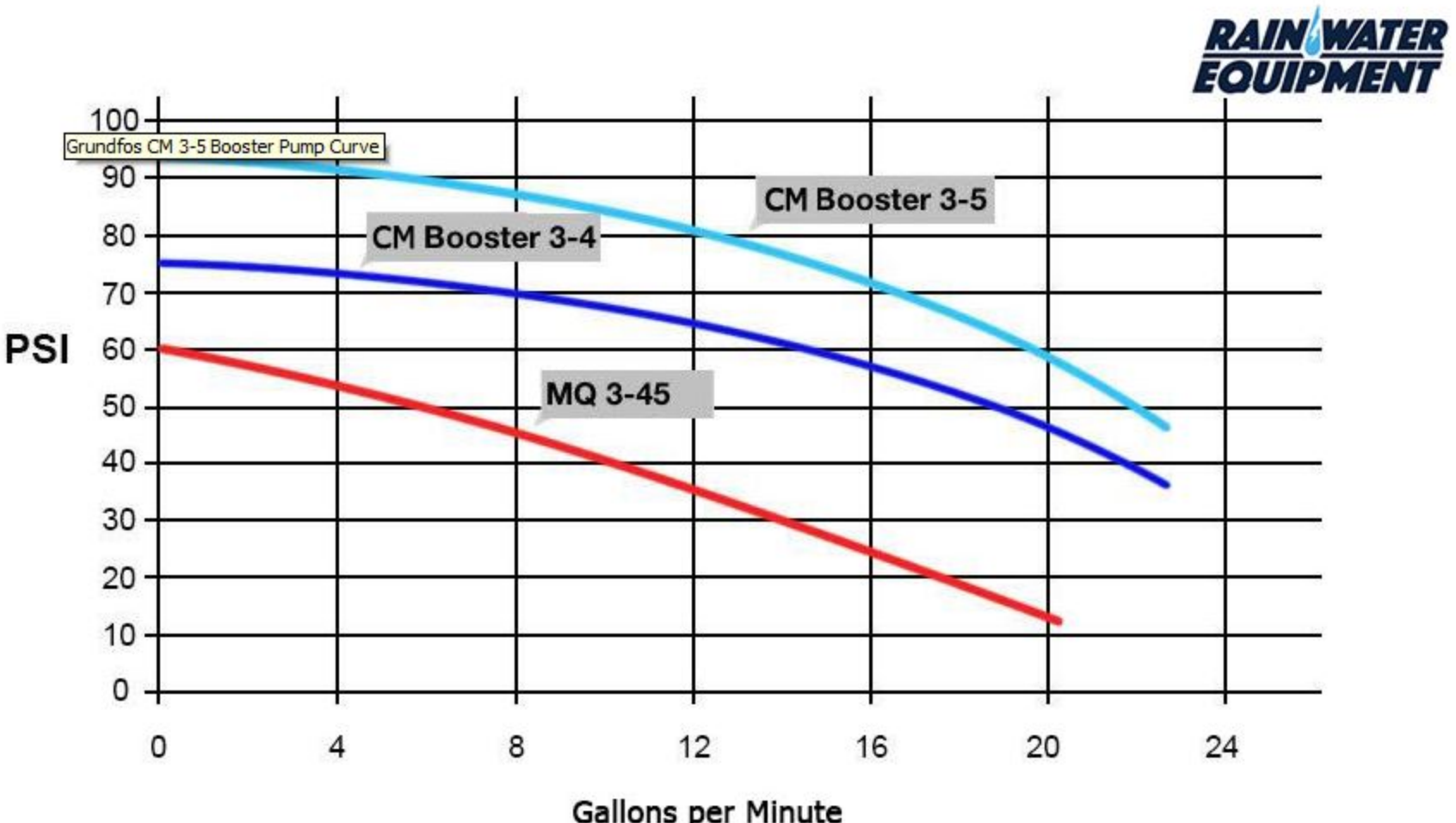
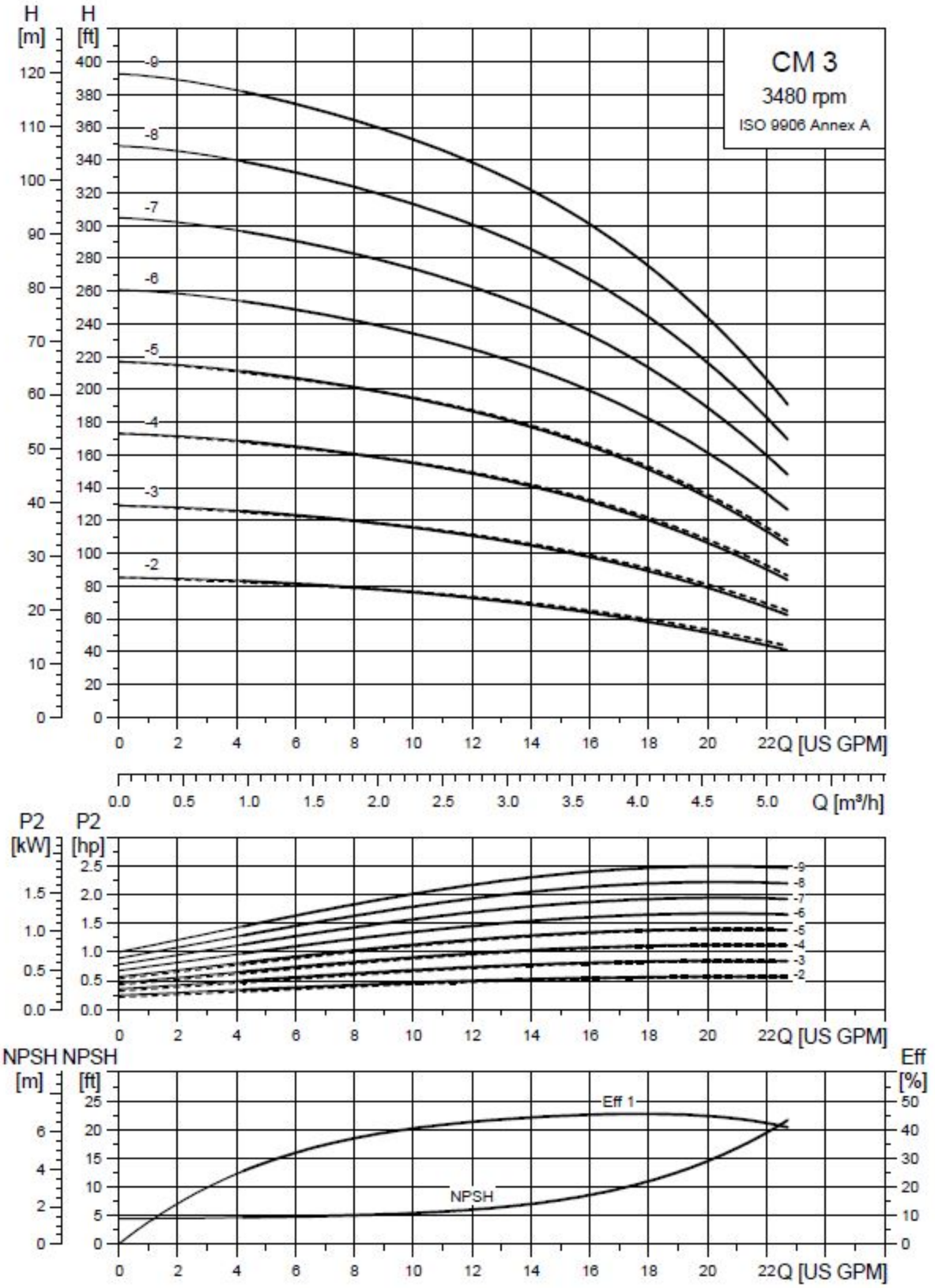

RAIN WATER EQUIPMENT
Grundfos CM 3-5 Booster Pump Curve
CM Booster 3-5
CM Booster 3-4
MQ 3-45
PSI
100
90
80
70
60
50
40
30
20
10
0
0
4
8
12
16
20
24
Gallons per Minute

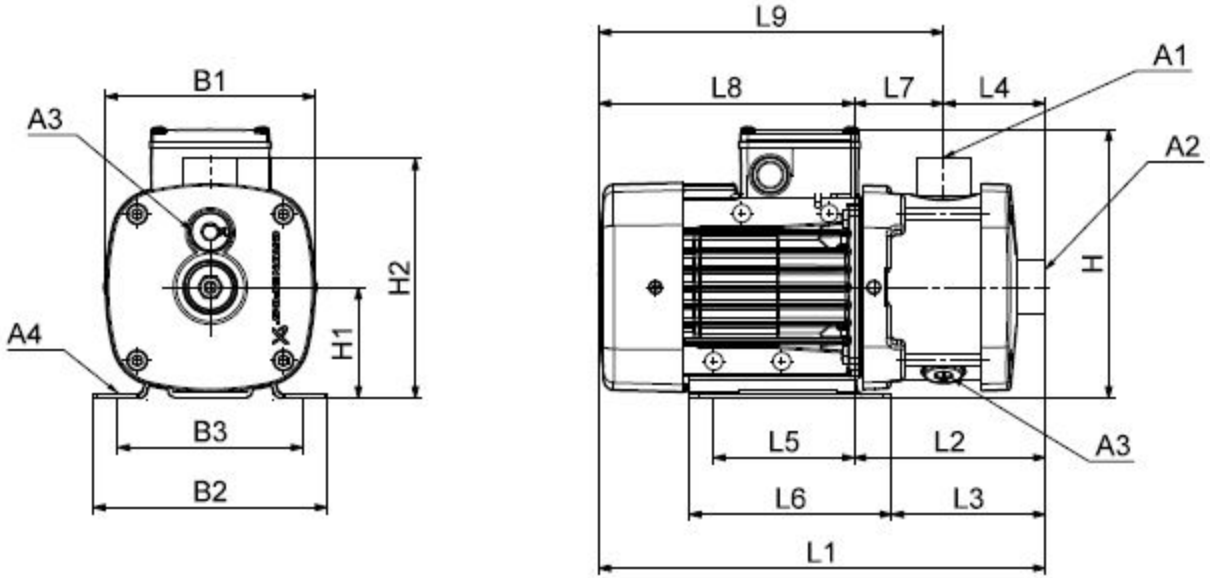
CM 3



TM04 5897 3610

CM 3-I and CM 3-G

(I = AISI 304 / EN 1.4301) and G = AISI 316 / EN 1.4401)



TM04 2246 2208

16. Motor data

Mains-operated motors, 60 Hz

1 x 115/230V, 60 Hz (supply voltage B)

Frame size	P_2 [Hp]	Service factor	$I_{1/1}$ [A]	Cos $\varphi_{1/1}$	I_{start}	Speed [rpm]
71	0.8	1.0	7.6 / 3.9	0.76	21.1 / 11.1	3240
80	1.06	1.0	10.6 / 5.4	0.65	33.0 / 16.8	3240
80	1.5	1.0	14.0 / 7.0	0.94	45.4 / 23.0	3320
90	2.03	1.0	19.5 / 9.8	0.97	75.2 / 39.2	3360

1 x 115/230 V, 60 Hz (supply voltage B)

Pump type	Frame size	P_2 [Hp]	NPT		Rp	Dimensions [in (mm)]														
			A1	A2	A3	A4	B1	B2	B3	H	H1	H2	L1	L2	L3	L4	L5	L6	L7	L8	L9
CM 3-2	71	0.6	1"	1"	3/8"	0.39 (10)	5.59 (142)	6.22 (158)	4.92 (125)	8.19 (208)	2.95 (75)	6.50 (165)	12.00 (305)	5.16 (131)	4.21 (107)	2.83 (72)	3.78 (96)	5.39 (137)	2.36 (60)	6.85 (174)	9.21 (234)
CM 3-3	71	0.6	1"	1"	3/8"	0.39 (10)	5.59 (142)	6.22 (158)	4.92 (125)	8.19 (208)	2.95 (75)	6.50 (165)	12.00 (305)	5.16 (131)	4.21 (107)	2.83 (72)	3.78 (96)	5.39 (137)	2.36 (60)	6.85 (174)	9.21 (234)
CM 3-4	80	1.06	1"	1"	3/8"	0.39 (10)	5.59 (142)	6.22 (158)	4.92 (125)	8.19 (208)	2.95 (75)	6.50 (165)	14.29 (363)	5.87 (149)	4.92 (125)	3.54 (90)	3.78 (96)	5.39 (137)	2.36 (60)	8.43 (214)	10.79 (274)
CM 3-5	80	1.5	1"	1"	3/8"	0.39 (10)	8.07 (205)	6.22 (158)	4.92 (125)	8.19 (208)	2.95 (75)	6.50 (165)	15.0 (381)	6.57 (167)	5.63 (143)	4.25 (108)	3.78 (96)	5.39 (137)	2.36 (60)	8.43 (214)	10.79 (274)
CM 3-6*	90	2.03	1"	1"	3/8"	0.39 (10)	7.01 (178)	7.01 (178)	5.51 (140)	9.02 (229)	3.54 (90)	7.09 (180)	18.39 (467)	9.57 (243)	8.98 (228)	5.67 (144)	4.92 (125)	6.10 (155)	3.90 (99)	8.82 (224)	12.72 (323)
CM 3-7*	90	2.03	1"	1"	3/8"	0.39 (10)	7.01 (178)	7.01 (178)	5.51 (140)	9.02 (229)	3.54 (90)	7.09 (180)	18.39 (467)	9.57 (243)	8.98 (228)	5.67 (144)	4.92 (125)	6.10 (155)	3.90 (99)	8.82 (224)	12.72 (323)
CM 3-8*	90	2.03	1"	1"	3/8"	0.39 (10)	7.01 (178)	7.01 (178)	5.51 (140)	9.02 (229)	3.54 (90)	7.09 (180)	19.80 (503)	10.98 (279)	10.39 (264)	7.09 (180)	4.92 (125)	6.10 (155)	3.90 (99)	8.82 (224)	12.72 (323)

* Only CM-I and CM-G versions are available with this number of stages.

CM 3-I and CM 3-G

(I = AISI 304 / EN 1.4301 and G = AISI 316 / EN 1.4401)

Supply voltage	Pump type	Net weight		Gross weight		Shipping volume	
		[lb]	[kg]	[lb]	[kg]	[ft^3]	[m^3]
1 x 115/230 V, 60 Hz (supply voltage B)	CM 3-2	27.1	12.3	32.6	14.8	1.05	0.0296
	CM 3-3	27.3	12.4	32.9	14.9	1.05	0.0296
	CM 3-4	31.1	14.1	36.6	16.6	1.31	0.0370
	CM 3-5	34.4	15.6	39.9	18.1	1.31	0.0370
	CM 3-6	52.5	23.8	58.0	26.3	1.58	0.0444
	CM 3-7	52.9	24.0	58.4	26.5	1.58	0.0444
	CM 3-8	54.2	24.6	59.8	27.1	1.58	0.0444
3 x 208-230 V / 440-480 V, 60 Hz (supply voltage E) 3 x 575 V, 60 Hz (supply voltage H)	CM 3-2	25.6	11.6	32.0	14.1	1.05	0.0296
	CM 3-3	27.3	12.4	32.9	14.9	1.05	0.0296
	CM 3-4	28.0	12.7	33.5	15.2	1.31	0.0370
	CM 3-5	32.0	14.5	37.5	17.0	1.31	0.0370
	CM 3-6	35.7	16.2	41.2	18.7	1.31	0.0370
	CM 3-7	52.9	24.0	58.4	26.5	1.58	0.0444
	CM 3-8	54.2	24.6	59.8	27.1	1.58	0.0444
	CM 3-9	54.6	24.7	60.0	27.2	1.58	0.0444

Functions

PM 1

The functions of the PM 1 are described below:

Anti-cycling

If there is a minor leakage in the system, or a tap has not been entirely closed, the PM 1 will start and stop the pump periodically. In order to avoid cycling, the anti-cycling function of the PM 1 will stop the pump and indicate an alarm.

Dry-running protection

The PM 1 incorporates dry-running protection that automatically stops the pump in case of dry running. The dry-running protection functions differently during priming and operation.

Note: If a dry-running alarm has been activated, the cause should be found before the pump is restarted in order to prevent damage to the pump.

Dry running during priming

If the PM 1 detects no pressure and no flow within 5 minutes after it has been connected to a power supply and the pump has started, the dry-running alarm is activated. This allows the pump to self-prime.

Dry running during operation

If the PM 1 detects no pressure and no flow within 40 seconds during normal operation, the dry-running alarm is activated.

PM 2

The PM 2 has the same functions as the PM 1, but the PM 2 has some additional functions which can be enabled and disabled with DIP switches located behind the control panel.

Auto-reset

When the auto-reset function is enabled, cycling and dry-running alarms will be automatically reset.

Note: The auto-reset function should NOT be enabled on pumps which cannot self-prime when water returns after dry-running.

Anti-cycling

To avoid inadvertent starts and stops of the pump in case of a failure in the installation, the anti-cycling function can be enabled.

The function will detect cycling if it occurs and stop the pump with an alarm.

When the PM 2 has been set to start/stop according to water consumption (default), cycling may occur in the following situations:

- In case of a minor leakage.
- If a tap has not been entirely closed.

When the PM 2 has been set to start/stop with 1 bar differential pressure, cycling may occur in the following situations:

- If the pressure tank has lost its precharge pressure.
- If the size of the pressure tank is insufficient.

If the cycling alarm has been activated, the pump can be restarted manually by pressing [Reset].

When the auto-reset function is enabled, the pump will be restarted automatically after 12 hours in alarm condition.

Note: In case of a very small consumption, the anti-cycling function may register this as a minor leakage and stop the pump inadvertently. If this occurs, the function can be disabled.

Maximum continuous operating time (30 minutes)

When this function is enabled, the pump will be stopped when the pump has been running continuously for 30 minutes.

The purpose of this function is to avoid unnecessary water and current consumption, e.g. in case of pipe fracture or considerable leakages.

Note: When the function is enabled, any consumption exceeding 30 minutes will cause an alarm, and the pump will be stopped. If enabled, the auto-reset function will not restart the pump.

PM 2

1 x 220-240 V, 50/60 Hz

Start pressure* [bar]	Plug type	Socket type	Max. liquid temperature [°C]	Max. ambient temperature [°C]	Cable length [m]		Product number
					Mains	Motor	
1.5 - 5	–	–	40	50	–	–	96848738
1.5 - 5	Schuko	Schuko	40	50	1.5	0.48	96848740
1.5 - 5	Australia	–	40	50	1.5	0.48	96848744
1.5 - 5	CH	CH	40	50	1.5	0.48	96848748
1.5 - 5	–	–	60	55	–	–	96848746**

* The start pressure can be set from 1.5 to 5.0 bar in steps of 0.5 bar.

** Variant intended for installation in warm climates. This variant has no VDE approval.

1 x 110-120 V, 50/60 Hz

Start pressure* [bar]	Plug type	Socket type	Max. liquid temperature [°C]	Max. ambient temperature [°C]	Cable length [m]		Product number
					Mains	Motor	
1.5 - 5	–	–	40	50	–	–	96848750

* The start pressure can be set from 1.5 to 5.0 bar in steps of 0.5 bar.

Technical data

PM 1

Data		230 V model	115 V model
Supply voltage		1 x 220-240 VAC	1 x 110-120 VAC
Maximum inductive contact load		6 A	8 A
Frequency		50/60 Hz	
Maximum ambient temperature		See page 5	
Maximum liquid temperature		See page 5	
p_{start} [1]	PM 1 - 15	1.5 bar	
	PM 1 - 22	2.2 bar	
$Q_{min.}$		1.0 litre/min.	
Time delay during stopping		10 seconds	
Maximum operating pressure		PN 10 / 10 bar / 1 MPa	
Enclosure class		IP65	
Maximum output power [2]		1200 W	800 W
Standby power consumption		< 1 W	
Ambient storage temperature		–30 °C to +70 °C	
Maximum humidity		95 % RH	
Maximum sound pressure level at 0-4 m^3/h		26 dB(A)	
Net weight [3]		0.890 kg	

1) The start pressure of PM 1 (p_{start}) depends on the variant. See nameplate.
2) The power of PM 1 is calculated with cos φ = 0.9.
3) Net weight of PM 1 is the weight of the unit without cable or plug.

Note: The technical data may be limited by the pump data. See installation and operating instructions for the pump.

PM 2

Data	230 V model	115 V model
Supply voltage	1 x 220-240 VAC	1 x 110-120 VAC
Maximum inductive contact load	10 A	
Frequency	50/60 Hz	
Maximum ambient temperature	See page 5	
Maximum liquid temperature	See page 5	
p_{start} [1]	1.5 to 5 bar	
p_{stop} [2]	P_{start} + 1 bar	
$Q_{min.}$	1.0 litre/min.	
Time delay during stopping	10 seconds	
Maximum operating pressure	PN 10 / 10 bar / 1 MPa	
Enclosure class	IP65	
Volume of internal pressure tank	0.1 litre	
Maximum output power [3]	2000 W	1000 W
Standby power consumption	< 1 W	
Ambient storage temperature	–30 °C to +70 °C	
Maximum humidity	95 % RH	
Maximum sound pressure level at 0-4 m^3/h	26 dB(A)	
Net weight [4]	1.042 kg	

1) The start pressure of PM 2 (p_{start}) can be set in steps of 0.5 bar.
2) The stop pressure of PM 2 (p_{stop}) is only used in systems with a pressure tank.
3) The power of PM 2 is calculated with cos φ = 0.9.
4) Net weight of PM 2 is the weight of the unit without cable or plug.

Note: The technical data may be limited by the pump data. See installation and operating instructions for the pump.

Dimensions

PM 1

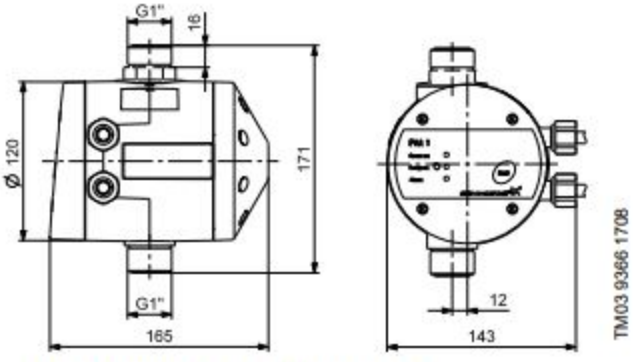


Fig. 10 Dimensional sketch of PM 1

PM 2

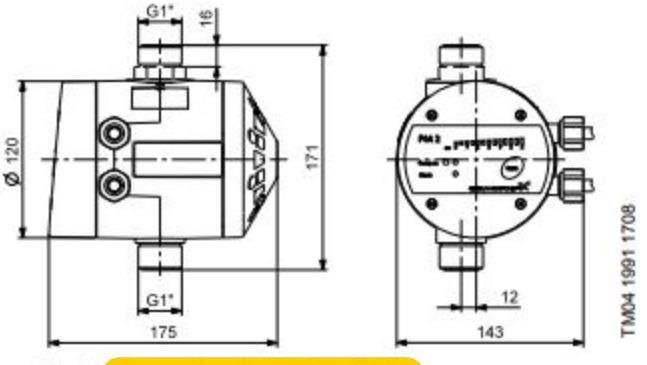


Fig. 11 Dimensional sketch of PM 2

Pressure loss curves

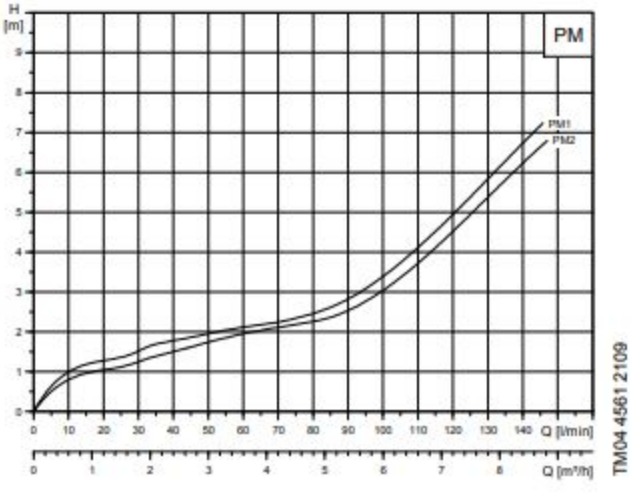


Fig. 12 Pressure loss curves for PM 1 and PM 2

Selection of Pressure Manager

The following helps determine which Pressure Manager type to select for a given application.

Functions

The PM 1 and PM 2 share some of the same functions, but the PM 2 offers some additional functions. Among other things, the start pressure for the PM 2 is adjustable.
For further information about *Functions*, see page 9.

Features

A comparison of the features of the PM 1 and PM 2 can be found in section *Features* on page 3 where the main features are also described.

Technical data

The *Technical data* for the PM 1 and PM 2 can be found on page 13. The maximum contact loads must be observed when selecting a PM 1 or PM 2. Furthermore, the height (H) between the PM unit and the highest tapping point must not exceed the values in the table below. See also fig. 8 on page 8.

PM type and variant	PM 1		PM 2
	1.5 bar	2.2 bar	1.5 - 5 bar
Max. height (H) between PM unit and highest tapping point	10 metres	17 metres	45 metres

Selection of pressure tank

Be aware that in systems where small leakages may occur, a small pressure tank might be required in order to minimise the number of starts and stops of the pump.

Recommended pressure tank:

Type	Size	Max. pressure	Pre-charge pressure	Connection	Product number
	[l]	[bar]	[bar]		
GT-H-8 V	8	10	1.5	1"	96526321

PM 1

In systems with a very small consumption, the above-mentioned pressure tank can be fitted to reduce the number of starts/stops of the pump.

PM 2

The PM 2 has an internal pressure tank with a capacity of 0.1 litre which reduces the number of starts/stops of the pump when there is a very small consumption in the system. To further reduce the number of start/stops of the pump, an external pressure tank can be installed.

Tank sizing for PM 2

The PM 2 can be set up for operation with 1 bar differential pressure, which reduces the pump operating time. When this operating mode is used, a pressure tank must be installed.

To find the correct size of the pressure tank, follow the guidelines below:

The size of the tank can be determined on the basis of the selection curves in fig. 9.

The selection curves are based on these values:

- Differential pressure Δp = 1 bar
- Number of starts/stops per hour = 20
- Precharge pressure = start pressure x 0.9 bar.

Sizing example

See fig. 9.

- Estimated consumption = 4 l/min. (point A on the x-axis)
- Start pressure = 3 bar (point B on the y-axis)
- An 18-litre pressure tank is suitable (point C).

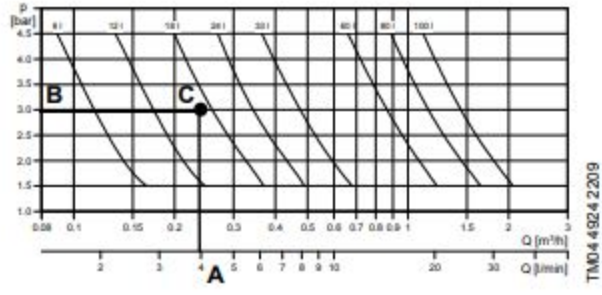


Fig. 9 Pressure tank selection curves

For further information about available tanks, see the GT data booklet available in WebCAPS. See section *Further product documentation* on page 10.

MODEL	PM 1	PM 2
Power on indication	•	•
Pump running indication	•	•
Alarm indication	•	•
Dry-running protection	•	•
Free position in installation	•	•
Suitable for generator supply	•	•
Rotary outlet connection	•	•
Integrated non-return valve	•	•
Cycling alarm	•	•
Integrated pressure sensor from Grundfos Direct Sensors™		•
Adjustable start pressure		•
Start/stop with 1 bar differential pressure		•
Auto restart after dry running		•
Maximum run time 30 min. (safety)		•
Pressure indication		•
Internal pressure tank		•