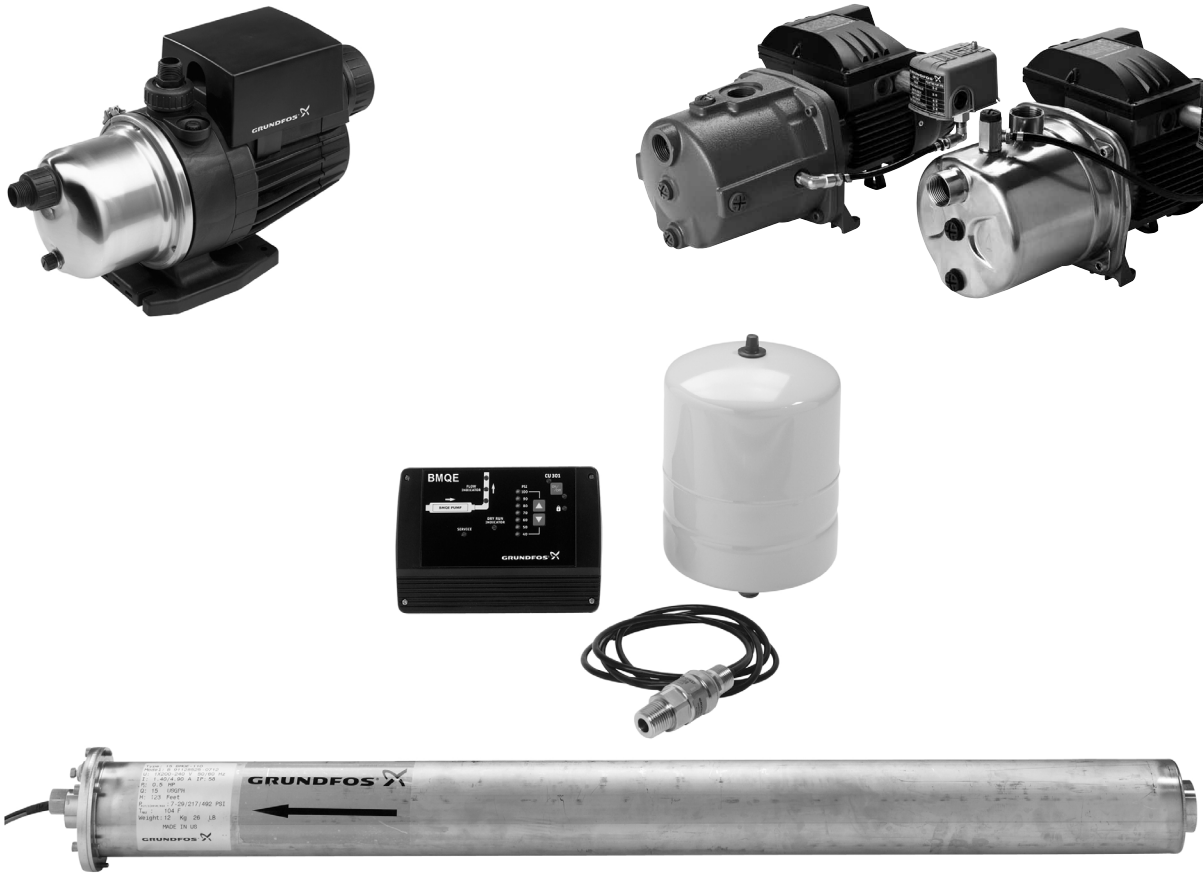
GRUNDFOS **PRODUCT GUIDE**

Domestic water supply

BMQE, MQ, Jets

60 Hz



BE > THINK > INNOVATE >

GRUNDFOS

Table of contents

1. Grundfos DWS family

The Grundfos Domestic Water Supply (DWS) family of pumps includes:

- BMQE Constant Pressure System
- MQ Flow Based Pressure System
- Jet pumps.

This product guide offers information about each of these product lines.

DWS applications

The Grundfos DWS family includes pumps to fit most applications including:

- Constant pressure systems (BMQE)
- flow-based pressure boosting (MQ)
- rain water harvesting (MQ)
- pressure-switch-based boosting (Jet)
- suction lift (Jet).

Application	Product		
	BMQE	MQ	Jet
Constant pressure system	●	-	-
Flow-based pressure boosting	-	●	-
Rain water harvesting	-	●	-
Suction lift	-	●	●
Pressure-switch-based boosting	-	-	●

Constant pressure systems

In constant water pressure systems, only the required discharge pressure needs setting (fig. 1).

Cut-in and cut-out pressures do not play a role in this system.

Discharge pressure can be set from 40 to 100 psi, according to individual needs and piping system limitations.

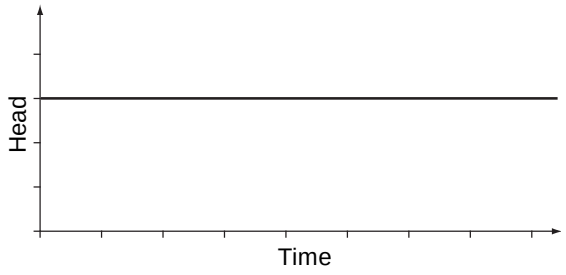


Fig. 1 In a constant pressure system, pressure does not vary in relationship to consumption

Flow-based pressure boosting

With flow-based pressure boosting, the pump starts automatically when water is consumed and stops automatically when the consumption ceases. This is accomplished via a flow switch connected to a printed circuit board (PCB).

The pump will produce pressure in relation to the flow rate with any incoming pressure cumulative to the total discharge pressure (fig. 2).

Fig. 2 Flow-based pressure boosting

Rain water harvesting

Rain water harvesting is a way to store rain water for future use — for example, watering a garden. Rain water is collected from the roof of a home and collected into a storage container. Pull a suction lift using a non-collapsible suction line from the storage container or connect the inlet of the pump to a spigot at the bottom of the collection barrel for flooded suction.

Suction lift

High pressure water from the drive pipe passes through the venturi and pulls water from the well into the ejector, then pushes it up to the pump. This makes it possible to push water up to the pump from depths greater than 25 feet or to boost the output from a shallow well pump to higher pressures.

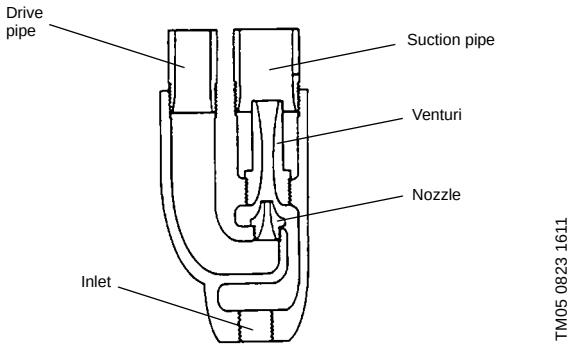


Fig. 3 Suction lift pressure boosting

Pressure-switch-based boosting

Pressure switches are used to control pump operation. These switches have a cut-in pressure and a cut-out pressure to turn the pump on and off respectively.

DWS product selection

Matching consumption and pump capacity

Selecting the right pump is a matter of matching water consumption with pump capacity. For best performance, avoid installing an undersized or oversized pump. Consumption may vary greatly depending on housing standards and lifestyle. For example, lawn sprinkler systems in the summer can increase consumption.

Pump selection

Pump selection is based on the water demand and required system head.

The water demand depends on the number of consumers connected to the system.

Head can either be expressed in feet or psi. Head refers to static head, pressure head, and friction head.

For assistance with pump selection, refer to the WebCAPS product selection program; a link to CAPS may be found on the Grundfos website.

Piping

In any water supply system, the sizing and choice of materials of the pipework has an impact on the choice of pumps and on the cost. Piping takes into account the system head as referred to in Pump Selection. Static head is the distance from the ground water level to the uppermost tap. Pressure head is the system pressure the user wants to achieve.

In most residential application this pressure is approximately 60 psi. Friction head depends on the pipe size, type and length.

When calculating friction loss remember to allow for deterioration in the piping schematic, since all water pipes will eventually become coated with rust, lime deposits, etc.

Flow velocity in the piping must be kept low as noise can occur due to turbulence in elbows and valves or from water hammer.

Fitting a pressure relief valve in the discharge piping is recommended to protect the piping from over-pressure due to system malfunction.

Pressure tanks

A pressure tank should be installed in order to minimize the number of pump starts and stops in the water supply system, and to reduce problems with water hammer in the pipework.

Tanks are included with the BMQE Constant Pressure System and the MQ. The BMQE system has an external tank. The MQ has an internal tank.

Jet pumps, however, may require the addition of a tank depending upon the application.

Pressure switches

Pressure switches are used to control pump operation. These switches have a cut-in pressure and a cut-out pressure to turn the pump on and off.

The BMQE Constant Pressure System includes a pressure transducer for constant pressure. The MQ has a built-in pressure switch. Jet pumps have an attached pressure switch.

Valves

Check valves

A check valve is a mechanical device which normally allows fluid to flow through in only one direction.

The BMQE Constant Pressure System and the MQ have built-in check valves. For suction lift applications with the MQ, a check valve (provided) is required at the inlet.

Foot Valves

A foot valve is required when pulling a suction lift (shallow or deep well) with a Jet pump. This valve is installed at the end of the suction pipe to prevent back flow. The MQ will also benefit from the use of a foot valve with suction lift applications.

Shut off valves

Shut off valves in the piping system make it possible to drain only the part of the system that needs attention or repair.

Flow control valves

Flow control valves are used in applications where a set flow (gpm) is required; for example, a shower head or an irrigation system.

Pressure reducing valves

Pressure reducing valves are used in applications where the incoming water pressure exceeds the maximum inlet pressure of the pump as is the case with the MQ and city water pressure. The pressure reducing valve (PRV) is used inline after the city water tap and before the pump to ensure a set pressure.

Pressure relief valves

This valve is a spring controlled device that can be adjusted to meet the needs of the pumping system. Pressure relief valves are used in applications where high pressure can result in damage to accessories; for example, tanks with maximum pressure ratings.

3. MQ

Product introduction

The Grundfos MQ is a compact pump and pressure boosting unit, purpose-designed for domestic water supply and other applications where a compact and reliable, easy-to-install pump is advantageous. The MQ is a self-priming multistage centrifugal pump; it self-primes from a well depth of down to 26 ft (8 m) within 5 minutes.

The MQ is a complete, all-in-one unit, incorporating pump, motor, diaphragm tank, pressure and flow sensor, controller and check valve.

TM01 9873

Fig. 15 Grundfos MQ

Applications

MQ is suitable for pressure boosting of potable water and rain water for:

- water pressure boosting
  (max. inlet pressure 40 psi (2.8 bar)
- water supply from wells
  (max. suction lift: 26 ft (8 m).

Examples of ideal applications for MQ are:

- private homes
- farms
- market gardens and other large gardens.

Pumped liquids

The MQ is suitable for pumping potable water, rain water, or other clean, thin, non-aggressive liquids not containing solid particles or fibers.

Features and benefits

Complete system

The MQ is a compact, "plug and pump" or all-in-one solution; there is no need for a separate pressure tank, pressure switch, electrical connections, fittings, or any other separate items. No maintenance of the pump is required. Two versions are available to choose from.

Installation

Installation of the MQ is simple and can be done in a matter of minutes, which means greatly reduced installation costs.

Outlet connnection can be angled up to 5° to fit existing pipework.

Simple operation

The MQ features a user-friendly control panel with ON/OFF button and indicator lights for indication of the operational state of the pump.

Compact design

Compact, horizontal design fits even where space is limited (outdoor applications require the use of the Protection Cover, sold separately); no space around the pump is required.

Self-priming

As it is self-priming, the MQ is able to pump water from a level below the pump. Provided it is filled with water, the pump is able to lift water from a depth of 26 ft (8 m) in less than 5 minutes. This facilitates installation and start-up of the pump and provides more reliable water supply in installations where there is a risk of dry running and leakages in suction hose or pipes.

Built-in protective functions

Built-in protective functions; if exposed to dry running, excessive temperature, or any overload condition the pump will stop automatically, thus preventing a motor burnout.

Automatic reset

In case of dry running or a similar alarm, the pump will stop. Restarting will be attempted every 30 minutes for a period of 24 hours. The reset function can be deactivated.

Low noise level

Superior hydraulics and internal cooling combined result in very quiet operation, which makes it suitable for many applications.

Pressure tank

The built-in pressure tank reduces the number of starts and stops in case of leakages in the pipe system, causing less wear on the pump.

How the MQ functions

The MQ pump has a small built-in pressure tank, sufficient to ensure that water is readily available from the tap. When water is required, the pump automatically starts. A non-return valve prevents backflow.

The controller ensures that the pump starts automatically when water is consumed and stops automatically when the consumption ceases. In addition, the controller protects the pump in case of faults.

Identification

Type key, MQ

Example	MQ	3	- 35	A	- B	- A	- BVBP

Pump range

Rated flow [m^3/h]

Max. head [m]

Code for pump version
A: standard

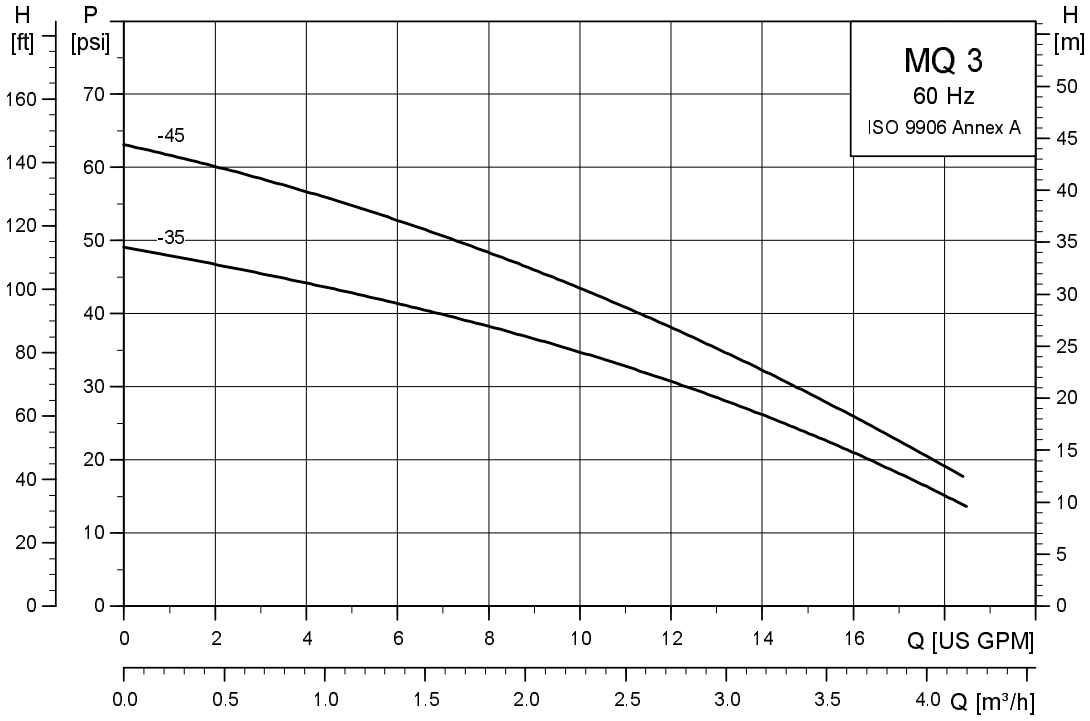
Code for pipework connection
B: External thread

Code for materials
A: Standard

Code for shaft seal
B: Bellow seal, rubber
V: Ceramic
B: Carbon, resin-impregnated
P: NBR (nitrile rubber)

Product overview

Performance range, MQ 60 Hz



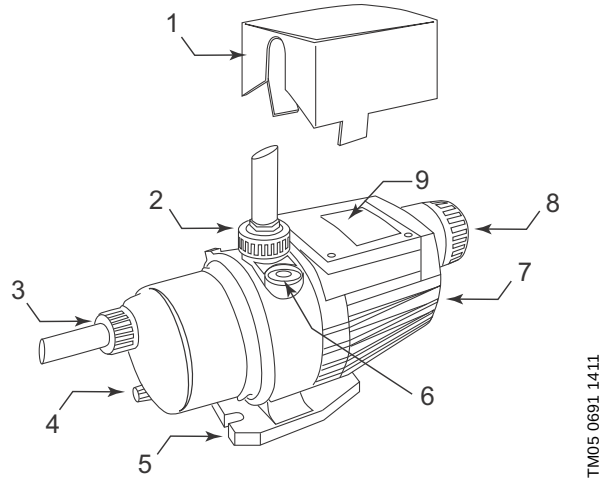
TM04 4141 0909

Product range, MQ

Range	MQ 3-35	MQ 3-45
Maximum flow rate [gpm (m^3h)]	19 (4.3)	
Maximum pressure [psi (bar)]	49 (3.4)	63 (4.3)
Maximum system pressure [psi (bar)]	109 (7.5)	
Maximum inlet pressure [psi (bar)]	40 (2.7)	
Maximum suction lift [ft (m)]	26 (8)	
Minimum ambient temperature [°F (°C)]	32 (0)	
Maximum ambient temperature [°F (°C)]	113 (45)	
Minimum liquid temperature [°F (°C)]	32 (0)	
Maximum liquid temperature [°F (°C)]	95 (35)	
Net weight [lbs (kg)]	29 (13.2)	
Sound pressure level [dB(A)]	< 60	
Tank volume [oz (ml)]	13.5 (399)	
Air pressure in tank [psi (bar)]	22 to 25 (1.5 to 1.7)	
Connections	1" NPT	
Priming and drain plugs	3/8" GAS	

Construction

Components, MQ

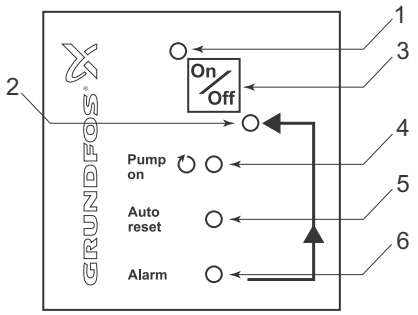


TM05 0691 1411

Fig. 16 MQ pump components

Pos.	Description
1	Protective cover (accessory)
2	Discharge port
3	Suction port
4	Drain plug
5	Baseplate
6	Priming plug
7	Shaft access port plug
8	Pressure tank
9	Control panel

MQ control panel



TM05 0769 1511

Fig. 17 MQ control panel

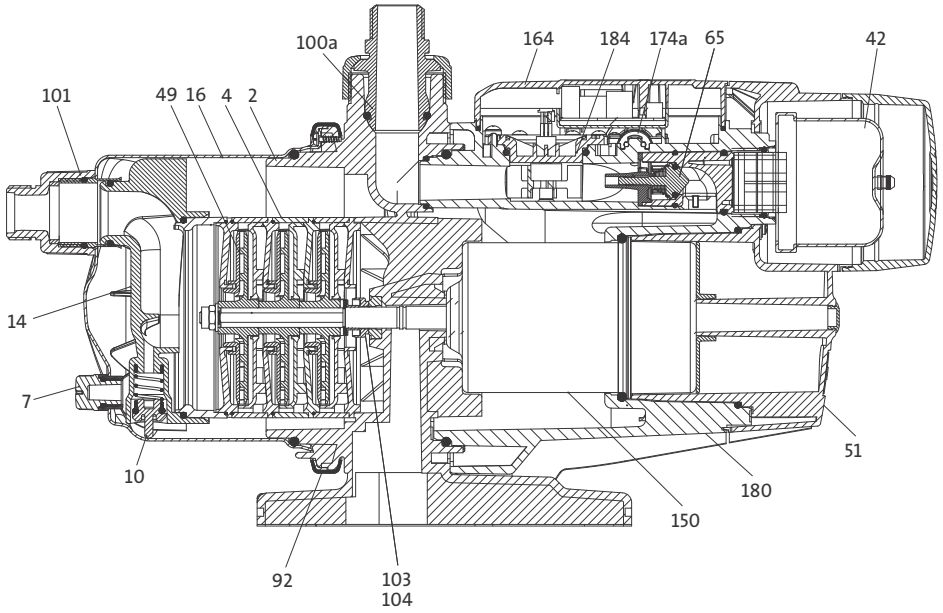
Pos.	Description	
1	Power indicator light	Indicates the pump is ready for operation (green).
2		Indicates the pump is on standby (red).
3	On/Off button	Pump is started and stopped by pressing On/Off button.
4	Pump ON (green)	Indicates pump is running.
5	Auto reset	Indicates auto reset function is active. After an alarm, restarting will be attempted every 30 minutes, for a period of 24 hours.
6	Alarm (red)	Indicates pump is in alarm state. Manual resetting is possible by pressing On/Off button.

Material specification, MQ

Pos.	Components	Material
2	Support flange	PP + 30 % glass fiber
4	Chamber	PPO + 20 % glass fiber
7	Drain and priming plug	PPO + 20 % glass fiber
10	Self-priming valve	PP + 30 % glass fiber
14	Self-priming part	PPO + 20 % glass fiber
16	Pump sleeve	Stainless steel, DIN W.-Nr. 1.4301, AISI 304
42	Tank cover	PP + 30 % glass fiber HB (f1)
49	Impeller	PPO + 20 % glass fiber-PTFE
51	Motor cover	PP + 30 % glass fiber HB (f1)
65	Non-return valve	POM + 25 % glass fiber
92	Clamp	Stainless steel, DIN W.-Nr 1.4301, AISI 304
100a	Discharge port	PPO + 20 % glass fiber

Pos.	Components	Material
101	Suction port	PPO + 20 % glass fiber
103 104	Shaft seal: Stationary and rotating part	Carbon/ceramics/NBR rubber
149	Insulation disc	PA 5VA (Polyammide)
150	Shaft	Stainless steel, DIN W.-Nr 1.4005, AISI 416
	Motor sleeve	Stainless steel, DIN W.-Nr 1.4301, AISI 304
164	Terminal box cover	PP + 30 % glass fiber 5VA (f1)
174a	Pressure switch	POM + 25 % glass fiber / SIL Rubber (Silicone Rubber)
	Pressure switch membrane	SIL Rubber - Silicone Rubber.
180	Motor body	PP + 30 % glass fiber 5VA (f1)
184	Flow sensor	POM + 25 % glass fiber
	O-rings	NBR-rubber

POM: Polyoximetylen
NR-rubber: Natural Rubber
PPO: Polyphenylene Oxides
PP: Polypropylene
NBR-rubber: Nitrile-Butadiene Rubber



TM01 9733 1411

Fig. 18 MQ exploded view

Operating conditions

System pressure:	Max. 109 psi (7.5 bar)
Inlet pressure:	Max. 40 psi (2.8 bar)
Suction lift:	Max. 26 ft (8 m)
Liquid temperature:	32°F to +95°F (0°C to +35°C)
Ambient temperature:	32°F to +113°F (0°C to +45°C)

Installation

Location

The pump is suitable for indoor and outdoor installation. It is resistant to sunlight. For outdoor installation, the pump must be fitted with a protective cover (accessory). Should the unlikely event of an internal leakage occur, pumped liquid will be drained out from the base and/or end cover instead of damaging the pump. Install the pump in such a way that no undesirable collateral damage can arise.

Positioning the pump

Mount the pump on the base plate with horizontal suction port and vertical discharge port.

The pump must be installed horizontally.

The maximum permissible inclination angle is +/- 18 °.

To prevent movement and vibrations, the pump and base plate can be secured to a solid foundation by means of the bolt holes in the base plate.

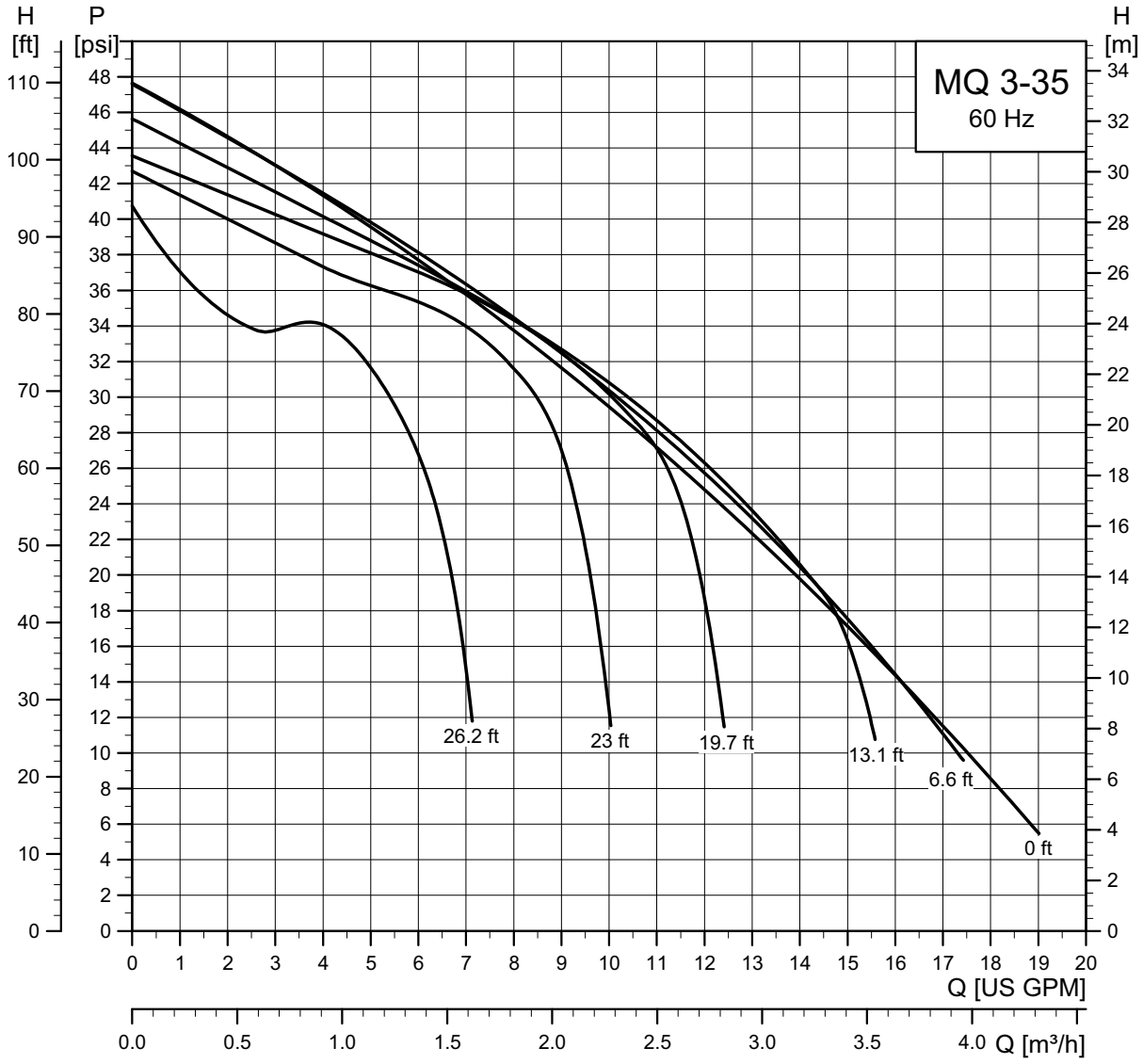
Selection of product

MQ is available in two sizes and two voltages.

Model	**Voltage [V]**	**Product number**
MQ 3-35	115	96860172
	230	96860201
MQ 3-45	115	96860195
	230	96860207

Curve charts and technical data

MQ 3-35 60 Hz, suction lift performance curve

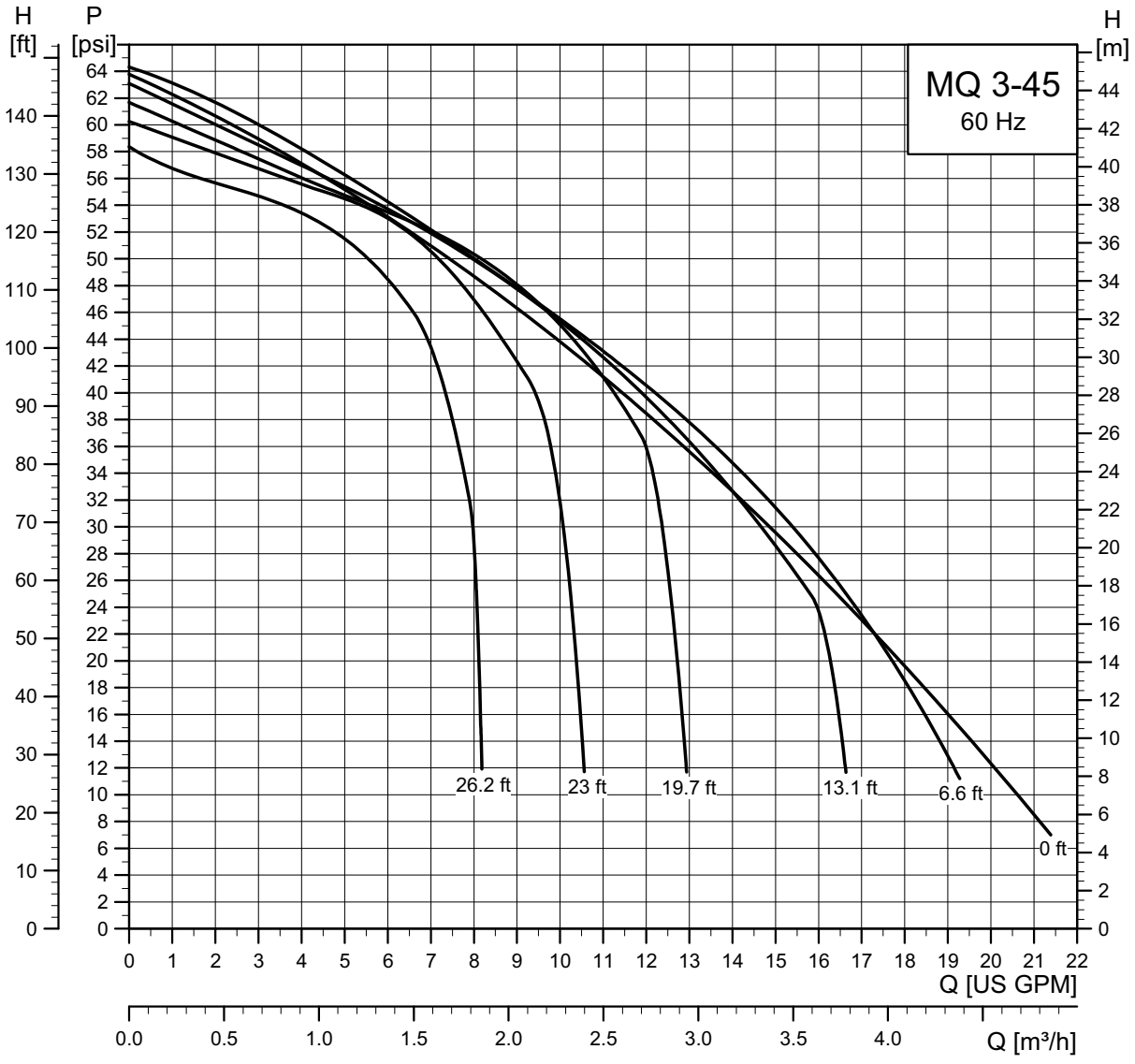


TM05 2056 4311

Provided it is filled with water, the pump is able to lift water from a depth of 26 ft (8 m) in less than 5 minutes.

Note: Use with a foot valve in suction lift applications.

MQ 3-45 60 Hz, suction lift performance curve

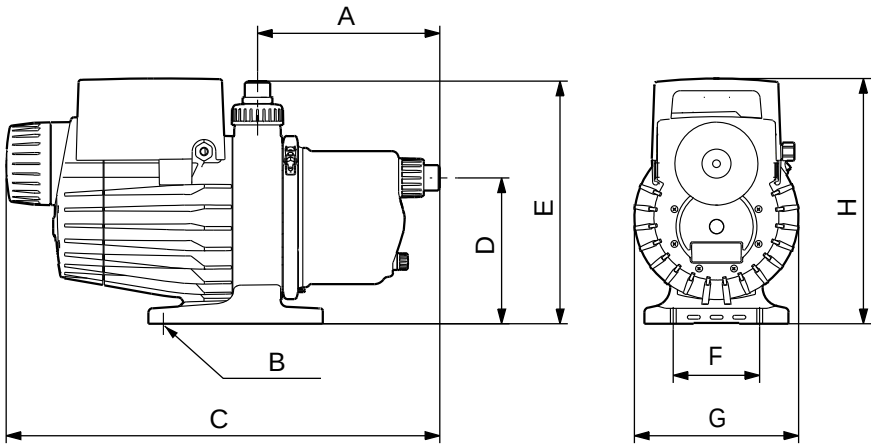


TM05 2057 4311

Provided it is filled with water, the pump is able to lift water from a depth of 26 ft (8 m) in less than 5 minutes.

Note: Use with a foot valve in suction lift applications.

Dimensional sketch - MQ



TM01 9799

Dimensions [in (mm)]							
A	B	C	D	E	F	G	H
9.45 (240)	2 x 3/8 (2 x 9.6)	22.44 (570)	7.56 (192)	12.60 (320)	4.49 (114)	8.58 (218)	12.74 (324)

Weights and electrical data

-10/+6 % voltage tolerance
7.5 ft. power cord with plug

Model	Part Number	Phase, Volts	Amps		P2		Net wt. [lb (kg)]
			Run	Start	W	Hp	
MQ 3-35	96860172	1X110-120V	8	29	585	0.75	30.1 (13.7)
MQ 3-45	96860195	1X110-120V	10	29	725	1	30.2 (13.7)
MQ 3-35	96860201	1X220-240V	4	15	565	0.75	30.1 (13.7)
MQ 3-45	96860207	1X220-240V	4.8	15	716	1	30.2 (13.7)

Approvals

C US
Liquid Pump

Drinking Water
NSF / ANSI 61

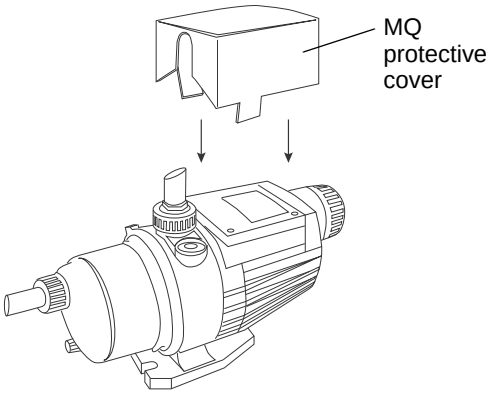
NSF / ANSI 372
Low Lead Content

Accessories, MQ

MQ protective cover

Protects keypad and electronics in outdoor applications. Required for outdoor applications where MQ is exposed to the elements. Two Velcro tabs are included to help adhere back end of cover to pump.

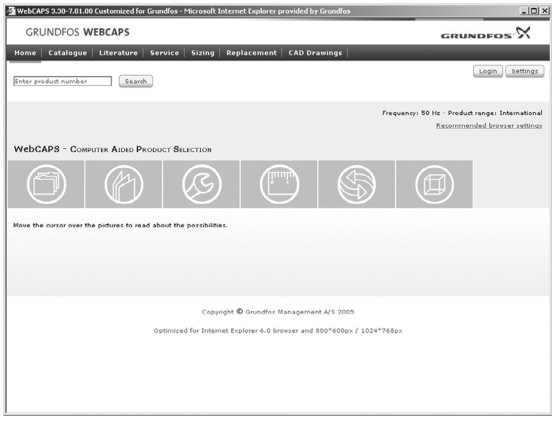
Description	Material	Product number
MQ protective cover	Polypropylene with Velcro tabs	96693071



TM05 0787 1511

5. Further documentation

WebCAPS

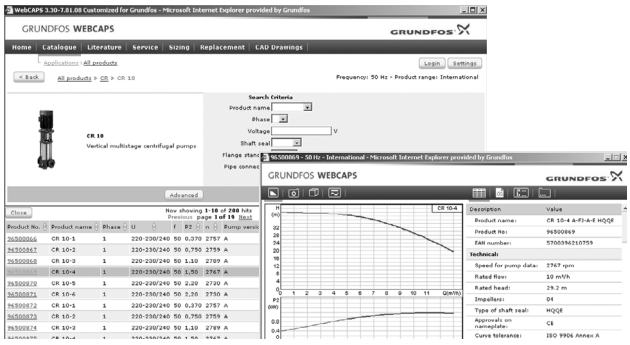


WebCAPS is a **Web**-based **C**omputer **A**ided **P**roduct **S**election program available on www.grundfos.com.

WebCAPS contains detailed information on more than 185,000 Grundfos products in more than 20 languages.

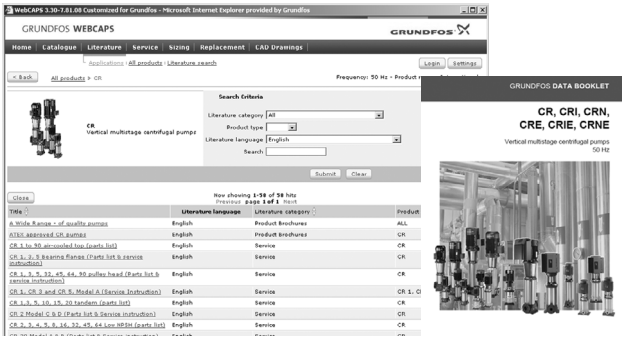
In WebCAPS, all information is divided into 6 sections:

- Catalog
- Literature
- Service
- Sizing
- Replacement
- CAD drawings.



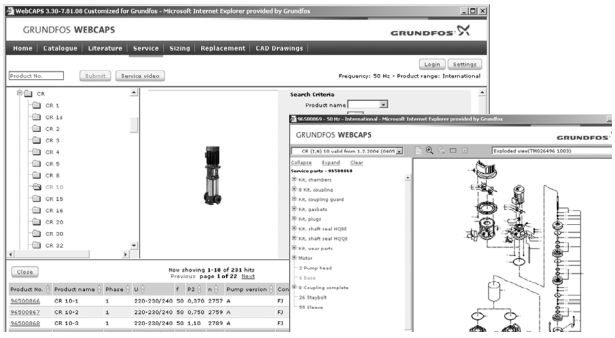
Catalog

This section is based on fields of application and pump types, and contains
- technical data
- curves (QH, Eta, P1, P2, etc) which can be adapted to the density and viscosity of the pumped liquid and show the number of pumps in operation
- product photos
- dimensional drawings
- wiring diagrams
- quotation texts, etc.



Literature

In this section you can access all the latest documents of a given pump, such as
- product guides
- installation and operating instructions
- service documentation, such as Service kit catalog and Service kit instructions
- quick guides
- product brochures, etc.



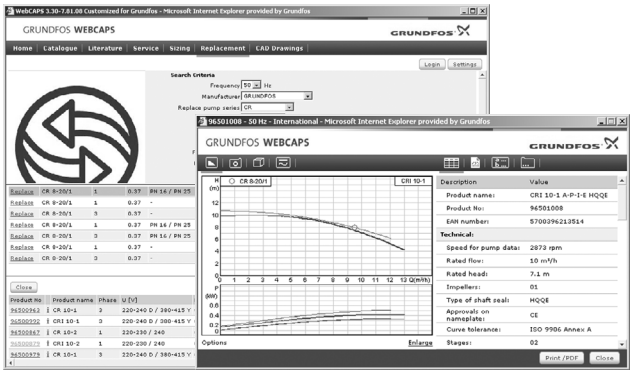
Service

This section contains an easy-to-use interactive service catalog. Here you can find and identify service parts of both existing and discontinued Grundfos pumps.
Furthermore, this section contains service videos showing you how to replace service parts.

Sizing

This section is based on different fields of application and installation examples, and gives easy step-by-step instructions in how to

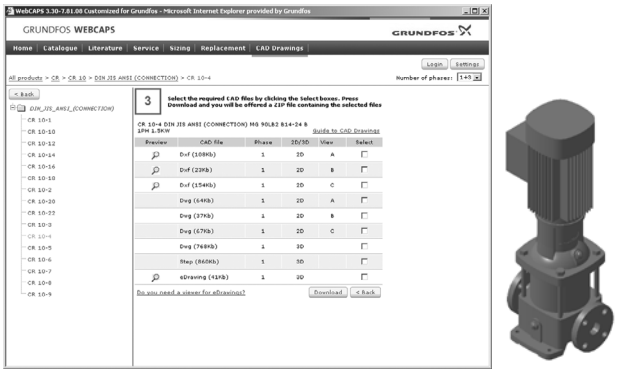
- select the most suitable and efficient pump for your installation
- carry out advanced calculations based on energy consumption, payback periods, load profiles, life cycle costs, etc.
- analyze your selected pump via the built-in life cycle cost tool
- determine the flow velocity in wastewater applications, etc.



Replacement

In this section you find a guide to selecting and comparing replacement data of an installed pump in order to replace the pump with a more efficient Grundfos pump.
The section contains replacement data of a wide range of pumps produced by other manufacturers than Grundfos.

Based on an easy step-by-step guide, you can compare Grundfos pumps with the one you have installed on your site. When you have specified the installed pump, the guide will suggest a number of Grundfos pumps which can improve both comfort and efficiency.



CAD drawings

In this section it is possible to download 2-dimensional (2D) and 3-dimensional (3D) CAD drawings of most Grundfos pumps.

These formats are available in WebCAPS:

2-dimensional drawings:

- .dxf, wireframe drawings
- .dwg, wireframe drawings.

3-dimensional drawings:

- .dwg, wireframe drawings (without surfaces)
- .stp, solid drawings (with surfaces)
- .eprt, E-drawings.

WinCAPS

Fig. 21 WinCAPS CD-ROM

WinCAPS is a **Win**dows-based **C**omputer **A**ided **P**roduct **S**election program containing detailed information on more than 185,000 Grundfos products in more than 20 languages.

The program contains the same features and functions as WebCAPS, but is an ideal solution if no Internet connection is available.

WinCAPS is available on CD-ROM and updated once a year.

L-DWS-PG-01 0612
ECM: -

GRUNDFOS Pumps Corporation
17100 West 118th Terrace
Olathe, Kansas 66061
Phone: +1-913-227-3400
Telefax: +1-913-227-3500

GRUNDFOS Canada Inc.
2941 Brighton Road
Oakville, Ontario L6H 6C9
Canada
Phone: +1-905 829 9533
Telefax: +1-905 829 9512

Bombas GRUNDFOS de Mexico S.A. de C.V.
Boulevard TLC No. 15
Parque Industrial Stiva Aeropuerto
Apodaca, N.L. Mexico 66600
Phone: +52-81-8144 4000
Telefax: +52-81-8144 4010

GRUNDFOS