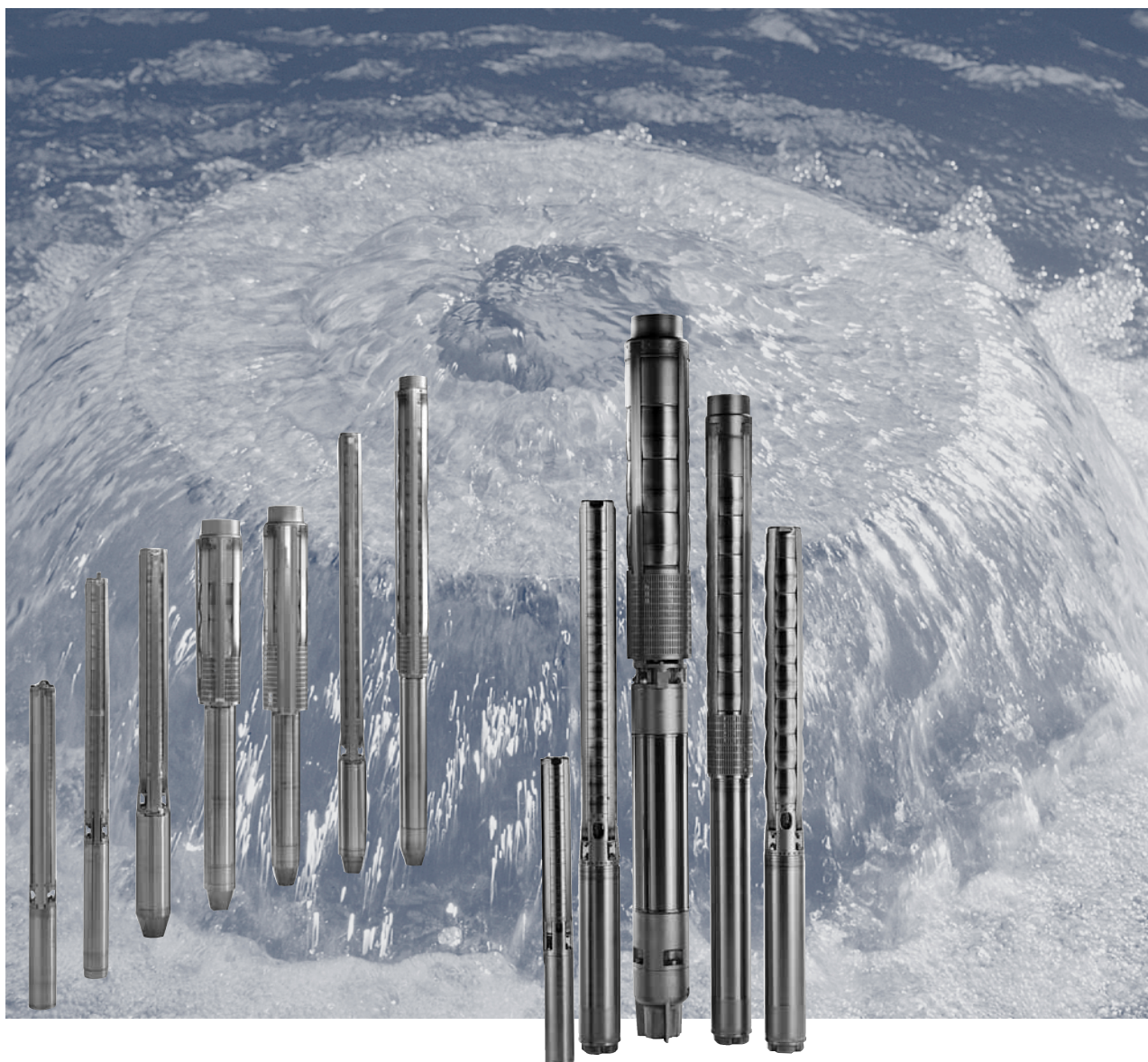


SP A, SP

Submersible pumps, motors and accessories
50 Hz



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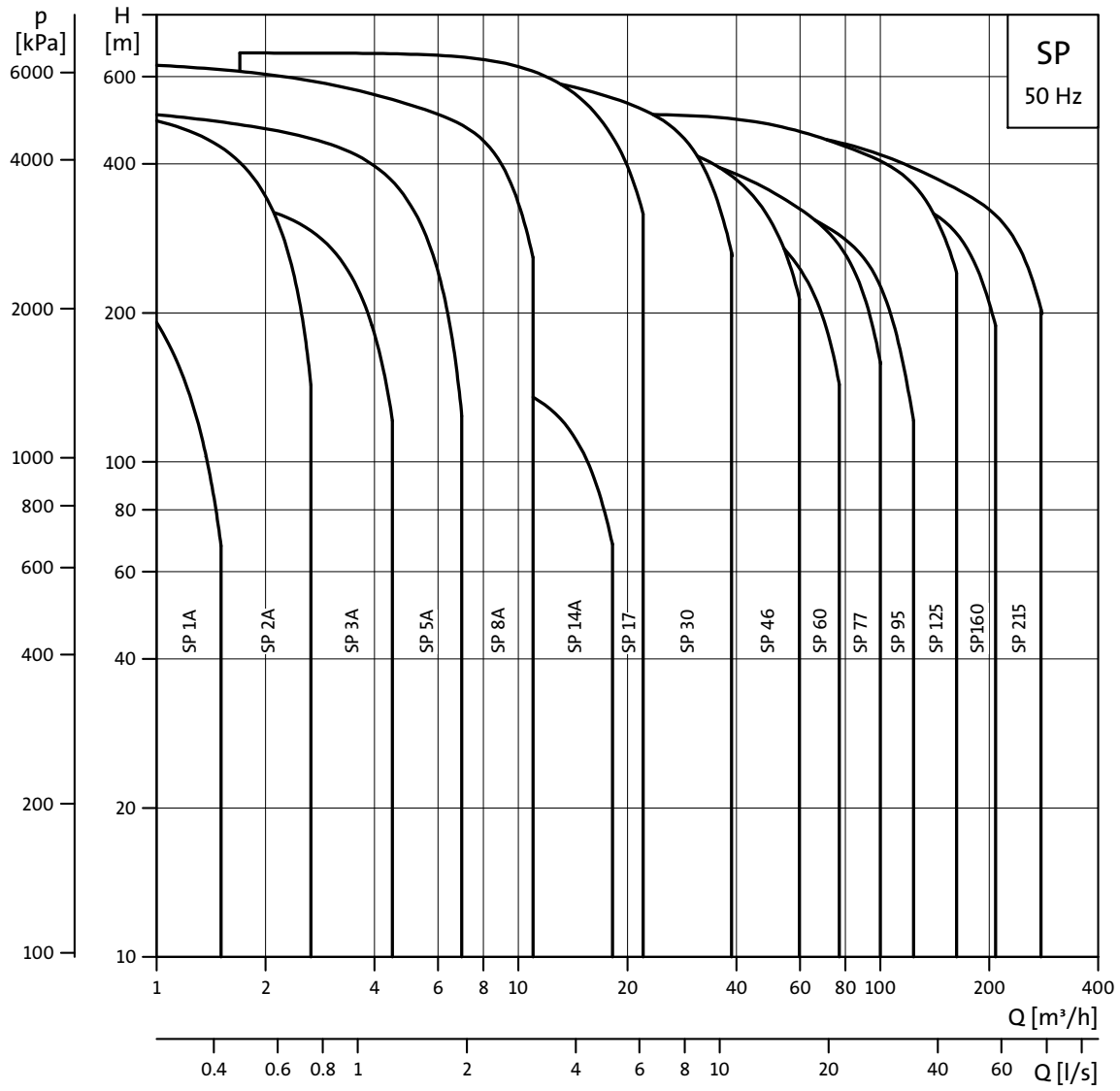
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Performance range



TM00 7254 4702

Applications

The SP A and SP pumps are suitable for the following applications:

- raw-water supply
- irrigation systems
- groundwater lowering
- pressure boosting
- fountain applications
- mining applications
- off-shore applications.

Type key

| Example | SP | 95 | - | 5 | - | A | B | N |
|--|----|----|---|---|---|---|---|---|
| Type range (SP A, SP) | | | | | | | | |
| Rated flow rate in m ³ /h | | | | | | | | |
| Number of impellers | | | | | | | | |
| First reduced-diameter impeller (A, B or C) | | | | | | | | |
| Second reduced-diameter impeller (A, B or C) | | | | | | | | |
| Stainless-steel parts of material = EN 1.4301 N = EN 1.4401 R = EN 1.4539 | | | | | | | | |

Pumped liquids

Clean, thin, non-aggressive liquids without solid particles or fibres.

The special SP A-N and SP-N versions made of stainless steel to EN 1.4401 and SP A-R and SP-R versions made of stainless steel to EN 1.4539 are available for applications involving aggressive liquids.

Maximum liquid temperature

| Grundfos motor | Installation | | |
|--|--------------------------------|---------------|-----------------|
| | Flow velocity past motor [m/s] | Vertical [°C] | Horizontal [°C] |
| MS 4" | 0.15 | 40 | 40 |
| MS6 T30 versions | 0.15 | 30 | 30 |
| MS 4" industrial versions | 0.15 | 60 | 60 |
| MS6 T60 versions | 1.0 | 60 | 60 |
| MMS6 with PVC in the windings | 0.15 | 25 | 25 |
| | 0.50 | 30 | 30 |
| MMS6 with PE/PA in the windings | 0.15 | 45 | 45 |
| | 0.50 | 50 | 50 |
| MMS 6000, 8000, 10000, 12000 rewindable with PVC in the windings | 0.15 | 25 | 25 |
| | 0.50 | 30 | 30 |
| MMS 6000, 8000, 10000, 12000 rewindable with PE/PA in the windings | 0.15 | 40 | 40 |
| | 0.50 | 45 | 45 |

Note: For MMS 6000, 37 kW, MMS 8000, 110 kW, and MMS 10000, 170 kW, the maximum liquid temperature is 5 °C lower than the values stated in the table above. For MMS 10000, 190 kW, the temperature is 10 °C lower.

Operating pressure

| Grundfos motor | Maximum operating pressure |
|---|----------------------------|
| MS 402 | 1.5 MPa (15 bar) |
| MS 4000 and 6" | 6 MPa (60 bar) |
| MMS6, MMS 6000, 8000, 10000, 12000 rewindable | |

Curve conditions

The conditions below apply to the curves on pages 16 to 72:

General conditions

- Curve tolerances according to ISO 9906, Annex A.
- The performance curves show pump performance at actual speed, cf. standard motor range. The speeds of the motors are approximately
4" motors: $n = 2870 \text{ min}^{-1}$
6" motors: $n = 2870 \text{ min}^{-1}$
8" to 12" motors: $n = 2900 \text{ min}^{-1}$.
- The measurements were made with airless water at a temperature of 20 °C. The curves apply to a kinematic viscosity of 1 mm²/s (1 cSt). When pumping liquids with a density higher than that of water, use motors with correspondingly higher outputs.
- The **bold** curves indicate the **recommended** performance range.
- The performance curves are inclusive of possible losses such as non-return valve loss.

SP A curves

- **Q/H:** The curves are inclusive of valve and inlet losses at the actual speed.
- **Power curve:** P₂ shows pump power input at the actual speed for each individual pump size.
- **Efficiency curve:** Eta shows pump stage efficiency.

SP curves

- **Q/H:** The curves are inclusive of valve and inlet losses at the actual speed. Operation without non-return valve will increase the actual head at rated performance by 0.5 to 1.0 m.
- **NPSH:** The curve is inclusive of pressure loss in the suction interconnector and shows required inlet pressure.
- **Power curve:** P₂ shows pump power input at the actual speed of each individual pump size.
- **Efficiency curve:** Eta shows pump stage efficiency. If Eta for the actual pump size is needed, please consult WinCAPS or WebCAPS.

Pump range

| Type | SP 1A | SP 2A | SP 3A | SP 5A | SP 8A | SP 14A | SP 17 | SP 30 | SP 46 | SP 60 | SP 77 | SP 95 | SP 125 | SP 160 | SP 215 |
|---------------------------------------|----------|-----------------------|----------|-----------------------|---------------|--------|-------------------|---------------|-----------------------|--------------|-------|-------|--------|--------|--------|
| Steel: EN 1.4301 AISI 304 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Steel: EN 1.4401 AISI 316 | | | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Steel: EN 1.4539 AISI 904L | | | | • | • | | • | • | • | • | • | • | • | • | • |
| Connection* | Rp 1 1/4 | Rp 1 1/4 (R 1 1/4) | Rp 1 1/4 | Rp 1 1/2 (R 1 1/2) | Rp 2 (R 2) | Rp 2 | Rp 2 1/2 (R 3) | Rp 3 (R 3) | Rp 3 Rp 4 (R 4) | Rp 3 Rp 4 | Rp 5 | Rp 5 | Rp 6 | Rp 6 | Rp 6 |
| Flange connection: Grundfos flange | | | | | | | | | | | 5" | 5" | 6" | 6" | 6" |

* Figures in brackets () indicate connection for pumps with sleeve.

Motor range

| Motor output [kW] | 0.37 | 0.55 | 0.75 | 1.1 | 1.5 | 2.2 | 3.0 | 3.7 | 4.0 | 5.5 | 7.5 | 9.2 | 11 | 13 | 15 | 18.5 | 22 | 26 | 30 | 37 | 45 | 55 | 63 | 75 | 92 | 110 | 132 | 147 | 170 | 190 | 220 | 250 | | |
|--|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|---|---|
| Single-phase | • | • | • | • | • | • | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Three-phase | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Industrial motor and MS6 T60 versions | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Rewindable motor | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Steel: EN 1.4301 AISI 304 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Steel: EN 1.4301 and cast iron | | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Steel: EN 1.4401 AISI 316 | | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Steel: EN 1.4539 AISI 904L | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Built-in temperature transmitter in motor | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |

Direct-on-line starting is recommended up to 75 kW.

Soft starter or autotransformer is recommended above 75 kW.

Motors with star-delta starting are available from 5.5 kW.

Motor protection and controllers

| Motor output [kW] | 0.37 | 0.55 | 0.75 | 1.1 | 1.5 | 2.2 | 3.0 | 3.7 | 4.0 | 5.5 | 7.5 | 9.2 | 11 | 13 | 15 | 18.5 | 22 | 26 | 30 | 37 | 45 | 55 | 63 | 75 | 92 | 110 | 132 | 147 | 170 | 190 | 220 | 250 | | | | |
|----------------------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|
| CUE | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | |
| MP 204 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | |
| IO 112 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | |
| Pr 5714 | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | |
| CU 220 | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | |
| Pt100 | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Pt1000 | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Zinc anode | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Vertical flow sleeve | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Flow sleeve | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| SA-SPM | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| R100 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| G100 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |

Motor protection of single-phase motors, see *Electrical data*, page 73.

Features and benefits

A wide pump range

Grundfos offers energy-efficient submersible pumps ranging from 1 to 280 m³/h. The pump range consists of many pump sizes, and each pump size is available with an optional number of stages to match any duty point.

High pump efficiency

Often pump efficiency is a neglected factor compared to the price. However, the observant user will notice that price variations are without importance to water supply economics compared to the importance of pump and motor efficiencies.

Example

When pumping 200 m³/h at a head of 100 m for a period of 10 years, EURO 60,000 will be saved if a pump/motor having a 10 % higher efficiency is chosen and the price is EURO 0.10 per kWh.

Material and pumped liquids

Grundfos offers a complete range of pumps and motors which, as standard, are made completely of stainless steel to EN 1.4301 (AISI 304). This ensures good wear resistance and a reduced risk of corrosion when pumping ordinary cold water with a minor chloride content.

A pump range made of upgraded stainless steel is available for more aggressive liquids:

SP N: EN 1.4401 (AISI 316)

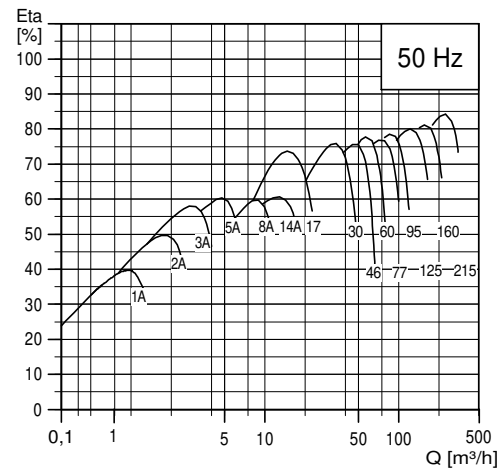
SP R: EN 1.4539 (AISI 904L).

Alternatively, a complete range of zinc anodes for cathodic protection is available. See page 90. For example this may be advisable for seawater applications.

For slightly polluted liquids containing for example oil, Grundfos offers a complete range of stainless-steel SP NE pumps to EN 1.4401 (AISI 316) with all rubber parts made of FKM.

Low installation costs

Stainless steel means low weight facilitating the handling of pumps and resulting in low equipment costs and reduced installation and service time.



TM00 7255 1898

Fig. 1 Pump/motor efficiencies in relation to flow



Gr6389 - GrA4019

Fig. 2 Various SP pumps

Bearings with sand channels

All bearings are water-lubricated and have a squared shape enabling sand particles, if any, to leave the pump together with the pumped liquid.

Inlet strainer

The inlet strainer prevents particles over a certain size from entering the pump.

Non-return valve

All pumps have a reliable non-return valve in the valve casing preventing back flow in connection with pump stoppage.

Furthermore, the short closing time of the non-return valve means that the risk of destructive water hammer is reduced to a minimum.

The valve casing is designed for optimum hydraulic properties to minimise the pressure loss across the valve and thus to contribute to the high efficiency of the pump.

Priming screw

All Grundfos 4" pumps are fitted with a priming screw. Consequently, dry running is prevented because the priming screw will ensure that the pump bearings are always lubricated.

Due to the semi-axial impellers of large SP pumps, this priming is provided automatically.

However, it applies to all pump types as, if the water table is lowered to a level below the pump inlet, neither pump nor motor will be protected against dry running.

Stop ring

The stop ring prevents damage to the pump during transport and in case of up-thrust in connection with start-up.

The stop ring, which is designed as a thrust bearing, limits axial movements of the pump shaft.

The stationary part of the stop ring (A) is secured in the upper chamber.

The rotating part (B) is fitted above the split cone (C).



Fig. 3 Bearing

TM00 7301 1096



Fig. 4 Inlet strainer

TM00 7302 1096

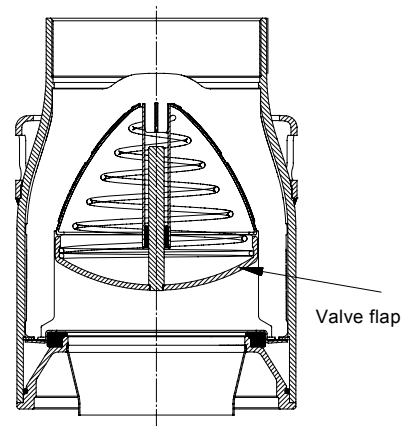


Fig. 5 Non-return valve

TM01 2499 1798

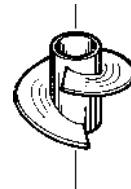


Fig. 6 Priming screw

TM00 7304 1096

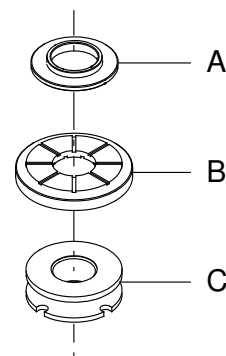
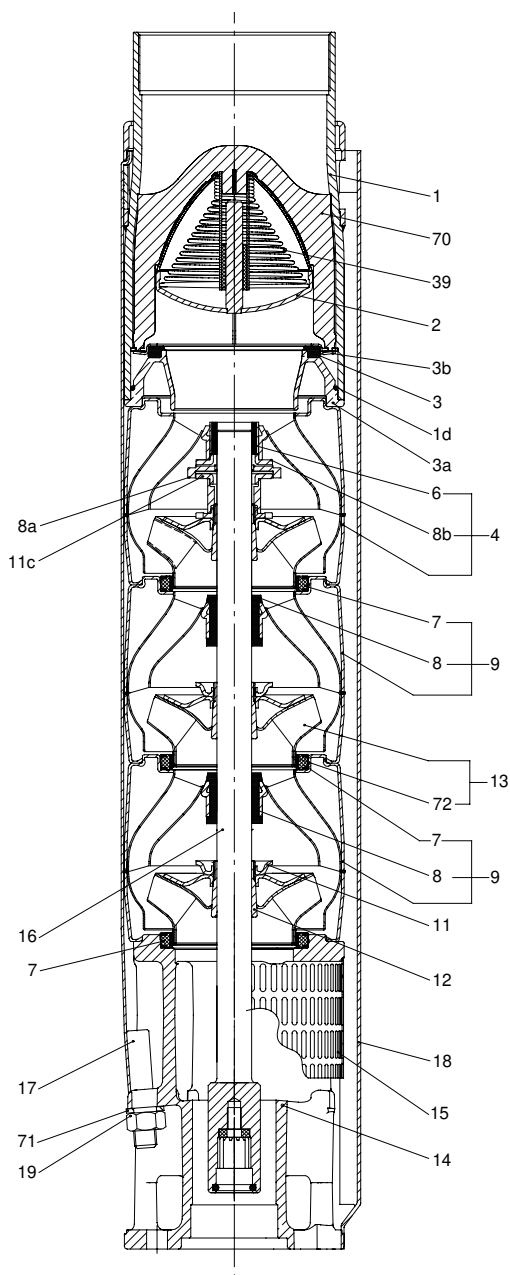


Fig. 7 Stop ring (rotating and stationary parts) and split cone

TM01 3327 3698

Material specification

| Pos. | Component | Material | Standard | N-version | R-version |
|------|---------------------------|---|----------------|----------------|---------------------|
| | | | EN/AISI | | |
| 1 | Valve casing | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 1d | O-ring | NBR | | | |
| 2 | Valve cup | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 3 | Valve seat | Standard/ N-version: NBR R-version: FKM | | | |
| 3a | Lower valve seat retainer | Stainless steel | 1.4308 | 1.4408/ 316 | 1.4517 |
| 3b | Upper valve seat retainer | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 4 | Top chamber | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 6 | Upper bearing | Stainless steel/ NBR | 1.4401/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 7 | Neck ring | NBR/PPS | | | |
| 8 | Bearing | NBR | | | |
| 8a | Washer for stop ring | Carbon/graphite HY22 in PTFE mass | | | |
| 8b | Stop ring | Stainless steel | 1.4401/ 316 | 1.4401/ 316 | 1.4539/ 904L |
| 9 | Chamber | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 11 | Split cone nut | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 11c | Nut for stop ring | Stainless steel | 1.4401/ 316 | 1.4401/ 316 | 1.4539/ 904L |
| 12 | Split cone | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 13 | Impeller | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 14 | Suction interconnector | Cast stainless steel | 1.4308 | 1.4408/ 316 | 1.4517 |
| 15 | Strainer | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 16 | Shaft complete | Stainless steel | 1.4057/ 431 | 1.4460/ 329 | 1.4460/329 |
| 17 | Strap | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 18 | Cable guard | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 19 | Nut for strap | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 39 | Spring for valve cup | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4462/ SAF 2205 |
| 70 | Valve guide | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |
| 71 | Washer | Stainless steel | 1.4401/ 316 | 1.4401/ 316 | 1.4539/ 904L |
| 72 | Wear ring | Stainless steel | 1.4301/ 304 | 1.4401/ 316 | 1.4539/ 904L |



TM01 2359 2301

Fig. 8 SP 77

Features and benefits

A complete motor range

Grundfos offers a complete range of submersible motors in different voltages:

Submersible motors, MS:

- 4" motors, single-phase up to 2.2 kW:
 - 2-wire
 - 3-wire
 - PSC (permanent split capacitor)
- 4" motors, three-phase up to 7.5 kW
- 6" motors, three-phase from 5.5 kW to 30 kW.

Submersible rewindable motors, MMS:

- 6" motors, three-phase from 3.7 kW up to 37 kW
- 8" motors, three-phase from 22 kW up to 110 kW
- 10" motors, three-phase from 75 kW up to 190 kW
- 12" motors, three-phase from 147 kW up to 250 kW.

High motor efficiency

Within the area of high motor efficiency, Grundfos is a market leader.

Rewindable motors

The 2-pole Grundfos MMS submersible motors are all easy to rewind. The windings of the stator are made of a special water-proof wire of pure electrolytic copper sheathed with special non-hydroscopic thermoplastic material. The fine dielectric properties of this material allow direct contact between the windings and the liquid for efficient cooling of the windings.

Industrial motors and MS6 T60-versions

For heavy-duty applications, Grundfos offers a complete motor range of industrial motors with up to 5 % higher efficiency than that of Grundfos' standard motors. The industrial motors are available in sizes as from 2.2 kW up to 22 kW. The cooling of the motor is very efficient due to the large motor surface. The efficient cooling makes it possible to increase the liquid temperature to 60 °C at a minimum flow of 0.15 m/s past the motor. The industrial motors are for customers who value low operating costs and long life higher than price.

Grundfos industrial motors are developed for difficult operating conditions. These motors will stand a higher thermal load than standard motors and thus have a longer life when subjected to high load. This applies whether the high load is caused by bad power supply, hot water, bad cooling conditions, high pump load, etc.

Please note that heavy-duty motors are longer than motors for standard conditions.



Fig. 9 MS motors

TM00 7305 1096 - GrA4013



Fig. 10 MMS motors

TM01 7873 4799 - GrA4575

Overtemperature protection

Accessories for protection against overtemperature are available for both Grundfos MS and MMS submersible motors. When the temperature becomes too high, the protection device will cut out, and damage to the pump and motor will be avoided.

Restarting of the motor after cut-out can be achieved in two ways:

- manual restarting or
- automatic restarting.

Automatic restarting means that the MP 204 motor protector attempts to restart the motor after 15 minutes. If the first attempt is not successful, restarting will be reattempted at 30-minute intervals.

MS

Grundfos submersible motors, type MS, except for MS 402, are available with built-in Tempcon (temperature transmitter) for monitoring of the temperature of the submersible motor.

The Grundfos MP 204 motor protector can warn and cut out the motor to provide protection against high temperatures. The signal from the Tempcon to the MP 204 is transmitted via powerline communication.

The MP 204 cannot be used in installations with frequency converters. Grundfos recommends to monitor the motor temperature via a Pt100 or Pt1000 sensor.

The Grundfos frequency converter, type CUE, can handle Pt100 or Pt1000 signals via an add-on card without any additional relays.

Grundfos offers the CU 220 (only Pt1000 and 50 Hz) or the PR 5714 as relays. These solutions require extra cabling for the temperature sensor.

MMS

Grundfos submersible motors, type MMS, can be fitted with a Pt100 or Pt1000 sensor for monitoring of the motor temperature. Grundfos offers the CU 220 or PR 5714 as relays.

The Grundfos frequency converter, type CUE, can handle Pt100 or Pt1000 signals via a small add-on card without any additional relays.

Protection against upthrust

In case of a very low counter-pressure in connection with start-up, there is a risk that the entire chamber stack may rise. This is called upthrust. Upthrust may damage both pump and motor. Therefore, both Grundfos pumps and motors are protected against upthrust as standard, preventing upthrust from occurring in the critical start-up phase. The protection consists of either a built-in stop ring or hydraulic balancing.

Built-in cooling chambers

In all Grundfos MS submersible motors, an efficient cooling is ensured by cooling chambers at the top and at the bottom of the motor and by an internal circulation of motor liquid. See fig. 11. As long as the required flow velocity past the motor is maintained (see *General data* on page 4), cooling of the motor will be efficient.

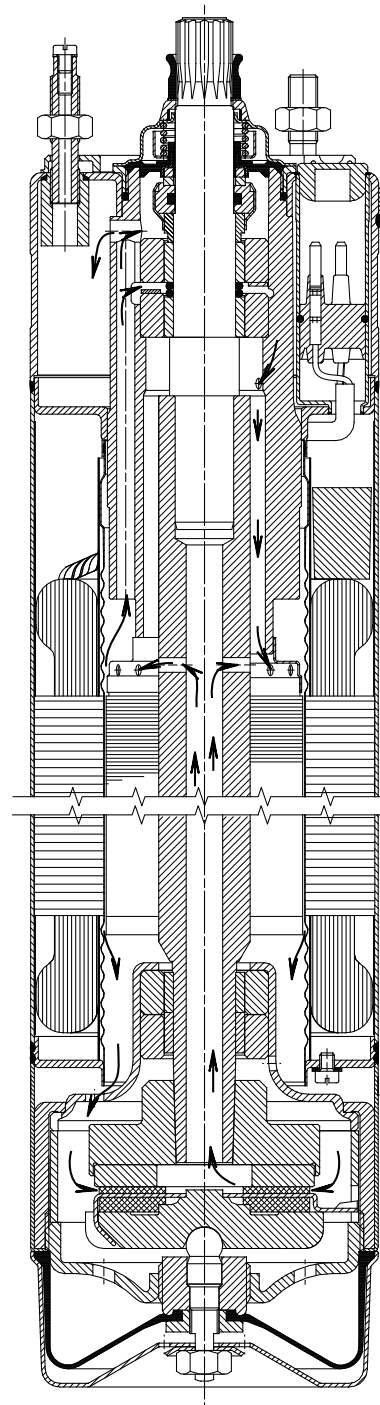


Fig. 11 MS 4000

TM00 5698 0996

Lightning protection

The smallest Grundfos submersible motors, i.e. MS 402, are all insulated in order to minimise the risk of motor burnout caused by stroke of lightning.

Reduced risk of short-circuit

The embedded stator winding in the Grundfos MS submersible motor is hermetically enclosed in stainless steel. The result is high mechanical stability and optimum cooling. Also, this eliminates the risk of short-circuit of the windings caused by condensed water.

Shaft seal

MS 402

The shaft seal is of the lip seal type characterised by low friction against the rotor shaft.

The choice of rubber offers good wear resistance, good elasticity and resistance to particles. The rubber material is approved for use in drinking water.

MS 4000, MS6

The material is ceramic/tungsten carbide providing optimum sealing, optimum wear resistance and long life.

The spring-loaded shaft seal is designed with a large surface and a sand shield. The result is a minimum exchange of pumped liquid and motor liquid and no penetration of particles. Motors, version R, have a SiC/SiC shaft seal according to DIN 24960. Other combinations are available on request.

MMS rewindable motors

The standard shaft seal is a ceramic/carbon mechanical shaft seal. The shaft seal is replaceable.

The material provides good wear resistance and resistance to particles.

Together with the shaft seal housing, the sand shield forms a labyrinth seal, which during normal operating conditions prevents penetration of sand particles into the shaft seal.

On request, motors can be supplied with a SiC/SiC seal according to DIN 24960.

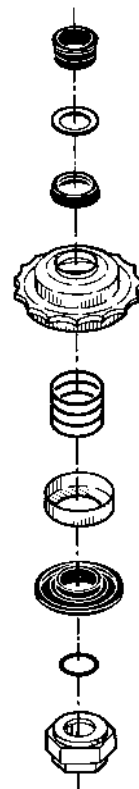


Fig. 12 Shaft seal, MS 4000

TM00 7306 2100



Fig. 13 Shaft seal, MS6

TM03 9225 3607

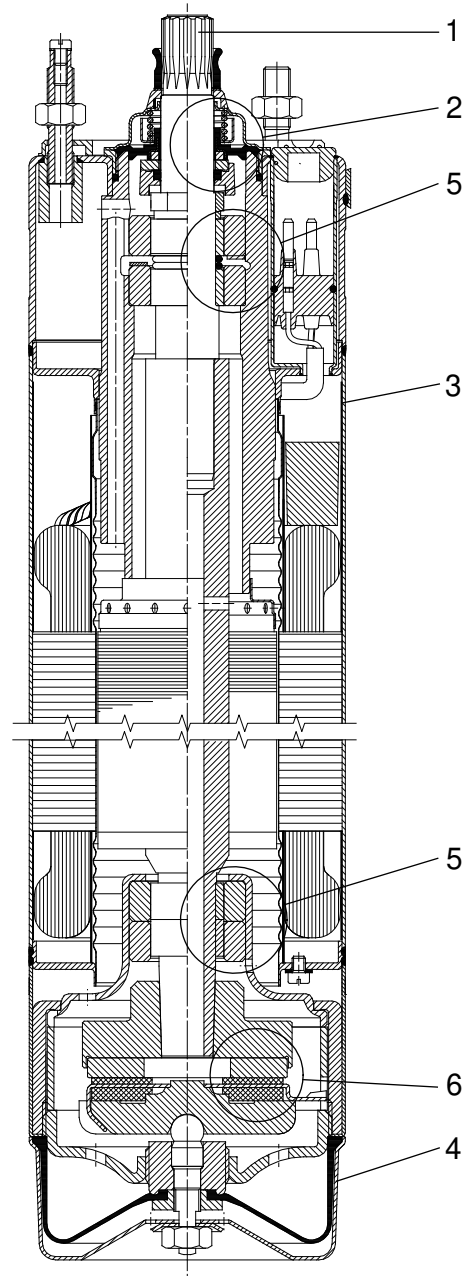
Material specification for MS motors

MS 402 and MS 4000 submersible motors

| Pos. | Component | MS 402 | MS 4000 |
|------|------------------|----------------|------------------------------|
| 1 | Shaft | EN 1.4057 | EN 1.4057 |
| 2 | Shaft seal | NBR | Tungsten carbide/ ceramic |
| 3 | Motor sleeve | EN 1.4301 | EN 1.4301 |
| 4 | Motor end shield | | EN 1.4301 |
| 5 | Radial bearing | Ceramic | Ceramic/ tungsten carbide |
| 6 | Axial bearing | Ceramic/carbon | Ceramic/carbon |
| | Rubber parts | NBR | NBR |

R-version motor

| Pos. | Component | MS 4000 |
|------|------------------|------------------------------|
| 1 | Shaft | EN 1.4462 |
| 2 | Shaft seal | NBR/ceramic |
| 3 | Motor sleeve | EN 1.4539 |
| 4 | Motor end shield | EN 1.4539 |
| 5 | Radial bearing | Ceramic/ tungsten carbide |
| 6 | Thrust bearing | Ceramic/carbon |
| | Rubber parts | NBR |



TM00 7865 2196

Fig. 14 MS 4000

MS6 submersible motors

| Pos. | Component | MS6 |
|------|------------------|----------------|
| 202 | Shaft with rotor | EN 1.4462 |
| 2 | Shaft seal | Ceramic/carbon |
| 3 | Motor sleeve | EN 1.4301 |
| 4 | Motor end cover | EN 1.4308 |
| | Rubber parts | NBR/FKM |

R-version motor

| Pos. | Component | MS6 |
|------|-----------------|-----------|
| 1 | Shaft | EN 1.4462 |
| 2 | Shaft seal | SiC/SiC |
| 3 | Motor sleeve | EN 1.4539 |
| 4 | Motor end cover | EN 1.4517 |
| | Rubber parts | FKM |

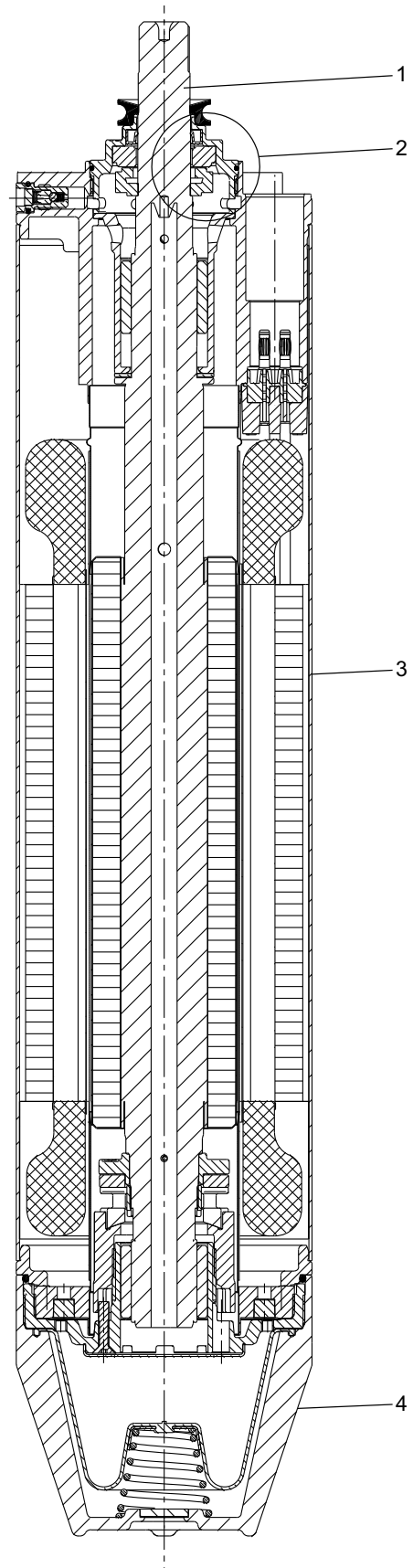


Fig. 15 MS6

TM03 9226 3607

Material specification for MMS 6000 to 12000 motors

Submersible rewindable motors

| Pos. | Component | Material | EN |
|-------------|--|---------------------|----------------------------|
| 202 | Shaft | Steel | 1.0533 |
| 202a | Shaft ends | Stainless steel | 1.4460 |
| 203/ 206 | Thrust bearing Stationary/ rotating part | 6" 3.7 to 15 kW | Hardened steel/EPDM |
| | | 12" | |
| | | 6" 18.5 to 37 kW | Ceramic/ carbon |
| | | 8" to 10" | |
| 204 | Bearing bush | Carbon | |
| | | 12" | Stainless steel/ NBR |
| 205 | Bearing housing, upper | Cast iron | EN-JL1040 |
| 212 | Diaphragm | CR | |
| 213 | Motor end shield | Cast iron | EN-JL1040 |
| 218 | Motor sleeve | Stainless steel | 1.4301 |
| 220 | Motor cable | EPDM | |
| 226 | Shaft seal | Ceramic/ carbon | |
| 235 | Intermediate housing | Cast iron | EN-JL1040 |
| 236 | Bearing housing, lower | Cast iron | EN-JL1040 |

N- and R-versions of MMS motors

| Pos. | Component | Material | Version | |
|-------------|---|-------------------------|---------|--------|
| | | | N | R* |
| | | | EN | EN |
| 202 | Shaft | Steel | 1.0533 | 1.0533 |
| 202a | Shaft ends | Stainless steel | 1.4460 | 1.4462 |
| 203/ 206 | Thrust bearing Stationary/rotating part: • 6" (3.7 to 15 kW) • 12" | Hardened steel/EPDM | | |
| | | | | |
| | | Ceramic/ carbon | | |
| | | | | |
| 204 | Bearing bush • 6" to 10" | Carbon | | |
| | Bearing bush • 12" | Stainless steel/ NBR | | |
| 205 | Bearing housing, upper | Stainless steel | 1.4401 | 1.4539 |
| 212 | Diaphragm | CR | | |
| 213 | Motor end shield | Stainless steel | 1.4401 | 1.4539 |
| 218 | Motor sleeve | Stainless steel | 1.4401 | 1.4539 |
| 220 | Motor cable | EPDM | | |
| 226 | Shaft seal | Ceramic/ carbon | | |
| 235 | Intermediate housing | Stainless steel | 1.4401 | 1.4539 |
| 236 | Bearing housing, lower | Stainless steel | 1.4401 | 1.4539 |

* MMS 6000, MMS 8000 and MMS10000 are available in R-versions.

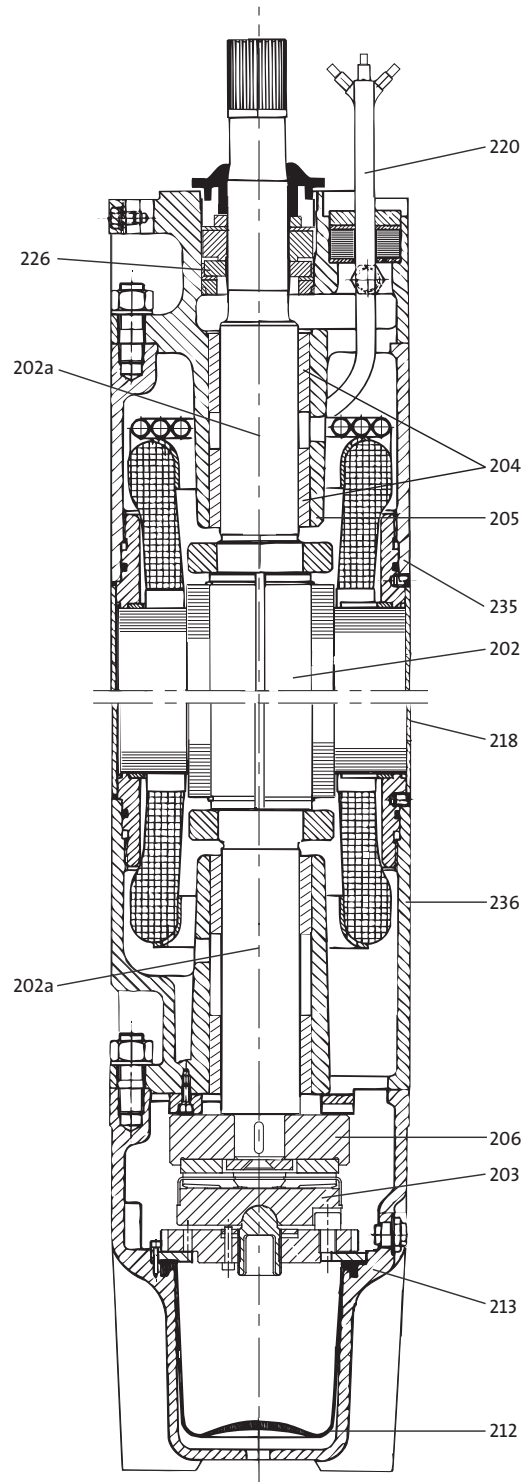


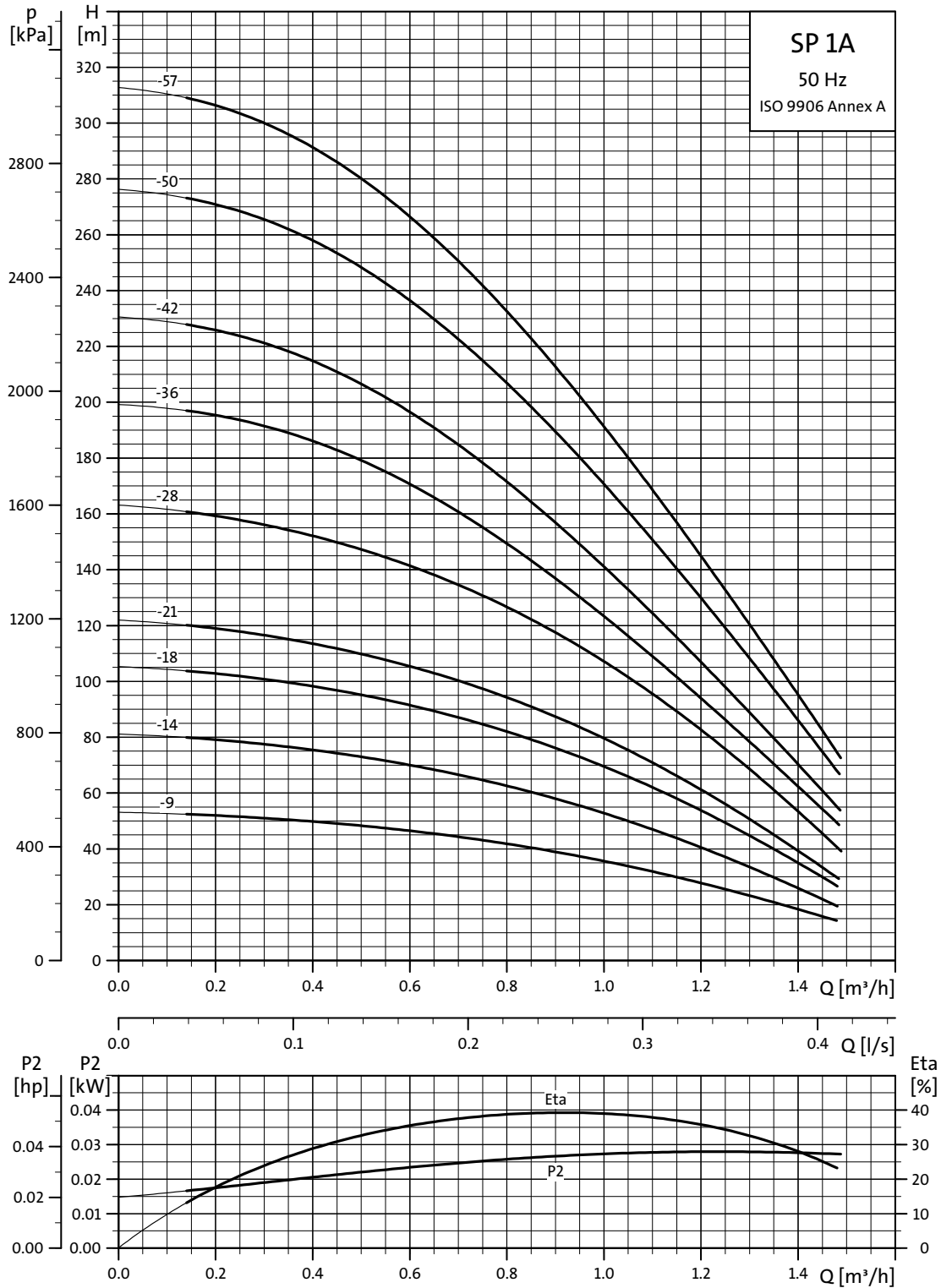
Fig. 16 MMS 10000

TM01 4985 0404

Performance curves/ Technical data

Submersible pumps
SP 1A

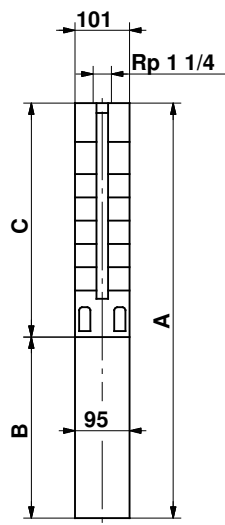
SP 1A



Explanation of efficiency curve, please see *Curve conditions*, page 4.

TM00 7271 4702

Dimensions and weights

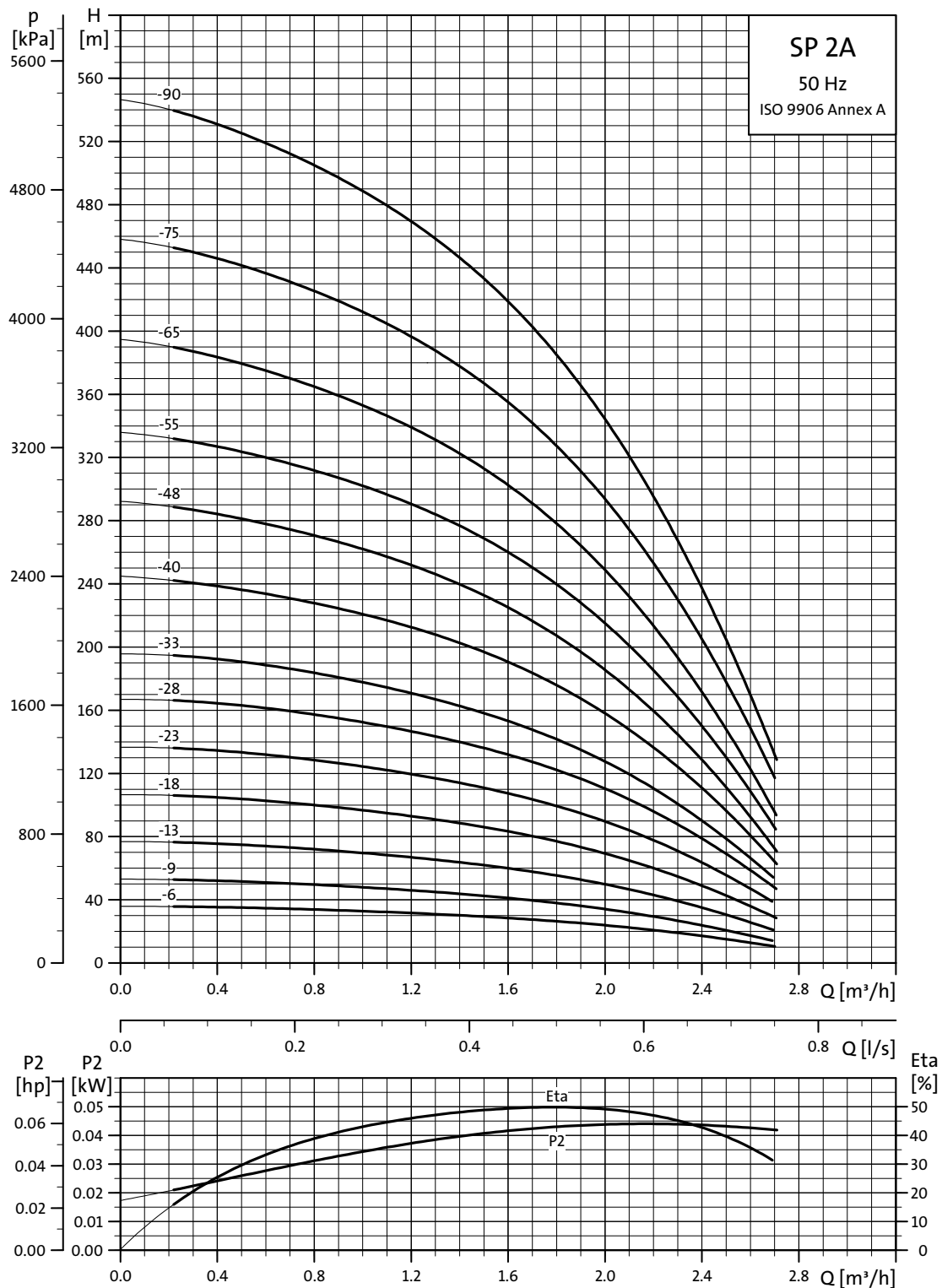


TM00 0955 1196

101 mm = Maximum diameter of pump inclusive of cable guard and motor.

| Pump type | Motor | | C | Dimensions [mm] | | | | Net weight [kg] | |
|-----------|--------|------------|------|-----------------|------------------|--------|------------------|-----------------|------------------|
| | Type | Power [kW] | | B | | A | | 1x230V | 3x230V 3x400V |
| | | | | 1x230V | 3x230V 3x400V | 1x230V | 3x230V 3x400V | | |
| SP 1A-9 | MS 402 | 0.37 | 344 | 256 | 226 | 600 | 570 | 11 | 9 |
| SP 1A-14 | MS 402 | 0.37 | 449 | 256 | 226 | 705 | 675 | 12 | 10 |
| SP 1A-18 | MS 402 | 0.55 | 533 | 291 | 241 | 824 | 774 | 14 | 12 |
| SP 1A-21 | MS 402 | 0.55 | 596 | 291 | 241 | 887 | 837 | 14 | 12 |
| SP 1A-28 | MS 402 | 0.75 | 743 | 306 | 276 | 1049 | 1019 | 16 | 15 |
| SP 1A-36 | MS 402 | 1.1 | 956 | 346 | 306 | 1302 | 1262 | 25 | 23 |
| SP 1A-42 | MS 402 | 1.1 | 1082 | 346 | 306 | 1428 | 1388 | 27 | 25 |
| SP 1A-50 | MS 402 | 1.5 | 1250 | 346 | 346 | 1596 | 1596 | 30 | 29 |
| SP 1A-57 | MS 402 | 1.5 | 1397 | 346 | 346 | 1743 | 1743 | 32 | 32 |

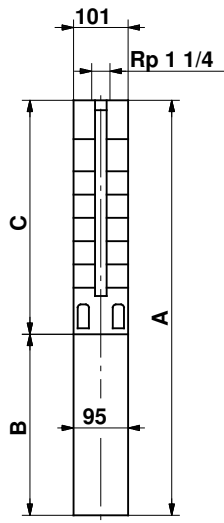
SP 2A



TM00 7272 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Dimensions and weights



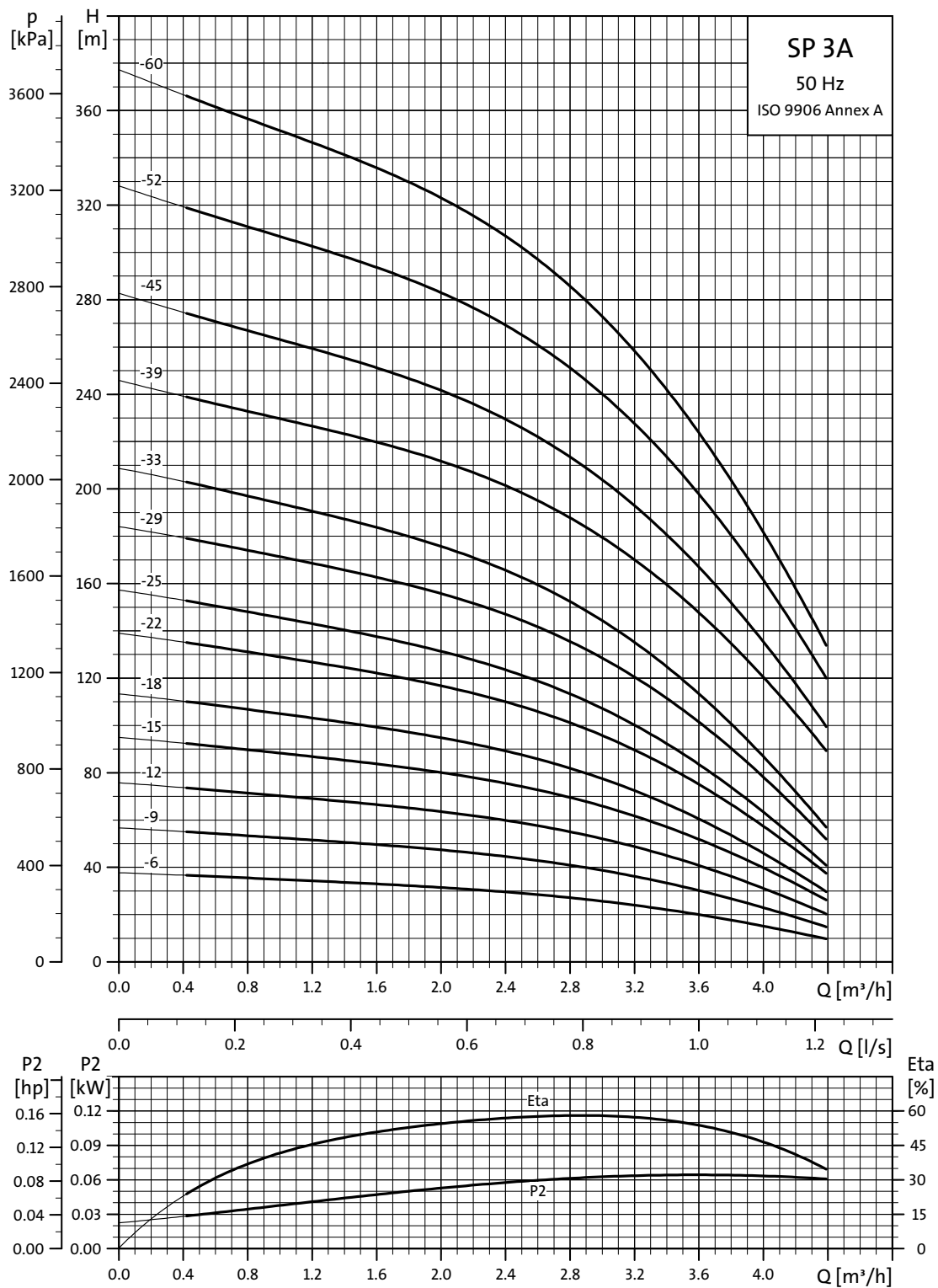
TM00 0955 1196

| Pump type | Motor | | | Dimensions [mm] | | | | Net weight [kg] | |
|-----------|---------|------------|------|-----------------|------------------|--------|------------------|-----------------|------------------|
| | Type | Power [kW] | C | B | | A | | 1x230V | 3x230V 3x400V |
| | | | | 1x230V | 3x230V 3x400V | 1x230V | 3x230V 3x400V | | |
| SP 2A-6 | MS 402 | 0.37 | 281 | 256 | 226 | 537 | 507 | 10 | 9 |
| SP 2A-9 | MS 402 | 0.37 | 344 | 256 | 226 | 600 | 570 | 11 | 9 |
| SP 2A-13 | MS 402 | 0.55 | 428 | 291 | 241 | 719 | 669 | 13 | 11 |
| SP 2A-18 | MS 402 | 0.75 | 533 | 306 | 276 | 839 | 809 | 15 | 13 |
| SP 2A-23 | MS 402 | 1.1 | 638 | 346 | 306 | 984 | 944 | 17 | 16 |
| SP 2A-28 | MS 402 | 1.5 | 743 | 346 | 346 | 1089 | 1089 | 19 | 18 |
| SP 2A-33 | MS 402 | 1.5 | 844 | 346 | 346 | 1190 | 1190 | 20 | 19 |
| SP 2A-40 | MS 4000 | 2.2 | 1040 | 573 | | 1613 | | 37 | |
| SP 2A-40 | MS 402 | 2.2 | 1040 | | 346 | | 1386 | | 27 |
| SP 2A-48 | MS 4000 | 2.2 | 1208 | 573 | | 1781 | | 39 | |
| SP 2A-48 | MS 402 | 2.2 | 1208 | | 346 | | 1554 | | 30 |
| SP 2A-55 | MS 4000 | 3.0 | 1355 | | 493 | | 1848 | | 38 |
| SP 2A-65 | MS 4000 | 3.0 | 1565 | | 493 | | 2058 | | 41 |
| SP 2A-75 | MS 4000 | 4.0 | 1954 | | 573 | | 2527 | | 57 |
| SP 2A-90 | MS 4000 | 4.0 | 2269 | | 573 | | 2842 | | 64 |

101 mm = Maximum diameter of pump inclusive of cable guard and motor.

SP 2A-75 and SP 2A-90 are mounted in sleeve for R 1 1/4 connection and with max. diameter 108 mm.

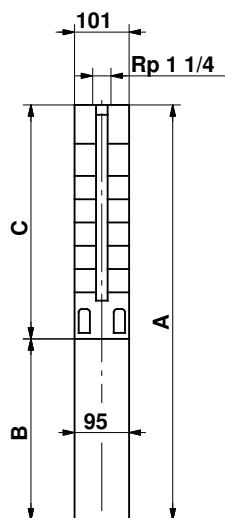
SP 3A



TM00 7273 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Dimensions and weights

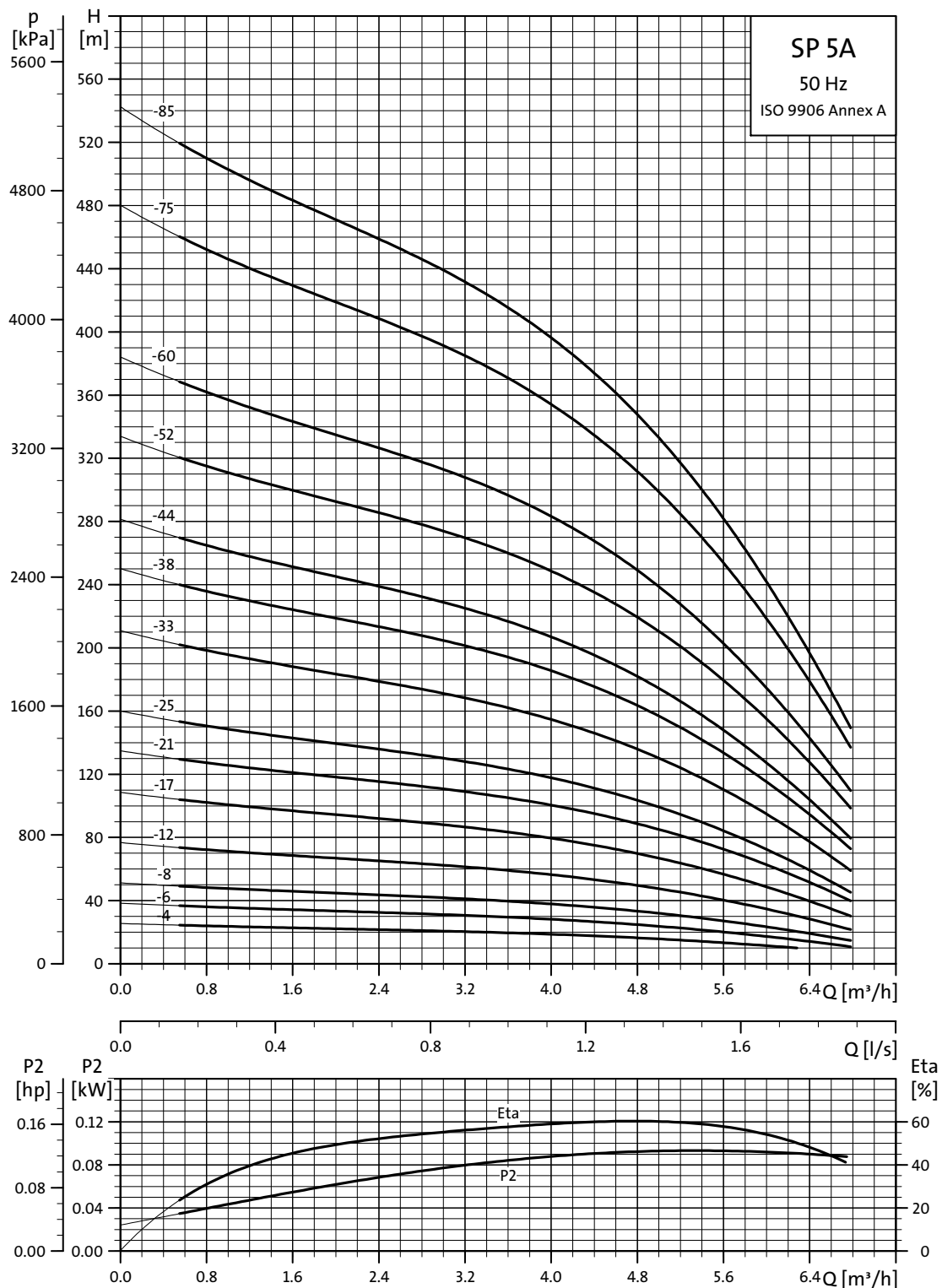


101 mm = Maximum diameter of pump inclusive of cable guard and motor.

TM00 0955 11

| Pump type | Motor | | C | Dimensions [mm] | | | | Net weight [kg] | |
|-----------|----------|------------|------|-----------------|------------------|--------|------------------|-----------------|------------------|
| | Type | Power [kW] | | B | | A | | 1x230V | 3x230V 3x400V |
| | | | | 1x230V | 3x230V 3x400V | 1x230V | 3x230V 3x400V | | |
| SP 3A-6 | MS 402 | 0.37 | 281 | 256 | 226 | 537 | 507 | 10 | 9 |
| SP 3A-6N | MS 4000R | 2.2 | 326 | 573 | | 899 | | 26 | |
| SP 3A-6N | MS 4000R | 0.75 | 326 | | 398 | | 724 | | 18 |
| SP 3A-9 | MS 402 | 0.55 | 344 | 291 | 241 | 635 | 585 | 12 | 10 |
| SP 3A-9N | MS 4000R | 2.2 | 389 | 573 | | 962 | | 27 | |
| SP 3A-9N | MS 4000R | 0.75 | 389 | | 398 | | 787 | | 19 |
| SP 3A-12 | MS 402 | 0.75 | 407 | 306 | 276 | 713 | 683 | 13 | 12 |
| SP 3A-12N | MS 4000R | 2.2 | 452 | 573 | | 1025 | | 28 | |
| SP 3A-12N | MS 4000R | 0.75 | 452 | | 398 | | 850 | | 20 |
| SP 3A-15 | MS 402 | 1.1 | 470 | 346 | 306 | 816 | 776 | 16 | 14 |
| SP 3A-15N | MS 4000R | 2.2 | 515 | 573 | | 1088 | | 29 | |
| SP 3A-15N | MS 4000R | 1.1 | 515 | | 413 | | 928 | | 22 |
| SP 3A-18 | MS 402 | 1.1 | 533 | 346 | 306 | 879 | 839 | 16 | 15 |
| SP 3A-18N | MS 4000R | 2.2 | 578 | 573 | | 1151 | | 30 | |
| SP 3A-18N | MS 4000R | 1.1 | 578 | | 413 | | 991 | | 23 |
| SP 3A-22 | MS 402 | 1.5 | 617 | 346 | 346 | 963 | 963 | 18 | 17 |
| SP 3A-22N | MS 4000R | 2.2 | 662 | 573 | | 1235 | | 31 | |
| SP 3A-22N | MS 4000R | 1.5 | 662 | | 413 | | 1075 | | 24 |
| SP 3A-25 | MS 402 | 1.5 | 680 | 346 | 346 | 1026 | 1026 | 18 | 18 |
| SP 3A-25N | MS 4000R | 2.2 | 725 | 573 | | 1298 | | 32 | |
| SP 3A-25N | MS 4000R | 1.5 | 725 | | 413 | | 1138 | | 25 |
| SP 3A-29 | MS 4000 | 2.2 | 764 | 573 | | 1337 | | 29 | |
| SP 3A-29 | MS 402 | 2.2 | 764 | | 346 | | 1110 | | 20 |
| SP 3A-29N | MS 4000R | 2.2 | 809 | 573 | 453 | 1382 | 1262 | 33 | 28 |
| SP 3A-33 | MS 4000 | 2.2 | 848 | 573 | | 1421 | | 30 | |
| SP 3A-33 | MS 402 | 2.2 | 848 | | 346 | | 1194 | | 21 |
| SP 3A-33N | MS 4000R | 2.2 | 893 | 573 | 453 | 1466 | 1346 | 34 | 29 |
| SP 3A-39 | MS 4000 | 3.0 | 1019 | | 493 | | 1512 | | 32 |
| SP 3A-39N | MS 4000R | 3.0 | 1019 | | 493 | | 1512 | | 32 |
| SP 3A-45 | MS 4000 | 3.0 | 1145 | | 493 | | 1638 | | 34 |
| SP 3A-45N | MS 4000R | 3.0 | 1145 | | 493 | | 1638 | | 34 |
| SP 3A-52 | MS 4000 | 4.0 | 1292 | | 573 | | 1865 | | 41 |
| SP 3A-52N | MS 4000R | 4.0 | 1292 | | 573 | | 1865 | | 41 |
| SP 3A-60 | MS 4000 | 4.0 | 1460 | | 573 | | 2033 | | 43 |
| SP 3A-60N | MS 4000R | 4.0 | 1460 | | 573 | | 2033 | | 43 |

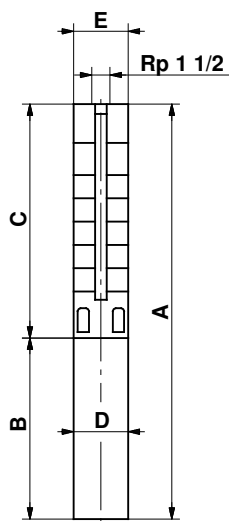
SP 5A



TM00 7274 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Dimensions and weights



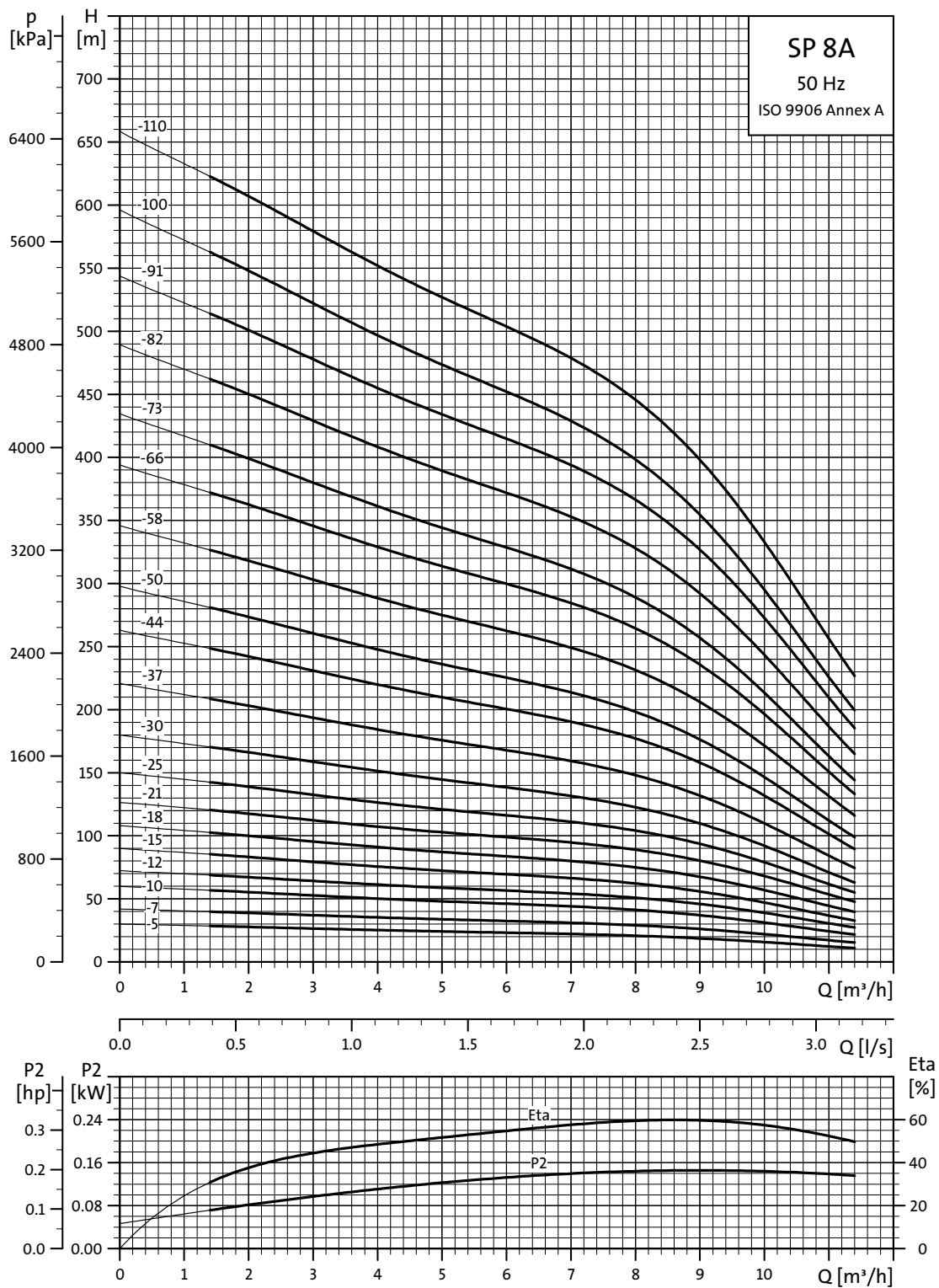
SP 5A-75 and SP 5A-85 are mounted in sleeve for R 1 1/2 connection.

TM00 0956 1196

| Pump type | Motor | | Dimensions [mm] | | | | | | | Net weight [kg] | |
|-----------|----------|------------|-----------------|--------|------------------|--------|------------------|-----|-----|-----------------|------------------|
| | Type | Power [kW] | C | B | | A | | D | E | 1x230V | 3x230V 3x400V |
| | | | | 1x230V | 3x230V 3x400V | 1x230V | 3x230V 3x400V | | | | |
| SP 5A-4 | MS 402 | 0.37 | 240 | 256 | 226 | 496 | 466 | 95 | 101 | 10 | 8 |
| SP 5A-4N | MS 4000R | 2.2 | 284 | 573 | | 857 | | 95 | 101 | 25 | |
| SP 5A-4N | MS 4000R | 0.75 | 284 | | 398 | | 682 | 95 | 101 | | 17 |
| SP 5A-6 | MS 402 | 0.55 | 282 | 291 | 241 | 573 | 523 | 95 | 101 | 11 | 10 |
| SP 5A-6N | MS 4000R | 2.2 | 326 | 573 | | 899 | | 95 | 101 | 26 | |
| SP 5A-6N | MS 4000R | 0.75 | 326 | | 398 | | 724 | 95 | 101 | | 18 |
| SP 5A-8 | MS 402 | 0.75 | 324 | 306 | 276 | 630 | 600 | 95 | 101 | 13 | 11 |
| SP 5A-8N | MS 4000R | 2.2 | 368 | 573 | | 941 | | 95 | 101 | 27 | |
| SP 5A-8N | MS 4000R | 0.75 | 368 | | 398 | | 766 | 95 | 101 | | 19 |
| SP 5A-12 | MS 402 | 1.1 | 408 | 346 | 306 | 754 | 714 | 95 | 101 | 15 | 13 |
| SP 5A-12N | MS 4000R | 2.2 | 452 | 573 | | 1025 | | 95 | 101 | 28 | |
| SP 5A-12N | MS 4000R | 1.1 | 452 | | 413 | | 865 | 95 | 101 | | 21 |
| SP 5A-17 | MS 402 | 1.5 | 513 | 346 | 346 | 859 | 859 | 95 | 101 | 17 | 16 |
| SP 5A-17N | MS 4000R | 2.2 | 557 | 573 | | 1130 | | 95 | 101 | 29 | |
| SP 5A-17N | MS 4000R | 1.5 | 557 | | 413 | | 970 | 95 | 101 | | 22 |
| SP 5A-21 | MS 4000 | 2.2 | 597 | 573 | | 1170 | | 95 | 101 | 27 | |
| SP 5A-21 | MS 402 | 2.2 | 597 | | 346 | | 943 | 95 | 101 | | 18 |
| SP 5A-21N | MS 4000R | 2.2 | 641 | 573 | 453 | 1214 | 1094 | 95 | 101 | 30 | 25 |
| SP 5A-25 | MS 4000 | 2.2 | 681 | 573 | | 1254 | | 95 | 101 | 28 | |
| SP 5A-25 | MS 402 | 2.2 | 681 | | 346 | | 1027 | 95 | 101 | | 19 |
| SP 5A-25N | MS 4000R | 2.2 | 725 | 573 | 453 | 1298 | 1178 | 95 | 101 | 32 | 27 |
| SP 5A-33 | MS 4000 | 3.0 | 849 | | 493 | | 1342 | 95 | 101 | | 26 |
| SP 5A-33N | MS 4000R | 3.0 | 893 | | 493 | | 1386 | 95 | 101 | | 30 |
| SP 5A-38 | MS 4000 | 4.0 | 998 | | 573 | | 1571 | 95 | 101 | | 36 |
| SP 5A-38N | MS 4000R | 4.0 | 998 | | 573 | | 1571 | 95 | 101 | | 36 |
| SP 5A-44 | MS 4000 | 4.0 | 1124 | | 573 | | 1697 | 95 | 101 | | 38 |
| SP 5A-44N | MS 4000R | 4.0 | 1124 | | 573 | | 1697 | 95 | 101 | | 38 |
| SP 5A-52 | MS 4000 | 5.5 | 1292 | | 673 | | 1965 | 95 | 101 | | 46 |
| SP 5A-52N | MS 4000R | 5.5 | 1292 | | 673 | | 1965 | 95 | 101 | | 46 |
| SP 5A-60 | MS 4000 | 5.5 | 1460 | | 673 | | 2133 | 95 | 101 | | 48 |
| SP 5A-60N | MS 4000R | 5.5 | 1460 | | 673 | | 2133 | 95 | 101 | | 48 |
| SP 5A-52 | MS6 | 5.5 | 1354 | | 535 | | 1889 | 143 | 138 | | 60 |
| SP 5A-52N | MS6R | 5.5 | 1354 | | 535 | | 1889 | 143 | 138 | | 60 |
| SP 5A-60 | MS6 | 5.5 | 1522 | | 535 | | 2057 | 143 | 138 | | 63 |
| SP 5A-60N | MS6R | 5.5 | 1522 | | 535 | | 2057 | 143 | 138 | | 63 |
| SP 5A-75 | MS6 | 7.5 | 2146 | | 565 | | 2711 | 143 | 140 | | 86 |
| SP 5A-85 | MS6 | 7.5 | 2356 | | 565 | | 2921 | 143 | 140 | | 92 |

E=Maximum diameter of pump inclusive of cable guard and motor.

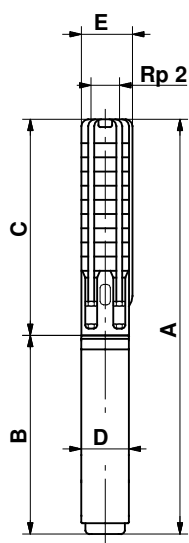
SP 8A



TM00 7275 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Dimensions and weights



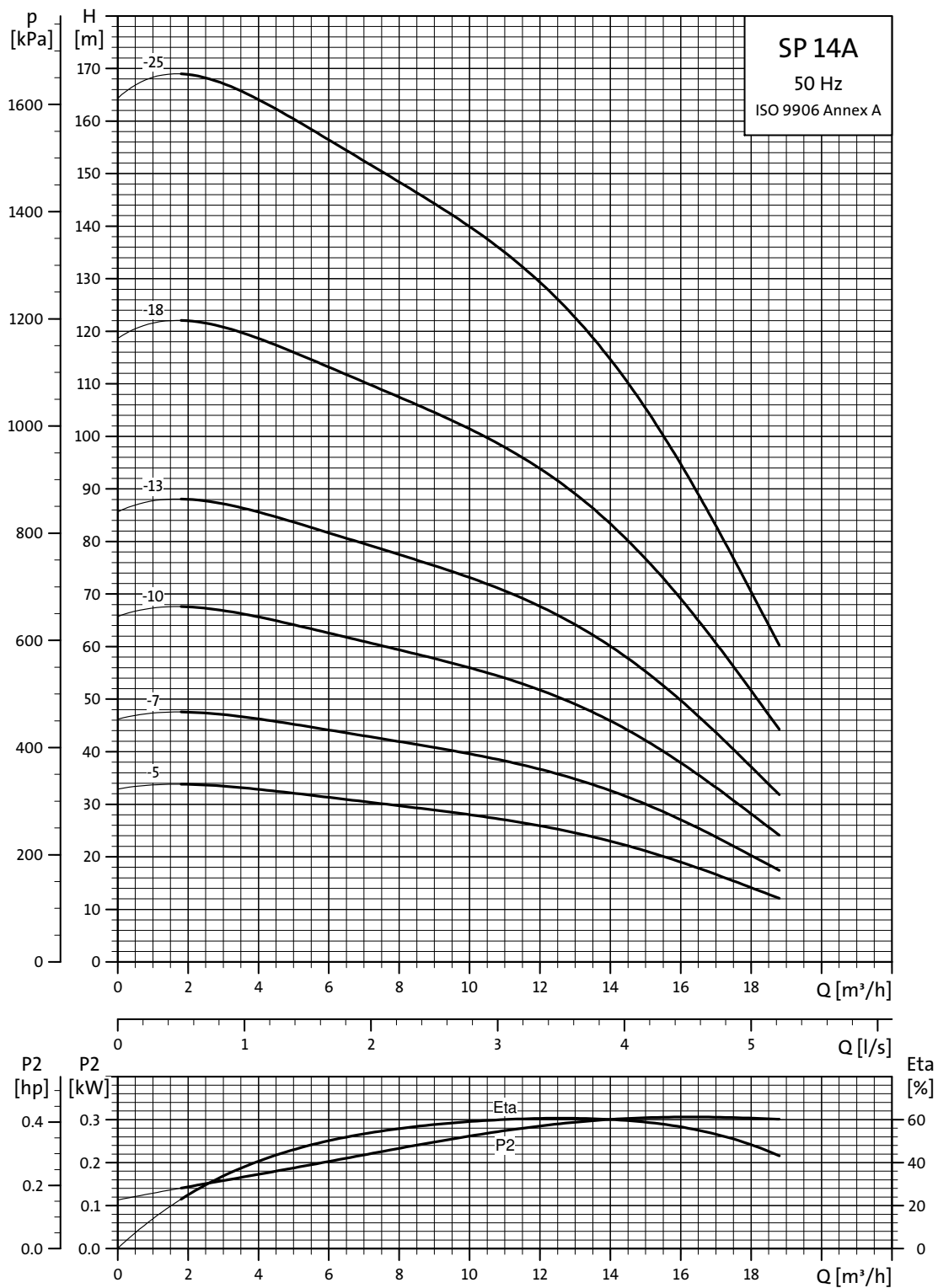
TM00 0957 1196

SP 8A-58(N) to SP 8A-110(N) are mounted in sleeve for R 2 connection.

| Pump type | Motor | | Dimensions [mm] | | | | | | Net weight [kg] | | |
|---------------|----------|------------|-----------------|--------|------------------|--------|------------------|-----|-----------------|-----------------|------------------|
| | Type | Power [kW] | C | B | | A | | D | E | Net weight [kg] | |
| | | | | 1x230V | 3x230V 3x400V | 1x230V | 3x230V 3x400V | | | 1x230V | 3x230V 3x400V |
| SP 8A-5 | MS 402 | 0.75 | 409 | 306 | 276 | 715 | 685 | 95 | 101 | 15 | 13 |
| SP 8A-5N (R) | MS 4000R | 2.2 | 409 | 573 | | 982 | | 95 | 101 | 27 | |
| SP 8A-5N (R) | MS 4000R | 0.75 | 409 | | 398 | | 807 | 95 | 101 | | 19 |
| SP 8A-7 | MS 402 | 1.1 | 493 | 346 | 306 | 839 | 799 | 95 | 101 | 17 | 16 |
| SP 8A-7N (R) | MS 4000R | 2.2 | 493 | 573 | | 1066 | | 95 | 101 | 28 | |
| SP 8A-7N (R) | MS 4000R | 1.1 | 493 | | 413 | | 906 | 95 | 101 | | 21 |
| SP 8A-10 | MS 402 | 1.5 | 619 | 346 | 346 | 965 | 965 | 95 | 101 | 19 | 19 |
| SP 8A-10N (R) | MS 4000R | 2.2 | 619 | 573 | | 1192 | | 95 | 101 | 30 | |
| SP 8A-10N (R) | MS 4000R | 1.5 | 619 | | 413 | | 1032 | 95 | 101 | | 23 |
| SP 8A-12 | MS 4000 | 2.2 | 703 | 573 | | 1276 | | 95 | 101 | 30 | |
| SP 8A-12 | MS 402 | 2.2 | 703 | | 346 | | 1049 | 95 | 101 | | 21 |
| SP 8A-12N (R) | MS 4000R | 2.2 | 703 | 573 | 453 | 1276 | 1156 | 95 | 101 | 30 | 25 |
| SP 8A-15 | MS 4000 | 2.2 | 829 | 573 | | 1402 | | 95 | 101 | 32 | |
| SP 8A-15 | MS 402 | 2.2 | 829 | | 346 | | 1175 | 95 | 101 | | 23 |
| SP 8A-15N (R) | MS 4000R | 2.2 | 829 | 573 | 453 | 1402 | 1282 | 95 | 101 | 32 | 27 |
| SP 8A-18 | MS 4000 | 3.0 | 955 | | 493 | | 1448 | 95 | 101 | | 29 |
| SP 8A-18N (R) | MS 4000R | 3.0 | 955 | | 493 | | 1448 | 95 | 101 | | 29 |
| SP 8A-21 | MS 4000 | 4.0 | 1081 | | 573 | | 1654 | 95 | 101 | | 35 |
| SP 8A-21N (R) | MS 4000R | 4.0 | 1081 | | 573 | | 1654 | 95 | 101 | | 35 |
| SP 8A-25 | MS 4000 | 4.0 | 1249 | | 573 | | 1822 | 95 | 101 | | 37 |
| SP 8A-25N (R) | MS 4000R | 4.0 | 1249 | | 573 | | 1822 | 95 | 101 | | 37 |
| SP 8A-30 | MS 4000 | 5.5 | 1459 | | 673 | | 2132 | 95 | 101 | | 45 |
| SP 8A-30N (R) | MS 4000R | 5.5 | 1459 | | 673 | | 2132 | 95 | 101 | | 45 |
| SP 8A-37 | MS 4000 | 5.5 | 1753 | | 673 | | 2426 | 95 | 101 | | 49 |
| SP 8A-37N (R) | MS 4000R | 5.5 | 1753 | | 673 | | 2426 | 95 | 101 | | 49 |
| SP 8A-30 | MS6 | 5.5 | 1521 | | 535 | | 2056 | 143 | 138 | | 56 |
| SP 8A-30N | MS6R | 5.5 | 1521 | | 535 | | 2056 | 143 | 138 | | 56 |
| SP 8A-37 | MS6 | 5.5 | 1815 | | 535 | | 2350 | 143 | 138 | | 60 |
| SP 8A-37N | MS6R | 5.5 | 1815 | | 535 | | 2350 | 143 | 138 | | 60 |
| SP 8A-44 | MS 4000 | 7.5 | 2051 | | 773 | | 2824 | 95 | 101 | | 60 |
| SP 8A-44N | MS 4000 | 7.5 | 2051 | | 773 | | 2824 | 95 | 101 | | 60 |
| SP 8A-44 | MS6 | 7.5 | 2109 | | 565 | | 2674 | 143 | 138 | | 66 |
| SP 8A-44N | MS6R | 7.5 | 2109 | | 565 | | 2674 | 143 | 138 | | 66 |
| SP 8A-50 | MS 4000 | 7.5 | 2303 | | 773 | | 3076 | 95 | 101 | | 64 |
| SP 8A-50N | MS 4000 | 7.5 | 2303 | | 773 | | 3076 | 95 | 101 | | 64 |
| SP 8A-50 | MS6 | 7.5 | 2361 | | 565 | | 2926 | 143 | 138 | | 70 |
| SP 8A-50N | MS6R | 7.5 | 2361 | | 565 | | 2926 | 143 | 138 | | 70 |
| SP 8A-58 | MS6 | 9.2 | 3013 | | 590 | | 3603 | 143 | 140 | | 104 |
| SP 8A-58N | MS6R | 9.2 | 3013 | | 590 | | 3603 | 143 | 140 | | 104 |
| SP 8A-66 | MS6 | 11.0 | 3349 | | 683 | | 4032 | 143 | 140 | | 114 |
| SP 8A-66N | MS6R | 11.0 | 3349 | | 683 | | 4032 | 143 | 140 | | 114 |
| SP 8A-73 | MS6 | 11.0 | 3643 | | 683 | | 4326 | 143 | 140 | | 120 |
| SP 8A-73N | MS6R | 11.0 | 3643 | | 683 | | 4326 | 143 | 140 | | 120 |
| SP 8A-82 | MS6 | 13.0 | 4021 | | 708 | | 4729 | 143 | 140 | | 131 |
| SP 8A-82N | MS6R | 13.0 | 4021 | | 708 | | 4729 | 143 | 140 | | 131 |
| SP 8A-91 | MS6 | 15.0 | 4399 | | 738 | | 5137 | 143 | 140 | | 143 |
| SP 8A-91N | MS6R | 15.0 | 4399 | | 738 | | 5137 | 143 | 140 | | 143 |
| SP 8A-100 | MS6 | 15.0 | 4777 | | 738 | | 5515 | 143 | 140 | | 150 |
| SP 8A-100N | MS6R | 15.0 | 4777 | | 738 | | 5515 | 143 | 140 | | 150 |
| SP 8A-110 | MS6 | 18.5 | 5197 | | 783 | | 5980 | 143 | 140 | | 164 |
| SP 8A-110N | MS6R | 18.5 | 5197 | | 783 | | 5980 | 143 | 140 | | 164 |

E=Maximum diameter of pump inclusive of cable guard and motor.

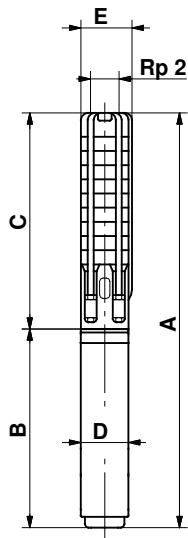
SP 14A



Explanation of efficiency curve, please see *Curve conditions*, page 4.

TM00 7276 4702

Dimensions and weights

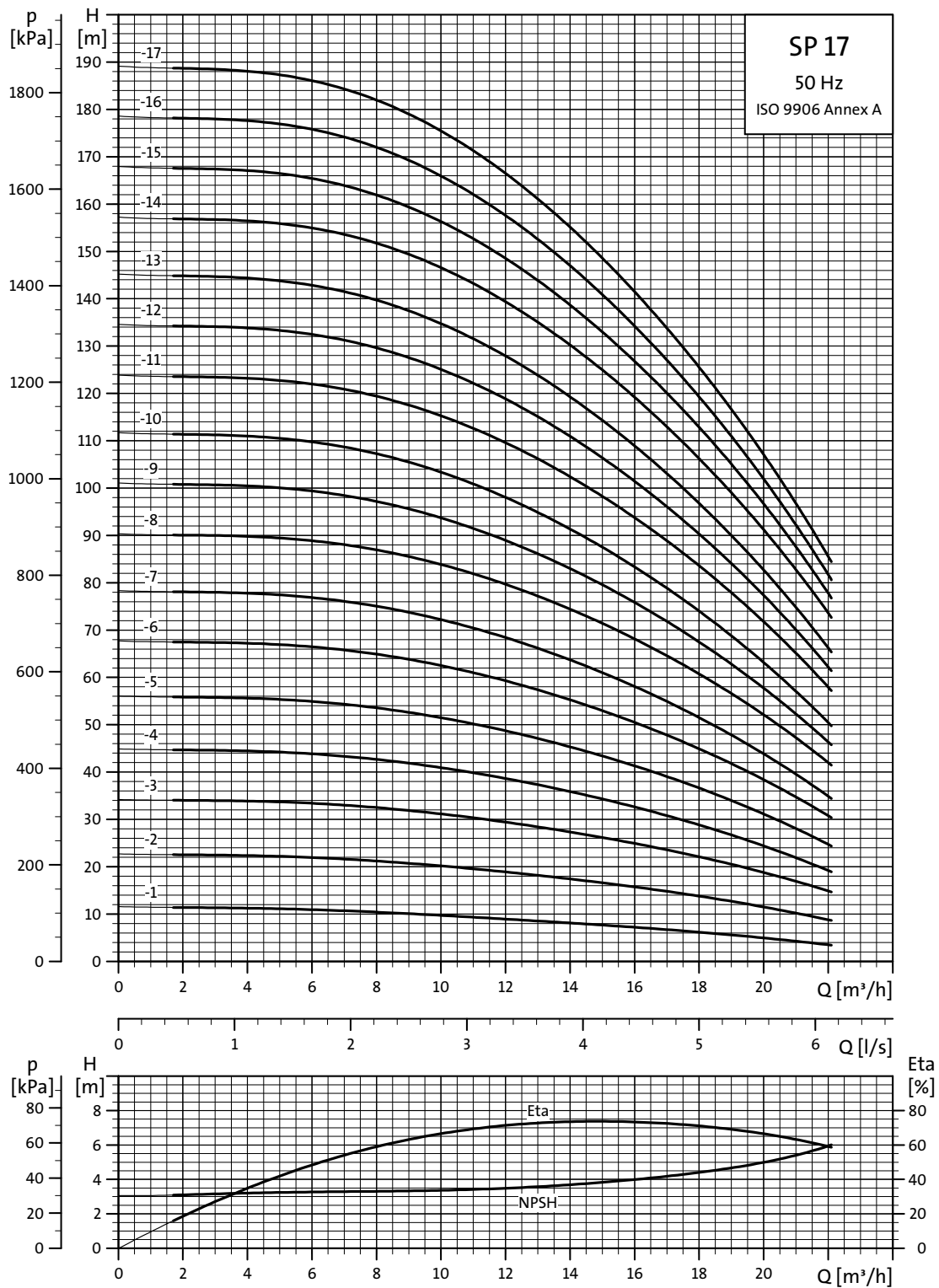


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E = Maximum diameter of pump inclusive of cable guard and motor.

| Pump type | Motor | | Dimensions [mm] | | | | | | Net weight [kg] | | |
|-----------|---------|------------|-----------------|--------|------------------|--------|------------------|-----|-----------------|--------|------------------|
| | Type | Power [kW] | C | B | | A | | D | E | | |
| | | | | 1x230V | 3x230V 3x400V | 1x230V | 3x230V 3x400V | | | 1x230V | 3x230V 3x400V |
| SP 14A-5 | MS 402 | 1.5 | 510 | 346 | 346 | 856 | 856 | 95 | 101 | 18 | 17 |
| SP 14A-7 | MS 4000 | 2.2 | 640 | 573 | | 1213 | | 95 | 101 | 29 | |
| SP 14A-7 | MS 402 | 2.2 | 640 | 346 | | 986 | | 95 | 101 | 19 | |
| SP 14A-10 | MS 4000 | 3.0 | 835 | 493 | | 1328 | | 95 | 101 | 27 | |
| SP 14A-13 | MS 4000 | 4.0 | 1030 | 573 | | 1603 | | 95 | 101 | 33 | |
| SP 14A-18 | MS 4000 | 5.5 | 1355 | 673 | | 2028 | | 95 | 101 | 41 | |
| SP 14A-25 | MS 4000 | 7.5 | 1810 | 773 | | 2584 | | 95 | 101 | 67 | |
| SP 14A-18 | MS6 | 5.5 | 1417 | 535 | | 1952 | | 143 | 138 | 52 | |
| SP 14A-25 | MS6 | 7.5 | 1872 | 565 | | 2437 | | 143 | 138 | 60 | |

SP 17

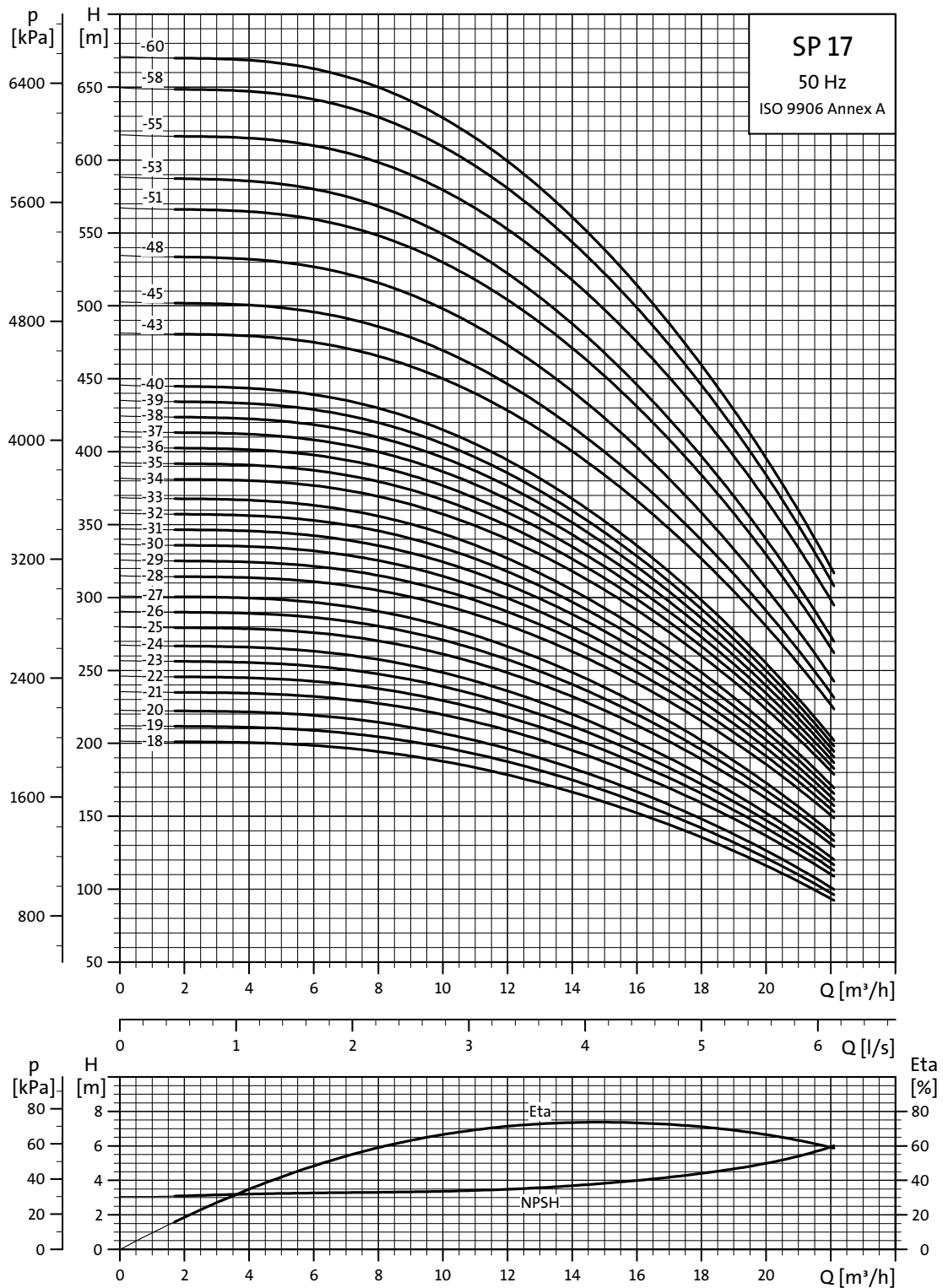


TMM01 8757 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Performance curves

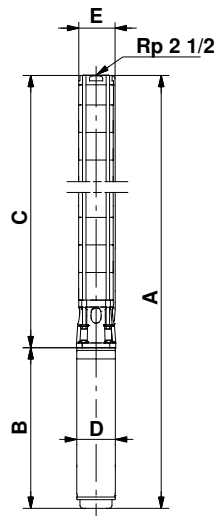
Submersible pumps
SP 17



TM01 8758 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Dimensions and weights



TM01 2435 1798

SP 17-43 to SP 17-60 are mounted in sleeve for R 3 connection.

| Pump type | Motor | | Dimensions [mm] | | | | | | Net weight [kg] | | | |
|---------------|-----------|------------|-----------------|--------|------------------|--------|------------------|-----|-----------------|-----|-----------------|------------------|
| | Type | Power [kW] | C | B | | A | | D | E* | E** | Net weight [kg] | |
| | | | | 1x230V | 3x230V 3x400V | 1x230V | 3x230V 3x400V | | | | 1x230V | 3x230V 3x400V |
| SP 17-1 | MS 402 | 0.55 | 314 | 291 | 241 | 605 | 555 | 95 | 131 | 13 | 11 | |
| SP 17-1 N (R) | MS 4000 R | 0.75 | 314 | | 398 | | 712 | 95 | 131 | | 17 | |
| SP 17-1 N (R) | MS 4000 R | 2.2 | 314 | 573 | | 887 | | 95 | 131 | 26 | | |
| SP 17-2 | MS 402 | 1.1 | 374 | 346 | 306 | 720 | 680 | 95 | 131 | 17 | 15 | |
| SP 17-2 N (R) | MS 4000 R | 1.1 | 374 | | 413 | | 787 | 95 | 131 | | 20 | |
| SP 17-2 N (R) | MS 4000 R | 2.2 | 374 | 573 | | 947 | | 95 | 131 | 27 | | |
| SP 17-3 | MS 402 | 2.2 | 435 | | 346 | | 781 | 95 | 131 | | 19 | |
| SP 17-3 N (R) | MS 4000 R | 2.2 | 435 | 573 | 453 | 1008 | 888 | 95 | 131 | 28 | 23 | |
| SP 17-4 | MS 402 | 2.2 | 495 | | 346 | | 841 | 95 | 131 | | 20 | |
| SP 17-4 | MS 4000 | 2.2 | 495 | 573 | 453 | 1068 | 948 | 95 | 131 | 29 | 24 | |
| SP 17-5 | MS 4000 | 3.0 | 556 | | 494 | | 1050 | 95 | 131 | | 26 | |
| SP 17-6 | MS 4000 | 4.0 | 616 | | 574 | | 1190 | 95 | 131 | | 31 | |
| SP 17-7 | MS 4000 | 4.0 | 677 | | 574 | | 1251 | 95 | 131 | | 33 | |
| SP 17-8 | MS 4000 | 5.5 | 737 | | 674 | | 1411 | 95 | 131 | | 39 | |
| SP 17-9 | MS 4000 | 5.5 | 798 | | 674 | | 1472 | 95 | 131 | | 40 | |
| SP 17-10 | MS 4000 | 5.5 | 858 | | 674 | | 1532 | 95 | 131 | | 41 | |
| SP 17-11 | MS 4000 | 7.5 | 919 | | 773 | | 1692 | 95 | 131 | | 47 | |
| SP 17-12 | MS 4000 | 7.5 | 979 | | 773 | | 1752 | 95 | 131 | | 49 | |
| SP 17-13 | MS 4000 | 7.5 | 1040 | | 773 | | 1813 | 95 | 131 | | 50 | |
| SP 17-8 | MS6 | 5.5 | 753 | | 535 | | 1288 | 143 | 142 | 142 | 50 | |
| SP 17-9 | MS6 | 5.5 | 814 | | 535 | | 1349 | 143 | 142 | 142 | 51 | |
| SP 17-10 | MS6 | 5.5 | 874 | | 535 | | 1409 | 143 | 142 | 142 | 53 | |
| SP 17-11 | MS6 | 7.5 | 935 | | 565 | | 1500 | 143 | 142 | 142 | 55 | |
| SP 17-12 | MS6 | 7.5 | 995 | | 565 | | 1560 | 143 | 142 | 142 | 56 | |
| SP 17-13 | MS6 | 7.5 | 1056 | | 565 | | 1621 | 143 | 142 | 142 | 57 | |
| SP 17-14 | MS6 | 9.2 | 1116 | | 590 | | 1706 | 143 | 142 | 142 | 64 | |
| SP 17-15 | MS6 | 9.2 | 1177 | | 590 | | 1767 | 143 | 142 | 142 | 65 | |
| SP 17-16 | MS6 | 9.2 | 1237 | | 590 | | 1827 | 143 | 142 | 142 | 66 | |
| SP 17-17 | MS6 | 9.2 | 1298 | | 590 | | 1888 | 143 | 142 | 142 | 67 | |
| SP 17-18 | MS6 | 11 | 1358 | | 683 | | 2041 | 143 | 142 | 142 | 72 | |
| SP 17-19 | MS6 | 11 | 1419 | | 683 | | 2102 | 143 | 142 | 142 | 73 | |
| SP 17-20 | MS6 | 11 | 1479 | | 683 | | 2162 | 143 | 142 | 142 | 74 | |
| SP 17-21 | MS6 | 13 | 1540 | | 708 | | 2248 | 143 | 142 | 142 | 78 | |
| SP 17-22 | MS6 | 13 | 1600 | | 708 | | 2308 | 143 | 142 | 142 | 79 | |
| SP 17-23 | MS6 | 13 | 1661 | | 708 | | 2369 | 143 | 142 | 142 | 81 | |
| SP 17-24 | MS6 | 13 | 1721 | | 708 | | 2429 | 143 | 142 | 142 | 82 | |
| SP 17-25 | MS6 | 15 | 1782 | | 738 | | 2520 | 143 | 142 | 142 | 87 | |
| SP 17-26 | MS6 | 15 | 1842 | | 738 | | 2580 | 143 | 142 | 142 | 88 | |
| SP 17-27 | MS6 | 15 | 1903 | | 738 | | 2641 | 143 | 142 | 142 | 89 | |
| SP 17-28 | MS6 | 18.5 | 1963 | | 783 | | 2746 | 143 | 142 | 142 | 96 | |
| SP 17-29 | MS6 | 18.5 | 2024 | | 783 | | 2807 | 143 | 142 | 142 | 97 | |
| SP 17-30 | MS6 | 18.5 | 2084 | | 783 | | 2867 | 143 | 142 | 142 | 99 | |
| SP 17-31 | MS6 | 18.5 | 2145 | | 783 | | 2928 | 143 | 142 | 142 | 100 | |
| SP 17-32 | MS6 | 18.5 | 2205 | | 783 | | 2988 | 143 | 142 | 142 | 101 | |
| SP 17-33 | MS6 | 18.5 | 2266 | | 783 | | 3049 | 143 | 142 | 142 | 102 | |
| SP 17-34 | MS6 | 22 | 2326 | | 838 | | 3164 | 143 | 142 | 142 | 109 | |
| SP 17-35 | MS6 | 22 | 2387 | | 838 | | 3225 | 143 | 142 | 142 | 111 | |
| SP 17-36 | MS6 | 22 | 2447 | | 838 | | 3285 | 143 | 142 | 142 | 112 | |
| SP 17-37 | MS6 | 22 | 2508 | | 838 | | 3346 | 143 | 142 | 142 | 113 | |
| SP 17-38 | MS6 | 22 | 2568 | | 838 | | 3406 | 143 | 142 | 142 | 114 | |
| SP 17-39 | MS6 | 22 | 2629 | | 838 | | 3467 | 143 | 142 | 142 | 115 | |
| SP 17-40 | MS6 | 22 | 2689 | | 838 | | 3527 | 143 | 142 | 142 | 117 | |
| SP 17-43 | MS6 | 26 | 3118 | | 903 | | 4021 | 143 | 175 | 181 | 164 | |
| SP 17-45 | MS6 | 26 | 3239 | | 903 | | 4142 | 143 | 175 | 181 | 167 | |
| SP 17-48 | MS6 | 26 | 3420 | | 903 | | 4323 | 143 | 175 | 181 | 172 | |
| SP 17-51 | MS6 | 30 | 3602 | | 968 | | 4570 | 143 | 175 | 181 | 185 | |
| SP 17-53 | MS6 | 30 | 3723 | | 968 | | 4691 | 143 | 175 | 181 | 189 | |
| SP 17-55 | MMS 6000 | 37 | 3844 | | 1425 | | 5269 | 144 | 175 | 181 | 239 | |
| SP 17-58 | MMS 6000 | 37 | 4025 | | 1425 | | 5450 | 144 | 175 | 181 | 244 | |
| SP 17-60 | MMS 6000 | 37 | 4146 | | 1425 | | 5571 | 144 | 175 | 181 | 248 | |
| SP 17-55 | MMS6 | 37 | 3844 | | 1312 | | 5156 | 143 | 175 | 181 | 234 | |
| SP 17-58 | MMS6 | 37 | 4025 | | 1312 | | 5337 | 143 | 175 | 181 | 239 | |
| SP 17-60 | MMS6 | 37 | 4146 | | 1312 | | 5458 | 143 | 175 | 181 | 243 | |

* Maximum diameter of pump with one motor cable

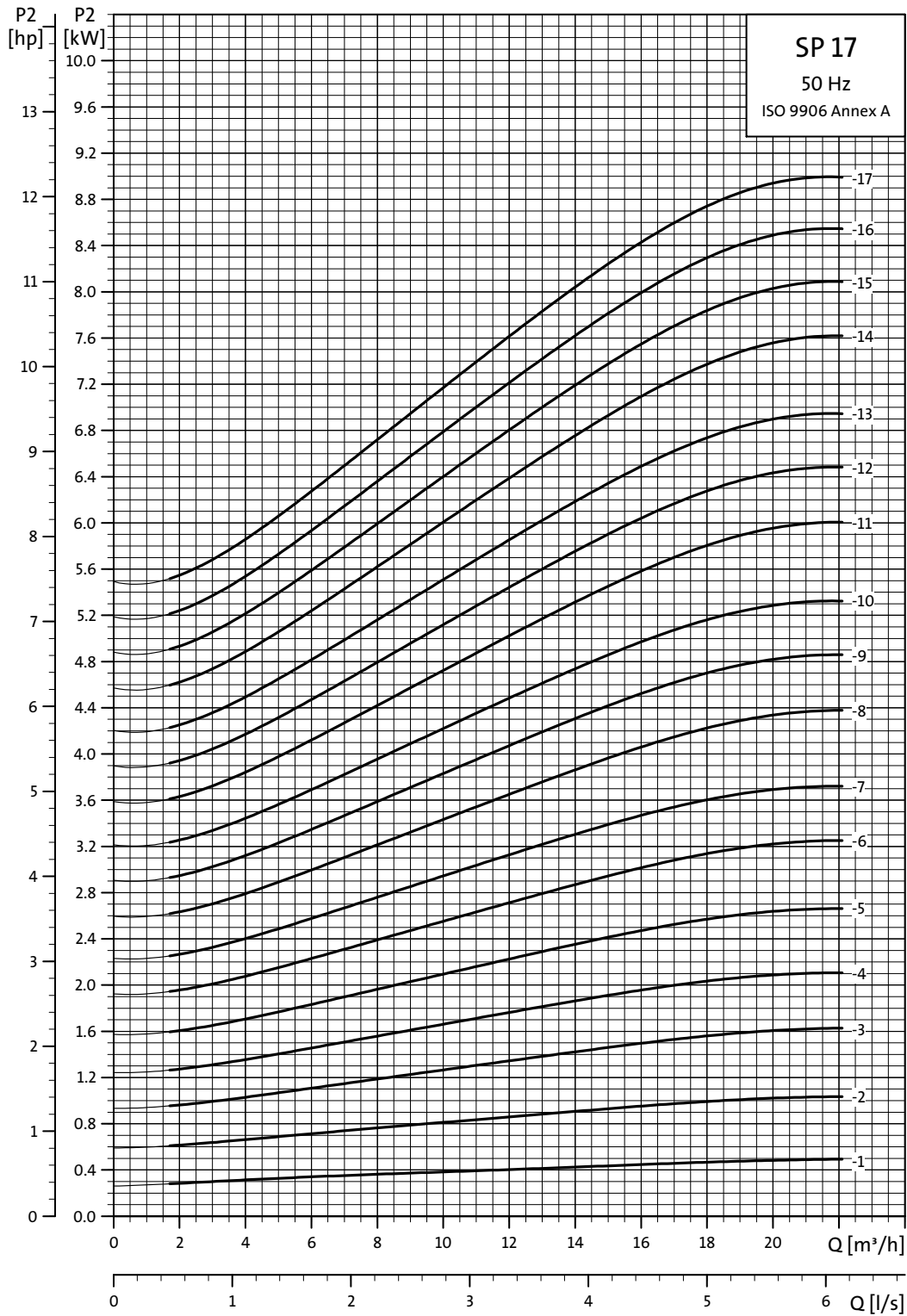
** Maximum diameter of pump with two motor cables.

The pump types above are also available in R- and N-versions. See page 5. Dimensions as above.

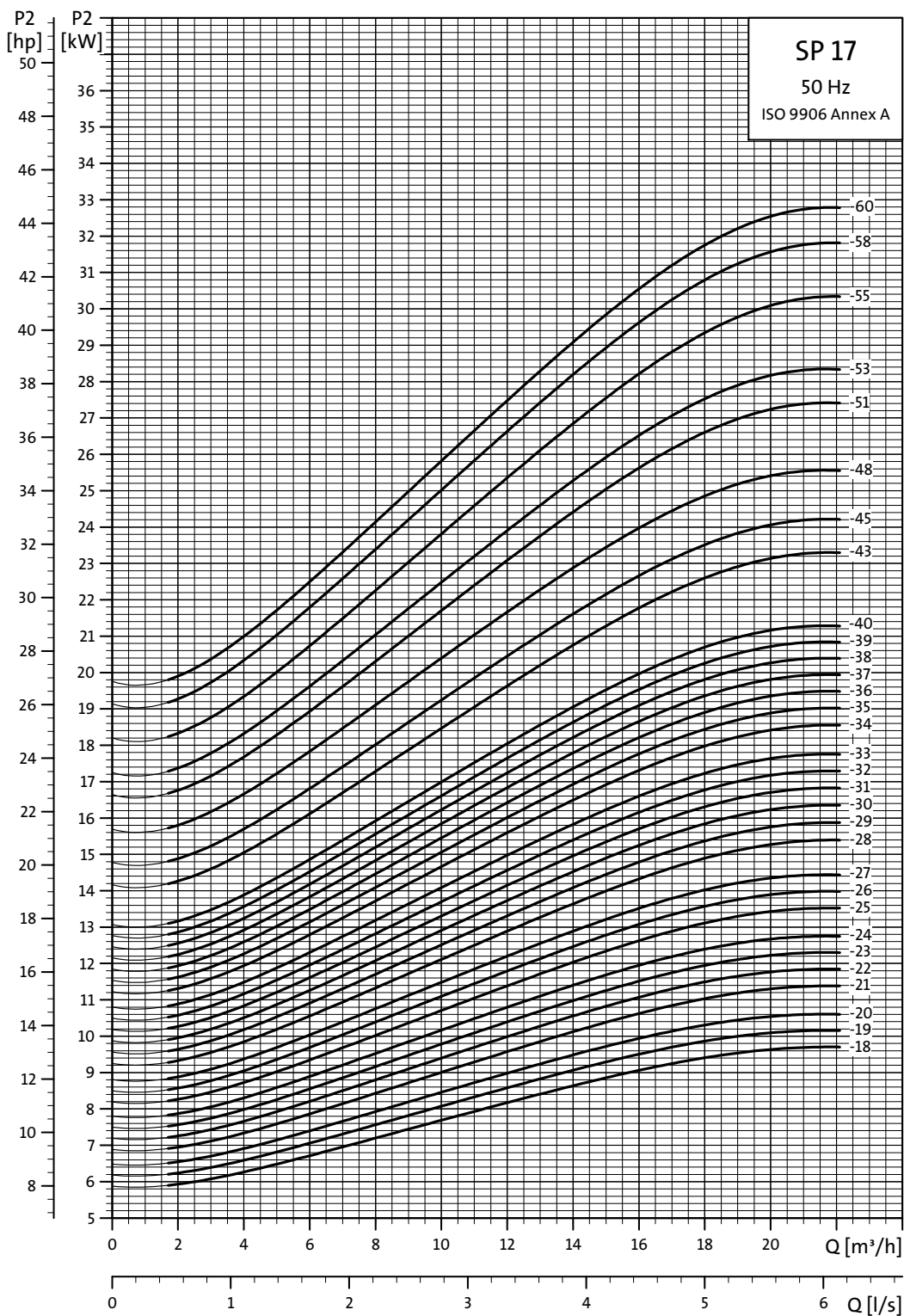
Other types of connection are possible by means of connecting pieces. See page 87

Power curves

Submersible pumps
SP 17



TM01 8759 4702

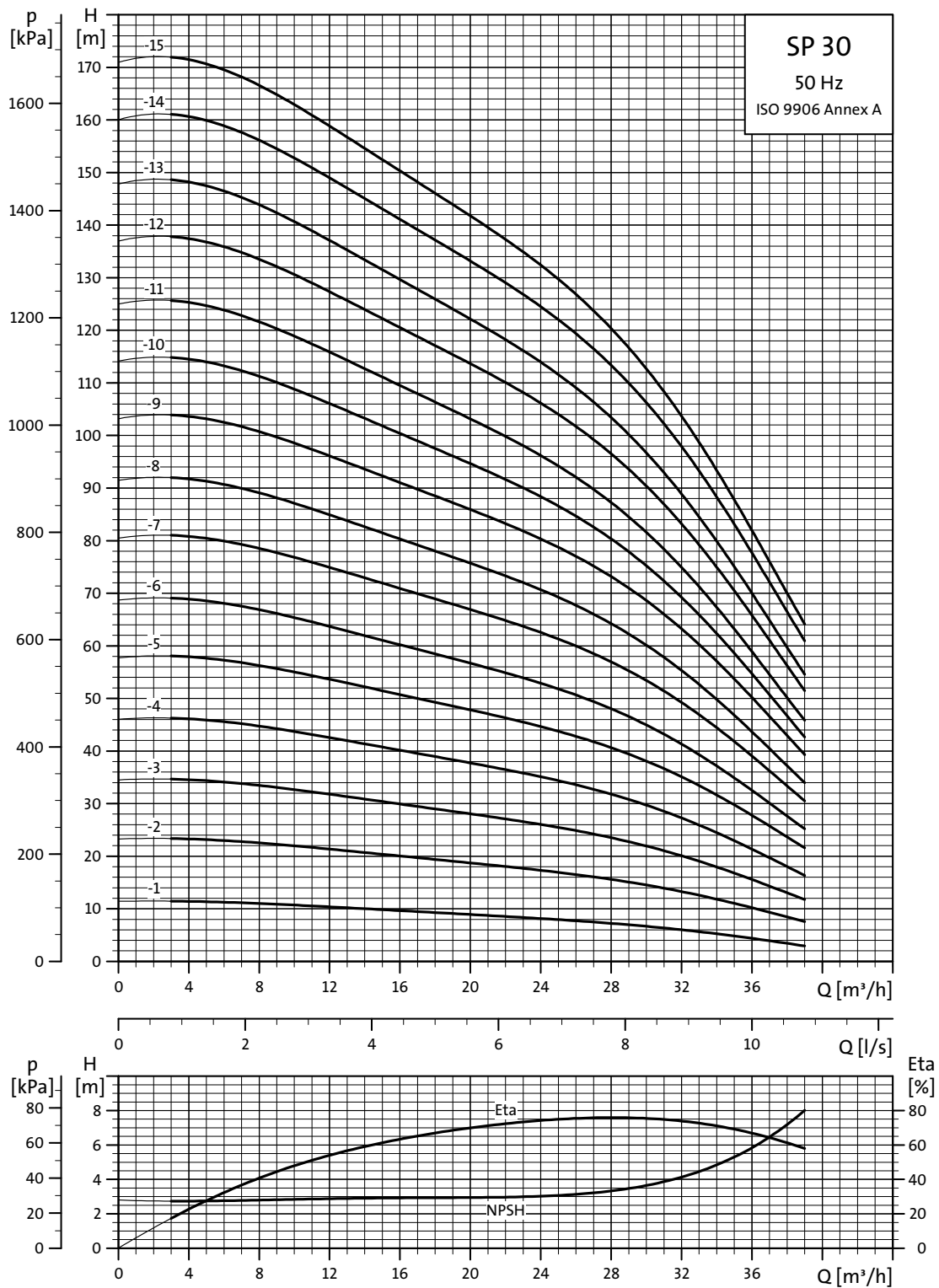


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Performance curves

Submersible pumps
SP 30

SP 30

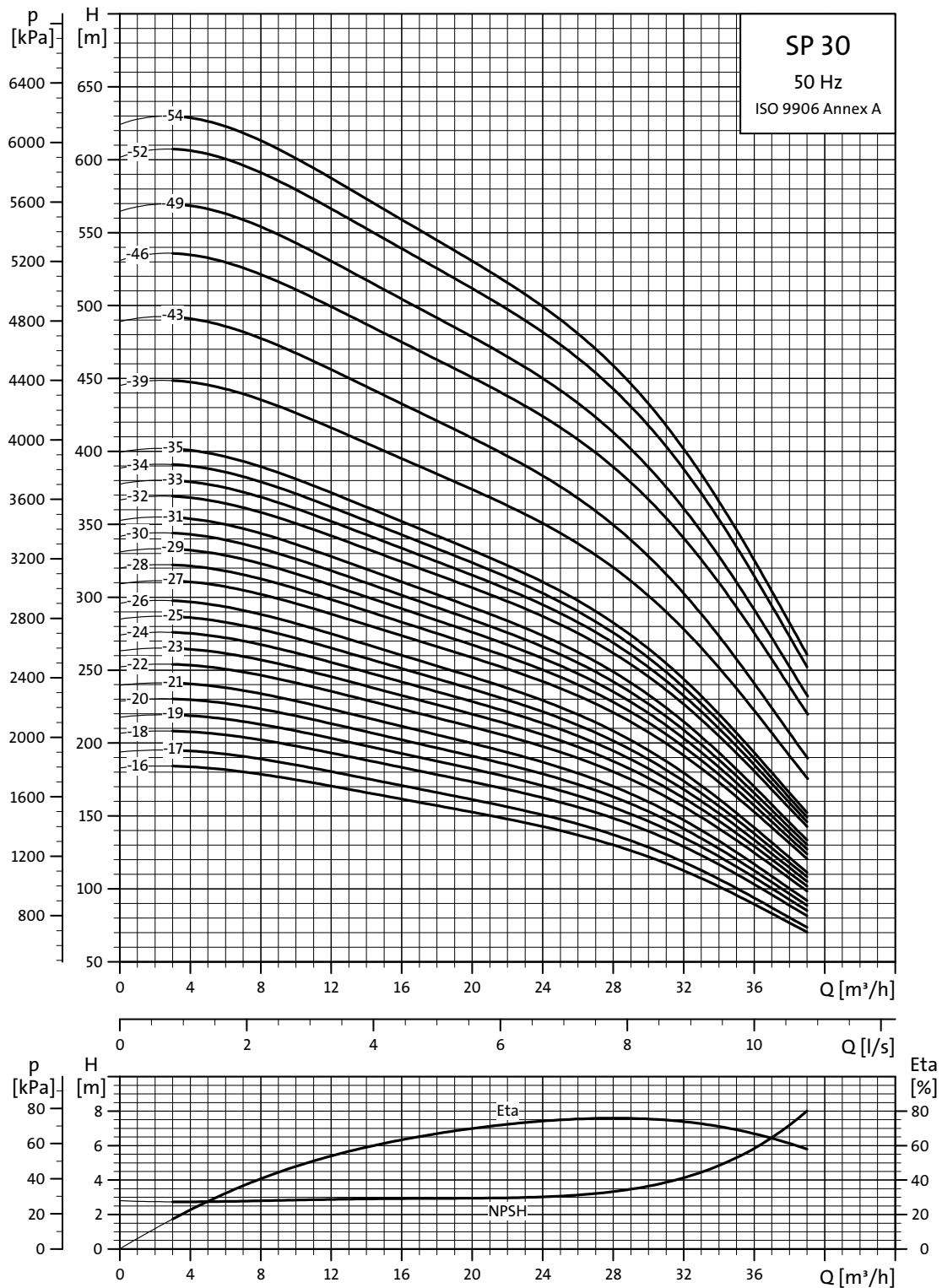


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Explanation of efficiency curve, please see *Curve conditions*, page 4.

Performance curves

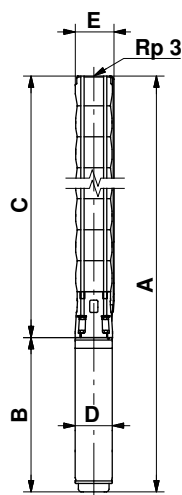
Submersible pumps
SP 30



TM01 8762 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Dimensions and weights



TN00 0960 1196

SP 30-39 to SP 30-54 are mounted in sleeve for R 3 connection.

| Pump type | Motor | | Dimensions [mm] | | | | | | Net weight [kg] | | | |
|---------------|-----------|------------|-----------------|--------|-----------------|--------|------------------|-----|-----------------|-----|-----------------|------------------|
| | Type | Power [kW] | C | B | | A | | D | E* | E** | Net weight [kg] | |
| | | | | 1x230V | 3x23V 3x400V | 1x230V | 3x230V 3x400V | | | | 1x230V | 3x230V 3x400V |
| SP 30-1 | MS 402 | 1.1 | 349 | 346 | 306 | 695 | 655 | 95 | 131 | | 16 | 14 |
| SP 30-1 N (R) | MS 4000 R | 2.2 | 349 | 573 | | 922 | | 95 | 131 | | 26 | |
| SP 30-2 | MS 402 | 2.2 | 445 | | 346 | | 791 | 95 | 131 | | | 19 |
| SP 30-2 N (R) | MS 4000 R | 2.2 | 445 | 573 | 453 | 1018 | 898 | 95 | 131 | | 28 | 23 |
| SP 30-3 | MS 4000 | 3.0 | 541 | | 494 | | 1035 | 95 | 131 | | | 25 |
| SP 30-4 | MS 4000 | 4.0 | 637 | | 574 | | 1211 | 95 | 131 | | | 31 |
| SP 30-5 | MS 4000 | 5.5 | 733 | | 674 | | 1407 | 95 | 131 | | | 38 |
| SP 30-6 | MS 4000 | 5.5 | 829 | | 674 | | 1503 | 95 | 131 | | | 39 |
| SP 30-7 | MS 4000 | 7.5 | 925 | | 773 | | 1698 | 95 | 131 | | | 46 |
| SP 30-8 | MS 4000 | 7.5 | 1021 | | 773 | | 1794 | 95 | 131 | | | 48 |
| SP 30-5 | MS6 | 5.5 | 749 | | 535 | | 1284 | 143 | 142 | 142 | | 49 |
| SP 30-6 | MS6 | 5.5 | 845 | | 535 | | 1380 | 143 | 142 | 142 | | 51 |
| SP 30-7 | MS6 | 7.5 | 941 | | 565 | | 1506 | 143 | 142 | 142 | | 53 |
| SP 30-8 | MS6 | 7.5 | 1037 | | 565 | | 1602 | 143 | 142 | 142 | | 55 |
| SP 30-9 | MS6 | 9.2 | 1133 | | 590 | | 1723 | 143 | 142 | 142 | | 62 |
| SP 30-10 | MS6 | 9.2 | 1229 | | 590 | | 1819 | 143 | 142 | 142 | | 64 |
| SP 30-11 | MS6 | 9.2 | 1325 | | 590 | | 1915 | 143 | 142 | 142 | | 65 |
| SP 30-12 | MS6 | 11 | 1421 | | 683 | | 2104 | 143 | 142 | 142 | | 70 |
| SP 30-13 | MS6 | 11 | 1517 | | 683 | | 2200 | 143 | 142 | 142 | | 72 |
| SP 30-14 | MS6 | 13 | 1613 | | 708 | | 2321 | 143 | 142 | 142 | | 76 |
| SP 30-15 | MS6 | 13 | 1709 | | 708 | | 2417 | 143 | 142 | 142 | | 78 |
| SP 30-16 | MS6 | 15 | 1805 | | 738 | | 2543 | 143 | 142 | 142 | | 84 |
| SP 30-17 | MS6 | 15 | 1901 | | 738 | | 2639 | 143 | 142 | 142 | | 85 |
| SP 30-18 | MS6 | 18.5 | 1997 | | 783 | | 2780 | 143 | 142 | 142 | | 93 |
| SP 30-19 | MS6 | 18.5 | 2093 | | 783 | | 2876 | 143 | 142 | 142 | | 94 |
| SP 30-20 | MS6 | 18.5 | 2189 | | 783 | | 2972 | 143 | 142 | 142 | | 96 |
| SP 30-21 | MS6 | 18.5 | 2285 | | 783 | | 3068 | 143 | 142 | 142 | | 98 |
| SP 30-22 | MS6 | 22 | 2381 | | 838 | | 3219 | 143 | 142 | 142 | | 105 |
| SP 30-23 | MS6 | 22 | 2477 | | 838 | | 3315 | 143 | 142 | 142 | | 107 |
| SP 30-24 | MS6 | 22 | 2573 | | 838 | | 3411 | 143 | 142 | 142 | | 109 |
| SP 30-25 | MS6 | 22 | 2669 | | 838 | | 3507 | 143 | 142 | 142 | | 110 |
| SP 30-26 | MS6 | 22 | 2765 | | 838 | | 3603 | 143 | 142 | 142 | | 112 |
| SP 30-27 | MS6 | 26 | 2861 | | 903 | | 3764 | 143 | 142 | 142 | | 119 |
| SP 30-28 | MS6 | 26 | 2957 | | 903 | | 3860 | 143 | 142 | 142 | | 121 |
| SP 30-29 | MS6 | 26 | 3053 | | 903 | | 3956 | 143 | 142 | 142 | | 123 |
| SP 30-30 | MS6 | 26 | 3149 | | 903 | | 4052 | 143 | 142 | 142 | | 124 |
| SP 30-31 | MS6 | 26 | 3245 | | 903 | | 4148 | 143 | 142 | 142 | | 126 |
| SP 30-32 | MS6 | 30 | 3341 | | 968 | | 4309 | 143 | 144 | 145 | | 136 |
| SP 30-33 | MS6 | 30 | 3437 | | 968 | | 4405 | 143 | 144 | 145 | | 137 |
| SP 30-34 | MS6 | 30 | 3533 | | 968 | | 4501 | 143 | 144 | 145 | | 139 |
| SP 30-35 | MS6 | 30 | 3629 | | 968 | | 4597 | 143 | 144 | 145 | | 141 |
| SP 30-39 | MMS 6000 | 37 | 4260 | | 1425 | | 5685 | 144 | 175 | 181 | | 253 |
| SP 30-43 | MMS 6000 | 37 | 4644 | | 1425 | | 6069 | 144 | 175 | 181 | | 264 |
| SP 30-39 | MMS6 | 37 | 4260 | | 1312 | | 5572 | 143 | 175 | 181 | | 248 |
| SP 30-43 | MMS6 | 37 | 4644 | | 1312 | | 5956 | 143 | 175 | 181 | | 259 |
| SP 30-46 | MMS 8000 | 45 | 4881 | | 1270 | | 6151 | 192 | 175 | 181 | | 325 |
| SP 30-49 | MMS 8000 | 45 | 5169 | | 1270 | | 6439 | 192 | 175 | 181 | | 332 |
| SP 30-52 | MMS 8000 | 55 | 5457 | | 1350 | | 6807 | 192 | 192 | 192 | | 357 |
| SP 30-54 | MMS 8000 | 55 | 5649 | | 1350 | | 6999 | 192 | 192 | 192 | | 362 |

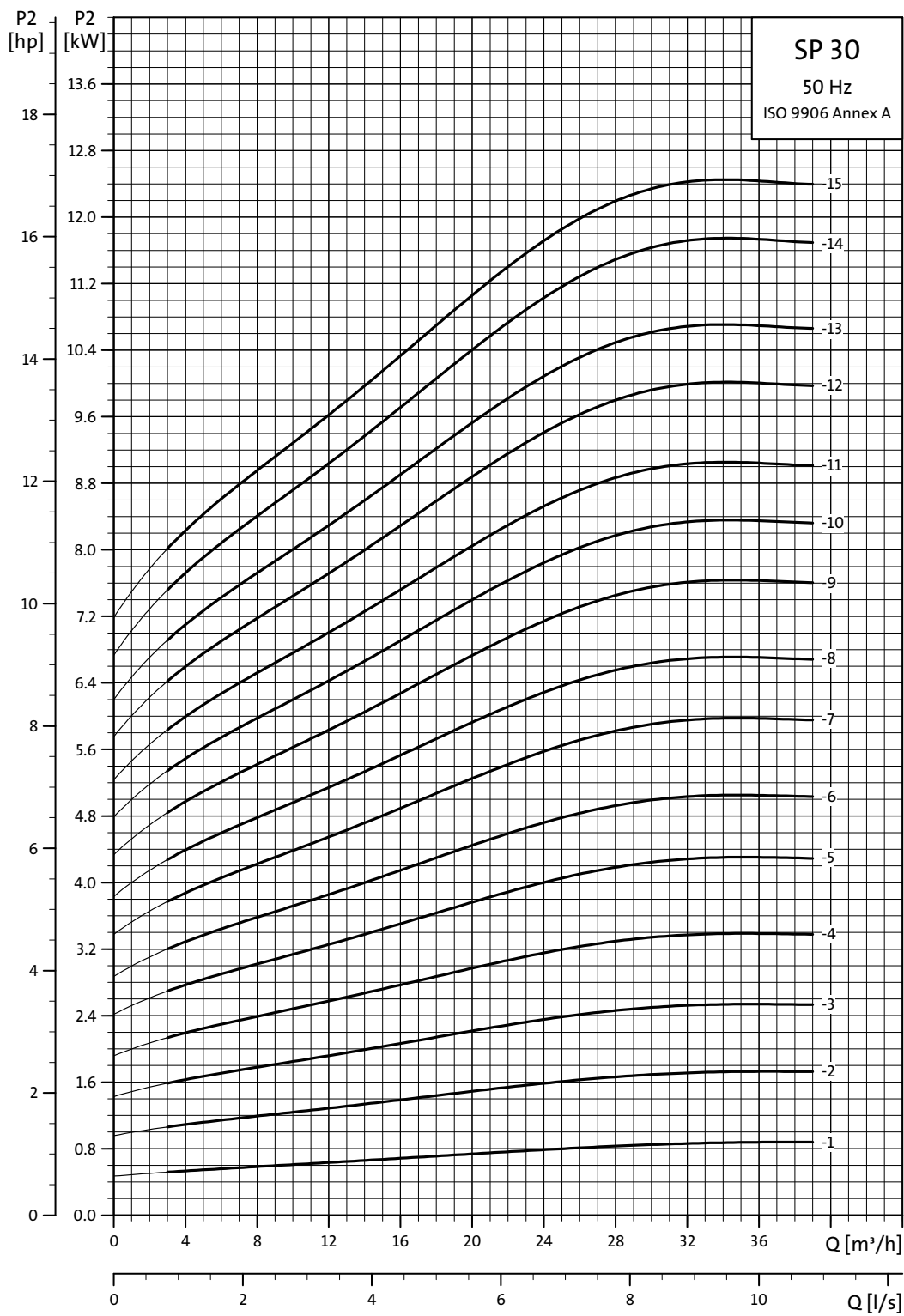
* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

The pump types above are also available in R- and N-versions. See page 5. Dimensions as above. Other types of connection are possible by means of connecting pieces. See page 87.

Power curves

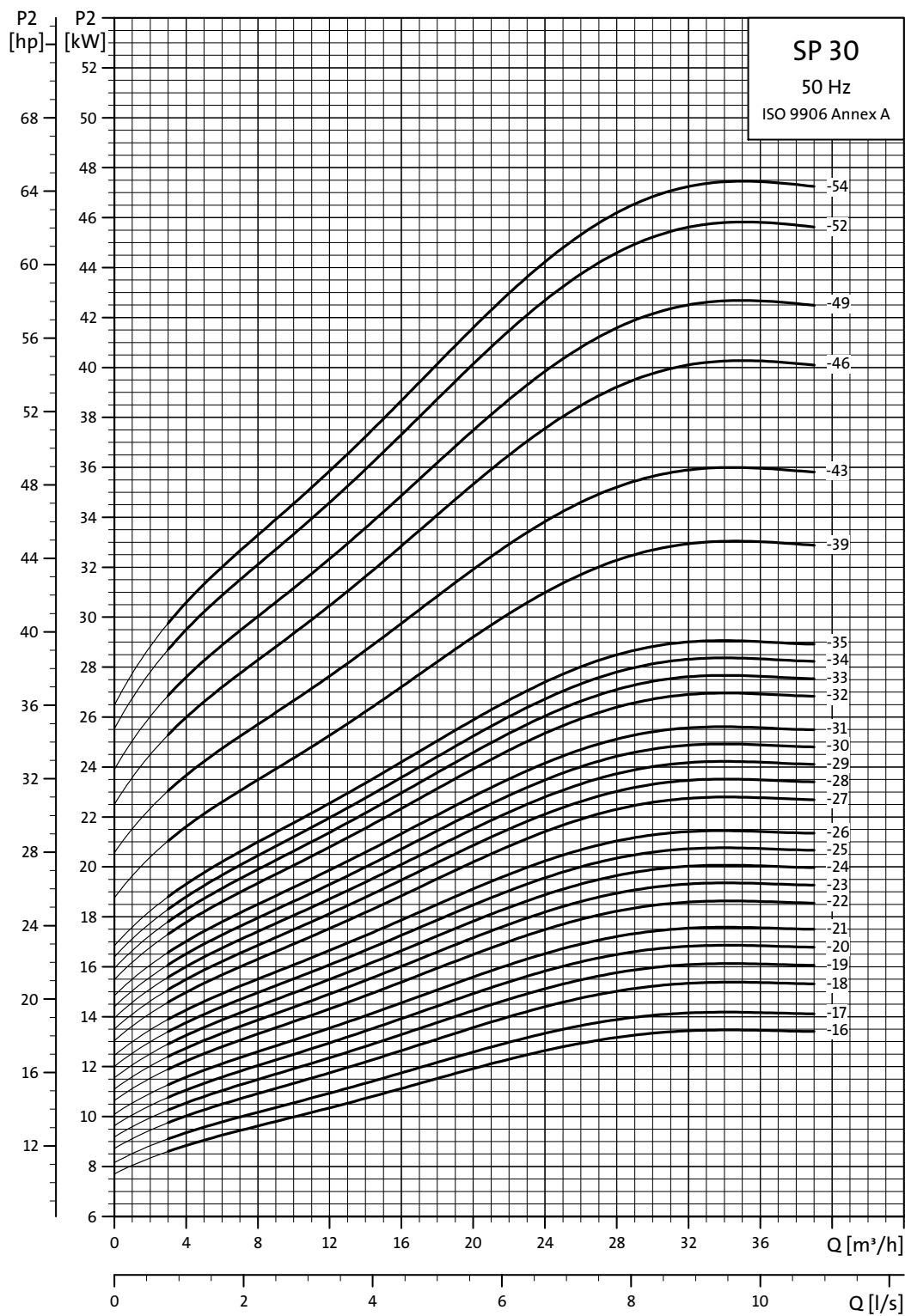
Submersible pumps
SP 30



TM01 8763 4702

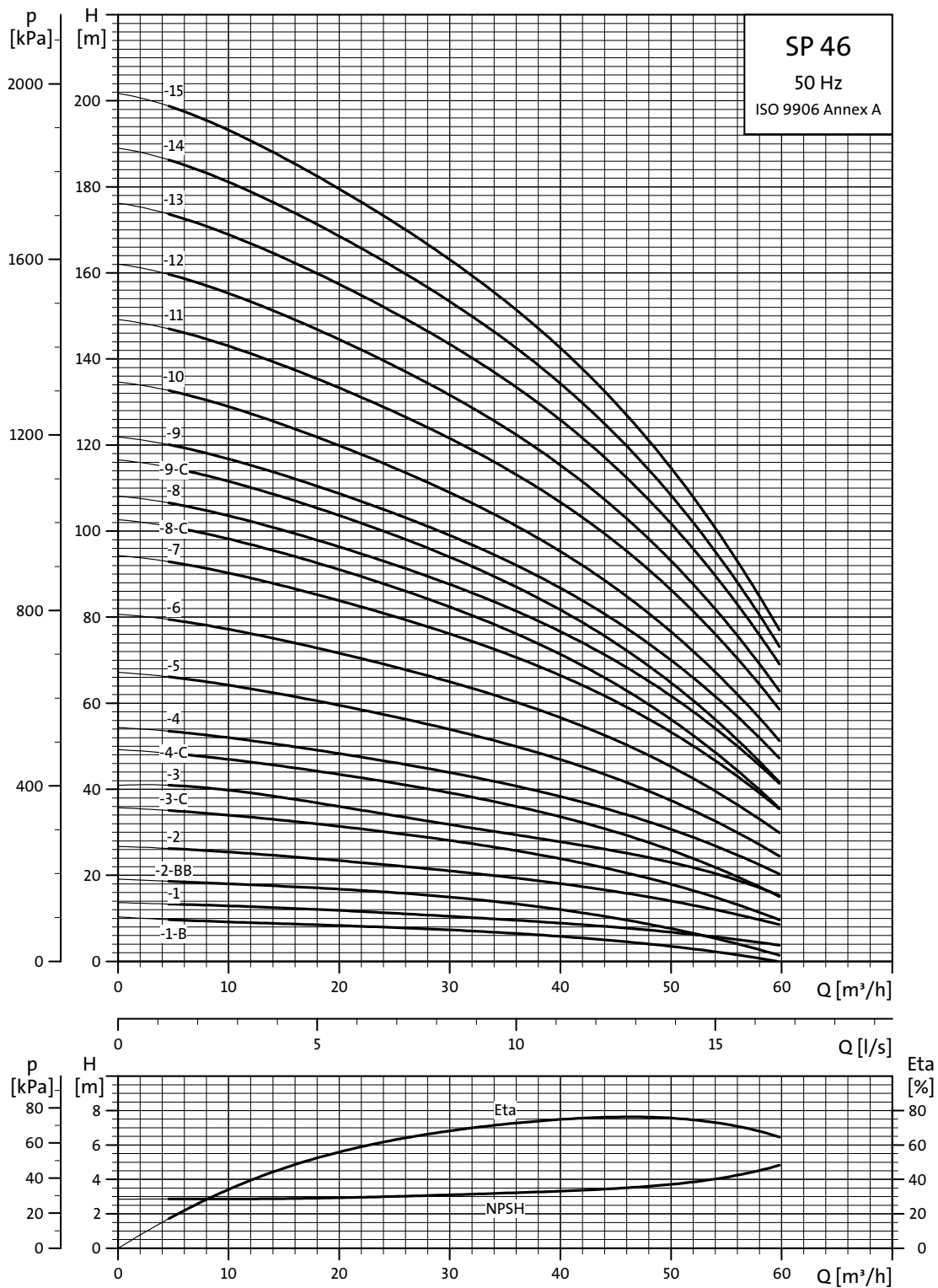
Power curves

Submersible pumps
SP 30



TM01 8764 4702

SP 46

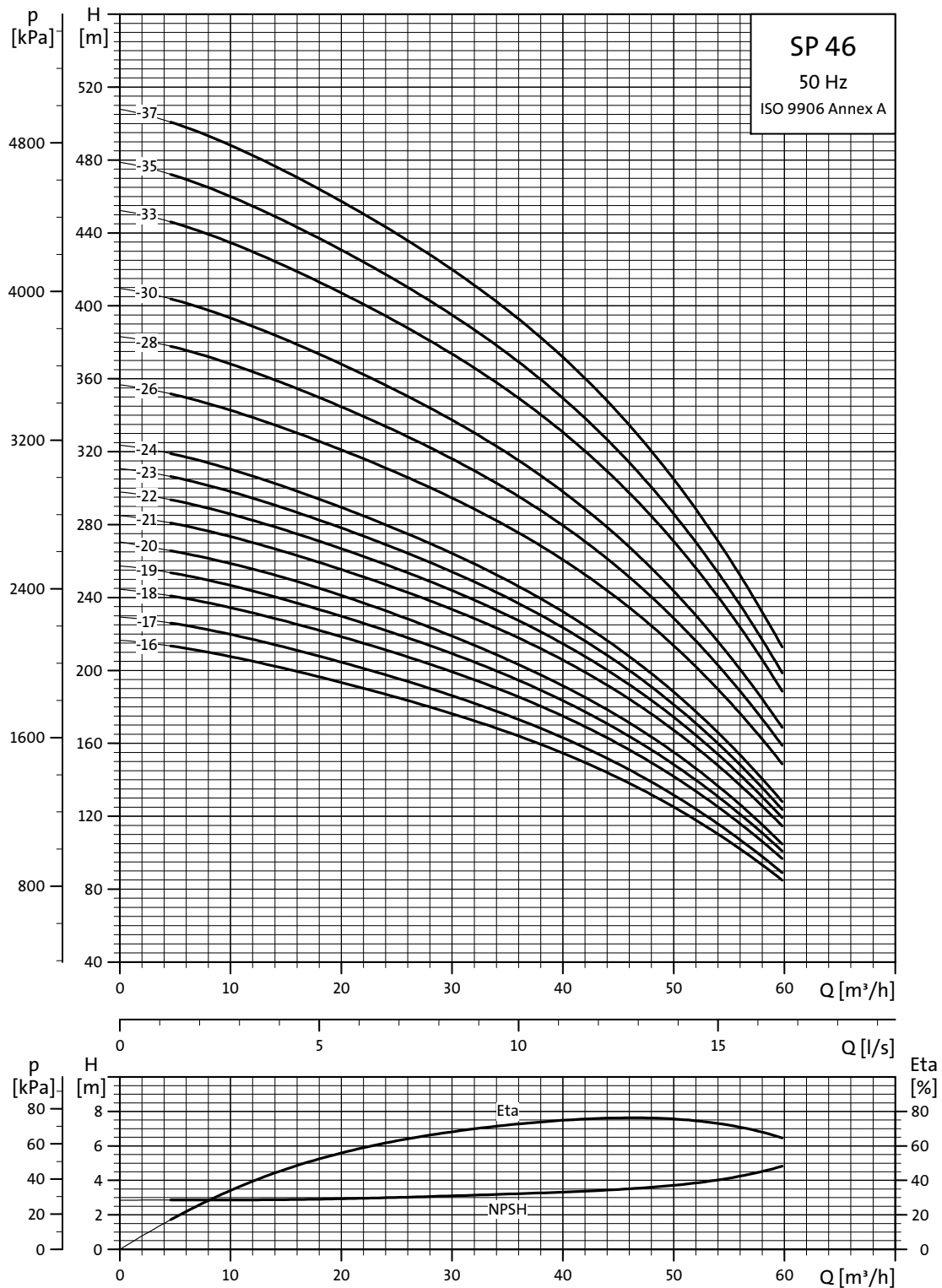


Explanation of efficiency curve, please see *Curve conditions*, page 4.

TM01 8765 4702

Performance curves

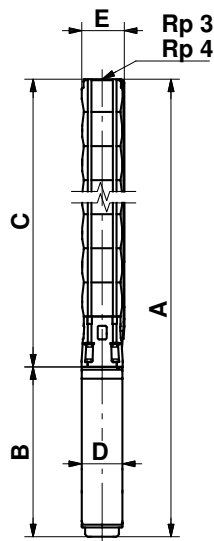
Submersible pumps
SP 46



TM01 8766 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Dimensions and weights



SP 46-26 to SP 46-37 are mounted in sleeve for R 4 connection.

TM00 0961 1196

| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] |
|------------|----------|------------|-----------------|------|-----|------|-----------------|-----|------|-----|-----------------|
| | Type | Power [kW] | Rp 3 connection | | | | Rp 4 connection | | | | |
| | | | A | C | E* | E** | A | C | E* | E** | |
| SP 46-1-B | MS 4000 | 1.1 | 777 | 364 | 141 | 783 | 370 | 145 | 413 | 95 | 20 |
| SP 46-1 | MS 4000 | 2.2 | 817 | 364 | 141 | 823 | 370 | 145 | 453 | 95 | 22 |
| SP 46-2-BB | MS 4000 | 2.2 | 930 | 477 | 141 | 936 | 483 | 145 | 453 | 95 | 24 |
| SP 46-2 | MS 4000 | 3.0 | 970 | 477 | 141 | 976 | 483 | 145 | 493 | 95 | 25 |
| SP 46-3-C | MS 4000 | 4.0 | 1163 | 590 | 141 | 1169 | 596 | 145 | 573 | 95 | 32 |
| SP 46-3 | MS 4000 | 5.5 | 1263 | 590 | 141 | 1269 | 596 | 145 | 673 | 95 | 37 |
| SP 46-4-C | MS 4000 | 5.5 | 1376 | 703 | 141 | 1382 | 709 | 145 | 673 | 95 | 39 |
| SP 46-4 | MS 4000 | 7.5 | 1476 | 703 | 141 | 1482 | 709 | 145 | 773 | 95 | 44 |
| SP 46-5 | MS 4000 | 7.5 | 1589 | 816 | 141 | 1595 | 822 | 145 | 773 | 95 | 47 |
| SP 46-3 | MS6 | 5.5 | 1141 | 606 | 145 | 1147 | 612 | 147 | 535 | 143 | 48 |
| SP 46-4 | MS6 | 7.5 | 1284 | 719 | 145 | 1290 | 725 | 147 | 565 | 143 | 52 |
| SP 46-5 | MS6 | 7.5 | 1397 | 832 | 145 | 1403 | 838 | 147 | 565 | 143 | 54 |
| SP 46-6 | MS6 | 9.2 | 1535 | 945 | 145 | 1541 | 951 | 147 | 590 | 143 | 62 |
| SP 46-7 | MS6 | 11 | 1741 | 1058 | 145 | 1747 | 1064 | 147 | 683 | 143 | 68 |
| SP 46-8-C | MS6 | 11 | 1854 | 1171 | 145 | 1860 | 1177 | 147 | 683 | 143 | 70 |
| SP 46-8 | MS6 | 13 | 1879 | 1171 | 145 | 1885 | 1177 | 147 | 708 | 143 | 73 |
| SP 46-9-C | MS6 | 13 | 1992 | 1284 | 145 | 1998 | 1290 | 147 | 708 | 143 | 76 |
| SP 46-9 | MS6 | 15 | 2022 | 1284 | 145 | 2028 | 1290 | 147 | 738 | 143 | 80 |
| SP 46-10 | MS6 | 15 | 2135 | 1397 | 145 | 2141 | 1403 | 147 | 738 | 143 | 82 |
| SP 46-11 | MS6 | 18.5 | 2293 | 1510 | 145 | 2299 | 1516 | 147 | 783 | 143 | 90 |
| SP 46-12 | MS6 | 18.5 | 2406 | 1623 | 145 | 2412 | 1629 | 147 | 783 | 143 | 93 |
| SP 46-13 | MS6 | 22 | 2574 | 1736 | 145 | 2580 | 1742 | 147 | 838 | 143 | 101 |
| SP 46-14 | MS6 | 22 | 2687 | 1849 | 145 | 2693 | 1855 | 147 | 838 | 143 | 104 |
| SP 46-15 | MS6 | 22 | 2800 | 1962 | 145 | 2806 | 1968 | 147 | 838 | 143 | 106 |
| SP 46-16 | MS6 | 26 | 2978 | 2075 | 145 | 2984 | 2081 | 147 | 903 | 143 | 114 |
| SP 46-17 | MS6 | 26 | 3091 | 2188 | 145 | 3097 | 2194 | 147 | 903 | 143 | 117 |
| SP 46-18 | MS6 | 30 | 3269 | 2301 | 145 | 3275 | 2307 | 147 | 968 | 143 | 128 |
| SP 46-19 | MS6 | 30 | 3382 | 2414 | 145 | 3388 | 2420 | 147 | 968 | 143 | 130 |
| SP 46-20 | MS6 | 30 | 3575 | 2607 | 145 | 3581 | 2613 | 147 | 968 | 143 | 132 |
| SP 46-21 | MMS 6000 | 37 | 4145 | 2720 | 145 | 4151 | 2726 | 147 | 1425 | 144 | 185 |
| SP 46-22 | MMS 6000 | 37 | 4258 | 2833 | 145 | 4264 | 2839 | 147 | 1425 | 144 | 188 |
| SP 46-23 | MMS 6000 | 37 | 4371 | 2946 | 145 | 4377 | 2952 | 147 | 1425 | 144 | 190 |
| SP 46-24 | MMS 6000 | 37 | 4484 | 3059 | 145 | 4490 | 3065 | 147 | 1425 | 144 | 193 |
| SP 46-21 | MMS6 | 37 | 4032 | 2720 | 145 | 4038 | 2726 | 147 | 1312 | 143 | 180 |
| SP 46-22 | MMS6 | 37 | 4145 | 2833 | 145 | 4151 | 2839 | 147 | 1312 | 143 | 183 |
| SP 46-23 | MMS6 | 37 | 4258 | 2946 | 145 | 4264 | 2952 | 147 | 1312 | 143 | 185 |
| SP 46-24 | MMS6 | 37 | 4371 | 3059 | 145 | 4377 | 3065 | 147 | 1312 | 143 | 188 |
| SP 46-26 | MMS 8000 | 45 | | | | 4673 | 3403 | 192 | 1270 | 192 | 278 |
| SP 46-28 | MMS 8000 | 45 | | | | 4899 | 3629 | 192 | 1270 | 192 | 284 |
| SP 46-30 | MMS 8000 | 45 | | | | 5125 | 3855 | 192 | 1270 | 192 | 290 |
| SP 46-33 | MMS 8000 | 55 | | | | 5544 | 4194 | 192 | 1350 | 192 | 314 |
| SP 46-35 | MMS 8000 | 55 | | | | 5770 | 4420 | 192 | 1350 | 192 | 319 |
| SP 46-37 | MMS 8000 | 63 | | | | 6136 | 4646 | 192 | 1490 | 192 | 351 |

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

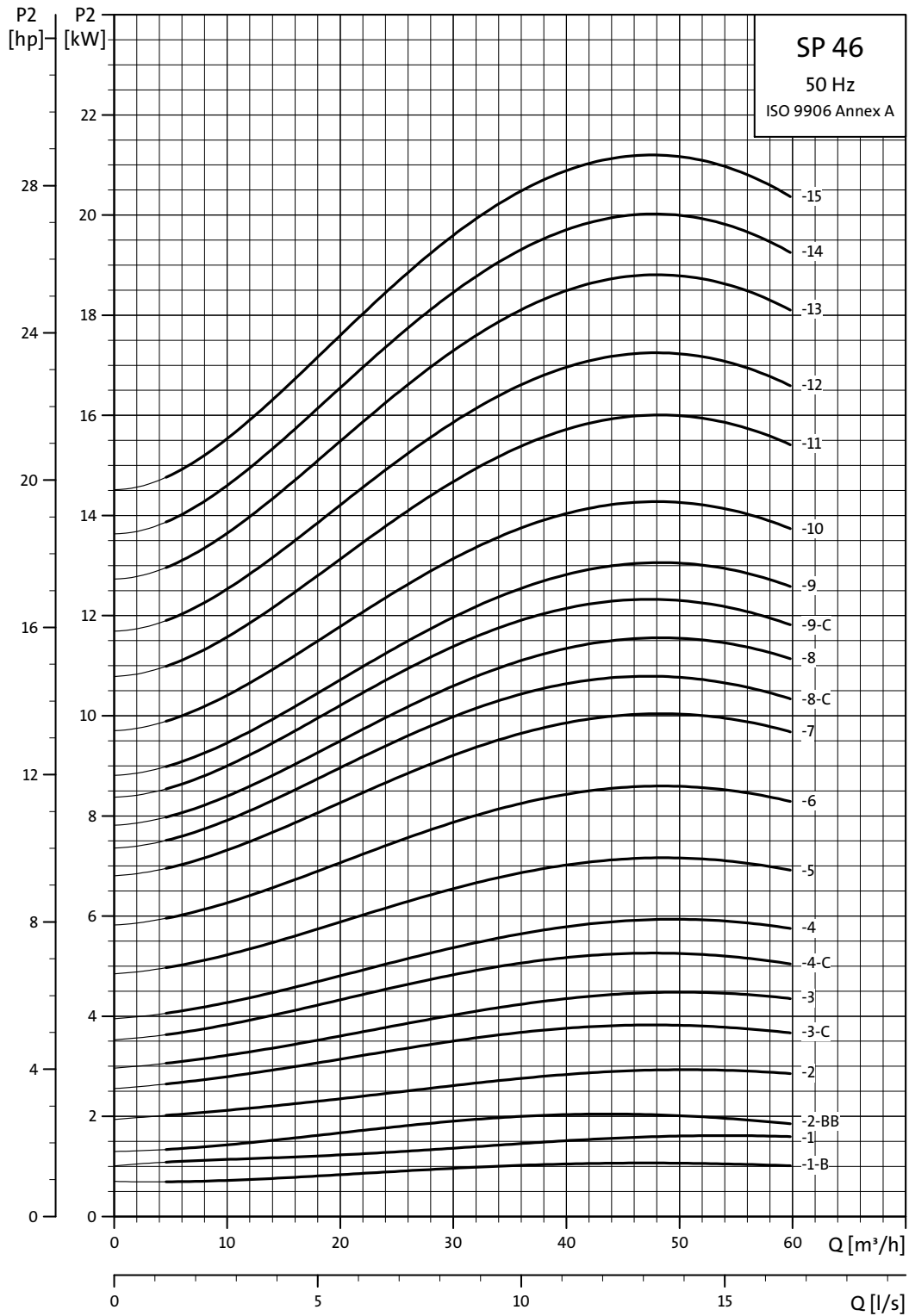
The pump types above are also available in R- and N-versions. See page 5.

Pumps in R-versions are available up to and incl. SP 46-24, i.e. sleeve versions. Dimensions as above.

Other types of connection are possible by means of connecting pieces. See page 87.

Power curves

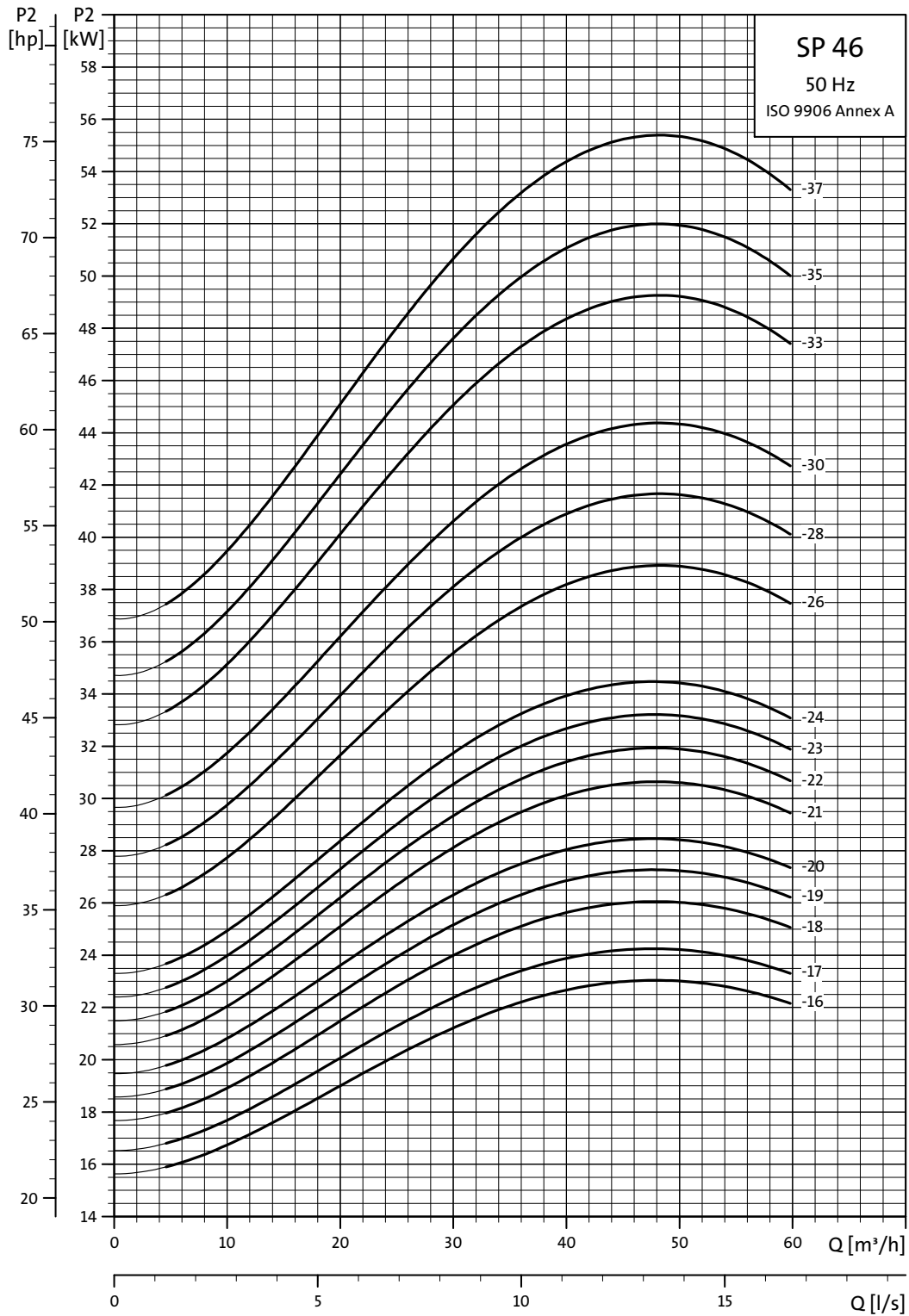
Submersible pumps
SP 46



TM01 8767 4702

Power curves

Submersible pumps
SP 46

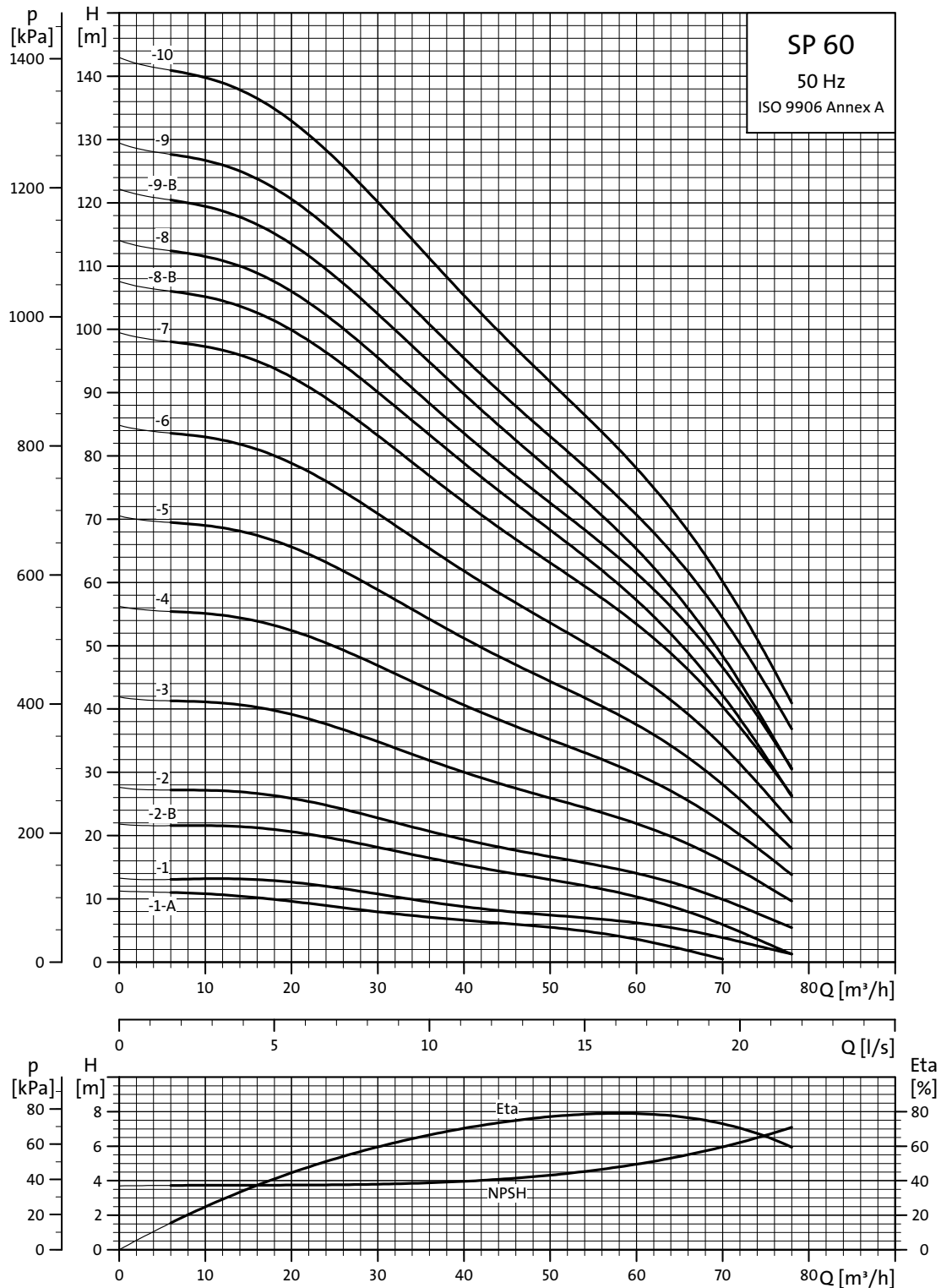


TM01 8768 4702

Performance curves

Submersible pumps
SP 60

SP 60

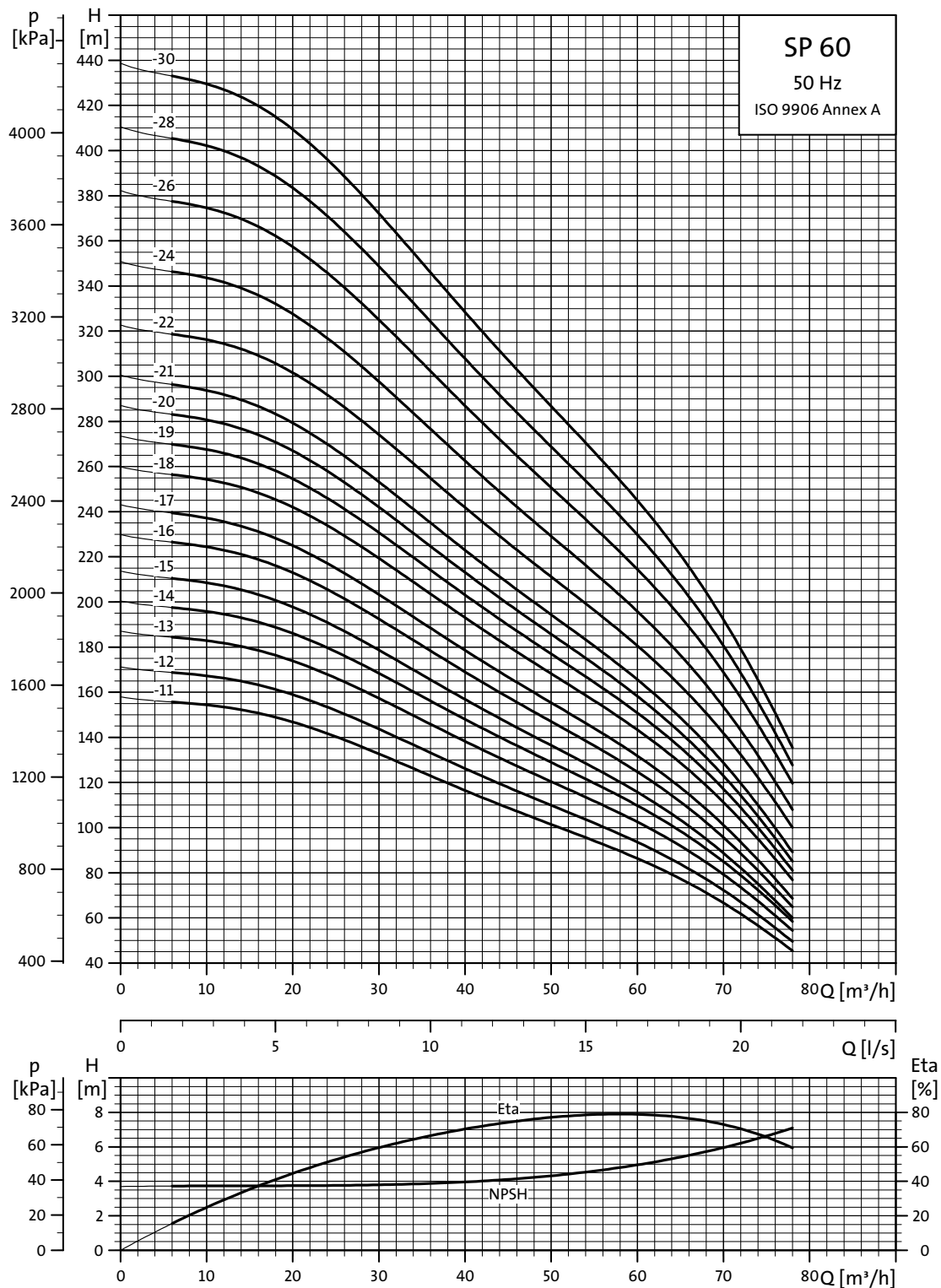


Explanation of efficiency curve, please see *Curve conditions*, page 4.

TM01 8826 4702

Performance curves

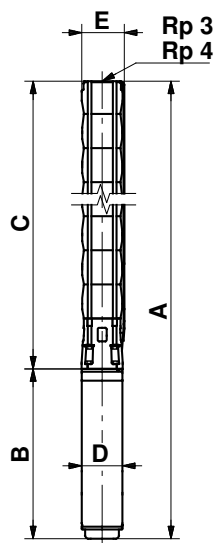
Submersible pumps
SP 60



Explanation of efficiency curve, please see *Curve conditions*, page 4.

TM01 8827 4702

Dimensions and weights



TM00 0961 1196

| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|-----------|----------|------------|-----------------|------|-----|-----|-----------------|------|-----|-----|-----------------|-----|-----|
| | Type | Power [kW] | Rp 3 connection | | | | Rp 4 connection | | | | | B | D |
| | | | A | C | E* | E** | A | C | E* | E** | | | |
| SP 60-1-A | MS 4000 | 1.5 | 780 | 364 | 142 | | 786 | 370 | 146 | 416 | 95 | 20 | |
| SP 60-1 | MS 4000 | 2.2 | 817 | 364 | 142 | | 823 | 370 | 146 | 453 | 95 | 22 | |
| SP 60-2-B | MS 4000 | 3.0 | 970 | 477 | 142 | | 976 | 483 | 146 | 493 | 95 | 25 | |
| SP 60-2 | MS 4000 | 4.0 | 1050 | 477 | 142 | | 1056 | 483 | 146 | 573 | 95 | 29 | |
| SP 60-3 | MS 4000 | 5.5 | 1263 | 590 | 142 | | 1269 | 596 | 146 | 673 | 95 | 37 | |
| SP 60-3 | MS6 | 5.5 | 1141 | 606 | 147 | 150 | 1147 | 612 | 149 | 152 | 535 | 138 | 47 |
| SP 60-4 | MS 4000 | 7.5 | 1476 | 703 | 142 | | 1482 | 709 | 146 | 773 | 95 | 44 | |
| SP 60-4 | MS6 | 7.5 | 1284 | 719 | 147 | 150 | 1290 | 725 | 149 | 152 | 565 | 143 | 50 |
| SP 60-5 | MS6 | 9.2 | 1422 | 832 | 147 | 150 | 1428 | 838 | 149 | 152 | 590 | 143 | 60 |
| SP 60-6 | MS6 | 11 | 1633 | 950 | 147 | 150 | 1634 | 951 | 149 | 152 | 683 | 143 | 65 |
| SP 60-7 | MS6 | 13 | 1766 | 1058 | 147 | 150 | 1772 | 1064 | 149 | 152 | 708 | 143 | 71 |
| SP 60-8-B | MS6 | 13 | 1879 | 1171 | 147 | 150 | 1885 | 1177 | 149 | 152 | 708 | 143 | 73 |
| SP 60-8 | MS6 | 15 | 1909 | 1171 | 147 | 150 | 1915 | 1177 | 149 | 152 | 738 | 143 | 77 |
| SP 60-9-B | MS6 | 15 | 2022 | 1284 | 147 | 150 | 2028 | 1290 | 149 | 152 | 738 | 143 | 80 |
| SP 60-9 | MS6 | 18.5 | 2067 | 1284 | 147 | 150 | 2073 | 1290 | 149 | 152 | 783 | 143 | 85 |
| SP 60-10 | MS6 | 18.5 | 2180 | 1397 | 147 | 150 | 2186 | 1403 | 149 | 152 | 783 | 143 | 88 |
| SP 60-11 | MS6 | 22 | 2348 | 1510 | 147 | 150 | 2354 | 1516 | 149 | 152 | 838 | 143 | 96 |
| SP 60-12 | MS6 | 22 | 2461 | 1623 | 147 | 150 | 2467 | 1629 | 149 | 152 | 838 | 143 | 99 |
| SP 60-13 | MS6 | 26 | 2639 | 1736 | 147 | 150 | 2645 | 1742 | 149 | 152 | 903 | 143 | 107 |
| SP 60-14 | MS6 | 26 | 2752 | 1849 | 147 | 150 | 2758 | 1855 | 149 | 152 | 903 | 143 | 109 |
| SP 60-15 | MS6 | 26 | 2865 | 1962 | 147 | 150 | 2871 | 1968 | 149 | 152 | 903 | 143 | 112 |
| SP 60-16 | MS6 | 30 | 3043 | 2075 | 147 | 150 | 3049 | 2081 | 149 | 152 | 968 | 143 | 122 |
| SP 60-17 | MS6 | 30 | 3156 | 2188 | 147 | 150 | 3162 | 2194 | 152 | 156 | 968 | 143 | 125 |
| SP 60-18 | MMS 6000 | 37 | 3806 | 2381 | 150 | 154 | 3812 | 2387 | 152 | 156 | 1425 | 144 | 178 |
| SP 60-19 | MMS 6000 | 37 | 3919 | 2494 | 150 | 154 | 3925 | 2500 | 152 | 156 | 1425 | 144 | 180 |
| SP 60-20 | MMS 6000 | 37 | 4032 | 2607 | 150 | 154 | 4038 | 2613 | 152 | 156 | 1425 | 144 | 183 |
| SP 60-21 | MMS 6000 | 37 | 4147 | 2722 | 150 | 154 | 4151 | 2726 | 152 | 156 | 1425 | 144 | 185 |
| SP 60-18 | MMS6 | 37 | 3693 | 2381 | 150 | 154 | 3699 | 2387 | 152 | 156 | 1312 | 143 | 173 |
| SP 60-19 | MMS6 | 37 | 3806 | 2494 | 150 | 154 | 3812 | 2500 | 152 | 156 | 1312 | 143 | 175 |
| SP 60-20 | MMS6 | 37 | 3919 | 2607 | 150 | 154 | 3925 | 2613 | 152 | 156 | 1312 | 143 | 178 |
| SP 60-21 | MMS6 | 37 | 4034 | 2722 | 150 | 154 | 4038 | 2726 | 152 | 156 | 1312 | 143 | 180 |
| SP 60-22 | MMS 8000 | 45 | 4054 | 2784 | 180 | 180 | 4058 | 2788 | 180 | 180 | 1270 | 192 | 239 |
| SP 60-24 | MMS 8000 | 45 | | | | | 4447 | 3177 | 193 | 195 | 1270 | 192 | 272 |
| SP 60-26 | MMS 8000 | 55 | | | | | 4753 | 3403 | 193 | 195 | 1350 | 192 | 293 |
| SP 60-28 | MMS 8000 | 55 | | | | | 4979 | 3629 | 193 | 195 | 1350 | 192 | 299 |
| SP 60-30 | MMS 8000 | 55 | | | | | 5205 | 3855 | 193 | 195 | 1350 | 192 | 305 |

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

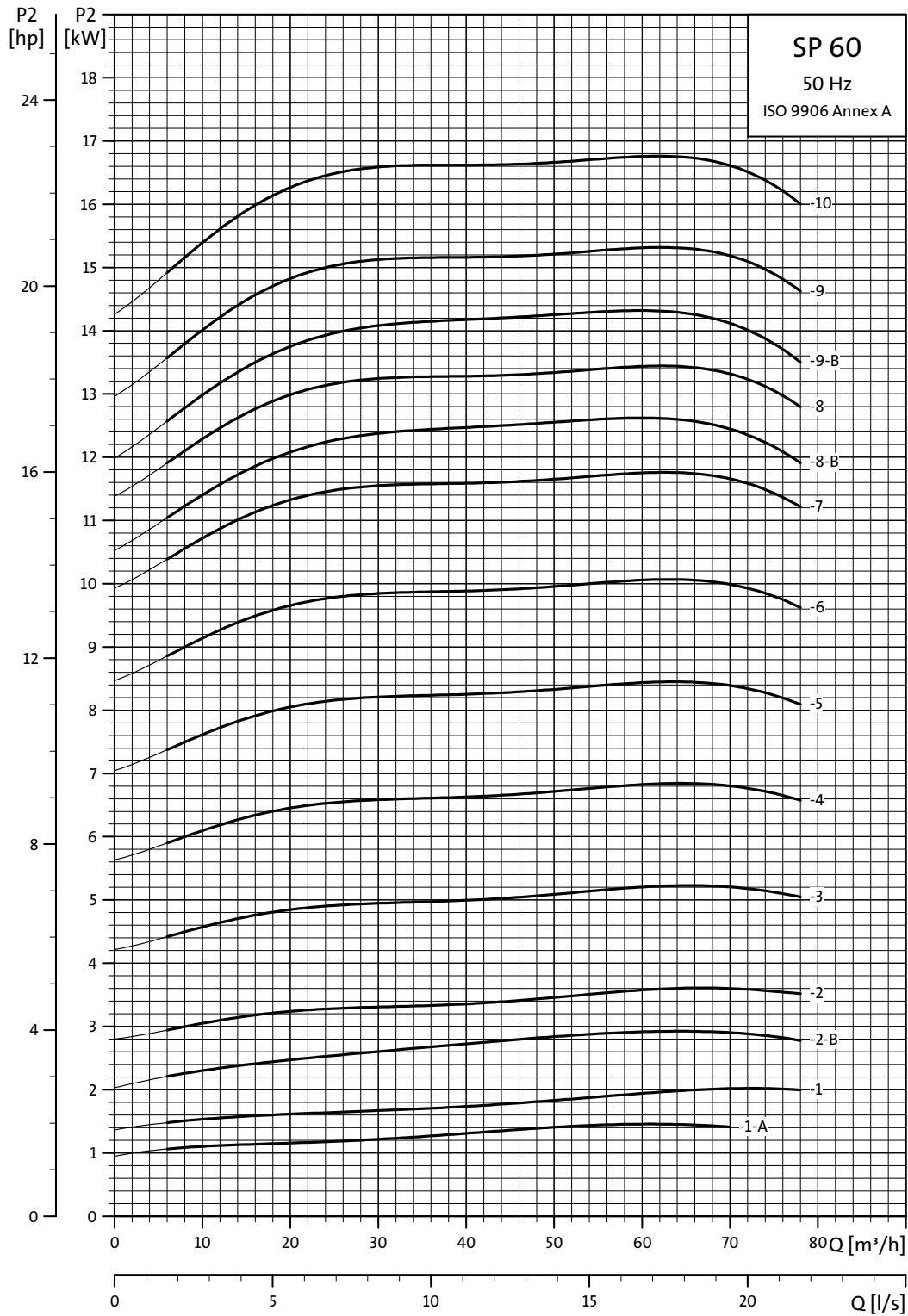
The pump types above are also available in R- and N-versions. See page 5.

Pumps in R-versions are available up to and incl. SP 60-22, i.e. sleeve versions. Dimensions as above.

Other types of connection are possible by means of connecting pieces. See page 87.

Power curves

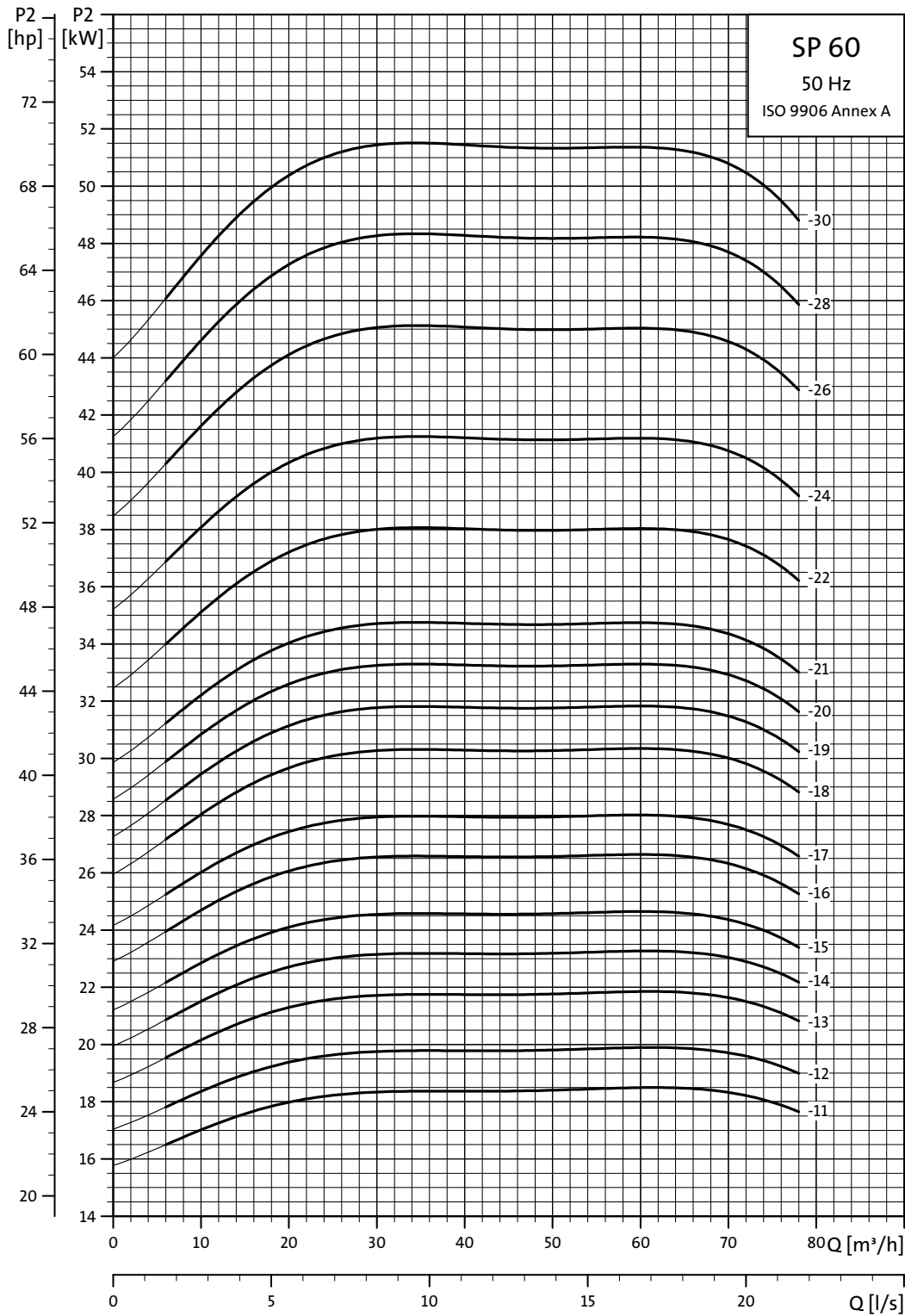
Submersible pumps
SP 60



TM01 8828 4702

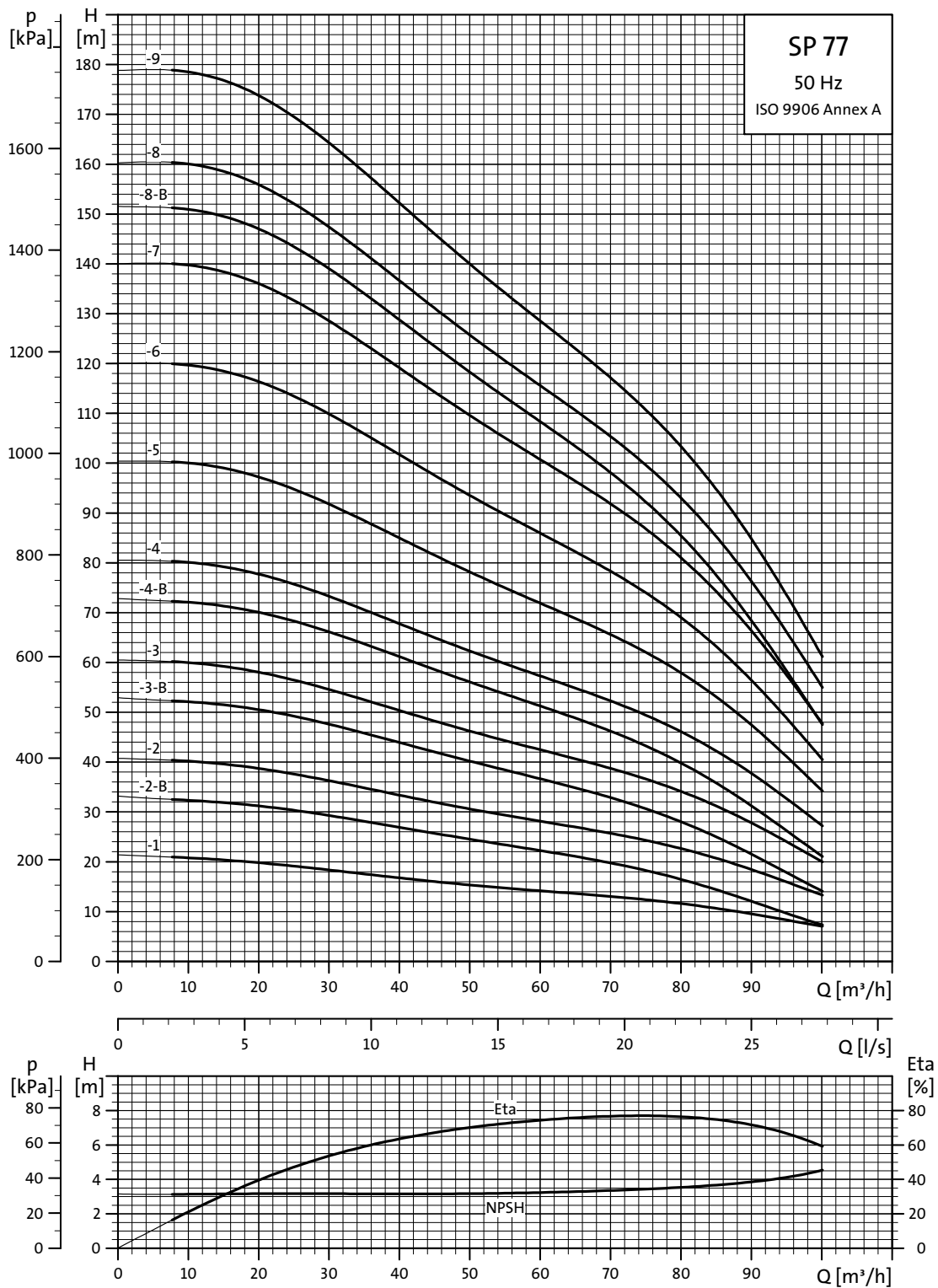
Power curves

Submersible pumps
SP 60



TM01 8829 4702

SP 77

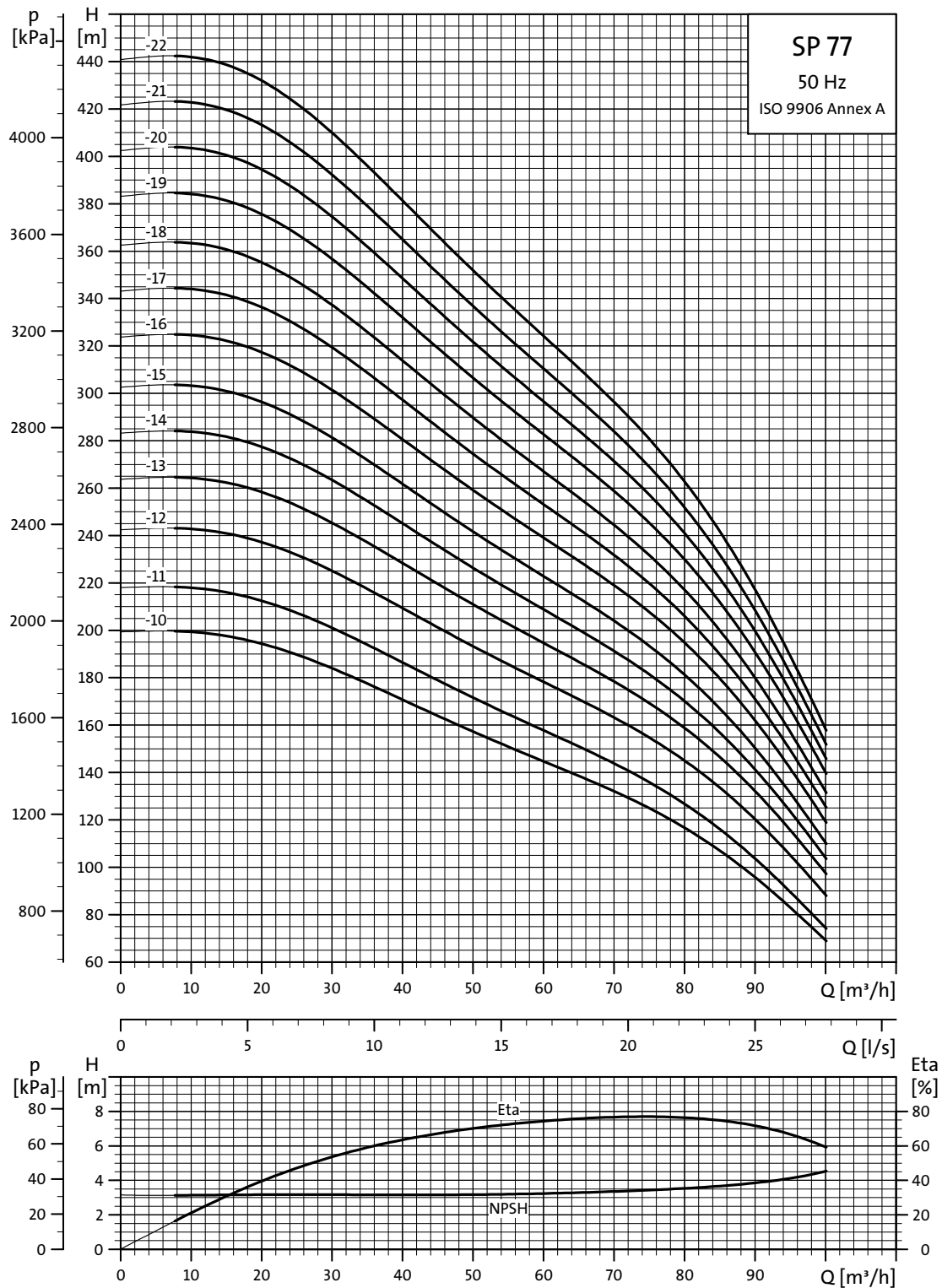


Explanation of efficiency curve, please see *Curve conditions*, page 4.

TM01 8769 4702

Performance curves

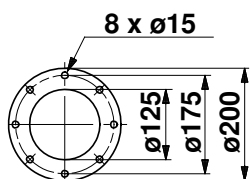
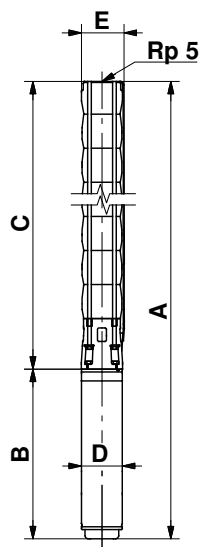
Submersible pumps
SP 77



TM01 8770 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Dimensions and weights



TM00 7872 2196

TM00 7323 1798

| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|-----------|----------|------------|-----------------|------|-----|-----|--------------------|------|-----|-----|-----------------|-----|-----|
| | Type | Power [kW] | Rp 5 connection | | | | 5" Grundfos flange | | | | | | |
| | | | A | C | E* | E** | A | C | E* | E** | | | |
| SP 77-1 | MS6 | 5.5 | 1153 | 618 | 178 | 186 | 1153 | 618 | 200 | 200 | 535 | 143 | 55 |
| SP 77-2-B | MS6 | 5.5 | 1281 | 746 | 178 | 186 | 1281 | 746 | 200 | 200 | 535 | 143 | 59 |
| SP 77-2 | MS6 | 7.5 | 1311 | 746 | 178 | 186 | 1311 | 746 | 200 | 200 | 565 | 143 | 63 |
| SP 77-3-B | MS6 | 9.2 | 1464 | 874 | 178 | 186 | 1464 | 874 | 200 | 200 | 590 | 143 | 72 |
| SP 77-3 | MS6 | 11 | 1557 | 874 | 178 | 186 | 1557 | 874 | 200 | 200 | 683 | 143 | 75 |
| SP 77-4-B | MS6 | 13 | 1711 | 1003 | 178 | 186 | 1711 | 1003 | 200 | 200 | 708 | 143 | 82 |
| SP 77-4 | MS6 | 15 | 1741 | 1003 | 178 | 186 | 1741 | 1003 | 200 | 200 | 738 | 143 | 86 |
| SP 77-5 | MS6 | 18.5 | 1914 | 1131 | 178 | 186 | 1914 | 1131 | 200 | 200 | 783 | 143 | 95 |
| SP 77-6 | MS6 | 22 | 2097 | 1259 | 178 | 186 | 2097 | 1259 | 200 | 200 | 838 | 143 | 105 |
| SP 77-7 | MS6 | 26 | 2290 | 1387 | 178 | 186 | 2290 | 1387 | 200 | 200 | 903 | 143 | 114 |
| SP 77-8-B | MS6 | 26 | 2418 | 1515 | 178 | 186 | 2418 | 1515 | 200 | 200 | 903 | 143 | 118 |
| SP 77-8 | MS6 | 30 | 2483 | 1515 | 178 | 186 | 2483 | 1515 | 200 | 200 | 968 | 143 | 126 |
| SP 77-9 | MS6 | 30 | 2611 | 1643 | 178 | 186 | 2611 | 1643 | 200 | 200 | 968 | 143 | 129 |
| SP 77-10 | MMS 6000 | 37 | 3196 | 1771 | 178 | 186 | 3196 | 1771 | 200 | 200 | 1425 | 144 | 181 |
| SP 77-11 | MMS 6000 | 37 | 3339 | 1898 | 178 | 186 | 3323 | 1898 | 200 | 200 | 1425 | 144 | 184 |
| SP 77-10 | MMS6 | 37 | 3083 | 1771 | 178 | 186 | 3083 | 1771 | 200 | 200 | 1312 | 143 | 176 |
| SP 77-11 | MMS6 | 37 | 3226 | 1898 | 178 | 186 | 3210 | 1898 | 200 | 200 | 1312 | 143 | 179 |
| SP 77-12 | MMS 8000 | 45 | 3313 | 2043 | 200 | 204 | 3313 | 2043 | 209 | 209 | 1270 | 192 | 240 |
| SP 77-13 | MMS 8000 | 55 | 3522 | 2172 | 200 | 204 | 3522 | 2172 | 209 | 209 | 1350 | 192 | 259 |
| SP 77-14 | MMS 8000 | 55 | 3650 | 2300 | 200 | 204 | 3650 | 2300 | 209 | 209 | 1350 | 192 | 263 |
| SP 77-15 | MMS 8000 | 55 | 3779 | 2429 | 200 | 204 | | | | | 1350 | 192 | 266 |
| SP 77-16 | MMS 8000 | 63 | 4047 | 2557 | 200 | 204 | | | | | 1490 | 192 | 296 |
| SP 77-17 | MMS 8000 | 63 | 4175 | 2685 | 200 | 204 | | | | | 1490 | 192 | 300 |
| SP 77-18 | MMS 8000 | 63 | 4304 | 2814 | 200 | 204 | | | | | 1490 | 192 | 304 |
| SP 77-19 | MMS 8000 | 75 | 4826 | 3236 | 200 | 204 | | | | | 1590 | 192 | 334 |
| SP 77-20 | MMS 8000 | 75 | 4954 | 3364 | 200 | 204 | | | | | 1590 | 192 | 338 |
| SP 77-21 | MMS 8000 | 75 | 5082 | 3492 | 200 | 202 | | | | | 1590 | 192 | 342 |
| SP 77-22 | MMS 8000 | 92 | 5450 | 3620 | 200 | 202 | | | | | 1830 | 192 | 391 |

* Maximum diameter of pump with one motor cable.

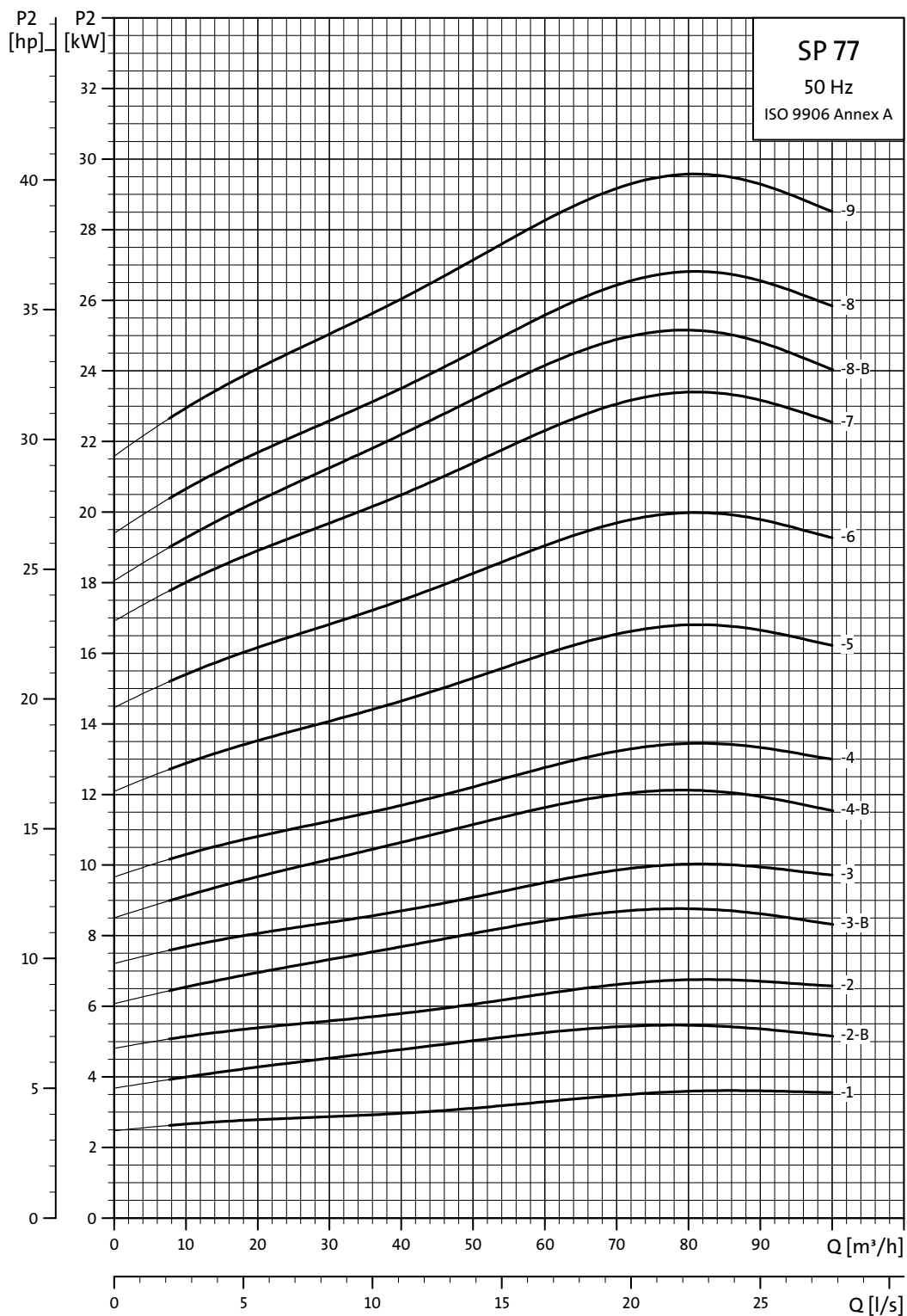
** Maximum diameter of pump with two motor cables.

The pump types are also available in N- and R-versions. See page 5. Dimensions as above.

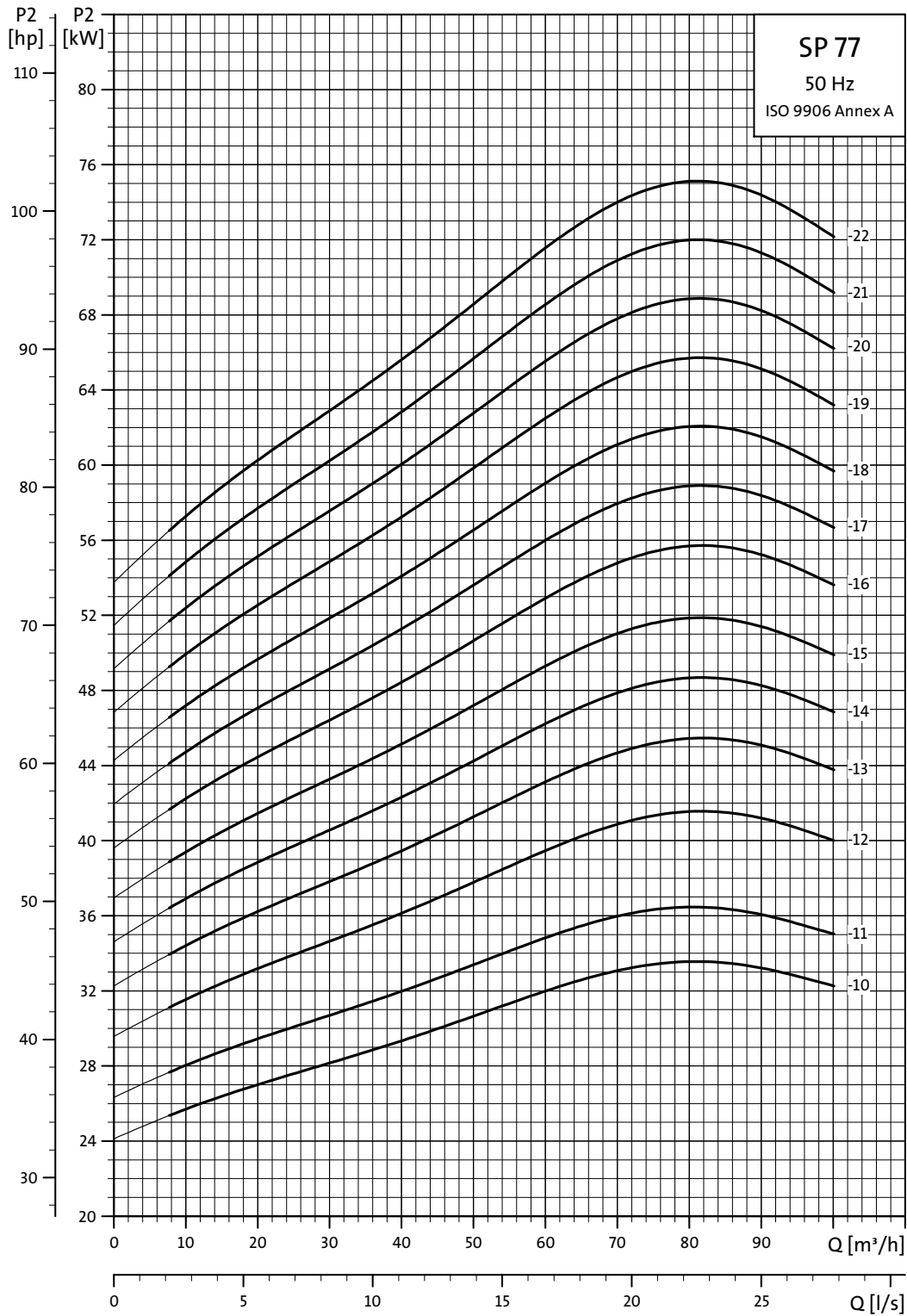
Other types of connection are possible by means of connecting pieces. See page 87.

Power curves

Submersible pumps
SP 77

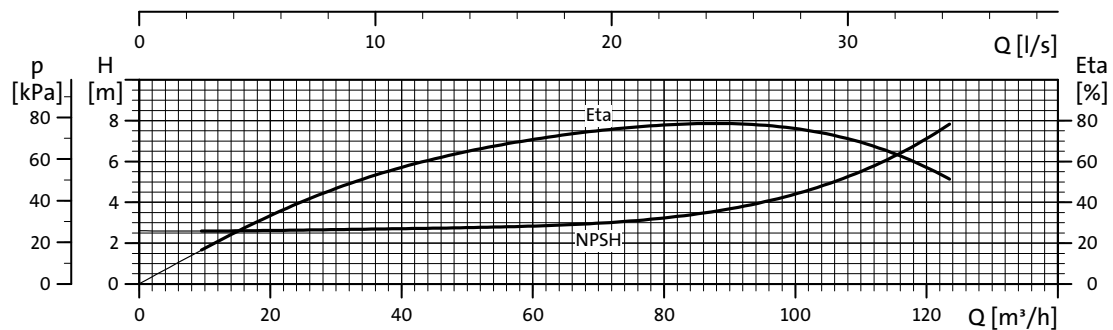
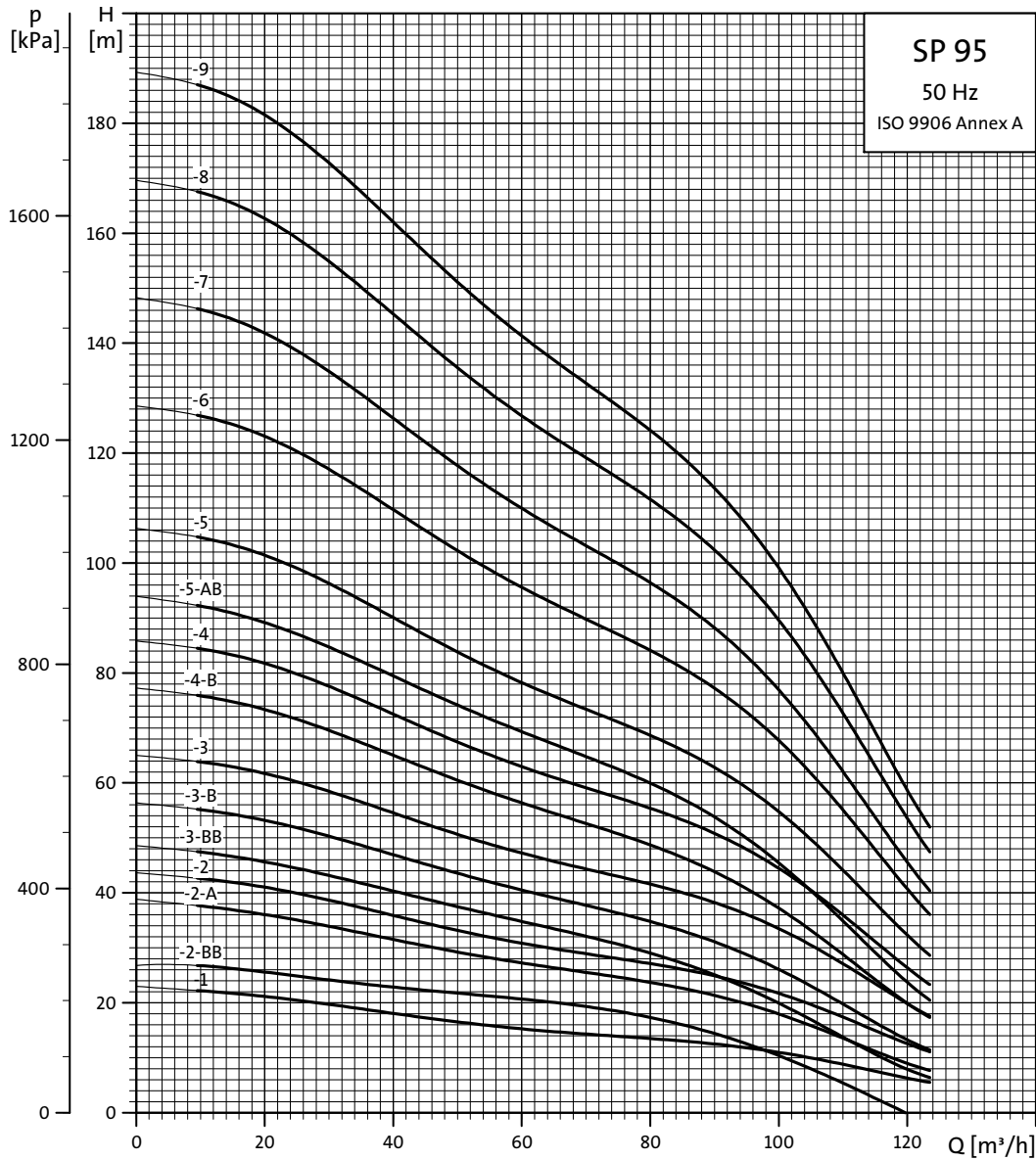


TM01 8771 4702



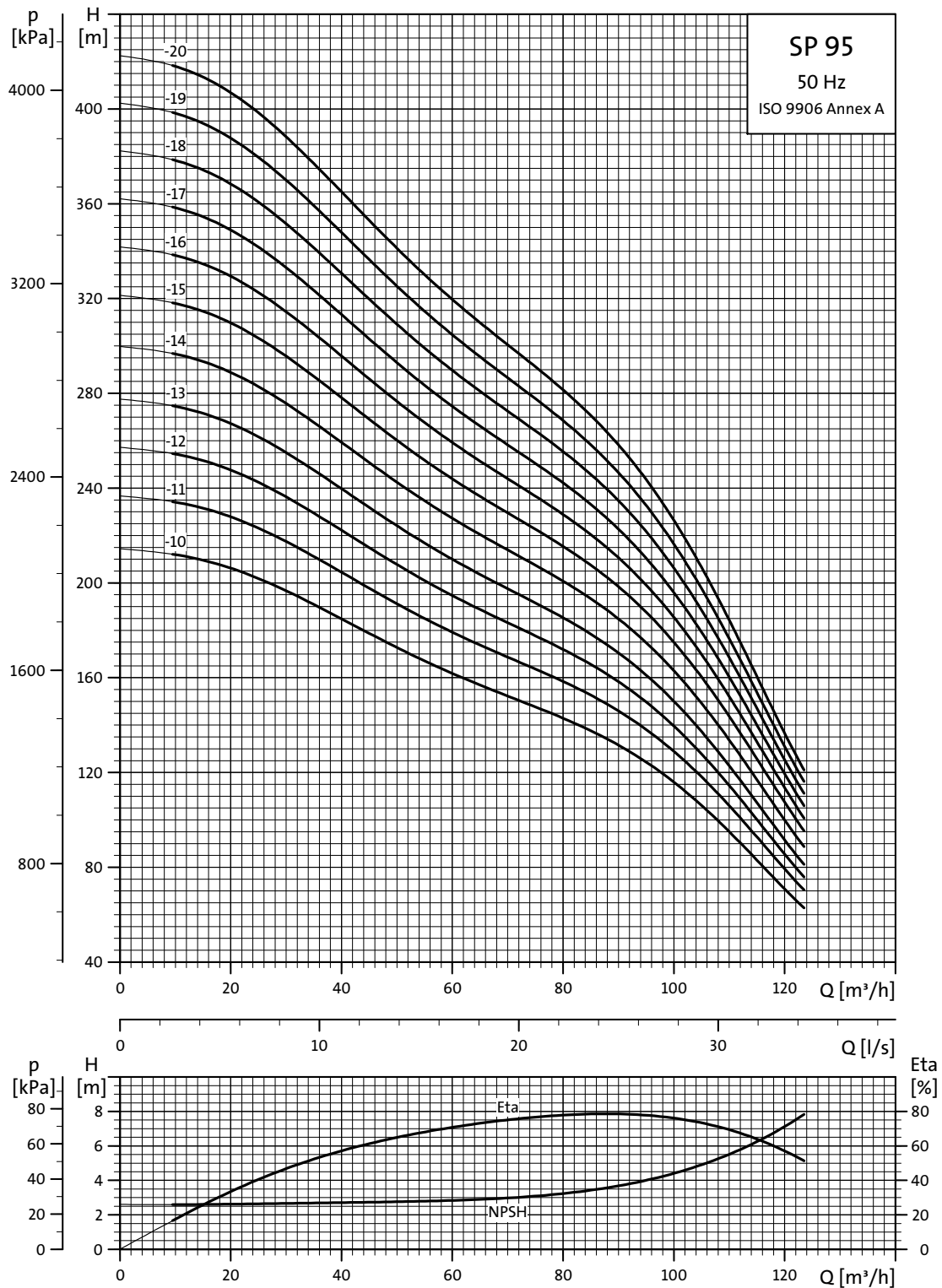
TM01 8772 4702

SP 95



Explanation of efficiency curve, please see *Curve conditions*, page 4.

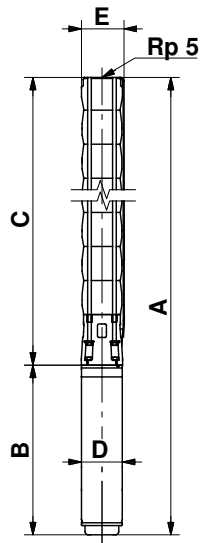
TM01 8773 4702



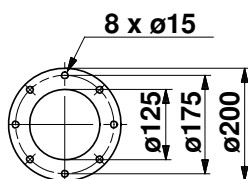
TM01 8774 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Dimensions and weights



TM00 7872 2196



TM00 7323 1798

| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|------------|----------|------------|-----------------|------|-----|-----|--------------------|------|-----|-----|-----------------|-----|-----|
| | Type | Power [kW] | Rp 5 connection | | | | 5" Grundfos flange | | | | | B | D |
| | | | A | C | E* | E** | A | C | E* | E** | | | |
| SP 95-1 | MS6 | 5.5 | 1153 | 618 | 178 | 186 | 1153 | 618 | 200 | 200 | 535 | 143 | 55 |
| SP 95-2-BB | MS6 | 5.5 | 1281 | 746 | 178 | 186 | 1281 | 746 | 200 | 200 | 535 | 143 | 72 |
| SP 95-2-A | MS6 | 7.5 | 1311 | 746 | 178 | 186 | 1311 | 746 | 200 | 200 | 565 | 143 | 63 |
| SP 95-2 | MS6 | 9.2 | 1336 | 746 | 178 | 186 | 1336 | 746 | 200 | 200 | 590 | 143 | 68 |
| SP 95-3-BB | MS6 | 9.2 | 1464 | 874 | 178 | 186 | 1464 | 874 | 200 | 200 | 590 | 143 | 72 |
| SP 95-3-B | MS6 | 11 | 1557 | 874 | 178 | 186 | 1557 | 874 | 200 | 200 | 683 | 143 | 75 |
| SP 95-3 | MS6 | 13 | 1582 | 874 | 178 | 186 | 1582 | 874 | 200 | 200 | 708 | 143 | 78 |
| SP 95-4-B | MS6 | 15 | 1741 | 1003 | 178 | 186 | 1741 | 1003 | 200 | 200 | 738 | 143 | 86 |
| SP 95-4 | MS6 | 18.5 | 1786 | 1003 | 178 | 186 | 1786 | 1003 | 200 | 200 | 783 | 143 | 91 |
| SP 95-5-AB | MS6 | 18.5 | 1914 | 1131 | 178 | 186 | 1914 | 1131 | 200 | 200 | 783 | 143 | 95 |
| SP 95-5 | MS6 | 22 | 1969 | 1131 | 178 | 186 | 1969 | 1131 | 200 | 200 | 838 | 143 | 101 |
| SP 95-6 | MS6 | 26 | 2162 | 1259 | 178 | 186 | 2162 | 1259 | 200 | 200 | 903 | 143 | 110 |
| SP 95-7 | MS6 | 30 | 2355 | 1387 | 178 | 186 | 2355 | 1387 | 200 | 200 | 968 | 143 | 122 |
| SP 95-8 | MMS 6000 | 37 | 2940 | 1515 | 178 | 186 | 2940 | 1515 | 200 | 200 | 1425 | 144 | 173 |
| SP 95-9 | MMS 6000 | 37 | 3067 | 1642 | 178 | 186 | 3076 | 1642 | 200 | 200 | 1425 | 144 | 177 |
| SP 95-8 | MMS6 | 37 | 2827 | 1515 | 178 | 186 | 2827 | 1515 | 200 | 200 | 1312 | 143 | 168 |
| SP 95-9 | MMS6 | 37 | 2954 | 1642 | 178 | 186 | 2954 | 1642 | 200 | 200 | 1312 | 143 | 172 |
| SP 95-10 | MMS 8000 | 45 | 3055 | 1785 | 196 | 204 | 3055 | 1785 | 205 | 205 | 1270 | 192 | 233 |
| SP 95-11 | MMS 8000 | 55 | 3264 | 1914 | 196 | 204 | 3264 | 1914 | 205 | 205 | 1350 | 192 | 251 |
| SP 95-12 | MMS 8000 | 55 | 3393 | 2043 | 196 | 204 | 3393 | 2043 | 205 | 205 | 1350 | 192 | 255 |
| SP 95-13 | MMS 8000 | 55 | 3522 | 2172 | 196 | 204 | 3522 | 2172 | 205 | 205 | 1350 | 192 | 259 |
| SP 95-14 | MMS 8000 | 63 | 3790 | 2300 | 196 | 204 | 3790 | 2300 | 205 | 205 | 1490 | 192 | 289 |
| SP 95-15 | MMS 8000 | 75 | 4019 | 2429 | 196 | 204 | | | | | 1590 | 192 | 311 |
| SP 95-16 | MMS 8000 | 75 | 4147 | 2557 | 196 | 204 | | | | | 1590 | 192 | 315 |
| SP 95-17 | MMS 8000 | 75 | 4275 | 2685 | 196 | 204 | | | | | 1590 | 192 | 319 |
| SP 95-18 | MMS 8000 | 92 | 4938 | 3108 | 196 | 204 | | | | | 1830 | 192 | 376 |
| SP 95-19 | MMS 8000 | 92 | 5066 | 3236 | 196 | 204 | | | | | 1830 | 192 | 380 |
| SP 95-20 | MMS 8000 | 92 | 5194 | 3364 | 196 | 204 | | | | | 1830 | 192 | 384 |

* Maximum diameter of pump with one motor cable.

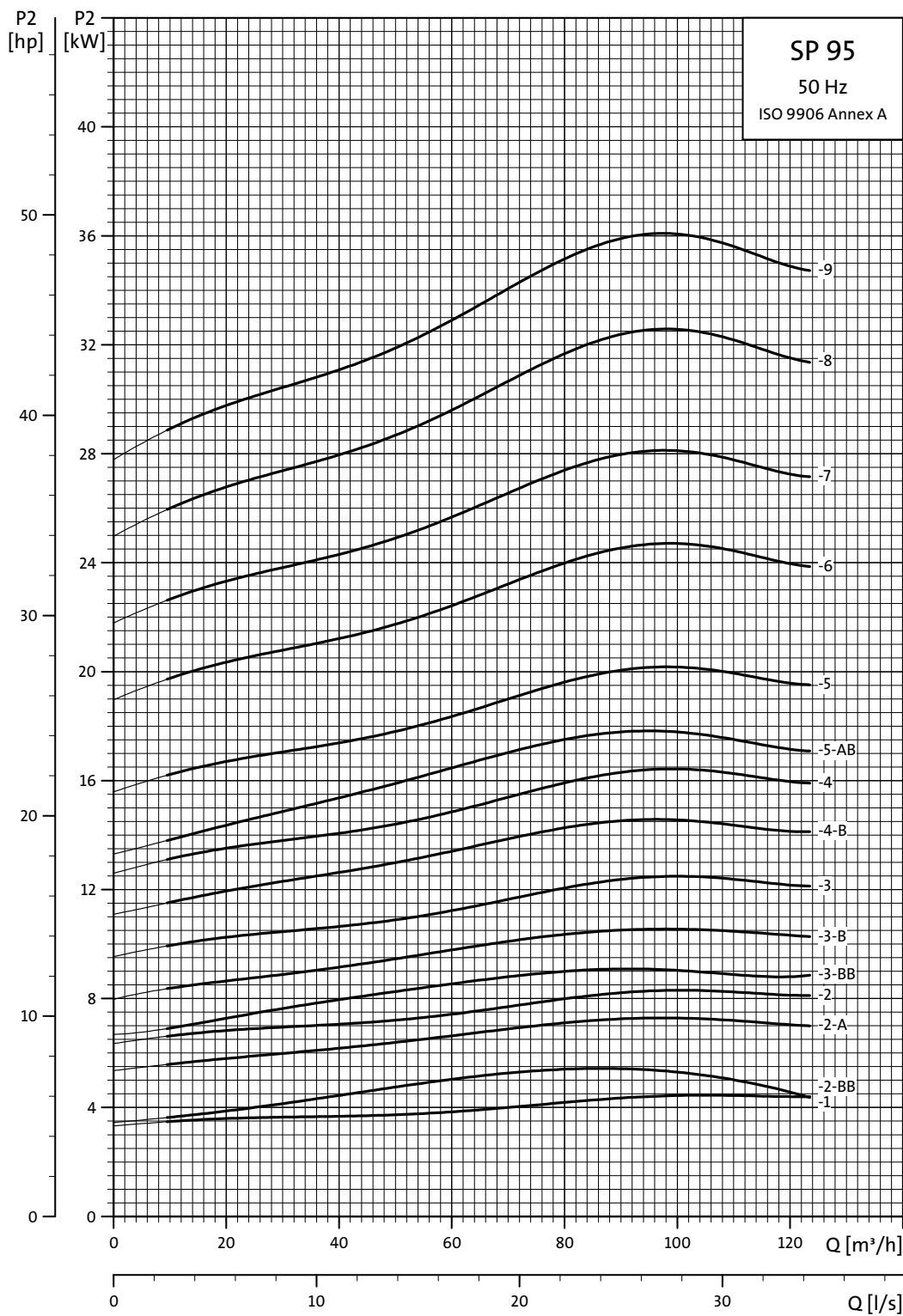
** Maximum diameter of pump with two motor cables.

The pump types above are also available in N- and R-versions. See page 5. Dimensions as above.

Other types of connection are possible by means of connecting pieces. See page 87.

Power curves

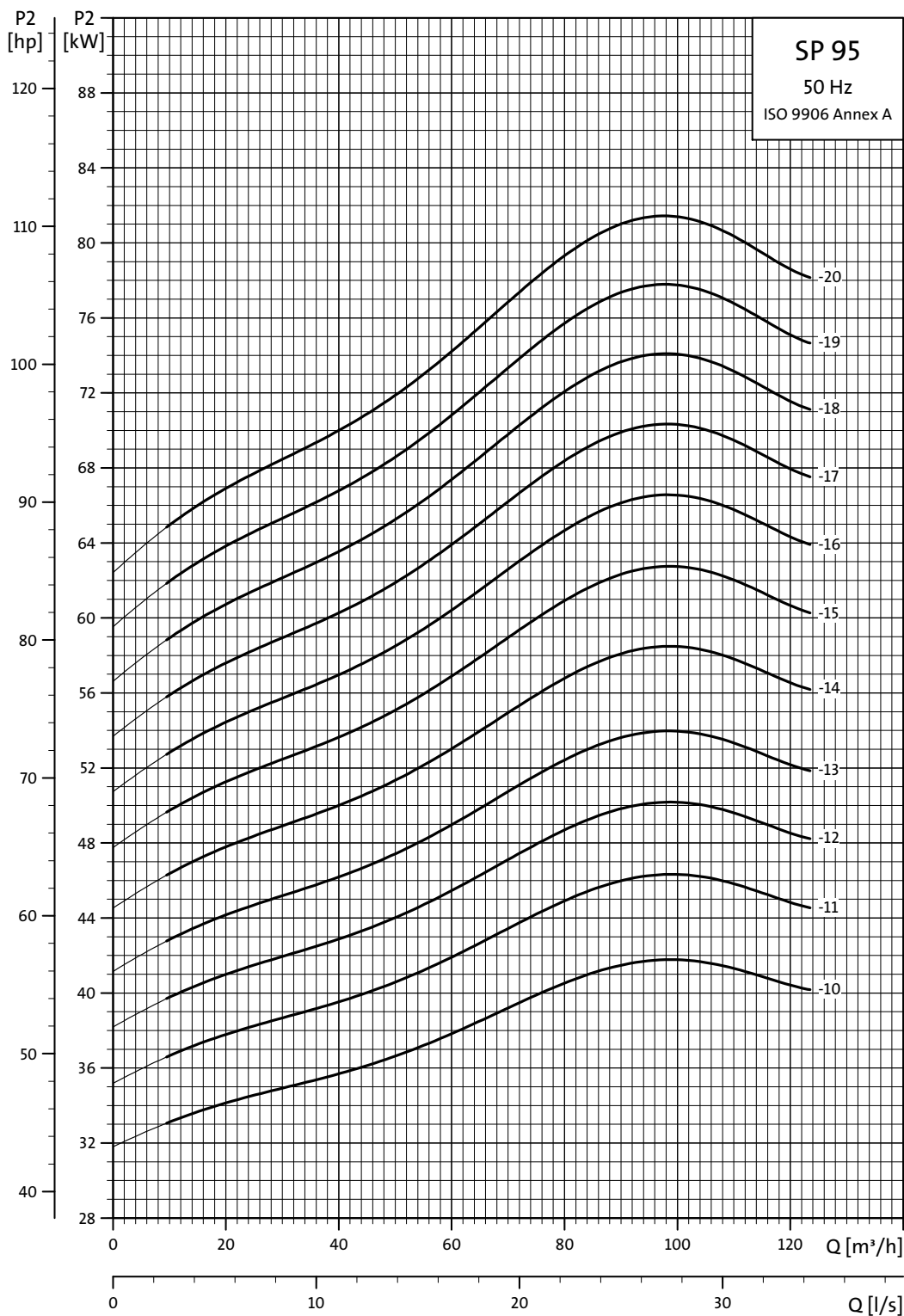
Submersible pumps
SP 95



TIM01 8775 4702

Power curves

Submersible pumps
SP 95

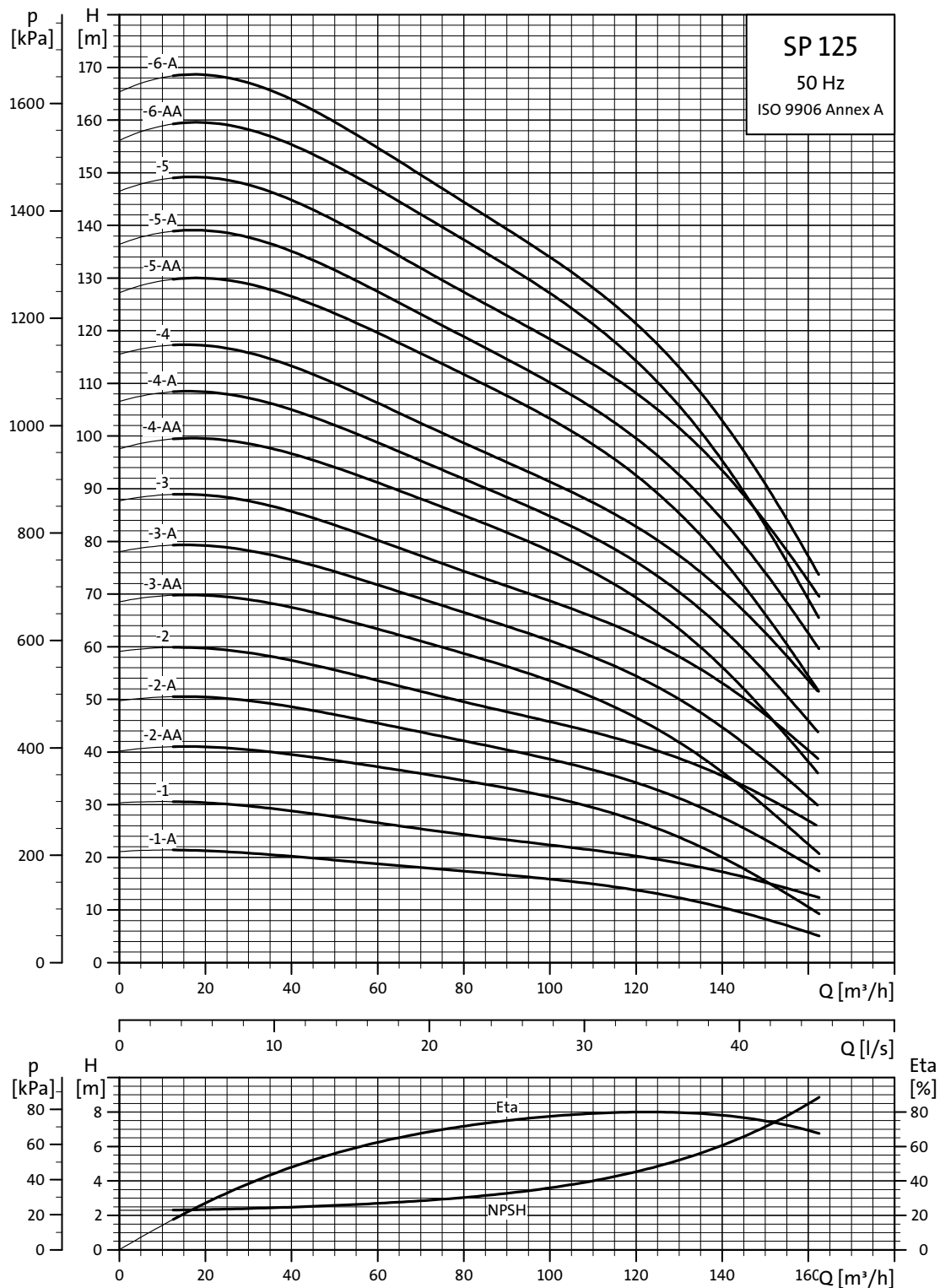


TM01 8776 4702

Performance curves

Submersible pumps
SP 125

SP 125

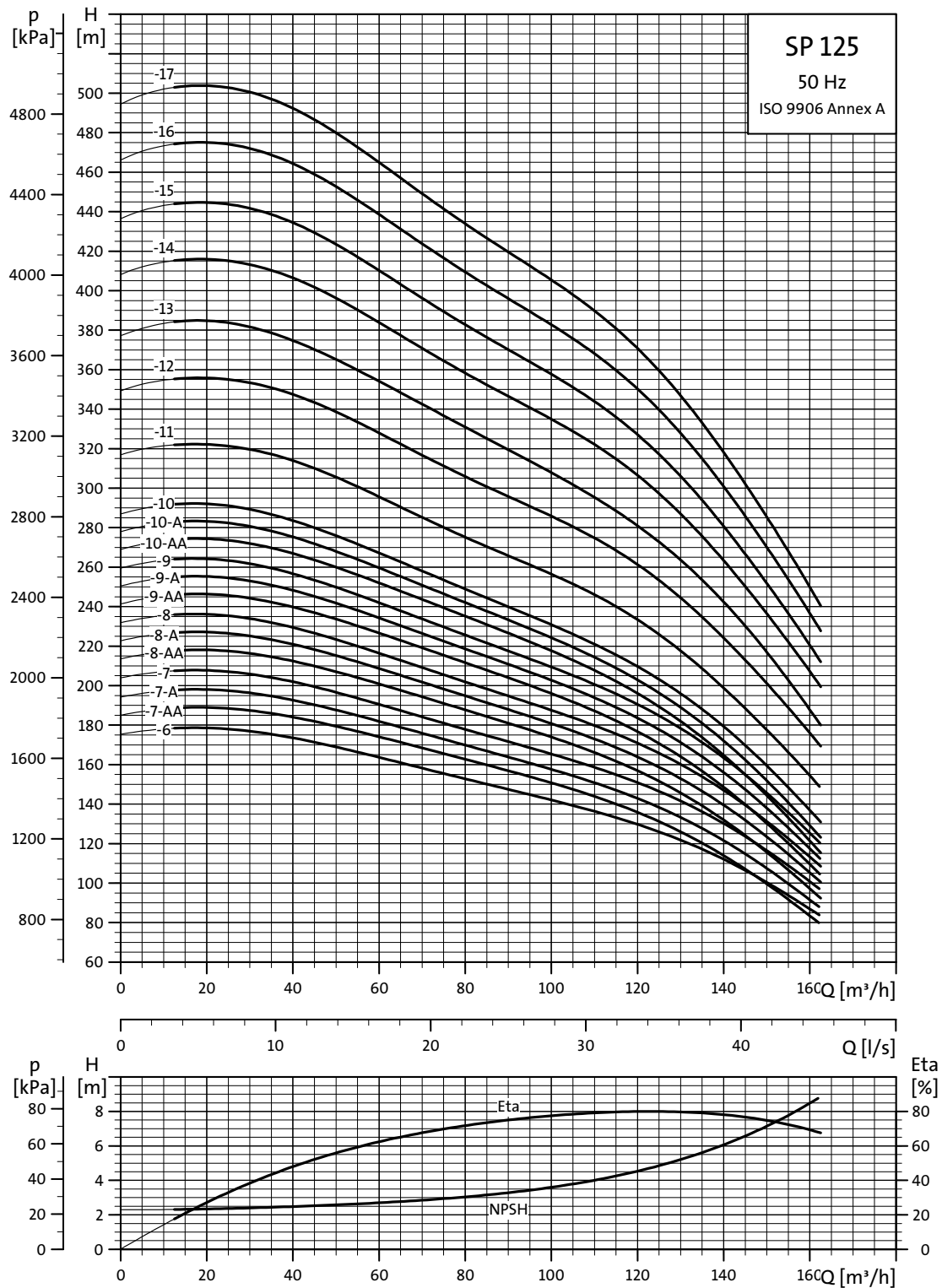


Explanation of efficiency curve, please see *Curve conditions*, page 4.

TM01 8777 4702

Performance curves

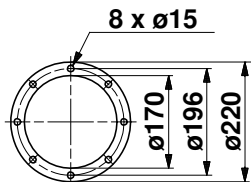
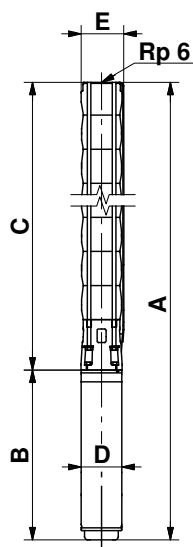
Submersible pumps
SP 125



Explanation of efficiency curve, please see *Curve conditions*, page 4.

TM01 8778 4702

Dimensions and weights



TM00 8760 3596

TM00 7324 1798

| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|--------------|-----------|------------|-----------------|------|-----|-----|--------------------|------|-----|-----|-----------------|-----|-----|
| | Type | Power [kW] | Rp 6 connection | | | | 6" Grundfos flange | | | | | B | D |
| | | | A | C | E* | E** | A | C | E* | E** | | | |
| SP 125-1-A | MS6 | 7.5 | 1216 | 651 | 211 | 218 | 1216 | 651 | 222 | 226 | 565 | 143 | 70 |
| SP 125-1 | MS6 | 11 | 1334 | 651 | 211 | 218 | 1334 | 651 | 222 | 226 | 683 | 143 | 79 |
| SP 125-2-AA | MS6 | 13 | 1515 | 807 | 211 | 218 | 1515 | 807 | 222 | 226 | 708 | 143 | 88 |
| SP 125-2-A | MS6 | 18.5 | 1590 | 807 | 211 | 218 | 1590 | 807 | 222 | 226 | 783 | 143 | 97 |
| SP 125-2 | MS6 | 22 | 1645 | 807 | 211 | 218 | 1645 | 807 | 222 | 226 | 838 | 143 | 103 |
| SP 125-3-AA | MS6 | 22 | 1801 | 963 | 211 | 218 | 1801 | 963 | 222 | 226 | 838 | 143 | 109 |
| SP 125-3-A | MS6 | 26 | 1866 | 963 | 211 | 218 | 1866 | 963 | 222 | 226 | 903 | 143 | 115 |
| SP 125-3 | MS6 | 30 | 1931 | 963 | 211 | 218 | 1931 | 963 | 222 | 226 | 968 | 143 | 123 |
| SP 125-4-AA | MMS 6000 | 37 | 2544 | 1119 | 211 | 218 | 2544 | 1119 | 222 | 226 | 1425 | 144 | 176 |
| SP 125-4-A | MMS 6000 | 37 | 2544 | 1119 | 211 | 218 | 2544 | 1119 | 222 | 226 | 1425 | 144 | 176 |
| SP 125-4 | MMS 6000 | 37 | 2544 | 1119 | 211 | 218 | 2544 | 1119 | 222 | 226 | 1425 | 144 | 176 |
| SP 125-4-AA | MMS6 | 37 | 2431 | 1119 | 211 | 218 | 2431 | 1119 | 222 | 226 | 1312 | 143 | 171 |
| SP 125-4-A | MMS6 | 37 | 2431 | 1119 | 211 | 218 | 2431 | 1119 | 222 | 226 | 1312 | 143 | 171 |
| SP 125-4 | MMS6 | 37 | 2431 | 1119 | 211 | 218 | 2431 | 1119 | 222 | 226 | 1312 | 143 | 171 |
| SP 125-5-AA | MMS 8000 | 45 | 2545 | 1275 | 213 | 218 | 2545 | 1275 | 223 | 226 | 1270 | 192 | 236 |
| SP 125-5-A | MMS 8000 | 45 | 2545 | 1275 | 213 | 218 | 2545 | 1275 | 223 | 226 | 1270 | 192 | 236 |
| SP 125-5 | MMS 8000 | 55 | 2625 | 1275 | 213 | 218 | 2625 | 1245 | 223 | 226 | 1350 | 192 | 251 |
| SP 125-6-AA | MMS 8000 | 55 | 2781 | 1431 | 213 | 218 | 2781 | 1431 | 223 | 226 | 1350 | 192 | 257 |
| SP 125-6-A | MMS 8000 | 55 | 2781 | 1431 | 213 | 218 | 2781 | 1431 | 223 | 226 | 1350 | 192 | 257 |
| SP 125-6 | MMS 8000 | 63 | 2921 | 1431 | 218 | 227 | 2921 | 1431 | 229 | 232 | 1490 | 192 | 283 |
| SP 125-7-AA | MMS 8000 | 63 | 3077 | 1587 | 218 | 227 | 3077 | 1587 | 229 | 232 | 1490 | 192 | 289 |
| SP 125-7-A | MMS 8000 | 63 | 3077 | 1587 | 218 | 227 | 3077 | 1587 | 229 | 232 | 1490 | 192 | 289 |
| SP 125-7 | MMS 8000 | 75 | 3177 | 1587 | 218 | 227 | 3177 | 1587 | 229 | 232 | 1590 | 192 | 308 |
| SP 125-8-AA | MMS 8000 | 75 | 3333 | 1743 | 218 | 227 | | | | | 1590 | 192 | 314 |
| SP 125-8-A | MMS 8000 | 75 | 3333 | 1743 | 218 | 227 | | | | | 1590 | 192 | 314 |
| SP 125-8 | MMS 8000 | 75 | 3333 | 1743 | 218 | 227 | | | | | 1590 | 192 | 314 |
| SP 125-9-AA | MMS 8000 | 92 | 3729 | 1899 | 218 | 227 | | | | | 1830 | 192 | 366 |
| SP 125-9-A | MMS 8000 | 92 | 3729 | 1899 | 218 | 227 | | | | | 1830 | 192 | 366 |
| SP 125-9 | MMS 8000 | 92 | 3729 | 1899 | 218 | 227 | | | | | 1830 | 192 | 366 |
| SP 125-10-AA | MMS 8000 | 92 | 3885 | 2055 | 218 | 227 | | | | | 1830 | 192 | 372 |
| SP 125-10-A | MMS 8000 | 92 | 3885 | 2055 | 218 | 227 | | | | | 1830 | 192 | 372 |
| SP 125-10 | MMS 8000 | 92 | 3885 | 2055 | 218 | 227 | | | | | 1830 | 192 | 372 |
| SP 125-11 | MMS 8000 | 110 | 4567 | 2507 | 218 | 227 | | | | | 2060 | 192 | 438 |
| SP 125-12 | MMS 10000 | 132 | 4584 | 2714 | 237 | 237 | | | | | 1870 | 237 | 556 |
| SP 125-13 | MMS 10000 | 132 | 4740 | 2870 | 237 | 237 | | | | | 1870 | 237 | 562 |
| SP 125-14 | MMS 10000 | 147 | 5095 | 3025 | 237 | 237 | | | | | 2070 | 237 | 633 |
| SP 125-15 | MMS 10000 | 147 | 5251 | 3181 | 237 | 237 | | | | | 2070 | 237 | 639 |
| SP 125-16 | MMS 10000 | 170 | 5556 | 3336 | 237 | 237 | | | | | 2220 | 237 | 685 |
| SP 125-17 | MMS 10000 | 170 | 5712 | 3492 | 237 | 237 | | | | | 2220 | 237 | 691 |

* Maximum diameter of pump with one motor cable.

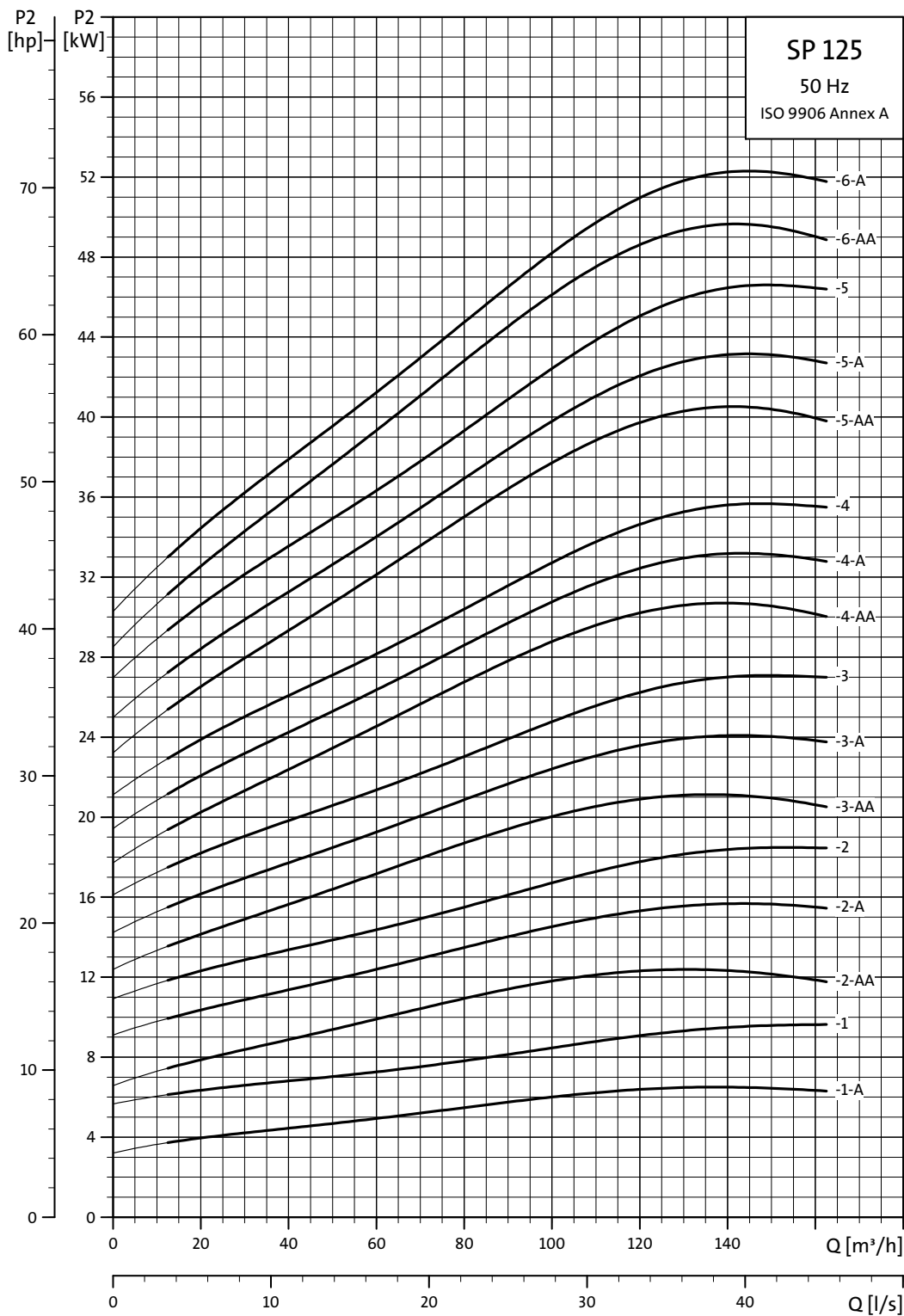
** Maximum diameter of pump with two motor cables.

The pump types above are also available in N- and R-versions. See page 5. Dimensions as above.

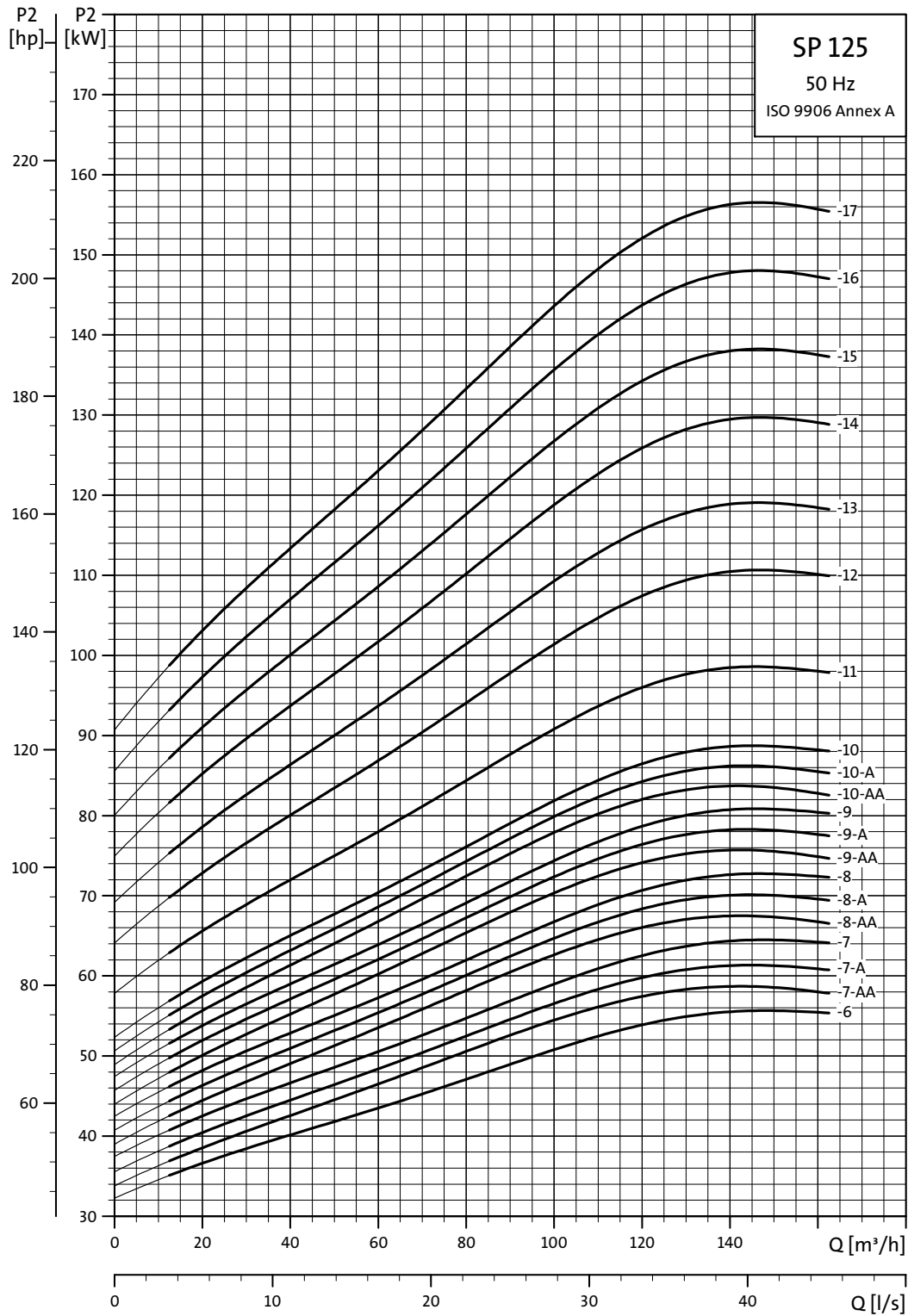
Other types of connection are possible by means of connecting pieces. See page 87.

Power curves

Submersible pumps
SP 125



TM01 8779 4702

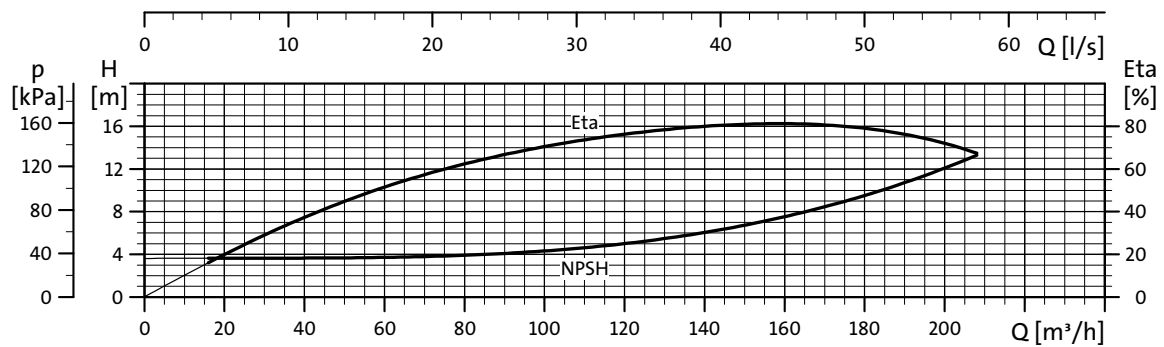
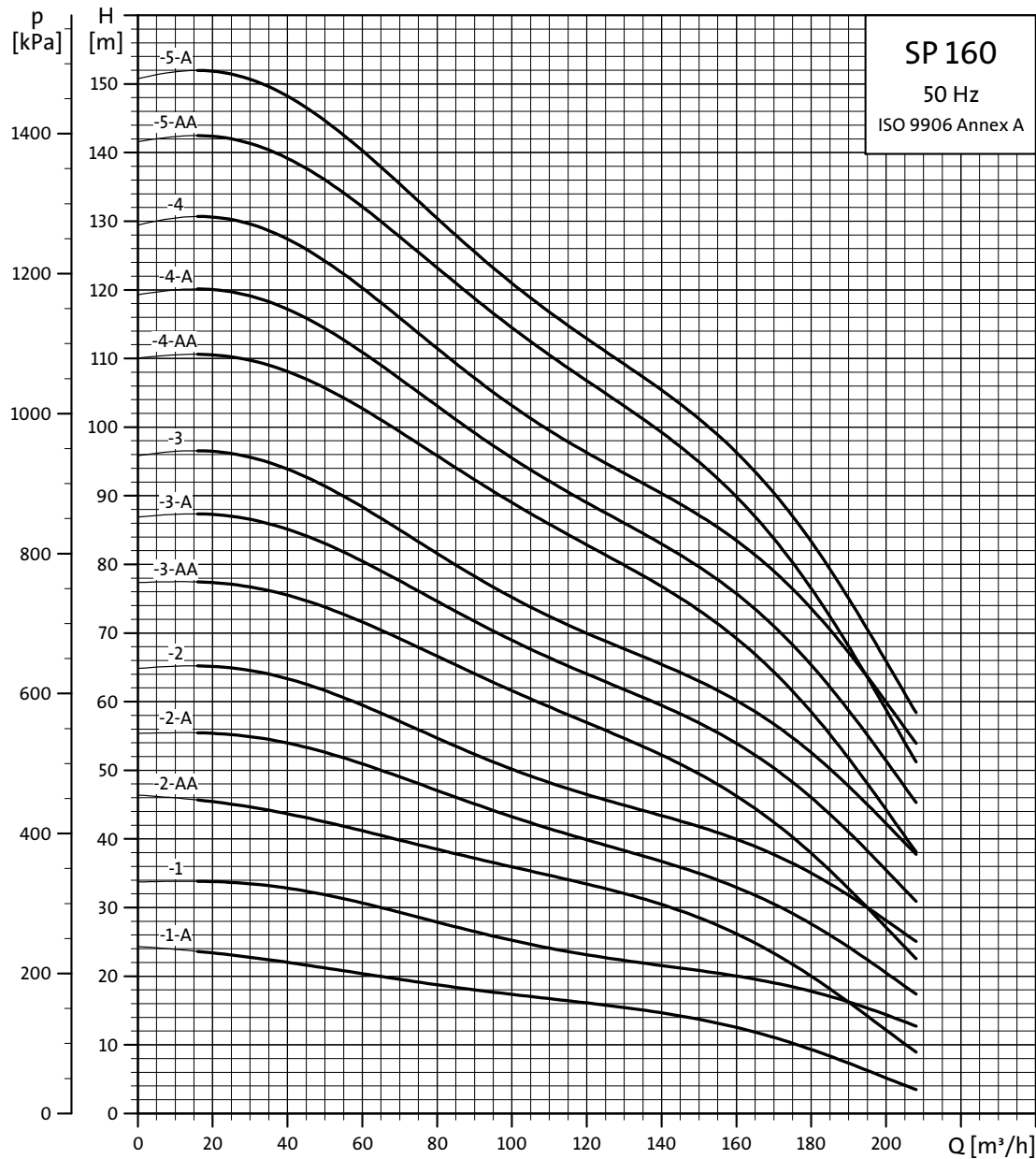


TM01 8780 4702

Performance curves

Submersible pumps
SP 160

SP 160

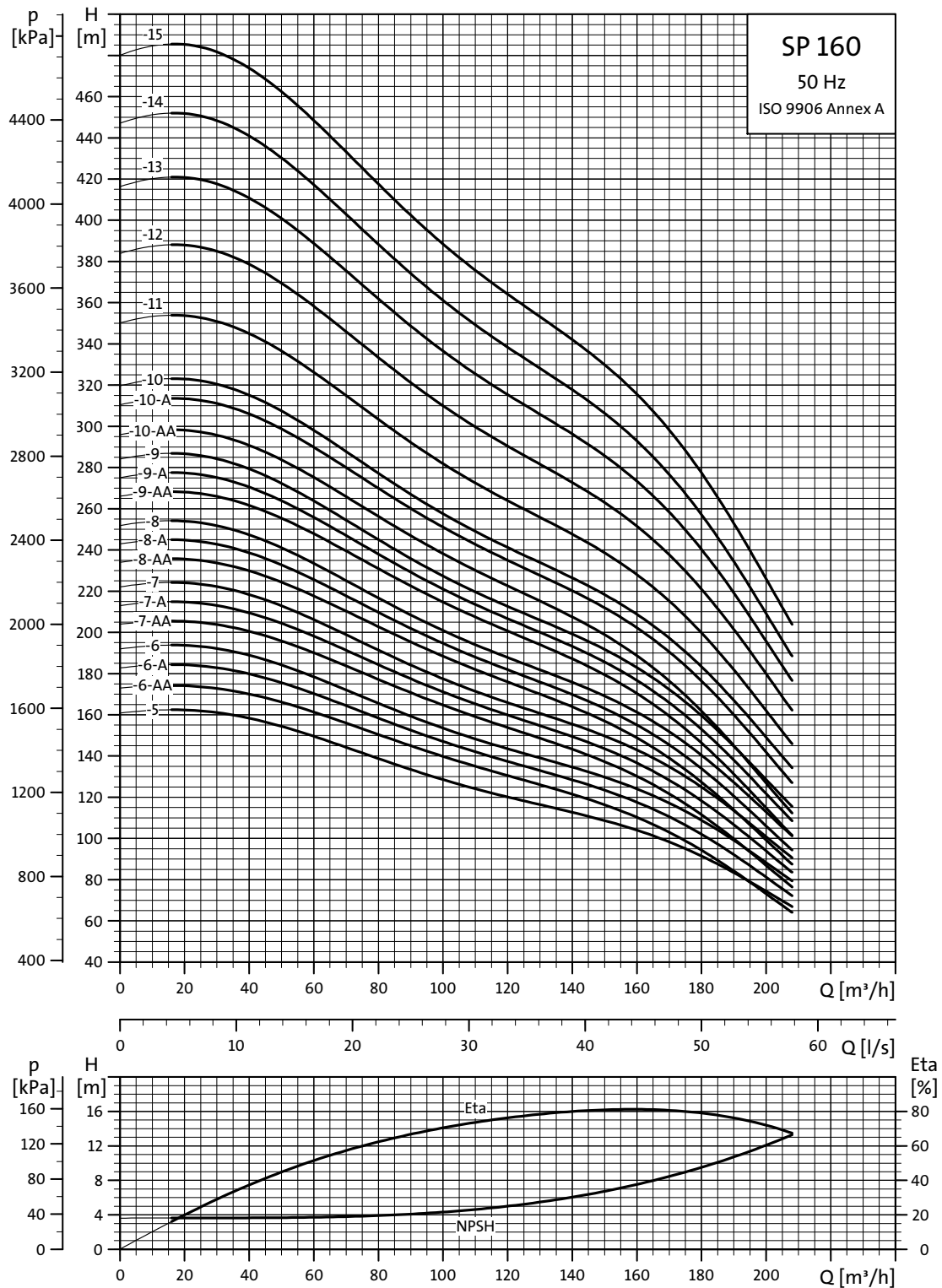


Explanation of efficiency curve, please see *Curve conditions*, page 4.

TM01 8781 4702

Performance curves

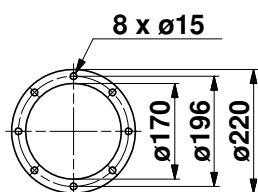
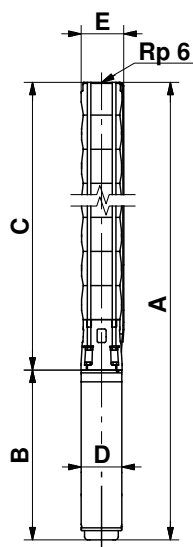
Submersible pumps
SP 160



TM00 8782 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Dimensions and weights



TM00 8760 3596

TM00 7324 1798

| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|--------------|-----------|------------|-----------------|------|-----|-----|--------------------|------|-----|-----|-----------------|-----|-----|
| | Type | Power [kW] | Rp 6 connection | | | | 6" Grundfos flange | | | | | B | D |
| | | | A | C | E* | E** | A | C | E* | E** | | | |
| SP 160-1-A | MS6 | 9.2 | 1241 | 651 | 211 | 218 | 1241 | 651 | 222 | 226 | 590 | 143 | 76 |
| SP 160-1 | MS6 | 13 | 1359 | 651 | 211 | 218 | 1359 | 651 | 222 | 226 | 708 | 143 | 82 |
| SP 160-2-AA | MS6 | 18.5 | 1590 | 807 | 211 | 218 | 1590 | 807 | 222 | 226 | 783 | 143 | 97 |
| SP 160-2-A | MS6 | 22 | 1645 | 807 | 211 | 218 | 1645 | 807 | 222 | 226 | 838 | 143 | 103 |
| SP 160-2 | MS6 | 26 | 1710 | 807 | 211 | 218 | 1710 | 807 | 222 | 226 | 903 | 143 | 109 |
| SP 160-3-AA | MS6 | 30 | 1931 | 963 | 211 | 218 | 1931 | 963 | 222 | 226 | 968 | 143 | 123 |
| SP 160-3-A | MMS 6000 | 37 | 2388 | 963 | 211 | 218 | 2388 | 963 | 222 | 226 | 1425 | 144 | 170 |
| SP 160-3 | MMS 6000 | 37 | 2388 | 963 | 211 | 218 | 2388 | 963 | 222 | 226 | 1425 | 144 | 170 |
| SP 160-3-A | MMS6 | 37 | 2275 | 963 | 211 | 218 | 2275 | 963 | 222 | 226 | 1312 | 143 | 165 |
| SP 160-3 | MMS6 | 37 | 2275 | 963 | 211 | 218 | 2275 | 963 | 222 | 226 | 1312 | 143 | 165 |
| SP 160-4-AA | MMS 8000 | 45 | 2389 | 1119 | 218 | 227 | 2389 | 1119 | 229 | 232 | 1270 | 192 | 230 |
| SP 160-4-A | MMS 8000 | 45 | 2389 | 1119 | 218 | 227 | 2389 | 1119 | 229 | 232 | 1270 | 192 | 230 |
| SP 160-4 | MMS 8000 | 55 | 2469 | 1119 | 218 | 227 | 2469 | 1119 | 229 | 232 | 1350 | 192 | 245 |
| SP 160-5-AA | MMS 8000 | 55 | 2625 | 1275 | 218 | 227 | 2625 | 1275 | 229 | 232 | 1350 | 192 | 251 |
| SP 160-5-A | MMS 8000 | 55 | 2625 | 1275 | 218 | 227 | 2625 | 1275 | 229 | 232 | 1350 | 192 | 251 |
| SP 160-5 | MMS 8000 | 63 | 2765 | 1275 | 218 | 227 | 2765 | 1275 | 229 | 232 | 1490 | 192 | 277 |
| SP 160-6-AA | MMS 8000 | 63 | 2921 | 1431 | 218 | 227 | 2921 | 1431 | 229 | 232 | 1490 | 192 | 283 |
| SP 160-6-A | MMS 8000 | 75 | 3021 | 1431 | 218 | 227 | 3021 | 1431 | 229 | 232 | 1590 | 192 | 302 |
| SP 160-6 | MMS 8000 | 75 | 3021 | 1431 | 218 | 227 | 3021 | 1431 | 229 | 232 | 1590 | 192 | 302 |
| SP 160-7-AA | MMS 8000 | 75 | 3177 | 1587 | 218 | 227 | | | | | 1590 | 192 | 302 |
| SP 160-7-A | MMS 8000 | 92 | 3417 | 1587 | 218 | 227 | | | | | 1830 | 192 | 354 |
| SP 160-7 | MMS 8000 | 92 | 3417 | 1587 | 218 | 227 | | | | | 1830 | 192 | 354 |
| SP 160-8-AA | MMS 8000 | 92 | 3573 | 1743 | 218 | 227 | | | | | 1830 | 192 | 360 |
| SP 160-8-A | MMS 8000 | 92 | 3573 | 1743 | 218 | 227 | | | | | 1830 | 192 | 360 |
| SP 160-8 | MMS 8000 | 92 | 3573 | 1743 | 218 | 227 | | | | | 1830 | 192 | 360 |
| SP 160-9-AA | MMS 8000 | 110 | 3959 | 1899 | 218 | 227 | | | | | 2060 | 192 | 416 |
| SP 160-9-A | MMS 8000 | 110 | 3959 | 1899 | 218 | 227 | | | | | 2060 | 192 | 416 |
| SP 160-9 | MMS 8000 | 110 | 3959 | 1899 | 218 | 227 | | | | | 2060 | 192 | 416 |
| SP 160-10-AA | MMS 8000 | 110 | 4411 | 2351 | 218 | 227 | | | | | 2060 | 192 | 432 |
| SP 160-10-A | MMS 10000 | 132 | 4273 | 2403 | 237 | 237 | | | | | 1870 | 237 | 544 |
| SP 160-10 | MMS 10000 | 132 | 4273 | 2403 | 237 | 237 | | | | | 1870 | 237 | 544 |
| SP 160-11 | MMS 10000 | 132 | 4429 | 2559 | 237 | 237 | | | | | 1870 | 237 | 550 |
| SP 160-12 | MMS 10000 | 147 | 4784 | 2714 | 237 | 237 | | | | | 2070 | 237 | 621 |
| SP 160-13 | MMS 10000 | 170 | 5090 | 2870 | 237 | 237 | | | | | 2220 | 237 | 667 |
| SP 160-14 | MMS 10000 | 170 | 5245 | 3025 | 237 | 237 | | | | | 2220 | 237 | 673 |
| SP 160-15 | MMS 12000 | 190 | 5239 | 3259 | 286 | 286 | | | | | 1980 | 286 | 803 |

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

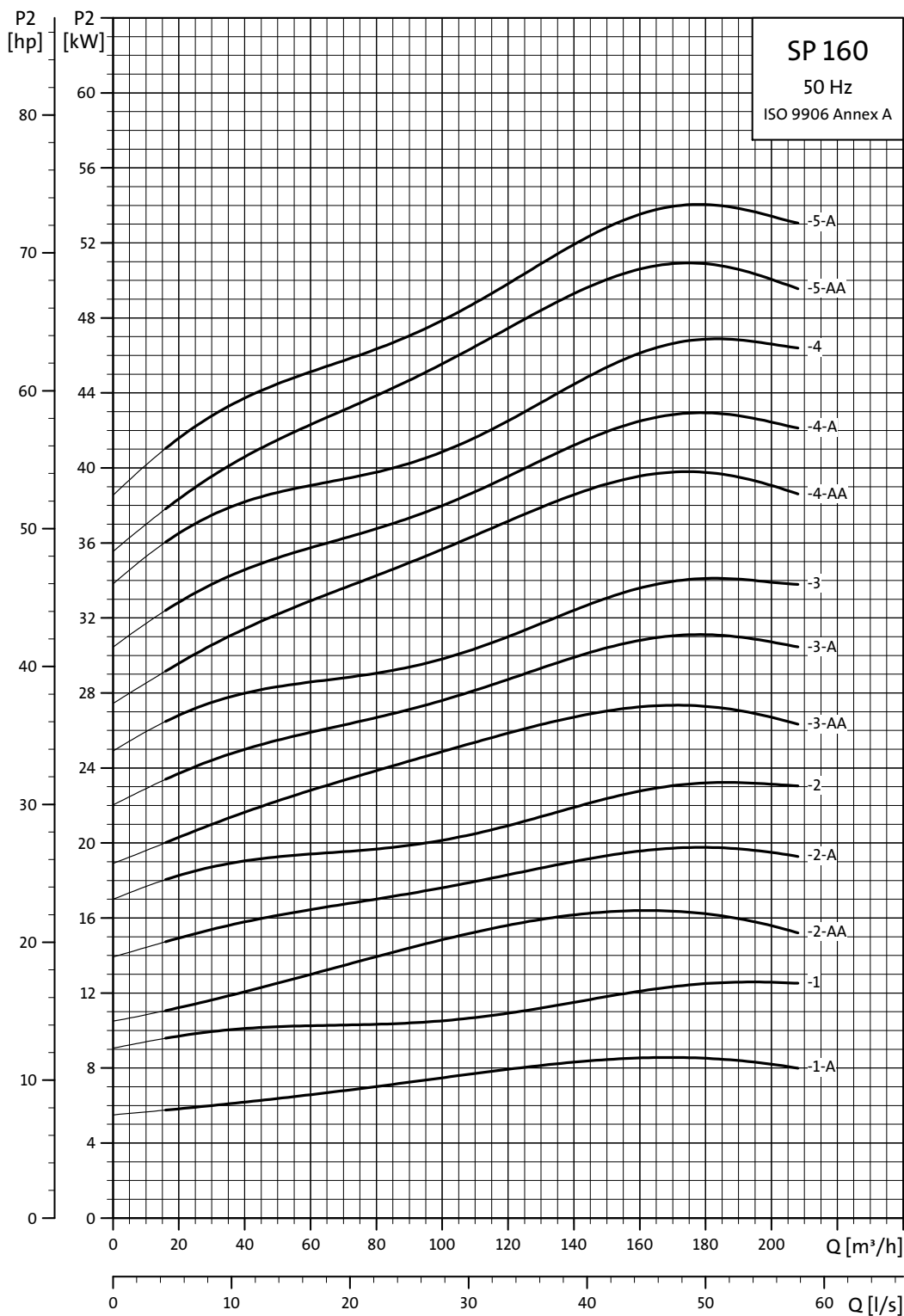
The pump types above are also available in N-versions. See page 5. Dimensions as above.

SP 160-1-A to SP 160-14 are also available in R-versions. See page 5. Dimensions as above.

Other types of connection are possible by means of connecting pieces. See page 87.

Power curves

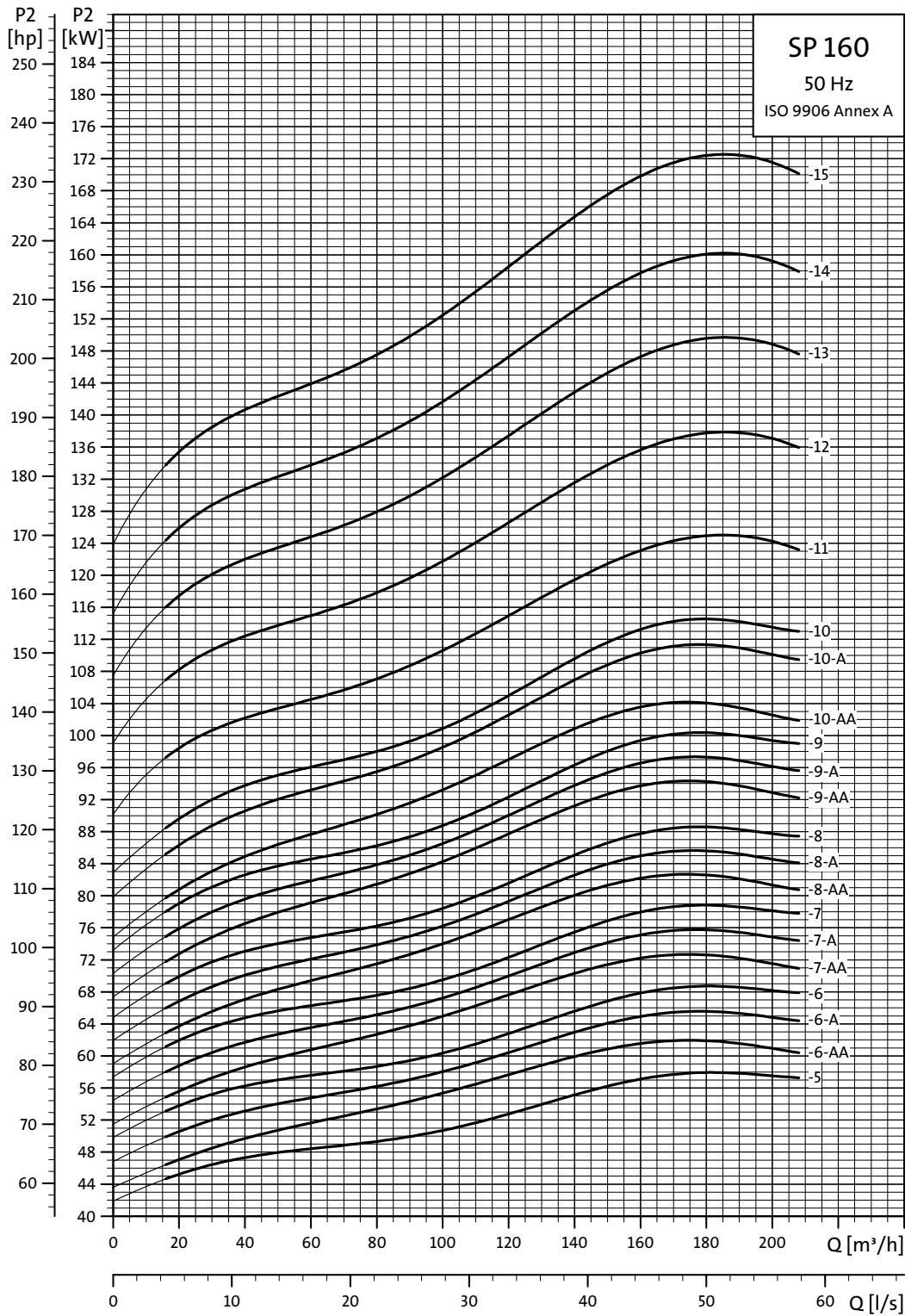
Submersible pumps
SP 160



TM00 8783 4702

Power curves

Submersible pumps
SP 160

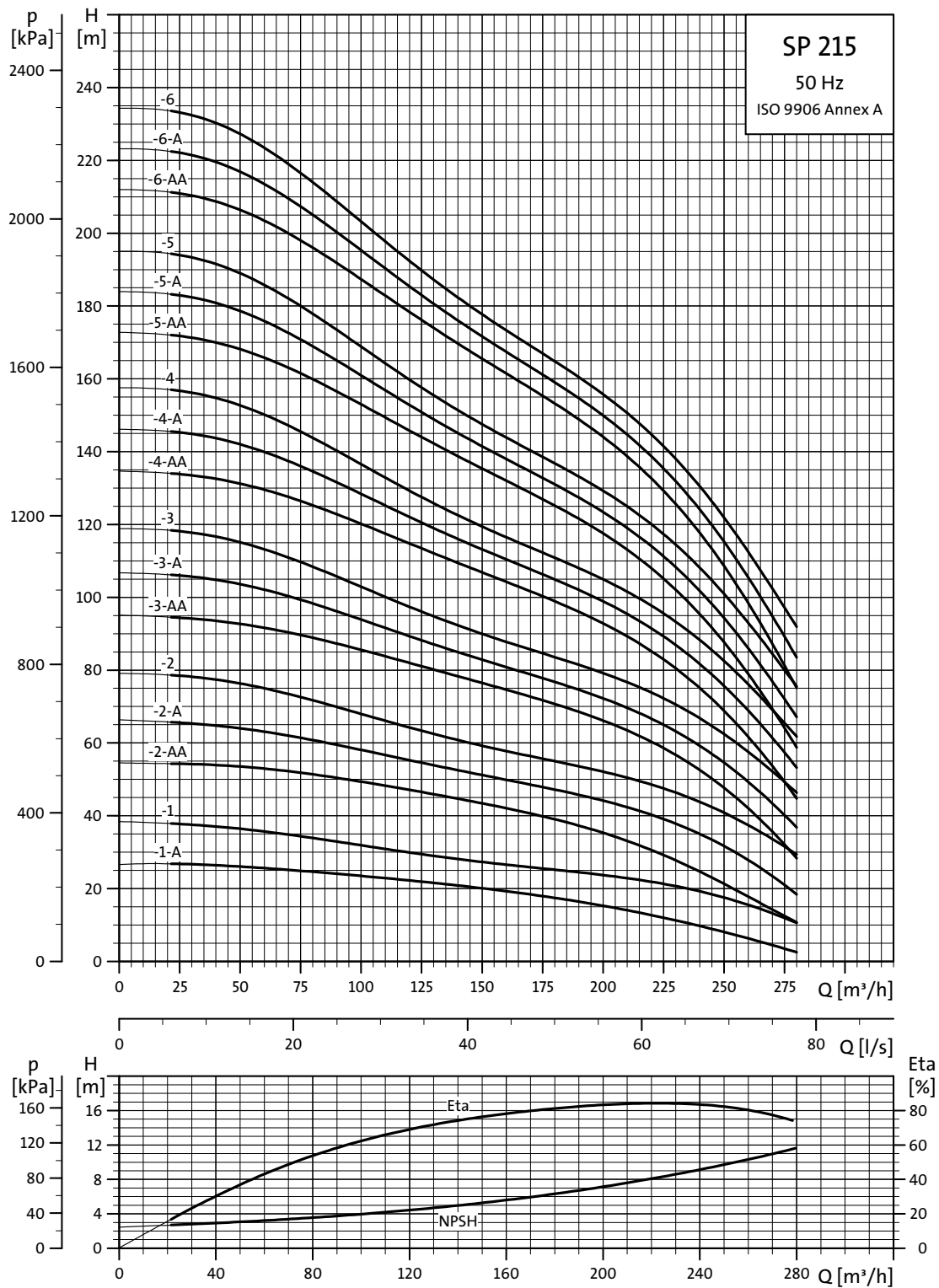


TM00 8784 4702

Performance curves

Submersible pumps
SP 215

SP 215

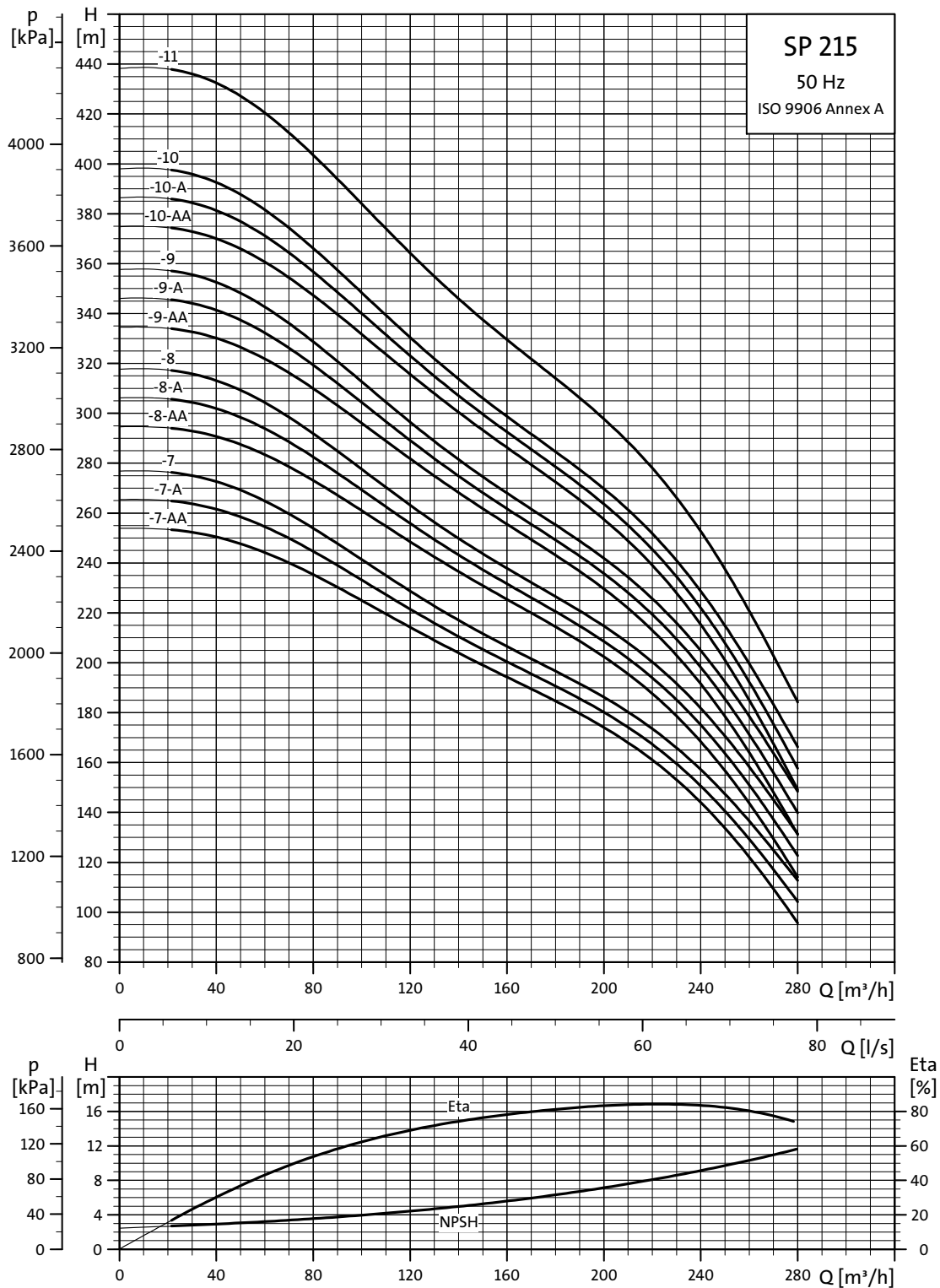


TMM00 8785 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Performance curves

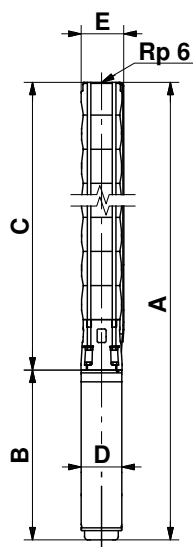
Submersible pumps
SP 215



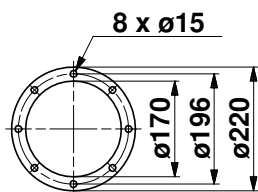
TM01 8786 4702

Explanation of efficiency curve, please see *Curve conditions*, page 4.

Dimensions and weights



TM00 8760 3596



TM00 7324 1798

| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|--------------|-----------|------------|-----------------|------|-----|-----|--------------------|------|-----|-----|-----------------|-----|-----|
| | Type | Power [kW] | Rp 6 connection | | | | 6" Grundfos flange | | | | | B | D |
| | | | A | C | E* | E** | A | C | E* | E** | | | |
| SP 215-1-A | MS6 | 15 | 1528 | 790 | 241 | 247 | 1528 | 790 | 241 | 247 | 738 | 143 | 92 |
| SP 215-1 | MS6 | 18.5 | 1573 | 790 | 241 | 247 | 1573 | 790 | 241 | 247 | 783 | 143 | 97 |
| SP 215-2-AA | MS6 | 30 | 1934 | 966 | 241 | 247 | 1934 | 966 | 241 | 247 | 968 | 143 | 127 |
| SP 215-2-A | MMS 6000 | 37 | 2391 | 966 | 241 | 247 | 2391 | 966 | 241 | 247 | 1425 | 144 | 174 |
| SP 215-2-A | MMS6 | 37 | 2278 | 966 | 241 | 247 | 2278 | 966 | 241 | 247 | 1312 | 143 | 169 |
| SP 215-2 | MMS 8000 | 45 | 2236 | 966 | 241 | 247 | 2236 | 966 | 241 | 247 | 1270 | 192 | 228 |
| SP 215-3-AA | MMS 8000 | 55 | 2492 | 1142 | 241 | 247 | 2492 | 1142 | 241 | 247 | 1350 | 192 | 253 |
| SP 215-3-A | MMS 8000 | 55 | 2492 | 1142 | 241 | 247 | 2492 | 1142 | 241 | 247 | 1350 | 192 | 253 |
| SP 215-3 | MMS 8000 | 63 | 2632 | 1142 | 241 | 247 | 2632 | 1142 | 241 | 247 | 1490 | 192 | 279 |
| SP 215-4-AA | MMS 8000 | 75 | 2908 | 1318 | 241 | 247 | 2908 | 1318 | 241 | 247 | 1590 | 192 | 308 |
| SP 215-4-A | MMS 8000 | 75 | 2908 | 1318 | 241 | 247 | 2908 | 1318 | 241 | 247 | 1590 | 192 | 308 |
| SP 215-4 | MMS 8000 | 75 | 2908 | 1318 | 241 | 247 | 2908 | 1318 | 241 | 247 | 1590 | 192 | 308 |
| SP 215-5-AA | MMS 8000 | 92 | 3324 | 1494 | 241 | 247 | 3324 | 1494 | 241 | 247 | 1830 | 192 | 364 |
| SP 215-5-A | MMS 8000 | 92 | 3324 | 1494 | 241 | 247 | 3324 | 1494 | 241 | 247 | 1830 | 192 | 364 |
| SP 215-5 | MMS 8000 | 92 | 3554 | 1494 | 241 | 247 | 3554 | 1494 | 241 | 247 | 1830 | 192 | 364 |
| SP 215-6-AA | MMS 8000 | 110 | 3730 | 1670 | 241 | 247 | 3730 | 1670 | 241 | 247 | 2060 | 192 | 424 |
| SP 215-6-A | MMS 8000 | 110 | 3730 | 1670 | 241 | 247 | 3730 | 1670 | 241 | 247 | 2060 | 192 | 424 |
| SP 215-6 | MMS 8000 | 110 | 3730 | 1670 | 241 | 247 | 3730 | 1670 | 241 | 247 | 2060 | 192 | 424 |
| SP 215-7-AA | MMS 10000 | 132 | 4016 | 2146 | 241 | 247 | | | | | 1870 | 237 | 547 |
| SP 215-7-A | MMS 10000 | 132 | 4016 | 2146 | 241 | 247 | | | | | 1870 | 237 | 547 |
| SP 215-7 | MMS 10000 | 132 | 4016 | 2146 | 241 | 247 | | | | | 1870 | 237 | 547 |
| SP 215-8-AA | MMS 10000 | 147 | 4392 | 2322 | 241 | 247 | | | | | 2070 | 237 | 622 |
| SP 215-8-A | MMS 10000 | 147 | 4392 | 2322 | 241 | 247 | | | | | 2070 | 237 | 622 |
| SP 215-8 | MMS 10000 | 147 | 4392 | 2322 | 241 | 247 | | | | | 2070 | 237 | 622 |
| SP 215-9-AA | MMS 10000 | 170 | 4718 | 2498 | 276 | 276 | | | | | 2220 | 237 | 672 |
| SP 215-9-A | MMS 10000 | 170 | 4718 | 2498 | 276 | 276 | | | | | 2220 | 237 | 672 |
| SP 215-9 | MMS 10000 | 170 | 4718 | 2498 | 276 | 276 | | | | | 2220 | 237 | 672 |
| SP 215-10-AA | MMS 12000 | 190 | 4654 | 2674 | 276 | 276 | | | | | 1980 | 286 | 793 |
| SP 215-10-A | MMS 12000 | 190 | 4654 | 2674 | 276 | 276 | | | | | 1980 | 286 | 793 |
| SP 215-10 | MMS 12000 | 190 | 4654 | 2674 | 276 | 276 | | | | | 1980 | 286 | 793 |
| SP 215-11 | MMS 12000 | 220 | 4990 | 2850 | 286 | 286 | | | | | 2140 | 286 | 853 |

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

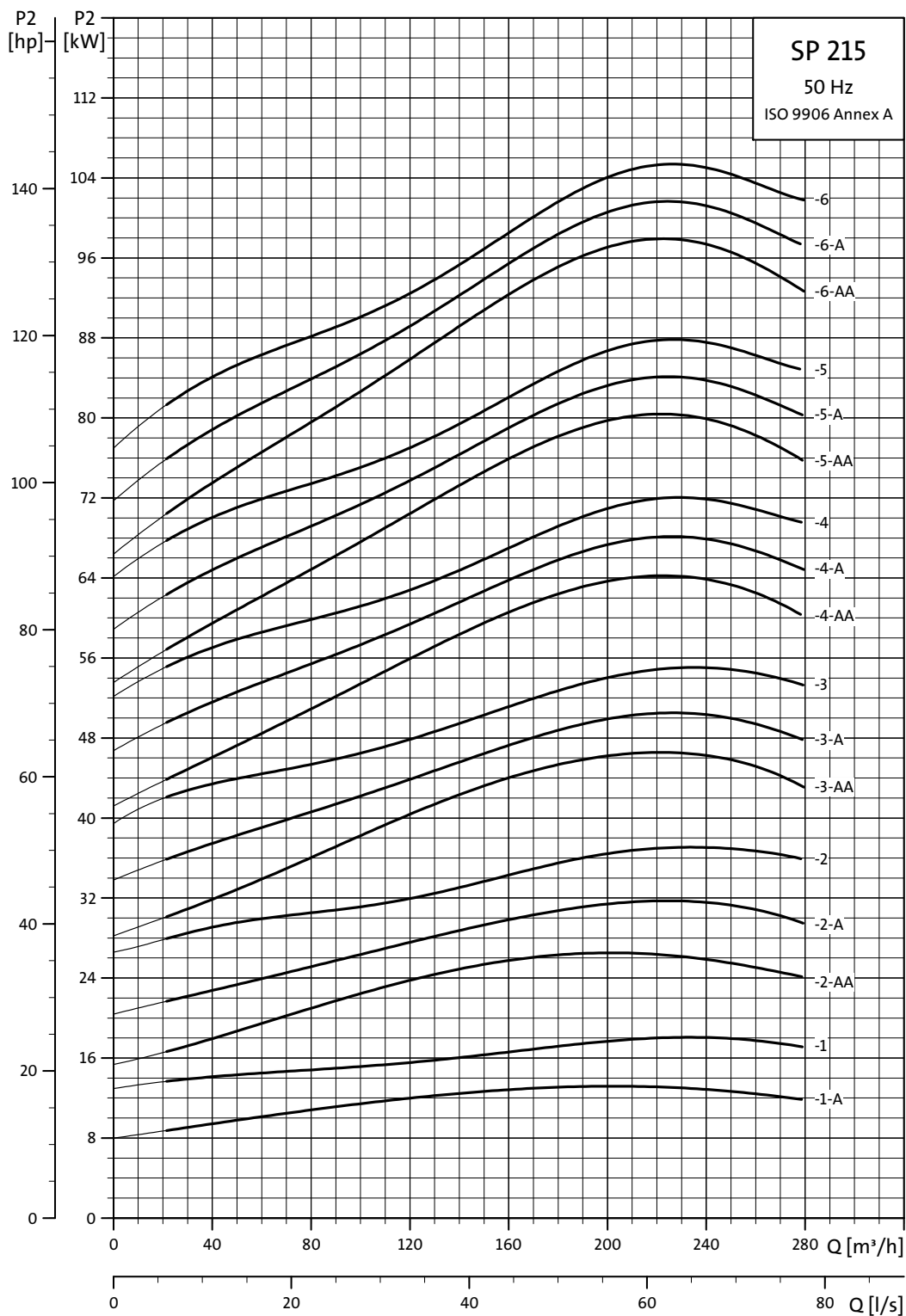
The pump types above are also available in N-versions. See page 5. Dimensions as above.

SP 215-1-A to SP 215-9 are also available in R-versions. See page 5. Dimensions as above.

Other types of connection are possible by means of connecting pieces. See page 87.

Power curves

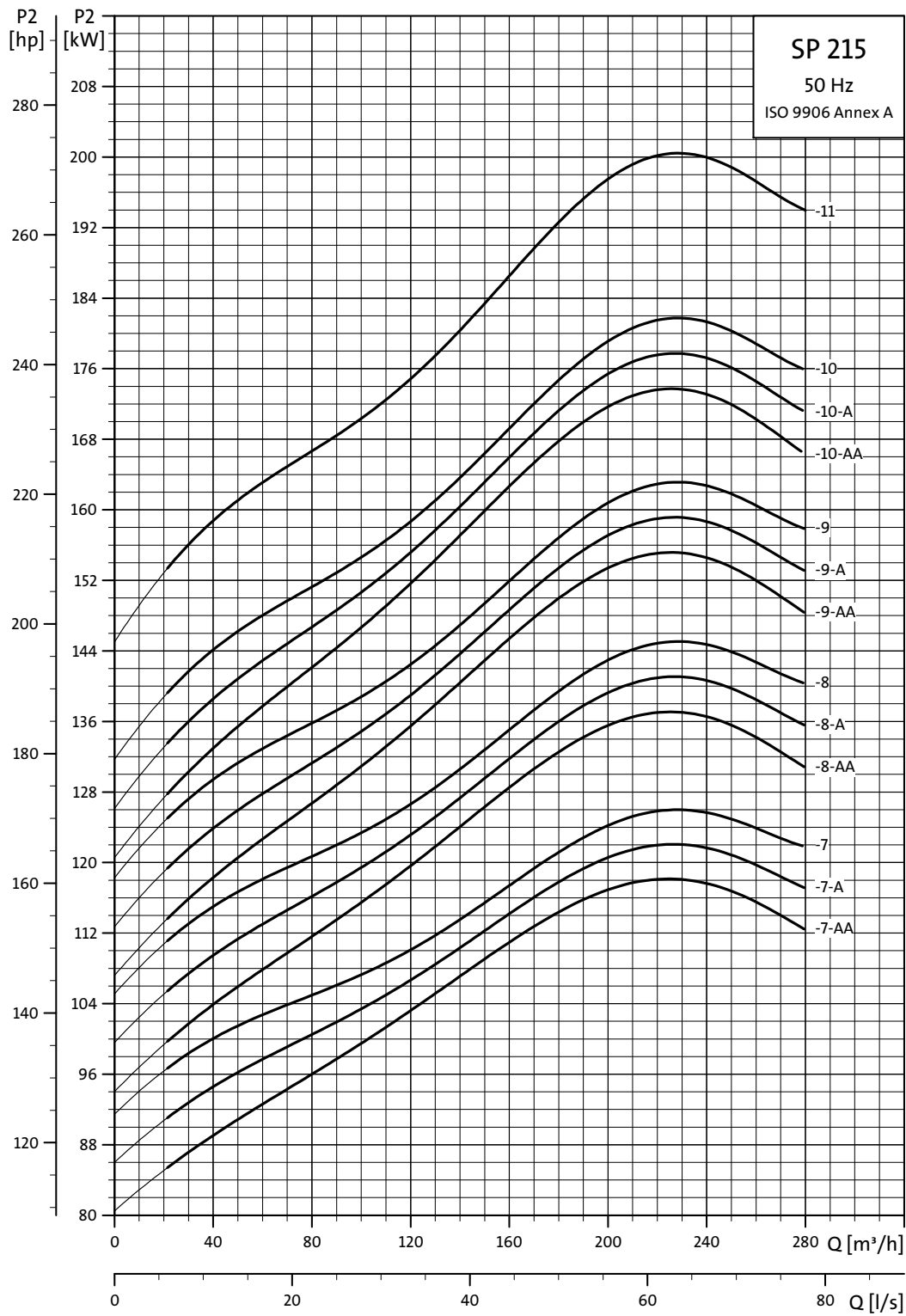
Submersible pumps
SP 215



TM01 8787 4702

Power curves

Submersible pumps
SP 215



TIM01 8788 4702

1 x 230 V, submersible motors

| Electrical data | | | | | | | | | | | Dimensions | | | |
|-----------------|------|------------|--------------------------------|----------------------|---------------|----------------|--------------------|--------------------|---------------------|--------------|-------------------------------|--------------------------|-------------|-------------|
| Motor | | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | I_{st}/I_n | Control box for 3-wire motors | Capacitor for PSC motors | Length [mm] | Weight [kg] |
| Type | Size | Power [kW] | | η_{50} % | η_{75} % | η_{100} % | $\cos \phi_{50}$ % | $\cos \phi_{75}$ % | $\cos \phi_{100}$ % | | | | | |
| MS 402 | 4" | 0.37 | 3.95 | 48.0 | 54.0 | 57.0 | 0.58 | 0.68 | 0.77 | 3.4* | SA-SPM 2 | 16 μ F, 400 V, 50 Hz | 256 | 6.8 |
| MS 402 | 4" | 0.55 | 5.80 | 49.5 | 56.5 | 59.5 | 0.52 | 0.65 | 0.74 | 3.5* | SA-SPM 2 | 20 μ F, 400 V, 50 Hz | 291 | 8.2 |
| MS 402 | 4" | 0.75 | 7.45 | 52.0 | 58.0 | 60.0 | 0.57 | 0.69 | 0.79 | 3.6* | SA-SPM 2 | 30 μ F, 400 V, 50 Hz | 306 | 8.9 |
| MS 402 | 4" | 1.1 | 7.30 | 62.0 | 69.5 | 72.5 | 0.99 | 0.99 | 0.99 | 4.3* | SA-SPM 3 | 40 μ F, 400 V, 50 Hz | 346 | 10.5 |
| MS 402 | 4" | 1.5 | 10.2 | 56.5 | 66.5 | 71.0 | 0.91 | 0.96 | 0.98 | 3.9 | SA-SPM 3 | | 346 | 11.0 |
| MS 4000 (R) | 4" | 2.2 | 14.0 | 67.0 | 73.0 | 75.0 | 0.91 | 0.94 | 0.96 | 4.4 | SA-SPM 3 | | 576 | 21.0 |

* Applies to 3-wire motors.

MS 402 2-wire motors incorporate motor protection and can therefore be connected directly to the mains.

3 x 230 V, submersible motors

| Electrical data | | | | | | | | | | | Dimensions | |
|-----------------|------|------------|--------------------------------|----------------------|---------------|----------------|--------------------|--------------------|---------------------|--------------|-------------|-------------|
| Motor | | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | I_{st}/I_n | Length [mm] | Weight [kg] |
| Type | Size | Power [kW] | | η_{50} % | η_{75} % | η_{100} % | $\cos \phi_{50}$ % | $\cos \phi_{75}$ % | $\cos \phi_{100}$ % | | | |
| MS 402 | 4" | 0.37 | 2.55 | 51.0 | 59.5 | 64.0 | 0.44 | 0.55 | 0.64 | 3.7 | 226 | 5.5 |
| MS 402 | 4" | 0.55 | 4.00 | 48.5 | 57.0 | 64.0 | 0.42 | 0.52 | 0.64 | 3.5 | 241 | 6.3 |
| MS 402 | 4" | 0.75 | 4.20 | 64.0 | 69.5 | 73.0 | 0.50 | 0.62 | 0.72 | 4.6 | 276 | 7.7 |
| MS 4000 (R) | 4" | 0.75 | 3.35 | 66.8 | 71.1 | 72.9 | 0.66 | 0.76 | 0.82 | 5.1 | 401 | 13.0 |
| MS 402 | 4" | 1.1 | 6.20 | 62.5 | 69.0 | 73.0 | 0.47 | 0.59 | 0.72 | 4.6 | 306 | 8.9 |
| MS 4000 (R) | 4" | 1.1 | 5.00 | 69.1 | 73.2 | 75.0 | 0.57 | 0.70 | 0.78 | 5.2 | 416 | 14.0 |
| MS 402 | 4" | 1.5 | 7.65 | 68.0 | 73.0 | 75.0 | 0.50 | 0.64 | 0.75 | 5.0 | 346 | 10.5 |
| MS 4000 (R) | 4" | 1.5 | 7.40 | 66.6 | 71.4 | 72.9 | 0.53 | 0.66 | 0.74 | 4.5 | 416 | 14.0 |
| MS 402 | 4" | 2.2 | 10.0 | 72.5 | 75.5 | 76.0 | 0.56 | 0.71 | 0.82 | 4.7 | 346 | 11.9 |
| MS 4000 (R) | 4" | 2.2 | 11.6 | 64.5 | 70.8 | 73.3 | 0.44 | 0.58 | 0.69 | 4.2 | 456 | 16.0 |
| MS 4000 (R) | 4" | 3.0 | 14.6 | 67.5 | 72.8 | 74.6 | 0.48 | 0.62 | 0.73 | 4.4 | 496 | 17.0 |
| MS 4000 (R) | 4" | 4.0 | 17.6 | 73.9 | 77.4 | 77.9 | 0.52 | 0.67 | 0.77 | 4.9 | 576 | 21.0 |
| MS 4000 (R) | 4" | 5.5 | 24.2 | 76.0 | 78.8 | 79.6 | 0.51 | 0.66 | 0.76 | 4.9 | 676 | 26.0 |
| MS6 (R) | 6" | 5.5 | 21.2 | 80.5 | 82.3 | 81.5 | 0.70 | 0.80 | 0.84 | 4.5 | 535 | 35.5 |
| MS6 (R) | 6" | 7.5 | 28.5 | 80.5 | 82.6 | 82.1 | 0.68 | 0.78 | 0.84 | 5.0 | 565 | 37.0 |
| MS6 (R) | 6" | 9.2 | 35.0 | 80.8 | 82.9 | 82.3 | 0.68 | 0.78 | 0.84 | 4.9 | 590 | 42.5 |
| MS6 (R) | 6" | 11 | 43.0 | 80.3 | 82.7 | 82.6 | 0.62 | 0.76 | 0.82 | 4.9 | 683 | 45.5 |
| MS6 (R) | 6" | 13 | 51.0 | 80.1 | 82.5 | 82.3 | 0.62 | 0.74 | 0.82 | 4.7 | 708 | 48.5 |
| MS6 (R) | 6" | 15 | 58.5 | 80.8 | 83.1 | 82.9 | 0.62 | 0.76 | 0.82 | 4.7 | 738 | 52.5 |
| MS6 (R) | 6" | 18.5 | 72.0 | 81.2 | 83.4 | 83.1 | 0.62 | 0.76 | 0.82 | 4.8 | 783 | 58.0 |
| MS6 (R) | 6" | 22 | 85.0 | 81.7 | 83.8 | 83.7 | 0.62 | 0.76 | 0.82 | 5.0 | 838 | 64.0 |
| MS6 (R) | 6" | 26 | 100 | 81.8 | 84.0 | 84.0 | 0.62 | 0.74 | 0.82 | 5.3 | 903 | 69.5 |
| MS6 (R) | 6" | 30 | 110 | 82.3 | 84.2 | 83.7 | 0.66 | 0.78 | 0.84 | 5.2 | 968 | 77.5 |

MS 402: Data apply to 3 x 220 V.

3 x 230 V, submersible rewindable motors

| Motor | | | Electrical data | | | | | | | Dimensions | | |
|--------------------|------|------------|-----------------------------|----------------------|---------------|----------------|-----------------|-----------------|------------------|--------------|-------------|-------------|
| Type | Size | Power [kW] | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | I_{st}/I_n | Length [mm] | Weight [kg] |
| | | | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | cos ϕ 50 % | cos ϕ 75 % | cos ϕ 100 % | | | |
| MMS 6000 (-N) | 6" | 3.7 | 17.2 | 67 | 71 | 70 | 0.64 | 0.75 | 0.82 | 4.0 | 630 | 45 |
| MMS 6000 (-N) | 6" | 5.5 | 24.2 | 75 | 76 | 74 | 0.63 | 0.75 | 0.81 | 3.7 | 660 | 48 |
| MMS 6000 (-N) | 6" | 7.5 | 32.0 | 78 | 79 | 77 | 0.61 | 0.74 | 0.80 | 3.7 | 690 | 50 |
| MMS 6000 (-N) | 6" | 9.2 | 38.5 | 77 | 78 | 77 | 0.64 | 0.76 | 0.82 | 3.6 | 720 | 55 |
| MMS 6000 (-N) | 6" | 11 | 45.5 | 78 | 79 | 78 | 0.66 | 0.77 | 0.83 | 3.7 | 780 | 60 |
| MMS 6000 (-N) | 6" | 13 | 52.5 | 81 | 82 | 80 | 0.65 | 0.77 | 0.82 | 3.8 | 915 | 72 |
| MMS 6000 (-N) | 6" | 15 | 58.5 | 82 | 83 | 81 | 0.66 | 0.78 | 0.83 | 3.8 | 975 | 78 |
| MMS 6000 (-N) | 6" | 18.5 | 67.0 | 85 | 85 | 83 | 0.76 | 0.85 | 0.88 | 5.3 | 1085 | 90 |
| MMS 6000 (-N) | 6" | 22 | 79.5 | 85 | 85 | 84 | 0.75 | 0.84 | 0.87 | 5.2 | 1195 | 100 |
| MMS 6000 (-N) | 6" | 26 | 100 | 84 | 85 | 84 | 0.63 | 0.76 | 0.83 | 4.7 | 1315 | 115 |
| MMS 6000 (-N) | 6" | 30 | 112 | 85 | 85 | 84 | 0.66 | 0.78 | 0.84 | 4.8 | 1425 | 125 |
| MMS 6000 (-N) | 6" | 37 | 146 | 85 | 86 | 84 | 0.59 | 0.73 | 0.80 | 4.8 | 1425 | 125 |
| MMS6 (-N, -R) | 6" | 22 | 87.0 | 82 | 84 | 83 | 0.61 | 0.74 | 0.81 | 5.3 | 1087 | 95 |
| MMS6 (-N, -R) | 6" | 26 | 106 | 81 | 83 | 83 | 0.57 | 0.70 | 0.78 | 5.6 | 1157 | 105 |
| MMS6 (-N, -R) | 6" | 30 | 118 | 82 | 83 | 82 | 0.63 | 0.76 | 0.82 | 4.8 | 1212 | 110 |
| MMS6 (-N, -R) | 6" | 37 | 148 | 82 | 84 | 83 | 0.59 | 0.72 | 0.81 | 5.4 | 1312 | 120 |
| MMS 8000 (-N, -R) | 8" | 22 | 82.5 | 80 | 84 | 84 | 0.71 | 0.80 | 0.84 | 5.3 | 1010 | 126 |
| MMS 8000 (-N, -R) | 8" | 26 | 95.5 | 81 | 84 | 84 | 0.76 | 0.83 | 0.86 | 5.1 | 1050 | 134 |
| MMS 8000 (-N, -R) | 8" | 30 | 110 | 83 | 85 | 86 | 0.71 | 0.80 | 0.84 | 5.7 | 1110 | 146 |
| MMS 8000 (-N, -R) | 8" | 37 | 134 | 83 | 86 | 86 | 0.73 | 0.82 | 0.85 | 5.7 | 1160 | 156 |
| MMS 8000 (-N, -R) | 8" | 45 | 168 | 84 | 87 | 88 | 0.62 | 0.74 | 0.81 | 6.0 | 1270 | 177 |
| MMS 8000 (-N, -R) | 8" | 55 | 214 | 84 | 87 | 88 | 0.57 | 0.70 | 0.77 | 5.9 | 1350 | 192 |
| MMS 8000 (-N, -R) | 8" | 63 | 210 | 87 | 89 | 89 | 0.81 | 0.87 | 0.90 | 5.7 | 1490 | 218 |
| MMS 10000 (-N, -R) | 10" | 75 | 270 | 84 | 86 | 86 | 0.72 | 0.81 | 0.85 | 5.4 | 1500 | 330 |
| MMS 10000 (-N, -R) | 10" | 92 | 345 | 83 | 85 | 86 | 0.65 | 0.77 | 0.82 | 5.6 | 1690 | 385 |
| MMS 10000 (-N, -R) | 10" | 110 | 385 | 85 | 86 | 86 | 0.80 | 0.86 | 0.88 | 5.7 | 1870 | 435 |

3 x 400 V, submersible motors

| Motor | | | Electrical data | | | | | | | Dimensions | | |
|-------------|------|------------|-----------------------------|----------------------|---------------|----------------|-----------------|-----------------|------------------|--------------|-------------|-------------|
| Type | Size | Power [kW] | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | I_{st}/I_n | Length [mm] | Weight [kg] |
| | | | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | cos ϕ 50 % | cos ϕ 75 % | cos ϕ 100 % | | | |
| MS 402 | 4" | 0.37 | 1.40 | 51.0 | 59.5 | 64.0 | 0.44 | 0.55 | 0.64 | 3.7 | 226 | 5.5 |
| MS 402 | 4" | 0.55 | 2.20 | 48.5 | 57.0 | 64.0 | 0.42 | 0.52 | 0.64 | 3.5 | 241 | 6.3 |
| MS 402 | 4" | 0.75 | 2.30 | 64.0 | 69.5 | 73.0 | 0.50 | 0.62 | 0.72 | 4.7 | 276 | 7.7 |
| MS 4000R | 4" | 0.75 | 1.84 | 68.1 | 71.6 | 72.8 | 0.69 | 0.79 | 0.84 | 4.9 | 401 | 13.0 |
| MS 402 | 4" | 1.1 | 3.40 | 62.5 | 69.0 | 73.0 | 0.47 | 0.59 | 0.72 | 4.6 | 306 | 8.9 |
| MS 4000R | 4" | 1.1 | 2.75 | 70.3 | 74.0 | 74.4 | 0.62 | 0.74 | 0.82 | 5.1 | 416 | 14.0 |
| MS 402 | 4" | 1.5 | 4.20 | 68.0 | 73.0 | 75.0 | 0.50 | 0.64 | 0.75 | 5.0 | 346 | 10.5 |
| MS 4000R | 4" | 1.5 | 4.00 | 69.1 | 72.7 | 73.7 | 0.55 | 0.69 | 0.78 | 4.3 | 416 | 14.0 |
| MS 402 | 4" | 2.2 | 5.50 | 72.5 | 75.5 | 76.0 | 0.56 | 0.71 | 0.82 | 4.7 | 346 | 11.9 |
| MS 4000 (R) | 4" | 2.2 | 6.05 | 67.9 | 73.1 | 74.5 | 0.49 | 0.63 | 0.74 | 4.5 | 456 | 16.0 |
| MS 4000 (R) | 4" | 3.0 | 7.85 | 71.5 | 74.5 | 75.2 | 0.53 | 0.67 | 0.77 | 4.5 | 496 | 17.0 |
| MS 4000 (R) | 4" | 4.0 | 9.60 | 77.3 | 78.4 | 78.0 | 0.57 | 0.71 | 0.80 | 4.8 | 576 | 21.0 |
| MS 4000 (R) | 4" | 5.5 | 13.0 | 78.5 | 80.1 | 79.8 | 0.57 | 0.72 | 0.81 | 4.9 | 676 | 26.0 |
| MS 4000 (R) | 4" | 7.5 | 18.8 | 75.2 | 78.2 | 78.2 | 0.52 | 0.67 | 0.78 | 4.5 | 776 | 31.0 |
| MS6 (R) | 6" | 5.5 | 12.2 | 80.0 | 82.0 | 81.2 | 0.68 | 0.80 | 0.84 | 4.6 | 544 | 35.5 |
| MS6 (R) | 6" | 7.5 | 16.6 | 80.5 | 82.6 | 82.0 | 0.68 | 0.80 | 0.84 | 5.0 | 574 | 37.0 |
| MS6 (R) | 6" | 9.2 | 20.2 | 81.2 | 83.1 | 82.5 | 0.68 | 0.80 | 0.84 | 4.9 | 604 | 42.5 |
| MS6 (R) | 6" | 11 | 24.6 | 80.6 | 82.7 | 82.3 | 0.64 | 0.78 | 0.84 | 4.8 | 634 | 45.5 |
| MS6 (R) | 6" | 13 | 29.0 | 80.6 | 82.9 | 82.6 | 0.62 | 0.76 | 0.82 | 4.7 | 664 | 48.5 |
| MS6 (R) | 6" | 15 | 33.5 | 81.0 | 83.2 | 82.8 | 0.64 | 0.76 | 0.82 | 4.6 | 699 | 52.5 |
| MS6 (R) | 6" | 18.5 | 41.5 | 80.9 | 83.1 | 82.8 | 0.62 | 0.76 | 0.82 | 4.8 | 754 | 58.0 |
| MS6 (R) | 6" | 22 | 48.5 | 81.7 | 83.7 | 83.4 | 0.64 | 0.76 | 0.84 | 4.9 | 814 | 64.0 |
| MS6 (R) | 6" | 26 | 57.5 | 81.8 | 83.9 | 83.6 | 0.64 | 0.76 | 0.82 | 5.2 | 874 | 69.5 |
| MS6 (R) | 6" | 30 | 65.0 | 82.4 | 84.3 | 83.8 | 0.66 | 0.78 | 0.84 | 5.3 | 944 | 77.5 |

3 x 400 V, submersible industrial motors

| Motor | | Electrical data | | | | | | | Dimensions | | | |
|-------------|------|-----------------|-----------------------------|----------------------|---------------|----------------|-----------------|-----------------|------------------|----------------------|-------------|-------------|
| Type | Size | Power [kW] | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | $\frac{I_{st}}{I_n}$ | Length [mm] | Weight [kg] |
| | | | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | Cos ϕ 50 % | Cos ϕ 75 % | Cos ϕ 100 % | | | |
| MS 4000 (R) | 4" | 2.2 | 5.9 | 72.5 | 76.5 | 77.0 | 0.59 | 0.71 | 0.80 | 5.0 | 496 | 17.0 |
| MS 4000 (R) | 4" | 3.0 | 7.5 | 75.0 | 79.0 | 80.0 | 0.58 | 0.71 | 0.79 | 5.4 | 576 | 21.0 |
| MS 4000 (R) | 4" | 4.0 | 9.75 | 75.5 | 79.5 | 79.5 | 0.67 | 0.78 | 0.84 | 5.3 | 676 | 26.0 |
| MS 4000 (R) | 4" | 5.5 | 14.4 | 77.5 | 79.6 | 79.8 | 0.55 | 0.69 | 0.79 | 5.0 | 776 | 42.5 |

3 x 400 V, submersible motors

| Motor | | Electrical data | | | | | | | Dimensions | | | |
|------------|------|-----------------|-----------------------------|----------------------|---------------|----------------|-----------------|-----------------|------------------|----------------------|-------------|-------------|
| Type | Size | Power [kW] | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | $\frac{I_{st}}{I_n}$ | Length [mm] | Weight [kg] |
| | | | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | Cos ϕ 50 % | Cos ϕ 75 % | Cos ϕ 100 % | | | |
| MS6 (R)T60 | 6" | 5.5 | 11.8 | 80.6 | 83.3 | 83.3 | 0.72 | 0.82 | 0.86 | 5.5 | 565 | 38 |
| MS6 (R)T60 | 6" | 7.5 | 15.8 | 81.7 | 83.7 | 83.2 | 0.78 | 0.84 | 0.86 | 4.8 | 610 | 43 |
| MS6 (R)T60 | 6" | 9.2 | 19.4 | 81.9 | 84.0 | 83.7 | 0.76 | 0.84 | 0.86 | 4.9 | 635 | 46 |
| MS6 (R)T60 | 6" | 11 | 23.2 | 82.1 | 84.3 | 84.0 | 0.74 | 0.82 | 0.86 | 4.9 | 738 | 53 |
| MS6 (R)T60 | 6" | 13 | 27.0 | 82.4 | 84.5 | 84.1 | 0.76 | 0.84 | 0.86 | 5.0 | 783 | 58 |
| MS6 (R)T60 | 6" | 15 | 31.0 | 82.6 | 84.8 | 84.7 | 0.76 | 0.84 | 0.86 | 5.3 | 838 | 64 |
| MS6 (R)T60 | 6" | 18.5 | 38.5 | 82.9 | 85.0 | 84.8 | 0.76 | 0.84 | 0.86 | 5.5 | 903 | 71 |
| MS6 (R)T60 | 6" | 22 | 45.0 | 83.2 | 85.2 | 84.9 | 0.78 | 0.84 | 0.88 | 5.6 | 1023 | 84 |

3 x 400 V, submersible rewindable motors

| Motor | | Electrical data | | | | | | | | Dimensions | | |
|--------------------|------|-----------------|--------------------------------------|----------------------|-------|--------|--------------|------------|-------------|---------------------------------|-------------|-------------|
| Type | Size | Power [kW] | Full-load current I _n [A] | Motor efficiency [%] | | | Power factor | | | I _{st} /I _n | Length [mm] | Weight [kg] |
| | | | | η50 % | η75 % | η100 % | Cos φ 50 % | Cos φ 75 % | Cos φ 100 % | | | |
| MMS 6000 (-N) | 6" | 3.7 | 9.85 | 67 | 70 | 70 | 0.63 | 0.75 | 0.81 | 4.0 | 630 | 45 |
| MMS 6000 (-N) | 6" | 5.5 | 14.0 | 75 | 76 | 74 | 0.62 | 0.75 | 0.81 | 3.7 | 660 | 48 |
| MMS 6000 (-N) | 6" | 7.5 | 18.4 | 77 | 79 | 77 | 0.60 | 0.73 | 0.80 | 3.7 | 690 | 50 |
| MMS 6000 (-N) | 6" | 9.2 | 22.4 | 77 | 78 | 77 | 0.64 | 0.76 | 0.81 | 3.6 | 720 | 55 |
| MMS 6000 (-N) | 6" | 11 | 26.0 | 78 | 79 | 78 | 0.65 | 0.77 | 0.82 | 3.7 | 780 | 60 |
| MMS 6000 (-N) | 6" | 13 | 30.0 | 81 | 81 | 80 | 0.64 | 0.76 | 0.82 | 3.8 | 915 | 72 |
| MMS 6000 (-N) | 6" | 15 | 34.0 | 82 | 82 | 81 | 0.66 | 0.78 | 0.83 | 3.8 | 975 | 78 |
| MMS 6000 (-N) | 6" | 18.5 | 40.5 | 83 | 85 | 84 | 0.64 | 0.77 | 0.83 | 5.3 | 1085 | 90 |
| MMS 6000 (-N) | 6" | 22 | 47.5 | 84 | 85 | 84 | 0.65 | 0.77 | 0.83 | 5.2 | 1195 | 100 |
| MMS 6000 (-N) | 6" | 26 | 56.0 | 85 | 85 | 84 | 0.68 | 0.79 | 0.85 | 4.7 | 1315 | 115 |
| MMS 6000 (-N) | 6" | 30 | 64.0 | 85 | 85 | 84 | 0.67 | 0.79 | 0.84 | 4.8 | 1425 | 125 |
| MMS 6000 (-N) | 6" | 37 | 80.0 | 84 | 85 | 83 | 0.66 | 0.77 | 0.83 | 4.3 | 1425 | 125 |
| MMS6 (-N, -R) | 6" | 22 | 51.5 | 81 | 83 | 83 | 0.57 | 0.70 | 0.79 | 5.5 | 1087 | 95 |
| MMS6 (-N, -R) | 6" | 26 | 61.0 | 81 | 83 | 83 | 0.57 | 0.70 | 0.78 | 5.7 | 1157 | 105 |
| MMS6 (-N, -R) | 6" | 30 | 68.2 | 83 | 84 | 84 | 0.61 | 0.73 | 0.81 | 5.0 | 1212 | 110 |
| MMS6 (-N, -R) | 6" | 37 | 84.5 | 82 | 84 | 83 | 0.60 | 0.73 | 0.81 | 5.1 | 1312 | 120 |
| MMS 8000 (-N, -R) | 8" | 22 | 48.0 | 80 | 82 | 82 | 0.72 | 0.81 | 0.84 | 5.3 | 1010 | 126 |
| MMS 8000 (-N, -R) | 8" | 26 | 56.5 | 80 | 82 | 82 | 0.76 | 0.83 | 0.85 | 5.1 | 1050 | 134 |
| MMS 8000 (-N, -R) | 8" | 30 | 64.0 | 82 | 84 | 84 | 0.74 | 0.82 | 0.85 | 5.7 | 1110 | 146 |
| MMS 8000 (-N, -R) | 8" | 37 | 78.5 | 82 | 84 | 84 | 0.74 | 0.82 | 0.85 | 5.7 | 1160 | 156 |
| MMS 8000 (-N, -R) | 8" | 45 | 96.5 | 84 | 86 | 86 | 0.65 | 0.76 | 0.82 | 6.0 | 1270 | 177 |
| MMS 8000 (-N, -R) | 8" | 55 | 114 | 84 | 86 | 86 | 0.72 | 0.81 | 0.85 | 5.9 | 1350 | 192 |
| MMS 8000 (-N, -R) | 8" | 63 | 132 | 85 | 87 | 87 | 0.66 | 0.78 | 0.83 | 5.7 | 1490 | 218 |
| MMS 8000 (-N, -R) | 8" | 75 | 152 | 86 | 87 | 87 | 0.71 | 0.82 | 0.86 | 5.8 | 1590 | 237 |
| MMS 8000 (-N, -R) | 8" | 92 | 186 | 87 | 88 | 87 | 0.72 | 0.82 | 0.86 | 5.9 | 1830 | 283 |
| MMS 8000 (-N, -R) | 8" | 110 | 224 | 86 | 87 | 87 | 0.73 | 0.83 | 0.87 | 5.8 | 2060 | 333 |
| MMS 10000 (-N, -R) | 10" | 75 | 156 | 84 | 86 | 87 | 0.70 | 0.80 | 0.84 | 5.4 | 1400 | 280 |
| MMS 10000 (-N, -R) | 10" | 92 | 194 | 84 | 87 | 87 | 0.67 | 0.78 | 0.82 | 5.6 | 1500 | 330 |
| MMS 10000 (-N, -R) | 10" | 110 | 228 | 85 | 87 | 88 | 0.70 | 0.79 | 0.84 | 5.7 | 1690 | 385 |
| MMS 10000 (-N, -R) | 10" | 132 | 270 | 85 | 88 | 88 | 0.71 | 0.81 | 0.84 | 5.7 | 1870 | 435 |
| MMS 10000 (-N, -R) | 10" | 147 | 315 | 84 | 87 | 87 | 0.64 | 0.75 | 0.81 | 6.2 | 2070 | 500 |
| MMS 10000 (-N, -R) | 10" | 170 | 365 | 84 | 86 | 87 | 0.64 | 0.75 | 0.81 | 6.0 | 2220 | 540 |
| MMS 10000 (-N, -R) | 10" | 190 | 425 | 83 | 86 | 87 | 0.60 | 0.72 | 0.79 | 5.9 | 2400 | 580 |
| MMS 12000 (N) | 12" | 147 | 305 | 84 | 87 | 88 | 0.66 | 0.77 | 0.83 | 6.2 | 1790 | 565 |
| MMS 12000 (N) | 12" | 170 | 345 | 85 | 87 | 88 | 0.69 | 0.79 | 0.85 | 6.1 | 1880 | 605 |
| MMS 12000 (N) | 12" | 190 | 390 | 85 | 87 | 88 | 0.68 | 0.79 | 0.84 | 6.2 | 1980 | 650 |
| MMS 12000 (N) | 12" | 220 | 445 | 85 | 87 | 88 | 0.69 | 0.80 | 0.85 | 6.1 | 2140 | 700 |
| MMS 12000 (N) | 12" | 250 | 505 | 85 | 87 | 88 | 0.69 | 0.80 | 0.85 | 5.9 | 2290 | 775 |

3 x 500 V, submersible motors

| Motor | | | Electrical data | | | | | | | Dimensions | | |
|-------------|------|------------|-----------------------------|----------------------|---------------|----------------|-----------------------|-----------------------|------------------------|--------------|-------------|-------------|
| Type | Size | Power [kW] | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | I_{st}/I_n | Length [mm] | Weight [kg] |
| | | | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | $\cos \varphi_{50\%}$ | $\cos \varphi_{75\%}$ | $\cos \varphi_{100\%}$ | | | |
| MS 4000R | 4" | 0.75 | 1.5 | 69.1 | 72.7 | 73.7 | 0.55 | 0.69 | 0.78 | 4.7 | 401 | 13.0 |
| MS 4000R | 4" | 1.1 | 2.2 | 70.3 | 74.0 | 74.4 | 0.62 | 0.74 | 0.82 | 5.0 | 416 | 14.0 |
| MS 4000R | 4" | 1.5 | 3.2 | 69.1 | 72.7 | 73.7 | 0.55 | 0.69 | 0.78 | 4.4 | 416 | 14.0 |
| MS 4000 (R) | 4" | 2.2 | 4.9 | 67.9 | 73.1 | 74.5 | 0.49 | 0.63 | 0.74 | 4.3 | 456 | 16.0 |
| MS 4000 (R) | 4" | 3.0 | 6.3 | 71.5 | 74.5 | 75.2 | 0.53 | 0.67 | 0.77 | 4.6 | 496 | 17.0 |
| MS 4000 (R) | 4" | 4.0 | 7.7 | 77.3 | 78.4 | 78.0 | 0.57 | 0.71 | 0.81 | 4.8 | 576 | 21.0 |
| MS 4000 (R) | 4" | 5.5 | 10.4 | 78.5 | 80.1 | 79.8 | 0.57 | 0.72 | 0.81 | 4.9 | 676 | 26.0 |
| MS 4000 (R) | 4" | 7.5 | 15.0 | 75.2 | 78.2 | 78.2 | 0.52 | 0.67 | 0.78 | 4.5 | 776 | 31.0 |
| MS6 (R) | 6" | 5.5 | 9.55 | 82.6 | 82.6 | 81.5 | 0.82 | 0.86 | 0.86 | 430 | 565 | 38 |
| MS6 (R) | 6" | 7.5 | 12.8 | 83.2 | 83.3 | 82.2 | 0.82 | 0.86 | 0.86 | 445 | 590 | 41 |
| MS6 (R) | 6" | 9.2 | 15.6 | 83.3 | 83.4 | 82.3 | 0.80 | 0.86 | 0.86 | 440 | 610 | 43 |
| MS6 (R) | 6" | 11 | 18.8 | 83.4 | 83.8 | 82.9 | 0.78 | 0.86 | 0.86 | 445 | 708 | 49 |
| MS6 (R) | 6" | 13 | 22.0 | 83.7 | 84.0 | 83.1 | 0.78 | 0.86 | 0.86 | 430 | 738 | 53 |
| MS6 (R) | 6" | 15 | 25.0 | 84.2 | 84.0 | 83.0 | 0.82 | 0.86 | 0.88 | 425 | 783 | 58 |
| MS6 (R) | 6" | 18.5 | 31.0 | 84.5 | 84.2 | 83.1 | 0.82 | 0.86 | 0.88 | 430 | 838 | 64 |
| MS6 (R) | 6" | 22 | 36.5 | 84.6 | 84.4 | 83.3 | 0.82 | 0.88 | 0.88 | 450 | 903 | 71 |
| MS6 (R) | 6" | 26 | 43.5 | 84.7 | 84.6 | 83.6 | 0.82 | 0.86 | 0.88 | 470 | 968 | 78 |
| MS6 (R) | 6" | 30 | 50.0 | 84.7 | 84.9 | 84.1 | 0.80 | 0.86 | 0.88 | 500 | 1023 | 84 |

3 x 500 V, submersible industrial motors

| Motor | | | Electrical data | | | | | | | Dimensions | | |
|-------------|------|------------|-----------------------------|----------------------|---------------|----------------|-----------------------|-----------------------|------------------------|--------------|-------------|-------------|
| Type | Size | Power [kW] | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | I_{st}/I_n | Length [mm] | Weight [kg] |
| | | | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | $\cos \varphi_{50\%}$ | $\cos \varphi_{75\%}$ | $\cos \varphi_{100\%}$ | | | |
| MS 4000 (R) | 4" | 2.2 | 4.7 | 72.5 | 76.5 | 77.0 | 0.59 | 0.71 | 0.80 | 4.9 | 496 | 17.0 |
| MS 4000 (R) | 4" | 3.0 | 6.2 | 75.0 | 79.0 | 80.0 | 0.58 | 0.71 | 0.79 | 5.4 | 576 | 21.0 |
| MS 4000 (R) | 4" | 4.0 | 7.8 | 75.5 | 79.5 | 79.5 | 0.67 | 0.78 | 0.84 | 5.2 | 676 | 26.0 |
| MS 4000 (R) | 4" | 5.5 | 11.6 | 77.0 | 79.5 | 80.0 | 0.55 | 0.68 | 0.78 | 5.0 | 776 | 31.0 |

3 x 500 V, submersible rewindable motors

| Motor | | Electrical data | | | | | | | | Dimensions | | |
|--------------------|------|-----------------|-----------------------------|----------------------|---------------|----------------|-----------------|-----------------|------------------|----------------------|-------------|-------------|
| Type | Size | Power [kW] | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | $\frac{I_{st}}{I_n}$ | Length [mm] | Weight [kg] |
| | | | | η_{50} % | η_{75} % | η_{100} % | Cos ϕ 50 % | Cos ϕ 75 % | Cos ϕ 100 % | | | |
| MMS 6000 (-N) | 6" | 7.5 | 14.4 | 78 | 78 | 74 | 0.73 | 0.82 | 0.85 | 3.2 | 690 | 50 |
| MMS 6000 (-N) | 6" | 9.2 | 17.4 | 77 | 78 | 76 | 0.69 | 0.80 | 0.84 | 3.4 | 720 | 55 |
| MMS 6000 (-N) | 6" | 11 | 15.0 | 79 | 79 | 77 | 0.71 | 0.81 | 0.85 | 4.7 | 780 | 60 |
| MMS 6000 (-N) | 6" | 13 | 23.4 | 82 | 82 | 80 | 0.69 | 0.98 | 0.84 | 3.7 | 915 | 72 |
| MMS 6000 (-N) | 6" | 15 | 26.5 | 83 | 83 | 80 | 0.76 | 0.84 | 0.86 | 4.2 | 975 | 78 |
| MMS 6000 (-N) | 6" | 18.5 | 31.5 | 84 | 85 | 84 | 0.70 | 0.81 | 0.85 | 5.2 | 1085 | 90 |
| MMS 6000 (-N) | 6" | 22 | 36.5 | 85 | 86 | 84 | 0.77 | 0.85 | 0.87 | 4.9 | 1195 | 100 |
| MMS 6000 (-N) | 6" | 26 | 44.5 | 85 | 85 | 84 | 0.68 | 0.79 | 0.85 | 4.8 | 1315 | 115 |
| MMS 6000 (-N) | 6" | 30 | 50.5 | 86 | 86 | 84 | 0.72 | 0.82 | 0.86 | 4.7 | 1425 | 125 |
| MMS 6000 (-N) | 6" | 37 | 63.0 | 86 | 86 | 85 | 0.68 | 0.79 | 0.84 | 4.9 | 1425 | 125 |
| MMS6 (-N, -R) | 6" | 22 | 39.5 | 82 | 82 | 80 | 0.69 | 0.80 | 0.84 | 4.8 | 1087 | 95 |
| MMS6 (-N, -R) | 6" | 26 | 47.0 | 81 | 82 | 80 | 0.67 | 0.79 | 0.84 | 5.0 | 1157 | 105 |
| MMS6 (-N, -R) | 6" | 30 | 54.5 | 80 | 81 | 79 | 0.67 | 0.79 | 0.84 | 4.5 | 1212 | 110 |
| MMS6 (-N, -R) | 6" | 37 | 66.5 | 81 | 82 | 80 | 0.66 | 0.78 | 0.85 | 5.1 | 1312 | 120 |
| MMS 8000 (-N, -R) | 8" | 22 | 37.5 | 81 | 83 | 83 | 0.79 | 0.85 | 0.87 | 4.7 | 1010 | 126 |
| MMS 8000 (-N, -R) | 8" | 26 | 44.0 | 81 | 84 | 83 | 0.80 | 0.85 | 0.86 | 4.8 | 1050 | 134 |
| MMS 8000 (-N, -R) | 8" | 30 | 49.5 | 83 | 85 | 85 | 0.78 | 0.85 | 0.86 | 5.6 | 1110 | 146 |
| MMS 8000 (-N, -R) | 8" | 37 | 60.5 | 84 | 85 | 85 | 0.82 | 0.87 | 0.87 | 5.6 | 1160 | 156 |
| MMS 8000 (-N, -R) | 8" | 45 | 72.0 | 85 | 87 | 87 | 0.73 | 0.82 | 0.86 | 6.2 | 1270 | 177 |
| MMS 8000 (-N, -R) | 8" | 55 | 88.5 | 86 | 88 | 88 | 0.71 | 0.81 | 0.86 | 6.1 | 1350 | 192 |
| MMS 8000 (-N, -R) | 8" | 63 | 96.5 | 87 | 89 | 88 | 0.82 | 0.88 | 0.90 | 6.1 | 1490 | 218 |
| MMS 8000 (-N, -R) | 8" | 75 | 114 | 88 | 89 | 88 | 0.85 | 0.89 | 0.90 | 5.6 | 1590 | 237 |
| MMS 8000 (-N, -R) | 8" | 92 | 142 | 88 | 87 | 88 | 0.81 | 0.87 | 0.89 | 5.3 | 1830 | 283 |
| MMS 8000 (-N, -R) | 8" | 110 | 182 | 86 | 88 | 88 | 0.67 | 0.78 | 0.84 | 5.3 | 2060 | 333 |
| MMS 10000 (-N, -R) | 10" | 75 | 122 | 85 | 87 | 87 | 0.77 | 0.84 | 0.86 | 5.3 | 1400 | 280 |
| MMS 10000 (-N, -R) | 10" | 92 | 150 | 85 | 87 | 87 | 0.74 | 0.82 | 0.85 | 5.3 | 1500 | 330 |
| MMS 10000 (-N, -R) | 10" | 110 | 178 | 85 | 87 | 88 | 0.76 | 0.84 | 0.86 | 5.4 | 1690 | 385 |
| MMS 10000 (-N, -R) | 10" | 132 | 210 | 86 | 88 | 87 | 0.82 | 0.87 | 0.88 | 5.0 | 1870 | 435 |
| MMS 10000 (-N, -R) | 10" | 147 | 236 | 85 | 88 | 88 | 0.74 | 0.83 | 0.86 | 5.8 | 2070 | 500 |
| MMS 10000 (-N, -R) | 10" | 170 | 270 | 86 | 88 | 88 | 0.78 | 0.85 | 0.87 | 5.4 | 2220 | 540 |
| MMS 10000 (-N, -R) | 10" | 190 | 305 | 86 | 88 | 87 | 0.80 | 0.86 | 0.87 | 5.3 | 2400 | 580 |
| MMS 12000 (N) | 12" | 147 | 218 | 86 | 89 | 90 | 0.80 | 0.88 | 0.91 | 6.9 | 1790 | 565 |
| MMS 12000 (N) | 12" | 170 | 265 | 87 | 89 | 90 | 0.74 | 0.82 | 0.86 | 6.0 | 1880 | 605 |
| MMS 12000 (N) | 12" | 190 | 220 | 88 | 90 | 91 | 0.85 | 0.91 | 0.93 | 7.8 | 1980 | 650 |
| MMS 12000 (N) | 12" | 220 | 335 | 88 | 90 | 90 | 0.79 | 0.86 | 0.88 | 5.8 | 2140 | 700 |
| MMS 12000 (N) | 12" | 250 | 375 | 87 | 90 | 91 | 0.75 | 0.85 | 0.89 | 6.3 | 2290 | 775 |

CUE frequency converter

The Grundfos CUE is a series of external frequency converters designed for speed control of a wide range of Grundfos pumps.

When a CUE is installed, the motor requires no further motor protection.

The CUE offers quick and easy set-up and commissioning compared to a standard frequency converter because of the start-up guide. Simply key in application-specific variables such as motor data, pump family, control function (e.g. constant pressure), sensor type, and setpoint, and the CUE will automatically set all necessary parameters.

The CUE enables gentle pumping and thereby protects the water reservoir and the rest of the distribution system, as water hammer can be avoided by adjusting ramp times up and down.

Overview of the CUE range

| Supply voltage [V] | Power range [kW] | | | | | | |
|--------------------|------------------|------|-----|-----|----|----|-----|
| | 0.55 | 0.75 | 1.1 | 7.5 | 11 | 45 | 250 |
| 3 x 525-690 | | | | | | | |
| 3 x 525-600 | | | | | | | |
| 3 x 380-500 | | | | | | | |
| 3 x 200-240 | | | | | | | |
| 1 x 200-240 | | | | | | | |

The CUE is available in two enclosure classes:

- IP20/21
- IP54/55.

RFI filters

To meet the EMC requirements, the CUE comes with the following types of built-in radio frequency interference filter (RFI).

| Voltage [V] | Typical shaft power, P2 [kW] | RFI filter type | Application |
|-------------|------------------------------|-----------------|-----------------------|
| 1 x 200-240 | 1.1 - 7.5 | C1 | Domestic |
| 3 x 200-240 | 0.75 - 45 | C1 | |
| 3 x 380-500 | 0.55 - 90 | C1 | |
| 3 x 380-500 | 110 - 250 | C2 | Domestic/ industry |
| 3 x 525-600 | 0.75 - 7.5 | C3 | Industry |
| 3 x 525-690 | 11 - 25 | C3 | |



GrA4404

Fig. 17 The CUE range

Functions

The CUE has a wide range of pump-specific functions, such as

- constant pressure
- constant level
- constant flow rate
- constant temperature
- constant curve.

CUE features

• Start-up guide

The CUE incorporates an innovative start-up guide for the general setting of the CUE including the setting of the correct direction of rotation. The start-up guide is started the first time when the CUE is connected to the power supply.

- Check of direction of rotation.
- Duty/standby operation.
- Dry-running protection.
- Low-flow stop function.

Inputs and outputs

The CUE incorporates various inputs and outputs:

- 1 RS-485 GENIbus connection
- 1 analog input, 0-10 V, 0/4-20 mA
 - external setpoint
- 1 analog input, 0/4-20 mA
 - sensor input, feedback sensor
- 1 analog output, 0-20 mA
- 4 digital inputs
 - start/stop and three programmable inputs
- 2 signal relays (C/NO/NC)
 - programmable.

Accessories for the CUE

Grundfos offers various accessories for the CUE.

MCB 114 sensor input module

The MCB 114 offers additional analog inputs for the CUE:

- 1 analog input, 0/4-20 mA
- 2 inputs for Pt100 and Pt1000 temperature sensors.

Output filters

Output filters are used primarily to protect the motor against overvoltage and increased operating temperature. However, output filters can also be used to reduce acoustic noise from the motor.

Grundfos offers two types of output filter as accessories for the CUE:

- dU/dt filters
- sine-wave filters.

Floor-mounting option

The CUE is as standard installed on the wall. The enclosures D1 and D2 can also be installed on the floor on a pedestal designed for that purpose.

For information about enclosures, see the product-specific documentation for the CUE.

IP21/NEMA1 option

An IP20 enclosure can be upgraded to IP21/NEMA1 by using the IP21/NEMA1 option. The power terminals (mains and motor) will be covered.

Sensors

The following sensors can be used in connection with the CUE. All sensors are with 4-20 mA output signal.

- Pressure sensors, up to 25 bar
- temperature sensors
- differential-pressure sensors
- differential-temperature sensors
- flowmeters
- potentiometer box for external setpoint setting.

Gateways

The CUE has a standard RS-485 GENIbus interface. Gateways to convert to other bus standards are available as accessories.

The CIU family (CIU = Communication Interface Units) can convert from GENIbus to the most common fieldbuses in the world:

- CIU 100 converts from GENIbus to LonWorks
- CIU 150 converts from GENIbus to Profibus DP
- CIU 200 converts from GENIbus to Modbus RTU
- CIU 250 is a GSM modem which can send SMS messages in case of alarms, etc.

Control MPC

Control MPC, a multi-pump control system for the control of parallel-connected CUE pump solutions.

Use of output filters

The table below shows in which cases an output filter is required. From the table, it can be seen if a filter is needed, and which type to use.

The selection depends on these factors:

- pump type
- motor cable length
- the required reduction of acoustic noise from the motor.

| Pump type | Typical shaft power P ₂ | dU/dt filter | Sine-wave filter |
|----------------------------|------------------------------------|--------------|------------------|
| SP with 380 V motor and up | Up to 7.5 kW | - | 0-300 m |
| | 11 kW and up | 0-150 m | 150-300 m |

The lengths stated apply to the motor cable.

Cables used in CUE installations

Note: When the CUE is installed in connection with SP pumps, we distinguish between two types of installation:

- installation in EMC-insensitive sites. See fig. 18.
- installation in EMC-sensitive sites. See fig. 19.

The two types of installation are different when it comes to the use of screened cable.

Note: Drop cables are always unscreened.

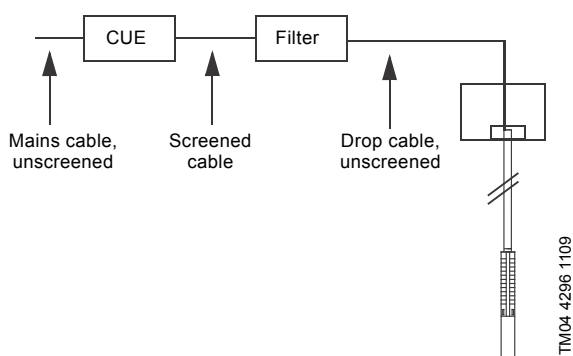


Fig. 18 Example of installation in EMC-insensitive sites

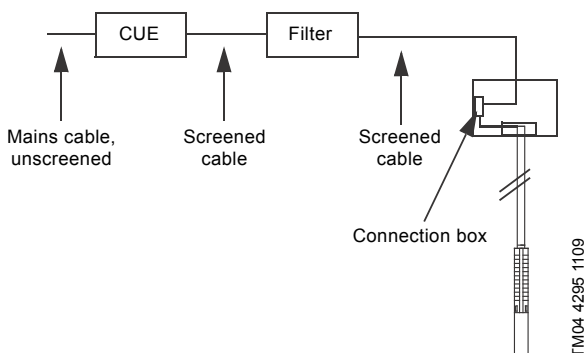


Fig. 19 Example of installation in EMC-sensitive sites

Screened cables are required in those parts of the installation where the surroundings must be protected against EMC.

The CUE is the right choice of frequency converter in SP installations as it meets all basic issues. The CUE has a pre-installed start-up guide which takes the installer through all the necessary settings.

The table below shows the different issues to be considered when using frequency converters in SP installations.

| Issues to be considered | Explanation |
|--|--|
| Ramp (up and down): Maximum 3 seconds. | The journal bearings must be lubricated in order to limit wear and overheating of windings. |
| Use temperature monitoring by Pt sensor. | Overheating of the motor => low insulation resistance => sensitive to voltage peaks. |
| Reduce peak voltages (max. 800 V peaks). | Never exceed peak voltages of 850 V at motor leads. |
| For MS and MMS, we recommend to use motors with 10 % extra in given duty point. For MMS, always use motors (PE2 - PA wound). | Grundfos CUE with output filter is a safe solution. |
| Remember output filter. | Cables act as an amplifier => measure peaks at the motor. |
| Rise time (dU/dt) shall be limited to a maximum of 1000 V/μs. Determined by the equipment in the CUE. | Time between switches is an expression of losses, so in the future, we might have to exceed the limit of 1000 V/μs. The solution is not higher insulation of the motor, but filter in the output from the CUE. |
| Min. 30 Hz. Use a 60 Hz motor for larger range. | Too low speed => no lubrication of journal bearings. |
| Size the CUE in respect of the current, not the power output. | Can end up with a too small CUE. |
| Size cooling provision for stator tube at duty point with lowest flow rate. | Flow min. m/s along the stator housing must be considered. |
| Ensure that the pump is used within the range of the pump curve. | Focus on discharge pressure and sufficient NPSH, as vibrations will "kill" the motor. |

MP 204 motor protector

The MP 204 is an electronic motor protector, designed for the protection of an asynchronous motor or a pump.

The MP 204 cannot be used in installations where a frequency converter is installed.

If one or more of the warning limits are exceeded, the motor continues to run, but the warnings will appear in the MP 204 display.

Some values only have a warning limit.

The warning can also be read out with the Grundfos R100 remote control.

If one of the trip limits is exceeded, the trip relay will stop the motor. At the same time, the signal relay is operating to indicate that the limit has been exceeded.

Applications

The MP 204 can be used as a stand-alone motor protector.

The MP 204 can be monitored via a Grundfos GENibus.

The MP 204 protects the motor primarily by measuring the motor current by means of a true RMS measurement.

The MP 204 is designed for single- and three-phase motors. In single-phase motors, the starting and run capacitors are also measured. $\cos \phi$ is measured in both single- and three-phase systems.

Benefits

The MP 204 offers these benefits:

- suitable for both single- and three-phase motors
- dry-running protection
- overload protection
- very high accuracy
- made for submersible pumps.

The MP 204, many monitoring options

The MP 204 monitors the following parameters:

- insulation resistance before start-up
- temperature (Tempcon, Pt sensor and PTC/thermal switch)
- overload/underload
- overvoltage/undervoltage
- phase sequence
- phase failure
- power factor
- power consumption
- harmonic distortion
- operating hours and number of starts.



Fig. 20 MP 204

Five sizes of single-turn transformers, 120-999 A.

Note: Monitoring of motor temperature is not possible when single-turn transformers are used.



Fig. 21 Single-turn transformers

Product numbers

| Product | Product number |
|---------|----------------|
| MP 204 | 96079927 |
| R100 | 625333 |

TM03 1471 2205

TM03 2033 3505

Functions

- Phase-sequence monitoring
- indication of current or temperature (user selection)
- indication of temperature in °C or °F (user selection)
- 4-digit, 7-segment display
- setting and status reading with the R100
- setting and status reading via the GENIbus.

Tripping conditions

- Overload
- underload (dry running)
- temperature (Tempcon sensor, PTC/thermal switch and Pt sensor)
- phase failure
- phase sequence
- overvoltage
- undervoltage
- power factor ($\cos \varphi$)
- current unbalance.

Warnings

- Overload
- underload
- temperature (Tempcon and Pt sensor)
- overvoltage
- undervoltage
- power factor ($\cos \varphi$)
Note: In connection with single- and three-phase connection.
- run capacitor (single-phase operation)
- starting capacitor (single-phase operation)
- loss of communication in network
- harmonic distortion.

Learning function

- Phase sequence (three-phase operation)
- run capacitor (single-phase operation)
- starting capacitor (single-phase operation)
- identification and measurement of Pt100/Pt1000 sensor circuit.


External current transformers

When fitted with external current transformers, the MP 204 can handle currents from 120 to 999 A. Grundfos can supply approved current transformers from stock (200/5A, 300/5A, 500/5A, 750/5A, 1000/5A).

Technical data, MP 204

| | |
|-----------------------------|--------------------------------|
| Enclosure class | IP20 |
| Ambient temperature | -20 °C to +60 °C |
| Relative air humidity | 99 % |
| Voltage range | 100-480 VAC |
| Current range | 3-999 A |
| Frequency | 50 to 60 Hz |
| IEC trip class | 1-45 |
| Special Grundfos trip class | 0.1 to 30 s |
| Voltage variation | -25 % / +15 % of rated voltage |
| Approvals | EN 60947, EN 60335, UL/CSA 508 |
| Marking | CE, cUL, C-tick |
| Consumption | Max. 5 W |
| Plastic type | Black PC / ABS |

| | Measuring range | Accuracy | Resolution |
|---|---------------------------|----------|------------|
| Current without external current transformers | 3-120 A | ± 1 % | 0.1 A |
| Current with external current transformers | 120-999 A | ± 1 % | 1 A |
| Phase-to-phase voltage | 80-610 VAC | ± 1 % | 1 V |
| Frequency | 47-63 Hz | ± 1 % | 0.5 Hz |
| Power | 0-1 MW | ± 2 % | 1 W |
| Power factor | 0 - 0.99 | ± 2 % | 0.01 |
| Energy consumption | 0-4 x 10 ⁹ kWh | ± 5 % | 1 kWh |

| IO 112 | Description | Product number |
|---|--|----------------|
|  | <p>The IO 112 is a measuring module and a single-channel protection unit for use in connection with the MP 204 motor protector. The module can be used for protection of the pump against other factors than the electrical conditions, for instance dry running. It can also be used as a stand-alone protection module.</p> <p>The IO 112 interface has three inputs for measured values, one potentiometer for setting of limits and indicator lights indicating the following:</p> <ul style="list-style-type: none"> • measured value of the input • value of the limit set • alarm source • pump status. <p>Electrical data:</p> <ul style="list-style-type: none"> • Supply voltage: 24 VAC ± 10 %, 50/60 Hz or 24 VDC ± 10 %. • Supply current: Min. 2.4 A, max. 8 A. • Power consumption: Max. 5 W. • Ambient temperature: -25 °C to +65 °C. • Enclosure class: IP20. | 96651601 |

TM03 5811 3906

G100 gateway

The G100 gateway is used for communication with Grundfos products.

The G100 offers a wide selection of options for integration of Grundfos products provided with GENIbus interface into main control and monitoring systems.

The G100 enables a pump installation to meet future demands for optimum pump operation in terms of reliability, operating costs, centralisation and automation.



GR5940

Fig. 22 G100

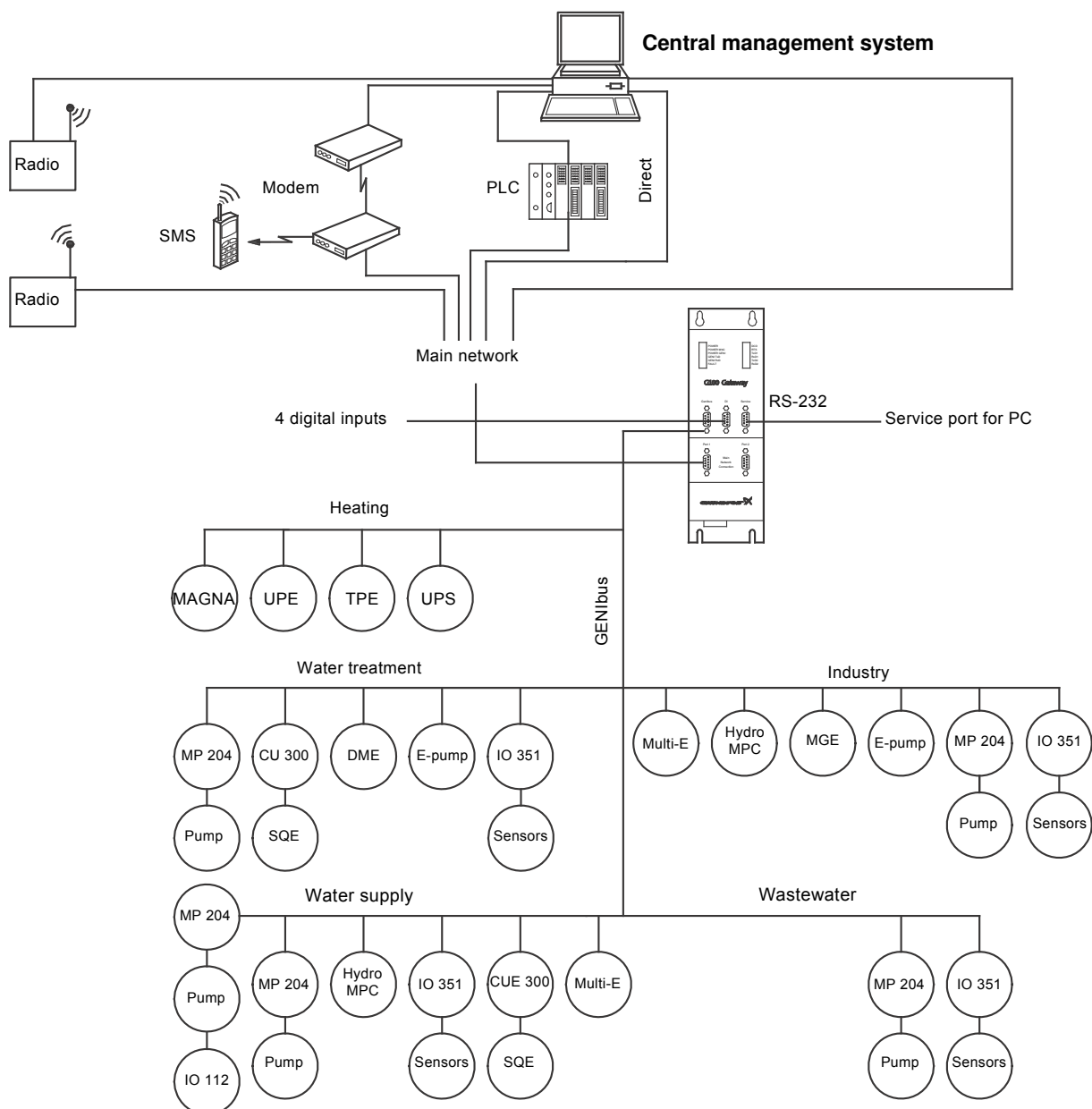


Fig. 23 Examples of G100 applications

TM03 9224 3607

Product description

The G100 gateway enables communication of operating data, such as measured values and setpoints, between Grundfos products with GENIbus interface and a main network for control and monitoring.

As indicated in the illustration on page 85, the G100 is suitable for use in applications such as water supply, water treatment, wastewater services, building automation and industry.

Common to the above applications is that downtime is usually costly, and extra investments are therefore often made to achieve maximum reliability by monitoring selected operating variables.

The day-to-day operation, such as starting and stopping of pumps and changing of setpoints, can also be effected from the main system by communication with the G100. In addition, the G100 can be set up to send event-controlled status indications such as alarms via SMS to mobile phones, and to make automatic alarm call-backs to a central management system.

Data logging

Besides data communication, the G100 offers logging of up to 350,000 time-stamped data. The logged data can be transmitted to the main system or a PC for further analysis in a spreadsheet or similar program.

For the data logging, the "PC Tool G100 Data Log" software tool is used. The tool is part of the PC Tool G100 package supplied with the G100.

Other features

- Four digital inputs.
- stop of all pumps in case of failing communication with the management system (optional).
- access code for modem communication (optional).
- alarm log.

Installation

Installation of the G100 is carried out by the system integrator. The G100 is connected to the GENIbus as well as to the main network. All units on the GENIbus can thus be controlled from a central management system on the main network.

The "G100 Support Files" CD-ROM supplied with the G100 contains examples of programs to be used when the G100 is connected to the various main network systems. Included is also a description of the data points available in Grundfos products with GENIbus interface.

The "PC Tool G100" software tool included can be used for the installation and use of the G100.

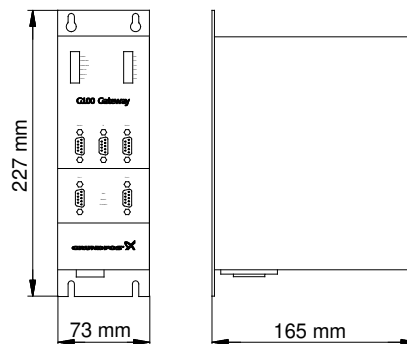


Fig. 24 Dimensional sketch

TM01 0621 1102

Technical data

Overview of protocols

| Main system | Software protocol |
|------------------|---------------------------|
| Profibus-DP | DP |
| Radio | Satt Control COMLI/Modbus |
| Modem | Satt Control COMLI/Modbus |
| PLC | Satt Control COMLI/Modbus |
| GSM mobile phone | SMS, UCP |

Other possible connections

- GENIbus RS-485: Connection of up to 32 units.
- Service port RS-232: For direct connection to a PC or via radio modem.
- Digital inputs: 4.
- Supply voltage: 1 x 110-240 V, 50/60 Hz.
- Ambient temperature: In operation: -20 °C to +60 °C.
- Enclosure class: IP20.
- Weight: 1.8 kg.

Accessories

- PC Tool G100 package (supplied with the product)
- G100 Support Files CD-ROM (supplied with the product).

Product numbers

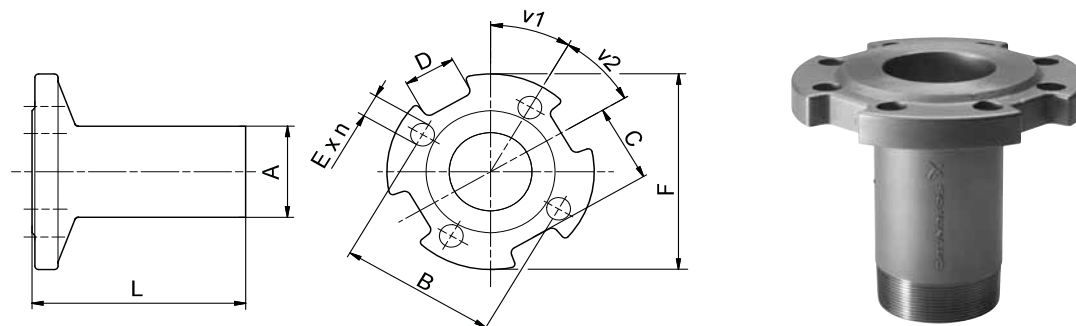
| Product | Product number |
|--|----------------|
| G100 with Profibus-DP expansion board* | 96411135 |
| G100 with Radio/Modem/PLC expansion board* | 96411136 |
| G100 Basic Version* | 96411137 |
| PC Tool G100 package | 96415783 |

* CD-ROM with G100 Support Files included.

Connecting pieces

The tables below show the range of connecting pieces for connection of thread-to-flange and thread-to-thread.

Thread-to-flange



TM01 2396 4508 - GrA2552

Fig. 25 Dimensional sketch and photo of the connecting piece thread-to-flange

| Type | Pump outlet | Connecting piece | Thread-to-flange | | | | | | | | | | Product number | |
|----------------------------|--------------|--------------------------|------------------|---------|------|----|-----------|-------|-----|------|----|----|----------------|-----------|
| | | | Dimensions [mm] | | | | | | | | | | EN 1.4308 | EN 1.4517 |
| | | | A | B | C | D | E | F | L | v1 | v2 | n | | |
| SP 17 | Rp 2 1/2 | R 2 1/2 → DN 50 PN 16/40 | R 2 1/2 | 125 | 65 | 40 | ∅ 19 | ∅ 165 | 170 | 60 | 90 | 4 | 120125 | 120911 |
| | | R 2 1/2 → DN 65 PN 16/40 | R 2 1/2 | 145 | 71 | 30 | ∅ 19 | ∅ 185 | 170 | 22.5 | 45 | 8 | 120126 | 120910 |
| | | R 2 1/2 → DN 80 PN 16/40 | R 2 1/2 | 160 | 82.5 | 40 | ∅ 19 | ∅ 200 | 170 | 22.5 | 45 | 8 | 120127 | 120909 |
| SP 30 | Rp 3 | R 3 → DN 65 PN 16/40 | R 3 | 145 | 71 | 30 | ∅ 19 | ∅ 185 | 170 | 22.5 | 45 | 8 | 130187 | 130920 |
| | | R 3 → DN 80 PN 16/40 | R 3 | 160 | 82.5 | 40 | ∅ 19 | ∅ 200 | 170 | 22.5 | 45 | 8 | 130188 | 130921 |
| | | R 3 → DN 100 PN 16/40 | R 3 | 180/190 | 100 | 40 | ∅ 19/∅ 23 | ∅ 235 | 170 | 22.5 | 45 | 8 | 130189 | 130922 |
| SP 46 SP 60 | Rp 3 Rp 4 | R 3 → DN 65 PN 16/40 | R 3 | 145 | 71 | 30 | ∅ 19 | ∅ 185 | 170 | 22.5 | 45 | 8 | 130187 | 130920 |
| | | R 3 → DN 80 PN 16/40 | R 3 | 160 | 82.5 | 40 | ∅ 19 | ∅ 200 | 170 | 22.5 | 45 | 8 | 130188 | 130921 |
| | | R 3 → DN 100 PN 16/40 | R 3 | 180/190 | 100 | 40 | ∅ 19/∅ 23 | ∅ 235 | 170 | 22.5 | 45 | 8 | 130189 | 130922 |
| SP 77 SP 95 | Rp 5 | R 4 → DN 100 PN 16/40 | R 4 | 180/190 | 100 | 40 | ∅ 19/∅ 23 | ∅ 235 | 180 | 22.5 | 45 | 8 | 140071 | 140577 |
| | | R 5 → DN 100 PN 16/40 | R 5 | 180/190 | 82 | 35 | ∅ 19/∅ 23 | ∅ 235 | 195 | 22.5 | 45 | 8 | 160148 | 160646 |
| | | R 5 → DN 125 PN 16/40 | R 5 | 210/220 | 99 | 37 | ∅ 19/∅ 28 | ∅ 270 | 195 | 22.5 | 45 | 8 | 160149 | 160647 |
| SP 125 SP 160 SP 215 | Rp 6 | R 5 → DN 150 PN 16/40 | R 5 | 240/250 | 115 | 36 | ∅ 23/∅ 28 | ∅ 300 | 195 | 22.5 | 45 | 8 | 160150 | 160648 |
| | | R 6 → DN 125 PN 16/40 | R 6 | 210/220 | 99 | 36 | ∅ 19/∅ 28 | ∅ 270 | 195 | 22.5 | 45 | 8 | 170159 | 170596 |
| | | R 6 → DN 150 PN 16/40 | R 6 | 240/250 | 114 | 36 | ∅ 23/∅ 28 | ∅ 300 | 195 | 22.5 | 45 | 8 | 170160 | 170597 |
| | | R 6 → DN 200 PN 16 | R 6 | 295 | 134 | 36 | ∅ 23 | ∅ 340 | 195 | 15 | 30 | 12 | 170161 | 170598 |
| | | R 6 → DN 200 PN 40 | R 6 | 320 | 151 | 36 | ∅ 31 | ∅ 375 | 200 | 15 | 30 | 12 | 170162 | 170599 |

Thread-to-thread




TM01 2397 1698 - GrA2555

Fig. 26 Dimensional sketch and photo of the connecting piece thread-to-thread

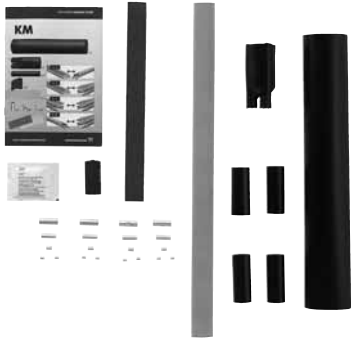

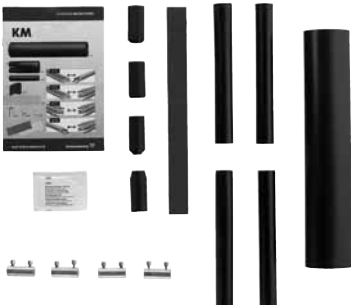
| Type | Pump outlet | Connecting piece | Dimensions | | | Product number | | |
|----------------------------|-------------|------------------|------------------|--------|--------|----------------|-----------|-----------|
| | | | Thread-to-thread | | L [mm] | EN 1.4301 | EN 1.4401 | EN 1.4539 |
| | | | A | B | | | | |
| SP 77 SP 95 | Rp 5 | R 5 → Rp 4 | R 5 | Rp 4 | 121 | 190063 | 190585 | 96917293 |
| | | R 5 → Rp 6 | R 5 | Rp 6 | 150 | 190069 | 190591 | 96917296 |
| | 5" NPT | 5" NPT → 4" NPT | 5" NPT | 4" NPT | 121 | 190064 | 190586 | - |
| | | 5" NPT → 6" NPT | 5" NPT | 6" NPT | 150 | 190070 | 190592 | - |
| SP 125 SP 160 SP 215 | Rp 6 | R 6 → Rp 5 | R 6 | Rp 5 | 150 | 200130 | 200640 | 200971 |
| | 6" NPT | 6" NPT → 5" NPT | 6" NPT | 5" NPT | 150 | 200135 | 200645 | - |

Cable termination kit with plug

| Product | Description | Version | Prod. no. |
|---|--|--|-----------|
|  | For watertight joining of motor cable and submersible drop cable in an acrylic tube filled with resin. Used for both single- and multi-core cables during installation of submersible pumps. 24 hours of hardening is required. | MS 402 and MS 4000 up to 7.5 kW: | |
| | | For cables up to 4 x 2.5 mm ² | 799901 |
| | | For cables up to 4 x 6 mm ² | 799902 |

TM00 7883 2296


Cable termination kit, type KM

| Product | Description | Version | | Prod. no. |
|---|--|-----------------|-----------------|-----------|
| | | Motor cable | Number of leads | |
|  | For watertight shrink-joining of motor cable and submersible drop cable. Enables the joining of <ul style="list-style-type: none"> cables of equal size. cables of different sizes. a cable lead and a single-lead. The joint is ready for use after a few minutes and requires no long hardening time as do resin joints. The joint cannot be separated. | Flat cable | 3 | 116251 |
| | | Flat cable | 4 | |
| | | Flat cable | 3 | 116252 |
|  | For watertight shrink-joining of motor cable and submersible drop cable. Enables the joining of <ul style="list-style-type: none"> cables of equal size. cables of different sizes. a cable lead and a single-lead. The joint is ready for use after a few minutes and requires no long hardening time as do resin joints. The joint cannot be separated. | Flat cable | 4 | 116255 |
| | | Flat cable | 3 | |
| | | Flat cable | 4 | |
|  | For watertight joining of motor cable and submersible drop cable. By means of shrink-screw-glue casting. | Screw-shrinking | 1 | 96828296 |
| | | Screw-shrinking | 1 | 116256 |
| | | Screw-shrinking | 4 | 96636867 |
| | | | 4 | 96636868 |
| | | | 4 | 96637278 |
| Screw-shrinking | 4 | 96637279 | | |

TM04 4977 2309

TM04 4978 2309


TM04 4979 2309

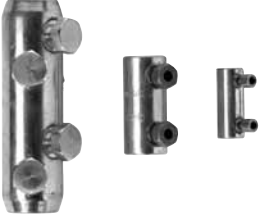
| Product | Description | Version | | Prod. no. | |
|--|---|-------------------|-----------------|-----------|----------|
| | | Motor cable | Number of leads | | |
|  <p style="text-align: right; margin-right: 20px;">TM04 4980 2309</p> | Reducing from 3 or 4 to one as from drop cable to single leads. | Reducer-shrinking | 10 - 50 | 3 | 96637318 |
| | | | 10 - 50 | 4 | 96637330 |
| | | | 16 - 70 | 3 | 96637331 |
| | | | 16 - 70 | 4 | 96637332 |
| | | 3 single leads | 1.5 - 6.0 | 3 | 116253 |
| | | 3 single leads | 10 - 25 | 3 | 116254 |
| | | 4 single leads | 1.5 - 4.0 | 4 | 116257 |
| | | 4 single leads | 6 - 16 | 4 | 116258 |

Mastik for flat cables

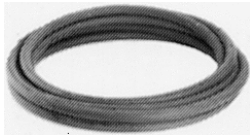
| Description | Prod. no. |
|---|-----------|
| Mastik for flat cables with separate earth, 48 pcs. | 96788662 |

Cable termination kit, types M0 to M6

| Product | Description | Version | | Prod. no. | |
|--|---|------------------------------|-----------------------------------|--------------|----------|
| | | Type | Fit cables with outer diameter of | | |
|  <p style="text-align: right; margin-right: 20px;">TM04 4981 2309</p> | For watertight joining of motor cable and submersible drop cable. The joint is encapsulated by the glue which is part of the kit. | Diameter of cable joint [mm] | | | |
| | | M0 | ∅ 40 | ∅ 6 to ∅ 15 | ID8903 |
| | | M1 | ∅ 46 | ∅ 9 to ∅ 23 | ID8904 |
| | | M2 | ∅ 52 | ∅ 17 to ∅ 31 | ID8905 |
| | | M3 | ∅ 77 | ∅ 26 to ∅ 44 | ID8906 |
| | | M4 | ∅ 97 | ∅ 29 to ∅ 55 | 91070700 |
| | | M5 | ∅ 110 | ∅ 40 to ∅ 62 | 96496918 |
| M6 | ∅ 144 | ∅ 50 to ∅ 80 | 96496919 | | |

| Product | Description | Version | | Prod. no. |
|--|---|---|----------------------|-----------|
| | | Cross section of the leads [mm ²] | Number of connectors | |
|  <p style="text-align: right; margin-right: 20px;">GrA 8251</p> | Accessories for cable kit, types M0 to M6. Screw connectors only. | 6-50 | 4 | 96626021 |
| | | 19-95 | | 96626022 |
| | | 35-185 | | 96626023 |
| | | 70-240 | | 96626028 |

Submersible drop cable

| Product | Description | Number of leads and nominal cross section [mm ²] | Outer diameter min./max. [mm] | Weight [kg/m] | Product no. |
|---|--|--|-------------------------------|---------------|-------------|
|  <p>TM00 7882 2296</p> | <p>Suitable for</p> <ul style="list-style-type: none"> • continuous application in groundwater and potable water (approved for potable-water applications) • connection of electrical equipment, such as submersible motors • installation depths up to 500 metres and average loads. <p>Insulation and sheath are made of special EPR-based elastomer materials adapted to applications in water.</p> <p>Maximum permissible water temperature: 60 °C. Maximum permissible lead service temperature: 90 °C.</p> <p>Further cable sizes are available on request.</p> | 1 x 25 | 12.5 / 16.5 | 0.410 | ID4072 |
| | | 1 x 35 | 14.0 / 18.5 | 0.560 | ID4073 |
| | | 1 x 50 | 16.5 / 21.0 | 0.740 | ID4074 |
| | | 1 x 70 | 18.5 / 23.5 | 1.000 | ID4075 |
| | | 1 x 95 | 21.0 / 26.5 | 1.300 | ID4076 |
| | | 1 x 120 | 23.5 / 28.5 | 1.650 | ID4077 |
| | | 1 x 150 | 26.0 / 31.5 | 2.000 | ID4078 |
| | | 1 x 185 | 27.5 / 34.5 | 2.500 | ID4079 |
| | | 3 x 25 | 26.5 / 34.0 | 1.450 | ID4062 |
| | | 4G1.5 | 10.5 / 13.5 | 0.190 | ID4063 |
| | | 4G2.5 | 12.5 / 15.5 | 0.280 | ID4064 |
| | | 4G4.0 | 14.5 / 18.0 | 0.390 | ID4065 |
| | | 4G6.0 | 16.5 / 22.0 | 0.520 | ID4066 |
| | | 4G10 | 22.5 / 24.5 | 0.950 | ID4067 |
| | | 4G16 | 26.5 / 28.5 | 1.400 | ID4068 |
| | | 4G25 | 32.0 / 34.0 | 1.950 | ID4069 |
| | | 4G35 | 33.0 / 42.5 | 2.700 | 96432949 |
| 4G50 | 38.0 / 48.5 | 3.600 | 96432950 | | |
| 4G70 | 43.0 / 54.5 | 4.900 | 96432951 | | |

Zinc anodes

Application

Cathodic protection by means of zinc can be used for corrosion protection of SP pumps in chloride-containing liquids, such as brackish water and seawater.

Sacrificial anodes are placed on the outside of the pump and motor as protection against corrosion.

The number of anodes required depends on the pump and motor in question.

Please contact Grundfos for further details.

Liquid temperatures

Seawater: Up to 35 °C.

Brackish water (min. 1500 g/m³ chloride): Up to 35 °C.

Anode life

The zinc anodes have a life of one to four years, depending on operating conditions (temperature, flow and chloride content).

Product numbers of zinc anodes

| Zinc anodes for pumps | | | | | | | | | | |
|-----------------------|--------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| Product number | Used for pump type | | | | | | | | | |
| | SP 1A to SP 14A | SP 17 | SP 30 | SP 46 | SP 60 | SP 77 | SP 95 | SP 125 | SP 160 | SP 215 |
| 96421444 | • | | | | | | | | | |
| 96421445 | | • | • | • | • | | | | | |
| 96421447 | | | | | | • | • | | | |
| 96421448 | | | | | | | • | | | |
| 96421449 | | | | | | | | • | | |
| 96421450 | | | | | | | | • | • | • |

| Zinc anodes for motors | | | | |
|------------------------|-----------|-----------|------------|------------|
| 4" motors | 6" motors | 8" motors | 10" motors | 12" motors |
| 96421444 | 96421446 | 96421450 | 96564808 | 96421451 |

Flow sleeves

Grundfos offers a complete range of stainless-steel flow sleeves for both vertical and horizontal operation. Flow sleeves are recommended for all applications in which motor cooling is insufficient. The result is a general extension of motor life. Flow sleeves are to be fitted in these cases:

- If the submersible pump is exposed to high thermal load like current unbalance, dry running, overload, high ambient temperature, bad cooling conditions.
- If aggressive liquids are pumped, since corrosion is doubled for every 10 °C the temperature rises.
- If sedimentation or deposits occur around and/or on the motor.

Note: More information about flow sleeves is available on request.



TM01 0751 2197 - TM01 0750 2197

Fig. 27 Flow sleeves

SA-SPM control boxes

Application

SA-SPM control boxes are used as starting units for single-phase, 3-wire motors, types MS 402B and MS 4000.

The **SA-SPM 2** is used for single-phase MS 402B motors with a power input lower than or equal to 0.75 kW.

The **SA-SPM 3** is used for single-phase MS 402B and MS 4000 motors with a power input higher than or equal to 1.1 kW. The SA-SPM 3 incorporates a motor-protective circuit breaker and thus protects the motor against overload.

Technical data

Enclosure class: IP42.

Ambient temperature: -20 °C to +60 °C.

Relative humidity: Maximum 95 %, normal non-aggressive atmosphere.

Product numbers

| Product number 50 Hz | SA-SPM control box | | | | | | | |
|-------------------------|--------------------|-----------|----------|---------|---------|--------|---------|--------|
| | SA-SPM 2 | | SA-SPM 3 | | MS 402B | | MS 4000 | |
| | 1 x 220-230 V | 1 x 240 V | 0.37 kW | 0.55 kW | 0.75 kW | 1.1 kW | 1.5 kW | 2.2 kW |
| 82219512 | • | • | • | | | | | |
| 82219513 | • | • | | • | | | | |
| 82219514 | • | • | | | • | | | |
| 82219315 | • | • | | | | • | | |
| 82219306 | • | • | | | | | • | |
| 82219307 | • | • | | | | | | • |
| 82249512 | • | • | • | | | | | |
| 82249513 | • | • | | • | | | | |
| 82249514 | • | • | | | • | | | |
| 82249315 | • | • | | | | • | | |
| 82249306 | • | • | | | | | • | |
| 82249307 | • | • | | | | | | • |

Capacitors for MS 402B PSC

MS 402B PSC motors must be connected to the mains via a run capacitor that is permanently connected during operation.

Product numbers

| Capacitors for MS 402B PSC | | | |
|----------------------------|------------|-----------------------|-------------------------|
| Capacitor size | Power [kW] | Capacitor Product no. | Control box Product no. |
| 16 µF, 400 V, 50 Hz | 0.37 | ID2970 | 96023791 |
| 20 µF, 400 V, 50 Hz | 0.55 | ID2971 | 96023792 |
| 30 µF, 400 V, 50 Hz | 0.75 | ID2973 | 96023793 |
| 40 µF, 400 V, 50 Hz | 1.1 | ID2974 | 96023794 |

Pt100 sensor

The Pt100 sensor offers these features

- continuous monitoring of the motor temperature
- protection against too high motor temperature.

Protecting the motor against too high motor temperature is the simplest and cheapest way of avoiding that the motor lifetime is reduced. The Pt100 ensures that the operating conditions are not exceeded and indicates when it is time for service of the motor.

Monitoring and protection by means of a Pt100 require the following parts:


- Pt100 sensor
- PR 5714 relay
- cable.

The PR 5714 relay is fitted with a Pt100 sensor. The following temperature limits are preset on delivery:


- 60 °C warning limit
- 75 °C stop limit.

Technical data


| Relay type | |
|---------------------|--|
| PR 5714 | |
| Enclosure class | IP65 (mounted in a control panel) |
| Ambient temperature | -20 °C to +60 °C |
| Relative humidity | 95 % (condensating) |
| Voltage variation | • 1 x 24-230 VAC ± 10 %, 50-60 Hz • 24-250 VDC ± 20 % |
| Approvals | UL, DNV |
| Marking | CE |

| Pt100 sensor with/without PR 5714 relay and cable | Cable length [m] | PR 5714 | Product number | | |
|--|------------------|---------|----------------|----------------------|------------------------|
| | | | MS6 | MMS 6000 MMS 8000 | MMS 10000 MMS 12000 |
|  | 20 | Yes | 96408953 | 96494596 | 96437287 |
| | 40 | Yes | 96408681 | 96494597 | 96437288 |
| | 60 | Yes | 96408954 | 96494598 | 96437289 |
| | 80 | Yes | 96408955 | 96494599 | 96437290 |
| | 100 | Yes | 96408956 | 96494610 | 96437291 |
| | 20 | No | 96658626 | 96658629 | 96658633 |
| | 40 | No | 96658627 | 96658630 | 96658634 |
| | 60 | No | 96658628 | 96658631 | 96658635 |
| | 80 | No | 96658637 | 96658632 | 96658636 |
| | 100 | No | 96658638 | 96658639 | 96658640 |


GrA3187

| PR 5714 relay | Voltage | Product number |
|---|-----------------------------------|----------------|
|  | 24-230 VAC, 50/60 Hz / 24-250 VDC | 96913234 |




GrA3186

| Pt100 sensor, including cable | Cable length [m] | Product number | |
|---|------------------|-----------------------------|------------------------|
| | | MS6 MMS 6000 MMS 8000 | MMS 10000 MMS 12000 |
|  | 20 | 96913237 | 96913264 |
| | 40 | 96913253 | 96913265 |
| | 60 | 96913256 | 96913268 |
| | 80 | 96913260 | 96913269 |
| | 100 | 96913263 | 96913313 |

GrA3190

| Staybolt kits for Pt100 in MS6 and MS 6000 | Description | Product number |
|---|--|----------------|
|  | Staybolt kit for Pt100. Suitable for MS 6000 model A, MS 6000 model B and MS6. Material: EN 1.4401/AISI 904. | 96803373 |
| | Staybolt kit for Pt100. Suitable for MS6 and MS 6000 model B. Material: EN 1.4539/AISI 316. | 97550639 |

GrA3191

| Insertion probe, MMS 10000 and MMS 12000 | Description | Product number |
|---|--|----------------|
|  | <p style="writing-mode: vertical-rl; transform: rotate(180deg);">TM04 3560 4508</p> <p>Insertion probe to be used for Pt100 in MMS 10000 and MMS 12000.</p> | 96913215 |
| Extension kit for sensor cable for Pt100 | Description | Product number |
|  | <p style="writing-mode: vertical-rl; transform: rotate(180deg);">TM00 7885 2296</p> <p>Extension kit for Pt100 sensor cable. For watertight shrink-joining of the sensor cable. Extra sensor cable must be ordered separately.</p> | 96571480 |
| Sensor cable | Description | Product number |
|  | <p style="writing-mode: vertical-rl; transform: rotate(180deg);">TM00 7882 2296</p> <p>Drop cable for extension. Mention length when ordering. Maximum recommended length: 350 m.</p> | RM5271 |

Pt1000 sensor

The Pt1000 sensor offers these features

- continuous monitoring of the motor temperature
- protection against too high motor temperature.

Protecting the motor against too high motor temperature is the simplest and cheapest way of avoiding that the motor lifetime is reduced. The Pt1000 ensures that the operating conditions are not exceeded and indicates when it is time for service of the motor.

Monitoring and protection by means of a Pt1000 require the following parts:

- Pt1000 sensor
- CU 220 control unit
- cable
- staybolt kit for Pt1000.


The CU 220 control unit is fitted with a Pt1000 sensor. The following temperature limits are preset on delivery:

- 50 °C warning limit
- 60 °C stop limit.


The Pt1000 sensor works within the temperature range of -60 °C to +120 °C.

Technical data


| CU 220 | |
|---------------------|-----------------------------------|
| Enclosure class | IP65 (mounted in a control panel) |
| Ambient temperature | 0 °C to +55 °C |
| Relative humidity | 20-80 % (condensating) |
| Voltage variation | 1 x 230 V -15 % / +10 %, 50 Hz |
| Approvals | UR |
| Marking | CE |

| Pt1000 sensor with CU 220 control unit, cable and staybolt or insertion probe | Cable length [m] | CU 220 | Product number | | |
|--|------------------|--------|----------------|----------------------|------------------------|
| | | | MS6 | MMS 6000 MMS 8000 | MMS 10000 MMS 12000 |
|  | 20 | Yes | 96803207 | 96803233 | 96803238 |
| | 40 | Yes | 96803241 | 96803252 | 96803253 |
| | 60 | Yes | 96803254 | 96803255 | 96803257 |
| | 80 | Yes | 96803258 | 96803292 | 96803294 |
| | 100 | Yes | 96803301 | 96803312 | 96803313 |


TM04 3561 4508 - TM04 3563 450
TM04 3562 4508 - TM04 3560 4508

| CU 220 control unit | Voltage | Product number |
|---|--------------------------------|----------------|
|  | 1 x 230 V -15 % / +10 %, 50 Hz | 96797484 |




TM04 3561 4508

| Pt1000 sensor including cable | Cable length [m] | Product number |
|---|------------------|---|
| | | MS6 MMS 6000 MMS 8000 MMS 10000 MMS 12000 |
|  | 20 | 96804042 |
| | 40 | 96804044 |
| | 60 | 96804064 |
| | 80 | 96804065 |
| | 100 | 96804067 |

TM04 3563 4508

| Staybolt kits for Pt1000 in MS6 and MS 6000 | Description | Product number |
|---|---|----------------|
|  | Staybolt kit for Pt1000. Suitable for MS 6000 model A, MS 6000 model B and MS6. Material: EN 1.4401/AISI 904. | 96803373 |
| | Staybolt kit for Pt1000. Suitable for MS6 and MS 6000 model B. Material: EN 1.4539/AISI 316. | 97550639 |

GrA3191

| Insertion probe for MMS 10000 and MMS 12000 | Description | Product number |
|---|---|----------------|
|  | <p style="writing-mode: vertical-rl; transform: rotate(180deg);">TM04 3560 4508</p> <p>Insertion probe to be used for Pt1000 in MMS 10000 and MMS 12000.</p> | 96913215 |
| Extension kit for sensor cable for Pt1000 | Description | Product number |
|  | <p style="writing-mode: vertical-rl; transform: rotate(180deg);">TM00 7885 2296</p> <p>Extension kit for Pt1000 sensor cable. For watertight shrink-joining of the sensor cable. Extra sensor cable must be ordered separately.</p> | 96571480 |
| Sensor cable | Description | Product number |
|  | <p style="writing-mode: vertical-rl; transform: rotate(180deg);">TM00 7882 2296</p> <p>Drop cable for extension. Mention length when ordering. Maximum recommended length: 350 m.</p> | RM5271 |

Energy consumption of submersible pumps

The percentage distribution of service life costs of a submersible pump for water supply is as follows:

- 5 % initial costs (pump)
- 85 % operating costs / energy consumption
- 10 % maintenance costs.

It is obvious that the highest savings can be achieved within energy consumption!

The annual energy consumption, E, of a submersible pump can be calculated as follows:

$$E = c \times h \times P_1 \text{ (EURO)}$$

c = specific energy price (EURO/kWh)

h = operating hours/year (hours)

P₁ = power input of the submersible pump (kW).

Example: Calculation of the annual energy consumption of the submersible pump, type SP 125-3.

SP 125-3 with MS6, 30 kW, 3 x 400 V, 50 Hz.

Duty point:

Flow rate: Q = 120 m³/h

Total head: H = 63 m

Specific energy price: c = EURO 0.1/kWh
(consisting of day and night rate)

Operating hours/year: h = 3200.

$$P_1 = \frac{Q \times H \times \rho}{367 \times \eta_{\text{pump}} \times \eta_{\text{motor}}} \text{ in kW}$$

Q = m³/h

H = m

Density ρ = kg/dm³ (assumed 1)

367 = conversion factor

η_{pump} = (not to be confused with the stage efficiency curve)

η_{motor} = (example 84.5 %, in equation 0.845)

By showing the P₂/Q curve we make it easier for you to calculate the energy consumption.

$$P_1 = \frac{P_2}{\eta_{\text{motor}}}$$

P₂ = 26 kW (power requirement of SP 125-3 pump at 120 m³/h, from curve P₂/Q on page 58).

Calculation of motor efficiency at duty point

As standard, the SP 125-3 is fitted with a 30 kW MS6 motor.

At duty point (Q = 120 m³/h), the pump requires 26 kW, thus:

a motor load of 87 % (26 kW/30 kW) and a power reserve of 13 %.

From the table on page 73, the motor efficiency can be read as:

85 % at a load of 75 % (η_{75%})

84 % at a load of 100 % (η_{100%})

The interpolated value in this example is

η_{motor} = 84.5 %, η_{motor} = 0.845.

$$P_1 = \frac{26}{0.845} = 30.77 \text{ kW}$$

E = 0.1 EURO/kWh x 3200 h x 30.77 kW.

The annual energy costs amount to EURO 9846.

If we compare the energy costs of this energy-efficient Grundfos submersible pump with a submersible pump, type SP 120-4, from 1995, (Q = 110 to 120 m³/h; H = 63 to 58 m; η_{motor} = 82 %), we see that at the same annual total flow of 384,000 m³ and the same current price of 0.1 EURO/kWh, the annual energy consumption of the old pump amounts to EURO 12,777.

Wear and deposits on the motor and the pump were not taken into account.

The pay-off time, A, (months) is calculated as follows:

$$A = \frac{\text{Purchase price of energy - efficient pump}}{\text{Energy savings/year}} \times 12$$

The purchase price of the energy-efficient pump is EURO 4,090.

$$A = \frac{4090}{(\text{EURO } 12,777 - \text{EURO } 9,846)} \times 12 = 16.7 \text{ months}$$

The pay-off time is 16.7 months.

Note: The complete system should be sized for energy efficiency (cable/discharge pipes).

Cable sizing

In order to obtain an economical duty of the pump, the voltage drop should be low.

Today large water works already size cables for a maximum voltage drop of 1 %.

The hydraulic resistance in the discharge pipe should be as low as possible.

Cables

Grundfos offers submersible drop cables for all applications: 3-core cable, 4-core cable, single leads.

Cables for Grundfos 4" submersible motors are available with or without plugs. The submersible drop cable is chosen according to application and type of installation.

Standard version: Max. liquid temperature +60 °C.

Hot-water version: Max. liquid temperature +70 °C, for short periods up to +90 °C (for MS only).

Tables indicating cable dimension in borehole

The tables indicate the maximum length of drop cables in metres from motor starter to pump at direct-on-line starting at different cable dimensions.

If star-delta starting is used, the current will be reduced by $\sqrt{3}$ ($I \times 0.58$), meaning that the cable length may be $\sqrt{3}$ longer ($L \times 1.73$) than indicated in the tables.

If for example the operating current is 10 % lower than the full-load current, the cable may be 10 % longer than indicated in the tables.

The calculation of the cable length is based on a maximum voltage drop of 1 % to 3 % of the rated voltage and a water temperature of maximum 30 °C.

In order to minimise operating losses, the cable cross-section may be increased compared to what is indicated in the tables. This is only economical if the borehole provides the necessary space, and if the operational time of the pump is long, especially if the operating voltage is below the rated voltage.

The table values are calculated on the basis of the formula:

Max. cable length of a single-phase submersible pump:

$$L = \frac{U \times \Delta U}{I \times 2 \times 100 \times (\cos\varphi \times \frac{\rho}{q} + \sin\varphi \times X_L)} \quad [\text{m}]$$

Max. cable length of a three-phase submersible pump:

$$L = \frac{U \times \Delta U}{I \times 1.73 \times 100 \times (\cos\varphi \times \frac{\rho}{q} + \sin\varphi \times X_L)} \quad [\text{m}]$$

Formula designations

U = Rated voltage [V]

ΔU = Voltage drop [%]

I = Rated current of the motor [A]

$\cos\varphi$ = Power factor

ρ = Specific resistance: 0.02 [$\Omega \text{ mm}^2$]

q = Cross-section of submersible drop cable [mm^2]

$\sin\varphi = \sqrt{1 - \cos^2\varphi}$

X_L = Inductive resistance: 0.078×10^{-3} [Ω/m]

Example

Motor size: 30 kW, MMS 8000

Starting method: Direct on line

Rated voltage (U): 3 x 400 V, 50 Hz

Voltage drop (ΔU): 3 %

Rated current (I): 64.0 A

Power factor ($\cos\varphi$): 0.85

Specific resistance (ρ): 0.02

Cross-section (q): 25 mm^2

$\sin\varphi$: 0.54

Inductive resistance (X_L): 0.078×10^{-3} [Ω/m]

$$L = \frac{400 \times 3}{64.0 \times 1.73 \times 100 \times (0.85 \times \frac{0.02}{25} + 0.54 \times 0.078 \times 10^{-3})}$$

L = 150 m.

Cable dimensions at 1 x 230 V, 50 Hz

| Motor | kW | I _n [A] | 1.5 mm ² | 2.5 mm ² | 4 mm ² | 6 mm ² | 10 mm ² |
|-------|------|--------------------|---------------------|---------------------|-------------------|-------------------|--------------------|
| 4" | 0.37 | 4.0 | 111 | 185 | 295 | 440 | 723 |
| | 0.55 | 5.8 | 80 | 133 | 211 | 315 | 518 |
| | 0.75 | 7.5 | 58 | 96 | 153 | 229 | 377 |
| | 1.1 | 7.3 | 48 | 79 | 127 | 190 | 316 |
| | 1.5 | 10.2 | 34 | 57 | 92 | 137 | 228 |
| | 2.2 | 14 | 24 | 43 | 68 | 102 | 169 |

Maximum cable length in metres from motor starter to pump.

Cable dimensions at 3 x 400 V, 50 Hz, DOL

Voltage drop: 1 %

| Motor | kW | I _n [A] | Cos φ 100 % | Dimensions [mm ²] | | | | | | | | | | | | | | | |
|-----------------------------|------|--------------------|-------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | | | 1.5 | 2.5 | 4 | 6 | 10 | 16 | 25 | 35 | 50 | 70 | 95 | 120 | 150 | 185 | 240 | 300 |
| 4" | 0.37 | 1.4 | 0.64 | 192 | 318 | 506 | 752 | | | | | | | | | | | | |
| 4" | 0.55 | 2.2 | 0.64 | 122 | 203 | 322 | 479 | 783 | | | | | | | | | | | |
| 4" | 0.75 | 2.3 | 0.72 | 104 | 173 | 275 | 409 | 672 | | | | | | | | | | | |
| 4" | 1.1 | 3.4 | 0.72 | 70 | 117 | 186 | 277 | 455 | 712 | | | | | | | | | | |
| 4" | 1.5 | 4.2 | 0.75 | 55 | 91 | 145 | 215 | 354 | 556 | 844 | | | | | | | | | |
| 4" | 2.2 | 5.5 | 0.82 | 38 | 64 | 101 | 151 | 249 | 393 | 599 | 818 | | | | | | | | |
| 4" | 3.0 | 7.85 | 0.77 | 29 | 47 | 75 | 112 | 185 | 291 | 442 | 601 | 822 | | | | | | | |
| 4" | 4.0 | 9.6 | 0.8 | 22 | 37 | 59 | 89 | 146 | 230 | 350 | 477 | 656 | 874 | | | | | | |
| 4" | 5.5 | 13 | 0.81 | 16 | 27 | 43 | 65 | 107 | 168 | 256 | 349 | 480 | 641 | 821 | 983 | | | | |
| 4" | 7.5 | 18.8 | 0.78 | | 20 | 31 | 46 | 76 | 120 | 183 | 248 | 340 | 452 | 577 | 687 | 804 | 923 | | |
| 6" | 5.5 | 13.6 | 0.77 | 16 | 27 | 44 | 65 | 107 | 168 | 255 | 347 | 475 | 629 | 801 | 953 | | | | |
| 6" | 7.5 | 17.6 | 0.8 | 12 | 20 | 32 | 48 | 80 | 125 | 191 | 260 | 358 | 477 | 610 | 728 | 855 | 984 | | |
| 6" | 9.2 | 21.8 | 0.81 | | 16 | 26 | 39 | 64 | 100 | 153 | 208 | 287 | 382 | 490 | 586 | 689 | 795 | 935 | |
| 6" | 11 | 24.8 | 0.83 | | 14 | 22 | 33 | 55 | 86 | 132 | 180 | 248 | 332 | 427 | 512 | 604 | 699 | 826 | 942 |
| 6" | 13 | 30 | 0.81 | | | 19 | 28 | 46 | 73 | 111 | 151 | 208 | 278 | 356 | 426 | 501 | 577 | 680 | 772 |
| 6" | 15 | 34 | 0.82 | | | | 24 | 40 | 64 | 97 | 132 | 182 | 244 | 313 | 375 | 441 | 510 | 601 | 684 |
| 6" | 18.5 | 42 | 0.81 | | | | 20 | 33 | 52 | 79 | 108 | 149 | 198 | 254 | 304 | 358 | 412 | 486 | 551 |
| 6" | 22 | 48 | 0.84 | | | | | 28 | 44 | 67 | 92 | 127 | 170 | 220 | 264 | 312 | 361 | 428 | 489 |
| 6" | 26 | 57 | 0.84 | | | | | 24 | 37 | 57 | 78 | 107 | 144 | 185 | 222 | 263 | 304 | 361 | 412 |
| 6" | 30 | 66.5 | 0.83 | | | | | | 32 | 49 | 67 | 92 | 124 | 159 | 191 | 225 | 261 | 308 | 351 |
| 6" | 37 | 85.5 | 0.79 | | | | | | | 40 | 54 | 74 | 99 | 126 | 150 | 176 | 203 | 238 | 269 |
| 8" | 22 | 48 | 0.84 | | | | | 28 | 44 | 67 | 92 | 127 | 170 | 220 | 264 | 312 | 361 | 428 | 489 |
| 8" | 26 | 56.5 | 0.85 | | | | | 23 | 37 | 57 | 78 | 107 | 144 | 186 | 224 | 265 | 307 | 365 | 418 |
| 8" | 30 | 64 | 0.85 | | | | | | 33 | 50 | 68 | 95 | 127 | 164 | 197 | 234 | 271 | 322 | 369 |
| 8" | 37 | 78.5 | 0.85 | | | | | | 27 | 41 | 56 | 77 | 104 | 134 | 161 | 191 | 221 | 263 | 301 |
| 8" | 45 | 96.5 | 0.82 | | | | | | | 34 | 47 | 64 | 86 | 110 | 132 | 155 | 180 | 212 | 241 |
| 8" | 55 | 114 | 0.85 | | | | | | | | 38 | 53 | 71 | 92 | 111 | 131 | 152 | 181 | 207 |
| 8" | 63 | 132 | 0.83 | | | | | | | | | 47 | 62 | 80 | 96 | 113 | 131 | 155 | 177 |
| 8" | 75 | 152 | 0.86 | | | | | | | | | 40 | 53 | 69 | 83 | 98 | 114 | 136 | 156 |
| 8" | 92 | 186 | 0.86 | | | | | | | | | | 43 | 56 | 68 | 80 | 94 | 111 | 128 |
| 8" | 110 | 224 | 0.87 | | | | | | | | | | | 47 | 56 | 67 | 78 | 93 | 107 |
| 10" | 75 | 156 | 0.84 | | | | | | | | | | 52 | 68 | 81 | 96 | 111 | 132 | 151 |
| 10" | 92 | 194 | 0.82 | | | | | | | | | | 43 | 55 | 66 | 77 | 89 | 105 | 120 |
| 10" | 110 | 228 | 0.84 | | | | | | | | | | | 46 | 56 | 66 | 76 | 90 | 103 |
| 10" | 132 | 270 | 0.84 | | | | | | | | | | | | 47 | 55 | 64 | 76 | 87 |
| 10" | 147 | 315 | 0.81 | | | | | | | | | | | | | 48 | 55 | 65 | 74 |
| 10" | 170 | 365 | 0.81 | | | | | | | | | | | | | | | 56 | 63 |
| 10" | 190 | 425 | 0.79 | | | | | | | | | | | | | | | 48 | 54 |
| 12" | 147 | 305 | 0.83 | | | | | | | | | | | | | 49 | 57 | 67 | 77 |
| 12" | 170 | 345 | 0.85 | | | | | | | | | | | | | | 50 | 60 | 68 |
| 12" | 190 | 390 | 0.84 | | | | | | | | | | | | | | | 53 | 60 |
| 12" | 220 | 445 | 0.85 | | | | | | | | | | | | | | | | 53 |
| 12" | 250 | 505 | 0.85 | | | | | | | | | | | | | | | | |
| Max. current for cable [A]* | | | | 18.5 | 25 | 34 | 43 | 60 | 80 | 101 | 126 | 153 | 196 | 238 | 276 | 319 | 364 | 430 | 497 |

* At particularly favourable heat dissipation conditions.

Maximum cable length in metres from motor starter to pump.

Cable dimensions at 3 x 400 V, 50 Hz, DOL

Voltage drop: 3 %

| Motor | kW | I _n [A] | Cos φ 100 % | Dimensions [mm ²] | | | | | | | | | | | | | | | |
|-----------------------------|------|--------------------|-------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | | | 1.5 | 2.5 | 4 | 6 | 10 | 16 | 25 | 35 | 50 | 70 | 95 | 120 | 150 | 185 | 240 | 300 |
| 4" | 0.37 | 1.4 | 0.64 | 576 | 955 | | | | | | | | | | | | | | |
| 4" | 0.55 | 2.2 | 0.64 | 366 | 608 | 966 | | | | | | | | | | | | | |
| 4" | 0.75 | 2.3 | 0.72 | 312 | 518 | 824 | | | | | | | | | | | | | |
| 4" | 1.1 | 3.4 | 0.72 | 211 | 350 | 558 | 830 | | | | | | | | | | | | |
| 4" | 1.5 | 4.2 | 0.75 | 164 | 273 | 434 | 646 | | | | | | | | | | | | |
| 4" | 2.2 | 5.5 | 0.82 | 115 | 191 | 304 | 453 | 748 | | | | | | | | | | | |
| 4" | 3.0 | 7.85 | 0.77 | 86 | 142 | 226 | 337 | 555 | 872 | | | | | | | | | | |
| 4" | 4.0 | 9.6 | 0.8 | 67 | 112 | 178 | 266 | 438 | 689 | | | | | | | | | | |
| 4" | 5.5 | 13 | 0.81 | 49 | 82 | 130 | 194 | 320 | 504 | 768 | | | | | | | | | |
| 4" | 7.5 | 18.8 | 0.78 | | 59 | 93 | 139 | 229 | 360 | 548 | 745 | | | | | | | | |
| 6" | 5.5 | 13.6 | 0.77 | 49 | 82 | 131 | 195 | 320 | 503 | 765 | | | | | | | | | |
| 6" | 7.5 | 17.6 | 0.8 | 37 | 61 | 97 | 145 | 239 | 376 | 573 | 781 | | | | | | | | |
| 6" | 9.2 | 21.8 | 0.81 | | 49 | 78 | 116 | 191 | 300 | 458 | 625 | 860 | | | | | | | |
| 6" | 11 | 24.8 | 0.83 | | 42 | 67 | 99 | 164 | 258 | 395 | 540 | 744 | 995 | | | | | | |
| 6" | 13 | 30 | 0.81 | | | 56 | 84 | 139 | 218 | 333 | 454 | 625 | 833 | | | | | | |
| 6" | 15 | 34 | 0.82 | | | | 73 | 121 | 191 | 291 | 397 | 547 | 731 | 938 | | | | | |
| 6" | 18.5 | 42 | 0.81 | | | | 60 | 99 | 156 | 238 | 324 | 446 | 595 | 763 | 913 | | | | |
| 6" | 22 | 48 | 0.84 | | | | | 84 | 132 | 202 | 276 | 382 | 511 | 659 | 792 | 935 | | | |
| 6" | 26 | 57 | 0.84 | | | | | 71 | 111 | 170 | 233 | 321 | 431 | 555 | 667 | 788 | 913 | | |
| 6" | 30 | 66.5 | 0.83 | | | | | | 96 | 147 | 201 | 277 | 371 | 477 | 573 | 676 | 782 | 925 | |
| 6" | 37 | 85.5 | 0.79 | | | | | | | 119 | 162 | 223 | 296 | 378 | 451 | 529 | 608 | 713 | 806 |
| 8" | 22 | 48 | 0.84 | | | | | 84 | 132 | 202 | 276 | 382 | 511 | 659 | 792 | 935 | | | |
| 8" | 26 | 56.5 | 0.85 | | | | | 70 | 111 | 170 | 233 | 322 | 432 | 557 | 671 | 794 | 922 | | |
| 8" | 30 | 64 | 0.85 | | | | | | 98 | 150 | 205 | 284 | 381 | 492 | 592 | 701 | 814 | 967 | |
| 8" | 37 | 78.5 | 0.85 | | | | | | 80 | 122 | 168 | 232 | 311 | 401 | 483 | 572 | 664 | 789 | 903 |
| 8" | 45 | 96.5 | 0.82 | | | | | | | 102 | 140 | 193 | 257 | 330 | 396 | 466 | 539 | 635 | 723 |
| 8" | 55 | 114 | 0.85 | | | | | | | | 115 | 159 | 214 | 276 | 333 | 394 | 457 | 543 | 622 |
| 8" | 63 | 132 | 0.83 | | | | | | | | | 140 | 187 | 240 | 289 | 340 | 394 | 466 | 531 |
| 8" | 75 | 152 | 0.86 | | | | | | | | | 119 | 160 | 206 | 249 | 295 | 343 | 409 | 469 |
| 8" | 92 | 186 | 0.86 | | | | | | | | | | 130 | 169 | 203 | 241 | 281 | 334 | 383 |
| 8" | 110 | 224 | 0.87 | | | | | | | | | | | 140 | 169 | 200 | 233 | 279 | 321 |
| 10" | 75 | 156 | 0.84 | | | | | | | | | | 157 | 203 | 244 | 288 | 334 | 395 | 452 |
| 10" | 92 | 194 | 0.82 | | | | | | | | | | 128 | 164 | 197 | 232 | 268 | 316 | 360 |
| 10" | 110 | 228 | 0.84 | | | | | | | | | | | 139 | 167 | 197 | 228 | 271 | 309 |
| 10" | 132 | 270 | 0.84 | | | | | | | | | | | | 141 | 166 | 193 | 228 | 261 |
| 10" | 147 | 315 | 0.81 | | | | | | | | | | | | | 143 | 165 | 194 | 221 |
| 10" | 170 | 365 | 0.81 | | | | | | | | | | | | | | | 168 | 190 |
| 10" | 190 | 425 | 0.79 | | | | | | | | | | | | | | | 143 | 162 |
| 12" | 147 | 305 | 0.83 | | | | | | | | | | | | | 147 | 170 | 202 | 230 |
| 12" | 170 | 345 | 0.85 | | | | | | | | | | | | | | 151 | 179 | 205 |
| 12" | 190 | 390 | 0.84 | | | | | | | | | | | | | | | 158 | 181 |
| 12" | 220 | 445 | 0.85 | | | | | | | | | | | | | | | | 159 |
| 12" | 250 | 505 | 0.85 | | | | | | | | | | | | | | | | |
| Max. current for cable [A]* | | | | 18.5 | 25 | 34 | 43 | 60 | 80 | 101 | 126 | 153 | 196 | 238 | 276 | 319 | 364 | 430 | 497 |

* At particularly favourable heat dissipation conditions.

Maximum cable length in metres from motor starter to pump.

Sizing of cable

Calculation of cable cross-section

Formula designations

U = Rated voltage [V]

ΔU = Voltage drop [%]

I = Rated current of the motor [A]

$\cos\varphi$ = Power factor

$\rho = 1/\chi$

Materials of cable:

Copper: $\chi = 52 \text{ m}/\Omega \times \text{mm}^2$

Aluminium: $\chi = 35 \text{ m}/\Omega \times \text{mm}^2$

q = Cross-section [mm^2]

$\sin\varphi = \sqrt{1 - \cos^2\varphi}$

$X_L = \text{Inductive resistance } 0.078 \times 10^{-3} \text{ } [\Omega/\text{m}]$

L = Length of cable [m]

$\Delta p = \text{Power loss [W]}$

For calculation of the cross-section of the submersible drop cable, use this formula:

DOL

$$q = \frac{I \times 1.73 \times 100 \times L \times \rho \times \cos\varphi}{U \times \Delta U - (I \times 1.73 \times 100 \times L \times X_L \times \sin\varphi)}$$

Star-delta

$$q = \frac{I \times 100 \times L \times \rho \times \cos\varphi}{U \times \Delta U - (I \times 1.73 \times 100 \times L \times X_L \times \sin\varphi)}$$

The values of the rated current (I) and the power factor ($\cos\varphi$) can be read in the tables on pages 73 to 78.

Calculation of the power loss

For calculation of the power loss in the submersible drop cable, use this formula:

$$\Delta p = \frac{3 \times L \times \rho \times I^2}{q}$$

Example

Motor size: 45 kW, MMS 8000

Voltage: 3 x 400 V, 50 Hz

Starting method: Direct on line

Rated current (I_n): 96.5 A

Required cable length (L): 200 m

Water temperature: 30 °C.

Cable selection

Choice A: 3 x 150 mm^2

Choice B: 3 x 185 mm^2 .

Calculation of power loss

Choice A:

$$\Delta p_A = \frac{3 \times L \times \rho \times I^2}{q}$$

$$\Delta p_A = \frac{3 \times 200 \times 0.02 \times 96.5^2}{150}$$

$\Delta p_A = 745 \text{ W}$.

Choice B:

$$\Delta p_B = \frac{3 \times 200 \times 0.02 \times 96.5^2}{185}$$

$\Delta p_B = 604 \text{ W}$.

Savings

Operating hours/year: h = 4000.

Annual saving (A):

$A = (\Delta p_A - \Delta p_B) \times h = (745 \text{ W} - 604 \text{ W}) \times 4000 = 564000 \text{ Wh} = 564 \text{ kWh}$.

By choosing the cable size 3 x 185 mm^2 instead of 3 x 150 mm^2 , an annual saving of 564 kWh is achieved.

Operating time: 10 years.

Saving after 10 years (A_{10}):

$A_{10} = A \times 10 = 564 \times 10 = 5640 \text{ kWh}$.

The saving in amount must be calculated in the local currency.

Head losses in ordinary water pipes

Upper figures indicate the velocity of water in m/sec.

Lower figures indicate head loss in metres per 100 metres of straight pipes.

| Quantity of water | | | Head losses in ordinary water pipes | | | | | | | | | | | |
|-----------------------------|-------------|-------------|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-------|-------|-------|
| m ³ /h | Litres/min. | Litres/sec. | Nominal pipe diameter in inches and internal diameter in [mm] | | | | | | | | | | | |
| | | | 1/2" | 3/4" | 1" | 1 1/4" | 1 1/2" | 2" | 2 1/2" | 3" | 3 1/2" | 4" | 5" | 6" |
| | | | 15.75 | 21.25 | 27.00 | 35.75 | 41.25 | 52.50 | 68.00 | 80.25 | 92.50 | 105.0 | 130.0 | 155.5 |
| 0.6 | 10 | 0.16 | 0.855 9.910 | 0.470 2.407 | 0.292 0.784 | | | | | | | | | |
| 0.9 | 15 | 0.25 | 1.282 20.11 | 0.705 4.862 | 0.438 1.570 | 0.249 0.416 | | | | | | | | |
| 1.2 | 20 | 0.33 | 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 | 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 | 2.565 69.34 | 1.409 16.50 | 0.876 5.277 | 0.498 1.379 | 0.374 0.700 | 0.231 0.223 | | | | | | |
| 2.1 | 35 | 0.58 | 2.993 91.54 | 1.644 21.75 | 1.022 6.949 | 0.581 1.811 | 0.436 0.914 | 0.269 0.291 | | | | | | |
| 2.4 | 40 | 0.67 | | 1.879 27.66 | 1.168 8.820 | 0.664 2.290 | 0.499 1.160 | 0.308 0.368 | | | | | | |
| 3.0 | 50 | 0.83 | | 2.349 41.40 | 1.460 13.14 | 0.830 3.403 | 0.623 1.719 | 0.385 0.544 | 0.229 0.159 | | | | | |
| 3.6 | 60 | 1.00 | | 2.819 57.74 | 1.751 18.28 | 0.996 4.718 | 0.748 2.375 | 0.462 0.751 | 0.275 0.218 | | | | | |
| 4.2 | 70 | 1.12 | | 3.288 76.49 | 2.043 24.18 | 1.162 6.231 | 0.873 3.132 | 0.539 0.988 | 0.321 0.287 | 0.231 0.131 | | | | |
| 4.8 | 80 | 1.33 | | 2.335 30.87 | 1.328 7.940 | 0.997 3.988 | 0.616 1.254 | 0.367 0.363 | 0.263 0.164 | | | | | |
| 5.4 | 90 | 1.50 | | 2.627 38.30 | 1.494 9.828 | 1.122 4.927 | 0.693 1.551 | 0.413 0.449 | 0.269 0.203 | | | | | |
| 6.0 | 100 | 1.67 | | 2.919 46.49 | 1.660 11.90 | 1.247 5.972 | 0.770 1.875 | 0.459 0.542 | 0.329 0.244 | 0.248 0.124 | | | | |
| 7.5 | 125 | 2.08 | | 3.649 70.41 | 2.075 17.93 | 1.558 8.967 | 0.962 2.802 | 0.574 0.809 | 0.412 0.365 | 0.310 0.185 | 0.241 0.101 | | | |
| 9.0 | 150 | 2.50 | | 2.490 25.11 | 1.870 12.53 | 1.154 3.903 | 0.668 1.124 | 0.494 0.506 | 0.372 0.256 | 0.289 0.140 | | | | |
| 10.5 | 175 | 2.92 | | 2.904 33.32 | 2.182 16.66 | 1.347 5.179 | 0.803 1.488 | 0.576 0.670 | 0.434 0.338 | 0.337 0.184 | | | | |
| 12 | 200 | 3.33 | | 3.319 42.75 | 2.493 21.36 | 1.539 6.624 | 0.918 1.901 | 0.659 0.855 | 0.496 0.431 | 0.385 0.234 | 0.251 0.084 | | | |
| 15 | 250 | 4.17 | | 4.149 64.86 | 3.117 32.32 | 1.924 10.03 | 1.147 2.860 | 0.823 1.282 | 0.620 0.646 | 0.481 0.350 | 0.314 0.126 | | | |
| 18 | 300 | 5.00 | | 3.740 45.52 | 2.309 14.04 | 1.377 4.009 | 0.988 1.792 | 0.744 0.903 | 0.577 0.488 | 0.377 0.175 | 0.263 0.074 | | | |
| 24 | 400 | 6.67 | | 4.987 78.17 | 3.078 24.04 | 1.836 6.828 | 1.317 3.053 | 0.992 1.530 | 0.770 0.829 | 0.502 0.294 | 0.351 0.124 | | | |
| 30 | 500 | 8.33 | | 3.848 36.71 | 2.295 10.40 | 1.647 4.622 | 1.240 2.315 | 0.962 1.254 | 0.628 0.445 | 0.439 0.187 | | | | |
| 36 | 600 | 10.0 | | 4.618 51.84 | 2.753 14.62 | 1.976 6.505 | 1.488 3.261 | 1.155 1.757 | 0.753 0.623 | 0.526 0.260 | | | | |
| 42 | 700 | 11.7 | | 3.212 19.52 | 2.306 8.693 | 1.736 4.356 | 1.347 2.345 | 0.879 0.831 | 0.614 0.347 | | | | | |
| 48 | 800 | 13.3 | | 3.671 25.20 | 2.635 11.18 | 1.984 5.582 | 1.540 3.009 | 1.005 1.066 | 0.702 0.445 | | | | | |
| 54 | 900 | 15.0 | | 4.130 31.51 | 2.964 13.97 | 2.232 6.983 | 1.732 3.762 | 1.130 1.328 | 0.790 0.555 | | | | | |
| 60 | 1000 | 16.7 | | 4.589 38.43 | 3.294 17.06 | 2.480 8.521 | 1.925 4.595 | 1.256 1.616 | 0.877 0.674 | | | | | |
| 75 | 1250 | 20.8 | | 4.117 26.10 | 3.100 13.00 | 2.406 7.010 | 1.570 2.458 | 1.097 1.027 | | | | | | |
| 90 | 1500 | 25.0 | | 4.941 36.97 | 3.720 18.42 | 2.887 9.892 | 1.883 3.468 | 1.316 1.444 | | | | | | |
| 105 | 1750 | 29.2 | | 4.340 24.76 | 3.368 13.30 | 2.197 4.665 | 1.535 1.934 | | | | | | | |
| 120 | 2000 | 33.3 | | 4.960 31.94 | 3.850 17.16 | 2.511 5.995 | 1.754 2.496 | | | | | | | |
| 150 | 2500 | 41.7 | | 4.812 26.26 | 3.139 9.216 | 2.193 3.807 | | | | | | | | |
| 180 | 3000 | 50.0 | | 3.767 13.05 | 2.632 5.417 | | | | | | | | | |
| 240 | 4000 | 66.7 | | 5.023 22.72 | 3.509 8.926 | | | | | | | | | |
| 300 | 5000 | 83.3 | | 4.386 14.42 | | | | | | | | | | |
| 90° bends, slide valves | | | 1.0 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.6 | 1.7 | 2.0 | 2.5 |
| T-pieces, non-return valves | | | 4.0 | 4.0 | 4.0 | 5.0 | 5.0 | 5.0 | 6.0 | 6.0 | 6.0 | 7.0 | 8.0 | 9.0 |

The table is 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. To find the head loss in foot valves multiply the loss in T-pieces by two.

Table of head losses

SP A, SP

Head losses in plastic pipes

Upper figures indicate the velocity of water in m/sec.

Lower figures indicate head loss in metres per 100 metres of straight pipes.

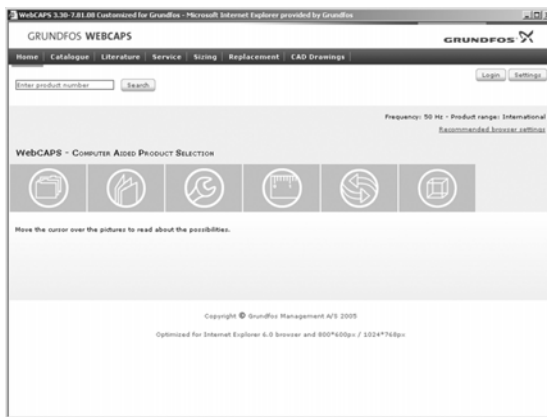
| Quantity of water | | | PELM/PEH PN 10 | | | | | | | | | | | |
|-------------------|-------------|-------------|----------------|--------------|--------------|---------------|--------------|---------------|---------------|---------------|--------------|---------------|---------------|---------------|
| m ³ /h | Litres/min. | Litres/sec. | PELM | | | | | PEH | | | | | | |
| | | | 25 | 32 | 40 | 50 | 63 | 75 | 90 | 110 | 125 | 140 | 160 | 180 |
| | | | 20.4 | 26.2 | 32.6 | 40.8 | 51.4 | 61.4 | 73.6 | 90.0 | 102.2 | 114.6 | 130.8 | 147.2 |
| 0.6 | 10 | 0.16 | 0.49 1.8 | 0.30 0.66 | 0.19 0.27 | 0.12 0.085 | | | | | | | | |
| 0.9 | 15 | 0.25 | 0.76 4.0 | 0.46 1.14 | 0.3 0.6 | 0.19 0.18 | 0.12 0.63 | | | | | | | |
| 1.2 | 20 | 0.33 | 1.0 6.4 | 0.61 2.2 | 0.39 0.9 | 0.25 0.28 | 0.16 0.11 | | | | | | | |
| 1.5 | 25 | 0.42 | 1.3 10.0 | 0.78 3.5 | 0.5 1.4 | 0.32 0.43 | 0.2 0.17 | 0.14 0.074 | | | | | | |
| 1.8 | 30 | 0.50 | 1.53 13.0 | 0.93 4.6 | 0.6 1.9 | 0.38 0.57 | 0.24 0.22 | 0.17 0.092 | | | | | | |
| 2.1 | 35 | 0.58 | 1.77 16.0 | 1.08 6.0 | 0.69 2.0 | 0.44 0.70 | 0.28 0.27 | 0.2 0.12 | | | | | | |
| 2.4 | 40 | 0.67 | 2.05 22.0 | 1.24 7.5 | 0.80 3.3 | 0.51 0.93 | 0.32 0.35 | 0.23 0.16 | 0.16 0.063 | | | | | |
| 3.0 | 50 | 0.83 | 2.54 37.0 | 1.54 11.0 | 0.99 4.8 | 0.63 1.40 | 0.4 0.50 | 0.28 0.22 | 0.2 0.09 | | | | | |
| 3.6 | 60 | 1.00 | 3.06 43.0 | 1.85 15.0 | 1.2 6.5 | 0.76 1.90 | 0.48 0.70 | 0.34 0.32 | 0.24 0.13 | 0.16 0.050 | | | | |
| 4.2 | 70 | 1.12 | 3.43 50.0 | 2.08 18.0 | 1.34 8.0 | 0.86 2.50 | 0.54 0.83 | 0.38 0.38 | 0.26 0.17 | 0.18 0.068 | | | | |
| 4.8 | 80 | 1.33 | | 2.47 25.0 | 1.59 10.5 | 1.02 3.00 | 0.64 1.20 | 0.45 0.50 | 0.31 0.22 | 0.2 0.084 | | | | |
| 5.4 | 90 | 1.50 | | 2.78 30.0 | 1.8 12.0 | 1.15 3.50 | 0.72 1.30 | 0.51 0.57 | 0.35 0.26 | 0.24 0.092 | 0.18 0.05 | | | |
| 6.0 | 100 | 1.67 | | 3.1 39.0 | 2.0 16.0 | 1.28 4.6 | 0.8 1.80 | 0.56 0.73 | 0.39 0.30 | 0.26 0.12 | 0.2 0.07 | | | |
| 7.5 | 125 | 2.08 | | 3.86 50.0 | 2.49 24.0 | 1.59 6.6 | 1.00 2.50 | 0.70 1.10 | 0.49 0.50 | 0.33 0.18 | 0.25 0.10 | 0.20 0.055 | | |
| 9.0 | 150 | 2.50 | | | 3.00 33.0 | 1.91 8.6 | 1.20 3.5 | 0.84 1.40 | 0.59 0.63 | 0.39 0.24 | 0.30 0.13 | 0.24 0.075 | | |
| 10.5 | 175 | 2.92 | | | 3.5 38.0 | 2.23 11.0 | 1.41 4.3 | 0.99 1.80 | 0.69 0.78 | 0.46 0.30 | 0.36 0.18 | 0.28 0.09 | | |
| 12 | 200 | 3.33 | | | 3.99 50.0 | 2.55 14.0 | 1.60 5.5 | 1.12 2.40 | 0.78 1.0 | 0.52 0.40 | 0.41 0.22 | 0.32 0.12 | 0.25 0.065 | |
| 15 | 250 | 4.17 | | | | 3.19 21.0 | 2.01 8.0 | 1.41 3.70 | 0.98 1.50 | 0.66 0.57 | 0.51 0.34 | 0.40 0.18 | 0.31 0.105 | 0.25 0.06 |
| 18 | 300 | 5.00 | | | | 3.82 28.0 | 2.41 10.5 | 1.69 4.60 | 1.18 1.95 | 0.78 0.77 | 0.61 0.45 | 0.48 0.25 | 0.37 0.13 | 0.29 0.085 |
| 24 | 400 | 6.67 | | | | | 3.21 19.0 | 2.25 8.0 | 1.57 3.60 | 1.05 1.40 | 0.81 0.78 | 0.65 0.44 | 0.50 0.23 | 0.39 0.15 |
| 30 | 500 | 8.33 | | | | | 4.01 28.0 | 2.81 11.5 | 1.96 5.0 | 1.31 2.0 | 1.02 1.20 | 0.81 0.63 | 0.62 0.33 | 0.49 0.21 |
| 36 | 600 | 10.0 | | | | | 4.82 37.0 | 3.38 15.0 | 2.35 6.6 | 1.57 2.60 | 1.22 1.50 | 0.97 0.82 | 0.74 0.45 | 0.59 0.28 |
| 42 | 700 | 11.7 | | | | | 5.64 47.0 | 3.95 24.0 | 2.75 8.0 | 1.84 3.50 | 1.43 1.90 | 1.13 1.10 | 0.87 0.60 | 0.69 0.40 |
| 48 | 800 | 13.3 | | | | | | 4.49 26.0 | 3.13 11.0 | 2.09 4.5 | 1.62 2.60 | 1.29 1.40 | 0.99 0.81 | 0.78 0.48 |
| 54 | 900 | 15.0 | | | | | | 5.07 33.0 | 3.53 13.5 | 2.36 5.5 | 1.83 3.20 | 1.45 1.70 | 1.12 0.95 | 0.08 0.58 |
| 60 | 1000 | 16.7 | | | | | | 5.64 40.0 | 3.93 16.0 | 2.63 6.7 | 2.04 3.90 | 1.62 2.2 | 1.24 1.2 | 0.96 0.75 |
| 75 | 1250 | 20.8 | | | | | | | 4.89 25.0 | 3.27 9.0 | 2.54 5.0 | 2.02 3.0 | 1.55 1.6 | 1.22 0.95 |
| 90 | 1500 | 25.0 | | | | | | | 5.88 33.0 | 3.93 13.0 | 3.05 8.0 | 2.42 4.1 | 1.86 2.3 | 1.47 1.40 |
| 105 | 1750 | 29.2 | | | | | | | 6.86 44.0 | 4.59 17.5 | 3.56 9.7 | 2.83 5.7 | 2.17 3.2 | 1.72 1.9 |
| 120 | 2000 | 33.3 | | | | | | | | 5.23 23.0 | 4.06 13.0 | 3.23 7.0 | 2.48 4.0 | 1.96 2.4 |
| 150 | 2500 | 41.7 | | | | | | | | 6.55 34.0 | 5.08 18.0 | 4.04 10.5 | 3.10 6.0 | 2.45 3.5 |
| 180 | 3000 | 50.0 | | | | | | | | 7.86 45.0 | 6.1 27.0 | 4.85 14.0 | 3.72 7.6 | 2.94 4.4 |
| 240 | 4000 | 66.7 | | | | | | | | | 8.13 43.0 | 6.47 24.0 | 4.96 13.0 | 3.92 7.5 |
| 300 | 5000 | 83.3 | | | | | | | | | | 8.08 33.0 | 6.2 18.0 | 4.89 11.0 |

The table is based on a nomogram.

Roughness: K = 0.01 mm.

Water temperature: t = 10 °C.

WebCAPS

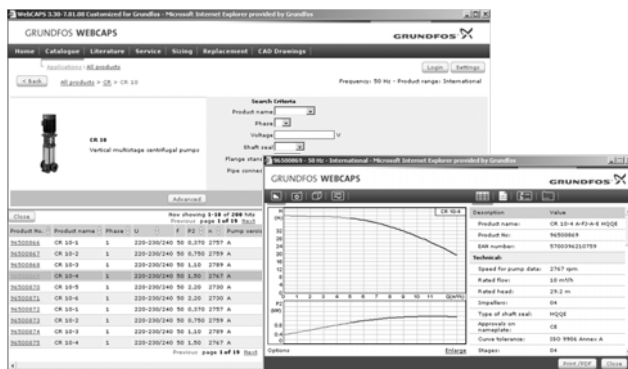


WebCAPS is a **Web-based Computer Aided Product Selection** program available on www.grundfos.com.

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

In WebCAPS, all information is divided into six sections:

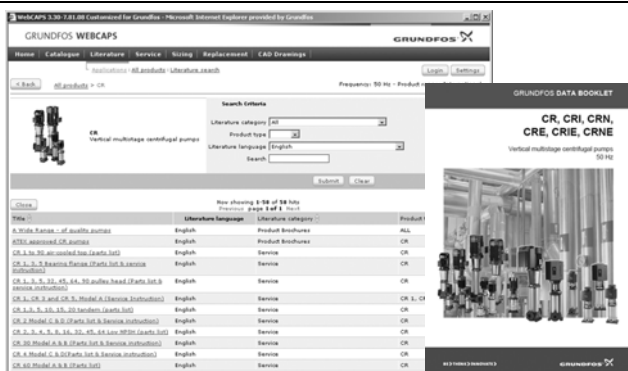
- Catalogue
- Literature
- Service
- Sizing
- Replacement
- CAD drawings.



Catalogue

This section is based on fields of application and pump types, and contains

- technical data
- curves (QH, Eta, P1, P2, etc.) which can be adapted to the density and viscosity of the pumped liquid and show the number of pumps in operation
- product photos
- dimensional drawings
- wiring diagrams
- quotation texts, etc.



Literature

In this section you can access all the latest documents of a given pump, such as

- data booklets
- installation and operating instructions
- service documentation, such as Service kit catalogue and Service kit instructions
- quick guides
- product brochures, etc.



Service

This section contains an easy-to-use interactive service catalogue. Here you can find and identify service parts of both existing and discontinued Grundfos pumps.

Furthermore, this section contains service videos showing you how to replace service parts.



Sizing

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

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

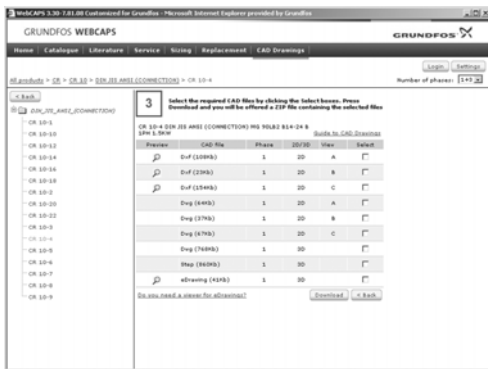


Replacement

In this section you find a guide to selecting and comparing replacement data of an installed pump in order to replace the pump with a more efficient Grundfos pump.

The section contains replacement data of a wide range of pumps produced by other manufacturers than Grundfos.

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



CAD drawings

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

These formats are available in WebCAPS:

- Two-dimensional drawings:
- .dxf, wireframe drawings
 - .dwg, wireframe drawings.

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

WinCAPS



Fig. 28 WinCAPS CD-ROM

WinCAPS is a **Windows-based Computer Aided Product Selection** program containing detailed information on more than 185,000 Grundfos products in more than 20 languages.

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

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

Subject to alterations.

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| Repl. V7023747 0907 | |

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