nm]	n_1 [rpm]	n_{1max} [rpm]	φ [arcmin]	C_t [Nm/arcmin]	F_{r2} [daN]	F_{a2} [daN]	J_1 [kgcm^2]	η %	P [kg]
28	**5**	---	---	---	---	---	---	---	---	---	---	---	---
	7	24	19	100	1400	5000	< 15	---	45	9	0.06	84	1.1
	10	24	19	90	1400	5000	< 15	---	50	10	0.05	81	1.1
	15	24	19	80	1400	5000	< 15	---	55	11	0.05	77	1.1
	20	27	22	70	1400	5000	< 12	---	60	12	0.05	74	1.1
	28	26	21	80	1400	5000	< 15	---	62	12.4	0.05	66	1.1
	40	29	24	65	1400	5000	< 12	---	70	14	0.05	62	1.1
	49	24	22	60	1400	5000	< 12	---	75	15	0.05	57	1.1
	56	18	17	50	1400	5000	< 12	---	80	16	0.05	51	1.1
	70	13	12	45	1400	5000	< 12	---	90	18	0.05	45	1.1
	80	12	11	45	1400	5000	< 12	---	95	19	0.05	45	1.1
	100	9	8	40	1400	5000	< 12	---	100	20	0.05	45	1.1

i - Reduction ratio (real ratios)
T_{2acc} - Max. output acceleration torque (S5 duty – max. 1000 cycles/hour)
T_{2ISO} - Nominal output torque according to ISO6336 (S1 duty – continuous operation)
T_{2max} - Emergency output torque (max. 1000 times on gearbox lifetime)
n_1 - Input speed
n_{1max} - Max. input speed
j - Angular backlash
C_t - Torsional rigidity (on demand)
F_{r2} - Output radial load (OHL)
F_{a2} - Output axial load
J_1 - Moment of inertia
h - Efficiency
P - Weight

RS28

RT28



Motor Size	Code	A Spigot	B Bolt circle	C	D	E	F	G	H
NEMA 24	A18003A	**ø 36**	ø 70.71	□ 60 x 60	57.5	13	14.1	41.5	M4
NEMA 23	A18001A	**ø 38.1**	ø 66.66	□ 56 x 56	57.5	13	14.1	41.5	M4
- - -	A18002A	**ø 40**	ø 63	□ 56 x 56	57.5	13	14.1	41.5	M4
IEC56-B14	530.206.080	**ø 50**	ø 65	ø 80	57.5	13	14.1	41.5	6
- - -	A18005A	**ø 50**	ø 70	□ 60 x 60	57.5	13	14.1	41.5	M5
- - -	APP.050022	**ø 50**	ø 70	□ 60 x 60	65.5	21	14.1	49.5	M5
IEC63-B14	APP.050035	**ø 60**	ø 75	□ 65 x 65	56.5	12	14.1	40.5	M5
IEC63-B14	530.206.090	**ø 60**	ø 75	ø 90	57.5	13	14.1	41.5	6
NEMA 34	APP.1829	**ø 73**	ø 98.4	□ 82.5 x 82.5	66.8	22.3	14.1	50.8	M5
NEMA 48	530.207.N048	**ø76.2**	ø95.225	ø143	60.5	16	14.1	44.5	7.5
IEC56-B5	530.206.120	**ø 80**	ø 100	ø 120	57.5	13	14.1	41.5	7
IEC63-B5	530.206.140	**ø 95**	ø 115	ø 140	57.5	13	14.1	41.5	10

Not binding dimensions, for reference only

Servo Gearheads - RS & RT

Selection

RS RT	i	T_{2acc} [Nm]	T_{2ISO} [Nm]	T_{2max} [Nm]	n_1 [rpm]	n_{1max} [rpm]	φ [arcmin]	C_t [Nm/arcmin]	F_{r2} [daN]	F_{a2} [daN]	J_1 [kgcm^2]	η %	P [kg]
40	**5**	50	45	285	1400	5000	< 15	---	100	20	0.25	87	2.5
	7	54	44	270	1400	5000	< 15	---	100	20	0.22	85	2.5
	10	59	48	245	1400	5000	< 15	---	110	22	0.20	83	2.5
	15	58	47	225	1400	5000	< 15	---	120	24	0.18	78	2.5
	20	56	45	180	1400	5000	< 12	---	135	27	0.18	75	2.5
	28	59	47	210	1400	5000	< 15	---	150	30	0.18	68	2.5
	40	51	42	175	1400	5000	< 12	---	160	32	0.18	61	2.5
	49	62	50	160	1400	5000	< 12	---	170	34	0.18	58	2.5
	56	56	50	145	1400	5000	< 12	---	180	36	0.18	56	2.5
	70	41	38	130	1400	5000	< 12	---	190	38	0.18	52	2.5
	80	34	31	120	1400	5000	< 12	---	200	40	0.18	50	2.5
	100	25	23	110	1400	5000	< 12	---	230	46	0.18	46	2.5

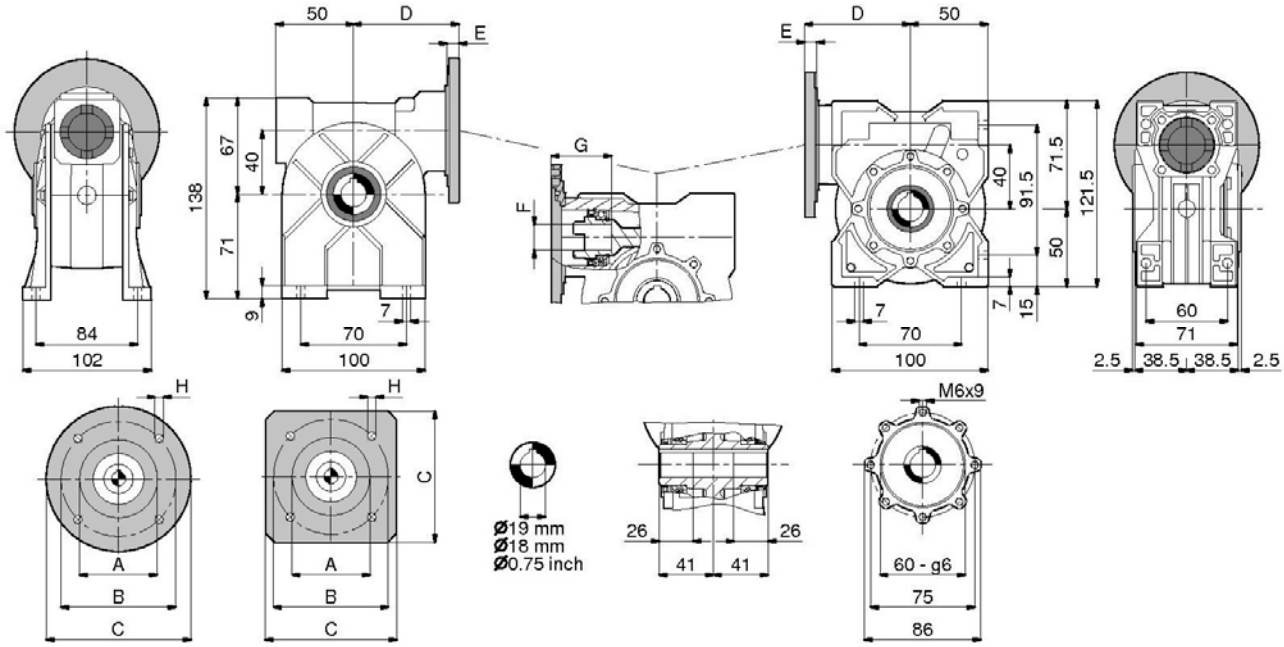
i - Reduction ratio (real ratios)
T_{2acc} - Max. output acceleration torque (S5 duty – max. 1000 cycles/hour)
T_{2ISO} - Nominal output torque according to ISO6336 (S1 duty – continuous operation)
T_{2max} - Emergency output torque (max. 1000 times on gearbox lifetime)
n_1 - Input speed
n_{1max} - Max. input speed
j - Angular backlash
C_t - Torsional rigidity (on demand)
F_{r2} - Output radial load (OHL)
F_{a2} - Output axial load
J_1 - Moment of inertia
h - Efficiency
P - Weight

RS & RT - Servo Gearhead

Dimensions

RS40

RT40



Motor Size	Code	A Spigot	B Bolt circle	C	D	E	F	G	H
IEC56-B14	531.206.080	**ø 50**	ø 65	ø 80	70.5	13.0	16	50.5	6
- - -	APP.070006	**ø 60**	ø 75	□ 72 x 72	71.0	13.5	16	51.0	M5
IEC63-B14	531.206.090	**ø 60**	ø 75	ø 90	70.5	13.0	16	505	MK5
- - -	APP.070003	**ø 70**	ø 90	□ 80 x 80	71.0	13.5	16	51.0	M6
IEC71-B14	531.206.105	**ø 70**	ø 85	ø 105	70.5	13.0	16	50.5	7
- - -	APP.070011	**ø 73**	ø 98.288	□ 86 x 86	71.0	13.5	16	51.0	M5
NEMA 48	531.227.N048	**ø76.2**	ø95.225	ø143	83.0	25.5	16	63.0	7.5
- - -	APP.070002	**ø 80**	ø 100	□ 85 x 85	71.0	13.5	16	51.0	M6
IEC56-B5	531.206.120	**ø 80**	ø 100	ø 120	70.5	13.0	16	51.0	M6
- - -	APP.070007	**ø 95**	ø 115	□ 98 x 98	71.0	13.5	16	51.0	M8
IEC63-B5	531.206.140	**ø 95**	ø 115	ø 140	70.5	13.0	16	50.5	10
IEC71-B5	531.206.160	**ø 110**	ø 130	ø 160	70.5	13.0	16	50.5	10
NEMA 56	531.227.N056	**ø114.3**	ø149.23	ø165.1	86.0	28.5	16	66.0	11

Not binding dimensions, for reference only

Servo Gearheads - RS & RT

Selection

RS RT	i	T_{2acc} [Nm]	T_{2ISO} [Nm]	T_{2max} [Nm]	n_1 [rpm]	n_{1max} [rpm]	φ [arcmin]	C_t [Nm/arcmin]	F_{r2} [daN]	F_{a2} [daN]	J_1 [kgcm^2]	η %	P [kg]
50	**5**	98	81	530	1400	5000	< 15	---	145	29	0.74	88	3.8
	7	102	82	515	1400	5000	< 15	---	125	25	0.60	86	3.8
	10	104	84	460	1400	5000	< 15	---	145	29	0.53	84	3.8
	15	104	83	420	1400	5000	< 15	---	170	34	0.49	78	3.8
	20	89	72	345	1400	5000	< 12	---	190	38	0.48	76	3.8
	28	113	91	420	1400	5000	< 15	---	200	40	0.47	71	3.8
	40	97	78	330	1400	5000	< 12	---	230	46	0.47	64	3.8
	49	110	89	305	1400	5000	< 12	---	240	48	0.47	62	3.8
	56	109	88	280	1400	5000	< 12	---	260	52	0.47	60	3.8
	70	80	72	240	1400	5000	< 12	---	280	56	0.46	53	3.8
	80	68	61	230	1400	5000	< 12	---	290	58	0.46	52	3.8
	100	49	44	205	1400	5000	< 12	---	320	64	0.46	47	3.8

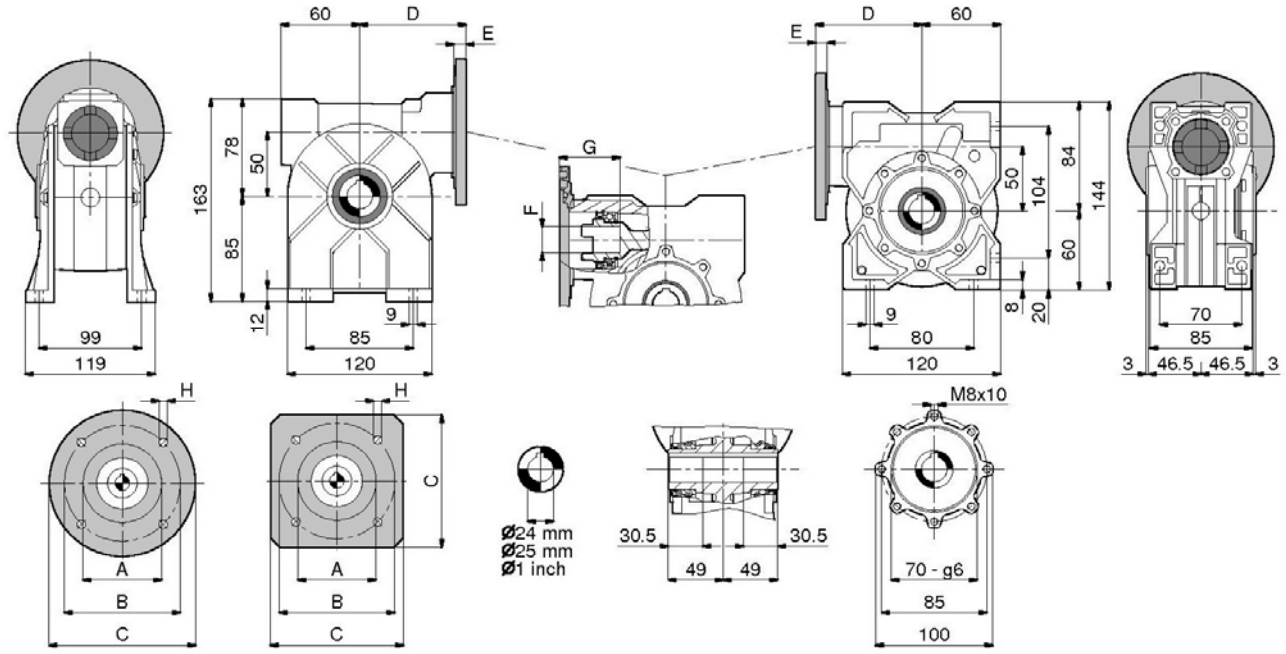
i - Reduction ratio (real ratios)
T_{2acc} - Max. output acceleration torque (S5 duty – max. 1000 cycles/hour)
T_{2ISO} - Nominal output torque according to ISO6336 (S1 duty – continuous operation)
T_{2max} - Emergency output torque (max. 1000 times on gearbox lifetime)
n_1 - Input speed
n_{1max} - Max. input speed
j - Angular backlash
C_t - Torsional rigidity (on demand)
F_{r2} - Output radial load (OHL)
F_{a2} - Output axial load
J_1 - Moment of inertia
h - Efficiency
P - Weight

RS & RT - Servo Gearhead

Dimensions

RS50

RT50



Motor Size	Code	A Spigot	B Bolt circle	C	D	E	F	G	H
- - -	APP.1810	**ø 55.5**	ø 125.73	□ 115 x 115	97.8	28.3	19.5	68.3	M8
IEC63-B14	532.206.090	**ø 60**	**ø** 75	**ø** 90	82.5	13.0	19.5	53.0	5
IEC71-B14	532.206.105	**ø 70**	**ø** 85	**ø** 105	82.5	13.0	19.5	53.0	7
- - -	APP.1976	**ø 73**	**ø** 98.43	□ 98 x 98	89.3	19.8	19.5	59.8	M5
IEC80-B14	532.206.120	**ø 80**	**ø** 100	**ø** 120	82.5	13.0	19.5	53.0	7
- - -	APP.2259	**ø 95**	**ø** 115	□ 100 x 100	82.5	13.0	19.5	53.0	9
IEC63-B5	532.206.140	**ø 95**	**ø** 115	**ø** 140	82.5	13.0	19.5	53.0	10
IEC71-B5	532.206.160	**ø 110**	**ø** 130	**ø** 160	82.5	13.0	19.5	53.0	10
NEMA 56	532.227.N056	**ø114.3**	ø149.23	ø165.1	99.0	29.5	19.5	69.5	11
IEC80-B5	532.206.200	**ø 130**	**ø** 160	**ø** 200	82.5	13.0	19.5	53.0	12

Not binding dimensions, for reference only

Servo Gearheads - RS & RT

Selection

RS RT	i	T_{2acc} [Nm]	T_{2ISO} [Nm]	T_{2max} [Nm]	n_1 [rpm]	n_{1max} [rpm]	φ [arcmin]	C_t [Nm/arcmin]	F_{r2} [daN]	F_{a2} [daN]	J_1 [kgcm^2]	η %	P [kg]
60	**5**	89	125	850	1400	5000	< 15	---	225	45	1.49	89	6.5
	7	93	113	835	1400	5000	< 15	---	240	48	1.34	86	6.5
	10	173	140	800	1400	5000	< 15	---	250	50	1.18	84	6.5
	15	162	131	745	1400	5000	< 15	---	290	58	1.10	81	6.5
	20	183	148	690	1400	5000	< 12	---	330	66	1.07	77	6.5
	28	174	141	720	1400	5000	< 15	---	360	72	1.05	71	6.5
	40	181	147	585	1400	5000	< 12	---	390	78	1.04	66	6.5
	49	193	156	510	1400	5000	< 12	---	430	86	1.04	62	6.5
	56	156	126	475	1400	5000	< 12	---	460	92	1.03	60	6.5
	70	146	132	420	1400	5000	< 12	---	500	100	1.03	55	6.5
	80	118	107	385	1400	5000	< 12	---	530	106	1.03	53	6.5
	100	87	79	345	1400	5000	< 12	---	560	112	1.03	49	6.5

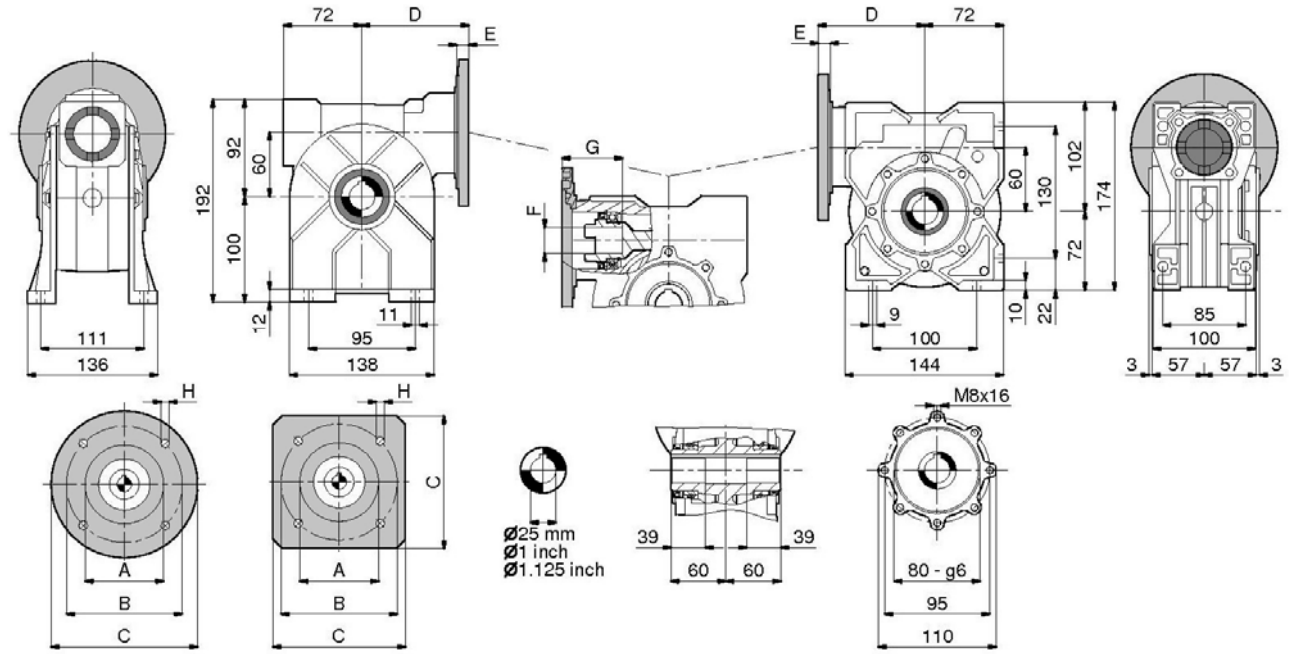
i - Reduction ratio (real ratios)
T_{2acc} - Max. output acceleration torque (S5 duty – max. 1000 cycles/hour)
T_{2ISO} - Nominal output torque according to ISO6336 (S1 duty – continuous operation)
T_{2max} - Emergency output torque (max. 1000 times on gearbox lifetime)
n_1 - Input speed
n_{1max} - Max. input speed
j - Angular backlash
C_t - Torsional rigidity (on demand)
F_{r2} - Output radial load (OHL)
F_{a2} - Output axial load
J_1 - Moment of inertia
h - Efficiency
P - Weight

RS & RT - Servo Gearhead

Dimensions

RS60

RT60



Motor Size	Code	A Spigot	B Bolt circle	C	D	E	F	G	H
IEC71-B14	539.206.105	**ø 70**	**ø** 85	**ø** 105	94.5	15.5	24.5	55.5	7
- - -	APP.090011	**ø 70**	**ø** 90	□ 80x 80	93.5	14.5	24.5	54.5	M6
- - -	APP.090009	**ø 70**	**ø** 100	□ 85 x 85	93.5	14.5	24.5	54.5	M6
IEC80-B14	539.206.120	**ø 80**	**ø** 100	**ø** 120	93.0	14.0	24.5	54.0	7
IEC63-B5	539.206.140	**ø 95**	**ø** 115	**ø** 140	93.0	14.0	24.5	54.0	10
- - -	APP.090013	**ø 95**	**ø** 115	□ 100 x 100	93.5	14.5	24.5	54.5	M8
- - -	APP.090014	**ø 95**	**ø** 115	□ 100 x 100	98.0	19.0	24.5	59.0	M6
- - -	APP.090041	**ø 95**	**ø** 135	□ 120 x 120	93.5	14.5	24.5	54.5	M8
IEC71-B5	539.206.160	**ø 110**	**ø** 130	**ø** 160	93.0	14.0	24.5	54.0	10
- - -	APP.090012	**ø 110**	**ø** 145	□ 120 x 120	93.5	14.5	24.5	54.5	M8
- - -	APP-090040	**ø 110**	**ø** 145	□ 120 x 120	98.5	19.5	24.5	59.5	M8
NEMA 56	539.227.N056	**ø114.3**	ø149.23	ø165.1	109.5	30.5	24.5	70.5	11
IEC80/90-B5	539.206.200	**ø 130**	**ø** 165	**ø** 200	93.0	14.0	24.5	54.0	12

Not binding dimensions, for reference only

Servo Gearheads - RS & RT 70

Selection

RS RT	i	T_{2acc} [Nm]	T_{2ISO} [Nm]	T_{2max} [Nm]	n_1 [rpm]	n_{1max} [rpm]	φ [arcmin]	C_t [Nm/arcmin]	F_{r2} [daN]	F_{a2} [daN]	J_1 [kgcm^2]	η %	P [kg]
70	**5**	200	176	1260	1400	5000	< 15	---	260	52	3.10	89	9.0
	7	214	174	1245	1400	5000	< 15	---	270	54	3.06	88	9.0
	10	241	195	1230	1400	5000	< 15	---	290	58	2.74	86	9.0
	15	247	200	1145	1400	5000	< 15	---	360	72	2.57	83	9.0
	20	240	194	970	1400	5000	< 12	---	390	78	2.51	81	9.0
	28	268	217	1135	1400	5000	< 15	---	420	84	2.47	75	9.0
	40	249	201	900	1400	5000	< 12	---	450	90	2.45	71	9.0
	49	258	209	785	1400	5000	< 12	---	520	104	2.44	67	9.0
	56	223	181	740	1400	5000	< 12	---	550	110	2.44	64	9.0
	70	226	183	640	1400	5000	< 10	---	590	118	2.44	59	9.0
	80	187	170	595	1400	5000	< 10	---	630	126	2.43	56	9.0
	100	138	125	530	1400	5000	< 10	---	670	134	2.43	52	9.0

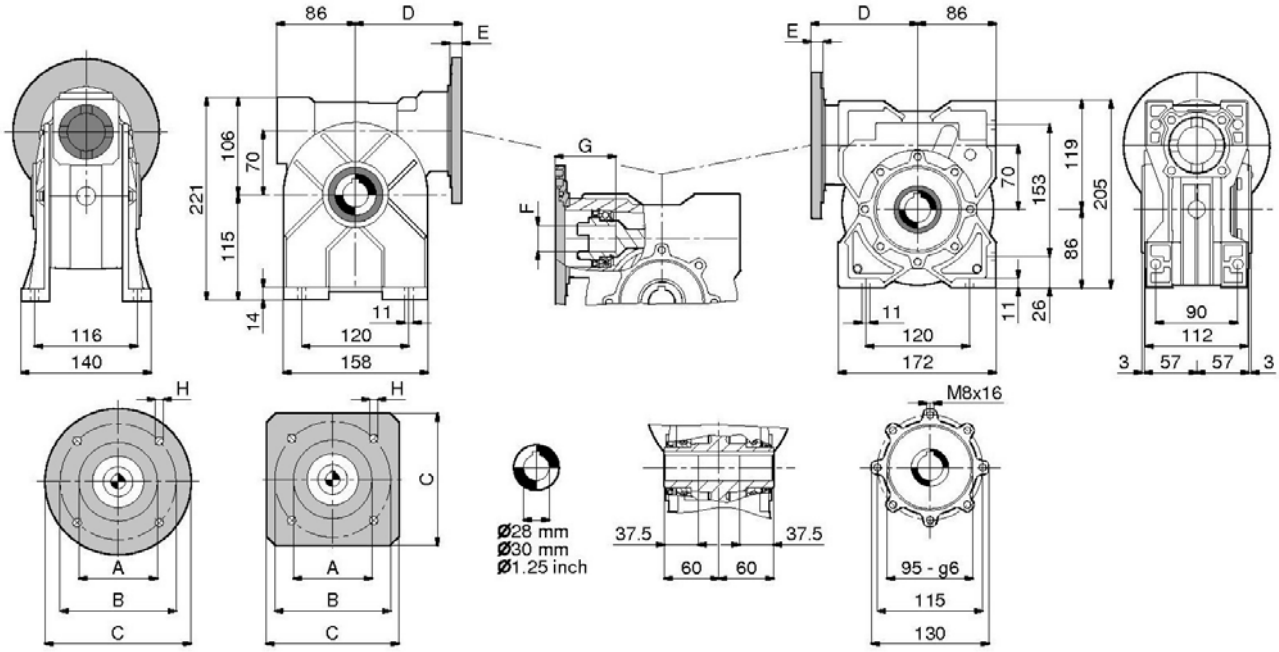
i - Reduction ratio (real ratios)
T_{2acc} - Max. output acceleration torque (S5 duty – max. 1000 cycles/hour)
T_{2ISO} - Nominal output torque according to ISO6336 (S1 duty – continuous operation)
T_{2max} - Emergency output torque (max. 1000 times on gearbox lifetime)
n_1 - Input speed
n_{1max} - Max. input speed
j - Angular backlash
C_t - Torsional rigidity (on demand)
F_{r2} - Output radial load (OHL)
F_{a2} - Output axial load
J_1 - Moment of inertia
h - Efficiency
P - Weight

RS & RT - Servo Gearhead

Dimensions

RS70

RT70



Motor Size	Code	A Spigot	B Bolt circle	C	D	E	F	G	H
IEC71-B14	533.206.105	**ø 70**	ø 85	ø 105	118.0	17.0	29	68.0	7
IEC80-B14	533.206.120	**ø 80**	ø 100	ø 120	118.5	17.5	29	68.5	7
IEC63-B5	533.206.140	**ø 95**	ø 110	ø 140	118.5	17.5	29	68.5	10
IEC71-B5	533.206.160	**ø 110**	ø 130	ø 160	116.5	15.5	29	66.5	10
NEMA 56	533.227.N056	**ø114.3**	ø149.23	ø165.1	141.5	40.5	29	91.5	11
IEC80/90-B5	533.206.200	**ø 130**	ø 165	ø 200	116.5	15.5	29	66.5	12
IEC100-B5	533.206.250	**ø 180**	ø 215	ø 250	117.7	16.7	29	67.7	13
NEMA 180	533.227N180	**ø215.9**	ø184.15	ø228.6	137.5	36.5	29	87.5	14

Not binding dimensions, for reference only

Servo Gearheads - RS & RT

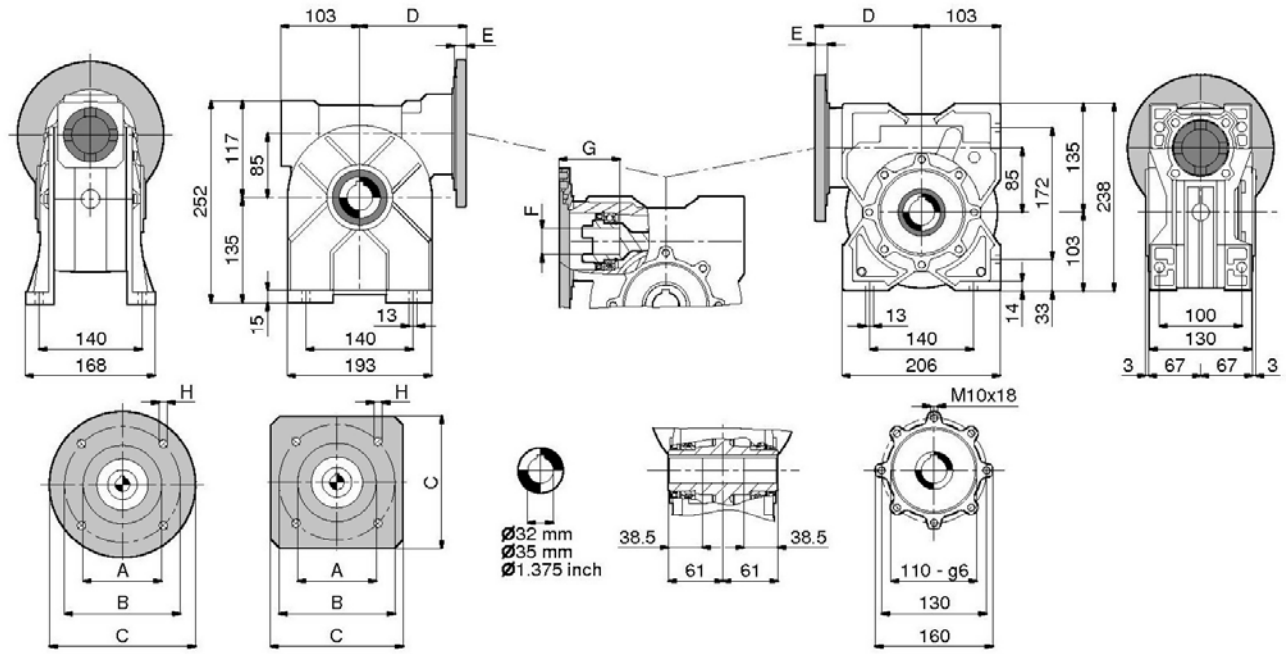
Selection

RS RT	i	T_{2acc} [Nm]	T_{2ISO} [Nm]	T_{2max} [Nm]	n_1 [rpm]	n_{1max} [rpm]	φ [arcmin]	C_t [Nm/arcmin]	F_{r2} [daN]	F_{a2} [daN]	J_1 [kgcm^2]	η %	P [kg]
85	**5**	335	279	2205	1400	5000	< 15	---	330	66	5.00	90	13.5
	7	343	277	2190	1400	5000	< 15	---	330	66	4.89	88	13.5
	10	386	312	2120	1400	5000	< 15	---	370	72	4.12	86	13.5
	15	406	329	1985	1400	5000	< 15	---	440	88	3.71	83	13.5
	20	399	323	1670	1400	5000	< 12	---	470	94	3.57	82	13.5
	28	422	342	1935	1400	5000	< 15	---	540	108	3.48	76	13.5
	40	430	348	1550	1400	5000	< 12	---	550	110	3.43	72	13.5
	49	443	359	1350	1400	5000	< 12	---	630	126	3.42	67	13.5
	56	400	324	1265	1400	5000	< 12	---	660	132	3.41	68	13.5
	70	415	336	1130	1400	5000	< 12	---	710	142	3.40	63	13.5
	80	340	308	1035	1400	5000	< 12	---	750	150	3.40	60	13.5
	100	248	225	915	1400	5000	< 12	---	830	166	3.39	56	13.5

i - Reduction ratio (real ratios)
T_{2acc} - Max. output acceleration torque (S5 duty – max. 1000 cycles/hour)
T_{2ISO} - Nominal output torque according to ISO6336 (S1 duty – continuous operation)
T_{2max} - Emergency output torque (max. 1000 times on gearbox lifetime)
n_1 - Input speed
n_{1max} - Max. input speed
j - Angular backlash
C_t - Torsional rigidity (on demand)
F_{r2} - Output radial load (OHL)
F_{a2} - Output axial load
J_1 - Moment of inertia
h - Efficiency
P - Weight

RS85

RT85



Motor Size	Code	A Spigot	B Bolt circle	C	D	E	F	G	H
IEC80-B14	534.206.120	**ø 80**	ø 100	ø 120	134	15.5	29	66.5	7
IEC63-B5	534.206.140	**ø 95**	ø 110	ø 140	137	18.5	29	69.5	10
IEC71-B5	534.206.160	**ø 110**	ø 130	ø 160	134	15.5	29	66.5	10
NEMA 56	APP.1295	**ø 114.3**	ø 149.23	ø 165.1	133	14.5	29	66.5	11
NEMA 56	534.227.N056	**ø 114.3**	ø 149.23	ø 165.1	158	42.0	29	83.0	11
IEC80/90-B5	534.206.200	**ø 130**	ø 165	ø 200	134	15.5	29	66.5	12
IEC100-B5	534.206.250	**ø 180**	ø 215	ø 250	135.2	16.7	29	67.7	13
NEMA 180	534.227.N180	**ø215.9**	ø184.15	ø228.6	155	36.5	29	87.5	14

Not binding dimensions, for reference only

Servo Gearheads - RS & RT 110

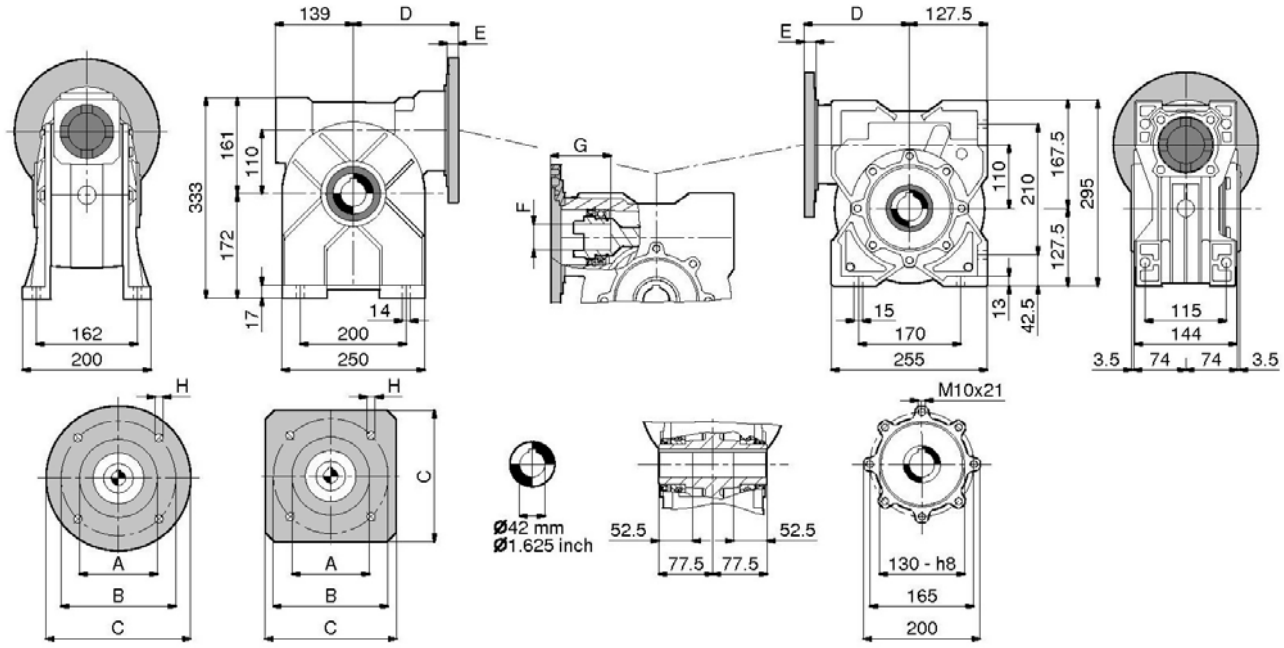
Selection

RS RT	i	T_{2acc} [Nm]	T_{2ISO} [Nm]	T_{2max} [Nm]	n_1 [rpm]	n_{1max} [rpm]	φ [arcmin]	C_t [Nm/arcmin]	F_{r2} [daN]	F_{a2} [daN]	J_1 [kgcm^2]	η %	P [kg]
110	5	---	---	---	---	---	---	---	---	---	---	---	---
	7	658	533	4470	1400	5000	< 15	---	390	78	22.16	88	39
	10	741	600	4315	1400	5000	< 15	---	415	83	19.42	87	39
	15	798	646	4110	1400	5000	< 15	---	520	104	17.96	84	39
	20	792	641	3445	1400	5000	< 12	---	540	108	17.45	83	39
	28	833	674	4220	1400	5000	< 15	---	590	118	17.13	76	39
	40	829	671	3195	1400	5000	< 12	---	570	114	16.96	73	39
	49	844	684	2775	1400	5000	< 12	---	750	150	16.91	71	39
	56	754	610	2620	1400	5000	< 12	---	780	156	16.88	70	39
	70	826	669	2345	1400	5000	< 12	---	800	160	16.85	67	39
	80	744	675	2160	1400	5000	< 12	---	880	176	16.84	66	39
	100	545	494	1890	1400	5000	< 12	---	980	196	16.82	61	39

i - Reduction ratio (real ratios)
T_{2acc} - Max. output acceleration torque (S5 duty – max. 1000 cycles/hour)
T_{2ISO} - Nominal output torque according to ISO6336 (S1 duty – continuous operation)
T_{2max} - Emergency output torque (max. 1000 times on gearbox lifetime)
n_1 - Input speed
n_{1max} - Max. input speed
j - Angular backlash
C_t - Torsional rigidity (on demand)
F_{r2} - Output radial load (OHL)
F_{a2} - Output axial load
J_1 - Moment of inertia
h - Efficiency
P - Weight

RS110

RT110



Motor Size	Code	A Spigot	B Bolt circle	C	D	E	F	G	H
- - -	APP.120001	**ø 95**	ø 115	□ 110 x 110	150.5	18	29	66.5	M8
IEC63-B14	535.206.300	**ø 95**	ø 115	ø 140	150.5	18	29	66.5	M12
IEC71-B5	535.206.160	**ø 110**	ø 130	ø 160	152.5	20	29	68.5	9
NEMA 56	535.227.N056	**ø114.3**	ø149.23	ø165.5	165.5	33	29	81.5	10.5
- - -	APP.120006	**ø 130**	ø 165	□ 140 x 140	150.5	18	29	66.5	M8
IEC80/90-B5	535.206.200	**ø 130**	ø 165	ø 200	150.5	18	29	66.5	12
IEC100-B5	535.206.250	**ø 180**	ø 215	ø 250	151.2	18.7	29	67.2	13
NEMA 180	535.227.N180	**ø215.9**	ø184.15	ø228.6	179.65	47.15	29	95.65	14

Not binding dimensions, for reference only

Servo Gearheads - RS & RT

Back-Driving and Self-Locking

When back-driving a worm gear set using the worm wheel as input, efficiency is lower than forward-driving and, by varying design data, back-drive efficiency can be reduced to zero, so obtaining self-locking or irreversible gear set.

When back-driving the worm gear, internal friction tends to lock gearing mesh, and the bigger applied torque is, the more mesh friction increases proportionally and increasing lockage at the same time.

The most obvious example is during braking or slowing-down where inertial load will try to back-drive the worm shaft.

A worm gear is intended a self-locking device when its lead angle is less than friction angle (arc tangent of friction coefficient).

Tooth contact is dynamic even when mesh velocity is zero, as vibrations in a non-rotating gear set can induce motion in tooth contact area.

To provide a safety factor, a 3° lead angle is at least recommended for full self-locking condition, and 10° lead angle for poor self-locking condition (reversible gear set), according to relation table between lead angles β and ratios *i*.

Lead angle	Static self-locking
$\beta > 20°$	Full back-driving
$10° < \beta < 20°$	High back-driving
$5° < \beta < 10°$	Good back-driving Poor self-locking
$3° < \beta < 5°$	Poor back-driving Good self-locking
$1° < \beta < 3°$	Full self-locking

	i =	5	7	10	15	20	28	40	49	56	70	80	100
RS/RT 28	m_x β	- - -	1.50 23°11'	1.40 16°41'	1.40 11°18'	1.10 10°23'	1.50 6°06'	1.10 5°14'	0.90 4°19'	0.75 3°03'	0.60 2°27'	0.55 2°37'	0.45 2°20'
RS/RT 40	m_x β	2,00 30°57'	2.10 21°36'	2.00 16°41'	2.00 11°18'	1.50 8°31'	2.10 5°39'	1.50 4°17'	1.25 3°48'	1.10 3°25'	0.90 3°01'	0.80 2°51'	0.65 2°38'
RS/RT 50	m_x β	2,50 30°57'	2.70 23°52'	2.50 16°41'	2.50 11°18'	1.90 5°59'	2.70 6°19'	1.90 4°31'	1.60 4°14'	1.40 3°42'	1.10 2°44'	1.00 2°51'	0.80 2°17'
RS/RT 60	m_x β	3,15 36°32'	3.30 25°33'	3.10 19°0'	3.10 12°55'	2.40 11°18'	3.30 6°49'	2.40 5°42'	2.00 5°11'	1.70 3°55'	1.40 3°38'	1.20 2°51'	1.00 2°51'
RS/RT 70	m_x β	3,60 34°01'	3.90 26°51'	3.60 18°38'	3.60 12°40'	2.80 11°18'	3.90 7°12'	2.80 5°42'	2.30 4°48'	2.00 4°05'	1.60 3°16'	1.40 2°51'	1.15 2°38'
RS/RT 85	m_x β	4,40 34°47'	4.70 26°05'	4.40 19°09'	4.40 13°02'	3.40 11°18'	4.70 6°58'	3.40 5°52'	2.80 4°52'	2.50 4°45'	2.00 3°48'	1.74 3°14'	1.40 2°40'
RS/RT 110	m_x β	- - -	6.10 26°22'	5.80 20°43'	5.80 14°09'	4.40 11°18'	6.10 7°04'	4.40 5°42'	3.60 4°43'	3.20 4°29'	2.60 3°54'	2.30 3°39'	1.80 2°34'

m_x = Axial module β= Lead angle (rh) 20° = Pressure angle

To the scope of intensifying our commitment to society, Varvel since 2004 started an ongoing support programme with three non-profit institutions: UNICEF (United Nations Children's Fund), MSF (Médicins sans Frontères) and ANT (National Cancer Association). Environmental respect and protection are also part of Varvel's values and this is why Varvel certified in 2001 its Environmental System to standard UNI EN ISO 14001.

A socially responsible company

Altri cataloghi
Other catalogues
Andere Kataloge

RS/RT

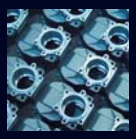
RN/RO/RV

VR

RD

RG

RP



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