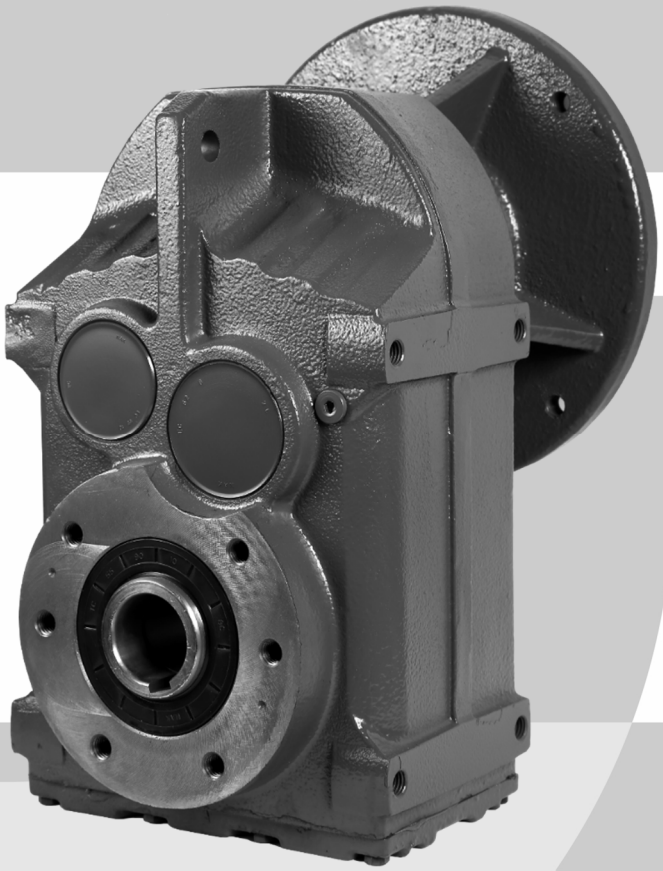
MORGENSEN
DRIVE WITH YOU



USER MANUAL
Parallel shaft helical gearbox

MSF

MSF series

Parallel shaft 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	F	3 7	2	FA	12,87	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

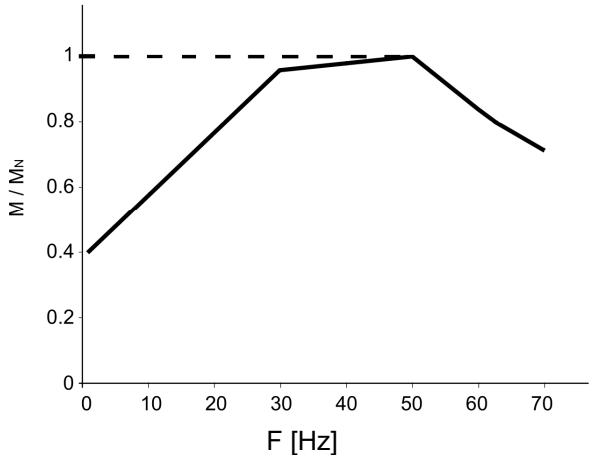
- In addition to its aesthetic appearance, the exterior paint also provides a high degree of corrosion protection for the gear unit.

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



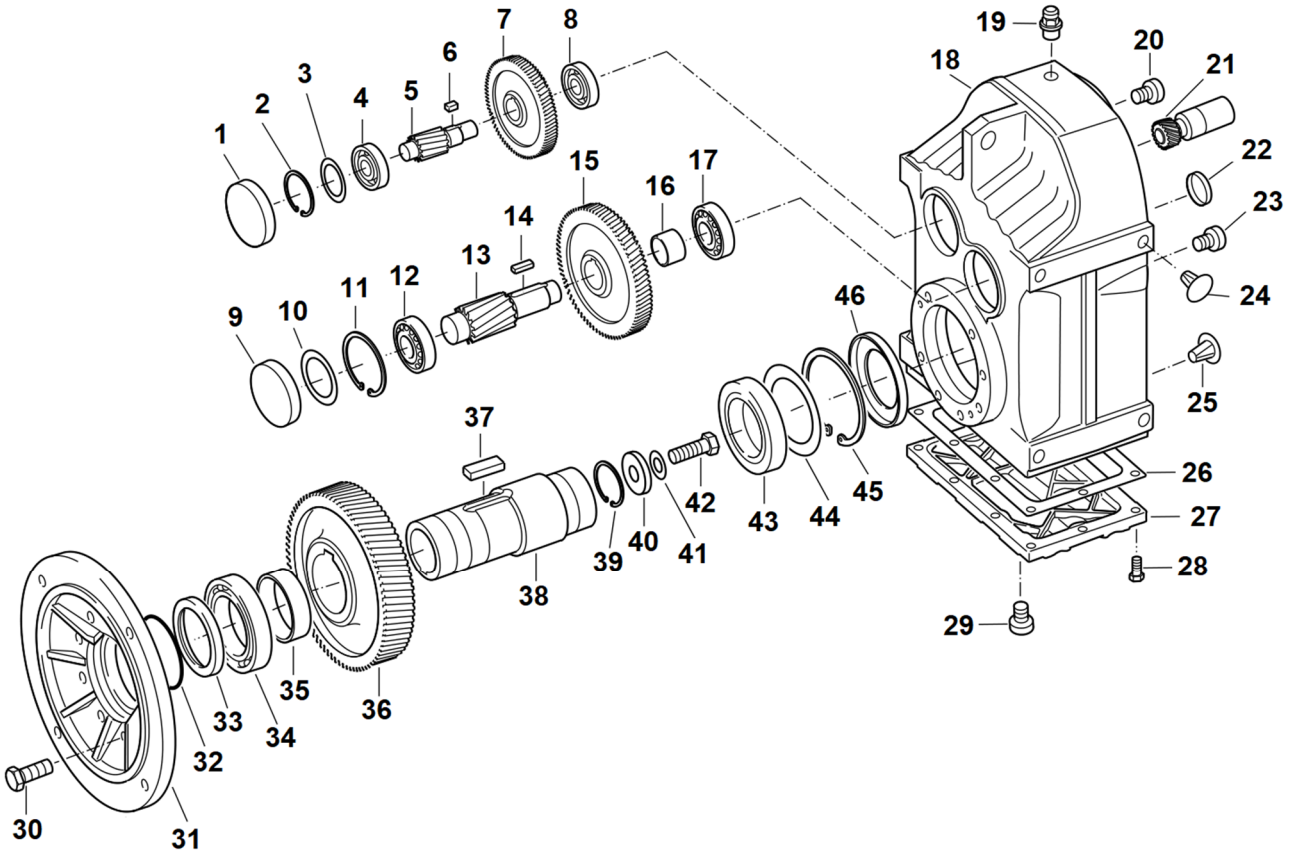
Energy saving

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

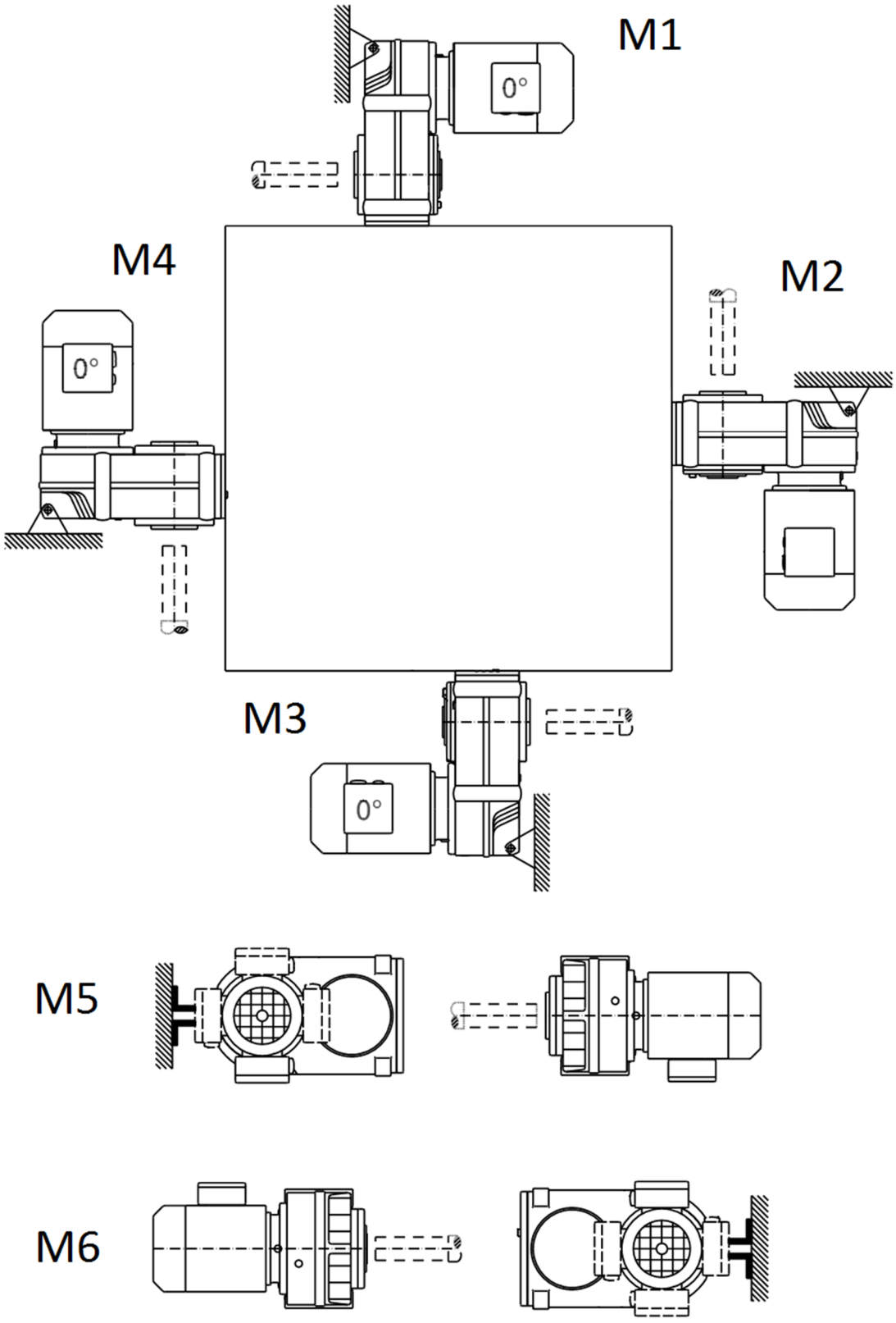
- Brake motor
- Backstop
- Explosion-proof design
- External cooling
- PTO and PTC thermal protection
- Encoder
- Class H insulation
- Higher degree of protection (IP65, IP56, IP66)
- Reinforced bearing
- Custom drive shaft drives
- Rain Cover

Parts list



1	closing cap	13	pinion	25	closing plug	37	key
2	retaining ring	14	key	26	gasket	38	hollow shaft
3	shim	15	gear	27	inspection cover	39	retaining ring
4	bearing	16	adjusting shim	28	hex head screw	40	shim
5	pinion	17	bearing	29	screw plug	41	spring shim
6	key	18	gear unit housing	30	hex head screw	42	hex head screw
7	gear	19	breather valve	31	output flange	43	bearing
8	bearing	20	screw plug	32	Shield ring	44	shim
9	closing cap	21	gear	33	oil seal	45	retaining ring
10	shim	22	closing cap	34	bearing	46	oil seal
11	retaining ring	23	screw plug	35	adjusting shim		
12	bearing	24	closing plug	36	gear		

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

MSF37					200Nm
	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	3,77	371	105	1970	4,34
	4,22	332	110	2030	4,07
	4,9	286	120	2100	3,82
	5,21	269	125	2120	3,74
	6,05	231	135	2190	3,48
	6,74	208	140	2270	3,24
	7,44	188	145	2350	3,04
	8,01	175	170	2380	3,31
	8,97	156	175	2460	3,04
	10,42	134	185	2560	2,77
	11,08	126	190	2620	2,67
	12,87	109	200	2750	2,42
	14,33	98	200	2910	2,18
	15,81	89	200	3070	1,97
	17,03	82	200	3160	1,83
	19,27	73	200	3390	1,62
	20,57	68	200	3500	1,52
	23,63	59	200	3740	1,32
3-stage					
	23,88	59	200	3760	1,35
	28,09	50	200	4060	1,15
	31,69	44	200	4290	1,02
	35,91	39	200	4290	0,90
	38,31	37	200	4290	0,84
	43,83	32	200	4290	0,74
	47,02	30	200	4290	0,69
	51,7	27	200	4290	0,62
	54,54	26	200	4290	0,59
	58,32	24	200	4290	0,55
	66,09	21	200	4290	0,49
	70,5	20	200	4290	0,46
	80,65	17	200	4290	0,40
	86,35	16	200	4290	0,37
	100,36	14	200	4290	0,32
	117,88	12	200	4290	0,27
	128,51	11	200	4290	0,25

MSF47 400Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	4,99	281	320	2310	10,00
	5,76	243	340	2390	9,21
	6,34	221	350	2470	8,61
	7,44	188	380	2530	7,97
	7,88	178	380	2630	7,52
	8,96	156	330	3250	5,74
	10,97	128	400	3440	5,69
	12,66	111	400	3740	4,93
	13,93	101	400	3950	4,48
	16,36	86	400	4320	3,81
	17,33	81	400	4450	3,60
	19,7	71	400	4770	3,17
	21,82	64	400	5030	2,86
	25,72	54	400	5470	2,43
	29,32	48	400	5830	2,13
	30,86	45	400	5920	2,02
3-stage					
	28,88	48	400	5790	2,23
	34,29	41	400	5920	1,88
	36,61	38	400	5920	1,76
	42,86	33	400	5920	1,50
	48	29	400	5920	1,34
	56,49	25	400	5920	1,14
	65,36	21	400	5920	0,99
	68,09	21	400	5920	0,95
	79,72	18	400	5920	0,81
	89,29	16	400	5920	0,72
	105,09	13	400	5920	0,61
	121,57	12	400	5920	0,53
	130,07	11	400	5920	0,50
	150,06	9	400	5920	0,43
	175,38	8	400	5920	0,37
	190,76	7	400	5920	0,34

MSF57 600Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	5,18	270	415	3460	12,49
	5,98	234	420	3730	10,95
	6,58	213	420	3940	9,95
	7,73	181	420	4310	8,47
	8,19	171	420	4450	8,00
	9,31	150	420	4760	7,04
	10,64	132	600	4320	8,79
	12,29	114	600	4710	7,61
	13,52	104	600	4980	6,92
	15,88	88	600	5450	5,89
	16,81	83	600	5620	5,57
	19,11	73	600	6020	4,90
	21,17	66	600	6350	4,42
	24,96	56	575	7060	3,59
	28,45	49	535	7760	2,93
	29,94	47	545	7890	2,84
	34,24	41	500	8670	2,28
	40,13	35	290	9710	1,13
3-stage					
	30,15	46	590	7650	3,15
	35,79	39	600	8200	2,70
	38,21	37	600	8200	2,53
	44,78	31	600	8200	2,16
	50,1	28	600	8200	1,93
	58,97	24	600	8200	1,64
	68,22	21	600	8200	1,42
	72,98	19	600	8200	1,32
	79,72	18	600	8200	1,21
	83,46	17	600	8200	1,16
	93,47	15	600	8200	1,03
	110,01	13	600	8200	0,88
	127,27	11	600	8200	0,76
	136,15	10	600	8200	0,71
	157,09	9	600	8200	0,62
	183,6	8	600	8200	0,53
	199,7	7	600	8200	0,48

MSF67 820Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	3,97	353	500	8390	19,64
	4,66	300	560	8590	18,74
	5,25	267	590	8850	17,53
	5,95	235	610	9200	15,99
	6,78	206	620	9660	14,26
	7,53	186	610	10100	12,63
	8,6	163	570	10900	10,34
	9,08	154	530	11400	9,10
	9,66	145	820	10300	13,24
	11,31	124	820	10300	11,31
	12,76	110	820	10300	10,02
	14,46	97	820	10300	8,84
	16,48	85	820	10300	7,76
	18,29	77	820	10300	6,99
	20,9	67	820	10300	6,12
	22,05	63	820	10300	5,80
	25,13	56	820	10300	5,09
	27,41	51	820	10300	4,67
	32,08	44	820	10300	3,99
	36,3	39	820	10300	3,52
3-stage					
	34,01	41	740	10300	3,51
	39,26	36	780	10300	3,20
	43,2	32	820	10300	3,06
	50,74	28	820	10300	2,60
	53,73	26	820	10300	2,46
	61,07	23	820	10300	2,16
	67,65	21	820	10300	1,95
	79,78	18	820	10300	1,66
	90,59	15	820	10300	1,46
	95,94	15	820	10300	1,38
	109,04	13	820	10300	1,21
	120,79	12	820	10300	1,09
	142,4	10	820	10300	0,93
	162,31	9	820	10300	0,81
	170,85	8	820	10300	0,77
	195,39	7	820	10300	0,68
	228,99	6	820	10300	0,58

MSF77 1500Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	4,28	327	1010	10200	36,80
	5,16	271	1080	10700	32,64
	5,76	243	1080	11300	29,24
	6,64	211	1080	12000	25,37
	7,39	189	1080	12500	22,79
	8,26	169	1080	13100	20,39
	9,3	151	1080	13800	18,11
	10,93	128	1500	14200	21,40
	12,2	115	1500	14900	19,17
	14,06	100	1500	15700	16,64
	15,64	90	1500	15700	14,96
	17,49	80	1500	15700	13,38
	19,7	71	1500	15700	11,87
	21,43	65	1500	15700	10,92
	25,5	55	1500	15700	9,17
	28,75	49	1430	15700	7,76
	31,51	44	1380	15700	6,83
	36,58	38	1110	15700	4,73
3-stage					
	25,54	55	1450	15700	9,15
	29,91	47	1500	15700	8,08
	33,74	41	1500	15700	7,16
	38,23	37	1500	15700	6,32
	43,58	32	1500	15700	5,54
	48,37	29	1500	15700	5,00
	55,27	25	1500	15700	4,37
	58,32	24	1500	15700	4,14
	66,46	21	1500	15700	3,64
	72,5	19	1500	15700	3,33
	85,52	16	1500	15700	2,83
	94,93	15	1500	15700	2,55
	108,46	13	1500	15700	2,23
	114,45	12	1500	15700	2,11
	130,42	11	1500	15700	1,85
	142,27	10	1500	15700	1,70
	166,47	8	1500	15700	1,45
	188,4	7	1500	15700	1,28
	198,31	7	1500	15700	1,22
	225,79	6	1500	15700	1,07
	262,93	5	1500	15700	0,92
	281,17	5	1500	15700	0,86

MSF87 3000Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	4,12	340	1460	5980	55,27
	4,92	285	1530	6430	48,50
	5,63	249	1530	7020	42,38
	6,65	211	1530	7790	35,88
	7,35	190	1530	8280	32,46
	8,29	169	1530	8890	28,78
	9,58	146	2880	5050	46,88
	11,46	122	3000	5580	40,83
	13,12	107	3000	6370	35,66
	15,48	90	3000	7390	30,22
	17,12	82	3000	8040	27,33
	19,31	73	3000	8840	24,23
	21,32	66	3000	9530	21,94
	23,68	59	3000	10300	19,76
	26,5	53	3000	11100	17,66
	28,78	49	2450	13900	13,28
	33,92	41	2610	14600	12,00
3-stage					
	29,2	48	2510	13800	13,85
	35,19	40	2610	14900	11,95
	39,3	36	2720	15400	11,15
	45,28	31	2820	16200	10,03
	50,36	28	2940	16800	9,40
	56,75	25	3000	17700	8,52
	68,4	20	3000	19600	7,07
	76,39	18	3000	19800	6,33
	88,01	16	3000	19800	5,49
	97,89	14	3000	19800	4,94
	109,49	13	3000	19800	4,41
	123,29	11	3000	19800	3,92
	134,16	10	3000	19800	3,60
	159,61	9	3000	19800	3,03
	179,97	8	3000	19800	2,69
	197,2	7	3000	19800	2,45
	228,93	6	3000	19800	2,11
	255,37	5	3000	19800	1,89
	270,68	5	3000	19800	1,79

MSF97 4300Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	4,57	306	2060	10100	70,30
	5,23	268	2150	10600	64,11
	6,17	227	2250	11200	56,87
	7,07	198	2360	11700	52,06
	8,22	170	2360	12800	44,78
	9,06	155	2360	13600	40,62
	11,16	125	4100	10000	57,29
	12,77	110	4300	10500	52,51
	15,06	93	4300	11900	44,53
	17,25	81	4300	13200	38,88
	20,07	70	4300	14600	33,41
	22,11	63	4300	15600	30,33
	24,92	56	4300	16800	26,91
	27,44	51	4300	17900	24,44
	30,39	46	4300	19000	22,07
	33,91	41	4300	20300	19,78
	36,64	38	3070	25500	13,07
	43,28	32	3070	27600	11,06
3-stage					
	32,5	43	4300	19800	21,31
	36,86	38	4300	21900	18,79
	44,49	31	4300	23600	15,57
	52,49	27	4300	25800	13,20
	58,06	24	4300	27200	11,93
	60,31	23	4300	29900	11,49
	65,47	21	4300	29900	10,58
	72,29	19	4300	29900	9,58
	75,63	19	4300	29900	9,16
	86,59	16	4300	29900	8,00
	89,85	16	4300	29900	7,71
	97,58	14	4300	29900	7,10
	102,16	14	4300	29900	6,78
	112,99	12	4300	29900	6,13
	127,42	11	4300	29900	5,44
	140,71	10	4300	29900	4,92
	156,3	9	4300	29900	4,43
	174,87	8	4300	29900	3,96
	189,92	7	4300	29900	3,65
	223,48	6	4300	29900	3,10
	263,41	5	4300	29900	2,63
	276,77	5	4300	29900	2,50

MSF107 — 7680Nm

	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	6,22	189	4600	21100	96,94
	7,4	170	4800	23200	91,07
	8,37	167	4800	24000	89,44
	9,69	144	4910	25400	79,02
	9,96	141	6500	22900	101,78
	12,33	114	7000	24300	88,54
	14,67	95	7680	24700	81,64
	16,58	84	7840	26000	73,74
	19,2	73	7640	28100	62,06
	21,76	64	7840	30000	56,19
	25,14	56	7640	32200	47,39
	27,57	51	7840	33700	44,19
	33,79	41	7400	38300	34,15
3-stage					
	31,8	44	7680	36500	38,91
	37,61	37	7680	39500	32,90
	43,03	33	7680	42000	28,75
	50,73	28	7680	45100	24,39
	58,12	24	7680	47800	21,29
	67,62	19	7680	49800	16,60
	74,52	17	7680	49800	14,73
	83,99	16	7680	49800	14,12
	88,49	16	7680	49800	13,98
	92,47	15	7680	49800	13,38
	101,38	14	7680	49800	12,20
	117,94	12	7680	49800	10,49
	129,97	11	7680	49800	9,52
	148,49	9	7680	49800	8,33
	178,64	8	7680	49800	6,93
	181,28	8	7680	49800	6,82
	199,31	7	7680	49800	6,21
	215,37	7	7680	49800	5,74
	254,4	6	7680	49800	4,86

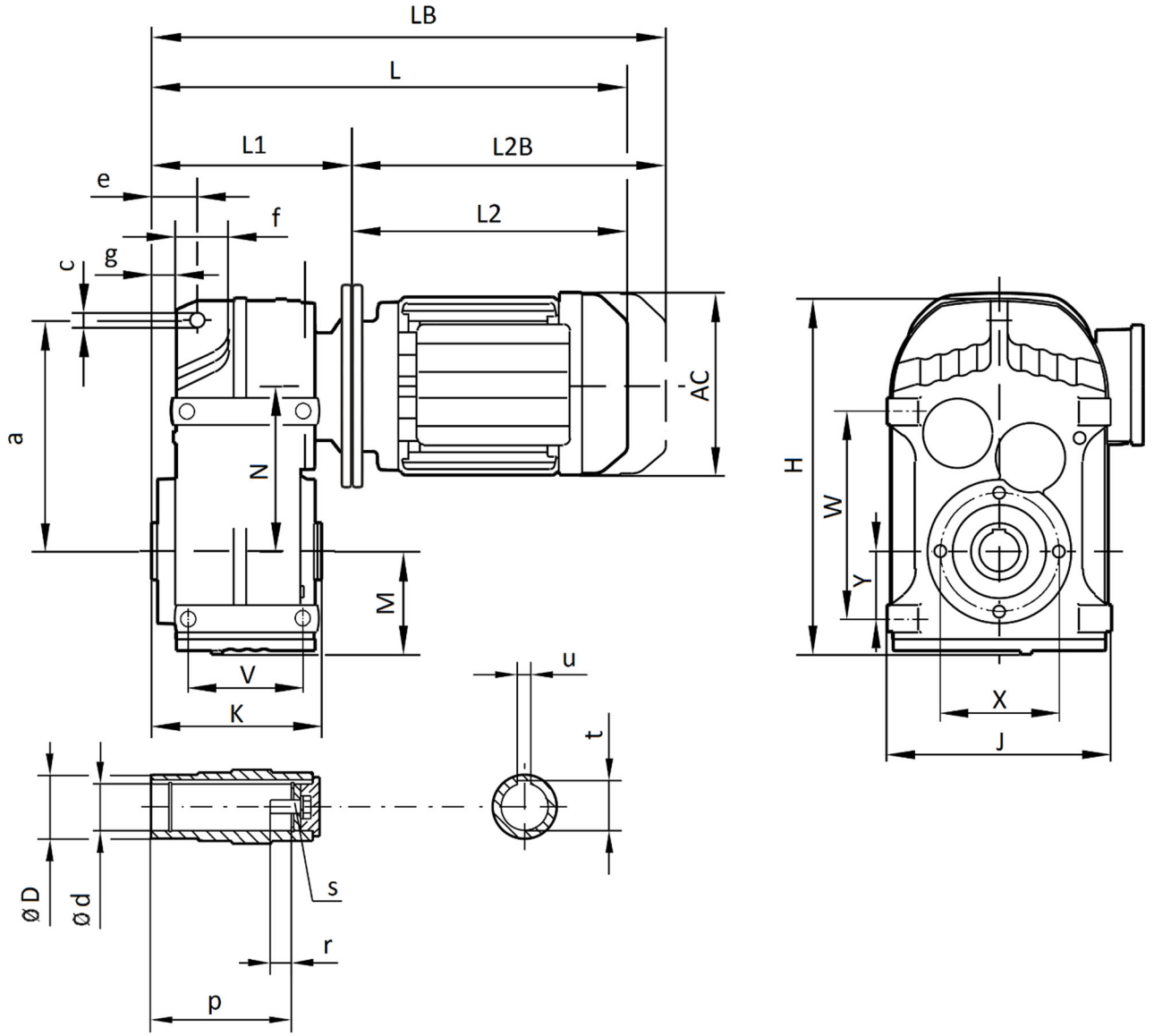
MSF127 — 12000Nm

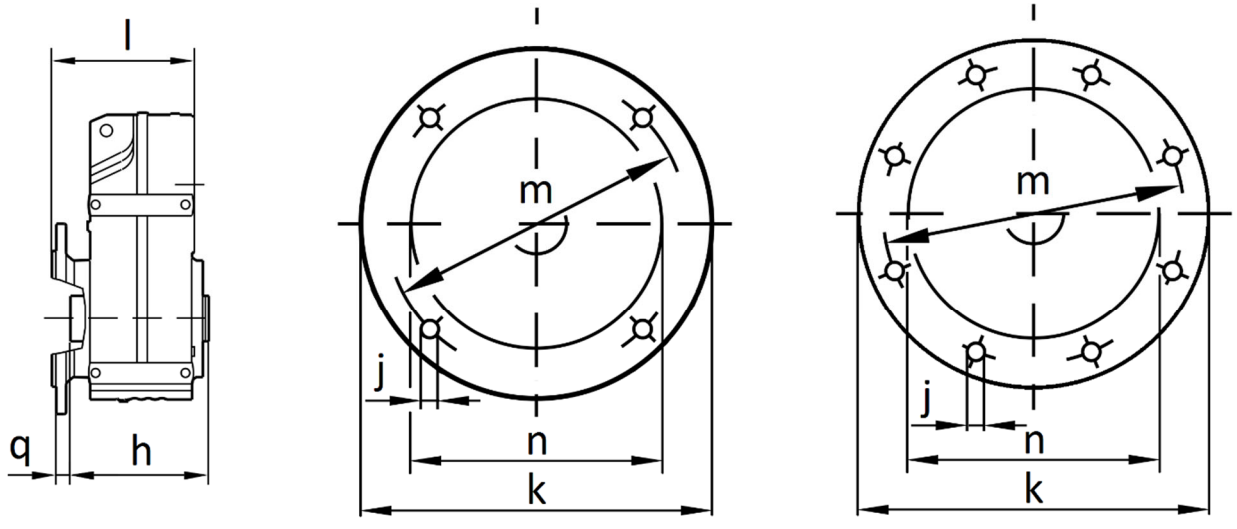
	i	n2 [1/min]	M max [Nm]	F rad [N]	Pn [kW]
2-stage					
	4,68	299	6000	29500	199,94
	5,52	254	6000	31700	169,52
	6,8	206	7000	32200	160,54
	7,88	178	6000	37000	118,75
	8,86	158	7000	36400	123,21
	10,19	137	9500	34000	145,39
	12,54	112	10000	36400	124,37
	14,65	96	11000	36200	117,10
	16,36	86	11000	39000	104,86
	16,87	83	11000	41900	101,69
	21,38	65	12000	42000	87,53
	24,57	57	8500	53300	53,95
	28,88	48	8500	55300	45,90
3-stage					
	25,3	55	12000	45700	76,41
	31,33	45	12000	50600	61,70
	37,28	38	12000	54800	51,85
	42,15	33	12000	57900	45,86
	48,8	29	12000	61800	39,61
	55,31	25	12000	65300	34,95
	63,91	22	12000	69400	30,25
	70,07	20	12000	72100	27,59
	75,41	19	12000	74300	25,64
	87,31	16	12000	78900	22,14
	98,95	14	12000	83000	19,54
	114,34	12	12000	88000	16,91
	125,37	11	12000	90000	15,42
	153,67	9	12000	90000	12,58
	170,83	8	12000	90000	11,32

MSF157 — 18000Nm

	i	n2 [1/min]	Mmax [Nm]	Frad [N]	Pn [kW]
2-stage					
	11,92	117	8000	40900	104,67
	13,96	100	10000	42500	111,71
	16,85	83	11000	44900	101,75
	19,77	71	17000	50900	134,10
	22,16	63	15000	51800	105,56
	25,43	55	18000	61500	110,39
	28,6	49	17000	60800	92,70
	35,75	39	18000	79300	78,52
	43,94	32	17000	87800	60,34
	53,55	22	16000	98300	39,20
3-stage					
	27,6	51	18000	57800	105,06
	32,66	43	18000	62500	88,78
	40,06	35	18000	68900	72,38
	46,48	30	18000	73600	62,39
	52,24	27	18000	77500	55,51
	60,25	23	18000	82500	48,13
	68,28	21	18000	87000	42,47
	78,48	18	18000	92300	36,95
	85,8	16	18000	95700	33,80
	96,53	15	18000	100300	30,04
	108,49	13	18000	100300	26,73
	126,14	11	18000	100300	22,99
	141,8	10	18000	100300	20,45
	162,96	9	18000	100300	17,79
	178,2	8	18000	100300	16,27
	217,62	6	18000	100300	13,32
	267,43	5	18000	100300	10,84

Dimensions





Type 1

Type 2

Gear size	H	J	X	M	N	K	a	c	e	f	g	Shaft dimensions						
												d	D	p	r	s	t	u
MSF37	252	172	94	76	112	123	158	14	31,5	46	15	30 H7	45	105	17	M10x25	33,3	8
MSF47	269	189	102	77	128	153	170	14	32	64	12	35H7	50	132	22	M10x25	38,3	10
MSF57	317	210	125	93	136	170	198	14	40,5	60	19,5	40 H7	55	142	29	M16x40	43,3	12
MSF67	343	223	125	97	160	184	218	14	41	65	21	40 H7	55	156	29	M16x40	43,3	12
MSF77	426	282	142	121	200	213	278	22	50	69	28	50 H7	70	183	32	M16x45	53,8	14
MSF87	531	336	178	152	247	243	346	22	62	79	32	60 H7	85	210	36	M20x50	64,4	18
MSF97	623	414	220	178	285	303	395	26	70	104	34	70 H7	95	270	34	M20x50	74,9	20
MSF107	717	456	260	200	332	353	485	26	88	100	57	90 H7	118	313	40	M24x60	95,4	25
MSF127	856	530	300	236	383	413	550	33	110	125	66	100 H7	135	373	38	M24x60	106,4	28
MSF157	1021	660	340	286	447	503	660	33	150	140	98	120 H7	155	460	36	M24x60	127,4	32

Gear size	Flange type	Flange dimensions						
		k	m	n	j	h	l	q
MSF37	1	160	130	110	9	123	138	24
MSF47	1	200	165	130	11	153	162	25
MSF57	1	250	215	180	13,5	169	177	23,5
MSF67	1	250	215	180	13,5	183	188	23
MSF77	1	300	265	230	13,5	213	234	37
MSF87	1	350	300	250	17,5	243	259	30
MSF97	2	450	400	350	17,5	303	321	41,5
MSF107	2	450	400	350	17,5	353	358	41
MSF127	2	550	500	450	17,5	413	429	51
MSF157	2	660	600	550	22	503	521	60

Gear size	Motor size	L1	Gearmotor dimensions				AC
			with standard motor		with brake motor		
			L2	L	L2B	LB	
MSF37	**IEC63**	182	197	379	219	401	130
	IEC71	182	211	393	235	417	147
	IEC80	216	250	466	276	492	163
	IEC90S	216	262	478	290	506	183
	IEC90L	216	287	503	290	506	183
MSF47	**IEC63**	199	197	396	219	418	130
	IEC71	199	211	410	235	434	147
	IEC80	232	250	482	276	508	163
	IEC90S	232	262	494	290	522	183
	IEC90L	232	287	519	290	522	183
	IEC100	267	309	576	348	615	205
MSF57	**IEC63**	216	197	413	219	435	130
	IEC71	216	211	427	235	451	147
	IEC80	249	250	499	276	525	163
	IEC90S	249	262	511	290	539	183

Gear size	Motor size	L1	Gearmotor dimensions				AC
			with standard motor		with brake motor		
			L2	L	L2B	LB	
	IEC90L	249	287	536	290	539	183
	IEC100	284	309	593	348	632	205
MSF67	IEC63	227	197	424	219	446	130
	IEC71	227	211	438	235	462	147
	IEC80	260	250	510	276	536	163
	IEC90S	260	262	522	290	550	183
	IEC90L	260	287	547	290	550	183
	IEC100	295	309	604	348	643	205
	IEC112	295	335	630	379	674	229
MSF77	IEC63	253	197	450	219	472	130
	IEC71	253	211	464	235	488	147
	IEC80	285	250	535	276	561	163
	IEC90S	285	262	547	290	575	183
	IEC90L	285	287	572	290	575	183
	IEC100	319	309	628	348	667	205
	IEC112	319	335	654	379	698	229
	IEC132S	372	357	729	407	779	265
	IEC132M	372	395	767	445	817	265
	IEC132L	372	421	793	471	843	265
MSF87	IEC80	311	250	561	276	587	163
	IEC90S	311	262	573	290	601	183
	IEC90L	311	287	598	290	601	183
	IEC100	345	309	654	348	693	205
	IEC112	345	335	680	379	724	229
	IEC132S	398	357	755	407	805	265
	IEC132M	398	395	793	445	843	265
	IEC132L	398	421	819	471	869	265
	IEC160M	456	549	1005	609	1065	330
	IEC160L	456	604	1060	664	1120	330
	IEC180M	456	628	1084	698	1154	380
	IEC180L	456	668	1124	738	1194	380
MSF97	IEC100	390	309	699	348	738	205
	IEC112	390	335	725	379	769	229
	IEC132S	443	357	800	407	850	265
	IEC132M	443	395	838	445	888	265
	IEC132L	443	421	864	471	914	265
	IEC160M	501	549	1050	609	1110	330
	IEC160L	501	604	1105	664	1165	330
	IEC180M	501	628	1129	698	1199	380

Gear size	Motor size	L1	Gearmotor dimensions				AC
			with standard motor		with brake motor		
			L2	L	L2B	LB	
	IEC180L	501	668	1169	738	1239	380
	IEC200	542	660	1202	788	1330	400
	IEC225S	557	680	1237	780	1337	470
	IEC225M	557	705	1262	805	1362	470
MSF107	IEC100	422	309	731	348	770	205
	IEC112	422	335	757	379	801	229
	IEC132S	475	357	832	407	882	265
	IEC132M	475	395	870	445	920	265
	IEC132L	475	421	896	471	946	265
	IEC160M	533	549	1082	609	1142	330
	IEC160L	533	604	1137	664	1197	330
	IEC180M	533	628	1161	698	1231	380
	IEC180L	533	668	1201	738	1271	380
	IEC200	574	660	1234	788	1362	400
	IEC225S	589	680	1269	780	1369	470
	IEC225M	589	705	1294	805	1394	470
MSF127	IEC132S	529	357	886	407	936	265
	IEC132M	529	395	924	445	974	265
	IEC132L	529	421	950	471	1000	265
	IEC160M	587	549	1136	609	1196	330
	IEC160L	587	604	1191	664	1251	330
	IEC180M	587	628	1215	698	1285	380
	IEC180L	587	668	1255	738	1325	380
	IEC200	628	660	1288	788	1416	400
	IEC225S	643	680	1323	780	1423	470
	IEC225M	643	705	1348	805	1448	470
MSF157	IEC132S	603	357	960	407	1010	265
	IEC132M	603	395	998	445	1048	265
	IEC132L	603	421	1024	471	1074	265
	IEC160M	661	549	1210	609	1270	330
	IEC160L	661	604	1265	664	1325	330
	IEC180M	661	628	1289	698	1359	380
	IEC180L	661	668	1329	738	1399	380
	IEC200	702	660	1362	788	1490	400
	IEC225S	717	680	1397	780	1497	470
	IEC225M	717	705	1422	805	1522	470
	IEC250	791	770	1561	870	1661	510
	IEC280S	791	845	1636	-	-	547
	IEC280M	791	895	1686	-	-	547

Notes

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