SQ/SQE

Visions & Values

"It is the Vision of the Company to achieve our Corporate Mission by providing quality and innovative products and services that give our customers complete satisfaction, through well-motivated, high performing and well rewarded people.
We achieve this by developing a caring, enjoyable stimulating and challenging working environment, incorporating all our Values"

Sustainable Development

"Sustainable development is a key concept at Grundfos. It is vital that our products demonstrate respect for the environment, especially in terms of energy consumption and use of materials."

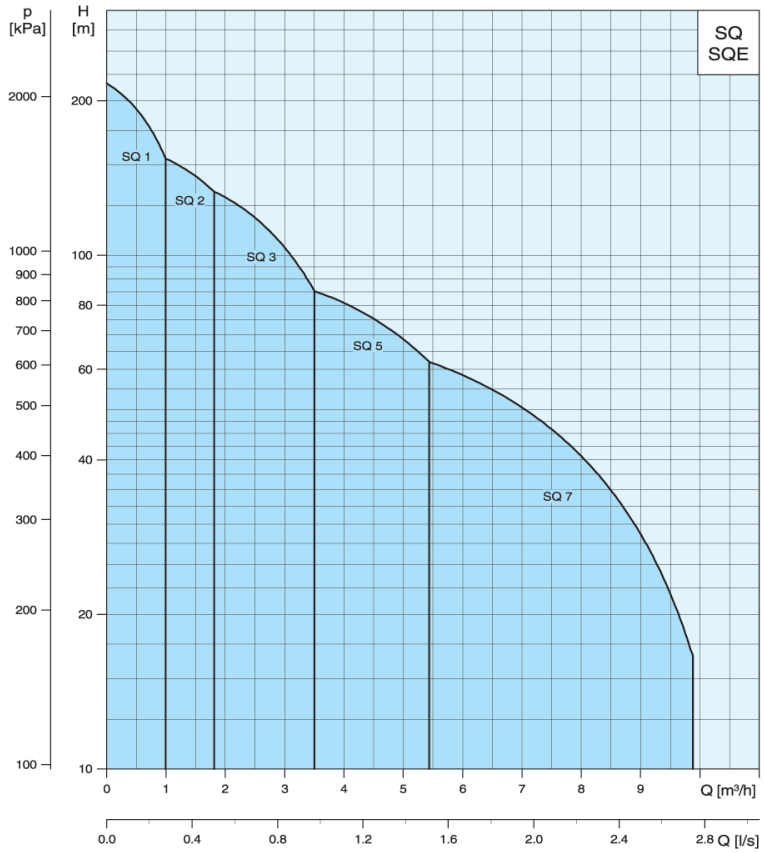
Stainless Steel Submersible pumps SQ/SQE

The Grundfos SQ/SQE series represents a major breakthrough in the design and performance of high quality and reliable small to medium sized submersible pumps.
The compact 3" design makes SQ ideal for a variety of applications, such as domestic water supply, small community waterworks, horticultural/irrigation, tank applications and various environmental uses.
The 'soft start' control system incorporated reduces water hammer, light flickering, component wear and prevents overloading of electrical circuits during start-up.
SQ/SQE is designed for pumping clean, non-aggressive liquids, and operates on a simple 'on-off' principle.

Features:

- Built-in motor frequency converter gives high performance in a small package
- Soft-start 2 second ramp period
- Compact 3" design -ideal for many domestic/small water applications
- SQE model features grade 316 stainless steel for sampling/contaminated water
- Dry-running protected
- Constant pressure/volume/level control possible with SQE models

Performance 50Hz



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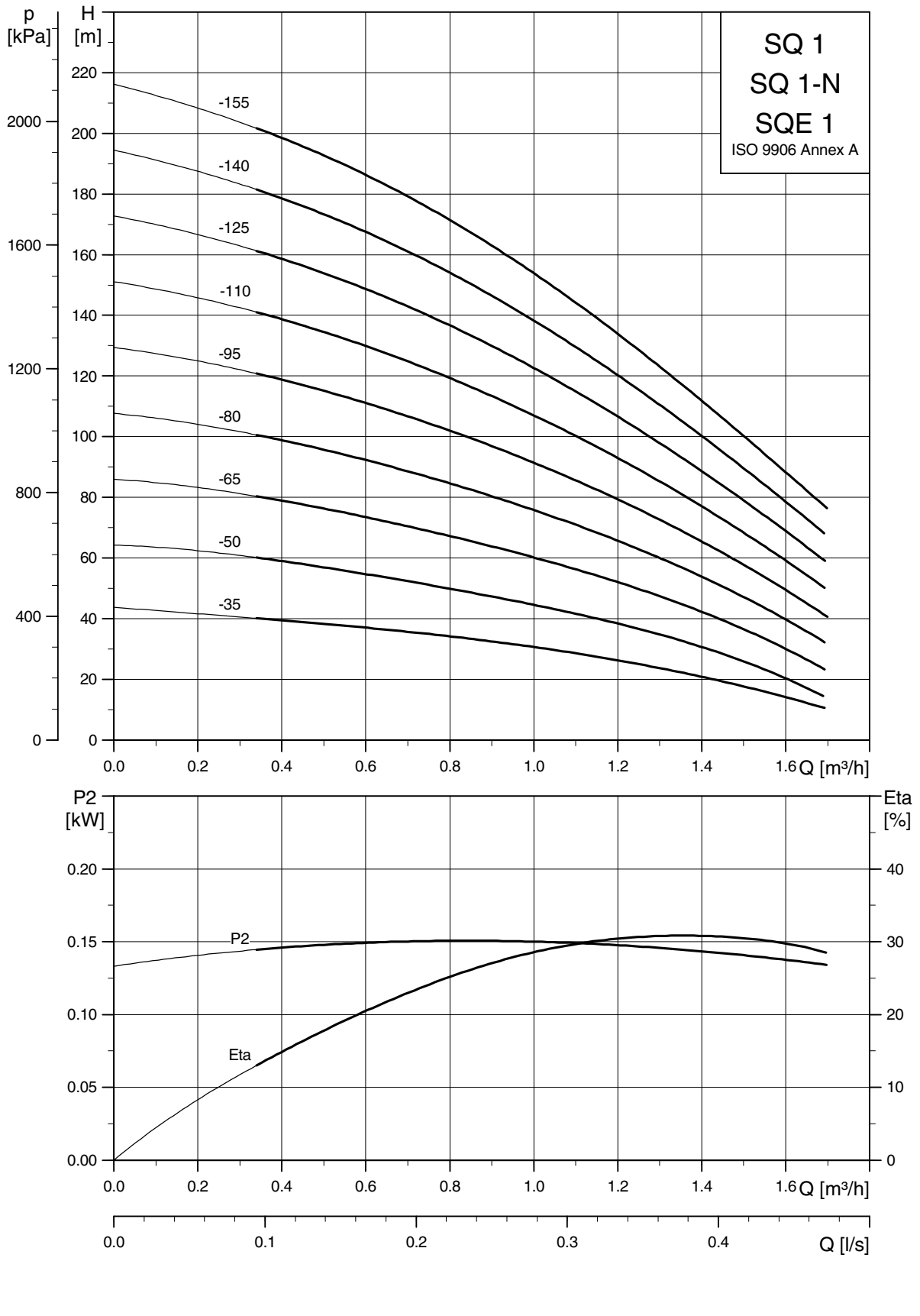
Performance curves



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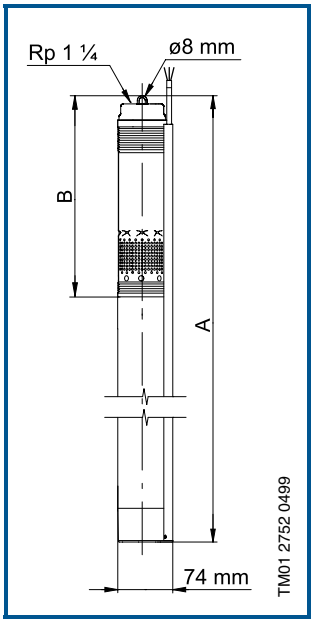
Dimensions and weights



Pump type	Number of stages	Motor		Dimensions [mm]		Net weight [kg]*	Shipping volume [m³]*
		Type	Output power (P_2) [kW]	A	B		
SQ 1 - 35 (-N) SQE 1 - 35	2	MS 3 (-NE) MSE 3	0.1-0.63	745	265	4.7	0.0092
SQ 1 - 50 (-N) SQE 1 - 50	3	MS 3 (-NE) MSE 3	0.1-0.63	745	265	4.8	0.0092
SQ 1 - 65 (-N) SQE 1 - 65	4	MS 3 (-NE) MSE 3	0.1-0.63	772	292	4.9	0.0094
SQ 1 - 80 (-N) SQE 1 - 80	5	MS 3 (-NE) MSE 3	0.7-1.05	826	346	5.6	0.0100
SQ 1 - 95 (-N) SQE 1 - 95	6	MS 3 (-NE) MSE 3	0.7-1.05	826	346	5.6	0.0100
SQ 1 - 110 (-N) SQE 1 - 110	7	MS 3 (-NE) MSE 3	0.7-1.05	853	373	5.7	0.0103
SQ 1 - 125 (-N) SQE 1 - 125	8	MS 3 (-NE) MSE 3	1.1-1.73	943	427	6.4	0.0113
SQ 1 - 140 (-N) SQE 1 - 140	9	MS 3 (-NE) MSE 3	1.1-1.73	943	427	6.5	0.0113
SQ 1 - 155 (-N) SQE 1 - 155	10	MS 3 (-NE) MSE 3	1.1-1.73	970	454	6.7	0.0116

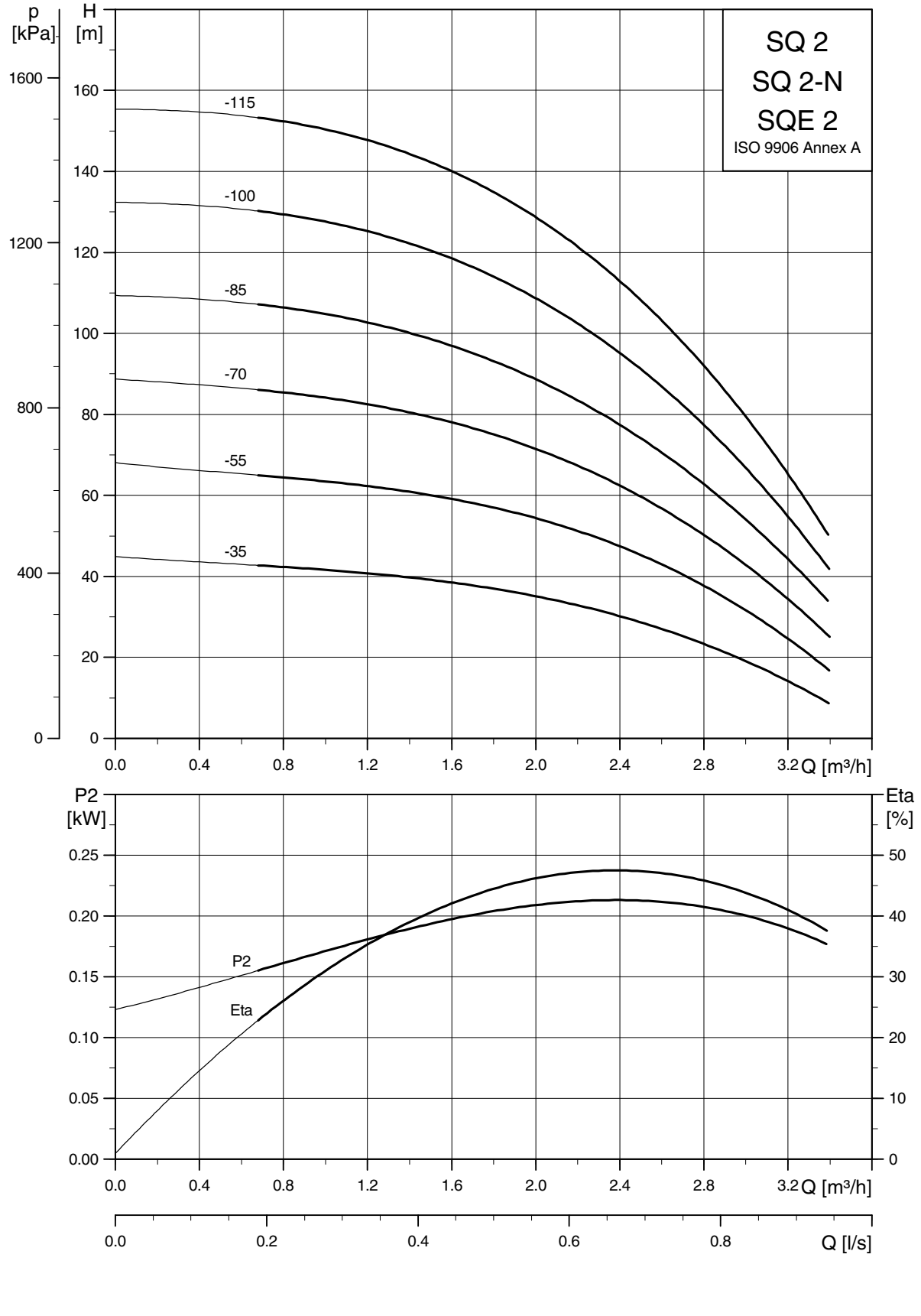
* Including pump, motor, 1.5 m cable and cable guard.

Electrical data

1 x 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]	Full load current $I_{1/1}$ [A]		Full load motor efficiency (η) [%]
					230 V	200 V	
SQ 1 - 35 (-N) SQE 1 - 35	MS 3 (-NE) MSE 3	0.44	0.1-0.63	0.29	2.1	2.4	70
SQ 1 - 50 (-N) SQE 1 - 50	MS 3 (-NE) MSE 3	0.62	0.1-0.63	0.44	2.8	3.2	70
SQ 1 - 65 (-N) SQE 1 - 65	MS 3 (-NE) MSE 3	0.82	0.1-0.63	0.58	3.7	4.3	70
SQ 1 - 80 (-N) SQE 1 - 80	MS 3 (-NE) MSE 3	1.00	0.7-1.05	0.73	4.4	5.1	73
SQ 1 - 95 (-N) SQE 1 - 95	MS 3 (-NE) MSE 3	1.20	0.7-1.05	0.87	5.4	6.2	73
SQ 1 - 110 (-N) SQE 1 - 110	MS 3 (-NE) MSE 3	1.40	0.7-1.05	1.03	6.2	7.1	73
SQ 1 - 125 (-N) SQE 1 - 125	MS 3 (-NE) MSE 3	1.67	1.1-1.73	1.20	7.8	9.0	74
SQ 1 - 140 (-N) SQE 1 - 140	MS 3 (-NE) MSE 3	1.90	1.1-1.73	1.37	8.9	10.2	74
SQ 1 - 155 (-N) SQE 1 - 155	MS 3 (-NE) MSE 3	2.20	1.1-1.73	1.55	10.2	-	74

Performance curves



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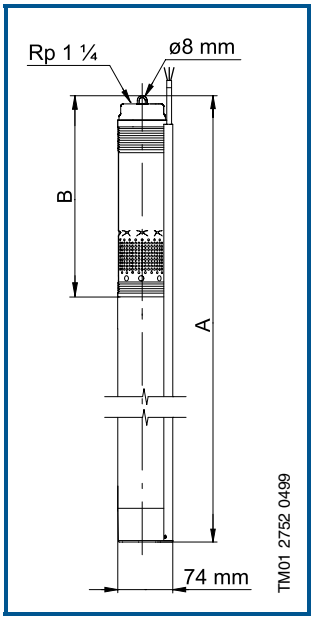
Dimensions and weights



Pump type	Number of stages	Motor		Dimensions [mm]		Net weight [kg]*	Shipping volume [m³]*
		Type	Output power (P_2) [kW]	A	B		
SQ 2 - 35 (-N) SQE 2 - 35	2	MS 3 (-NE) MSE 3	0.1-0.63	745	265	4.7	0.0092
SQ 2 - 55 (-N) SQE 2 - 55	3	MS 3 (-NE) MSE 3	0.7-1.05	745	265	5.2	0.0092
SQ 2 - 70 (-N) SQE 2 - 70	4	MS 3 (-NE) MSE 3	0.7-1.05	772	292	5.4	0.0094
SQ 2 - 85 (-N) SQE 2 - 85	5	MS 3 (-NE) MSE 3	1.1-1.73	862	346	6.2	0.0104
SQ 2 - 100 (-N) SQE 2 - 100	6	MS 3 (-NE) MSE 3	1.1-1.73	862	346	6.2	0.0104
SQ 2 - 115 (-N) SQE 2 - 115	7	MS 3 (-NE) MSE 3	1.1-1.73	889	373	6.3	0.0107

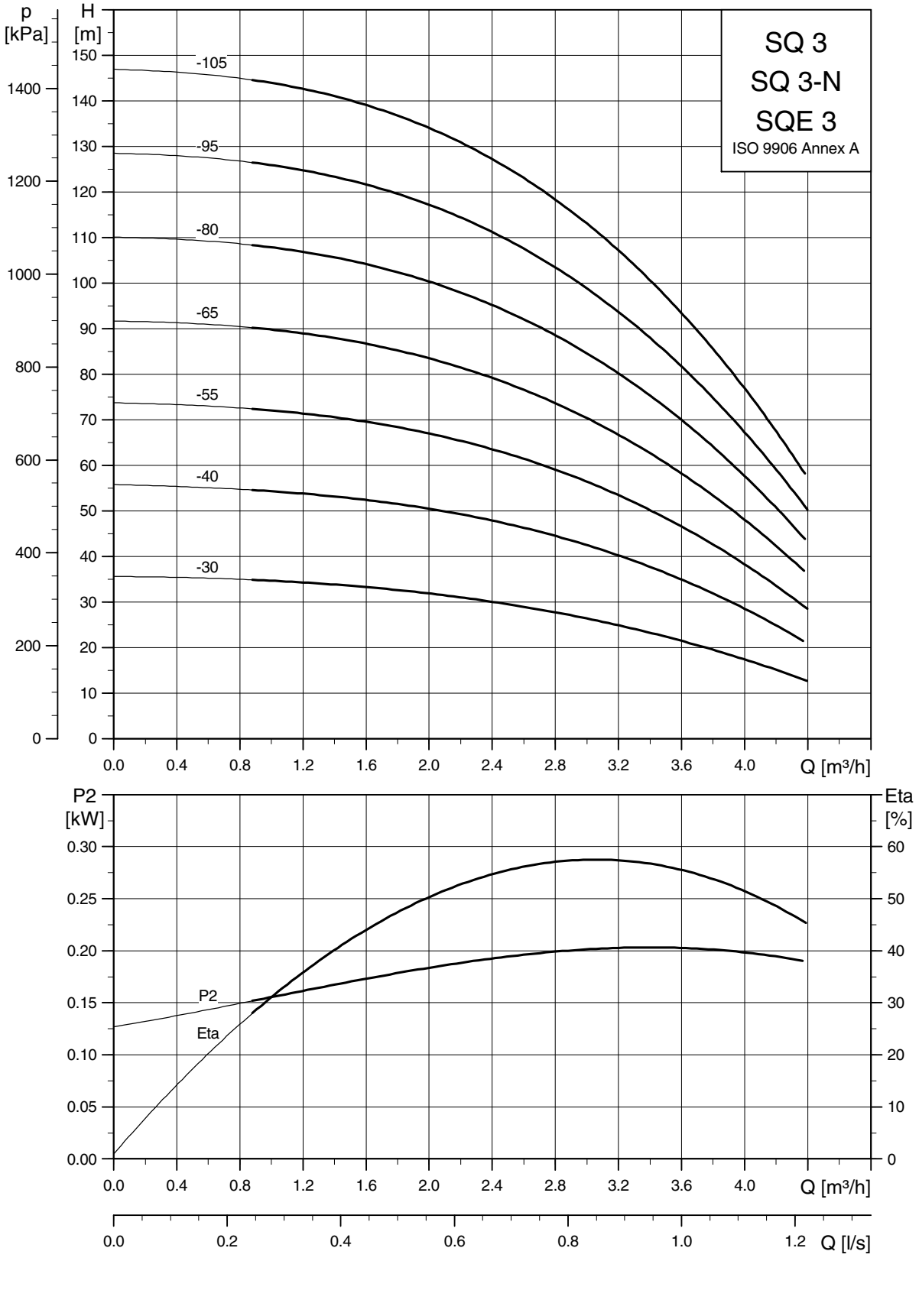
* Including pump, motor, 1.5 m cable and cable guard.

Electrical data

1 x 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]	Full load current $I_{1/1}$ [A]		Full load motor efficiency (η) [%]
					230 V	200 V	
SQ 2 - 35 (-N) SQE 2 - 35	MS 3 (-NE) MSE 3	0.72	0.1-0.63	0.45	3.2	3.7	70
SQ 2 - 55 (-N) SQE 2 - 55	MS 3 (-NE) MSE 3	0.91	0.7-1.05	0.65	4.1	4.7	70
SQ 2 - 70 (-N) SQE 2 - 70	MS 3 (-NE) MSE 3	1.20	0.7-1.05	0.87	5.4	6.2	73
SQ 2 - 85 (-N) SQE 2 - 85	MS 3 (-NE) MSE 3	1.38	1.1-1.73	0.98	6.8	7.8	73
SQ 2 - 100 (-N) SQE 2 - 100	MS 3 (-NE) MSE 3	1.80	1.1-1.73	1.30	8.4	9.7	74
SQ 2 - 115 (-N) SQE 2 - 115	MS 3 (-NE) MSE 3	2.11	1.1-1.73	1.50	9.9	11.1	74

Performance curves



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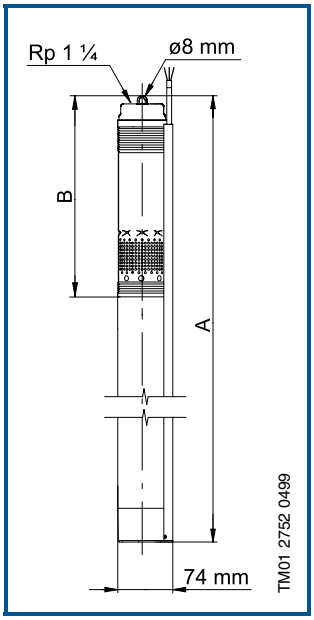
Dimensions and weights



Pump type	Number of stages	Motor		Dimensions [mm]		Net weight [kg]*	Shipping volume [m³]*
		Type	Output power (P_2) [kW]	A	B		
SQ 3 - 30 (-N) SQE 3 - 30	2	MS 3 (-NE) MSE 3	0.1-0.63	745	265	4.8	0.0092
SQ 3 - 40 (-N) SQE 3 - 40	3	MS 3 (-NE) MSE 3	0.1-0.63	745	265	4.8	0.0092
SQ 3 - 55 (-N) SQE 3 - 55	4	MS 3 (-NE) MSE 3	0.7-1.05	772	292	5.4	0.0094
SQ 3 - 65 (-N) SQE 3 - 65	5	MS 3 (-NE) MSE 3	0.7-1.05	826	346	6.1	0.0100
SQ 3 - 80 (-N) SQE 3 - 80	6	MS 3 (-NE) MSE 3	1.1-1.73	862	346	6.3	0.0104
SQ 3 - 95 (-N) SQE 3 - 95	7	MS 3 (-NE) MSE 3	1.1-1.73	889	373	6.4	0.0107
SQ 3 - 105 (-N) SQE 3 - 105	8	MS 3 (-NE) MSE 3	1.1-1.73	943	427	6.5	0.0113

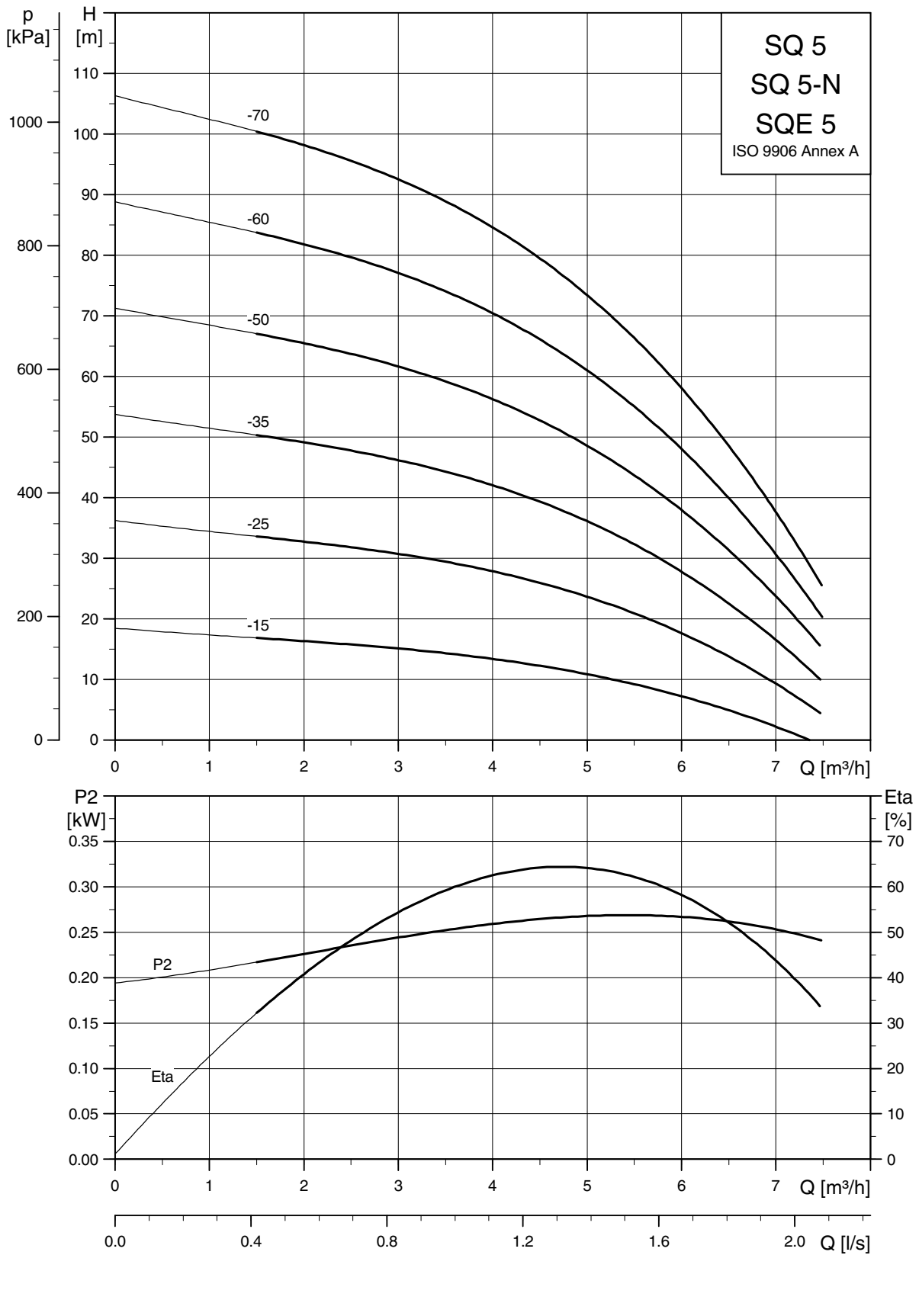
* Including pump, motor, 1.5 m cable and cable guard.

Electrical data

1 x 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]	Full load current $I_{1/1}$ [A]		Full load motor efficiency (η) [%]
					230 V	200 V	
SQ 3 - 30 (-N) SQE 3 - 30	MS 3 (-NE) MSE 3	0.72	0.1-0.63	0.44	3.2	3.7	70
SQ 3 - 40 (-N) SQE 3 - 40	MS 3 (-NE) MSE 3	0.88	0.1-0.63	0.63	4.0	4.6	70
SQ 3 - 55 (-N) SQE 3 - 55	MS 3 (-NE) MSE 3	1.14	0.7-1.05	0.83	5.1	5.9	73
SQ 3 - 65 (-N) SQE 3 - 65	MS 3 (-NE) MSE 3	1.40	0.7-1.05	1.02	6.2	7.1	73
SQ 3 - 80 (-N) SQE 3 - 80	MS 3 (-NE) MSE 3	1.70	1.1-1.73	1.23	7.9	9.1	74
SQ 3 - 95 (-N) SQE 3 - 95	MS 3 (-NE) MSE 3	1.98	1.1-1.73	1.43	9.2	10.6	74
SQ 3 - 105 (-N) SQE 3 - 105	MS 3 (-NE) MSE 3	2.28	1.1-1.73	1.63	10.6		74

Performance curves



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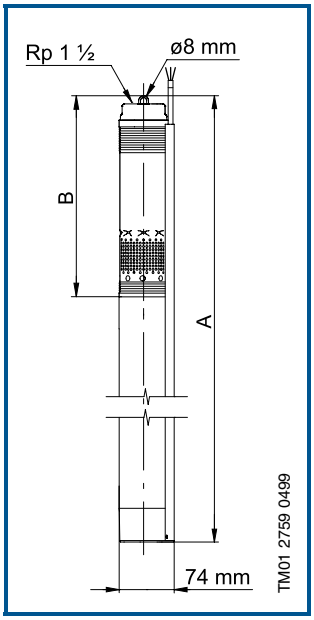
Dimensions and weights



Pump type	Number of stages	Motor		Dimensions [mm]		Net weight [kg]*	Shipping volume [m³]*
		Type	Output power (P_2) [kW]	A	B		
SQ 5 - 15 (-N) SQE 5 - 15	1	MS 3 (-NE) MSE 3	0.1-0.63	745	265	4.7	0.0092
SQ 5 - 25 (-N) SQE 5 - 25	2	MS 3 (-NE) MSE 3	0.1-0.63	745	265	4.8	0.0092
SQ 5 - 35 (-N) SQE 5 - 35	3	MS 3 (-NE) MSE 3	0.7-1.05	826	346	5.5	0.0100
SQ 5 - 50 (-N) SQE 5 - 50	4	MS 3 (-NE) MSE 3	1.1-1.73	862	346	6.2	0.0104
SQ 5 - 60 (-N) SQE 5 - 60	5	MS 3 (-NE) MSE 3	1.1-1.73	943	427	6.4	0.0113
SQ 5 - 70 (-N) SQE 5 - 70	6	MS 3 (-NE) MSE 3	1.1-1.73	943	427	6.4	0.0113

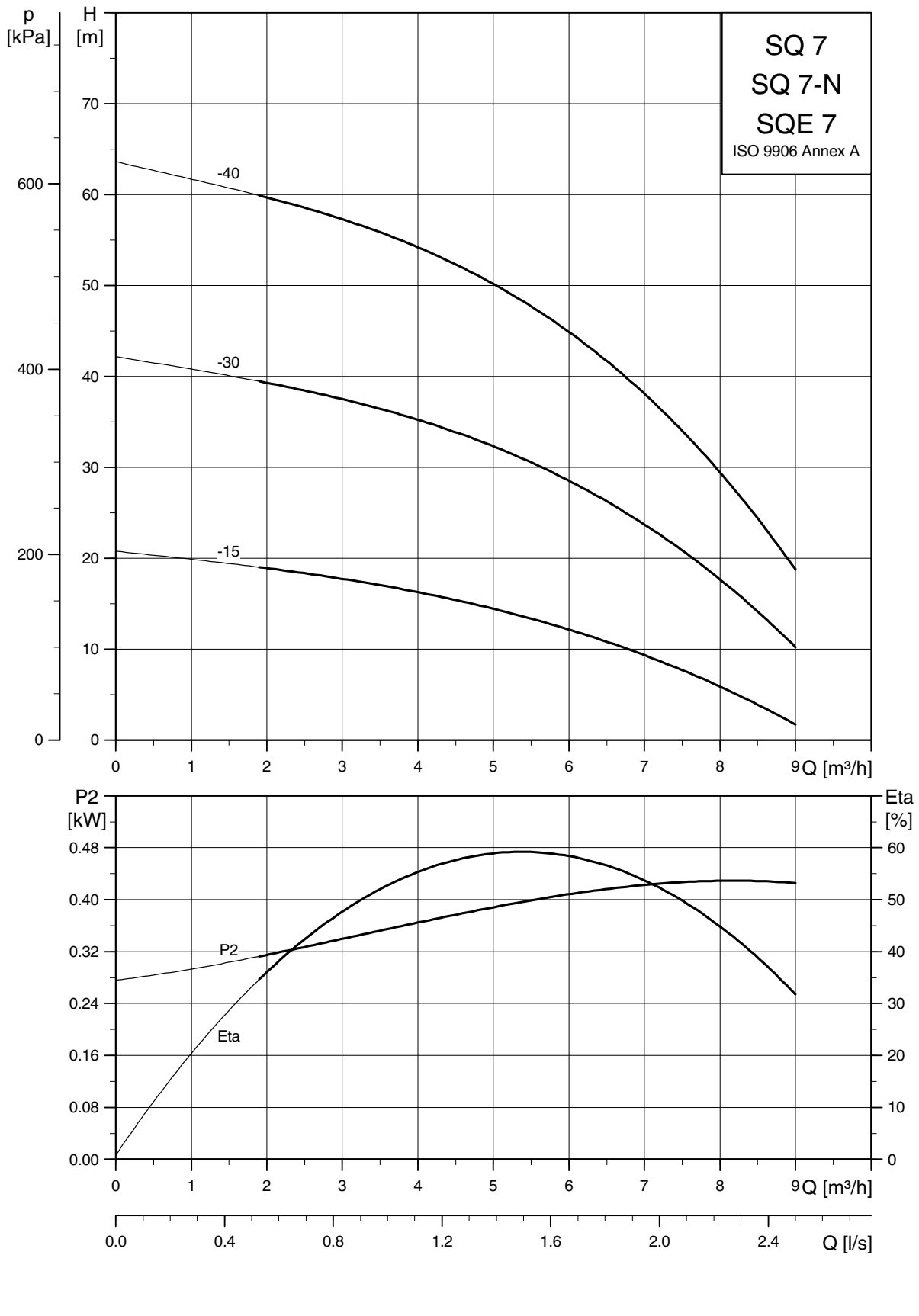
* Including pump, motor, 1.5 m cable and cable guard.

Electrical data

1 x 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]	Full load current $I_{1/1}$ [A]		Full load motor efficiency (η) [%]
					230 V	200 V	
SQ 5 - 15 (-N) SQE 5 - 15	MS 3 (-NE) MSE 3	0.41	0.1-0.63	0.26	1.9	2.2	70
SQ 5 - 25 (-N) SQE 5 - 25	MS 3 (-NE) MSE 3	0.76	0.1-0.63	0.54	3.4	3.9	70
SQ 5 - 35 (-N) SQE 5 - 35	MS 3 (-NE) MSE 3	1.10	0.7-1.05	0.80	4.9	5.6	70
SQ 5 - 50 (-N) SQE 5 - 50	MS 3 (-NE) MSE 3	1.49	1.1-1.73	1.06	7.0	8.1	73
SQ 5 - 60 (-N) SQE 5 - 60	MS 3 (-NE) MSE 3	1.84	1.1-1.73	1.33	8.6	9.9	74
SQ 5 - 70 (-N) SQE 5 - 70	MS 3 (-NE) MSE 3	2.23	1.1-1.73	1.60	10.4		74

Performance curves



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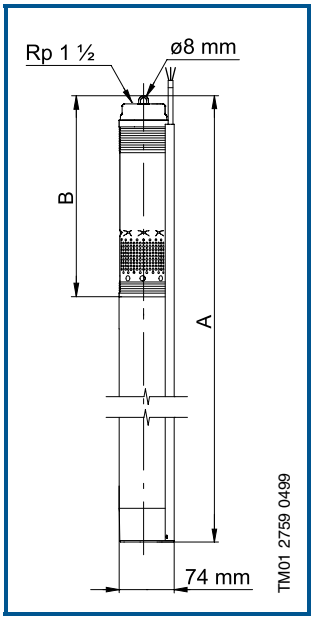
Dimensions and weights



Pump type	Number of stages	Motor		Dimensions [mm]		Net weight [kg]*	Shipping volume [m³]*
		Type	Output power (P_2) [kW]	A	B		
SQ 7 - 15 (-N) SQE 7 - 15	1	MS 3 (-NE) MSE 3	0.1-0.63	745	265	4.7	0.0092
SQ 7 - 30 (-N) SQE 7 - 30	2	MS 3 (-NE) MSE 3	0.7-1.05	745	265	5.2	0.0092
SQ 7 - 40 (-N) SQE 7 - 40	3	MS 3 (-NE) MSE 3	1.1-1.73	862	346	6.1	0.0104

* Including pump, motor, 1.5 m cable and cable guard.

Electrical data

1 x 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]	Full load current $I_{1/1}$ [A]		Full load motor efficiency (η) [%]
					230 V	200 V	
SQ 7 - 15 (-N) SQE 7 - 15	MS 3 (-NE) MSE 3	0.60	0.1-0.63	0.42	2.8	3.2	70
SQ 7 - 30 (-N) SQE 7 - 30	MS 3 (-NE) MSE 3	1.16	0.7-1.05	0.84	5.2	6.0	73
SQ 7 - 40 (-N) SQE 7 - 40	MS 3 (-NE) MSE 3	1.78	1.1-1.73	1.27	8.2	9.5	74

Pump, SQ and SQE

Mains supply to pump	1 x 200-240 V –10%/+6%, 50/60 Hz, PE.
Starting	Soft starting.
Stopping	Soft stopping when stopped by the CU 300 or CU 301.
Run-up time	Maximum: 2 seconds. No limitation to the number of starts/stops per hour.
Motor protection	Built into the pump. Protection against: **Dry running.** **Overvoltage and undervoltage**, cuts out below 150 V and above 280 V. **Overload.** **Overtemperature.**
Sound pressure level	The sound pressure level is lower than the limiting values stated in the EEC Machinery Directive.
Radio noise	SQ and SQE comply with EMC Directive 89/336/EEC. Approved according to EN 50081-1 and 50082-2.
Reset function	SQE pumps can be reset via CU 300 or via CU 301 (possibly by means of R100).
Power factor	PF = 1.
Operation via generator	It is recommended that the generator output is equal to the motor input power P_1 [kW] plus 50%; min. P1 +10%, however.
Earth leakage circuit breaker	If the pump is connected to an electrical installation where an earth-leakage circuit breaker (ELCB) is used as an additional protection, this circuit breaker **must** trip out when earth fault currents with DC content (pulsating DC) occur.
Pipe connection	SQ 1, SQ 2, SQ 3 : Rp 1¼. SQ 5, SQ 7: Rp 1½.
Borehole diameter	Minimum: 76 mm.
Installation depth	Maximum: 150 m below the static water table (15 bar). For horizontal installation flow sleeve is recommended. Installation depth below dynamic water level: Vertical installation with/without flow sleeve: 0.5 m. Horizontal installation with/without flow sleeve: 0.5 m.
NPSH	Max. 8 m.
Strainer	Holes of the strainer: ø2.3 mm.
Pumped liquids	SQ, SQE (DIN W.-Nr. 1.4301), SQ-N (DIN W.-Nr. 1.4401): pH 5 to 9. Sand content up to 50 g/m³.

Control units, CU 300 and CU 301

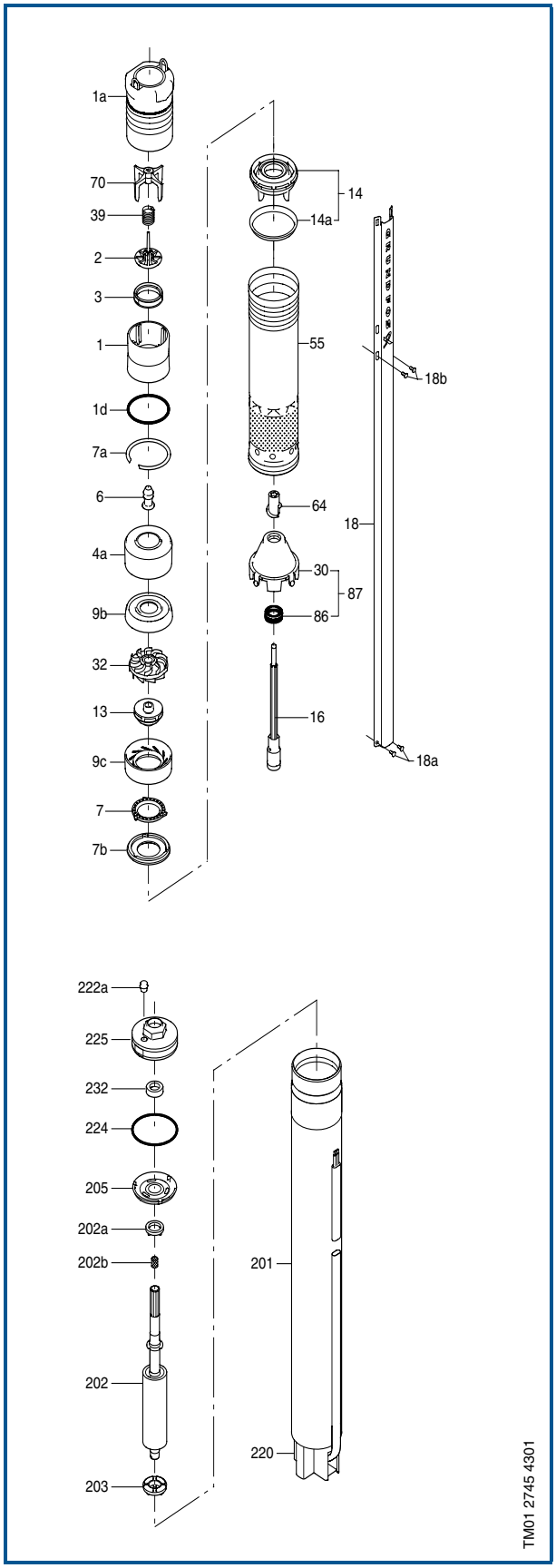
Voltage	1 x 100-240 V –10%/+6%, 50/60 Hz, PE.
Power consumption	5 W.
Current consumption	Maximum 130 mA.
Enclosure class	IP 55.
Ambient temperature	In operation: –30°C to +50°C, during storage –30°C to +60°C.
Relative air humidity	95%.
Pump cable	Maximum length between CU 300 or CU 301 and pump: 200 m.
Back-up fuse	Maximum: 16 A.
Radio noise	CU 300 and CU 301 comply with EMC Directive 89/336/EEC. Approved according to the standards EN 55 014 and 55 014-2.
Marking	CE.
Load	Max. 100 mA.

Material specification (Pump)

Pos.	Component	Material	DIN W.-Nr. SQ/SQE	AISI	DIN W.-Nr. SQ-N	AISI
1	Valve casing	Polyamide				
1a	Discharge 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	1.4401	316
7b	Neck ring retainer	Polyamide				
9b	Chamber top	Polyamide				
9c	Chamber bottom	Polyamide				
13	Impeller with tungsten carbide bearing	Polyamide				
14	Suction 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 18b	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	316LN	1.4406	316LN
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 equalization complete	Polyamide/ NBR rubber				

Material specification (Motor)

Pos.	Component	Material	DIN W.-Nr. MS 3/ MSE 3	AISI	DIN W.-Nr. MS 3-NE	AISI
201	Stator	Stainless steel	1.4301	304	1.4401	316
202	Rotor	Stainless steel	1.4301	304	1.4401	316
202a	Stop ring	PP				
202b	Filter	Polyester				
203	Thrust bearing	Carbon				
205	Radial bearing	Ceramic/ tungsten carbide				
220	Motor cable with plug	EPR				
222a	Filling plug	MS 3: NBR MSE 3: FKM				
224	O-ring	FKM				
225	Top cover	PPS				
232	Shaft seal	MS 3: NBR MSE 3: FKM				
	Motor liquid	SML-2				

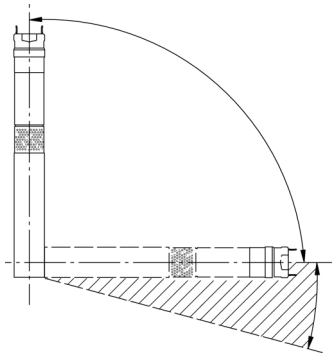


VARIABLE SPEED OPERATION

The MSE 3 motor enables continuously variable speed control within 65% - 100%. The pump can be set to operate in any duty point in the range between 65% and 100% performance curves of the pump. Consequently, pump operation can be adapted to any specific need.
The variable speed control requires the CU 300 control unit and the R100.
For the calculation of the speed the calculation program "PC Tool SQE" can be supplied on floppy disk as an accessory, see page 51. On the basis of a required head and flow the speed of the motor is calculated. Furthermore, the specific pump performance curve can be illustrated.

INSTALLATION

The 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.
The following features ensure simple installation of the SQ and SQE pumps:

- Built-in non-return valve with spring,
- low weight ensuring user-friendly handling,
- installation in 3" or larger boreholes,
- only on/off switch is needed, which means that no extra motor starter / starter box is necessary, and
- SQE available with cable with a motor plug (up to 100 m). For horizontal installation a flow sleeve is recommended in order to
- ensure sufficient flow velocity past the motor and thus provide sufficient cooling,
- prevent motor and electronic unit from being buried in sand or mud.

CONTROLS/ACCESSORIES

SQ with Presscontrol (with/without diaphragm tank)
Functioning and benefits:
If water is consumed the SQ pump is cut -in via the Presscontrol. The diaphragm tank is fitted between the SQ and the Presscontrol. In an installation with a diaphragm tank, water is supplied as soon as the tap is opened. It means that the diaphragm tank takes over water supply during the smooth start up of the SQ pump (about 2 seconds).

Constant-pressure control with CU 301

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 the CU 301. The CU 301 adjusts the pump performance accordingly.

CU 301, control unit

The CU 301 is a control and communication unit especially developed for the SQE submersible pumps in constant pressure applications.
The CU 301 control unit provides:

- Full control of the SQE pumps.
- Two-way communication with the SQE pumps.
- Possibility of adjusting the pressure.
- Alarm indication (LED) when service is needed.
- The possibility of starting, stopping and resetting the pump simply by means of a push-button.
- Communication with remote control, R100

Constant-pressure control with CU 300

Functioning and benefits:
A constant pressure can be maintained in the system.
A flow switch ensures that the pump starts at once when a tap is opened. A preset pressure is maintained via the pressure sensor and the CU 300. When the flow switch is detecting no flow the tank is filled with water and the pump stops.
The CU 300 is a control and communication unit especially developed for the SQE submersible pumps.
It provides:

- Easy adjustment to a specific borehole.
- Full control of the SQE pumps.
- Two-way communication with the SQE pumps.
- Alarm indication of pump operation by diodes on the front, and
- The possibility of starting, stopping and resetting the pump simply by means of a push-button.

R100, remote control

Wireless infrared remote control of the CU 301 is possible by means of the R100. Using the R100 it is possible

1) to monitor the installation by reading current operating parameters, such as

- power consumption,
- speed, and
- number of operating hours;

2) to change the factory setting, such as

- max. speed,
- max. pressure, and
- setpoint.

SQE with manual speed control

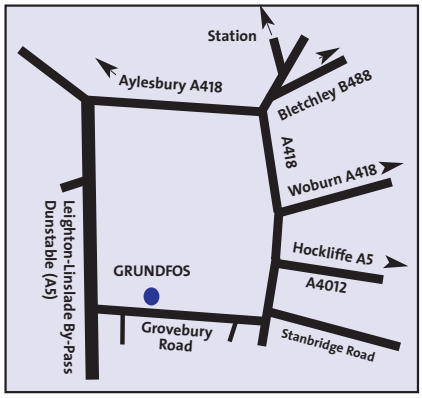
Functioning and benefits:
Manual speed control of the SQE pumps is possible by means of R100 and an SPP1 potentiometer.
This application is especially suitable for sampling from groundwater monitoring wells. The monitoring well is purged at high speed and the sample is taken at a low speed (quiet flow). For contaminated groundwater the SQE-NE type range is recommended (available on request).

SERVICE

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

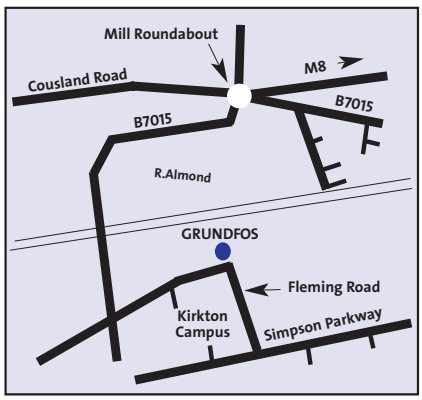
GRUNDFOS PUMPS LTD

South:
Grovebury Road,
Leighton Buzzard,
Beds LU7 4TL
Tel: 01525 850000
Fax: 01525 850011
Spares: Tel: 01525 775401
Fax: 01525 370625



North:
Gawsworth Court ,
Risley Road, Risley
Warrington, Cheshire WA3 6NJ
Tel: 01925 813300
Fax: 01925 830014
Service (Repairs): Tel: 01925 838527
Fax: 01925 811658

Scotland/N.Ireland :
Fleming Road, Kirkton Campus,
Livingston
West Lothian, Scotland
EH54 7BN
Tel: 01506 461666
Fax: 01506 461555



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