Selection guides for SIMOTICS M-1PH8 motors
Terminal boxes/Cable cross-sections

Technical specifications

Terminal box type (see selection and ordering data for assignment)	Cable entry Power	External signals	Max. outer cable diameter[3] mm (in)	Number of main terminals	Max. cross-section per terminal mm²	Max. rated current[4] A
gk803	1 × M25 × 1.5	1 × M16 × 1.5[1]	20 (0.79)	Phases: 3 × M5 Grounding: 2 × M5	1 × 10	52
gk813	1 × M32 × 1.5	1 × M16 × 1.5[1]	24.2 (0.95)	Phases: 3 × M5 Grounding: 2 × M5	1 × 16	70
gk823	1 × M32 × 1.5	1 × M16 × 1.5[1]	24.2 (0.95)	Phases: 3 × M5 Grounding: 2 × M5	1 × 16	70
gk826	1 × M32 × 1.5	1 × M16 × 1.5[1]	24.2 (0.95)	Phases: 6 × M5 Grounding: 2 × M5	1 × 10	52
gk833	1 × M40 × 1.5	1 × M16 × 1.5[1]	32 (1.26)	Phases: 3 × M6 Grounding: 2 × M6	1 × 35	110
gk843	1 × M50 × 1.5	1 × M16 × 1.5[1]	38 (1.50)	Phases: 3 × M6 Grounding: 2 × M6	1 × 50	133
gk863	1 × M50 × 1.5	1 × M16 × 1.5[1]	38 (1.50)	Phases: 3 × M6 Grounding: 2 × M6	1 × 50	133
gk873	1 × M63 × 1.5	1 × M16 × 1.5[1]	42.6 (1.68)	Phases: 3 × M6 Grounding: 2 × M6	1 × 50	133
gk874	1 × M63 × 1.5	1 × M16 × 1.5[1]	42.6 (1.68)	Phases: 3 × M10 Grounding: 2 × M6	2 × 70	240
1XB7322-P05	2 × M50 × 1.5	1 × M16 × 1.5[2]	38 (1.50)	Phases: 3 × M12 Grounding: 2 × M6	2 × 50	210
1XB7422-P06	2 × M63 × 1.5	1 × M16 × 1.5[2]	53 (2.09)	Phases: 3 × M12 Grounding: 4 × M8	2 × 70	270
1XB7700-P02	3 × M75 × 1.5	1 × M16 × 1.5[2]	68 (2.68)	Phases: 3 × 3 × M12 Grounding: 3 × fixing eyelet	3 × 150	700
1XB7712-P03	4 × M75 × 1.5	1 × M16 × 1.5[2]	68 (2.68)	Phases: 3 × 4 × M16 Grounding: 4 × M16	4 × 185	1150
With 1PH835 only						
1XB7712-P01	3 × M63 × 1.5	1 × M20 × 1.5[5] 1 × M25 × 1.5[6]	53 (2.09)	Phases: 3 × 4 × M16 Grounding: 4 × M16	3 × 95	450
1XB7712-P03	4 × M75 × 1.5	1 × M20 × 1.5[5] 1 × M25 × 1.5[6]	68 (2.68)	Phases: 3 × 4 × M16 Grounding: 4 × M16	4 × 185	1150
1XB7820-P00	Undrilled	1 × M20 × 1.5[5] 1 × M25 × 1.5[6]	–	Phases: 2 × 3 × 4 × M16 Grounding: 8 × M16	8 × 240	2100

For terminal box type **1XB7712-P01** or **1XB7712-P03**, other cable entries (power) can be ordered via P options, depending on the standard:

P00	Undrilled cable entry plate
P01	Cable entry plate 3 × M63 × 1.5 (not for 1XB7712-P01)
P02	Cable entry plate 3 × M75 × 1.5
P03	Cable entry plate 4 × M75 × 1.5 (not for 1XB7712-P03)
P04	Cable entry plate 4 × M63 × 1.5

For terminal box type **1XB7700-P02**, other cable entries (power) can be ordered via P options, depending on the standard:

P00	Undrilled cable entry plate
P01	Cable entry plate 3 × M63 × 1.5

For terminal box types **1XB7322-P05** and **1XB7422-P06**, another cable entry (power) can be ordered via the P option, depending on the standard:

P00	Undrilled cable entry plate

For options **K09** or **K10**, instead of terminal box **gk863**, terminal box **gk873** is used mounted on the side.

For options **K09** or **K10**, instead of terminal box **gk833**, terminal box **gk843** is used mounted on the side.

For options **K09** or **K10**, instead of terminal box **gk813**, terminal box **gk823** is used mounted on the side.

[1] Thread M16 × 1.5 arranged with 90° to signal connection; thread only for options A12, A25 and 9th position of Order No. A (without encoder).
[2] Arranged opposite of signal connection (sideways from cable entry plate), thread only for option A12 and 9th position of Order No. A (without encoder).
[3] Dependent on the design of the metric cable gland (see 1PH8 Configuration Manual for definition).
[4] Current-carrying capacity based on EN 60204-1/IEC 60364-5-52 with installation type C.
[5] Mounted on left side of terminal box (viewed toward cable entries).
[6] Mounted on right side of terminal box (viewed toward cable entries).

Technical specifications (continued)

Motor type	Fan motor current consumption, max.			Direction of air flow	Volume of air, min.	Sound pressure level L_{pA} (1 m) Motor + external fan operation 50 Hz tolerance + 3 dB
	A	A	A		m^3/s (ft^3/s)	dB
Forced ventilation	**230 V 1 AC/50 Hz (± 10 %)**	**230 V 1 AC/60 Hz (± 10 %)**	**265 V 1 AC/60 Hz (± 10 %)**			
1PH808	0.33 0.20	0.25 0.16	0.32 0.19	NDE → DE DE → NDE	0.02 (0.71)	70[1]
Forced ventilation	**400 V 3 AC/50 Hz (± 10 %)**	**400 V 3 AC/60 Hz (± 10 %)**	**480 V 3 AC/60 Hz (± 10 %)**			
1PH810	0.12 0.13	0.09 0.09	0.12 0.13	NDE → DE DE → NDE	0.04 (1.41)	70[1]
1PH813	0.13 0.21	0.16 0.19	0.17 0.23	NDE → DE DE → NDE	0.09 (3.18)	70[1]
1PH816	0.17 0.23	0.22 0.30	0.22 0.30	NDE → DE DE → NDE	0.16 (5.65)	73[1]
Forced ventilation (EC fan)	**200 V ... 277 V 1 AC/ 50 Hz, 60 Hz (± 10 %)**					
1PH818	1.45 ... 1.05	–	–	NDE → DE DE → NDE	0.17 (6.00)	73[2]
1PH822	2.3 ... 1.6	–	–	NDE → DE DE → NDE	0.31 (10.9)	73[2]
Forced ventilation	**400 V 3 AC/50 Hz (± 10 %)**	**400 V 3 AC/60 Hz (+ 5 %, ± 10 %)**	**480 V 3 AC/60 Hz (+ 5 %, – 10 %)**			
1PH828	2.55	2.5	2.5	NDE → DE DE → NDE	0.31 (10.9)	74[2]
1PH835.-1..1 (IP55 degree of protection)	4.7	4.6	4.6	NDE → DE DE → NDE	0.75 (26.5)	77[3]
1PH835.-1..4 (IP23 degree of protection)	4.7	4.6	4.6	NDE → DE DE → NDE	1 (35.3)	77[3]

[1] For rated pulse frequency of 4 kHz and speed range up to 5000 rpm.

[2] For rated pulse frequency of 2 kHz and speed ranges:
Forced ventilation (IP55 degree of protection):
1PH818 up to 5000 rpm
1PH822 up to 3500 rpm
1PH828 up to 3300 rpm
Forced ventilation (IP23 degree of protection):
1PH818 up to 3000 rpm
1PH822 up to 2000 rpm
1PH828 up to 2800 rpm

[3] For rated pulse frequency of 2.5 kHz and speed range up to 2800 rpm.

Selection guides for SIMOTICS M-1PH8 motors
Cooling data/Sound pressure levels/Water specification

Technical specifications (continued)

Cooling data and sound pressure levels

Motor type	Flow volume, min.	Pressure drop	Water connection at NDE thread	Sound pressure level L_{pA} (1 m) motor tolerance + 3 dB
	l/min (US gal./min)	bar	Inch	dB
Water cooling				
1PH808	6 (1.58)	0.6	G 1/8	68[1)]
1PH810	8 (2.11)	0.4	G 1/4	68[1)]
1PH813	12 (3.17)	0.9	G 3/8	68[1)]
1PH816	15 (3.96)	0.2	G 1/2	69[1)]
1PH8184	15 (3.96)	0.6	G 3/8	70[2)]
1PH8186	15 (3.96)	0.7	G 3/8	70[2)]
1PH822.-1 (asynchronous variant)	20 (5.28)	0.6	G 3/8	70[2)]
1PH822.-2 (synchronous variant)	25 (6.60)	0.9	G 3/8	70[3)]
1PH828	35 (9.25)	0.6	G 1/2	72[3)]

Water specification

Cooling water quality	The values specified for the cooling water correspond to the requirements for a closed cooling circuit. Not all of the specified concentrations will occur in the cooling water at the same time. For trouble-free operation, a filter can be installed. The filter fineness should be no less than 100 µm.	
Cooling water specifications	Quality of the water used as coolant for motors with stainless steel pipes + cast iron or steel jacket 1PH808 ... 1PH816	Quality of the water used as coolant for motors with stainless steel pipes 1PH818 ... 1PH828
pH value	6.0 ... 9.0	
Total hardness	< 170 ppm	
Conductivity	< 500 µS/cm	< 2000 µS/cm
Operating pressure, max.	< 6 bar	
Pressure drop at V(N)	< 1 bar	
Cooling water inlet temperature, max.	< 30 °C (86 °F)	
Cooling water temperature, min.	$T_{cooling\ water} > T_{ambient} - 5$ K	
Anti-freeze protection / corrosion protection	20 ... 30 %	
NALCO 00GE056 inhibitor	0.2 ... 0.25 %	
Components		
Dissolved substances	< 340 ppm	
Max. grain size	< 100 µm	
Chloride ions	< 40 ppm	< 250 ppm
Sulfate ions	< 50 ppm	< 240 ppm
Nitrate ions	< 50 ppm	

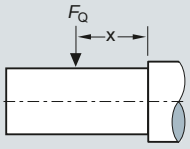
1) For rated pulse frequency of 4 kHz and speed range up to 5000 rpm.

2) For rated pulse frequencies of 2 kHz or 4 kHz and speed ranges:
1PH818 up to 5000 rpm
1PH822 up to 4500 rpm.

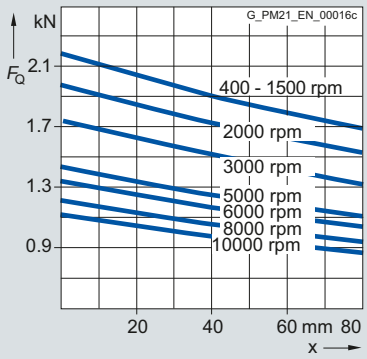
3) At rated pulse frequency of 2 kHz and speed ranges:
1PH822 up to 4500 rpm
1PH828 up to 3300 rpm.

Characteristic curves

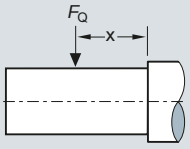
Permissible radial forces
1PH808 motors
Standard



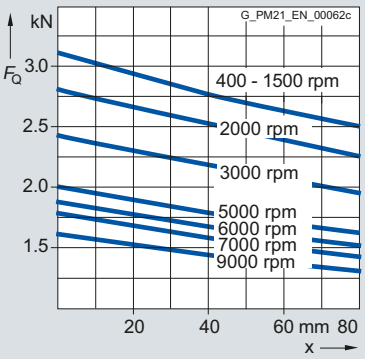
L_{10h} = 20000 h



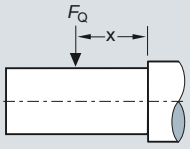
Permissible radial forces
1PH810 motors
Standard



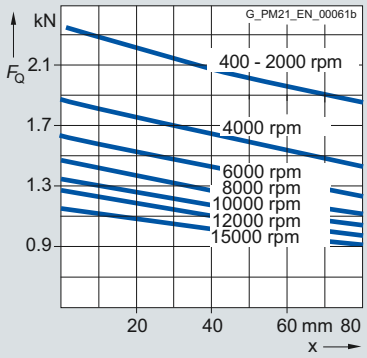
L_{10h} = 20000 h



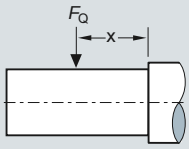
Permissible radial forces
1PH808 motors
Performance



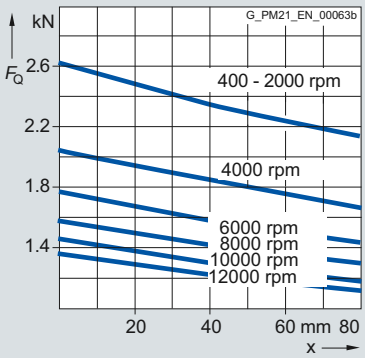
L_{10h} = 12000 h



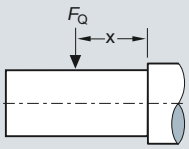
Permissible radial forces
1PH810 motors
Performance



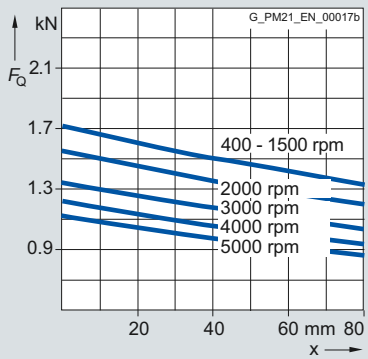
L_{10h} = 12000 h



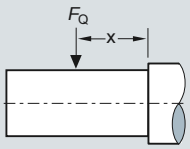
Permissible radial forces
1PH808 motors
Advanced lifetime



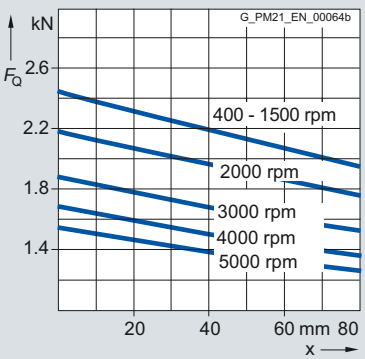
L_{10h} = 40000 h



Permissible radial forces
1PH810 motors
Advanced lifetime



L_{10h} = 40000 h



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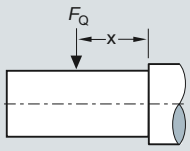
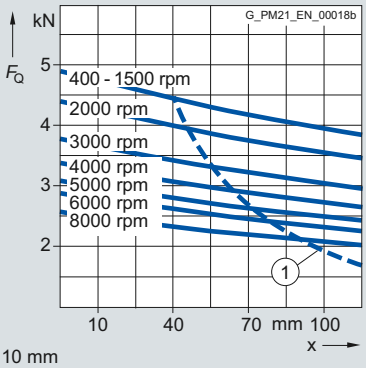
Selection guides for SIMOTICS M-1PH8 motors
Radial force diagrams

Characteristic curves (continued)

Permissible radial forces
1PH813 motors
Standard

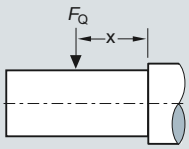


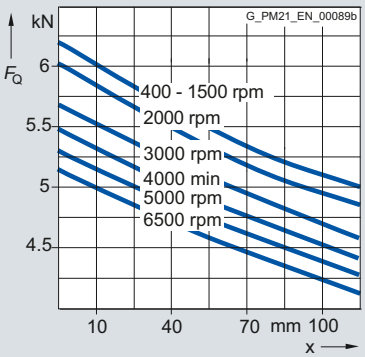


(1) Maximum load for 1PH7-compatible shaft extension (42 x 110 mm (1.65 x 4.33 in)) (option V90)

L_{10h} = 20000 h

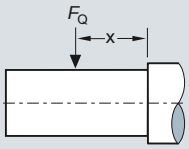
Permissible radial forces
1PH816 motors
Standard

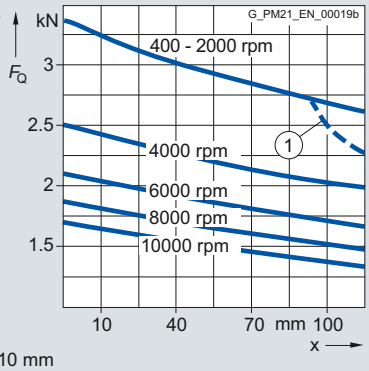




L_{10h} = 20000 h

Permissible radial forces
1PH813 motors
Performance

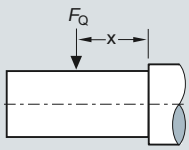


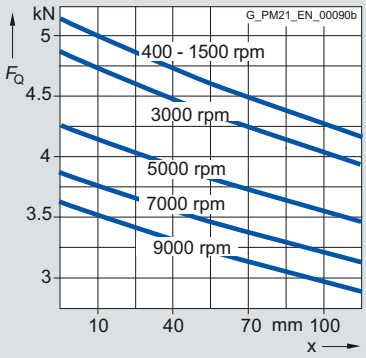


(1) Maximum load for 1PH7-compatible shaft extension (42 x 110 mm (1.65 x 4.33 in)) (option V90)

L_{10h} = 12000 h

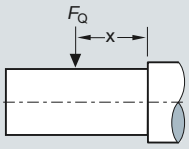
Permissible radial forces
1PH816 motors
Performance

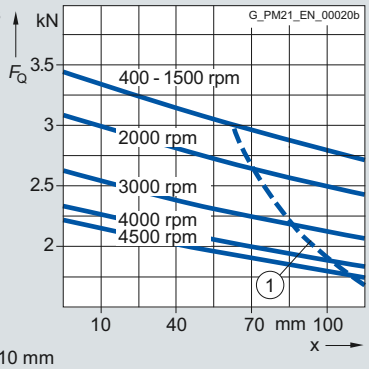




L_{10h} = 12000 h

Permissible radial forces
1PH813 motors
Advanced lifetime

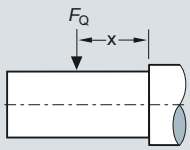


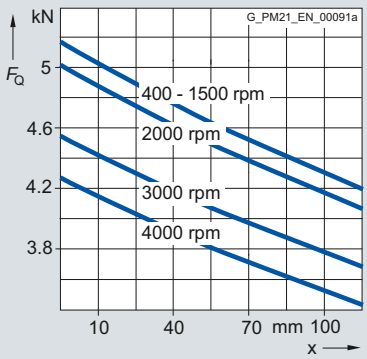


(1) Maximum load for 1PH7-compatible shaft extension (42 x 110 mm (1.65 x 4.33 in)) (option V90)

L_{10h} = 40000 h

Permissible radial forces
1PH816 motors
Advanced Lifetime

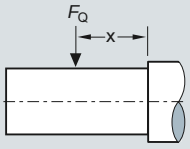




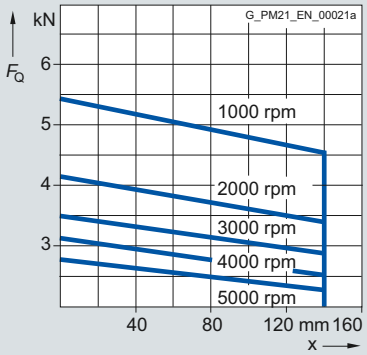
L_{10h} = 40000 h

Characteristic curves (continued)

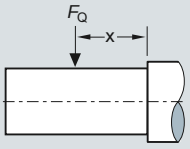
Permissible radial forces 1PH818 motors Standard



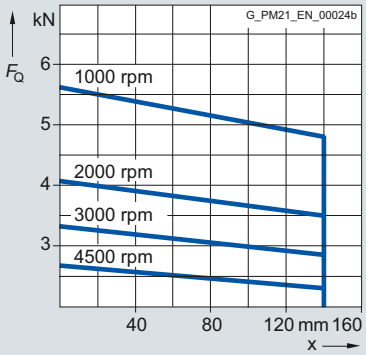
L_{10h} = 20000 h



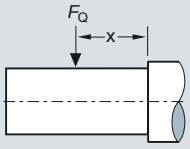
Permissible radial forces 1PH822 motors Standard



L_{10h} = 20000 h

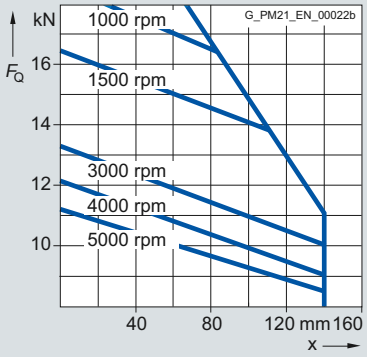


Permissible radial forces 1PH818 motors with increased radial force

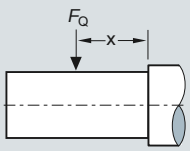


Minimum radial force 4 kN (899 lb_f)

L_{10h} = 12000 h

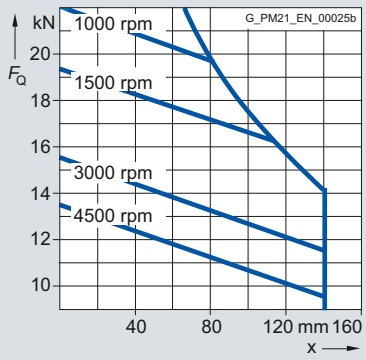


Permissible radial forces 1PH822 motors with increased radial force

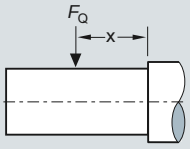


Minimum radial force 5 kN (1124 lb_f)

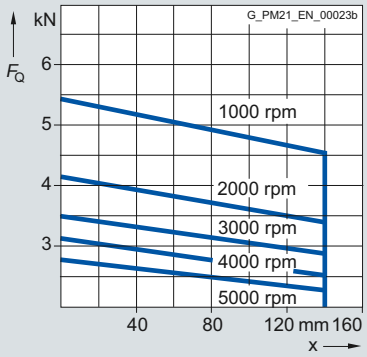
L_{10h} = 12000 h



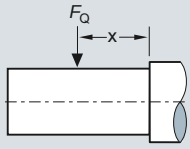
Permissible radial forces 1PH818 motors Performance



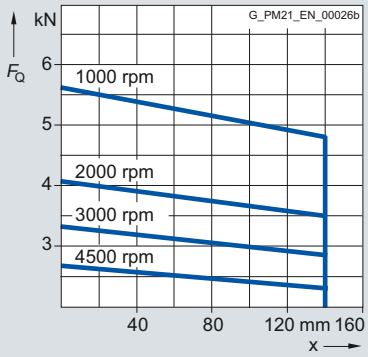
L_{10h} = 12000 h



Permissible radial forces 1PH822 motors Performance



L_{10h} = 12000 h

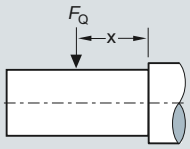


The roller bearings used here (bearings with increased radial force) could sustain damage if they are operated under no load. Observe the specified minimum radial forces.

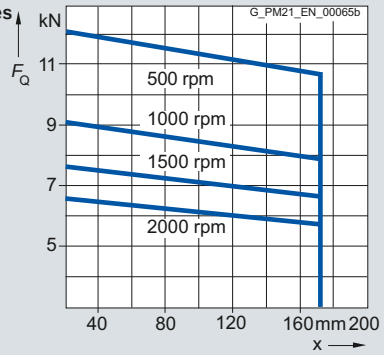
Selection guides for SIMOTICS M-1PH8 motors
Radial force diagrams

Characteristic curves (continued)

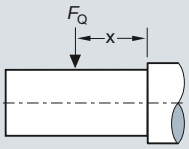
Permissible radial forces 1PH828 motors Standard



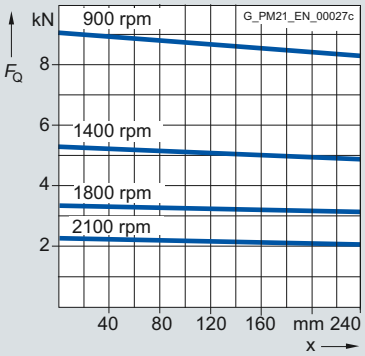
L_{10h} = 20000 h



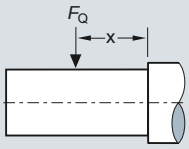
Permissible radial forces 1PH835 motors Standard



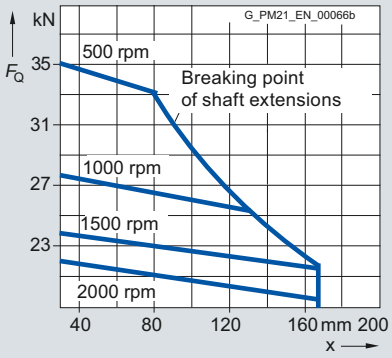
L_{10h} = 20000 h



Permissible radial forces 1PH828 motors with increased radial force

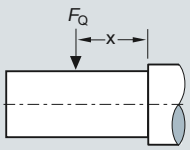


Minimum radial force 9 kN (2023 lb_f)

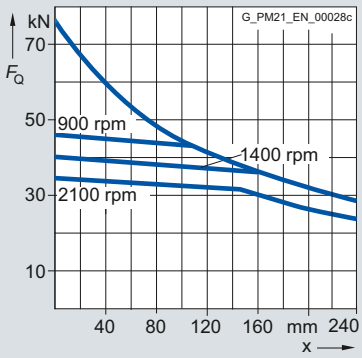


L_{10h} = 12000 h

Permissible radial forces 1PH835 motors with increased radial force



Minimum radial force 13 kN (2923 lb_f)



L_{10h} = 20000 h

The roller bearings used here (bearings with increased radial force) could sustain damage if they are operated under no load. Observe the specified minimum radial forces.

Overview

Mounted holding brake for 1PH8 motors

A brake can be mounted on the DE of 1PH808 to 1PH822 motors.

These brakes are electromagnetic units for dry-running operation. An electromagnetic field is used to release the brake which is applied using spring force. They operate in accordance with the quiescent current principle, i.e. when no current is flowing, the spring-operated brake brakes and holds the drive. When current is flowing, the brake is released and the drive can turn.

When the power fails or an emergency stop is issued, the drive is braked from its current speed down to standstill.

Connection of the brakes (must be provided by the customer)

- Alternating voltage 230 V 1 AC, 50/60 Hz
- Direct voltage 24 V DC up to 1PH816

The brake module is designed for an ambient temperature of -5 °C (41 °F) to +40 °C (104 °F).

The maximum speed of a motor with brake is limited to the maximum speed of the brake (refer to the table).

The holding brakes are not UL-approved. Motors with brake mounting therefore do not have the cUR marking.

Motor type	Brake type	Holding torque	Maximum speed	Moment of inertia	Weight	Coil current		Single switching energy, perm.	Total moment of inertia (emergency stop)	Speed (emergency stop)	Number of emergency stops[1]	Opening time	Closing time
			n_{max}	J_{Br}	m_{Br}	230 V AC ±10 %	24 V DC ±10 %	W_E	J_{tot}	n	z		
		Nm (lb_f-ft)	rpm	kgm^2 (lb_f-in-s^2)	kg (lb)	A	A	kJ	kgm^2 (lb_f-in-s^2)	rpm		ms	ms
1PH808	Size 13	29 (21.4)	5000	0.00093 (0.0082)	10 (22.0)	0.8	4.1	2.2	0.0174 (0.154)	4800	2000	150	40
1PH810	Size 19	60 ... 150 (44.3 ... 111)	5000	0.0048 (0.042)	21 (46.3)	1.0	4.7	7	0.063 (0.558)	4500	2000	500	60
1PH813	Size 24	140 ... 310 (103 ... 229)	4500	0.0141 (0.125)	46 (101)	1.3	6.3	15.5	0.218 (1.930)	3600	2000	650	100
1PH816	Size 29	280 ... 500 (207 ... 369)	4000	0.0266 (0.235)	66 (145)	1.4	6.7	24	0.456 (4.036)	3100	2000	750	150
1PH818	NFF-A 63	1000 (738)	3500	0.022 (0.195)	63 (139)	2.2	–	98	1.3 (11.5)	3000	2000	300	80
1PH822	NFF-A 100	1600 (1180)	3100	0.051 (0.451)	88 (194)	2.7	–	210	3.9 (34.5)	2800	1200	300	100

Explanation of terms

Holding torque	For 1PH810 to 1PH816 motors, the holding torque can be continuously set in the specified value range using a setting ring. The dynamic braking torque is approximately 70 % of the set holding torque.
Single switching energy, perm. W_E	Perm. switching energy for emergency stop $W_E = J_{tot} \times n^2/182.4 \times 10^{-3}$ (J in kgm^2, n in rpm)
Service life switching energy W_{max}	Max. possible switching energy of the brake (for emergency stop) until the brake linings must be replaced, $W_{max} = W_E \times z$.
Number of emergency stops z	The specified number of emergency stops refers to the specified conditions. A conversion can be made for operation under different conditions: Number of emergency stops $z = W_{max}/W_E$
Coil current	Current to release the brake.
Opening time	Separating time until the brake opens (the specified values refer to the maximum braking torque and with rated voltage).
Closing time	Interlocking time until the brake closes (values refer to the maximum braking torque and with rated voltage).

[1] Max. 3 switching operations per hour