RG

PLANETARY GEARBOXES

low backlash
coupling to brushless, DC
and IEC / NEMA standard motors

CONTENTS

VARVEL
KNOW-HOW TO DO IT

RG - Gearboxes

Description, Gearbox designation

The reduced backlash planetary speed reducers, Series RG, are designed as one and two stage versions, with hardened and tempered steel housing and broached internal gear.

Manufactured to latest ISO engineering design specifications is checked by com-puter-aided structural analysis for deflection and stress distribution.

Significant strains caused by the effects of both torque and external loads do not stress the monolithic housing, substantially improving the sealed surfaces.

The planetary speed reducers RG are made with gearing of alloyed steel, hardened and tempered; the planetary gear shafts of tempered steel.

Motor coupling options are available with clamping clutch, input flange and bush adapters.

Single-setup machining on state-of-the-art CNC production lines, the most recent calculation techniques and process controls give superior operational reliability, maximum output torques, high overhung and thrust load capacity, and long working life-time.

Gearbox designation

F	RG	071	3	Electric motor
				Motor designation
			Reduction ratio	
		Gearbox size		
	Gearbox type			

F = with Input flange
S = without input flange
M = Geared motor

Gearboxes - RG

Description

	General Specifications
Range	4 sizes 22 ratios 1 and 2 reducer stages
Housing	Hardened and tempered steel housing and broached internal gear
Flange	Aluminium
Toothed parts	Steel hardened and tempered
Shafts & Keys	Tempered steel Shafts h7 - Bores F8 Keys according to DIN6885 B1
Bearings	Ball types according to sizes and technical requirements
Lubricant	Synthetic long-life grease
Baking painting	Epoxy powder paint Standard colour RAL 9005

RG - Gearboxes

Symbols

Symbol	Description
C_t [Nm / arcmin]	Torsional rigidity
F_{r2} [N]	Catalogue radial load (output)
F_{a2} [N]	Catalogue axial load (output)
F_S	Shock factor
i	Reduction ratio (finite values)
J_1 [$kgcm^2$]	Moment of inertia at gearbox input shaft
T_{2acc} [Nm]	Gearbox max. output acceleration torque (S5 - max. 1000 cycles per hour)
T_{2ISO} [Nm]	Gearbox nominal output torque according to ISO 6336 (S1 - continuous operation)
T_{2max} [Nm]	Gearbox emergency output torque (max. 1000 times in gearbox life)
n_1 [min^{-1}]	Input speed
n_{1max} [min^{-1}]	Max. input speed
P [kg]	Weight (average reduction ratio)
η	Efficiency
φ	Angular backlash

VARsize by VARVEL

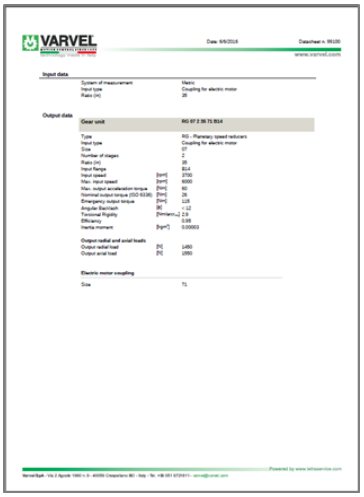
Modularity and flexibility
have been leading the design of VARVEL products since the years 2000: this way, the gearbox-kit concept was carried out allowing anyone to assemble the unit in few minutes with standard tooling.

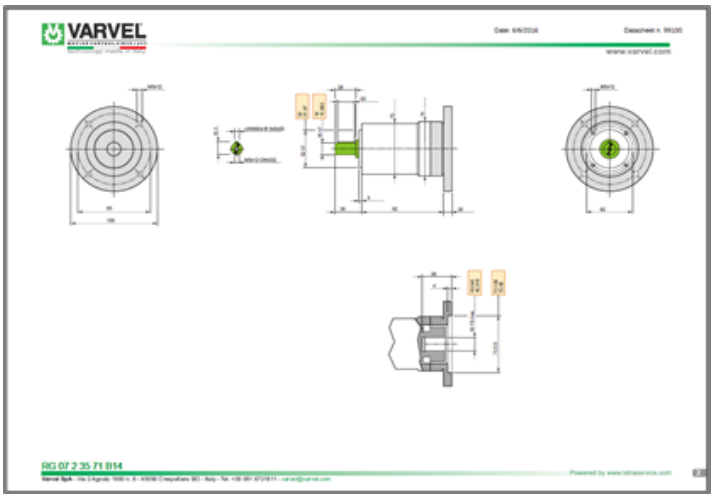
This feature provides the highest flexibility to VARVEL's distributors and resellers who - thanks to a limited kit selection - are able to immediately configure the required product.

VARsize® selection program, available from our web-site
www.varvel.com
allows a friendly sizing of VARVEL product range.

2D/3D Drawings
A guided selection lets 2D/3D models downloaded for the most popular CAD systems.

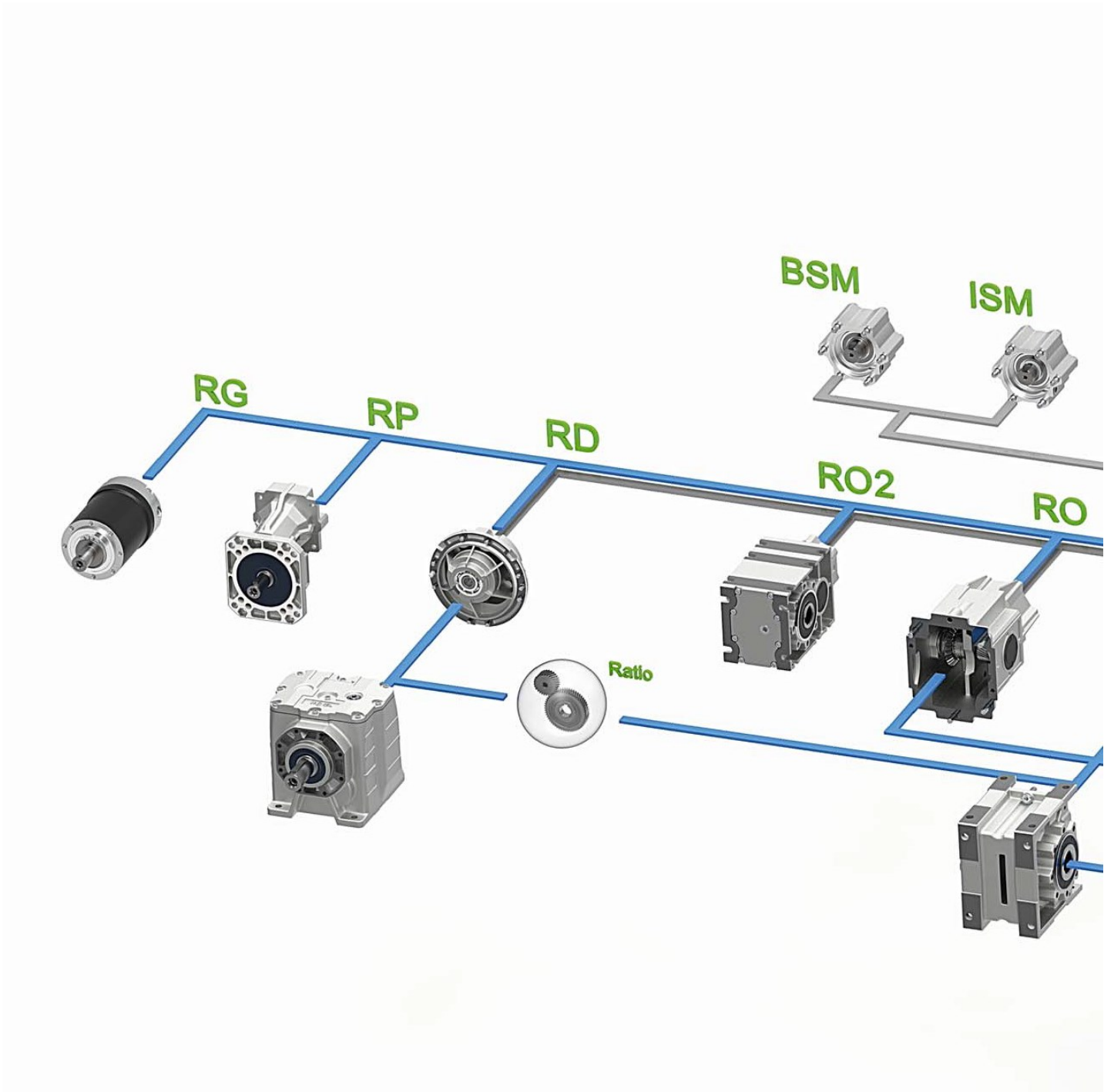
Guided selection
This option returns a list of applicable product configurations upon a given sequence of application parameters (power, output torque, rpm, service factor etc.); a PDF data sheet featuring performance data and dimensional drawings is generated for each configuration, as well as the 3D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

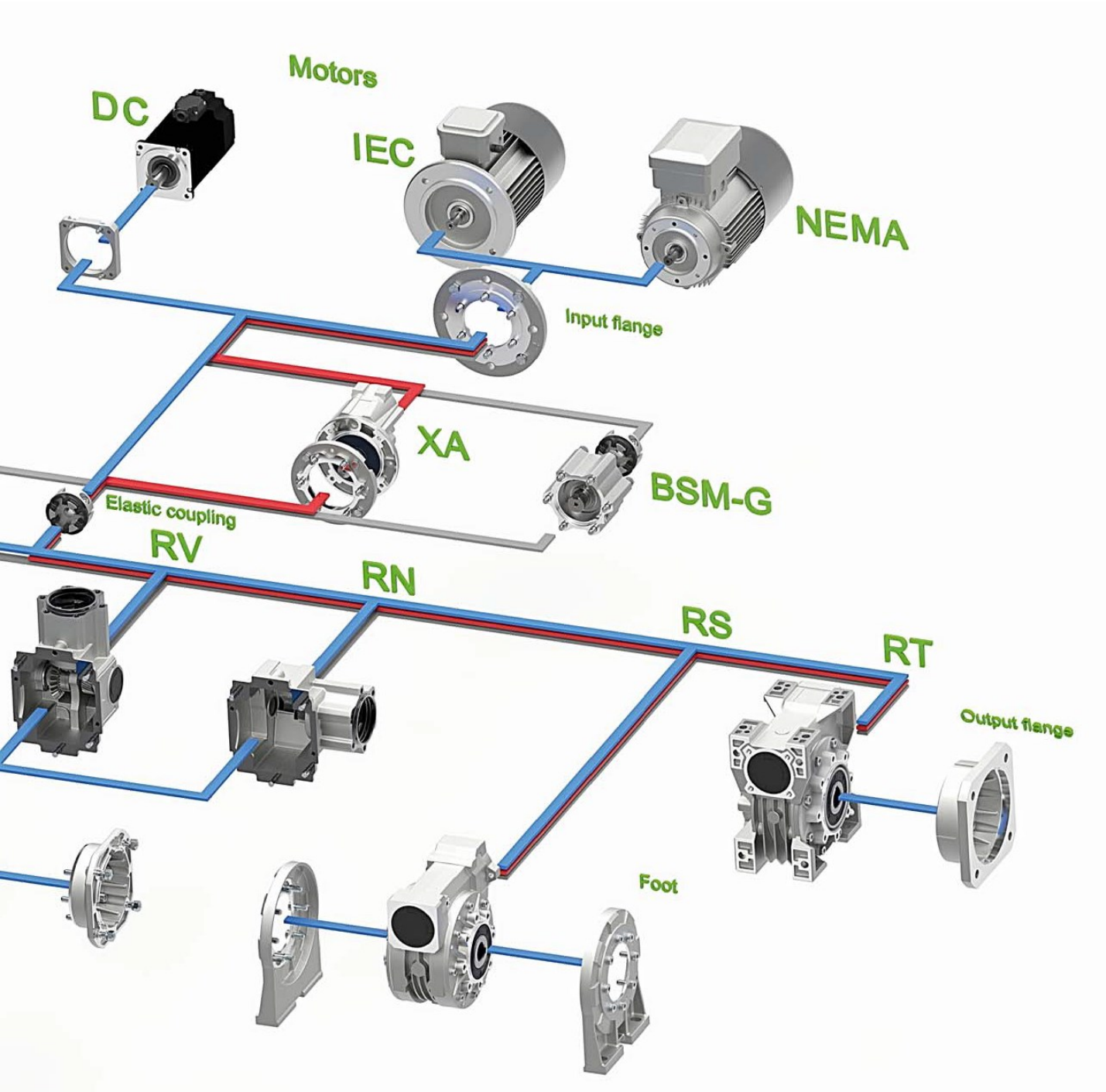




RG - Gearboxes

Modular System



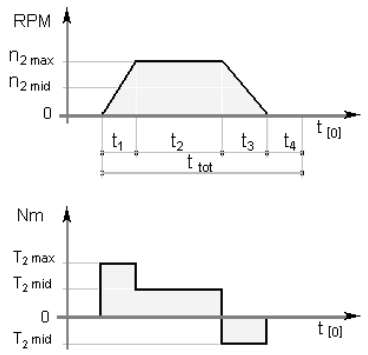

Motors
DC
IEC
NEMA
Input flange
XA
BSM-G
Elastic coupling
RV
RN
RS
RT
Output flange
Foot

RG - Gearboxes

Duty cycle

Investigation of gearbox actual duty cycle is the basic rule in planetary gearbox selection.
An operative duty cycle can be pictured as follows:

n_{2max}	[rpm]	Max. speed
n_{2mid}	[rpm]	Average speed
t_1	[s]	Acceleration speed time
t_2	[s]	Speed standard time
t_3	[s]	Speed deceleration time
t_4	[s]	Pause time
T_{2max}	[Nm]	Max. torque
T_{2mid}	[Nm]	Standard torque
T_{2dec}	[Nm]	Deceleration torque



Gearbox selection is made according to Continuous or Intermittent operation under time percentage (S_p) or duration (S_t) evaluation of duty cycle.

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

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

S1 - Continuous duty if S_p > 60 % or S_t > 20 minutes

$T_{2\,nom}$ [Nm]	Gearbox nominal output torque (continuous duty)	$T_{2nom} = \frac{T_{1nom} * i * \eta}{0,65}$
$T_{1\,nom}$ [Nm]	Motor nominal torque	$T_{2nom} < T_{2_{ISO}}$
$T_{2\,ISO}$ [Nm]	Gearbox nominal output torque according to ISO 6336	$n_{2nom} > n_{2eqv}$
$n_{\,2nom}$ [min^{-1}]	Gearbox nominal output speed	
$n_{\,2\,eqv}$ [min^{-1}]	Gearbox average speed	

S5 - Intermittent duty if S_p < 60 % and S_t < 20 minutes

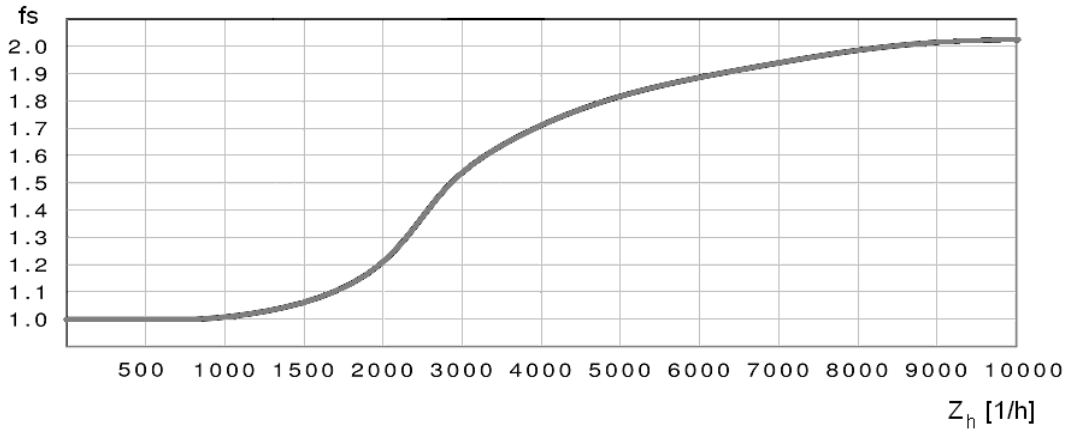
T_{2acc} [Nm]	Max. output acceleration torque	$T_{2acc} \geq T_{1acc} * i * f_s * \eta$
T_{1acc} [Nm]	Max. motor acceleration torque	$Z_h \geq \frac{3600}{t_1 + t_2 + t_3 + t_4}$
i	Reduction ratio	$T_{2_{eqv}} = \sqrt[3]{\frac{T^3_{2max} * n_{2mid} * t_1 + ... + T^3_{2n} * n_{2n} * t_n}{t_1 * n_{2mid} + ... + t_n * n_{2n}}}$
f_s	Shock factor (see chart - page 10)	$n_{2_{eqv}} = \frac{n_{21} * t_1 + ... + n_{2n} * t_n}{t_1 + ... + t_n}$
η	Gearbox efficiency	
Z_h [1/h]	Number of Cycles per hour	

RG - Gearboxes

Duty cycle - Shock factor

The shock factor (f_s) - for the intermittent service - is a service factor that keeps into account rapid motion inversions associated with quick acceleration times.

Such overloads must be considered when sizing.



Gearboxes - RG

Versions

MRG

- Motoriduttori a uno e due coppie di ingranaggi
  Coppia: 6 Nm a 230 Nm
  Rapporti di riduzione: 3:1 a 100:1

FRG

- Gearboxes with two and three gear sets and with input motor flange,
  input quill and clamp coupling
  Motor flanges: square, IEC, NEMA
  Output torques: 6 Nm to 230 Nm
  Reduction ratios: 3:1 to 100:1

SRG

- Gearboxes with two and three gear sets without input motor flange, but with input hollow shaft and clamp coupling
  Output torques: 6 Nm to 230 Nm
  Reduction ratios: 3:1 to 100:1

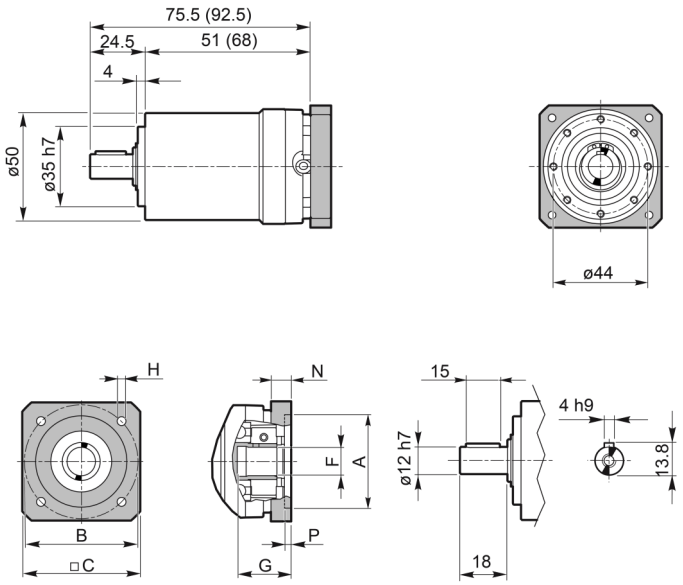
RG - Gearboxes RG05

Gearbox Selection

RG	i	T_{2acc} [Nm]	T_{2ISO} [Nm]	T_{2max} [Nm]	n_1 [min^{-1}]	n_{1max} [min^{-1}]	φ [arcmin]	C_t [Nm/arcmin]	F_{r2} [N]	F_{a2} [N]	J_1 [$kgcm^2$]	η %	P [kg]
051 ①	**3**	12	6	24	3500	5000	< 8	0,9	650	700	0,12	97	0,8
	4	18	8	35	3500	5000	< 8	0,9	650	700	0,12	97	0,8
	5	20	9	40	4000	6000	< 8	0,9	650	700	0,12	97	0,8
	7	23	10	46	4000	6000	< 8	0,9	650	700	0,10	97	0,8
	9	18	8	35	4000	6000	< 8	0,9	650	700	0,10	97	0,8
	10	25	11	52	4000	6000	< 8	0,9	650	700	0,10	97	0,8
052 ②	**12**	12	6	24	3500	5000	< 12	0,8	650	700	0,10	95	1,0
	15	12	6	24	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	16	18	8	35	3500	5000	< 12	0,8	650	700	0,10	95	1,0
	20	18	8	35	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	25	20	9	40	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	28	18	8	35	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	30	12	6	24	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	35	20	9	40	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	40	18	8	35	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	45	18	8	35	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	50	20	9	40	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	63	18	8	35	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	70	23	10	46	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	81	18	8	35	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	90	18	8	35	4000	6000	< 12	0,8	650	700	0,10	95	1,0
	100	25	11	52	4000	6000	< 12	0,8	650	700	0,10	95	1,0

① - Single reduction stages

② - Two reduction stages



Flange part No.	Motor flange							
	A (#)	B	C	F	G	H	N	P
652.206.070	60	75	70	11	24	M4	21	4
APP050003	40	63	56	11	33	M5	9	4,5
APP050004	22	43.84	56	11	31	Ø5	7	4,5
APP050006	38.1	66.66	56	11	33	M4	9	4,5
APP050009	36	70.71	60	11	33	M4	9	4,5
APP050013	50	70	60	11	33	M5	9	4,5
APP050022	50	70	60	11	45	M4	21	4,5
APP050027	50	70	60	11	45	M5	21	4,5
APP050035	60	75	65	11	36	M5	12	4,5
A180001A	38.1	66.66	56	11	38,5	M4	14,5	4,5
A180002A	40	63	56	11	37	M5	13	4,5
A180003A	36	70.71	60	11	37	M4	13	4,5
A180005A	50	70	60	11	37	M5	13	4,5
A180043A	30	45	50	11	33	M3	9	3
APP2101	38.1	66.66	57	11	37	M4	13	2,5
A180083A	40	63	56	11	41	M5	17	4,5

68) & (92.5) - Dimensions RG052
(#) - Motor flange spigot
Not binding dimensions and weights

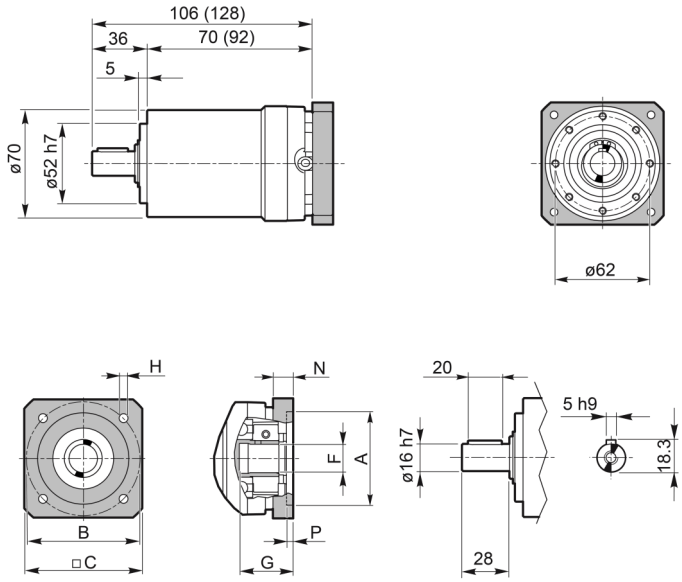
RG - Gearboxes

RG07

RG	i	T_{2acc} [Nm]	T_{2ISO} [Nm]	T_{2max} [Nm]	n_1 [min^{-1}]	n_{1max} [min^{-1}]	φ [arcmin]	C_t [Nm/arcmin]	F_{r2} [N]	F_{a2} [N]	J_1 [$kgcm^2$]	η %	P [kg]
071 ①	**3**	37	17	70	3500	5000	< 8	3,4	1450	1550	0,35	97	1,8
	4	53	25	100	3500	5000	< 8	3,4	1450	1550	0,35	97	1,8
	5	60	26	115	3700	6000	< 8	3,4	1450	1550	0,35	97	1,8
	7	69	32	135	3700	6000	< 8	3,4	1450	1550	0,30	97	1,8
	9	55	25	110	3700	6000	< 8	3,4	1450	1550	0,30	97	1,8
	10	76	35	150	3700	6000	< 8	3,4	1450	1550	0,30	97	1,8
072 ②	**12**	37	17	70	3500	5000	< 12	2,9	1450	1550	0,30	95	2,2
	15	37	17	70	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	16	53	25	100	3500	5000	< 12	2,9	1450	1550	0,30	95	2,2
	20	53	25	100	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	25	60	26	115	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	28	53	25	100	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	30	35	17	70	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	35	60	26	115	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	40	53	25	100	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	45	55	25	110	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	50	60	26	115	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	63	55	25	110	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	70	69	32	135	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	81	55	25	110	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	90	55	25	110	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2
	100	76	35	150	3700	6000	< 12	2,9	1450	1550	0,30	95	2,2

① - Single reduction stages

② - Two reduction stages



Flange part No.	Motor flange							
	A (#)	B	C	F	G	H	N	P
653.206.085	80	100	85	19	30	M6	25	4.5
APP070002	80	100	85	19	44	M6	13,5	4.5
APP070003	70	90	80	19	44	M6	13,5	4.5
APP070006	60	75	72	19	44	M5	13,5	3
APP070007	95	115	98	19	44	M8	13,5	4
APP070008	80	100	85	19	44	M8	13,5	4.5
APP070011	73	98.29	85	19	44	M5	13,5	4.5
A180007A	95	115	98	19	55,5	M8	25	4
A180008A	50	95	80	19	44	M6	13,5	4
A180051A	80	100	90	19	44	M6	13,5	5.5
A180054A	73.025	98.43	87	19	45,5	M5	15	4.5
A180055A	50	70	60	19	44	M5	13,5	3.5
APP2258	40	63	65	19	45,5	M5	15	10.5
A180066A	70	90	80	19	50	M6	19,5	4.5
A180076A	40	73.5	65	19	44	M4	13,5	4.5

92) & (128) - Dimensions RG072
(#) - Motor flange spigot
Dimensions and weights are not binding

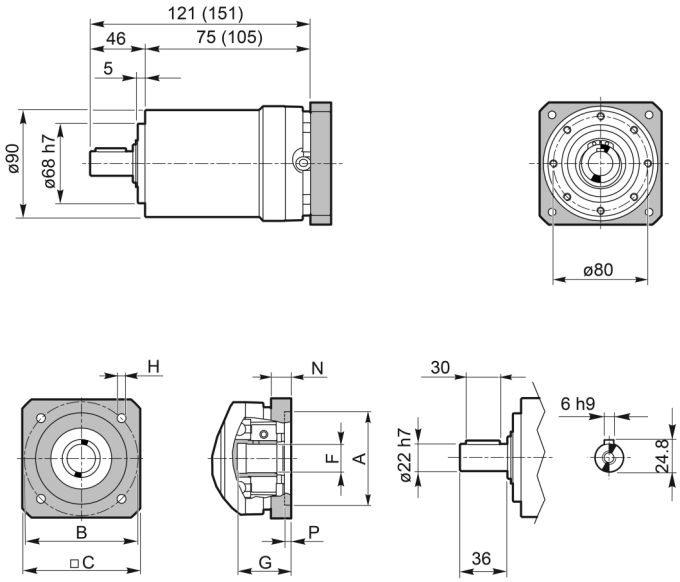
RG - Gearboxes RG09

Gearbox Selection

RG	i	T_{2acc} [Nm]	T_{2ISO} [Nm]	T_{2max} [Nm]	n_1 [min^{-1}]	n_{1max} [min^{-1}]	φ [arcmin]	C_t [Nm/arcmin]	F_{r2} [N]	F_{a2} [N]	J_1 [$kgcm^2$]	η %	P [kg]
091 ①	**3**	95	45	185	3000	4500	< 8	9,3	2400	1900	1,85	97	4,0
	4	140	68	260	3000	4500	< 8	9,3	2400	1900	1,85	97	4,0
	5	160	75	300	3400	5500	< 8	9,3	2400	1900	1,85	97	4,0
	7	180	89	350	3400	5500	< 8	9,3	2400	1900	1,80	97	4,0
	9	145	70	280	3400	5500	< 8	9,3	2400	1900	1,80	97	4,0
	10	200	98	390	3400	5500	< 8	9,3	2400	1900	1,80	97	4,0
092 ②	**12**	95	45	185	3000	4500	< 12	7,6	2400	1900	1,80	95	4,9
	15	95	45	185	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	16	140	68	260	3000	4500	< 12	7,6	2400	1900	1,80	95	4,9
	20	140	68	260	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	25	160	75	300	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	28	140	68	260	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	30	95	45	185	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	35	160	75	300	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	40	140	68	260	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	45	145	70	280	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	50	160	75	300	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	63	145	70	280	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	70	180	89	350	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	81	145	70	280	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	90	145	70	280	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9
	100	200	98	390	3400	5500	< 12	7,6	2400	1900	1,80	95	4,9

① - Single reduction stages

② - Two reduction stages



Flange part No.	Motor flange							
	A (#)	B	C	F	G	H	N	P
654.206.120	100	130	120	24	38	M8	50	4.5
APP090009	80	100	85	24	65	M6	14,5	4.5
APP090011	70	90	80	24	65	M6	14,5	4.5
APP090012	110	145	120	24	65	M8	14,5	6.5
APP090013	95	115	100	24	65	M8	14,5	4.5
APP090014	95	115	100	24	69,5	M6	19	4.5
APP090040	110	145	120	24	70	M8	19,5	6.5
APP090041	95	135	120	24	65	M8	14,5	6.5
A180036A	110	130	125	24	75,5	Ø8,5	25	8.5
A180037A	80	100	90	24	68,5	M6	18	6
A180041A	110	145	130	24	69,5	M8	19	11
A180045A	110	145	120	24	78,5	M8	28	6.5
A180059A	110	145	120	24	65	M8	14,5	3.5
A180061A	110	145	130	24	65	M8	14,5	3.5
A180064A	73	98.43	86	24	65	M6	14,5	4.5

(105) & (151) - Dimensions RG092
(#) - Motor flange spigot
Dimensions and weights are not binding

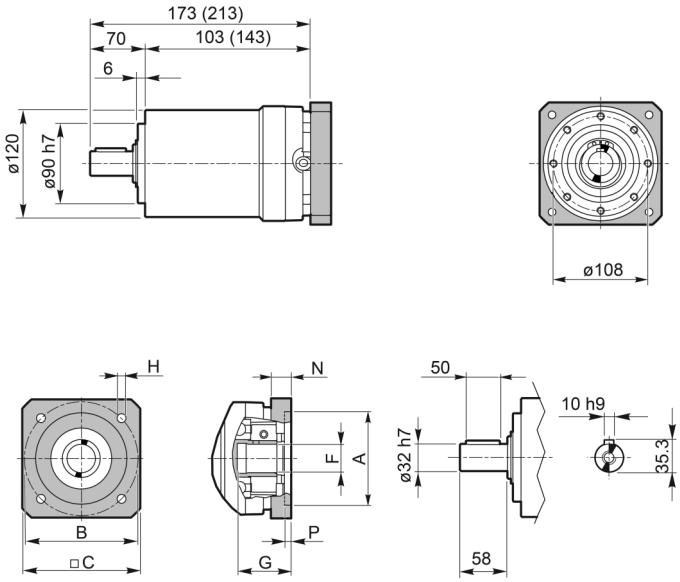
RG - Gearboxes RG12

Gearbox Selection

RG	i	T_{2acc} [Nm]	T_{2ISO} [Nm]	T_{2max} [Nm]	n_1 [min^{-1}]	n_{1max} [min^{-1}]	φ [arcmin]	C_t [Nm/arcmin]	F_{r2} [N]	F_{a2} [N]	J_1 [$kgcm^2$]	η %	P [kg]
121 ①	**3**	230	110	430	2500	4000	< 8	25	4600	4000	5,60	97	9,0
	4	330	160	600	2500	4000	< 8	25	4600	4000	5,60	97	9,0
	5	380	180	700	2600	4800	< 8	25	4600	4000	5,60	97	9,0
	7	430	210	800	2600	4800	< 8	25	4600	4000	5,55	97	9,0
	9	350	160	650	2600	4800	< 8	25	4600	4000	5,55	97	9,0
	10	480	230	900	2600	4800	< 8	25	4600	4000	5,55	97	9,0
122 ②	**12**	230	110	430	2500	4000	< 12	21	4600	4000	5,55	95	11
	15	230	110	430	2600	4800	< 12	21	4600	4000	5,55	95	11
	16	330	160	600	2500	4000	< 12	21	4600	4000	5,55	95	11
	20	330	160	600	2600	4800	< 12	21	4600	4000	5,55	95	11
	25	380	180	700	2600	4800	< 12	21	4600	4000	5,55	95	11
	28	330	160	600	2600	4800	< 12	21	4600	4000	5,55	95	11
	30	230	110	430	2600	4800	< 12	21	4600	4000	5,55	95	11
	35	380	180	700	2600	4800	< 12	21	4600	4000	5,55	95	11
	40	330	160	600	2600	4800	< 12	21	4600	4000	5,55	95	11
	45	350	160	650	2600	4800	< 12	21	4600	4000	5,55	95	11
	50	380	180	700	2600	4800	< 12	21	4600	4000	5,55	95	11
	63	350	160	650	2600	4800	< 12	21	4600	4000	5,55	95	11
	70	430	210	800	2600	4800	< 12	21	4600	4000	5,55	95	11
	81	350	160	350	2600	4800	< 12	21	4600	4000	5,55	95	11
	90	350	160	650	2600	4800	< 12	21	4600	4000	5,55	95	11
	100	480	230	900	2600	4800	< 12	21	4600	4000	5,55	95	11

① - Single reduction stages

② - Two reduction stages



Flange part No.	Motor flange							
	A (#)	B	C	F	G	H	N	P
655.206.158	130	165	158	38	52.5	M10	58	- - -
APP120001	95	115	110	38	80	M8	18	5
APP120006	130	165	140	38	80	M8	18	5
APP120033	130	165	140	38	80	M10	18	5
A180040A	110	130	126	38	80	M8	18	5

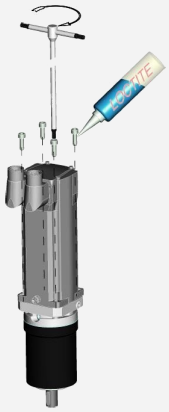
(143) & (213) - Dimensions RG122
(#) - Motor flange spigot
Dimensions and weights are not binding

RG - Gearboxes

Motor fitting

Step 1

- Remove the protection cap.
- Rotate the gearbox input bush until tightening screw head is aligned with the access hole of the flange.
- Loosen the tightening screw.
- Correctly align the motor shaft to the gearbox.
- Fit the motor, preferably vertically.



Screw	Class	Tightening torque [Nm]
M4	12.9	4.9
M5		9.7
M6		16
M8		40
M10		77

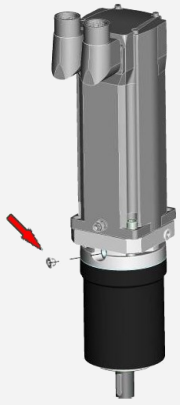
Step 2 - Motor locking

- Apply anti-loosening paste (Loctite 243 or similar) on screw thread.
- Tighten the screws according to table torque values.
- Screw resistance class: 12.9 (recommended)

Gearbox size	Screw (*)	Tightening torque **[Nm]**
RG 051/052	VC 4.12	4.9
RG 071/072	VC 5.20	9.7
RG 091/092	VC 6.30	16
RG 121/122	VC 8.40	40

Step 3 - Clamp jaw locking
- Set torque wrench to measure tightening torque value as shown.
- Tighten clamp screw (Class 12.9) as listed.

(*) - Socked-head screw (Allen screw).

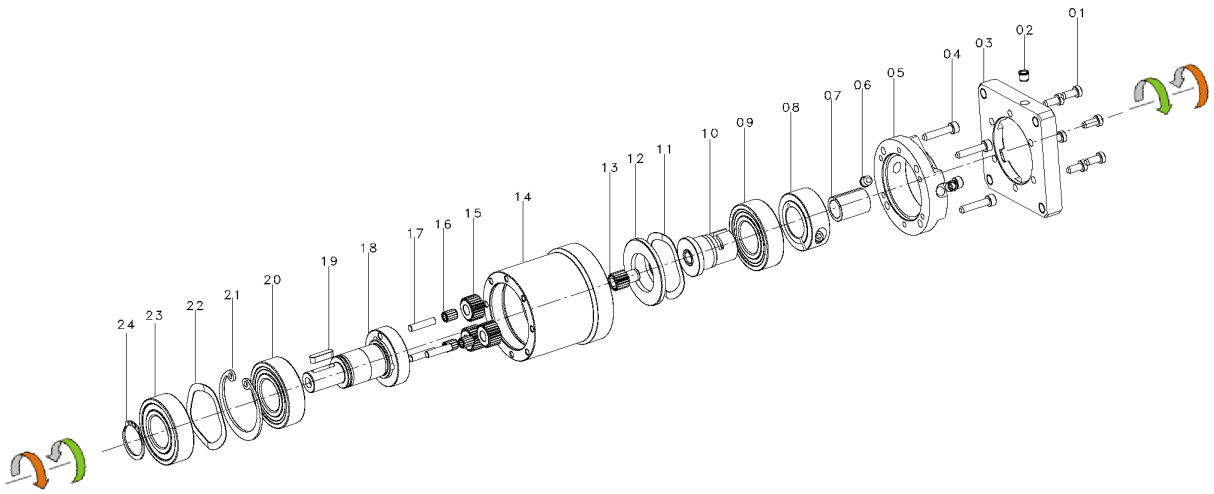


Step 4
- Reset the protection plug.

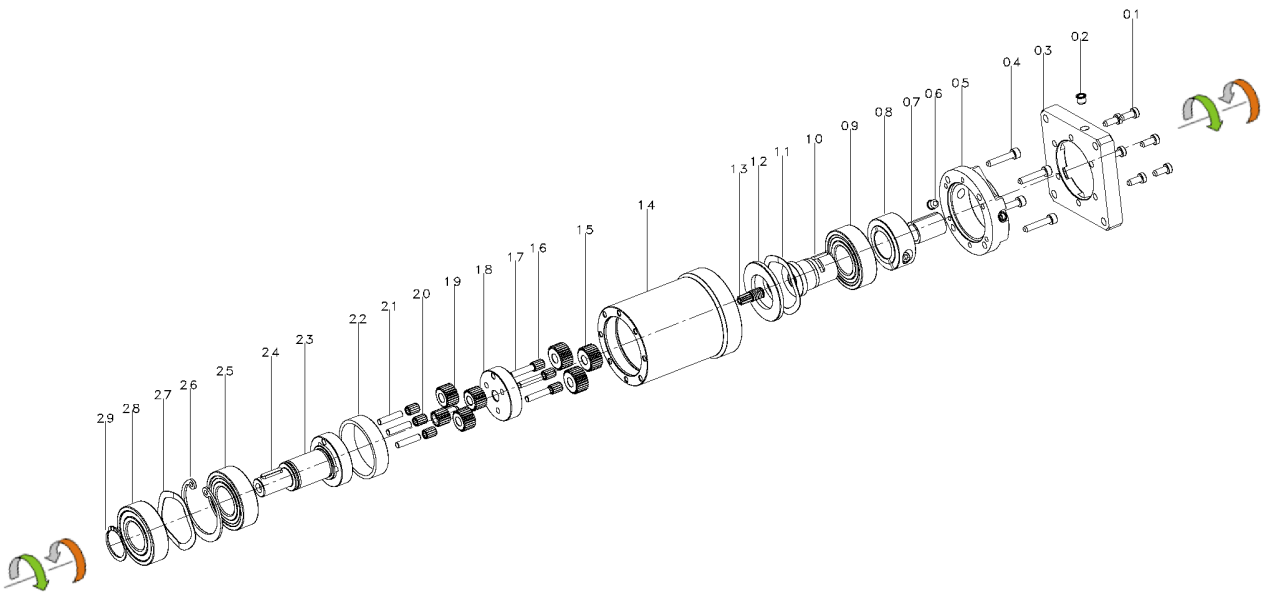
RG - Gearboxes

RG_1

Rotation and Component Parts



Item	Description	Item	Description
01	Screw	16	Needle bearing
02	Plug	17	Planet shaft
03	Motor flange	18	Planet carrier
04	Screw	19	Key
05	Input flange	20	Bearing
06	Plug	21	Snap ring
07	Adapter	22	Shim
08	Clamp coupling	23	Bearing
09	Bearing	24	Snap ring
10	Input shaft		
11	Shim		
12	Spacer		
13	Sun gear		
14	Ring gear body		
15	Planet gear		



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09	Bearing	24	Key
10	Input shaft	25	Bearing
11	Shim	26	Snap ring
12	Spacer	27	Shim
13	Sun gear	28	Bearing
14	Ring gear body	29	Snap ring
15	Planet gear		

RG - Gearboxes

Abstract of OPERATION AND MAINTENANCE INSTRUCTIONS
(complete manual on **www.varvel.com**)

Under the terms of the Machine Directive 2006/42/EC and relevant Guidelines, the speed gearboxes and variators are considered as “machines’ separate elements not having a specific application and meant for being incorporated onto the machine. The complete machine and equipped with such components must comply with the essential and relevant requisites for safety and health preservation” of the mentioned Directive.

Installation
Check if the unit to be installed, is properly selected to perform the required function and that its mounting position complies with the order.

The nameplate reports such information.

Check mounting stability to ensure the unit runs without vibrations or overloads.

Running
The unit may be connected for clockwise or counter-clockwise rotation.

The unit must be stopped as soon as defective running or unexpected noise occur, remove the faulty part or return the unit to the factory for checking.

If the faulty part is not replaced, other parts can also be affected, causing more severe damage and making the identification of initial cause more difficult.

Maintenance
Although the units are no-load run tested in the factory before despatch, it is recommended not to run them at maximum load for the first 20-30 running hours to allow the proper running in.

The gearboxes are delivered already filled with long-life synthetic oil and, in case of replacement or topping, do not mix with mineral lubricants.

Handling
When hoisting, use relevant housing locations or eyebolts if provided, or foot or flange holes

Never hoist on any moving part.

Painting
Carefully protect oil seals, coupling faces and shafts when units are re-painted.

Long-term storage
For storages longer than three months, apply anti-oxidants onto shafts and machined surfaces, and protective grease on oil seal lips.

Product’s Environmental Management
In conformity with Environmental Certification ISO 14001, we recommend the following to dispose of our products:
- scraped components of the units to be delivered to authorized centres for metal object collection;
- oils and lubricants drained from the units to be delivered to Exhausted Oil Unions;
- packages (pallets, carton boxes, paper, plastic, etc.,) to lead into regeneration/recycling circuits as far as possible, by delivering separate waste classes to authorized companies.