Additional Data for Motors 1PH7 and 1PL6

Ventilation Data and Sound Pressure Level

Shaft Height	Fan Motor: Power Consumption at 400 V/50 Hz (±10 %)	400 V/60 Hz (±10 %)	480 V/60 Hz (+5 %, –10 %)	Direction of Air Flow	Sound Pressure Level L_{pA} Motor + Separately Driven Fan Rated Load, 50 Hz Tolerance + 3 dB	Air Flow Rate at 50 Hz Approx.
	A	A	A		1 dB (A)	m^3/s (ft^3/s)
1PH7 Motors						
100	0.19	0.13	0.18	NDE → DE	70	0.04 (1.41)
	0.20	0.13	0.20	DE → NDE	70	0.04 (1.41)
132	0.35	0.24	0.32	NDE → DE	70	0.1 (3.53)
	0.37	0.24	0.33	DE → NDE	70	0.1 (3.53)
160	0.29	0.31	0.33	NDE → DE	72	0.15 (5.3)
	0.30	0.33	0.34	DE → NDE	75	0.15 (5.3)
180	0.8	1.1	1.1	NDE → DE, DE → NDE	73	0.19 (6.71)
225	1.9	2.2	2.2	NDE → DE	74	0.36 (12.71)
	2.8	2.8	2.8	DE → NDE	76	0.36 (12.71)
280	2.55	2.6	2.6	NDE → DE, DE → NDE	74	0.42 (14.83)
1PL6 Motors						
180	0.8	1.1	1.1	NDE → DE, DE → NDE	73 [1])	0.27 (9.54)
225	1.9	2.2	2.2	NDE → DE	74 [1])	0.38 (13.42)
	2.8	2.8	2.8	DE → NDE	76 [1])	0.38 (13.42)
280	2.55	2.6	2.6	NDE → DE, DE → NDE	74 [1])	0.52 (18.36)

1) Speed range 0 to 2,000 rpm.

Bearing Design/Drive Type and Maximum Rotational Speeds

Shaft Height/ Motor Type	Bearing Type/ Drive Type	Bearing Type		Max Continuous Speed in S1 Duty		Max. Limit Speed [1]	
		Motor Side	Bearing ID	n_{S1} rpm	n_{S1} [2] rpm	$n_{max.}$ rpm	$n_{max.}$ [2] rpm
100	Deep-groove ball bearing for coupling or belt drive	DE NDE	6308 C4 6208 C4	5500	10000	9000	12000
132	Deep-groove ball bearing for coupling or belt drive	DE NDE	6310 C4 6210 C4	4500	8500	8000	10000
160	Deep-groove ball bearing for coupling or belt drive	DE NDE	6312 C4 6212 C4	3700	7000	6500	8000
180	Deep-groove ball bearing for coupling drive	DE NDE	6214 C3 6214 C3	3500	4500	5000	7000
	Cylindrical roller bearing for belt drive	DE NDE	NU22 14E 6214 C3	3500	–	5000	–
	Cylindrical-roller bearing for strong cantilever forces	DE NDE	NU22 14E 6214 C3	3000	–	5000	–
225	Deep-groove ball bearing for coupling drive	DE NDE	6216 C3 6216 C3	3100	3600 (for 1PH7224)	4500	5500 (for 1PH7224)
	Cylindrical roller bearing for belt drive	DE NDE	NU22 16E 6216 C3	3100	–	4500	–
Type 224, 226	Cylindrical-roller bearing for strong cantilever forces	DE NDE	NU22 16E 6216 C3	2700	–	4500	–
Type 228	Cylindrical-roller bearing for strong cantilever forces	DE NDE	NU22 16E 6216 C3	2500	–	4000	–
280	Deep-groove ball bearing for coupling drive	DE NDE	6220 C3 6220 C3	2200	–	3300	–
	Cylindrical roller bearing for belt drive	DE NDE	NU22 0E 6220 C3	2200	–	3300	–

Statistical Bearing Lifetime L_{10h} (Nominal Rated Lifetime)

The statistical bearing lifetime is defined according to standardized calculation procedures (DIN ISO 281) and, for 90% of the bearings, is reached or even exceeded when the motors are operated in compliance with the data provided in this catalog.

The bearing lifetime is determined primarily by the bearing size and load, the operating conditions, the speed, and the lubrication interval.

The values specified in the cantilever force diagrams are applicable at a coolant temperature of up to 40 °C (104 °F) maximum, a horizontal mounting position, and an average operating speed ≤ 2,000 rpm. For additional information, refer to the planning guides.

Permanent Lubrication

With permanent lubrication, the bearing grease lifetime is the same as the bearing lifetime. For permanent lubrication, the motor must be operated in accordance with catalog specifications.

The basic version of motors up to and including shaft height 225 have permanent lubrication.

Relubrication

For motors that can be relubricated at defined intervals, the bearing lifetime can be extended and/or unfavorable factors such as temperature, mounting conditions, speed, bearing size, and mechanical load can be compensated.

Relubrication with a lubricating nipple is a standard feature for motors with a shaft height of 280.

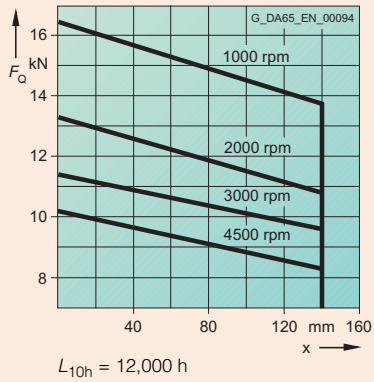
For motors with shaft heights of 180 to 225, relubrication with a lubricating nipple is optional, Order Code K40.

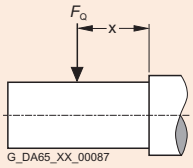
1) During continuous duty (with 30 % n_{max}, 60 % $^2/_3$ n_{max}, 10 % standstill) for a cycle duration of 10 min.

2) See Ordering Options, Part 3 (1PH7 only) for a model with higher maximum speed.

Cantilever Force Diagrams

Permissible Cantilever Forces Motors 1PH722. and 1PL622. Shaft Height 225 for Belt Drive

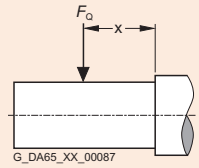


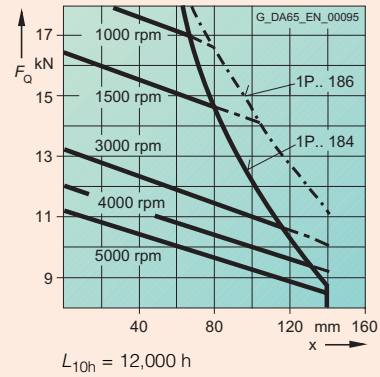


L_{10h} = 12,000 h

Minimum cantilever force 4 kN (900 lb_f)

Permissible Cantilever Forces Motors 1PH718. and 1PL618. Shaft Height 180 for Belt Drive with Increased Cantilever Force

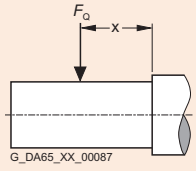


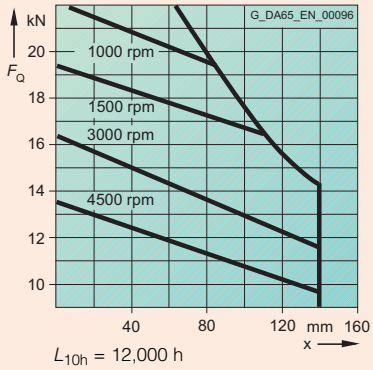


L_{10h} = 12,000 h

Minimum cantilever force 4 kN (900 lb_f)

Permissible Cantilever Forces Motors 1PH722. and 1PL622. Shaft Height 225 for Belt Drive with Increased Cantilever Force

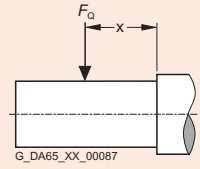


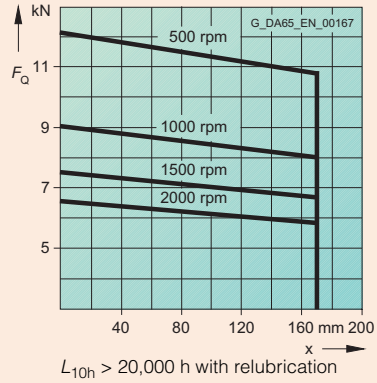


L_{10h} = 12,000 h

Minimum cantilever force 5 kN (1125 lb_f)

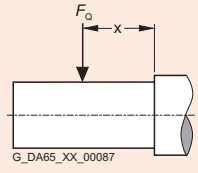
Permissible Cantilever Forces Motors 1PH728. and 1PL628. Shaft Height 280 for Coupling Drive

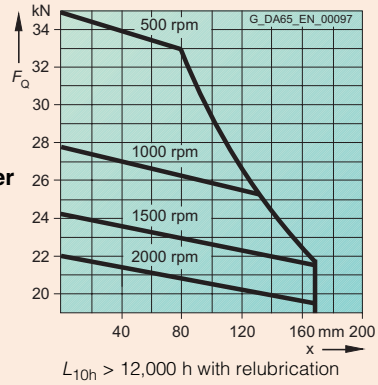




L_{10h} > 20,000 h with relubrication

Permissible Cantilever Forces Motors 1PH728. and 1PL628. Shaft Height 280 for Belt Drive with Increased Cantilever Force





L_{10h} > 12,000 h with relubrication

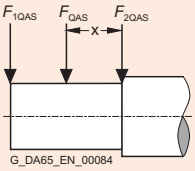
Minimum cantilever force 9 kN (2025 lb_f)

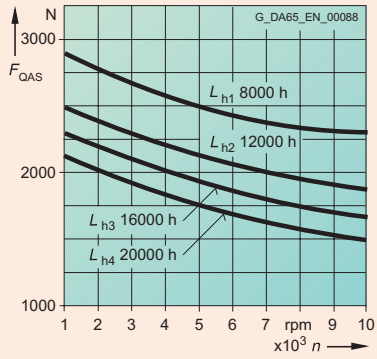
No-load operation of the roller bearings used here can damage the bearings.
Note the specified minimum cantilever forces!

Additional Data for Motors 1PH7 and 1PL6

Cantilever Force Diagrams

Permissible Cantilever Forces 1PH7 Motors Shaft Height 100

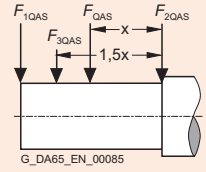


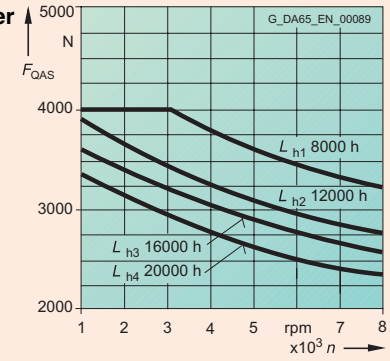


x = 40 mm (1.57 in)
$F_{1QAS} = 0.9\ F_{QAS}$
$F_{2QAS} = 1.1\ F_{QAS}$
L_{h1}, L_{h2}, L_{h3}, L_{h4} = Estimated lifetime for varying operating conditions (F_{QAS}; n)
q = residual effect [%] at constant conditions

$$L_{10htot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

Permissible Cantilever Forces 1PH7 Motors Shaft Height 132

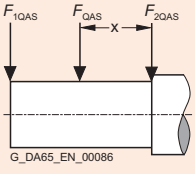


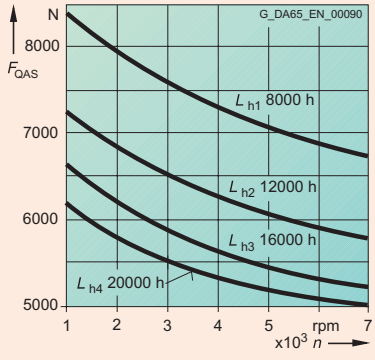


x = 55 mm (2.17 in)
F_{1QAS} = max. 2,000 N (450 lb_f)
$F_{2QAS} = 1.1\ F_{QAS}$
F_{3QAS} = max. 2,500 N (560 lb_f)
L_{h1}, L_{h2}, L_{h3}, L_{h4} = Estimated lifetime for varying operating conditions (F_{QAS}; n)
q = residual effect [%] at constant conditions

$$L_{10htot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

Permissible Cantilever Forces 1PH7 Motors Shaft Height 160

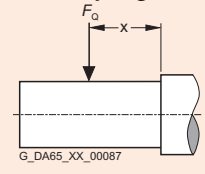


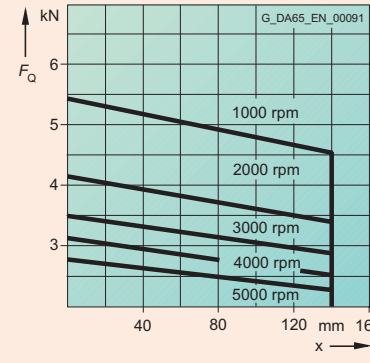


x = 55 mm (2.17 in)
$F_{1QAS} = 0.9\ F_{QAS}$
$F_{2QAS} = 1.1\ F_{QAS}$
L_{h1}, L_{h2}, L_{h3}, L_{h4} = Estimated lifetime for varying operating conditions (F_{QAS}; n)
q = residual effect [%] at constant conditions

$$L_{10htot} = \frac{100}{\frac{q_1}{L_{h1}} + \frac{q_2}{L_{h2}} + \frac{q_3}{L_{h3}} + \frac{q_4}{L_{h4}}}$$

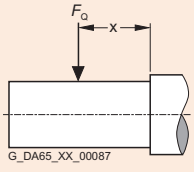
Permissible Cantilever Forces Motors 1PH718. and 1PL618. Shaft Height 180 for Coupling Drive

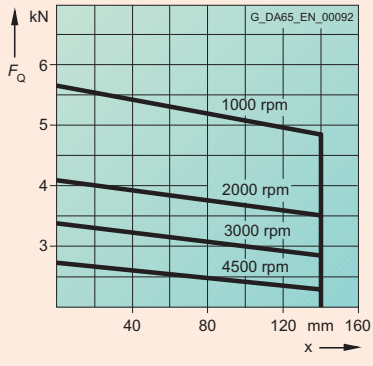




L_{10h} = 20,000 h

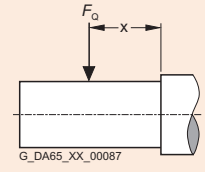
Permissible Cantilever Forces Motors 1PH722. and 1PL622. Shaft Height 225 for Coupling Drive



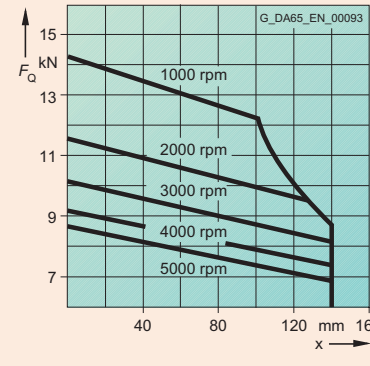


L_{10h} = 20,000 h

Permissible Cantilever Forces Motors 1PH718. and 1PL618. Shaft Height 180 for Belt Drive



Minimum cantilever force 3 kN (675 lb_f)



L_{10h} = 12,000 h

No-load operation of the roller bearings used here can damage the bearings.
Note the specified minimum cantilever forces!

Additional Data for Motors 1PH7 and 1PL6

Terminal Box Assignment, Maximum Connectable Cable Cross-Sections

Shaft Height	Motor Type	Terminal Box Type	Cable Entry	Max. Poss. Cable Outer Diameter	Cable Entry	Max. Poss. Cable Outer Diameter	No. Main Terminals	Max. Conn. Cross-Section per Terminal	Max. Poss. Current per Terminal [1]
			Valid for Position 8 of Order No.: "2", "4" or "6" [3]		Valid for Position 8 of Order No.: "7" or "8"				
				mm (in)		mm (in)[2]		mm^2	A
1PH7 Motors									
100	1PH710.–...	Integrated	PG 29	28 (1.1)	M 32 x 1.5	21 (0.83)	6 x M 5	25	84
132	1PH713.–...	Integrated	PG 36	34 (1.34)	M 40 x 1.5	28 (1.1)	6 x M 6	35	104
160	1PH716.–...	Integrated	PG 42	40 (1.57)	M 50 x 1.5	38 (1.5)	6 x M 6	50	123
180	1PH7184–...	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PH7186–..B	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PH7186–..D	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PH7186–..F	1XB7422	2 x M 72 x 2	56 (2.2)	2 x M 63 x 1.5	53 (2.09)	3 x M 12	2 x 70	242
	1PH7186–..L	1XB7422	2 x M 72 x 2	56 (2.2)	2 x M 63 x 1.5	53 (2.09)	3 x M 12	2 x 70	242
225	1PH7224–..B	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PH7224–..D	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PH7224–..U	1XB7422	2 x M 72 x 2	56 (2.2)	2 x M 63 x 1.5	53 (2.09)	3 x M 12	2 x 70	242
	1PH7224–..L	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
	1PH7226–..B	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PH7226–..D	1XB7422	2 x M 72 x 2	56 (2.2)	2 x M 63 x 1.5	53 (2.09)	3 x M 12	2 x 70	242
	1PH7226–..F	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
	1PH7226–..L	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
	1PH7228–..B	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PH7228–..D	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
	1PH7228–..F	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
	1PH7228–..L	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
280	1PH728.–..B 1PH7284–..D	1XB7712	3 x M 63 x 1.5	53 (2.09)	–	–	(3+1) [4] x 3 x M 16	3 x 95	450
	1PH7286–..D 1PH7288–..D 1PH728.–..F	1XB7712	3 x M 75 x 1.5	68 (2.68)	–	–	(3+1) [4] x 3 x M 16	3 x 185	710

1) Current-carrying capacity based on IEC 60204-1, Routing Type C.
2) Depends on type of metric cable gland.
3) Not for shaft height 280.
4) Including ground terminal.

Terminal Box Assignment, Maximum Connectable Cable Cross-Sections

Shaft Height	Motor Type	Terminal Box Type	Cable Entry	Max. Poss. Cable Outer Diameter	Cable Entry	Max. Poss. Cable Outer Diameter	No. Main Terminals	Max. Conn. Cross-Section per Terminal	Max. Poss. Current per Terminal [1]
			Valid for Position 8 of Order No.: "2", "4" or "6" [3]		Valid for Position 8 of Order No.: "7" or "8"				
				mm (in)		mm (in)[2]		mm^2	A
1PL6 Motors									
180	1PL6184–..B	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PL6184–..D	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PL6184–..F	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PL6184–..L	1XB7422	2 x M 72 x 2	56 (2.2)	2 x M 63 x 1.5	53 (2.09)	3 x M 12	2 x 70	242
	1PL6186–..B	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PL6186–..D	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PL6186–..F	1XB7422	2 x M 72 x 2	56 (2.2)	2 x M 63 x 1.5	53 (2.09)	3 x M 12	2 x 70	242
	1PL6186–..L	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
225	1PL6224–..B	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PL6224–..D	1XB7422	2 x M 72 x 2	56 (2.2)	2 x M 63 x 1.5	53 (2.09)	3 x M 12	2 x 70	242
	1PL6224–..F	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
	1PL6224–..L	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
	1PL6226–..B	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PL6226–..D	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
	1PL6226–..F	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
	1PL6226–..L	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
	1PL6228–..B	1XB7322	2 x PG 42	40 (1.57)	2 x M 50 x 1.5	38 (1.5)	3 x M 12	2 x 50	191
	1PL6228–..D	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
	1PL6228–..F	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
	1PL6228–..L	1XB7700	3 x M 72 x 2	56 (2.2)	3 x M 75 x 1.5	68 (2.68)	3 x 2 x M 12	3 x 150	583
280	1PL628.	1XB7712	4 x M 75 x 1.5	68 (2.68)	–	–	(3+1) [4] x 4 x M 16	4 x 185	925

Notes on Cable Glands

Cable glands and EMC cable glands for shielded cables with PG or metric threads and conversion pieces from PG to metric threads can be obtained from the following companies:

HUGRO-Armaturen GmbH
Rudolf-Blessing-Str. 5
D-79183 Waldkirch, Germany
Tel. +49 (0) 76 81/40 73-0
Fax +49 (0) 76 81/40 73-40
E-mail: info@hugro-gmbh.de
www.hugro-gmbh.de

- EMC cable glands
- Cable glands with heavy-gauge conduit thread
- Metric cable glands
- Conversion pieces PG ↔ metric

Pflitsch GmbH & Co. KG
P.O. Box 10 03 51
D-42492 Hückeswagen, Germany
Tel. +49 (0) 21 92-91 10
Fax +49 (0) 21 92-91 12 11

- Cable glands up to PG 42
- Screw plugs/ Filler plugs

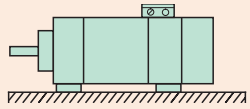
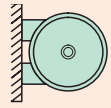
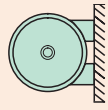
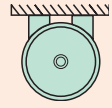
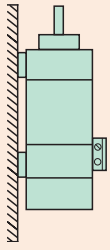
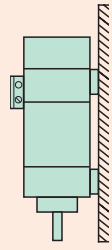
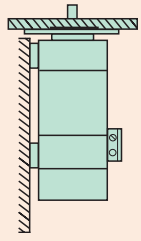
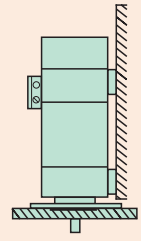
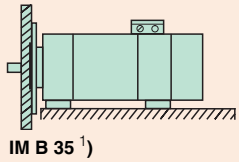
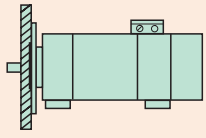
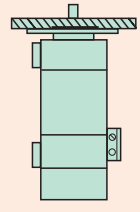
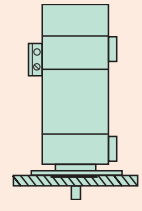
1) Current-carrying capacity based on IEC 60204-1, Routing Type C.
2) Depends on type of metric cable gland.
3) Not for shaft height 280.
4) Including ground terminal.

Additional Data for Motors 1PH7 and 1PL6

Overview of Available Construction Types

Motors 1PH7 and 1PL6 are available in construction types IM B3 (standard model), IM B5, and IM B35. Other construction types (IM V15, IM V36, IM B6, IM B7, IM B8 etc.) are also available. When ordering the motors with shaft heights 180 and 225 from the factory, the correct number of lifting lugs for the intended mounting position should be specified (position 12 in the motor order number). For motors with shaft heights 100 to 160, the internal lifting lugs can be converted for other mounting schemes.

Note: There are no condensate drain holes in the motors.

Type of construction		Type of construction		1 2 3 4 5 6 7 8 9 10 11 12 1PH7 . . . – . . . . 1PL6 . . . –	
	IM B 3		IM B 6	1 0	Foot Mounting Type (≙ IM B 3)
	IM B 7		IM B 8	1	
	IM V 6		IM V 5	1	
	IM V 36 [1])		IM V 15 [1])	5	Foot-Flange Mounting Type (≙ IM B 35)
	IM B 35 [1])			3	
	IM B 5		IM V 3	2	Flange Mounting Type (≙ IM B 5)
			IM V 1		

1) Foot and flange mounting required.