Asynchronous motors

For products approved for Canada and the U.S.A., see Appendix.

Introduction

Overview

	Asynchronous motors with solid shaft	
	1PH7	**1PH4**
Cooling	Forced ventilation	Water cooling
Rated power P_{rated} (S1)	3.7 ... 100 kW (4.96 ... 134 HP)	7.5 ... 52 kW (10.1 ... 69.7 HP)
Maximum speed	12000 rpm	
Rated torque M_{rated}	23.6 ... 750 Nm (17.4 ... 553 lb_f-ft)	48 ... 331 Nm (35.4 ... 244 lb_f-ft)
Type in accordance with EN 60034-7 (IEC 60034-7)	IM B3 (IM V5, IM V6) IM B5 (IM V1, IM V3, only possible with 1PH710/1PH713) IM B35 (IM V15, IM V35)	IM B35 (IM V15, IM V35)
Encoder systems, built-in, for motors with/without DRIVE-CLiQ interface	• Incremental encoder • Absolute encoder See the technical specifications and the selection and ordering data for the required motor for information about a compatible encoder system.	
Sound pressure level in accordance with EN ISO 1680	70 ... 76 dB (A) if the external fan unit is operated on a 50 Hz supply system Tolerance +3 dB	69 ... 71 dB (A) Tolerance +3 dB
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	IP55 Fan IP54	IP65 IP55 at shaft exit
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a coolant temperature (air) of up to 40 °C (104 °F)	Temperature class 155 (F) for a coolant inlet temperature of up to 30 °C (86 °F)
Type of motor	Squirrel-cage induction motor	
Type of connection	Star connection	
Paint finish	Unpainted/primed Anthracite (option)	Anthracite
Holding brake	–	Fitted to drive end (option)
Mounted gearing	Prepared (option)	

Application

The areas of application for the 1PH/1PM asynchronous motors are extremely varied.

In machine tools, they are usually used as main spindle motors.

In production machines, such as printing, packaging and re-forming machines, they are used as high-output asynchronous servo motors.

The motors are referred to generally in this documentation as asynchronous motors, due to their principle of operation.

Core types can be supplied for certain motor types. These core types can be express delivered as replacement motors in the event of plant outages and offer the advantage of a quicker spare parts supply. For this reason, core types should be used for configuration wherever possible.

Overview

	Asynchronous motors with hollow shaft		Asynchronous built-in motors
	1PM4	1PM6	1PH2
Cooling	Oil/water cooling	Forced ventilation	Water cooling
Rated power P_{rated} (S1)	3.7 ... 27 kW (4.96 ... 36.2 HP)	3.7 ... 22 kW (4.96 ... 29.5 HP)	7.5 ... 30.9 kW (10.1 ... 41.4 HP)
Maximum speed	12000 rpm (optional: 18000 rpm)		Up to 10000 rpm
Rated torque M_{rated}	24 ... 170 Nm (32.2 ... 228 lb_f-ft)	24 ... 140 Nm (32.2 ... 188 lb_f-ft)	48 ... 197 Nm (64.4 ... 264 lb_f-ft)
Type in accordance with EN 60034-7 (IEC 60034-7)	IM B35 (IM V15, IM V35)	IM B5 (IM V1, IM V3)	Supplied in component form, assembled on user's premises
Encoder systems, for motors with/without DRIVE-CLiQ interface	Hollow-shaft measuring system: Incremental encoder (built-in) See the technical specifications and the selection and ordering data for the required motor for information about a compatible encoder system.		Hollow-shaft measuring system: SIMAG H2 up to 800 S/R (option)
Sound pressure level in accordance with EN ISO 1680	69 dB (A) Tolerance +3 dB	70 dB (A) if the external fan unit is operated on a 50 Hz supply system Tolerance +3 dB	Depending on spindle design
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	IP65 IP55 at shaft exit	IP55 Fan IP54	IP00 or as specified by spindle manufacturer
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a coolant inlet temperature of up to 30 °C (86 °F)	Temperature class 155 (F) for a coolant temperature (air) of up to 40 °C (104 °F)	Temperature class 155 (F) for a coolant inlet temperature of up to 25 °C (77 °F)
Type of motor	Squirrel-cage induction motor		
Type of connection	Selectable star/delta connection[1)]		
Paint finish	Anthracite		Unpainted
Holding brake	–		Using spindle design
Mounted gearing	–		

S/R = signals/revolution

1) Star connection only for water cooling.

1PH7 motors

Overview

1PH7 motors (SH 100 to SH 160 and SH 180/SH 225)

Air-cooled 1PH7 motors are rugged and low-maintenance 4-pole asynchronous motors with squirrel-cage rotors.
A fan for providing forced ventilation is mounted axially on the rear of the motor. The normal direction of air flow is from the drive end to the non-drive end in order to keep the exhaust heat of the motor away from the machine. The reverse direction of air flow can be ordered as an option.The motors are equipped with a built-in encoder system for sensing the motor speed and indirect position. In machine tools, the encoder system is capable of C-axis operation as standard – that is, an additional encoder is not required for C-axis operation.

Benefits

- Short overall length of motor
- Minimal overall dimension thanks to the integrated terminal box (SH 100 to SH 160)
- Maximum speeds of up to 9000 rpm (optional: 12000 rpm)
- Full rated torque is continuously available, even at standstill
- Optimum matching to the SINAMICS S120 power levels

Application

- Small, compact machine tools
- Complex machining centers and turning machines
- Special machines
- Printing industry:
  - Single drives for printing units
- Rubber, plastic, wire, and glass manufacturing:
  - Drives for extruders, calenders, rubber injection machines, film machines, fleece machines
  - Wire-drawing machines, wire-stranding machines, etc.
- General applications such as coiler and winder drives

Technical specifications (general)

Product name	1PH7 motor
Coolant temperature, permissible	-15 ... +40 °C (+5 ... +104 °F)
Temperature monitoring	KTY 84 temperature sensor in stator winding
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a coolant temperature of up to 40 °C (104 °F)
Motor fan ratings	400 V 3 AC ±10%, 50/60 Hz 480 V 3 AC +5% -10%, 60 Hz
Encoder systems, built-in for motors without DRIVE-CLiQ interface	• Incremental encoder sin/cos 1 V_{pp} 2048 S/R • EnDat absolute encoder 2048 S/R
Encoder systems, built-in for motors with DRIVE-CLiQ interface	• Incremental encoder 22 bit (2048 S/R internal) • Incremental encoder 22 bit (2048 S/R internal) with 11 bit commutation position • Absolute encoder 22 bit single-turn (2048 S/R internal) + 12 bit multi-turn (traversing range 4096 revolutions)
Type in accordance with EN 60034-7 (IEC 60034-7)	IM B3 IM B35
Sound pressure level in accordance with EN ISO 1680 Tolerance +3 dB	From DE to NDE (with the fan operating on a 50 Hz supply system)
• 1PH710	70 dB (A)
• 1PH713	70 dB (A)
• 1PH716	75 dB (A)[1]
• 1PH718	73 dB (A)[2]
• 1PH722	76 dB (A)[2]
Terminal box connection type	
• Motor	Terminals in terminal box
• Fan	Terminals in terminal box
• Motor encoder and PTC thermistor	12-pin/17-pin circular socket (without mating connector) or DRIVE-CLiQ
Rating plate	1 supplied separately with terminal box

S/R = signals/revolution

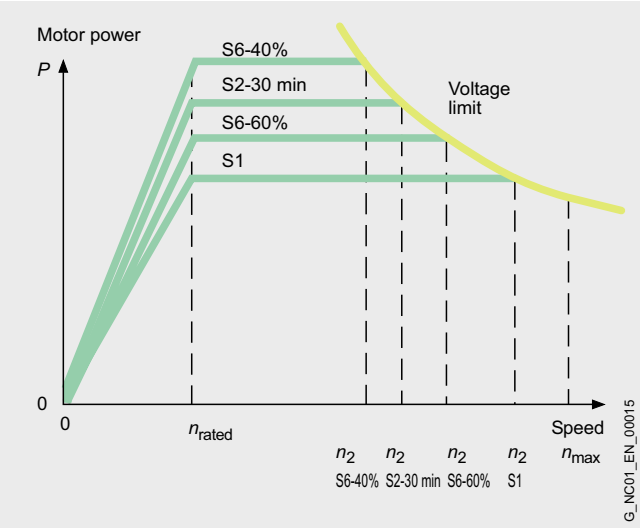
[1] The sound pressure level can be reduced if the fan is operated on a 60 Hz supply system with option K44.

[2] The sound pressure level can be reduced if the air flow is from the drive end to the non-drive end with option G15.

Technical specifications (core type)

Product name	1PH7 motor
Type in accordance with EN 60034-7 (IEC 60034-7) [1]	
• 1PH710	IM B5 (IM V1, IM V3)
• 1PH713	IM B5 (IM V1, IM V3)
• 1PH716	IM B35 (IM V15, IM V35)
Terminal box location (view drive end) [2]	Top, cable entry from right
Bearing version on DE [3]	Bearing for belt or coupling output
Vibration magnitude in accordance with EN 60034-14 (IEC 60034-14)	Grade S
Shaft and flange accuracy [4] **in accordance with DIN 42955 (IEC 60072-1)**	Tolerance R (reduced)
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	Motor IP55, fan IP54
Paint finish	Unpainted

Characteristic curves



Typical speed/power graph for AC motors [5]

The graph shows the typical relationship between motor speed and drive power in 1PH7 motors for the following duty types in accordance with IEC 60034-1:

S1: Continuous duty

S6: Continuous duty with intermittent loading and a relative duty factor of 60% (S6-60%) or 40% (S6-40%) with a maximum duty cycle time of 10 minutes.

S2: Short-time duty with duty period of 30 min (S2-30 min) and subsequent standstill.

Characteristic curves (continued)

1PH7 motor	Rated speed	Attainable speed for rated power in duty type in accordance with IEC 60034-1			
Type	n_{rated}	n_2 [6]			
		S1	S6-60%	S6-40%	S2-30 min
	rpm	rpm	rpm	rpm	rpm
1PH7101-..F	1500	8200	7000	6000	6500
1PH7103-..D	1000	3750	3750	3100	3350
1PH7103-..F	1500	5000	4600	3900	4500
1PH7103-..G	2000	9000	7500	6400	6900
1PH7105-..F	1500	7900	6750	5750	6150
1PH7107-..D	1000	5800	4800	4100	4650
1PH7107-..F	1500	6500	6200	5250	5650
1PH7107-..G	2000	7000	7000	6900	7000
1PH7131-..F	1500	6700	5500	4500	5000
1PH7133-..D	1000	4700	3700	2800	3450
1PH7133-..F	1500	6800	5600	4500	5100
1PH7133-..G	2000	6500	6500	5900	6450
1PH7135-..F	1500	7500	6200	5200	5650
1PH7137-..D	1000	5400	4500	3600	4100
1PH7137-..F	1500	7000	7000	6200	6800
1PH7137-..G	2000	6000	6000	5800	6000
1PH7163-..B	500	2500	1900	1500	1730
1PH7163-..D	1000	5800	4800	4000	4400
1PH7163-..F	1500	5500	5500	5500	5500
1PH7163-..G	2000	3500	3500	3500	3500
1PH7167-..B	500	2100	1600	1250	1400
1PH7167-..D	1000	6250	5200	4300	4700
1PH7167-..F	1500	4500	4500	4500	4500
1PH7167-..G	2000	3250	3250	3250	3250
1PH7184-..T	500	4500	3800	3350	3350
1PH7184-..D	1000	5000	4400	3600	3600
1PH7184-..E	1250	5000	4680	4190	3600
1PH7184-..F	1500	5000	5000	5000	5000
1PH7184-..L	2500	5000	5000	5000	5000
1PH7186-..T	500	4800	4100	3580	4000
1PH7186-..D	1000	5000	4650	3850	3850
1PH7186-..E	1250	5000	4260	3780	3580
1PH7224-..C	700	3020	2570	2290	2170
1PH7224-..D	1000	4500	4500	4100	3730
1PH7224-..F	1500	4500	4330	4000	3890

1) For type, see Selection guides.

2) DE is the drive end with shaft. NDE is the non-drive end.

3) For maximum permissible load, see the 1PH Motors Configuration Manual.

4) Shaft extension run-out, concentricity of spigot and shaft and perpendicularity of mounting face of flange to shaft.

5) For further configuration information, see the 1PH Motors Configuration Manual.

6) Values taken from the speed/power graph when using an Active Line Module on a 400 V 3 AC supply system. If you are using a Smart Line Module, and with option for increased maximum speed, proceed in accordance with the 1PH Motors Configuration Manual.

1PH7 core type motors SH 100 to SH 160

Selection and Ordering Data

Shaft height	Rated speed	Continuous speed, max.		Speed, max.[1]		Rated power for duty type in accordance with IEC 60034-1				1PH7 asynchronous motor with solid shaft Forced ventilation
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	n_{max}	n_{max}[4]	P_{rated}				Order No. Core type
						S1	S6-60%	S6-40%	S2-30 min	
	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	
100	2000	5500	–	9000	–	7 (9.39)	8.5 (11.4)	10 (13.4)	9.25(12.4)	**1PH7103 - ■ ■G02 - 0C■0**
	1500	5500	–	9000	–	9 (12.1)	11 (14.8)	13 (17.4)	12 (16.1)	**1PH7107 - ■ ■F02 - 0C■0**
132	1000	4500	–	8000	–	12 (16.1)	15 (20.1)	18.5 (24.8)	16 (21.5)	**1PH7133 - ■ ■D02 - 0C■0**
	2000					20 (26.8)	25 (33.5)	30 (40.2)	27.5 (36.9)	**1PH7133 - ■ ■G02 - 0C■0**
	1000	4500	–	8000	–	17 (22.8)	20.5 (27.5)	25 (33.5)	22.5 (30.2)	**1PH7137 - ■ ■D02 - 0C■0**
	2000					28 (37.6)	35 (46.9)	43 (57.7)	39 (52.3)	**1PH7137 - ■ ■G02 - 0C■0**
160	1000	3700	–	6500	–	22 (29.5)	27 (36.2)	33 (44.3)	30 (40.2)	**1PH7163 - ■ ■D03 - 0C■0**
	1500					30 (40.2)	37 (49.6)	45 (60.4)	41 (55.0)	**1PH7163 - ■ ■F03 - 0C■0**
	1500	3700	–	6500	–	37 (49.6)	46 (61.7)	56 (75.1)	51 (68.4)	**1PH7167 - ■ ■F03 - 0C■0**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box				**2**
	External fan unit, metric cable entry in terminal box				**7**
Encoder systems for motors without DRIVE-CLiQ interface:	Incremental encoder sin/cos 1 V_{pp} without C and D track				**N**
Encoder systems for motors with DRIVE-CLiQ interface:	Incremental encoder 22 bit				**Q**
Type:[5]	IM B5 (IM V1, IM V3)				**2**
	IM B35 (IM V15, IM V35)[6]				**3**
Shaft extension (DE):[5]	**Balancing:**	**Direction of air flow (fan):**	**Blow-out direction:**		
Fitted key	Half-key	DE → NDE	Axial		**A**
Plain shaft	–	DE → NDE	Axial		**J**

To select the type and the degree of protection, see Selection guides.

Selection and Ordering Data

Motor type (continued)	Rated torque	Moment of inertia	Weight, approx.	Rated current for duty type in accordance with IEC 60034-1				SINAMICS S120 Motor Module	
								Rated output current	Booksize format
	M_{rated}	J	m	I_{rated}				I_{rated}	Order No.
				S1	S6-60%	S6-40%	S2- 30 min	S1	
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	A	A	
1PH7103-2NG02-...	33.4 (24.6)	0.017 (0.15)	40 (88.2)	17.5	20.5	23.5	21.5	18	**6SL312■ - ■TE21-8AA3**
1PH7107-2NF02-...	57.3 (43.3)	0.029 (0.26)	63 (138.9)	23.5	27.5	31	29	30	**6SL312■ - 1TE23-0AA3**
1PH7133-2ND02-...	114.6 (84.5)	0.076 (0.67)	90 (198.5)	30	36	43	37.5	30	**6SL312■ - 1TE23-0AA3**
1PH7133-2NG02-...	95.5 (70.4)	0.076 (0.67)	90 (198.5)	45	54	63	59	45	**6SL312■ - 1TE24-5AA3**
1PH7137-2ND02-...	162.3 (119.7)	0.109 (0.96)	130 (287)	43	50	60	54	45	**6SL312■ - 1TE24-5AA3**
1PH7137-2NG02-...	133.7 (98.6)	0.109 (0.96)	130 (287)	60	73	87	80	60	**6SL312■ - 1TE26-0AA3**
1PH7163-2ND03-...	210.1 (155)	0.19 (1.68)	180 (397)	55	65	77	71	60	**6SL312■ - 1TE26-0AA3**
1PH7163-2NF03-...	191.0 (141)	0.19 (1.68)	180 (397)	72	86	102	94	85	**6SL312■ - 1TE28-5AA3**
1PH7167-2NF03-...	235.5 (174)	0.23 (2.04)	228 (503)	82	97	115	104	85	**6SL312■ - 1TE28-5AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

1PH7 motor (SH 100 to SH 160)

1) For continuous duty (with 30% n_{max}, 60% $^2/_3$ n_{max}, 10% standstill) for a duty cycle time of 10 min. For maintenance intervals for motors and components, see the 1PH Motors Configuration Manual.

2) Bearing version for coupling/belt output.

3) Bearing version for increased maximum speed.

4) Version for increased maximum speed only possible with vibration magnitude grade SR. The following options are not possible:
• Shaft seal.

5) The following motor versions are required for ZF gearbox mounting prepared (see Gearboxes for gear selection):
• Shaft with fitted key and full-key balancing

6) Motors of shaft height 160 and higher require foot support.

1PH7 standard type motors
SH 100

Selection and Ordering Data

Shaft height	Rated speed	Continuous speed, max.		Speed, max.[1]		Rated power for duty type in accordance with IEC 60034-1				1PH7 asynchronous motor with solid shaft Forced ventilation
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	n_{max}	n_{max}[4]	P_{rated}				Order No. Standard type
						S1	S6-60%	S6-40%	S2-30 min	
	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	
100	1500	5500	10000	9000	12000	3.7 (4.96)	4.5 (6.03)	5.25 (7.04)	4.9 (6.57)	**1PH7101 - ■ ■F■ ■ - 0■ ■ ■**
	1000	5500	10000	9000	12000	3.7 (4.96)	4.5 (6.03)	5.25 (7.04)	4.7 (6.30)	**1PH7103 - ■ ■D■ ■ - 0■ ■ ■**
	1500					5.5 (7.38)	6.7 (8.98)	7.7 (10.3)	7 (9.39)	**1PH7103 - ■ ■F■ ■ - 0■ ■ ■**
	2000					7 (9.39)	8.5 (11.4)	10 (13.4)	9.25 (12.4)	**1PH7103 - ■ ■G■ ■ - 0■ ■ ■**
	1500	5500	10000	9000	12000	7 (9.39)	8.5 (11.4)	10 (13.4)	9.25 (12.4)	**1PH7105 - ■ ■F■ ■ - 0■ ■ ■**
	1000	5500	10000	9000	12000	6.25 (8.38)	7.5 (10.1)	8.8 (11.8)	7.75 (10.4)	**1PH7107 - ■ ■D■ ■ - 0■ ■ ■**
	1500					9 (12.1)	11 (14.8)	13 (17.4)	12 (16.1)	**1PH7107 - ■ ■F■ ■ - 0■ ■ ■**
	2000					10.5 (14.1)	12.5 (16.8)	14.5 (19.4)	13.5 (18.1)	**1PH7107 - ■ ■G■ ■ - 0■ ■ ■**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box	2
	External fan unit, metric cable entry in terminal box	7
Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat 2048 S/R	E
	Incremental encoder sin/cos 1 V_{pp} with C and D track	M
	Incremental encoder sin/cos 1 V_{pp} without C and D track	N
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder, 22 bit single-turn + 12 bit multi-turn	F
	Incremental encoder, 22 bit with 11 bit commutation position	D
	Incremental encoder, 22 bit	Q
Terminal box/ Cable entry:	Top/right	0
	Top/NDE	2
	Top/left	3
Type:[5]	IM B3 (IM V5, IM V6)	0
	IM B5 (IM V1, IM V3)	2
	IM B35 (IM V15, IM V35)[7]	3

Bearing version for:	**Vibration magnitude:**	**Shaft and flange accuracy:**	
Coupling/belt output	Grade R	Tolerance R	B
Coupling/belt output	Grade S	Tolerance R	C
Coupling/belt output Increased speed (coupling/belt output)[6]	Grade SR	Tolerance R	D
	Grade SR	Tolerance R	L

Shaft extension (DE):[5]	**Balancing:**	**Direction of air flow (fan):**	**Blow-out direction:**	
Fitted key	Half-key	DE → NDE	Axial	A
Fitted key	Half-key	NDE → DE	Axial	B
Fitted key	Full-key	DE → NDE	Axial	C
Fitted key	Full-key	NDE → DE	Axial	D
Plain shaft	–	DE → NDE	Axial	J
Plain shaft	–	NDE → DE	Axial	K

Degree of protection:	**Seal:**	**Paint finish:**	
IP55, fan IP54	–	Unpainted	0
IP55, fan IP54	DE flange with shaft sealing ring[6]	Unpainted	2
IP55, fan IP54	–	Anthracite	3
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite	5
IP55, fan IP54	–	Anthracite, two coats	6
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite, two coats	8

To select the type and the degree of protection, see Selection guides.

Selection and Ordering Data

Motor type (continued)	Rated torque	Moment of inertia	Weight, approx.	Rated current for duty type in accordance with IEC 60034-1				SINAMICS S120 Motor Module	
								Rated output current	Booksize format
	M_{rated}	J	m	I_{rated}				I_{rated}	Order No.
				S1	S6-60%	S6-40%	S2- 30 min	S1	
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	A	A	
1PH7101 - ..F...	23.6 (17.4)	0.017 (0.15)	40 (88.2)	10	11.5	12.5	12	18	**6SL312■ - ■TE21-8AA3**
1PH7103 - ..D...	35.3 (26.0)	0.017 (0.15)	40 (88.2)	10	11.5	13	12	18	**6SL312■ - ■TE21-8AA3**
1PH7103 - ..F...	35.0 (25.8)	0.017 (0.15)	40 (88.2)	13	16	18	16.5	18	**6SL312■ - ■TE21-8AA3**
1PH7103 - ..G...	33.4 (24.6)	0.017 (0.15)	40 (88.2)	17.5	20.5	23.5	21.5	18	**6SL312■ - ■TE21-8AA3**
1PH7105 - ..F...	44.6 (32.9)	0.029 (0.26)	63 (139)	17.5	21	23.5	22	18	**6SL312■ - ■TE21-8AA3**
1PH7107 - ..D...	59.7 (44.0)	0.029 (0.26)	63 (139)	17.5	20.5	23	21	18	**6SL312■ - ■TE21-8AA3**
1PH7107 - ..F...	57.3 (43.3)	0.029 (0.26)	63 (139)	23.5	27.5	31	29	30	**6SL312■ - 1TE23-0AA3**
1PH7107 - ..G...	50.1 (37.0)	0.029 (0.26)	63 (139)	26	28.5	33	31	30	**6SL312■ - 1TE23-0AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

1PH7 motor (SH 100 to SH 160)

1) For continuous duty (with 30% n_{max}, 60% $^2/_3$ n_{max}, 10% standstill) for a duty cycle time of 10 min. For maintenance intervals for motors and components, see the 1PH Motors Configuration Manual.

2) Bearing version for coupling/belt output.

3) Bearing version for increased maximum speed.

4) Version for increased maximum speed only possible with vibration magnitude grade SR. The following options are not possible:
- Shaft sealing ring.

5) The following motor versions are required for ZF gearbox mounting prepared (see Gearboxes for gear selection):
- Types IM B5 or IM B35
- Shaft with fitted key and full-key balancing

6) Only appropriate if the sealing ring is occasionally lubricated with oil spray/mist. A sealing ring is not possible with increased maximum speed.

7) Motors of shaft height 160 and higher require foot support.

1PH7 standard type motors SH 132

Selection and Ordering Data

Shaft height	Rated speed	Continuous speed, max.		Speed, max.[1]		Rated power for duty type in accordance with IEC 60034-1				1PH7 asynchronous motor with solid shaft Forced ventilation
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	n_{max}	n_{max}[4]	P_{rated}				Order No. Standard type
						S1	S6-60%	S6-40%	S2-30 min	
	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	
132	1500	4500	8500	8000	10000	11 (14.8)	13.5 (18.1)	16.5 (22.1)	15 (20.1)	**1PH7131 - ■ ■F■ ■ - 0■ ■ ■**
	1000	4500	8500	8000	10000	12 (16.1)	15 (20.1)	18.5 (24.8)	16 (21.5)	**1PH7133 - ■ ■D■ ■ - 0■ ■ ■**
	1500					15 (20.1)	18.5 (24.8)	23 (30.8)	20.5 (27.5)	**1PH7133 - ■ ■F■ ■ - 0■ ■ ■**
	2000					20 (26.8)	25 (33.5)	30 (40.2)	27.5 (36.9)	**1PH7133 - ■ ■G■ ■ - 0■ ■ ■**
	1500	4500	8500	8000	10000	18.5 (24.8)	23 (30.8)	28 (37.6)	25.5 (34.2)	**1PH7135 - ■ ■F■ ■ - 0■ ■ ■**
	1000	4500	8500	8000	10000	17 (22.8)	20.5 (27.5)	25 (33.5)	22.5 (30.2)	**1PH7137 - ■ ■D■ ■ - 0■ ■ ■**
	1500					22 (29.5)	27.5 (36.9)	33 (44.3)	30 (40.2)	**1PH7137 - ■ ■F■ ■ - 0■ ■ ■**
	2000					28 (37.6)	35 (46.9)	43 (57.7)	39 (52.3)	**1PH7137 - ■ ■G■ ■ - 0■ ■ ■**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box	**2**
	External fan unit, metric cable entry in terminal box	**7**
Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat 2048 S/R	**E**
	Incremental encoder sin/cos 1 V_{pp} with C and D track	**M**
	Incremental encoder sin/cos 1 V_{pp} without C and D track	**N**
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder, 22 bit single-turn + 12 bit multi-turn	**F**
	Incremental encoder, 22 bit with 11 bit commutation position	**D**
	Incremental encoder, 22 bit	**Q**
Terminal box/ Cable entry:	Top/right	**0**
	Top/NDE	**2**
	Top/left	**3**
Type:[5]	IM B3 (IM V5, IM V6)	**0**
	IM B5 (IM V1, IM V3)	**2**
	IM B35 (IM V15, IM V35)[7]	**3**

Bearing version for:	**Vibration magnitude:**	**Shaft and flange accuracy:**	
Coupling/belt output	Grade R	Tolerance R	**B**
Coupling/belt output	Grade S	Tolerance R	**C**
Coupling/belt output	Grade SR	Tolerance R	**D**
Increased speed (coupling/belt output)[6]	Grade SR	Tolerance R	**L**

Shaft extension (DE):[5]	**Balancing:**	**Direction of air flow (fan):**	**Blow-out direction:**	
Fitted key	Half-key	DE → NDE	Axial	**A**
Fitted key	Half-key	NDE → DE	Axial	**B**
Fitted key	Full-key	DE → NDE	Axial	**C**
Fitted key	Full-key	NDE → DE	Axial	**D**
Plain shaft	–	DE → NDE	Axial	**J**
Plain shaft	–	NDE → DE	Axial	**K**

Degree of protection:	**Seal:**	**Paint finish:**	
IP55, fan IP54	–	Unpainted	**0**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Unpainted	**2**
IP55, fan IP54	–	Anthracite	**3**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite	**5**
IP55, fan IP54	–	Anthracite, two coats	**6**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite, two coats	**8**

To select the type and the degree of protection, see Selection guides.

Selection and Ordering Data

Motor type (continued)	Rated torque	Moment of inertia	Weight, approx.	Rated current for duty type in accordance with IEC 60034-1				SINAMICS S120 Motor Module	
								Rated output current	Booksize format
	M_{rated}	J	m	I_{rated}				I_{rated}	Order No.
				S1	S6-60%	S6-40%	S2-30 min	S1	
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	A	A	
1PH7131 - ..F...	70.0 (51.6)	0.076 (0.67)	90 (198)	24	29	34	31.5	30	**6SL312■ - 1TE23-0AA3**
1PH7133 - ..D...	114.6 (84.5)	0.076 (0.67)	90 (198)	30	36	43	37.5	30	**6SL312■ - 1TE23-0AA3**
1PH7133 - ..F...	95.5 (70.4)	0.076 (0.67)	90 (198)	34	41	49	43.5	45	**6SL312■ - 1TE24-5AA3**
1PH7133 - ..G...	95.5 (70.4)	0.076 (0.67)	90 (198)	45	54	63	59	45	**6SL312■ - 1TE24-5AA3**
1PH7135 - ..F...	117.8 (86.9)	0.109 (0.96)	130 (287)	42	50	58	54	45	**6SL312■ - 1TE24-5AA3**
1PH7137 - ..D...	162.3 (119.7)	0.109 (0.96)	130 (287)	43	50	60	54	45	**6SL312■ - 1TE24-5AA3**
1PH7137 - ..F...	140.1 (103.3)	0.109 (0.96)	130 (287)	57	68	79	73	60	**6SL312■ - 1TE26-0AA3**
1PH7137 - ..G...	133.7 (98.6)	0.109 (0.96)	130 (287)	60	73	87	80	60	**6SL312■ - 1TE26-0AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**

1PH7 motor (SH 100 to SH 160)

1) For continuous duty (with 30% n_{max}, 60% $^2/_3$ n_{max}, 10% standstill) for a duty cycle time of 10 min. For maintenance intervals for motors and components, see the 1PH Motors Configuration Manual.

2) Bearing version for coupling/belt output.

3) Bearing version for increased maximum speed.

4) Version for increased maximum speed only possible with vibration magnitude grade SR. The following options are not possible:
• Shaft sealing ring.

5) The following motor versions are required for ZF gearbox mounting prepared (see Gearboxes for gear selection):
• Types IM B5 or IM B35
• Shaft with fitted key and full-key balancing

6) Only appropriate if the sealing ring is occasionally lubricated with oil spray/mist. A sealing ring is not possible with increased maximum speed.

7) Motors of shaft height 160 and higher require foot support.

1PH7 standard type motors SH 160

Selection and Ordering Data

Shaft height	Rated speed	Continuous speed, max.		Speed, max.[1]		Rated power for duty type in accordance with IEC 60034-1				1PH7 asynchronous motor with solid shaft Forced ventilation
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	n_{max}	n_{max}[4]	P_{rated}				Order No. Standard type
						S1	S6-60%	S6-40%	S2-30 min	
	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	
160	500	3700	7000	6500	8000	12 (16.1)	15 (20.1)	18 (24.1)	16.5 (22.1)	**1PH7163 -■■B■■-0■■■**
	1000					22 (29.5)	27 (36.2)	33 (44.3)	30 (40.2)	**1PH7163 -■■D■■-0■■■**
	1500					30 (40.2)	37 (49.6)	45 (60.4)	41 (55.0)	**1PH7163 -■■F■■-0■■■**
	2000					36 (48.3)	44 (59.0)	52 (69.7)	48 (64.4)	**1PH7163 -■■G■■-0■■■**
	500	3700	7000	6500	8000	16 (21.5)	19.5 (26.1)	24 (32.2)	21.5 (28.8)	**1PH7167 -■■B■■-0■■■**
	1000					28 (37.5)	34.5 (46.3)	42 (56.3)	38 (51.0)	**1PH7167 -■■D■■-0■■■**
	1500					37 (49.6)	46 (61.7)	56 (75.1)	51 (68.4)	**1PH7167 -■■F■■-0■■■**
	2000					41 (55.0)	51 (68.4)	61 (81.8)	56 (75.1)	**1PH7167 -■■G■■-0■■■**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box	**2**
	External fan unit, metric cable entry in terminal box	**7**
Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat 2048 S/R	**E**
	Incremental encoder sin/cos 1 V_{pp} with C and D track	**M**
	Incremental encoder sin/cos 1 V_{pp} without C and D track	**N**
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder, 22 bit single-turn + 12 bit multi-turn	**F**
	Incremental encoder, 22 bit with 11 bit commutation position	**D**
	Incremental encoder, 22 bit	**Q**
Terminal box/ Cable entry:	Top/right	**0**
	Top/NDE	**2**
	Top/left	**3**
Type:[5]	IM B3 (IM V5, IM V6)	**0**
	IM B35 (IM V15, IM V35)[7]	**3**

Bearing version for:	**Vibration magnitude:**	**Shaft and flange accuracy:**	
Coupling/belt output	Grade R	Tolerance R	**B**
Coupling/belt output	Grade S	Tolerance R	**C**
Coupling/belt output	Grade SR	Tolerance R	**D**
Increased speed (coupling/belt output)[6]	Grade SR	Tolerance R	**L**

Shaft extension (DE):[5]	**Balancing:**	**Direction of air flow (fan):**	**Blow-out direction:**	
Fitted key	Half-key	DE → NDE	Axial	**A**
Fitted key	Half-key	NDE → DE	Axial	**B**
Fitted key	Full-key	DE → NDE	Axial	**C**
Fitted key	Full-key	NDE → DE	Axial	**D**
Plain shaft	–	DE → NDE	Axial	**J**
Plain shaft	–	NDE → DE	Axial	**K**

Degree of protection:	**Seal:**	**Paint finish:**	
IP55, fan IP54	–	Unpainted	**0**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Unpainted	**2**
IP55, fan IP54	–	Anthracite	**3**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite	**5**
IP55, fan IP54	–	Anthracite, two coats	**6**
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite, two coats	**8**

To select the type and the degree of protection, see Selection guides.

Selection and Ordering Data

Motor type (continued)	Rated torque	Moment of inertia	Weight, approx.	Rated current for duty type in accordance with IEC 60034-1				SINAMICS S120 Motor Module	
								Rated output current	Booksize format
	M_{rated}	J	m	I_{rated}				I_{rated}	Order No.
				S1	S6-60%	S6-40%	S2- 30 min	S1	
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	A	A	
1PH7163 - ..B...	229.2 (169)	0.19 (1.68)	180 (397)	30	36	42	39	30	**6SL312■ - 1TE23-0AA3**
1PH7163 - ..D...	210.1 (155)	0.19 (1.68)	180 (397)	55	65	77	71	60	**6SL312■ - 1TE26-0AA3**
1PH7163 - ..F...	191.0 (141)	0.19 (1.68)	180 (397)	72	86	102	94	85	**6SL312■ - 1TE28-5AA3**
1PH7163 - ..G...	171.9 (127)	0.19 (1.68)	180 (397)	85	100	114	107	85	**6SL312■ - 1TE28-5AA3**
1PH7167 - ..B...	305.5 (225)	0.23 (2.04)	228 (503)	37	44	53	48	45	**6SL312■ - 1TE24-5AA3**
1PH7167 - ..D...	267.4 (197)	0.23 (2.04)	228 (503)	71	85	100	92	85	**6SL312■ - 1TE28-5AA3**
1PH7167 - ..F...	235.5 (174)	0.23 (2.04)	228 (503)	82	97	115	104	85	**6SL312■ - 1TE28-5AA3**
1PH7167 - ..G...	195.8 (144)	0.23 (2.04)	228 (503)	89	106	124	115	132	**6SL312■- 1TE31-3AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**

1PH7 motor (SH 100 to SH 160)

1) For continuous duty (with 30% n_{max}, 60% $^2/_3$ n_{max}, 10% standstill) for a duty cycle time of 10 min. For maintenance intervals for motors and components, see the 1PH Motors Configuration Manual.

2) Bearing version for coupling/belt output.

3) Bearing version for increased maximum speed.

4) Version for increased maximum speed only possible with vibration magnitude grade SR. The following options are not possible:
- Shaft sealing ring.

5) The following motor versions are required for ZF gearbox mounting prepared (see Gearboxes for gear selection):
- Types IM B5 or IM B35
- Shaft with fitted key and full-key balancing

6) Only appropriate if the sealing ring is occasionally lubricated with oil spray/mist. A sealing ring is not possible with increased maximum speed.

7) Motors of shaft height 160 and higher require foot support.

1PH7 standard type motors SH 180

Selection and Ordering Data

Shaft height	Rated speed	Continuous speed, max.			Speed, max.[1]		Rated power for duty type in accordance with IEC 60034-1				1PH7 asynchronous motor with solid shaft, Forced ventilation
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	$n_{S1\ cont.}$[4]	n_{max}	n_{max}[5]	P_{rated}				Order No. Standard type
							S1	S6-60%	S6-40%	S2-30 min	
	rpm	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	
180	500	3500	3000	4500	5000	7000	21.5 (28.8)	26.5 (35.5)	30.5 (40.9)	30 (40.2)	**1PH7184 -■■T■■-0■■■**
	1000						39 (52.3)	48 (64.4)	58 (77.8)	58 (77.8)	**1PH7184 -■■D■■-0■■■**
	1250						40 (53.6)	50 (67.1)	56 (75.1)	66 (88.5)	**1PH7184 -■■E■■-0■■■**
	1500						51 (68.4)	68 (91.2)	81 (109)	81 (109)	**1PH7184 -■■F■■-0■■■**
	2500						78 (105)	97 (130)	115 (154)	115 (154)	**1PH7184 -■■L■■-0■■■**
	500	3500	3000	4500	5000	7000	29.6 (39.7)	36.5 (48.9)	43 (57.7)	38 (51.0)	**1PH7186 -■■T■■-0■■■**
	1000						51 (68.4)	65 (87.2)	77 (103)	77 (103)	**1PH7186 -■■D■■-0■■■**
	1250						60 (80.5)	71 (95.2)	80 (107)	84 (113)	**1PH7186 -■■E■■-0■■■**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box	2
	External fan unit, metric cable entry in terminal box	7
Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat 2048 S/R	E
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D track	M
	Incremental encoder sin/cos 1 V_{pp} 2048 S/R without C and D track	N
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder, 22 bit single-turn + 12 bit multi-turn	F
	Incremental encoder, 22 bit with 11 bit commutation position	D
	Incremental encoder, 22 bit	Q
Terminal box/ Cable entry:	Top/right	0
	Top/DE	1
	Top/NDE	2
	Top/left	3
Type:	IM B3	0
	IM B3 (IM V5, IM V6) (hoisting system for vertical types)	2
	IM B35[9]	3
	IM B35 (for 1PH7184 with 450 mm (17.7 in) flange only)[9]	4
	IM B35 (IM V15, IM V35) (hoisting system for vertical types)[9]	5
	IM B35 (IM V15, IM V35) (for 1PH7184 with 450 mm (17.7 in) flange only)[9]	6

Bearing version for:	Vibration magnitude:	Shaft and flange accuracy:	
Coupling output	Grade R	Tolerance N	A
Coupling output	Grade R	Tolerance R	B
Coupling output	Grade S	Tolerance R	C
Coupling output	Grade SR	Tolerance R	D
Belt output	Grade R	Tolerance N	E
Belt output	Grade R	Tolerance R	F
Increased cantilever force (belt output)[6]	Grade R	Tolerance N	G
Increased cantilever force (belt output)[6]	Grade R	Tolerance R	H
Increased speed (coupling output)[6]	Grade S	Tolerance R	J

Shaft extension (DE):[7]	Balancing:	Direction of air flow (fan):	Blow-out direction:	
Fitted key	Half-key	DE → NDE	Right	A
Fitted key	Half-key	NDE → DE	Axial	B
Fitted key	Full-key	DE → NDE	Right	C
Fitted key	Full-key	NDE → DE	Axial	D
Plain shaft	–	DE → NDE	Right	J
Plain shaft	–	NDE → DE	Axial	K

Degree of protection:	Seal:	Paint finish:	
IP55, fan IP54	–	Primed	0
IP55, fan IP54	DE flange with shaft sealing ring[6]	Primed	2
IP55, fan IP54	–	Anthracite	3
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite	5
IP55, fan IP54	–	Anthracite, two coats	6
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite, two coats	8

To select the type and the degree of protection, see Selection guides.

Selection and Ordering Data

Motor type (continued)	Rated torque	Moment of inertia	Weight, approx.[8]	Rated current for duty type in accordance with IEC 60034-1				SINAMICS S120 Motor Module	
								Rated output current	Booksize format
	M_{rated}	J	m	I_{rated}				I_{rated}	Order No.
				S1	S6-60%	S6-40%	S2-30 min	S1	
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	A	A	
1PH7184 - ..T...	410 (302)	0.5 (4.43)	390 (860)	76	90	103	102	85	**6SL312■ - 1TE28-5AA3**
1PH7184 - ..D...	372 (274)	0.5 (4.43)		90	106	126	126	132	**6SL312■ - 1TE31-3AA3**
1PH7184 - ..E...	305 (225)	0.5 (4.43)		85	100	110	128	85	**6SL312■ - 1TE28-5AA3**
1PH7184 - ..F...	325 (240)	0.5 (4.43)		120	149	174	174	132	**6SL312■ - 1TE31-3AA3**
1PH7184 - ..L...	298 (220)	0.5 (4.43)		172	204	237	237	200	**6SL312■ - 1TE32-0AA3**
1PH7186 - ..T...	565 (417)	0.67 (5.93)	460 (1014)	105	126	147	130	132	**6SL312■ - 1TE31-3AA3**
1PH7186 - ..D...	487 (359)	0.67 (5.93)		118	141	164	164	132	**6SL312■ - 1TE31-3AA3**
1PH7186 - ..E...	458 (338)	0.67 (5.93)		120	135	150	156	132	**6SL312■ - 1TE31-3AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**

1PH7 motor (SH 180 and SH 225)

1) For continuous duty (with 30% n_{max}, 60% $^2/_3$ n_{max}, 10% standstill) for a duty cycle time of 10 min. For maintenance intervals for motors and components, see the 1PH Motors Configuration Manual.

2) Bearing version for coupling/belt output.

3) Bearing version for increased cantilever force.

4) Bearing version for increased maximum speed.

5) Version for increased maximum speed, only possible in combination with vibration magnitude grade S. The following options are not possible:
- ZF gearbox mounting prepared
- Shaft sealing ring

6) Only appropriate if the sealing ring is occasionally lubricated with oil spray/mist. A sealing ring is not possible for type IM B3 (IM V5, IM V6), version with increased cantilever force or increased maximum speed.

7) The following motor versions are required for ZF gearbox mounting prepared (see Gearboxes for gear selection):
- Type IM B35, IM V15 (not IM V35)
- Shaft with fitted key and full-key balancing
- Bearing version for coupling output
- Shaft and flange accuracy tolerance R
- DE flange with shaft sealing ring

8) Applies to type IM B35, as type IM B3, the motor is 20 kg (44 lb) lighter.

9) Motors of shaft height 160 and higher require foot support.

1PH7 standard type motors
SH 225

Selection and Ordering Data

Shaft height	Rated speed	Continuous speed, max.			Speed, max.[1]		Rated power for duty type in accordance with IEC 60034-1				1PH7 asynchronous motor with solid shaft, Forced ventilation
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	$n_{S1\ cont.}$[4]	n_{max}	n_{max}[5]	P_{rated}				Order No. Standard type
							S1	S6-60%	S6-40%	S2-30 min	
	rpm	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)	
225	700	3100	2700	3600	4500	5500	55 (73.8)	66 (88.5)	75 (101)	78 (105)	**1PH7224 -■■C■■-0■■■**
	1000						71 (95.2)	88 (118)	105 (141)	114 (153)	**1PH7224 -■■D■■-0■■■**
	1500						100 (134)	126 (169)	136 (182)	140 (188)	**1PH7224 -■■F■■-0■■■**

Fans:	External fan unit, heavy-gauge threaded cable entry in terminal box	2
	External fan unit, metric cable entry in terminal box	7
Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat 2048 S/R	E
	Incremental encoder sin/cos 1 V_{pp} with C and D track	M
	Incremental encoder sin/cos 1 V_{pp} without C and D track	N
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder, 22 bit single-turn + 12 bit multi-turn	F
	Incremental encoder, 22 bit with 11 bit commutation position	D
	Incremental encoder, 22 bit	Q
Terminal box/ Cable entry:	Top/right	0
	Top/DE	1
	Top/NDE	2
	Top/left	3
Type:	IM B3	0
	IM B3 (IM V5, IM V6) (hoisting system for vertical types)	1
	IM B35[9]	3
	IM B35 (IM V15, IM V35) (hoisting system for vertical types)[9]	5

Bearing version for:	**Vibration magnitude:**	**Shaft and flange accuracy:**	
Coupling output	Grade R	Tolerance N	A
Coupling output	Grade R	Tolerance R	B
Coupling output	Grade S	Tolerance R	C
Coupling output	Grade SR	Tolerance R	D
Belt output	Grade R	Tolerance N	E
Belt output	Grade R	Tolerance R	F
Increased cantilever force[6] (belt output)	Grade R	Tolerance N	G
Increased cantilever force[6] (belt output)	Grade R	Tolerance R	H
Increased speed (coupling output)[6]	Grade S	Tolerance R	J

Shaft extension (DE):[7]	**Balancing:**	**Direction of air flow (fan):**	**Blow-out direction:**	
Fitted key	Half-key	DE → NDE	Right	A
Fitted key	Half-key	NDE → DE	Axial	B
Fitted key	Full-key	DE → NDE	Right	C
Fitted key	Full-key	NDE → DE	Axial	D
Plain shaft	–	DE → NDE	Right	J
Plain shaft	–	NDE → DE	Axial	K

Degree of protection:	**Seal:**	**Paint finish:**	
IP55, fan IP54	–	Primed	0
IP55, fan IP54	DE flange with shaft sealing ring[6]	Primed	2
IP55, fan IP54	–	Anthracite	3
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite	5
IP55, fan IP54	–	Anthracite, two coats	6
IP55, fan IP54	DE flange with shaft sealing ring[6]	Anthracite, two coats	8

To select the type and the degree of protection, see Selection guides.

Selection and Ordering Data

Motor type (continued)	Rated torque	Moment of inertia	Weight, approx.[8]	Rated current for duty type in accordance with IEC 60034-1				SINAMICS S120 Motor Module	
								Rated output current	Booksize format
	M_{rated}	J	m	I_{rated}				I_{rated}	Order No.
				S1	S6-60%	S6-40%	S2-30 min	S1	
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A	A	A	
1PH7224 - ..C...	750 (553)	1.48 (13.1)	650 (1433)	117	135	149	155	132	**6SL312■ - 1TE31-3AA3**
1PH7224 - ..D...	678 (500)	1.48 (13.1)	650 (1433)	164	190	222	240	200	**6SL312■ - 1TE32-0AA3**
1PH7224 - .. F...	636 (469)	1.48 (13.1)	650 (1433)	188	230	248	256	200	**6SL312■ - 1TE32-0AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**

1PH7 motor (SH 180 and SH 225)

1) For continuous duty (with 30% n_{max}, 60% $^2/_3$ n_{max}, 10% standstill) for a duty cycle time of 10 min. For maintenance intervals for motors and components, see the 1PH Motors Configuration Manual.

2) Bearing version for coupling/belt output.

3) Bearing version for increased cantilever force.

4) Bearing version for increased maximum speed.

5) Version for increased maximum speed, only possible in combination with vibration magnitude grade S. The following options are not possible:
- ZF gearbox mounting prepared
- Shaft sealing ring

6) Only appropriate if the sealing ring is occasionally lubricated with oil spray/mist. A sealing ring is not possible for type IM B3 (IM V5, IM V6), version with increased cantilever force or increased maximum speed.

7) The following motor versions are required for ZF gearbox mounting prepared (see Gearboxes for gear selection):
- Type IM B35, IM V15 (not IM V35)
- Shaft with fitted key and full-key balancing
- Bearing version for coupling output
- Shaft and flange accuracy tolerance R
- DE flange with shaft sealing ring

8) Applies to type IM B35, as type IM B3, the motor is 20 kg (44 lb) lighter.

9) Motors of shaft height 160 and higher require foot support.

1PH4 motors

Overview

Given the compact design of modern machines, the heat loss from electrical drives can have an adverse effect on the accuracy of machining. The resulting demands for cold motors with a high power density led to the development of the water-cooled 1PH4 motors.

Furthermore, a combination of high torque and small construction volume (low mass inertia) results in short acceleration and braking times, and thus in a reduction in non-productive time.

1PH4 motors are rugged, 4-pole asynchronous motors with squirrel-cage rotors. Power loss and noise emission are reduced to a minimum. Thanks to the compact design of the motors, high maximum speeds can be achieved.

The motors are equipped with an encoder system for sensing the motor speed and indirect position. In machine tools, the encoder system is capable of C-axis operation as standard - that is, an additional encoder is not required for C-axis operation.

Benefits

- High power density thanks to the small construction volume
- Maximum speeds of up to 9000 rpm (optional: 12000 rpm)
- Full rated torque is continuously available, even at standstill
- Cooled flange to prevent thermal stressing of the connected mechanical power train
- Low noise level
- High degree of protection IP65 (shaft exit IP55)
- High rotational accuracy
- High cantilever force loading
- Ruggedness

Application

- Wherever extreme ambient conditions, such as high temperatures, dust, dirt, or a corrosive atmosphere, do not permit air cooling
- In processes in which the environment must not be heated
- On special machines, when cooling water is available due to the process
- Milling machines with full enclosure
- High-load milling spindles
- Counterspindles or rotating tools for turning machines

Technical specifications

Product name	1PH4 motor
Cooling	Water cooling
Coolant inlet temperature	Because of the formation of condensation, we recommend a coolant inlet temperature of approx. 30 °C (86 °F), depending on the ambient conditions.
Cooling water pressure at inlet, max.	7 bar
Temperature monitoring	2 KTY 84 temperature sensors in the stator winding, 1 as reserve
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a coolant inlet temperature of up to 30 °C (86 °F)
Built-in encoder systems for motors without DRIVE-CLiQ interface	• Incremental encoder sin/cos 1 V_{pp} 2048 S/R • Absolute encoder EnDat 2048 S/R
Built-in encoder systems for motors with DRIVE-CLiQ interface	• Incremental encoder 22 bit (2048 S/R internal) • Incremental encoder 22 bit (2048 S/R internal) with 11 bit commutation position • Absolute encoder 22 bit single-turn (2048 S/R internal) + 12 bit multi-turn (traversing range 4096 revolutions)
Type in accordance with EN 60034-7 (IEC 60034-7)	IM B35 (IM V15, IM V35)
Terminal box location (view drive end)[1)]	Top, rotatable 4 x 90°
Terminal box connection type	
• Motor	Terminals in terminal box
• Motor encoder and PTC thermistor	12-pin/17-pin circular socket (without mating connector) or DRIVE-CLiQ

S/R = signals/revolution

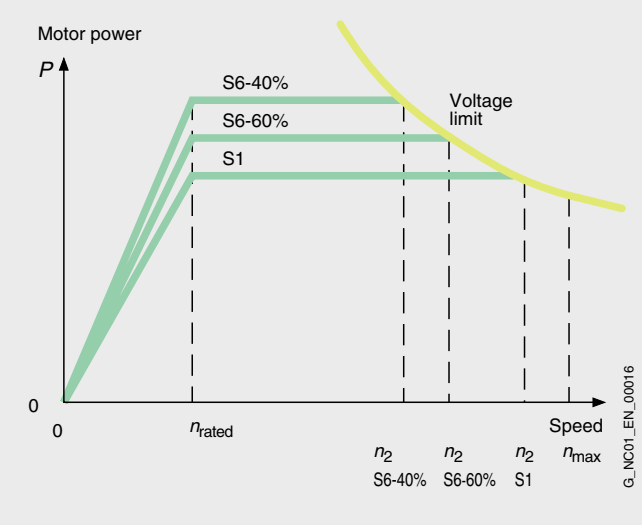
Refer to Liquid cooling for a list of heat exchanger manufacturers.

1) DE is the drive end with shaft. NDE is the non-drive end.

Technical specifications (continued)

Product name	1PH4 motor
Bearing version on DE[1]	Duplex bearing for belt or coupling output (minimum cantilever force required)
Vibration magnitude in accordance with EN 60034-14 (IEC 60034-14)	Grade R (reduced)
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)[2]	Tolerance N (normal)
Shaft extension drive end in accordance with DIN 748-3 (IEC 60072-1)	Full-key balancing with keyway
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	IP65, IP55 on shaft exit
Sound pressure level in accordance with EN ISO 1680 Tolerance +3 dB	
• 1PH410	69 dB (A)
• 1PH413	69 dB (A)
• 1PH416	71 dB (A)
Paint finish	Anthracite

Characteristic curves



Typical speed/power graph for AC motors[3]

The graph shows the typical relationship between motor speed and drive power in 1PH4 motors for duty types in accordance with IEC 60034-1:

S1: Continuous duty

S6: Continuous duty with intermittent loading and a relative duty factor of 60% (S6-60%) or 40% (S6-40%) with a maximum duty cycle time of 10 minutes.

1PH4 motor	Rated speed	Attainable speed for rated power in duty type in accordance with IEC 60034-1		
Type	n_{rated}	n_2[4]		
		S1	S6-60%	S6-40%
	rpm	rpm	rpm	rpm
1PH4103	1500	8600	7500	6500
1PH4105	1500	8800	7600	6500
1PH4107	1500	8600	7400	6400
1PH4133	1500	8000	7400	6000
1PH4135	1500	7400	6200	5500
1PH4137	1500	6800	5800	5000
1PH4138	1500	7800	6600	5800
1PH4163	1500	6300	5200	4500
1PH4167	1500	5200	4400	3800
1PH4168	1500	6300	5300	4600

1) For maximum permissible load, see the 1PH Motors Configuration Manual.

2) Shaft extension run-out, concentricity of spigot and shaft and perpendicularity of mounting face of flange to shaft.

3) For further configuration information, see the 1PH Motors Configuration Manual.

4) Values taken from the speed/power graph when using an Active Line Module on a 400 V 3 AC supply system.
If you are using a Smart Line Module, and with option for increased maximum speed, proceed in accordance with the 1PH Motors Configuration Manual.

1PH4 standard type motors SH 100 to SH 160

Selection and Ordering Data

Shaft height	Rated speed	Continuous speed, max.			Speed, max.[1]			Rated power for duty type in accordance with IEC 60034-1			1PH4 asynchronous motor with solid shaft Water cooling
SH	n_{rated}	$n_{S1\ cont.}$[2]	$n_{S1\ cont.}$[3]	$n_{S1\ cont.}$[4]	n_{max}[2]	n_{max}[3]	n_{max}[4]	P_{rated} S1	S6-60%	S6-40%	Order No. Standard type
	rpm	rpm	rpm	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	
100	1500	5600	6500	10000	7500	9000	12000	7.5 (10.1)	8.75 (11.7)	10 (13.4)	**1PH4103 - 4■F26**
								11 (14.8)	12.75 (17.1)	14.75 (19.8)	**1PH4105 - 4■F26**
								14 (18.8)	16.25 (21.8)	18.75 (25.1)	**1PH4107 - 4■F26**
132	1500	5200	6000	9250	6700	8000	10000	15 (20.1)	18 (24.1)	21 (28.2)	**1PH4133 - 4■F26**
								22 (29.5)	26.5 (35.5)	31 (41.6)	**1PH4135 - 4■F26**
								27 (36.2)	32.5 (43.6)	38 (51.0)	**1PH4137 - 4■F26**
								30 (40.2)	36 (48.3)	42 (56.3)	**1PH4138 - 4■F26**
160	1500	4000	4500	7000	5300	6500	8000	37 (49.6)	45 (60.3)	52.5 (70.4)	**1PH4163 - 4■F26**
								46 (61.7)	55 (73.8)	65 (87.2)	**1PH4167 - 4■F26**
								52 (69.7)	62.5 (83.8)	73 (97.9)	**1PH4168 - 4■F26**

Encoder systems for motors without DRIVE-CLiQ interface:	Absolute encoder EnDat, 2048 S/R Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D track Incremental encoder sin/cos 1 V_{pp} 2048 S/R without C and D track	**E** **M** **N**
Encoder systems for motors with DRIVE-CLiQ interface:	Absolute encoder 22 bit single-turn + 12 bit multi-turn Incremental encoder 22 bit with 11 bit commutation position Incremental encoder 22 bit	**F** **D** **Q**

7

Options

Designation	Order code
Bearing version (view drive end) (standard = duplex bearing) • Single bearing for coupling, for low to medium cantilever forces or planetary gear units (e.g. mounting of a ZF gearbox 2LG43...)[6)7)]	**K00**
Vibration magnitude in accordance with EN 60034-14 (IEC 60034-14) (standard = vibration magnitude grade R, duplex bearing) • Grade S with duplex bearing[8)] • Grade S with single bearing[8)] • Grade SR with single bearing[8)]	**K05**[9)] **K02**[9)] **K03**[9)]
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1) (standard = tolerance N) • Tolerance R	**K04**[10)]
Shaft extension (DE) (standard = full-key balancing with keyway) • Plain shaft • Half-key balancing	**K42** **L69**

Designation	Order code
Shaft seal (DE) • Radial shaft sealing ring, oil-tight, IP65	**K18**[11)]
Brake[7)] • With holding brake mounted on DE	**G46**
Terminal box location (view DE) (standard = top) • Right side, cable entry from below[7)14)] • Left side, cable entry from below[7)14)]	 **K09** **K10**
Rotation of terminal box on its own axis • By 90°, cable entry from drive end[12)] • By 90°, cable entry from non-drive end[12)] • By 180°, cable entry from above[12)14)]	 **K83** **K84** **K85**
Speed[13)] • With increased maximum speed and half-key balancing	**L37**
Other • Second rating plate, separately packed	**K31**
Encoder system • Without encoder system	**H30**[5)]

When ordering a motor with options, **-Z** should be added to the order number and the order code should also be specified for each additional required version.

Order codes must not be repeated in plain text in the order.

Order No. **1PH4135-4NF26-Z**

Order code(s) **K05** + **K09** + **K31**

Selection and Ordering Data

Motor type (continued)	Rated torque	Moment of inertia	Weight, approx.	Rated current for duty type in accordance with IEC 60034-1			SINAMICS S120 Motor Module	
							Required rated output current	Booksize format
	M_{rated}	J	m	I_{rated}			I_{rated}	Order No.
				S1	S6-60%	S6-40%	S1	
	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	A		
1PH4103 - ...	48 (35.4)	0.017 (0.15)	52 (115)	26	29	32	30	**6SL312■ - 1TE23-0AA3**
1PH4105 - ...	70 (51.6)	0.024 (0.21)	67 (148)	38	42	47	45	**6SL312■ - 1TE24-5AA3**
1PH4107 - ...	90 (66.4)	0.031 (0.27)	80 (176)	46	52	58	60	**6SL312■ - 1TE26-0AA3**
1PH4133 - ...	95 (70.1)	0.046 (0.41)	90 (198)	55	65	74	60	**6SL312■ - 1TE26-0AA3**
1PH4135 - ...	140 (103)	0.071 (0.63)	112 (247)	73	86	99	85	**6SL312■ - 1TE28-5AA3**
1PH4137 - ...	170 (125)	0.085 (0.75)	130 (287)	85	100	114	85	**6SL312■ - 1TE28-5AA3**
1PH4138 - ...	190 (140)	0.097 (0.86)	150 (331)	102	119	136	132	**6SL312■ - 1TE31-3AA3**
1PH4163 - ...	235 (173)	0.17 (1.50)	175 (386)	107	125	142	132	**6SL312■ - 1TE31-3AA3**
1PH4167 - ...	293 (216)	0.206 (1.82)	210 (463)	120	138	158	132	**6SL312■ - 1TE31-3AA3**
1PH4168 - ...	331 (244)	0.22 (1.95)	240 (529)	148	173	197	200	**6SL312■ - 1TE32-0AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**

Notes on water cooling

Motor type	Coolant flow rate (water)	Connecting thread on non-drive end (NDE)
1PH410	6 l/min	G 1/4
1PH413	8 l/min	G 3/8
1PH416	10 l/min	G 1/2

1) For continuous duty (with 30% n_{max}, 60% $^2/_3$ n_{max}, 10% standstill) for a duty cycle time of 10 min. For maintenance intervals for motors and components, see the 1PH Motors Configuration Manual.

2) Bearing version for duplex bearing.

3) Bearing version for single bearing.

4) Bearing version for increased speed using option L37.

5) These encoders are not suitable for operation on machine tools.

6) Vibration magnitude grades S, SR and mounting position IM V35 not possible for integrated gearbox. Use order code K00 + G97 for old ZF gearbox 2LG42... (for gear selection, see Gearboxes).

7) Options gear mounting, built-on brake, terminal box location on side are mutually exclusive.

8) Options K05, K02 and K03 are mutually exclusive.

9) Automatically includes version K04.

10) Increased shaft accuracy.

11) Only recommended if oil spray/mist occasionally gets onto the sealing ring.

12) Options K83, K84 and K85 are mutually exclusive.

13) Version for increased maximum speed includes vibration magnitude grade SR and half-key balancing. The following options are not possible:
- ZF gearbox mounting prepared (on request only)
- Shaft seal.

14) K09 or K10 cannot be combined with K85.

1PM4 motors with hollow shaft

Overview

1PM4 motor (SH 100 and SH 132, liquid-cooled)

The liquid-cooled 1PM4 motors have been specially designed for direct mounting on mechanical spindles. The hollow shaft permits the passage of coolant for tools with internal cooling. The shaft is prepared on the non-drive end of the motor for connection of a turning bushing for input of the coolant.

Given the compact design of modern machines, the heat loss from electrical drives can have an adverse effect on the accuracy of machining. The resulting demand for cold motors with a high power density led to the development of the 1PM4 liquid-cooled motors.

Furthermore, a combination of high torque and small construction volume (low moment of inertia) results in short acceleration and braking times, and thus in a reduction in non-productive time.

The motors have a built-in hollow-shaft measuring system for recording the motor speed and indirect position.

Benefits

- Hollow shaft for passage of coolant with direct spindle mounting
- Maximum speeds of up to 12000 rpm (optional: 18000 rpm)[4]
- Full rated torque is continuously available, even at standstill
- Cooled flange to prevent thermal stressing of the connected mechanical power train
- Low noise level
- High rotational accuracy
- Short ramp-up and braking times

Application

- Compact machining centers
- Directly driven tools with internal cooling
- Special machines

Technical specifications

Product name	1PM4 motor
Coolant inlet temperature	Because of the formation of condensation, we recommend a coolant inlet temperature of approximately 30 °C (86 °F), depending on the ambient conditions.
Cooling water pressure at inlet, max.	3 bar
Temperature monitoring	2 KTY 84 temperature sensors in the stator winding, 1 as reserve
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a coolant inlet temperature of up to 30 °C (86 °F)
Built-in encoder system for motors without DRIVE-CLiQ interface	Incremental encoder sin/cos 1 V_{pp} 256 S/R
Built-in encoder system for motors with DRIVE-CLiQ interface	Incremental encoder 19 bit (256 S/R internal)
Type[1] in accordance with EN 60034-7 (IEC 60034-7)	IM B35 (IM V15, IM V35)
Terminal box location (view drive end)[2]	Top, rotatable 4 x 90°
Terminal box connection type	
• Motor	Terminals in terminal box
• Motor encoder and PTC thermistor	17-pin circular socket (without mating connector) or DRIVE-CLiQ
Vibration magnitude in accordance with EN 60034-14 (IEC 60034-14)	Grade SR
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)[3]	Tolerance R (reduced)
DE shaft extension	With plain shaft, without keyway
Hollow ID for shaft	Ø 11.5 mm (0.45 in)
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	IP65, IP55 on shaft exit
Sound pressure level in accordance with EN ISO 1680 tolerance +3 dB	
• 1PM410	69 dB (A)[4]
• 1PM413	69 dB (A)[4]
Paint finish	Anthracite

S/R = signals/revolution

Notes on liquid cooling

Motor type	Coolant flow rate (water, oil)	Connecting thread on non-drive end (NDE)
1PM410	6 l/min	G 1/4
1PM413	8 l/min	G 3/8

Refer to Liquid cooling for a list of heat exchanger manufacturers.

1) For types, see Selection guides.
2) DE is the drive end with shaft. NDE is the non-drive end.
3) Shaft extension run-out, concentricity of spigot and shaft and perpendicularity of mounting face of flange to shaft.
4) With option L37: 72 dB (A).

Overview

1PM6 motors (SH 100 and SH 132 with radial and axial fans)

The air-cooled 1PM6 motors have been specially designed for direct mounting on mechanical spindles. The hollow shaft permits the passage of coolant for tools with internal cooling. The shaft is prepared on the non-drive end of the motor for connection of a turning bushing for input of the coolant.

The 1PM6 motors are rugged and maintenance-free 4-pole asynchronous motors with squirrel-cage rotors. They have been designed specifically for use in conjunction with the SINAMICS S120 drive system.

A fan for providing forced ventilation is mounted either radially or axially (depending on the version) on the rear of the motor. The direction of air flow is from the drive end to the non-drive end to keep the exhaust heat of the motor away from the machine tool.

The motors have a built-in hollow-shaft measuring system for recording the motor speed and indirect position.

Benefits

- Hollow shaft for passage of coolant with direct spindle mounting
- Maximum speeds of up to 12000 rpm (optional: 18000 rpm)[4)]
- Full rated torque is continuously available, even at standstill
- Axial or radial fans
- High rotational accuracy
- Short ramp-up and braking times

Application

- Compact machining centers
- Directly driven tools with internal cooling
- Special machines

Technical specifications

Product name	1PM6 motor
Coolant temperature, permissible	-15 ... +40 °C (+5 ... +104 °F)
Temperature monitoring	2 KTY 84 temperature sensors in the stator winding, 1 as reserve
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a coolant temperature of up to 40 °C (104 °F)
Motor fan ratings	400 V 3 AC, 50/60 Hz
Built-in encoder system for motors without DRIVE-CLiQ interface	Incremental encoder sin/cos 1 V_{pp} 256 S/R
Built-in encoder system for motors with DRIVE-CLiQ interface	Incremental encoder 19 bit (256 S/R internal)
Type in accordance with[1)] EN 60034-7 (IEC 60034-7)	IM B5 (IM V1, IM V3)
Terminal box location (view drive end)[2)]	For axial fan Top, rotatable 4 x 90° For radial fan On right side, rotatable 4 x 90°
Terminal box connection type	
• Motor	Terminals in terminal box
• Fan	Terminals in terminal box
• Motor encoder and PTC thermistor	17-pin circular socket (without mating connector) or DRIVE-CLiQ
Vibration magnitude in accordance with EN 60034-14 (IEC 60034-14)	Grade SR
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1)[3)]	Tolerance R (reduced)
DE shaft extension	With plain shaft, without keyway
Hollow ID for shaft	Ø 11.5 mm (0.45 in)
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	IP55, fan IP54
Sound pressure level in accordance with EN ISO 1680 tolerance +3 dB	From DE to NDE (with the fan operating on a 50 Hz supply system)
• 1PM610	70 dB (A)[4)]
• 1PM613	70 dB (A)[4)]
Paint finish	Anthracite

S/R = signals/revolution

1) For types, see Selection guides.
2) DE is the drive end with shaft. NDE is the non-drive end.
3) Shaft extension run-out, concentricity of spigot and shaft and perpendicularity of mounting face of flange to shaft.
4) With option L37: 72 dB (A).

1PM4/1PM6 standard type motors SH 100/SH 132

Selection and Ordering Data

Shaft height	Rated speed		Contin-uous speed, max.	Speed, max.[1]	Rated power for **star** n_{ratedY} = 1500 rpm		Rated power for **delta** $n_{rated\Delta}$ = 4000 rpm		**1PM4 asynchronous motor with hollow shaft**	**1PM6 asynchronous motor with hollow shaft**
SH	star	delta	n_{S1cont}	n_{max}	P_{rated}		P_{rated}			
					S1	S6-40%	S1	S6-40%	Order No. **Standard type**	Order No. **Standard type**
	rpm	rpm	rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)		
									Oil cooling[2]	***Forced ventilation***
100	1500	4000	12000	12000	3.7 (4.96)	5.25 (7.04)	3.7 (4.96)	6 (8.05)	**1PM4101 - 2■F86 - 1■S1**	**1PM6101 - 2■F8■ - 1■ ■1**
	1500	4000	18000	18000	3.7 (4.96)	5.25 (7.04)	3.7 (4.96)	6 (8.05)	**1PM4101 - 2L F86 - 1■S1**[3]	**1PM6101 - 2L F8■ - 1■ ■1**[3]
	1500	4000	12000	12000	7.5 (10.1)	11 (14.8)	7.5 (10.1)	13 (17.4)	**1PM4105 - 2■F86 - 1■S1**	**1PM6105 - 2■F8■ - 1■ ■1**
	1500	4000	18000	18000	7.5 (10.1)	11 (14.8)	7.5 (10.1)	13 (17.4)	**1PM4105 - 2L F86 - 1■S1**[3]	**1PM6105 - 2L F8■ - 1■ ■1**[3]
132	1500	4000	10000	10500	11 (14.8)	16.5 (22.1)	11 (14.8)	19.5 (26.1)	**1PM4133 - 2■F86 - 1■S1**	**1PM6133 - 2■F8■ - 1■ ■1**
	1500	4000	15000	15000	11 (14.8)	16.5 (22.1)	11 (14.8)	19.5 (26.1)	**1PM4133 - 2L F86 - 1■S1**[3]	**1PM6133 - 2L F8■ - 1■ ■1**[3]
	1500	4000	10000	10500	18.5 (24.8)	28 (37.5)	18.5 (24.8)	32 (42.9)	**1PM4137 - 2■F86 - 1■S1**	**1PM6137 - 2■F8■ - 1■ ■1**
	1500	4000	12000	12000	18.5 (24.8)	28 (37.5)	18.5 (24.8)	32 (42.9)	**1PM4137 - 2L F86 - 1■S1**[3]	**1PM6137 - 2L F8■ - 1■ ■1**[3]
	1500	4000	10000	10500	22 (29.5)	33 (44.3)	22 (29.5)	39 (52.3)	–	**1PM6138 - 2■F8■ - 1■ ■1**
	1500	4000	11000	11000	22 (29.5)	33 (44.3)	22 (29.5)	39 (52.3)	–	**1PM6138 - 2L F8■ - 1■ ■1**[3]
									Water cooling[4]	
100	1500		12000	12000	5 (6.71)	6.5 (8.72)	–	–	**1PM4101 - 2■W26 - 1■S1**	
	1500		18000	18000	5 (6.71)	6.5 (8.72)	–	–	**1PM4101 - 2■W26 - 1■S1**[3]	
	1500		12000	12000	11 (14.8)	14.75 (19.8)	–	–	**1PM4105 - 2■W26 - 1■S1**	
	1500		18000	18000	11 (14.8)	14.75 (19.8)	–	–	**1PM4105 - 2■W26 - 1■S1**[3]	
132	1500		10000	10500	15 (20.1)	21 (28.2)	–	–	**1PM4133 - 2■W26 - 1■S1**	
	1500		15000	15000	15 (20.1)	21 (28.2)	–	–	**1PM4133 - 2■W26 - 1■S1**[3]	
	1500		10000	10500	27 (36.2)	38 (51.0)	–	–	**1PM4137 - 2■W26 - 1■S1**	
	1500		12000	12000	27 (28.2)	38 (51.0)	–	–	**1PM4137 - 2■W26 - 1■S1**[3]	

Option	Version	1PM4	1PM6 version	1PM6
Encoder system for motors without DRIVE-CLiQ interface:	Incremental encoder sin/cos 1 V_{pp}, 256 S/R	**L**		**L**
Encoder system for motors with DRIVE-CLiQ interface:	Incremental encoder 19 bit	**V**		**V**
Type:	IM B35, IM V15, IM V35		IM B5 IM V1 IM V3	**1** **4** **5**
Fans: Without fan combined with terminal box/metric cable entry	Top/right Top/DE Top/NDE Top/left	**A** **B** **C** **D**		
Axial fan/Blow-out direction below/Direction of air flow DE → NDE combined with terminal box/metric cable entry			Top/right Top/DE Top/NDE Top/left	**A R** **B R** **C R** **D R**
Radial fan/Blow-out direction NDE/Direction of air flow DE → NDE combined with terminal box/metric cable entry			Right side/below Right side/DE Right side/NDE[5]	**E D** **F D** **G D**

To select the type and the degree of protection, see Selection guides.

1) For continuous duty (with 30% n_{max}, 60% $^2/_3$ n_{max}, 10% standstill) for a duty cycle time of 10 min. For maintenance intervals for motors and components, see 1PM Motors Configuration Manual.
2) Star/delta changeover.
3) With option L37: Version for increased maximum speed.
4) Only star connection possible.
5) For 1PM6101 and 1PM6105 only.
6) Version for increased maximum speeds includes vibration magnitude grade SR. The following options are not possible:
- ZF gearbox mounting prepared
- Shaft seal.

Selection and Ordering Data

Motor type (continued)	Rated torque for **star**		Rated torque for **delta**		Moment of inertia	Weight, approx.		Rated current for **star**		**SINAMICS S120 Motor Module**	
						1PM4	1PM6			Required rated output current	**Booksize format**
	M_{rated}		M_{rated}		J	m	m	I_{rated}		I_{rated}	Order No.
	S1	S6-40%	S1	S6-40%				S1	S6-40%	S1	
	Nm (lb_f-ft)	Nm (lb_f-ft)	Nm (lb_f-ft)	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kg (lb)	kg (lb)	A	A	A	
1PM .101- ...	24 (17.7)	33 (24.3)	9 (6.64)	14 (10.3)	0.011 (0.10)	42 (92.6)	45 (99.2)	13	17.5	18	**6SL312■ - ■TE21-8AA3**
1PM .101-2L...[3]	24 (17.7)	33 (24.3)	9 (6.64)	14 (10.3)	0.011 (0.10)	42 (92.6)	45 (99.2)	13	17.5	18	**6SL312■ - ■TE21-8AA3**
1PM .105- ...	48 (35.4)	70 (51.6)	18 (13.3)	31 (22.9)	0.024 (0.21)	67 (148)	70 (154)	23	31	30	**6SL312■ - 1TE23-0AA3**
1PM .105-2L...[3]	48 (35.4)	70 (51.6)	18 (13.3)	31 (22.9)	0.024 (0.21)	67 (148)	70 (154)	23	31	30	**6SL312■ - 1TE23-0AA3**
1PM .133- ...	70 (51.6)	105 (77.4)	26 (19.2)	47 (34.7)	0.046 (0.41)	90 (198)	94 (207)	41	58	45	**6SL312■ - 1TE24-5AA3**
1PM .133-2L...[3]	70 (51.6)	105 (77.4)	26 (19.2)	47 (34.7)	0.046 (0.41)	90 (198)	94 (207)	41	58	45	**6SL312■ - 1TE24-5AA3**
1PM .137- ...	118 (87.0)	178 (131)	44 (32.5)	76 (56.1)	0.085 (0.75)	130 (287)	135 (298)	56	79	60	**6SL312■ - 1TE26-0AA3**
1PM .137-2L...[3]	118 (87.0)	178 (131)	44 (32.5)	76 (56.1)	0.085 (0.75)	130 (287)	135 (298)	56	79	60	**6SL312■ - 1TE26-0AA3**
1PM6138- ...	140 (103)	210 (155)	53 (39.1)	93 (68.6)	0.104 (0.92)	–	156 (344)	58	80	60	**6SL312■ - 1TE26-0AA3**
1PM6138-2L...[3]	140 (103)	210 (155)	53 (39.1)	93 (68.6)	0.104 (0.92)	–	156 (344)	58	80	60	**6SL312■ - 1TE26-0AA3**
1PM4101- ...	32 (23.6)	41 (30.2)	–	–	0.011 (0.10)	42 (92.6)	–	18	22.5	18	**6SL312■ - ■TE21-8AA3**
1PM4101- ...[3]	32 (23.6)	41 (30.2)	–	–	0.011 (0.10)	42 (92.6)	–	18	22.5	18	**6SL312■ - ■TE21-8AA3**
1PM4105- ...	70 (51.6)	94 (69.3)	–	–	0.024 (0.21)	67 (148)	–	38	47	45	**6SL312■ - 1TE24-5AA3**
1PM4105- ...[3]	70 (51.6)	94 (69.3)	–	–	0.024 (0.21)	67 (148)	–	38	47	45	**6SL312■ - 1TE24-5AA3**
1PM4133- ...	95 (70.1)	134 (98.8)	–	–	0.046 (0.41)	90 (198)	–	55	74	60	**6SL312■ - 1TE26-0AA3**
1PM4133- ...[3]	95 (70.1)	134 (98.8)	–	–	0.046 (0.41)	90 (198)	–	55	74	60	**6SL312■ - 1TE26-0AA3**
1PM4137- ...	172 (127)	242 (178)	–	–	0.085 (0.75)	130 (287)	–	85	114	85	**6SL312■ - 1TE28-5AA3**
1PM4137- ...[3]	172 (127)	242 (178)	–	–	0.085 (0.75)	130 (287)	–	85	114	85	**6SL312■ - 1TE28-5AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**
Double Motor Module	**2**

Options

Designation	Order code
Speed[6]	
• With increased maximum speed	**L37**

When ordering a motor with options, **-Z** should be added to the order number and the order code should also be specified for each additional required version.

Order codes must not be repeated in plain text in the order.

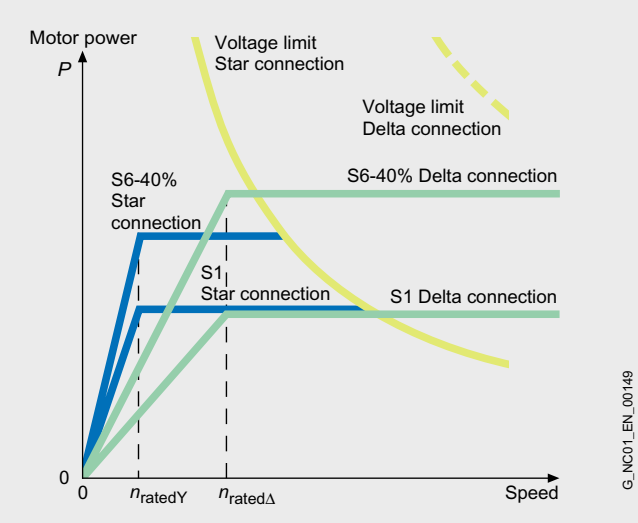
Order No. **1PM4101-2LF86-1AS1-Z**

Order code **L37**

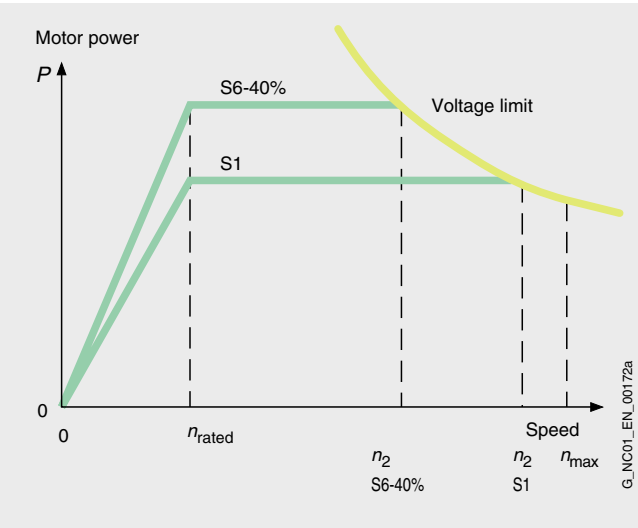
1PM6 motor (radial fan), 1PM6 motor (axial fan) and 1PM4 motor (liquid-cooled)

1PM4/1PM6 motors
SH 100/SH 132

Characteristic curves



Typical speed/power graph for 1PM4 motors with selectable star/delta connection[1] (oil-cooled) and 1PM6 motors[1]



Typical speed/power graph for 1PM4 motors[1] (water-cooled)

The graphs show the typical relationship between motor speed and drive power for 1PM4/1PM6 motors for the following duty types in accordance with IEC 60034-1:

S1: Continuous duty

S6-40%: Continuous duty with intermittent loading and a relative duty factor of 40% (S6-40%) with a maximum duty cycle time of 10 minutes.

1PM motor	Rated speed	Attainable speeds for rated power in duty type in accordance with IEC 60034-1		Rated speed	Attainable speeds for rated power in duty type in accordance with IEC 60034-1	
Type	Star connection			Delta connection		
	n_{ratedY}	n_2[2]		$n_{ratedΔ}$	n_2[2]	
		S1	S6-40%		S1	S6-40%
	rpm	rpm	rpm	rpm	rpm	rpm
Forced ventilation						
1PM6101	1500	9710	7170	4000	12000	12000
1PM6105	1500	9000	6360	4000	12000	12000
1PM6133	1500	8000	8140	4000	10500	10500
1PM6137	1500	7000	5920	4000	10500	10500
1PM6138	1500	4000	4000	4000	6000	6500
Oil cooling						
1PM4101	1500	9710	7170	4000	12000	12000
1PM4105	1500	9000	6360	4000	12000	12000
1PM4133	1500	8000	8140	4000	10500	10500
1PM4137	1500	7000	5920	4000	10500	10500
Water cooling						
1PM4101	1500	9670	7590	–	–	–
1PM4105	1500	9460	7130	–	–	–
1PM4133	1500	8290	6130			
1PM4137	1500	6860	4920	–	–	–

[1] For further configuration information, see the 1PM Motors Configuration Manual.

[2] Values taken from the speed/power graph when using an Active Line Module on a 400 V 3 AC supply system.
If you are using a Smart Line Module, and with option for increased maximum speed, proceed in accordance with the 1PM Motors Configuration Manual.

Overview

Active parts (rotor and stator) of 1PH2 asynchronous integral motors

1PH2 built-in motors for turning machines are liquid-cooled squirrel-cage AC asynchronous motors. These built-in motors have been specially developed for variable-speed operation of main spindles on turning machines.

Benefits

- Compact design obtained by dispensing with mechanical components such as coupling, belt drive, gearbox and spindle encoder
- High power density as a result of liquid cooling
- The absence of drive transverse forces permits extremely high accuracy on workpiece due to smooth, accurate spindle motion even at very low speeds
- Extremely short ramp-up and braking times
- Full rated torque is continuously available, even at standstill
- Simple servicing by replacing complete motor spindles
- Increased rigidity of the spindle drive, achieved by mounting the motor components between the main spindle bearings
- C-axis compatibility with hollow-shaft measuring system mounted on the spindle
- Low noise level due to absence of machine elements
- Torque is transmitted to the spindle mechanically without play by means of a cylindrical stepped press fit. The rotor is mounted on the spindle by thermal shrinking. The bond can be released by pressure-oil injection without affecting the joint surfaces.
- The rotor with sleeve is pre-balanced and can be removed and subsequently remounted
- The rotor with sleeve is finished-machined - that is, the rotor outer diameter need not be finished after mounting.

Application

1PH2 built-in motors are used for machines requiring an extremely high standard of machining, accuracy and running smoothness.

- Turning machines
- Grinders

Technical specifications

Product name	1PH2 built-in motor
Coolant inlet temperature	Because of the formation of condensation, we recommend a coolant inlet temperature of approx. 25 °C (77 °F), depending on the ambient conditions.
Cooling water pressure at inlet, max.	7 bar
Temperature monitoring	2 KTY 84 temperature sensors in the stator winding, 1 as reserve
Insulation of the stator winding in accordance with EN 60034-1 (IEC 60034-1)	Temperature class 155 (F) for a coolant inlet temperature of up to 25 °C (77 °F)
Recommended motor encoder (not included in scope of supply)	SIMAG H2 hollow-shaft measuring system
Type (cf. ISO)	Individual components: Stator, rotor
Motor connection type	Free cable ends with 0.5 m (19.7 in) or 1.5 m (59.1 in) length
Balance quality of rotor in accordance with ISO 1940-1	Sizes 093 to 118: G 2.5 Reference speed 3600 rpm
Degree of protection in accordance with IEC 60034-5	IP00

Notes on water cooling

Motor type	Coolant flow rate (water)	Connecting thread
1PH209	8 l/min	dependent on cooler used
1PH211	8 l/min	

Refer to Liquid cooling for a list of heat exchanger manufacturers.

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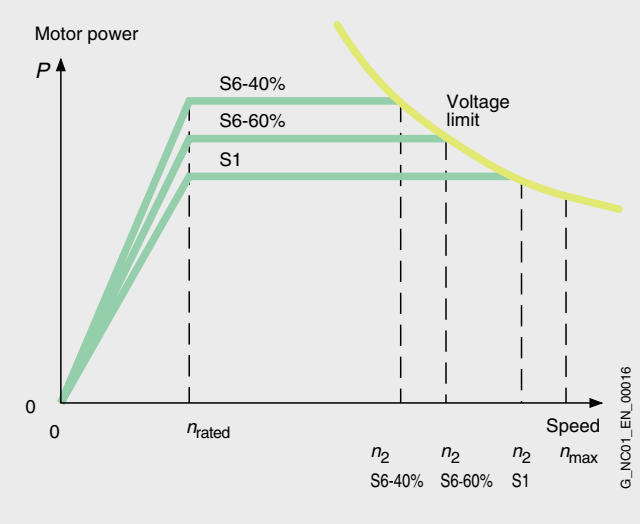
1PH2 built-in motors for direct drive

Selection and Ordering Data

Rated speed	Speed, max.	Rated power for duty type in accordance with IEC 60034-1 [1]				1PH2 asynchronous built-in motor for direct drive Water cooling	Rated torque [1]	
n_{rated}	n_{max}	P_{rated}					M_{rated}	
		S1	S1 ΔT=105 K	S6-60%	S6-40%	Order No. **Standard type**		ΔT=105 K
rpm	rpm	kW (HP)	kW (HP)	kW (HP)	kW (HP)		Nm (lb_f-ft)	Nm (lb_f-ft)
1500	10000	7.5 (10.1)	9.4 (12.6)	8.2 (11.0)	9 (12.1)	**1PH2093 - 6WF4** ■	48 (35.4)	60 (44.3)
		10.1 (13.5)	13 (17.4)	11 (14.8)	12 (16.1)	**1PH2095 - 6WF4** ■	64 (47.2)	83 (61.2)
1500	10000	15.1 (20.2)	18.5 (24.8)	17 (22.8)	19 (25.5)	**1PH2113 - 6WF4** ■	95 (70.1)	118 (87.0)
		16.5 (22.1)	21.5 (28.8)	18.5 (24.8)	21 (28.2)	**1PH2115 - 6WF4** ■	105 (77.4)	137 (101)
		18.1 (24.3)	23.7 (31.8)	20.5 (27.5)	23 (30.8)	**1PH2117 - 6WF4** ■	115 (84.8)	151 (111)
		23.6 (31.6)	30.9 (41.4)	26 (34.9)	29.5 (39.6)	**1PH2118 - 6WF4** ■	146 (108)	197 (145)

Free cable ends:
Length: 1.5 m (59.1 in) **1**
Length: 0.5 m (19.7 in) (preferred type) **2**

Characteristic curves



Typical speed/power graph for AC motors [2]

The graph shows the typical relationship between motor speed and drive power for 1PH2 motors for the following duty types in accordance with IEC 60034-1:

S1: Continuous duty

S6: Continuous duty with intermittent loading and a relative duty factor of 60% (S6-60%) or 40% (S6-40%) with a maximum duty cycle time of 10 minutes.

1PH2 motor	Rated speed	Attainable speed for rated power in duty type in accordance with IEC 60034-1		
Type	n_{rated}	n_2 [3]		
		S1	S6-60%	S6-40%
	rpm	rpm	rpm	rpm
1PH2093	1500	4700	4200	3900
1PH2095	1500	4000	3600	3300
1PH2113	1500	5400	4800	4400
1PH2115	1500	4500	4100	3700
1PH2117	1500	4700	4200	3800
1PH2118	1500	5300	4700	4300

[1] Data for ΔT = 70 K, unless specified otherwise.

[2] For further configuration information, see the 1PH Motors Configuration Manual.

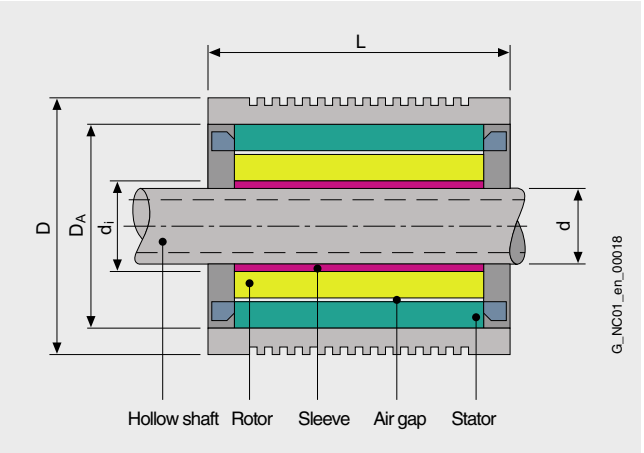
[3] Values taken from the speed/power graph when using an Active Line Module on a 400 V 3 AC supply system. If you are using a Smart Line Module, proceed in accordance with the 1PH Motors Configuration Manual.

Selection and Ordering Data

Motor type (continued)	Moment of inertia of rotor	Weight (rotor and stator), approx.	Rated current for duty type in accordance with IEC 60034 -1[1]			SINAMICS S120 Motor Module	
						Required rated output current	Booksize format
	J		I_{rated}			I_{rated}	Order No.
			S1	S6-60%	S6-40%	S1	
	kgm² (lb$_f$-in-s²)	kg (lb)	A	A	A	A	
1PH2093-6W...	0.028 (0.25)	33 (72.8)	24	26	28	30	**6SL312■ - 1TE23-0AA3**
1PH2095-6W...	0.036 (0.32)	42 (92.6)	30	32	34	30	**6SL312■ - 1TE23-0AA3**
1PH2113-6W...	0.066 (0.58)	51 (112)	56	61	67	60	**6SL312■ - 1TE26-0AA3**
1PH2115-6W...	0.073 (0.65)	56 (123)	55	60	66	60	**6SL312■ - 1TE26-0AA3**
1PH2117-6W...	0.079 (0.70)	62 (137)	60	67	74	60	**6SL312■ - 1TE26-0AA3**
1PH2118-6W...	0.100 (0.89)	78 (172)	82	90	100	85	**6SL312■ - 1TE28-5AA3**

Cooling:	
Internal air cooling	**0**
External air cooling	**1**
Motor Module:	
Single Motor Module	**1**

Dimension drawing



1PH2 motor	Standard spindle diameter	Rotor internal diameter	Stator outer diameter	Total outer diameter	Total length
Type	d	d_i	D_A	D	L
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)
1PH2093	67 (2.64)	85 (3.35)	180 (7.09)	205 (8.07)	250 (9.84)
1PH2095					300 (11.8)
1PH2113	82 (3.23)	100 (3.94)	220 (8.66)	250 (9.84)	290 (11.4)
1PH2115					310 (12.2)
1PH2117					330 (13.0)
1PH2118					390 (15.3)

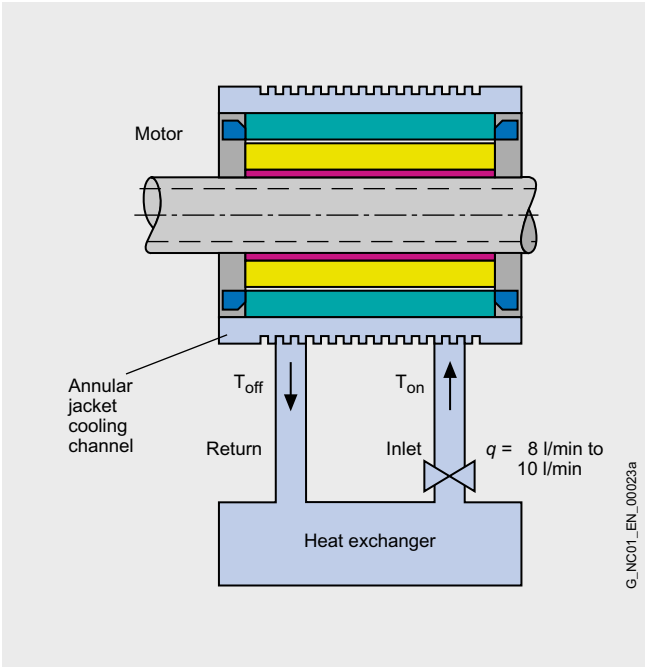
7

For 1PH4/1PM4/1PH2/1FE1 motors

Overview

Cooling principle

For design of the cooling units, see Configuration Manual.



Cooling unit manufacturers

Non-Siemens products whose fundamental suitability is familiar to us. It goes without saying that equivalent products from other manufacturers may be used. Our recommendations are to be seen as helpful information, not as requirements or dictates. We do not warrant the composition, nature, state or quality of non-Siemens products.

Please contact the companies below for technical information.

BKW Kälte-Wärme-Versorgungstechnik GmbH

Contact: Mr. Walker
Benzstraße 2
72649 WOLFSCHLUGEN, Germany
Phone: +49 (0) 70 22 - 50 03 - 0
Fax: +49 (0) 70 22 - 50 03 - 30
E-mail: info@bkw-kuema.de
www.bkw-kuema.de

DELTATHERM Hirmer GmbH

Contact: Mr. Hirmer
Gewerbegebiet Bövingen122
53804 MUCH, Germany
Phone: +49 (0) 22 45 - 61 07 - 0
Fax: +49 (0) 22 45 - 61 07 - 10
E-mail: info@deltatherm.com
www.deltatherm.de

Glen Dimplex Deutschland GmbH
RIEDEL Kältetechnik Division

Contact: Mr. Schneider
Am Goldenen Feld 18
95326 KULMBACH, Germany
Phone: +49 (0) 92 21 - 7 09 - 5 55
Fax: +49 (0) 92 21 - 7 09 - 5 49
E-mail: info@riedel-cooling.com
www.riedel-cooling.com

Helmut Schimpke Industriekühlanlagen GmbH + Co. KG

Contact: Mr. Geerkens
Ginsterweg 25-27
42781 HAAN, Germany
Phone: +49 (0) 21 29 - 94 38 - 0
Fax: +49 (0) 21 29 - 94 38 - 99
E-mail: info@schimpke.de
www.schimpke.com

Hydac System GmbH

Contact: Mr. Klein
Postfach 12 51
66273 SULZBACH/SAAR, Germany
Phone: +49 (0) 68 97 - 5 09 - 7 08
Fax: +49 (0) 68 97 - 5 09 - 4 54
E-Mail: winfried.klein@hydac.com
www.hydac.com

Hyfra Industriekühlanlagen GmbH

Contact: Mr. Forberger
Industriepark 54
56593 KRUNKEL, Germany
Phone: +49 (0) 26 87 - 8 98 - 0
Fax: +49 (0) 26 87 - 8 98 - 25
E-mail: infohyfra@hyfra.com
www.hyfra.com

KKT Kraus Kälte- und Klimatechnik GmbH

Contact: Mr. Titschack
Mühllach 13a
90552 RÖTHENBACH A. D. PEGNITZ, Germany
Phone: +49 (0) 911 - 953 33 - 40
Fax: +49 (0) 911 - 953 33 - 33
E-mail: gtitschack@kkt-kraus.com
www.kkt-kraus.com

Pfannenberg GmbH

Contact: Mr. Hille
Werner-Witt-Straße 1
21035 HAMBURG, Germany
Phone: +49 (0) 40 - 73 412 - 127
Fax: +49 (0) 40 - 73 412 - 101
E-mail: werner.hille@pfannenberg.com
www.pfannenberg.com

Application

Change-speed gearboxes increase the drive torque at low motor speeds and expand the range of constant power output available from the main spindle motor. The full cutting capacity of modern machine tools can therefore be utilized throughout the entire speed range.

Benefits

The performance characteristics of the two-speed gearboxes for 1PH7/1PH4 motors are as follows:

- Drive power up to 100 kW (134 HP)
- Constant power range at drive shaft up to 1:24
- Suitable for both directions of rotation
- Motor shaft heights SH 100 to SH 225
- Types IM B35 and IM V15 (IM V35 available on request)

Mounting the change-speed gearbox outside the headstock of the machine tool has the following advantages:

- Easy adaptation to the machine tool
- Low noise and no temperature fluctuations due to gearing inside the headstock
- Separate lubrication systems for the main spindle (grease) and the change-speed gearbox (oil)
- Gearbox efficiency > 95%
- Instead of V belts, the drive power can also be transmitted from the gear output by a gear wheel (available on request) or coaxially by means of a flexible coupling.

Design

The two-speed gearboxes have a planetary design. The central sun wheel distributes the power to several planet wheels which revolve around it. The outstanding advantage of this design is its compactness. The gear-changing device, a splined sleeve that moves axially, is of form-fit design.

Position 1: Gear ratio $i_1 = 4$
Position 2: Gear ratio $i_2 = 1$

The motor is flange-mounted onto the change-speed gearbox using an adapter plate. The AC motor must be suitably prepared for mounting.

For shaft heights of SH 160 and higher, motors of types IM B35 and IM V15 must be supported free from stress on the non-drive end.

Any transverse force imported into the gearbox has to be borne by the gearbox and transmitted to the machine base.

The motors for all 2K gearboxes must be full-key balanced with a fitted key. The 2K 120, 2K 250, 2K 300 gearboxes are enclosed, so that the motor flange is adequately sealed in the standard version.
Vertical mounting positions for the IM V 15 and IM V 35 require circulating-oil lubrication of the gearboxes.

The standard version of the change-speed gearboxes up to and including the 2K 300 has a maximum circumferential backlash of 30 angular minutes (measured at the gear output). Several special versions suitable for milling or machining with cut interruption can be supplied on request:
• Reduced backlash with special features: max. 20'
• Reduced backlash for high performance: max. 15'

Design (continued)

Profile of a planetary gearbox

The power unit (motor and gearbox) is supplied with vibration magnitude grade R in accordance with EN 60034-14 (IEC 60034-14). This is also the case when the motor is ordered with vibration magnitude grade S.

The belt pulley[1)] should be a cup wheel type pulley.
For mounting the pulley, the output shaft on the gearbox has a flange with an external centering spigot and tapped holes for easy fitting and removal of the pulley.

Motors with built-on planetary gearbox

The 1PH motors can also be supplied with flange-mounted planetary gearboxes. The motor-gearbox unit is tested for correct functioning. The complete drive unit - that is, 1PH7 or 1PH4 motor with mounted ZF change-speed gearbox - can be ordered directly from Siemens:

Siemens AG

Industrial Solutions and Services
Contact: Mr. Britz

Im Schiffelland 10
66386 ST. INGBERT, Germany

Fax: +49 (0) 68 94 - 8 91 - 1 12
E-mail: hans-peter.britz@siemens.com

The following details must be specified with the order:

Ordering example for 1PH4 motor:

Motor complete with gearbox
1PH4133-4NF26-Z
K00
2LG4315-3FD11

Ordering example for 1PH7 motor:

Motor complete with gearbox
1PH7186-2NE03-0BC2
2LG4260-1JC21
1PH7163-2NF03-0CC0
2LG4320-3JD11

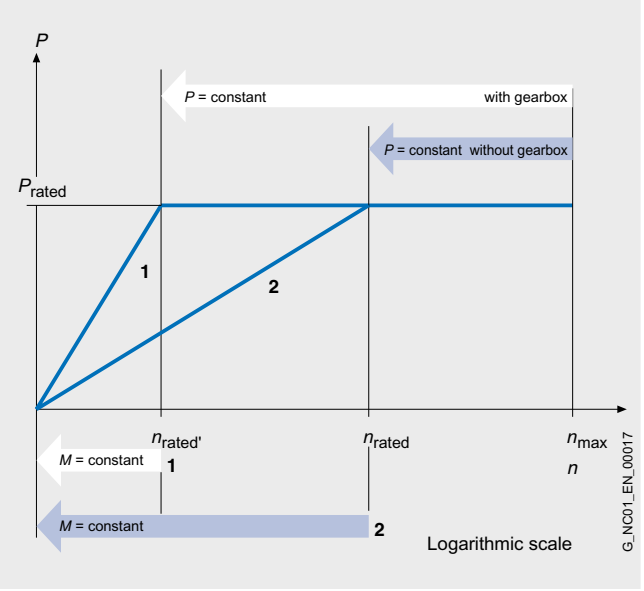
1) Not included in scope of supply.

Two-speed gearboxes for 1PH7/1PH4 motors

Technical specifications

Motor 1PH	Gearbox											
	ZF identifier	Type	Speed, max.[1]	Rated torque, permissible (S1 duty)			Maximum torque, permissible (S6-60% duty)			Moment of inertia of gearbox		Weight of gear-box, approx.
Shaft height			Drive	Drive	Output $i = 1$	Output $i = 4$	Drive	Output $i = 1$	Output $i = 4$	Output $i = 1$	Output $i = 4$	
SH			n_{max}	M	M	M	M	M	M	J	J	m
			rpm	Nm (lb_f-ft)	Nm (lb_f-ft)	Nm (lb_f-ft)	Nm (lb_f-ft)	Nm (lb_f-ft)	Nm (lb_f-ft)	kgm^2 (lb_f-in-s^2)	kgm^2 (lb_f-in-s^2)	kg (lb)
100	2K 120	2LG4312-...	8000	120 (88.5)	120 (88.5)	480 (354)	140 (103)	140 (103)	560 (413)	0.0110 (0.10)	0.0114 (0.10)	30 (66.2)
132	2K 250	2LG4315-...	6300	250 (184)	250 (184)	1000 (738)	400 (295)	400 (295)	1600 (1180)	0.0270 (0.24)	0.0570 (0.50)	62 (137)
160	2K 300	2LG4320-...	6300	300 (221)	300 (221)	1200 (885)	400 (295)	400 (295)	1600 (1180)	0.0270 (0.24)	0.0570 (0.50)	70 (154)
180	2K 800 2K 801	2LG4250-... 2LG4260-...	5000	800 (590)	800 (590)	3200 (2360)	900 (664)	900 (664)	3600 (2655)	0.1956 (1.73)	0.1766 (1.56)	110 (243)
225	2K 802	2LG4270-...	On request									

For further binding technical specifications and configuring aid (e.g. lubrication, temperature rise and typical applications), please refer to the latest catalog supplied by ZF (Zahnradfabrik Friedrichshafen). The permissible characteristics of the motor and gearbox are a governing factor in the design of the complete drive unit (motor and gearbox).
With 1PH4168 or 1PH7167-2NB motors, for example, the rated torque must be reduced to 300 Nm (221 lb_f-ft). With motors of SH 132, please note that the maximum permissible speed of the 2K 250 gearbox for splash lubrication is 6300 rpm.
The use of a change-speed gearbox permits the constant power range to be greatly increased.



Power-speed graph

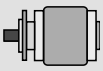
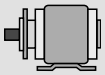
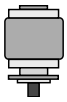
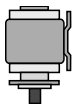
Legend:
n_{rated} Rated speed
$n_{rated'}$ Rated speed with two-stage gearbox
n_{max} Max. permissible speed
P_{rated} Rated power and constant power of the motor in the speed range between n_{rated} and n_{max} or $n_{rated'}$ and n_{max}
M Torque

Type for complete unit	Output flange dimension D_2	Two-speed gearbox (standard version)[2] Gear stage $i_1 = 4$	
	mm (in)	Order No.	ZF identifier
For 1PH710/1PH410 motors			
IM B5, IM B35, IM V1, IM V15	100 (3.94)	**2LG4312-3CC31**	2K 120
For 1PH713/1PH413 motors			
IM B5, IM B35	118 (4.65)	**2LG4315-3FD11**	2K 250
IM V1, IM V15	118 (4.65)	**2LG4315-3FC11**	2K 250
For 1PH716/1PH416 motors			
IM B35	130 (5.12)	**2LG4320-3JD11**	2K 300
IM V15	130 (5.12)	**2LG4320-3JC11**	2K 300
For 1PH7184 motors			
IM B35, IM V15	180 (7.09)	**2LG4250-1JC11**	2K 800
For 1PH7186 motors			
IM B35, IM V15	180 (7.09)	**2LG4260-1JC21**	2K 801

[1] Higher drive speeds are allowed with oil-cooled gearboxes and for gear ratios $i = 1$ in some instances (refer to the ZF Catalog).

[2] Special versions, such as gearboxes with different torsional backlash, or other gear ratios ($i = 3.17$ or $i = 5.5$), are available on request.

Type/mounting position

Type/ mounting position	Designation	Type/ mounting position	Designation	Type/ mounting position	Designation
	IM B3		IM B5 IM B14		IM B35
	IM V5		IM V1 IM V18		IM V15
	IM V6		IM V3 IM V19		IM V35

Degree of protection

The degree of protection designation in accordance with EN 60034-5 (IEC 60034-5) is made using the letters "IP" and two digits (e.g., IP64). The second digit in the degree of protection designation represents the protection against water, the first digit the protection against penetration of foreign matter.

Since coolants used for machine tools and transfer machines usually contain oil, are able to creep, and may also be corrosive, protection against water alone is insufficient. The indicated degree of protection should only be considered here as a guideline. The motors must be protected by suitable covers. Attention must be paid to providing suitable sealing of the motor shaft for the selected degree of protection for the motor.

The table can serve as a decision aid for selecting the proper degree of protection for motors. For a mounting position with vertical shaft end IM V3/IM V19, static fluid on the flange is only permitted with degree of protection IP67/IP68 and recessed DE flange in some cases.

Liquids / Effect	General workshop environment	Water; gen. coolant (95% water, 5% oil); oil	Creep oil; petroleum; aggressive coolants
Dry	IP64	–	–
Water-enriched environment	–	IP64	IP67[1)]
Mist	–	IP65	IP67
Spray	–	IP65	IP68
Jet	–	IP67	IP68
Surge, brief immersion; constant inundation	–	IP67	IP68

1) IP64 with dry run at shaft exit.

Dimension drawings

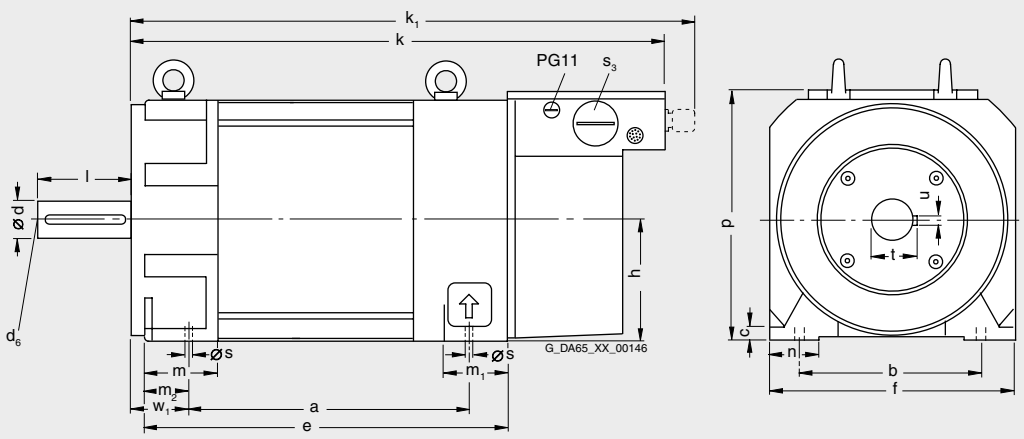
1PH7 motors
Forced ventilation

For motor		Dimensions in mm (in)																
Shaft height	Type	DIN / IEC	a B	b A	c LA	e M	f AB	h H	k LB	k_1 –	m BA	m_1 –	m_2 –	n AA	p HD	s K	s_3 –	w_1 C
1PH7, type IM B3, forced ventilation																		
100	**1PH7101** **1PH7103**		202.5 (7.97)	160 (6.30)	11 (0.43)	263 (10.35)	196 (7.72)	100 (3.94)	411 (16.18)	434 (17.09)	52 (2.05)	64 (2.52)	27 (1.06)	39 (1.54)	220 (8.66)	12 (0.47)	PG29	40 (1.57)
	1PH7105 **1PH7107**		297.5 (11.71)			358 (14.09)			506 (19.92)	529 (20.83)								
132	**1PH7131** **1PH7133**		265.5 (10.45)	216 (8.50)	14 (0.55)	341 (13.43)	260 (10.24)	132 (5.20)	538 (21.18)	561 (22.09)	63 (2.48)	75 (2.95)	33 (1.30)	52 (2.05)	275 (10.83)	12 (0.47)	PG36	50 (1.97)
	1PH7135 **1PH7137**		350.5 (13.80)			426 (16.77)			623 (24.53)	646 (25.43)								
160	**1PH7163**		346.5 (13.64)	254 (10.00)	17 (0.67)	438 (17.24)	314 (12.36)	160 (6.30)	640 (25.20)	663 (26.10)	78 (3.07)	81 (3.19)	42 (1.65)	62 (2.44)	330 (12.99)	14 (0.55)	PG42	64 (2.52)
	1PH7167		406.5 (16.00)			498 (19.61)			700 (27.56)	723 (28.46)								

		DE shaft extension				
Shaft height	Type	DIN / IEC	**d** **D**	d_6 –	l E	t GA	u F
100	**1PH7101** **1PH7103** **1PH7105** **1PH7107**		**38** **(1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
132	**1PH7131** **1PH7133** **1PH7135** **1PH7137**		**42** **(1.65)**	M16	110 (4.33)	45 (1.77)	12 (0.47)
160	**1PH7163** **1PH7167**		**55** **(2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)

For deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ, see 1PH7 motors with DRIVE-CLiQ.

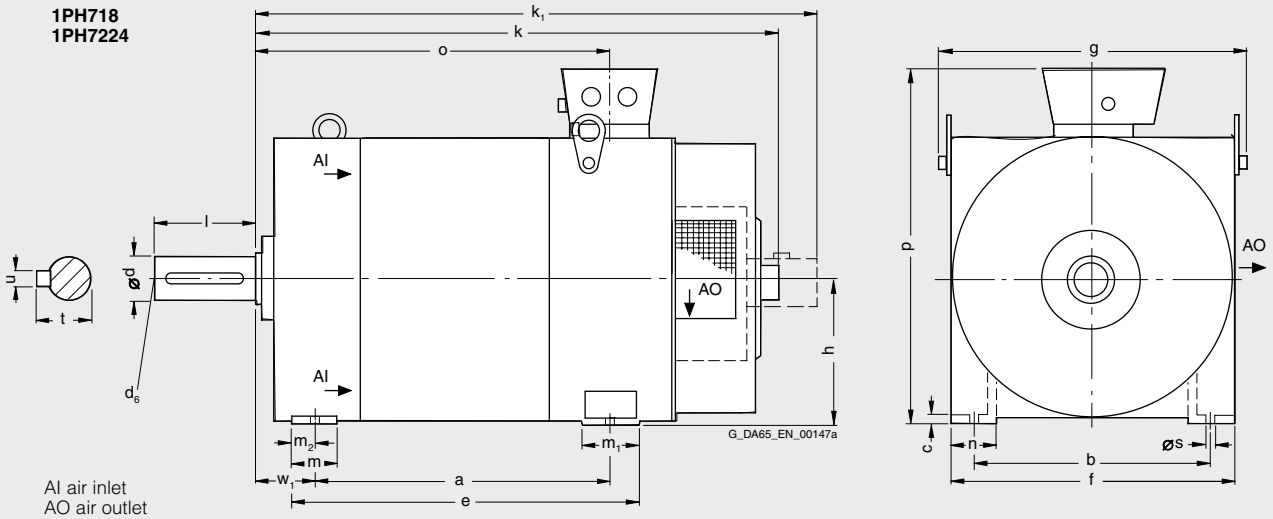
1PH710
1PH713
1PH716



For motor		Dimensions in mm (in)															Terminal box type 1XB7...		
																	...322	...422	...700
Shaft height	Type	DIN IEC	a B	b A	c LA	e M	f AB	g AC	h H	k LB	k_1 –	m BA	m_1 –	m_2 –	n AA	o –	$p^{1)}$ HD	$p^{1)}$ HD	$p^{1)}$ HD
1PH7, type IM B3, forced ventilation, direction of air flow DE → NDE																			
180	**1PH7184**		430 (16.93)	279 (10.98)	14 (0.55)	510 (20.08)	360 (14.17)	408 (16.09)	180 (7.09)	835 (32.87)	–	60 (2.36)	120 (4.72)	35 (1.38)	65 (2.56)	541 (21.30)	495 (19.49)	–	–
	1PH7186		520 (20.47)			600 (23.62)				925 (36.42)						631 (24.84)		545 (21.46)	–
225	**1PH7224**		445 (17.52)	356 (14.02)	18 (0.71)	530 (20.87)	450 (17.72)	498 (19.61)	225 (8.86)	–	1100 (43.31)	60 (2.36)	120 (4.72)	40 (1.57)	85 (3.35)	629 (24.76)	595 (23.43)	645 (25.39)	680 (26.77)

		DE shaft extension						
Shaft height	Type	DIN IEC	s K	w_1 C	**d** **D**	d_6 –	l E	t GA	u F
180	**1PH7184**		14.5 (0.57)	121 (4.76)	**60** **(2.36)**	M20	140 (5.51)	64 (2.52)	18 (0.72)
	1PH7186				**65** **(2.56)**			69 (2.72)	
225	**1PH7224**		18.5 (0.73)	149 (5.87)	**75** **(2.95)**	M20	140 (5.51)	79.5 (3.13)	20 (0.79)

1PH718
1PH7224



AI air inlet
AO air outlet

1) Maximum dimensions, depending on electrical version (terminal box type).

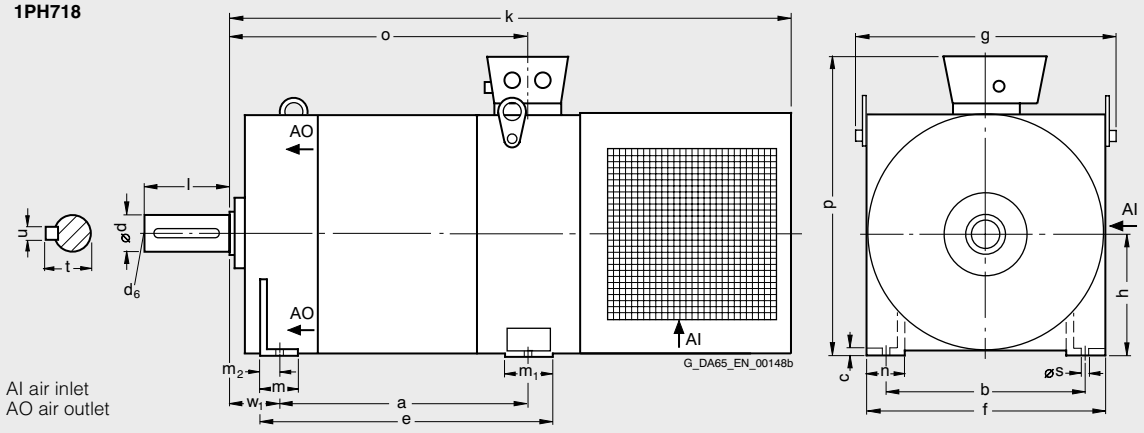
Dimension drawings

1PH7 motors
Forced ventilation

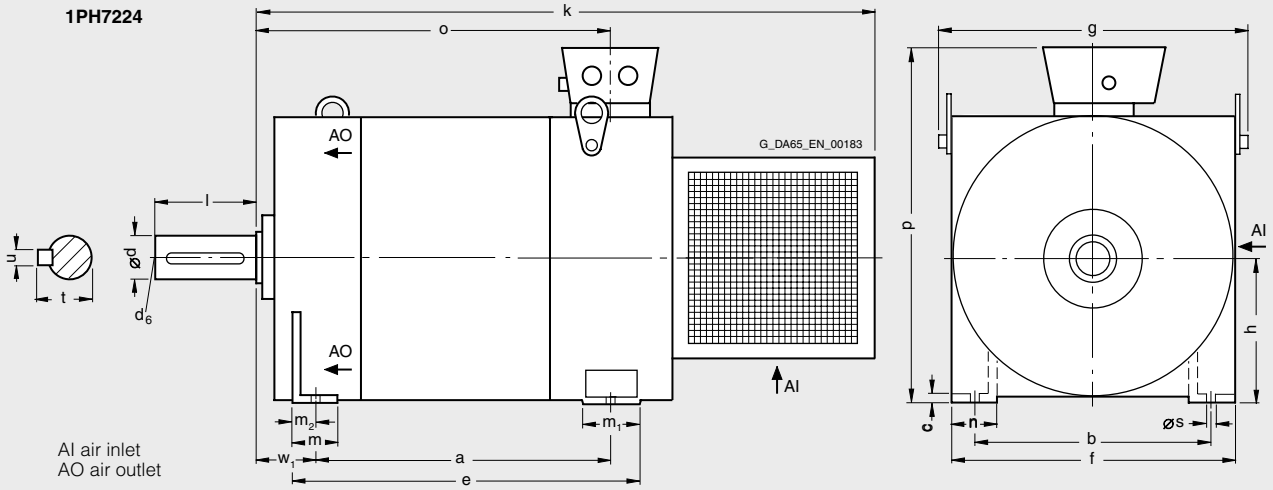
For motor		Dimensions in mm (in)														Terminal box type 1XB7...		
																...322	...422	...700
Shaft height	Type	DIN IEC	a B	b A	c LA	e M	f AB	g AC	h H	k LB	m BA	m_1 –	m_2 –	n AA	o –	p[1] HD	p[1] HD	p[1] HD
1PH7, type IM B3, forced ventilation, direction of air flow NDE → DE																		
180	**1PH7184**		430 (16.93)	279 (10.98)	14 (0.55)	510 (20.08)	360 (14.17)	405 (15.94)	180 (7.09)	1010 (39.76)	60 (2.36)	120 (4.72)	35 (1.38)	65 (2.56)	541 (21.30)	495 (19.49)	–	–
	1PH7186		520 (20.47)			600 (23.62)				1100 (43.31)					631 (24.84)		560 (22.05)	–
225	**1PH7224**		445 (17.52)	356 (14.02)	18 (0.71)	530 (20.87)	450 (17.72)	498 (19.61)	225 (8.86)	1090 (42.91)	60 (2.36)	120 (4.72)	40 (1.57)	85 (3.35)	629 (24.76)	595 (23.43)	645 (25.39)	680 (26.77)

For motor			DE shaft extension						
Shaft height	Type	DIN IEC	s K	w_1 C	**d** **D**	d_6 –	l E	t GA	u F
180	**1PH7184**		14.5 (0.57)	121 (4.76)	**60** **(2.36)**	M20	140 (5.51)	64 (2.52)	18 (0.71)
	1PH7186				**65** **(2.56)**			69 (2.72)	
225	**1PH7224**		18.5 (0.73)	149 (5.87)	**75** **(2.95)**	M20	140 (5.51)	79.5 (3.13)	20 (0.79)

1PH718



1PH7224

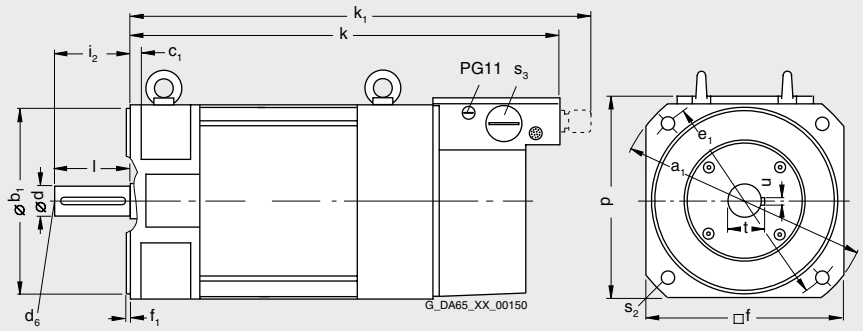


[1] Maximum dimensions, depending on electrical version (terminal box type).

For motor		Dimensions in mm (in)													DE shaft extension					
Shaft height	Type	DIN IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f AB	f_1 T	i_2 –	k LB	k_1 –	p HD	s_2 S	s_3 –	**d** **D**	d_6 –	l E	t GA	u F
1PH7, type IM B5, forced ventilation																				
100	**1PH7101** **1PH7103** **1PH7105** **1PH7107**		250 (9.84)	180 (7.09)	10 (0.39)	215 (8.46)	196 (7.72)	4 (0.16)	80 (3.15)	411 (16.18) 506 (19.92)	434 (17.09) 529 (20.83)	218 (8.58)	14 (0.55)	PG29	**38** **(1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
132	**1PH7131** **1PH7133** **1PH7135** **1PH7137**		350 (13.78)	250 (9.84)	16 (0.63)	300 (11.81)	260 (10.24)	5 (0.20)	110 (4.33)	538 (21.18) 623 (24.53)	561 (22.09) 646 (25.43)	273 (10.75)	18 (0.71)	PG36	**42** **(1.65)**	M16	110 (4.33)	45 (1.77)	12 (0.47)

For deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ, see 1PH7 motors with DRIVE-CLiQ.

1PH710
1PH713



Dimension drawings

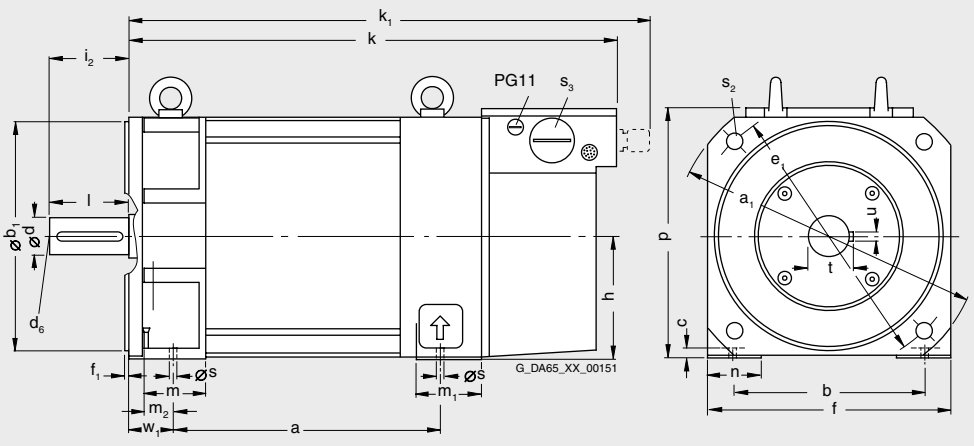
1PH7 motors
Forced ventilation

For motor		Dimensions in mm (in)																
Shaft height	Type	DIN / IEC	a B	a_1 P	b A	b_1 N	c LA	e_1 M	f AB	f_1 T	h H	i_2 –	k LB	k_1 –	m BA	m_1 –	m_2 –	n AA	p HD
1PH7, type IM B35, forced ventilation																			
100	**1PH7101** **1PH7103**		202.5 (7.97)	250 (9.84)	160 (6.30)	180 (7.09)	11 (0.43)	215 (8.46)	196 (7.72)	4 (0.16)	100 (3.94)	80 (3.15)	411 (16.18)	435 (17.13)	52 (2.05)	64 (2.52)	27 (1.06)	39 (1.54)	220 (8.66)
	1PH7105 **1PH7107**		297.5 (11.71)										506 (19.92)	529 (20.83)					
132	**1PH7131** **1PH7133**		265.5 (10.45)	350 (13.78)	216 (8.50)	250 (9.84)	14 (0.55)	300 (11.81)	260 (10.24)	5 (0.20)	132 (5.20)	110 (4.33)	538 (21.18)	561 (22.09)	63 (2.48)	75 (2.95)	33 (1.30)	52 (2.05)	275 (10.83)
	1PH7135 **1PH7137**		350.5 (13.80)										623 (24.53)	646 (25.43)					
160	**1PH7163**		346.5 (13.64)	400 (15.75)	254 (10.00)	300 (11.81)	17 (0.67)	350 (13.78)	314 (12.36)	5 (0.20)	160 (6.30)	110 (4.33)	640 (25.20)	663 (26.10)	78 (3.07)	81 (3.19)	42 (1.65)	62 (2.44)	330 (12.99)
	1PH7167		406.5 (16.00)										700 (27.56)	723 (28.46)					

			DE shaft extension								
Shaft height	Type	DIN / IEC	s K	s_2 S	s_3 –	w_1 C	**d** **D**	d_6 –	l E	t GA	u F
100	**1PH7101** **1PH7103** **1PH7105** **1PH7107**		12 (0.47)	14 (0.55)	PG29	40 (1.57)	**38** **(1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
132	**1PH7131** **1PH7133** **1PH7135** **1PH7137**		12 (0.47)	18 (0.71)	PG36	50 (1.97)	**42** **(1.65)**	M16	110 (4.33)	45 (1.77)	12 (0.47)
160	**1PH7163** **1PH7167**		14 (0.47)	18 (0.71)	PG42	64 (2.52)	**55** **(2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)

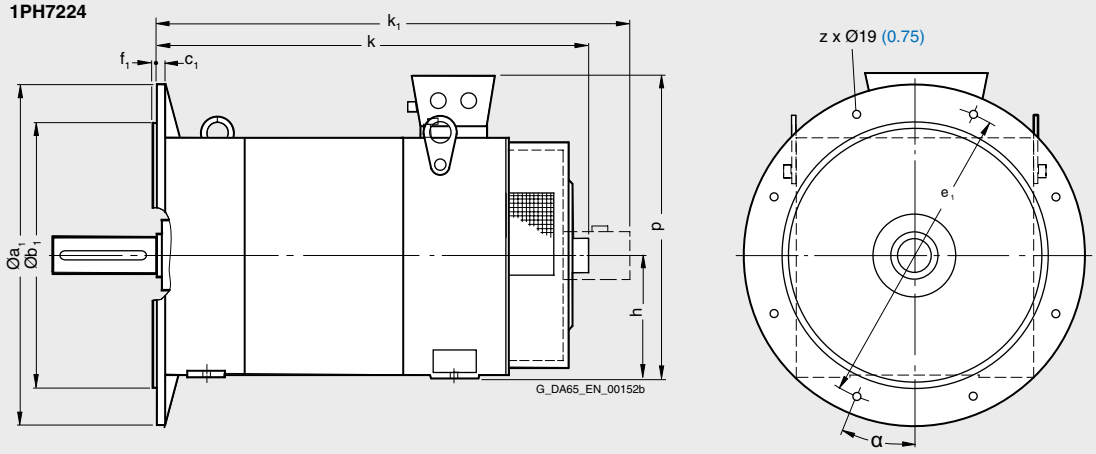
For deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ, see 1PH7 motors with DRIVE-CLiQ.

1PH710
1PH713
1PH716



For motor		Dimensions in mm (in)									For dimensions for foot mounting, shaft and terminal box, see dimension drawing of 1PH718 and 1PH722 motors type IM B3. Terminal box type 1XB7...				
Shaft height	Type	DIN / IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f_1 T	h H	k LB	k_1 –	...322 p[1)]	...422 p[1)]	...700 p[1)]	z –	α –
1PH7, type IM B35, forced ventilation, direction of air flow DE → NDE															
180	**1PH7184**		400 (15.75)	300 (11.81)	15 (0.59)	350 (13.78)	5 (0.20)	180 (7.09)	835 (32.87)	–	495 (19.49)	–	–	4	45°
	1PH7184		450 (17.72)	350 (13.78)	16 (0.63)	400 (15.75)			835 (32.87)			–	–	8	22.5°
	1PH7186								925 (36.42)			560 (22.05)			
225	**1PH7224**		550 (21.65)	450 (17.72)	18 (0.71)	500 (19.69)	5 (0.20)	225 (8.86)	–	1100 (43.31)	595 (23.43)	645 (25.39)	680 (26.77)	8	22.5°

1PH718
1PH7224



[1)] Maximum dimensions, depending on electrical version (terminal box type).

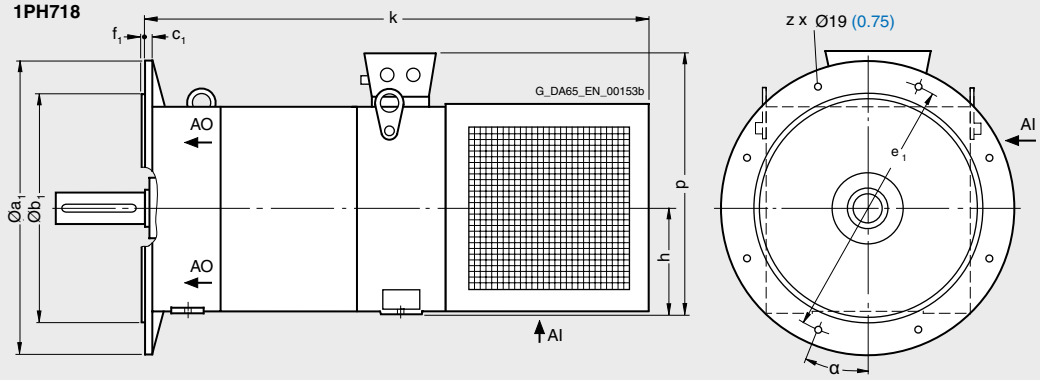
Dimension drawings

1PH7 motors
Forced ventilation

For motor | Dimensions in mm (in) | For dimensions for foot mounting, shaft and terminal box, see dimension drawing of 1PH718 and 1PH722 motors type IM B3.

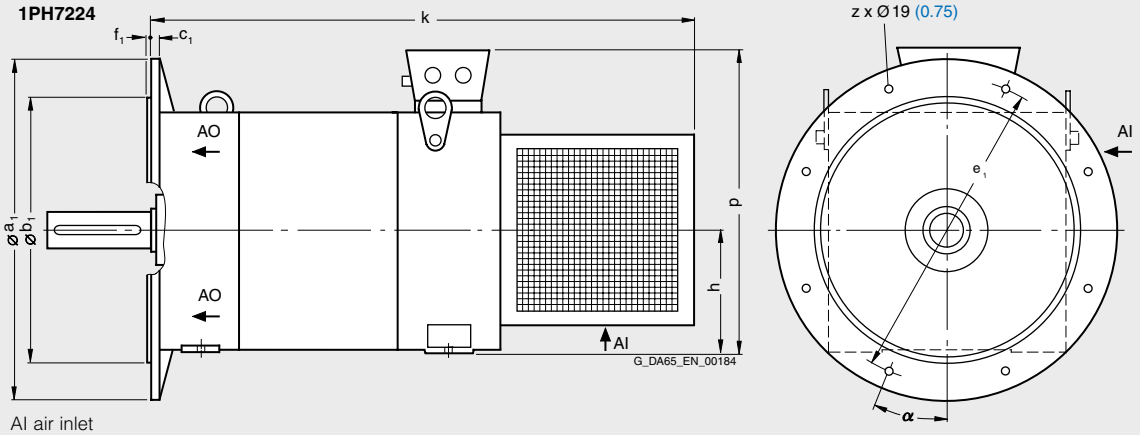
Shaft height	Type	DIN / IEC	a_1 P	b_1 N	c_1 LA	e_1 M	f_1 T	h H	k LB	Terminal box type 1XB7... ...322 p[1)]	...422 p[1)]	...700 p[1)]	z –	α –
1PH7, type IM B35, forced ventilation, direction of air flow NDE → DE														
180	**1PH7184**		400 (15.75)	300 (11.81)	15 (0.59)	350 (13.78)	5 (0.20)	180 (7.09)	1010 (39.76)	495 (19.49)	–	–	4	45°
	1PH7184		450 (17.72)	350 (13.78)	16 (0.63)	400 (15.75)			1010 (39.76)		–	–	8	22.5°
	1PH7186								1100 (43.31)		560 (22.05)	–		
225	**1PH7224**		550 (21.65)	450 (17.72)	18 (0.71)	500 (19.69)	5 (0.20)	225 (8.86)	1090 (42.91)	595 (23.39)	645 (25.43)	680 (26.77)	8	22.5°

1PH718



AI air inlet
AO air outlet

1PH7224

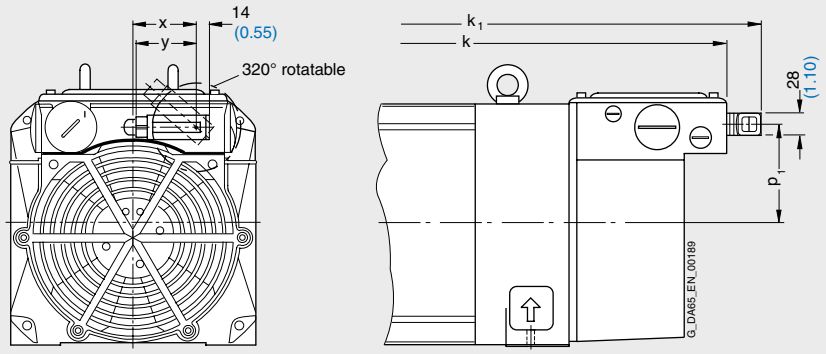


AI air inlet
AO air outlet

[1)] Maximum dimensions, depending on electrical version (terminal box type).

For motor		Dimensions in mm (in)						
Shaft height	Type	**DIN** **IEC**	k LB	k_1 –	p_1 –	x –	y –
Deviating and additional dimensions for 1PH7 motors with DRIVE-CLiQ to those given in dimension tables 1PH7, forced ventilation								
100	**1PH7101** **1PH7103**		411 (16.18)	453 (17.83)	81 (3.19)	52.5 (2.07)	63.5 (2.50)
	1PH7105 **1PH7107**		506 (19.92)	548 (21.57)			
132	**1PH7131** **1PH7133**		538 (21.18)	580 (22.83)	103.5 (4.07)	66 (2.60)	63.5 (2.50)
	1PH7135 **1PH7137**		623 (24.53)	665 (26.18)			
160	**1PH7163**		640 (25.20)	682 (26.85)	127 (5.00)	75 (2.95)	63.5 (2.50)
	1PH7167		700 (27.56)	742 (29.21)			

1PH710
1PH713
1PH716



7

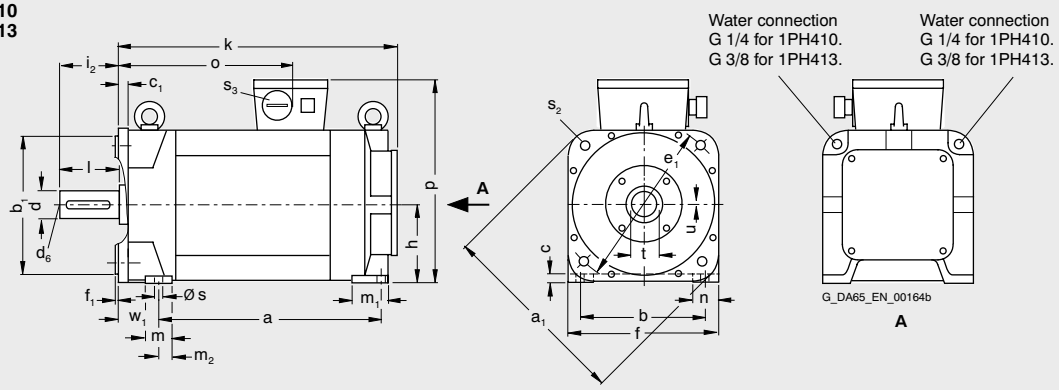
Dimension drawings

1PH4 motors
Water cooling

For motor		Dimensions in mm (in)																
Shaft height	Type	DIN / IEC	a B	a_1 P	b A	b_1 N	c LA	c_1 –	e_1 –	f AB	f_1 T	h H	i_2 –	k LB	m BA	m_1 –	m_2 –	n AA
1PH4, type IM B35, water cooling																		
100	**1PH4103**		349 (13.74)	250 (9.84)	160 (6.30)	180 (7.09)	11 (0.43)	12 (0.47)	215 (8.46)	190 (7.48)	4 (0.16)	100 (3.94)	80 (3.15)	416 (16.38)	35 (1.38)	60 (2.36)	24 (0.94)	40 (1.57)
	1PH4105		409 (16.10)											476 (18.74)				
	1PH4107		474 (18.66)											541 (21.30)				
132	**1PH4133**		377 (14.84)	350 (13.78)	216 (8.50)	250 (9.84)	14 (0.55)	16 (0.63)	300 (11.81)	245 (9.65)	5 (0.20)	132 (5.20)	110 (4.33)	458 (18.03)	36 (1.42)	85 (3.35)	24 (0.94)	43 (1.69)
	1PH4135		447 (17.60)											528 (20.79)				
	1PH4137		497 (19.57)											578 (22.76)				

			DE shaft extension										
Shaft height	Type	DIN / IEC	o –	p HD	s K	s_2 K	s_3 –	w_1 C	**d** **D**	d_6 –	l E	t GA	u F
100	**1PH4103**		244 (9.61)	259 (10.20)	12 (0.47)	14 (0.55)	PG29	44 (1.73)	**38 (1.50)**	M12	80 (3.15)	41 (1.61)	10 (0.39)
	1PH4105		304 (11.97)										
	1PH4107		369 (14.53)										
132	**1PH4133**		264 (10.39)	334.5 (13.17)	12 (0.47)	18 (0.71)	PG36	53 (2.09)	**42 (1.77)**	M16	110 (4.33)	45 (1.77)	12 (0.47)
	1PH4135		334 (13.15)										
	1PH4137		384 (15.12)										

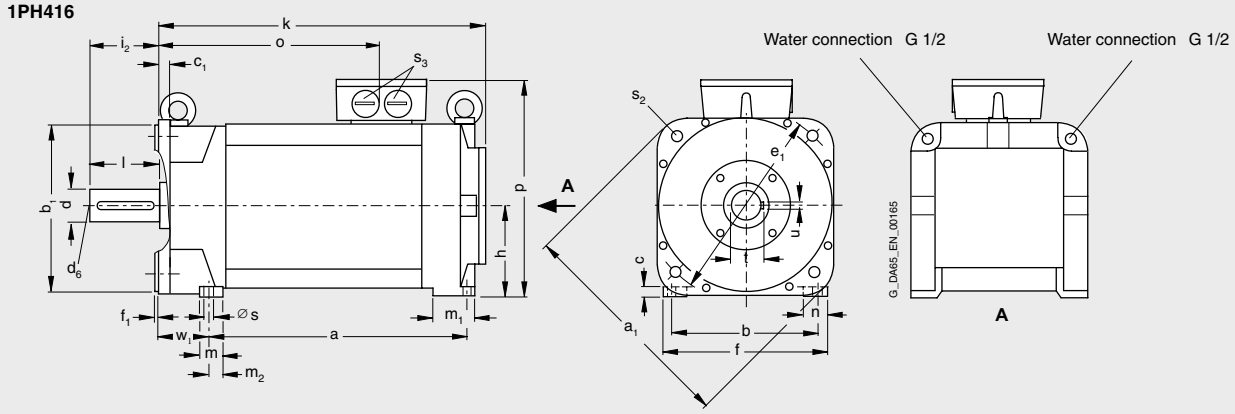
1PH410
1PH413



For motor		Dimensions in mm (in)																
Shaft height	Type	DIN IEC	a B	a_1 P	b A	b_1 N	c LA	c_1 –	e_1 –	f AB	f_1 T	h H	i_2 –	k LB	m BA	m_1 –	m_2 –	n AA
1PH4, type IM B35, water cooling																		
160	**1PH4163**		508 (20.00)	400 (15.75)	254 (10.00)	300 (11.81)	15 (0.59)	18 (0.71)	350 (13.78)	294 (11.57)	5 (0.20)	160 (6.30)	110 (4.33)	591 (23.27)	44 (1.73)	77 (3.03)	29 (1.14)	49 (1.93)
	1PH4167		563 (22.17)											646 (25.43)				
	1PH4163		608 (23.94)											691 (27.20)				

			DE shaft extension										
Shaft height	Type	DIN IEC	o –	p HD	s K	s_2 K	s_3 –	w_1 C	**d** **D**	d_6 –	l E	t GA	u F
160	**1PH4163**		407 (16.02)	388 (15.28)	14 (0.55)	18 (0.71)	PG36	56 (2.20)	**55** **(2.17)**	M20	110 (4.33)	59 (2.32)	16 (0.63)
	1PH4167		462 (18.19)										
	1PH4168		507 (19.96)										

1PH416



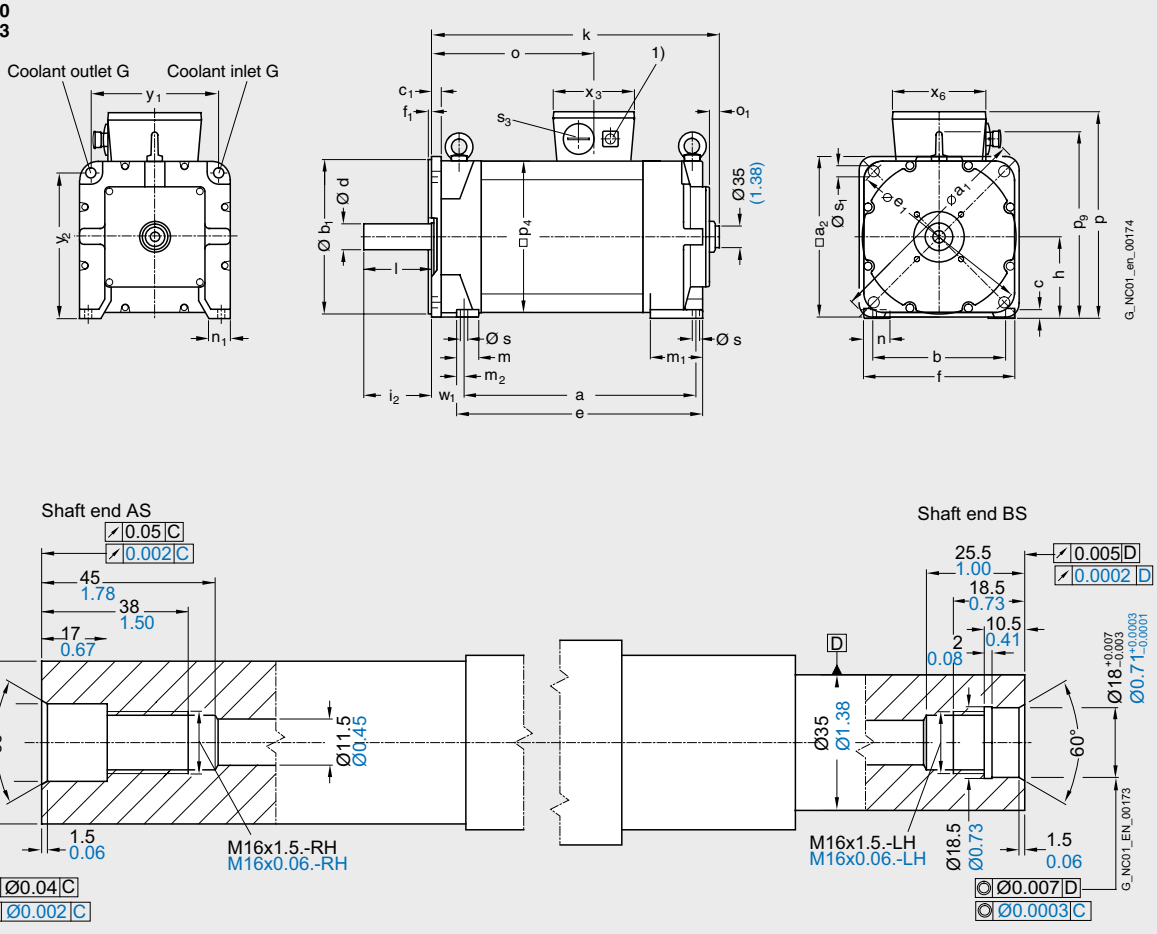
Dimension drawings

1PM4 motors
Water cooling

For motor		Dimensions in mm (in)																	
Shaft height	Type	DIN / IEC	a B	a_1 P	a_2 –	b A	b_1 N	c HA	c_1 LA	e BB	e_1 M	f AB	f_1 T	G –	h H	i_2 –	k LB	m BA	m_1 –	m_2 –
1PM4, type IM B35, water cooling																				
100	**1PM4101**		304 (11.97)	250 (9.84)	196 (7.72)	160 (6.30)	180 (7.09)	11 (0.43)	12 (0.47)	326 (12.83)	215 (8.46)	190 (7.48)	4 (0.16)	G1/4	100 (3.94)	80 (3.15)	389 (15.31)	35 (1.38)	60 (2.36)	11 (0.43)
	1PM4105		409 (16.10)							431 (16.97)							494 (19.45)			
132	**1PM4133**		377 (14.84)	350 (13.78)	260 (10.24)	216 (8.50)	250 (9.84)	14 (0.55)	16 (0.63)	400 (15.75)	300 (11.81)	246 (9.59)	5 (0.20)	G3/8	132 (5.20)	110 (4.33)	468 (18.43)	36 (1.42)	85 (3.35)	12 (0.47)
	1PM4137		497 (19.57)							520 (20.47)							588 (23.15)			

Motor		Dimensions in mm (in)															DE shaft extension	
Shaft height	Type	DIN / IEC	n AA	n_1 –	o –	o_1 –	p HD	p_4 AC	p_9 –	s K	s_1 S	s_3 –	w_1 C	x_3	x_6	y_1 –	y_2 –	**d** **D**	l E
100	**1PM4101**		37 (1.46)	35 (1.38)	199 (7.83)	18 (0.71)	259 (10.20)	190 (7.48)	233 (9.17)	12 (0.47)	14 (0.55)	M32x1.5	44 (1.73)	117 (4.61)	122 (4.80)	154 (6.06)	177 (6.97)	**38** **(1.50)**	80 (3.15)
	1PM4105				304 (12)														
132	**1PM4133**		43 (1.69)	35 (1.38)	264 (10.39)	16 (0.63)	335 (13.19)	245 (9.65)	302 (11.89)	12 (0.47)	18 (0.71)	M40x1.5	53 (2.09)	132 (5.20)	152 (5.98)	206 (8.11)	235 (9.25)	**42** **(1.65)**	110 (4.33)
	1PM4137				384 (15.12)														

1PM410
1PM413



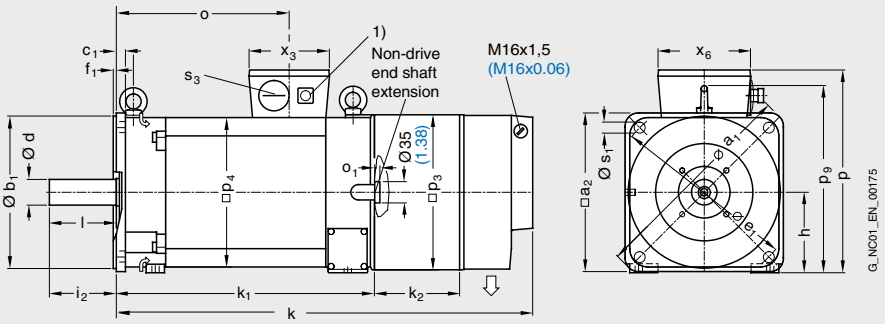
1) Signal connection.

For motor		Dimensions in mm (in)														DE shaft extension	
Shaft height	Type	DIN IEC	a_1 P	a_2 –	b_1 N	c_1 LA	e_1 M	f_1 T	h H	i_2 –	p_4 AC	s_1 S	s_3 –	x_3 –	x_6 –	d D	l E
1PM6, type IM B35, forced ventilation																	
100	**1PM6101** **1PM6105**		250 (9.84)	196 (7.72)	180 (7.09)	14 (0.55)	215 (8.46)	4 (0.16)	100 (3.94)	80 (3.15)	190 (7.48)	14 (0.55)	M32x1.5	117 (4.61)	122 (4.80)	38 (1.50)	80 (3.15)
132	**1PM6133** **1PM6137** **1PM6138**		350 (13.78)	260 (10.24)	250 (9.84)	15 (0.59)	300 (11.81)	5 (0.20)	132 (5.20)	110 (4.33)	245 (9.65)	18 (0.71)	M40x1.5	132 (5.20)	152 (5.98)	42 (1.65)	110 (4.33)

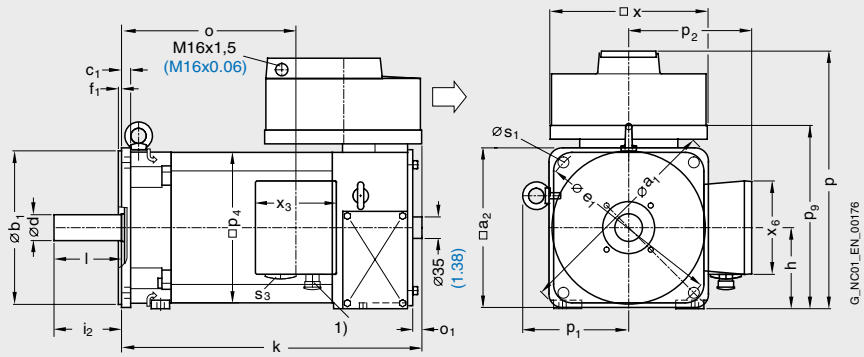
Motor		Dimensions in mm (in)								
Shaft height	Type	DIN IEC	k LB	k_1 –	k_2 –	o –	o_1 –	p HD	p_3 –	p_9 –
With axial fan										
100	**1PM6101**		616 (24.25)	337 (13.27)	160 (6.30)	198 (7.80)	10 (0.39)	259 (10.20)	195 (7.68)	236 (9.29)
	1PM6105		721 (20.39)	442 (17.40)		304 (11.97)				
132	**1PM6133**		684 (26.93)	424 (16.69)	140 (5.51)	284 (11.18)	-2 (-0.08)	333 (13.11)	254 (10.00)	307 (12.09)
	1PM6137		804 (31.65)	544 (21.42)		404 (15.91)				
	1PM6138		874 (34.41)	614 (24.17)		474 (18.66)				

Motor		Dimensions in mm (in)								
Shaft height	Type	DIN IEC	k LB	o –	o_1 –	p HD	p_1 –	p_2 –	p_9 –	x –
With radial fan										
100	**1PM6101**		389 (15.31)	199 (7.83)	20 (0.79)	331 (13.03)	133 (5.24)	159 (6.26)	231 (9.09)	190 (7.48)
	1PM6105		494 (19.45)	304 (11.97)						
132	**1PM6133**		490 (19.29)	285 (11.22)	15 (0.59)	420 (16.54)	172 (6.77)	201 (7.91)	302 (11.89)	256 (10.08)
	1PM6137		610 (24.02)	405 (15.94)						
	1PM6138		680 (26.77)	475 (18.70)						

1PM6 motor with axial fan



1PM6 motor with radial fan



1) Signal connection.

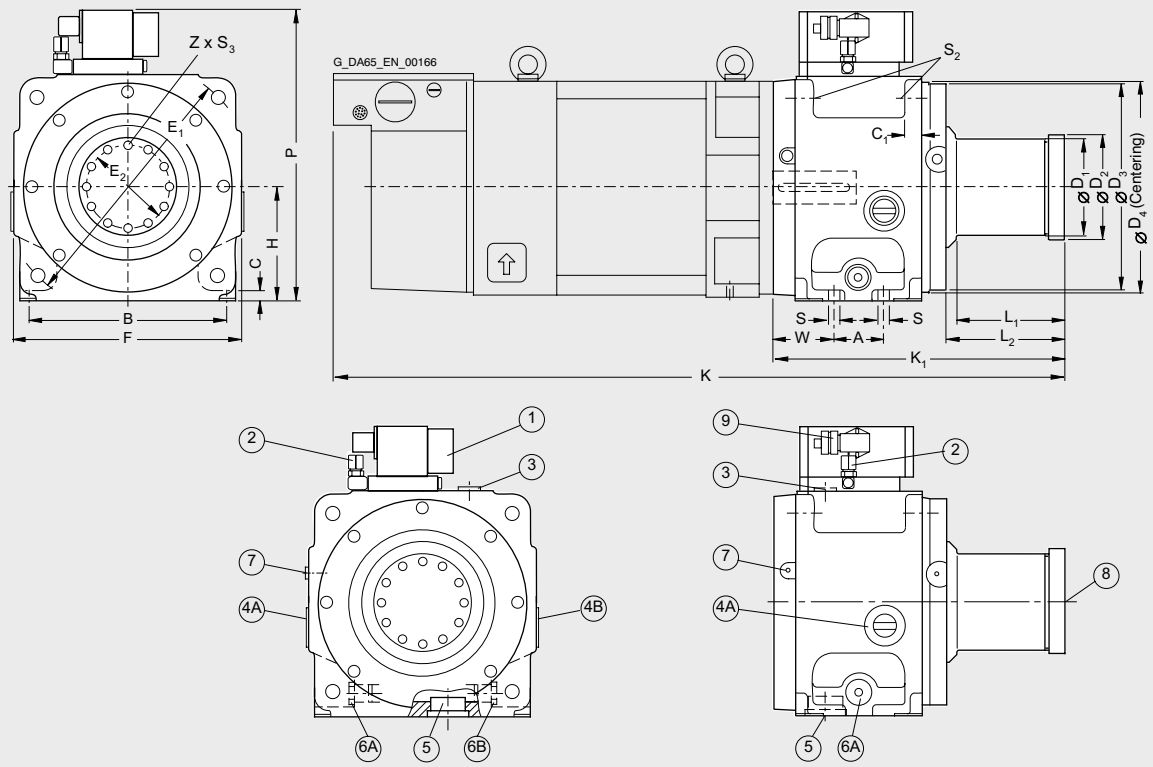
Dimension drawings

1PH7 motors with two-speed gearbox
Forced ventilation

For motor		Gearbox Dimensions in mm (in)											
Shaft height	Type	A	B	C	C_1	D_1	D_2	D_3	D_4	E_1	E_2	F	H
1PH7 with two-speed gearbox, type IM B35, forced ventilation													
100	**1PH7101** **1PH7103** **1PH7105** **1PH7107**	55 (2.17)	184 (7.24)	12 (0.47)	18 (0.71)	100 (3.94)	100 (3.94)	188 (7.40)	190 (7.48)	215 (8.46)	80 (3.15)	208 (8.19)	**108** **(4.25)**
132	**1PH7131** **1PH7133** **1PH7135** **1PH7137**	58 (2.28)	234 (9.21)	12 (0.47)	20 (0.79)	116 (4.57)	118 (4.65)	249 (9.80)	250 (9.84)	300 (11.81)	100 (3.94)	270 (10.63)	**136** **(5.35)**
160	**1PH7163** **1PH7167**	58 (2.28)	290 (11.42)	17 (0.67)	20 (0.79)	140 (5.51)	130 (5.12)	249 (9.80)	250 (9.84)	350 (13.78)	100 (3.94)	326 (12.83)	**164** **(6.46)**

Motor		Gearbox Dimensions in mm (in)									Total length motor-gearbox
Shaft height	Type	K_1	L_1	L_2	P	S	S_2	S_3	Z	W	K
100	**1PH7101** **1PH7103**	298 (11.73)	–	116 (4.57)	301 (11.85)	14 (0.55)	14 (0.55)	M8	8	63 (2.48)	709 (27.91)
	1PH7105 **1PH7107**										804 (31.65)
132	**1PH7131** **1PH7133**	346.5 (13.64)	129.5 (5.10)	142.5 (5.61)	346 (13.62)	14 (0.55)	18 (0.71)	M12	12	71 (2.80)	885 (34.84)
	1PH7135 **1PH7137**										970 (38.19)
160	**1PH7163**	346.5 (13.64)	–	142.5 (5.61)	402 (15.83)	14 (0.55)	18 (0.71)	M12	12	71 (2.80)	987 (38.86)
	1PH7167										1024 (40.31)

Dimensions for 1PH7184, 1PH7186 and 1PH7224 on request.



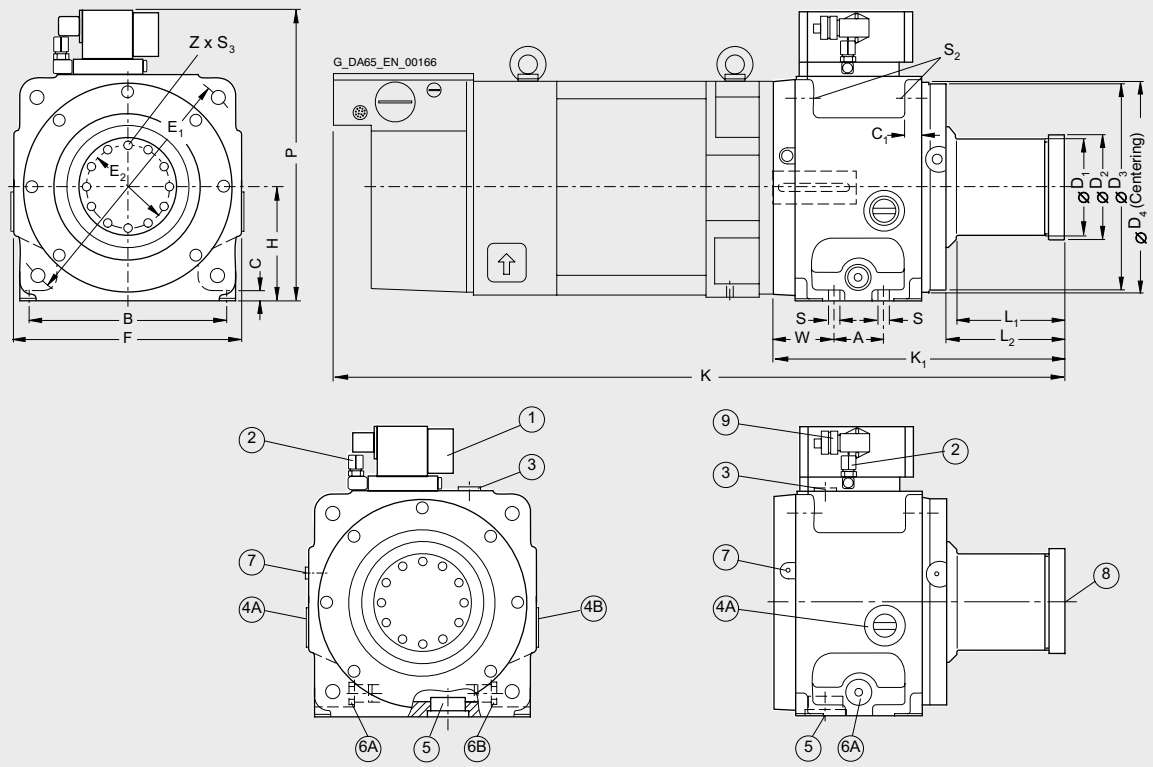
① Switching unit (lifting solenoid 24 V DC, 5 A).
② Ventilation valve.
③ Oil filling bolt.
④A Oil level inspection window or oil return for counterclockwise rotation and circulating-oil lubrication.
④B Oil level inspection window or oil return for clockwise rotation and circulating-oil lubrication.
⑤ Oil drain bolt for type IM B35.
⑥A Oil inlet for clockwise rotation and circulating-oil lubrication.
⑥B Oil inlet for counterclockwise rotation and circulating-oil lubrication.
⑦ Oil inlet for type IM V15 (must be connected).
⑧ Oil inlet for type IM V35.
⑨ Connector, manufacture: Harting, type HAN 8 U.

Dimension drawings

1PH4 motors with two-speed gearbox
Forced ventilation

For motor		Gearbox Dimensions in mm (in)											
Shaft height	Type	A	B	C	C_1	D_1	D_2	D_3	D_4	E_1	E_2	F	H
1PH4 with two-speed gearbox, type IM B35, forced ventilation													
100	**1PH4103** **1PH4105** **1PH4107**	55 (2.17)	184 (7.24)	12 (0.47)	18 (0.71)	100 (3.94)	100 (3.94)	188 (7.40)	190 (7.48)	215 (8.46)	80 (3.15)	208 (8.19)	**108** **(4.25)**
132	**1PH4133** **1PH4135** **1PH4137** **1PH4138**	58 (2.28)	234 (9.21)	12 (0.47)	20 (0.79)	116 (4.57)	118 (4.65)	249 (9.80)	250 (9.84)	300 (11.81)	100 (3.94)	270 (10.63)	**136** **(5.35)**
160	**1PH4163** **1PH4167** **1PH4168**	58 (2.28)	290 (11.42)	17 (0.67)	20 (0.79)	140 (5.51)	130 (5.12)	249 (9.80)	250 (9.84)	350 (13.78)	110 (4.33)	326 (12.83)	**164** **(6.46)**

Motor		Gearbox Dimensions in mm (in)									Total length motor-gearbox
Shaft height	Type	K_1	L_1	L_2	P	S	S_2	S_3	Z	W	K
100	**1PH4103**	298 (11.73)	–	116 (4.57)	301 (11.85)	14 (0.55)	14 (0.55)	M8	8	63 (2.48)	714 (28.11)
	1PH4105										774 (30.47)
	1PH4107										839 (33.03)
132	**1PH4133**	346.5 (13.64)	129.5 (5.10)	142.5 (5.61)	346 (13.62)	14 (0.55)	18 (0.71)	M12	12	71 (2.80)	805 (31.69)
	1PH4135										875 (34.45)
	1PH4137										925 (36.42)
	1PH4138										960 (37.80)
160	**1PH4163**	346.5 (13.64)	–	142.5 (5.61)	402 (15.83)	14 (0.55)	18 (0.71)	M12	12	71 (2.80)	938 (36.93)
	1PH4167										993 (39.09)
	1PH4168										1038 (40.87)



① Switching unit (lifting solenoid 24 V DC, 5 A).
② Ventilation valve.
③ Oil filling bolt.
④A Oil level inspection window or oil return for counterclockwise rotation and circulating-oil lubrication.
④B Oil level inspection window or oil return for clockwise rotation and circulating-oil lubrication.
⑤ Oil drain bolt for type IM B35.
⑥A Oil inlet for clockwise rotation and circulating-oil lubrication.
⑥B Oil inlet for counterclockwise rotation and circulating-oil lubrication.
⑦ Oil inlet for type IM V15 (must be connected).
⑧ Oil inlet for type IM V35.
⑨ Connector, manufacture: Harting, type HAN 8 U.

Dimension drawings

1PH2 built-in motors
Water cooling

Motor Type	Dimensions in mm (in) Standard spindle diameter d	Rotor internal diameter d_i	Stator outer diameter D_A	Total outer diameter D	Total length L
1PH2 built-in motors, water cooling					
1PH2093	67 (2.64)	85 (3.35)	180 (7.09)	205 (8.07)	250 (9.84)
1PH2095					300 (11.81)
1PH2113	82 (3.23)	100 (3.94)	220 (8.66)	250 (9.84)	290 (11.42)
1PH2115					310 (12.20)
1PH2117					330 (12.99)
1PH2118					390 (15.35)