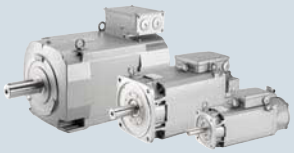
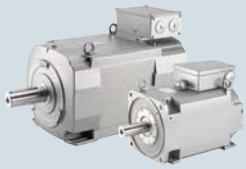
SIMOTICS main motors
Overview

Motor type	Features	Degree of protection	Cooling method
SIMOTICS M-1PH8 asynchronous motor 	Three-phase squirrel-cage motor without housing Compact unit with high power density	IP55 IP23 IP55/IP65	Forced ventilation Forced ventilation Water cooling
SIMOTICS M-1PH8 synchronous motor 	Permanent-magnet synchronous motor Outstanding performance capabilities Compact unit with extremely high power density	IP55 IP55/IP65	Forced ventilation Water cooling
SIMOTICS M-1FE1/1FE2 synchronous built-in motors 	Synchronous built-in motors Permanent-magnet	IP00	Water cooling

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SIMOTICS M main motors

The potential applications for SIMOTICS M-1PH8/M-1FE1/M-1FE2 motors are extremely versatile.

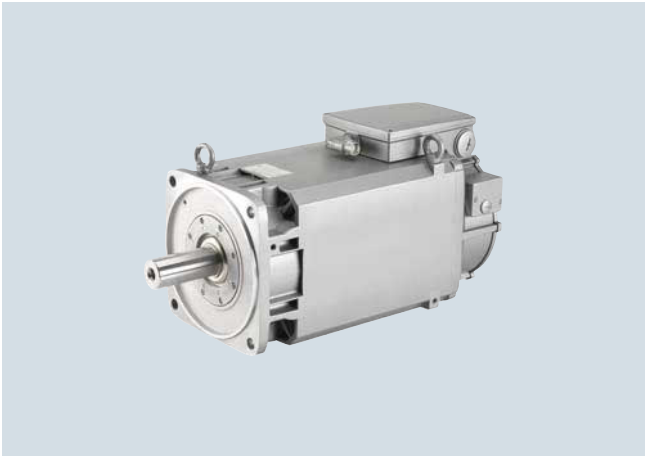
In machine tools, they are usually designated and used as main spindle motors.

In production machines, such as printing, packaging, and reforming machines, they are used as high-output main motors.

The selection and ordering data for the SINAMICS S120 Motor Modules are based on the booksize format by way of example. Blocksize and chassis formats are also possible. The SIZER for Siemens Drives engineering tool is available for detailed configuration

Shaft height	Rated power P_{rated} for duty type S1 kW (hp)	Rated torque M_{rated}	Page
SH 80/SH 100/SH 132/SH 160/ SH 180/SH 225/SH 280	2.8 (3.75) – 385 (516)	13 ... 2475 Nm (9.59 ... 1825 lb_f-ft)	**9/8**
SH 180/SH 225/SH 280	24.5 (32.9) – 630 (845)	317 ... 3710 Nm (234 ... 2736 lb_f-ft)	**9/26**
SH 80/SH 100/SH 132/SH 160/ SH 180/SH 225/SH 280	3.5 (4.69) – 460 (617)	20 ... 2610 Nm (14.8 ... 1925 lb_f-ft)	**9/36**
SH 132/SH 160/SH 180/SH 225	15.7 (21.1) – 196 (263)	94 ... 1091 Nm (69.3 ... 805 lb_f-ft)	**9/52**
SH 132/SH 160/SH 180/SH 225	15 (20.1) – 310 (416)	107 ... 1650 Nm (78.9 ... 1217 lb_f-ft)	**9/58**
Outer diameter (cooling jacket)			
High Torque series 95/115/130/190/ 205/250/310	4 (5.36) – 104 (139)	4.5 ... 820 Nm (3.32 ... 605 lb_f-ft)	**9/90**
High Speed series 120/155/180/205/ 230/270	6.5 (8.72) – 94 (126)	5 ... 300 Nm (3.69 ... 221 lb_f-ft)	**9/94**
High Torque series 180	34 (45.6) – 159 (213)	640 ... 1530 Nm (472 ... 1128 lb_f-ft)	**9/98**

Overview

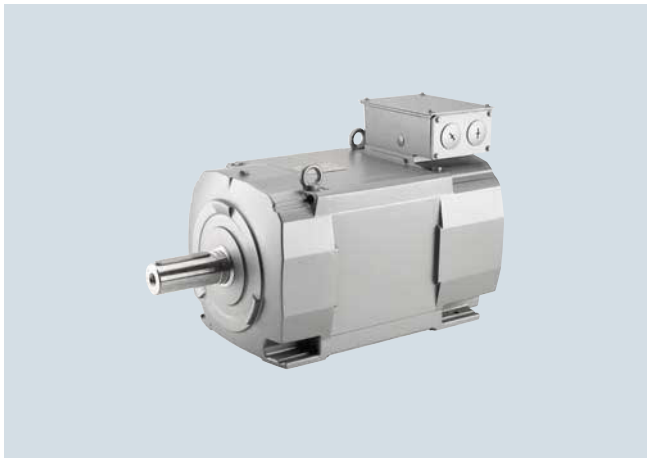


SIMOTICS M-1PH8 motors, forced ventilation, shaft heights 80 to 160

SIMOTICS M-1PH8 motors, water cooling, shaft heights 80 to 160

The SIMOTICS M-1PH8 series is the latest motor generation for universal use with Motion Control applications. The wide power range is aimed at use as a central machine drive (as what is known as a “main motor”) for various applications. The motors are available as an asynchronous variant as well as a compact synchronous variant with either forced ventilation or water cooling, based on a flexible building block principle. The flexible configuration – such as storage or electrical connection technology – allows you to adapt the motors to the requirements of almost any industrial application.

**Main drive with 1PH8 = high power +
high dynamic response +
high accuracy**



SIMOTICS M-1PH8 motors, water cooling, shaft heights 180 to 280

When developing the SIMOTICS M-1PH8 motor series, we placed special emphasis on making them perfectly compatible with the SINAMICS S120 drive system. For example, the specially harmonized power components, electronic rating plates, and the ability to integrate the motors via the DRIVE-CLiQ system interface ensure quick and easy commissioning as well as problem-free operation. What’s more, thanks to the harmonization of the system, they are capable of handling extreme duty cycles, short rise times, and are exceptionally precise in terms of speed, torque, and positioning.

Benefits

- Low space requirements thanks to high power density
- Performance capability thanks to wide rotational speed setting ranges
- High degree of structural flexibility due to the choice of
  - Asynchronous or synchronous design
  - Forced ventilation or water cooling
  - Mechanical designs
- Minimized maintenance costs thanks to high bearing service lives
- Precise motion control thanks to high rotational accuracy, even at the lowest speeds
- Maximum thermal utilization over the complete speed range
- Quiet operation as a result of low sound pressure level
- Optimized for the SINAMICS S120 drive system

Application

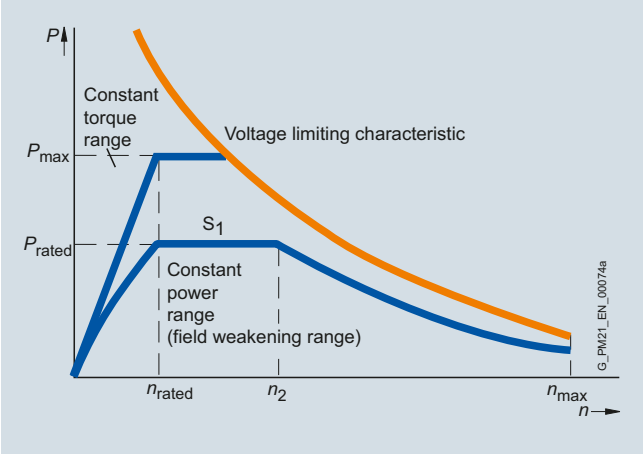
The application spectrum reaches across all industries and comprises, for example:

- Main drives in presses and extruders
- Converting applications
- Main spindle drives in machine tools (See Catalog NC 62)
- Rotary axes in the paper and printing industry
- Use in crane systems

The SIMOTICS M-1PH8 motors are suitable for installation in dry indoor areas without corrosive atmospheres.

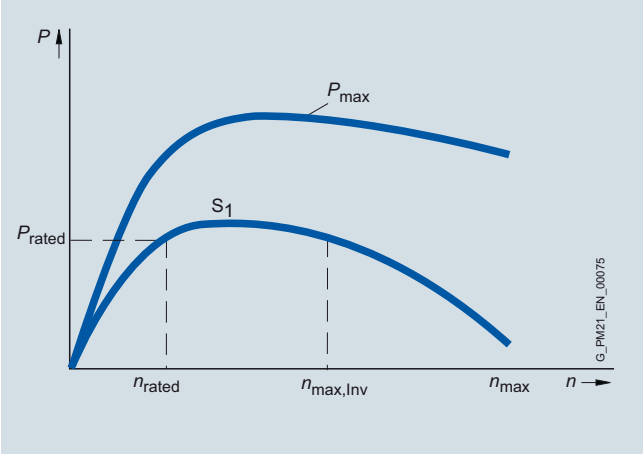
Characteristic curves

SIMOTICS M-1PH8 asynchronous motor



Typical speed/power characteristic curve for SIMOTICS M-1PH8 asynchronous motors

SIMOTICS M-1PH8 synchronous motor



Typical speed/power characteristic curve for SIMOTICS M-1PH8 synchronous motors

The characteristic curves show the typical relationship between motor speed and drive power for SIMOTICS M-1PH8 motors for duty type S1 (continuous duty) in accordance with IEC 60034-1.

The detailed characteristic curves for the corresponding voltage and winding can be found in the SIMOTICS M-1PH8 Configuration Manual.

Technical specifications

SIMOTICS M-1PH8 motor, forced ventilation	
Stator winding insulation in accordance with EN 60034-1 (IEC 60034-1)	For an ambient temperature of up to 40 °C (104 °F) Temperature class 180 (H)
Cooling according to EN 60034-6 (IEC 60034-6)	Forced ventilation
• 1PH808 ... 1PH822	Fan mounted axially at NDE
• 1PH828	Fan mounted radially at NDE
Temperature monitoring	Pt1000 temperature sensor in the stator winding 1PH818 ... 1PH828 additional Pt1000 as reserve
Fan supply voltage	
• 1PH808	230 V 1 AC 50/60 Hz, 265 V 1 AC 60 Hz
• 1PH810 ... 1PH816	400 V 3 AC 50/60 Hz, 480 V 3 AC 60 Hz
• 1PH818/1PH822	200 ... 277 V 1 AC 50/60 Hz (EC fan) 400 V 3 AC 50/60 Hz, 480 V 3 AC 60 Hz (optional)
• 1PH828	400 V 3 AC 50/60 Hz, 480 V 3 AC 60 Hz
Type of construction in accordance with EN 60034-7 (IEC 60034-7)	
• 1PH808	IM B3, IM B5
• 1PH810 ... 1PH828	IM B3, IM B5, IM B35
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	
• 1PH808 ... 1PH828	IP55 (forced ventilation)
• 1PH818 ... 1PH828	IP23 (open-circuit cooling)
Shaft extension on the drive end in accordance with DIN 748-3 (IEC 60034-5)	Plain shaft or feather key full-key or half-key balancing for feather key
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1) [1]	Without holding brake: Tolerance R (reduced) With holding brake: Tolerance N (normal)
Vibration severity	In accordance with Siemens/EN 60034-14 (IEC 60034-14) [1]
Sound pressure level L_{pA} (1 m) in accordance with DIN EN ISO 1680, max. Tolerance +3 dB	
Forced ventilation (IP55)	
• 1PH808 ... 1PH813	70 dB at a rated pulse frequency of 4 kHz and a speed range up to 5000 rpm
• 1PH816	73 dB at a rated pulse frequency of 4 kHz and a speed range up to 5000 rpm
• 1PH818	73 dB at a rated pulse frequency of 2 kHz and a speed range up to 5000 rpm
• 1PH822	73 dB at a rated pulse frequency of 2 kHz and a speed range up to 3500 rpm
• 1PH828	74 dB at a rated pulse frequency of 2 kHz and a speed range up to 3300 rpm
Forced ventilation (IP23)	
• 1PH818	73 dB at a rated pulse frequency of 2 kHz and a speed range up to 3000 rpm
• 1PH822	73 dB at a rated pulse frequency of 2 kHz and a speed range up to 2000 rpm
• 1PH828	74 dB at a rated pulse frequency of 2 kHz and a speed range up to 2800 rpm
Built-in encoder systems	Absolute and incremental encoder with or without DRIVE-CLiQ interface
Connection	Connector for signals or DRIVE-CLiQ interface (mating connector not included in the scope of supply)
Power	
• 1PH808 ... 1PH813	Power connector or terminal box
• 1PH816 ... 1PH828	Terminal box
Fan	
• 1PH808	Power connector
• 1PH810 ... 1PH813	Power connector or terminal box
• 1PH816 ... 1PH828	Terminal box
Encoder system	Connector for signals or DRIVE-CLiQ interface (mating connector not included in the scope of supply)
Rating plate	1 attached to motor 1 supplied separately with terminal box
Paint finish	Standard paint finish in anthracite RAL 7016
Certificate of suitability, according to	cURus, CE, EAC

[1] Shaft extension run-out, concentricity of centering ring and shaft, and perpendicularity of flange to shaft.

Technical specifications (continued)

SIMOTICS M-1PH8 motor, water cooling	
Stator winding insulation in accordance with EN 60034-1 (IEC 60034-1)	For a coolant inlet temperature up to 30 °C (86 °F) Temperature class 180 (H) [2]
Cooling according to EN 60034-6 (IEC 60034-6)	Water cooling Max. cooling water pressure at inlet: 6 bar Connecting thread at NDE
Temperature monitoring	
• 1PH808 ... 1PH816 • 1PH818 ... 1PH828	Pt1000 temperature sensor in the stator winding 1 additional Pt1000 as reserve
Type of construction in accordance with EN 60034-7 (IEC 60034-7)	
• 1PH808 • 1PH810 ... 1PH828	IM B3, IM B5 IM B3, IM B5, IM B35
Degree of protection in accordance with EN 60034-5 (IEC 60034-5)	
• 1PH808 ... 1PH816 • 1PH818 ... 1PH828	IP65 IP55
Shaft extension on the drive end in accordance with DIN 748-3 (IEC 60072-1)	Plain shaft or feather key, full-key or half-key balancing for feather key
Shaft and flange accuracy in accordance with DIN 42955 (IEC 60072-1) [1]	Without holding brake: Tolerance R (reduced) With holding brake: Tolerance N (normal)
Vibration severity	in accordance with Siemens/EN 60034-14 (IEC 60034-14) [1]
Sound pressure level L_{pA} (1 m) in accordance with DIN EN ISO 1680, max. Tolerance +3 dB	
• 1PH808 ... 1PH813 • 1PH816 • 1PH818 • 1PH822 • 1PH828	68 dB at a rated pulse frequency of 4 kHz and a speed range up to 5000 rpm 69 dB at a rated pulse frequency of 4 kHz and a speed range up to 5000 rpm 70 dB at a rated pulse frequency of 2 or 4 kHz and a speed range up to 5000 rpm 70 dB at a rated pulse frequency of 2 or 4 kHz and a speed range up to 4500 rpm 72 dB at a rated pulse frequency of 2 kHz and a speed range up to 3300 rpm
Built-in encoder systems	Absolute and incremental encoder with or without DRIVE-CLiQ interface
Connection	Connector for signals or DRIVE-CLiQ interface (mating connector not included in the scope of supply)
Power	
• 1PH808 ... 1PH813 • 1PH816 ... 1PH828	Power connector or terminal box Terminal box
Fan	
• 1PH808 • 1PH810 ... 1PH813 • 1PH816 ... 1PH828	Power connector Power connector or terminal box Terminal box
Encoder system	Connector for signals or DRIVE-CLiQ interface (mating connector not included in the scope of supply)
Rating plate	1 attached to motor 1 supplied separately with terminal box
Paint finish	Standard paint finish in anthracite RAL 7016
Certificate of suitability	cURus, CE, EAC

[1] Shaft extension run-out, concentricity of centering ring and shaft, and perpendicularity of flange to shaft.

[2] The following motors are designed to conform to temperature class 155 (F):
1PH8107-1.F2/1PH8107-1.M2
1PH8138-2.F2/1PH8138-2.G2
1PH8164/1PH8166/1PH8168

Article No. supplements for SIMOTICS M-1PH8 without holding brake > SH 80 to SH 160

Selection and ordering data

Data position of the Article No.	1	2	3	4	5	6	7		8	9	10	11	12		13	14	15	16		
Shaft height 80	**1**	**P**	**H**	**8**	**0**	**8**	**.**	**–**	■	■	■	■	■	**–**	■	■	■	**.**	**–**	**Z**
Shaft height 100	**1**	**P**	**H**	**8**	**1**	**0**	**.**	**–**	■	■	■	■	■	**–**	■	■	■	**.**	**–**	**Z**
Shaft height 132	**1**	**P**	**H**	**8**	**1**	**3**	**.**	**–**	■	■	■	■	■	**–**	■	■	■	**.**	**–**	**Z**
Shaft height 160	**1**	**P**	**H**	**8**	**1**	**6**	**.**	**–**	■	■	■	■	■	**–**	■	■	■	**.**	**–**	**Z**
Overall length (cannot be selected, determined by the choice of rated power)							**.**													
Asynchronous version									**1**											
Synchronous version (only shaft height 132 and 160)									**2**											
Encoder systems for motors without DRIVE-CLiQ interface																				
Without encoder [1]										**A**								**2**		
Absolute encoder EnDat 2048 S/R (encoder AM2048S/R) [2]										**E**								**2**		
Incremental encoder HTL 1024 S/R (encoder HTL1024S/R) [1] [3]										**H**								**2**		
Incremental encoder HTL 2048 S/R (encoder HTL2048S/R) [1] [4]										**J**								**2**		
Incremental encoder HTL 1024 S/R (encoder HTL1024S/R) with connection via additional terminal box [1] [3] [10]										**W**								**2**		
Incremental encoder HTL 2048 S/R (encoder HTL2048S/R) with connection via additional terminal box [1] [4] [10]										**Y**								**2**		
Incremental encoder sin/cos 1 V_{pp} 2048 S/R with C and D tracks (encoder IC2048S/R) [2]										**M**								**2**		
Incremental encoder sin/cos 1 V_{pp} 512 S/R without C and D tracks (encoder IN512S/R) [1] [5]										**T**								**2**		
Encoder systems for motors with DRIVE-CLiQ interface																				
Absolute encoder 22-bit singleturn + 12-bit multiturn (encoder AM22DQ) [2]										**F**								**1**		
Incremental encoder 22-bit with commutation position (encoder IC22DQ) [2]										**D**								**1**		
Incremental encoder 20-bit without commutation position (encoder IN20DQ) [1] [5]										**U**								**1**		
Rated speeds (380 V to 480 V 3 AC) (winding design)																				
400 rpm, 500 rpm, 600 rpm, 700 rpm											**B**									
1000 rpm, 1150 rpm, 1350 rpm, 1500 rpm											**D**									
1500 rpm, 1750 rpm, 2000 rpm, 2200 rpm											**F**									
2000 rpm, 2300 rpm, 2650 rpm, 2800 rpm											**G**									
2500 rpm, 2800 rpm, 3000 rpm											**L**									
3000 rpm, 3300 rpm, 3600 rpm, 3900 rpm											**M**									
Cooling / **Degree of protection**																				
Forced ventilation DE → NDE / IP55												**0**								
Forced ventilation NDE → DE / IP55												**1**								
Water cooling / IP65												**2**								
Type of construction																				
IM B3 (IM V5, IM V6, IM B6, IM B7, IM B8)													**0**							
IM B5 (IM V1, IM V3) [12]													**2**							
IM B35 (IM V15, IM V35) [6]													**3**							
Version status [11]																				
Special version (order codes required for options)																				**Z**

For the 13th to 16th digit of the Article No., see next page.

For footnotes, see next page.

Selection and ordering data (continued)

Data position of the Article No.		1	2	3	4	5	6	7		8	9	10	11	12		13	14	15	16		
		1	**P**	**H**	**8**	**.**	**.**	**.**	**–**	■	■	■	■	■	**–**	■	■	■	**.**	**–**	**Z**
Shaft extension (DE)	**Balancing**																				
Plain shaft	–															**0**					
Feather key	Full-key															**1**					
Feather key	Half-key															**2**					
Bearing	**Vibration severity acc. to Siemens/EN 60034-14**	**Shaft and flange accuracy**																			
Standard with location bearing [13]	R/A	R															**B**				
Standard with location bearing [13]	S/A	R															**C**				
Standard with location bearing [1] [13]	SR/A	R															**D**				
Standard [13]	R/A	R															**G**				
Standard [13]	S/A	R															**H**				
Increased radial forces [13] [15]	R/A	R															**F**				
Performance [7]	SPECIAL/B	SPECIAL															**L**				
Advanced Lifetime [8] [13]	S/A	R															**Q**				
Power connection (looking at DE)																					
Terminal box	Cable entry	Signal connection																			
Top	Right	DE																**A**			
Top	Left	DE																**B**			
Top	NDE	Left																**C**			
Top [14]	DE	Left																**D**			
power connector																					
Top [9]	Right	DE																**E**			
Top [9]	Left	DE																**F**			
Top [9]	NDE	Left																**G**			
Top [9]	DE	Left																**H**			
Version status [11]																					
Special version (order codes required for options)																					**Z**

1) Only possible when 8th data position is "1" (Asynchronous version).
2) Limited to n_{max} = 12000 rpm.
3) Limited to n_{max} = 9000 rpm.
4) Limited to n_{max} = 4600 rpm.
5) Limited to n_{max} = 15000 rpm.
6) Only possible for shaft height 100, 132, and 160.
7) Only possible when 8th data position is "1" (Asynchronous version).
Shaft height 80: limited to n_{max} = 15000 rpm
Shaft height 100: limited to n_{max} = 12000 rpm
Shaft height 132: limited to n_{max} = 10000 rpm
Shaft height 160: Limited to n_{max} = 9000 rpm; not possible when 12th data position is "2" (IM B5).
8) Limited to n_{max} = 5000 rpm, shaft height 132: n_{max} = 4500 rpm, shaft height 160: n_{max} = 4000 rpm.
9) Power connector for shaft height 100 only possible up to a maximum stall current of I_0 = 36 A.
Power connector for shaft height 132 only possible up to a maximum stall current of I_0 = 85 A.
Power connector not possible for shaft height 160.
10) Only possible when 14th data position is: B, C, D, G, H, Q, F; and 15th data position is: A and B.
11) Directly coupled to 9th data position.
12) Not possible with shaft height 160 and 14th data position: L.
13) Not possible when 9th data position is: T, U.
14) Not possible with shaft height 160 and 8th data position is "2" or "4" (Synchronous version).
15) Limited to shaft height 100: n_{max} = 7000 rpm, shaft height 132: n_{max} = 6500 rpm, shaft height 160: n_{max} = 5300 rpm.