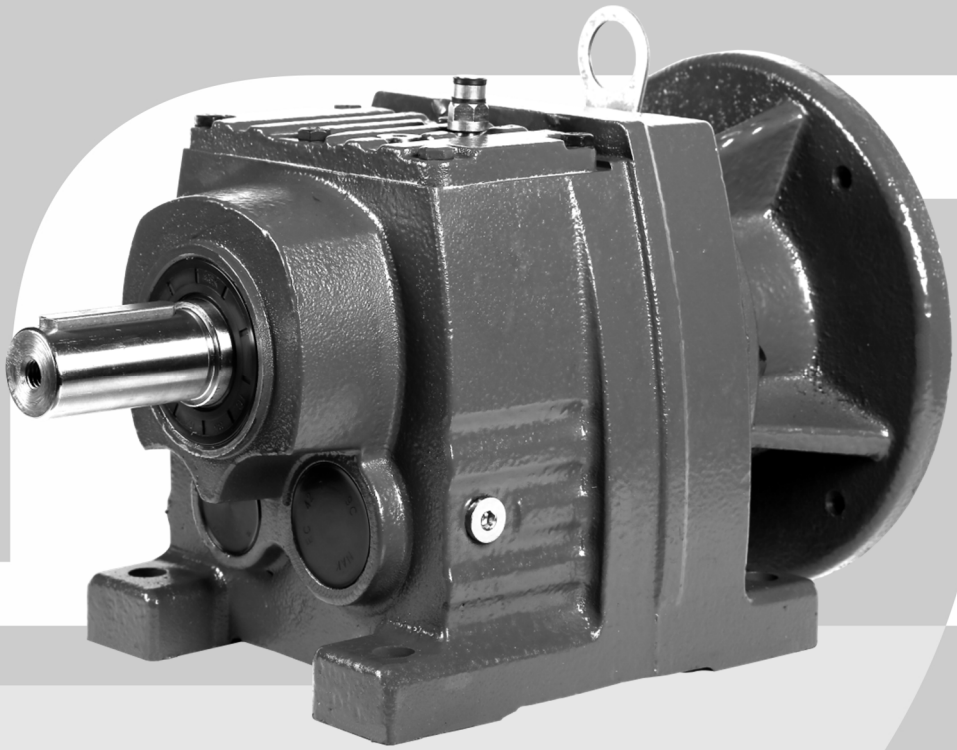
MORGENSEN
DRIVE WITH YOU

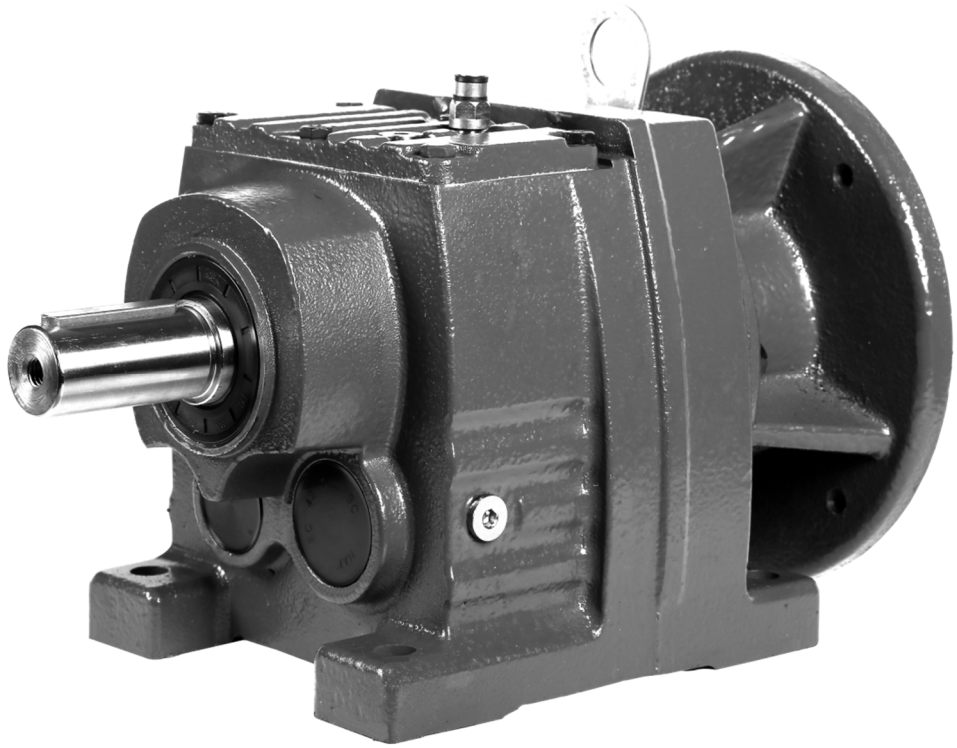


USER MANUAL
Helical gearboxes

MSR

MSR series

Helical gearboxes



We are pleased to present a new generation of MORGENSEN gearboxes.

Thanks to new, innovative technological developments, even more robust gearboxes and components will provide even more reliable operation, providing a reassuring support to our partners.
The robust design guarantees that our gearboxes are able to withstand the toughest conditions in all areas of the industry.

Our gear units have the following advantages:

- even greater load capacity
- even greater operational safety
- longer service life

We install our gearwheels at our Hungarian site at any speed and size that our customers require.

Designation

M S	R	3 7	2	FA	13,25	P90	B5
1	2	3	4	5	6	7	8

1 – Morgensen series
2 – Type of the gearbox
- R – In line helical gear reducer
- F – Parallel shaft gear reducer
- K – Helical bevel gear reducer
- W – Worm gear reducer

3 – Gearbox size
4 – Number of the stages
5 – Flange
- FA – Flange mounted gear reducer
- \- – Foot mounted gear reducer

6 – Ratio
7 – Motor size
8 – Motor flange
- B5
- B14 – only at worm gear reducers

General informations

P1 – Power

This is the power of the driver at the input site of the gearbox

Pn – Nominal load

This is the power that the gearbox can be loaded with.

Pt – Thermal load capacity

The maximum power the gear motor is loaded with, it still can transfer the amount of the produced heat to the environment through the heat transfer surface. In the case of helical gearmotors, this is almost always greater than the load capacity.

n1 – Input speed

This is the driver speed at the input site of the gearbox

n2 – Output speed

This is the speed at the output site of the gearbox
n2=n1/i

i – Ratio

The ratio of a gearbox is the coefficient of the input and output speed of the gearbox. It depends on the number of the teeth of the gears inside the gearbox.
i=n1/n2

η – Efficiency

This value shows the amount of percenatges the driver power uses on the output site of the gearbox. The efficiency of the helical gearboxes is 97% at each stage.
So the efficiency is at a 2 stage gearbox: 97% x 97% = 94%

Mr2 – Demanded (Required) torque

This is the torque that is demanded at the application.

M2 – Output torque

This is the effective output torque of the gearbox. It is related to the power of the driver and output rpm. It can be calculated according to the following:
M2=9550 x P x η / n2

M2 = output torque (Nm)
P = motor power (kW)
η = efficiency
n2 = output speed

fs – Service factor

This value indicates how a certain drive system is to be oversized in order to assure the requested service and stand up to shocks. The tables given in the catalogue offer a wide range of drive systems with different service factors able to satisfy most types of applications. To correctly understand service factor values sf given for each item, approximate values for load classes A, B and C along with the number of hours of daily operation h/d and number of start-ups/hours need to be known.
Once the load class required for the application has been determined, locate corresponding value sf to be used when selecting the most suitable drive system.
The value of the service factor depends on the technical and load characteristics of the driven machine. There are three main load characteristics:

Type of load	Service factor
Uniform	1 – 1,2
Moderate shock	1,2 – 1,5
Heavy shock	1,5 – 2,5

a. Selecting of the service factor:

sf - uniform load									
h/d	number of start up / hour								
	2	4	8	16	32	63	125	250	500
4	0.8	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.2
8	1.0	1.0	1.0	1.0	1.3	1.3	1.3	1.3	1.3
16	1.3	1.3	1.3	1.3	1.5	1.5	1.5	1.5	1.5
24	1.5	1.5	1.5	1.5	1.8	1.8	1.8	1.8	1.8

sf - moderate shock load									
h/d	number of start up / hour								
	2	4	8	16	32	63	125	250	500
4	1.0	1.0	1.0	1.0	1.3	1.3	1.3	1.3	1.3
8	1.3	1.3	1.3	1.3	1.5	1.5	1.5	1.5	1.5
16	1.5	1.5	1.5	1.5	1.8	1.8	1.8	1.8	1.8
24	1.8	1.8	1.8	1.8	2.2	2.2	2.2	2.2	2.2

sf - heavy shock load									
h/d	number of start up / hour								
	2	4	8	16	32	63	125	250	500
4	1.3	1.3	1.3	1.3	1.5	1.5	1.5	1.5	1.5
8	1.5	1.5	1.5	1.5	1.8	1.8	1.8	1.8	1.8
16	1.8	1.8	1.8	1.8	2.2	2.2	2.2	2.2	2.2
24	2.2	2.2	2.2	2.2	2.5	2.5	2.5	2.5	2.5

b. Calculating of the service factor:

fs=Pn/P1
fs: service factor
Pn: the nominal power of the gearbox
P1: the power of the driver machine

If there is more information available about the drive, then you can find a more detailed definition below.

Type of load	Service factor
Uniform	fa <= 0,3
Moderate shock	fa <= 3
Heavy shock	fa <= 10

fa = J1 / J2 - where J1 is the momentum of the gearbox, J2 is the momentum of the driven machine

Selecting of the gearmotor

In order to select the right gearbox, use the following steps:

1. Defining the safety factor by following the steps above.
2. In case the required motor power is known see paragraph number 3. In case the required torque is known then calculate the applying motor power according to the following formula:
   $$P=M2 \times n2 / 9550 \times \eta$$
3. From the gear selection table, select the gear that has higher load rating than the required gearmotor power at the required speed multiplied by the selected safety factor.

Installation and storage of the gearmotors

- Only qualified personnel should install, service or maintain the gear units.
- When purchasing make sure that the gear unit is undamaged and compare the nameplate with your order.
- Do not store the gear unit in high humidity or high temperatures.
- Lubricate the shaft joint with a suitable protective agent (eg Loctite Antiseize 767) to prevent surface abrasion and seepage. This operation should be repeated every year.
- Protect the shaft from shocks to save bearings.
- Always fix the gear unit securely and ensure that the mounting surface is smooth and strong.
- Ensure that the connected shafts are aligned.
- Install a torque limiter if dynamic backlashes can occur during operation.
- Always ensure that the operating conditions are safe before starting.
- For outdoor operation, provide the gear unit with a weatherproof cover.
- Do not expose the gear unit to aggressive materials (unless it was stated on the order and the gear unit
- has been selected accordingly).
- Make sure that all connecting surfaces are properly treated to prevent rusting on the contact surfaces.
- Make sure that all retaining screws are tightened.
- Check if the amount of lubricant is suitable for for the mounting position you have chosen.

Structural characteristics

- Our gearwheels are made exclusively of high-quality cast iron housings, which are more durable than other aluminum housings.
- Thanks to their design and high quality alloys they are capable of withstanding high torque loads.
- The efficiency of our gear units can be up to 98% depending on the gear.
- Precise machining of gears for easy, smooth running and low noise.
- Long service life even in extreme conditions.
- Oil-free housing: Leak-proof operation is guaranteed thanks to a sealing system that provides better sealing than other types.
- Only standard IEC flanged motor couplings are used, which, while making our geared motors structurally more robust, significantly simplifies subsequent servicing procedures.

Material specification

- Gear housing: Cast steel alloy.
- Hardened and ground gears with high wear resistance.
- Anti-corrosion housing: The outer and inner surfaces of the gear housing are treated with epoxy-polyester paint.

Appearance

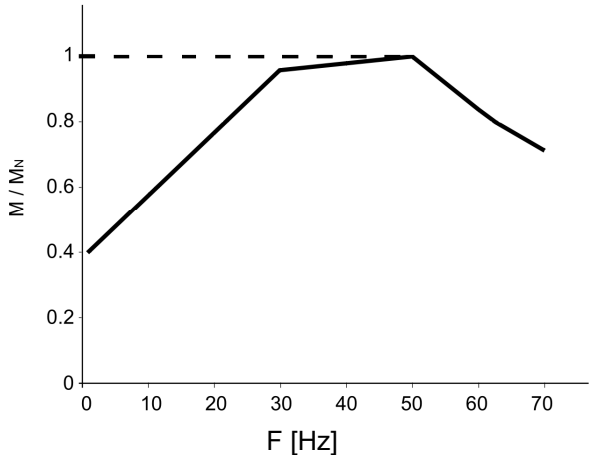
- In addition to its aesthetic appearance, the exterior paint also provides a high degree of corrosion protection for the gear unit.

Drive control

Nowadays, electronic speed control of electric motors is essential for modern drives. However, by using a frequency inverter, you can not only change the speed, but also make your machines much safer. With any type of our frequency inverters you can set either current or thermal protection, different programs, runs, rushes. Not to mention the fact that the use of inverters are significantly money and energy saving. All our geared electric motors are suitable for normal and frequency inverter operation.

In case of a variable speed drive, select the value for the nominal speed of the gear motor at which the drive operates the most. If the range is wide, keep in mind that the maximum speed of the motors is usually set at 3000 rpm, and an electric motor should only be used with forced cooling under 25 Hz. These values are indicative, but highly dependent on the nature, magnitude and temporal distribution of the load. If you are unsure of the selection or need help, please contact our support team, where our colleagues will be happy to assist you.

The following figure shows the torque curve of the electric motors operated by the frequency inverters. The dashed line indicates the torque of the external forced cooling electric motors



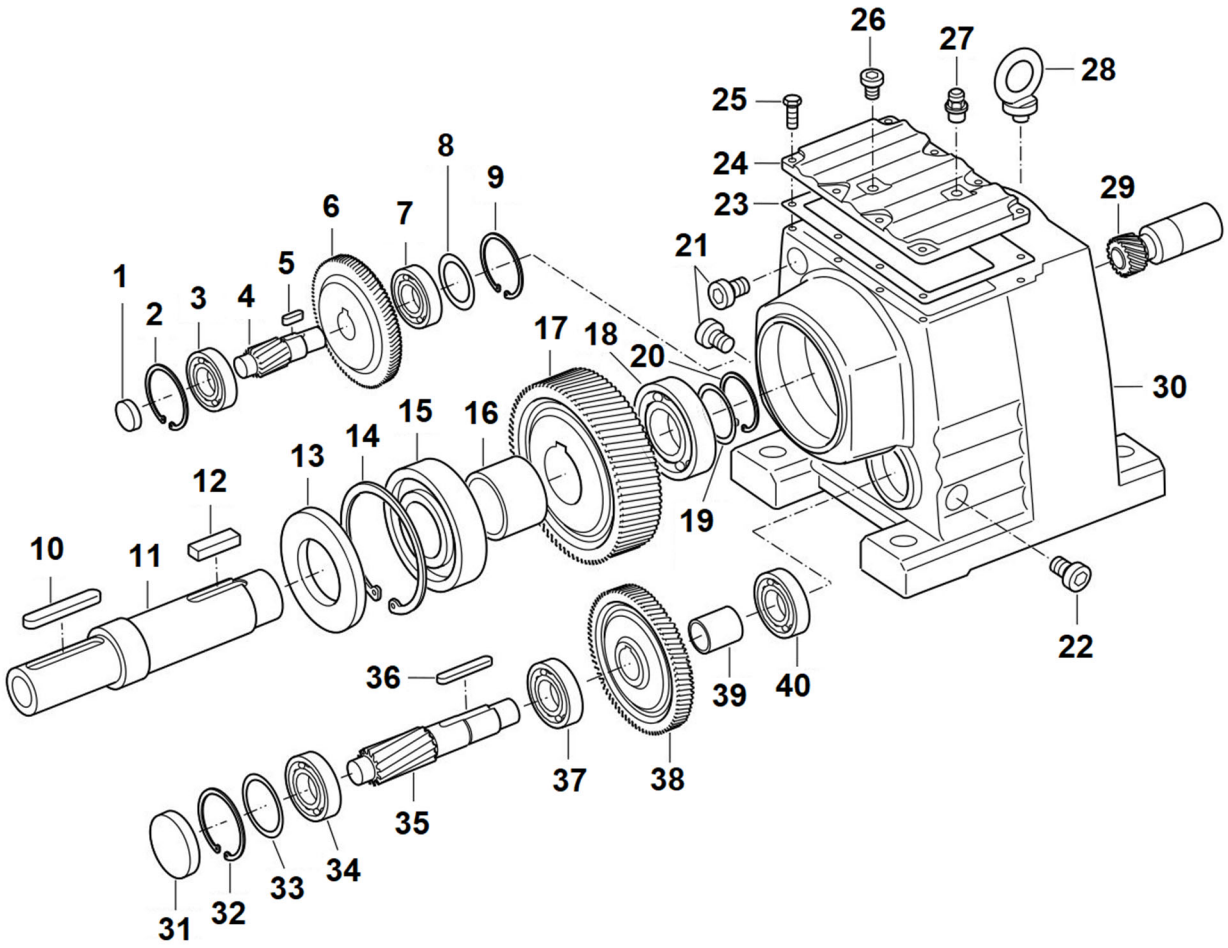
Energy saving

All of our gear units can be delivered with IE2, IE3 and IE4 high efficiency, energy saving electric motors. Not only does this mean protecting the environment, but depending on the duration of use, the difference in price will pay off in one year compared to a conventional electric motor.

Available Options for electric motors

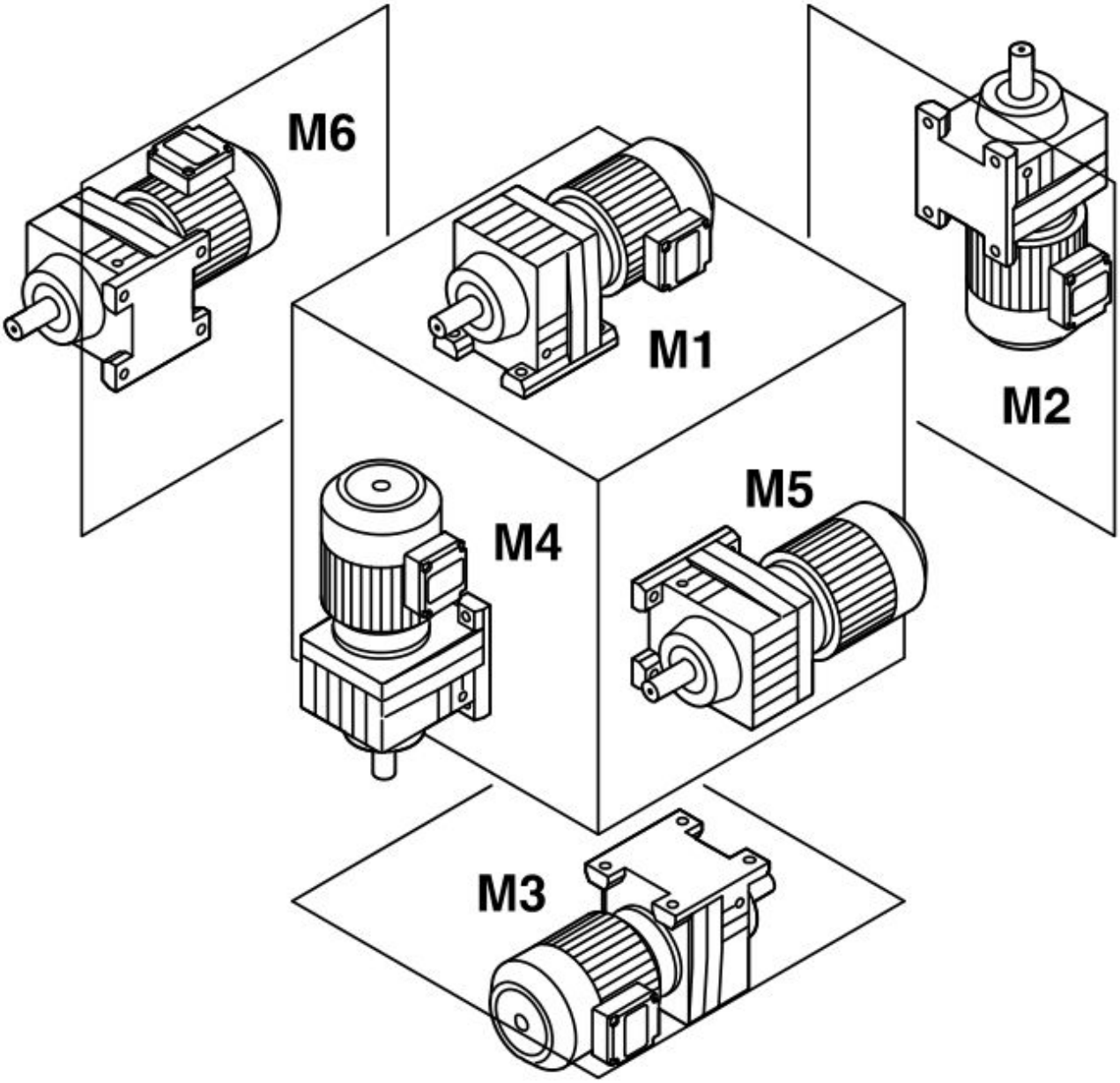
- Brake motor
- Backstop
- Explosion-proof design
- External cooling
- PTO and PTC thermal protection
- Encoder
- Class H insulation
- Higher degree of protection (IP65, IP56, IP66)
- Reinforced bearing
- Custom drive shaft drives
- Rain Cover

Parts list



1	closing cap	11	output shaft	21	screw plug	31	closing cap
2	retaining ring	12	key	22	screw plug	32	retaining ring
3	bearing	13	oil seal	23	gasket	33	shim
4	pinion shaft	14	retaining ring	24	inspection cover	34	bearing
5	key	15	bearing	25	hex head screw	35	pinion shaft
6	gearwheel	16	spacer	26	screw plug	36	key
7	bearing	17	gearwheel	27	breathher valve	37	bearing
8	washer	18	bearing	28	eyebolt	38	gearwheel
9	retaining ring	19	shim	29	gearwheel	39	spacer tube
10	key	20	retaining ring	30	gear unit housing	40	bearing

Mounting positions



Lubrication

Our gearboxes are oil lubricated. In any case, make sure there is enough oil in the gear unit.

Recommended types of synthetic oils:

AGIP Blasia S 220
BP Energol SG XP220
ESSO Glycolube 220
MOBIL Glygoyle 30
Shell Tivela Oil SC 320

Always use mineral or synthetic oil according to the type of load and ambient temperatur:

	Ambient temperatur: -20°C - +25°C		Ambient temperatur: -10°C - +40°C	
Type of load	Mineral oil	Synthetic oil	Type of load	Mineral oil
Uniform	ISO VG150	ISO VG150	**Uniform**	ISO VG150
Moderate shock	ISO VG150	ISO VG150	**Moderate shock**	ISO VG150
Heavy shock	ISO VG220	ISO VG220	**Heavy shock**	ISO VG220

The following table shows the required oil level for the gear units. Please specify the installation position when ordering.

Gearbox type	Oil quantity (L)					
Mounting position	M1	M2	M3	M4	M5	M6
MSR37	0.3/1	0.9	1	1.1	0.8	1
MSR47	0.7/1.5	1.6	1.5	1.7	1.5	1.5
MSR57	0.8/1.7	1.9	1.7	2.1	1.7	1.7
MSR67	1.1/2.3	2.6/3.5	2.8	3.2	1.8	2
MSR77	1.2/3	3.8/4.3	3.6	4.3	2.5	3.4
MSR87	2.3/6	6.7/6.4	7.2	7.7	6.3	6.5
MSR97	4.6/9.8	11.7/14	11.7	13.4	11.3	11.7
MSR107	8/13.7	16.3	16.9	19.2	13.2	15.9
MSR137	10/25	28	29.5	31.5	25	25
MSR147	15.4/40	46.5	48	52	39.5	41
MSR167	27/70	82	78	88	66	69

Weight

Type	MSR37	MSR47	MSR57	MSR67	MSR77	MSR87	MSR97	MSR107	MSR137	MSR147	MSR167
Weight [kg]	8,50	10,00	18,00	25,00	36,00	63,00	101,00	153,00	220,00	400,00	700,00

Technical data

MSR37					200Nm
	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	3.41	411	112	900	4,8
	4.05	346	122	850	4,46
	4.32	324	126	820	4,3
	5.06	277	135	790	3,91
	5.67	247	142	760	3,63
	6.67	210	144	1000	3,17
	7.97	176	156	1720	2,86
	9.47	148	167	1760	2,59
	10.11	138	170	1820	2,46
	11.83	118	183	1810	2,35
	13.25	106	190	1880	2,03
	15.60	90	200	2010	1,83
	18.05	78	200	2390	1,57
	19.31	73	200	2570	1,47
	22.27	63	200	2970	1,28
	26.03	54	185	3860	1,1
	28.32	49	200	3690	1,01
3-stage					
	24.43	57	200	3240	1,17
	28.73	49	200	3740	0,99
	32.40	43	200	4120	0,88
	36.72	38	200	4540	0,77
	39.17	36	200	4760	0,73
	44.81	31	200	4950	0,64
	48.08	29	200	4950	0,59
	55.76	25	200	4950	0,51
	61.18	23	200	4950	0,45
	69.33	20	200	4950	0,39
	73.96	19	200	4950	0,37
	84.61	17	200	4950	0,32
	90.77	15	200	4950	0,3
	105.28	13	200	4950	0,26
	123.66	11	200	4950	0,22
	134.82	10	200	4950	0,2

MSR47 300Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	3.83	366	144	2090	5,56
	4.34	323	146	2190	4,94
	4.85	289	150	2280	4,58
	5.64	248	155	2410	4,06
	6.00	233	156	2740	3,86
	6.96	201	159	2620	3,86
	7.78	180	163	2720	3,09
	8.01	175	205	2690	3,79
	9.07	154	220	2780	3,59
	10.15	138	230	2890	3,35
	11.79	119	245	3020	3,06
	12.54	112	250	3080	2,94
	14.56	96	265	3230	2,66
	16.22	86	275	3350	2,52
	17.89	78	290	3390	2,38
	19.27	73	295	3530	2,24
	21.81	64	300	3710	2,01
	23.28	60	300	3820	1,89
	26.74	52	300	4050	1,61
	31.13	45	220	4610	1,02
	33.79	41	240	4690	1,02
3-stage					
	23.59	59	300	3840	1,86
	26.70	52	300	4050	1,65
	29.88	47	300	4240	1,47
	34.73	40	300	4520	1,27
	36.93	38	300	4630	1,2
	42.87	33	300	4930	1,03
	47.75	29	300	5150	0,92
	52.69	27	300	5420	0,82
	56.73	25	300	5420	0,77
	64.21	22	300	5420	0,68
	66.54	20	300	5420	0,63
	76.23	18	300	5420	0,57
	84.90	16	300	5420	0,52
	93.68	15	300	5420	0,46
	100.86	14	300	5420	0,43
	114.17	12	300	5420	0,38
	121.87	11	300	5420	0,36
	139.99	10	300	5420	0,31
	162.94	8.6	300	5420	0,26
	176.88	7.9	300	5420	0,23

MSR57 450Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	4.39	319	280	1900	9,49
	5.05	277	305	1730	8,97
	5.82	241	320	1820	8,15
	6.41	218	335	1770	7,79
	7.53	186	360	1950	6,83
	7.97	176	355	2020	6,56
	9.06	155	375	2010	6,11
	9.35	150	370	3180	5,86
	10.79	130	390	3330	5,33
	11.88	118	405	3430	5,03
	13.95	100	430	3610	4,5
	14.77	95	435	3690	4,35
	16.79	63	450	3860	3,96
	18.60	75	450	4050	3,6
	21.93	64	450	4370	3,05
	24.99	56	450	4640	2,63
	26.31	53	450	4750	2,51
3-stage					
	26.97	52	450	4800	2,48
	30.18	46	450	5050	2,2
	35.07	40	450	5390	1,87
	37.30	38	450	5530	1,77
	43.30	32	450	5900	1,52
	48.23	29	450	6170	1,38
	53.22	26	450	6430	1,24
	57.29	24	450	6630	1,15
	64.85	22	450	6980	1,02
	69.23	20	450	7110	0,95
	80.55	17	450	7110	0,81
	89.71	16	450	7110	0,72
	98.99	14	450	7110	0,65
	106.58	13	450	7110	0,61
	120.63	12	450	7110	0,54
	128.77	11	450	7110	0,5
	147.92	9.5	450	7110	0,44
	172.17	8.1	450	7110	0,38
	186.89	7.5	450	7110	0,35

MSR67 600Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	4.29	326	270	5000	9,31
	4.93	284	290	5210	8,72
	5.70	246	310	5450	8,1
	6.27	223	330	5590	7,81
	7.36	190	370	5790	7,47
	7.79	180	380	5830	7,24
	8.70	161	440	5960	7,49
	10.00	140	470	6220	6,96
	11.54	121	500	6500	6,45
	12.70	110	520	6650	6,12
	14.91	94	550	6980	5,5
	15.79	89	560	7130	5,27
	17.95	78	590	7290	4,87
	19.89	70	600	7170	4,49
	23.44	60	560	7640	3,5
	26.72	52	540	7850	2,97
	28.13	50	540	7850	2,83
3-stage					
	28.83	49	520	8050	2,66
	32.27	43	540	7850	2,48
	37.50	37	570	7530	2,24
	39.68	35	580	7410	2,13
	46.29	30	600	7170	1,91
	51.56	27	600	7170	1,71
	56.69	25	600	7170	1,55
	61.26	23	600	7170	1,43
	69.75	20	600	7170	1,26
	74.17	19	600	7170	1,19
	31717	16	600	7170	1,02
	95.91	15	600	7170	0,91
	105.83	13	600	7170	0,82
	113.94	12	600	7170	0,77
	128.97	11	600	7170	0,67
	138.67	10	600	7170	0,63
	158.14	8.9	600	7170	0,55
	184.07	7.6	600	7170	0,47
	199.81	7.0	600	7170	0,44

MSR77 820Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	5.31	264	510	3990	14,38
	5.99	234	540	3990	13,5
	6.79	206	580	3850	12,76
	7.74	181	610	3940	11,77
	8.59	163	630	4110	11
	9.64	145	630	6300	9,59
	10.88	129	660	6490	8,8
	12.33	114	690	6740	8,28
	14.05	100	720	7050	7,45
	15.60	90	740	7390	6,94
	17.82	79	780	7620	6,41
	18.80	74	780	7980	6,08
	21.43	65	820	8250	5,59
	23.37	60	820	8870	5,13
3-stage					
	25.23	55	780	10100	4,54
	29.00	48	820	9920	4,13
	33.47	42	620	9920	3,59
	36.83	38	820	9920	3,26
	43.26	32	820	9920	2,76
	45.81	31	820	9920	2,62
	19176	27	820	9920	2,28
	57.68	24	820	9920	2,05
	65.77	21	620	9920	1,81
	77.24	18	820	9920	1,54
	81.80	17	620	9920	1,45
	92.97	15	820	9920	1,27
	102.99	14	820	9920	1,15
	121.42	12	820	9920	0,98
	138.39	10	820	9920	0,85
	145.67	9.6	820	9920	0,81
	166.59	8.4	820	9920	0,72
	195.24	7.2	820	9920	0,61

MSR87 — 1550Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	5.3	254	910	8980	25,75
	6.39	218	1020	9450	23,91
	7.13	196	1070	9780	22,61
	8.22	170	1160	10200	21,22
	9.14	153	1210	10500	19,73
	9.90	141	1180	10400	17,78
	11.93	117	1230	11200	15,38
	13.33	105	1280	11600	14,37
	15.35	91	1340	12100	13,04
	17.08	82	1390	12600	12,23
	19.10	73	1440	13000	11,31
	21.51	65	1550	13600	10,79
	23.40	60	1550	13900	9,91
	27.80	50	1550	15000	8,36
	31.40	45	1550	7820	7,27
	34.40	41	1550	9480	6,6
3-stage					
	27.88	50	1550	15100	8,36
	32.66	43	1550	16000	7,1
	36.84	38	1550	16800	6,31
	41.74	34	1550	16900	5,57
	47.58	29	1550	16900	4,87
	52.82	27	1550	13500	4,32
	60.35	23	1550	15200	3,75
	63.68	22	1550	15800	3,55
	72.57	19	1550	16900	3,13
	81.92	17	1550	16900	2,77
	93.38	15	1550	16900	2,44
	103.65	14	1550	16900	2,19
	118.43	12	1550	16900	1,92
	124.97	11	1550	16900	1,81
	142.41	9.8	1550	16900	1,59
	155.34	9.0	1550	16900	1,46
	181.77	7.7	1550	16900	0,8
	205.71	6.8	1550	16900	0,71
	216.54	6.5	1550	16900	0,67
	246.54	5.7	1550	16900	0,59

MSR97 — 3000Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	4.50	311	1630	9500	55,6
	5.20	269	1780	9850	52,56
	6.21	225	1890	10500	46,72
	7.12	197	2000	10900	43,14
	8.39	167	2030	11700	37,22
	9.29	151	2030	12200	33,58
	10.83	129	2090	12100	29,66
	12.39	113	2190	12700	27,07
	14.62	96	2300	13400	24,1
	16.17	87	2400	13800	22,76
	18.24	77	2500	14400	20,99
	20.14	70	2610	14800	19,87
	22.37	63	2720	15300	18,13
	25.03	56	2830	15900	16,77
	27.19	51	2560	8380	14,52
	32.05	44	2560	10600	11,91
3-stage					
	27.58	51	2670	16900	14,54
	33.25	42	2890	17900	12,99
	37.13	38	3000	18600	12
	42.78	33	3000	19800	10,43
	47.58	29	3000	19800	9,38
	53.21	26	3000	19800	8,39
	59.92	23	3000	19800	7,45
	65.21	21	3000	19800	6,86
	72.17	19	3000	19800	6,19
	83.15	17	3000	19800	5,36
	92.48	15	3000	19800	4,82
	103.44	14	3000	19800	4,32
	116.48	12	3000	19800	3,83
	126.75	11	3000	19800	3,47
	150.78	9.3	3000	19800	2,92
	170.02	8.2	3000	19800	2,58
	186.30	7.5	3000	19800	2,36
	216.28	6.5	3000	19800	2,04
	241.25	5.8	3000	19800	1,82
	255.71	5.5	3000	19800	1,72
	289.74	4.8	3000	19800	1,47

MSR107 — 4300Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	4.92	285	2900	11300	90,63
	5.82	241	2970	12100	78,16
	6.66	210	2970	12800	68,54
	7.86	178	2970	13800	58,24
	8.56	164	4300	11300	77,25
	10.13	138	4300	12400	65,48
	11.59	121	4300	13300	57,08
	13.66	102	4300	14400	48,5
	15.65	89	4300	15400	42,3
	18.21	77	4300	16600	36,34
	20.07	70	4300	17300	32,99
	22.62	62	4300	18300	28,54
	24.90	56	4300	19200	25,8
	27.58	51	4300	20100	23,37
	30.77	45	4300	21100	20,94
3-stage					
	29.49	47	4300	20700	21,79
	35.26	40	4300	22400	18,22
	40.37	35	4300	23800	15,97
	47.63	29	4300	25500	13,49
	52.68	27	4300	26600	12,22
	59.41	24	4300	28000	10,82
	65.60	21	4300	29200	9,8
	72.88	19	4300	29500	8,84
	78.57	18	4300	29500	8,19
	92.70	15	4300	29500	6,95
	102.53	14	4300	29500	6,18
	115.63	12	4300	29500	5,5
	127.68	10	4300	29500	4,98
	141.83	9.9	4300	29500	4,48
	156.68	8.8	4300	29500	4,01
	172.34	8.1	4300	29500	1,78
	203.16	6.9	4300	29500	1,51
	229.95	6.1	4300	29500	1,33
	251.16	5.6	4300	29500	1,22

MSR137 — 8000Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	5.15	272	4600	34500	111,29
	6.38	219	5110	35900	100,2
	7.59	184	5110	39000	84,23
	8.71	161	7840	27600	112,54
	10.79	130	8000	31100	92,66
	12.83	109	8000	34700	77,92
	14.51	96	8000	37300	68,77
	16.80	83	8000	40600	59,41
	19.04	74	8000	43500	52,4
	22.00	64	8000	47100	45,37
	24.12	58	8000	49400	41,38
	29.57	47	7780	53900	40,37
3-stage					
	27.83	50	7680	54100	34,44
	32.91	43	8000	53400	30,34
	37.65	37	8000	53400	26,52
	44.39	32	8000	53400	27,16
	50.66	28	8000	53400	23,72
	59.17	24	8000	53400	20,37
	65.20	21	8000	53400	18,49
	73.49	19	8000	53400	16,42
	80.91	17	8000	53400	14,92
	88.70	16	8000	53400	13,6
	103.20	14	8000	53400	11,69
	113.72	12	8000	53400	10,6
	128.18	11	8000	53400	9,41
	141.12	9.9	8000	53400	8,54
	156.31	9.0	8000	53400	7,67
	174.40	8.0	8000	53400	6,86
	188.45	7.4	8000	53400	6,36
	222.60	6.3	8000	53400	5,38

MSR147 — 13000Nm

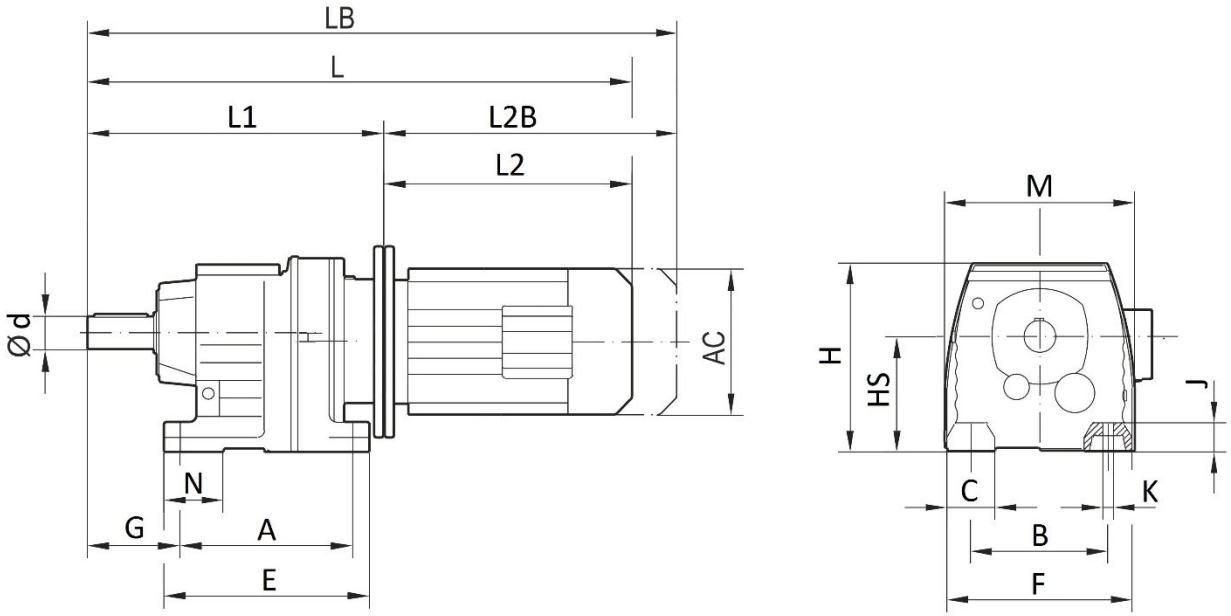
	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	5.00	280	8670	49300	269,07
	5.89	238	8670	53200	228,16
	7.25	193	8670	58400	185,34
	8.26	169	13000	49900	243,75
	9.74	144	13000	54400	206,71
	11.99	117	13000	60400	168,1
	13.91	101	12600	63400	140,35
	15.65	90	13000	62700	128,85
	18.04	78	10500	67000	90
	20.44	68	12000	64600	90,76
3-stage					
	24.19	58	11900	64700	75,8
	29.95	47	13000	62700	66,78
	35.64	39	13000	62700	56,12
	40.29	35	13000	62700	49,68
	46.65	30	13000	62700	42,9
	52.87	26	13000	62700	37,86
	61.09	23	13000	62700	32,77
	66.99	21	13000	62700	29,77
	72.09	19	13000	62700	27,86
	83.47	17	13000	62700	23,93
	94.60	15	13000	62700	21,01
	109.31	13	13000	62700	18,22
	119.86	12	13000	62700	16,53
	146.91	9.5	13000	62700	13,54
	168.81	8.6	13000	62700	12,19

MSR167 — 18000Nm

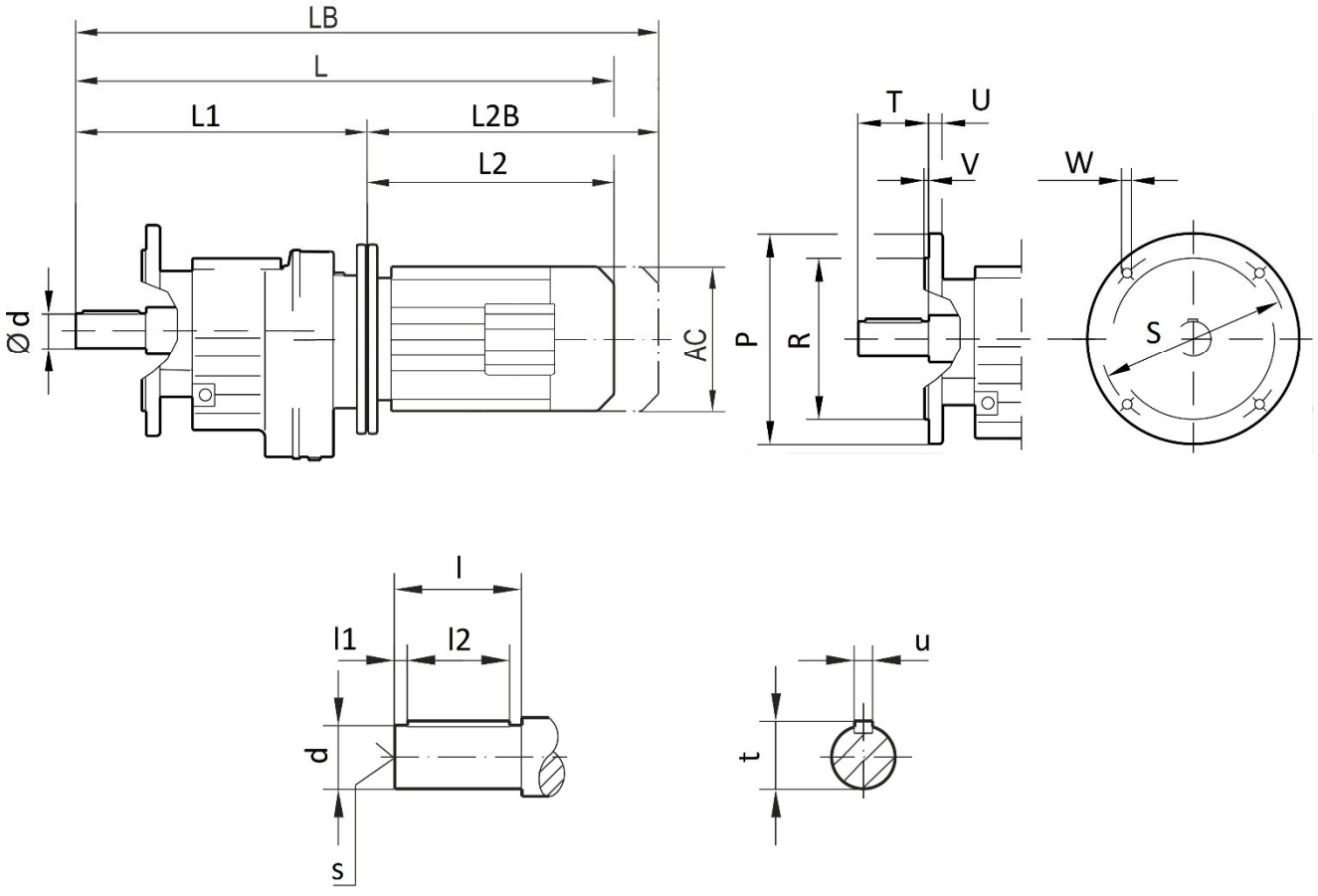
	i	n2 [1/min]	Mmax [Nm]	Frad [N]	Pn [kW]
2-stage					
	10.24	137	17000	82500	257,58
	11.99	117	17000	88700	219,83
	14.48	97	18000	93800	192,63
	16.98	82	15000	108900	136,92
	19.03	74	16000	111400	130,91
	21.85	64	13000	120000	92,13
	24,57	57	14000	120000	88,11
	30.71	46	10000	120000	50,14
3-stage					
	23.71	59	18000	116500	116,88
	27.96	50	18000	120000	99,08
	34.41	41	18000	120000	80,48
	39.92	35	18000	120000	69,41
	44.87	31	18000	120000	61,78
	51.76	27	18000	120000	53,47
	58.65	24	18000	120000	47,37
	67.40	21	18000	120000	41,22
	73.70	19	18000	120000	37,5
	82.91	17	18000	120000	33,3
	93.19	15	18000	120000	29,73
	107.49	13	18000	120000	25,62
	121.81	11	18000	120000	22,65
	139.98	10	18000	120000	19,7
	153.07	9.1	18000	120000	18
	186.93	7.5	18000	120000	14,8
	229.71	6.1	18000	120000	12

Dimensions

MSR



MSRF



Gear size	A	B	E	F	G	H	HS	J	K	N	C	Shaft dimensions						
												d	l	l1	l2	s	t	U
MSR37..	130	110	160	145	75	151	90	18	9	40	35	25k6	50	3,5	40	M10	28	8
MSR47..	165	135	195	170	90	187	115	24	13,5	50	42	30k6	60	3,5	50	M10	33	8
MSR57..	165	135	200	190	100	187	115	24	13,5	60	55	35k6	70	7	56	M12	38	10
MSR67..	195	150	235	210	100	212	130	30	14	60	60	35k6	70	7	56	M12	38	10
MSR77..	205	170	245	230	115	228	140	30	17,5	60	60	40k6	80	8	70	M16	43	12
MSR87..	260	215	310	290	140	295	180	45	17,5	90	75	50k6	100	10	80	M16	53,5	14
MSR97..	310	250	365	340	160	368	225	55	22	100	90	60m6	120	5	110	M20	64	18
MSR107..	370	290	440	400	185	408	250	65	26	125	110	70m6	140	7,5	125	M20	74,5	20
MSR137..	410	340	490	450	220	495	315	70	33	130	110	90m6	170	5	160	M24	95	25
MSR147..	500	380	590	530	260	565	355	80	39	150	150	110m6	210	15	180	M24	116	28
MSR167..	560	500	670	660	270	675	425	100	39	160	160	120m6	210	5	200	M24	127	32

Flange dimensions for MSRF gear units

Gear size	P	R	S	T	U	V	W
MSR37..	160	110	130	50	10	3,5	9
MSR47..	160	110	130	60	10	3,5	9
MSR57..	200	130	165	70	12	3,5	11
MSR67..	200	130	165	70	12	3,5	11
MSR77..	250	180	215	80	15	4	13,5
MSR87..	300	230	265	100	16	4	13,5
MSR97..	350	250	300	120	18	5	17,5
MSR107..	350	250	300	140	20	5	17,5
MSR137..	450	350	400	170	22	5	17,5
MSR147..	450	350	400	170	22	5	17,5
MSR167..	550	450	500	210	25	5	17,5

Gear size	Motor size	L1	Gearmotor dimensions				AC
			with standard motor		with brake motor		
			L2	L	L2B	LB	
MSR37..	IEC63	273	197	470	219	492	130
	IEC71	273	211	484	235	508	147
	IEC80	307	250	557	276	583	163
	IEC90S	307	262	569	290	597	183
	IEC90L	307	287	594	290	597	183
MSR47..	IEC63	301	197	498	219	520	130
	IEC71	301	211	512	235	536	147
	IEC80	334	250	584	276	610	163
	IEC90S	334	262	596	290	624	183
	IEC90L	334	287	621	290	624	183
	IEC100	369	309	678	348	717	205
MSR57..	IEC63	323	197	520	219	542	130
	IEC71	323	211	534	235	558	147

Gear size	Motor size	L1	Gearmotor dimensions				AC
			with standard motor		with brake motor		
			L2	L	L2B	LB	
	IEC80	356	250	606	276	632	163
	IEC90S	356	262	618	290	646	183
	IEC90L	356	287	643	290	646	183
	IEC100	391	309	700	348	739	205
MSR67..	IEC63	346	197	543	219	565	130
	IEC71	346	211	557	235	581	147
	IEC80	379	250	629	276	655	163
	IEC90S	379	262	641	290	669	183
	IEC90L	379	287	666	290	669	183
	IEC100	414	309	723	348	762	205
	IEC112	414	335	749	379	793	229
MSR77..	IEC63	360	197	557	219	579	130
	IEC71	360	211	571	235	595	147
	IEC80	392	250	642	276	668	163
	IEC90S	392	262	654	290	682	183
	IEC90L	392	287	679	290	682	183
	IEC100	426	309	735	348	774	205
	IEC112	426	335	761	379	805	229
	IEC132S	479	357	836	407	886	265
	IEC132M	479	395	874	445	924	265
	IEC132L	479	421	900	471	950	265
MSR87..	IEC80	459	250	709	276	735	163
	IEC90S	459	262	721	290	749	183
	IEC90L	459	287	746	290	749	183
	IEC100	493	309	802	348	841	205
	IEC112	493	335	828	379	872	229
	IEC132S	546	357	903	407	953	265
	IEC132M	546	395	941	445	991	265
	IEC132L	546	421	967	471	1017	265
	IEC160M	604	549	1153	609	1213	330
	IEC160L	604	604	1208	664	1268	330
	IEC180M	604	628	1232	698	1302	380
	IEC180L	604	668	1272	738	1342	380
MSR97..	IEC100	556	309	865	348	904	205
	IEC112	556	335	891	379	935	229
	IEC132S	609	357	966	407	1016	265
	IEC132M	609	395	1004	445	1054	265
	IEC132L	609	421	1030	471	1080	265
	IEC160M	667	549	1216	609	1276	330
	IEC160L	667	604	1271	664	1331	330
	IEC180M	667	628	1295	698	1365	380
	IEC180L	667	668	1335	738	1405	380
	IEC200	708	660	1368	788	1448	400
	IEC225S	723	680	1403	780	1503	470
	IEC225M	723	705	1428	805	1528	470
MSR107..	IEC100	605	309	914	348	953	205

Gear size	Motor size	L1	Gearmotor dimensions				AC
			with standard motor		with brake motor		
			L2	L	L2B	LB	
	IEC112	605	335	940	379	984	229
	IEC132S	658	357	1015	407	1065	265
	IEC132M	658	395	1053	445	1103	265
	IEC132L	658	421	1079	471	1129	265
	IEC160M	716	549	1265	609	1325	330
	IEC160L	716	604	1320	664	1380	330
	IEC180M	716	628	1344	698	1414	380
	IEC180L	716	668	1384	738	1454	380
	IEC200	757	660	1417	740	1497	400
	IEC225S	772	680	1452	780	1552	470
	IEC225M	772	705	1477	805	1577	470
MSR137..	IEC132S	745	357	1102	407	1152	265
	IEC132M	745	395	1140	445	1190	265
	IEC132L	745	421	1166	471	1216	265
	IEC160M	803	549	1352	609	1412	330
	IEC160L	803	604	1407	664	1467	330
	IEC180M	803	628	1431	698	1501	380
	IEC180L	803	668	1471	738	1541	380
	IEC200	844	660	1504	740	1584	400
	IEC225S	859	680	1539	780	1639	470
	IEC225M	859	705	1564	805	1664	470
MSR147..	IEC132S	843	357	1200	407	1250	265
	IEC132M	843	395	1238	445	1288	265
	IEC132L	843	421	1264	471	1314	265
	IEC160M	901	549	1450	609	1510	330
	IEC160L	901	604	1505	664	1565	330
	IEC180M	901	628	1529	698	1599	380
	IEC180L	901	668	1569	738	1639	380
	IEC200	942	660	1602	740	1682	400
	IEC225S	957	680	1637	780	1737	470
	IEC225M	957	705	1662	805	1762	470
	IEC250	1031	770	1801	870	1901	510
	IEC280S	1031	845	1876	-	-	547
	IEC280M	1031	895	1926	-	-	547
MSR167..	IEC160M	988	549	1537	609	1597	330
	IEC160L	988	604	1592	664	1652	330
	IEC180M	988	628	1616	698	1686	380
	IEC180L	988	668	1656	738	1726	380
	IEC200	1029	660	1689	740	1769	400
	IEC225S	1044	680	1724	780	1824	470
	IEC225M	1044	705	1749	805	1849	470
	IEC250	1118	770	1888	870	1988	510
	IEC280S	1118	845	1963	-	-	547
	IEC280M	1118	895	2013	-	-	547

Notes

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