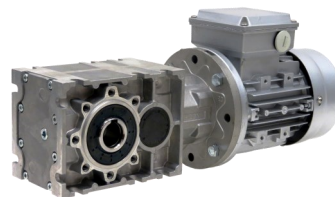


RO-2

BEVEL/HELICAL GEARBOXES

with two gear stages



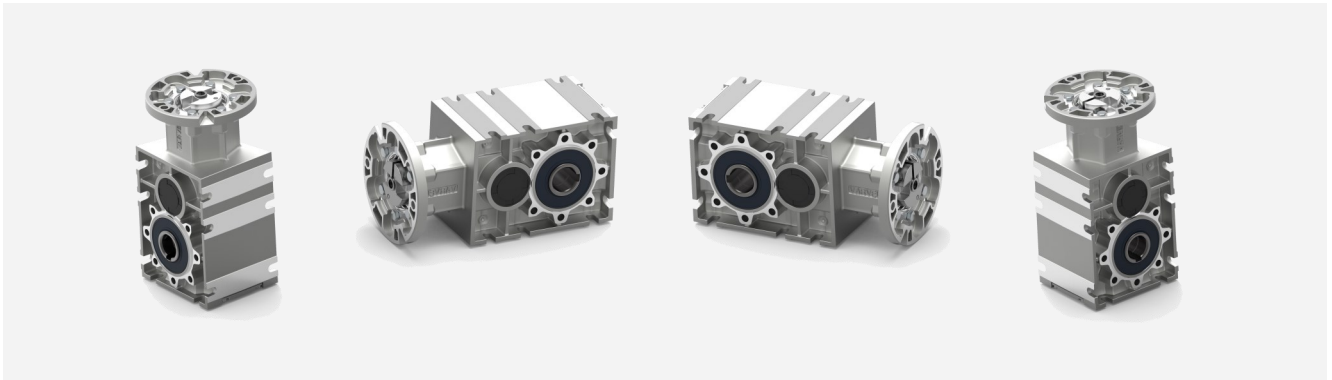
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RO-2 Gearboxes

Description



The two-stage bevel/helical gearboxes Series RO-2 are made of compact and robust one-piece-cast housing, input bevel gears and output helical stage to withstand important external loads.

RO-2 Series is designed according to latest ISO engineering specifications with the help of computer aided structural analysis for displacement and stress field.

The one-piece framework does not deflect under the effect of torque and external loads with effective results on sealing surfaces.

A shaft mount version allows the B5 flange mount conversion by a simply fitting of the many output flanges available.

Various dimensions and types of output shafts (hollow with through keyway, hollow with shrink disk, hollow splined and solid with single or double end) are available on request.

RO-2 Series is made of 4 sizes, 17 reduction ratios and output torques between 120 and 500 Nm.

Directive ATEX

The gearboxes VARVEL-ATEX, supplied on demand, are designed and manufactured according to Directive 94/9/CE "ATEX" and therefore, they are qualified for installation in potentially explosive atmospheres:

- Zones of Group II.
- Category 2 (or 3).
- Explosion hazard with gas presence (Zone 1 or 2).
- Explosion hazard with combustible dust presence (Zone 21 or 22).

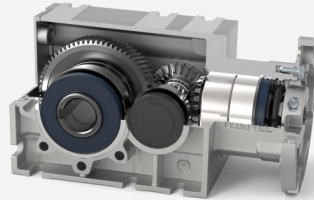
See detailed information at pages 58 and 59.

The units VARVEL-ATEX are identified by the additional marking:

 II 2 GD ck IP66CE T_{max}=135 °C

Gearboxes RO-2

Description



	Series RO2 - Bevel/helical gearboxes
Multipurpose Housing	Foot & Foot/Flange Mountings One housing for 2 gear-stages
Housing & Covers	Aluminium die cast
Input	NEMA and IEC motor adapters with universal elastic coupling or conventional bore and keyway.
Gearing	Alloy steel Case hardened Profile ground or shaved
Oil seals	NBR - Nitrile Butadiene Rubber as standard; Viton and Silicone on demand
Bearings	Ball or tapered roller on request according to sizes and technical requirements.
Output	Solid shafts; metric and imperial
Lubrication	Synthetic long-life Grade ISO VG 320. No oil/vent plugs. In-house filling

RO-2 Gearboxes

Description

	General specifications
Range	4 sizes 17 ratios in 2 stages 500 Nm max. output torque
Sizing	According to ISO6336 / DIN3990. 10.000 hrs average lifetime with service factor SF1
Housing Covers	Pressure die cast aluminium
Coupling G input	Pressure die cast aluminium Steel on demand
Toothed parts	Steel case hardened Tooth profile, ground or shaved Run-in bevel gears
AShafts Keys	Steel Tolerances: - Shafts h6 - Bores E8 - Keys according to DIN6885 B1
Bearings	Ball- or tapered roller-types according to sizes and technical requirements
Oil seals	Type NBR - Nitril-Butadiene Rubber with anti-dust lip according to DIN 3760 Type FKM - Fluor elastomer Viton on demand
LLubricant	Synthetic long-life oil Grade ISO VG 320
Powder coating	Natural aluminium, unpainted
ATEX	On demand

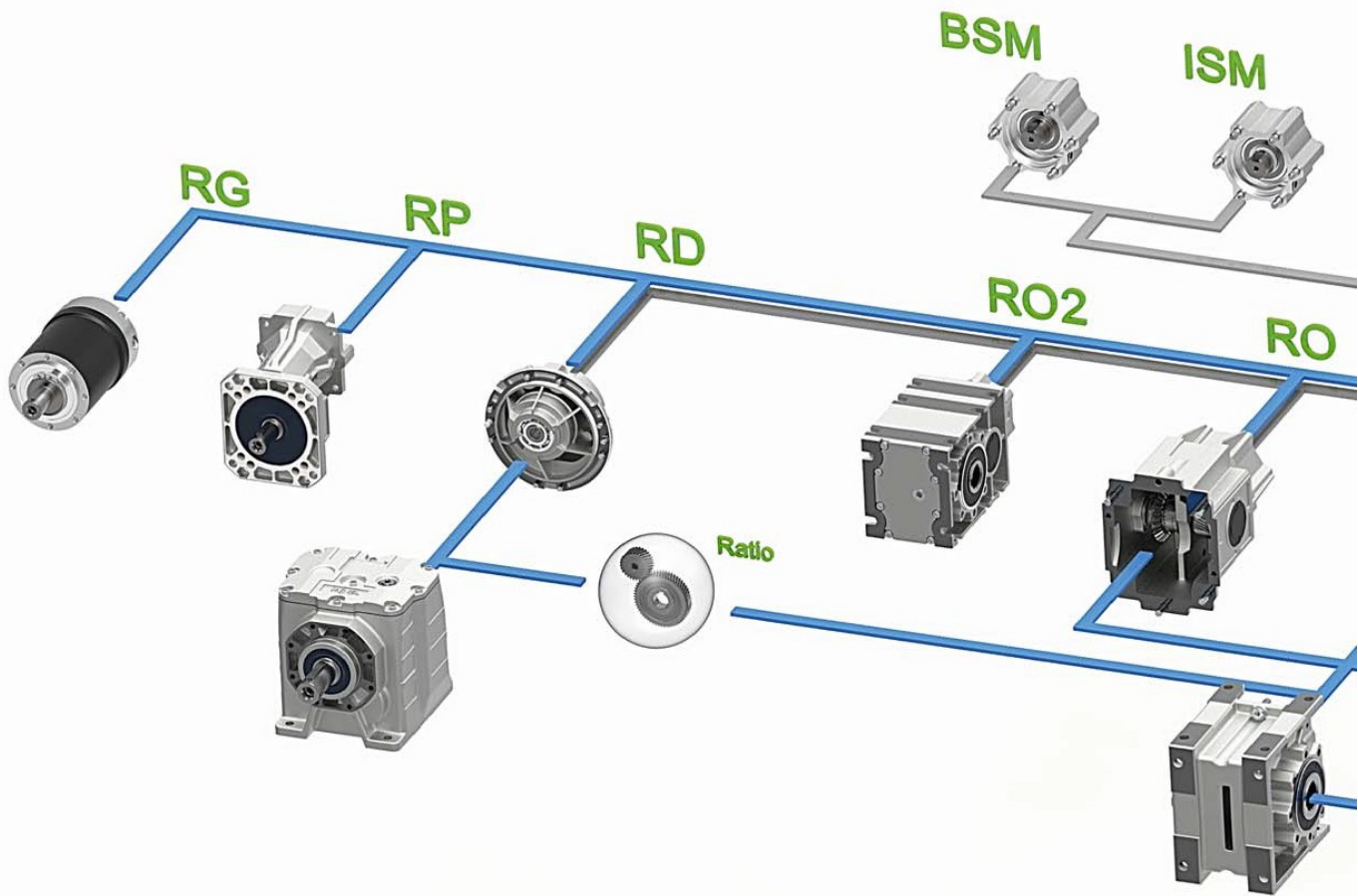
Gearboxes RO-2

Symbols

Symbol	Description
D [mm]	PCD of transmission element $k_{(t)}$
F_r [N]	Application radial load
F_{r1} [N]	Catalogue radial load (input)
F_{r2} [N]	Catalogue radial load (output)
$F_{r2b(x)}$ [N]	Permissible radial load at position "X" on output shaft. Based on bearing lifetime.
$F_{r2s(x)}$ [N]	Permissible radial load same as $F_{r2b(x)}$. Based on shaft bending and torsional stress.
FS	Service factor $FS = \frac{M_2}{M_{(app)}}$
i_n	Nominal reduction ratio
i_r	Actual reduction ratio
J_1 [kgcm ²]	Moment of inertia of the gearbox at gearbox input shaft
J_2 [kgcm ²]	Moment of inertia of the application
J_m [kgcm ²]	Moment of inertia of the motor
$k_{(a)}$	Mass acceleration factor
$k_{(t)}$	Transmission element factor
Lub H/V [l]	Lubricant (litres) H - Horizontal mounting V - Vertical mounting
M_2 [Nm]	Gearbox maximum output torque $M_2 = \frac{9550 * P_1 * \eta}{n_2}$
$M_{(app)}$ [Nm]	Application torque
n_1 [min ⁻¹]	Input speed
n_2 [min ⁻¹]	Output speed
P_1 [kW]	Input power $P_1 = \frac{M_2 * n_2}{9550 * \eta}$
$P_{(kg)}$ [kg]	Weight: for mounting B3H2 / B3H4 and average reduction ratio
η	Efficiency - $\eta = 0.96$ (two stage units)

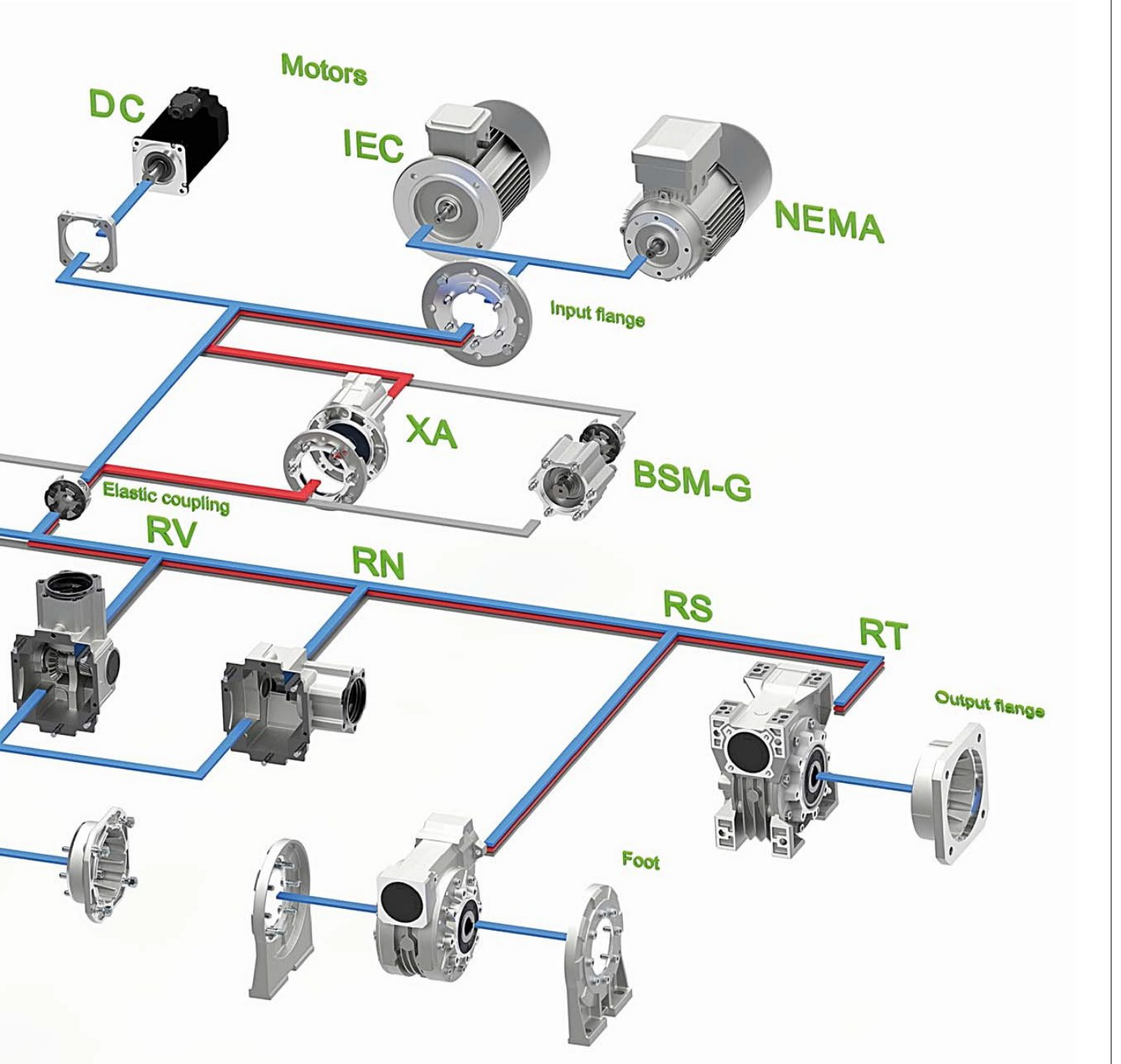
RO-2 Gearboxes

Modular System



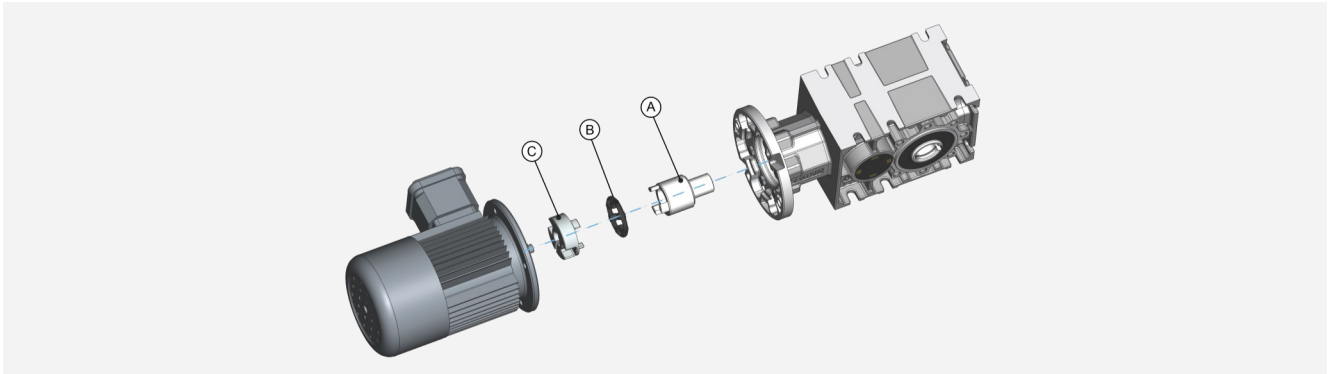
Gearboxes RO-2

Modular System



RO-2 Gearboxes

Coupling Description



A)

Reducer-side coupling hub

- Material: steel
- One piece machined on input shaft
- Two bearing setting
- Unchanged casing dimensions

B)

Spider

- External tooth connection
- Material: Thermoplastic Elastomer: IXEF® - Polyarylamide
- Hardness 90 Shore D
- Temperature -30/+135°C (-22/+275°F)

C)

Motor-side coupling hub

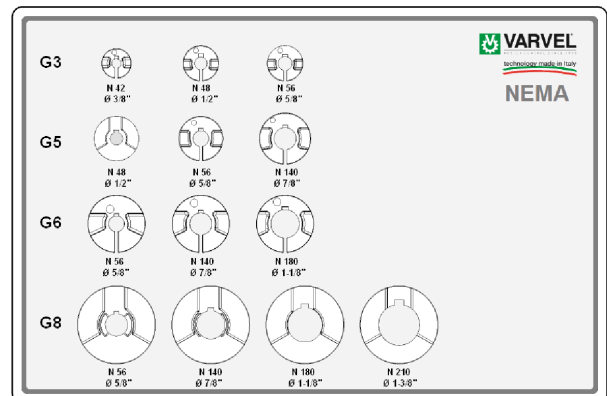
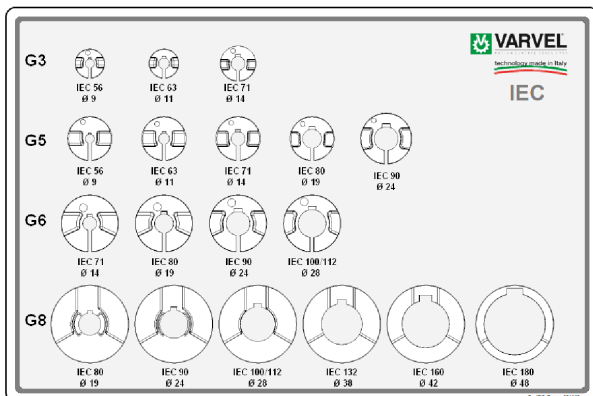
- Material: Pressure die cast aluminium (G3, G5, G6) Steel (GS3, GS5, GS6, GS8)
- Dynamic balancing
- Fitting: Clamp (G3, G5, G6) Key (GS3, GS5, GS6, GS8)
- Bores, available according to: IEC 72 / DIN42948 NEMA C and TC

Advantages:

- One gearbox only for each reduction ratio
- Greater flexibility
- Increased stock rotation
- Elimination of fretting corrosion between key and keyway
- Gearbox / motor connection with zero backlash
- Allowed angular misalignment 1° max.
- High torsional rigidity
- High vibration damping

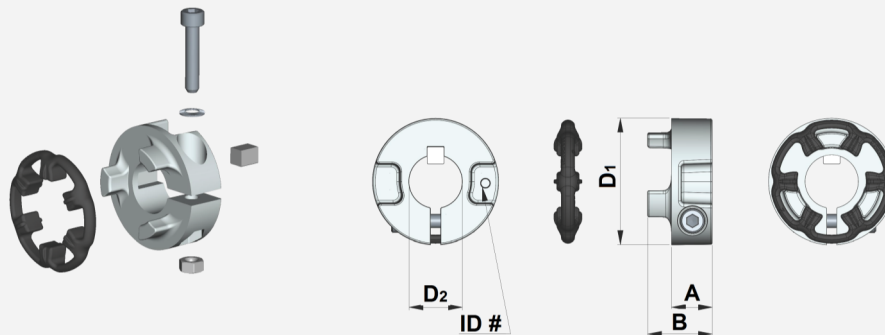
Input flanges:

- Material: Aluminium up to IEC112 & NEMA TC180
Cast iron from IEC 132 & NEMA TC200



Gearboxes RO-2

Elastic Coupling Selection



Type	IEC NEMA	Kit Part No.	RO 2 Size	Mt [Nm]	Mt ₁ [Nm]	Mt ₂ [Nm]	A [mm]	B [mm]	D ₁ [mm/ inch]	D ₂ [mm/ inch]	ID#				
G5	IEC	KG5.009/X	RO02	10	14	10	14.5	23	45	9	509				
		KG5.011/X			15	10			45	11	511				
KG5.014/X	30	17			45	14			514						
KG5.019/X	40	25			45	19			519						
KG5.024/X	70	40			52	24			524						
NEMA	KG5.N56/X KG5.N140/X	45			35	1.77			5/8"	5N56					
		60			45	2.05			7/8"	5N140					
G6	IEC	KG6.014/X			RO12-RO22-RO32	18			60	40	19.5	31.5	58	14	614
		KG6.019/X							90	65				19	619
KG6.024/X	130	100							24	624					
KG6.028/X	180	120	28	628											
KGs6.038X	500	---	38	---											
NEMA	KG6.N56/X KG6.N140/X KG6.N180/X	50	---	2.28			5/8"	6N56							
		85	---	7/8"	6N140										
		200	---	1-1/8"	6N180										

- Mt - Screw locking torque
- Mt₁ - Transmissible torque with key
- Mt₂ - Transmissible torque without key
- * - Coupling Gs6: steel. key fit and grub screw
- ../X - Code of coupling with IXEF black-spider
- Note** - No ID# marked on Coupling Gs6

RO-2 Gearboxes

Flange & Coupling Selection

IEC						
Gearbox	Flange				Coupling	
	Type	IEC	Kit Part No. B5	Kit Part No. B14	Type	Kit Part No.
RO02	FM 50	IEC56	K532.206.120	---	G5 ø9	KG5.009/X
		IEC63	K532.206.140	K532.206.090	G5 ø11	KG5.011/X
		IEC71	K532.206.160	K532.206.105	G5 ø14	KG5.014/X
		IEC80	K532.206.200	K532.206.120	G5 ø19	KG5.019/X
		IEC90	K532.206.200	K532.206.140	G5 ø24	KG5.024/X
RO12	FM 70	IEC63	K533.206.140	---	○ ø11	○ ø11
		IEC71	K533.206.160	K533.206.105	G6 ø14	KG6.014/X
		IEC80	K533.206.200	K533.206.120	G6 ø19	KG6.019/X
		IEC90	K533.206.200	K533.206.140	G6 ø24	KG6.024/X
		IEC 100/112	K533.206.250	K533.206.160	G6 ø28	KG6.028/X
RO22	FM 85	IEC63	K534.206.140	---	○ ø11	○ ø11
		IEC71	K534.206.160	---	G6 ø14	KG6.014/X
		IEC80	K534.206.200	K534.206.120	G6 ø19	KG6.019/X
		IEC90	K534.206.200	K534.206.140	G6 ø24	KG6.024/X
		IEC 100/112	K534.206.250	K534.206.160	G6 ø28	KG6.028/X
RO32	FM 110	IEC71	K535.206.160	---	G6 ø14	KG6.014/X
		IEC80	K535.206.200	---	G6 ø19	KG6.019/X
		IEC90	K535.206.200	---	G6 ø24	KG6.024/X
		IEC 100/112	K535.206.250	K535.206.160	G6 ø28	KG6.028/X
		IEC132	K535.206.300	K535.206.200	IEC Ø38	---

○ ø11 - Bore with key/keyway

NEMA					
Gearbox	Flange			Coupling	
	Type	NEMA	Kit Part No.	Type	Kit Part No.
RO02	FM 50	56 C 140 TC	K532.227.N56	G5 ø5/8" G5 ø7/8"	KG5.N56/X KG5.N140/X
RO12	FM 70	56 C 140 TC	K533.227.N56	G6 ø5/8" G6 ø7/8"	KG6.N56/X KG6.N140/X
RO22	FM 85	56 C 140 TC	K534.227.N56	G6 ø5/8" G6 ø7/8"	KG6.N56/X KG6.N140/X
RO32	FM 110	56 C 140 TC 180 TC	K535.227.N56 K535.227.N56 K535.227.N180	G6 ø5/8" G6 ø7/8" G6 ø1-1/8"	KG6.N56/X KG6.N140/X KG6.N180/X

Gearboxes RO-2

Gearbox & Motor Designation

GEARBOX DESIGNATION

F	RO	12	/B3	H	31.5	IEC71	-B14	AU30	DFU200
									Output flange
									Output shaft ø
									B5, B14 = Motor form
									Electric motor frame
									Reduction ratio
									H, V = Gearbox mounting position
									B3, B5 = Gearbox form
									02, 12, 22, 32 = Gearbox size and stages
									RO = Gearbox type

M = Geared motor
 F = Gearbox with input flange
 S = Gearbox without input flange
 ... = (nothing) Gearbox with input free shaft

MOTOR DESIGNATION

MT	0.37 kW	71 B	4	B14	230/400/50	IP55	F	X4
								Terminal box position
								Classe F (std) = Insulation class
								IP55 (std) = Protection class
								Voltage / Frequency
								B5, B14 = Mounting form
								Number of poles
								Motor frame (IEC)
								Motor power

MT = Three-phase motor
 MM = Single-phase motor
 MA = Brake motor

RO-2 Gearboxes

VARsize - Electronic catalogue



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

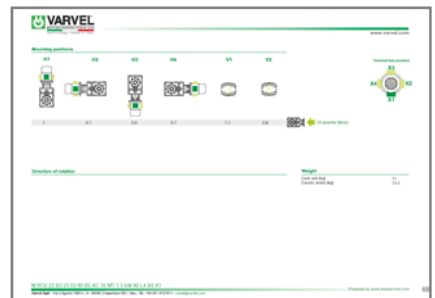
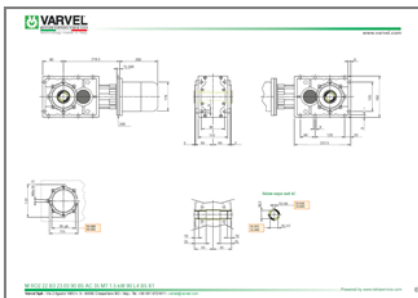
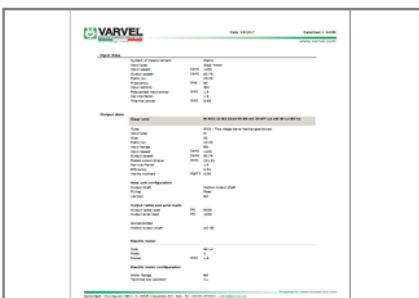
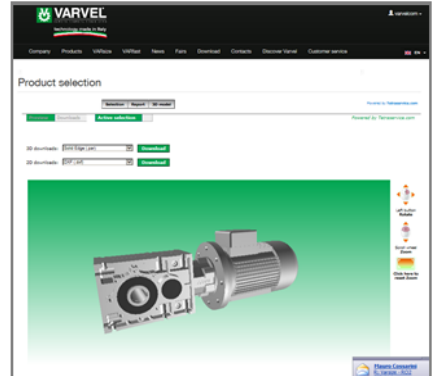
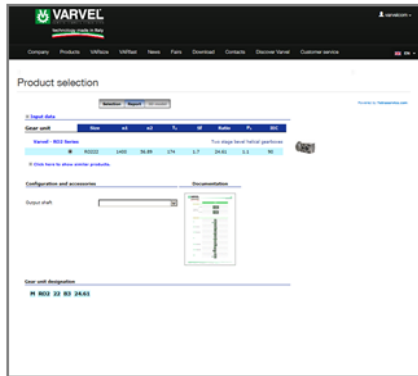
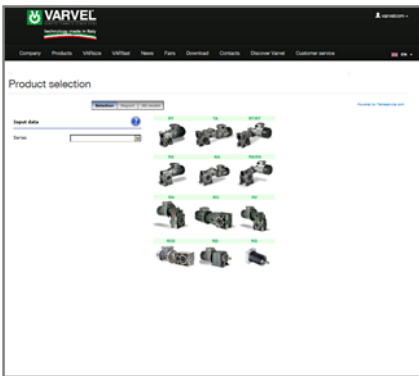
allows a friendly sizing of VARVEL product range.

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.

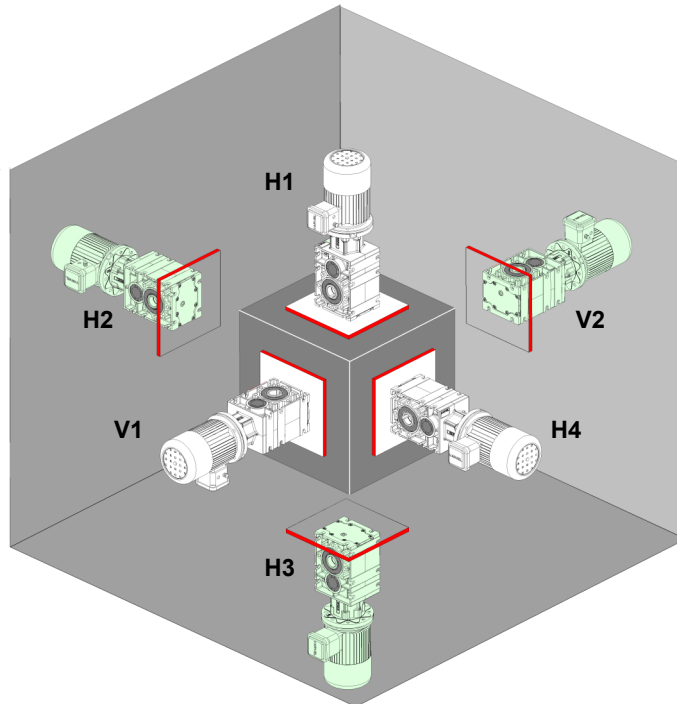


Gearboxes RO-2

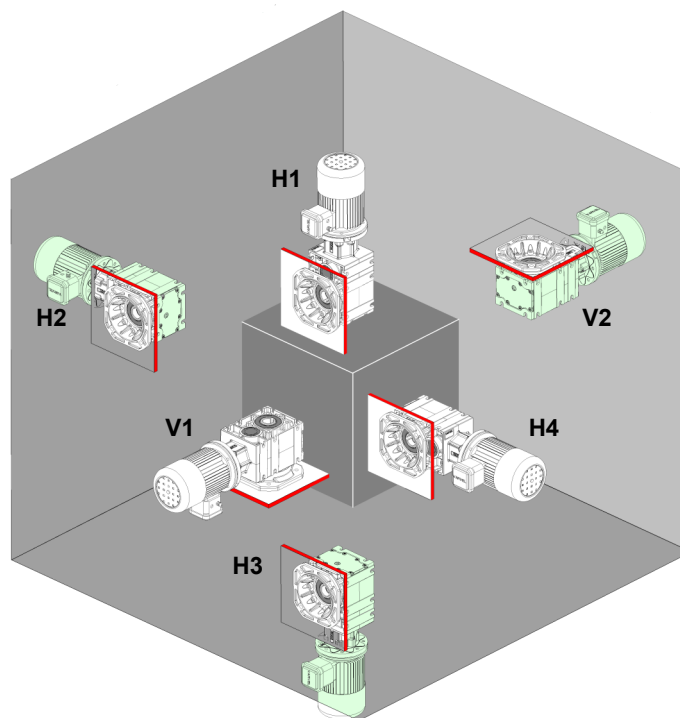
Mounting positions

B3
Foot mounting

RO 2



B5
Flange mounting



Mounting position is referred to the output shaft and not to foot or flange fixing.

RO-2 Gearboxes

Service factors

SERVICE FACTOR of the gearbox

Service factor FS1.0 is meant as typical of 8 hours/day operation, with uniform load and mass acceleration factor $k_{(a)} \leq 0.2$, starts/ stops lower than 300 per hour and ambient temperature between 15 and 35 Celsius.

The performance shown in the tables gives the service factor calculation as a ratio between gearbox maximum output torque M_2 and application torque $M_{(app)}$.

Thermal power (see page19) can be not considered when the max. continuous operation is about 3 hours with long enough rest periods (about 2 to 4 hours) to restore the ambient temperature into the gearbox.

For max. ambient temperature exceeding 40 °C or below 0 °C, please ask our Customer Service.

Service factor SF						
Load SF ₁				Start-Stops / hour		SF = SF ₁ x SF ₂
Hours	Uniform	Variable	Shock	Number	SF ₂	
8	0.8	1.1	1.4	6	1.0	
16	1.0	1.3	1.5	600	1.2	
24	1.2	1.4	1.6	1200	1.3	

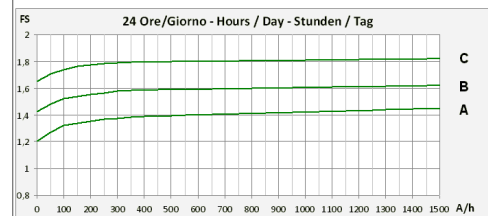
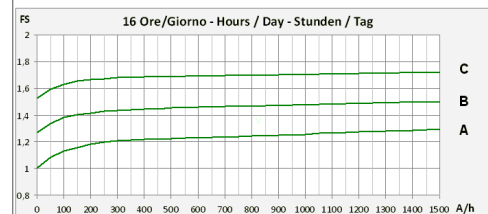
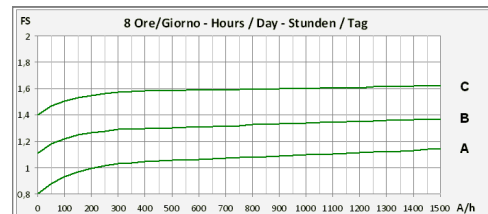
Mass acceleration factor

$$k_{(a)} = \frac{\frac{J_2}{J_1} + J_1}{i r^2}$$

Load class

- A - Uniform load
 $k_{(a)} \leq 0,2$
- B - Moderate shock load
 $0,2 > k_{(a)} \leq 3$
- C - Severe shock load
 $3 < k_{(a)} \leq 10$

A/h - Number of starts/stops per hour



Gearboxes RO-2

Service factors

DUTY TYPE of the motor

Duty types are defined by CEI EN 60034-1 / IEC34-1 Standard.

S1 - Continuous duty

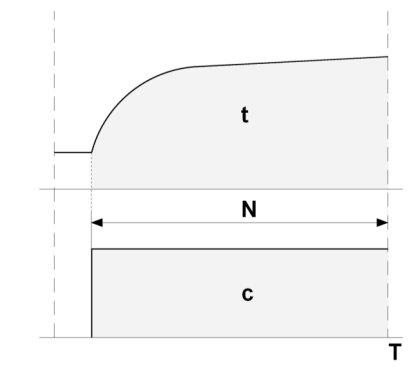
Steady load operation for an indefinite period (N), but long enough to achieve thermal balancing.

FS = 1.0

N = Operation time

c = Load

t = Temperature



S3 - Periodic intermittent duty

Operation according to cycle (C) including steady load time (N) and rest time (R).

Starts/stops do not affect temperature.

The reference cycle (C) to count as a total of 10 minutes.

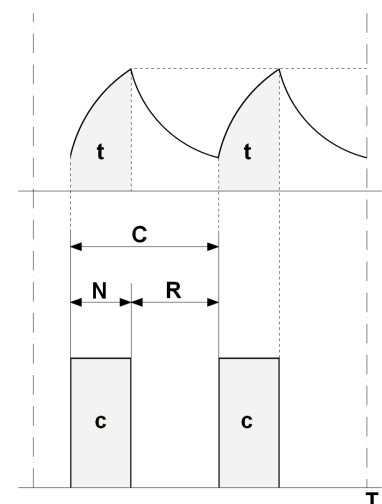
Intermittence ratio is calculated according the following formula.

$$\frac{N}{(N+R)} * 100 = \begin{matrix} 60\% & \text{FS 1.1} \\ 40\% & \text{FS 1.2} \\ 25\% & \text{FS 1.3} \\ 15\% & \text{FS 1.4} \end{matrix}$$

N = Operation time

R = Rest time

C = Duty cycle



RO-2 Gearboxes

External Loads

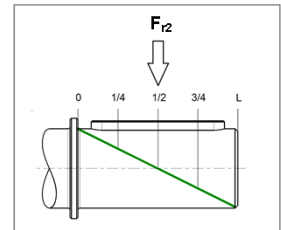
OUTPUT RADIAL LOADS (OHL)

The radial (overhung) load shown in the tables should be checked according to output speed, mounting position (A) and type of the transmission element (B) fitted on the gearbox output shaft by the appropriate k_L and k_T rating factors.

A - Application point of radial load

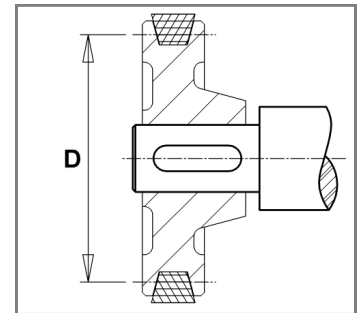
OHL is considered as applied at the output shaft mid-point.
Other positions origin loads to be adjusted with the appropriate factor k_L .
Examples of the distance from the shaft shoulder follow.

k_L	L
1.1	1/4 * L
1.0	1/2 * L
0.9	3/4 * L
0.8	L



B - Transmission element

k_T	Element type
1.15	Gear tooth No. < 17
1.40	Chain sprocket tooth No. < 13
1.25	tooth No. < 20
1.00	tooth No. > 20
2.50	Pulley for V-belt
1.25	toothed-belt



F_{r2} - Radial (overhung) load

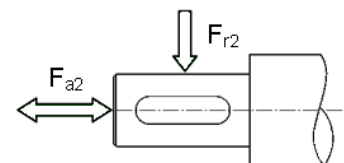
$$F_{r2} = \frac{2000 * M_2}{D} \times k_L \times k_T$$

OUTPUT AXIAL LOADS

Axial load value

$$F_{a2} = F_{r2} \times 0.2$$

is included within the catalogue radial load figure
and is valid on both tensile and compressive stress.



Gearboxes RO-2

Versions

MRO-2

- Geared motors with two gear sets
Powers: 0.09 kW to 7.5 kW, 4 poles
Output speed: 270 rpm to 27 rpm

FRO-2

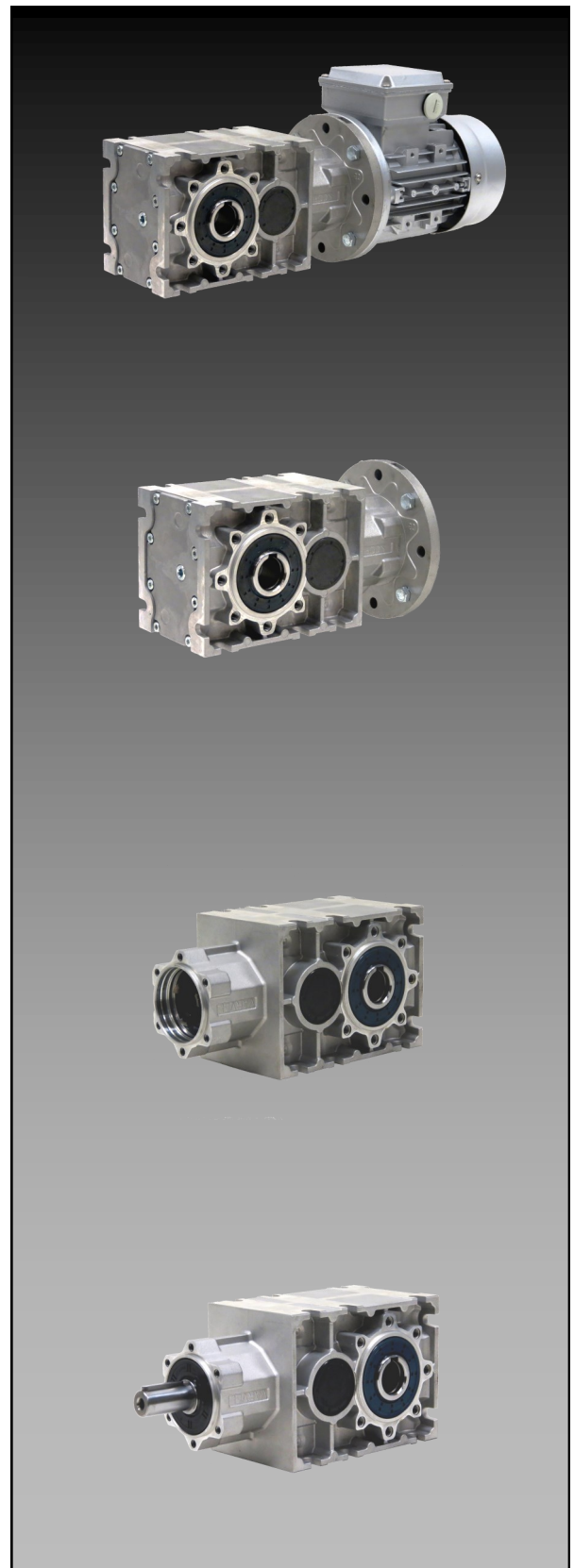
- Gearboxes with two gear sets and with input motor flange
Motor flanges: IEC 56 to IEC 132 and NEMA 56C to NEMA 180TC
Output torque: 120 Nm [855 in-lb] to 500 Nm [4425 in-lb]
Reduction ratios: 5:1 to 50:1

SRO-2

- Gearboxes with two gear sets without input motor flange but with input hollow shaft with flexible coupling
Output torque: 120 Nm [855 in-lb] to 500 Nm [4425 in-lb]
Reduction ratios: 5:1 to 50:1

RO-2

- Gearboxes with two gear sets with input solid shaft
Output torque: 120 Nm [855 in-lb] to 500 Nm [4425 in-lb]
Reduction ratios: 5:1 to 50:1



RO-2 Gearboxes

Thermal power

Thermal power

The **rated power** P_1 is the power that can be applied at the gearbox input, on continuous operation, max. temperature of 40 °C , max. altitude 1000 m, air speed of 1.25 m/s, without exceeding the oil temperature of about 85 °C.

The **thermal power** P_{t1} can limit the rated P_1 (grey area) depending on the cooling system, input speed, ambient temperature and service factor.

FRO02			FRO12			FRO32			FRO42		
i_n	P_1 [kW]	P_{t1} [kW]	i_n	P_1 [kW]	P_{t1} [kW]	i_n	P_1 [kW]	P_{t1} [kW]	i_n	P_1 [kW]	P_{t1} [kW]
5.2	3.20	5.85	5.0	4.20	8.16	5.2	5.40	11.61	5.2	8.10	15.40
7.2	2.40	4.83	7.1	3.80	6.52	7.3	5.50	9.18	7.3	6.00	13.16
8.6	2.00	4.48	8.7	3.20	6.85	8.4	4.80	9.62	8.5	5.50	13.22
10.9	1.70	4.16	10.6	2.90	5.88	10.9	3.90	8.28	10.9	5.30	11.36
15.1	1.10	3.66	12.3	1.90	5.08	11.7	3.60	7.30	11.6	5.40	8.43
16.4	1.00	3.44	14.9	2.10	5.02	15.3	3.40	7.01	15.3	4.90	10.12
18.0	1.00	3.44	15.9	1.70	4.86	16.4	3.10	6.87	16.4	4.60	9.52
21.8	0.80	3.09	18.4	1.70	5.28	17.6	2.90	7.35	18.0	4.30	10.24
22.7	0.80	3.09	21.8	1.20	4.72	22.4	2.30	6.66	21.3	3.60	9.07
24.4	0.60	2.83	22.4	1.40	4.25	23.0	2.20	5.68	23.0	3.40	8.61
27.1	0.60	2.93	25.9	0.90	4.18	24.6	1.90	5.99	24.4	3.20	7.20
31.9	0.50	2.63	27.6	1.10	4.44	26.4	1.90	6.21	27.0	2.90	8.70
32.7	0.50	2.66	31.5	1.00	3.65	32.3	1.60	5.04	32.3	2.40	7.18
36.7	0.40	2.47	32.7	0.80	4.01	33.6	1.50	5.70	36.7	2.10	6.35
38.1	0.50	2.51	38.8	0.80	3.79	37.1	1.40	5.22	37.9	2.10	7.25
45.9	0.30	2.31	45.9	0.60	3.47	47.2	1.10	4.84	45.1	1.70	6.62
51.5	0.30	2.16	54.7	0.40	3.16	51.9	1.00	4.47	51.5	1.50	5.53

RO02 - 120 Nm

Gearboxes RO-2

1400 rpm

Speed Reducer Selection

FRO SRO RO	i_n	i_r	n_2 [rpm]	M_2 [Nm]	P_1 [kW]	F_{r1} [N]	F_{r2} [N]	$J_1 (x 10^{-4})$ [kgcm ²]	56 B5	63 B*	71 B*	80 B*	90 B*
02	5.2	5.18	270.5	105	3.2	1200	1700	1.21	⊙	⊙	⊙	⊙	⊙
	7.2	7.19	194.8	110	2.4	1250	2000	1.01	⊙	⊙	⊙	⊙	⊙
	8.6	8.58	163.2	110	2.0	1250	2200	0.94	⊙	⊙	⊙	⊙	⊙
	10.9	10.88	128.7	120	1.7	1250	2300	0.64	⊙	⊙	⊙	⊙	⊙
	15.1	15.10	92.7	110	1.1	1280	2850	0.59	⊙	⊙	⊙	⊙	⊙
	16.4	16.36	85.6	100	1.0	1280	3000	0.55	⊙	⊙	⊙	⊙	⊙
	18.0	18.03	77.6	110	1.0	1300	3100	0.58	⊙	⊙	⊙	⊙	
	21.8	21.75	64.4	110	0.8	1300	3400	0.56	⊙	⊙	⊙	⊙	
	22.7	22.73	61.6	110	0.8	1300	3400	0.53	⊙	⊙	⊙	⊙	
	24.4	24.41	57.4	100	0.6	1300	3700	0.56	⊙	⊙	⊙	⊙	
	27.1	27.13	51.6	110	0.6	1300	3700	0.52	⊙	⊙	⊙	⊙	
	31.9	31.88	43.9	100	0.5	1300	3950	0.50	⊙	⊙	⊙	⊙	
	32.7	32.73	42.8	100	0.5	1300	4150	0.51	⊙	⊙	⊙	⊙	
	36.7	36.73	38.1	100	0.4	1300	4350	0.51	⊙	⊙	⊙		
	38.1	38.05	36.8	100	0.4	1300	4200	0.49	⊙	⊙	⊙		
	45.9	45.90	30.5	100	0.3	1300	4900	0.49	⊙	⊙	⊙		
	51.5	51.51	27.2	100	0.3	1300	4900	0.49	⊙	⊙	⊙		

B* = B5 & B14

FRO SRO RO	Oil [litres]						Weight [kg]	
	H1	H2	H3	H4	V1	V2		
02	0.4	0.2	0.3	0.2	0.4	0.3	4.4	

RO-2 Gearboxes

RO12 - 200 Nm

Speed Reducer Selection

1400 rpm

FRO SRO RO	i_n	i_r	n_2 [rpm]	M_2 [Nm]	P_1 [kW]	F_{r1} [N]	F_{r2} [N]	$J_1 (x10^{-4})$ [kgm ²]	63 B5	71 B*	80 B*	90 B*	100 B*	112 B*
12	5.0	5.03	278.3	135	4.2	1500	2300	3.20	⊙	⊙	⊙	⊙	⊙	⊙
	7.1	7.09	197.4	175	3.8	1550	2450	2.70	⊙	⊙	⊙	⊙	⊙	⊙
	8.7	8.74	160.2	180	3.2	1580	2700	2.50	⊙	⊙	⊙	⊙	⊙	
	10.6	10.57	132.4	200	2.9	1580	2700	2.03	⊙	⊙	⊙	⊙	⊙	
	12.3	12.34	113.5	150	1.9	1600	3550	2.27	⊙	⊙	⊙	⊙	⊙	
	14.9	14.90	93.9	200	2.1	1600	3350	1.92	⊙	⊙	⊙	⊙	⊙	
	15.9	15.91	88.0	170	1.7	1610	3650	1.84	⊙	⊙	⊙	⊙		
	18.4	18.37	76.2	200	1.7	1610	3750	1.87	⊙	⊙	⊙	⊙		
	21.8	21.75	64.4	170	1.2	1610	4350	1.85	⊙	⊙	⊙	⊙		
	22.4	22.42	62.4	200	1.4	1610	4100	1.79	⊙	⊙	⊙	⊙		
	25.9	25.92	54.0	150	0.9	1610	4850	1.82	⊙	⊙	⊙			
	27.6	27.64	50.7	200	1.1	1610	4550	1.77	⊙	⊙	⊙			
	31.5	31.45	44.5	200	1.0	1610	4800	1.74	⊙	⊙	⊙			
	32.7	32.73	42.8	170	0.8	1610	5200	1.76	⊙	⊙	⊙			
	38.8	38.76	36.1	200	0.8	1610	5300	1.73	⊙	⊙	⊙			
	45.9	45.90	30.5	170	0.6	1610	5700	1.73	⊙	⊙	⊙			
	54.7	54.71	25.6	150	0.4	1610	5750	1.72	⊙	⊙				

B* = B5 & B14

⊙ = Bore with key/keyway

FRO SRO RO	Oil [litres]						Weight [kg]	
	H1	H2	H3	H4	V1	V2		
12	0.7	0.4	0.6	0.4	0.7	0.5	7.0	

RO22 - 330 Nm

Gearboxes RO-2

1400 rpm

Speed Reducer Selection

FRO SRO RO	i_n	i_r	n_2 [rpm]	M_2 [Nm]	P_1 [kW]	F_{r1} [N]	F_{r2} [N]	$J_1 (x10^{-4})$ [kgm ²]	63 B5	71 B5	80 B*	90 B*	100 B*	112 B*
22	5.2	5.18	270.5	180	5.4	2900	3150	5.89	⊙	⊙	⊙	⊙	⊙	⊙
	7.3	7.28	192.2	255	5.5	2900	3200	4.79	⊙	⊙	⊙	⊙	⊙	⊙
	8.4	8.36	167.5	260	4.8	2900	3450	4.50	⊙	⊙	⊙	⊙	⊙	⊙
	10.9	10.88	128.7	270	3.9	2900	3700	3.55	⊙	⊙	⊙	⊙	⊙	⊙
	11.7	11.71	119.6	270	3.6	3000	4050	3.95	⊙	⊙	⊙	⊙	⊙	
	15.3	15.31	91.5	330	3.4	3000	4100	3.30	⊙	⊙	⊙	⊙	⊙	
	16.4	16.36	85.6	330	3.1	3000	4100	3.16	⊙	⊙	⊙	⊙	⊙	
	17.6	17.56	79.7	330	2.9	3000	4450	3.23	⊙	⊙	⊙	⊙	⊙	
	22.4	22.35	62.6	330	2.3	3000	5000	3.14	⊙	⊙	⊙	⊙	⊙	
	23.0	23.03	60.8	330	2.2	3000	5000	3.05	⊙	⊙	⊙	⊙	⊙	
	24.6	24.61	56.9	300	1.9	3000	5500	3.11	⊙	⊙	⊙	⊙		
	26.4	26.42	53.0	330	1.9	3000	5450	3.02	⊙	⊙	⊙	⊙		
	32.3	32.30	43.3	330	1.6	3000	5900	2.96	⊙	⊙	⊙	⊙		
	33.6	33.64	41.6	330	1.5	3000	6100	2.98	⊙	⊙	⊙	⊙		
	37.1	37.06	37.8	330	1.4	3000	6350	2.94	⊙	⊙	⊙	⊙		
	47.2	47.18	29.7	330	1.1	3000	6400	2.92	⊙	⊙	⊙			
	51.9	51.93	27.0	300	1.0	3000	6450	2.91	⊙	⊙	⊙			

B* = B5 & B14

⊙ = Bore with key/keyway

FRO SRO RO	Oil [litres]						Weight [kg]	
	H1	H2	H3	H4	V1	V2		
22	1.0	0.7	0.9	0.7	1.1	0.8	11.0	

RO-2 Gearboxes

RO 32 - 500 Nm

Speed Reducer Selection

1400 rpm

FRO SRO RO	i_n	i_r	n_2 [rpm]	M_2 [Nm]	P_1 [kW]	F_{r1} [N]	F_{r2} [N]	$J_1 (x10^{-4})$ [kgm ²]	71 B5	80 B5	90 B5	100 B*	112 B*	132 B*
32	5.2	5.18	270.5	270	8.1	4500	4800	9.07	⊙	⊙	⊙	⊙	⊙	⊙
	7.3	7.28	192.2	280	6.0	4550	5650	6.77	⊙	⊙	⊙	⊙	⊙	⊙
	8.5	8.54	163.9	300	5.5	5540	6000	6.07	⊙	⊙	⊙	⊙	⊙	⊙
	10.9	10.88	128.7	370	5.3	5630	6000	4.27	⊙	⊙	⊙	⊙	⊙	⊙
	11.6	11.60	120.6	400	5.4	5710	6400	4.99	⊙	⊙	⊙	⊙	⊙	⊙
	15.3	15.31	91.5	480	4.9	5710	6450	3.75	⊙	⊙	⊙	⊙	⊙	⊙
	16.4	16.36	85.6	480	4.6	5730	6500	3.48	⊙	⊙	⊙	⊙	⊙	
	18.0	17.95	78.0	500	4.3	5730	6900	3.59	⊙	⊙	⊙	⊙	⊙	
	21.3	21.35	65.6	500	3.6	5680	7550	3.43	⊙	⊙	⊙	⊙		
	23.0	23.03	60.8	500	3.4	5730	7700	3.25	⊙	⊙	⊙	⊙		
	24.4	24.39	57.4	500	3.2	5740	8300	3.34	⊙	⊙	⊙	⊙		
	27.0	27.01	51.8	500	2.9	5730	8400	3.18	⊙	⊙	⊙	⊙		
	32.3	32.30	43.3	500	2.4	5740	9050	3.06	⊙	⊙	⊙	⊙		
	36.7	36.69	38.2	500	2.1	5740	9950	3.07	⊙	⊙	⊙	⊙		
	37.9	37.89	37.0	500	2.1	5740	9800	3.02	⊙	⊙	⊙	⊙		
	45.1	45.05	31.1	500	1.7	5740	9800	2.99	⊙	⊙	⊙			
	51.5	51.46	27.2	500	1.5	5740	9800	2.97	⊙	⊙	⊙			

B* = B5 & B14

FRO SRO RO	Oil [litres]						Weight	
	H1	H2	H3	H4	V1	V2	[kg]	
32	1.6	1.0	1.3	1.0	1.5	0.9	15.0	

Gearboxes RO-2

1400 rpm

Geared motor Selection

P ₁ [kW]	i _n	i _r	n ₂ [rpm]	M ₂ [Nm]	FS	Size	F _{r2} [N]	MRO [kg]	FRO [kg]	J _m × 10 ⁻⁴	J ₁ × 10 ⁻⁴
0,06	51,50	51,510	27,2	20,0	>3,0	MRO 02	4.900	7,1	4,6	1,50	0,4902
	45,90	45,900	30,5	20,0	>3,0	MRO 02	4.900	7,1	4,6	1,50	0,4917
	38,10	38,050	36,8	14,4	>3,0	MRO 02	4.200	7,1	4,6	1,50	0,4948
	36,70	36,730	38,1	15,0	>3,0	MRO 02	4.350	7,1	4,6	1,50	0,5092
	32,70	32,730	42,8	12,0	>3,0	MRO 02	4.150	7,1	4,6	1,50	0,5121
	31,90	31,880	43,9	13,2	>3,0	MRO 02	3.950	7,1	4,6	1,50	0,4983
	27,10	27,130	51,6	11,0	>3,0	MRO 02	3.700	7,1	4,6	1,50	0,5181
	24,40	24,410	57,4	10,0	>3,0	MRO 02	3.700	7,1	4,6	1,50	0,5579
	22,70	22,730	61,6	8,3	>3,0	MRO 02	3.400	7,1	4,6	1,50	0,5251
	21,80	21,750	64,4	8,3	>3,0	MRO 02	3.400	7,1	4,6	1,50	0,5645
	18,00	18,030	77,6	6,6	>3,0	MRO 02	3.100	7,1	4,6	1,50	0,5780
	16,40	16,360	85,6	6,0	>3,0	MRO 02	3.000	7,1	4,6	1,50	0,5451
	15,10	15,100	92,7	6,0	>3,0	MRO 02	2.850	7,1	4,6	1,50	0,5939
	10,90	10,880	128,7	4,2	>3,0	MRO 02	2.300	7,1	4,6	1,50	0,6392
	8,60	8,580	163,2	3,3	>3,0	MRO 02	2.200	7,1	4,6	1,50	0,9445
	7,20	7,190	194,8	2,8	>3,0	MRO 02	2.000	7,1	4,6	1,50	1,0150
5,20	5,180	270,5	2,0	>3,0	MRO 02	1.700	7,1	4,6	1,50	1,2149	
0,09	51,50	51,510	27,2	30,0	>3,0	MRO 02	4.900	7,2	4,6	2,00	0,4902
	45,90	45,900	30,5	30,0	>3,0	MRO 02	4.900	7,2	4,6	2,00	0,4917
	38,10	38,050	36,8	21,6	>3,0	MRO 02	4.200	7,2	4,6	2,00	0,4948
	36,70	36,730	38,1	22,5	>3,0	MRO 02	4.350	7,2	4,6	2,00	0,5092
	32,70	32,730	42,8	18,0	>3,0	MRO 02	4.150	7,2	4,6	2,00	0,5121
	31,90	31,880	43,9	19,8	>3,0	MRO 02	3.950	7,2	4,6	2,00	0,4983
	27,10	27,130	51,6	16,5	>3,0	MRO 02	3.700	7,2	4,6	2,00	0,5181
	24,40	24,410	57,4	15,0	>3,0	MRO 02	3.700	7,2	4,6	2,00	0,5579
	22,70	22,730	61,6	12,4	>3,0	MRO 02	3.400	7,2	4,6	2,00	0,5251
	21,80	21,750	64,4	12,4	>3,0	MRO 02	3.400	7,2	4,6	2,00	0,5645
	18,00	18,030	77,6	9,9	>3,0	MRO 02	3.100	7,2	4,6	2,00	0,5780
	16,40	16,360	85,6	9,0	>3,0	MRO 02	3.000	7,2	4,6	2,00	0,5451
	15,10	15,100	92,7	9,0	>3,0	MRO 02	2.850	7,2	4,6	2,00	0,5939
	10,90	10,880	128,7	6,4	>3,0	MRO 02	2.300	7,2	4,6	2,00	0,6392
	8,60	8,580	163,2	5,0	>3,0	MRO 02	2.200	7,2	4,6	2,00	0,9445
	7,20	7,190	194,8	4,1	>3,0	MRO 02	2.000	7,2	4,6	2,00	1,0150
5,20	5,180	270,5	3,0	>3,0	MRO 02	1.700	7,2	4,6	2,00	1,2149	
0,13	54,70	54,710	25,6	48,8	>3,0	MRO 12	5.750	11,1	7,4	2,80	1,7202
	51,90	51,930	27	39,0	>3,0	MRO 22	6.450	15,4	11,7	2,80	2,9144
	51,50	51,510	27,2	43,3	2,3	MRO 02	4.900	8,3	4,6	2,80	0,4902
	47,20	47,180	29,7	39,0	>3,0	MRO 22	6.400	15,4	11,7	2,80	2,9213
	45,90	45,900	30,5	43,3	2,3	MRO 02	4.900	8,3	4,6	2,80	0,4917
	45,90	45,900	30,5	36,8	>3,0	MRO 12	5.700	11,1	7,4	2,80	1,7254
	38,80	38,760	36,1	32,5	>3,0	MRO 12	5.300	11,1	7,4	2,80	1,7320
	38,10	38,050	36,8	31,2	>3,0	MRO 02	4.200	8,3	4,6	2,80	0,4948
	37,10	37,060	37,8	30,6	>3,0	MRO 22	6.350	15,4	11,7	2,80	2,9425
	36,70	36,730	38,1	32,5	>3,0	MRO 02	4.350	8,3	4,6	2,80	0,5092
	33,60	33,640	41,6	28,6	>3,0	MRO 22	6.100	15,4	11,7	2,80	2,9816
	32,70	32,730	42,8	26,0	>3,0	MRO 02	4.150	8,3	4,6	2,80	0,5121
	32,70	32,730	42,8	27,6	>3,0	MRO 12	5.200	11,1	7,4	2,80	1,7591
	32,30	32,300	43,3	26,8	>3,0	MRO 22	5.900	15,4	11,7	2,80	2,9572
	31,90	31,880	43,9	28,6	>3,0	MRO 02	3.950	8,3	4,6	2,80	0,4983
	31,50	31,450	44,5	26,0	>3,0	MRO 12	4.800	11,1	7,4	2,80	1,7418

RO-2 Gearboxes

Geared motor Selection

1400 rpm

P ₁ [kW]	i _n	i _r	n ₂ [rpm]	M ₂ [Nm]	FS	Size	F _{r2} [N]	MRO [kg]	FRO [kg]	J _m × 10 ⁻⁴	J ₁ × 10 ⁻⁴
0,13	27,60	27,640	50,7	23,6	>3,0	MRO 12	4.550	11,1	7,4	2,80	1,7720
	27,10	27,130	51,6	23,8	>3,0	MRO 02	3.700	8,3	4,6	2,80	0,5181
	26,40	26,420	53	22,6	>3,0	MRO 22	5.450	15,4	11,7	2,80	3,0234
	25,90	25,920	54	21,7	>3,0	MRO 12	4.850	11,1	7,4	2,80	1,8225
	24,60	24,610	56,9	20,5	>3,0	MRO 22	5.500	15,4	11,7	2,80	3,1062
	24,40	24,410	57,4	21,7	>3,0	MRO 02	3.700	8,3	4,6	2,80	0,5579
	23,00	23,030	60,8	19,5	>3,0	MRO 22	5.000	15,4	11,7	2,80	3,0523
	22,70	22,730	61,6	17,9	>3,0	MRO 02	3.400	8,3	4,6	2,80	0,5251
	22,40	22,420	62,4	18,6	>3,0	MRO 12	4.100	11,1	7,4	2,80	1,7913
	22,40	22,350	62,6	18,7	>3,0	MRO 22	5.000	15,4	11,7	2,80	3,1366
	21,80	21,750	64,4	17,9	>3,0	MRO 02	3.400	8,3	4,6	2,80	0,5645
	21,80	21,750	64,4	18,4	>3,0	MRO 12	4.350	11,1	7,4	2,80	1,8457
	18,40	18,370	76,2	15,3	>3,0	MRO 12	3.750	11,1	7,4	2,80	1,8749
	18,00	18,030	77,6	14,3	>3,0	MRO 02	3.100	8,3	4,6	2,80	0,5780
	17,60	17,560	79,7	14,8	>3,0	MRO 22	4.450	15,4	11,7	2,80	3,2313
	16,40	16,360	85,6	13,0	>3,0	MRO 02	3.000	8,3	4,6	2,80	0,5451
	16,40	16,360	85,6	13,8	>3,0	MRO 22	4.100	15,4	11,7	2,80	3,1625
	15,90	15,910	88	13,0	>3,0	MRO 12	3.650	11,1	7,4	2,80	1,8416
	15,30	15,310	91,5	12,6	>3,0	MRO 22	4.100	15,4	11,7	2,80	3,2966
	15,10	15,100	92,7	13,0	>3,0	MRO 02	2.850	8,3	4,6	2,80	0,5939
	14,90	14,900	93,9	12,4	>3,0	MRO 12	3.350	11,1	7,4	2,80	1,9187
	12,30	12,340	113,5	10,3	>3,0	MRO 12	3.550	11,1	7,4	2,80	2,2731
	11,70	11,710	119,6	9,8	>3,0	MRO 22	4.050	15,4	11,7	2,80	3,9507
	10,90	10,880	128,7	9,2	>3,0	MRO 02	2.300	8,3	4,6	2,80	0,6392
	10,90	10,880	128,7	9,0	>3,0	MRO 22	3.700	15,4	11,7	2,80	3,5463
	10,60	10,570	132,4	9,0	>3,0	MRO 12	2.700	11,1	7,4	2,80	2,0326
	8,70	8,740	160,2	7,3	>3,0	MRO 12	2.700	11,1	7,4	2,80	2,5046
	8,60	8,580	163,2	7,2	>3,0	MRO 02	2.200	8,3	4,6	2,80	0,9445
	8,40	8,360	167,5	7,0	>3,0	MRO 22	3.450	15,4	11,7	2,80	4,5033
	7,30	7,280	192,2	6,0	>3,0	MRO 22	3.200	15,4	11,7	2,80	4,7920
	7,20	7,190	194,8	6,0	>3,0	MRO 02	2.000	8,3	4,6	2,80	1,0150
	7,10	7,090	197,4	6,0	>3,0	MRO 12	2.450	11,1	7,4	2,80	2,6978
5,20	5,180	270,5	4,3	>3,0	MRO 02	1.700	8,3	4,6	2,80	1,2149	
5,20	5,180	270,5	4,3	>3,0	MRO 22	3.150	15,4	11,7	2,80	5,8944	
5,00	5,030	278,3	4,2	>3,0	MRO 12	2.300	11,1	7,4	2,80	3,2008	
0,18	54,70	54,710	25,6	67,5	2,2	MRO 12	5.750	11,7	7,4	4,00	1,7202
	51,90	51,930	27	54,0	>3,0	MRO 22	6.450	16,0	11,7	4,00	2,9144
	51,50	51,510	27,2	60,0	1,7	MRO 02	4.900	8,9	4,6	4,00	0,4902
	47,20	47,180	29,7	54,0	>3,0	MRO 22	6.400	16,0	11,7	4,00	2,9213
	45,90	45,900	30,5	60,0	1,7	MRO 02	4.900	8,9	4,6	4,00	0,4917
	45,90	45,900	30,5	51,0	>3,0	MRO 12	5.700	11,7	7,4	4,00	1,7254
	38,80	38,760	36,1	45,0	>3,0	MRO 12	5.300	11,7	7,4	4,00	1,7320
	38,10	38,050	36,8	43,2	2,8	MRO 02	4.200	8,9	4,6	4,00	0,4948
	37,10	37,060	37,8	42,4	>3,0	MRO 22	6.350	16,0	11,7	4,00	2,9425
	36,70	36,730	38,1	45,0	2,2	MRO 02	4.350	8,9	4,6	4,00	0,5092
	33,60	33,640	41,6	39,6	>3,0	MRO 22	6.100	16,0	11,7	4,00	2,9816
	32,70	32,730	42,8	36,0	2,8	MRO 02	4.150	8,9	4,6	4,00	0,5121
	32,70	32,730	42,8	38,3	>3,0	MRO 12	5.200	11,7	7,4	4,00	1,7591
	32,30	32,300	43,3	37,1	>3,0	MRO 22	5.900	16,0	11,7	4,00	2,9572
	31,90	31,880	43,9	39,6	2,8	MRO 02	3.950	8,9	4,6	4,00	0,4983

Gearboxes RO-2

1400 rpm

Geared motor Selection

P ₁ [kW]	i _n	i _r	n ₂ [rpm]	M ₂ [Nm]	FS	Size	F _{r2} [N]	MRO [kg]	FRO [kg]	J _m × 10 ⁻⁴	J ₁ × 10 ⁻⁴
0,18	31,50	31,450	44,5	36,0	>3,0	MRO 12	4.800	11,7	7,4	4,00	1,7418
	27,60	27,640	50,7	32,7	>3,0	MRO 12	4.550	11,7	7,4	4,00	1,7720
	27,10	27,130	51,6	33,0	>3,0	MRO 02	3.700	8,9	4,6	4,00	0,5181
	26,40	26,420	53	31,3	>3,0	MRO 22	5.450	16,0	11,7	4,00	3,0234
	25,90	25,920	54	30,0	>3,0	MRO 12	4.850	11,7	7,4	4,00	1,8225
	24,60	24,610	56,9	28,4	>3,0	MRO 22	5.500	16,0	11,7	4,00	3,1062
	24,40	24,410	57,4	30,0	>3,0	MRO 02	3.700	8,9	4,6	4,00	0,5579
	23,00	23,030	60,8	27,0	>3,0	MRO 22	5.000	16,0	11,7	4,00	3,0523
	22,70	22,730	61,6	24,8	>3,0	MRO 02	3.400	8,9	4,6	4,00	0,5251
	22,40	22,420	62,4	25,7	>3,0	MRO 12	4.100	11,7	7,4	4,00	1,7913
	22,40	22,350	62,6	25,8	>3,0	MRO 22	5.000	16,0	11,7	4,00	3,1366
	21,80	21,750	64,4	24,8	>3,0	MRO 02	3.400	8,9	4,6	4,00	0,5645
	21,80	21,750	64,4	25,5	>3,0	MRO 12	4.350	11,7	7,4	4,00	1,8457
	18,40	18,370	76,2	21,2	>3,0	MRO 12	3.750	11,7	7,4	4,00	1,8749
	18,00	18,030	77,6	19,8	>3,0	MRO 02	3.100	8,9	4,6	4,00	0,5780
	17,60	17,560	79,7	20,5	>3,0	MRO 22	4.450	16,0	11,7	4,00	3,2313
	16,40	16,360	85,6	18,0	>3,0	MRO 02	3.000	8,9	4,6	4,00	0,5451
	16,40	16,360	85,6	19,2	>3,0	MRO 22	4.100	16,0	11,7	4,00	3,1625
	15,90	15,910	88	18,0	>3,0	MRO 12	3.650	11,7	7,4	4,00	1,8416
	15,30	15,310	91,5	17,5	>3,0	MRO 22	4.100	16,0	11,7	4,00	3,2966
	15,10	15,100	92,7	18,0	>3,0	MRO 02	2.850	8,9	4,6	4,00	0,5939
	14,90	14,900	93,9	17,1	>3,0	MRO 12	3.350	11,7	7,4	4,00	1,9187
	12,30	12,340	113,5	14,2	>3,0	MRO 12	3.550	11,7	7,4	4,00	2,2731
	11,70	11,710	119,6	13,5	>3,0	MRO 22	4.050	16,0	11,7	4,00	3,9507
	10,90	10,880	128,7	12,7	>3,0	MRO 02	2.300	8,9	4,6	4,00	0,6392
	10,90	10,880	128,7	12,5	>3,0	MRO 22	3.700	16,0	11,7	4,00	3,5463
	10,60	10,570	132,4	12,4	>3,0	MRO 12	2.700	11,7	7,4	4,00	2,0326
	8,70	8,740	160,2	10,1	>3,0	MRO 12	2.700	11,7	7,4	4,00	2,5046
	8,60	8,580	163,2	9,9	>3,0	MRO 02	2.200	8,9	4,6	4,00	0,9445
	8,40	8,360	167,5	9,8	>3,0	MRO 22	3.450	16,0	11,7	4,00	4,5033
	7,30	7,280	192,2	8,3	>3,0	MRO 22	3.200	16,0	11,7	4,00	4,7920
	7,20	7,190	194,8	8,3	>3,0	MRO 02	2.000	8,9	4,6	4,00	1,0150
7,10	7,090	197,4	8,3	>3,0	MRO 12	2.450	11,7	7,4	4,00	2,6978	
5,20	5,180	270,5	5,9	>3,0	MRO 02	1.700	8,9	4,6	4,00	1,2149	
5,20	5,180	270,5	6,0	>3,0	MRO 22	3.150	16,0	11,7	4,00	5,8944	
5,00	5,030	278,3	5,8	>3,0	MRO 12	2.300	11,7	7,4	4,00	3,2008	
0,25	54,70	54,710	25,6	93,8	1,6	MRO 12	5.750	13,2	7,4	5,00	1,7202
	51,90	51,930	27	75,0	>3,0	MRO 22	6.450	17,5	11,7	5,00	2,9144
	51,50	51,510	27,2	83,3	1,2	MRO 02	4.900	10,4	4,6	5,00	0,4902
	51,50	51,460	27,2	83,3	>3,0	MRO 32	9.800	24,3	18,5	5,00	2,9671
	47,20	47,180	29,7	75,0	>3,0	MRO 22	6.400	17,5	11,7	5,00	2,9213
	45,90	45,900	30,5	83,3	1,2	MRO 02	4.900	10,4	4,6	5,00	0,4917
	45,90	45,900	30,5	70,8	2,4	MRO 12	5.700	13,2	7,4	5,00	1,7254
	45,10	45,050	31,1	73,5	>3,0	MRO 32	9.800	24,3	18,5	5,00	2,9882
	38,80	38,760	36,1	62,5	2,8	MRO 12	5.300	13,2	7,4	5,00	1,7320
	38,10	38,050	36,8	60,0	1,6	MRO 02	4.200	10,4	4,6	5,00	0,4948
	37,90	37,890	37	59,5	>3,0	MRO 32	9.800	24,3	18,5	5,00	3,0222
	37,10	37,060	37,8	58,9	>3,0	MRO 22	6.350	17,5	11,7	5,00	2,9425
	36,70	36,730	38,1	62,5	1,6	MRO 02	4.350	10,4	4,6	5,00	0,5092
	36,70	36,690	38,2	59,5	>3,0	MRO 32	9.950	24,3	18,5	5,00	3,0718

RO-2 Gearboxes

Geared motor Selection

1400 rpm

P ₁ [kW]	i _n	i _r	n ₂ [rpm]	M ₂ [Nm]	FS	Size	F _{r2} [N]	MRO [kg]	FRO [kg]	J _m × 10 ⁻⁴	J ₁ × 10 ⁻⁴
0,25	33,60	33,640	41,6	55,0	>3,0	MRO 22	6.100	17,5	11,7	5,00	2,9816
	32,70	32,730	42,8	50,0	2,0	MRO 02	4.150	10,4	4,6	5,00	0,5121
	32,70	32,730	42,8	53,1	>3,0	MRO 12	5.200	13,2	7,4	5,00	1,7591
	32,30	32,300	43,3	51,6	>3,0	MRO 22	5.900	17,5	11,7	5,00	2,9572
	32,30	32,300	43,3	52,1	>3,0	MRO 32	9.050	24,3	18,5	5,00	3,0580
	31,90	31,880	43,9	55,0	2,0	MRO 02	3.950	10,4	4,6	5,00	0,4983
	31,50	31,450	44,5	50,0	>3,0	MRO 12	4.800	13,2	7,4	5,00	1,7418
	27,60	27,640	50,7	45,5	>3,0	MRO 12	4.550	13,2	7,4	5,00	1,7720
	27,10	27,130	51,6	45,8	2,4	MRO 02	3.700	10,4	4,6	5,00	0,5181
	27,00	27,010	51,8	43,1	>3,0	MRO 32	8.400	24,3	18,5	5,00	3,1801
	26,40	26,420	53	43,4	>3,0	MRO 22	5.450	17,5	11,7	5,00	3,0234
	25,90	25,920	54	41,7	>3,0	MRO 12	4.850	13,2	7,4	5,00	1,8225
	24,60	24,610	56,9	39,5	>3,0	MRO 22	5.500	17,5	11,7	5,00	3,1062
	24,40	24,410	57,4	41,7	2,4	MRO 02	3.700	10,4	4,6	5,00	0,5579
	24,40	24,390	57,4	39,1	>3,0	MRO 32	8.300	24,3	18,5	5,00	3,3409
	23,00	23,030	60,8	37,5	>3,0	MRO 22	5.000	17,5	11,7	5,00	3,0523
	23,00	23,030	60,8	36,8	>3,0	MRO 32	7.700	24,3	18,5	5,00	3,2506
	22,70	22,730	61,6	34,4	>3,0	MRO 02	3.400	10,4	4,6	5,00	0,5251
	22,40	22,420	62,4	35,7	>3,0	MRO 12	4.100	13,2	7,4	5,00	1,7913
	22,40	22,350	62,6	35,9	>3,0	MRO 22	5.000	17,5	11,7	5,00	3,1366
	21,80	21,750	64,4	34,4	>3,0	MRO 02	3.400	10,4	4,6	5,00	0,5645
	21,80	21,750	64,4	35,4	>3,0	MRO 12	4.350	13,2	7,4	5,00	1,8457
	21,30	21,350	65,6	34,7	>3,0	MRO 32	7.550	24,3	18,5	5,00	3,4347
	18,40	18,370	76,2	29,4	>3,0	MRO 12	3.750	13,2	7,4	5,00	1,8749
	18,00	18,030	77,6	27,5	>3,0	MRO 02	3.100	10,4	4,6	5,00	0,5780
	18,00	17,950	78	29,1	>3,0	MRO 32	6.900	24,3	18,5	5,00	3,5860
	17,60	17,560	79,7	28,4	>3,0	MRO 22	4.450	17,5	11,7	5,00	3,2313
	16,40	16,360	85,6	25,0	>3,0	MRO 02	3.000	10,4	4,6	5,00	0,5451
	16,40	16,360	85,6	26,6	>3,0	MRO 22	4.100	17,5	11,7	5,00	3,1625
	16,40	16,360	85,6	26,1	>3,0	MRO 32	6.500	24,3	18,5	5,00	3,4806
	15,90	15,910	88	25,0	>3,0	MRO 12	3.650	13,2	7,4	5,00	1,8416
	15,30	15,310	91,5	24,3	>3,0	MRO 22	4.100	17,5	11,7	5,00	3,2966
	15,30	15,310	91,5	24,5	>3,0	MRO 32	6.450	24,3	18,5	5,00	3,7457
	15,10	15,100	92,7	25,0	>3,0	MRO 02	2.850	10,4	4,6	5,00	0,5939
	14,90	14,900	93,9	23,8	>3,0	MRO 12	3.350	13,2	7,4	5,00	1,9187
	12,30	12,340	113,5	19,7	>3,0	MRO 12	3.550	13,2	7,4	5,00	2,2731
	11,70	11,710	119,6	18,8	>3,0	MRO 22	4.050	17,5	11,7	5,00	3,9507
	11,60	11,600	120,6	18,5	>3,0	MRO 32	6.400	24,3	18,5	5,00	4,9874
	10,90	10,880	128,7	17,6	>3,0	MRO 02	2.300	10,4	4,6	5,00	0,6392
	10,90	10,880	128,7	17,3	>3,0	MRO 22	3.700	17,5	11,7	5,00	3,5463
	10,90	10,880	128,7	17,5	>3,0	MRO 32	6.000	24,3	18,5	5,00	4,2665
	10,60	10,570	132,4	17,2	>3,0	MRO 12	2.700	13,2	7,4	5,00	2,0326
	8,70	8,740	160,2	14,1	>3,0	MRO 12	2.700	13,2	7,4	5,00	2,5046
	8,60	8,580	163,2	13,8	>3,0	MRO 02	2.200	10,4	4,6	5,00	0,9445
	8,50	8,540	163,9	13,6	>3,0	MRO 32	6.000	24,3	18,5	5,00	6,0700
	8,40	8,360	167,5	13,5	>3,0	MRO 22	3.450	17,5	11,7	5,00	4,5033
	7,30	7,280	192,2	11,6	>3,0	MRO 22	3.200	17,5	11,7	5,00	4,7920
	7,30	7,280	192,2	11,7	>3,0	MRO 32	5.650	24,3	18,5	5,00	6,7749
	7,20	7,190	194,8	11,5	>3,0	MRO 02	2.000	10,4	4,6	5,00	1,0150
	7,10	7,090	197,4	11,5	>3,0	MRO 12	2.450	13,2	7,4	5,00	2,6978

Gearboxes RO-2

1400 rpm

Geared motor Selection

P ₁ [kW]	i _n	i _r	n ₂ [rpm]	M ₂ [Nm]	FS	Size	F _{r2} [N]	MRO [kg]	FRO [kg]	J _m × 10 ⁻⁴	J ₁ × 10 ⁻⁴
0,25	5,20	5,180	270,5	8,2	>3,0	MRO 02	1.700	10,4	4,6	5,00	1,2149
	5,20	5,180	270,5	8,3	>3,0	MRO 22	3.150	17,5	11,7	5,00	5,8944
	5,20	5,180	270,5	8,3	>3,0	MRO 32	4.800	24,3	18,5	5,00	9,0749
	5,00	5,030	278,3	8,0	>3,0	MRO 12	2.300	13,2	7,4	5,00	3,2008
	54,70	54,710	25,6	138,8	1,1	MRO 12	5.750	13,6	7,4	8,00	1,7202
0,37	51,90	51,930	27	111,0	2,7	MRO 22	6.450	17,9	11,7	8,00	2,9144
	51,50	51,510	27,2	123,3	0,8	MRO 02	4.900	10,8	4,6	8,00	0,4902
	51,50	51,460	27,2	123,3	>3,0	MRO 32	9.800	24,7	18,5	8,00	2,9671
	47,20	47,180	29,7	111,0	3,0	MRO 22	6.400	17,9	11,7	8,00	2,9213
	45,90	45,900	30,5	123,3	0,8	MRO 02	4.900	10,8	4,6	8,00	0,4917
	45,90	45,900	30,5	104,8	1,6	MRO 12	5.700	13,6	7,4	8,00	1,7254
	45,10	45,050	31,1	108,8	>3,0	MRO 32	9.800	24,7	18,5	8,00	2,9882
	38,80	38,760	36,1	92,5	1,9	MRO 12	5.300	13,6	7,4	8,00	1,7320
	38,10	38,050	36,8	88,8	1,1	MRO 02	4.200	10,8	4,6	8,00	0,4948
	37,90	37,890	37	88,1	>3,0	MRO 32	9.800	24,7	18,5	8,00	3,0222
	37,10	37,060	37,8	87,2	>3,0	MRO 22	6.350	17,9	11,7	8,00	2,9425
	36,70	36,730	38,1	92,5	1,1	MRO 02	4.350	10,8	4,6	8,00	0,5092
	36,70	36,690	38,2	88,1	>3,0	MRO 32	9.950	24,7	18,5	8,00	3,0718
	33,60	33,640	41,6	81,4	>3,0	MRO 22	6.100	17,9	11,7	8,00	2,9816
	32,70	32,730	42,8	74,0	1,4	MRO 02	4.150	10,8	4,6	8,00	0,5121
	32,70	32,730	42,8	78,6	2,2	MRO 12	5.200	13,6	7,4	8,00	1,7591
	32,30	32,300	43,3	76,3	>3,0	MRO 22	5.900	17,9	11,7	8,00	2,9572
	32,30	32,300	43,3	77,1	>3,0	MRO 32	9.050	24,7	18,5	8,00	3,0580
	31,90	31,880	43,9	81,4	1,4	MRO 02	3.950	10,8	4,6	8,00	0,4983
	31,50	31,450	44,5	74,0	2,4	MRO 12	4.800	13,6	7,4	8,00	1,7418
	27,60	27,640	50,7	67,3	3,0	MRO 12	4.550	13,6	7,4	8,00	1,7720
	27,10	27,130	51,6	67,8	1,6	MRO 02	3.700	10,8	4,6	8,00	0,5181
	27,00	27,010	51,8	63,8	>3,0	MRO 32	8.400	24,7	18,5	8,00	3,1801
	26,40	26,420	53	64,3	>3,0	MRO 22	5.450	17,9	11,7	8,00	3,0234
	25,90	25,920	54	61,7	2,4	MRO 12	4.850	13,6	7,4	8,00	1,8225
	24,60	24,610	56,9	58,4	>3,0	MRO 22	5.500	17,9	11,7	8,00	3,1062
	24,40	24,410	57,4	61,7	1,6	MRO 02	3.700	10,8	4,6	8,00	0,5579
	24,40	24,390	57,4	57,8	>3,0	MRO 32	8.300	24,7	18,5	8,00	3,3409
	23,00	23,030	60,8	55,5	>3,0	MRO 22	5.000	17,9	11,7	8,00	3,0523
	23,00	23,030	60,8	54,4	>3,0	MRO 32	7.700	24,7	18,5	8,00	3,2506
	22,70	22,730	61,6	50,9	2,2	MRO 02	3.400	10,8	4,6	8,00	0,5251
	22,40	22,420	62,4	52,9	>3,0	MRO 12	4.100	13,6	7,4	8,00	1,7913
	22,40	22,350	62,6	53,1	>3,0	MRO 22	5.000	17,9	11,7	8,00	3,1366
	21,80	21,750	64,4	50,9	2,2	MRO 02	3.400	10,8	4,6	8,00	0,5645
	21,80	21,750	64,4	52,4	>3,0	MRO 12	4.350	13,6	7,4	8,00	1,8457
	21,30	21,350	65,6	51,4	>3,0	MRO 32	7.550	24,7	18,5	8,00	3,4347
	18,40	18,370	76,2	43,5	>3,0	MRO 12	3.750	13,6	7,4	8,00	1,8749
	18,00	18,030	77,6	40,7	2,7	MRO 02	3.100	10,8	4,6	8,00	0,5780
	18,00	17,950	78	43,0	>3,0	MRO 32	6.900	24,7	18,5	8,00	3,5860
	17,60	17,560	79,7	42,1	>3,0	MRO 22	4.450	17,9	11,7	8,00	3,2313
16,40	16,360	85,6	37,0	2,7	MRO 02	3.000	10,8	4,6	8,00	0,5451	
16,40	16,360	85,6	39,4	>3,0	MRO 22	4.100	17,9	11,7	8,00	3,1625	
16,40	16,360	85,6	38,6	>3,0	MRO 32	6.500	24,7	18,5	8,00	3,4806	
15,90	15,910	88	37,0	>3,0	MRO 12	3.650	13,6	7,4	8,00	1,8416	
15,30	15,310	91,5	35,9	>3,0	MRO 22	4.100	17,9	11,7	8,00	3,2966	

RO-2 Gearboxes

Geared motor Selection

1400 rpm

P ₁ [kW]	i _n	i _r	n ₂ [rpm]	M ₂ [Nm]	FS	Size	F _{r2} [N]	MRO [kg]	FRO [kg]	J _m × 10 ⁻⁴	J ₁ × 10 ⁻⁴
0,37	15,30	15,310	91,5	36,2	>3,0	MRO 32	6.450	24,7	18,5	8,00	3,7457
	15,10	15,100	92,7	37,0	3,0	MRO 02	2.850	10,8	4,6	8,00	0,5939
	14,90	14,900	93,9	35,2	>3,0	MRO 12	3.350	13,6	7,4	8,00	1,9187
	12,30	12,340	113,5	29,2	>3,0	MRO 12	3.550	13,6	7,4	8,00	2,2731
	11,70	11,710	119,6	27,8	>3,0	MRO 22	4.050	17,9	11,7	8,00	3,9507
	11,60	11,600	120,6	27,4	>3,0	MRO 32	6.400	24,7	18,5	8,00	4,9874
	10,90	10,880	128,7	26,1	>3,0	MRO 02	2.300	10,8	4,6	8,00	0,6392
	10,90	10,880	128,7	25,6	>3,0	MRO 22	3.700	17,9	11,7	8,00	3,5463
	10,90	10,880	128,7	25,8	>3,0	MRO 32	6.000	24,7	18,5	8,00	4,2665
	10,60	10,570	132,4	25,5	>3,0	MRO 12	2.700	13,6	7,4	8,00	2,0326
	8,70	8,740	160,2	20,8	>3,0	MRO 12	2.700	13,6	7,4	8,00	2,5046
	8,60	8,580	163,2	20,4	>3,0	MRO 02	2.200	10,8	4,6	8,00	0,9445
	8,50	8,540	163,9	20,2	>3,0	MRO 32	6.000	24,7	18,5	8,00	6,0700
	8,40	8,360	167,5	20,0	>3,0	MRO 22	3.450	17,9	11,7	8,00	4,5033
	7,30	7,280	192,2	17,2	>3,0	MRO 22	3.200	17,9	11,7	8,00	4,7920
	7,30	7,280	192,2	17,3	>3,0	MRO 32	5.650	24,7	18,5	8,00	6,7749
	7,20	7,190	194,8	17,0	>3,0	MRO 02	2.000	10,8	4,6	8,00	1,0150
	7,10	7,090	197,4	17,0	>3,0	MRO 12	2.450	13,6	7,4	8,00	2,6978
	5,20	5,180	270,5	12,1	>3,0	MRO 02	1.700	10,8	4,6	8,00	1,2149
	5,20	5,180	270,5	12,3	>3,0	MRO 22	3.150	17,9	11,7	8,00	5,8944
	5,20	5,180	270,5	12,3	>3,0	MRO 32	4.800	24,7	18,5	8,00	9,0749
5,00	5,030	278,3	11,9	>3,0	MRO 12	2.300	13,6	7,4	8,00	3,2008	
0,55	51,90	51,930	27	165,0	1,8	MRO 22	6.450	20,2	11,7	14,00	2,9144
	51,50	51,460	27,2	183,3	2,7	MRO 32	9.800	27,0	18,5	14,00	2,9671
	47,20	47,180	29,7	165,0	2,0	MRO 22	6.400	20,2	11,7	14,00	2,9213
	45,90	45,900	30,5	155,8	1,1	MRO 12	5.700	15,9	7,4	14,00	1,7254
	45,10	45,050	31,1	161,8	>3,0	MRO 32	9.800	27,0	18,5	14,00	2,9882
	38,80	38,760	36,1	137,5	1,3	MRO 12	5.300	15,9	7,4	14,00	1,7320
	37,90	37,890	37	131,0	>3,0	MRO 32	9.800	27,0	18,5	14,00	3,0222
	37,10	37,060	37,8	129,6	2,5	MRO 22	6.350	20,2	11,7	14,00	2,9425
	36,70	36,690	38,2	131,0	>3,0	MRO 32	9.950	27,0	18,5	14,00	3,0718
	33,60	33,640	41,6	121,0	2,7	MRO 22	6.100	20,2	11,7	14,00	2,9816
	32,70	32,730	42,8	116,9	1,5	MRO 12	5.200	15,9	7,4	14,00	1,7591
	32,30	32,300	43,3	113,4	2,9	MRO 22	5.900	20,2	11,7	14,00	2,9572
	32,30	32,300	43,3	114,6	>3,0	MRO 32	9.050	27,0	18,5	14,00	3,0580
	31,90	31,880	43,9	121,0	0,9	MRO 02	3.950	13,1	4,6	14,00	0,4983
	31,50	31,450	44,5	110,0	1,6	MRO 12	4.800	15,9	7,4	14,00	1,7418
	27,60	27,640	50,7	100,0	2,0	MRO 12	4.550	15,9	7,4	14,00	1,7720
	27,10	27,130	51,6	100,8	1,1	MRO 02	3.700	13,1	4,6	14,00	0,5181
	27,00	27,010	51,8	94,8	>3,0	MRO 32	8.400	27,0	18,5	14,00	3,1801
	26,40	26,420	53	95,5	>3,0	MRO 22	5.450	20,2	11,7	14,00	3,0234
	25,90	25,920	54	91,7	1,6	MRO 12	4.850	15,9	7,4	14,00	1,8225
	24,60	24,610	56,9	86,8	>3,0	MRO 22	5.500	20,2	11,7	14,00	3,1062
	24,40	24,410	57,4	91,7	1,1	MRO 02	3.700	13,1	4,6	14,00	0,5579
	24,40	24,390	57,4	85,9	>3,0	MRO 32	8.300	27,0	18,5	14,00	3,3409
	23,00	23,030	60,8	82,5	>3,0	MRO 22	5.000	20,2	11,7	14,00	3,0523
	23,00	23,030	60,8	80,9	>3,0	MRO 32	7.700	27,0	18,5	14,00	3,2506
	22,70	22,730	61,6	75,6	1,5	MRO 02	3.400	13,1	4,6	14,00	0,5251
	22,40	22,420	62,4	78,6	2,5	MRO 12	4.100	15,9	7,4	14,00	1,7913
	22,40	22,350	62,6	78,9	>3,0	MRO 22	5.000	20,2	11,7	14,00	3,1366

Gearboxes RO-2

1400 rpm

Geared motor Selection

P ₁ [kW]	i _n	i _r	n ₂ [rpm]	M ₂ [Nm]	FS	Size	F _{r2} [N]	MRO [kg]	FRO [kg]	J _m × 10 ⁻⁴	J ₁ × 10 ⁻⁴
0,55	21,80	21,750	64,4	75,6	1,5	MRO 02	3.400	13,1	4,6	14,00	0,5645
	21,80	21,750	64,4	77,9	2,2	MRO 12	4.350	15,9	7,4	14,00	1,8457
	21,30	21,350	65,6	76,4	>3,0	MRO 32	7.550	27,0	18,5	14,00	3,4347
	18,40	18,370	76,2	64,7	>3,0	MRO 12	3.750	15,9	7,4	14,00	1,8749
	18,00	18,030	77,6	60,5	1,8	MRO 02	3.100	13,1	4,6	14,00	0,5780
	18,00	17,950	78	64,0	>3,0	MRO 32	6.900	27,0	18,5	14,00	3,5860
	17,60	17,560	79,7	62,6	>3,0	MRO 22	4.450	20,2	11,7	14,00	3,2313
	16,40	16,360	85,6	55,0	1,8	MRO 02	3.000	13,1	4,6	14,00	0,5451
	16,40	16,360	85,6	58,5	>3,0	MRO 22	4.100	20,2	11,7	14,00	3,1625
	16,40	16,360	85,6	57,4	>3,0	MRO 32	6.500	27,0	18,5	14,00	3,4806
	15,90	15,910	88	55,0	>3,0	MRO 12	3.650	15,9	7,4	14,00	1,8416
	15,30	15,310	91,5	53,4	>3,0	MRO 22	4.100	20,2	11,7	14,00	3,2966
	15,30	15,310	91,5	53,9	>3,0	MRO 32	6.450	27,0	18,5	14,00	3,7457
	15,10	15,100	92,7	55,0	2,0	MRO 02	2.850	13,1	4,6	14,00	0,5939
	14,90	14,900	93,9	52,4	>3,0	MRO 12	3.350	15,9	7,4	14,00	1,9187
	12,30	12,340	113,5	43,4	>3,0	MRO 12	3.550	15,9	7,4	14,00	2,2731
	11,70	11,710	119,6	41,3	>3,0	MRO 22	4.050	20,2	11,7	14,00	3,9507
	11,60	11,600	120,6	40,7	>3,0	MRO 32	6.400	27,0	18,5	14,00	4,9874
	10,90	10,880	128,7	38,8	>3,0	MRO 02	2.300	13,1	4,6	14,00	0,6392
	10,90	10,880	128,7	38,1	>3,0	MRO 22	3.700	20,2	11,7	14,00	3,5463
	10,90	10,880	128,7	38,4	>3,0	MRO 32	6.000	27,0	18,5	14,00	4,2665
	10,60	10,570	132,4	37,9	>3,0	MRO 12	2.700	15,9	7,4	14,00	2,0326
	8,70	8,740	160,2	30,9	>3,0	MRO 12	2.700	15,9	7,4	14,00	2,5046
	8,60	8,580	163,2	30,3	>3,0	MRO 02	2.200	13,1	4,6	14,00	0,9445
	8,50	8,540	163,9	30,0	>3,0	MRO 32	6.000	27,0	18,5	14,00	6,0700
	8,40	8,360	167,5	29,8	>3,0	MRO 22	3.450	20,2	11,7	14,00	4,5033
	7,30	7,280	192,2	25,5	>3,0	MRO 22	3.200	20,2	11,7	14,00	4,7920
	7,30	7,280	192,2	25,7	>3,0	MRO 32	5.650	27,0	18,5	14,00	6,7749
	7,20	7,190	194,8	25,2	>3,0	MRO 02	2.000	13,1	4,6	14,00	1,0150
	7,10	7,090	197,4	25,3	>3,0	MRO 12	2.450	15,9	7,4	14,00	2,6978
	5,20	5,180	270,5	18,0	>3,0	MRO 02	1.700	13,1	4,6	14,00	1,2149
	5,20	5,180	270,5	18,3	>3,0	MRO 22	3.150	20,2	11,7	14,00	5,8944
	5,20	5,180	270,5	18,3	>3,0	MRO 32	4.800	27,0	18,5	14,00	9,0749
5,00	5,030	278,3	17,7	>3,0	MRO 12	2.300	15,9	7,4	14,00	3,2008	
0,75	51,90	51,930	27	225,0	1,3	MRO 22	6.450	21,5	11,7	17,00	2,9144
	51,50	51,460	27,2	250,0	2,0	MRO 32	9.800	28,3	18,5	17,00	2,9671
	47,20	47,180	29,7	225,0	1,5	MRO 22	6.400	21,5	11,7	17,00	2,9213
	45,90	45,900	30,5	212,5	0,8	MRO 12	5.700	17,2	7,4	17,00	1,7254
	45,10	45,050	31,1	220,6	2,3	MRO 32	9.800	28,3	18,5	17,00	2,9882
	38,80	38,760	36,1	187,5	0,9	MRO 12	5.300	17,2	7,4	17,00	1,7320
	37,90	37,890	37	178,6	2,8	MRO 32	9.800	28,3	18,5	17,00	3,0222
	37,10	37,060	37,8	176,8	1,9	MRO 22	6.350	21,5	11,7	17,00	2,9425
	36,70	36,690	38,2	178,6	2,8	MRO 32	9.950	28,3	18,5	17,00	3,0718
	33,60	33,640	41,6	165,0	2,0	MRO 22	6.100	21,5	11,7	17,00	2,9816
	32,70	32,730	42,8	159,4	1,1	MRO 12	5.200	17,2	7,4	17,00	1,7591
	32,30	32,300	43,3	154,7	2,1	MRO 22	5.900	21,5	11,7	17,00	2,9572
	32,30	32,300	43,3	156,3	>3,0	MRO 32	9.050	28,3	18,5	17,00	3,0580
	31,90	31,880	43,9	165,0	0,7	MRO 02	3.950	14,4	4,6	17,00	0,4983
	31,50	31,450	44,5	150,0	1,2	MRO 12	4.800	17,2	7,4	17,00	1,7418
	27,60	27,640	50,7	136,4	1,5	MRO 12	4.550	17,2	7,4	17,00	1,7720

RO-2 Gearboxes

Geared motor Selection

1400 rpm

P ₁ [kW]	i _n	i _r	n ₂ [rpm]	M ₂ [Nm]	FS	Size	F _{r2} [N]	MRO [kg]	FRO [kg]	J _m × 10 ⁻⁴	J ₁ × 10 ⁻⁴
0,75	27,10	27,130	51,6	137,5	0,8	MRO 02	3.700	14,4	4,6	17,00	0,5181
	27,00	27,010	51,8	129,3	>3,0	MRO 32	8.400	28,3	18,5	17,00	3,1801
	26,40	26,420	53	130,3	2,5	MRO 22	5.450	21,5	11,7	17,00	3,0234
	25,90	25,920	54	125,0	1,2	MRO 12	4.850	17,2	7,4	17,00	1,8225
	24,60	24,610	56,9	118,4	2,5	MRO 22	5.500	21,5	11,7	17,00	3,1062
	24,40	24,410	57,4	125,0	0,8	MRO 02	3.700	14,4	4,6	17,00	0,5579
	24,40	24,390	57,4	117,2	>3,0	MRO 32	8.300	28,3	18,5	17,00	3,3409
	23,00	23,030	60,8	112,5	2,9	MRO 22	5.000	21,5	11,7	17,00	3,0523
	23,00	23,030	60,8	110,3	>3,0	MRO 32	7.700	28,3	18,5	17,00	3,2506
	22,70	22,730	61,6	103,1	1,1	MRO 02	3.400	14,4	4,6	17,00	0,5251
	22,40	22,420	62,4	107,1	1,9	MRO 12	4.100	17,2	7,4	17,00	1,7913
	22,40	22,350	62,6	107,6	>3,0	MRO 22	5.000	21,5	11,7	17,00	3,1366
	21,80	21,750	64,4	103,1	1,1	MRO 02	3.400	14,4	4,6	17,00	0,5645
	21,80	21,750	64,4	106,3	1,6	MRO 12	4.350	17,2	7,4	17,00	1,8457
	21,30	21,350	65,6	104,2	>3,0	MRO 32	7.550	28,3	18,5	17,00	3,4347
	18,40	18,370	76,2	88,2	2,3	MRO 12	3.750	17,2	7,4	17,00	1,8749
	18,00	18,030	77,6	82,5	1,3	MRO 02	3.100	14,4	4,6	17,00	0,5780
	18,00	17,950	78	87,2	>3,0	MRO 32	6.900	28,3	18,5	17,00	3,5860
	17,60	17,560	79,7	85,3	>3,0	MRO 22	4.450	21,5	11,7	17,00	3,2313
	16,40	16,360	85,6	75,0	1,3	MRO 02	3.000	14,4	4,6	17,00	0,5451
	16,40	16,360	85,6	79,8	>3,0	MRO 22	4.100	21,5	11,7	17,00	3,1625
	16,40	16,360	85,6	78,3	>3,0	MRO 32	6.500	28,3	18,5	17,00	3,4806
	15,90	15,910	88	75,0	2,3	MRO 12	3.650	17,2	7,4	17,00	1,8416
	15,30	15,310	91,5	72,8	>3,0	MRO 22	4.100	21,5	11,7	17,00	3,2966
	15,30	15,310	91,5	73,5	>3,0	MRO 32	6.450	28,3	18,5	17,00	3,7457
	15,10	15,100	92,7	75,0	1,5	MRO 02	2.850	14,4	4,6	17,00	0,5939
	14,90	14,900	93,9	71,4	2,8	MRO 12	3.350	17,2	7,4	17,00	1,9187
	12,30	12,340	113,5	59,2	2,5	MRO 12	3.550	17,2	7,4	17,00	2,2731
	11,70	11,710	119,6	56,3	>3,0	MRO 22	4.050	21,5	11,7	17,00	3,9507
	11,60	11,600	120,6	55,6	>3,0	MRO 32	6.400	28,3	18,5	17,00	4,9874
	10,90	10,880	128,7	52,9	2,3	MRO 02	2.300	14,4	4,6	17,00	0,6392
	10,90	10,880	128,7	51,9	>3,0	MRO 22	3.700	21,5	11,7	17,00	3,5463
	10,90	10,880	128,7	52,4	>3,0	MRO 32	6.000	28,3	18,5	17,00	4,2665
	10,60	10,570	132,4	51,7	>3,0	MRO 12	2.700	17,2	7,4	17,00	2,0326
	8,70	8,740	160,2	42,2	>3,0	MRO 12	2.700	17,2	7,4	17,00	2,5046
	8,60	8,580	163,2	41,3	2,7	MRO 02	2.200	14,4	4,6	17,00	0,9445
	8,50	8,540	163,9	40,9	>3,0	MRO 32	6.000	28,3	18,5	17,00	6,0700
	8,40	8,360	167,5	40,6	>3,0	MRO 22	3.450	21,5	11,7	17,00	4,5033
	7,30	7,280	192,2	34,8	>3,0	MRO 22	3.200	21,5	11,7	17,00	4,7920
	7,30	7,280	192,2	35,0	>3,0	MRO 32	5.650	28,3	18,5	17,00	6,7749
7,20	7,190	194,8	34,4	>3,0	MRO 02	2.000	14,4	4,6	17,00	1,0150	
7,10	7,090	197,4	34,5	>3,0	MRO 12	2.450	17,2	7,4	17,00	2,6978	
5,20	5,180	270,5	24,6	>3,0	MRO 02	1.700	14,4	4,6	17,00	1,2149	
5,20	5,180	270,5	25,0	>3,0	MRO 22	3.150	21,5	11,7	17,00	5,8944	
5,20	5,180	270,5	25,0	>3,0	MRO 32	4.800	28,3	18,5	17,00	9,0749	
5,00	5,030	278,3	24,1	>3,0	MRO 12	2.300	17,2	7,4	17,00	3,2008	
1,1	51,50	51,460	27,2	366,7	1,4	MRO 32	9.800	30,5	18,5	33,00	2,9671
	45,10	45,050	31,1	323,5	1,5	MRO 32	9.800	30,5	18,5	33,00	2,9882
	37,90	37,890	37	261,9	1,9	MRO 32	9.800	30,5	18,5	33,00	3,0222
	37,10	37,060	37,8	259,3	1,3	MRO 22	6.350	23,7	11,7	33,00	2,9425

Gearboxes RO-2

1400 rpm

Geared motor Selection

P ₁ [kW]	i _n	i _r	n ₂ [rpm]	M ₂ [Nm]	FS	Size	F _{r2} [N]	MRO [kg]	FRO [kg]	J _m × 10 ⁻⁴	J ₁ × 10 ⁻⁴
1,1	36,70	36,690	38,2	261,9	1,9	MRO 32	9.950	30,5	18,5	33,00	3,0718
	33,60	33,640	41,6	242,0	1,4	MRO 22	6.100	23,7	11,7	33,00	2,9816
	32,30	32,300	43,3	226,9	1,5	MRO 22	5.900	23,7	11,7	33,00	2,9572
	32,30	32,300	43,3	229,2	2,2	MRO 32	9.050	30,5	18,5	33,00	3,0580
	27,00	27,010	51,8	189,7	2,6	MRO 32	8.400	30,5	18,5	33,00	3,1801
	26,40	26,420	53	191,1	1,7	MRO 22	5.450	23,7	11,7	33,00	3,0234
	24,60	24,610	56,9	173,7	1,7	MRO 22	5.500	23,7	11,7	33,00	3,1062
	24,40	24,390	57,4	171,9	2,9	MRO 32	8.300	30,5	18,5	33,00	3,3409
	23,00	23,030	60,8	165,0	2,0	MRO 22	5.000	23,7	11,7	33,00	3,0523
	23,00	23,030	60,8	161,8	>3,0	MRO 32	7.700	30,5	18,5	33,00	3,2506
	22,40	22,420	62,4	157,1	1,3	MRO 12	4.100	19,4	7,4	33,00	1,7913
	22,40	22,350	62,6	157,8	2,1	MRO 22	5.000	23,7	11,7	33,00	3,1366
	21,80	21,750	64,4	155,8	1,1	MRO 12	4.350	19,4	7,4	33,00	1,8457
	21,30	21,350	65,6	152,8	>3,0	MRO 32	7.550	30,5	18,5	33,00	3,4347
	18,40	18,370	76,2	129,4	1,5	MRO 12	3.750	19,4	7,4	33,00	1,8749
	18,00	17,950	78	127,9	>3,0	MRO 32	6.900	30,5	18,5	33,00	3,5860
	17,60	17,560	79,7	125,2	2,6	MRO 22	4.450	23,7	11,7	33,00	3,2313
	16,40	16,360	85,6	117,1	2,8	MRO 22	4.100	23,7	11,7	33,00	3,1625
	16,40	16,360	85,6	114,8	>3,0	MRO 32	6.500	30,5	18,5	33,00	3,4806
	15,90	15,910	88	110,0	1,5	MRO 12	3.650	19,4	7,4	33,00	1,8416
	15,30	15,310	91,5	106,8	>3,0	MRO 22	4.100	23,7	11,7	33,00	3,2966
	15,30	15,310	91,5	107,8	>3,0	MRO 32	6.450	30,5	18,5	33,00	3,7457
	15,10	15,100	92,7	110,0	1,0	MRO 02	2.850	16,6	4,6	33,00	0,5939
	14,90	14,900	93,9	104,8	1,9	MRO 12	3.350	19,4	7,4	33,00	1,9187
	12,30	12,340	113,5	86,8	1,7	MRO 12	3.550	19,4	7,4	33,00	2,2731
	11,70	11,710	119,6	82,5	>3,0	MRO 22	4.050	23,7	11,7	33,00	3,9507
	11,60	11,600	120,6	81,5	>3,0	MRO 32	6.400	30,5	18,5	33,00	4,9874
	10,90	10,880	128,7	77,6	1,5	MRO 02	2.300	16,6	4,6	33,00	0,6392
	10,90	10,880	128,7	76,2	>3,0	MRO 22	3.700	23,7	11,7	33,00	3,5463
	10,90	10,880	128,7	76,8	>3,0	MRO 32	6.000	30,5	18,5	33,00	4,2665
	10,60	10,570	132,4	75,9	2,6	MRO 12	2.700	19,4	7,4	33,00	2,0326
	8,70	8,740	160,2	61,9	2,9	MRO 12	2.700	19,4	7,4	33,00	2,5046
	8,60	8,580	163,2	60,5	1,8	MRO 02	2.200	16,6	4,6	33,00	0,9445
	8,50	8,540	163,9	60,0	>3,0	MRO 32	6.000	30,5	18,5	33,00	6,0700
	8,40	8,360	167,5	59,6	>3,0	MRO 22	3.450	23,7	11,7	33,00	4,5033
	7,30	7,280	192,2	51,0	>3,0	MRO 22	3.200	23,7	11,7	33,00	4,7920
	7,30	7,280	192,2	51,3	>3,0	MRO 32	5.650	30,5	18,5	33,00	6,7749
	7,20	7,190	194,8	50,4	2,2	MRO 02	2.000	16,6	4,6	33,00	1,0150
	7,10	7,090	197,4	50,7	>3,0	MRO 12	2.450	19,4	7,4	33,00	2,6978
	5,20	5,180	270,5	36,1	2,9	MRO 02	1.700	16,6	4,6	33,00	1,2149
5,20	5,180	270,5	36,7	>3,0	MRO 22	3.150	23,7	11,7	33,00	5,8944	
5,20	5,180	270,5	36,7	>3,0	MRO 32	4.800	30,5	18,5	33,00	9,0749	
5,00	5,030	278,3	35,4	>3,0	MRO 12	2.300	19,4	7,4	33,00	3,2008	
1,5	51,50	51,460	27,2	500,0	1,0	MRO 32	9.800	32,0	18,5	40,00	2,9671
	45,10	45,050	31,1	441,2	1,1	MRO 32	9.800	32,0	18,5	40,00	2,9882
	37,90	37,890	37	357,1	1,4	MRO 32	9.800	32,0	18,5	40,00	3,0222
	37,10	37,060	37,8	353,6	0,9	MRO 22	6.350	25,2	11,7	40,00	2,9425
	36,70	36,690	38,2	357,1	1,4	MRO 32	9.950	32,0	18,5	40,00	3,0718
	33,60	33,640	41,6	330,0	1,0	MRO 22	6.100	25,2	11,7	40,00	2,9816
	32,30	32,300	43,3	309,4	1,1	MRO 22	5.900	25,2	11,7	40,00	2,9572

RO-2 Gearboxes

Geared motor Selection

1400 rpm

P ₁ [kW]	i _n	i _r	n ₂ [rpm]	M ₂ [Nm]	FS	Size	F _{r2} [N]	MRO [kg]	FRO [kg]	J _m × 10 ⁻⁴	J ₁ × 10 ⁻⁴
1,5	32,30	32,300	43,3	312,5	1,6	MRO 32	9.050	32,0	18,5	40,00	3,0580
	27,00	27,010	51,8	258,6	1,9	MRO 32	8.400	32,0	18,5	40,00	3,1801
	26,40	26,420	53	260,5	1,3	MRO 22	5.450	25,2	11,7	40,00	3,0234
	24,60	24,610	56,9	236,8	1,3	MRO 22	5.500	25,2	11,7	40,00	3,1062
	24,40	24,390	57,4	234,4	2,1	MRO 32	8.300	32,0	18,5	40,00	3,3409
	23,00	23,030	60,8	225,0	1,5	MRO 22	5.000	25,2	11,7	40,00	3,0523
	23,00	23,030	60,8	220,6	2,3	MRO 32	7.700	32,0	18,5	40,00	3,2506
	22,40	22,420	62,4	214,3	0,9	MRO 12	4.100	20,9	7,4	40,00	1,7913
	22,40	22,350	62,6	215,2	1,5	MRO 22	5.000	25,2	11,7	40,00	3,1366
	21,80	21,750	64,4	212,5	0,8	MRO 12	4.350	20,9	7,4	40,00	1,8457
	21,30	21,350	65,6	208,3	2,4	MRO 32	7.550	32,0	18,5	40,00	3,4347
	18,40	18,370	76,2	176,5	1,1	MRO 12	3.750	20,9	7,4	40,00	1,8749
	18,00	17,950	78	174,4	2,9	MRO 32	6.900	32,0	18,5	40,00	3,5860
	17,60	17,560	79,7	170,7	1,9	MRO 22	4.450	25,2	11,7	40,00	3,2313
	16,40	16,360	85,6	159,7	2,1	MRO 22	4.100	25,2	11,7	40,00	3,1625
	16,40	16,360	85,6	156,5	>3,0	MRO 32	6.500	32,0	18,5	40,00	3,4806
	15,90	15,910	88	150,0	1,1	MRO 12	3.650	20,9	7,4	40,00	1,8416
	15,30	15,310	91,5	145,6	2,3	MRO 22	4.100	25,2	11,7	40,00	3,2966
	15,30	15,310	91,5	146,9	>3,0	MRO 32	6.450	32,0	18,5	40,00	3,7457
	15,10	15,100	92,7	150,0	0,7	MRO 02	2.850	18,1	4,6	40,00	0,5939
	14,90	14,900	93,9	142,9	1,4	MRO 12	3.350	20,9	7,4	40,00	1,9187
	12,30	12,340	113,5	118,4	1,3	MRO 12	3.550	20,9	7,4	40,00	2,2731
	11,70	11,710	119,6	112,5	2,4	MRO 22	4.050	25,2	11,7	40,00	3,9507
	11,60	11,600	120,6	111,1	>3,0	MRO 32	6.400	32,0	18,5	40,00	4,9874
	10,90	10,880	128,7	105,9	1,1	MRO 02	2.300	18,1	4,6	40,00	0,6392
	10,90	10,880	128,7	103,8	2,6	MRO 22	3.700	25,2	11,7	40,00	3,5463
	10,90	10,880	128,7	104,7	>3,0	MRO 32	6.000	32,0	18,5	40,00	4,2665
	10,60	10,570	132,4	103,4	1,9	MRO 12	2.700	20,9	7,4	40,00	2,0326
	8,70	8,740	160,2	84,4	2,1	MRO 12	2.700	20,9	7,4	40,00	2,5046
	8,60	8,580	163,2	82,5	1,3	MRO 02	2.200	18,1	4,6	40,00	0,9445
	8,50	8,540	163,9	81,8	>3,0	MRO 32	6.000	32,0	18,5	40,00	6,0700
	8,40	8,360	167,5	81,3	>3,0	MRO 22	3.450	25,2	11,7	40,00	4,5033
	7,30	7,280	192,2	69,5	>3,0	MRO 22	3.200	25,2	11,7	40,00	4,7920
	7,30	7,280	192,2	70,0	>3,0	MRO 32	5.650	32,0	18,5	40,00	6,7749
	7,20	7,190	194,8	68,8	1,6	MRO 02	2.000	18,1	4,6	40,00	1,0150
	7,10	7,090	197,4	69,1	2,5	MRO 12	2.450	20,9	7,4	40,00	2,6978
5,20	5,180	270,5	49,2	2,1	MRO 02	1.700	18,1	4,6	40,00	1,2149	
5,20	5,180	270,5	50,0	>3,0	MRO 22	3.150	25,2	11,7	40,00	5,8944	
5,20	5,180	270,5	50,0	>3,0	MRO 32	4.800	32,0	18,5	40,00	9,0749	
5,00	5,030	278,3	48,2	2,8	MRO 12	2.300	20,9	7,4	40,00	3,2008	
2,2	37,90	37,890	37	523,8	1,0	MRO 32	9.800	37,5	18,5	75,00	3,0222
	36,70	36,690	38,2	523,8	1,0	MRO 32	9.950	37,5	18,5	75,00	3,0718
	32,30	32,300	43,3	458,3	1,1	MRO 32	9.050	37,5	18,5	75,00	3,0580
	27,00	27,010	51,8	379,3	1,3	MRO 32	8.400	37,5	18,5	75,00	3,1801
	24,40	24,390	57,4	343,8	1,5	MRO 32	8.300	37,5	18,5	75,00	3,3409
	23,00	23,030	60,8	330,0	1,0	MRO 22	5.000	30,7	11,7	75,00	3,0523
	23,00	23,030	60,8	323,5	1,5	MRO 32	7.700	37,5	18,5	75,00	3,2506
	22,40	22,350	62,6	315,7	1,0	MRO 22	5.000	30,7	11,7	75,00	3,1366
	21,30	21,350	65,6	305,6	1,6	MRO 32	7.550	37,5	18,5	75,00	3,4347
	18,00	17,950	78	255,8	2,0	MRO 32	6.900	37,5	18,5	75,00	3,5860

Gearboxes RO-2

1400 rpm

Geared motor Selection

P ₁ [kW]	i _n	i _r	n ₂ [rpm]	M ₂ [Nm]	FS	Size	F _{r2} [N]	MRO [kg]	FRO [kg]	J _m × 10 ⁻⁴	J ₁ × 10 ⁻⁴
2,2	17,60	17,560	79,7	250,3	1,3	MRO 22	4.450	30,7	11,7	75,00	3,2313
	16,40	16,360	85,6	234,2	1,4	MRO 22	4.100	30,7	11,7	75,00	3,1625
	16,40	16,360	85,6	229,6	2,1	MRO 32	6.500	37,5	18,5	75,00	3,4806
	15,30	15,310	91,5	213,5	1,5	MRO 22	4.100	30,7	11,7	75,00	3,2966
	15,30	15,310	91,5	215,5	2,2	MRO 32	6.450	37,5	18,5	75,00	3,7457
	14,90	14,900	93,9	209,5	1,0	MRO 12	3.350	26,4	7,4	75,00	1,9187
	12,30	12,340	113,5	173,7	0,9	MRO 12	3.550	26,4	7,4	75,00	2,2731
	11,70	11,710	119,6	165,0	1,6	MRO 22	4.050	30,7	11,7	75,00	3,9507
	11,60	11,600	120,6	163,0	2,5	MRO 32	6.400	37,5	18,5	75,00	4,9874
	10,90	10,880	128,7	152,3	1,8	MRO 22	3.700	30,7	11,7	75,00	3,5463
	10,90	10,880	128,7	153,6	2,4	MRO 32	6.000	37,5	18,5	75,00	4,2665
	10,60	10,570	132,4	151,7	1,3	MRO 12	2.700	26,4	7,4	75,00	2,0326
	8,70	8,740	160,2	123,8	1,5	MRO 12	2.700	26,4	7,4	75,00	2,5046
	8,50	8,540	163,9	120,0	2,5	MRO 32	6.000	37,5	18,5	75,00	6,0700
	8,40	8,360	167,5	119,2	2,2	MRO 22	3.450	30,7	11,7	75,00	4,5033
	7,30	7,280	192,2	102,0	2,5	MRO 22	3.200	30,7	11,7	75,00	4,7920
	7,30	7,280	192,2	102,7	2,7	MRO 32	5.650	37,5	18,5	75,00	6,7749
	7,10	7,090	197,4	101,3	1,7	MRO 12	2.450	26,4	7,4	75,00	2,6978
	5,20	5,180	270,5	73,3	2,5	MRO 22	3.150	30,7	11,7	75,00	5,8944
	5,20	5,180	270,5	73,3	>3,0	MRO 32	4.800	37,5	18,5	75,00	9,0749
5,00	5,030	278,3	70,7	1,9	MRO 12	2.300	26,4	7,4	75,00	3,2008	
3	37,90	37,890	37	714,3	0,7	MRO 32	9.800	39,5	18,5	85,00	3,0222
	36,70	36,690	38,2	714,3	0,7	MRO 32	9.950	39,5	18,5	85,00	3,0718
	32,30	32,300	43,3	625,0	0,8	MRO 32	9.050	39,5	18,5	85,00	3,0580
	27,00	27,010	51,8	517,2	1,0	MRO 32	8.400	39,5	18,5	85,00	3,1801
	24,40	24,390	57,4	468,8	1,1	MRO 32	8.300	39,5	18,5	85,00	3,3409
	23,00	23,030	60,8	450,0	0,7	MRO 22	5.000	32,7	11,7	85,00	3,0523
	23,00	23,030	60,8	441,2	1,1	MRO 32	7.700	39,5	18,5	85,00	3,2506
	22,40	22,350	62,6	430,4	0,8	MRO 22	5.000	32,7	11,7	85,00	3,1366
	21,30	21,350	65,6	416,7	1,2	MRO 32	7.550	39,5	18,5	85,00	3,4347
	18,00	17,950	78	348,8	1,4	MRO 32	6.900	39,5	18,5	85,00	3,5860
	17,60	17,560	79,7	341,4	1,0	MRO 22	4.450	32,7	11,7	85,00	3,2313
	16,40	16,360	85,6	319,4	1,0	MRO 22	4.100	32,7	11,7	85,00	3,1625
	16,40	16,360	85,6	313,0	1,5	MRO 32	6.500	39,5	18,5	85,00	3,4806
	15,30	15,310	91,5	291,2	1,1	MRO 22	4.100	32,7	11,7	85,00	3,2966
	15,30	15,310	91,5	293,9	1,6	MRO 32	6.450	39,5	18,5	85,00	3,7457
	14,90	14,900	93,9	285,7	0,7	MRO 12	3.350	28,4	7,4	85,00	1,9187
	12,30	12,340	113,5	236,8	0,6	MRO 12	3.550	28,4	7,4	85,00	2,2731
	11,70	11,710	119,6	225,0	1,2	MRO 22	4.050	32,7	11,7	85,00	3,9507
	11,60	11,600	120,6	222,2	1,8	MRO 32	6.400	39,5	18,5	85,00	4,9874
	10,90	10,880	128,7	207,7	1,3	MRO 22	3.700	32,7	11,7	85,00	3,5463
	10,90	10,880	128,7	209,4	1,8	MRO 32	6.000	39,5	18,5	85,00	4,2665
	10,60	10,570	132,4	206,9	1,0	MRO 12	2.700	28,4	7,4	85,00	2,0326
	8,70	8,740	160,2	168,8	1,1	MRO 12	2.700	28,4	7,4	85,00	2,5046
	8,50	8,540	163,9	163,6	1,8	MRO 32	6.000	39,5	18,5	85,00	6,0700
	8,40	8,360	167,5	162,5	1,6	MRO 22	3.450	32,7	11,7	85,00	4,5033
	7,30	7,280	192,2	139,1	1,8	MRO 22	3.200	32,7	11,7	85,00	4,7920
	7,30	7,280	192,2	140,0	2,0	MRO 32	5.650	39,5	18,5	85,00	6,7749
	7,10	7,090	197,4	138,2	1,3	MRO 12	2.450	28,4	7,4	85,00	2,6978
	5,20	5,180	270,5	100,0	1,8	MRO 22	3.150	32,7	11,7	85,00	5,8944

RO-2 Gearboxes

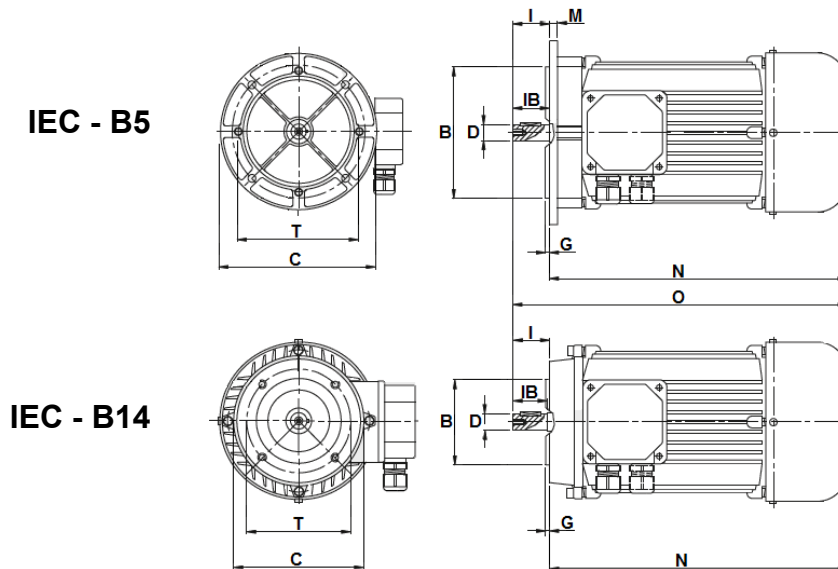
Geared motor Selection

1400 rpm

P ₁ [kW]	i _n	i _r	n ₂ [rpm]	M ₂ [Nm]	FS	Size	F _{r2} [N]	MRO [kg]	FRO [kg]	J _m × 10 ⁻⁴	J ₁ × 10 ⁻⁴
3	5,20	5,180	270,5	100,0	2,7	MRO 32	4.800	39,5	18,5	85,00	9,0749
	5,00	5,030	278,3	96,4	1,4	MRO 12	2.300	28,4	7,4	85,00	3,2008
4	18,00	17,950	78	465,1	1,1	MRO 32	6.900	47,5	18,5	130,00	3,5860
	16,40	16,360	85,6	417,4	1,2	MRO 32	6.500	47,5	18,5	130,00	3,4806
	15,30	15,310	91,5	391,8	1,2	MRO 32	6.450	47,5	18,5	130,00	3,7457
	11,60	11,600	120,6	296,3	1,4	MRO 32	6.400	47,5	18,5	130,00	4,9874
	10,90	10,880	128,7	276,9	1,0	MRO 22	3.700	40,7	11,7	130,00	3,5463
	10,90	10,880	128,7	279,2	1,3	MRO 32	6.000	47,5	18,5	130,00	4,2665
	8,50	8,540	163,9	218,2	1,4	MRO 32	6.000	47,5	18,5	130,00	6,0700
	8,40	8,360	167,5	216,7	1,2	MRO 22	3.450	40,7	11,7	130,00	4,5033
	7,30	7,280	192,2	185,5	1,4	MRO 22	3.200	40,7	11,7	130,00	4,7920
	7,30	7,280	192,2	186,7	1,5	MRO 32	5.650	47,5	18,5	130,00	6,7749
	7,10	7,090	197,4	184,2	1,0	MRO 12	2.450	36,4	7,4	130,00	2,6978
	5,20	5,180	270,5	133,3	1,4	MRO 22	3.150	40,7	11,7	130,00	5,8944
	5,20	5,180	270,5	133,3	2,0	MRO 32	4.800	47,5	18,5	130,00	9,0749
	5,00	5,030	278,3	128,6	1,1	MRO 12	2.300	36,4	7,4	130,00	3,2008
5,5	15,30	15,310	91,5	538,8	0,9	MRO 32	6.450	61,5	18,5	240,00	3,7457
	11,60	11,600	120,6	407,4	1,0	MRO 32	6.400	61,5	18,5	240,00	4,9874
	10,90	10,880	128,7	384,0	1,0	MRO 32	6.000	61,5	18,5	240,00	4,2665
	8,50	8,540	163,9	300,0	1,0	MRO 32	6.000	61,5	18,5	240,00	6,0700
	7,30	7,280	192,2	256,7	1,1	MRO 32	5.650	61,5	18,5	240,00	6,7749
	5,20	5,180	270,5	183,3	1,5	MRO 32	4.800	61,5	18,5	240,00	9,0749
7,5	15,30	15,310	91,5	734,7	0,7	MRO 32	6.450	70,5	18,5	330,00	3,7457
	11,60	11,600	120,6	555,6	0,7	MRO 32	6.400	70,5	18,5	330,00	4,9874
	10,90	10,880	128,7	523,6	0,7	MRO 32	6.000	70,5	18,5	330,00	4,2665
	8,50	8,540	163,9	409,1	0,7	MRO 32	6.000	70,5	18,5	330,00	6,0700
	7,30	7,280	192,2	350,0	0,8	MRO 32	5.650	70,5	18,5	330,00	6,7749
	5,20	5,180	270,5	250,0	1,1	MRO 32	4.800	70,5	18,5	330,00	9,0749

Gearboxes RO-2

IEC Motors



Frame	4 poles			2 poles			Flange C / T / B	Shaft D x I	G	IB	M	N	O
	kW	rpm	kg (B3)	kW	rpm	kg (B3)							
T56A	0.06	1410	2.5	0.09	2730	2.6	B5 - 120 / 100 / 80	9 x 20	2.5	20	8.5	168	188
T56B	0.09	1340	2.6	0.14	2750	3.2	B14 - 80 / 65 / 50						
T63A	0.13	1340	3.7	0.18	2770	3.7	B5 - 140 / 115 / 95	11 x 23	2.5	23	10	190.5	213.5
T63B	0.18	1360	4.3	0.25	2820	4.3	B14 - 90 / 75 / 60						
T71A	0.25	1410	5.8	0.37	2860	5.8	B5 - 160 / 130 / 110	14 x 30	3.0	30	10	218	248
T71B	0.37	1370	6.2	0.55	2860	6.2	B14 - 105 / 85 / 70						
T80A	0.55	1430	8.5	0.75	2860	8.5	B5 - 200 / 165 / 130	19 x 40	3.0	40	11	248	282
T80B	0.75	1430	9.8	1.1	2850	9.8	B14 - 120 / 100 / 80						
T90S	1.1	1430	12.0	1.5	2880	12.0	B5 - 200 / 165 / 130	24 x 50	3.5	50	10	255	305
T90L	1.5	1430	13.5	2.2	2850	13.5	B14 - 140 / 115 / 95						
T100A	2.2	1430	19.0	3	2910	18.5	B5 - 250 / 215 / 180	28 x 60	4.0	60	14	312	372
T100B	3	1430	21.0	4	2920	21.0	B14 - 160 / 130 / 110						
T112A	4	1440	29.0	5.5	2920	32.0	B5 - 250 / 215 / 180 B14 - 160 / 130 / 110	28 x 60	4.0	60	14	330	390
T132S	5.5	1460	43	7.5	2920	48	B5 - 300 / 265 / 230	38 x 80	4.0	80	20	380.5	460.5
T132M	7.5	1460	52	11	2940	54	B14 - 200 / 165 / 130						

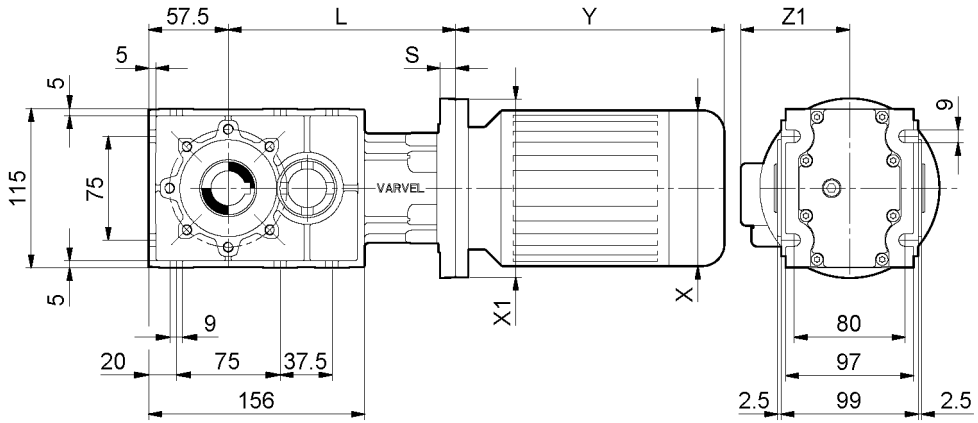
Not binding dimensions and weights

RO-2 Gearboxes

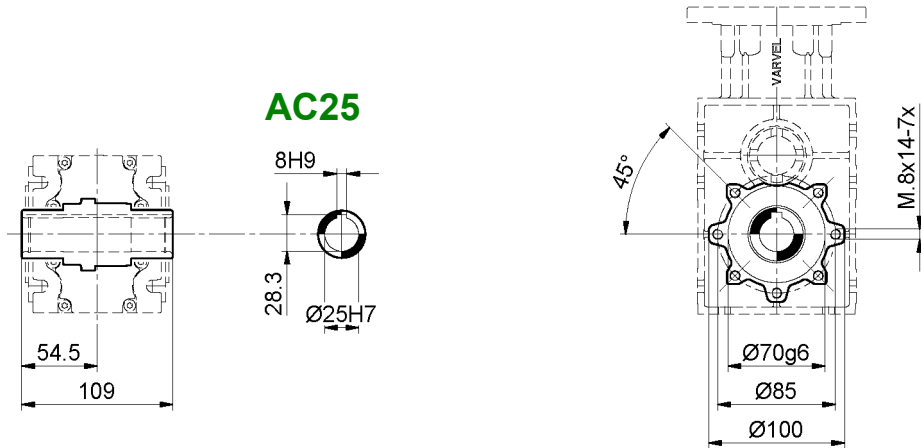
RO02

Dimensions

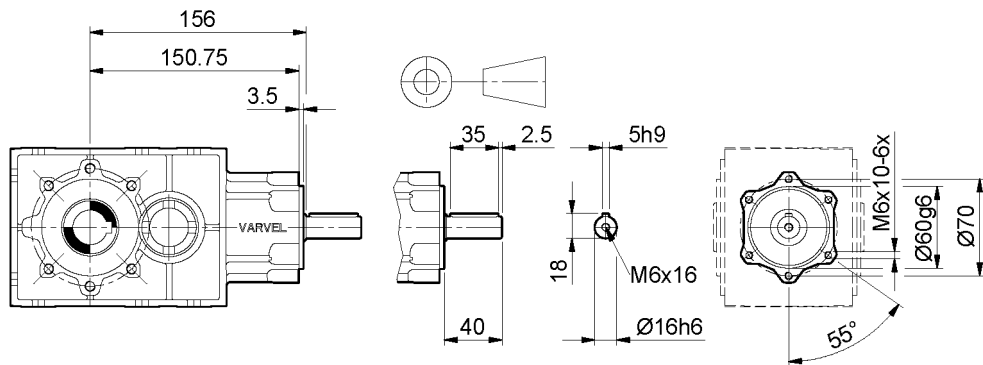
**MRO
FRO**



AC25



RO



IEC	56	63	71	80	90 S	90 L	
X / Y / Z1	110/168/108	123/185/110	140/215/121	159/238/138	176/255/149	176/280/149	
X1 (B5) / S	120/13	140/13	160/13.5	200/13	200/13	200/13	
X1 (B14) / S	---	90/13	105/18.5	120/13	140/13	140/13	
L (B5)	163.75	163.75	164.25	163.75	163.75	163.75	
L (B14)	---	163.75	169.25	163.75	163.75	163.75	

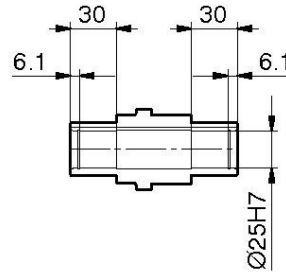
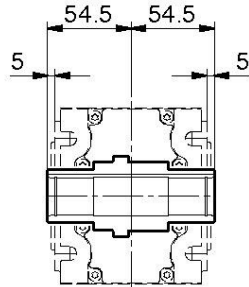
Not binding dimensions and weights

RO02

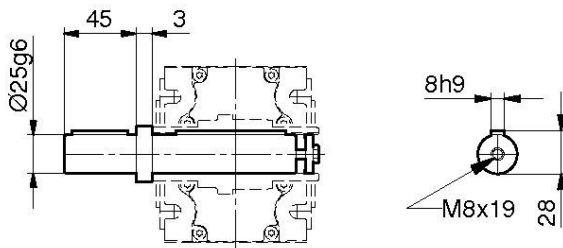
Gearboxes RO-2

Output shaft dimensions

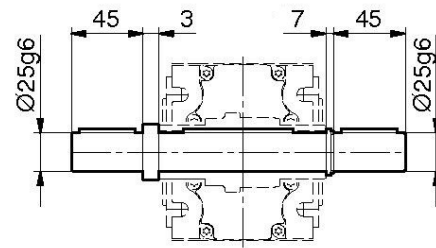
AC



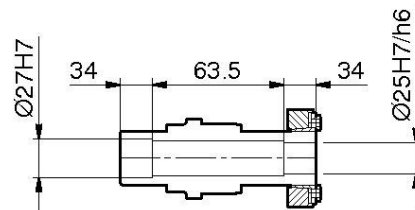
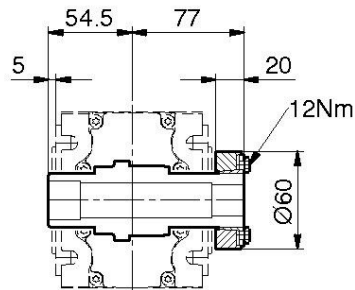
AS



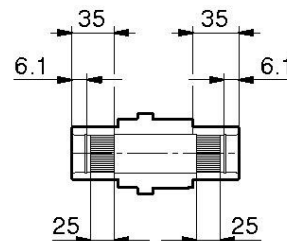
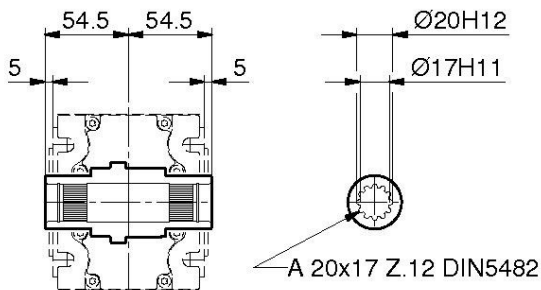
AD



ACC



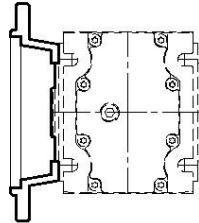
ACS



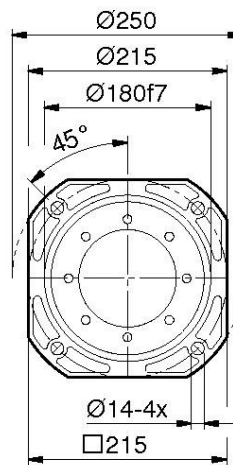
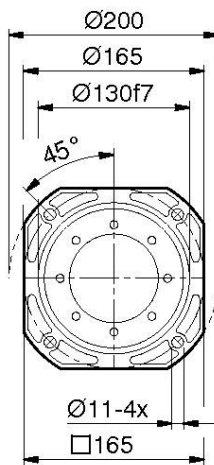
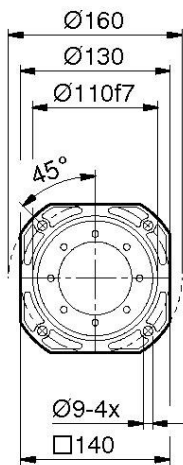
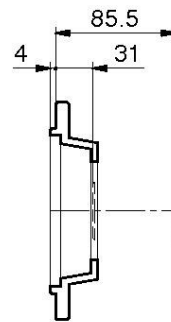
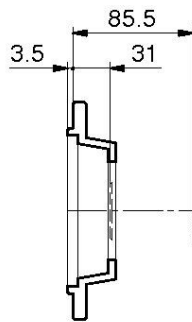
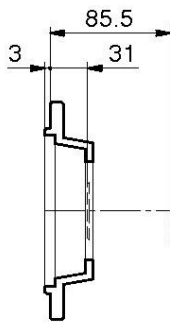
- Machine shaft dimensions: pages52-54

Not binding dimensions and weights

Output flange dimensions



A

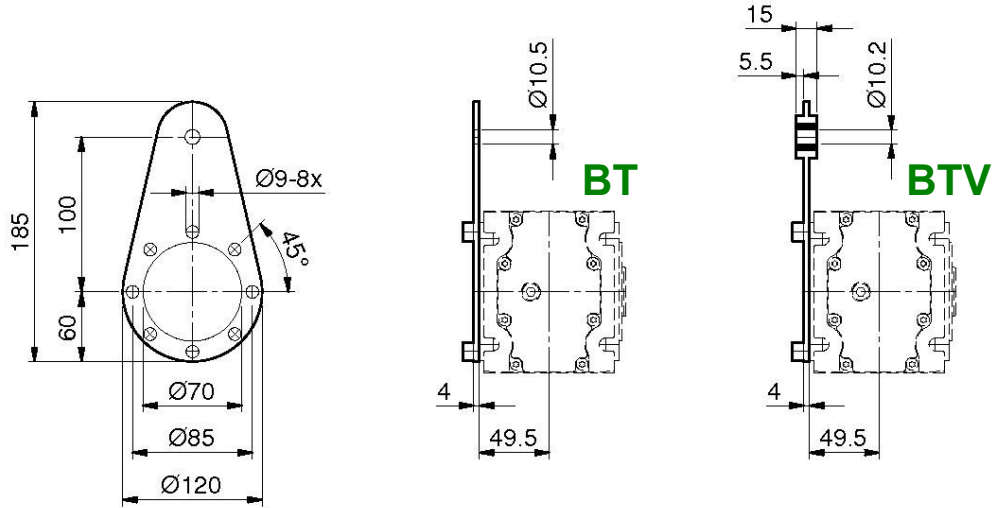


Not binding dimensions and weights

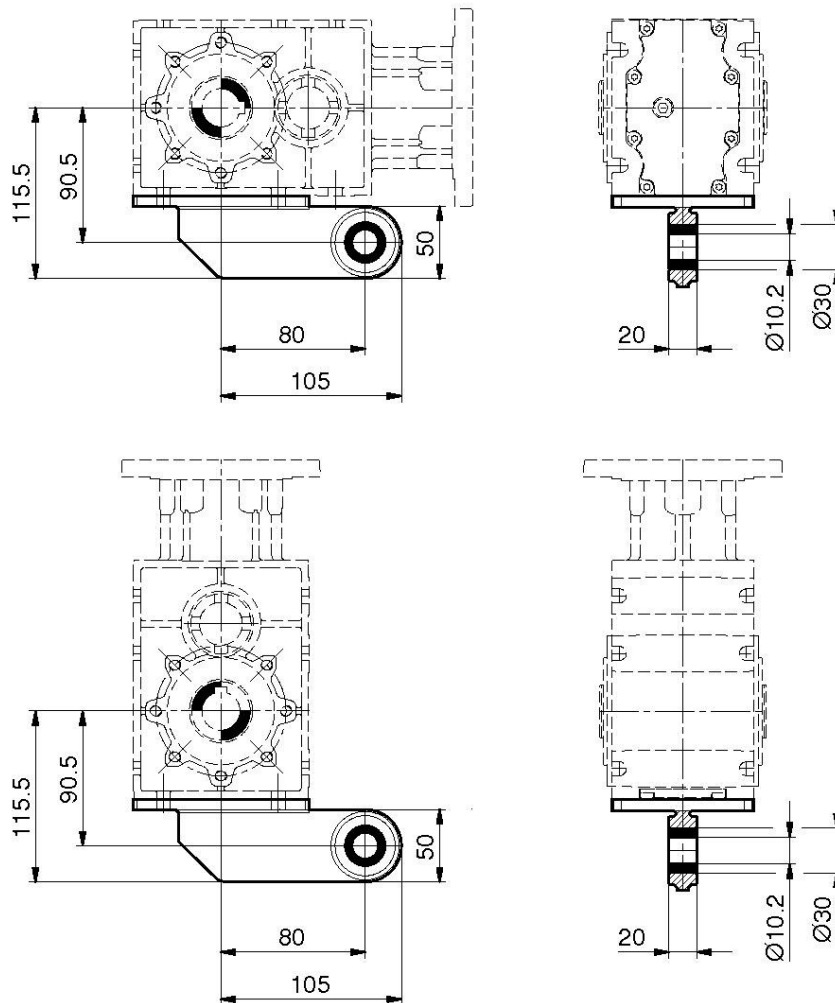
RO02

Gearboxes RO-2

Torque arm dimensions



BTF



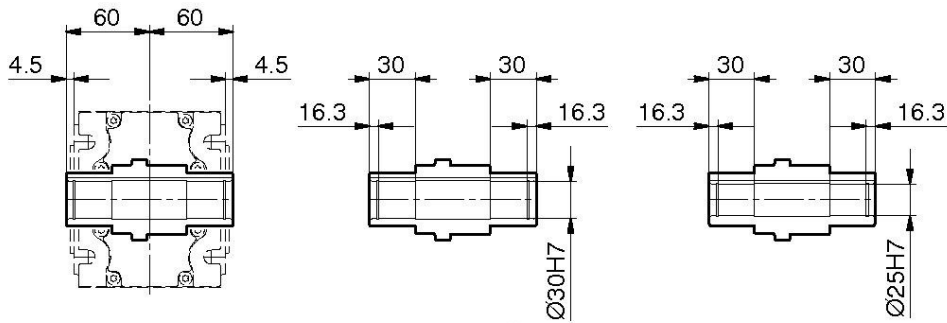
Not binding dimensions and weights

RO12

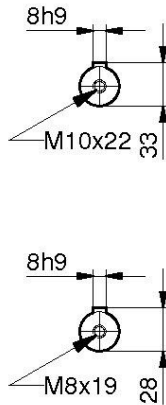
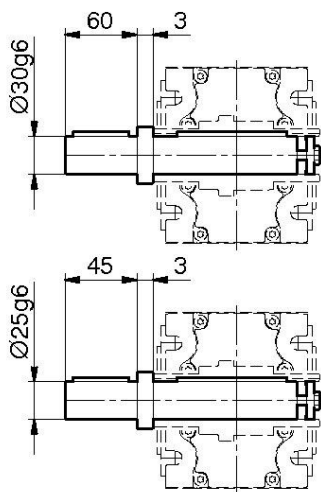
Gearboxes RO-2

Output shaft dimensions

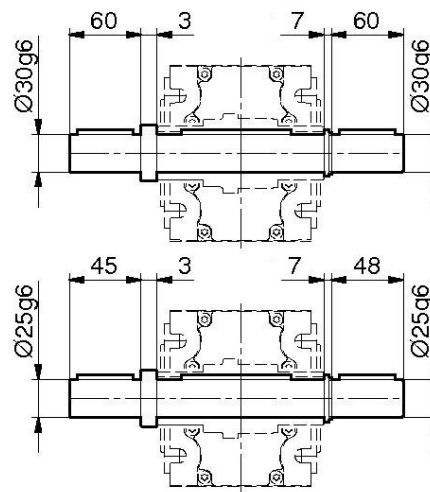
AC



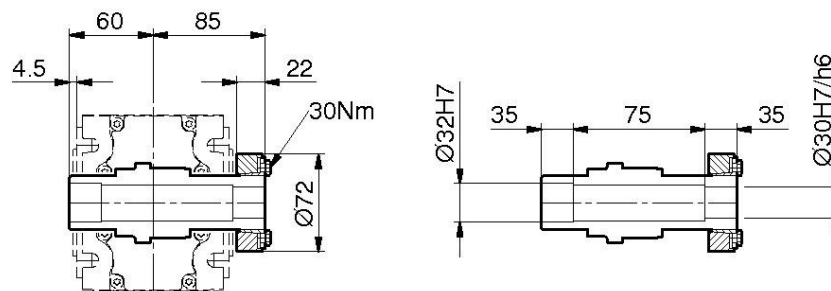
AS



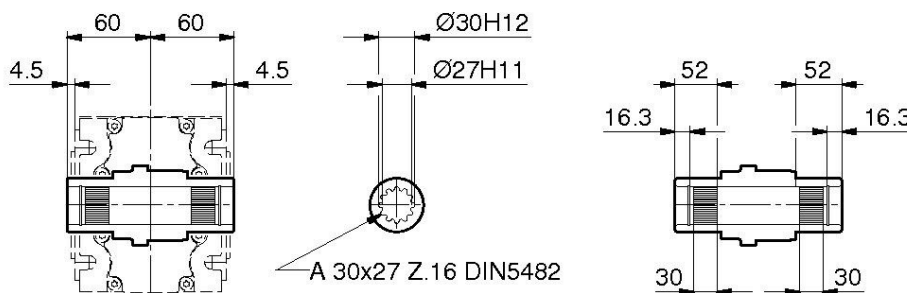
AD



ACC



ACS



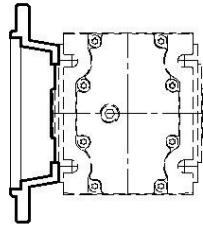
- Machine shaft dimensions: pages 52-54

Not binding dimensions and weights

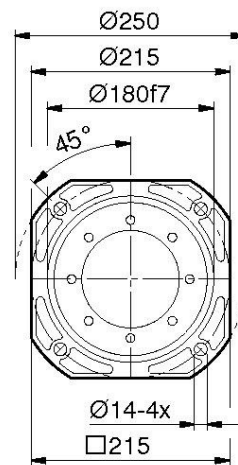
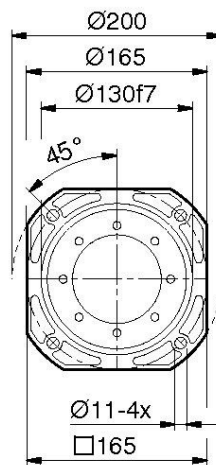
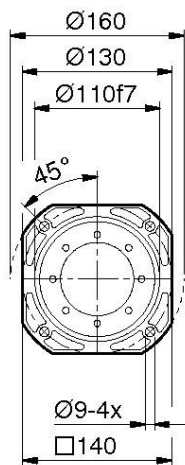
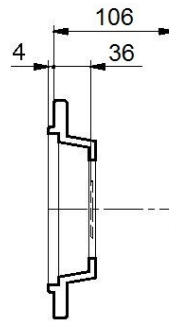
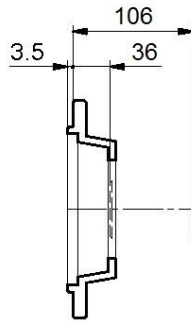
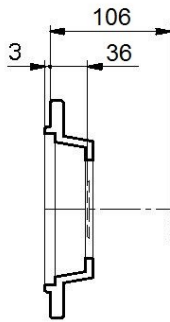
RO-2 Gearboxes

R012

Output flange dimensions



F

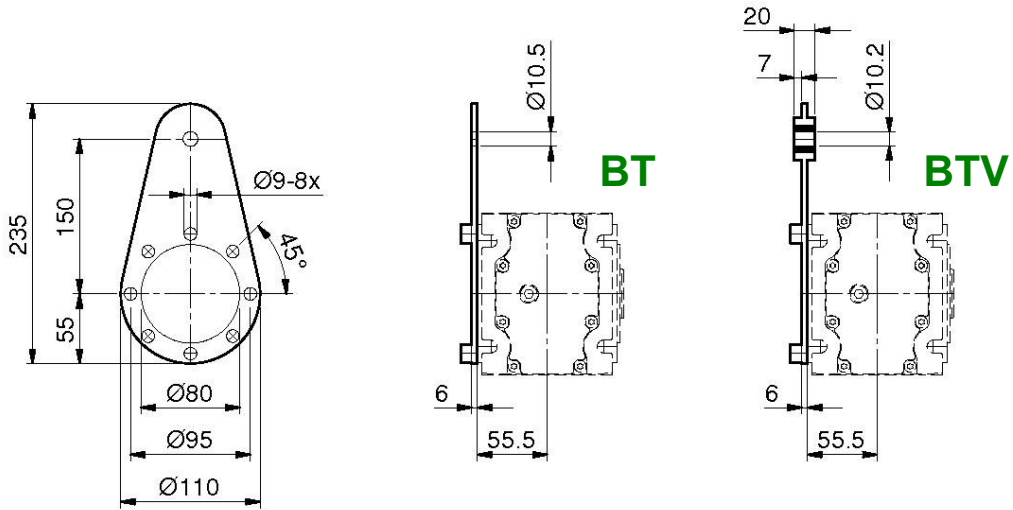


Not binding dimensions and weights

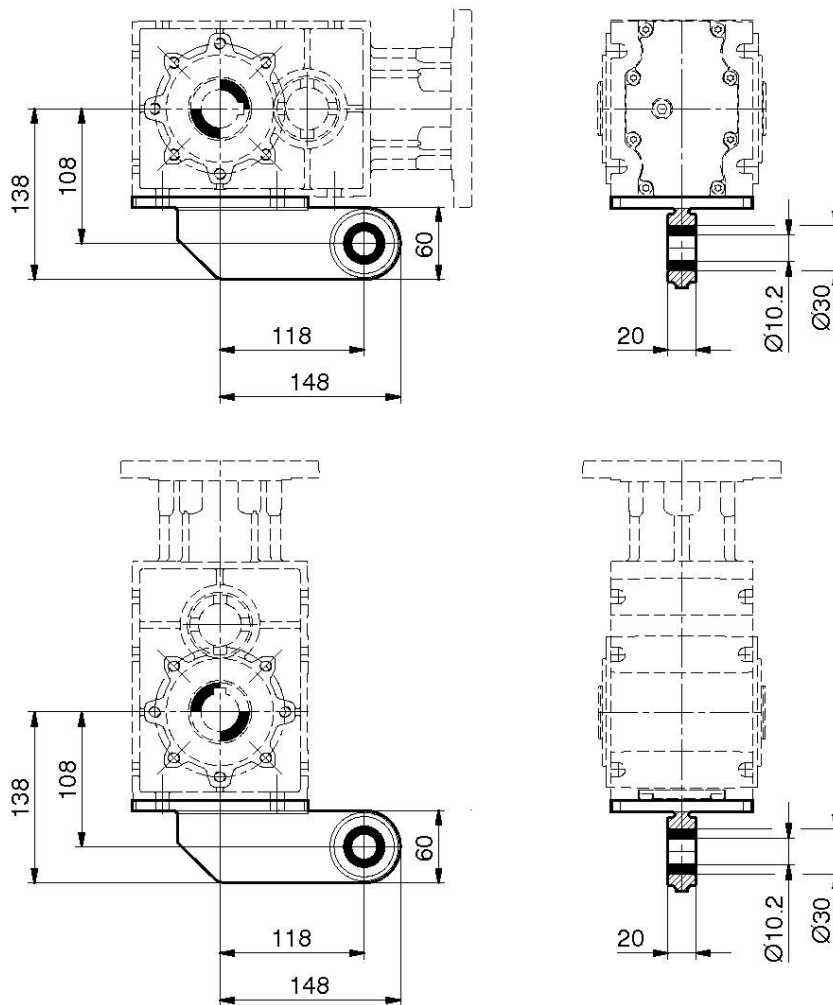
RO12

Gearboxes RO-2

Torque arm dimensions



BTF



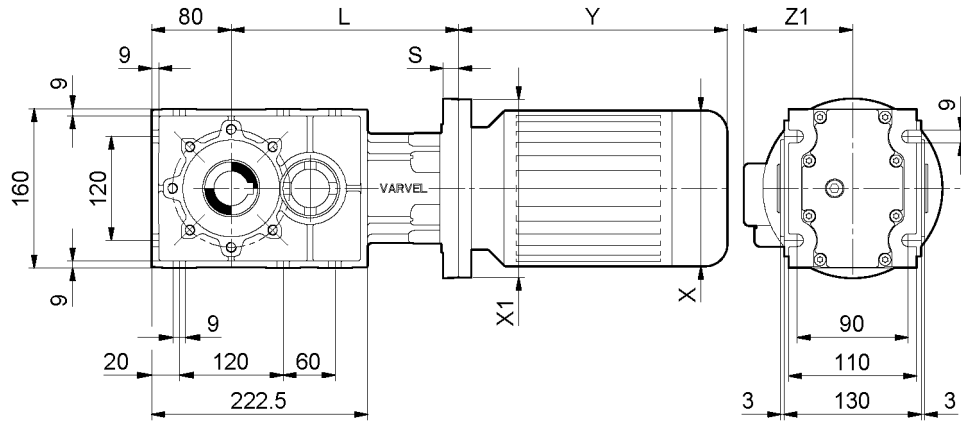
Not binding dimensions and weights

RO-2 Gearboxes

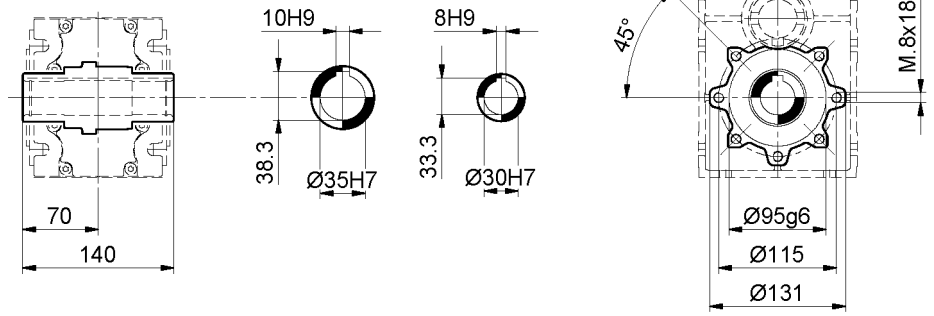
RO22

Dimensions

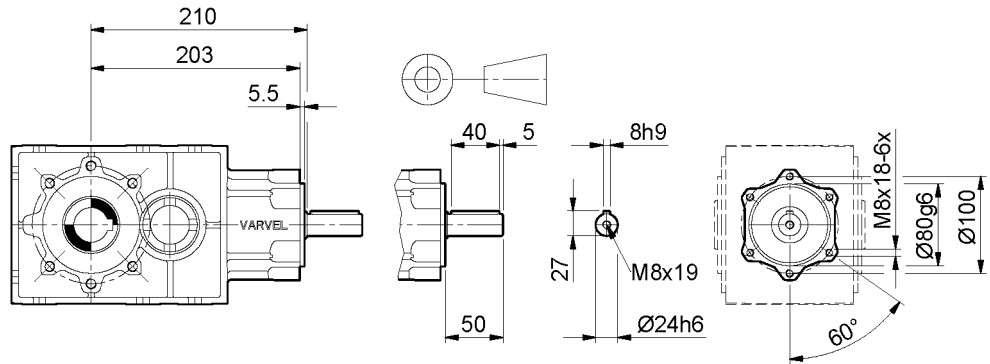
**MRO
FRO**



AC35 AC30



RO



IEC	63	71	80	90 S	90 L	100	112
X / Y / Z1	123/185/110	140/215/121	159/238/138	176/255/149	176/280/149	195/309/160	219/328/172
X1 (B5) / S	140/18.5	160/15.5	200/15.5	200/15.5	200/15.5	250/16.7	250/16.7
X1 (B14) / S	---	---	120/15.5	140/18.5	140/18.5	160/15.5	160/15.5
L (B5)	221.5	218.5	218.5	218.5	218.5	219.7	219.7
L (B14)	---	---	218.5	221.5	221.5	218.5	218.5

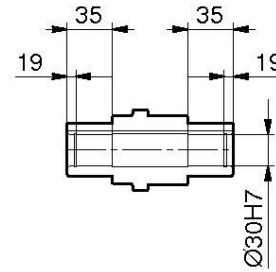
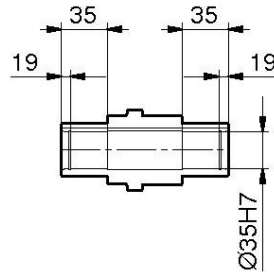
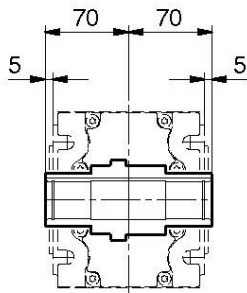
Not binding dimensions and weights

RO22

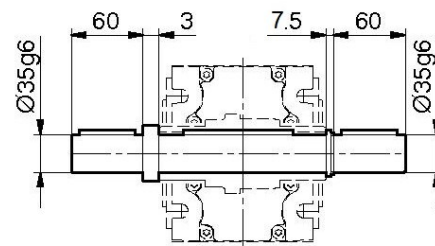
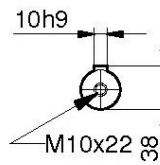
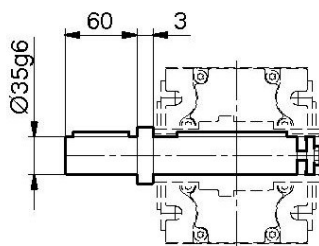
Gearboxes RO-2

Output shaft dimensions

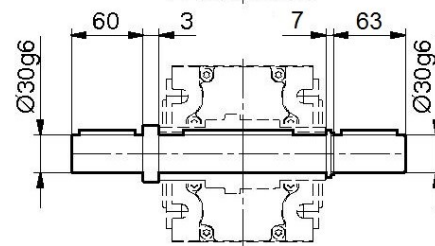
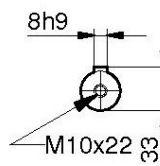
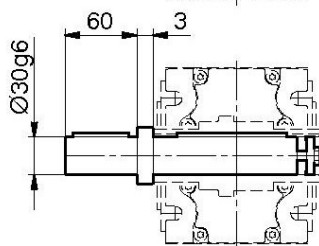
AC



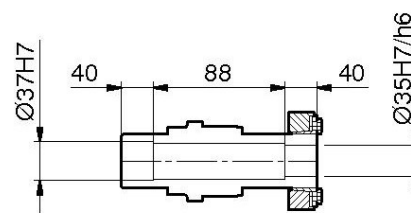
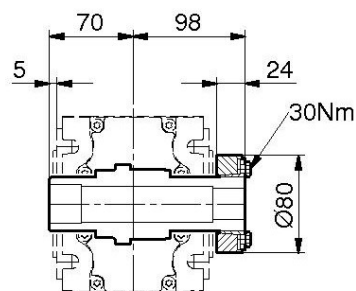
AS



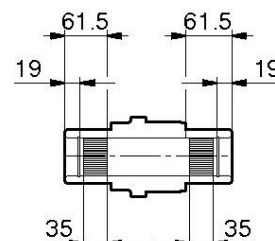
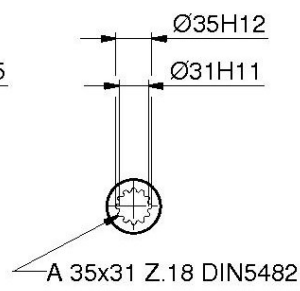
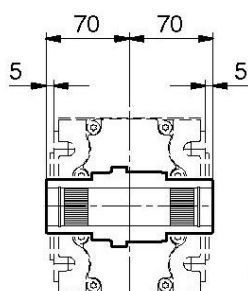
AD



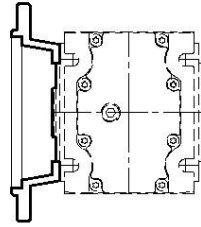
ACC



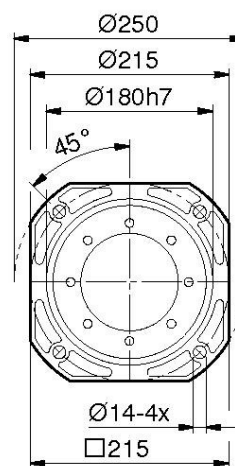
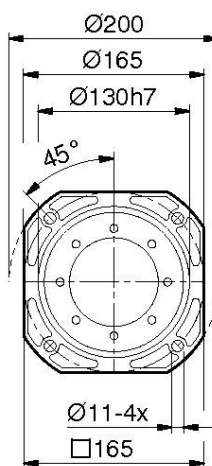
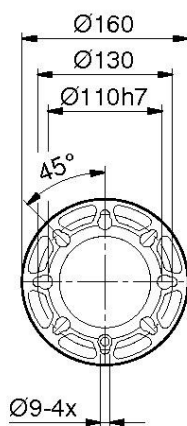
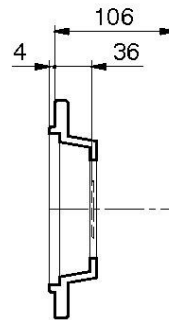
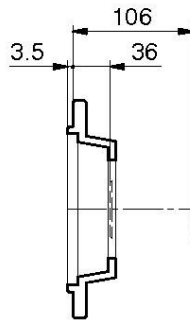
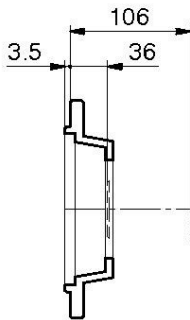
ACS



- Machine shaft dimensions: pages 52-54



A

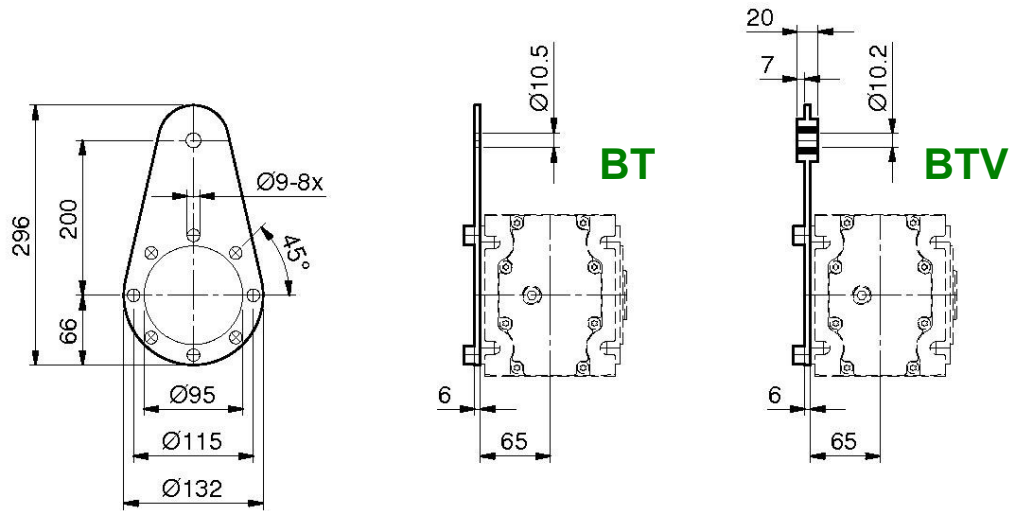


Not binding dimensions and weights

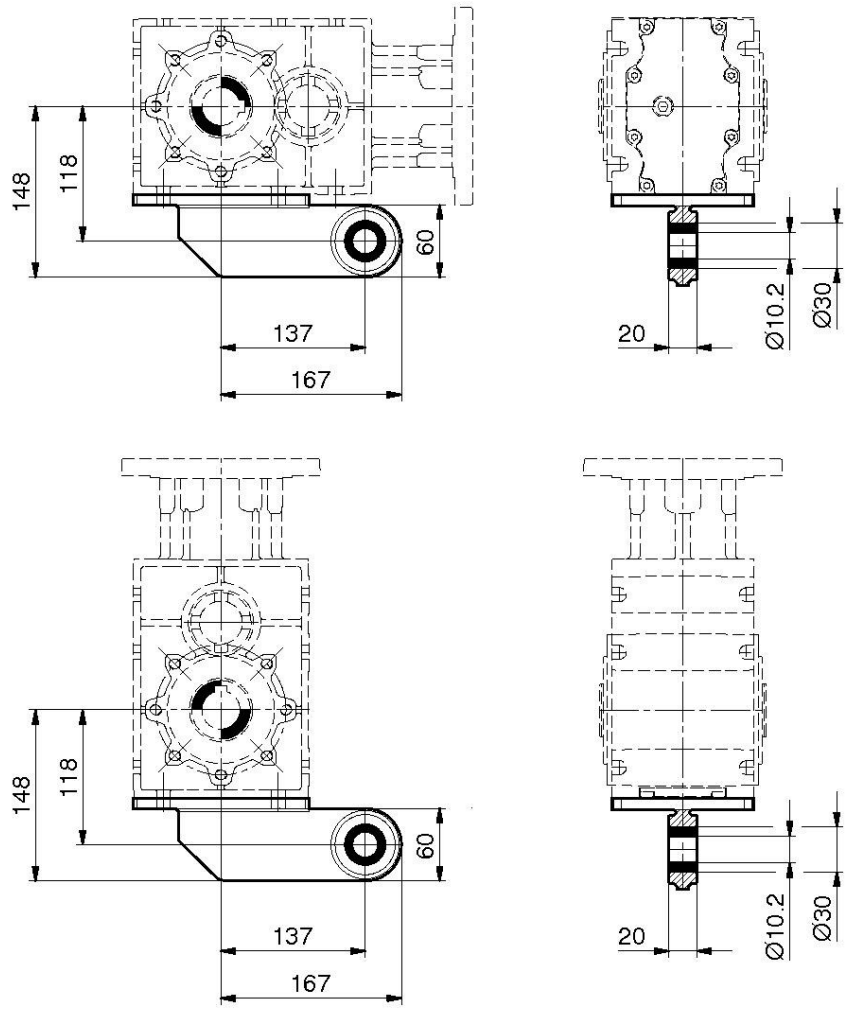
RO22

Gearboxes RO-2

Torque arm dimensions



BTF



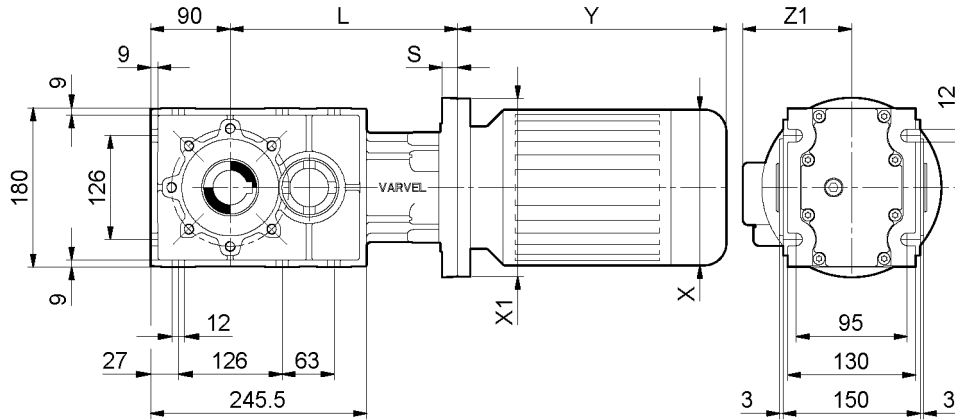
Not binding dimensions and weights

RO-2 Gearboxes

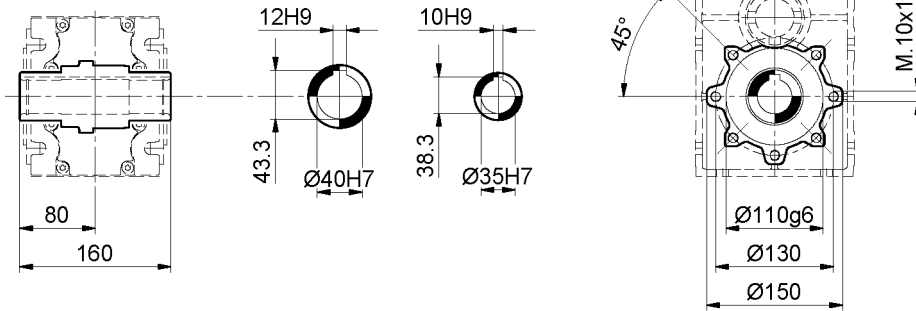
RO32

Dimensions

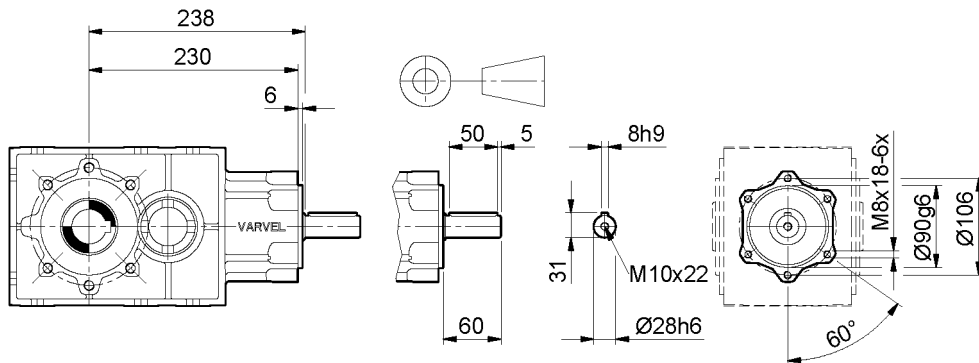
**MRO
FRO**



AC40 AC35



RO



IEC	71	80	90 S	90 L	100	112	132 S (*)
X / Y / Z1	140/215/121	159/238/138	176/255/149	176/280/149	195/309/160	219/328/172	258/368/192
X1 (B5) / S	160/20	200/18	200/18	200/18	250/18.7	250/18.7	300/18
X1 (B14) / S	---	---	---	---	160/20	160/20	200/18
L (B5)	250	248	248	248	248.7	248.7	298.5
L (B14)	---	---	---	---	250	250	298.5

(*) 132 M: Y=405 mm

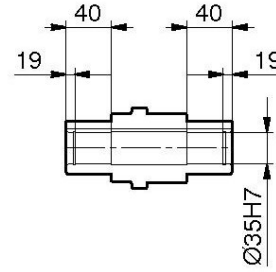
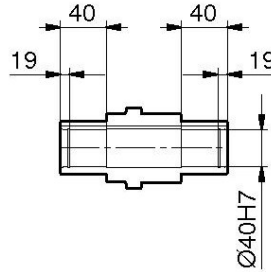
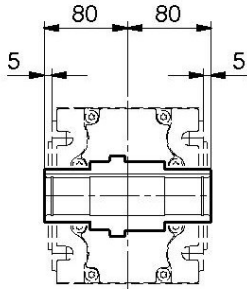
Not binding dimensions and weights

RO32

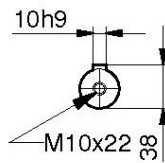
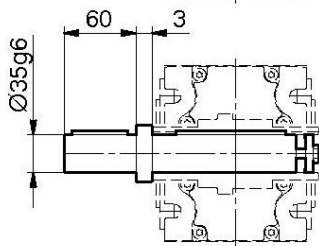
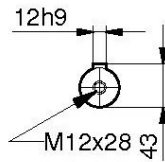
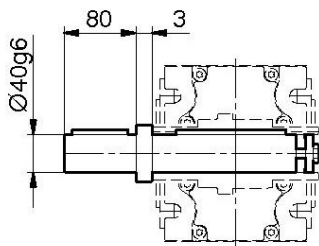
Gearboxes RO-2

Output shaft dimensions

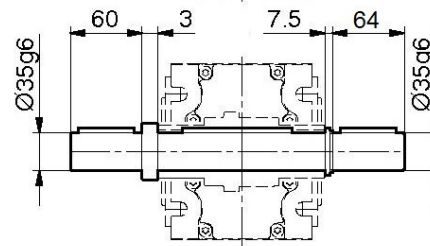
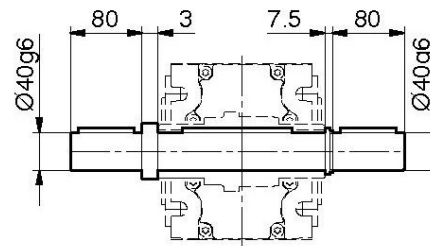
AC



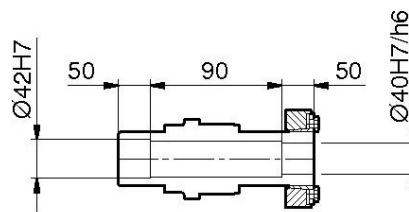
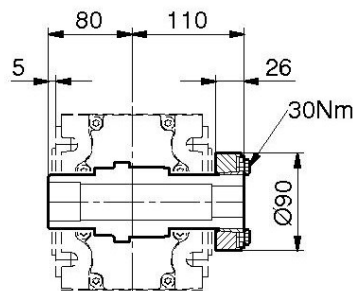
AS



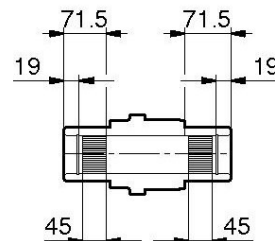
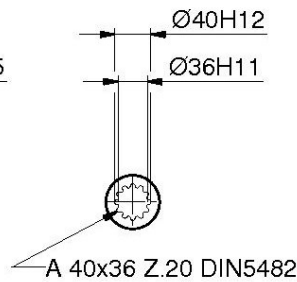
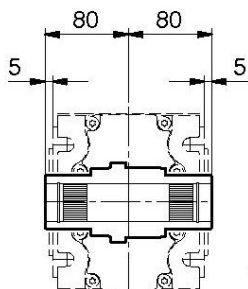
AD



ACC



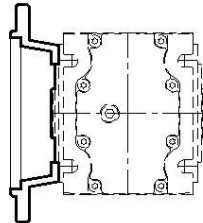
ACS



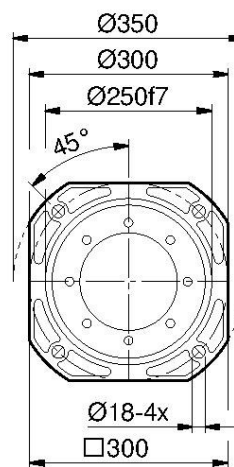
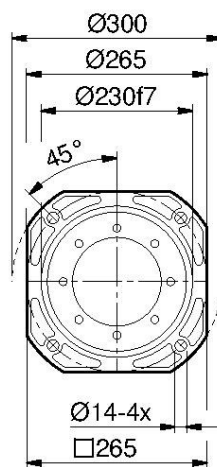
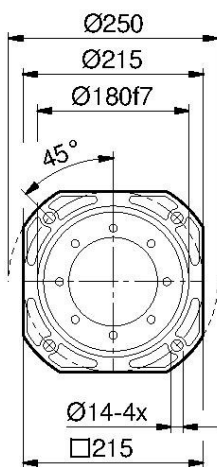
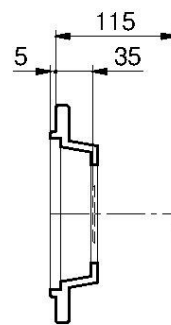
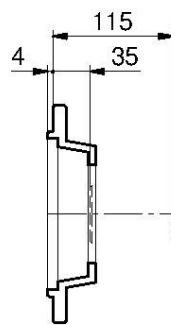
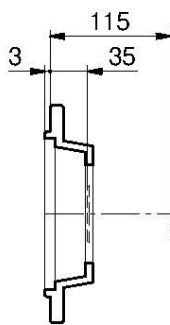
- Machine shaft dimensions: pages 52-54

Not binding dimensions and weights

Output flange dimensions



A

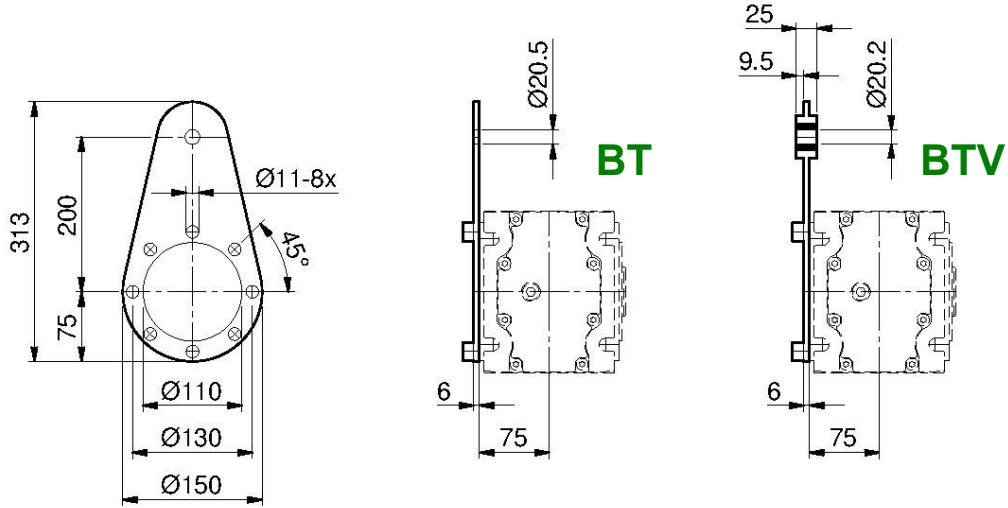


Not binding dimensions and weights

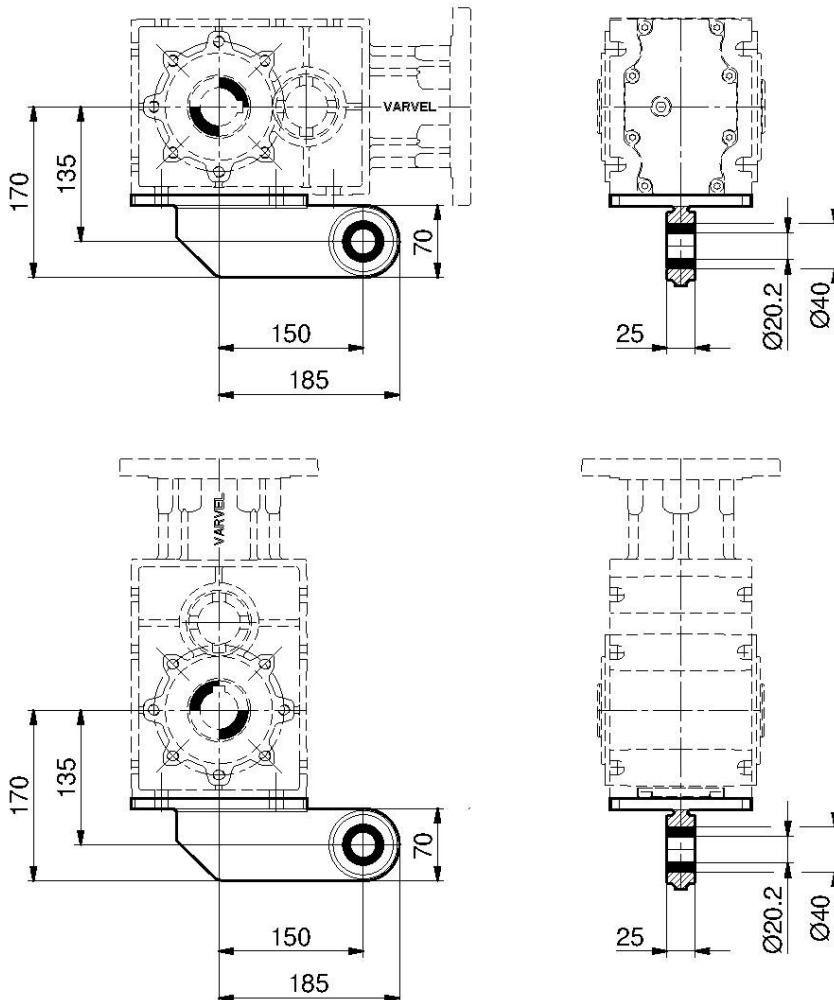
RO32

Gearboxes RO-2

Torque arm dimensions



BTF

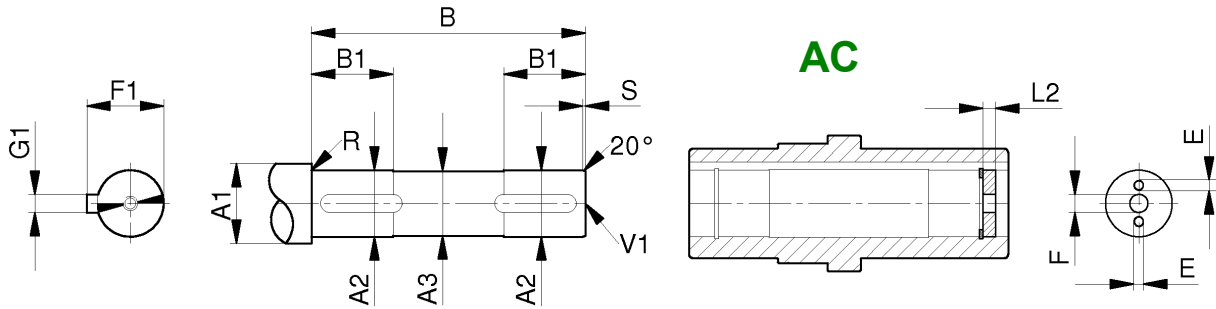


Not binding dimensions and weights

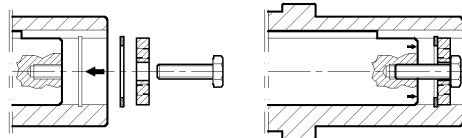
RO-2 Gearboxes

Machine shaft dimensions

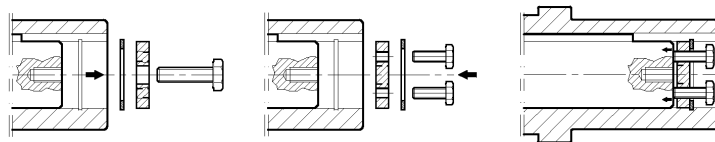
The table provides the dimensions of the machine shaft to be inserted into the AC hollow output shaft with standard key.



- Mounting



- Disassembly



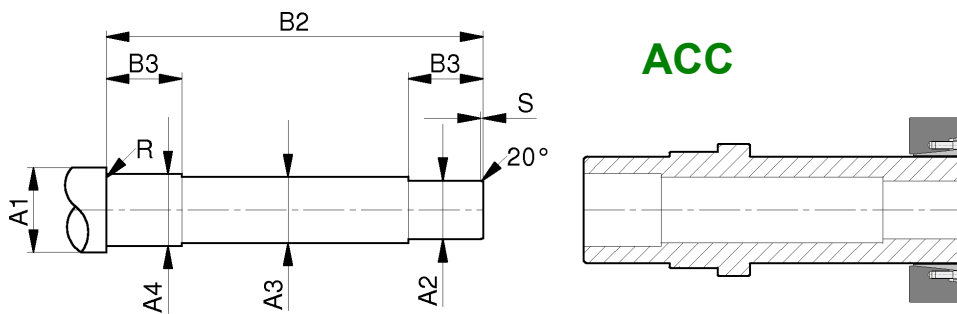
Size	A1	A2	A3	B	B1	E	F	F1	G1	L2	R	S	V1
RO02	35	25	24	98	35	M5	9	28	8	4.5	1	2	M8x19
RO12	40	30	29	98	35	M6	11	33	8	5.5	1	2	M10x22
	35	25	24	98	35	M5	9	28	8	4.5	1	2	M8x19
RO22	45	35	34	113.5	40	M8	11	38	10	7	1	2	M10x22
	40	30	29	113.5	40	M6	11	33	8	7	1	2	M10x22
RO32	50	40	38	133.5	45	M8	13	43	12	7	1	2	M12x28
	35	35	34	133.5	45	M8	11	38	10	7	1	2	M10x22

Not binding dimensions and weights

Gearboxes RO-2

Machine shaft dimensions

The table provides the dimensions of the machine shaft to be inserted into the ACC hollow output shaft with shrink disk .



Size	A1	A2	A3	A4	B2	B3	R	S
RO02	35	25	25	27	130.5	33	1	2
RO12	40	30	29	32	144	34	1	2
RO22	45	35	34	37	167	39	1	2
RO32	50	40	39	42	189	49	1	2

The shrink-disk fit relies upon the proven wedge principle to create a keyless mechanical interference fit. Screw axial locking tension is converted into radial contact pressure on the shaft/hub connection, making the shrink fit steady.

Assembly

Carefully clean the shaft/hub contact surfaces and grease with a fine layer of oil. Tighten the screws gradually and evenly until the locking torque is reached.

Do not use lubricants containing molybdenum bisulphite that origins notable lowering of the friction coefficient. No axial hub shifting occurs as regards the shaft when are tightening the screws.

Disassembly

Loose the screws in a continuous and even way without removing the screws.

In case of further assembly, apply a lubricant paste on screws and tapered surfaces to guarantee a friction coefficient of 0.04.

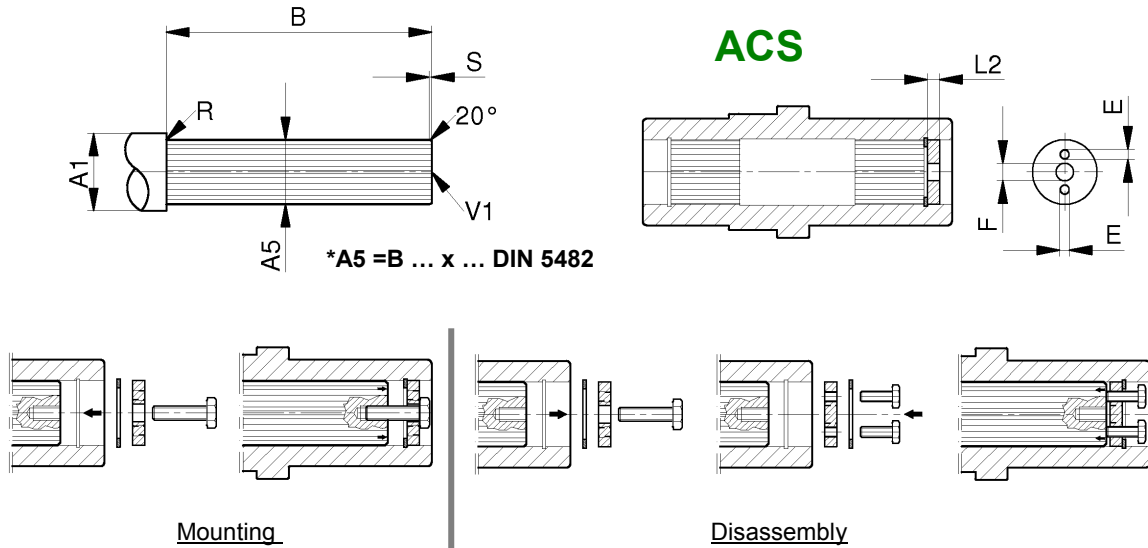
Locking torques, tolerances and roughness according to manufacturer's specifications.

Not binding dimensions and weights

RO-2 Gearboxes

Machine shaft dimensions

The table provides the dimensions of the machine shaft to be inserted into the ACS splined hollow output shaft.



Size	A1	A5	B	E	F	L2	R	S	V1
RO02	35	20x17	98	M4	9	4.5	1	2	M8x19
RO12	40	30x27	98	M6	11	5.5	1	2	M8x19
RO22	45	35x31	113.5	M8	11	7	1	2	M10x22
RO32	50	40x36	133.5	M8	13	7	1	2	M10x22

Spline shafts have teeth that mesh with grooves in a mating piece and transfer torque to it, maintaining the angular correspondence between them.

As alternative to key/keyway connection, splines provide higher torque and longer fatigue lifetime.

Not binding dimensions and weights

Gearboxes RO-2

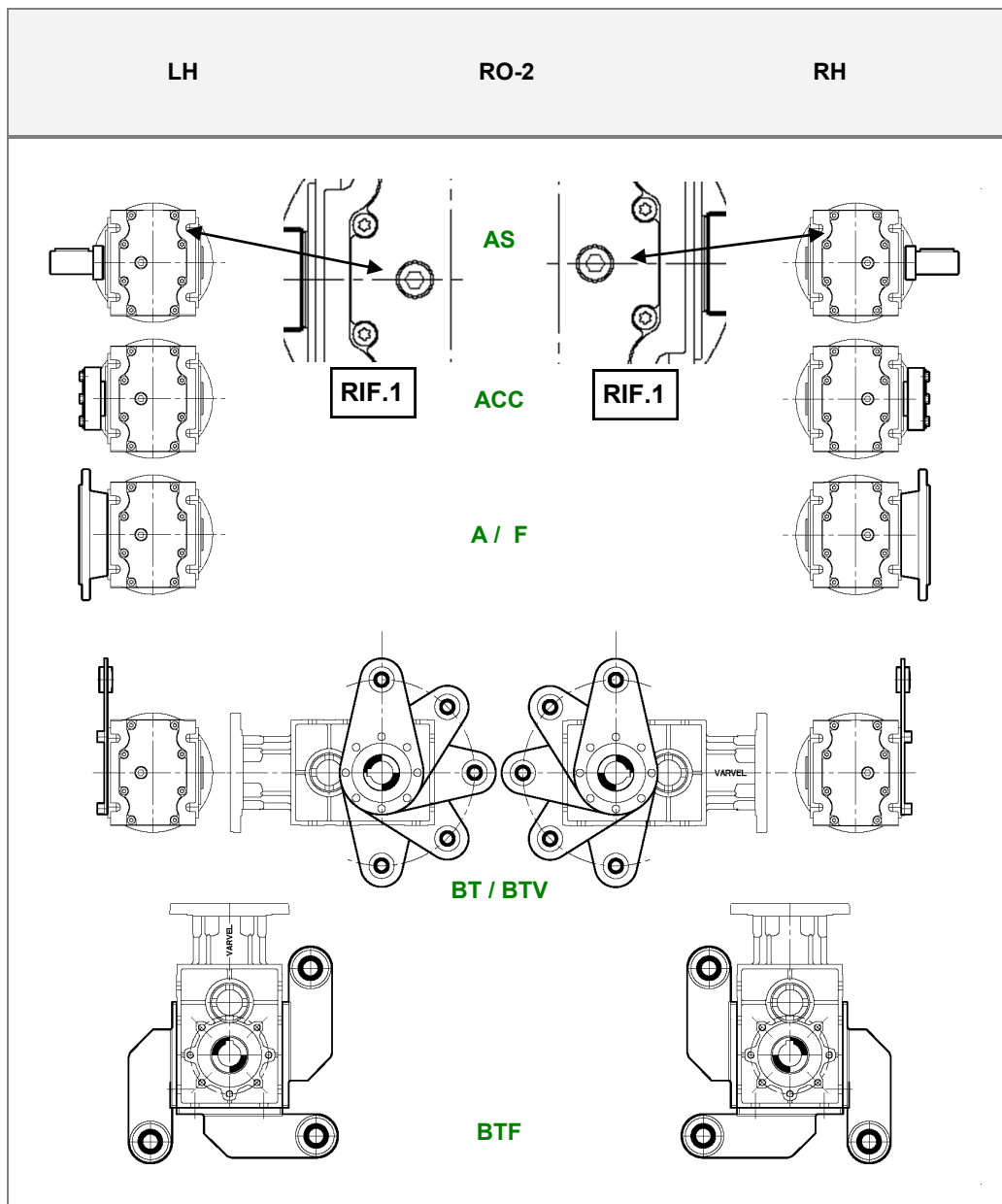
Accessory position

Accessory positions, here defined as RH and LH, refer to H1 mounting position at page 13 and are seen from the bottom side cover of the gearbox.

The housing side with the screw as shown (RIF.1) is the right identification of the reference side.

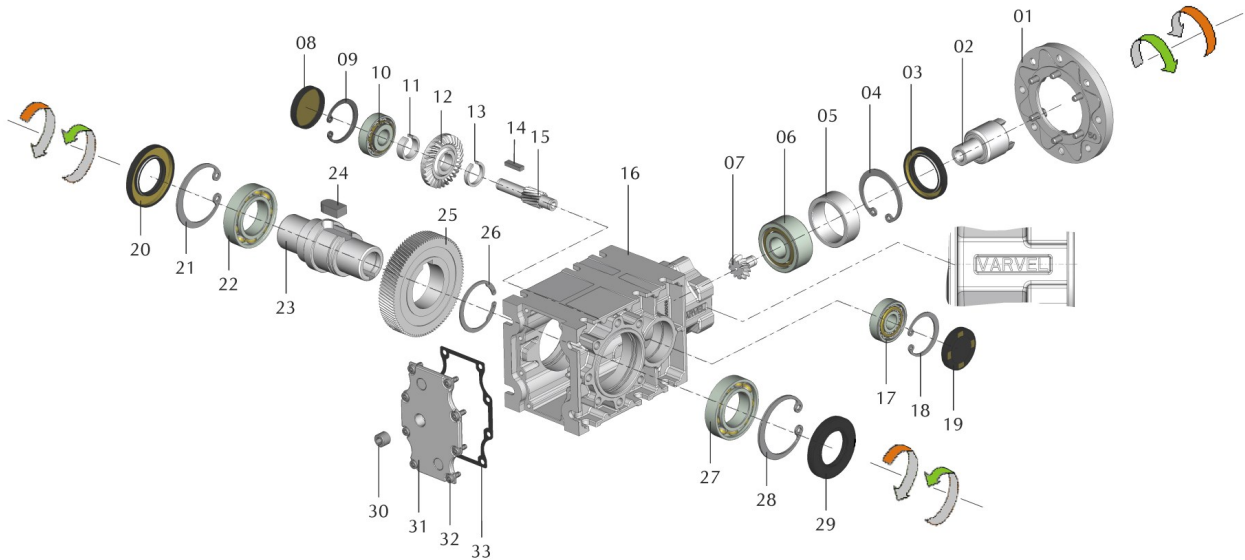
If the accessory is requested in-house assembled, the order is held-on until RH or LH side is defined.

For the accessories BT-BTV-BTF and other mounting positions, please refer to the Customer Service.



RO-2 Gearboxes

Rotation and Component Parts

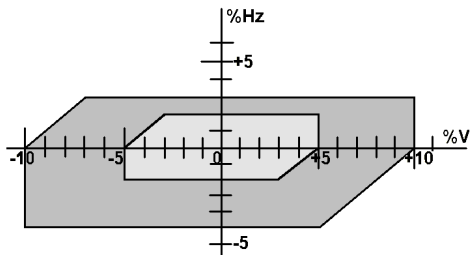


Item	Description	Item	Description
01	Motor flange	18	Snap ring
02	Input shaft	19	Oil seal
03	Oil seal	20	Oil seal
04	Snap ring	21	Snap ring
05	Spacer	22	Bearing
06	Bearing	23	Output shaft
07	Conical pinion	24	Key
08	Oil seal	25	Gear
09	Snap ring	26	Snap ring
10	Bearing	27	Bearing
11	Spacer	28	Snap ring
12	Conical gear	29	Oil seal
13	Spacer	30	Plug
14	Key	31	Cover
15	Pinion	32	Screw
16	Housing	33	Gasket
17	Bearing		

Gearboxes RO-2

Electric motor Standards

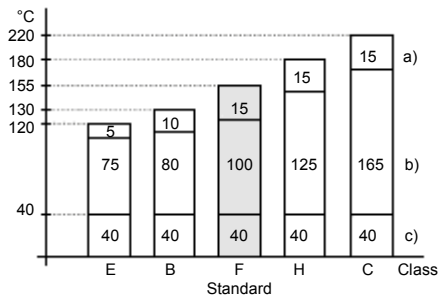
Voltage and frequency



Rated values	Usable values
230/400V 50Hz	240/415V 50Hz 220/380V 50Hz
277/480V 60 Hz	265/460V 60Hz 260/440V 60Hz

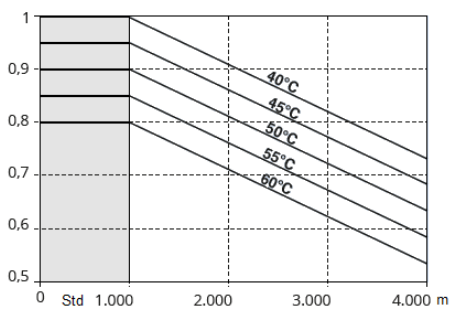
- Servizio normale
- Servizio pesante e limitato

Insulation class



- a) safety margin
- b) admissible temperature
- c) conventional ambient temperature

Altitude and Temperature Factors (k_{AT})



- Conventional conditions

- 1000 m [3285 ft] - altitude above sea level
- 40 °C [104 °F] - ambient temperature
- 15 °C [5 °F] - min. ambient air temperature
- ≤ 60% - relative humidity

$$P_{AT} = P_1 * k_{AT} \text{ [Kw]}$$

RO-2 Gearboxes

ATEX - European Directive 94/9/EC

The European Directive 94/9/EC-ATEX relates not only to electric devices but to all the machines and driving units destined, alone or combined, to operate in potentially explosive environments within European Community territory.

The gearboxes VARVEL-ATEX are manufactured

- with metallic housings and covers, containing the driving gears fitted on ball or roller bearings;
- FKM-Fluor-elastomer (Viton) oil seals on input and output shafts;
- the needed oil quantity to ensure the unit operation;
- sealed thread screws with sealing paste.

The gearboxes VARVEL-ATEX are identified in the Directive as «components», therefore stripped away any autonomous function, but fundamental to operation of units and protection systems destined to production, transport, storage, measuring, adjusting and conversion of energy and material transformation that because of their own inflammable potentiality, risk to induce an explosion trigger.

ATEX-Directive Code Breakdown

- **Group**

utilization in

I - mining

II - surface industries

- **Category**

1- continuous exposure in possibly explosive environment for more than 1000 hrs/year or with frequent malfunctioning

2- occasional exposure in possibly explosive environment for 10 to 1000 hrs/year or with sporadic malfunctioning

3- not very likely exposure in possibly explosive environment and if happened, not longer than 10 hours/year

- **Letters “G” and “D”**

G - gas presence

D - dust presence

- **Letters “c” and “k”**

c - safety indication of construction

k - safety indication of immersion in liquid

- **IP66 (IP4X Nema)**

IP- International Protection Coding

6 - 1st digit - protection dust tight

6 - 2nd digit - protection against powerful water jets

- **T_{max} and T_{amb}**

T_{max} - surface max. temperature

T_{amb} - ambient max. temperature

Gearboxes RO-2

European Directive 94/9/EC - ATEX

VARVEL RD, RS, RT, Rn, RO, RV, RP90 and XA100 series are conforming with design requirements asked by Group II, Category 2 or 3, and for operation in possible hazardous zones in presence of gas (zones 1 and 2) and combustible dust (zones 21 and 22).

The VARVEL-ATEX products are marked

II 2 GD ck IP66

$T_{max}=135^{\circ}\text{C}$

Group	Category	Gas Vapours Cloud	Zone	Dust
I (a)	M1 (c)			
	M2 (d)			
II (b)	1 (c)	G (0)		D (20)
	2 (d)	G (1)		D (21)
	3 (e)	G (2)		D (22)

Warning

The VARVEL-ATEX gearboxes **are not certified** for operation in **shaded areas**.

- (a) - Mines
- (b) - Surface industries
- © - Protection level: very high
- (d) - Protection level: high
- (e) - Protection level: normal
- (0) - Continuous presence of gas
- (1) - Discontinuous presence of gas
- (2) - Occasional presence of gas
- (20)- Continuous presence of dust
- (21)- Discontinuous presence of dust
- (22)- Occasional presence of dust

RO-2 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.