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SQ, SQE

Submersible pumps and accessories

50/60 Hz



GRUNDFOS

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Table of contents

1. Product Introduction 3
Applications 3
Features and Benefits 3
Performance range 4
Pump and motor range 5
Pipe connection 5
Type key 5
Pumped liquids 5

2. Features and benefits 6
Dry-running protection 6
High pump efficiency 6
High motor efficiency 6
Wear resistance 6
Protection against upthrust 6
Excellent starting capabilities 6
Overvoltage and undervoltage protection 7
Overload protection 7
Overtemperature protection 7
Reliability 7
Variable speed 7
Installation 7
Service 7

3. Application examples 8
SQ with pressure switch and pressure tank 8
SQ with Pressure Manager (with or without pressure tank) 9
Constant-pressure control with CU 301, residential water supply 10
Constant-pressure control with the CU 301, irrigation 11
Maintaining a constant water table 12
Emptying or filling a tank 13
Pumping from one tank to another 14
Workshop setting of operating parameters 15
Manual speed control of SQE (sampling) 16
Replacement in existing installation 17

4. Control units 18
CU 301 constant pressure control 18
CU 300 multi-function control 20
Benefits of CU 300 and Grundfos GO 20

5. Pump selection 22
Determining head and flow 22
Variable speed 22
Pump sizing 23
Selection of pressure tank 24
Selecting the right pump for the SQE constant-pressure system 26
Curve conditions 28

6. Performance curves and technical data . . . 29
SQ 1, SQ 1-N, SQE 1, SQE 1-N 29
Dimensions and weights 30
Electrical data, 1 × 200-240 V, 50/60 Hz 30
SQ 2, SQ 2-N, SQE 2, SQE 2-N 31
Dimensions and weights 32
Electrical data, 1 × 200-240 V, 50/60 Hz 32
SQ 3, SQ 3-N, SQE 3, SQE 3-N 33
Dimensions and weights 34
Electrical data, 1 × 200-240 V, 50/60 Hz 34
SQ 5, SQ 5-N, SQE 5, SQE 5-N 35
Dimensions and weights 36
Electrical data, 1 × 200-240 V, 50/60 Hz 36
SQ 7, SQ 7-N, SQE 7, SQE 7-N 37
Dimensions and weights 38
Electrical data, 1 × 200-240 V, 50/60 Hz 38

7. Technical data 39
SQ and SQE pumps 39
Factory settings 39
CU 300 and CU 301 control units 40
Mains connection of pump via pressure switch . . . 40
Electrical connection of CU 301 41
Electrical connection of CU 300 42
Material specification, pump 43
Material specification, motor 44

8. Accessories 45
CU 301 45
Pressure sensor for CU 301 45
Constant-pressure package without the pump . . . 45
Constant-pressure packages with the pump 45
CU 300 45
Grundfos GO MI 301 45
SPP 1 potentiometer 45
Pressure Manager 46
Pressure tank 46
Pressure gauge 46
Submersible drop cable 46
Cable termination kit, type KM 46
Cable clips 47
Straining wire 47
Wire clamp 47
Zinc anodes 47
Flow sleeve 47

9. Order data 48
SQ, SQ-N, SQE, SQE-N 48
Complete unit, 1 × 200-240 V, 1.5 m cable 48
Submersible drop cables 50
SQ and SQE including cable 51
Spare motor with cable 51

10. Grundfos Product Center 52

11. Document quality feedback 53

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1. Product Introduction

SQ pumps are submersible pumps available in the following versions:

- SQ
- SQ-N
- SQE
- SQE-N.

Applications

SQ and SQE pumps are suitable for both continuous and intermittent operation for a variety of applications:

- domestic water supply
- small waterworks
- irrigation
- tank applications
- pressure boosting.

Note: For other applications, please contact Grundfos.

Features and Benefits

SQ pumps offer the following features:

- dry-running protection
- high pump and motor efficiency
- wear resistance
- protection against upthrust
- soft starter
- overvoltage and undervoltage protection
- overload protection
- overtemperature protection.

Additionally, SQE pumps offer the following benefits:

- variable speed
- electronic control and communication.

The motors are based on the most recent technology within permanent magnets. This technology is the main reason for the high efficiency of the motors. The motors have a built-in electronic unit containing a frequency converter featuring soft start.

SQ pumps are fitted with a single-phase Grundfos MS 3 or MS 3-N motor, and by means of the built-in frequency converter, the motor is driven at a constant speed.

SQE pumps are also fitted with a single-phase Grundfos MSE 3 or MSE 3-N motor. Both motor types can communicate with the Grundfos CU 300 and CU 301 control units, which can be operated with Grundfos GO.

SQE pumps feature variable speed which is offered through frequency control. This means that the pump can be set to operate in any duty point in the range between the pump minimum and maximum performance curves.

CU 301 is specially developed for applications where a constant pressure is required.

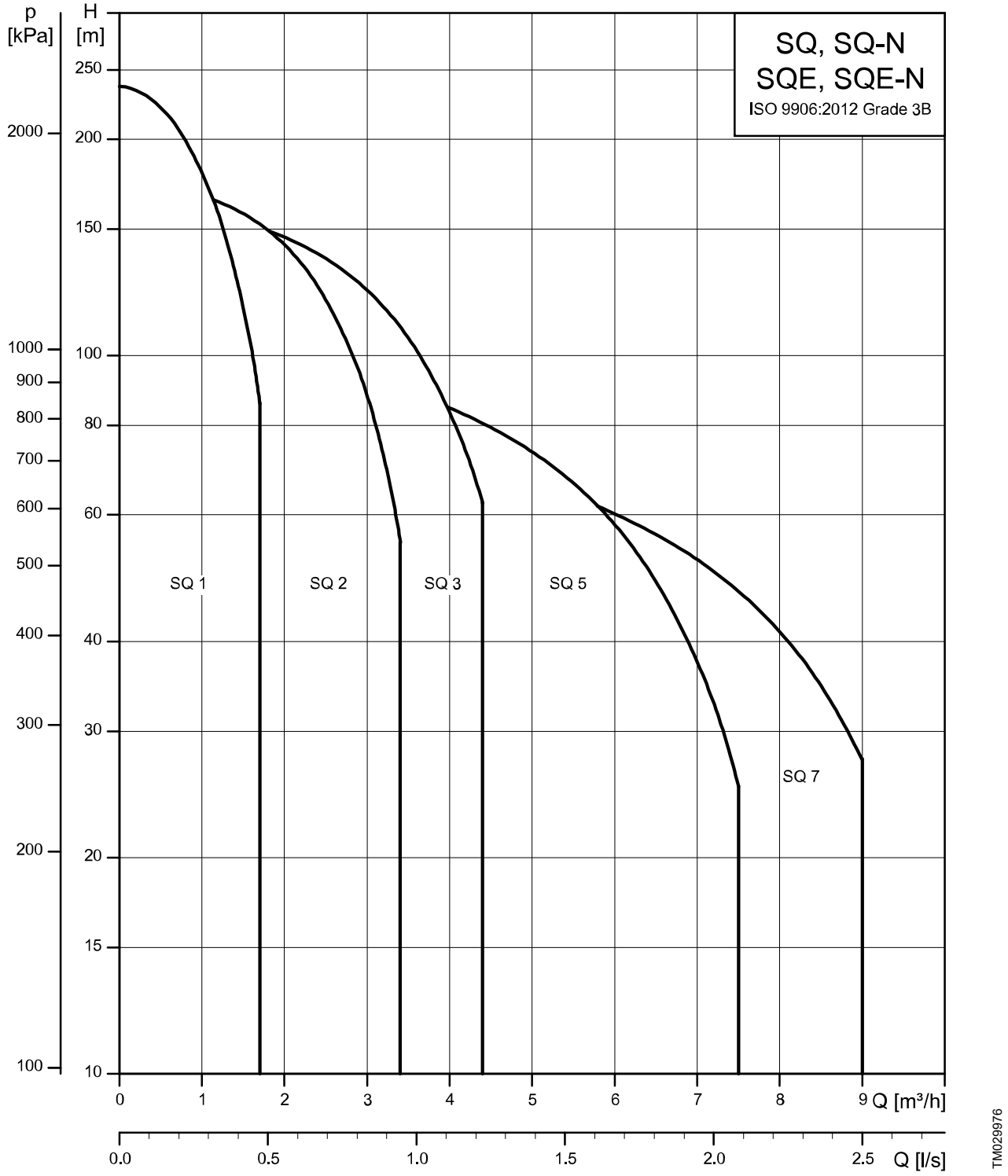
CU 300 and CU 301 provide full control of SQE pumps.

In case of pump fault, the front of the CU 300 or CU 301 shows an alarm. Grundfos GO enables monitoring of the installation and changing of the factory settings.

SQE pumps can operate without a CU 300 or CU 301. However, in such case, the pump does not offer all the features available when connected to a CU 300 or a CU 301.

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Performance range



Performance range, SQ/SQ-N/SQE/SQE-N

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Pump and motor range

Product	Description	Material
SQ, SQE pump	(1, 2, 3, 5, and 7 m^3/h)	Stainless steel EN 1.4301, AISI 304
SQ-N, SQE-N pump	(1, 2, 3, 5, and 7 m^3/h)	Stainless steel EN 1.4401, AISI 316
MS 3 motor	Single-phase Max. 1.85 kW	Stainless steel EN 1.4301, AISI 304
MS 3-N motor	Single-phase Max. 1.85 kW	Stainless steel EN 1.4401, AISI 316
MSE 3 motor	Single-phase Max. 1.85 kW	Stainless steel EN 1.4301, AISI 304
MSE 3-N motor	Single-phase Max. 1.85 kW	Stainless steel EN 1.4401, AISI 316

Pipe connection

Pump type	Threaded connection
SQ 1, SQ 2, SQ 3	Rp 1 1/4
SQ 5, SQ 7	Rp 1 1/2

Type key

Code	Example	SQ E 2 55
	Type range	**SQ**
- E	Basic version Electronic control and communication	**E**
	Rated flow rate [m^3/h]	**2**
	Head [m] at rated flow rate	**-55**
- N	Material code: Stainless steel EN 1.4301 Stainless steel EN 1.4401	

Pumped liquids

The SQ and SQE pumps are suitable for pumping thin, clean, non-aggressive, non-explosive liquids, not containing solid or long-fibred particles larger than sand grains. The pH value of the pumped liquid should be between 5 and 9.

Sand content

The maximum sand content allowed is 50 g/m^3.

A higher sand content will reduce pump life due to wear.

Temperature

Due to differences in regulations, temperature limits have been determined according to the following regions:

- West European
- Central European
- Asian-Pacific
- North American.

For the West European, Central European and Asian-Pacific region, the following table applies:

Flow velocity past the motor	Max. liquid temperature [°C (°F)]
0 m/s (free convection)	35 (95)
Min. 0.15 m/s	40 (105)

Temperature limit on the motor nameplate: 35 °C.

Note: UL accepts only one temperature limit to be stamped on the motor nameplate. Identical motors are used in the following regions:

- West European
- Central European
- Asian-Pacific
- North America.

For the North American region, the following table applies:

Flow velocity past the motor	Max. liquid temperature [°C (°F)]
0 m/s (free convection)	30 (86)

Note: According to UL regulations, the temperature of the pumped liquid must not exceed 86 °F (30 °C) for products in the North American region.

Viscosity

The pumping of liquids with a viscosity higher than that of water will cause the following:

- head loss
- higher power consumption.

If in doubt, contact Grundfos.

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2. Features and benefits

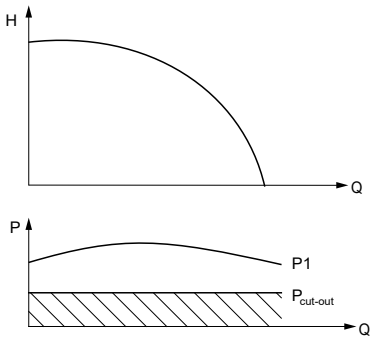
Dry-running protection

The pumps are protected against dry running. A value of $p_{cut-out}$ ensures cut-out of the pump in case of water shortage in the borehole, thus preventing a burnout of the motor.

The dry-running protection is active after 30 seconds of operation. The dry-running alarm is activated when the load has been below the minimum power limit for an accumulated time of 5 seconds.

$P_{cut-out}$ is factory-set both for the SQ and SQE pumps.

On SQE, the dry-run limit can be adjusted with Grundfos GO.



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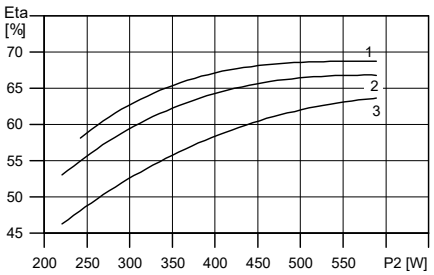
Dry-running protection

High pump efficiency

The hydraulic pump components are polyamide-reinforced with 30 % glass fibre. The hydraulic design ensures high pump efficiency, yielding low energy consumption and thus low energy costs.

High motor efficiency

The motors are designed according to the permanent-magnet principle (PM motor), featuring high efficiency within a wide performance range.



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Comparison of motor efficiency

Pos.	Description
1	MS 3
2	Conventional 3-ph.
3	Conventional 1-ph.

Wear resistance

The pump impellers are not fastened to the shaft ("floating"). Each impeller has its own tungsten carbide/ceramic bearing. The design and the materials chosen ensure high wear resistance to sand, thus long product life.



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Impellers

Protection against upthrust

Starting up a pump with a very low counter pressure involves the risk of the entire impeller stack being lifted. This phenomenon is called upthrust. Upthrust may cause breakdown of both pump and motor.

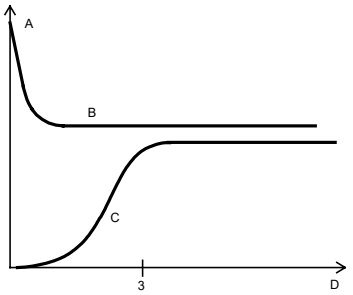
The motors are fitted with an upthrust bearing protecting both pump and motor against upthrust, thus preventing breakdown during the critical start up phase.

Excellent starting capabilities

The integrated electronic unit of the motor includes soft starting. Soft starting reduces the starting current, thus gives the pump a smooth and steady acceleration.

The soft starter minimises the risk of wear of the pump and prevents overloading of the mains during start up.

The excellent starting capabilities are a result of the high locked-rotor torque of the permanent-magnet motor, and the few pump stages. High starting reliability also applies in case of low voltage supply.



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Comparison of locked-rotor current

Pos.	Description
A	Current [A]
B	DOL (direct-on-line starting)
C	Soft start
D	Time [s]

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Overvoltage and undervoltage protection

Overvoltage and undervoltage may occur in case of unstable voltage supply.

The integrated protection of all motors prevents damage to the motor in case the voltage moves outside the permissible voltage range.

The pump is cut out if the voltage falls below 150 V or rises above 315 V. The motor automatically restarts when the voltage returns within the permissible range. Consequently, no extra protection relay is required.

Overload protection

If the pump is exposed to heavy load, the current consumption rises. The motor automatically compensates for this by reducing the speed. If the speed falls below 3000 min^{-1}, the motor is cut out.

If the rotor is prevented from rotating, it is automatically detected and the power supply is cut out. Consequently, no extra motor protection is required.

Overtemperature protection

A permanent-magnet motor gives off very little heat to its surroundings. In combination with an efficient internal circulation system leading the heat away from the rotor, stator and bearings, optimum operating conditions are ensured for the motor.

As an extra protection, the electronic unit has a built-in temperature sensor. When the temperature exceeds a critical limit, the motor is cut out. When the temperature returns below the limit, the motor is automatically cut in again.

Reliability

The motors have been designed with high reliability and have the following features:

- tungsten carbide or ceramic bearings
- thrust bearings protecting against downthrust
- product life equal to conventional AC motors.

Variable speed

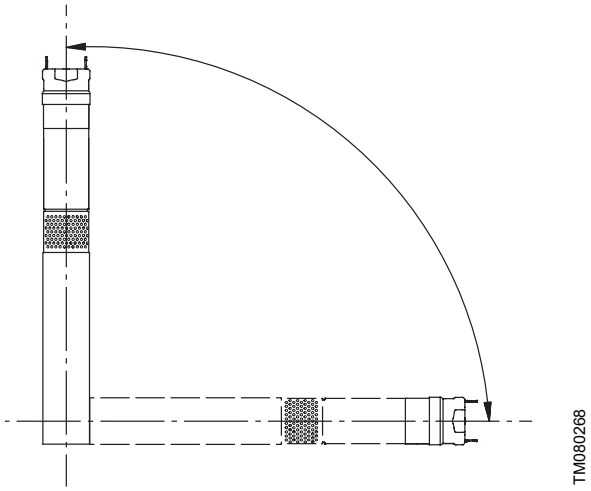
The MSE 3 motor enables variable speed control within the range of 3,000 to 10,700 min^{-1}. The pump can be set to operate in any duty point within the 3,000 to 10,700 min^{-1} performance range of the pump. Consequently, the pump performance can be adapted to any specific requirement.

The variable-speed control facility requires the use of a CU 300 or CU 301 control unit and Grundfos GO. See section Variable speed.

Installation

SQ and SQE may be installed vertically, horizontally or in any position in between.

Note: The pump must not fall below the horizontal level in relation to the motor.



Installation of SQ/SQE pumps

The following features ensure simple installation of the pump:

- built-in non-return valve with spring
- low weight facilitating handling
- installation in 3-inch or larger boreholes
- on/off switch without extra motor starter or starter box necessary
- SQE available with cable with a motor plug (up to 100 m).

For horizontal installation, we recommend that you install the pump in a flow sleeve, for the following reasons:

- to ensure sufficient flow velocity past the motor, thus provide sufficient cooling
- to prevent motor and electronic unit from being buried in sand or mud.

Service

The modular pump and motor design facilitates installation and service. The cable and plug are fitted to the pump with screws, which enables replacement.

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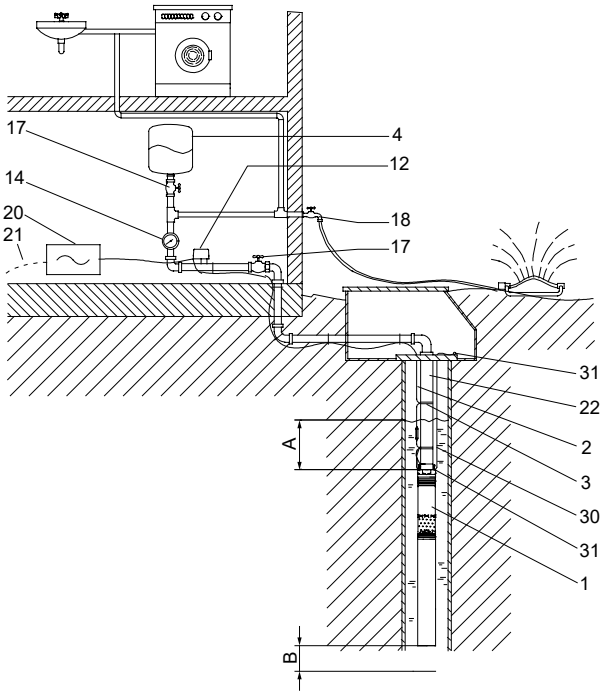
3. Application examples

SQ with pressure switch and pressure tank

SQ is ideally suited for domestic water supply in single-family dwellings, or summer cottages not connected to municipal waterworks. SQ is easy to install and operate.

Pos.	Description
1	SQ pump
2	Cable
3	Cable clips
4	Pressure tank [1]
12	Pressure switch
14	Pressure gauge
17	Isolating valve
18	Tap
20	Mains switch
21	Mains connection, 1 × 200-240 V, 50/60 Hz
22	Riser pipe
30	Straining wire
31	Wire clamp
A	Recommended min. 0.5 m
B	Min. 0.5 m

[1] For selection of pressure tank, see section Order data.



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Domestic water supply

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SQ with Pressure Manager (with or without pressure tank)

Features and benefits

If water is consumed, the pump is cut in via the Pressure Manager. The pressure tank is installed between the pump and the Pressure Manager. In an installation with a pressure tank, water is supplied as soon as a tap is opened. This means that the pressure tank takes over water supply during the smooth start up of the pump (about 3 seconds).

When the water consumption stops (flow is zero), the pump continues operating for 10 seconds, building up pressure in the pressure tank.

The setting of the tank precharge pressure depends on the water level (difference of height between water level and Pressure Manager).

The setting of the flow-pipe pressure at the pressure tank depends on the water level (difference of height between water level and Pressure Manager) according to the following table:

Difference of height [m]	Flow-pipe pressure in pressure tank [bar]
0	1.22
10	1.0
20	0.77
30	0.56

Pos.	Description
1	SQ pump
2	Cable
3	Cable clips
4	Pressure tank
14	Pressure gauge
17	Isolating valve
18	Tap
22	Riser pipe
23	PM 1 or PM 2 Pressure Manager available with/without plug
24	Union
25	Plug
26	Mains connection, 1 × 200-240 V, 50/60 Hz, for PM 1 or PM 2
30	Straining wire
31	Wire clamp
A	18 l
B	Difference of height max. 13 m
C	Recommended min. 0.5 m
D	Min. 0.5 m

Note: For the Pressure Manager, back-up fuse should not exceed 10 A.

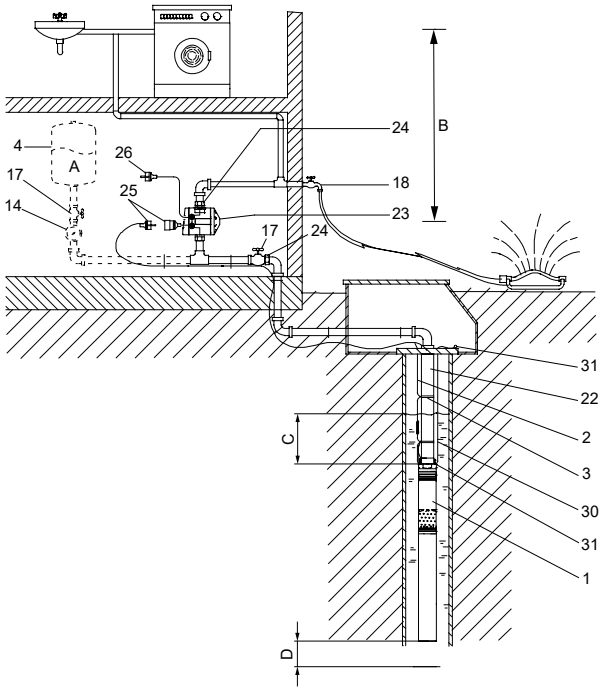
System pressure: max. 10 bar.

The following pump types can be used:

SQ 1-65, SQ 1-80, SQ 2-35, SQ 2-55, SQ 2-70, SQ 2-85, SQ 3-40, SQ 3-55, SQ 3-65, SQ 3-80.

The installation must be designed for maximum pump pressure.

Do not install draw-off points between the pump and the Pressure Manager.



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SQ with Pressure Manager

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Constant-pressure control with CU 301, residential water supply

Features and benefits

The system maintains a constant pressure within the maximum pump performance in spite of a varying water consumption.

The pressure is registered by the pressure sensor and transmitted to CU 301. CU 301 adjusts the pump performance accordingly.

Function

When a tap is opened, the pressure in the 8-litre tank will start to drop.

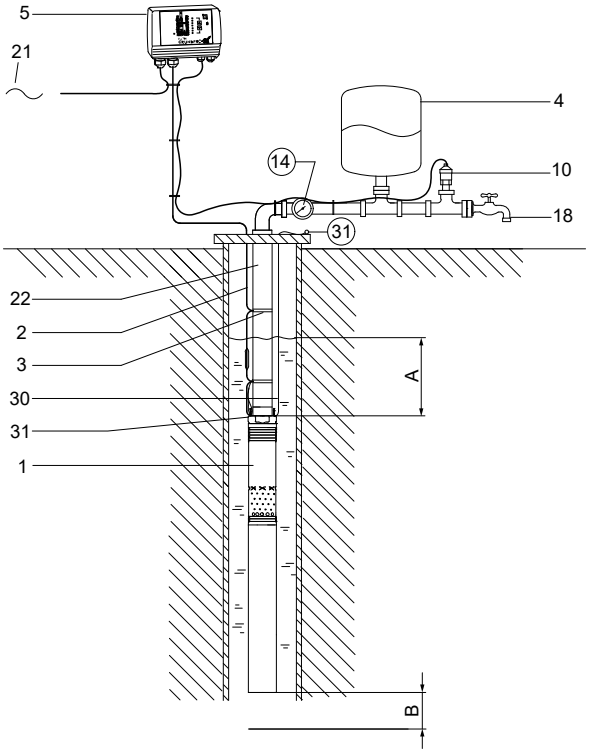
At a flow lower than approximately 0.18 m^3/h, the pressure will drop slowly. When the pressure in the tank is 0.5 bar below setpoint, the pump will start. The pump will run until the pressure is 0.5 bar above setpoint. This way of operation is called on/off operation.

At a flow higher than approximately 0.18 m^3/h, the pressure will drop quickly and the pump will start immediately and maintain a constant pressure.

During operation, CU 301 will control the pump speed to maintain a constant pressure. If there is no consumption, the pump will fill up the tank and stop after a few seconds.

Pos.	Description
1	SQE pump
2	Cable
3	Cable clips
4	Pressure tank, 8 litres
5	CU 301 control unit
10	Pressure sensor, 0-6 bar
14	Pressure gauge
18	Tap
21	Mains connection, 1 × 200-240 V, 50/60 Hz
22	Riser pipe
30	Straining wire
31	Wire clamp
A	Recommended min. 0.5 m
B	Min. 0.5 m

If a higher constant pressure (max. 10 bar) is required, use a CU 300, pressure sensor and flow switch. See section Constant-pressure control with CU 301, residential water supply.



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Residential water supply with the CU 301

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Constant-pressure control with the CU 301, irrigation

Features and benefits

The system maintains a constant pressure within the maximum pump performance even in case of varying water consumption.

The pressure is registered by the pressure sensor and transmitted to CU 301. CU 301 adjusts the pump performance accordingly.

Function

When the sprinkler system is on, the pressure in the 8-litre tank starts to drop.

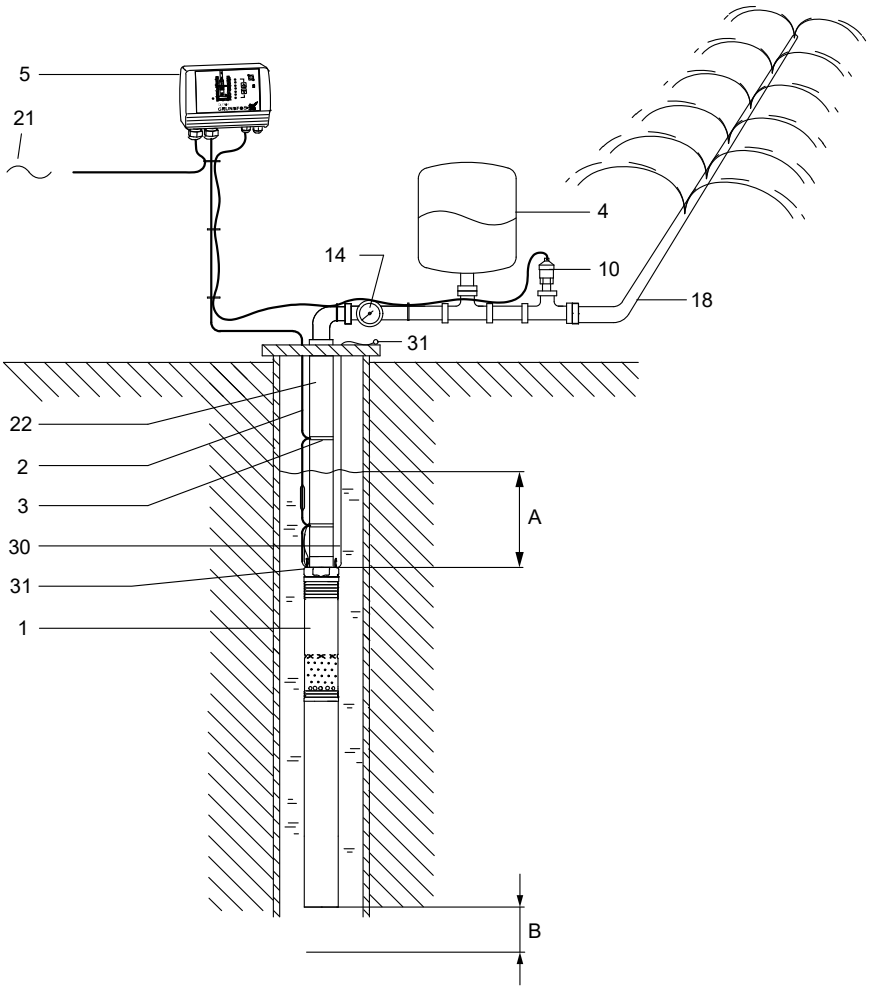
At a flow lower than approximately 0.18 m^3/h, the pressure drops slowly. When the pressure in the tank is 0.5 bar below setpoint, the pump starts. The pump runs until the pressure is 0.5 bar above setpoint. This way of operation is called on/off operation.

At a flow higher than approximately 0.18 m^3/h, the pressure drops quickly, and the pump starts immediately and maintains a constant pressure.

During operation, CU 301 controls the pump speed to maintain a constant pressure. If there is no consumption, the pump fills up the tank and stop after a few seconds.

Pos.	Description
1	SQE pump
2	Cable
3	Cable clips
4	Pressure tank, 8 litres
5	CU 301 control unit
10	Pressure sensor, 0-6 bar
14	Pressure gauge
18	Sprinkler system
21	Mains connection, 1 × 200-240 V, 50/60 Hz
22	Riser pipe
30	Straining wire
31	Wire clamp
A	Recommended min. 0.5 m
B	Min. 0.5 m

If a higher constant pressure (max. 10 bar) is required, use a CU 300, pressure sensor and flow switch. See section Maintaining a constant water table.



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Irrigation

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Maintaining a constant water table

Features and benefits

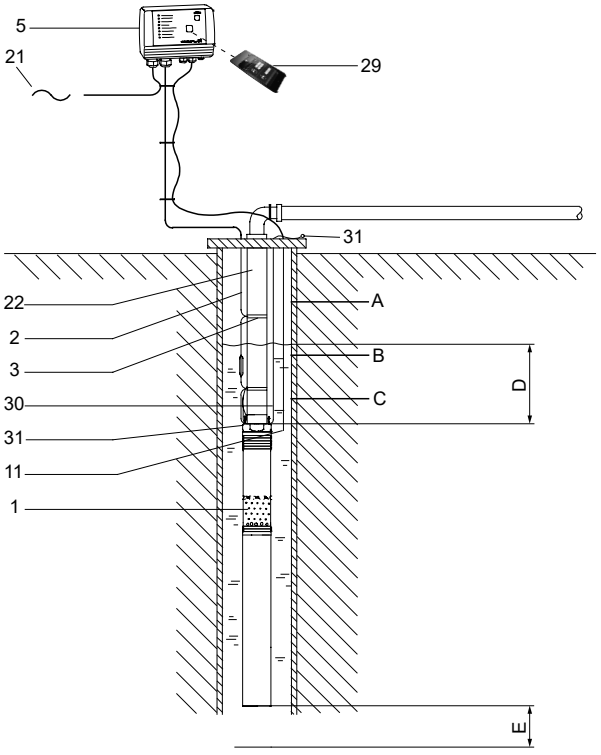
A constant water table can be maintained by adjusting the pump performance. Maintaining a constant water table is important, for example, in connection with keeping out the groundwater of a building site, or preventing the penetration of salt water into a borehole containing potable water.

The example shows how to maintain a constant water table by adjusting pump performance.

Sensors

Level	Description	Reaction
Level sensor (11)		
Warning (max.)	Too high water level. Possible cause: insufficient pump capacity.	Alarm relay operates.
Desired level	The water level that must be maintained.	
Warning (min.)	Too low water level. Possible cause: too high pump capacity.	Alarm relay operates.

Pos.	Description
1	SQE pump
2	Cable
3	Cable clips
5	CU 300 control unit
11	Level sensor
21	Mains connection, 1 × 200-240 V, 50/60 Hz
22	Riser pipe
29	Grundfos GO
30	Straining wire
31	Wire clamp
A	Warning (max.)
B	Desired level
C	Warning (min.)
D	Recommended min. 0.5 m
E	Min. 0.5 m



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Maintaining a constant water table

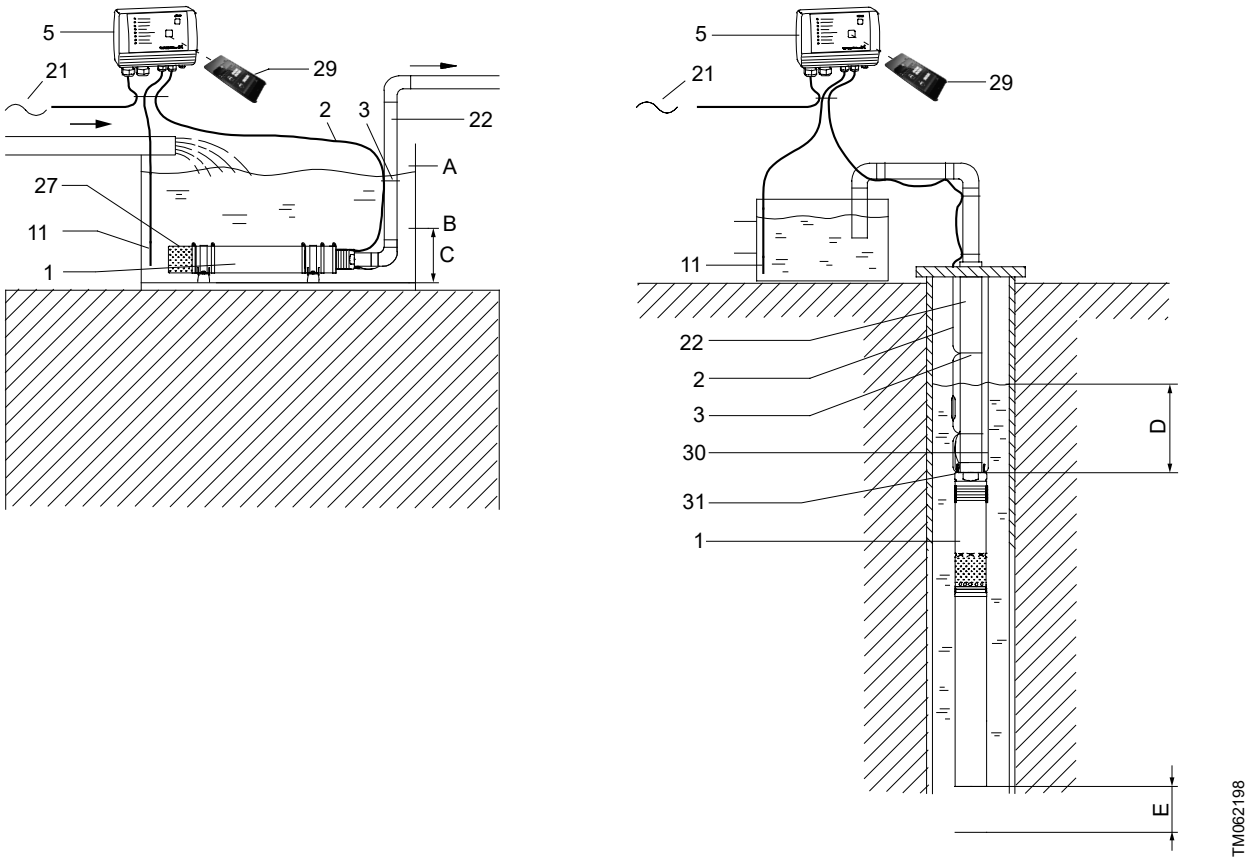
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Emptying or filling a tank

SQE with a CU 300 is ideal for emptying or filling a tank.

Pos.	Description
1	SQE pump
2	Cable
3	Cable clips
5	CU 300 control unit
11	Level sensor
21	Mains connection, 1 × 200-240 V, 50/60 Hz
22	Riser pipe
27	Flow sleeve with strainer and supporting brackets

Pos.	Description
29	Grundfos GO
30	Straining wire
31	Wire clamp
A	Max. (start)
B	Min. (stop)
C	Recommended min. 0.5 m
D	Recommended min. 0.5 m
E	Min. 0.5 m



Emptying or filling a tank

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Pumping from one tank to another

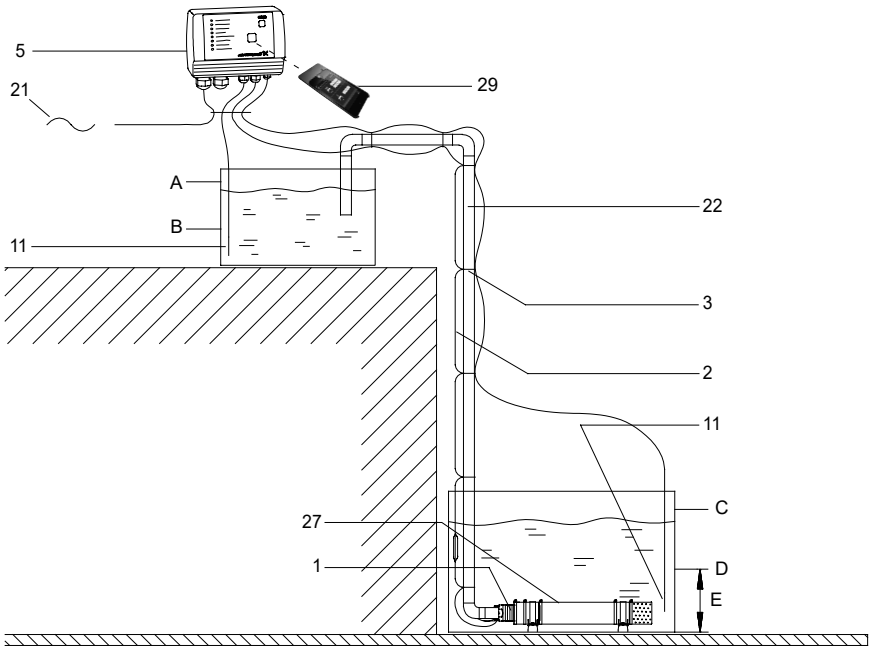
Functioning and benefits

SQE is ideal for pumping water from one tank to another.

Sensors

Level	Description	Light indication on CU 300
Level sensor (11, tank at top)		
Max. (stop)	When the water reaches this level, the pump stops.	Green indicator light in ON/OFF button is flashing.
Min. (start)	When the water drops to this level, the pump starts.	Green indicator light in ON/OFF button is permanently on.
Level sensor (11, tank at bottom)		
Max. (start)	When the water reaches this level, the pump starts.	Green indicator light in ON/OFF button is on.
Min. (stop)	When the water drops to this level, the pump stops.	Green indicator light in ON/OFF button is flashing.

Pos.	Description
1	SQE pump
2	Cable
3	Cable clips
5	CU 300 control unit
11	Level sensor
21	Mains connection, 1 × 200-240 V, 50/60 Hz
22	Riser pipe
27	Flow sleeve with strainer and supporting brackets
29	Grundfos GO
A	Max. (stop)
B	Min. (start)
C	Max. (start)
D	Min. (stop)
E	Recommended min. 0.5 m



Pumping from one tank to another

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Workshop setting of operating parameters

Using CU 300 and Grundfos GO enables changing the motor speed in a workshop, and thereby setting of the pump to a specific performance.

An SQE Speed Calculation program has been developed for the calculation of the speed to obtain the required flow rate and head.

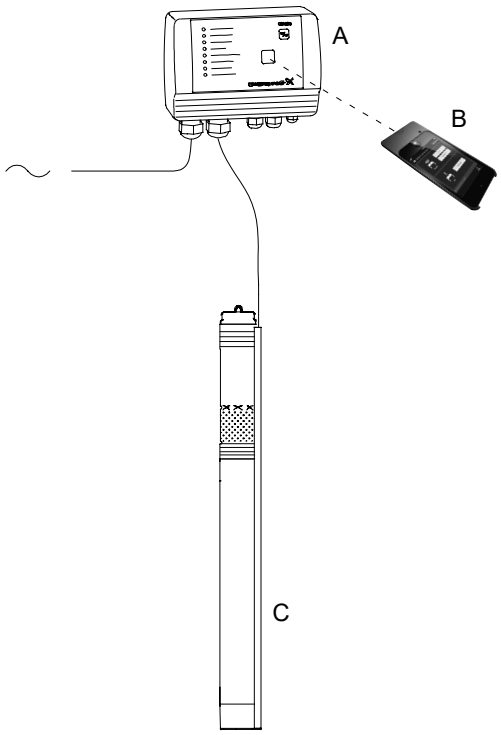
Dry-running protection

The $p_{cut\text{-}out}$ value is factory set for SQE and it ensures dry-running protection.

If the speed of the pump is reduced by more than 1000 min^{-1}, the $p_{cut\text{-}out}$ value must be readjusted via CU 300 or CU301 and Grundfos GO.

Pos.	Description
A	CU 300
B	Grundfos GO
C	SQE

Note: The SQE pump must not be started until the pump is completely submerged below the water table. However, the motor speed can be changed even if the pump is not submerged.



Setting of operating parameters

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SQ SQE
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Manual speed control of SQE (sampling)

Features and benefits

Manual speed control of SQE is possible with an SPP 1 potentiometer and Grundfos GO.

This application is especially suitable for sampling from groundwater monitoring wells. The monitoring well is purged at high speed and the sample is taken at a low speed (quiet flow). For contaminated groundwater, we recommend the SQE-NE pump range.

If frequent sampling is required, we recommend dedicated installation of the pump, thus eliminating wear and additional costs caused by frequent assembly and dismantling of the installation.

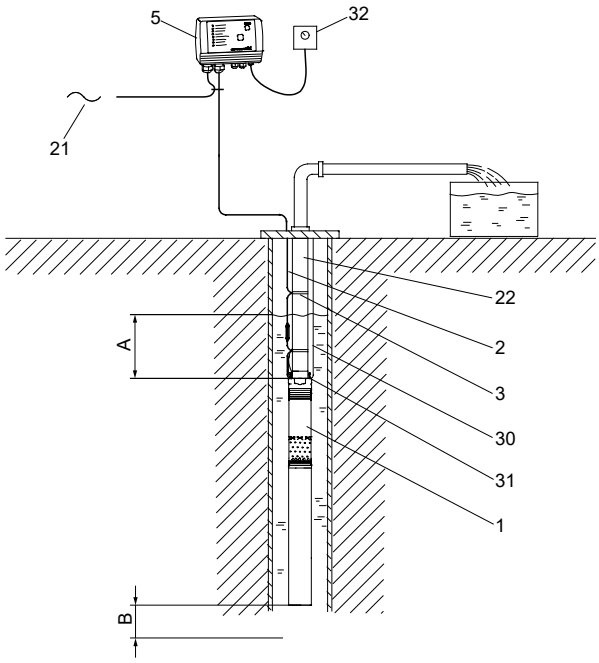
Important: Through dedicated installation, the transfer of contamination from one monitoring well to another is also prevented.

Dry-running protection

The $p_{cut\text{-}out}$ value is factory set for SQE and it ensures dry-running protection.

If the speed of the pump is reduced by more than 1000 min^{-1}, the $p_{cut\text{-}out}$ value must be readjusted via CU 300 and Grundfos GO.

Pos.	Description
1	SQE pump
2	Cable
3	Cable clips
5	CU 300 control unit
21	Mains connection, 1 × 220-240 V, 50/60 Hz
22	Riser pipe
30	Stainless-steel straining wire
31	Stainless-steel wire clamps, 2 per lifting eye
32	SPP 1 potentiometer
A	Recommended min. 0.5 m
B	Min. 0.5 m



TM019028

Manual speed control of the SQE

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Replacement in existing installation

Features and benefits

SQ can be installed as replacement for a 4-inch submersible pump in an existing installation.

When water is consumed, it is taken from the pressure tank without the pump being in operation. If the preset cut-in pressure (p_{cut-in}) is reached, the pump starts operating in the soft-start mode (run-up time approximately 3 seconds). Within this time, the pressure may drop to minimum pressure ($p_{min.}$).

When water consumption stops, the pump builds up system pressure until the preset cut-out pressure ($p_{cut-out}$) of the pressure switch is reached and the pump is cut out.

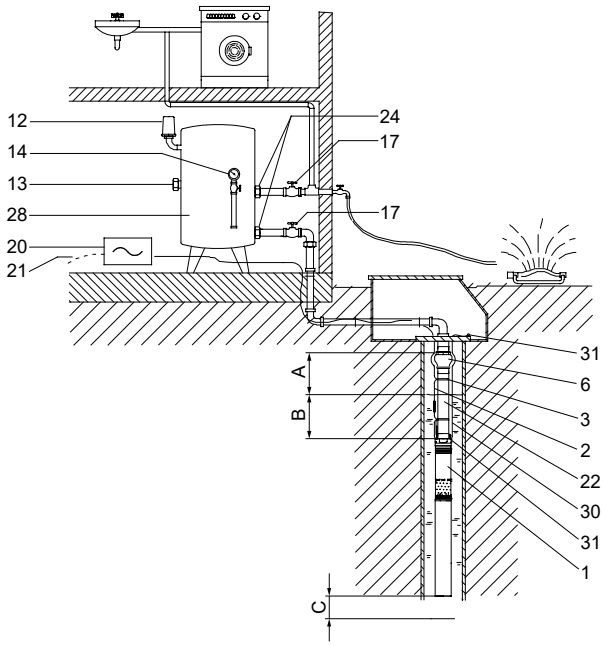
At this time the riser pipe between the aerator with non-return valve and the water table is emptied of water. This water is replaced by an amount of air which is pressed to the pressure tank every time the pump starts operating. The air, which serves as an air cushion, is absorbed by the pressure tank or let out to the atmosphere through the vent. It must be tested whether the selected pump can reach $p_{cut-out}$ + A. See section Head losses (Hf) in plastic pipes and ordinary water pipes.

The system must be designed for maximum pump pressure.

Pos.	Description
1	SQ pump
2	Cable
3	Cable clips
6	Aerator with non-return valve
12	Pressure switch
13	Vent
14	Pressure gauge
17	Isolating valve
20	Mains switch
21	Mains connection, 1 × 200-240 V, 50/60 Hz
22	Riser pipe
24	Union
28	Pressure tank
30	Straining wire
31	Wire clamp
A	Recommended min. 1-2 m
B	Recommended min. 0.5 m
C	Min. 0.5 m

Note: Do not install draw-off points between the pump and the pressure tank.

Pos. 6: If the aerator remains in the installation, the non-return valve in the SQ pump must be removed.



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Replacement

Related information

Head losses (Hf) in plastic pipes and ordinary water pipes

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4. Control units

CU 301 constant pressure control

CU 301 is a control and communication unit specially developed for the SQE submersible pumps in constant-pressure applications.

CU 301 provides the following features:

- full control of SQE
- two-way communication with SQE
- possibility of adjusting the pressure
- alarm indication (LED) when service is needed
- possibility of starting, stopping and resetting the pump by a push-button
- communication with Grundfos GO.

CU 301 communicates with the pump via power-line communication, meaning that no extra cable is required between the CU 301 and the pump.

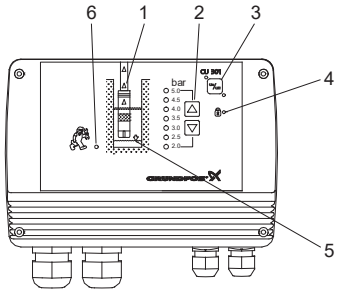
CU 301 features the following indications (see fig. Front view of CU 301):

1. flow indicator
2. system pressure setting
3. system on/off
4. button lock indicator
5. dry-running indicator
6. service needed in case of:

- no contact to pump
- overvoltage
- undervoltage
- speed reduction
- overtemperature
- overload
- sensor defective.

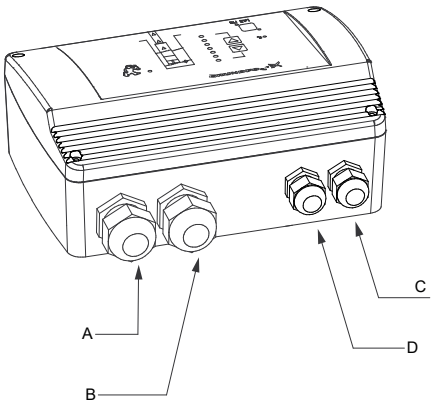
CU 301 incorporates the following indications:

- external signal input for pressure sensor
- disconnect relay in case of "no contact to pump" or "sensor defective"
- pressure switch mode in case of "no contact to pump" with disconnect relay
- connection to an operating relay for indication of pump operation (changes position after 40 seconds of operation).



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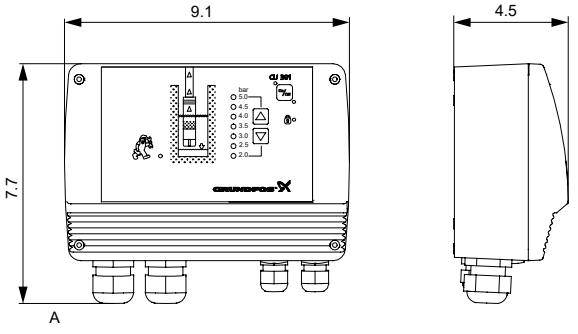
Front view of CU 301



TM033427

Cable entries of CU 301

Pos.	Description
A	Power supply entry
B	Submersible drop cable entry
C	Operating relay entry
D	Pressure sensor entry



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Dimensional sketch of CU 301

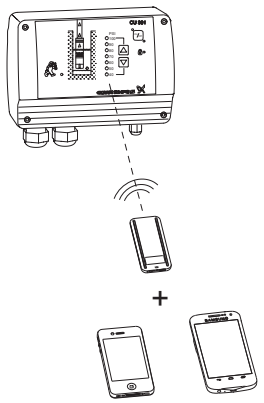
Pos.	Description
A	Dimensions stated in inches.

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Grundfos GO

Grundfos GO enables setting of functions and gives access to status overviews, technical product information and actual operating parameters.

CU 301 is designed for infrared communication with Grundfos GO. Grundfos GO offers the MI 301 mobile interface. See fig. CU 301 communicating with Grundfos GO.



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CU 301 communicating with Grundfos GO

Communication

Grundfos GO is used for wireless infrared communication with CU 301. During communication, there must be visual contact between CU 301 and Grundfos GO. When the communication between Grundfos GO and CU 301 is established, the red indicator light in the on/off button flashes.

Grundfos GO menus for CU 301

Main menus

Status
Controlled from
Value, sensor 1
Motor temperature
Motor speed
Power consumption
Energy consumption
Operating hours
Number of starts

Settings
Operating mode
Setpoint
Analog input 1
Selection of sensor
Maximum pressure
Automatic restarting
Double restarting time
Dry-running stop
Maximum speed
Cut-in speed
Buttons on product
Number
Indicator lights
Store settings
Recall settings
Undo
Unit configuration

Alarms and warnings
Alarm log
"Reset alarm" button

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CU 300 multi-function control

CU 300 is a control and communication unit specially developed for the SQE submersible pumps in constant-pressure applications.

CU 300 provides the following advantages:

- easy adjustment to a specific borehole
- full control of SQE
- two-way communication with SQE
- alarm indication of pump operation by diodes on the front
- possibility of starting, stopping and resetting the pump by a push-button
- communication with Grundfos GO.

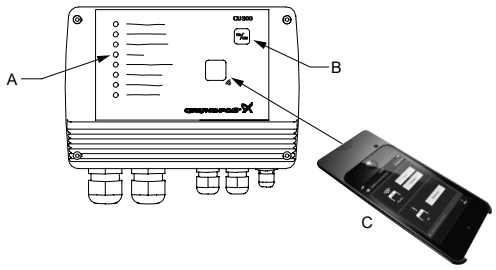
CU 300 communicates with the pump via power-line communication, meaning that no extra cables are required between CU 300 and the pump.

The following alarms can be indicated by CU 300:

- no contact
- overvoltage
- undervoltage
- dry running
- speed reduction
- overtemperature
- overload
- sensor alarm.

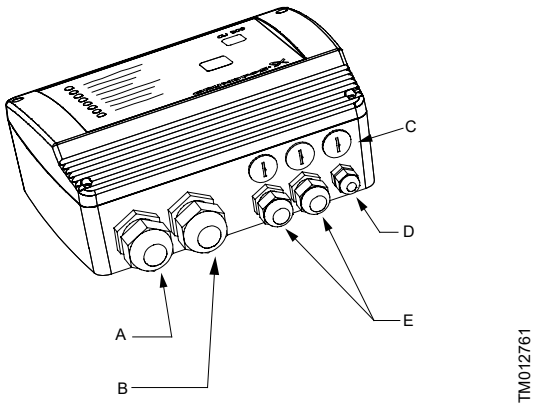
CU 300 incorporates the following features:

- external signal input for two analog sensors and one digital sensor
- relay output for external alarm indication
- control according to the signals received, for example of flow, pressure, water level and conductivity.



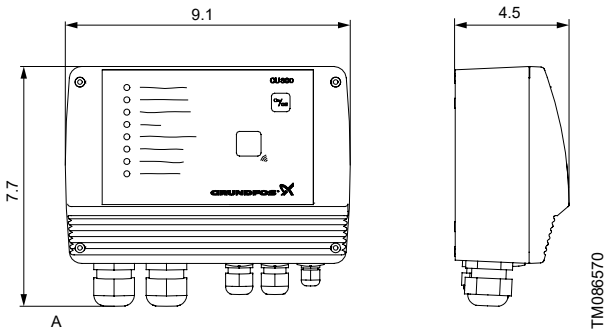
Front view of CU 300

Pos.	Description
A	LED alarm indication
B	ON/OFF button with red and green indicator lights
C	Grundfos GO



Cable entries of CU 300

Pos.	Description
A	Power supply entry
B	Submersible drop cable entry
C	Extra cable entries
D	Fieldbus entry
E	Sensor entries



Dimensional sketch of CU 300

Pos.	Description
A	Dimensions stated in inches.

Benefits of CU 300 and Grundfos GO

CU 300 and Grundfos GO have the following benefits:

- The status of the connection between the pump and CU 300 is monitored.
- The supply voltage is measured.
- Dry-running protection is provided,
- The pump can operate at a moderate undervoltage and overload, thereby ensuring that the motor is not overloaded.
- The pump stops at a too high temperature, and restarts when the motor electronics have cooled sufficiently.
- Overload protection is provided for the motor.
- Sensor can be connected directly to the CU 300, and the sensor signals are monitored.

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Grundfos GO menus for CU 300

Main menus

Status
External setpoint
Controlled from
Motor temperature
Motor speed
Accumulated flow
Power consumption
Energy consumption
Operating hours
Number of starts

Settings
Operating mode
Control mode
Setpoint
Analog input 1
Analog input 2
External setpoint
Warning temperature
Digital input 1
Flow per pulse
Stop limit, accum. flow
Sensor, accum. flow stop
Automatic restarting
Double restarting time
Start delay
Dewatering
Dewatering max. on time
Dewatering max. off time
Dry-running protection
Dry-running stop
Maximum speed
Buttons on product
Number
Store settings
Recall settings
Undo
Unit configuration

Alarms and warnings
Alarm log
Warning log
"Reset alarm" button

Status menu

This menu provides status information only. It is not possible to change settings in this menu.

Accumulated flow

This status item shows the pumped water quantity, and requires connection of an external flowmeter.

Power consumption

This status item shows the actual power consumption of the pump.

Energy consumption

This status item shows the energy consumed by the pump over time.

Operating hours

The number of operating hours and the number of starts are values accumulated from the time of installation and they cannot be reset.

Both values are stored in the motor electronics, and are kept even if CU 300 is replaced.

The number of operating hours is registered every two minutes of continuous operation.

Settings menu

Setpoint

Analog inputs

The analog inputs are used for the connection of sensors. The following parameters are determined in order to set a sensor:

Parameters	Possible settings
Signal type:	Not active, 0-10 V, 2-10 V, 0-20 mA, 4-20 mA.
Sensor unit:	m^3/h, m, %, GPM, ft.
Minimum:	0-249.
Maximum:	1-250.

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5. Pump selection

Determining head and flow

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

Water demand

These data are normally determined by the manufacturers of fittings and sprinkler systems.

Examples of water demand:

Sprinkler systems: 1.5 m^3/h per sprinkler

Domestic water supply: 2-4 m^3/h

Agriculture: 4-6 m^3/h

Irrigation: 6-8 m^3/h

Head

H [m]	**=**	**p_{tap} × 10.2 + H_{geo} + H_f**
p_{tap}	=	required pressure at the draw-off point (for example sprinkler), at least 2 bar
H_{geo}	=	difference of height between lower water level in well and draw-off point
H_f	=	loss of head in piping and tubing

For selection of H_f, see section Pump sizing.

Example of calculation

Application: domestic water supply.

Required flow: 2.4 m^3/h

p_{tap} = 3 bar

H_{geo} = 30 m

H_f = 7.7 m

The tubing is made of a 35-metre plastic pipe of 25 mm diameter.

This will give the following:

H_f = value from table × length of pipe

H_f = 0.22 × 35 m = 7.7 m

H [m] = p_{tap} × 10.2 + H_{geo} + H_f

= 3 × 10.2 + 30 m + 7.7 = 68.3 m

Selected at Q = 2.4 m^3/h, H = 68.3 m

For selection of the pump type best meeting the requirements, see section Pump sizing.

Related information

Pump sizing

How to select an SQ pump

How to select an SQ pump

- A head of 68 m and a flow of 2.4 m^3/h are required.
- The pump type best meeting these requirements is SQ 3. In the curve chart below, draw a rightward horizontal line from the head required 68 m (1) to the intersection with the vertical line from the required flow (2). In this example, the intersection (3) of the two lines is not on one of the pump curves, therefore, follow the pipe characteristic upwards. The intersection of the pump curve and the pipe characteristic (4) gives the size of the pump. The size of the pump is SQ 3-65.
- The pump power input per stage (P2) can be read 0.20 kW (5), and the pump efficiency per stage is 57 % (6).

SQ 3-65 has 5 stages. See section Performance curves and technical data SQ 3, SQ 3-N, SQE 3, SQE 3-N. With 5 stages, the total pump power input for SQ 3-65 is 1.02 kW, (0.20 kW multiplied by 5), which corresponds to an MS 3 1.15 kW motor.

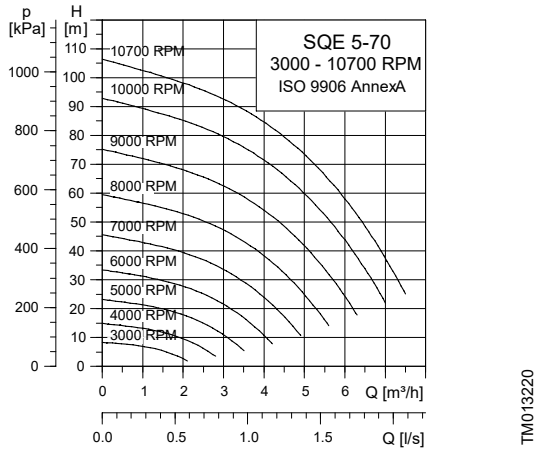
How to select an SQE pump

The procedure for selecting an SQE pump is identical to the procedure for selecting an SQ pump.

Variable speed

The performance of the SQE pump can be adjusted to a specific duty point within its performance range. This is done via CU 300 or CU 301 and Grundfos GO.

The SQE pump is especially ideal in cases when the water consumption varies over time, or the duty point is between two pump curves, as energy savings can be achieved by reducing the performance to the required speed. The figure below shows the performance of an SQE 5-70 pump at various speeds.



Performance curve at various speeds

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Pump sizing

Important: The dry-running protection is effective only within the recommended duty range of the pump, indicated by the bold curves. See performance curves.

Pump type	Input power (P1) [kW]	Flow rate Q [m^3/h] / [l/s]													Max. head [m] (Q = 0 m^3/h)	Rated current $I_{1/1}$ [A]		Pipe connection Rp
		0.5/ 0.14	1.0/ 0.28	1.5/ 0.42	2.0/ 0.56	2.5/ 0.70	3.0/ 0.83	3.5/ 0.97	4.0/ 1.11	5.0/ 1.39	6.0/ 1.67	7.0/ 1.95	8.0/ 2.22	9.0/ 2.50		230 V	200 V	
		Head [m]																
SQ 1-35	0.58	43	34	20	-	-	-	-	-	-	-	-	-	-	47	2.5	2.9	1 1/4
SQ 1-50	0.78	65	52	32	-	-	-	-	-	-	-	-	-	-	71	3.3	4.0	1 1/4
SQ 1-65	1.00	88	70	44	-	-	-	-	-	-	-	-	-	-	94	4.3	5.2	1 1/4
SQ 1-80	1.18	110	89	56	-	-	-	-	-	-	-	-	-	-	118	5.1	6.0	1 1/4
SQ 1-95	1.38	132	107	68	-	-	-	-	-	-	-	-	-	-	142	6.0	7.0	1 1/4
SQ 1-110	1.59	155	125	80	-	-	-	-	-	-	-	-	-	-	166	7.0	8.1	1 1/4
SQ 1-125	1.82	177	144	93	-	-	-	-	-	-	-	-	-	-	189	7.8	9.3	1 1/4
SQ 1-140	2.02	199	162	104	-	-	-	-	-	-	-	-	-	-	213	8.6	10.3	1 1/4
SQ 1-155	2.19	222	180	117	-	-	-	-	-	-	-	-	-	-	237	9.6	11.0	1 1/4
SQ 2-35	0.71	43	42	39	35	29	19	-	-	-	-	-	-	-	45	3.0	3.6	1 1/4
SQ 2- 55	1.00	66	63	60	54	45	32	-	-	-	-	-	-	-	68	4.3	5.2	1 1/4
SQ 2-70	1.27	87	84	79	72	60	43	-	-	-	-	-	-	-	89	5.5	6.4	1 1/4
SQ 2-85	1.55	108	105	99	89	74	54	-	-	-	-	-	-	-	109	6.8	7.9	1 1/4
SQ 2-100	1.86	131	128	120	109	91	67	-	-	-	-	-	-	-	132	8.0	9.5	1 1/4
SQ 2-115	2.11	154	150	142	129	108	79	-	-	-	-	-	-	-	155	9.3	10.6	1 1/4
SQ 2-130	2.30	171	166	157	142	120	88	-	-	-	-	-	-	-	172	10.3	11.5	1 1/4
SQ 3-30	0.70	-	-	34	32	30	26	22	-	-	-	-	-	-	36	3.0	3.6	1 1/4
SQ 3-40	0.99	-	-	53	50	47	42	36	-	-	-	-	-	-	56	4.2	5.1	1 1/4
SQ 3-55	1.25	-	-	70	67	63	56	48	-	-	-	-	-	-	74	5.4	6.6	1 1/4
SQ 3-65	1.52	-	-	87	83	78	70	60	-	-	-	-	-	-	92	6.7	7.8	1 1/4
SQ 3-80	1.82	-	-	105	100	94	85	73	-	-	-	-	-	-	110	7.8	9.3	1 1/4
SQ 3-95	2.09	-	-	123	117	109	99	85	-	-	-	-	-	-	129	9.0	10.7	1 1/4
SQ 3-105	2.33	-	-	140	134	125	113	97	-	-	-	-	-	-	147	10.3	11.7	1 1/4
SQ 3-120	2.35	-	-	152	146	136	123	106	-	-	-	-	-	-	160	10.4	11.8	1 1/4
SQ 5-15	0.53	-	-	-	-	-	15	14	13	11	7	-	-	-	18	2.3	2.7	1 1/2
SQ 5-25	0.92	-	-	-	-	-	31	29	28	24	18	-	-	-	36	3.9	4.7	1 1/2
SQ 5-35	1.29	-	-	-	-	-	46	44	42	36	28	-	-	-	54	5.6	6.5	1 1/2
SQ 5-50	1.70	-	-	-	-	-	62	59	56	49	38	-	-	-	71	7.3	8.7	1 1/2
SQ 5-60	2.08	-	-	-	-	-	77	74	70	61	48	-	-	-	89	8.9	10.6	1 1/2
SQ 5-70	2.43	-	-	-	-	-	93	89	85	73	58	-	-	-	106	10.7	12.0	1 1/2
SQ 7-15	0.73	-	-	-	-	-	-	17	16	14	12	9	6	2	21	3.1	3.7	1 1/2
SQ 7-30	1.26	-	-	-	-	-	-	36	35	32	29	24	18	10	42	5.5	6.4	1 1/2
SQ 7-40	1.81	-	-	-	-	-	-	56	54	50	45	38	29	19	64	7.8	9.3	1 1/2
SQ 7-55								73	71	66	60	52	41	27	107	9.5	10.9	1 1/2

Example

Required:

Flow rate: 2.4 m^3/h

The nearest higher value in the table is 2.5 m^3/h.

Head: 68.3 m

The nearest higher value in the table is 78 m.

Selected:

Pump type: SQ 3-65 (as it offers the best pump efficiency for the required flow and head).

Required pump power input: 1.52 kW

Rated current: $I_{1/1}$ = 6.7 A at 230 V

$I_{1/1}$ = 7.8 A at 200 V

Pipe connection: Rp 1 1/4

Length of pump: 826 mm

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Selection of pressure tank

The electronic unit in the SQ pump ensures a smooth startup. To yield sufficient pressurised water in the period when the pump is not in operation, a pressure tank can be installed in the water supply system.

During startup, the system pressure falls below the cut-in pressure of the pressure switch. This value (p_{min}) is to be determined before sizing the pressure tank.

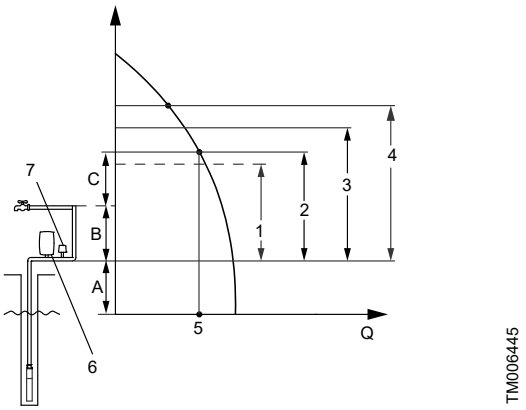
P_{min} is the required minimum pressure at the highest tap point plus head and valve and friction loss from the pressure tank to the highest tap point (C + B).

Furthermore, the flow at p_{min} has to be determined. This is called Q_{max} and is found in the performance curve for the pump type in question.

Use p_{min} and Q_{max} in the table below to find the size of the pressure tank, the precharge pressure of the pressure tank and the cut-in and cut-out pressure settings of the pressure switch.

Note: If a minimum pressure is not required, an 18-litre pressure tank is sufficient for all SQ pumps.

Ensure that the selected pump can deliver a pressure higher than $p_{cut-out}$ + A.



System with pressure tank

Pos.	Description
1	p_{pre}
2	p_{min}
3	p_{cut-in}
4	$p_{cut-out}$
5	Q_{max}
6	Pressure tank
7	Pressure switch
p_{pre}:	precharge pressure of the pressure tank
p_{min}:	required minimum pressure
p_{cut-in}:	cut-in pressure of the pressure switch
$p_{cut-out}$:	cut-out pressure of the pressure switch
Q_{max}:	flow at p_{min}
A:	head plus pipe friction loss from dynamic water level to pressure tank
B:	head plus pipe friction loss from pressure tank to the top tap point
C:	minimum pressure at the highest point

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p_{min} [m]	Q_{max} [m³/h]																		p_{pre} [m]	p_{cut-in} [m]	$p_{cut-out}$ [m]
	0.6	0.8	1	1.2	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8			
	Pressure tank size [litres]																				
25	8	8	18	18	18	18	24	33	33	50	50	50	50	80	80	80	80	80	22.5	26	40
30	8	8	18	18	18	24	33	33	50	50	50	50	80	80	80	80	80		27	31	45
35	8	18	18	18	18	24	33	33	50	50	50	80	80	80	80	80			31.5	36	50
40	8	18	18	18	18	24	33	50	50	50	80	80	80	80	80				36	41	55
45	8	18	18	18	24	33	33	50	50	50	80	80	80	80					40.5	46	60
50	8	18	18	18	24	33	50	50	50	80	80	80	80						45	51	65
55	18	18	18	18	24	33	50	50	50	80	80	80							49.5	56	70
60	18	18	18	18	24	33	50	50	80	80	80	80							54	61	75
65	18	18	18	24	24	33	50	50	80	80	80	80							58.5	66	80

Note: The pressure tank sizes stated in the table are minimum requirements. We recommend that you use a tank one size bigger.

1 m head = 0.098 bar

Example

p_{min} = 45 m, Q_{max} = 2.5 m³/h

The following values are found in the table:

Minimum size of pressure tank = 33 litres

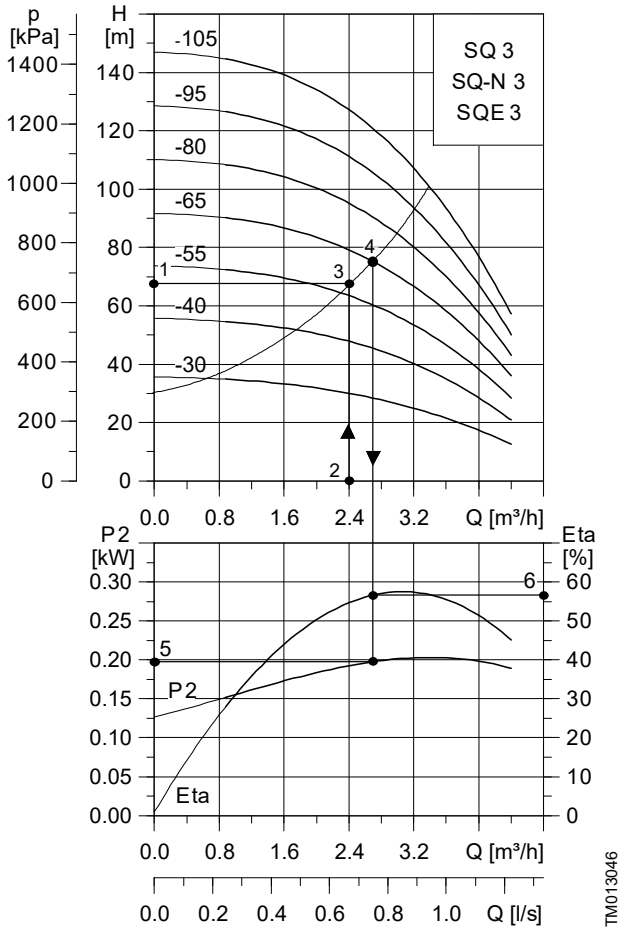
p_{pre} = 40.5 m

p_{cut-in} = 46 m

$p_{cut-out}$ = 60 m.

Example

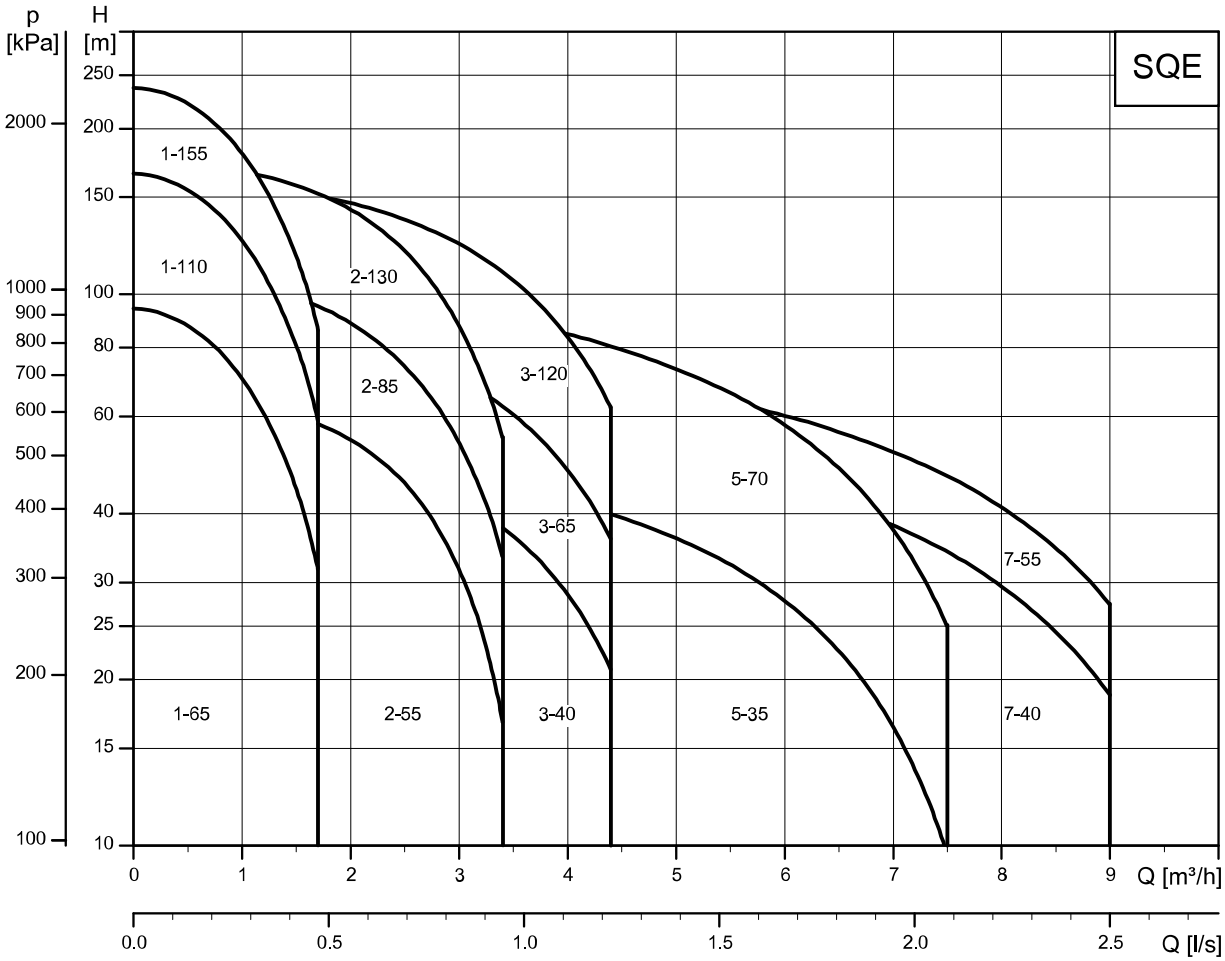
How to select an SQE pump



Pump selection in steps

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Selecting the right pump for the SQE constant-pressure system



How to select an SQE pump

Example

Required:

Total head (from water level to water tap, including friction loss): 25 m **(A)**.

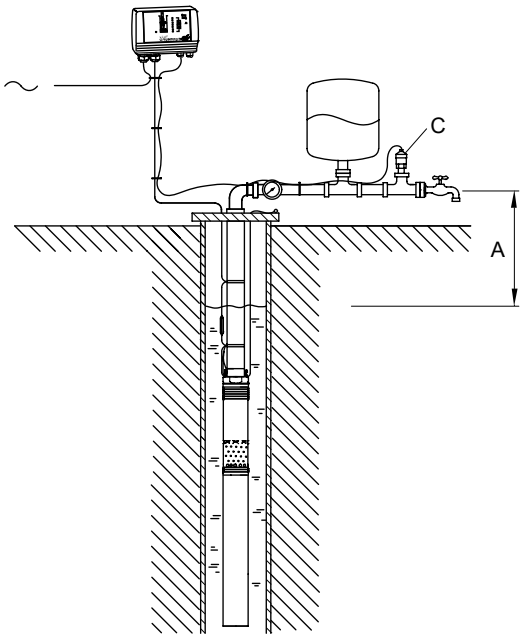
Maximum flow rate: 3 m^3/h **(B)**.

System pressure: 3.5 bar **(C)**.

Selected:

Pump type: SQE 3-65.

The system pressure can be adjusted to any constant pressure from 2 to 4 bars **(D)**.



Parameters A and C for selection of an SQE pump

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Head losses (H_f) in plastic pipes and ordinary water pipes

Upper figures indicate the velocity of water in metre per secundum (m/s).
Lower figures indicate head loss in metres per 100 metres of straight pipes.

Quantity of water			Plastic pipes [2] (PELM/PEH PN 10 PELM)				Ordinary water pipes [3]				
			Nominal pipe diameter and internal diameter in mm				Nominal pipe diameter in inches and internal diameter in mm				
m^3/h	Litres/min.	Litres/sec.	25 20.4	32 26.2	40 32.6	50 40.8	1/2 15.75	3/4 21.25	1 27.00	1 1/4 35.75	1 1/2 41.25
0.6	10	0.16	0.49 1.8	0.30 0.66	0.19 0.27	0.12 0.085	0.855 9.910	0.470 2.407	0.292 0.784	-	-
0.9	15	0.25	0.76 4.0	0.46 1.14	0.3 0.6	0.19 0.18	1.282 20.11	0.705 4.862	0.438 1.570	0.249 0.416	-
1.2	20	0.33	1.0 6.4	0.61 2.2	0.39 0.9	0.25 0.28	1.710 33.53	0.940 8.035	0.584 2.588	0.331 0.677	0.249 0.346
1.5	25	0.42	1.3 10.0	0.78 3.5	0.5 1.4	0.32 0.43	2.138 49.93	1.174 11.91	0.730 3.834	0.415 1.004	0.312 0.510
1.8	30	0.50	1.53 13.0	0.93 4.6	0.6 1.9	0.38 0.57	2.565 69.34	1.409 16.50	0.876 5.277	0.498 1.379	0.374 0.700
2.1	35	0.58	1.77 16.0	1.08 6.0	0.69 2.0	0.44 0.70	2.993 91.54	1.644 21.75	1.022 6.949	0.581 1.811	0.436 0.914
2.4	40	0.67	2.05 22.0	1.24 7.5	0.80 3.3	0.51 0.93	-	1.879 27.66	1.168 8.820	0.664 2.290	0.499 1.160
3.0	50	0.83	2.54 37.0	1.54 11.0	0.99 4.8	0.63 1.40	-	2.349 41.40	1.460 13.14	0.830 3.403	0.623 1.719
3.6	60	1.00	3.06 43.0	1.85 15.0	1.2 6.5	0.76 1.90	-	2.819 57.74	1.751 18.28	0.996 4.718	0.748 2.375
4.2	70	1.12	3.43 50.0	2.08 18.0	1.34 8.0	0.86 2.50	-	3.288 76.49	2.043 24.18	1.162 6.231	0.873 3.132
4.8	80	1.33	-	2.47 25.0	1.59 10.5	1.02 3.00	-	-	2.335 30.87	1.328 7.940	0.997 3.988
5.4	90	1.50	-	2.78 30.0	1.8 12.0	1.15 3.50	-	-	2.627 38.30	1.494 9.828	1.122 4.927
6.0	100	1.67	-	3.1 39.0	2.0 16.0	1.28 4.6	-	-	2.919 46.49	1.660 11.90	1.247 5.972
7.5	125	2.08	-	3.86 50.0	2.49 24.0	1.59 6.6	-	-	3.649 70.41	2.075 17.93	1.558 8.967
9.0	150	2.50	-	-	3.00 33.0	1.91 8.6	-	-	-	2.490 25.11	1.870 12.53
10.5	175	2.92	-	-	3.5 38.0	2.23 11.0	-	-	-	2.904 33.32	2.182 16.66
90° bends, slide valves							1.0	1.0	1.1	1.2	1.3
T-pieces, non-return valves							4.0	4.0	4.0	5.0	5.0

[2] The table is based on a nomogram.
Roughness: K = 0.01 mm.
Water temperature: t = 10 °C.

[3] The data are calculated in accordance with H. Lang's new formula a = 0.02, and for a water temperature of 10 °C. The head loss in bends, slide valves, T-pieces and non-return valves is equivalent to the metres of straight pipes stated in the last two lines of the table.

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Curve conditions

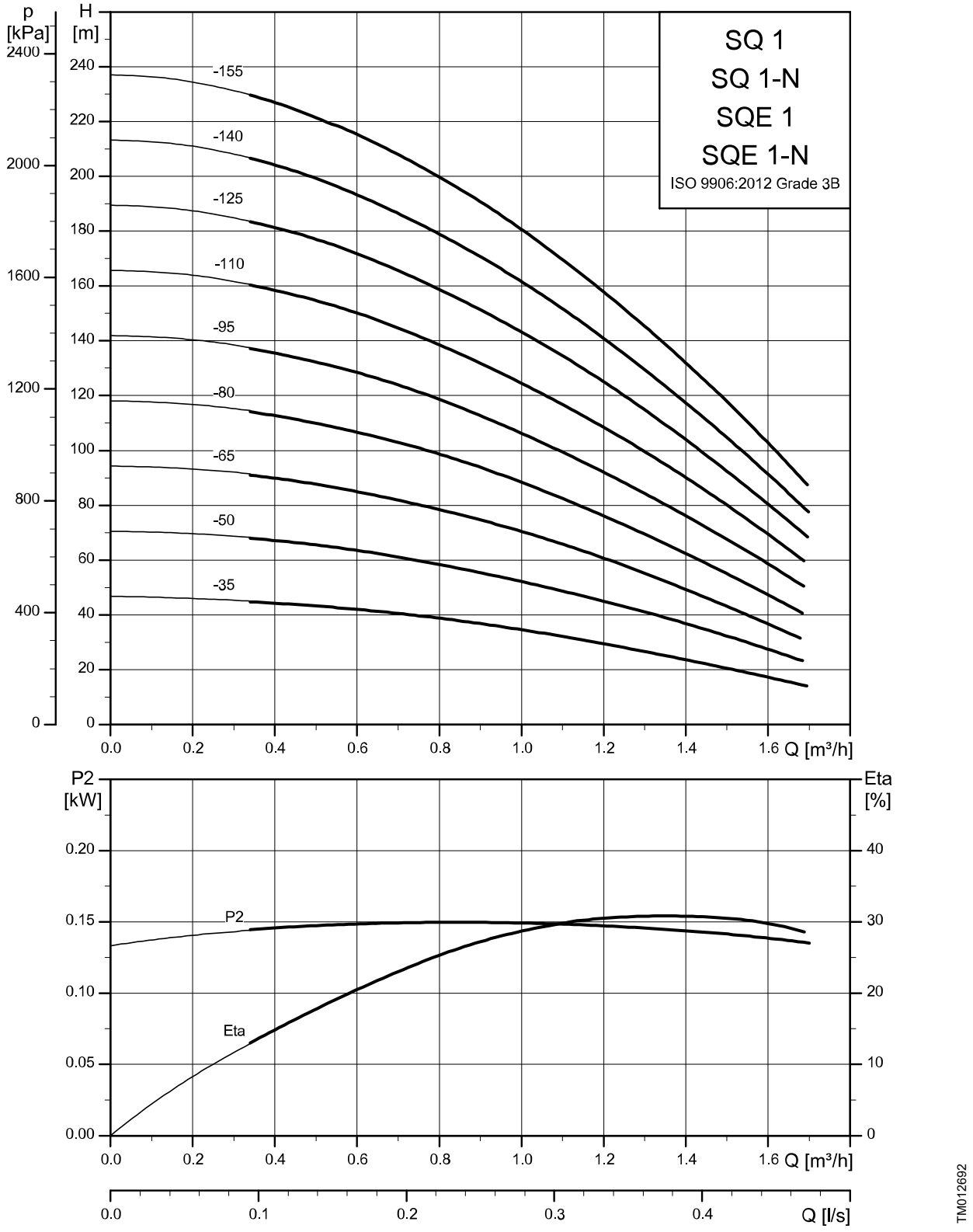
The guidelines below apply to the performance curves in section Performance curves and technical data:

- Tolerances are according to ISO 9906:2012 Grade 3, thus all curves show mean values.
- The curves must not be used as guarantee curves.
- The bold curves show the recommended duty range.
- The measurements were made with airless water at a temperature of 20 °C.
- The conversion between head H [m] and pressure p [kPa] applies to water with a density of 1,000 kg/m^3.
- The curves apply to a kinematic viscosity of 1 mm^2/s (1 cSt). If the pump is used for liquids with a viscosity higher than that of water, it will reduce the head and increase the power consumption.
- Q/H: The curves include valve and inlet losses at the actual speed.
- Power curve: P2 shows pump power input per stage.
- Efficiency curve: Eta shows pump efficiency per stage.

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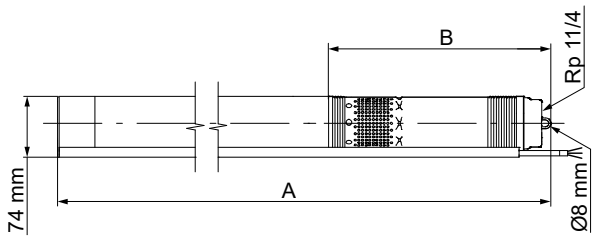
6. Performance curves and technical data

SQ 1, SQ 1-N, SQE 1, SQE 1-N



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Dimensions and weights



TM085137

Pump type	Number of stages	Motor		Dimensions [mm]		Net weight [4]	Shipping volume [4]
		Type	Output power (P2) [kW]	A	B	[kg]	[m³]
SQ 1-35 (-N)	2	MS 3 (-N)	0.70	740	257	4.4	0.0092
SQE 1-35 (-N)		MSE 3 (-N)					
SQ 1-50 (-N)	3	MS 3 (-N)	0.70	740	257	4.4	0.0092
SQE 1-50 (-N)		MSE 3 (-N)					
SQ 1-65 (-N)	4	MS 3 (-N)	0.70	767	24	4.6	0.0094
SQE 1-65 (-N)		MSE 3 (-N)					
SQ 1-80 (-N)	5	MS 3 (-N)	1.15	822	339	5.2	0.0100
SQE 1-80 (-N)		MSE 3 (-N)					
SQ 1-95 (-N)	6	MS 3 (-N)	1.15	822	339	5.2	0.0100
SQE 1-95 (-N)		MSE 3 (-N)					
SQ 1-110 (-N)	7	MS 3 (-N)	1.15	849	366	5.3	0.0103
SQE 1-110 (-N)		MSE 3 (-N)					
SQ 1-125 (-N)	8	MS 3 (-N)	1.55	939	420	6.2	0.0113
SQE 1-125 (-N)		MSE 3 (-N)					
SQ 1-140 (-N)	9	MS 3 (-N)	1.55	939	420	6.2	0.0113
SQE 1-140 (-N)		MSE 3 (-N)					
SQ 1-155 (-N)	10	MS 3 (-N)	1.55	966	447	6.5	0.0116
SQE 1-155 (-N)		MSE 3 (-N)					

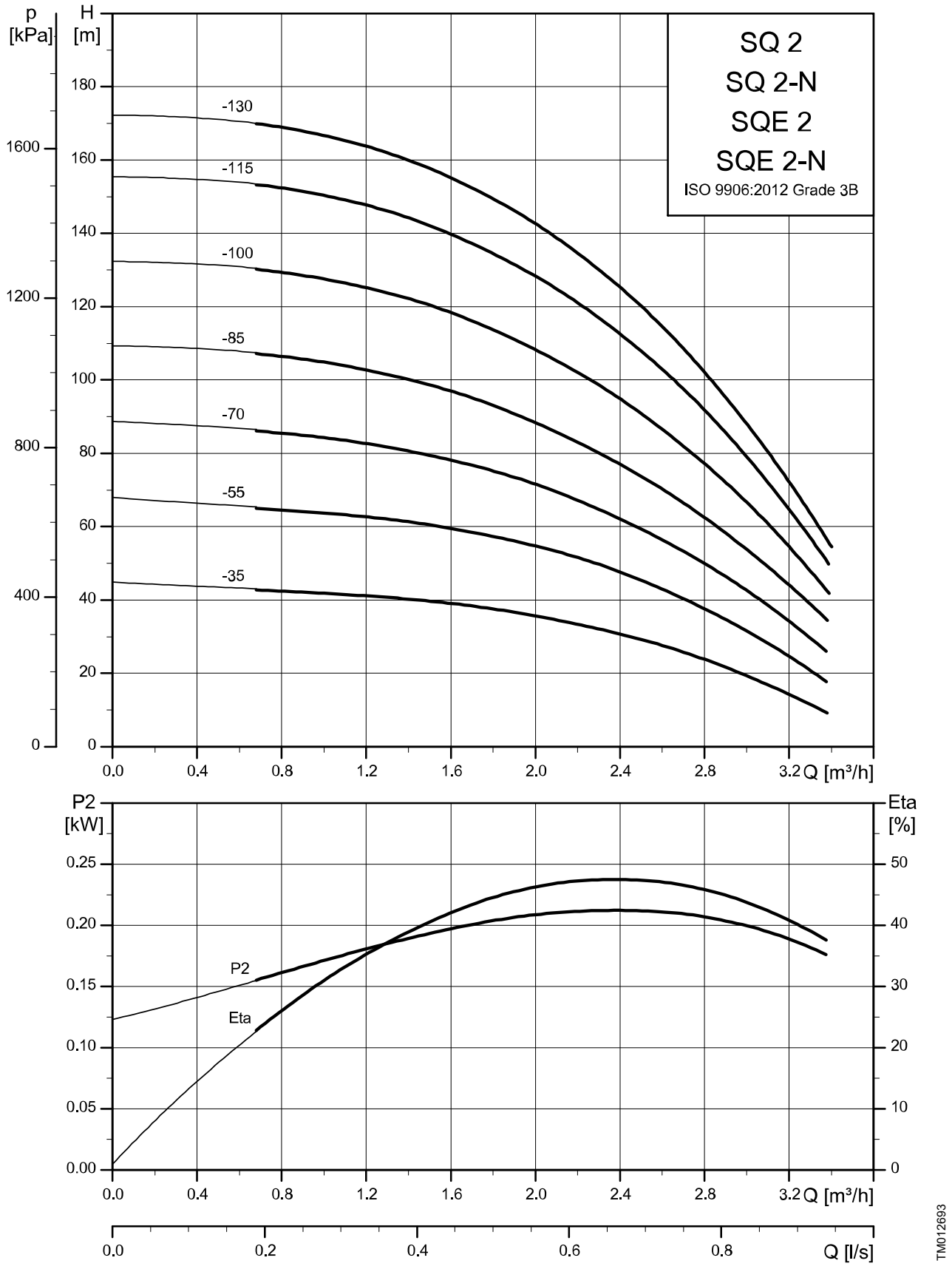
4) Including pump, motor, 1.5-metre cable and cable guard.

Electrical data, 1 × 200-240 V, 50/60 Hz

Pump type	Motor type	Input power, motor (P1) [kW]	Output power, motor (P2) [kW]	Required input power, pump [kW]	Rated current $I_{1/1}$ [A]		Rated motor efficiency (η) [%]
					230 V	200 V	
SQ 1-35 (-N)	MS 3 (-N)	0.58	0.70	0.37	2.5	2.9	70
SQE 1-35 (-N)	MSE 3 (-N)						
SQ 1-50 (-N)	MS 3 (-N)	0.78	0.70	0.52	3.3	4.0	70
SQE 1-50 (-N)	MSE 3 (-N)						
SQ 1-65 (-N)	MS 3 (-N)	1.00	0.70	0.68	4.3	5.2	70
SQE 1-65 (-N)	MSE 3 (-N)						
SQ 1-80 (-N)	MS 3 (-N)	1.18	1.15	0.84	5.1	6.0	73
SQE 1-80 (-N)	MSE 3 (-N)						
SQ 1-95 (-N)	MS 3 (-N)	1.38	1.15	0.99	6.0	7.0	73
SQE 1-95 (-N)	MSE 3 (-N)						
SQ 1-110 (-N)	MS 3 (-N)	1.59	1.15	1.15	7.0	8.1	73
SQE 1-110 (-N)	MSE 3 (-N)						
SQ 1-125 (-N)	MS 3 (-N)	1.82	1.55	1.31	7.8	9.3	74
SQE 1-125 (-N)	MSE 3 (-N)						
SQ 1-140 (-N)	MS 3 (-N)	2.02	1.55	1.47	8.6	10.3	74
SQE 1-140 (-N)	MSE 3 (-N)						
SQ 1-155 (-N)	MS 3 (-N)	2.19	1.85	1.62	9.6	11.0	74
SQE 1-155 (-N)	MSE 3 (-N)						

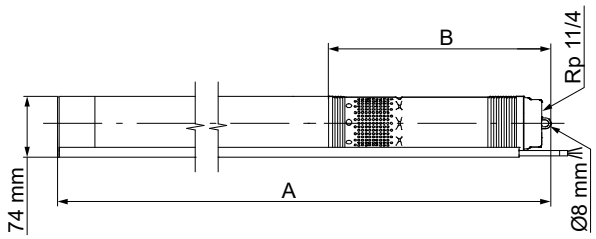
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SQ 2, SQ 2-N, SQE 2, SQE 2-N



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Dimensions and weights



TM085137

Pump type	Number of stages	Motor		Dimensions [mm]		Net weight [kg] [5]	Shipping volume [m^3] [5]
		Type	Output power (P2) [kW]	A	B		
SQ 2-35 (-N)	2	MS 3 (-N)	0.70	740	257	4.4	0.0092
SQE 2-35 (-N)		MSE 3 (-N)					
SQ 2-55 (-N)	3	MS 3 (-N)	0.70	740	257	4.4	0.0092
SQE 2-55 (-N)		MSE 3 (-N)					
SQ 2-70 (-N)	4	MS 3 (-N)	1.15	767	24	5.0	0.0094
SQE 2-70 (-N)		MSE 3 (-N)					
SQ 2-85 (-N)	5	MS 3 (-N)	1.15	822	339	5.2	0.0100
SQE 2-85 (-N)		MSE 3 (-N)					
SQ 2-100 (-N)	6	MS 3 (-N)	1.55	858	339	5.9	0.0104
SQE 2-100 (-N)		MSE 3 (-N)					
SQ 2-115 (-N)	7	MS 3 (-N)	1.85	885	366	6.2	0.0107
SQE 2-115 (-N)		MSE 3 (-N)					
SQE 2-130 (-N)	8	MS 3 (-N)	1.85	939	420	6.4	0.0125
		MSE 3 (-N)					

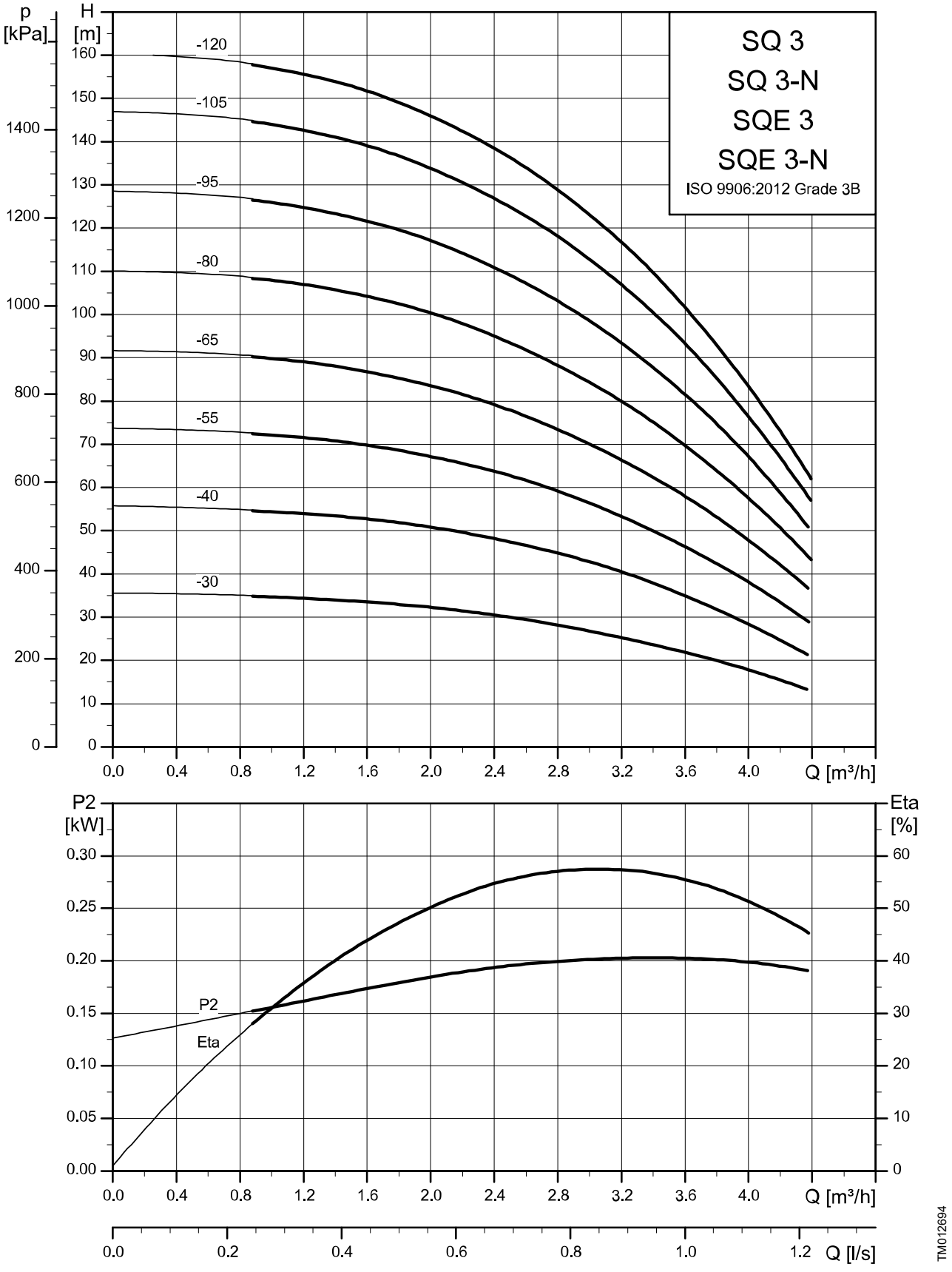
[5] Including pump, motor, 1.5-metre cable and cable guard.

Electrical data, 1 × 200-240 V, 50/60 Hz

Pump type	Motor type	Input power, motor (P1) [kW]	Output power, motor (P2) [kW]	Required input power, pump [kW]	Rated current $I_{1/1}$ [A]		Rated motor efficiency (η) [%]
					230 V	200 V	
SQ 2-35 (-N)	MS 3 (-N)	0.71	0.70	0.47	3.0	3.6	70
SQE 2-35 (-N)	MSE 3 (-N)						
SQ 2-55 (-N)	MS 3 (-N)	1.00	0.70	0.69	4.3	5.2	70
SQE 2-55 (-N)	MSE 3 (-N)						
SQ 2-70 (-N)	MS 3 (-N)	1.27	1.15	0.91	5.5	6.4	73
SQE 2-70 (-N)	MSE 3 (-N)						
SQ 2-85 (-N)	MS 3 (-N)	1.55	1.15	1.13	6.8	7.9	73
SQE 2-85 (-N)	MSE 3 (-N)						
SQ 2-100 (-N)	MS 3 (-N)	1.86	1.55	1.35	8.0	9.5	74
SQE 2-100 (-N)	MSE 3 (-N)						
SQ 2-115 (-N)	MS 3 (-N)	2.11	1.85	1.57	9.3	10.6	74
SQE 2-115 (-N)	MSE 3 (-N)						
SQ 2-130 (-N)	MS 3 (-N)	2.30	1.85	1.73	10.3	11.5	74
SQE 2-130 (-N)	MSE 3 (-N)						

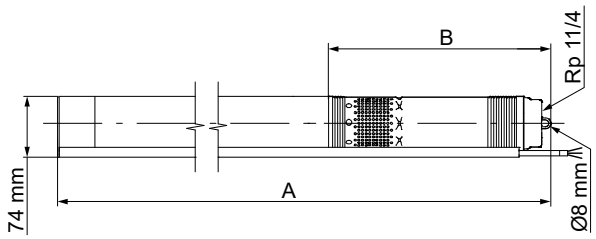
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SQ 3, SQ 3-N, SQE 3, SQE 3-N



Authorized distributor
SQ SQE
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Dimensions and weights



TM085137

Pump type	Number of stages	Motor		Dimensions [mm]		Net weight [kg] [6]	Shipping volume [m^3] [6]
		Type	Output power (P2) [kW]	A	B		
SQ 3-30 (-N)	2	MS 3 (-N)	0.70	740	257	4.4	0.0092
SQE 3-30 (-N)		MSE 3 (-N)					
SQ 3-40 (-N)	3	MS 3 (-N)	0.70	740	257	4.4	0.0092
SQE 3-40 (-N)		MSE 3 (-N)					
SQ 3-55 (-N)	4	MS 3 (-N)	1.15	767	24	5.0	0.0094
SQE 3-55 (-N)		MSE 3 (-N)					
SQ 3-65 (-N)	5	MS 3 (-N)	1.15	822	339	5.2	0.0100
SQE 3-65 (-N)		MSE 3 (-N)					
SQ 3-80 (-N)	6	MS 3 (-N)	1.55	858	339	5.9	0.0104
SQE 3-80 (-N)		MSE 3 (-N)					
SQ 3-95 (-N)	7	MS 3 (-N)	1.55	885	366	6.0	0.0107
SQE 3-95 (-N)		MSE 3 (-N)					
SQ 3-105 (-N)	8	MS 3 (-N)	1.85	939	420	6.4	0.0125
SQE 3-105 (-N)		MSE 3 (-N)					
SQ 3-120 (-N)	9	MS 3 (-N)	1.85	939	420	6.4	0.0125
SQE 3-120 (-N)		MSE 3 (-N)					

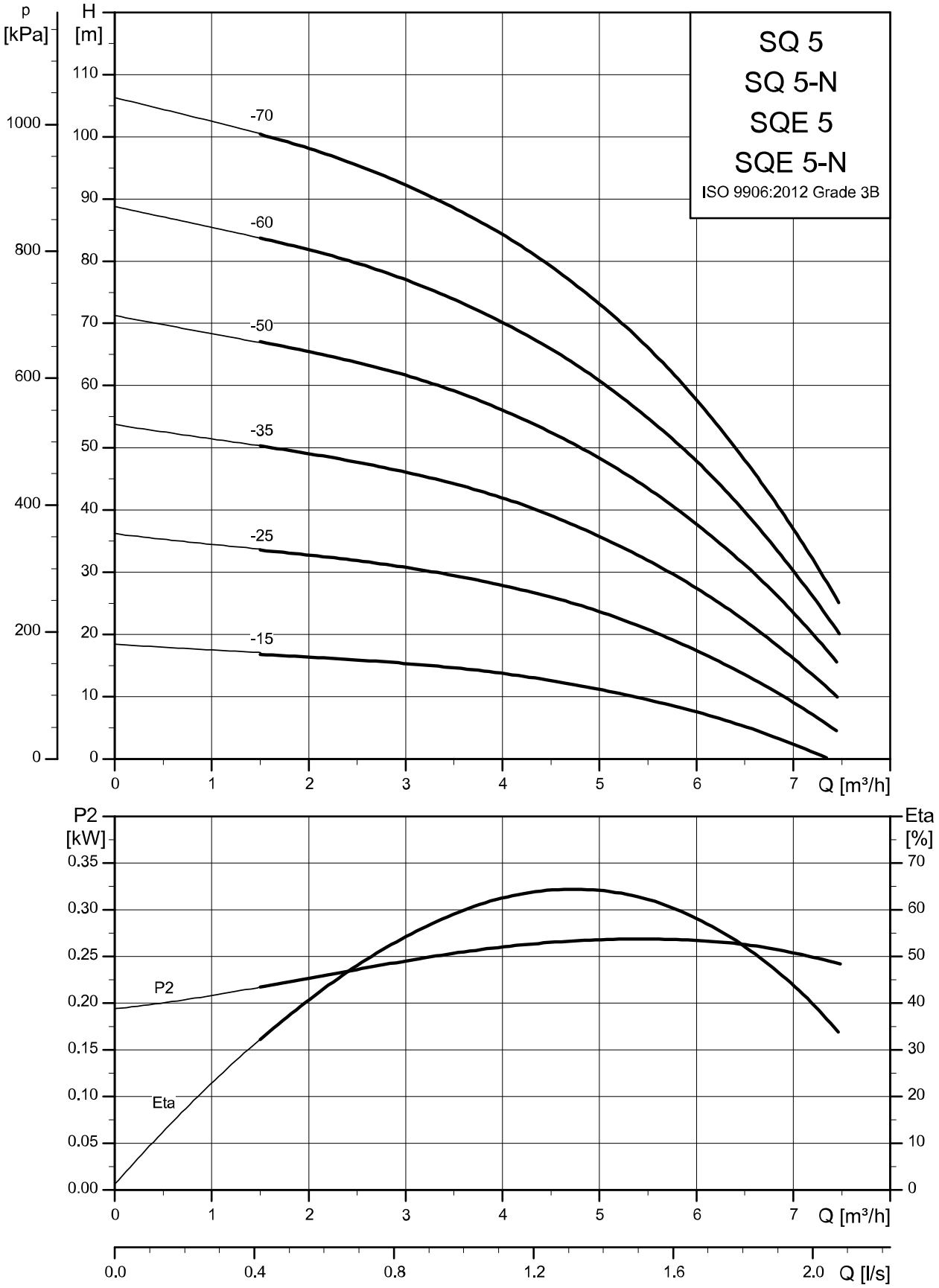
[6] Including pump, motor, 1.5-metre cable and cable guard.

Electrical data, 1 × 200-240 V, 50/60 Hz

Pump type	Motor type	Input power, motor (P1) [kW]	Output power, motor (P2) [kW]	Required input power, pump [kW]	Rated current $I_{1/1}$ [A]		Rated motor efficiency (η) [%]
					230 V	200 V	
SQ 3-30 (-N)	MS 3 (-N)	0.70	0.70	0.46	3.0	3.6	70
SQE 3-30 (-N)	MSE 3 (-N)						
SQ 3-40 (-N)	MS 3 (-N)	0.99	0.70	0.68	4.2	5.1	70
SQE 3-40 (-N)	MSE 3 (-N)						
SQ 3-55 (-N)	MS 3 (-N)	1.25	1.15	0.89	5.4	6.3	73
SQE 3-55 (-N)	MSE 3 (-N)						
SQ 3-65 (-N)	MS 3 (-N)	1.52	1.15	1.10	6.7	7.8	73
SQE 3-65 (-N)	MSE 3 (-N)						
SQ 3-80 (-N)	MS 3 (-N)	1.82	1.55	1.31	7.8	9.3	74
SQE 3-80 (-N)	MSE 3 (-N)						
SQ 3-95 (-N)	MS 3 (-N)	2.09	1.55	1.52	9.0	10.7	74
SQE 3-95 (-N)	MSE 3 (-N)						
SQ 3-105 (-N)	MS 3 (-N)	2.33	1.85	1.74	10.3	11.7	74
SQE 3-105 (-N)	MSE 3 (-N)						
SQ 3-120 (-N)	MS 3 (-N)	2.35	1.85	1.76	10.4	11.8	74
SQE 3-120 (-N)	MSE 3 (-N)						

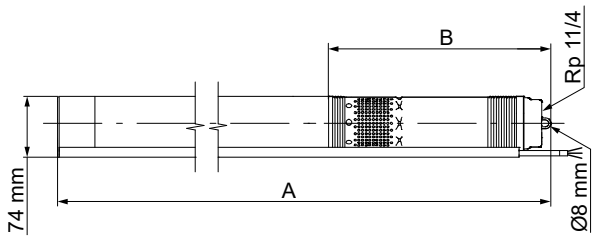
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SQ 5, SQ 5-N, SQE 5, SQE 5-N



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SQ SQE

Dimensions and weights



TM085137

Pump type	Number of stages	Motor		Dimensions [mm]		Net weight [kg] [7]	Shipping volume [m^3] [7]
		Type	Output power (P2) [kW]	A	B		
SQ 5-15 (-N)	1	MS 3 (-N)	0.70	740	257	4.4	0.0092
SQE 5-15 (-N)		MSE 3 (-N)					
SQ 5-25 (-N)	2	MS 3 (-N)	0.70	740	257	4.4	0.0092
SQE 5-25 (-N)		MSE 3 (-N)					
SQ 5-35 (-N)	3	MS 3 (-N)	1.15	821	338	5.2	0.0100
SQE 5-35 (-N)		MSE 3 (-N)					
SQ 5-50 (-N)	4	MS 3 (-N)	1.55	857	338	5.9	0.0104
SQE 5-50 (-N)		MSE 3 (-N)					
SQ 5-60 (-N)	5	MS 3 (-N)	1.55	93	419	6.2	0.0113
SQE 5-60 (-N)		MSE 3 (-N)					
SQ 5-70 (-N)	6	MS 3 (-N)	1.85	93	419	6.4	0.0113
SQE 5-70 (-N)		MSE 3 (-N)					

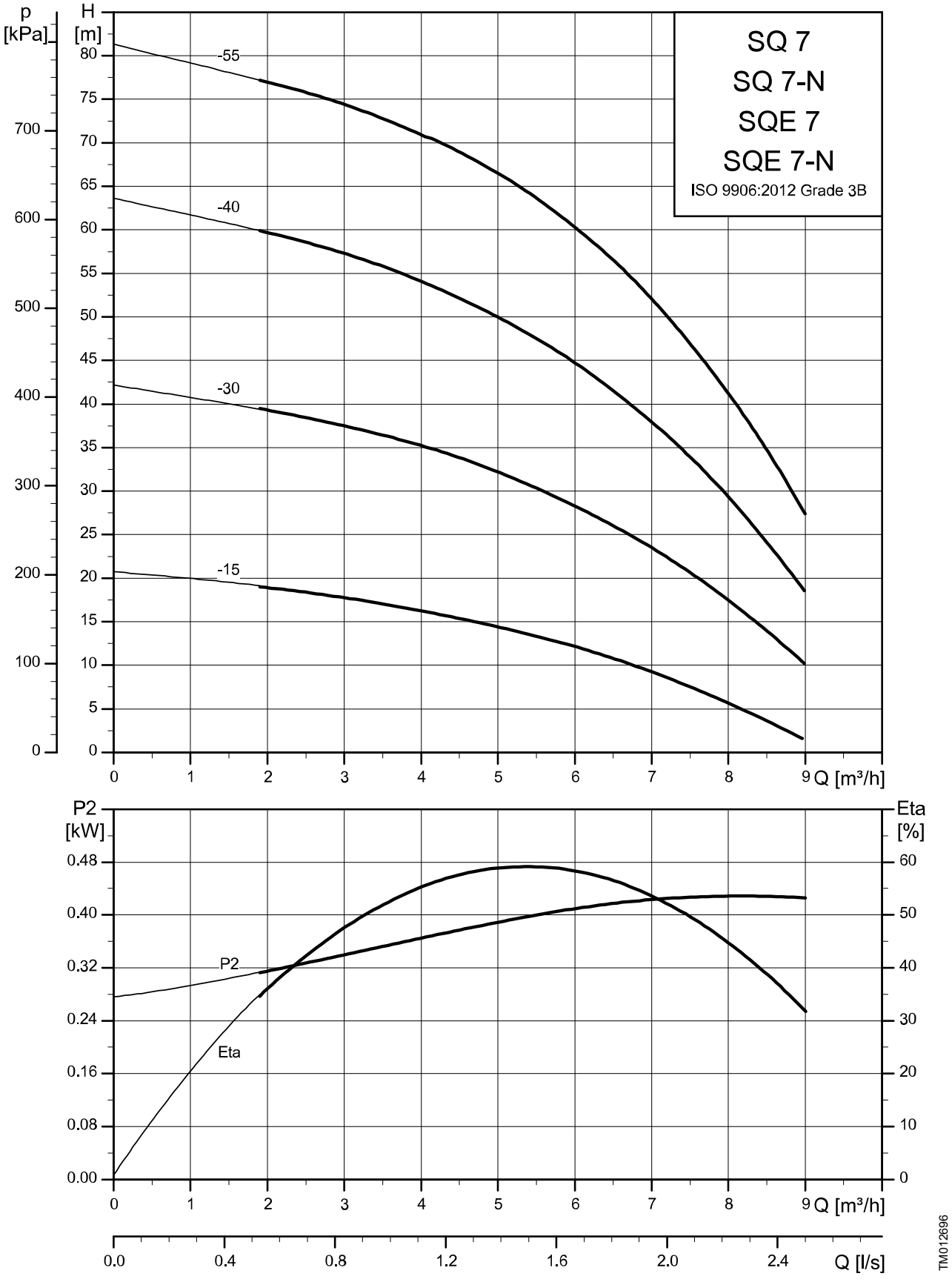
7) Including pump, motor, 1.5-metre cable and cable guard.

Electrical data, 1 × 200-240 V, 50/60 Hz

Pump type	Motor type	Input power, motor (P1) [kW]	Output power, motor (P2) [kW]	Required input power, pump [kW]	Rated current $I_{1/1}$ [A]		Rated motor efficiency (η) [%]
					230 V	200 V	
SQ 5-15 (-N)	MS 3 (-N)	0.53	0.70	0.33	2.3	2.7	70
SQE 5-15 (-N)	MSE 3 (-N)						
SQ 5-25 (-N)	MS 3 (-N)	0.92	0.70	0.63	3.9	4.7	70
SQE 5-25 (-N)	MSE 3 (-N)						
SQ 5-35 (-N)	MS 3 (-N)	1.29	1.15	0.92	5.6	6.5	70
SQE 5-35 (-N)	MSE 3 (-N)						
SQ 5-50 (-N)	MS 3 (-N)	1.70	1.55	1.22	7.3	8.7	74
SQE 5-50 (-N)	MSE 3 (-N)						
SQ 5-60 (-N)	MS 3 (-N)	2.08	1.55	1.51	8.9	10.6	74
SQE 5-60 (-N)	MSE 3 (-N)						
SQ 5-70 (-N)	MS 3 (-N)	2.43	1.85	1.81	10.7	12.0	74
SQE 5-70 (-N)	MSE 3 (-N)						

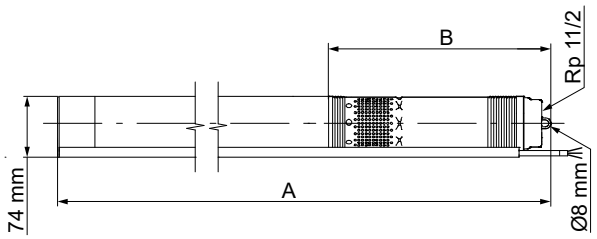
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SQ 7, SQ 7-N, SQE 7, SQE 7-N



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Dimensions and weights



TM085138

Pump type	Number of stages	Motor		Dimensions [mm]		Net weight [kg] [8]	Shipping volume [m^3] [8]
		Type	Output power (P2) [kW]	A	B		
SQ 7-15 (-N)	1	MS 3 (-N)	0.7	740	257	4.4	0.0092
SQE 7-15 (-N)		MSE 3 (-N)					
SQ 7-30 (-N)	2	MS 3 (-N)	1.15	740	257	4.8	0.0092
SQE 7-30 (-N)		MSE 3 (-N)					
SQ 7-40 (-N)	3	MS 3 (-N)	1.55	857	338	5.9	0.0125
SQE 7-40 (-N)		MSE 3 (-N)					
SQ 7-55 (-N)	4	MS 3 (-N)	1.85	857	338	6.1	0.0125
SQE 7-55 (-N)		MSE 3 (-N)					

[8] Including pump, motor, 1.5-metre cable and cable guard.

Electrical data, 1 × 200-240 V, 50/60 Hz

Pump type	Input power, motor (P1) [kW]	Output power, motor (P2) [kW]	Required input power, pump [kW]	Rated current $I_{1/1}$ [A]		Rated motor efficiency (η) [%]
				230 V	200 V	
SQ 7-15 (-N)	0.73	0.70	0.48	3.1	3.7	70
SQE 7-15 (-N)						
SQ 7-30 (-N)	1.26	1.15	0.90	5.5	6.4	73
SQE 7-30 (-N)						
SQ 7-40 (-N)	1.81	1.55	1.31	7.8	9.3	74
SQE 7-40 (-N)						
SQ 7-55 (-N)	2.18	1.85	1.65	9.5	10.9	74
SQE 7-55 (-N)						

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7. Technical data

SQ and SQE pumps

Mains supply to pump	1 × 200-240 V -10 % / +6 %, 50/60 Hz, PE 1 × 100-115 V -10 % / +6 %, 50/60 Hz, PE
Starting	Soft starting
Stopping	Soft stopping when stopped by CU 300 or CU 301
Run-up time	Maximum 3 seconds No limitation to the number of starts/stops per hour
Motor protection	There is built-in motor protection against the following: • dry running • overvoltage and undervoltage (cuts out below 150 V and above 315 V) • overload • overtemperature.
Sound pressure level	The sound pressure level is lower than the limiting values stated in the EC Machinery Directive.
Radio noise	SQ and SQE pumps comply with the EMC Directive (2014/30/EU). Standards used: EN 55014-1:2006 + A1:2009 + A2:2011, EN 55014-2:1997 + A1:2001 + A2:2008, EN 61000-3-2:2014 and EN 61000-3-3:2013.
Reset function	SQE pumps can be reset via CU 300 or CU 301
Power factor	PF = 1
Operation via generator	We recommend that the generator output be equal to the motor input power (P1) plus 50 %, and at least (P1) plus 10 %.
Earth leakage circuit breaker	If the pump is connected to an electric installation where an earth leakage circuit breaker (ELCB) is used as an additional protection, the circuit breaker must trip when earth fault currents with pulsating DC content occur.
Pipe connection	SQ 1, SQ 2, SQ 3: Rp 1 1/4 SQ 5, SQ 7: Rp 1 1/2 (Male thread must be R type)
Borehole diameter	Minimum 76 mm
Installation depth	The installation depth must be maximum 150 m below the static water table (15 bar). For horizontal installation, flow sleeve is recommended. The installation depth below dynamic water level (in either horizontal or vertical installation) must be 0.5 m.
NPSH	Minimum 8 m
Strainer	Holes in the suction strainer: ∅2.3 mm
Pumped liquids	SQ, SQE (EN 1.4301), SQ-N (EN 1.4401): pH 5 to 9.

Factory settings

Alarm	**200-240 V motors**				**100-115 V motors**
	0.7 kW	**1.15 kW**	**1.55 kW**	**1.85 kW**	**0.7 kW**
Overvoltage [9]	280 VAC	280 VAC	280 VAC	280 VAC	150 VAC
Undervoltage	Speed reduction: 198 V	Speed reduction: 198 V	Speed reduction: 207 V	Speed reduction: 207 V	Speed reduction: 90 V
	Stop limit: 150 V	Stop limit: 150 V	Stop limit: 150 V	Stop limit: 150 V	Stop limit: 75 V
Dry-running stop	300 W 550 W [10]	680 W	800 W	900 W	300 W
Speed reduction	In connection with undervoltage or overload				
Electronics temperature	Stop limit: 60 °C	Stop limit: 65 °C	Stop limit: 65 °C	Stop limit: 70 °C	Stop limit: 70 °C
	Restart: 50 °C	Restart: 55 °C	Restart: 55 °C	Restart: 60 °C	Restart: 60 °C
Overload	5.2 A	8.4 A	11 A	12 A	12 A

9) 200-240 V motors: Operation is guaranteed up to 280 VAC.
100-115 V motors: Operation is guaranteed up to 150 VAC,
In order to avoid unnecessary stops, the overvoltage stop limit is as stated.

10) Applies only to SQ/SQE 2-55.

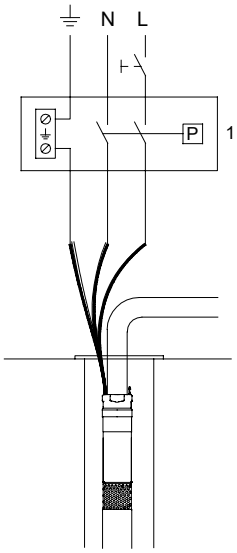
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SQ SQE

CU 300 and CU 301 control units

Voltage	1 × 100-240 V -10 % / +6 %, 50/60 Hz, PE
Power consumption	5 W
Current consumption	Maximum 130 mA
Enclosure class	IP55
Ambient temperature	During operation: -30 °C to +50 °C During storage: -30 °C to +60 °C
Relative humidity	95 %
Pump cable	Maximum length between CU 300 or CU 301 and pump: 300 m
Backup fuse	Maximum 16 A
Radio noise	CU 300 and CU 301 comply with the EMC Directive (2014/30/EU). The standard used is EN 60730-1:2016.
Marking	CE
Load	Maximum 100 mA

Mains connection of pump via pressure switch

The pressure switch must be rated to the maximum amps of the specific pump size.

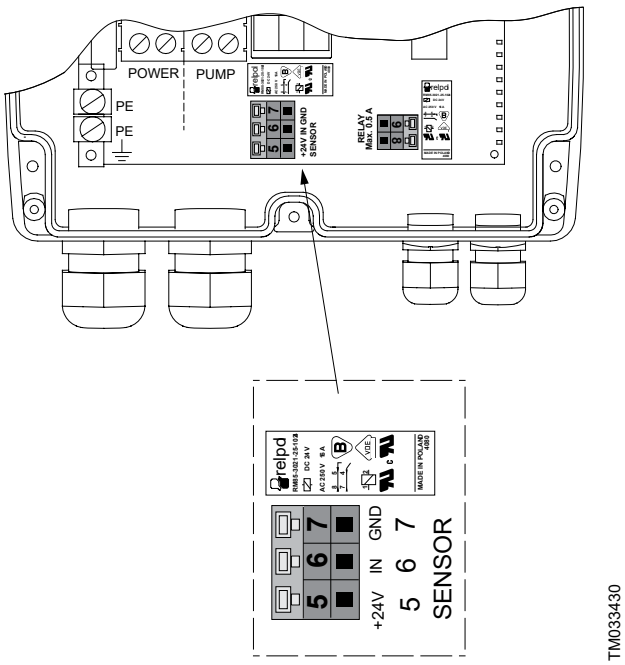


TM011480

Wiring diagram to main supply

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Electrical connection of CU 301



Electrical connection of CU 301

Sensor

Voltage signal: DC 0-10 V / 2-10 V, R_i = 11 kΩ

Tolerance: ± 3 % at maximum voltage signal.

Screened cable recommended. Maximum cable length: 500 m.

Current signal: DC 0-20 mA / 4-20 mA, R_i = 500 Ω

Tolerance: ± 3 % at maximum current signal.

Screened cable recommended. Maximum cable length: 500 m.

Product number for the pressure sensor, 4-20 mA, 0-6 bar: 96437851.

Operating relay

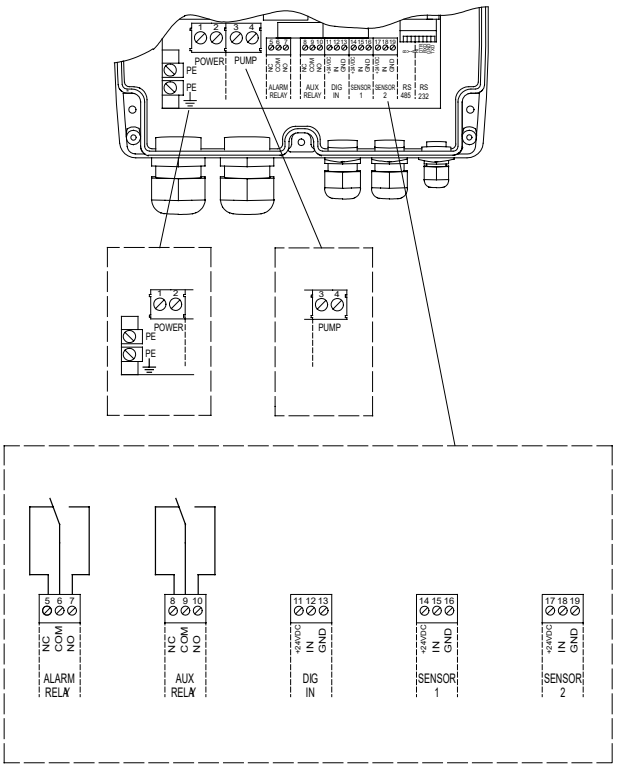
The operating relay is a normally open (NO) contact.

The relay is activated when the pump is running.

- Maximum current: 0.5 A
- Maximum voltage: 230 VAC

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SQ SQE

Electrical connection of CU 300



Electrical connection of CU 300

Alarm relay

Potential-free changeover contact.

Maximum contact load: AC 250 V, maximum current 1 A.

Minimum contact load: DC 5 V, 10 mA.

Auxiliary relay

Potential-free changeover contact.

Maximum contact load: Safety extra-low voltage to be used only.

Maximum current 1 A.

Minimum contact load: DC 5 V, 10 mA.

Digital input

External potential-free contact.

Logic "0": U_{in} > 3.2 V.

Logic "1": U_{in} < 0.9 V.

Sensor 1

Voltage signal: DC 0-10 V / 2-10 V

Screened cable recommended. Maximum cable length: 500 m.

Current signal: DC 0-20 mA / 4-20 mA

Screened cable recommended. Maximum cable length: 500 m.

Sensor 2

Potentiometer: DC 0-24 V, 10 kΩ (via internal voltage supply).

Screened cable recommended. Maximum cable length: 100 m.

Voltage signal: DC 0-10 V / 2-10 V

Screened cable recommended. Maximum cable length: 500 m.

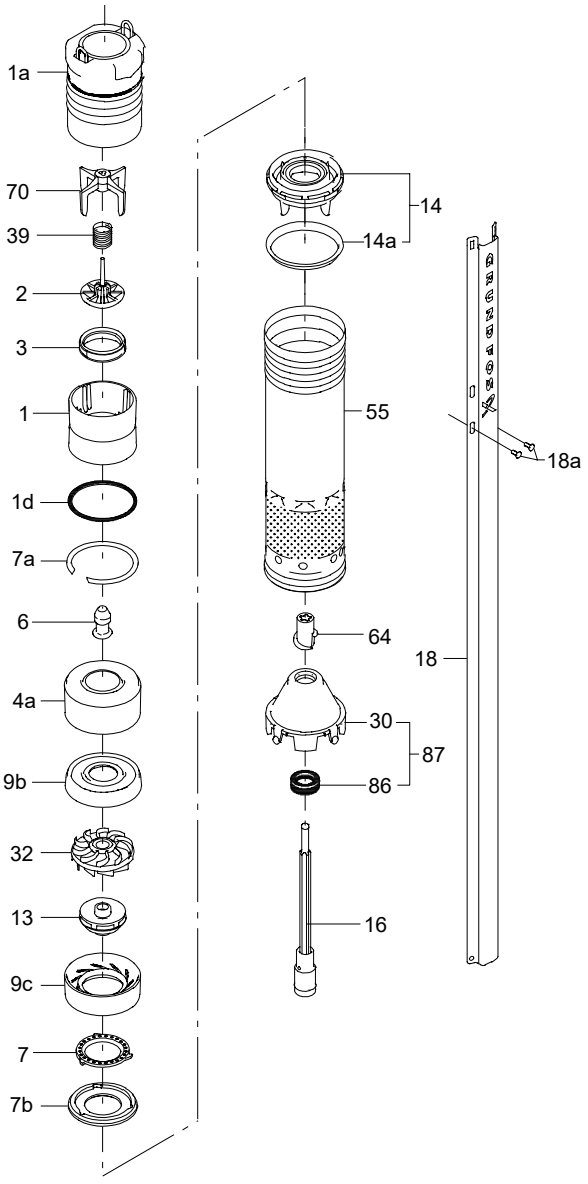
Current signal: DC 0-20 mA / 4-20 mA

Screened cable recommended. Maximum cable length: 500 m.

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Material specification, pump

Pos.	Component	Material	EN SQ/ SQE	AISI	EN SQ-N/ SQE-N	AISI
1	Valve casing	Polyamide				
1a	Outlet chamber	Stainless steel	1.4301	304	1.4401	316
1d	O-ring	NBR rubber				
2	Valve cup	Polyamide				
3	Valve seat	NBR rubber				
4a	Empty chamber	Polyamide				
6	Top bearing	NBR rubber				
7	Neck ring	TPU/PBT				
7a	Lock ring	Stainless spring steel	1.4310	310	1.4404	316
7b	Neck ring retainer	Polyamide				
9b	Chamber top	Polyamide				
9c	Chamber bottom	Polyamide				
13	Impeller with tungsten carbide bearing	Polyamide				
14	Inlet interconnector	Polyamide				
14a	Ring	Stainless steel	1.4301	304	1.4401	316
16	Shaft with coupling	Stainless steel	1.4301	304	1.4401	316
		Sintered steel				
18	Cable guard	Stainless steel	1.4301	304	1.4401	316
18a	Screws for cable guard	Stainless steel	1.4401	316	1.4401	316
30	Cone for pressure equalisation	Polyamide				
32	Guide vanes	Polyamide				
39	Spring	Stainless spring steel	1.4406	316L N	1.4406	316L N
55	Pump sleeve	Stainless steel	1.4301	304	1.4401	316
64	Priming screw	Polyamide				
70	Valve guide	Polyamide				
86	Lip seal ring	NBR rubber				
87	Cone for pressure equalisation complete	Polyamide/ NBR rubber				

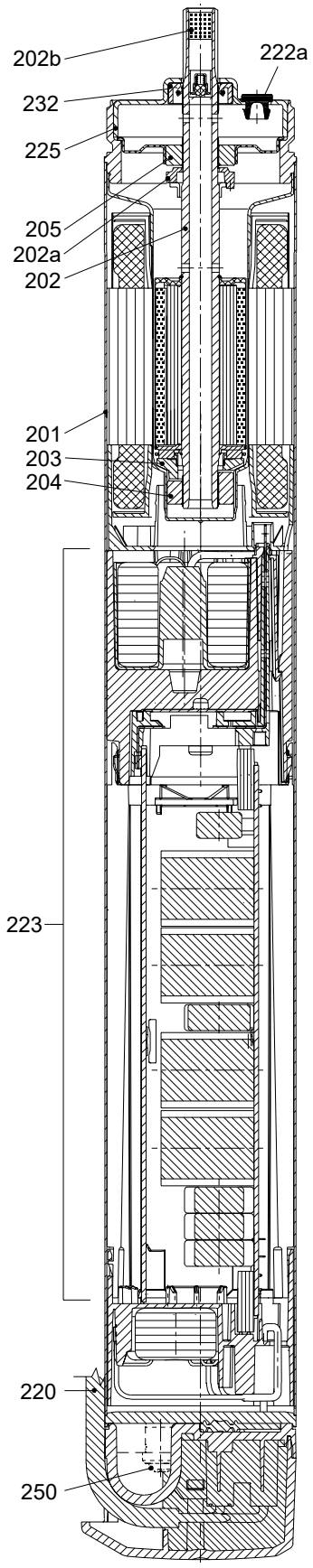


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Material specification, motor

SQ, SQ-N, SQE, SQE-N

Pos.	Component	Material	EN	AISI
			MS 3/MSE 3	
201	Stator	Stainless steel	1.4301	304
202	Rotor	Stainless steel	1.4301	304
202a	Stop ring	PP		
202b	Strainer	Polyester		
203	Thrust bearing	Carbon		
204	Radial bearing, lower	Silicon carbide/tungsten carbide (coating)		
205	Radial bearing, upper	Silicon carbide/tungsten carbide (coating)		
220	Motor cable with plug	See Section Product range and Section Submersible drop cable		
222a	Filling plug	Silicone LSR		
223	Electronic unit			
225	Top cover	Stainless steel	1.4301	304
232	Shaft seal	NBR		
250	Screw (M4)	Stainless steel	1.4401	316
	Motor liquid	SML-3		



Sectional view of motor

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8. Accessories

CU 301



TM077843

Product	Product number
CU 301 Elunit/Bar cpl. (Europe)	96436753
CU 301 Elunit/PSI cpl. w. sensor (USA)	96438895
CU 301 Elunit/Bar cpl. w. Sensor (Europe)	98594079
CU 301 Elunit/PSI cpl. (USA)	96436754
CU 301 Elunit/Bar cpl. (Japan)	96438896
CU 301 Elunit/kPa cpl. (APREG)	96438897

Pressure sensor for CU 301

Product	Measuring range [bar]	Product number
Pressure sensor kit, including 2 m cable	0-6	405168

Constant-pressure package without the pump

Contents	Product number
• CU 301 control unit • Tank, 8 litres • Pressure sensor, Pt 0-6 bar • Pressure gauge, 10 bar, ∅63 • Ball valve, 3/4" • Cable clips, 20 pieces	96524504
Note: The constant-pressure package can be used with all SQE pumps.	

Constant-pressure packages with the pump

Contents	Pump type	Cable length [m]	Product number
One constant-pressure package includes the following: • SQE pump incl. cable • CU 301 control unit • tank, 8 litres • pressure sensor, Pt 0-6 bar • pressure gauge, 10 bar, ∅63 • ball valve, 3/4" • cable clips, 20 pieces.	SQE 2-55	40	96524505
	SQE 2-85	60	96524506
	SQE 2-115	80	96524507
	SQE 3-65	20	96524502
	SQE 3-65	40	96524501
	SQE 3-105	80	96524508
	SQE 5-50	40	96524509
	SQE 5-70	40	96524503

CU 300

Product	Product number
CU 300	96422775 (English)
Language-specific CU 300 versions are available on request.	

Grundfos GO MI 301

Grundfos GO is used for wireless infrared or radio communication with the pumps.

MI 301 is a module with built-in infrared and radio communication. MI 301 must be used in conjunction with Android or iOS-based smart devices with a Bluetooth connection. MI 301 has rechargeable Li-ion battery and must be charged separately.

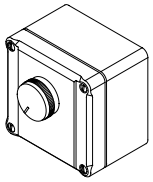


TM053890

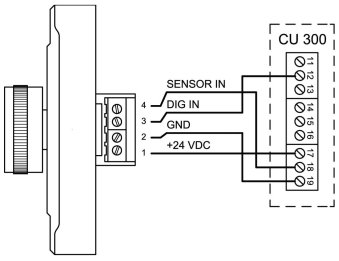
MI 301

Product number: 98046408

SPP 1 potentiometer



TM002604



TM013291

Description	Version	Product number
External potentiometer with cabinet for wall mounting. Screened cables, 4-wire cable. Maximum cable length: 100 m.	Grundfos SPP 1 potentiometer. Enclosure class: IP55.	625468

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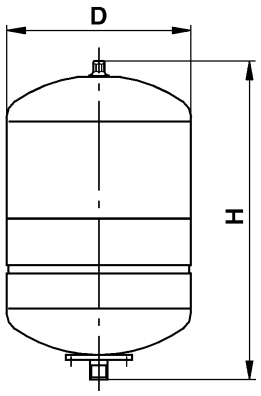
Pressure Manager



TM040334

Product	Voltage [V]	Maximum current [A]	Motor size (P2) [kW] / [hp]	Product number
PM 1 1.5 bar	230	6	0.7 / 0.5	96848693
PM 1 2.2 bar	230	6	0.7 / 0.5	96848722
PM 2	230	10	0.7 - 1.15 / 0.5 - 0.75	96848740

Pressure tank

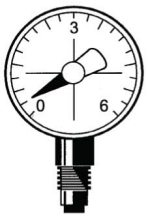


TM027934

Duty range					
Precharge pressure:			1.5 bar		
Maximum operating pressure:			10 bar		
Maximum liquid temperature:			+99 °C		
Flange material:			Stainless steel		
Description [litre]	Connection	D [mm]	H [mm]	Weight [kg]	Product number
8	G 3/4	202	303	2.3	96528335
18	G 3/4	279	367	4.6	96526322
24	G 1	289	447	5.1	96528339
33	G 1	289	584	6.7	96528340
60 [11]	G 1	397	557	11.0	96528341
80 [11]	G 1	397	755	16.0	96528342

[11] For installation on the floor. Fitted with 90° elbow.

Pressure gauge



TM013092

Measuring range [bar]	Connection	Diameter [mm]	Product number
0-6	G 1/4	50	ID3266
0-10	G 1/4	63	ID8048

Submersible drop cable

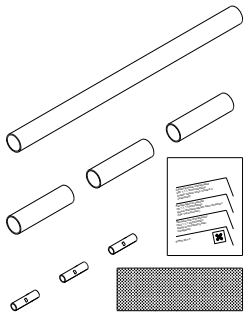


TM007882

Description	Version	Nominal diameter [mm]	Product number
3-core cable including earth conductor (KTW-approved) [12]	3G 1.5 mm^2 (round)	9.6 - 12.5	ID7946
	3G 2.5 mm^2 (round)	11.5 - 14.5	ID7947
	3G 4.0 mm^2 (round)	13.0 - 16.0	ID7948
	3G 6.0 mm^2 (round)	14.5 - 20.0	RM4098
	3G × 1.5 mm^2 (flat)	6.5 - 13.2	RM3952

[12] When ordering, state the length [m].

Cable termination kit, type KM



TM081418

Description	Cross-section of leads [mm^2]	Product number
The kit is for watertight shrink-joining of motor cable and submersible drop cable (round or flat cable). Enables the joining of: • cables of equal size • cables of different size • cable leads with single leads. The joint is ready for use after a few minutes and requires no long hardening time like resin joints. The joint cannot be separated.	1.5 - 6.0	96021473

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Cable clips



TM004179

Description	Specification	Product number
The clips are for fastening of cable and straining wire to the riser pipe.	Length = 7.5 m 16 buttons	115016
The clips must be fitted every 3 metres.		
One set is for approximately 45 m riser pipe.		

Straining wire



TM007897

Description	Diameter [mm]	Product number
The wire is stainless steel EN 1.4401.	2	ID8957
It retains the submersible pump. [13]		

13) When ordering, state the length [m].

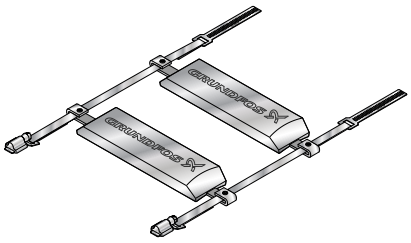
Wire clamp



TM007898

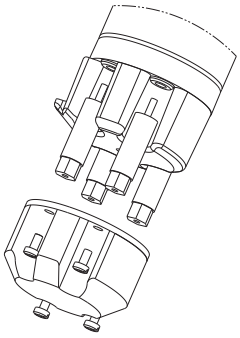
Description	Material	Product number
Two clamps per loop	Stainless steel EN 1.4401	ID8960

Zinc anodes



TM077621

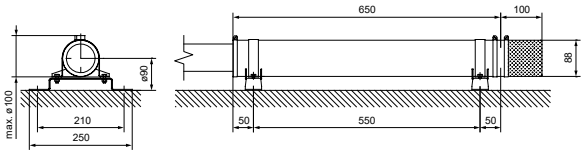
Description	Product number
Sacrificial anodes are placed on the outside of the pump and motor as a protection against corrosion. The zinc anode kit consists of 2 zinc anodes and a set of fasteners. Dimensions: Diameter when fitted: 125 mm (4.9 in). Minimum borehole diameter: 127 mm (5 in).	92836041



TM077637

Description	Product number
Sacrificial anodes are placed on the bottom of the pump and motor as a protection against corrosion. The number of anodes depends on the pump and the motor. The product number includes 1 zinc anode and 4 threaded rods. Dimensions: The zinc anode adds 55 mm (2.2 in) to the length of the pump. Minimum borehole diameter: 76 mm (3 in).	99599098

Flow sleeve



TM013292

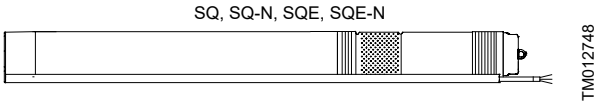
Description	Material	Product number
Flow sleeve including strainer and supporting bracket	Stainless steel EN 1.4301	98148594
Flow sleeve	Stainless steel EN 1.4301	97535677
Strainer	Stainless steel EN 1.4301	97943446
Supporting brackets	Stainless steel EN 1.4301	97512995

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9. Order data

SQ, SQ-N, SQE, SQE-N

Complete unit, 1 × 200-240 V, 1.5 m cable



Note: A cable joint set is included in all -N models.

Complete unit: SQ 1, SQ 1-N, SQE 1, SQE 1-N

Pump type	Motor		Product number
	Type	Output power (P2) [kW]	
SQ 1-35	MS 3	0.70	96510178
SQ 1-35 N	MS 3-N	0.70	96160403
SQE 1-35	MSE 3	0.70	96510071
SQE 1-35 N	MSE 3-N	0.70	96160436
SQ 1-50	MS 3	0.70	96510179
SQ 1-50 N	MS 3-N	0.70	96160404
SQE 1-50	MSE 3	0.70	96510141
SQE 1-50 N	MSE 3-N	0.70	96160437
SQ 1-65	MS 3	0.70	96510190
SQ 1-65 N	MS 3-N	0.70	96160405
SQE 1-65	MSE 3	0.70	96510142
SQE 1-65 N	MSE 3-N	0.70	96160438
SQ 1-80	MS 3	1.15	96510191
SQ 1-80 N	MS 3-N	1.15	96160406
SQE 1-80	MSE 3	1.15	96510143
SQE 1-80 N	MSE 3-N	1.15	96160439
SQ 1-95	MS 3	1.15	96510192
SQ 1-95 N	MS 3-N	1.15	96160407
SQE 1-95	MSE 3	1.15	96510144
SQE 1-95 N	MSE 3-N	1.15	96160440
SQ 1-110	MS 3	1.15	96510193
SQ 1-110 N	MS 3-N	1.15	96160408
SQE 1-110	MSE 3	1.15	96510145
SQE 1-110 N	MSE 3-N	1.15	96160441
SQ 1-125	MS 3	1.55	96510194
SQ 1-125 N	MS 3-N	1.55	96160409
SQE 1-125	MSE 3	1.55	96510146
SQE 1-125 N	MSE 3-N	1.55	96160442
SQ 1-140	MS 3	1.55	96510195
SQ 1-140 N	MS 3-N	1.55	96160410
SQE 1-140	MSE 3	1.55	96510147
SQE 1-140 N	MSE 3-N	1.55	96160443
SQ 1-155	MS 3	1.85	96510196
SQ 1-155 N	MS 3-N	1.85	96160411
SQE 1-155	MSE 3	1.85	96510148
SQE 1-155 N	MSE 3-N	1.85	96160444

Complete unit: SQ 2, SQ 2-N, SQE 2, SQE 2-N

Pump type	Motor		Product number
	Type	Output power (P2) [kW]	
SQ 2-35	MS 3	0.70	96510198
SQ 2-35 N	MS 3-N	0.70	96160412
SQE 2-35	MSE 3	0.70	96510150
SQE 2-35 N	MSE 3-N	0.70	96160445
SQ 2-55	MS 3	0.70	96510199
SQ 2-55 N	MS 3-N	0.70	96160413
SQE 2-55	MSE 3	0.70	96510151
SQE 2-55 N	MSE 3-N	0.70	96160446
SQ 2-70	MS 3	1.15	96510200
SQ 2-70 N	MS 3-N	1.15	96160414
SQE 2-70	MSE 3	1.15	96510152
SQE 2-70 N	MSE 3-N	1.15	96160447
SQ 2-85	MS 3	1.15	96510201
SQ 2-85 N	MS 3-N	1.15	96160415
SQE 2-85	MSE 3	1.15	96510153
SQE 2-85 N	MSE 3-N	1.15	96160448
SQ 2-100	MS 3	1.55	96510202
SQ 2-100 N	MS 3-N	1.55	96160416
SQE 2-100	MSE 3	1.55	96510154
SQE 2-100 N	MSE 3-N	1.55	96160449
SQ 2-115	MS 3	1.85	96510203
SQ 2-115 N	MS 3-N	1.85	96160417
SQE 2-115	MSE 3	1.85	96510155
SQE 2-115 N	MSE 3-N	1.85	96160450
SQ 2-130	MS 3	1.85	92994556
SQ 2-130 N	MS 3-N	1.85	93001363
SQE 2-130	MSE 3	1.85	93001365
SQE 2-130 N	MSE 3-N	1.85	93001366

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Complete unit: SQ 3, SQ 3-N, SQE 3, SQE 3-N

Pump type	Motor		Product number
	Type	Output power (P2) [kW]	
SQ 3-30	MS 3	0.70	96510204
SQ 3-30 N	MS 3-N	0.70	96160419
SQE 3-30	MSE 3	0.70	96510156
SQE 3-30 N	MSE 3-N	0.70	96160452
SQ 3-40	MS 3	0.70	96510205
SQ 3-40 N	MS 3-N	0.70	96160420
SQE 3-40	MSE 3	0.70	96510157
SQE 3-40 N	MSE 3-N	0.70	96160453
SQ 3-55	MS 3	1.15	96510206
SQ 3-55 N	MS 3-N	1.15	96160421
SQE 3-55	MSE 3	1.15	96510158
SQE 3-55 N	MSE 3-N	1.15	96160454
SQ 3-65	MS 3	1.15	96510207
SQ 3-65 N	MS 3-N	1.15	96160422
SQE 3-65	MSE 3	1.15	96510159
SQE 3-65 N	MSE 3-N	1.15	96160455
SQ 3-80	MS 3	1.55	96510208
SQ 3-80 N	MS 3-N	1.55	96160423
SQE 3-80	MSE 3	1.55	96510160
SQE 3-80 N	MSE 3-N	1.55	96160456
SQ 3-95	MS 3	1.55	96510209
SQ 3-95 N	MS 3-N	1.55	96160424
SQE 3-95	MSE 3	1.55	96510161
SQE 3-95 N	MSE 3-N	1.55	96160457
SQ 3-105	MS 3	1.85	96510210
SQ 3-105 N	MS 3-N	1.85	96160425
SQE 3-105	MSE 3	1.85	96510162
SQE 3-105 N	MSE 3-N	1.85	96160458
SQ 3-120	MS 3	1.85	93001417
SQ 3-120 N	MS 3-N	1.85	93001533
SQE 3-120	MSE 3	1.85	93001537
SQE 3-120 N	MSE 3-N	1.85	93001538

Complete unit: SQ 5, SQ 5-N, SQE 5, SQE 5-N

Pump type	Motor		Product number
	Type	Output power (P2) [kW]	
SQ 5-15	MS 3	0.70	96510211
SQ 5-15 N	MS 3-N	0.70	96160426
SQE 5-15	MSE 3	0.70	96510163
SQE 5-15 N	MSE 3-N	0.70	96160459
SQ 5-25	MS 3	0.70	96510212
SQ 5-25 N	MS 3-N	0.70	96160427
SQE 5-25	MSE 3	0.70	96510164
SQE 5-25 N	MSE 3-N	0.70	96160460
SQ 5-35	MS 3	1.15	96510213
SQ 5-35 N	MS 3-N	1.15	96160428
SQE 5-35	MSE 3	1.15	96510165
SQE 5-35 N	MSE 3-N	1.15	96160461
SQ 5-50	MS 3	168	96510214
SQ 5-50 N	MS 3-N	1.55	96160429
SQE 5-50	MSE 3	1.55	96510166
SQE 5-50 N	MSE 3-N	1.55	96160462
SQ 5-60	MS 3	1.55	96510215
SQ 5-60 N	MS 3-N	1.55	96160430
SQE 5-60	MSE 3	1.55	96510167
SQE 5-60 N	MSE 3-N	1.55	96160463
SQ 5-70	MS 3	1.85	96510217
SQ 5-70 N	MS 3-N	1.85	96160431
SQE 5-70	MSE 3	1.85	96510168
SQE 5-70 N	MSE 3-N	1.85	96160464

Complete unit: SQ 7, SQ 7-N, SQE 7, SQE 7-N

Pump type	Motor		Product number
	Type	Output power (P2) [kW]	
SQ 7-15	MS 3	0.70	96510218
SQ 7-15 N	MS 3-N	0.70	96160432
SQE 7-15	MSE 3	0.70	96510169
SQE 7-15 N	MSE 3-N	0.70	96160465
SQ 7-30	MS 3	1.15	96510219
SQ 7-30 N	MS 3-N	1.15	96160433
SQE 7-30	MSE 3	1.15	96510170
SQE 7-30 N	MSE 3-N	1.15	96160466
SQ 7-40	MS 3	1.55	96510220
SQ 7-40 N	MS 3-N	1.55	96160434
SQE 7-40	MSE 3	1.55	96510171
SQE 7-40 N	MSE 3-N	1.55	96160467
SQ 7-55	MS 3	1.85	93001547
SQ 7-55 N	MS 3-N	1.85	93001588
SQE 7-55	MSE 3	1.85	93001566
SQE 7-55 N	MSE 3-N	1.85	96160468

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Submersible drop cables

The selection of drop cable dimension requires an evaluation of the voltage drop, the maximum motor current and the dimensioning current of the cable as a minimum. According to IEC 60364-5-52: 2009, 5 % is the maximum recommended voltage drop for cables up to 100 m. Where IEC does not apply, local regulations may require a different calculation. If the motor supply voltage drops below approximately 63 % of the nominal voltage, the motor will stop.

Maximum cable lengths

The maximum length for a given cable can be calculated by the following equation:

$$L_{Max} = \frac{U \times \Delta U}{I \times 2 \times 100 \times \left(PF \times \frac{\rho}{q}\right)} [m]$$

L_{Max} = maximum cable length [m]

U = rated or nominal supply voltage [V]

ΔU = maximum recommended voltage drop [%]

I = maximum motor current [A]

The SQ and SQE product families use the MS3 and MSE3 motor family which has four different motor sizes (P2): 0,70 kW, 1,15 kW, 1,55 kW and 1,85 kW.

ρ = specific resistance: [Ω mm^2/m]

The specific resistance of the drop cables supplied by Grundfos for SQ and SQE is 0,02 [Ω mm^2/m].

q = cross-sectional area of the individual wires in the submersible drop cable [mm^2]

Note that the equation is valid only for SQ and SQE as it requires that the Power Factor (PF) of the motor unit equals 1.0. For SQ and SQE, the PF equals 1.0 due to the characteristics of the built-in inverter in the MS3 and MSE3 motors.

Calculation example

The following example calculates the maximum cable length of an SQ 2-55 MS3-motor with a P2 of 0.70 kW, using a drop cable with a wire cross-sectional area of 1.5 mm^2.

The following parameters are used:

Nominal supply voltage (U): 230 V

Maximum recommended voltage drop (ΔU): 5 %

Maximum motor current (I): 5.2 A for the MS3 motor with a P2 equal to 0.70 kW

Specific resistance of cable (ρ): 0.02 Ω mm^2/m

Cross-sectional area of the individual wires (q): 1.5 mm^2 cable

$$L_{Max} = \frac{240V \times 5\%}{5.2A \times 2 \times 100 \times 1 \times \frac{0.02\Omega mm^2/m}{1.5mm^2}} = 150 [m]$$

The table below shows the values for maximum cable length calculated for all MS3 motors in combination with the available sizes and lengths of drop cables.

P2 [kW]	I [A]	U [V]	ΔU [%]	Maximum cable length [m]			
				1.5 mm^2	2.5 mm^2	4 mm^2	6 mm^2
0.7	5.2	240	5	86	144	230	346
1.15	8.4	240	5	53	89	142	214
1.55	11.0	240	5	40	66	107	160
1.85	12.0	240	5	37	62	100	150

ρ = 0.02 [Ω mm^2/m]

SQ, SQ-N, SQE, SQE-N drop cables

Length [m]	Cross-section of leads			
	1.5 mm^2	2.5 mm^2	4 mm^2	6 mm^2
	Flat	Round	Round	Round
1.5	97778318	-	-	-
5	97778319	-	-	-
10	97778320	-	-	-
15	97778321	-	-	-
20	97778322	-	-	-
30	97778323	-	-	-
40	97778324	97778346	-	-
50	97778325	97778347	-	-
60	97778326	97778348	-	-
70	97778327	97778349	-	-
80	97778328	97778350	97778353	-
90	97778329	97778351	97778354	97778356
100	97778330	97778352	97778355	97778357

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SQ and SQE including cable

Packages of SQ and SQE pumps including selected lengths of submersible drop cable are listed below.

The cable lengths in the table below are calculated according to the actual motor load of each specific pump size.

Pump type	Cable length (3×1.5 mm^2) [m]	Product number
SQ 1-65	30	96524421
SQ 1-80	30	96524428
SQ 1-80	50	96524429
SQ 1-140	70	96524442 [14]
SQ 2-35	15	96524423
SQ 2-55	10	96524430
SQ 2-55	15	96524431
SQ 2-55	30	96524432
SQ 2-55	60	96524433
SQ 2-70	30	96524434
SQ 2-70	60	96524436
SQ 2-70	80	96524435 [14]
SQ 2-85	40	96524443
SQ 2-85	80	96524444 [14]
SQ 3-30	30	96618723
SQ 3-40	15	96524426
SQ 3-40	30	96524427
SQ 3-40	30	96160577 [15]
SQ 3-55	15	96524437
SQ 3-55	30	96524438
SQ 3-65	30	96524439
SQ 3-65	40	96524440
SQE 3-65	40	96524475
SQ 3-80	30	96524445
SQ 3-80	50	96524446
SQ 3-95	70	96524447 [14]
SQ 3-105	80	96524448 [16]
SQ 5-35	15	96524441
SQ 5-35	30	96160956
SQE 5-35	30	96647657
SQ 5-50	15	96524449
SQ 5-50	30	96524450
SQ 5-60	30	96524451
SQ 5-70	30	96524452
SQ 7-40	15	96524453

[14] 3×2.5 mm^2

[15] Fitted with schuko plug.

[16] 3×4 mm^2

Spare motor with cable

Type	P1	P2	Voltage	Part number
MS 3	1000	700	200-240VAC	96160850
MS 3 (SQ 2-55)	1000	700	200-240VAC	96160570
MS 3	1000	700	100-115VAC	96160551
MS 3	1500	1150	200-240VAC	96160851
MS 3	2200	1550	200-240VAC	96160852
MS 3	2400	1850	200-240VAC	96160853
MSE 3	1000	700	200-240VAC	96195288
MSE 3 (SQE 2-55)	1000	700	200-240VAC	96165289
MSE 3	1000	700	100-115VAC	96195293
MSE 3	1500	1150	200-240VAC	96195290
MSE 3	2200	1550	200-240VAC	96195291
MSE 3	2400	1850	200-240VAC	96195292
MS 3-N	1000	700	200-240VAC	96160858
MS 3- N (SQ 2-55N)	1000	700	200-240VAC	96160918
MS 3-N	1500	1150	200-240VAC	96160859
MS 3-N	2200	1550	200-240VAC	96160860
MS 3-N	2400	1850	200-240VAC	96160861
MSE 3-N	1000	700	200-240VAC	96195294
MSE 3-N (SQE 2-55N)	1000	700	200-240VAC	96160919
MSE 3-N	1500	1150	200-240VAC	96195295
MSE 3-N	2200	1550	200-240VAC	96195296
MSE 3-N	2400	1850	200-240VAC	96195297

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SQ SQE

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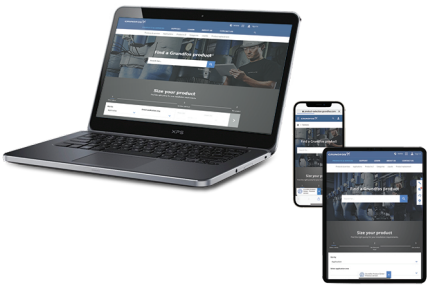
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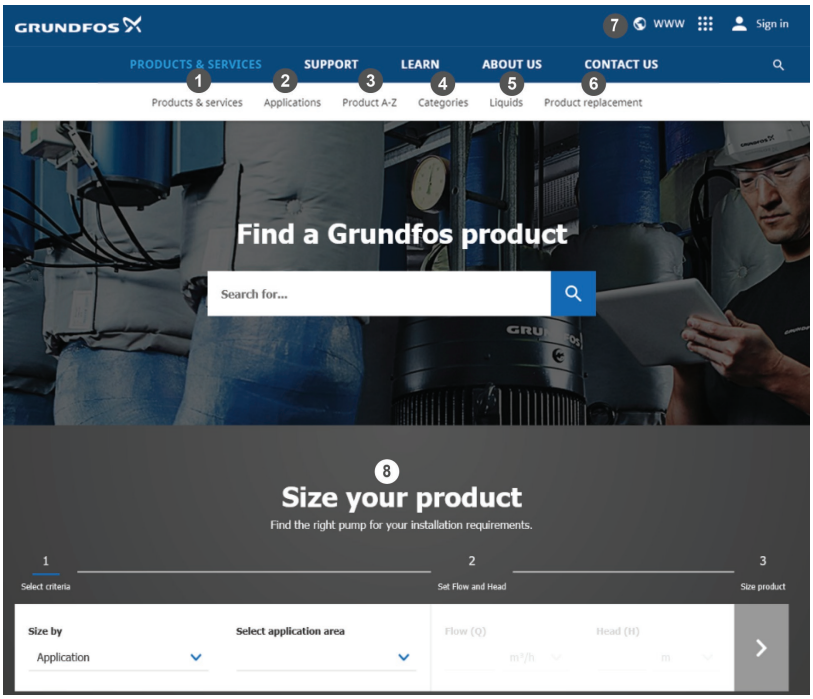
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