RO2 CATALOGUE

VARVEL®
KNOW-HOW TO DO IT

technology
made in Italy

EN

Experience at the service of innovation

The Varvel Group has been designing and producing power transmission systems for numerous areas of industry since 1955. "Know-how to do it": Varvel has the know-how needed to satisfy customers' requests in the best way possible. Thanks to over sixty years of accumulated experience, Varvel can offer customers a vast range of standard solutions and customise products for specific needs. The entire product range is designed and made in Italy and sold worldwide through two subsidiaries (in the USA and India) and a global network of over 100 commercial partners.

UNI EN ISO 9001:2015
UNI EN ISO 14001:2015
BS OHSAS 180001:2007

EC DIRECTIVE 2014/34/EC (ATEX)

RO2

BEVEL HELICAL GEARBOXES

one bevel and one helical stage
in-line version
aluminium die-cast housing and covers

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technology made in Italy

Gearboxes - Series RO2

Product description

Two-stage Bevel/helical gearboxes, in-line RO Series

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 available output flanges.

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 environment:

- 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),

whenever installation is operative inside the EC territory.

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

Ⓔx II 2 GD ck IP66 CE T_{max}=135 °C

Gearboxes - Series RO2

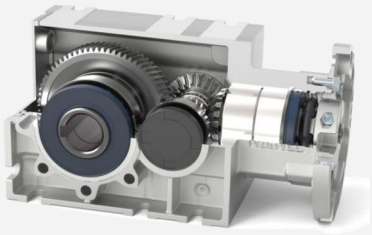
Two stage Bevel/helical gearboxes, in-line RO Series

● Universal Housing
Foot & Foot/Flange Mounting
One-piece cast and machined

● Housing and covers
Four sizes
Aluminium die cast

● Gearing
Alloy steel
Case hardening
Tooth profile ground or shaved

● Bearings
Ball or roller types



Input ●
NEMA and IEC motor adapters
Universal flexible coupling or
bore and keyway quill shaft

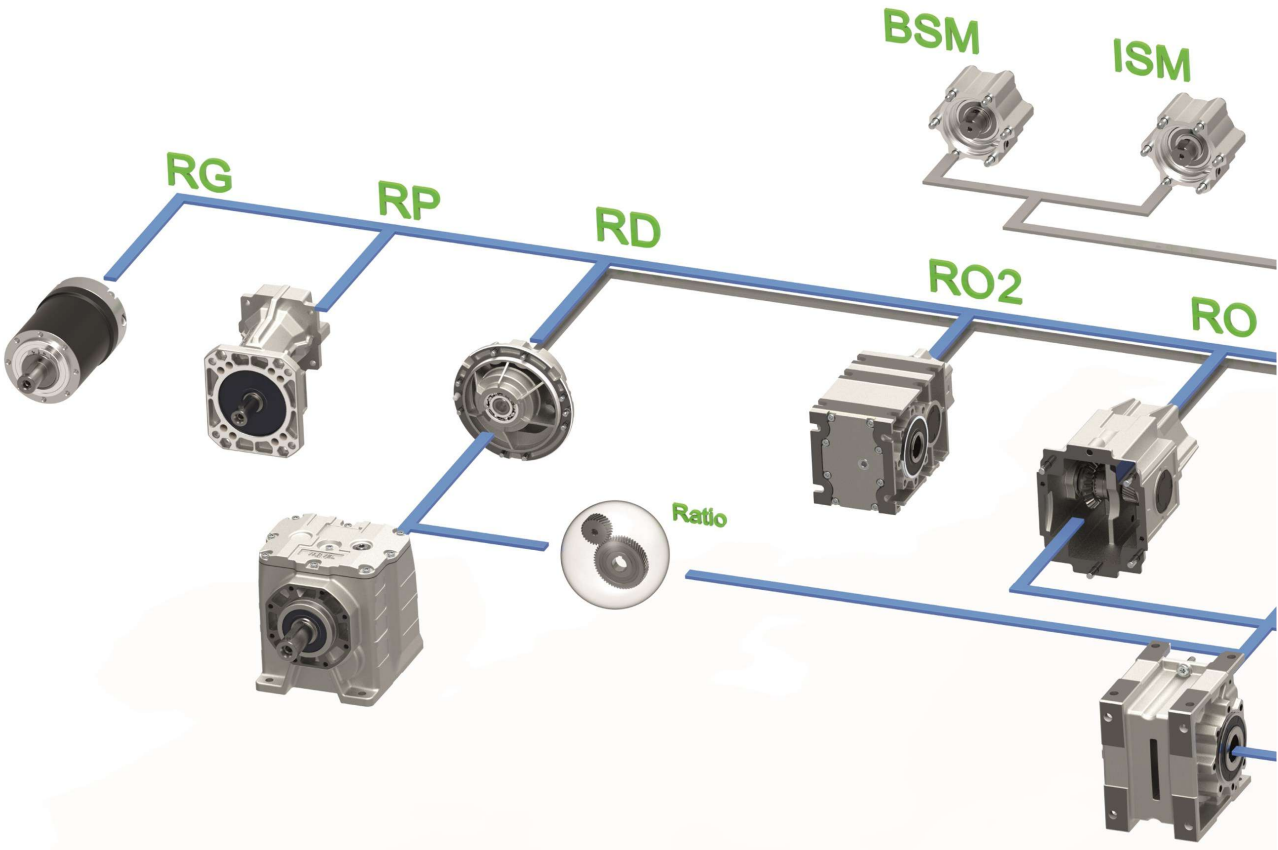
Oil seals ●
NBR - Nitrile Butadiene Rubber
as standard
Viton and Silicone on request

Output ●
Hollow output shaft as standard
Shrink disc and spline versions on demand
Imperial and metric solid shafts

● Lubrication
Synthetic long-life oil; Grade ISO VG 320
No oil/vent plugs
In-house filling

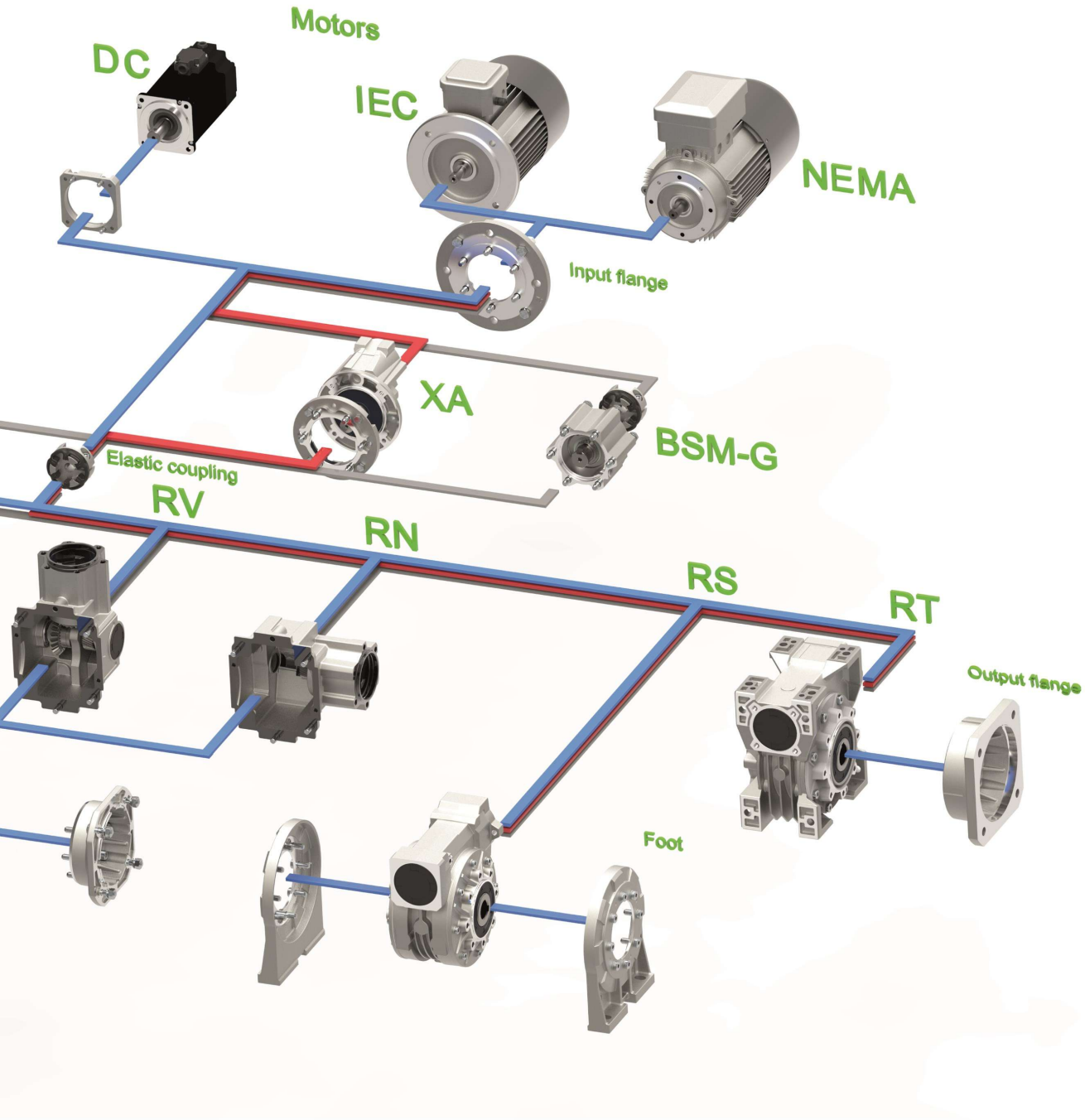
Gearboxes - Series RO2

Modular system



Gearboxes - Series RO2

Modular system

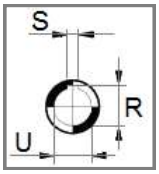


Gearboxes - Series RO2

General specifications

	GENERAL SPECIFICATIONS
Range	4 sizes; 17 ratios; 2 stages; 4425 in-lb max. output torque
Sizing	According to ISO6336/DIN3990. 10,000 hrs average lifetime with service factor SF1.0
Housing, Covers	Pressure die cast aluminium
Coupling G input	Pressure die cast aluminium
Toothed parts	Steel case hardened. Tooth profile ground or shaved. Run-in bevel gears
Keys	According to DIN6885 B1
Bearings	Ball- or roller-types according to sizes
Oil seals	Type NBR - nitril-butadiene rubber type with additional anti-dust lip according to DIN 3760 Type FKM - fluoroelastomer Viton type on demand
Lubricant	Synthetic long-life oil: Grade ISO VG 320
Powder coating	Natural aluminium
ATEX Version	On demand
Tolerances	

		Diameter [in[	Tolerance [in]	Tolerance [mm]
Solid shaft	U	ø0.5 … ø1.5 ø>1.5 … ø2.75	0 / -0.0005 0 / -0.0010	ISO g6
Hollow shaft	U	ø0.625 ø0.75 … ø1.0 ø1.25 … ø1.625 ø2.0 … ø2.75	+0.0007 / 0 +0.0008 / 0 +0.0010 / 0 +0.0012 / 0	ISO H7
	R	ø0.625… ø2.75	+0.0079 / 0	+0.2 / 0
	S	ø0.625… ø0.75 ø1.0 … ø1.625 ø2.0 … ø2.75	+0.0012 / 0 +0.0014 / 0 +0.0017 / 0	ISO H9



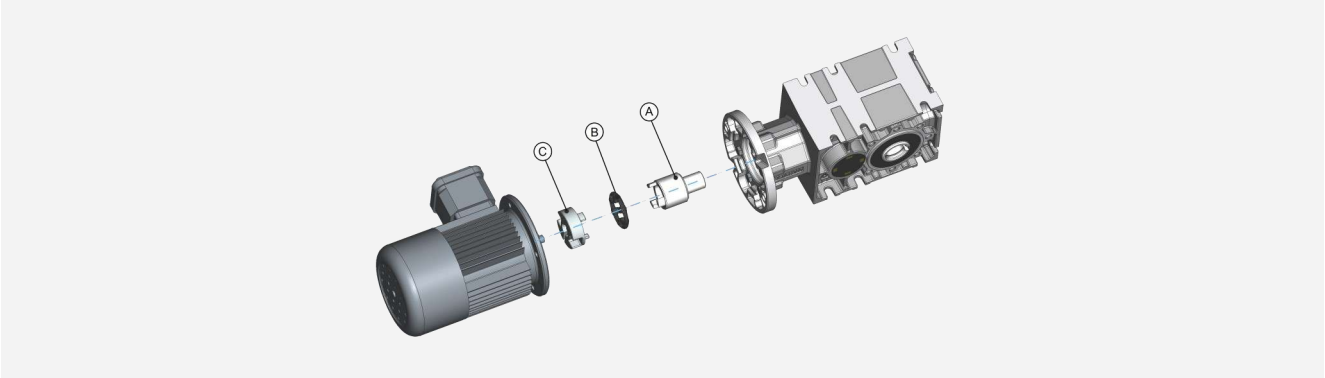
Gearboxes - Series RO2

Symbols

Symbol	Description	Formula
D / R [in]	Diameter / radius of transmission element (k_T of page 19)	
F_r [lb]	Application radial load	
F_{r1} [lb]	Catalogue radial load (input)	
F_{r2} [lb]	Catalogue OHL (radial output load)	
FS	Service factor	M_2 / $M_{(app)}$
i_n	Nominal reduction ratio	
i_r	Actual reduction ratio	
J_1 [ft^2-lb]	Moment of inertia of the gearbox at gearbox input shaft	
J_2 [ft^2-lb]	Moment of inertia of the application	
J_m [ft^2-lb]	Moment of inertia of the motor	
k	Motor pole number (2, 4, 6, 8)	
$k_{(a)}$	Mass acceleration factor	
$k_{(t)}$	Transmission element factor	
Lub [qt]	Lubricant (US quart) Lub H - In-line mounting / Lub V - square angle mounting	
M_2 [in-lb]	Gearbox maximum output torque	in-lb = 63025*HP*eff./rpm
$M_{(app)}$ [in-lb]	Application torque	
n_1 [rpm]	Input speed	
n_2 [rpm]	Output speed	
P_1 [HP]	Input power	HP = in-lb*rpm/(63025*eff.)
$P_{(kg)}$ [lb]	Weight: as average of B3H mounting and reduction ratio	
Efficiency [η]	η = 0.96 (2 stages) ; η = 0.94 (3 stages)	

Gearboxes - Series RO2

Flexible coupling



Input flexible coupling system

A) Gearbox-side coupling hub	B) Spider	C) Motor-side coupling hub
- Material: steel - One-piece machined with input pinion shaft - Two bearing setting - Not altered gearbox casing dimensions	- Material: Polyarylamide Thermoplastic Elastomer - External tooth connection - Hardness 90 Shore D - Temperature range -22/+275°F (-30/+135°C)	- Material: Aluminium die cast (G3, G5, G6) Steel (GS3, GS5, GS6) - Dynamic balancing - Fitting: Clamp (G3, G5, G6) Key (GS3, GS5, GS6)

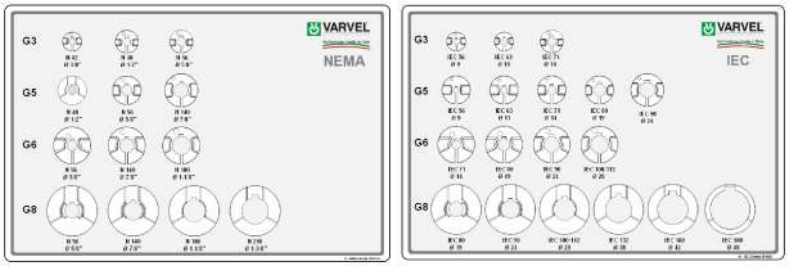
Input flange system

- Material
  Aluminium up to NEMA TC180 & IEC112
  Cast iron from NEMA TC200 & IEC132
- Flanges according to
  NEMA C and TC
  IEC 72 / DIN42948
  Square shape for brushless and DC motor mount

Advantages of unique integrated elastomer jaw coupling

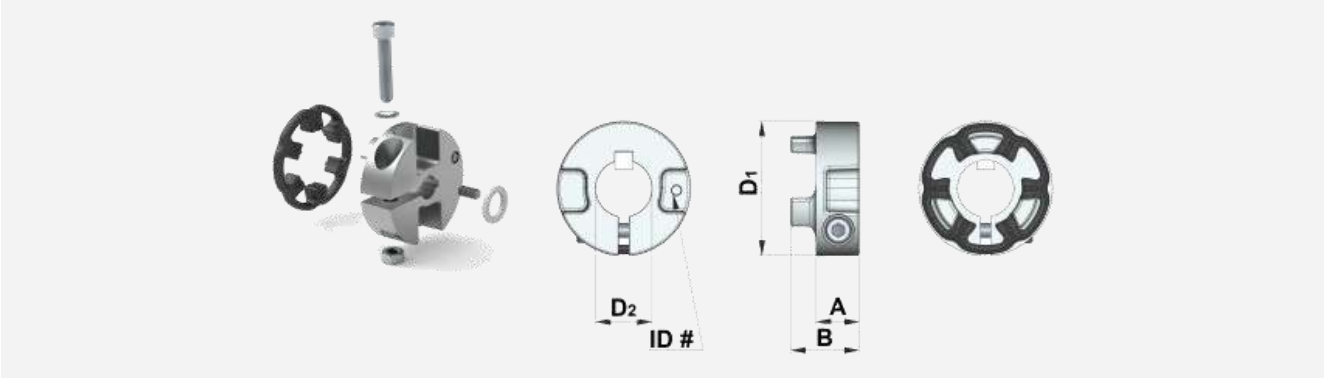
- One gearbox for multiple motor frame sizes and convertible into NEMA, IEC, Brushless, DC motor input with specific adapter/coupling kits and modular flange system
- Greater flexibility and increased stock rotation
- Elimination of fretting corrosion common to quill mount
- Elimination of key/keyway wear in dynamic applications
- Zero backlash on motor-to-reducer connection
- Reduction of efficiency losses due to motor mounting misalignment
- High torsional rigidity
- High vibration damping

Flexible coupling program



Gearboxes - Series RO2

Flexible coupling selection



Type	NEMA	Kit Part No.	RO 2	Mt [in-lb]	Mt_1 [in-lb]	Mt_2 [in-lb]	A [in]	B [in]	D_1 [in]	D_2 [in]	ID#
G5	NEMA	KG5.N56/X KG5.N140/X	RO02	32	45 60	35 45	0.57	0.90	1.77 2.05	5/8" 7/8"	5N56 5N140
G6	NEMA	KG6.N56/X KG6.N140/X KG6.N180/X	RO12-RO22-RO32 RO12-RO22-RO32 RO32	58	50 85 200	- - - - - - - - -	0.77	1.24	2.28	5/8" 7/8" 1-1/8"	6N56 6N140 6N180

Type	IEC	Kit Part No.	RO 2	Mt [Nm]	Mt_1 [Nm]	Mt_2 [Nm]	A [mm]	B [mm]	D_1 [mm]	D_2 [mm]	ID#
G5	IEC	KG5.009/X KG5.011/X KG5.014/X KG5.019/X KG5.024/X	RO02	10	14 15 30 40 70	10 10 17 25 40	14.5	23	45 45 45 45 52	9 11 14 19 24	509 511 514 519 524
G6	IEC	KG6.014/X KG6.019/X KG6.024/X KG6.028/X KGs6.038X	RO12-RO22-RO32	18	60 90 130 180 500	40 65 100 120 - - -	19.5	31.5	58	14 19 24 28 38	614 619 624 628 - - -

Mt - Screw locking torque
Mt_1 - Transmissible torque with key
Mt_2 - Transmissible torque without key
../X - Code of coupling with IXEF black-spider

Gearboxes - Series RO2

NEMA/IEC Flanges & Coupling selection

N E M A

	Adapter			Coupling	
	Type	NEMA frame	Kit 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

I E C

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

O Bore with key/keyway

../X - Code of coupling with IXEF black-spider

VARsize by VARVEL

Modularity and flexibility
have been leading the design of VARVEL products since the years 2000: this way, the kit-concept gearbox 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.

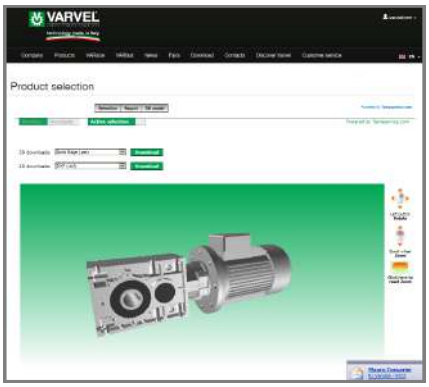
VARsize® selection program, available from our web-site
www.varvel.com/en/varsize
allows a friendly sizing of VARVEL product range.

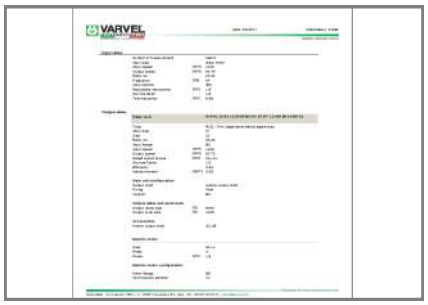
2D/3D Drawings
A guided selection lets 2D/3D models downloaded for the most popular CAD systems.

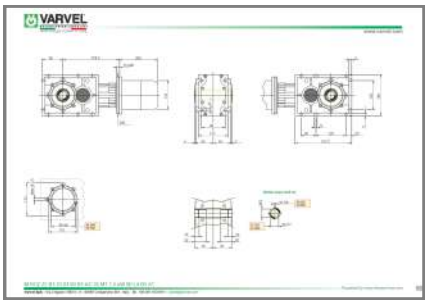
Guided selection
This option returns a list of applicable product configurations upon a given sequence of application parameters (power, output torque, rpm, service factor etc.).

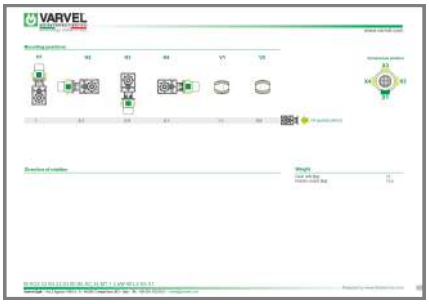
A PDF data sheet featuring performance data and dimensional drawings is generated for each configuration, as well as the 3D model and 2D drawings.

- Pick a configuration identifying inch or metric units
- Enter your application information or requirements
- The program selects a range of appropriate solutions
- Pick the one you want and download 2D/3D drawings
- Print out a technical data sheet with all specifications of the selected unit









Gearboxes - Series RO2

Gearbox designation

Example: **FRO-G22/B3-H4 15.9 N56 AC1.375**

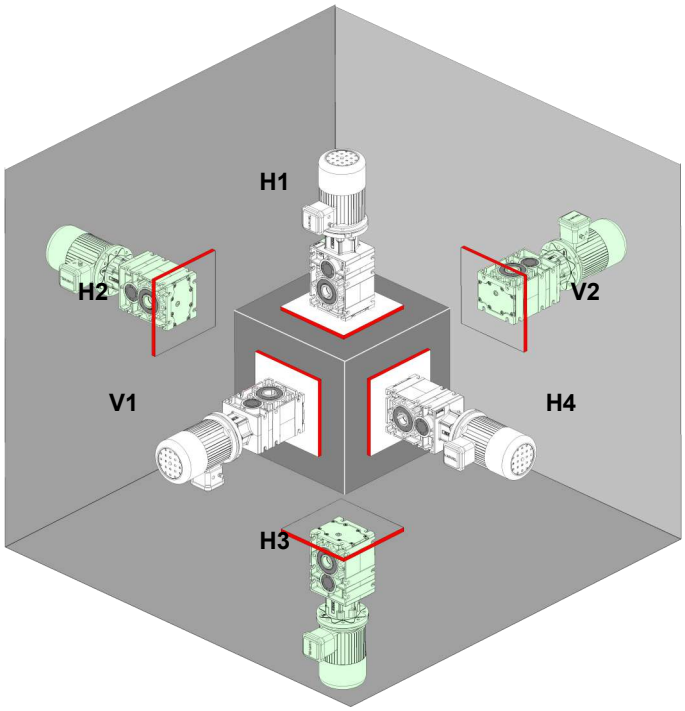
F RO -G	22	B3-H4	15.9	N56	
Input configuration	**Gearbox size**	**Mounting**	**Reduction ratio**	**Motor adapter**	
M - motorized unit *F - with input flange* S - no input flange nil - solid input shaft **Gearbox Type** *RO - bevel helical, in-line* **Motor fitting** *-G - flexible coupling* nil - quill fitting (NEMA, IEC, servo motors)	02 12 *22* 32	See pages *16* - 17	5 … 54.7	*NEMA* *56C* 140TC 180TC	IEC 56 … 132

AC1.375		
Hollow output shaft diameter		
Gearbox size	in	mm
RO02	1.0	25
RO12	1.0 … 1.125	25 … 30
RO22	1.25 … *1.375*	30 ... 35
RO32	1.375 … 1.5	35 ... 40

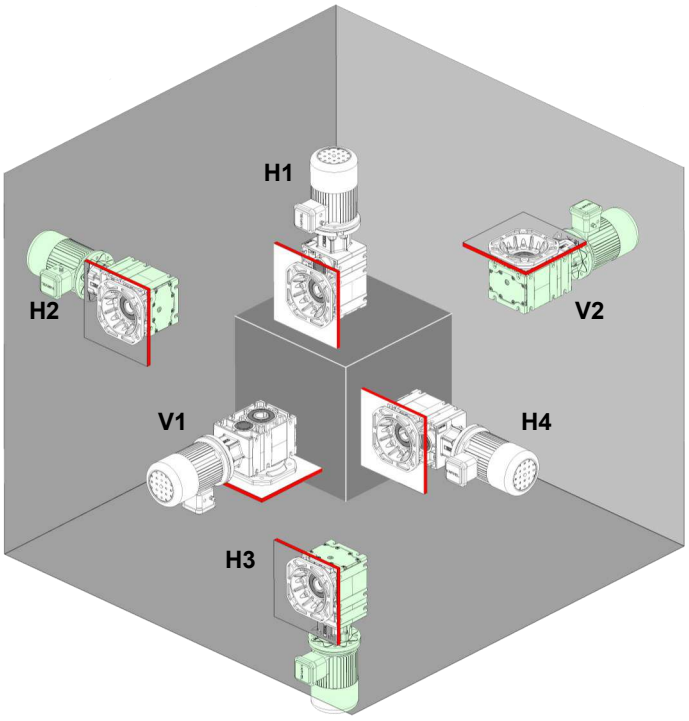
DFU	
Output flange diameter	
Gearbox size	mm
RO02	160 … 250
RO12	160 … 250
RO22	160 … 250
RO32	250 … 350

Bevel helical gearboxes, two stages - RO 2

B3
Foot mounting



B5
Flange mounting



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

Gearboxes - Series RO2

Service factors

GEARBOX SERVICE FACTOR
The ratio between the drive's maximum output torque M_2 and application torque $M_{(app)}$ defines the drive's Duty Factor that must be equal or bigger than the application Service Factor SF.
Service factor SF1.0 is meant as typical of 16 hours/day operation, with uniform load, max. 60 start/stops per hour and ambient temperature between 60 and 95 °F (15 and 35 °C).
For ambient temperature exceeding 104 °F (40 °C) or below 32 °F (0 °C), please ask Customer Service.

Application	Load duration (hrs/day)		
	3 -	3 - 10	10 +
Agitators (mixers)			
Pure liquids	1.00	1.00	1.25
Liquids and solids	1.00	1.00	1.50
Liquids - variable density	1.00	1.25	1.50
Blowers			
Centrifugal	1.00	1.00	1.25
Lobe	1.00	1.25	1.50
Vane	1.00	1.25	1.50
Brewing and distilling			
Bottling machinery	1.00	1.25	1.25
Brew kettles - continuous duty	1.25	1.25	1.25
Cookers - continuous duty	1.25	1.25	1.25
Mash tubs - continuous duty	1.25	1.25	1.25
Scale hopper - frequent starts	1.25	1.25	1.25
Can filling machine	1.00	1.00	1.25
Car dumpers	1.50	1.75	2.00
Car pullers	1.00	1.25	1.50
Clarifiers	1.00	1.00	1.25
Classifiers	1.00	1.25	1.50
Clay working machinery			
Brick press	1.50	1.75	2.00
Briquette machine	1.50	1.75	2.00
Pug mill	1.00	1.25	1.50
Compactors	2.00	2.00	2.00
Compressors			
Centrifugal	1.00	1.00	1.25
Lobe	1.00	1.25	1.50
Reciprocating, multi-cylinder	1.50	1.50	1.75
Reciprocating, single-cylinder	1.75	1.75	2.00
Conveyors			
- General purpose			
Uniformly loaded or fed	1.00	1.00	1.25
- Heavy duty			
Not uniformly fed	1.00	1.25	1.50
- Reciprocating or shaker	1.50	1.75	2.00
Crusher			
Stone or ore	1.75	1.75	2.00
Dredges			
Cable reels .	1.25	1.25	1.50
Conveyors	1.25	1.25	1.50
Cutter head drives	2.00	2.00	2.00
Pumps	2.00	2.00	2.00
Screen drives	1.75	1.75	2.00
Stackers	1.25	1.25	1.50
Winches	1.25	1.25	1.50

Application	Load duration (hrs/day)		
	3 -	3 - 10	10 +
Elevators			
Bucket	1.00	1.25	1.50
Centrifugal discharge	1.00	1.00	1.25
Escalators	1.00	1.00	1.25
Freight	1.00	1.25	1.50
Gravity discharge	1.00	1.00	1.25
Extruders			
General	1.50	1.50	1.50
Plastics			
Variable speed drive	1.50	1.50	1.50
Fixed speed drive	1.75	1.75	1.75
Rubber			
Continuous screw operation	1.75	1.75	1.75
Intermittent screw operation	1.75	1.75	1.75
Fans			
Centrifugal	1.00	1.00	1.25
Cooling towers	2.00	2.00	2.00
Forced draft	1.25	1.25	1.25
Induced draft	1.50	1.50	1.50
Industrial and mine	1.50	1.50	1.50
Feeders			
Apron	1.00	1.25	1.50
Belt	1.00	1.25	1.50
Disc	1.00	1.00	1.25
Reciprocating	1.50	1.75	2.00
Screw	1.00	1.25	1.50
Food industry			
Cereal cooker	1.00	1.00	1.25
Dough mixer	1.25	1.25	1.50
Meat grinders	1.25	1.25	1.50
Slicers	1.25	1.25	1.50
Generators and exciters	1.00	1.00	1.25
Hammer mills	1.75	1.75	2.00
Hoists			
Heavy duty	1.25	1.75	2.00
Medium duty	1.25	1.25	1.50
Skip hoist	1.25	1.25	1.50
Laundry			
Tumblers	1.25	1.25	1.50
Washers	1.50	1.50	2.00
Lumber industry			
Barkers			
Spindle feed	1.25	1.25	1.50
Main drive	1.75	1.75	1.75
Conveyors			
Burner	1.25	1.25	1.50
Main or heavy duty	1.50	1.50	1.50
Main log	1.75	1.75	2.00
Re-saw, merry-go-round	1.25	1.25	1.50

Gearboxes - Series RO2

Service factors

Application	Load duration (hrs/day) 3 -	3 - 10	10 +
Conveyors			
Slab	1.75	1.75	2.00
Transfer	1.25	1.25	1.50
Chains			
Floor	1.50	1.50	1.50
Green	1.50	1.50	1.75
Cut-off saws			
Chain	1.50	1.50	1.75
Drag	1.50	1.50	1.75
Debarking drums	1.75	1.75	2.00
Feeds			
Edger	1.25	1.25	1.50
Gang	1.75	1.75	1.75
Trimmer	1.25	1.25	1.50
Log deck	1.75	1.75	1.75
Log hauls - incline - well type	1.75	1.75	1.75
Log turning devices	1.75	1.75	1.75
Planer feed	1.25	1.25	1.50
Planer tilting hoists	1.50	1.50	1.50
Rolls -live-off bearings - roll cases	1.75	1.75	1.75
Sorting table	1.25	1.25	1.50
Tipple hoist	1.25	1.25	1.50
Transfers			
Chain	1.50	1.50	1.75
Crane way	1.50	1.50	1.75
Tray drives	1.25	1.25	1.50
Veneer lathe drives	1.25	1.25	1.50
Metal mills			
Draw bench carriage and main drive	1.25	1.25	1.50
Runout table			
Non-reversing			
Group drives	1.50	1.50	1.50
Individual drives	2.00	2.00	2.00
Reversing	2.00	2.00	2.00
Slab pushers	1.50	1.50	1.50
Shears	2.00	2.00	2.00
Wire drawing machine	1.25	1.25	1.50
Wire winding machine	1.25	1.50	1.50
Metal strip processing machinery			
Bridles	1.25	1.25	1.50
Coilers and uncoilers	1.00	1.00	1.25
Edge trimmers	1.00	1.25	1.50
Flatteners	1.25	1.25	1.50
Loopers (accumulators)	1.00	1.00	1.25
Pinch rolls	1.25	1.25	1.50
Scrap choppers	1.25	1.25	1.50
Shears	2.00	2.00	2.00
Slitters	1.00	1.25	1.50
Mills, rotary type			
Ball and rod	2.00	2.00	2.00
Spur ring gear	2.00	2.00	2.00
Helical ring gear	1.50	1.50	1.50
Direct connected	2.00	2.00	2.00
Cement kilns	1.50	1.50	1.50
Dryers and coolers	1.50	1.50	1.50

Application	Load duration (hrs/day) 3 -	3 - 10	10 +
Mixers			
Concrete	1.25	1.25	1.50
Paper mills			
Agitator (mixer)	1.50	1.50	1.50
Agitator for pure liquors	1.25	1.25	1.25
Barking drums	2.00	2.00	2.00
Barkers -mechanical	2.00	2.00	2.00
Beater	1.50	1.50	1.50
Breaker stack	1.25	1.25	1.25
Calendar	1.25	1.25	1.25
Chipper	2.00	2.00	2.00
Chip feeder	1.50	1.50	1.50
Coating rolls	1.25	1.25	1.25
Conveyors			
Chip, bark, chemical	1.25	1.25	1.25
Log (including slab)	2.00	2.00	2.00
Couch rolls	1.25	1.25	1.25
Cutter	2.00	2.00	2.00
Cylinder moulds	1.25	1.25	1.25
Dryers			
Paper machine	1.25	1.25	1.25
Conveyor type	1.25	1.25	1.25
Embosser	1.25	1.25	1.25
Extruder	1.50	1.50	1.50
Fourdrinier rolls (includes lump breaker, dandy roll, wire turning, and return rolls)	1.25	1.25	1.25
Jordan	1.50	1.50	1.50
Kiln drive	1.50	1.25	1.50
Mt Hope roll	1.25	1.50	1.25
Paper rolls	1.25	1.25	1.25
Platter	1.50	1.50	1.50
Presses - felt and suction	1.25	1.25	1.25
Pulper	2.00	2.00	2.00
Pumps - vacuum	1.50	1.50	1.50
Reel (surface type)	1.25	1.25	1.25
Screens			
Chip	1.50	1.50	1.50
Rotary	1.50	1.50	1.50
Vibrating	2.00	2.00	2.00
Size press	1.25	1.25	1.25
Super calendar	1.25	1.25	1.25
Thickener (AC motor)	1.50	1.50	1.50
(DC motor)	1.25	1.25	1.25
Washer (AC motor)	1.50	1.50	1.50
(DC motor)	1.25	1.25	1.25
Wind and unwind stand	1.00	1.00	1.25
Winders (surface type)	1.25	1.25	1.25
Yankee dryers	1.25	1.25	1.25
Plastics industry			
Primary processing			
Intensive internal mixers			
Batch mixers	1.75	1.75	1.75
Continuous mixers	1.50	1.50	1.50
Batch drop mill - two smooth rolls	1.25	1.25	1.25
Continuous feed, holding and blend mill	1.25	1.25	1.50
Compounding mill	1.25	1.25	1.25
Calendars	1.50	1.50	1.25

Gearboxes - Series RO2

Service factors

Application	Load duration (hrs/day) 3 -	3 - 10	10 +	Application	Load duration (hrs/day) 3 -	3 - 10	10 +
Plastics industry				Sand miller	1.25	1.25	1.50
Secondary processing				Sewage disposal equipment			
Blow moulders	1.50	1.50	1.50	Bar screens	1.25	1.25	1.25
Coating	1.25	1.25	1.25	Chemical feeders	1.25	1.25	1.25
Film	1.25	1.25	1.25	Dewatering screens	1.50	1.50	1.50
Pipe	1.25	1.25	1.25	Scum breakers	1.50	1.50	1.50
Pre-plasticizers	1.50	1.50	1.50	Slow or rapid mixers	1.50	1.50	1.50
Rods	1.25	1.25	1.25	Sludge collectors	1.25	1.25	1.25
Sheet	1.25	1.25	1.25	Thickeners	1.50	1.50	1.50
Tubing	1.25	1.25	1.50	Vacuum filters	1.50	1.50	1.50
Pullers -barge haul	1.25	1.25	1.50	Screens			
Pumps				Air washing	1.00	1.00	1.25
Centrifugal	1.00	1.00	1.25	Rotary - stone or gravel	1.25	1.25	1.50
Proportioning	1.25	1.25	1.00	Travelling water intake	1.00	1.00	1.25
Reciprocating				Sugar industry			
Single acting, three or more cylinders	1.25	1.25	1.50	Beet slicer	2.00	2.00	2.00
				Cane knives	1.50	1.50	1.50
Double acting, two or more cylinders	1.25	1.25	1.50	Crushers	1.50	1.50	1.50
				Mills (low speed end)	1.75	1.75	1.75
Rotary				Textile industry			
Gear type	1.00	1.00	1.25	Batchers	1.25	1.25	1.50
Lobe	1.00	1.00	1.25	Calendars	1.25	1.25	1.50
Vane	1.00	1.00	1.25	Cards	1.25	1.25	1.50
Rubber industry				Dry cans	1.25	1.25	1.50
Intensive internal mixers				Dryers	1.25	1.25	1.50
Batch mixers	1.75	1.75	1.75	Dyeing machinery	1.25	1.25	1.50
Continuous mixers	1.50	1.50	1.50	Looms	1.25	1.25	1.50
Mixing mill - two smooth rolls (if corrugated rolls are used, then use the same selection factors that are used for a cracker warmer).	1.50	1.50	1.50	Mangles	1.25	1.25	1.50
				Nappers	1.25	1.25	1.50
				Pads	1.25	1.25	1.50
				Slashers	1.25	1.25	1.50
Batch drop mill - two smooth rolls	1.50	1.50	1.50	Soapers	1.25	1.25	1.50
				Spinners	1.25	1.25	1.50
Cracker warmer - two rolls; one corrugated roll	1.75	1.75	1.75	Tenter frames	1.25	1.25	1.50
				Washers	1.25	1.25	1.50
Cracker - two corrugated rolls.				Winders	1.25	1.25	1.50
Holding, feed and blend mill -	2.00	2.00	2.00				
two rolls	1.25	1.25	1.25				
Refiner - two rolls							
Calendars	1.50	1.50	1.50				
	1.50	1.50	1.50				

This application guide is given by way of an example and therefore, may not include all the possible cases.
Should the application not be referable to any of the listed cases, the table below gives two service factors - F_1 referred to both load type and work duration, and F_2 to starts and stops of duty cycle - of which the product is the gearbox oversizing coefficient to have a torque good enough for the required work.

Application: Conveyor 1000 in-lb @ 80rpm - uniform load - 24 hrs/day give F_1=1.4; six start/stops per hour gives F_2= 1.0;
Required torque 1000 x 1.4 (F_1) x 1.0 (F_2)= 1400 in-lb
Gearbox to select FRO12 1/22.4 (80 rpm) 1770 in-lb; i.e. the gearbox size with torque greater than 1400 in-lb
Gearbox service factor: SF1.7 = 1770 in-lb : 1000 in-lb

SERVICE FACTOR
SF = F_1 × F_2

F_1 = Load & Operation factor
F_2 = Start/stop factor

Type of load	Uniform load **F_1**	Variable load **F_1**	Shock load **F_1**	Start/stops per hour	**F_2**
8 hrs	0.8	1.1	1.4	60	1.0
16 hrs	1.0	1.3	1.5	600	1.2
24 hrs	1.2	1.4	1.6	1200	1.3

OUTPUT RADIAL LOADS

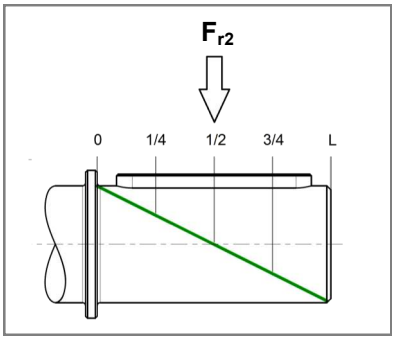
OUTPUT RADIAL LOADS (OHL)

Overhung (radial) loads (F_{r2}) should be checked according to output speed, mounting position (A) and type of the transmission element (B) fitted on the gearbox output shaft and rectified when applicable by the appropriate k_T rating factor.

Application point of radial load

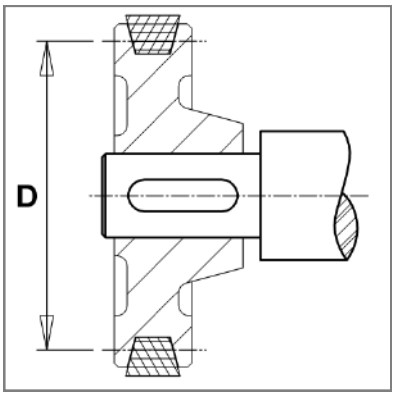
OHL is considered as applied at the output shaft mid-point.
Other positions origin loads to be adjusted with the appropriate factor k_L.
Examples of load distance from the shaft shoulder:

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



Transmission element

k_T	Type of transmission element
1,15	Gear tooth No. < 17
1,40	Chain sprocket
1,25	tooth No. < 13
1,00	tooth No. < 20 tooth No. > 20
2,50	Pulley for
1,25	V-belt toothed-belt



Overhung (radial) load - F_{r2}

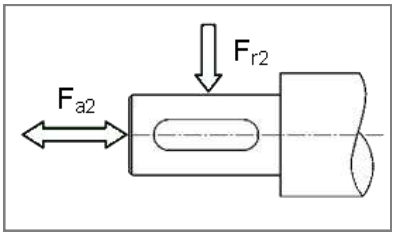
$$F_{r2} = \frac{2000 * M_2}{D} \times k_L \times k_T$$

OUTPUT AXIAL LOADS

Axial load (F_{a2})

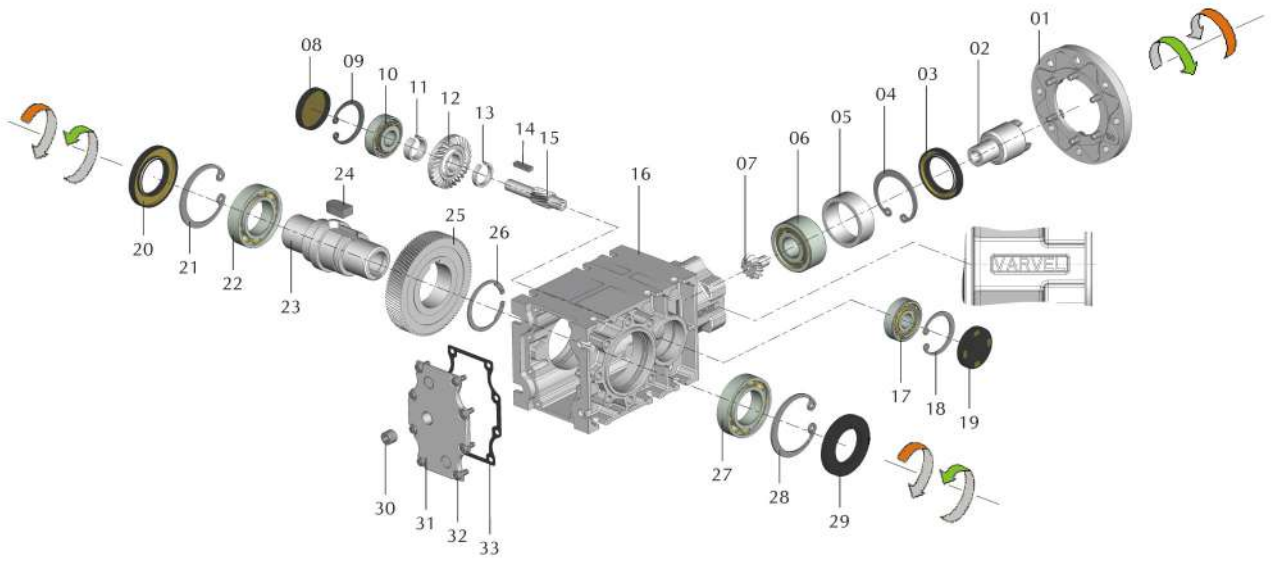
$F_{a2} = F_{r2} \times 0.2$

Axial load value is included within the catalogue radial load figures and is valid on both tensile and compressive stress.



Gearboxes - Series RO2

Components and Direction of rotation



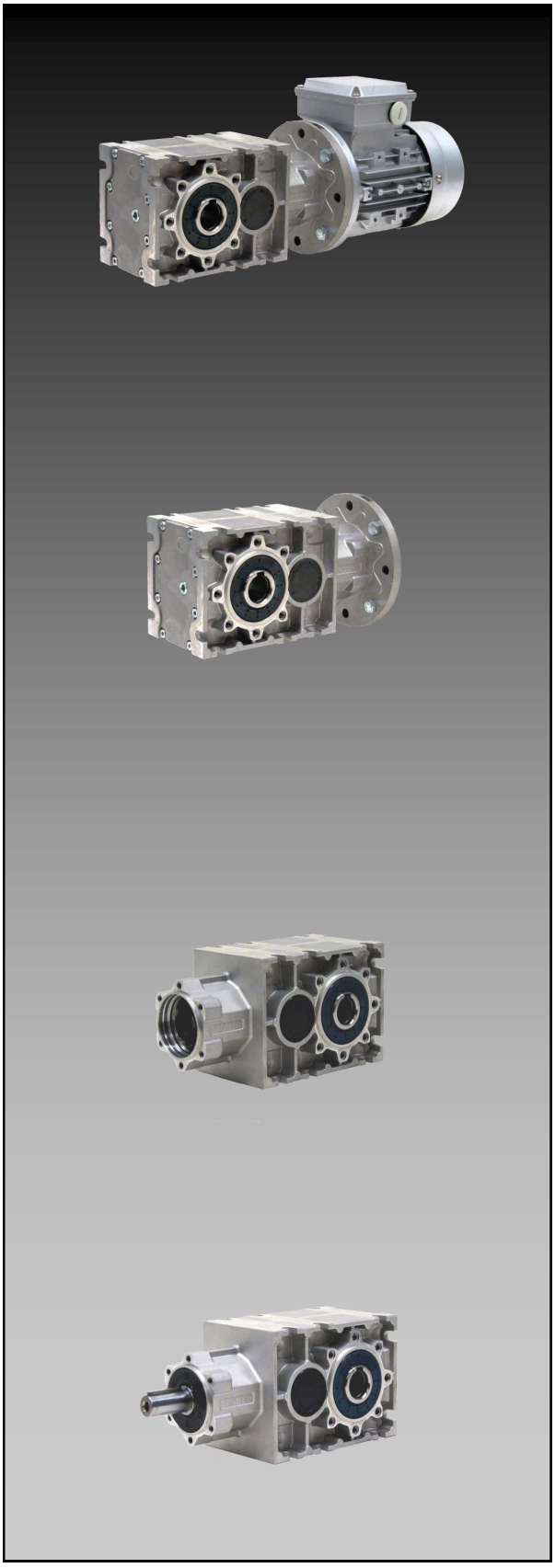
Item	Description	Item	Description
01	Motor adapter	18	Snap ring
02	Input shaft and gearbox semi-coupling	19	Oil seal
03	Oil seal	20	Oil seal
04	Snap ring	21	Snap ring
05	Spacer	22	Bearing
06	Bearing	23	Output shaft
07	Conical pinion	24	Key
08	Oil seal	25	Helical gear
09	Snap ring	26	Snap ring
10	Bearing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

Gearboxes - Series RO2

Versions

MRO - In-line version

Geared motors with two stages
Powers: 0.33 HP to 10 HP, 4 poles
Output speed: 360 rpm to 36 rpm



FRO - In-line version

Gearboxes with two stages, with input motor flange, input quill and flexible coupling
Motor flanges: NEMA 56C to NEMA 180TC and IEC 56 to IEC 132
Output torque: 240 in-lb [27 Nm] to 4425 in-lb [500 Nm]
Reduction ratios: 5.0 :1 to 54.7:1

SRO - In-line version

Gearboxes with two gear stages, without input motor flange but with input quill and flexible coupling
Output torque: 240 in-lb [27 Nm] to 4425 in-lb [500 Nm]
Reduction ratios: 5.0:1 to 54.7:1

RO - In-line version

Gearboxes with two gear stages and input solid shaft
Output torque: 240 in-lb [27 Nm] to 4425 in-lb [500 Nm]
Reduction ratios: 5.0:1 to 54.7:1

Gearboxes - Series RO2

Thermal power 1800 rpm

Thermal power
Rated power (P_1) is the power that can be applied at the gearbox input, on continuous operation, max. temperature of 104 °F, max. altitude 3280 ft, air speed of 410 ft/s, without exceeding the oil temperature of about 185 °F.
Thermal power (Pt_1) may limit the rated power (shaded area) depending on input speed, ambient temperature, service factor and cooling system.

FRO02			FRO12			FRO22			FRO23		
i_n	P_1 [HP]	Pt_1 [HP]	i_n	P_1 [HP]	Pt_1 [HP]	i_n	P_1 [HP]	Pt_1 [HP]	i_n	P_1 [HP]	Pt_1 [HP]
5.2	4.29	7.84	5	5.63	10.94	5.2	7.24	15.57	5.2	12.04	20.65
7.2	3.22	6.48	7.1	5.10	8.74	7.3	7.38	12.31	7.3	11.55	17.65
8.6	2.68	6.01	8.7	4.29	9.19	8.4	6.44	12.90	8.5	10.43	17.73
10.9	2.28	5.58	10.6	3.89	7.89	10.9	5.23	11.10	10.9	10.97	15.23
15.1	1.48	4.91	12.3	2.55	6.81	11.7	4.83	9.79	11.6	9.45	11.30
16.4	1.34	4.61	14.9	2.82	6.73	15.3	4.56	9.40	15.3	9.72	13.57
18	1.34	4.61	15.9	2.28	6.52	16.4	4.16	9.21	16.4	9.17	12.77
21.8	1.07	4.14	18.4	2.28	7.08	17.6	3.89	9.86	18	8.94	13.73
22.7	1.07	4.14	21.8	1.61	6.33	22.4	3.08	8.93	21.3	8.85	12.16
24.4	0.80	3.80	22.4	1.88	5.70	23	2.95	7.62	23	7.95	11.55
27.1	0.80	3.93	25.9	1.21	5.61	24.6	2.55	8.03	24.4	8.38	9.66
31.9	0.67	3.53	27.6	1.48	5.95	26.4	2.55	8.33	27	7.42	11.67
32.7	0.67	3.57	31.5	1.34	4.89	32.3	2.15	6.76	32.3	7.98	9.63
36.7	0.54	3.31	32.7	1.07	5.38	33.6	2.01	7.64	36.7	7.48	8.52
38.1	0.67	3.37	38.8	1.07	5.08	37.1	1.88	7.00	37.9	6.41	9.72
45.9	0.40	3.10	45.9	0.80	4.65	47.2	1.48	6.49	45.1	5.26	8.88
51.5	0.40	2.90	54.7	0.54	4.24	51.9	1.34	5.99	51.5	5.51	7.42

Gearboxes - Series RO2

SF1.0 - 4 poles | **1800 rpm** | **Selection RO02**

	i_n nominal	i_r actual	n_2 [rpm]	M_2 [in-lb]	P_1 [HP]	F_{r1} [lb]	F_{r2} [lb]	J_1 (x 10^{-4}) [lb × ft^2]	NEMA frame 56	NEMA frame 140
RO02	5,2	5,18	347,8	929	5,5	270	382	28,7137	G5	G5
	7,2	7,19	250,5	974	4,1	281	450	23,9677	G5	G5
	8,6	8,58	209,8	974	3,4	281	495	22,3065	G5	G5
	10,9	10,88	165,5	1062	2,9	281	517	15,1874	G5	G5
	15,1	15,1	119,2	974	1,9	288	641	14,0009	G5	G5
	16,4	16,36	110,1	885	1,7	288	674	13,0517	G5	G5
	18	18,03	99,8	974	1,7	292	697	13,7636	G5	G5
	21,8	21,75	82,8	974	1,4	292	764	13,2890	G5	G5
	22,7	22,73	79,2	974	1,4	292	764	12,5771	G5	G5
	24,4	24,41	73,8	885	1,0	292	832	13,2890	G5	G5
	27,1	27,13	66,3	974	1,0	292	832	12,3398	G5	G5
	31,9	31,88	56,4	885	0,86	292	888	11,8652	G5	G5
	32,7	32,73	55,0	885	0,86	292	933	12,1025	G5	G5
	36,7	36,73	49,0	885	0,69	292	978	12,1025	G5	G5
	38,1	38,05	47,3	885	0,69	292	944	11,6279	G5	G5
	45,9	45,9	39,2	885	0,52	292	1102	11,6279	G5	G5
	51,5	51,51	35,0	885	0,52	292	1102	11,6279	G5	G5

G5 - Coupling size

	Oil [US qt / litres] H1	H2	H3	H4	V1	V2	Weight [lb / kg]
FRO02	0,42 / 0,4	0,21 / 0,2	0,32 / 0,3	0,21 / 0,2	0,42 / 0,4	0,32 / 0,3	9,7 / 4,4

Gearboxes - Series RO2

Selection RO12 | **1800 rpm** | **SF1.0 - 4 poles**

	i_n	i_r	n_2	M_2	P_1	F_{r1}	F_{r2}	J_1 (x 10^{-4})	NEMA frame	
	nominal	actual	[rpm]	[in-lb]	[HP]	[lb]	[lb]	[lb × ft^2]	56	140
RO12	5	5,03	357,8	1195	7,2	337	517	75,9373	G6	G6
	7,1	7,09	253,8	1549	6,6	348	551	64,0721	G6	G6
	8,7	8,74	206,0	1593	5,5	355	607	59,3260	G6	G6
	10,6	10,57	170,2	1770	5,0	355	607	48,1727	G6	G6
	12,3	12,34	145,9	1328	3,3	360	798	53,8680	G6	G6
	14,9	14,9	120,7	1770	3,6	360	753	45,5624	G6	G6
	15,9	15,91	113,1	1505	2,9	362	821	43,6639	G6	G6
	18,4	18,37	98,0	1770	2,9	362	843	44,3758	G6	G6
	21,8	21,75	82,8	1505	2,1	362	978	43,9012	G6	G6
	22,4	22,42	80,2	1770	2,4	362	922	42,4774	G6	G6
	25,9	25,92	69,4	1328	1,6	362	1090	43,1893	G6	G6
	27,6	27,64	65,2	1770	1,90	362	1023	42,0028	G6	G6
	31,5	31,45	57,2	1770	1,72	362	1079	41,2909	G6	G6
	32,7	32,73	55,0	1505	1,38	362	1169	41,7655	G6	G6
	38,8	38,76	46,4	1770	1,38	362	1192	41,0536	G6	G6
	45,9	45,9	39,2	1505	1,03	362	1281	41,0536	G6	G6
	54,7	54,71	32,9	1328	0,69	362	1293	40,8163	G6	G6

G6 - Coupling size

	Oil [US qt / litres]						Weight
	H1	H2	H3	H4	V1	V2	[lb / kg]
FRO12	0,74 / 0,7	0,42 / 0,4	0,63 / 0,6	0,42 / 0,4	0,74 / 0,7	0,53 / 0,5	15,4 / 7

Gearboxes - Series RO2

SF1.0 - 4 poles | **1800 rpm** | **Selection RO22**

	i_n	i_r	n_2	M_2	P_1	F_{r1}	F_{r2}	J_1 (x 10^{-4})	NEMA frame	
	nominal	actual	[rpm]	[in-lb]	[HP]	[lb]	[lb]	[lb × ft^2]	56	140
RO22	5,2	5,18	347,8	1593	9,3	652	708	139,7718	G6	G6
	7,3	7,28	247,1	2257	9,5	652	719	113,6684	G6	G6
	8,4	8,36	215,4	2301	8,3	652	776	106,7866	G6	G6
	10,9	10,88	165,5	2390	6,7	652	832	84,2428	G6	G6
	11,7	11,71	153,8	2390	6,2	674	911	93,7349	G6	G6
	15,3	15,31	117,6	2921	5,9	674	922	78,3102	G6	G6
	16,4	16,36	110,1	2921	5,3	674	922	74,9879	G6	G6
	17,6	17,56	102,5	2921	5,0	674	1000	76,6491	G6	G6
	22,4	22,35	80,5	2921	4,0	674	1124	74,5133	G6	G6
	23	23,03	78,2	2921	3,8	674	1124	72,3776	G6	G6
	24,6	24,61	73,2	2655	3,3	674	1237	73,8014	G6	G6
	26,4	26,42	68,1	2921	3,28	674	1225	71,6657	G6	G6
	32,3	32,3	55,7	2921	2,76	674	1326	70,2419	G6	G6
	33,6	33,64	53,5	2921	2,59	674	1371	70,7165	G6	G6
	37,1	37,06	48,6	2921	2,41	674	1428	69,7673	G6	G6
	47,2	47,18	38,2	2921	1,90	674	1439	69,2927	G6	G6
	51,9	51,93	34,7	2655	1,72	674	1439	69,0553	G6	G6

G6 - Coupling size

	Oil [US qt / litres]						Weight
	H1	H2	H3	H4	V1	V2	[lb / kg]
FRO22	1,06 / 1	0,74 / 0,7	0,95 / 0,9	0,74 / 0,7	1,16 / 1,1	0,85 / 0,8	24,3 / 11

Gearboxes - Series RO2

Selection RO32 | **1800 rpm** | **SF1.0 - 4 poles**

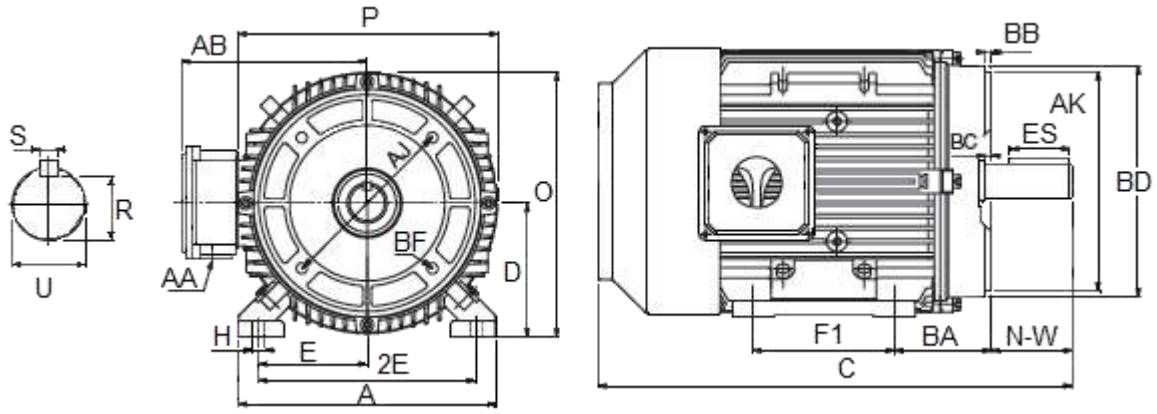
	i_n	i_r	n_2	M_2	P_1	F_{r1}	F_{r2}	J_1 (x 10^{-4})	NEMA frame		
	nominal	actual	[rpm]	[in-lb]	[HP]	[lb]	[lb]	[lb × ft^2]	56	140	180
RO32	5,2	5,18	347,8	2390	14,0	1012	1079	215,2344	G6	G6	G6
	7,3	7,28	247,1	2478	10,3	1023	1270	160,6545	G6	G6	G6
	8,5	8,54	210,7	2655	9,5	1246	1349	144,0433	G6	G6	G6
	10,9	10,88	165,5	3275	9,1	1266	1349	101,3286	G6	G6	G6
	11,6	11,6	155,1	3540	9,3	1284	1439	118,4145	G6	G6	G6
	15,3	15,31	117,6	4248	8,4	1284	1450	88,9889	G6	G6	G6
	16,4	16,36	110,1	4248	7,9	1288	1461	82,5817	G6	G6	G6
	18	17,95	100,3	4425	7,4	1288	1551	85,1920	G6	G6	G6
	21,3	21,35	84,3	4425	6,2	1277	1697	81,3951	G6	G6	G6
	23	23,03	78,2	4425	5,9	1288	1731	77,1237	G6	G6	G6
	24,4	24,39	73,8	4425	5,5	1290	1866	79,2594	G6	G6	G6
	27	27,01	66,6	4425	5,00	1288	1888	75,4625	G6	G6	G6
	32,3	32,3	55,7	4425	4,14	1290	2035	72,6149	G6	G6	G6
	36,7	36,69	49,1	4425	3,62	1290	2237	72,8522	G6	G6	G6
	37,9	37,89	47,6	4425	3,62	1290	2203	71,6657	G6	G6	G6
	45,1	45,05	40,0	4425	2,93	1290	2203	70,9538	G6	G6	G6
	51,5	51,46	35,0	4425	2,59	1290	2203	70,4792	G6	G6	G6

G6 - Coupling size

	Oil [US qt / litres]						Weight
	H1	H2	H3	H4	V1	V2	[lb / kg]
FRO32	1,69 / 1,6	1,06 / 1	1,37 / 1,3	1,06 / 1	1,59 / 1,5	0,95 / 0,9	33,1 / 15

Gearboxes - Series RO2

NEMA Electric motors | **1800 rpm** | **Dimensions**



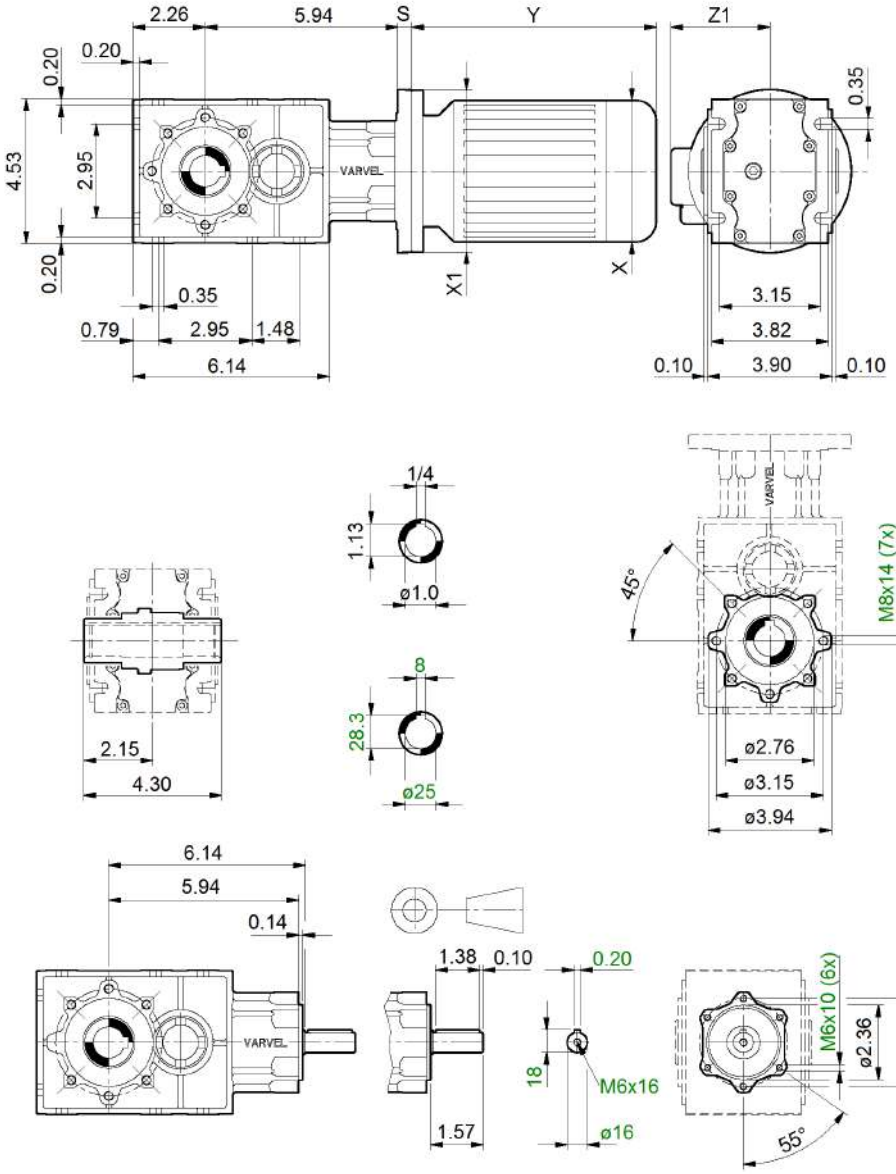
Frame	A	AA	AB	AJ	AK	BA	BB	BC	BD	BF	C
56C	6.3	3/4	5.2	5.875	4.5	2.75	0.16	0.19	5.0	4 x 3/8 - 16	11.5
143TC 145TC	7.1	3/4	5.5	5.875	4.5	2.25	0.16	0.125	8.875	4 x 3/8 - 16	12.8 13.8
182TC 184TC	9.05	3/4	6.6	7.25	8.5	2.75	0.25	0.19	8.875	4 x 1/2 - 13	16.3

Frame	D	E	ES	2E	F1	H	O	P	R	S	U	N-W
56C	3.5	2.44	1.41	4.88	3.0	0.5x0.34	6.25	6.18	0.517	0.188	0.625	1.88
143TC 145TC	3.5	2.75	1.41	5.5	4.0 5.0	0.5x0.34	7.0	6.93	0.771	0.188	0.875	2.25
182TC 184TC	4.5	3.75	1.78	7.5	4.5 5.5	0.59x0.43	9.0	8.85	0.986	0.25	1.125	2.75

Not binding dimensions and weights.

Gearboxes - Series RO2

MRO FRO



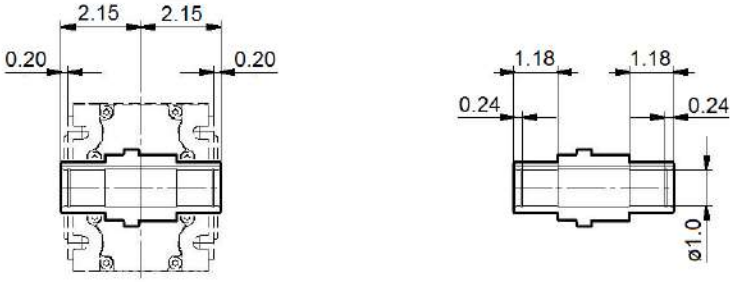
RO

NEMA	RO02 56C	RO02 140TC	180TC				
S-adapter	1.16	1.16					
Adapter part #	K533.227.N56 + K533.217.N56	K533.227.N56 + K533.217.N56					
Coupling part #	KG5.N56/X	KG5.N56/X					

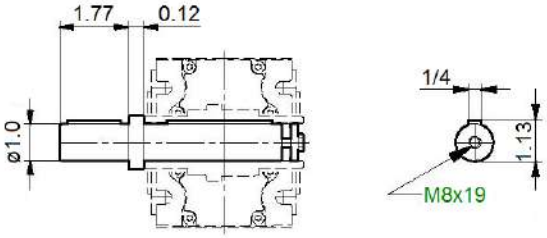
Dimensions X, X1, Y and Z: according to motor manufacturer

Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

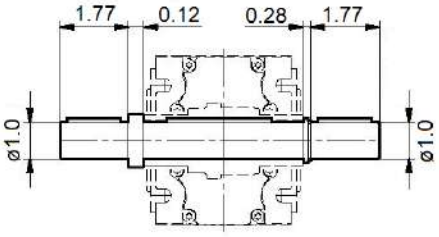
AC



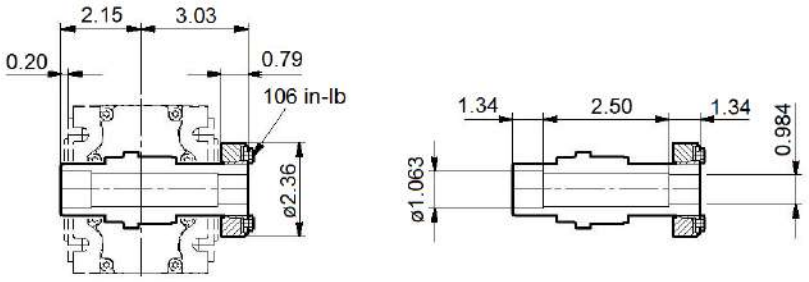
AS



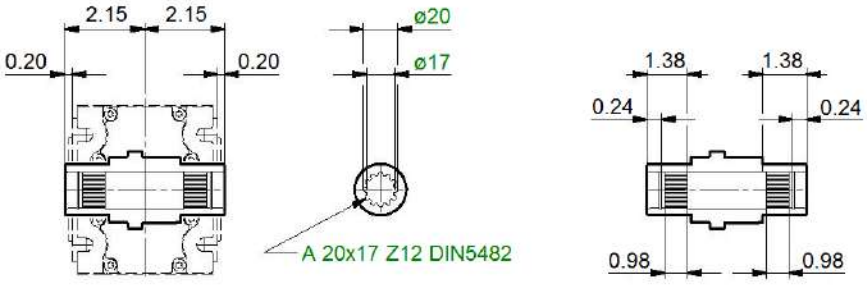
AD



ACC



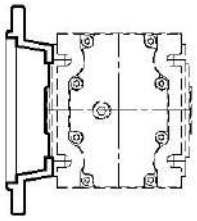
ACS

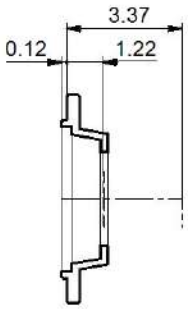


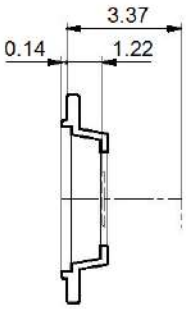
Machine shaft dimensions: pages 42-43
Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

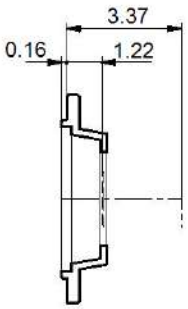
Gearboxes - Series RO2

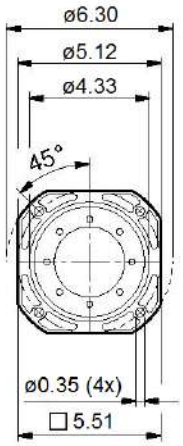
A

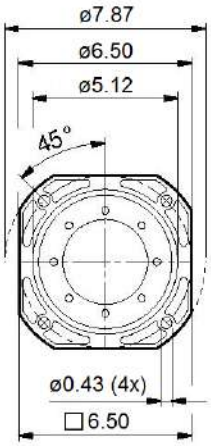


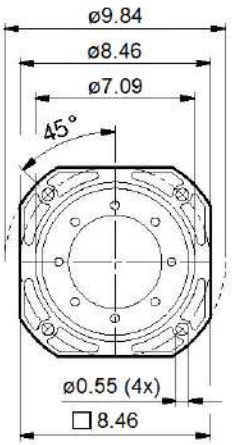




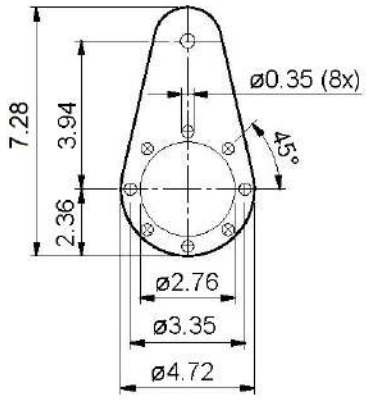




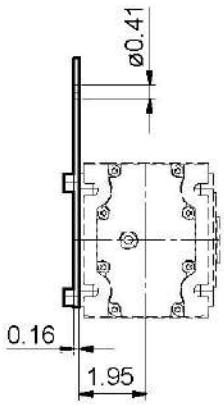




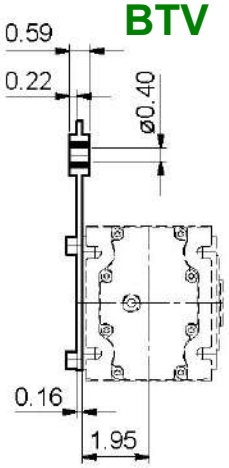
Dimensions: inches (black) and mm (green). Not binding dimensions and weights.



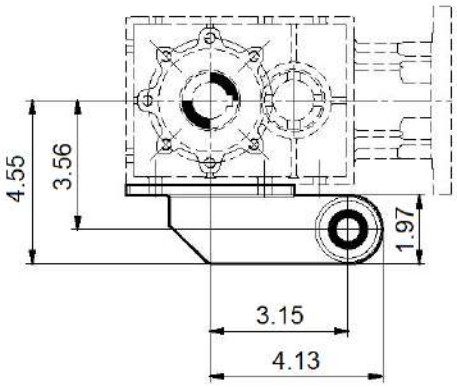
BT

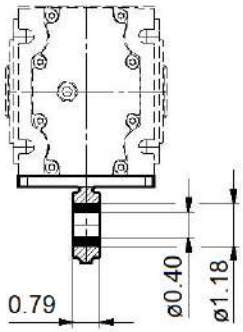


BTV

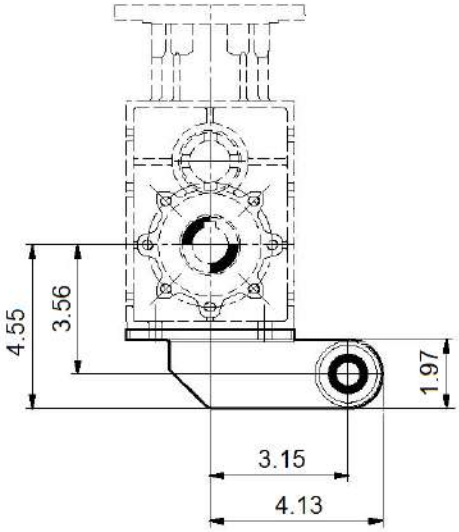


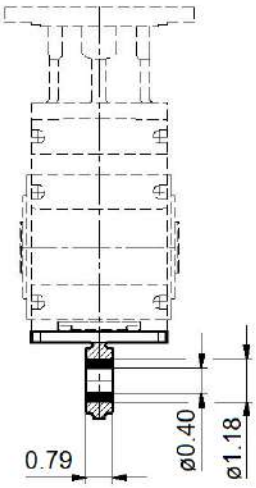
Max. allowed torque: 750 in-lb





BTF

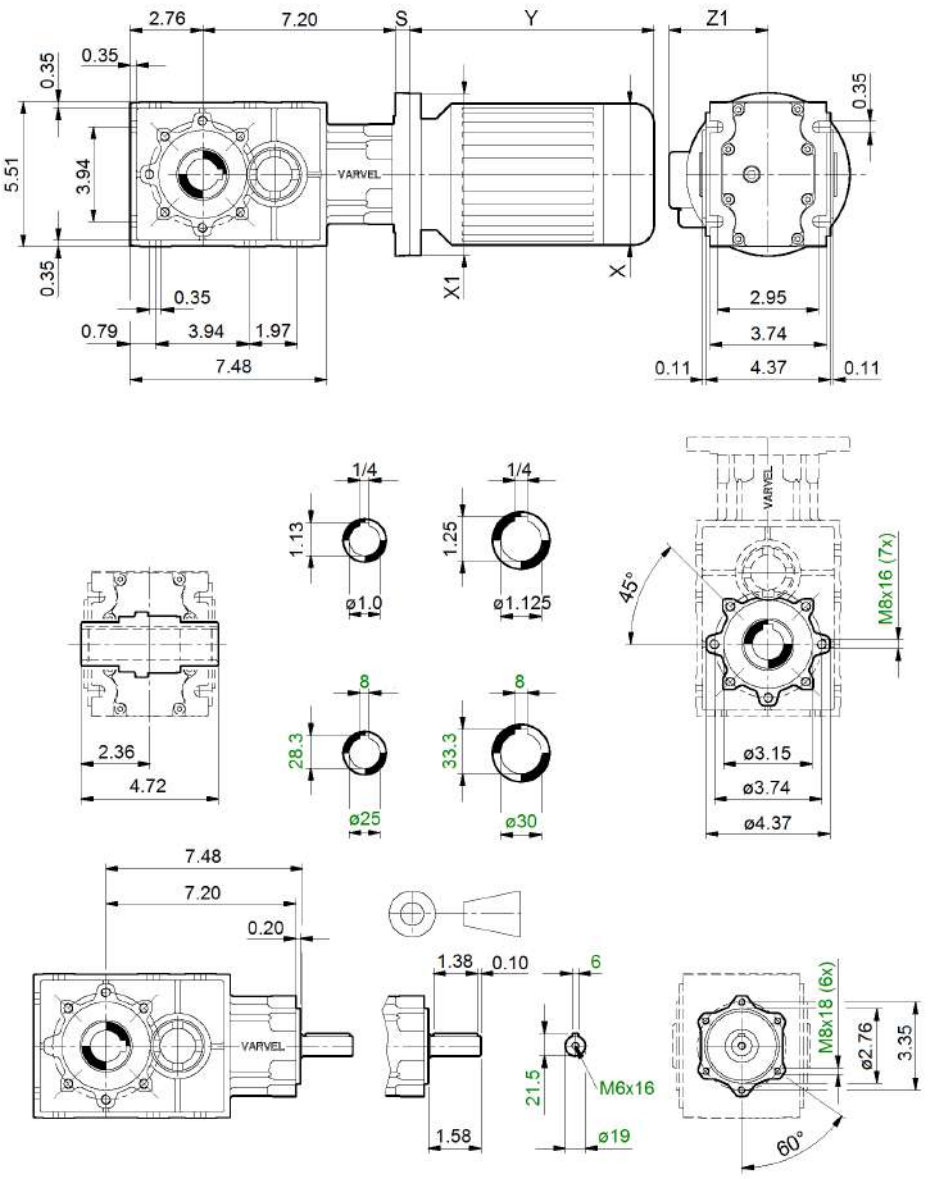




Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

Gearboxes - Series RO2

MRO FRO



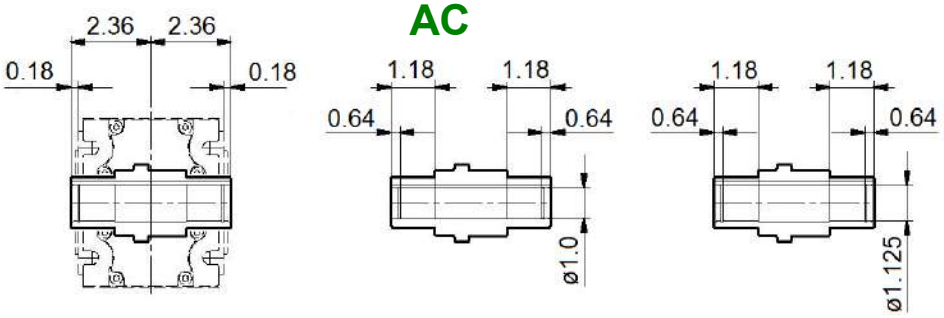
RO

NEMA	RO12 56C	RO12 140TC	180TC				
S-adapter	1.59	1.59					
Adapter part #	K533.227.N56 + K533.217.N180	K533.227.N56 + K533.217.N180					
Coupling part #	KG5.N56/X	KG6.N140/X					

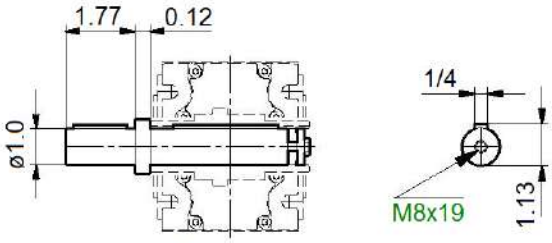
Dimensions X, X1, Y and Z: according to motor manufacturer

Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

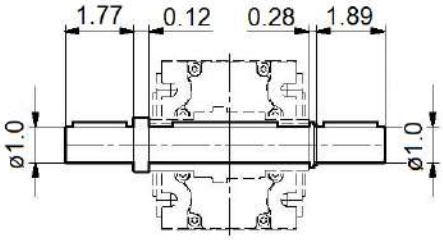
AC

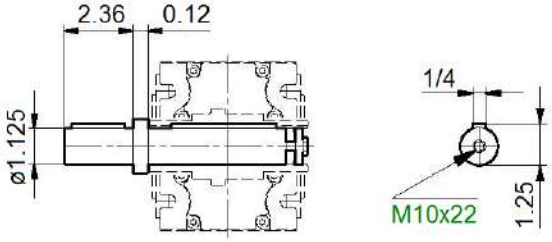


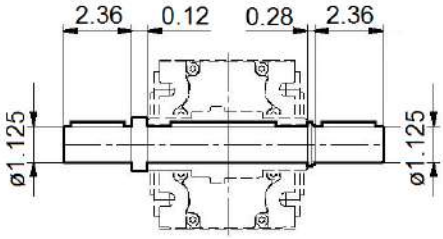
AS



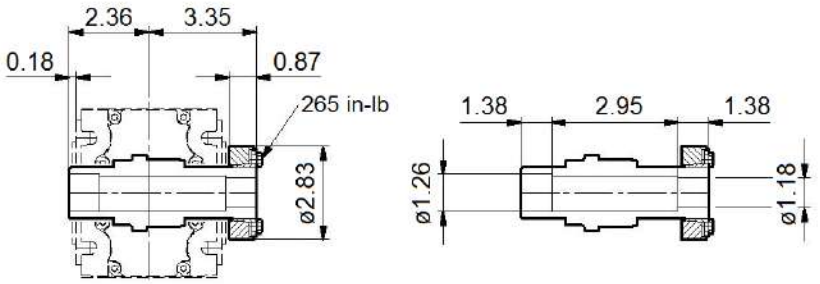
AD



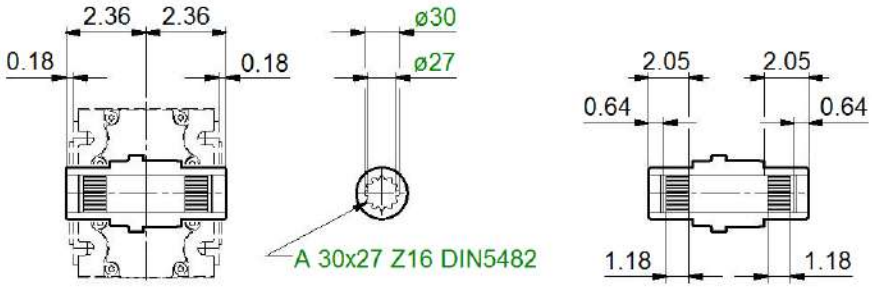




ACC



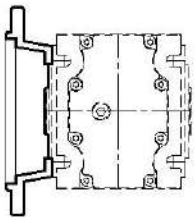
ACS

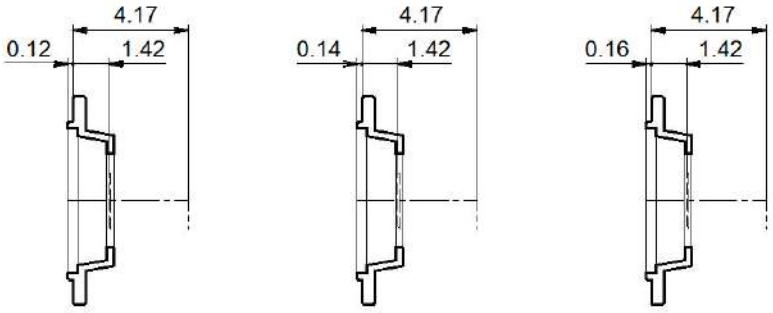


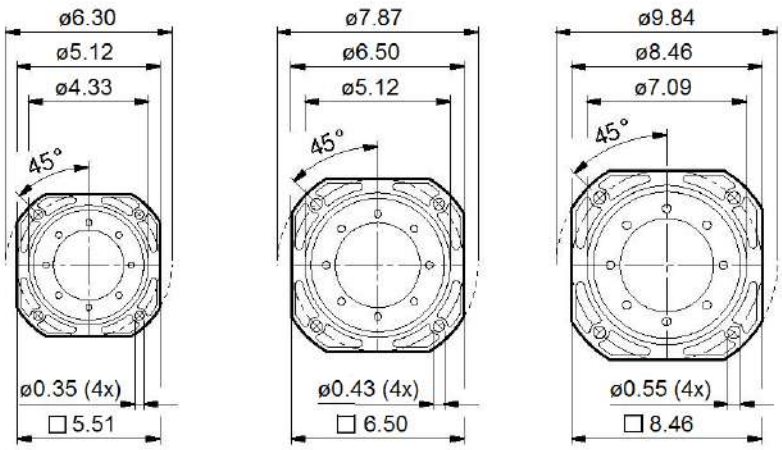
Machine shaft dimensions: pages 42-43
Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

Gearboxes - Series RO2

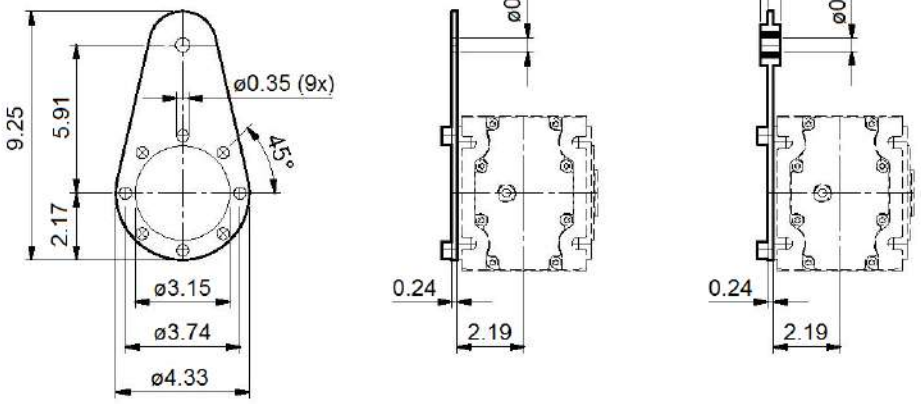
F



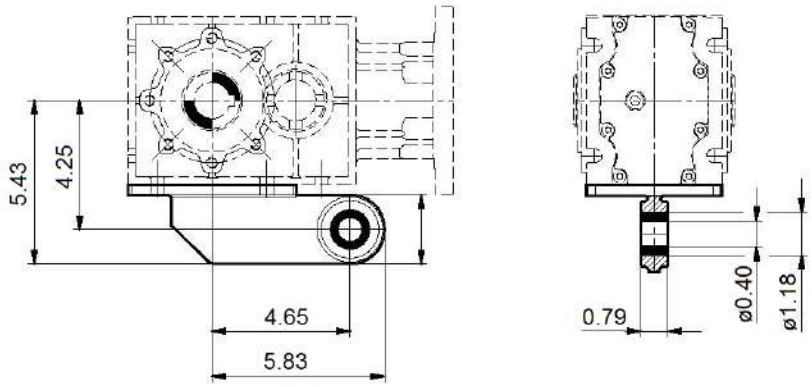




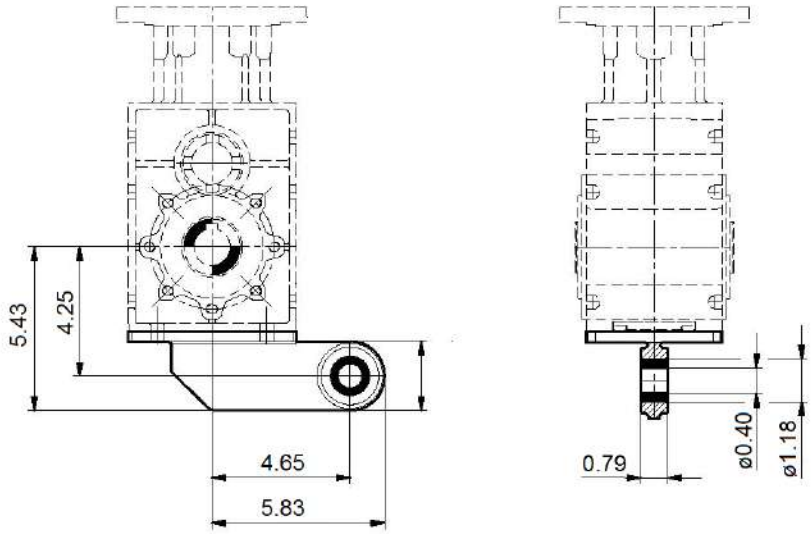
Dimensions: inches (black) and mm (green). Not binding dimensions and weights.



Max. allowed torque: 1250 in-lb



BTF

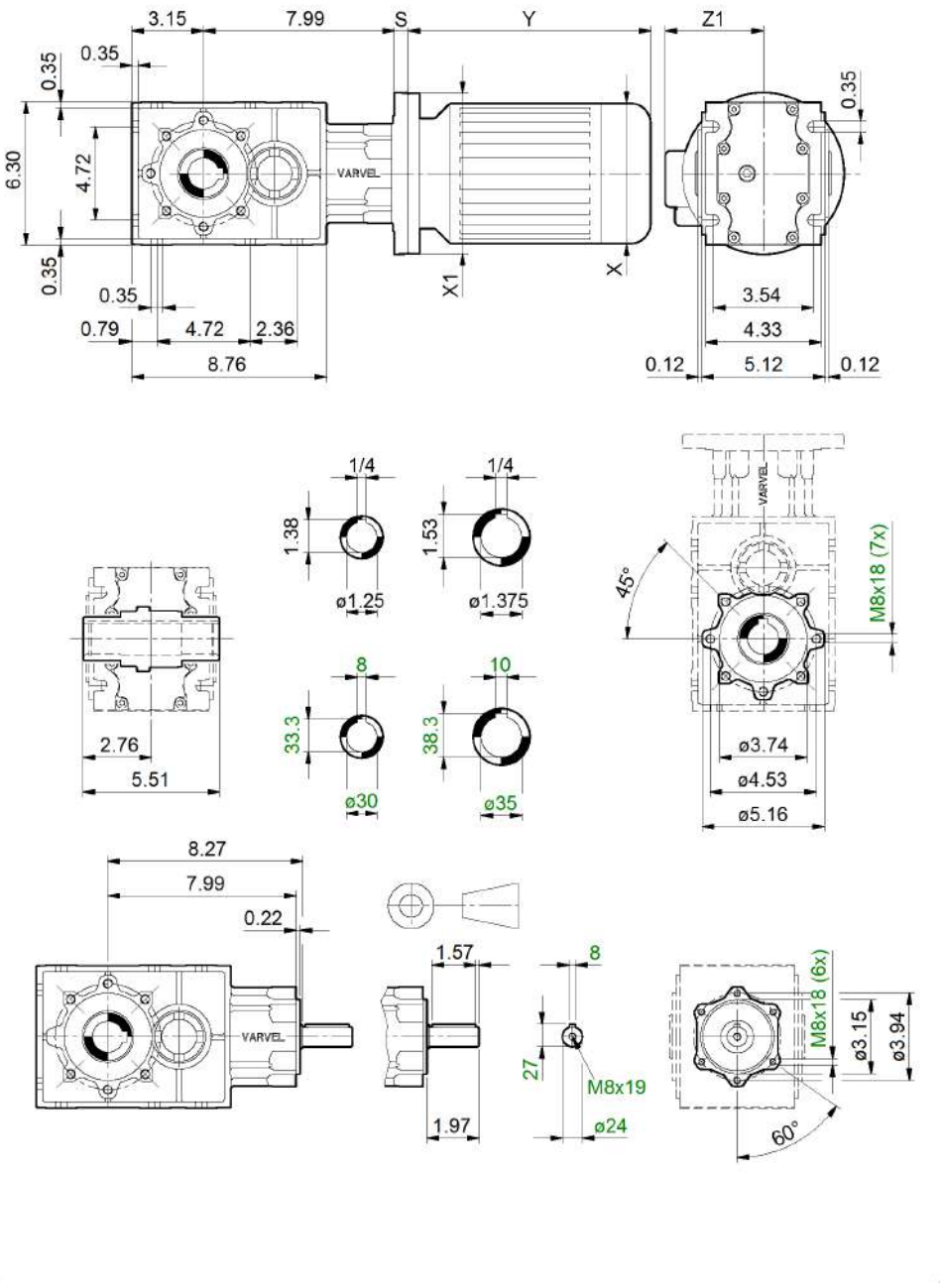


Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

Gearboxes - Series RO2

Dimensions RO22

MRO
FRO



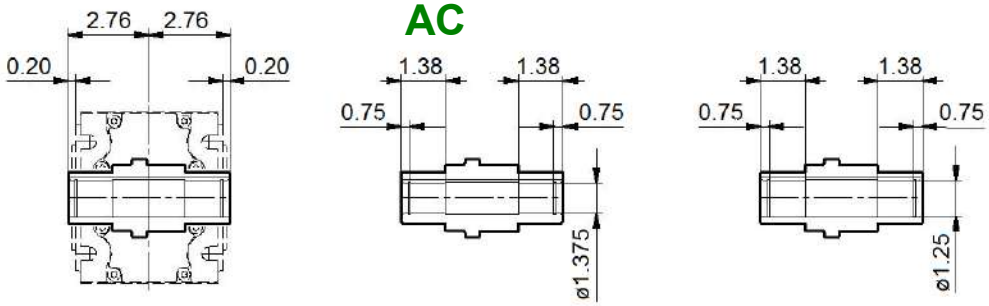
RO

NEMA	RO22 56C	RO22 140TC	180TC				
S-adapter	1.59	1.59					
Adapter part #	K533.227.N56 + K533.217.N180	K533.227.N56 + K533.217.N180					
Coupling part #	KG6.N56/X	KG6.N140/X					

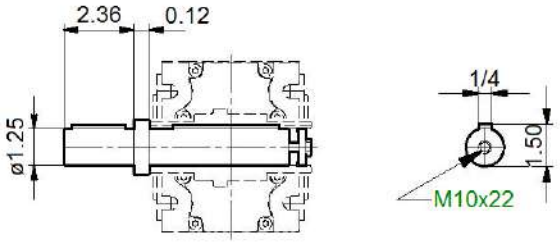
Dimensions X, X1, Y and Z: according to motor manufacturer

Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

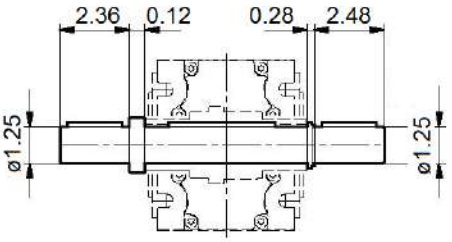
AC

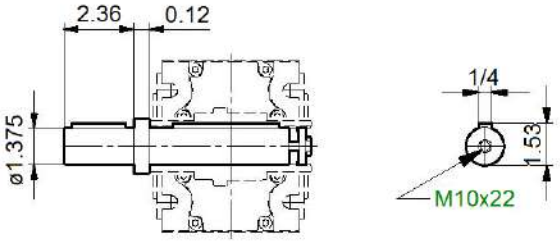


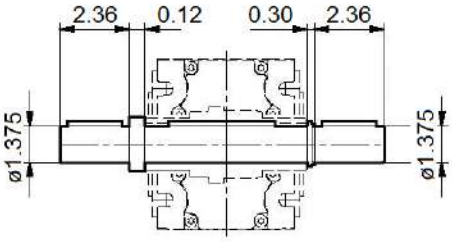
AS



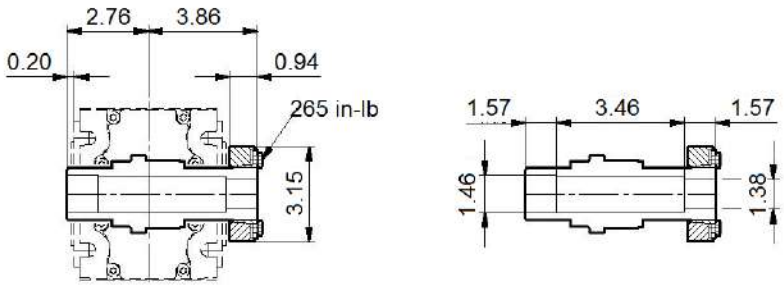
AD



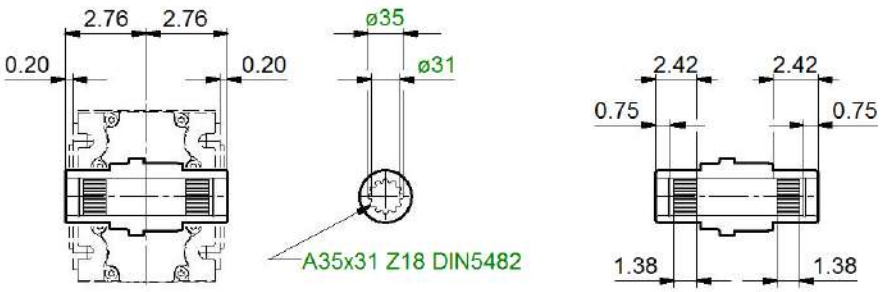




ACC



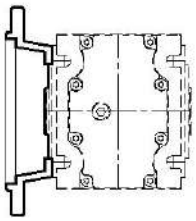
ACS

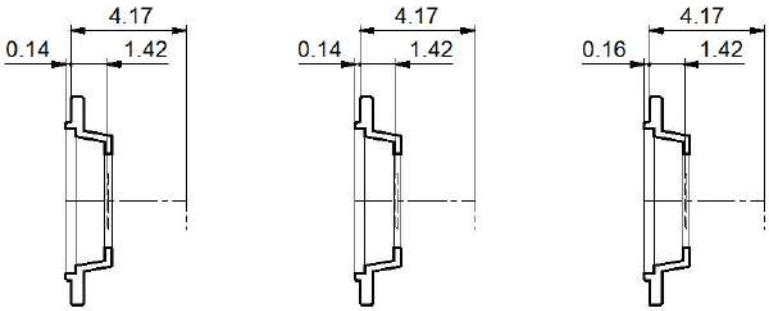


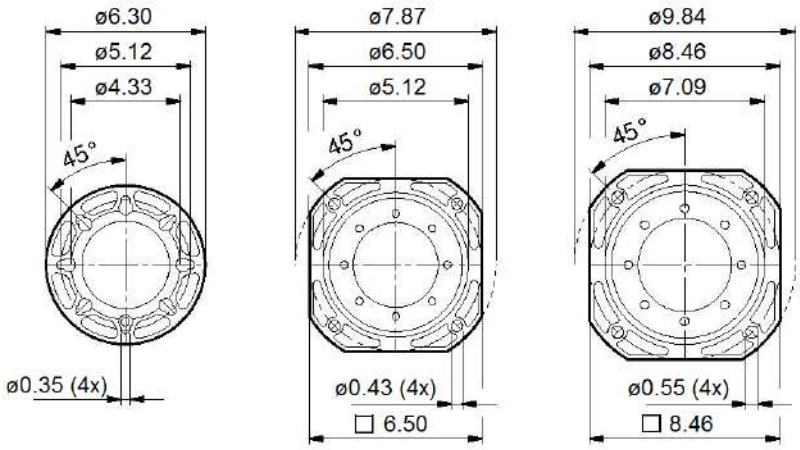
Machine shaft dimensions: pages 42-43
Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

Gearboxes - Series RO2

A

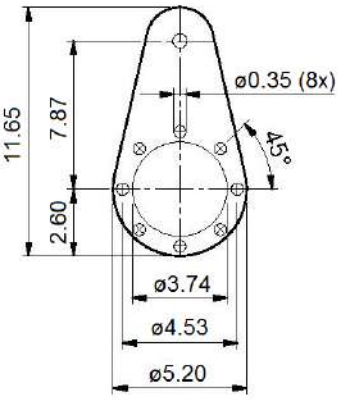




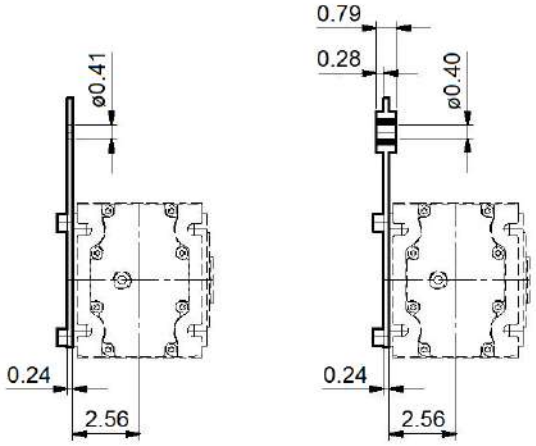


Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

BT

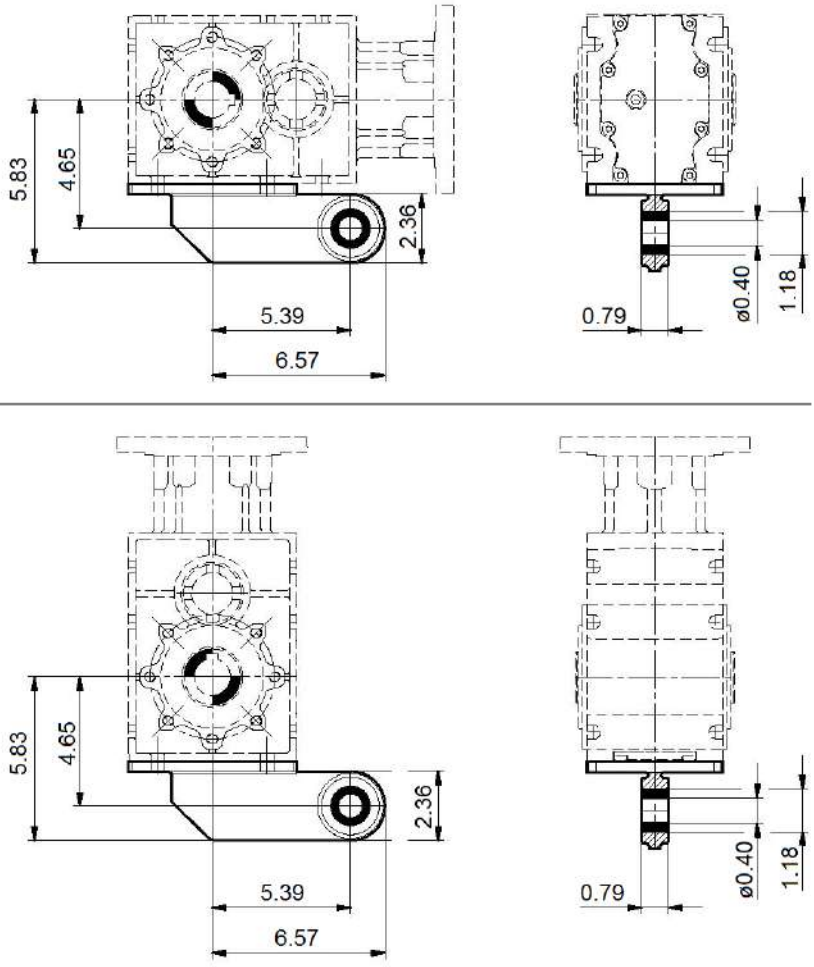


BTV



Max. allowed torque: 2125 in-lb

BTF

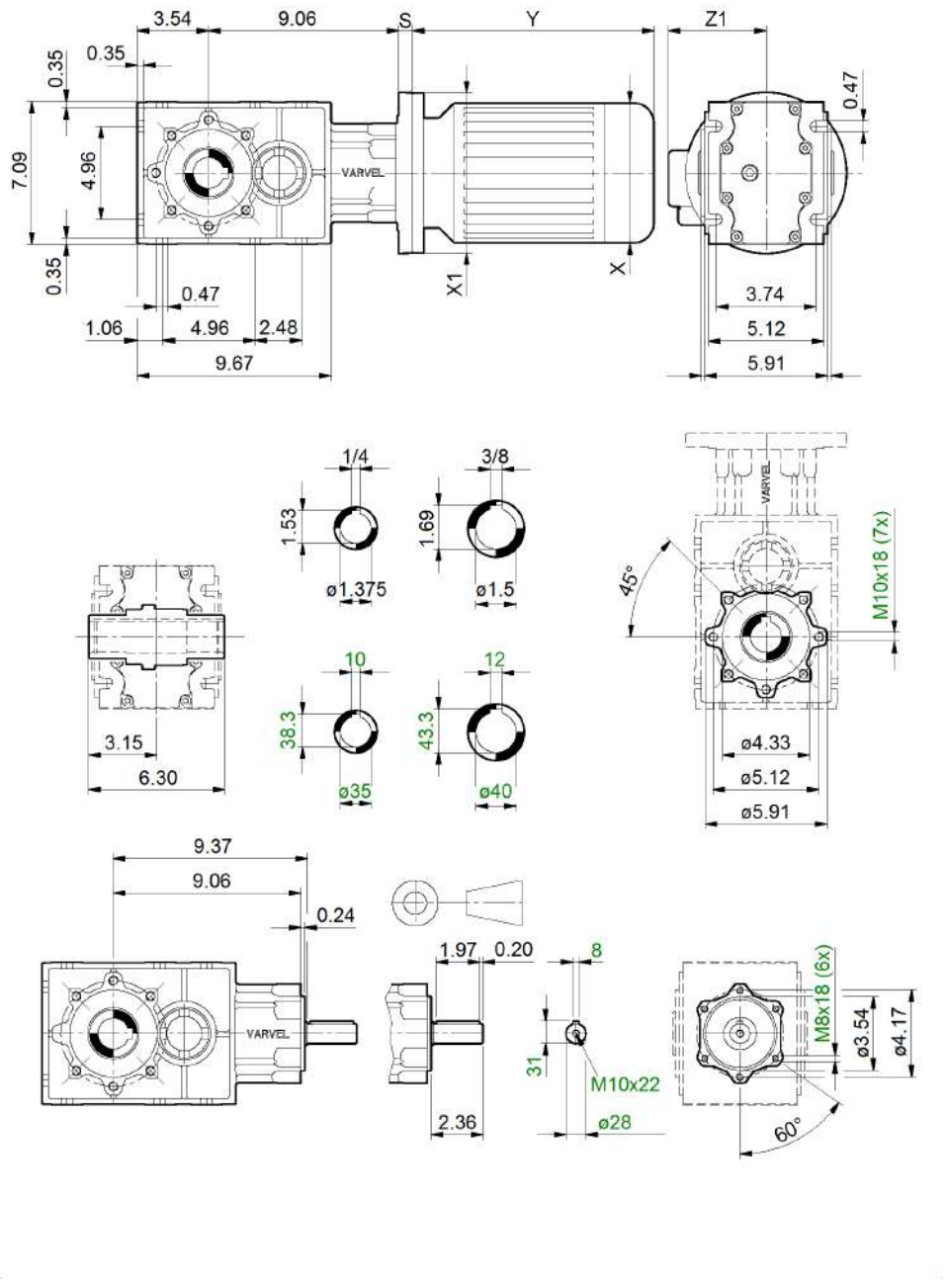


Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

Gearboxes - Series RO2

Dimensions RO32

MRO
FRO



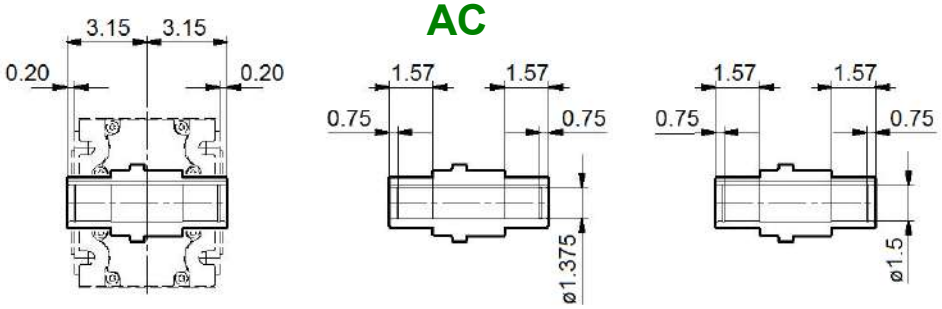
RO

NEMA	RO32 56C	RO32 140TC	RO32 180TC				
S-adapter	1.65	1.65	1.65				
Adapter part #	K534.227.N56 + K534.217.N56	K534.227.N56 + K534.217.N56	K534.227.N180 + K534.217.N180				
Coupling part #	KG6.N56/X	KG6.N140/X	KG6.N180/X				

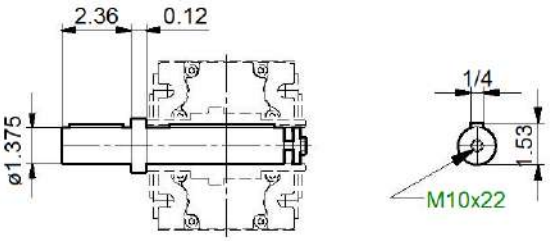
Dimensions X, X1, Y and Z: according to motor manufacturer

Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

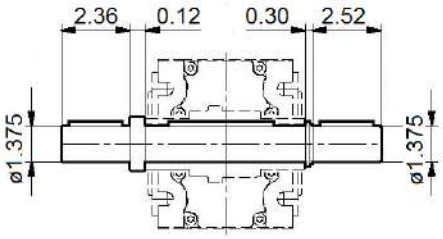
AC

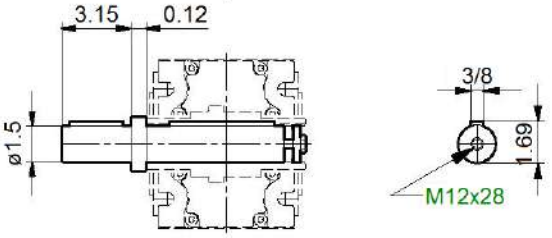


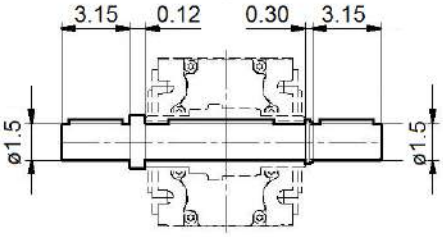
AS



AD







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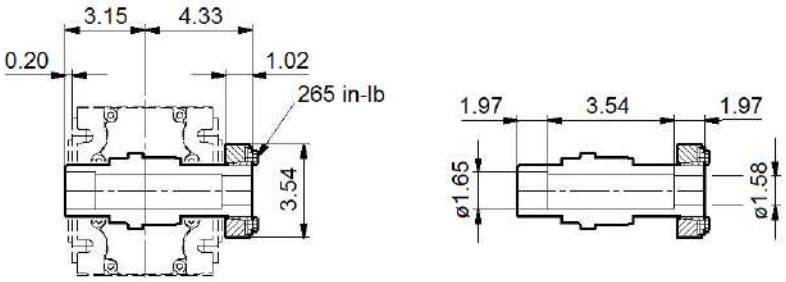

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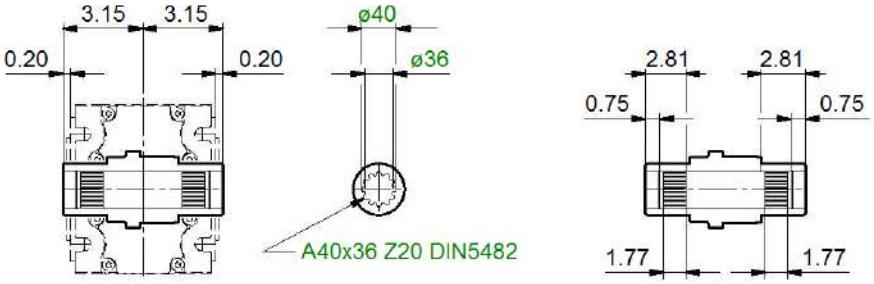
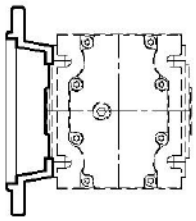


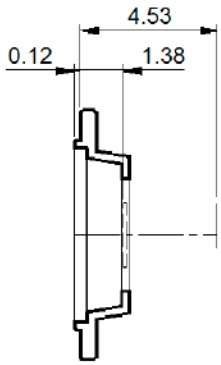
Machine shaft dimensions: pages 42-43
Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

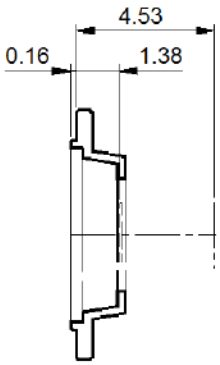
Gearboxes - Series RO2

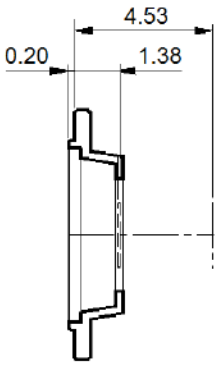
Dimensions RO32

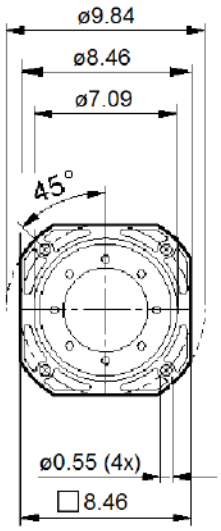
A

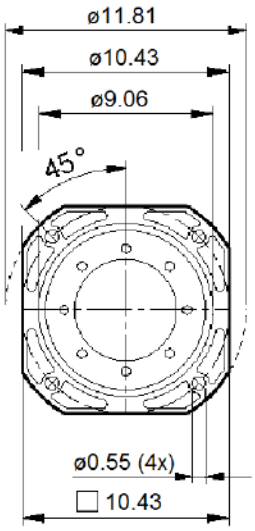


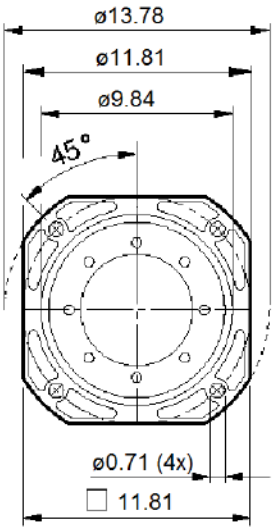






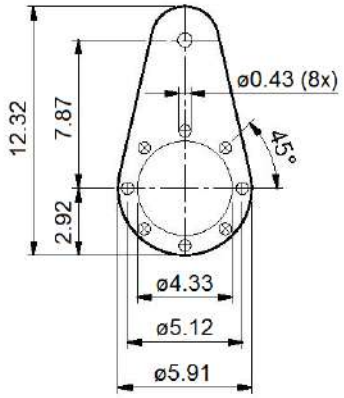


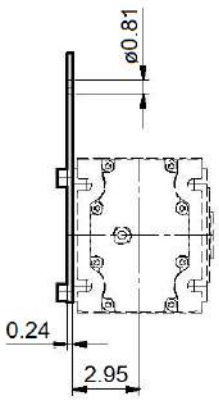




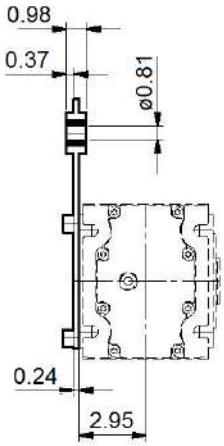
Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

BT

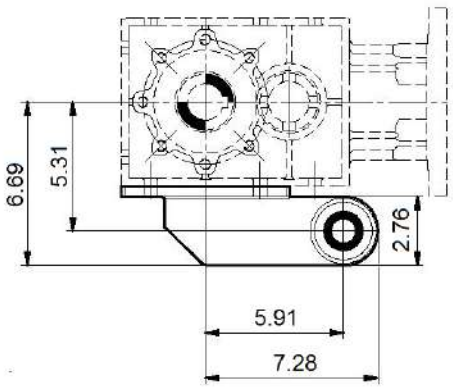


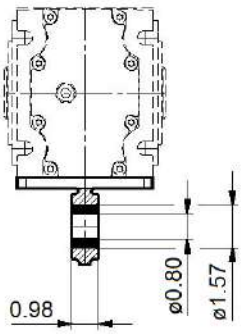


BTV

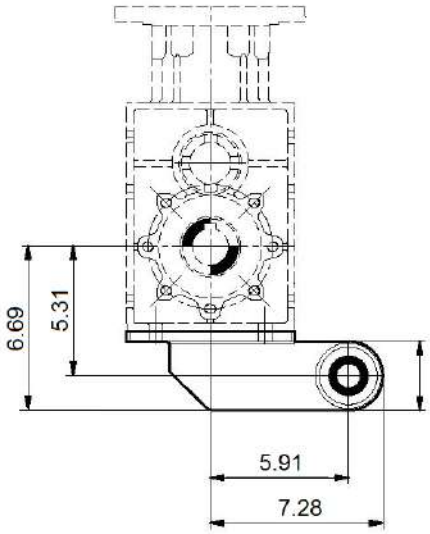


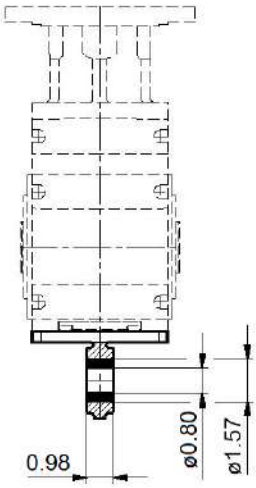
Max. allowed torque: 2900 in-lb





BTF



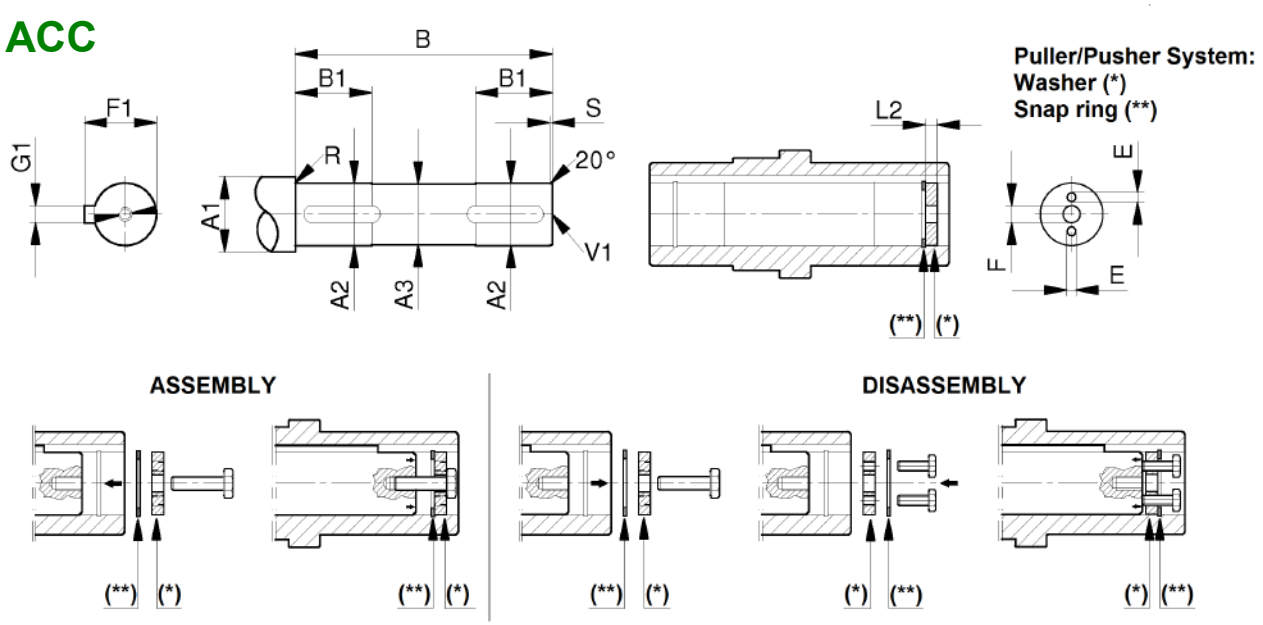


Dimensions: inches (black) and mm (green). Not binding dimensions and weights.

Gearboxes - Series RO2

Solid shaft dimensions — AC version

The table gives the machine shaft dimensions to fit into the AC hollow output shaft with standard key.
Internal snap ring (**) according to A2 diameter.

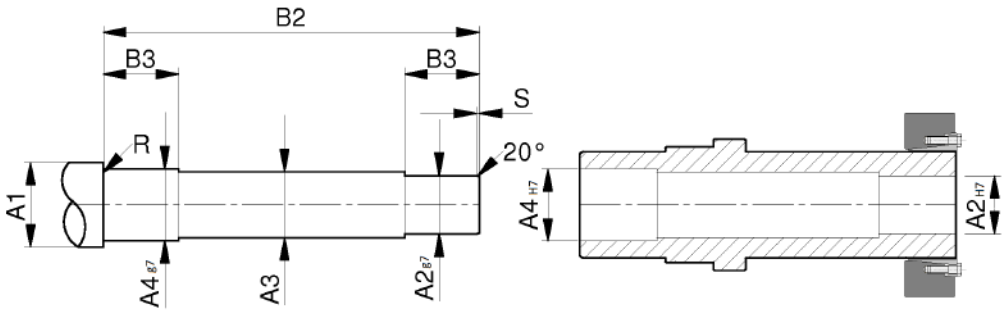


Size	A1	A2	A3	B	B1	E	F	F1	G1	L2	R	S	V1
RO02	1,38	**0,98**	0,94	3,86	1,38	M6	0,35	1,10	0,31	0,18	0,039	0,079	M8x19
RO12	1,57	**1,18**	1,14	4,47	1,57	M6	0,43	1,30	0,31	0,28	0,039	0,079	M10x22
	1,77	**1,38**	1,34	4,47	1,57	M8	0,43	1,50	0,39	0,28	0,039	0,079	M10x22
RO22	1,77	**1,38**	1,34	5,26	1,77	M8	0,43	1,50	0,39	0,28	0,039	0,079	M10x22
	1,97	**1,57**	1,54	5,26	1,77	M8	0,51	1,69	0,47	0,28	0,039	0,079	M12x28
RO32	1,97	**1,57**	1,54	6,12	2,17	M8	0,51	1,69	0,47	0,31	0,059	0,118	M12x28
	2,36	**1,97**	1,93	6,12	2,17	M10	0,67	2,11	0,55	0,31	0,059	0,118	M16x36

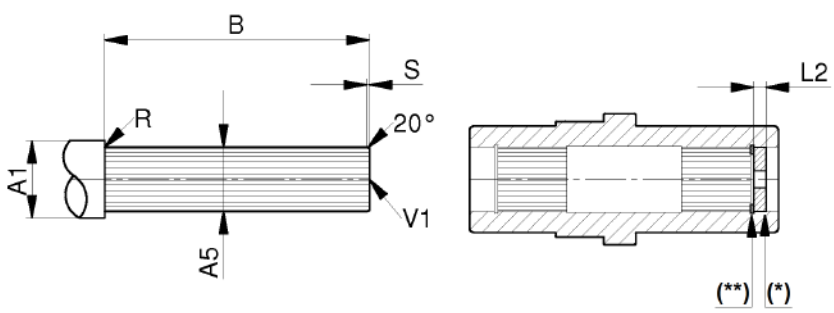
Dimensions: inch (black) and mm (green)
Not binding dimensions and weights

The table gives the machine shaft dimensions to fit into a ACC Shrink Disk shaft and ACS Spline type hollow shaft.
Internal snap ring (**) according to A2 diameter.

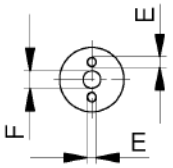
ACC



ACS

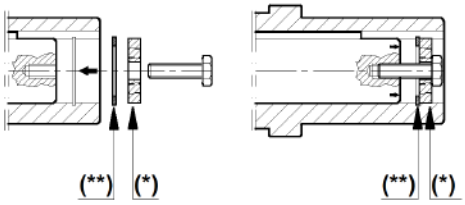


Puller/Pusher System:
Washer (*)
Snap ring (**)

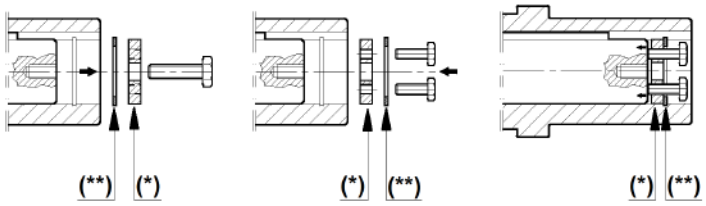


***A5 =B … x … DIN 5482**

ASSEMBLY



DISASSEMBLY



Size	A1	A2	A3	A4	A5	B	B2	B3	E	F	L2	R	S	V1
RO02	1,38	**0,98**	0,94	1.06	20x17	3.86	5.14	1.30	M6	0.35	0.18	0.039	0.079	M8x19
RO12	1,38	**0,98**	0,94	1.46	35x31	4,47	6.57	1.54	M8	0.43	0,28	0,039	0,079	M10x22
RO22	1,97	**1,57**	1,54	1.65	40x36	5,26	7.44	1.93	M8	0,51	0,28	0,039	0,079	M10x22
RO32	2,36	**1,97**	1,93	2.05	50x45	6,12	8.66	1.93	M10	0,67	0,31	0,059	0,118	M16x36

Dimensions: inch (black) and mm (green)
Not binding dimensions and weights

Gearboxes - Series RO2

Imperial	CONVERSION FACTORS	Metric
1 lb = 4.45 N 1 lb = 0.454 kg 1 oz = 0.028 kg	**Mass & Force**	1 N = 0.225 lb 1 kg = 2.205 lb 1 kg = 35.27 oz
HP (60Hz) = kW (50Hz) × 1.341 × 1.2 HP (50Hz) = kW (50Hz) × 1.341 HP = in-lb × rpm : (63025 x eff.)	**Power**	kW (50Hz) = HP (60Hz) × 0.745 × 0.833 kW (50Hz) = HP (50Hz) × 0.745 kW = Nm × rpm / (9550 × eff.)
1 in-lb = 0.113 Nm 1 ft-lb = 1.355 Nm ft-lb = 108 × **k** × HP × eff. × ratio in-lb = 63025 x HP x eff. / rpm = 9 × **k** × HP × eff. × ratio = 8000 × **k** × HP × eff. / output speed (where **k**= motor pole number, i.e. 2, 4, 6, 8)	**Torque**	1 Nm = 8.851 in-lb 1 Nm = 0.738 ft-lb Nm = 9550 × kW × eff. / rpm
1 qt (US) = 0.946 litre	**Volume**	1 litre = 1.057 qt (US)

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.

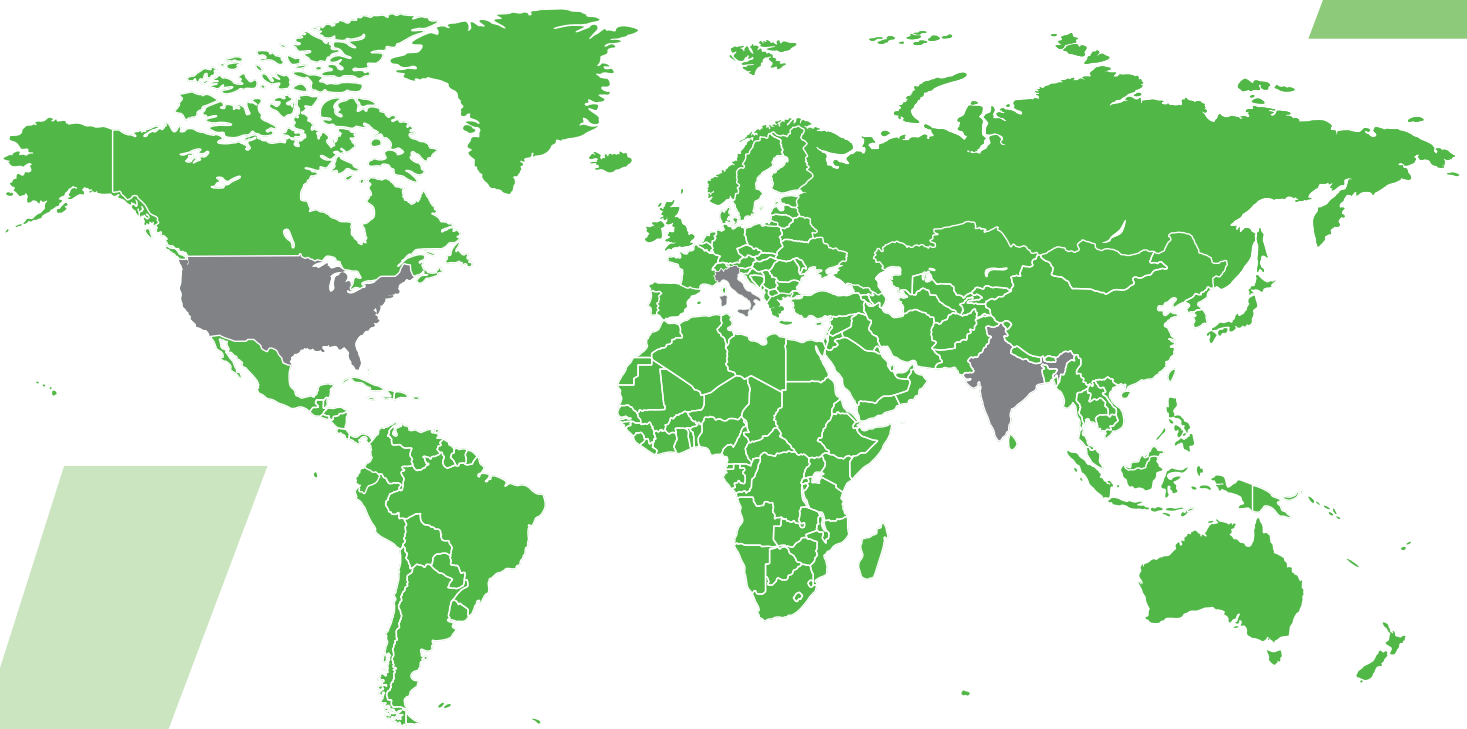
Long-term storage

For storage longer than 3 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.



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www.mgmvarvelindia.com

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