

RS

WORM GEARBOXES



- RS**
- One stage
 - Powers from 0,06 to 15 kW
 - Reduction ratio from 7:1 to 100:1
 - Output torque from 8 to 1680 Nm (input 1400 RPM)



- RA**
- Helical / worm
 - Powers from 0,06 to 7,5 kW
 - Reduction ratio from 25:1 to 800:1
 - Output torque from 25 to 2860 Nm (input 1400 RPM)



- RS/RS**
- Two stage
 - Powers from 0,06 to 1,1 kW
 - Reduction ratio from 420:1 to 10000:1
 - Output torque from 11 to 3020 Nm (input 1400 RPM)



GEARBOXES SERIES “RS” - “RA” - “RS/RS”

RS - Worm gears

The worm gearboxes, RS series, specifically designed for universal mounting, are manufactured with die cast housings and covers in aluminium up to the size RS85 and cast iron for the size FRS110.

Torques - as listed in selection tables - are output torque values for the specific size, and motor powers are always referred to 1440 RPM.

Input Viton oil seals, fitted on demand, allow free-trouble operation with 2-pole standard ac motors or 3000 RPM dc motors.

Gearboxes are delivered filled with synthetic long-life oil (without plugs), in quantities as recommended on page 6, and valid for all mounting positions.

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

RA - Helical worm gears

The gearboxes, RA series, made up of an independent single stage helical gearbox FXA fitted to a standard FTR gearbox, allow greater output torques and higher efficiency than the FRS gearbox with equivalent ratios.

RS/RS - Two stage worm gears

The gearboxes, RS/RS series, are made up of two gearboxes RS and offer a full selection of high reduction ratios to obtain the very low output speeds.

AS, AD - Output shafts

All the gearboxes are manufactured with hollow output shaft as standard version and, optionally, a single AS or double AD solid output shaft - made of steel C43 - can be supplied.

An ASC safety shield for the opposite side of a single output shaft AS, is available on demand.

BR, BRV - Torque arms

Standard gearboxes are supplied normally with covers on each side allowing torque arm fixing when gearboxes have to operate as shaft mounted units.

The torque arm BT or BTV (with Vulkollan vibration-damping) is made of extra thick plate and white galvanized.

TLI/TLE - Torque limiters

The torque limiter and safeguard device - TLI internal built-in and TLE external plug-in types - allows easy torque adjustments, full gearbox safeguard against unexpected overload conditions, simple hand release, and manual operation in case of power supply failure.

Slipping torque, factory preset, can be adjusted from the maximum pre-set torque down to zero, and shaft rotation restarts automatically as soon as torque value is lower than the pre-set value.

Oil quantity of torque limiter TLI are listed at page 22.

SL - Travel limiters

The SL travel limiter device stops - by means of built-in limit switches - the gearbox after a given operation time.

Standard thread allows approx. 40 turns of the output shaft. Limit switch travel is adjustable and operation time varies upon the used reduction ratio from min. 12 to max. 170 seconds.

Electric motors

The electric motors are supplied with voltage 230/400V ($\pm 10\%$) three-phase and 230V single-phase, frequency 50 Hz, 4 poles, temperature class F at ambient temperature 40 Celsius, protection IP55.

On request, motors according to different specifications, high starting torque single-phase, brake-motors, dual-speed motors, for separate or on board inverter drive.

The terminal box is located downwards as standard in worm or helical/worm gear boxes, however and in case of two-stage types refer at page 5.

GEARBOXES SERIES “RS” - “RA” - “RS/RS”

	GENERAL SPECIFICATIONS
Range	9 sizes 55 reduction ratios 3020 Nm max. output torque
Sizing	According to BS721. 15.000 hrs average lifetime with service factor SF1
Housings, Covers	Pressure die cast aluminium AlSi12Cu2F up to size RS85 and grey cast iron G25 from RS110.
Toothed Parts	Worm shafts of steel 20MnCr5, case hardened and tooth profile ZK ground. Worm wheels of CuSn12 on cast iron hubs.
Shafts & Keys	Steel C43 Shafts h6 - Bores E8 Keys according to DIN6885 B1
Bearings	Ball or roller types According to sizes and technical requirements
Oil seals	Type NB - nitril-butadiene With additional anti-dust lip According to DIN 3760
Lubricant	Synthetic long-life oil Grade ISO VG 320
Baking Painting	RT110-150: epoxy powder paint, standard colour RAL 7012. RT28-85: real aluminium

Directive ATEX

The gearboxes Series VARVEL-ATEX, delivered on demand, are designed and manufactured according to Directive 94/9/CE “Atex” and therefore, they are qualified for installation in potentially explosive atmospheres of:

- 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).

The units VARVEL-ATEX are identified by the additional marking


II 2 GD ck IP66 T_{max}=135 °C

DESIGNATION

GEARBOX DESIGNATION

F RS [../] 40 B3 28 IEC71 B14 (OPS, OPP)

OPS = Standard Options, Page 22
OPP = Options at the foot of the page

B5, B14 = Electric motor form

Electric motor size

Reduction ratio

Gearbox mounting form

RS (S, I, D, FL, PC) - RA (10, 11, 12, 13)

RS/RS (11, 12, 13, 14, 15, 16, 17, 18)

28, 40, 50, 60, 70, 85, 110, 130, 150 = Gearbox size RS

63/, 71/, 80/ = Helical stage size RA

28/, 40/, 50/, 60/, 70/ = First gearbox size RS

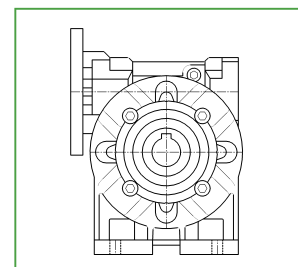
RS, RA, RS/RS= Gearbox type

M = Geared motor

F = Quill input and flange: IEC standard

S = Quill input only: IEC standard (no flange)

... = Nothing - Free input shaft



MOTOR DESIGNATION

MT 0,37 kW 71b4 B14 230/400/50 IP55 F X1

Terminal box position

Cl. F (std) = Insulation class

IP55 (std) = Protection class

Voltage / Frequency

B5 or B14 = Flange mounting

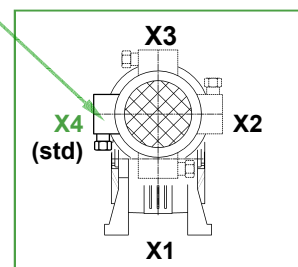
IEC motor frame and pole No.

Motor power

MT = Three-phase motor

MM = Single-phase motor

MA = Brake motor



OPTIONS OPP

Standard fitting side, unless otherwise requested, is the right side of the gearbox when seen from the input side.

ACØ - Not standard hollow output shaft Ø... mm

CS - Not standard output bearings

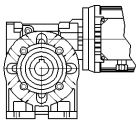
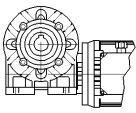
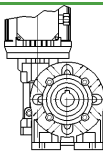
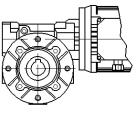
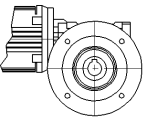
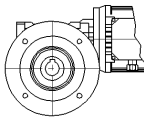
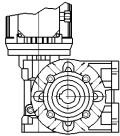
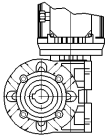
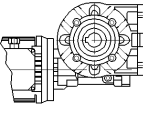
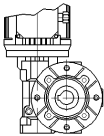
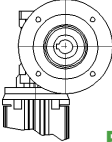
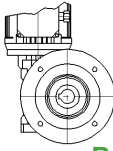
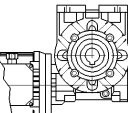
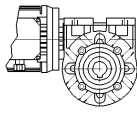
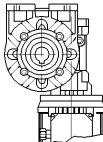
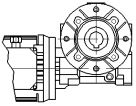
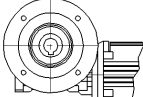
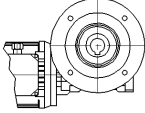
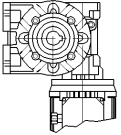
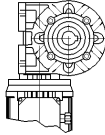
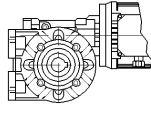
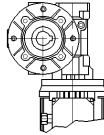
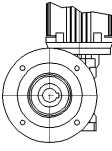
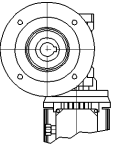
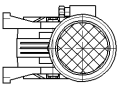
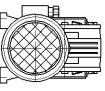
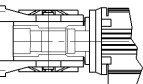
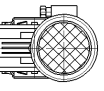
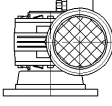
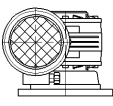
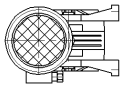
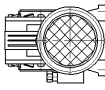
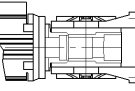
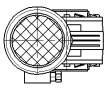
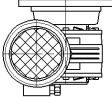
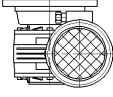
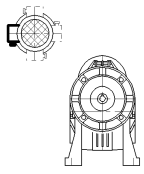
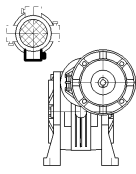
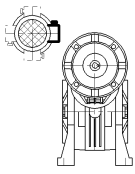
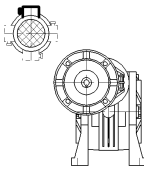
FL - Additional output flange FL

GRI - Reduced gearing backlash

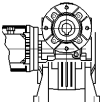
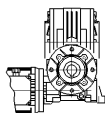
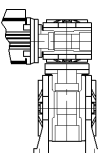
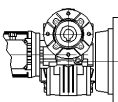
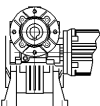
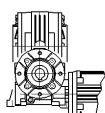
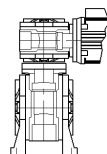
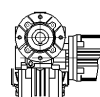
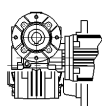
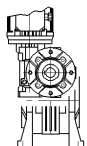
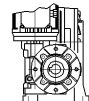
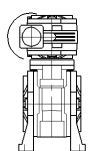
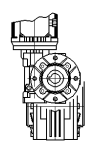
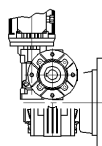
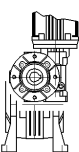
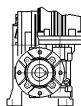
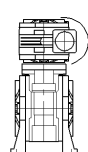
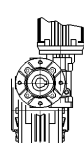
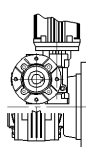
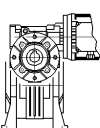
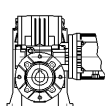
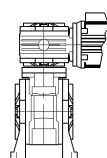
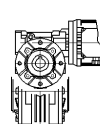
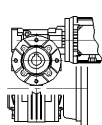
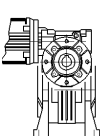
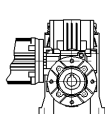
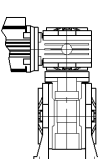
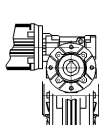
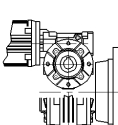
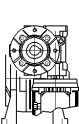
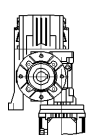
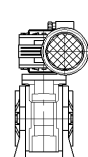
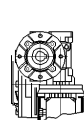
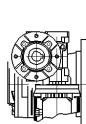
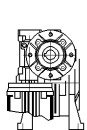
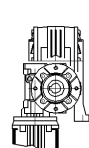
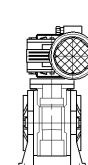
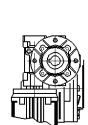
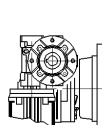
LNS - Not standard lubrication

VB - NDE worm shaft extension

STANDARD MOUNTING POSITIONS

RS , RA , RS/RS Output					
S - SA	I - IA	D - DA	PC - PC	FL - FA - FB - PA - PB	
 B3 (std)	 B3 (std)	 B3 (std)	 B5 (std)	 B5 (std)	 B5i
 V5	 V5	 V5	 B5	 B5a	 B5ai
 B8	 B8	 B8	 B5	 B5b	 B5bi
 V6	 V6	 V6	 B5	 B5c	 B5ci
 B6	 B6	 B6	 V1	 V1	 V1i
 B7	 B7	 B7	 V3	 V3	 V3i
RA Input					
 10 (std)	 11	 12	 13		

STANDARD MOUNTING POSITIONS

RS / RS Output					
	S - SA	I - IA	D - DA	PC - PA - PB	FL - FA - FB
11					
12					
13					
14					
15					
16					
17					
18					

SERVICE FACTORS - WEIGHTS & LUBRICANTS

SERVICE FACTORS

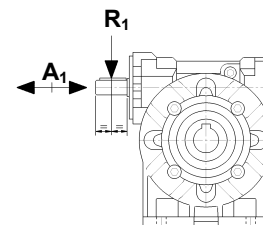
$$FS = F_1 \times F_2$$

Load F_1	uniform	variable	shock	Starts/ stops F_2	starts/ stops per hour
3 - 4 h	0.8	1.0	1.5	6	1.0
8 - 10 h	1.0	1.2	1.8	60	1.2
10 - 24 h	1.4	1.6	2.0	120	1.4

WEIGHTS AND LUBRICANTS

RS	kg	l	RA	kg	l ₁ /l ₂	RS / RS	kg	l ₁ /l ₂
28	1.1	0.03	63 / 40	4.0	0.04/0.08	28 / 28	2.5	0.03/0.03
40	2.5	0.08	63 / 50	5.3	0.04/0.13	28 / 40	3.9	0.03/0.08
50	3.8	0.13	63 / 60	8.0	0.04/0.20	28 / 50	5.2	0.03/0.13
60	6.5	0.20	71 / 50	6.6	0.06/0.13	28 / 60	7.9	0.03/0.20
70	9.0	0.35	71 / 60	9.3	0.06/0.20	40 / 70	12.0	0.08/0.35
85	13.5	0.60	71 / 70	11.8	0.06/0.35	40 / 85	16.5	0.08/0.60
110	39.0	1.50	71 / 85	16.3	0.06/0.60	50 / 110	45.0	0.13/1.50
130	50.0	2.75	80 / 60	10.5	0.10/0.20	60 / 130	57.0	0.25/2.75
150	80.0	4.40	80 / 70	13.0	0.10/0.35	70 / 150	90.0	0.35/4.40
			80 / 85	17.5	0.10/0.60			
			80 / 110	43.0	0.10/1.50			
			130	64.0	0.20/2.75			
			150	94.0	0.20/4.40			

INPUT LOADS

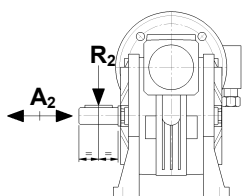


INPUT RADIAL LOADS R_1 [daN]

$$A_1 = 0,2 \times R_1$$

min^{-1}	2800	1400	900	700	500	300
RS28	5	7	8	9	10	12
RS40	11	15	16	17	18	20
RS50	15	20	22	25	28	30
RS60	23	30	33	35	37	40
RS70	26	35	40	44	47	50
RS85	34	45	52	58	62	70
RS110	57	75	80	85	92	100
RS130	70	100	105	110	115	120
RS150	90	120	125	130	140	150

OUTPUT LOADS



$$A_2 = 0.2 \times R_2$$

RADIAL LOADS R_2 [daN] WITH STANDARD BEARINGS

min ⁻¹	200	140	93	70	50	35	29	25	20	18	14	N. cusc.
RS28	45	50	55	60	62	70	75	80	90	95	100	16005
RS40	100	110	120	135	150	160	170	180	190	200	230	16006
RS50	125	145	170	190	200	230	240	260	280	290	320	16008
RS60	240	250	290	330	360	390	430	320	500	420	560	6208
RS70	270	290	360	390	420	450	520	550	590	630	670	6209
RS85	330	370	440	470	540	550	630	660	710	750	830	6210
RS110	390	415	520	540	590	570	750	780	800	880	980	6212
RS130	500	565	615	650	660	780	880	950	970	1050	1150	6015
RS150	650	770	830	880	900	1100	1200	1250	1300	1400	1500	6216

RADIAL LOADS R_2 [daN] WITH HEAVY DUTY BEARINGS

min ⁻¹	200	140	93	70	50	35	29	25	20	18	14	N. cusc.
RS28	65	75	82	90	93	105	112	120	130	130	130	6005
RS40	150	155	165	190	210	225	240	250	260	260	260	32006
RS50	175	200	240	260	300	340	360	390	420	420	420	32008
RS60	300	320	370	420	480	510	570	610	660	660	660	30208
RS70	330	370	450	516	560	610	690	730	790	790	790	30209
RS85	420	460	550	630	720	730	840	870	940	940	940	32010
RS110	500	540	670	750	800	930	1050	1110	1110	1110	1110	32012
RS130	700	790	860	970	990	1170	1290	1420	1450	1450	1450	32015
RS150	900	1080	1160	1320	1350	1650	1800	1870	1950	1950	1950	30216

MOTOR FRAMES IEC
FRS

FRS	min ⁻¹ IEC	i = 7	10	15	20	28	40	49	56	70	80	100
		200	140	93	70	50	35	29	25	20	18	14
28	56	★	★	★	★	★	★	★	★	★	★	★
	63	★	★	★	★	★	★	★	---	---	---	---
40	56	①	①	①	①	①	①	①	①	①	①	①
	63	★	★	★	★	★	★	★	★	★	★	★
	71	★	★	★	★	★	★	★	---	---	---	---
50	63	①	①	①	①	①	①	①	①	★	★	★
	71	★	★	★	★	★	★	★	★	★	★	★
	80	★	★	★	★	★	★	★	---	---	---	---
60	71	①	①	①	①	★	★	★	★	★	★	★
	80	★	★	★	★	★	★	★	★	★	★	★
	90	★	★	★	★	★	★	---	---	---	---	---
70	71	①	①	①	①	★	★	★	★	★	★	★
	80	★	★	★	★	★	★	★	★	★	★	★
	90	★	★	★	★	★	★	★	---	---	---	---
	100	★	★	★	---	---	---	---	---	---	---	---
85	80	①	①	①	①	①	★	★	★	★	★	★
	90	★	★	★	★	★	★	★	★	★	★	★
	100/112	★	★	★	★	★	★	---	---	---	---	---
110	90	②	②	②	②	②	☆	☆	☆	☆	☆	☆
	100/112	★	★	★	★	★	★	★	★	★	★	★
	132	★	★	★	★	---	---	---	---	---	---	---
130	90	---	---	---	---	---	---	☆	☆	☆	☆	☆
	100/112	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
	132	☆	☆	☆	☆	☆	☆	---	---	---	---	---
150	90	---	---	---	---	---	---	☆	☆	☆	☆	☆
	100/112	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
	132	☆	☆	☆	☆	☆	☆	☆	☆	☆	---	---
	160	☆	☆	☆	☆	☆	☆	☆	---	---	---	---

- ★ - Flange mounting B5 & B14
- ☆ - Flange mounting B5
- ① - Bore with bush (IEC B5 & B14)
- ② - Bore with bush (IEC B5 only)

FRA
MOTOR FRAMES IEC

FRA	IEC *	i = 7 **	10 **	15 **	20 **	28 **	40 **	49 **	56 **	70 **	80 **	100 **
63/40	56	①	①	①	①	①	①	①	①	①	①	①
63/50	B5&B14	①	①	①	①	①	①	①	①	①	①	①
63/60		---	---	---	---	①	①	①	①	①	①	①
63/40	63	①	①	①	①	①	①	①	①	①	①	①
63/50	B5&B14	①	①	①	①	①	①	①	①	①	①	①
63/60		---	---	---	---	①	①	①	①	①	①	①
71/50		②	②	②	②	②	②	②	---	---	---	---
71/60	71	②	②	②	②	②	②	②	②	②	②	②
71/70	B5&B14	②	②	②	②	②	②	②	②	②	②	②
71/85		---	---	---	---	---	②	②	②	②	②	②
80/60		③	③	③	③	③	---	---	---	---	---	---
80/70	80	③	③	③	③	③	③	③	---	---	---	---
80/85	B5&B14	③	③	③	③	③	③	③	③	③	③	③
80/110		④	④	④	④	③	③	③	③	③	③	③
80/60		③	③	③	③	③	---	---	---	---	---	---
80/70	90	③	③	③	③	③	③	③	---	---	---	---
80/85	B5&B14	③	③	③	③	③	③	③	③	③	③	③
80/110		④	④	④	④	③	③	③	③	③	③	③
130	80 B5	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤
	90 B5	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤
	100 B5	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤
150	80 B5	⑥	⑥	⑥	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤
	90 B5	⑥	⑥	⑥	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤
	100 B5	⑥	⑥	⑥	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤

* - Helical stage input

** - Helical stage input & FRS input

① - ø105 x 14

② - ø120 x 19

③ - ø140 x 24

④ - ø140 x 28

⑤ - ø200 x 28

⑥ - ø200 x 28 (Worm bore ø38 mm + Bush ø38/ø28)

SELECTION TABLE

FRS - RS
2800 & 1400 min⁻¹

2800	i = min ⁻¹	7 400	10 280	15 187	20 140	28 100	40 70	49 57	56 50	70 40	80 35	100 28
RS28	kW	0.63	0.49	0.35	0.25	0.23	0.16	0.13	0.12	0.09	0.08	0.04
	Nm	13	14	14	13	15	14	13	12	11	10	7
	eff.	0.86	0.83	0.79	0.77	0.69	0.64	0.61	0.54	0.49	0.49	0.46
RS40	kW	1,5	1,2	0,82	0,56	0,49	0,36	0,30	0,26	0,21	0,19	0,15
	Nm	31	34	34	30	34	32	31	30	29	28	26
	eff.	0,87	0,85	0,81	0,78	0,72	0,66	0,62	0,6	0,57	0,54	0,51
RS50	kW	3,0	2,0	1,5	0,95	0,92	0,63	0,51	0,43	0,33	0,31	0,23
	Nm	62	59	61	52	66	59	56	53	46	49	40
	eff.	0,88	0,86	0,82	0,8	0,75	0,69	0,66	0,64	0,58	0,58	0,52
RS60	kW	4,4	3,5	2,6	1,9	1,6	1,1	0,72	0,73	0,60	0,52	0,34
	Nm	93	104	110	108	116	105	85	92	92	85	68
	eff.	0,88	0,87	0,84	0,82	0,76	0,73	0,71	0,66	0,64	0,6	0,58
RS70	kW	5,7	4,3	3,2	2,4	2,2	1,5	1,2	1,0	0,80	0,69	0,54
	Nm	122	130	139	136	161	155	142	130	120	115	107
	eff.	0,89	0,88	0,85	0,83	0,78	0,74	0,7	0,68	0,63	0,61	0,58
RS85	kW	9,6	7,5	5,3	4,3	3,1	2,4	2,0	1,7	1,3	1,1	0,93
	Nm	205	225	234	237	235	250	242	229	210	200	190
	eff.	0,89	0,88	0,86	0,8	0,8	0,76	0,72	0,71	0,67	0,64	0,6
RS110	kW	17,5	14,8	10,7	8,6	7,0	5,0	4,5	3,6	3,1	3,0	2,1
	Nm	375	445	470	490	530	520	545	490	525	540	450
	eff.	0,9	0,88	0,86	0,84	0,79	0,76	0,73	0,71	0,7	0,67	0,62
RS130	kW	26,3	21,6	15,8	12,2	9,4	7,7	6,0	5,3	3,9	3,3	2,4
	Nm	565	655	705	715	715	815	740	780	670	620	560
	eff.	0,9	0,89	0,87	0,86	0,8	0,78	0,74	0,77	0,72	0,68	0,68
RS150	kW	37,0	29,6	22,8	17,1	13,6	10,7	8,5	6,6	5,5	4,9	3,6
	Nm	795	900	1015	1005	1065	1170	1090	970	950	9155	845
	eff.	0,9	0,89	0,87	0,86	0,82	0,8	0,77	0,77	0,72	0,68	0,68
1400 min ⁻¹	i = min ⁻¹	7 200	10 140	15 93	20 70	28 50	40 35	49 29	56 25	70 20	80 18	100 14
RS28	kW	0,45	0,33	0,23	0,16	0,16	0,10	0,09	0,08	0,06	0,05	0,03
	Nm	18	18	18	16	20	17	17	15	12	12	8
	eff.	0,84	0,81	0,77	0,74	0,66	0,62	0,57	0,51	0,45	0,45	0,43
RS40	kW	1,1	0,81	0,55	0,38	0,37	0,25	0,21	0,18	0,14	0,12	0,09
	Nm	45	46	44	39	48	42	41	38	36	32	29
	eff.	0,85	0,83	0,78	0,75	0,68	0,61	0,58	0,56	0,52	0,50	0,46
RS50	kW	1,8	1,3	0,93	0,63	0,63	0,41	0,37	0,31	0,25	0,20	0,13
	Nm	75	75	74	65	85	72	76	71	63	58	43
	eff.	0,86	0,84	0,78	0,76	0,71	0,64	0,62	0,60	0,53	0,52	0,47
RS60	kW	2,8	2,3	1,6	1,2	1,0	0,75	0,62	0,54	0,46	0,37	0,25
	Nm	113	133	130	122	139	135	128	123	122	106	83
	eff.	0,86	0,84	0,81	0,77	0,71	0,66	0,62	0,60	0,55	0,53	0,49
RS70	kW	4,0	3,1	2,2	1,8	1,5	1,2	0,84	0,74	0,58	0,50	0,37
	Nm	166	180	188	194	216	238	189	180	163	154	130
	eff.	0,88	0,86	0,83	0,81	0,75	0,71	0,67	0,64	0,59	0,56	0,52
RS85	kW	6,2	4,6	3,4	2,9	2,2	2,0	1,4	1,2	0,96	0,86	0,55
	Nm	259	268	289	322	319	401	316	305	290	280	210
	eff.	0,88	0,86	0,83	0,82	0,76	0,72	0,67	0,68	0,63	0,60	0,56
RS110	kW	12,5	9,0	6,5	5,7	4,4	3,5	2,7	2,2	2,0	1,5	1,1
	Nm	525	532	560	647	642	691	631	595	635	525	469
	eff.	0,88	0,87	0,84	0,83	0,76	0,73	0,71	0,70	0,67	0,66	0,61
RS130	kW	19,0	15,0	11,0	8,5	7,5	5,5	3,9	3,7	2,7	2,4	1,8
	Nm	807	890	960	975	1100	1140	950	1005	865	810	750
	eff.	0,89	0,87	0,85	0,84	0,77	0,76	0,72	0,71	0,67	0,63	0,61
RS150	kW	24,9	21,0	16,0	12,5	9,5	8,0	5,9	5,1	3,8	3,3	2,6
	Nm	1060	1260	1410	1430	1435	1680	1440	1420	1230	1170	1120
	eff.	0,89	0,88	0,86	0,84	0,79	0,77	0,73	0,73	0,68	0,65	0,63

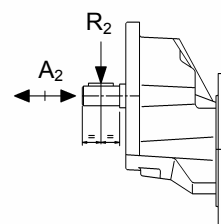
FRS - RS
 900 & 700 min⁻¹
SELECTION TABLE

900 min⁻¹	i = min⁻¹	7	10	15	20	28	40	49	56	70	80	100
		128	90	60	45	32	23	19	16	13	11	9
RS28	kW	0,36	0,24	0,18	0,13	0,12	0,08	0,07	0,06	0,04	0,03	0,02
	Nm	22	20	21	19	22	20	19	16	13	11	8
	eff.	0.82	0.78	0.72	0.70	0.61	0.56	0.52	0.45	0.43	0.40	0.37
RS40	kW	0,84	0,64	0,44	0,30	0,28	0,19	0,16	0,14	0,12	0,10	0,08
	Nm	52	54	52	45	52	46	43	41	40	39	36
	eff.	0.83	0.80	0.74	0.70	0.63	0.56	0.52	0.49	0.46	0.44	0.42
RS50	kW	1,5	1,1	0,75	0,52	0,51	0,35	0,28	0,25	0,19	0,17	0,12
	Nm	95	95	91	79	99	85	81	80	67	67	55
	eff.	0.85	0.81	0.76	0.72	0.65	0.58	0.56	0.54	0.47	0.46	0.42
RS60	kW	2,4	1,9	1,4	1,0	0,87	0,56	0,43	0,40	0,32	0,28	0,19
	Nm	150	163	166	161	175	152	135	130	125	115	94
	eff.	0.85	0.83	0.75	0.76	0.68	0.64	0.61	0.55	0.53	0.48	0.47
RS70	kW	3,2	2,4	1,7	1,3	1,2	0,87	0,64	0,53	0,42	0,38	0,30
	Nm	202	211	218	207	242	240	205	187	170	160	147
	eff.	0.86	0.83	0.79	0.77	0.70	0.65	0.62	0.59	0.54	0.50	0.46
RS85	kW	5,0	3,9	3,0	2,1	1,8	1,5	1,0	0,83	0,73	0,64	0,51
	Nm	320	350	378	355	373	410	350	332	300	290	260
	eff.	0.86	0.84	0.80	0.78	0.71	0.66	0.67	0.67	0.55	0.53	0.48
RS110	kW	9,8	8,0	5,7	4,4	3,7	2,7	2,3	1,9	1,7	1,5	0,94
	Nm	635	720	745	745	795	780	780	690	765	715	500
	eff.	0.87	0.85	0.82	0.79	0.73	0.68	0.64	0.62	0.59	0.57	0.50
RS130	kW	14,9	11,7	8,4	6,5	5,1	4,1	3,1	2,8	2,1	1,8	1,3
	Nm	975	1070	1115	1115	1145	1215	1095	1145	960	890	805
	eff.	0.88	0.86	0.83	0.81	0.75	0.70	0.67	0.68	0.63	0.58	0.57
RS150	kW	20,8	15,9	12,2	9,3	7,3	5,6	4,5	3,3	2,9	2,5	2,0
	Nm	1360	1470	1635	1625	1660	1740	1600	1370	1390	1290	1230
	eff.	0.88	0.87	0.84	0.82	0.77	0.73	0.69	0.69	0.64	0.61	0.58
700 min⁻¹	i = min⁻¹	7	10	15	20	28	40	49	56	70	80	100
		100	70	47	35	25	18	15	13	10	8.7	7
RS28	kW	0,29	0,21	0,14	0,10	0,10	0,06	0,05	0,04	0,03	0,02	0,01
	Nm	23	23	22	21	24	21	20	17	13	11	8
	eff.	0.81	0.77	0.71	0.69	0.60	0.55	0.51	0.44	0.40	0.39	0.36
RS40	kW	0,74	0,54	0,39	0,26	0,24	0,17	0,14	0,12	0,10	0,09	0,07
	Nm	58	58	58	49	55	49	46	45	43	41	38
	eff.	0.82	0.79	0.73	0.68	0.59	0.53	0.50	0.48	0.44	0.42	0.39
RS50	kW	1,4	0,92	0,65	0,44	0,43	0,29	0,24	0,21	0,16	0,15	0,12
	Nm	110	100	99	86	106	91	87	83	70	72	62
	eff.	0.83	0.80	0.75	0.71	0.64	0.57	0.54	0.52	0.45	0.44	0.39
RS60	kW	2,0	1,6	1,1	0,87	0,73	0,49	0,35	0,34	0,26	0,24	0,17
	Nm	164	177	178	175	187	165	140	139	128	120	100
	eff.	0.84	0.81	0.77	0.74	0.67	0.62	0.59	0.54	0.51	0.46	0.44
RS70	kW	2,7	2,1	1,4	1,1	1,0	0,71	0,55	0,46	0,36	0,32	0,24
	Nm	216	233	231	225	256	245	220	197	176	167	150
	eff.	0.85	0.82	0.78	0.75	0.68	0.63	0.60	0.56	0.51	0.48	0.45
RS85	kW	4,6	3,5	2,5	1,9	1,5	1,2	0,93	0,78	0,59	0,56	0,44
	Nm	370	400	408	388	400	420	379	353	310	305	275
	eff.	0.85	0.83	0.79	0.76	0.69	0.65	0.61	0.59	0.55	0.50	0.46
RS110	kW	8,5	6,8	4,9	3,9	3,3	2,3	2,0	1,7	1,5	1,2	0,79
	Nm	700	780	795	815	890	820	840	770	815	720	515
	eff.	0.86	0.84	0.80	0.77	0.71	0.66	0.62	0.60	0.57	0.55	0.48
RS130	kW	12,8	10,3	7,4	5,6	4,4	3,6	2,7	2,4	1,8	1,6	1,1
	Nm	1060	1200	1230	1215	1200	1320	1185	1215	1030	955	855
	eff.	0.87	0.85	0.81	0.80	0.72	0.68	0.65	0.66	0.61	0.56	0.55
RS150	kW	18,0	13,7	10,6	8,1	6,2	4,9	3,8	3,0	2,6	2,3	1,7
	Nm	1475	1610	1805	1780	1790	1890	1710	1535	1500	1425	1275
	eff.	0.87	0.86	0.83	0.81	0.75	0.71	0.68	0.67	0.61	0.58	0.56

SELECTION TABLE

FRA - RA
1400 min⁻¹

1400 min⁻¹	i₁ = min⁻¹	3.5 400	6.3 225	8 175
XA63	kW	0.50	0.23	0.18
	Nm	12	10	9
	R ₂ [N]	390	450	450
XA71	kW	1.1	0.52	0.37
	Nm	26	22	20
	R ₂ [N]	490	560	560
XA80	kW	3.1	1.5	1.1
	Nm	68	65	60
	R ₂ [N]	610	700	700



$$A_2 = 0.2 \times R_2$$

i₁ = 3.5	i = i₁ × i₂	25	35	53	70	98	140	172	196	245	280	350
	min ⁻¹	57	40	27	20	14	10	8	7	6	5	4
	i₂	7	10	15	20	28	40	49	56	70	80	100
RA63/40	kW	0.55	0.40	0.28	0.20	0.19	0.13	0.11	0.10	0.06	0.05	0.03
	Nm	72	72	70	60	70	64	58	56	42	35	25
	eff.	0.78	0.75	0.70	0.63	0.56	0.50	0.46	0.44	0.41	0.40	0.35
RA63/50 RA71/50	kW	1.02	0.70	0.50	0.33	0.32	0.21	0.20	0.16	0.11	0.09	0.06
	Nm	135	127	125	105	125	105	115	100	80	70	50
	eff.	0.79	0.76	0.70	0.66	0.59	0.52	0.50	0.46	0.42	0.40	0.35
RA63/60 RA71/60 RA80/60	kW	1.53	1.18	0.83	0.57	0.53	0.33	0.27	0.23	0.19	0.15	0.10
	Nm	205	217	215	192	217	177	170	152	145	110	85
	eff.	0.80	0.77	0.72	0.70	0.61	0.57	0.54	0.49	0.45	0.38	0.36
RA71/70 RA80/70	kW	1.96	1.48	1.08	0.77	0.72	0.50	0.43	0.36	0.30	0.26	0.19
	Nm	265	275	285	260	310	270	270	235	225	200	180
	eff.	0.81	0.78	0.74	0.71	0.64	0.57	0.54	0.49	0.45	0.41	0.39
RA71/85 RA80/85	kW	3.14	2.39	1.77	1.37	1.11	0.80	0.65	0.58	0.49	0.40	0.26
	Nm	430	450	475	470	475	445	420	410	390	340	250
	eff.	0.82	0.79	0.75	0.72	0.64	0.58	0.55	0.53	0.48	0.44	0.40
RA80/110	kW	6.02	4.63	3.58	2.61	2.18	1.60	1.27	1.12	0.86	0.86	0.54
	Nm	835	895	950	910	960	950	850	820	750	740	540
	eff.	0.83	0.81	0.74	0.73	0.66	0.62	0.57	0.55	0.52	0.45	0.42
RA130	kW	7.0	6.8	5.5	3.8	3.1	2.3	1.7	1.5	1.3	1.1	0.8
	Nm	975	1320	1495	1350	1430	1380	1300	1250	1200	1080	880
	eff.	0.83	0.81	0.77	0.75	0.67	0.63	0.64	0.62	0.60	0.50	0.48
RA150	kW	7.9	7.8	7.5	5.7	4.5	3.3	2.7	2.4	1.8	1.6	1.0
	Nm	1115	1535	2090	2060	2130	2050	2040	2025	1700	1459	1200
	eff.	0.84	0.82	0.79	0.76	0.69	0.66	0.64	0.62	0.60	0.52	0.50
i₁ = 6.3	i = i₁ × i₂	44	63	95	126	176	252	309	353	441	504	630
	min ⁻¹	32	22	15	11	8	5.5	4.6	4	3.2	2.8	2.2
	i₂	7	10	15	20	28	40	49	56	70	80	100
RA63/40	kW	0.35	0.25	0.17	0.12	0.11	0.08	0.06	0.06	0.05	0.04	0.03
	Nm	79	78	74	63	69	63	57	55	53	51	46
	eff.	0.76	0.72	0.67	0.60	0.52	0.45	0.43	0.39	0.35	0.34	0.31
RA63/50 RA71/50	kW	0.62	0.42	0.30	0.20	0.20	0.14	0.11	0.10	0.09	0.07	0.05
	Nm	145	133	130	113	138	115	108	100	92	89	72
	eff.	0.78	0.74	0.67	0.63	0.55	0.48	0.45	0.42	0.36	0.36	0.31
RA63/60 RA71/60 RA80/60	kW	0.92	0.74	0.52	0.40	0.35	0.23	0.16	0.16	0.11	0.10	0.08
	Nm	218	237	235	230	238	210	160	175	141	130	122
	eff.	0.79	0.75	0.70	0.67	0.57	0.53	0.49	0.45	0.42	0.37	0.35
RA71/70 RA80/70	kW	1.2	0.95	0.68	0.50	0.44	0.32	0.26	0.23	0.18	0.17	0.12
	Nm	289	310	310	292	320	295	272	254	221	210	190
	eff.	0.80	0.76	0.71	0.68	0.60	0.54	0.50	0.46	0.42	0.37	0.36
RA71/85 RA80/85	kW	2.0	1.6	1.1	0.84	0.69	0.53	0.43	0.37	0.28	0.26	0.22
	Nm	490	526	516	495	501	500	466	449	391	380	345
	eff.	0.80	0.77	0.72	0.69	0.60	0.55	0.51	0.50	0.46	0.42	0.36
RA80/110	kW	4.3	3.2	2.4	1.8	1.6	1.1	1.0	0.80	0.66	0.51	0.32
	Nm	1030	1100	1150	1100	1170	1110	1100	995	950	780	550
	eff.	0.81	0.79	0.74	0.71	0.63	0.57	0.53	0.52	0.48	0.45	0.39

FRA - RA
 1400 min⁻¹
SELECTION TABLE

i₁ = 8	i = i₁ x i₂	56	80	120	160	224	320	392	448	560	640	800
	min⁻¹	25	18	12	9	6	4	3.5	3	2.5	2.2	1.75
	i₂	7	10	15	20	28	40	49	56	70	80	100
RA63/40	kW	0.32	0.23	0.16	0.11	0.11	0.08	0.06	0.05	0.03	0.03	0.02
	Nm	93	89	84	72	85	75	69	59	45	38	27
	eff.	0.75	0.72	0.65	0.59	0.50	0.44	0.41	0.38	0.36	0.34	0.31
RA63/50 RA71/50	kW	0.58	0.41	0.28	0.20	0.18	0.13	0.10	0.09	0.06	0.05	0.03
	Nm	170	165	154	130	150	130	120	115	86	73	53
	eff.	0.77	0.73	0.67	0.61	0.55	0.47	0.45	0.41	0.36	0.37	0.31
RA63/60 RA71/60 RA80/60	kW	0.87	0.68	0.49	0.34	0.31	0.21	0.16	0.15	0.10	0.08	0.05
	Nm	260	280	275	240	270	235	220	200	155	125	92
	eff.	0.78	0.75	0.69	0.65	0.57	0.51	0.50	0.43	0.41	0.37	0.35
RA71/70 RA80/70	kW	1.26	0.88	0.63	0.44	0.48	0.28	0.24	0.20	0.16	0.12	0.05
	Nm	380	365	360	325	440	320	320	275	245	200	145
	eff.	0.79	0.76	0.70	0.67	0.60	0.53	0.50	0.45	0.41	0.38	0.35
RA71/85 RA80/85	kW	1.76	1.42	1.07	0.85	0.65	0.48	0.40	0.33	0.26	0.20	0.13
	Nm	530	595	620	620	600	560	550	510	450	360	260
	eff.	0.79	0.77	0.71	0.67	0.60	0.54	0.52	0.50	0.45	0.41	0.37
RA80/11	kW	3.42	2.75	1.97	1.52	1.29	0.97	0.73	0.64	0.52	0.43	0.27
	Nm	1045	1170	1180	1160	1200	1180	1020	980	920	850	550
	eff.	0.80	0.78	0.73	0.70	0.61	0.56	0.52	0.50	0.46	0.45	0.38
RA130	kW	3.3	3.0	3.2	2.3	1.8	1.2	1.1	0.9	0.7	0.7	0.5
	Nm	1000	1240	1840	1765	1760	1700	1660	1600	1435	1330	1160
	eff.	0.80	0.78	0.73	0.72	0.62	0.58	0.56	0.54	0.51	0.45	0.43
RA150	kW	3.7	3.4	3.6	3.4	2.7	2.0	1.7	1.4	1.1	1.0	0.8
	Nm	1130	1425	2150	2580	2675	2860	2550	2490	2110	1970	1855
	eff.	0.81	0.79	0.75	0.72	0.63	0.61	0.56	0.57	0.49	0.46	0.45

RS / RS
 1400 min⁻¹

	i = i₁ x i₂	420	560	784	1120	1568	2240	2800	4000	5600	8000	10000
	min⁻¹	3.3	2.5	1.8	1.25	0.9	0.6	0.5	0.35	0.25	0.17	0.14
	i₁ = i₂ =	15 28	20 28	28 28	40 28	56 28	56 40	70 40	100 40	100 56	100 80	100 100
RS28/28	W	32	25	21	16	13	9	8	6	3	1.8	1.3
	Nm	35	36	36	36	35	30	30	30	16	12	11
	eff.	0.38	0.37	0.32	0.30	0.25	0.21	0.20	0.18	0.14	0.12	0.13
RS28/40	W	75	60	46	34	30	22	22	14	11	5	3
	Nm	85	85	80	80	80	73	76	70	62	41	25
	eff.	0.39	0.37	0.33	0.31	0.25	0.21	0.18	0.18	0.15	0.14	0.12
RS28/50	W	133	106	91	74	60	36	36	28	20	10	6
	Nm	150	150	160	175	160	125	131	147	125	78	49
	eff.	0.39	0.37	0.33	0.31	0.25	0.22	0.19	0.19	0.16	0.14	0.12
RS28/60	W	197	157	132	91	91	67	54	30	32	16	10
	Nm	240	240	245	230	260	245	217	164	195	128	91
	eff.	0.42	0.40	0.35	0.33	0.27	0.23	0.21	0.20	0.16	0.14	0.13
RS40/70	W	298	249	198	157	119	86	72	60	42	24	16
	Nm	380	400	400	395	380	370	345	360	321	201	154
	eff.	0.44	0.42	0.38	0.33	0.30	0.27	0.25	0.22	0.20	0.15	0.14
RS40/85	W	447	372	276	224	180	138	120	90	72	39	26
	Nm	595	625	585	625	610	615	595	565	550	373	264
	eff.	0.46	0.44	0.40	0.35	0.32	0.28	0.26	0.23	0.20	0.17	0.15
RS50/110	W	865	756	579	453	382	292	235	163	128	82	51
	Nm	1190	1300	1300	1280	1350	1340	1210	1070	980	810	560
	eff.	0.48	0.45	0.42	0.37	0.33	0.30	0.27	0.24	0.20	0.18	0.16
RS60/130	kW	1.5	1.1	0.75	0.55	0.55	0.37	0.25	0.25	0.25	0.25	0.25
	Nm	2015	1930	1670	1530	2015	1830	1410	1770	1850	1420	1225
	eff.	0.50	0.46	0.43	0.40	0.35	0.33	0.30	0.27	0.25	0.21	0.20
RS70/150	kW	1.8	1.5	1.1	0.75	0.75	0.55	0.37	0.37	0.25	0.25	0.25
	Nm	2570	2830	2570	2460	2850	3020	2325	2875	2670	2135	1995
	eff.	0.52	0.50	0.46	0.43	0.39	0.36	0.33	0.31	0.27	0.23	0.22

SELECTION TABLE

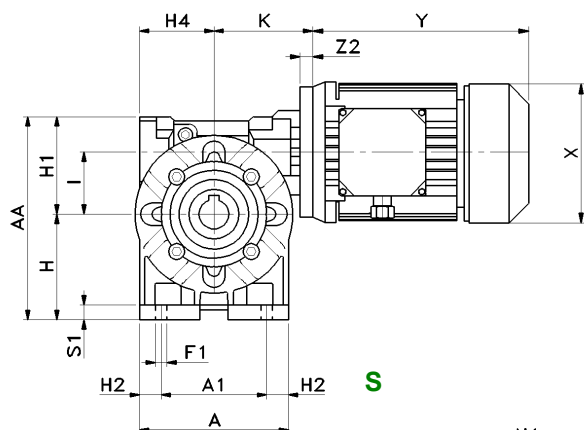
MRT, MTA
0,06 - 0,55 kW

0.06 kW (0.08 HP)						0.09 kW (0.12 HP)						0.25 kW (0.33 HP)					
	min ⁻¹	i =	Nm	SF	kg		min ⁻¹	i =	Nm	SF	kg		min ⁻¹	i =	Nm	SF	kg
MRS28	200	7	2.4	>3	3.6	MRS40/85	0.5	280	447	1.3	19	MRS40	35	40	42	1.0	8.3
MRS28	140	10	3.3	>3	3.6	MRS40/85	0.4	400	565	1.0	19	MRA71/50	32	44	59	2.5	12
MRS28	93	15	4.7	>3	3.6	MRS40/85	0.3	560	688	0.8	19	MRS50	29	49	52	1.5	9.6
MRS28	70	20	6.1	2.6	3.6							MRS50	25	56	57	1.3	9.6
MRS28	50	28	7.6	2.6	3.6							MRA71/50	22	63	80	1.7	12
MRS28	35	40	10	1.7	3.6	MRS28	200	7	4.8	>3	4.8	MRS50	20	70	63	1.0	9.6
MRA63/40	32	44	14	>3	6.5	MRS28	140	10	6.6	2.7	4.8	MRS60	18	80	72	1.5	12
MRS28	29	49	11	1.5	3.6	MRS28	93	15	9.5	1.9	4.8	MRA71/50	95	95	109	1.2	12
MRS28	25	56	12	1.3	3.6	MRS28	70	20	12	1.3	4.8	MRS60	14	100	88	1.0	12
MRA63/40	22	63	19	>3	6.5	MRS28	50	28	15	1.3	4.8	MRA71/60	11	126	144	1.6	15
MRS28	20	70	13	0.9	3.6	MRS40	35	40	20	2.1	6.2	MRS40/70	9.3	150	146	1.5	18
MRS40	18	80	16	2.0	5.0	MRA63/40	32	44	27	2.9	7.7	MRA71/60	8.0	176	171	1.4	15
MRA63/40	15	95	26	2.8	6.5	MRS40	29	49	23	1.8	6.2	MRS40/70	7.0	200	188	1.5	18
MRS40	14	100	19	1.5	5.0	MRS40	25	56	26	1.5	6.2	MRA71/70	5.5	252	232	1.3	18
MRA63/40	11	126	31	2.0	6.5	MRA63/40	22	63	37	2.1	7.7	MRS40/70	5.0	280	224	1.5	18
MRS28/28	9.3	150	31	1.1	5.0	MRS40	20	70	30	1.2	6.2	MRA71/70	4.6	309	263	1.0	18
MRA63/40	8.0	176	37	1.8	6.5	MRS40	18	80	33	1.0	6.2	MRA71/70	4.0	353	277	0.9	18
MRS28/28	7.0	200	30	0.8	5.0	MRA63/40	15	95	52	1.4	7.7	MRS40/70	3.3	420	315	1.2	18
MRA63/40	5.5	252	46	1.4	6.5	MRS50	14	100	38	1.1	7.5	MRS40/70	2.5	560	401	1.0	18
MRS28/28	5.0	280	35	0.8	5.0	MRA63/40	11	126	62	1.0	7.7	MRS40/85	1.8	784	535	1.1	22
MRA63/40	4.6	309	54	1.0	6.5	MRS28/40	9.3	150	64	1.4	7.6	MRS50/110	1.3	112	707	1.8	46
MRA63/40	4.0	353	56	1.0	6.5	MRA63/40	8.0	176	75	0.9	7.7	MRS50/110	0.9	156	882	1.5	46
MRS28/40	3.3	420	67	1.3	6.4	MRS28/40	7.0	200	77	1.0	7.6	MRS50/110	0.6	224	114	1.2	46
MRA63/50	3.2	441	65	1.4	7.8	MRA63/50	5.5	252	99	1.2	9.0	MRS50/110	0.5	280	128	0.9	46
MRA63/50	2.8	504	74	1.2	7.8	MRS28/40	5.0	280	94	0.8	7.6						
MRS28/40	2.5	560	85	1.0	6.4	MRA63/50	4.6	309	114	0.9	9.0						
MRA63/50	2.2	630	80	0.9	7.8	MRS28/50	3.3	420	134	1.2	8.9	MRS40	200	7	15	3.0	8.7
MRS28/50	1.8	784	106	1.5	7.7	MRS28/50	2.5	560	170	0.9	8.9	MRS40	140	10	21	2.2	8.7
MRS28/50	1.3	1120	142	1.2	7.7	MRS28/60	1.8	784	225	1.1	12	MRS40	93	15	30	1.5	8.7
MRS28/50	0.9	1568	160	1.0	7.7	MRS28/60	1.3	112	303	0.8	12	MRS40	70	20	38	1.0	8.7
MRS28/60	0.6	2240	211	1.2	10	MRS40/70	0.9	156	385	1.0	16	MRS40	50	28	48	1.0	8.7
MRS28/60	0.5	2800	241	0.9	10	MRS40/85	0.6	224	513	1.2	20	MRS50	35	40	65	1.1	10
MRS40/70	0.4	4000	360	1.0	15	MRS40/85	0.5	280	596	1.0	20	MRA71/50	32	44	87	1.7	13
MRS40/70	0.3	5600	458	0.7	15	MRS40/85	0.4	400	753	0.8	20	MRS50	29	49	77	1.0	10
MRS40/85	0.2	8000	557	0.7	19							MRS60	25	56	85	1.5	13
MRS40/110	0.1	10000	614	0.4	19							MRA71/50	22	63	118	1.1	13
						MRS28	200	7	7.2	2.5	5.4	MRS60	20	70	97	1.3	13
						MRS28	140	10	9.9	1.8	5.4	MRS60	18	80	107	1.0	13
						MRS28	93	15	14	1.3	5.4	MRA71/60	15	95	168	1.4	16
						MRS40	70	20	18	2.1	6.8	MRS70	14	100	130	1.0	15
						MRS40	50	28	23	2.1	6.8	MRA71/60	11	126	213	1.1	15
						MRS40	35	40	30	1.4	6.8	MRS40/70	9.3	150	217	2.1	18
						MRA63/40	32	44	41	1.9	8.3	MRA71/60	8.0	176	253	0.9	15
						MRS40	29	49	35	1.2	6.8	MRS40/70	7.0	200	278	1.3	18
						MRS40	25	56	39	1.0	6.8	MRA71/70	5.5	252	343	0.9	18
						MRA63/40	22	63	56	1.4	8.3	MRS40/70	5.0	280	332	1.1	18
						MRS50	20	70	46	1.4	8.1	MRS40/85	3.3	420	488	1.2	23
						MRS50	18	80	51	1.1	8.1	MRS40/85	2.5	560	622	1.0	23
						MRA63/40	15	95	78	0.9	8.3	MRS50/110	1.3	112	104	1.2	47
						MRA63/50	11	126	97	1.2	9.6	MRS50/110	0.9	156	130	1.1	47
						MRS28/50	9.3	150	93	1.6	9.5						
						MRA63/50	8.0	176	119	1.2	9.6						
						MRS28/50	7.0	200	120	1.1	9.5	MRS50	200	7	23	>3	12
						MRS28/50	5.0	280	141	1.1	9.5	MRS50	140	10	32	2.4	12
						MRS28/60	3.3	420	217	1.1	12	MRS50	93	15	44	1.7	12
						MRS40/70	2.5	560	289	1.4	16	MRS50	70	20	57	1.1	12
						MRS40/70	1.8	784	366	1.1	16	MRS50	50	28	75	1.1	12
						MRS40/85	1.3	112	481	1.3	21	MRS60	35	40	99	1.4	15
						MRS40/85	0.9	156	616	1.0	21	MRA80/60	32	44	130	1.7	19
						MRS40/85	0.6	224	770	0.8	21	MRS60	29	49	114	1.1	15
												MRS60	25	56	126	1.0	15
												MRA80/60	22	63	177	1.2	19
												MRS70	20	70	155	1.1	18
												MRS70	18	80	168	1.0	18
												MRA80/60	15	95	249	1.0	19
												MRS85	14	100	210	1.0	22
												MRA80/70	11	126	321	1.1	22

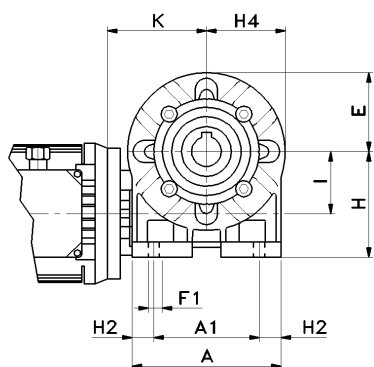
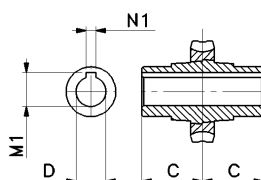
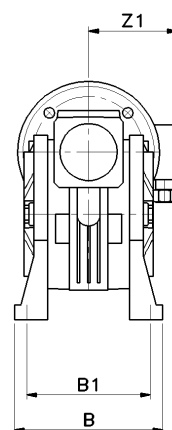
MRT, MTA
 0,55 - 15 kW

SELECTION TABLE

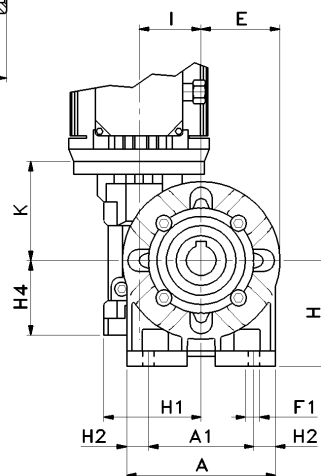
0.55 kW (0. 75 HP)						1.5 kW (2 HP)						4 kW (5.5 HP)					
	min ⁻¹	i =	Nm	SF	kg		min ⁻¹	i =	Nm	SF	kg		min ⁻¹	i =	Nm	SF	kg
MRA80/85	8.0	176	396	1.3	26	MRS110	29	49	356	1.8	50	MRA150	14	98	1845	1.2	123
MRA80/85	5.5	252	520	1.0	26	MRS110	25	56	401	1.5	50	MRA150	12	120	2456	0.9	123
MRA80/110	4.6	309	614	1.8	49	MRA80/85	22	63	496	1.1	31						
MRA80/110	4.0	353	689	1.4	49	MRS110	20	70	480	1.3	50						
MRS50/110	3.3	420	756	1.1	49	MRS110	18	80	540	1.0	50						
MRA80/110	3.2	441	794	1.2	49	MRA80/110	15	95	719	1.6	54	MRS110	200	7	231	2.3	79
MRA80/110	2.8	504	851	0.9	49	MRS130	14	100	624	1.2	64	MRS110	140	10	326	1.6	79
MRS50/110	2.5	570	962	1.3	49	MRA80/110	11	126	915	1.2	54	MRS110	93	15	473	1.2	79
MRS50/110	1.8	784	1235	1.5	49	MRA80/110	8.0	176	1135	1.0	54	MRS110	70	20	623	1.0	79
						MRA130	7.0	200	1269	1.0	78	MRS130	50	28	809	1.4	93
						MRA130	6.3	224	1421	1.2	78	MRS130	35	40	1141	1.0	93
						MRA150	5.0	280	1490	1.1	108	MRS130	29	49	1342	1.1	123
						MRA150	3.5	400	2292	1.1	108	MRS150	27	53	1531	1.0	107
						MRA150	3.0	448	2613	1.0	108	MRA130	25	56	1534	0.9	123



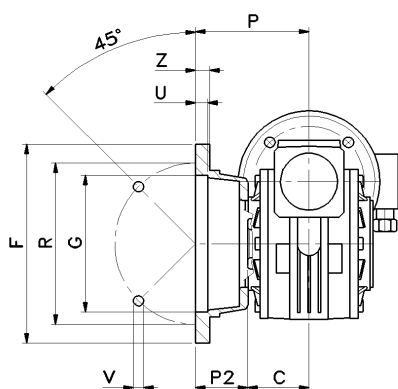
S



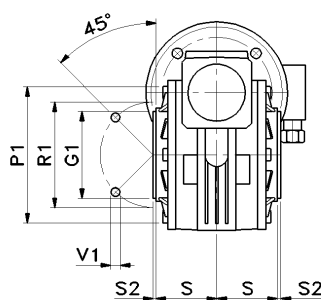
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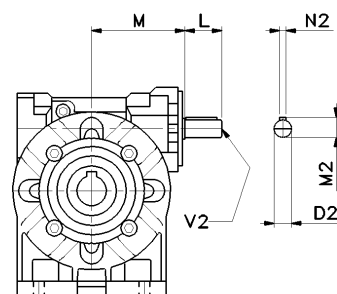
D



FL



PC



RS

OVERALL DIMENSIONS

RS	28	40	50	60	70	85	110	130	150
A ₁	52	70	85	95	120	140	200	235	260
AA	99	138	163	192	221	252	342	400	454
B	78	102	119	136	140	168	200	230	250
B ₁	66	84	99	111	116	140	162	190	210
C	30	41	49	60	60	61	77,5	90	105
D _(H7)	14	19	24	25	28	32	42	48	55
D* _(H7)	- - -	18	25	- - -	30	35	- - -	- - -	- - -
D ₂ _(h6)	9	11	14	19	19	24	28	38	42
E	34	50	61	70	80	98	125	143	168
F	70	140	160	180	200	200	250	300	350
F ₁	5,5	7	9	11	11	13	14	15	19
G _(H8)	40	95	110	115	130	130	180	230	250
G ₁ _(f8)	42	60	70	70	80	110	130	180	180
H	52	71	85	100	115	135	172	200	230
H ₁	47	67	78	92	106	117	170	200	224
H ₂	9	15	17,5	21,5	19	26,5	25	25,5	38
H ₄	40	50	60	72	86	103	142	159	183
I	28	40	50	60	70	85	110	130	150
K	57,5	70,5	83-88*	93-94*	117-118*	134-137*	151-153*	165-166*	191-211*
L	20	23	30	40	40	40	60	80	100
M	50	65	75	87	110	123,5	146	166	195
M ₁	16,3	21,8	27,3	28,3	31,3	35,3	45,3	51,8	59,3
M ₂	10,2	12,5	16	22,5	22,5	27	31	41	45
N ₁	5	6	8	8	8	10	12	14	16
N ₂	3	4	5	6	6	8	8	10	12
P	49	82	91,5	116	111	100	150	150	160
P ₁	67	94	100	102	118	150	200	234	250
P ₂	19	41	42,5	56	51	39	72,5	60	55
R	56	115	130	150	165	165	215	265	300
R ₁	56	83	85	85	100	130	165	215	215
S	32	38	49	57,5	57	56,5	74,5	87	102
S ₁	6	9	12	12	14	15	17	19	20
S ₂	-3	2	2,5	2,5	3	3	2,5	5	5
U	4	6	10	10	12	6	5	5	6
V	6,5 (4)	9 (4)	9 (4)	11 (4)	13 (4)	13 (4)	15 (8)	15 (8)	19 (8)
V ₁	M6x6 (4)	M6x9 (4)	M8x12 (4)	M8x15 (8)	M8x18 (8)	M10x20 (8)	M12x21 (4)	M12x24 (4)	M14x30 (8)
V ₂	M4x10	M4x10	M6x15	M8x20	M8x20	M8x20	M8x20	M10x22	M12x25
Z	6	10	10	11	14	14	16	18	20

D* - Bore on demand

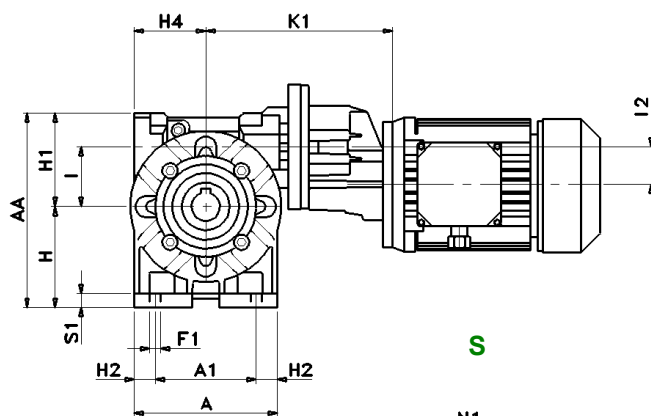
V₁ - 90° for RS28

(*) - IEC71-B14 (**FRS50**) – IEC71-B14 (**FRS60**) – IEC 80-B14 (**FRS70**) – IEC 90-B14 (**FRS85**)

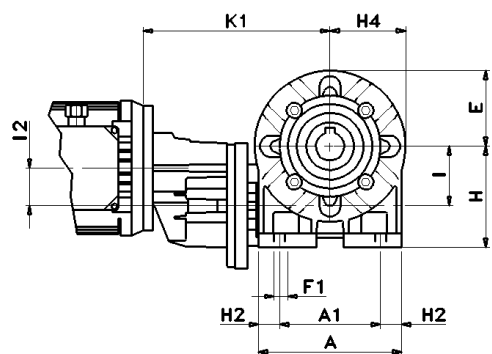
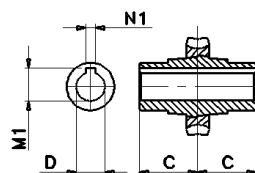
(*) - IEC100/112-B14 (**FRS110**) – IEC 100/112-B5 (**FRS130**) – IEC 160-B5 (**FRS150**)

Motor dimensions: see page 28

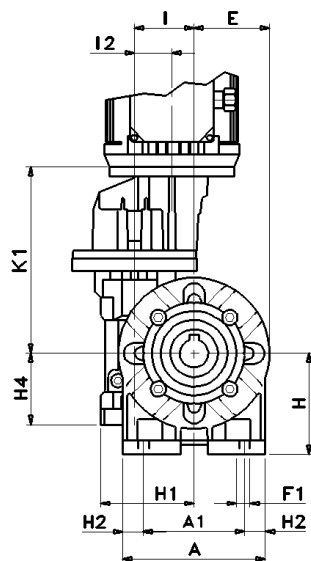
Not binding dimensions



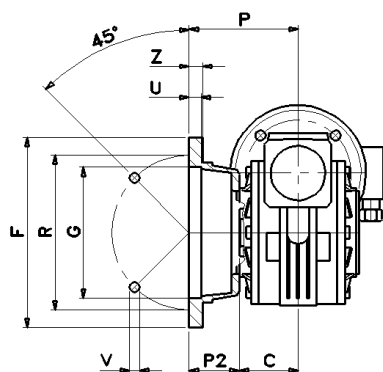
S



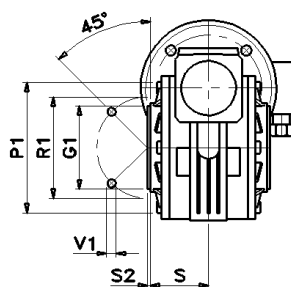
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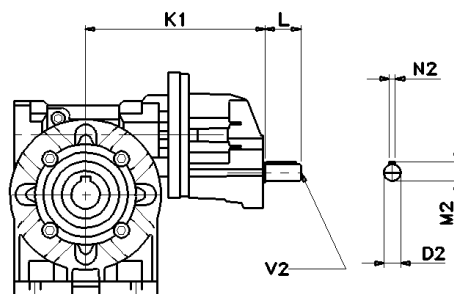
D



FL



PC



RA

OVERALL DIMENSIONS

RA	63/40	63/50	63/60	71/50	71/60	71/70	71/85	80/60	80/70	80/85	80/110	130	150
A ₁	70	85	95	85	95	120	140	95	120	140	200	235	260
AA	138	163	192	163	192	221	252	192	221	252	342	400	454
B	102	119	136	119	136	140	168	136	140	168	200	230	250
B ₁	84	99	111	99	111	116	140	111	116	140	162	190	210
C	41	49	60	49	60	60	61	60	60	61	77,5	90	105
D	19	24	25	24	25	28	32	25	28	32	42	48	55
D*	18	25	---	25	---	30	35	---	30	35	---	---	---
D ₂	11	11	11	14	14	14	14	19	19	19	19	19	19
E	50	61	70	61	70	80	98	70	80	98	125	143	168
F	140	160	180	160	180	200	200	180	200	200	250	300	350
F ₁	7	9	11	9	11	11	13	11	11	13	14	15	19
G	95	110	115	110	115	130	130	115	130	130	180	230	250
G ₁	60	70	70	70	70	80	110	70	80	110	130	180	180
H	71	85	100	85	100	115	135	100	115	135	172	200	230
H ₁	67	78	92	78	92	106	117	92	106	117	170	200	224
H ₂	15	17,5	21,5	17,5	21,5	19	26,5	21,5	19	26,5	25	25,5	38
H ₄	50	60	72	60	72	86	103	72	86	103	142	159	189
I	40	50	60	50	60	70	85	60	70	85	110	130	150
I ₁	32	32	32	40	40	40	40	50	50	50	50	75	75
K	153,5	171	177	173	183	209	224	207	232,5	250,5	264,5	290	316
				178*	188*	214*	229*					300*	<<<
L	23	23	23	30	30	30	30	40	40	40	40	40	40
M ₁	21,8	27,3	28,3	27,3	28,3	31,3	35,3	28,3	31,3	35,3	45,3	51,8	59,3
M ₂	12,5	12,5	12,5	16	16	16	16	22,5	22,5	22,5	22,5	22,5	22,5
N ₁	6	8	8	8	8	8	10	8	8	10	12	14	16
N ₂	4	4	4	5	5	5	5	6	6	6	6	6	6
P	82	91,5	116	91,5	116	111	100	116	111	100	150	150	160
P ₁	94	100	102	100	102	118	150	102	118	150	200	234	250
P ₂	41	42,5	56	42,5	56	51	39	56	51	39	72,5	60	55
R	115	130	150	130	150	165	165	150	165	165	215	265	300
R ₁	83	85	85	85	85	100	130	85	100	130	165	215	215
S	38	49	57,5	49	57,5	57	56,5	57,5	57	56,5	74,5	87	102
S ₁	9	12	12	12	12	14	15	12	14	15	17	19	20
S ₂	2	2,5	2,5	2,5	2,5	3	3	2,5	3	3	2,5	5	5
U	6	10	10	10	10	12	6	10	12	6	5	5	6
V	9 (4)	9 (4)	11 (4)	9 (4)	11 (4)	13 (4)	13 (4)	11 (4)	13 (4)	13 (4)	15 (8)	15 (8)	19 (8)
V ₁	M6x9 (4)	M8x12 (4)	M8x15 (8)	M8x12 (4)	M8x15 (8)	M8x18 (8)	M10x20 (8)	M8x15 (8)	M8x18 (8)	M10x20 (8)	M12x21 (4)	M12x24 (4)	M14x30 (4)
V ₂	M4x10	M4x10	M4x10	M6x15	M6x15	M6x15	M6x15	M8x20	M8x20	M8x20	M8x20	M8x20	M8x20
Y ₁	105	105	105	120	120	120	120	140	140	140	140	200	200
Z	10	10	11	10	11	14	14	11	14	14	16	18	20

D* - Bore on demand

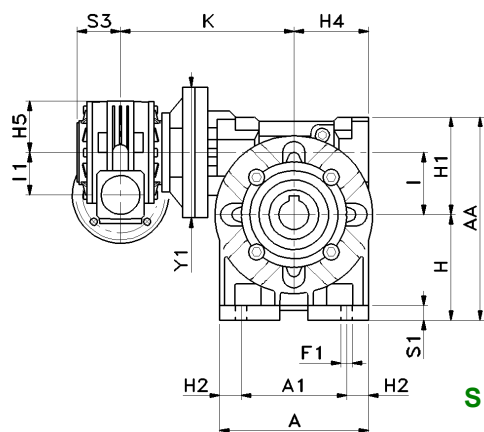
V₁ - 90° for RS28

(*) - IEC71-B14 (FRA 71/....) - IEC100-B5 (FRA130) - IEC100-B5 (FRA150)

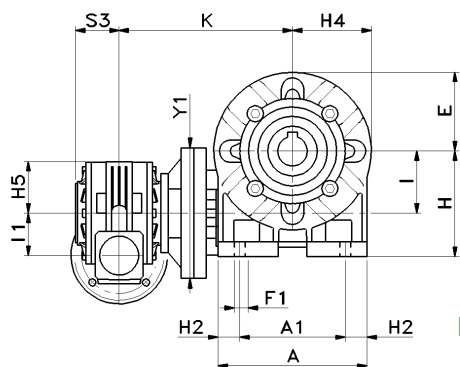
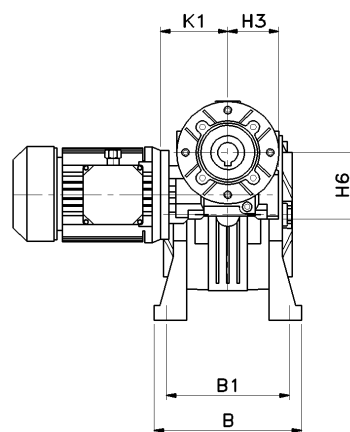
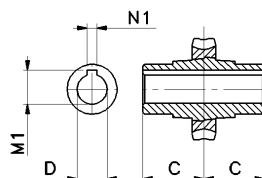
Motor dimensions: page 28

Not binding dimensions

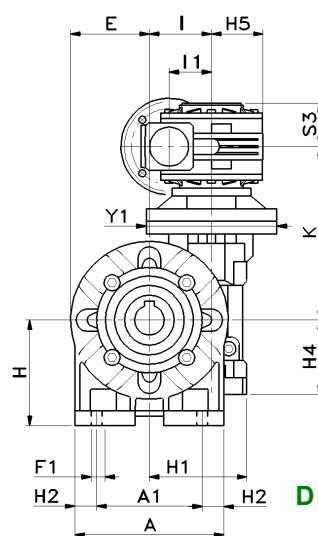
MRS/RS FRS/RS - RS/RS



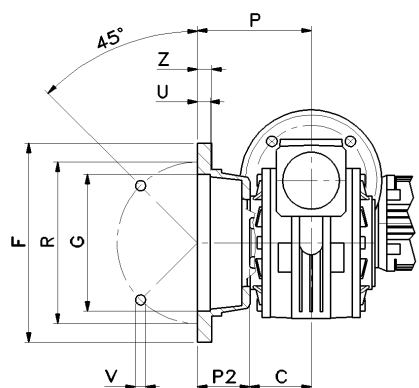
S



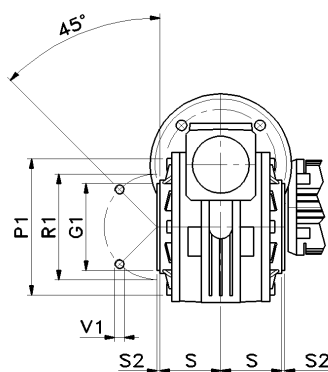
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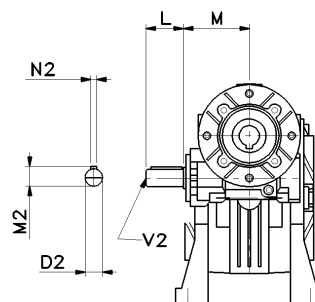
D



FL



PC



RS/RS

OVERALL DIMENSIONS

RS/RS	28/28	28/40	28/50	28/60	40/70	40/85	50/110	60/130	70/150
A ₁	52	70	85	95	120	140	200	235	260
AA	99	138	163	192	221	252	342	400	454
B	78	102	119	136	140	168	200	230	250
B ₁	66	84	99	111	116	140	162	190	210
C	30	41	49	60	60	61	77,5	90	105
D _(H7)	14	19	24	25	28	32	42	48	55
D* _(H7)	- - -	18	25	- - -	30	35	- - -	- - -	- - -
D ₂ _(H6)	9	9	9	9	11	11	14	38	42
E	34	50	61	70	80	98	125	143	168
F	70	140	160	180	200	200	250	300	350
F ₁	5,5	7	9	11	11	13	14	15	19
G _(H8)	40	95	110	115	130	130	180	230	250
G ₁ _(F8)	42	60	70	70	80	110	130	180	180
H	52	71	85	100	115	135	172	200	230
H ₁	47	67	78	92	106	117	170	200	224
H ₂	9	15	17,5	21,5	19	26,5	25	25,5	38
H ₃	40	40	40	40	50	50	60	72	86
H ₄	40	50	60	72	86	103	142	159	189
H ₅	34	34	34	34	50	50	61	70	80
H ₆	47	47	47	47	67	67	78	92	106
I	28	40	50	60	70	85	110	130	150
I ₂	28	28	28	28	40	40	50	60	70
K	99,5	116	138,5	146	182	199	246	246	300
K ₁	57,5	57,5	57,5	57,5	70,5	70,5	83 - 88*	93 - 94*	117 - 118*
L	20	20	20	20	23	23	30	40	40
M	50	50	50	50	65	65	75	87	110
M ₁	16,3	21,8	27,3	28,3	31,3	35,3	45,3	51,8	59,3
M ₂	10,2	10,2	10,2	10,2	12,5	12,5	16	22,5	22,5
N ₁	5	6	8	8	8	10	12	14	16
N ₂	3	3	3	3	4	4	5	6	6
P	49	82	91,5	116	111	100	150	150	160
P ₁	67	94	100	102	118	150	200	234	250
P ₂	19	41	42,5	56	51	39	72,5	60	55
R	56	115	130	150	165	165	215	265	300
R ₁	56	83	85	85	100	130	165	215	215
S	32	38	49	57,5	57	56,5	74,5	87	102
S ₁	6	9	12	12	14	15	17	19	20
S ₂	-3	2	2,5	2,5	3	3	2,5	5	5
S ₃	30	30	30	30	41	41	49	60	60
U	4	6	10	10	12	6	5	5	6
V	6,5 (4)	9 (4)	9 (4)	11 (4)	13 (4)	13 (4)	15 (8)	15 (8)	19 (8)
V ₁	M6x6 (4)	M6x9 (4)	M8x12 (4)	M8x15 (8)	M8x18 (8)	M10x20 (8)	M12x21 (4)	M12x24 (4)	M14x30 (4)
V ₂	M4x10	M4x10	M4x10	M4x10	M4x10	M4x10	M6x15	M8x20	M8x20
Y ₁	80	80	80	90	115	115	110	180	200
Z	6	10	10	11	14	14	16	18	20

D* - Bore on demand

V₁ - 90° for RS28

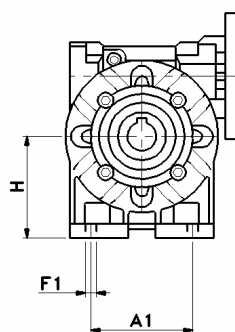
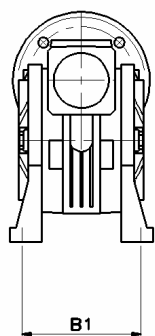
(*) - IEC71-B14 (FRS50) - IEC71-B14 (FRS60) - IEC 80-B14 (FRS70)

Motor dimensions: page 28

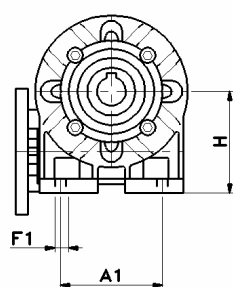
Not binding dimensions

SA - IA - DA
FA - FB - FR
PA - PB

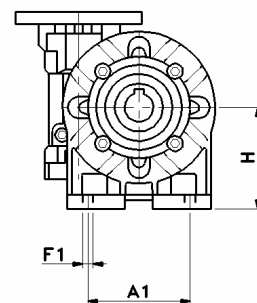
ALTERNATIVE MOUNTINGS



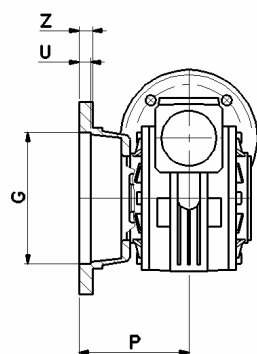
SA



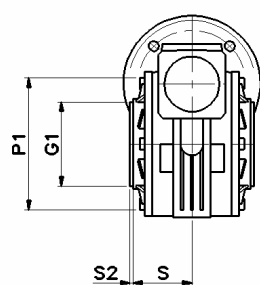
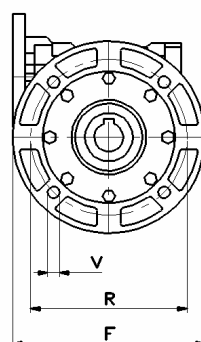
IA



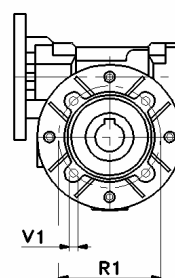
DA



FA - FB - FR



PA - PB

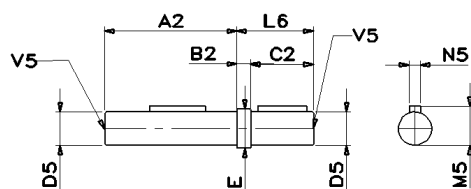


OVERALL DIMENSIONS

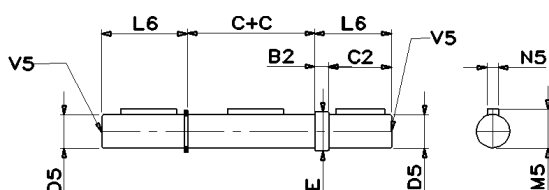
RS	28	40	50	60	70	85	110	130	150
SA - IA - DA									
A ₁	---	52	63	---	---	140	---	---	---
B ₁	---	81	98.5	---	---	146	---	---	---
F ₁	---	8.5	9	---	---	11	---	---	---
H	---	72	82	---	---	142	---	---	---
FA									
F	80	105	125	165	165	---	---	---	---
G _(H8)	50	60	70	110	115	---	---	---	---
P	50.5	69	93	90	116	---	---	---	---
R	68	87	90	130	150	---	---	---	---
U	3.5	5	5	10	4.5	---	---	---	---
V	6.5 (4)	9 (4)	11 (4)	10.5 (4)	11 (4)	---	---	---	---
Z	7	8	10	15	10	---	---	---	---
FB									
F	---	120	---	180	---	210	270	---	---
G _(H8)	---	80	---	115	---	152	170	---	---
P	---	62	---	86	---	119.5	131.5	---	---
R	---	100	---	150	---	176	230	---	---
U	---	4	---	3.5	---	5	5	---	---
V	---	9 (4)	---	11 (4)	---	11 (4)	13 (4)	---	---
Z	---	9	---	12	---	14	18	---	---
FR									
F	---	---	---	---	160	---	---	---	---
G _(H8)	---	---	---	---	110	---	---	---	---
P	---	---	---	---	84.5	---	---	---	---
R	---	---	---	---	130	---	---	---	---
U	---	---	---	---	4.5	---	---	---	---
V	---	---	---	---	11 (4)	---	---	---	---
Z	---	---	---	---	14	---	---	---	---
PA									
G _{1 (H8)}	---	50	68	75	90	---	---	---	---
P ₁	---	95	110	104	125	---	---	---	---
R ₁	---	65	94	90	110	---	---	---	---
S	---	38	49	47.5	55	---	---	---	---
S ₂	---	2	2.5	5.5	3	---	---	---	---
V ₁	---	M6x8 (4)	M6x12.5(4)	M8x14 (4)	M8x14 (4)	---	---	---	---
PB									
G _{1 (H8)}	---	---	60	---	70	---	---	---	---
P ₁	---	---	110	---	116	---	---	---	---
R ₁	---	---	75	---	85	---	---	---	---
S	---	---	49	---	67	---	---	---	---
S ₂	---	---	2.5	---	4	---	---	---	---
V ₁	---	---	M6x12.5(4)	---	M8x14 (4)	---	---	---	---
Not binding dimensions									

ACCESSORIES

AS

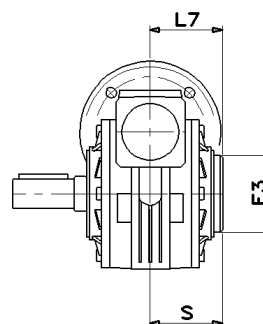


AD

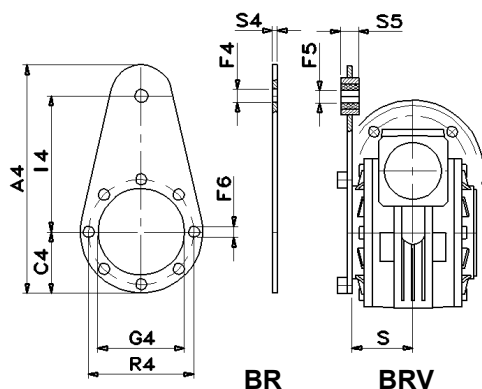


ASC

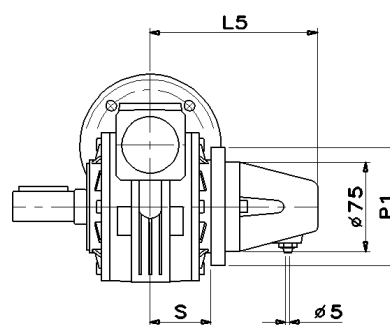
Safety cap for AS



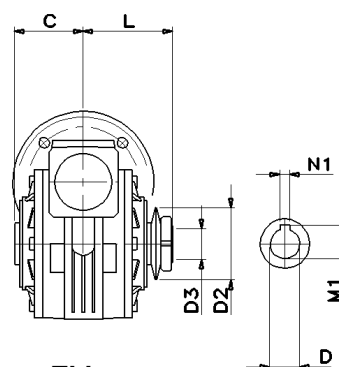
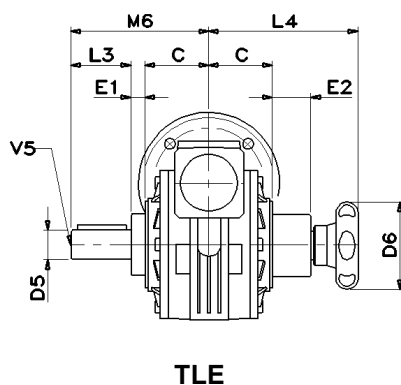
BR



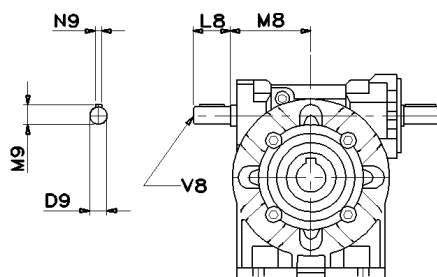
SL



TL



VB



TLI

Litres

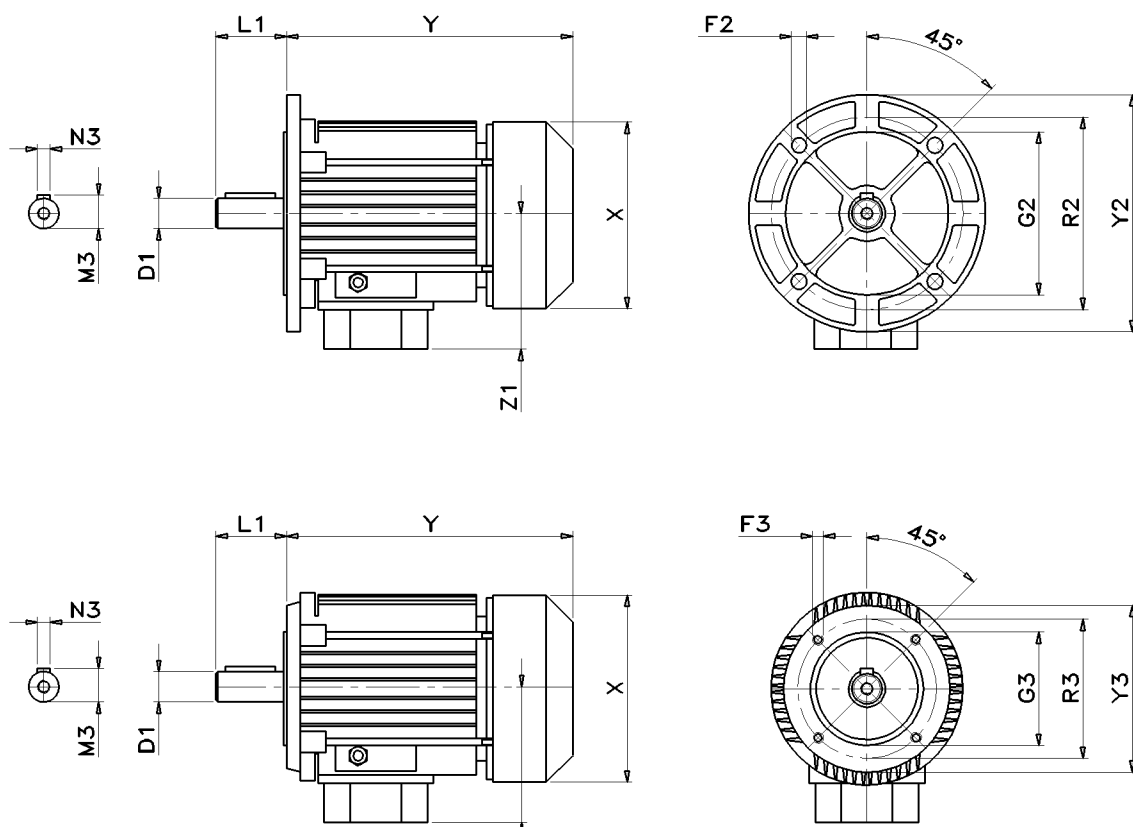
28	0,04
40	0,10
50	0,13
60	0,30
70	0,45
85	0,75
110	2,25

OVERALL DIMENSIONS

RS		28	40	50	60	70	85	110	130	150
AS & AD	A ₂	58	80	95	117	117	119	153	177	207
	B ₂	1	10	10	10	10	10	10	20	20
	C	30	41	49	60	60	61	77.5	90	105
	C ₂	30	40	45	50	60	70	100	110	110
	D ₅ (g6)	14	19 (18)	24 (25)	25	28	32 (35)	42	48	55
	E	14	22	28	30	34	38	50	58	63
	L ₆	31	50	55	60	70	80	106	130	130
	M ₅	16	21.5	27	28	31	35	45	51.5	59
	N ₅	5	6	8	8	8	10	12	14	16
	V ₅	M5x10	M8x20	M8x20	M8x20	M8x20	M10x25	M10x25	---	---
ASC	E ₃	42	55	62	62	72	90	120	---	---
	L ₇	36	48.5	55.5	68.5	67	77	85	---	---
	S	27.5	38.5	46.5	57	57	67	74	---	---
BR BRV	A ₄	138	168	185	235	295	313	388	---	---
	C ₄	38	43	60	55	65	75	100	---	---
	F ₄	10.5	10.5	10.5	10.5	10.5	20.5	20.5	---	---
	F ₅	10	10	10	10	10	20	20	---	---
	F ₆	7	7	9	9	9	12	13	---	---
	G ₄	55	60	70	80	95	110	130	---	---
	I ₄	80	100	100	150	150	200	250	---	---
	R ₄	65	75	85	95	115	130	165	---	---
	S ₄	4	4	4	6	6	6	6	---	---
	S ₅	15	15	15	20	20	25	25	---	---
SL	L ₅	100	110	120	130	130	140	155	---	---
	P ₁	77	88	100	110	132	160	200	---	---
	S	27.5	38.5	46.5	57	57	67	74	---	---
TLE	D ₆	52	70	70	70	80	100	100	---	---
	E ₁	10	12	12	15	14	19	24	---	---
	E ₂	28	37	31	40	46	57	71	---	---
	L ₃	30	40	50	50	60	70	80	---	---
	L ₄	94	116	118	128	146	168	201	---	---
	M ₆	70	93	111	125	134	150	181	---	---
TLI	D (H7)	14	19	24	25	28	32	42	---	---
	D ₂	40	56	71	71	80	90	125	---	---
	D ₃	14.2 x 20	19.5 x 20.5	24.5 x 28	25.5 x 26	28.5 x 22	32.5 x 27	42.5 x 38.5	---	---
	L	45	61.5	77	86.5	89	94	109	---	---
	M ₁	15.4*	21.8	27.3	27.3*	31.3	35.3	45.3	---	---
	N ₁ (H9)	5	6	8	8	8	10	12	---	---
VB	D ₉	9	11	14	19	19	24	28	---	---
	L ₈	20	23	30	40	40	50	60	---	---
	M ₈	43	55	65	77	84	106.5	145	---	---
	M ₉	10.2	12.5	16	22.5	22.5	27	31	---	---
	N ₉	3	4	5	6	6	8	8	---	---
	V ₈	M4x10	M4x10	M6x15	M8x20	M8x20	M8x20	M8x20	---	---
* = Undersized key		- D ₅ (..) = Bore on demand								

OVERALL DIMENSIONS

ELECTRIC MOTORS



MOTOR IEC	56	63	71	80	90 S / L	100 - 112	132 S / M	160 M / L
D _{1(j6)}	9	11	14	19	24	28	38	42
F ₂	7	9	9	11	11	14	14	18
F ₃	M.5	M.5	M.6	M.6	M.8	M.8	M.10	12
G _{2(j6)}	80	95	110	130	130	180	230	250
G _{3(j6)}	50	60	70	80	95	110	130	180
M ₃	10.4	12.8	16.3	21.8	27.3	31.3	41.3	45.3
N ₃	3	4	5	6	8	8	8	8
R ₂	100	115	130	165	165	215	265	300
R ₃	65	75	85	100	115	130	165	215
X	110	123	140	159	176	195 / 219	258	315
Y	168	185	215	238	255 / 280	309 / 328	368 / 405	478 / 522
Y ₂	120	140	160	200	200	250	300	350
Y ₃	80	90	105	120	140	160	200	250
Z ₁	108	110	121	138	149	160 / 172	192	220

Not binding dimensions

BACK-DRIVING AND SELF-LOCKING

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

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

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

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

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

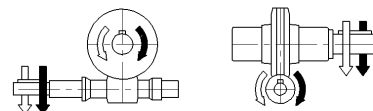
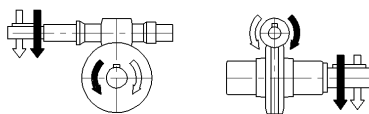
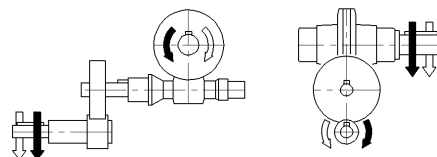
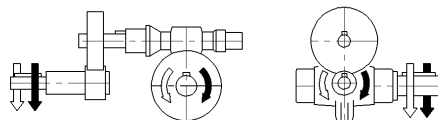
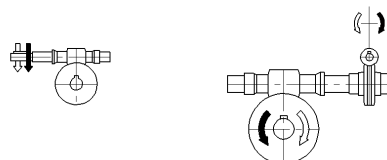
To provide a safety factor, a 3° lead angle is recommended for full self-locking condition, and 10° lead angle for poor self-locking condition, according to the table of relations between lead angles and static self-locking.

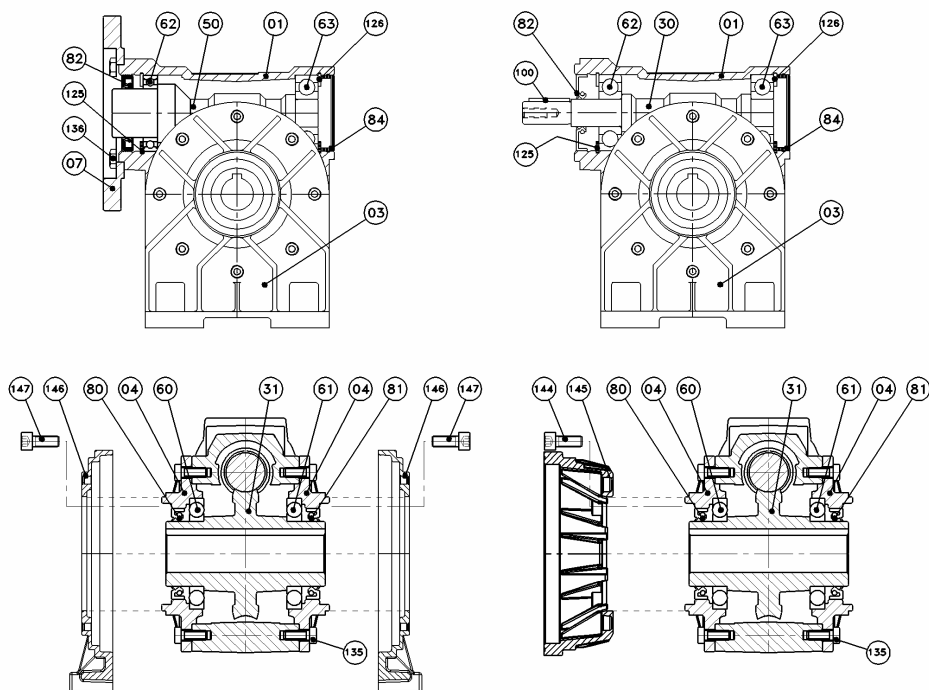
Lead angle	Static self-locking
$\beta > 20^\circ$	Full reversibility
$10^\circ < \beta < 20^\circ$	High reversibility
$5^\circ < \beta < 10^\circ$	Good reversibility Poor self-locking
$3^\circ < \beta < 5^\circ$	Poor reversibility Good self-locking
$1^\circ < \beta < 3^\circ$	Full self-locking

GEARING DATA AND DIRECTION OF ROTATION

	i =	7	10	15	20	28	40	49	56	70	80	100
RS28	m_x β	1.50 23°11' 4	1.40 16°41' 3	1.40 11°18' 2	1.10 10°23' 2	1.50 6°06' 1	1.10 5°14' 1	0.90 4°19' 1	0.75 3°03' 1	0.60 2°27' 1	0.55 2°37' 1	0.45 2°20' 1
RS40	m_x β z_1	2.10 21°36' 4	2.00 16°41' 3	2.00 11°18' 2	1.50 8°31' 2	2.10 5°39' 1	1.50 4°17' 1	1.25 3°48' 1	1.10 3°25' 1	0.90 3°01' 1	0.80 2°51' 1	0.65 2°38' 1
RS50	m_x β z_1	2.70 23°52' 4	2.50 16°41' 3	2.50 11°18' 2	1.90 5°59' 2	2.70 6°19' 1	1.90 4°31' 1	1.60 4°14' 1	1.40 3°42' 1	1.10 2°44' 1	1.00 2°51' 1	0.80 2°17' 1
RS60	m_x β z_1	3.30 25°33' 4	3.10 19°0' 3	3.10 12°55' 2	2.40 11°18' 2	3.30 6°49' 1	2.40 5°42' 1	2.00 5°11' 1	1.70 3°55' 1	1.40 3°38' 1	1.20 2°51' 1	1.00 2°51' 1
RS70	m_x β z_1	3.90 26°51' 4	3.60 18°38' 3	3.60 12°40' 2	2.80 11°18' 2	3.90 7°12' 1	2.80 5°42' 1	2.30 4°48' 1	2.00 4°05' 1	1.60 3°16' 1	1.40 2°51' 1	1.15 2°38' 1
RS85	m_x β z_1	4.70 26°05' 4	4.40 19°09' 3	4.40 13°02' 2	3.40 11°18' 2	4.70 6°58' 1	3.40 5°52' 1	2.80 4°52' 1	2.50 4°45' 1	2.00 3°48' 1	1.74 3°14' 1	1.40 2°40' 1
RS110	m_x β z_1	6.10 26°22' 4	5.80 20°43' 3	5.80 14°09' 2	4.40 11°18' 2	6.10 7°04' 1	4.40 5°42' 1	3.60 4°43' 1	3.20 4°29' 1	2.60 3°54' 1	2.30 3°39' 1	1.80 2°34' 1
RS130	m_x β z_1	7.25 26°57' 4	6.90 21°20' 3	6.85 14°06' 2	5.35 13°05' 2	7.25 7°14' 1	5.30 6°18' 1	4.35 5°18' 1	4.00 6°20' 1	3.15 4°33' 1	2.70 3°30' 1	2.25 3°40' 1
RS150	m_x β z_1	8.25 25°33' 4	8.00 21°48' 3	8.15 16°22' 2	6.20 13°24' 2	8.45 7°35' 1	6.25 7°07' 1	5.10 5°48' 1	4.60 6°11' 1	3.60 4°17' 1	3.15 3°45' 1	2.60 3°43' 1

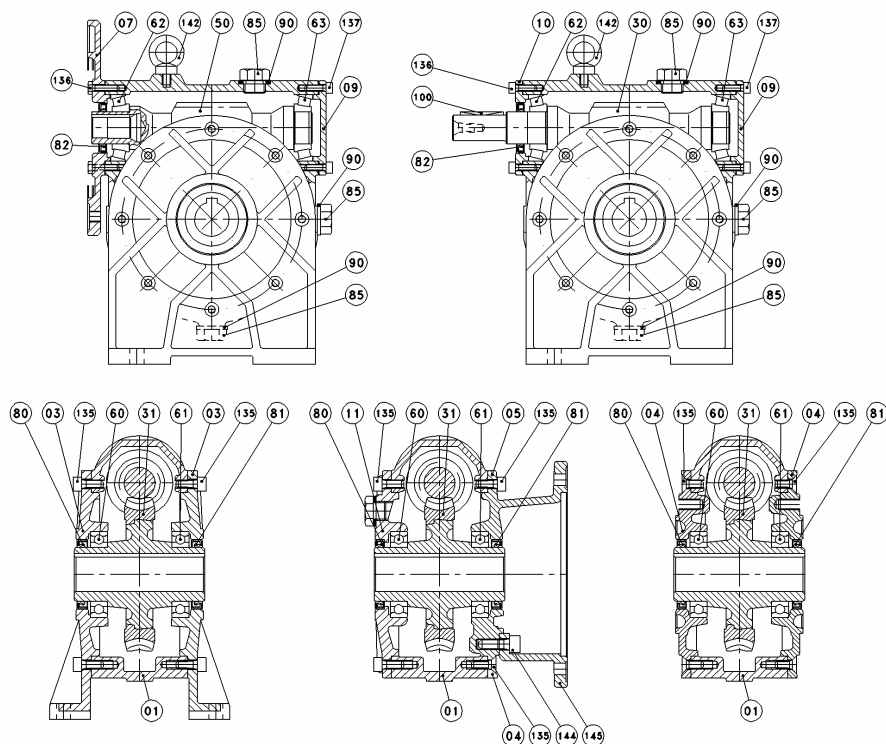
m_x = Axial module
 z_1 = Number of starts
 β = Lead angle (rh)
 20° = Pressure angle

RS

RA

RS / RS


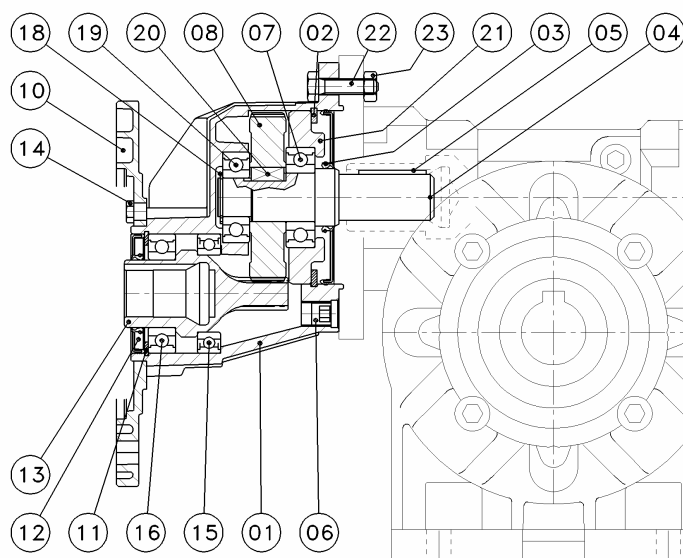
RS 28 - 85
PART LIST


1	Housing
3	Side Cover (S)
4	Side Cover (PC)
7	Input Flange
30	Wormshaft RS
31	Worm wheel
50	Wormshaft FRS
60	Worm wheel Bearing
61	Worm wheel Bearing
62	Wormshaft Front Bearing
63	Wormshaft Rear Bearing
80	Worm wheel Oilseal
81	Worm wheel Oilseal
82	Wormshaft Oilseal
84	Plain Rear Oilseal
100	Wormshaft Key RS
125	Wormshaft Front Snap ring (i)
126	Wormshaft Rear Snap ring (i)
135	Side Cover Screw
136	Input Flange Screw
144	Output Flange F Screw
145	Output Flange
146	Bolted Footed Cover (S)

PART LIST

RS 110 - 150


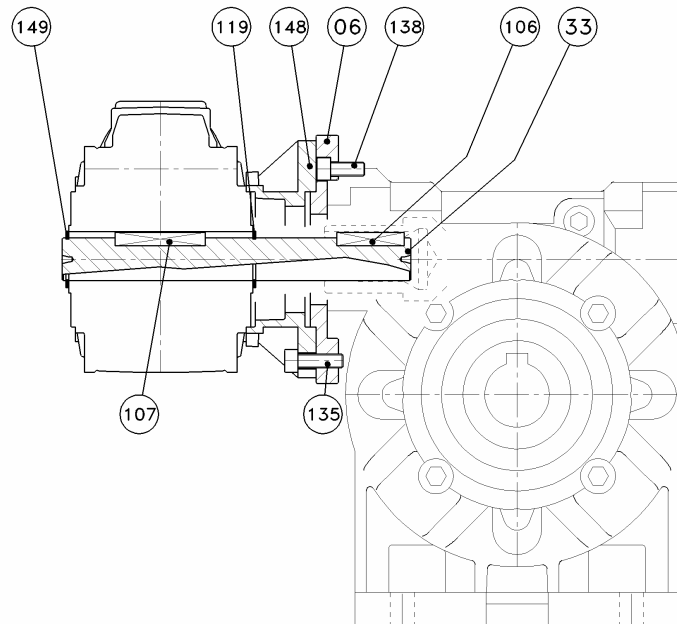
1	Housing
3	Side Cover S
4	Side Cover PC
5	Side Cover FL
7	Input Flange
9	Wormshaft Rear Cover
10	Wormshaft Front Cover RS
11	Side Cover FO
30	Wormshaft RT
31	Worm wheel
50	Wormshaft FRT
60	Worm wheel Bearing
61	Worm wheel Bearing
62	Wormshaft Front Bearing
63	Wormshaft Rear Bearing
80	Worm wheel Oliseal
81	Worm wheel Oliseal
82	Worm wheel Oilseal
85	Oil Plug
90	Oil Plug gasket
100	Wormshaft Key RS
135	Side Cover Screw
136	Input Flange Screw
137	Wormshaft Rear Cover Screw
142	Eyebolt
144	Output Flange FL Screw
145	Output Flange FL

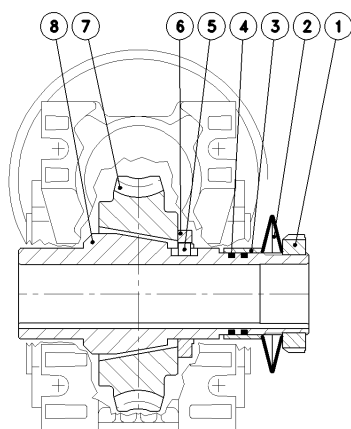
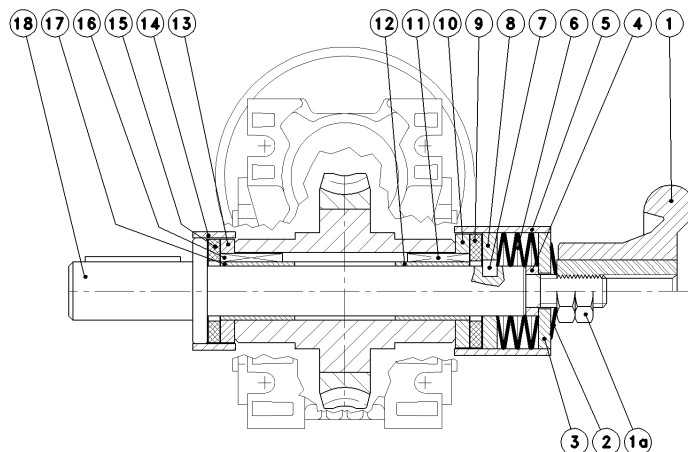
RA 63/ - 80/
PART LIST


1	Housing
2	Snap ring (i)
3	Output Oilseal
4	Output Shaft
5	Output Shaft Key
6	Plug
7	Wheel Front Bearing
8	Wheel
10	Input Flange
11	Input Snap ring (i)
12	Input Oilseal
13	Pinion
14	Input Flange Screw
15	Pinion Rear Bearing
16	Pinion Front Bearing
18	Output Shaft Snap ring (e)
19	Wheel Rear Bearing
20	Wheel Key
21	Holder
22	Screw
23	Nut

PART LIST

KIT RS / RS

[illegible]

**TLI - TLE
28 - 110**
PART LIST

TLI

TLE
TLI INTERNAL TORQUE LIMITER

- | | |
|---|---------------------|
| 1 | Ring Nut |
| 2 | Belville Spring |
| 3 | Bush |
| 4 | Oilseal OR |
| 5 | Key |
| 6 | Thrust Collar |
| 7 | Worm wheel |
| 8 | Hollow Output Shaft |

TLE EXTERNAL TORQUE LIMITER

- | | |
|--------|---------------------------------|
| 1 / 1a | Locking Knob / Nut and Lock Nut |
| 2 | Belville Spring |
| 3 | Locking Ring |
| 4 | Adjustment Shim |
| 5 | Rear Cover |
| 6 | Belville Spring |
| 7 | Key |
| 8 | Thrust Collar |
| 9 | Rear Friction Ring |
| 10 | Thrust Collar |
| 11 | Key |
| 12 | Rear Bush |
| 13 | Thrust Collar |
| 14 | Front Cover |
| 15 | Front Friction Ring |
| 16 | Key |
| 17 | Front Bush |
| 18 | Single Output Shaft |

Abstract of OPERATION AND MAINTENANCE INSTRUCTIONS

Variable speed and reduction gearboxes are not part of the field of application of the Machinery Directive, art.1(2), and they must not be put into service until the machinery into which they are to be incorporated, has been declared in conformity with the provision of art. 4(2), annex II(B) of Machinery Directives 98/37/CEE/22.6.98 and for Italy only, of DL 459/24.7.96.

The Instructions must be performed by trained and qualified personnel and, in case of Directive Atex, specifically experienced in potentially explosive zone safety.

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 run the unit 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

Attention, right positioning and stability when handling are essential to avoid subsequent damages in unit operation. 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 3 months, apply anti-oxidants onto shafts and machined surfaces, and protective grease on oil seal lips.

Storages longer than one year reduce bearing grease lifetime.

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 deliver to authorized centres for metal object collection;
- oils and lubricants drained from the units to deliver 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.

Directive 84/9/CE - ATEX

Directive involves not only electrical machines but also every apparatus and control devices to be used in potentially explosive atmosphere.

The products VARVEL-ATEX are designed and manufactured according to Directive 94/9/CE and they are therefore qualified to installation in potentially explosive atmosphere.