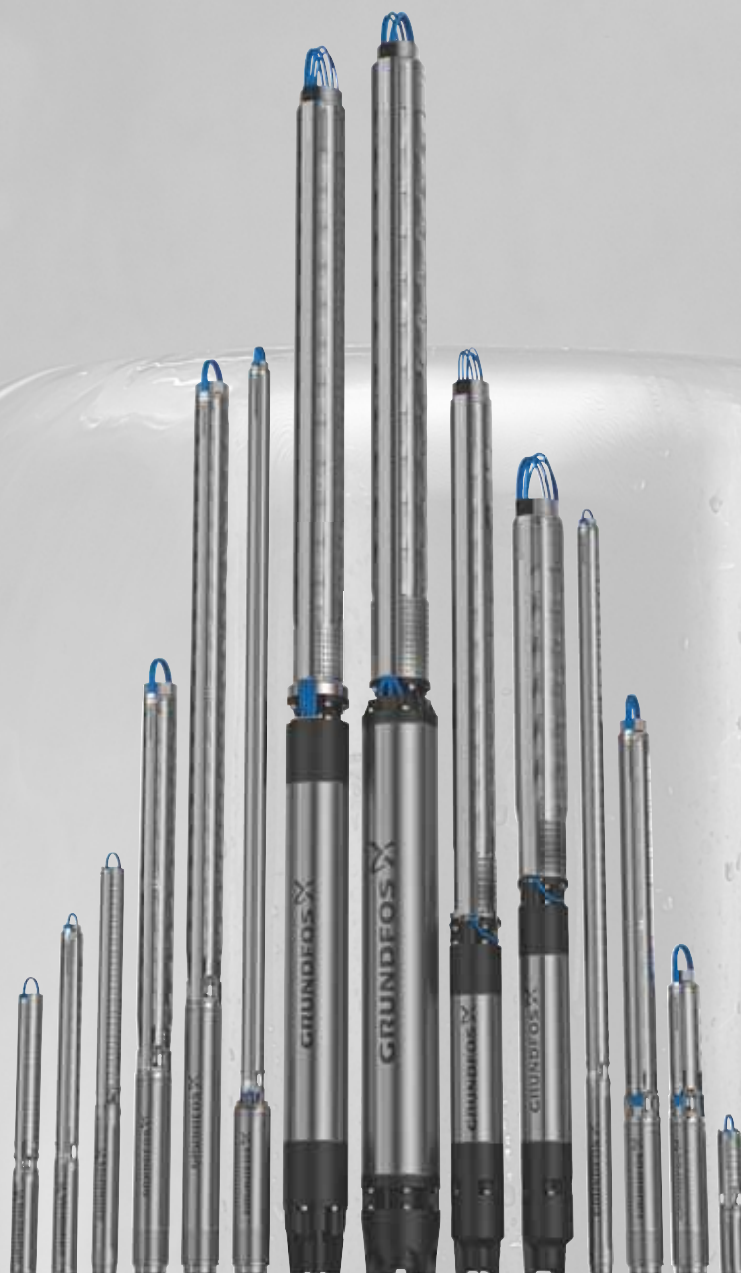


SP A, SP

Submersible pumps, motors and accessories

50 Hz



be
think
innovate

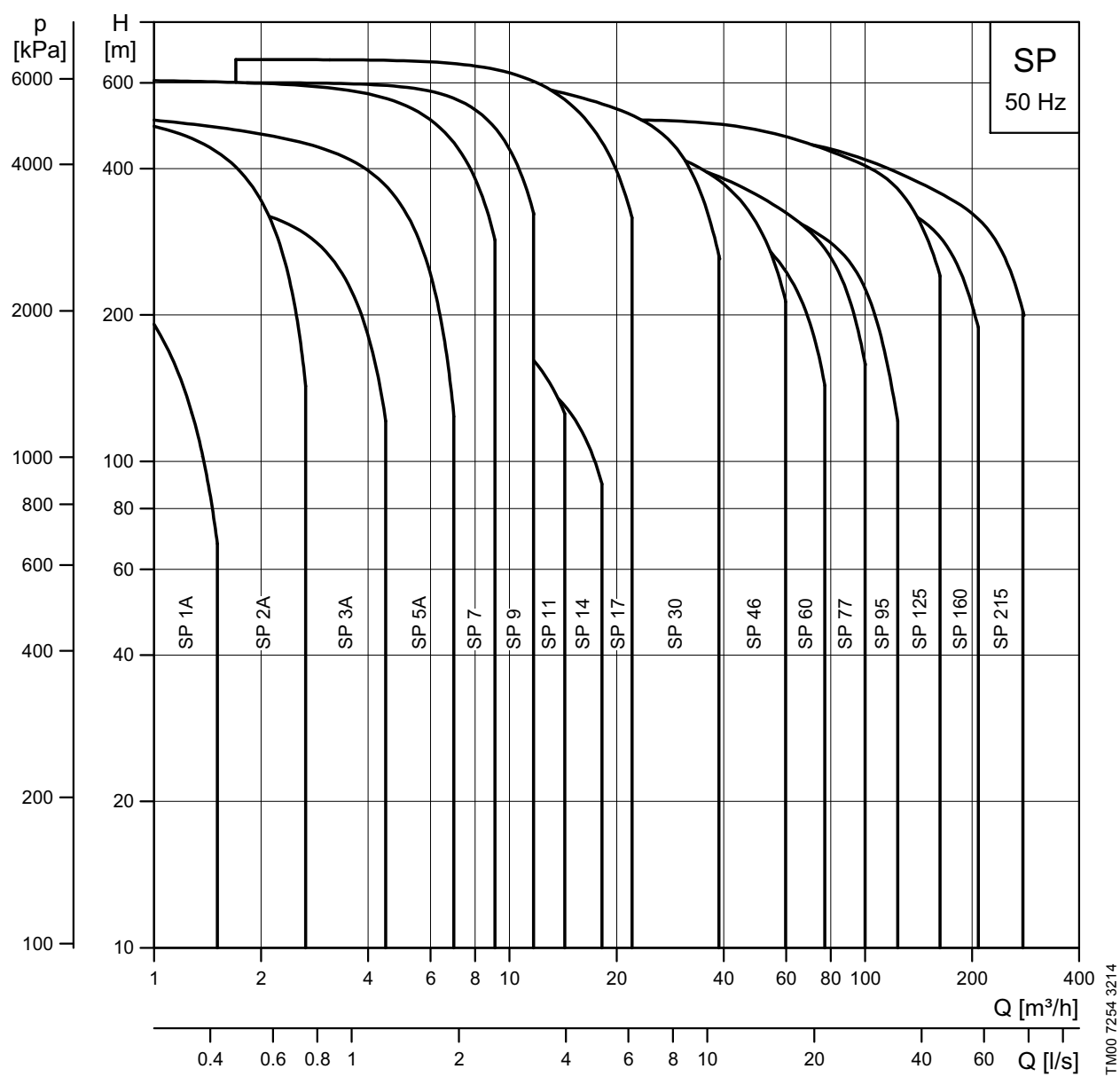
GRUNDFOS 

| | |
|---|-----------|
| 1. General description | 4 |
| Performance range | 4 |
| Minimum efficiency index | 5 |
| Type key | 5 |
| Applications | 6 |
| Pump range | 6 |
| Motor range | 6 |
| 2. Submersible pumps | 7 |
| Features and benefits | 7 |
| Material specification (SP 1A - SP 5A) | 9 |
| Material specification (SP 7 - SP 14) | 10 |
| Material specification (SP 17 - SP 60) | 11 |
| Material specification (SP 77 - SP 215) | 12 |
| 3. Submersible motors | 13 |
| Features and benefits | 13 |
| Shaft seal | 15 |
| Material specification for MS motors | 16 |
| Material specification for MMS motors | 17 |
| 4. Operating conditions | 18 |
| Inlet pressure | 18 |
| Minimum flow rate | 18 |
| Maximum flow rate | 18 |
| Pumped liquids | 18 |
| Liquid temperature | 18 |
| Maximum operating pressure | 18 |
| Service | 18 |
| Maximum start/stop frequency | 19 |
| Sound pressure level | 19 |
| Moment of inertia | 20 |
| Recommended minimum borehole diameter | 21 |
| 5. SP NE, SP A NE environmental pumps | 22 |
| Material specification SP NE, SPA NE pumps | 23 |
| How to read the curve charts | 24 |
| Curve conditions | 24 |
| Cavitation | 25 |
| 6. Performance curves and technical data | 26 |
| SP 1A | 26 |
| SP 2A | 28 |
| SP 3A | 30 |
| SP 5A | 32 |
| SP 7 | 34 |
| SP 9 | 37 |
| SP 11 | 40 |
| SP 14 | 43 |
| SP 17 | 46 |
| SP 30 | 52 |
| SP 46 | 58 |
| SP 60 | 64 |
| SP 77 | 69 |
| SP 95 | 74 |
| SP 125 | 79 |
| SP 160 | 84 |
| SP 215 | 89 |
| 7. Electrical data | 94 |
| 1 x 230 V, submersible motors "MS" | 94 |
| 3 x 230 V, submersible motors "MS" | 94 |
| 3 x 230 V, submersible rewindable motors "MMS" | 95 |
| 3 x 400 V, submersible motors "MS" | 95 |
| 3 x 400 V, submersible motors "MS T60" (60 °C) | 96 |

| | |
|---|------------|
| 3 x 400 V, submersible rewindable motors "MMS" | 96 |
| 3 x 500 V, submersible motors "MS" | 97 |
| 3 x 500 V, submersible motors "MS T60" | 97 |
| 3 x 500 V, submersible rewindable motors "MMS" | 98 |
| 8. Electrical accessories | 99 |
| CUE frequency converter | 102 |
| CIU communication interface units | 105 |
| Motor starters for MS402 and MS 4000 CSIR/CSCR motors | 106 |
| PR 5714 with Pt100 sensor | 106 |
| MS motor cables | 108 |
| Submersible drop cable | 110 |
| Submersible drop cables with plug | 110 |
| Cable clips | 111 |
| Cable termination kit with plug for MS4000 and MS402 | 111 |
| Cable termination kit, type KM | 112 |
| Cable termination kit, types M0 to M4 | 113 |
| 9. Mechanical accessories | 114 |
| Connecting pieces / Adaptors | 114 |
| Zinc anodes | 116 |
| Flow sleeves | 116 |
| 10. Certificates | 117 |
| SP certificates | 117 |
| ISO 9906:2012 test report | 117 |
| ISO 9906:2012 tolerance factors | 117 |
| Example of certificate | 118 |
| 11. Cable sizing | 121 |
| Cables | 121 |
| Calculation of the power loss | 122 |
| 12. Table of head losses | 124 |
| Head losses in ordinary water pipes | 124 |
| Head losses in plastic pipes | 125 |
| 13. Grundfos Product Center | 126 |

1. General description

Performance range



TM00 7254 3214

ErP ready

The SP A, SP 4" and 6" pumps are energy-optimised and comply with the ErP Directive (Commission Regulation (EC) No 547/2012) which has been effective as from 1 January 2013. As from this date, all pumps are classified/graduated in a new energy efficiency index (MEI).

Minimum efficiency index

Minimum efficiency index (MEI) means the dimensionless scale unit for hydraulic pump efficiency at best efficiency point (BEP), part load (PL, 75 % BEP) and overload (OL, 110 % BEP). The Commission Regulation (EU) sets efficiency requirements to MEI ≥ 0.40 as from 1 January 2015. An indicative benchmark for best-performing water pump available on the market as from 1 January 2013 is determined in the Regulation.

- The benchmark for most efficient water pumps is MEI ≥ 0.70.
- The efficiency of a pump with a trimmed impeller is usually lower than that of a pump with the full impeller diameter. The trimming of the impeller will adapt the pump to a fixed duty point, leading to reduced energy consumption. The minimum efficiency index (MEI) is based on the full impeller diameter.

- The operation of this water pump with variable duty points may be more efficient and economic when controlled, for example, by the use of a variable-speed drive that matches the pump duty to the system.
- Information on benchmark efficiency is available at <http://europump.eu/efficiencycharts>.

Efficiency and MEI index for SP pumps

| Pump type | Pump size | Pump stage efficiency [%] | MEI |
|-----------|-----------|---------------------------|--------|
| SP 1A | 4" | 39 | ≥ 0.70 |
| SP 2A | 4" | 50 | ≥ 0.70 |
| SP 3A | 4" | 58 | ≥ 0.70 |
| SP 5A | 4" | 60 | ≥ 0.40 |
| SP 7 | 4" | 69 | ≥ 0.70 |
| SP 9 | 4" | 71 | ≥ 0.70 |
| SP 11 | 4" | 70 | ≥ 0.60 |
| SP 14 | 4" | 70 | ≥ 0.50 |
| SP 17 | 6" | 74 | ≥ 0.70 |
| SP 30 | 6" | 75 | ≥ 0.50 |
| SP 46 | 6" | 76 | ≥ 0.40 |
| SP 60 | 6" | 77 | ≥ 0.40 |
| SP 77 | 8" | 78 | - |
| SP 95 | 8" | 79 | - |
| SP 125 | 10" | 79 | - |
| SP 160 | 10" | 80 | - |
| SP 215 | 10" | 83 | - |

Type key

| | | | | | | | | | |
|------------------------------------|---------------|---------------|----------------|----|---|-----|----|-------------|-------------|
| Example of pump | SP 46 | - | 9 | C | L | Rp4 | 6" | 50/60 | SD |
| Example of pump with motor | SP 125 | - | 10 | AA | N | Rp6 | 8" | 3 x 380-415 | 50 SD 92 kW |
| Type range (SPXA, SP) | | | | | | | | | |
| Number of impellers | | | | | | | | | |
| Reduced impellers (A, B, C max. 2) | | | | | | | | | |
| Stainless-steel parts of material | | | | | | | | | |
| = EN 1.4301 | | | | | | | | | |
| N = EN 1.4401 | | | | | | | | | |
| R = EN 1.4539 | | | | | | | | | |
| Rubber parts of material | | | | | | | | | |
| SP 1A - SP 5A | SP 9 - SP 14 | SP 17 - SP 60 | SP 77 - SP 215 | | | | | | |
| = NBR | = LSR/NBR/TPU | = LSR/NBR | = NBR | | | | | | |
| E = FKM | E = FKM | E = FKM | E = FKM | | | | | | |
| Connection | | | | | | | | | |
| Rp thread (RpX) | | | | | | | | | |
| R thread (RX) | | | | | | | | | |
| NPT thread (XNPT) | | | | | | | | | |
| Grundfos flange (GrX) | | | | | | | | | |
| Inlet motor size | | | | | | | | | |
| Voltage [V] | | | | | | | | | |
| Frequency [Hz] | | | | | | | | | |
| Starting method | | | | | | | | | |
| S = DOL | | | | | | | | | |
| D = SD | | | | | | | | | |
| Motor power [kW] | | | | | | | | | |

Applications

SP pumps are primarily used to pump raw water from the underground. The pumps are installed in boreholes or wells, submerged below the water level.

For industrial purposes, you can place the pump in for example a tank.

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

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

Pump range

| Type | Steel EN 1.4301 | Steel (N) EN 1.4401 | Steel (R) EN 1.4539 | Connection* | Flange connection Grundfos flange |
|--------|--------------------|------------------------|------------------------|--------------------|--------------------------------------|
| SP 1A | • | | | Rp 1 1/4 | |
| SP 2A | • | | | Rp 1 1/4 (R 1 1/4) | |
| SP 3A | • | • | | Rp 1 1/4 | |
| SP 5A | • | • | • | Rp 1 1/2 (R 1 1/2) | |
| SP 7 | • | • | • | Rp 1 1/2 (R 1 1/2) | |
| SP 9 | • | • | • | Rp 2 (R 2) | |
| SP 11 | • | • | • | Rp 2 | |
| SP 14 | • | • | • | Rp 2 | |
| SP 17 | • | • | • | Rp 2 1/2 (R 3) | |
| SP 30 | • | • | • | Rp 3 (R 3) | |
| SP 46 | • | • | • | Rp 3 Rp 4 (R 4) | |
| SP 60 | • | • | • | Rp 3 Rp 4 (R 4) | |
| SP 77 | • | • | • | Rp 5 | 5" |
| SP 95 | • | • | • | Rp 5 | 5" |
| SP 125 | • | • | • | Rp 6 | 6" |
| SP 160 | • | • | • | Rp 6 | 6" |
| SP 215 | • | • | • | Rp 6 | 6" |

* Figures in brackets () indicate connection for pumps within a 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 | | |
|----------------------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|---|---|
| MS 402 | • | • | • | • | • | • | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MS 4000 (R) | | | • | • | • | • | • | • | • | • | • | • | • | | | | | | | | | | | | | | | | | | | | | |
| MS 4000I (R) | | | | | | • | • | • | • | • | • | • | • | | | | | | | | | | | | | | | | | | | | | |
| MS 6000 (R) | | | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | | | | | |
| MS 6000I (R) | | | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | | | | | |
| MMS 6 (N, R) | | | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | | | | | |
| MMS 8000 (N, R) | | | | | | | | | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| MMS 10000 (N, R) | | | | | | | | | | | | | | | | | | | | | | | | | • | • | • | • | • | • | • | • | • | |
| MMS 12000 (N, R) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | • | • | • | • |

We recommend that you use a soft starter or auto transformer above 75 kW.

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

MS 4000 and MS 6000 are available with a built-in temperature transmitter (Tempcon).

2. Submersible pumps

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, a normal pump consumes about 688,000 kWh. If the pump/motor efficiency is enhanced by 5 %, you can save about 34,000 EUR in energy cost, if the price is EUR 0.10/kWh.

Material and pumped liquids

To ensure the right wear resistance and reduce risk of corrosion, the pump ranges are available with different steel variants.

- **SP:** EN 1.4301
- **SP N:** EN 1.4401
- **SP R:** EN 1.4539

See specified material variants in *Pump range* on page 6. For further protection to corrosive environments, a complete range of zinc anodes for cathodic protection is available. See page 111.

Rubber components

For pumping liquid with risk of chemical residue or liquids > 60 °C, all pumps can be supplied with rubber components made of FKM elastomer.

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.

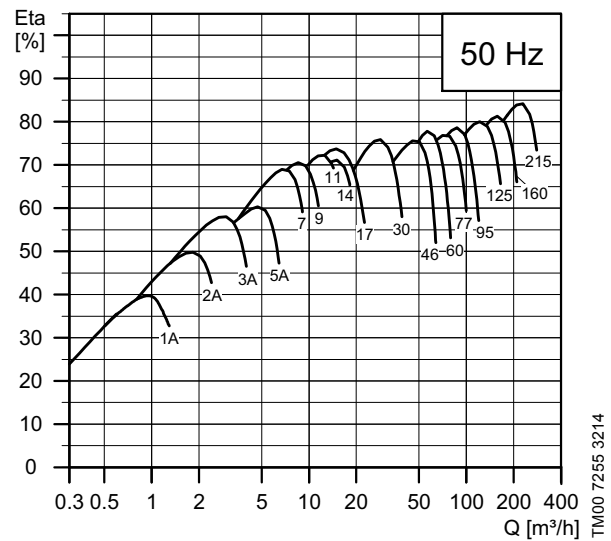


Fig. 1 Pump efficiencies in relation to flow

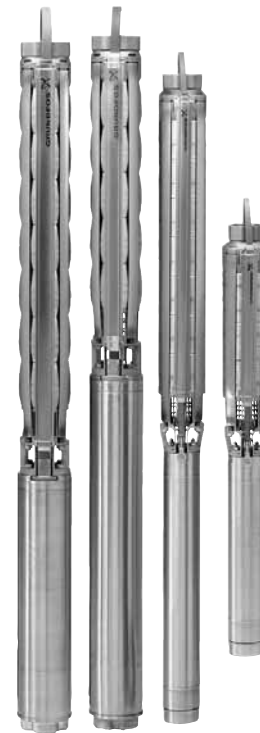


Fig. 2 Various SP pumps

TM00 7255 3214

TM06 1385 2314

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.

SP 1A to SP 5A with spline shaft strainer hole size: $\varnothing 2.5$ mm.

SP 1A to SP 5A with smooth shaft strainer hole size: 2 x 20 mm.

SP 7 to SP 215 all smooth shaft strainer hole size: 4 x 20 mm.

Non-return valve

All pumps have a reliable non-return valve in the valve casing preventing backflow in connection to 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.

You can get the pump with and without non-return valve and also with a hole in so the raiser pipe can be emptied over time.

Priming screw

All Grundfos pumps with radial impellers are fitted with a priming screw. Consequently, dry running is prevented because the priming screw ensures that the pump bearings are always lubricated.

SP pumps with semi-axial impellers require no priming screw. The pumps are primed automatically.

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

Stop ring

The stop ring prevents damage to the pump during transport and in case of upthrust in connection with startup.

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).

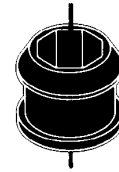


Fig. 3 Bearing

TM00 7301 1096

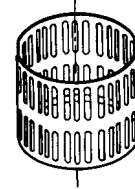


Fig. 4 Inlet strainer

TM00 7302 1096

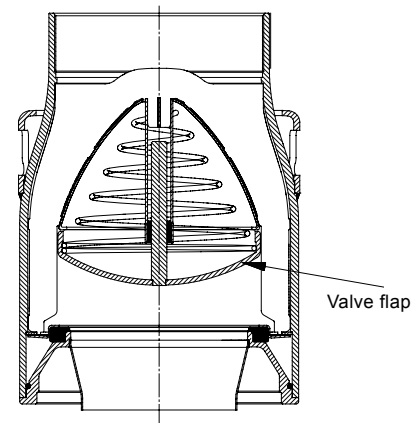


Fig. 5 Non-return valve

TM01 2499 1798

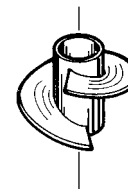


Fig. 6 Priming screw

TM00 7304 1096

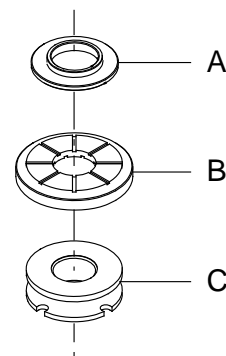


Fig. 7 Stop ring (rotating and stationary parts) and split cone

TM01 3327 3898

Material specification (SP 1A - SP 5A)

| Pos. | Component | Material | EN | | |
|------|------------------------|----------------------|----------|-----------------------------------|------------------------|
| | | | Standard | N-version | R-version (only SP 5A) |
| 1 | Valve casing | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 2 | Valve cup | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 3 | Valve seat | Rubber type | NBR-FKM | NBR-FKM | NBR-FKM |
| 7 | Neck ring | Rubber type | NBR-FKM | NBR-FKM | NBR-FKM |
| 8 | Bearing | Rubber type | NBR-FKM | NBR-FKM | NBR-FKM |
| | Washer for stop ring | Carbon | | Carbon/graphite HY22 in PTFE mass | |
| 9 | Chamber | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 12 | Impeller | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 14 | Suction interconnector | Cast stainless steel | 1.4308 | 1.4408 | 1.4517 |
| | Strainer | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 16 | Shaft complete | Stainless steel | 1.4057 | 1.4460 | 1.4462 |
| 17 | Strap | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 18 | Cable guard | Stainless steel | 1.4301 | 1.4401 | 1.4539 |

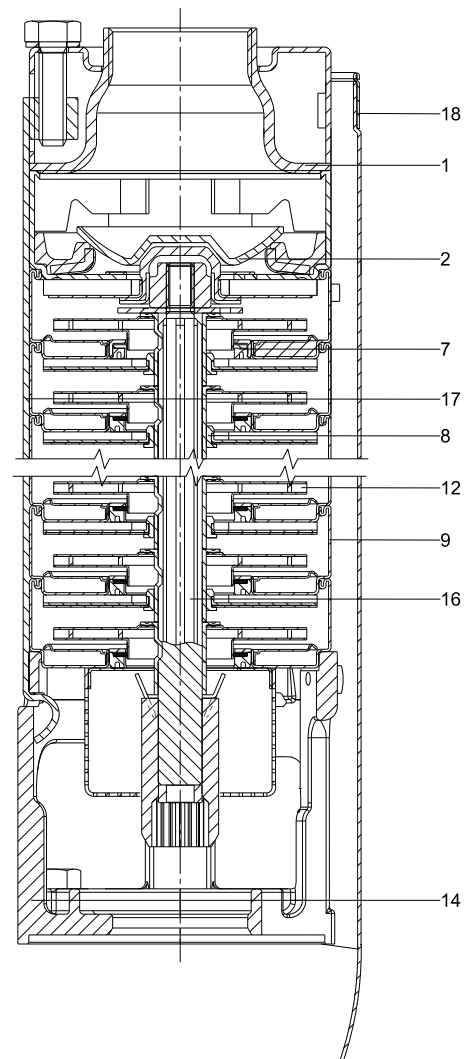


Fig. 8 Example SP 3A, pump with spline shaft.

TM06 1193 1614

Material specification (SP 7 - SP 14)

| Pos. | Component | Material | EN | | |
|------|------------------------|--------------------------------------|-------------|-------------|-------------|
| | | | Standard | N-version | R-version |
| 1 | Valve casing | Cast stainless steel | 1.4301 | 1.4401 | 1.4517 |
| 2 | Valve cup | Cast stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 3 | Valve seat | NBR-FKM | NBR-FKM | NBR-FKM | NBR-FKM |
| 7 | Neck ring | TPU/PPS-FKM | TPU/PPS-FKM | TPU/PPS-FKM | TPU/PPS-FKM |
| 8 | Bearing | LSR/FKM | LSR/FKM | LSR/FKM | LSR/FKM |
| 8a | Washer for stop ring | Carbon/graphite HY22 in PTFE mass | | | |
| 9 | Chamber | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 13 | Impeller | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 14 | Suction interconnector | Cast stainless steel | 1.4308 | 1.4408 | 1.4517 |
| 15 | Strainer | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 16 | Shaft complete | Stainless steel | 1.4057 | 1.4460 | 1.4462 |
| 17 | Strap | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 18 | Cable guard | Stainless steel | 1.4301 | 1.4401 | 1.4539 |

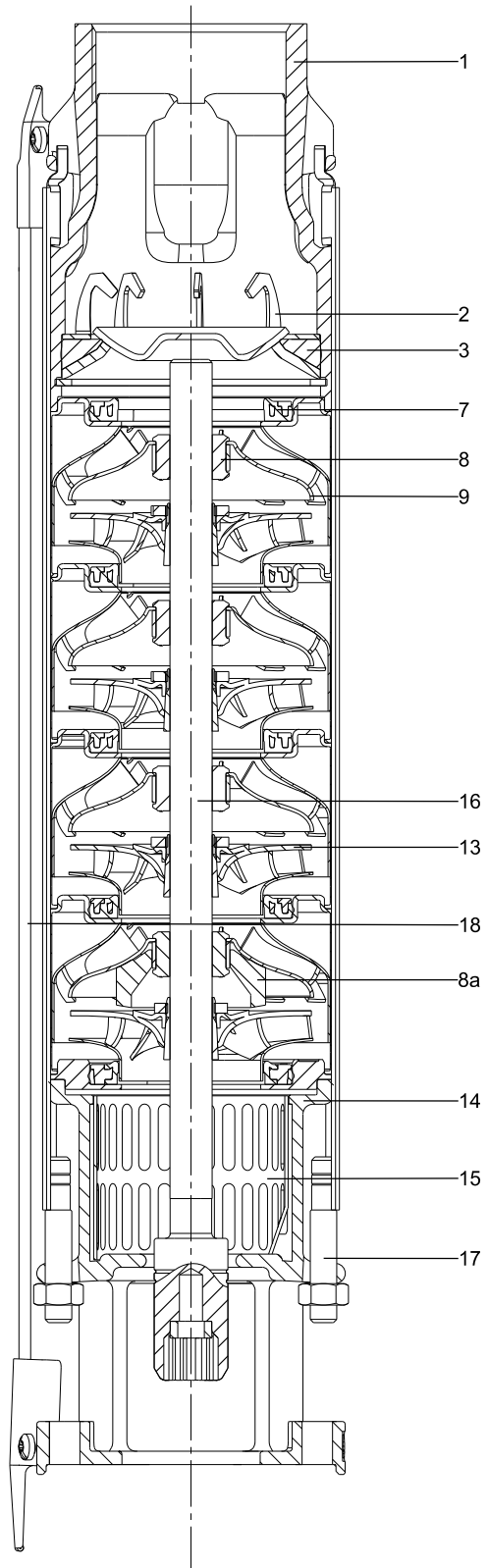


Fig. 9 Example SP 9

TM06 1110 1614

Material specification (SP 17 - SP 60)

| Pos. | Component | Material | Standard | N-version | R-version |
|------|------------------------|---|-------------|-------------|-------------|
| | | | EN | | |
| 1 | Valve casing | Stainless steel | 1.4301 | 1.4401 | 1.4517 |
| 2 | Valve cup | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| | Valve seat | NBR-FKM | NBR-FKM | NBR-FKM | NBR-FKM |
| 7 | Neck ring | NBR-FKM | NBR-FKM | NBR-FKM | NBR-FKM |
| 8 | Bearing | NBR-FKM-LSR | NBR-FKM-LSR | NBR-FKM-LSR | NBR-FKM-LSR |
| 8a | Washer for stop ring | Carbon/graphite HY22 in PTFE mass | | | |
| 9 | Chamber | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 13 | Impeller | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 14 | Suction interconnector | Cast stainless steel | 1.4308 | 1.4408 | 1.4517 |
| | Strainer | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 16 | Shaft complete | Stainless steel | 1.4057 | 1.4460 | 1.4462 |
| 17 | Strap | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 18 | Cable guard | Stainless steel | 1.4301 | 1.4401 | 1.4539 |

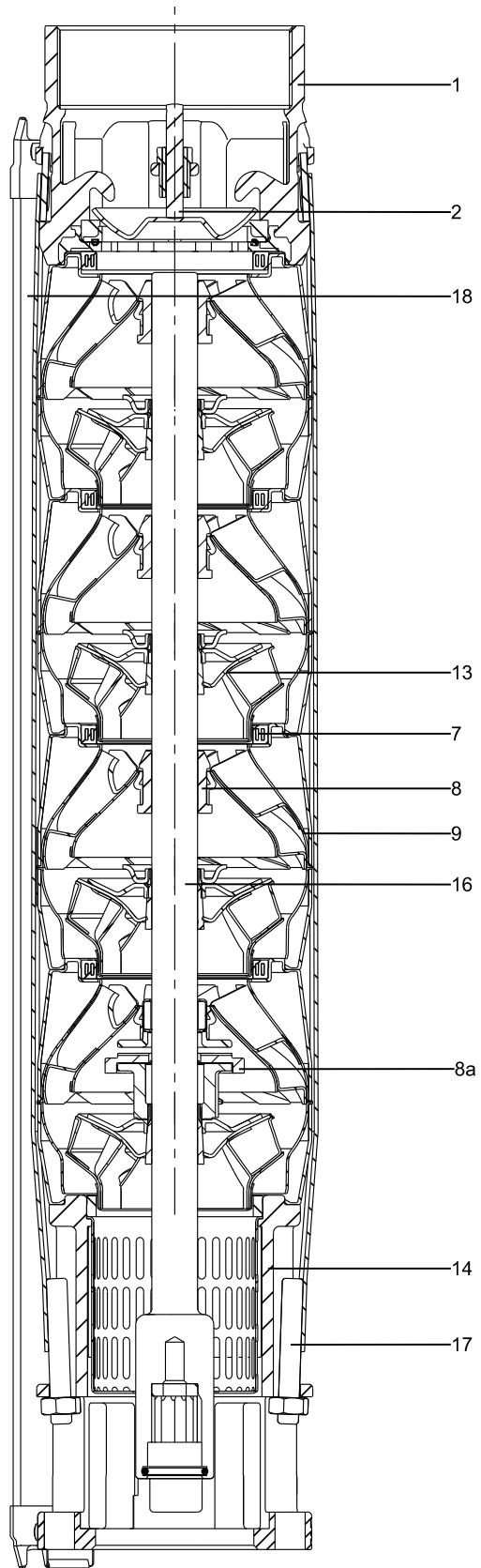


Fig. 10 Example SP 46

TM06 1521 1614

Material specification (SP 77 - SP 215)

| Pos. | Component | Material | Standard | N-version | R-version |
|------|------------------------|---|----------|-----------|-----------|
| | | | EN | | |
| 1 | Valve casing | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 2 | Valve cup | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| | Valve seat | NBR-FKM | NBR-FKM | NBR-FKM | NBR-FKM |
| 7 | Neck ring | NBR-FKM | NBR-FKM | NBR-FKM | NBR-FKM |
| 8 | Bearing | NBR-FKM | NBR-FKM | NBR-FKM | NBR-FKM |
| | Washer for stop ring | Carbon/graphite HY22 in PTFE mass | | | |
| 9 | Chamber | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 13 | Impeller | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 14 | Suction interconnector | Cast stainless steel | 1.4308 | 1.4408 | 1.4517 |
| | Strainer | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 16 | Shaft complete | Stainless steel | 1.4057 | 1.4460 | 1.4462 |
| 17 | Strap | Stainless steel | 1.4301 | 1.4401 | 1.4539 |
| 18 | Cable guard | Stainless steel | 1.4301 | 1.4401 | 1.4539 |

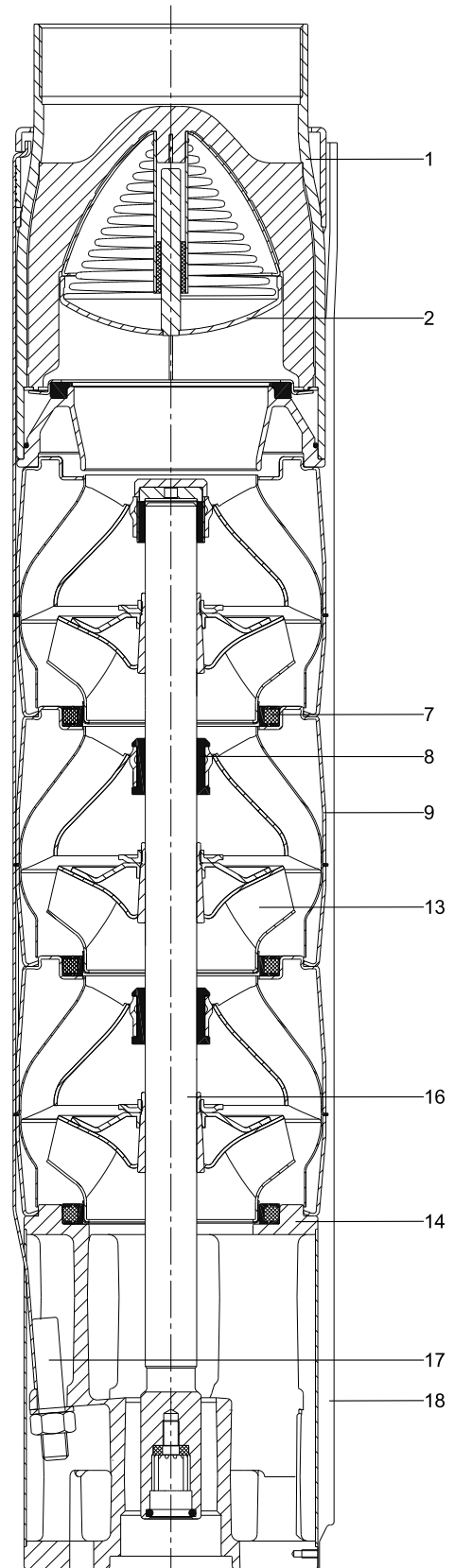


Fig. 11 Example SP 77

TM06 1192 1614

3. Submersible motors

For further information about Grundfos submersible motors, see the MS and MMS motor literature available in Grundfos Product Center at <https://product-selection.grundfos.com>.

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 from 0.37 to 2.2 kW:
 - 2-wire
 - 3-wire
 - PSC (permanent split capacitor)
- 4" motors, three-phase from 0.37 to 7.5 kW
- 4" T60 motors, three-phase from 2.2 to 5.5 kW
- 6" motors, three-phase from 5.5 to 30 kW
- 6" T60 motors, three-phase from 5.5 to 22 kW.

Submersible, rewindable motors, MMS

- 6" motors, three-phase from 3.7 to 45 kW
- 8" motors, three-phase from 22 to 110 kW
- 10" motors, three-phase from 75 to 190 kW
- 12" motors, three-phase from 147 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 waterproof 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 (T60)

For heavy-duty applications, Grundfos offers a complete motor range of T60 motors with up to 5 % higher efficiency than that of Grundfos' standard motors. The T60 motors are available in sizes 2.2 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 1 m/s past the motor. The T60 motors are for customers who value low operating costs and long life higher than price.

Grundfos T60 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, for example, bad power supply, hot water, bad cooling conditions, high pump load.

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



Fig. 12 MS motors

TM00 7305 1096



Fig. 13 MMS motors

TM01 7873 4799 - GRA4575 3908

Overtemperature protection

Protecting the motor against too high motor temperature is the simplest and cheapest way of avoiding that the motor life is reduced.

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

MS

The Grundfos MS submersible motors, except MS 402, are available with a built-in Tempcon temperature sensor for protection against overtemperature. By means of this sensor connected to the MP 204 motor protector via the power line, you can read out and/or monitor the motor temperature. As an alternative, you can fit the MS motors with Pt100 and Pt1000 sensors for temperature monitoring via a control unit.

MMS

The Grundfos MMS submersible motors are not available with built-in Tempcon temperature sensor. For these motors, we offer Pt100 and Pt1000 sensors for temperature monitoring. Together with a control unit, the sensor ensures that the maximum operating temperature is not exceeded.

Protection against upthrust

In case of a very low counter pressure in connection with startup, 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 startup phase. The protection consists of either a built-in stop ring or hydraulic balancing.

Built-in cooling chambers

In all Grundfos MS submersible motors, cooling chambers at the top and at the bottom of the motor and internal circulation of motor liquid ensure efficient cooling. See fig. 14. As long as the required flow velocity past the motor is maintained (see section *Operating conditions* on page 18), cooling of the motor will be efficient.

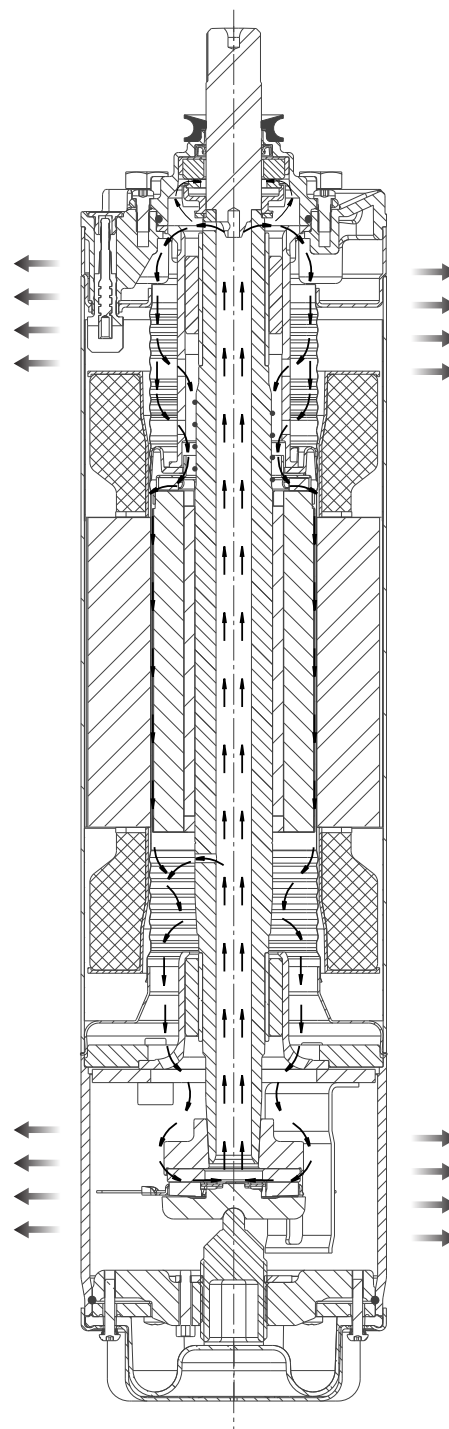


Fig. 14 MS 6000

TM06 0511 0414

Lightning protection

Grundfos recommends that you use extra lightning protection to minimise the risk of motor burnout caused by lightning strike.

Reduced risk of short-circuit

The stator is hermetically encapsulated in stainless steel. The stator windings are embedded in polymer compound. This results in high mechanical stability, optimum cooling and eliminates the risk of short circuits in the windings caused by condensing 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 potable water.

MS 4000, MS 6000

The material is ceramic/carbon 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.

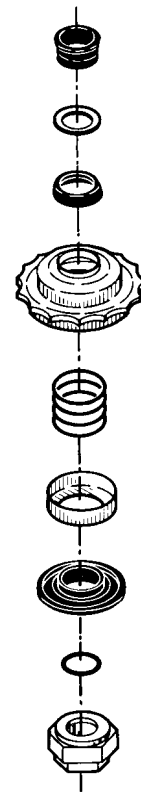


Fig. 15 Shaft seal, MS 4000

TM00 7306 2100

Material specification for MS motors

MS 402, MS 4000 and MS 6000 submersible motors

| Pos. | Component | MS 402 | MS 4000 MS 6000 |
|------|------------------|----------------|--------------------------|
| 1 | Shaft | EN 1.4057 | EN 1.4057 |
| 2 | Shaft seal | NBR | Ceramic/tungsten carbide |
| 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 MS 6000 |
|------|------------------|--------------------------|
| 1 | Shaft | EN 1.4462 |
| 2 | Shaft seal | SiC/SiC |
| 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 |

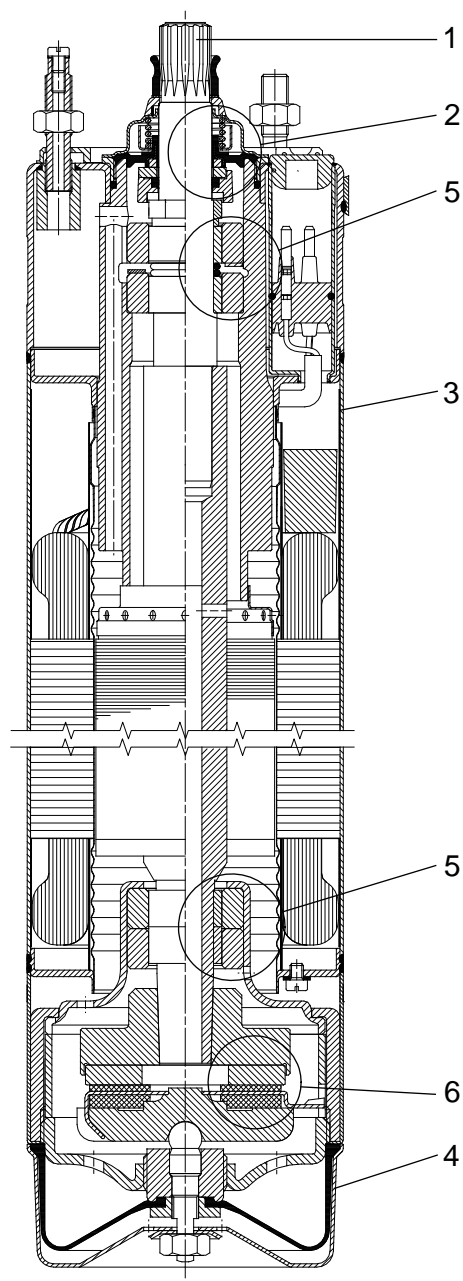


Fig. 16 MS 4000

TM00 7865 2196

Material specification for MMS motors

Cast-iron version

| Pos. | Component | Material | Version | | |
|-------------|--|------------------------------------|---------|--------|--------|
| | | | - | N | R |
| | | | EN | EN | EN |
| 202 | Shaft with rotor | Stainless steel | 1.4301 | 1.4401 | 1.4462 |
| 203/ 206 | Thrust bearing/ rotating thrust bearing part | Hardened steel/ stainless steel | 1.4125 | 1.4125 | 1.4125 |
| | | Ceramic/carbon | - | - | - |
| 204 | Radial bearing | Carbon | - | - | - |
| 205 | NEMA flange | Cast iron/ stainless steel | GJL-250 | 1.4408 | 1.4517 |
| 208a | Thrust ring | Stainless steel | 1.4016 | 1.4016 | 1.4016 |
| 208b | Thrust bearing support | Stainless steel | 1.4016 | 1.4016 | 1.4016 |
| 212 | Diaphragm | EPDM | - | - | - |
| 213 | End cover | Cast iron/ stainless steel | GJL-250 | 1.4408 | 1.4517 |
| 216 | Lock nut | Steel, BN1235 | - | - | - |
| 216a | Washer | Stainless steel | 1.4301 | 1.4301 | 1.4301 |
| 219 | Thrust bearing housing | Stainless steel | 1.4308 | 1.4308 | 1.4517 |
| 221 | Stator with sleeve | Stainless steel | 1.4306 | 1.4404 | 1.4539 |
| 222b | O-ring | Fibronit | - | - | - |
| 223b | Plug | Stainless steel | 1.4401 | 1.4401 | 1.4539 |
| 224 | O-ring | NBR | - | - | - |
| 226 | Shaft seal housing | Cast iron/ stainless steel | GJL-250 | 1.4401 | 1.4539 |
| 226a | Shaft seal, stationary part | Ceramic/carbon | • | • | - |
| | | SiC/SiC | • | • | • |
| 226b | Shaft seal, rotating part | SiC | - | - | - |
| 229 | Sand shield | FKM | - | - | - |
| 231 | O-ring | NBR | - | - | - |
| 232 | Lip seal ring | FKM | - | - | - |
| 235 | Intermediate housing | Cast iron/ stainless steel | GJL-250 | 1.4408 | 1.4517 |
| 236 | Bearing housing, lower | Cast iron/ stainless steel | GJL-250 | 1.4408 | 1.4517 |
| 236a | Hexagon socket head screw | Steel | - | - | - |
| 242 | Upthrust spacer | PP | - | - | - |
| 247 | Screw | | 1.4401 | 1.4401 | 1.4539 |
| | Motor cable | EPDM | - | - | - |

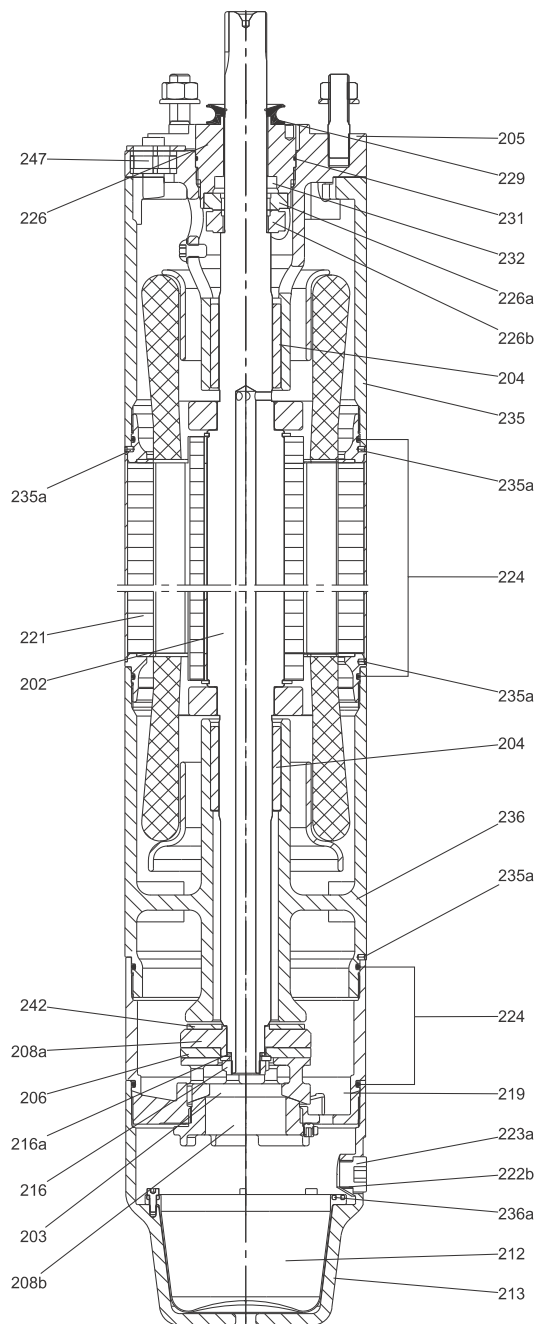


Fig. 17 MMS 6

TMD4 4951 2309

4. Operating conditions

To ensure long and trouble-free pump life, it is important that the following is observed.

Inlet pressure

The minimum inlet pressure is indicated by the NPSH-curves in the single-stage curve charts.

The minimum safety margin of the NPSH-curves must always be 0.5 m head.

Minimum flow rate

To ensure sufficient cooling of the motor, the pump must not run continuously at a flow rate below 0.1 x nominal flow rate.

Operation of the pump against a closed valve must be limited to a maximum of 30 seconds due to the risk of local heating of the pumped liquid and the consequent damage to the pump and motor.

Maximum flow rate

The pump must not run continuously at a flow rate above 1.3 x nominal flow rate due to the risk of upthrust and cavitation.

Pumped liquids

SP A and SP pumps are capable of pumping clean, thin, non-aggressive liquids, not containing solid particles or fibres larger than sand grains.

| Pump type | Maximum content of sand [ppm] |
|----------------|-------------------------------|
| SP 1A - SP 5A | 50 |
| SP 7 - SP 14 | 150 |
| SP 17 - SP 60 | 100 |
| SP 77 - SP 215 | 50 |

Special liquids

A larger content of sand will reduce pump life.

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. Pumping of liquids with a higher density than that of water requires a motor with a correspondingly higher output.

Pumping of liquids with a higher viscosity than that of water may result in

- increased pressure loss
- reduced hydraulic performance
- increased pump power input.

In case of doubt, contact Grundfos.

Liquid temperature

For protection of pump and motor rubber parts, the liquid temperature must not exceed 60 °C.

Alternatively, you can fit the pump with bearings made of FKM material, resistant to liquid temperatures of up to 90 °C.

Maximum liquid temperature

The maximum liquid temperature allowed depends on the flow velocity of the liquid past the motor, see the table below.

| Grundfos motor | Flow velocity past motor [m/s] | Max. liquid temperature [°C] |
|---|--------------------------------|------------------------------|
| MS 4" T40 | 0.15 | 40 |
| MS 4" T60 | 0.15 | 60 |
| MS 6000 T40 | 0.15 | 40 |
| MS 6000 T60 | 1.00 | 60 |
| MMS 6" T30 with PVC windings | 0.15 0.50 | 25 30 |
| MMS 6" T50 with PE/PA windings | 0.15 0.50 | 45 50 |
| MMS 8", 10", 12" T30 rewindable with PVC windings | 0.15 0.50 | 25 30 |
| MMS 8", 10", 12" T45 rewindable with PE/PA windings | 0.15 0.50 | 40 45 |

Note: For MMS 6", 37 kW, MMS 8", 110 kW, and MMS 10", 170 kW, the maximum liquid temperature is 5 °C lower than the values stated in the table above. For MMS 10", 190 kW, the temperature is 10 °C lower.

Maximum operating pressure

| Grundfos motor | Maximum operating pressure |
|---------------------------------|----------------------------|
| MS 402 | 1.5 MPa (15 bar) |
| MS 4000 and MS 6000 | 6 MPa (60 bar) |
| MMS 6", 8", 10", 12" rewindable | 6 MPa (60 bar) |

Service

If you request Grundfos to service the pump, contact Grundfos with details about the pumped liquid before you return the pump for service. Otherwise Grundfos can refuse to accept the pump for service.

Possible costs of returning the pump are paid by the customer.

However, any application for service, no matter to whom it may be made, must include details about the pumped liquid if the pump has been used for liquids which are injurious to health or toxic.

Before you return a pump, clean it in the best possible way.

Maximum start/stop frequency

The SP pump is suitable for continuous as well as intermittent operation:

| Motor type | Number of starts |
|------------------|---|
| MS 402 | <ul style="list-style-type: none"> Minimum 1 per year is recommended. Maximum 100 per hour. Maximum 300 per day. |
| MS 4000 | <ul style="list-style-type: none"> Minimum 1 per year is recommended. Maximum 100 per hour. Maximum 300 per day. |
| MS 6000 | <ul style="list-style-type: none"> Minimum 1 per year is recommended. Maximum 30 per hour. Maximum 300 per day. |
| MMS 6 | PVC windings <ul style="list-style-type: none"> Minimum 1 per year is recommended. Maximum 3 per hour. Maximum 40 per day. |
| | PE/PA windings <ul style="list-style-type: none"> Minimum 1 per year is recommended. Maximum 10 per hour. Maximum 70 per day. |
| MMS 8000 | PVC windings <ul style="list-style-type: none"> Minimum 1 per year is recommended. Maximum 3 per hour. Maximum 30 per day. |
| | PE/PA windings <ul style="list-style-type: none"> Minimum 1 per year is recommended. Maximum 8 per hour. Maximum 60 per day. |
| MMS 10000 | PVC windings <ul style="list-style-type: none"> Minimum 1 per year is recommended. Maximum 2 per hour. Maximum 20 per day. |
| | PE/PA windings <ul style="list-style-type: none"> Minimum 1 per year is recommended. Maximum 6 per hour. Maximum 50 per day. |
| MMS 12000 | PVC windings <ul style="list-style-type: none"> Minimum 1 per year is recommended. Maximum 2 per hour. Maximum 15 per day. |
| | PE/PA windings <ul style="list-style-type: none"> Minimum 1 per year is recommended. Maximum 5 per hour. Maximum 40 per day. |

Sound pressure level

The sound pressure level has been measured in accordance with the rules laid down in the EC machinery directive 2006/42/EC.

Sound pressure level of pumps

The values apply to pumps submerged in water without an external regulating valve.

| Pump type | \bar{L}_{pA} [dB(A)] |
|-----------|------------------------|
| SP 1A | < 70 |
| SP 2A | < 70 |
| SP 3A | < 70 |
| SP 5A | < 70 |
| SP 7 | < 70 |
| SP 9 | < 70 |
| SP 11 | < 70 |
| SP 14 | < 70 |
| SP 17 | < 70 |
| SP 30 | < 70 |
| SP 46 | < 70 |
| SP 60 | < 70 |
| SP 77 | < 70 |
| SP 95 | < 70 |
| SP 125 | 79 |
| SP 160 | 79 |
| SP 215 | 82 |

Sound pressure level of motors

The sound pressure level of Grundfos MS and MMS motors is lower than 70 dB(A).

Other motor makes: See installation and operating instructions for these motors.

Moment of inertia

Calculate the moment of inertia by use of one of the formulas below. Choose the formula from pump and motor size 4", 6", 8", 10" or 12" and insert the number of stages.

| Pump type | Moment of inertia [kgm ²] | | | | |
|-----------|---------------------------------------|---|---------------------------------------|----------------|--|
| | Motor size 4" | Motor size 6" | motor size 8" | Motor size 10" | Motor size 12" |
| SP 1A | Splined shaft | $(9.4 + n \times 21.4) \times 10^{-6}$ | | | |
| | Smoot shaft | $(11.7 + n \times 27.8) \times 10^{-6}$ | | | |
| SP 1.5A | Splined shaft | $(9.4 + n \times 20.4) \times 10^{-6}$ | | | |
| SP 2A | Splined shaft | $(9.4 + n \times 28.4) \times 10^{-6}$ | | | |
| | Smoot shaft | $(11.7 + n \times 40.8) \times 10^{-6}$ | | | |
| SP 3A | Splined shaft | $(9.4 + n \times 27.9) \times 10^{-6}$ | | | |
| | Smoot shaft | $(11.7 + n \times 40.7) \times 10^{-6}$ $(415.68 + n \times 40.7) \times 10^{-6}$ | | | |
| SP 5A | Splined shaft | $(9.4 + n \times 27.9) \times 10^{-6}$ | | | |
| | Smoot shaft | $(11.7 + n \times 41.7) \times 10^{-6}$ $(415.97 + n \times 41.7) \times 10^{-6}$ | | | |
| SP 7 | $(0.5 + n \times 2.0) \times 10^{-4}$ | | $(4.0 + n \times 2.0) \times 10^{-4}$ | | |
| SP 9 | $(0.5 + n \times 2.0) \times 10^{-4}$ | | $(4.0 + n \times 2.0) \times 10^{-4}$ | | |
| SP 11 | $(0.5 + n \times 2.0) \times 10^{-4}$ | | $(4.0 + n \times 2.0) \times 10^{-4}$ | | |
| SP 14 | $(0.5 + n \times 2.0) \times 10^{-4}$ | | $(4.0 + n \times 2.0) \times 10^{-4}$ | | |
| SP 17 | $(0.5 + n \times 2.0) \times 10^{-4}$ | | $(4.0 + n \times 2.0) \times 10^{-4}$ | | |
| SP 30 | $(0.5 + n \times 5.1) \times 10^{-4}$ | | $(4.0 + n \times 5.1) \times 10^{-4}$ | | $(6.0 + n \times 5.1) \times 10^{-4}$ |
| SP 46 | $(0.5 + n \times 3.6) \times 10^{-4}$ | | $(4.0 + n \times 3.6) \times 10^{-4}$ | | $(6.0 + n \times 3.6) \times 10^{-4}$ |
| SP 60 | $(0.5 + n \times 4.1) \times 10^{-4}$ | | $(4.0 + n \times 4.1) \times 10^{-4}$ | | $(6.0 + n \times 4.1) \times 10^{-4}$ |
| SP 77 | | | $(5.5 + n \times 19) \times 10^{-4}$ | | $(7.0 + n \times 19) \times 10^{-4}$ |
| SP 95 | | | $(5.5 + n \times 22) \times 10^{-4}$ | | $(20 + n \times 22) \times 10^{-4}$ |
| SP 125 | $(5.5 + n \times 33) \times 10^{-4}$ | | $(20 + n \times 33) \times 10^{-4}$ | | $(25 + n \times 33) \times 10^{-4}$ $(25 + n \times 33) \times 10^{-4}$ |
| SP 160 | $(5.5 + n \times 33) \times 10^{-4}$ | | $(20 + n \times 33) \times 10^{-4}$ | | $(25 + n \times 33) \times 10^{-4}$ $(25 + n \times 33) \times 10^{-4}$ |
| SP 215 | | | $(25 + n \times 100) \times 10^{-4}$ | | $(25 + n \times 100) \times 10^{-4}$ $(30 + n \times 100) \times 10^{-4}$ $(30 + n \times 100) \times 10^{-4}$ |

n = number of stages.

Recommended minimum borehole diameter

If you use a connecting piece in the installation, the recommended minimum borehole diameter is the largest diameter of either pump or connecting piece.

The following table shows the recommended minimum borehole diameter of SP pumps with standard connections.

| Pumps size | Starting | Motor size | Minimum borehole diameter [mm] | | | | | | | | |
|------------------|------------------|------------------|--------------------------------|-----------|-------|-------|------|--------|-------|--------|--|
| | | | Rp 1 1/4" | Rp 2 1/2" | Rp 3" | Rp 4" | R 5" | 5" GRF | Rp 6" | 6" GRF | |
| SP 1A - SP 5A | DOL | 4" | 105 | | | | | | | | |
| | | 6" | 145 | | | | | | | | |
| | | 4" ¹⁾ | 113 | | | | | | | | |
| | | 6" ¹⁾ | 145 | | | | | | | | |
| SP 7 / SP 9 | DOL | 4" | | 105 | | | | | | | |
| | | 6" | | 145 | | | | | | | |
| | | 6" ¹⁾ | | | 145 | | | | | | |
| SP 11 / SP 14 | DOL | 4" | | 105 | | | | | | | |
| | | 6" | | 145 | | | | | | | |
| SP 17 | DOL | 4" | | 140 | | | | | | | |
| | | 6" | | 145 | | | | | | | |
| | 6" ¹⁾ | | 190 | 190 | | | | | | | |
| | Y/D | 6" | | 150 | | | | | | | |
| 6" ¹⁾ | | | 180 | 180 | | | | | | | |
| SP 45 / SP 60 | DOL | 4" | | | 150 | 155 | | | | | |
| | | 6" | | | 155 | 155 | | | | | |
| | 8" ¹⁾ | | | 200 | 200 | | | | | | |
| | Y/D | 6" | | | 160 | 160 | | | | | |
| 8" ¹⁾ | | | | 200 | 200 | | | | | | |
| SP 77 / SP 95 | DOL | 6" | | | 188 | 188 | 215 | | | | |
| | | 8" | | | 206 | 206 | 215 | | | | |
| | Y/D | 6" | | | 196 | 196 | 215 | | | | |
| | | 8" | | | 200 | 200 | 215 | | | | |
| SP 125 / SP 160 | DOL | 6" | | | | | 215 | | 215 | 230 | |
| | | 8" | | | | | 225 | | 225 | 240 | |
| | Y/D | 6" | | | | | 215 | | 225 | 235 | |
| | | 8" | | | | | 235 | | 240 | 255 | |
| SP 215 | DOL | 6" | | | | | | | 246 | 246 | |
| | | 8" | | | | | | 246 | 246 | | |
| | | 10" | | | | | | 257 | 257 | | |
| | | 12" | | | | | | 300 | 300 | | |
| | Y/D | 6" | | | | | | | 257 | 257 | |
| | | 8" | | | | | | | 257 | 257 | |
| | | 10" | | | | | | | 268 | 268 | |
| | | 12" | | | | | | | 300 | 300 | |

¹⁾ Pump in sleeve.

5. SP NE, SP A NE environmental pumps

Pump

Multistage, centrifugal pump with radial impellers directly coupled to a Grundfos submersible motor. The pump is made of stainless steel EN 1.4401 and has water-lubricated, FKM-rubber bearings and sealings. The pump is without a non-return valve.

| Pump type | Pump stages | Pipe connection |
|-----------|-------------|-----------------|
| SP 3A NE | 6-29 | Rp 1 1/4 |
| SP 5A NE | 4-33 | Rp 1 1/2 |
| SP 9 NE | 4-21 | Rp 2 |
| SP 17 NE | 1-10 | Rp 2 1/2 |

Motor

The motor is suitable for aggressive and slightly contaminated or polluted liquids, including liquids containing oils.

The 2-pole, asynchronous, squirrel-cage MS 4000 RE motor of the canned type with journal bearings is made entirely of stainless steel. Electric tolerances comply with VDE 0530.

The type designation for RE is:

- R
Materials in stainless steel DIN W.-Nr. 1.4539.
- E
FKM rubber parts and shaft seal with ceramic tungsten-carbide shaft seals for optimum wear resistance.

Insulation class: F.

Enclosure class: IP58.

The motor cable is enclosed in PTFE and it is one long cable without joints for increased cable life.

Pumped liquids

Thin, non-explosive liquids without abrasive particles or fibres.

Maximum sand content: 50 g/m³.

Note that as the SP environmental pump has not been approved as explosion-proof, consult local authorities and regulations if you are in doubt whether to use the SP environmental pump for a specific application.

Order data

Product numbers

The pump is supplied complete with motor and cable guards fitted but without the motor cable, which must be ordered separately in order to choose the rubber quality.

SP A 3 NE, 3 x 400 V

| Pump type | Motor | | Product number |
|-------------|------------|---------------------|----------------|
| | Type | P ₂ [kW] | |
| SP 3A-6 NE | MS 4000 RE | 0.75 | 10221906 |
| SP 3A-9 NE | | | 10221909 |
| SP 3A-12 NE | | | 10221912 |
| SP 3A-15 NE | | | 10221915 |
| SP 3A-18 NE | MS 4000 RE | 1.1 | 10221918 |
| SP 3A-22 NE | | | 10221922 |
| SP 3A-25 NE | | | 10221925 |
| SP 3A-29 NE | | 2.2 | 10221929 |

SP A 5 NE, 3 x 400 V

| Pump type | Motor | | Product number |
|-------------|------------|---------------------|----------------|
| | Type | P ₂ [kW] | |
| SP 5A-4 NE | MS 4000 RE | 0.75 | 05221904 |
| SP 5A-6 NE | | | 05221906 |
| SP 5A-8 NE | | | 05221908 |
| SP 5A-12 NE | | | 05221912 |
| SP 5A-17 NE | MS 4000 RE | 1.5 | 05221917 |
| SP 5A-21 NE | | | 05221921 |
| SP 5A-25 NE | | | 05221925 |
| SP 5A-33 NE | | 3.0 | 05221933 |

SP 9 NE, 3 x 400 V

| Pump type | Motor | | Product number |
|------------|------------|---------------------|----------------|
| | Type | P ₂ [kW] | |
| SP 9-4 NE | MS 4000 RE | 0.75 | 98780182 |
| SP 9-5 NE | | | 98730819 |
| SP 9-8 NE | | | 98730820 |
| SP 9-10 NE | | | 98779812 |
| SP 9-11 NE | MS 4000 RE | 2.2 | 98730831 |
| SP 9-13 NE | | | 98730832 |
| SP 9-16 NE | | | 98730834 |
| SP 9-18 NE | MS 4000 RE | 4.0 | 98730835 |
| SP 9-21 NE | | | 98730836 |

SP 17 NE, 3 x 400 V

| Pump type | Motor | | Product number |
|-------------|------------|---------------------|----------------|
| | Type | P ₂ [kW] | |
| SP 17-1 NE | MS 4000 RE | 0.75 | 12C91901 |
| SP 17-2 NE | | | 12C91902 |
| SP 17-3 NE | | | 12C91903 |
| SP 17-4 NE | | | 12C91904 |
| SP 17-5 NE | MS 4000 RE | 3.0 | 12C91905 |
| SP 17-6 NE | | | 12C91906 |
| SP 17-7 NE | | | 12C91907 |
| SP 17-8 NE | MS 4000 RE | 4.0 | 12C91908 |
| SP 17-9 NE | | | 12C91909 |
| SP 17-10 NE | | | 12C91910 |

Material specification SP NE, SPA NE pumps

| Pos. | Component | Material | DIN W.-Nr. |
|------|------------------------|-----------------|-------------------|
| 1 | Valve casing | Stainless steel | 1.4401/ 1.4517 |
| 2 | Top bearing | FKM | |
| 3 | Chamber | Stainless steel | 1.4401 |
| 4 | Intermediate bearing | FKM | |
| 5 | Impeller | Stainless steel | 1.4401 |
| 6 | Suction interconnector | Stainless steel | 1.4401/ 1.4517 |
| 7 | Shaft | Stainless steel | 1.4462 |
| 8 | Strap | Stainless steel | 1.4401 |

Material specification (motor)

| Pos. | Component | Material | DIN W.-Nr. |
|------|-----------------|---------------------------|------------|
| 9 | Radial bearing | Ceramics/tungsten carbide | |
| 10 | Thrust bearings | Carbon/ceramics | |
| 11 | Shaft end | Stainless steel | 1.4462 |
| 12 | Stator housing | Stainless steel | 1.4539 |
| 13 | End shield | Stainless steel | 1.4539 |
| | O-rings | FKM | |

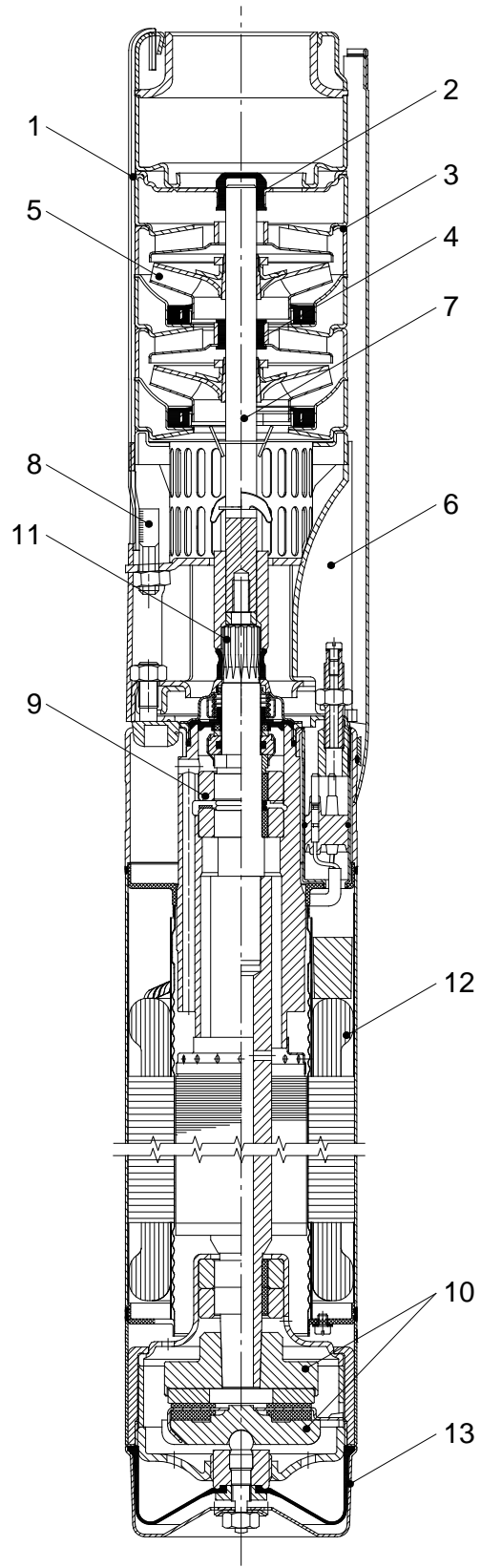
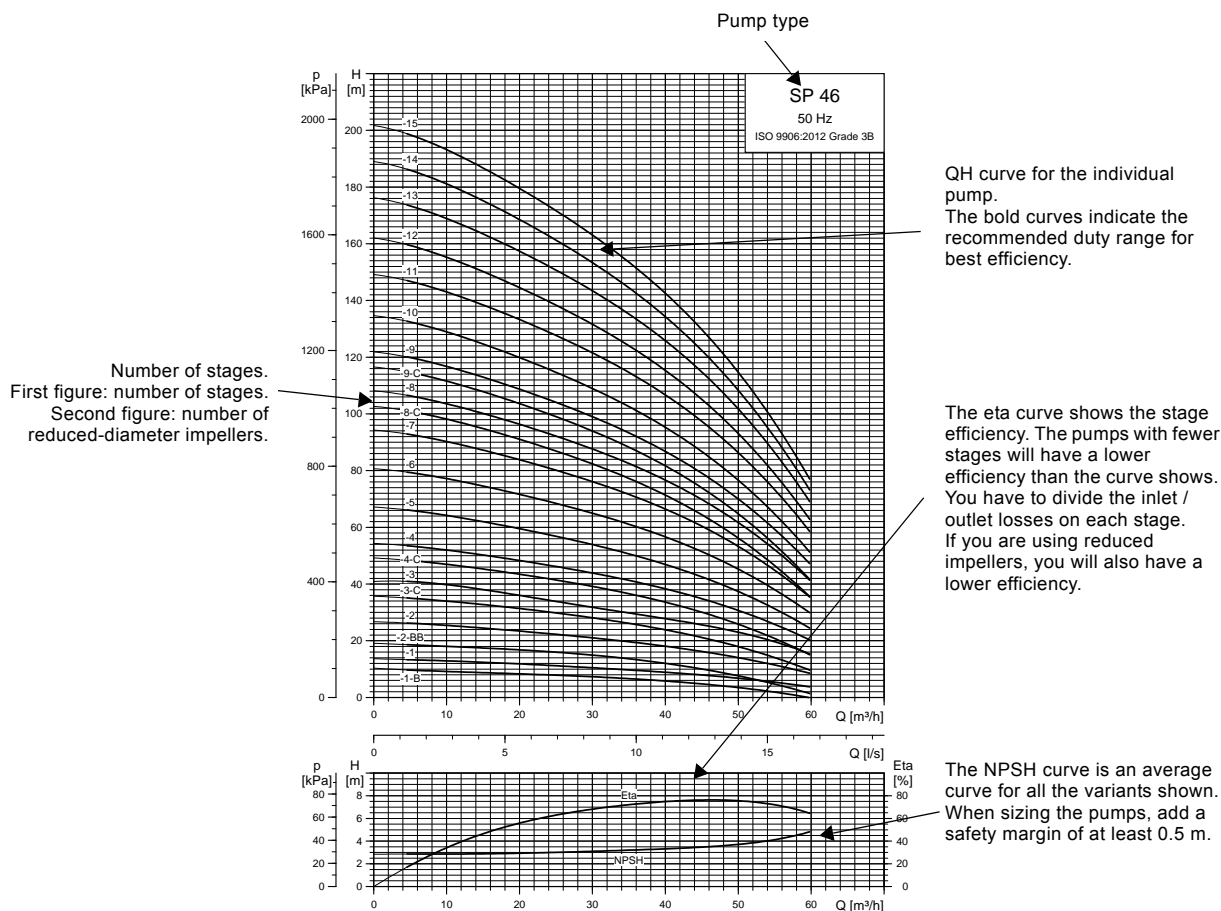


Fig. 18 SP 5A NE

TM01 9176 1500

How to read the curve charts



TM01 8765 2414

Fig. 19 How to read the curve charts

Curve conditions

The conditions below apply to the curves on pages 26 to 93.

General conditions

- Curve tolerances according to ISO 9906:2012 - Grade 3B.
- The performance curves show pump performance at actual speed, cf. standard motor range.
Approximate motor speeds:
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 include possible losses such as non-return valve loss.

SP A, SP curves

- **Q/H:** The curves include valve and inlet losses at the actual speed.
Operations without a non-return valve 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 the required inlet pressure.
- **Power curve:** P2 shows the pump power input of each stage for the individual pump size when the pump is running at the rated speed.
- **Efficiency curve:** Eta shows pump stage efficiency. If Eta for the actual pump size is needed, please consult <https://product-selection.grundfos.com> (Grundfos Product Center).

SP certificates

For more information about SP certificates, see *Certificates* on page 117.

Cavitation

Cavitation does not normally take place in submersible pumps. If, however, the following two factors occur at the same time, cavitation damage on both pump and motor may arise at low installation depths:

- Invasive air bubbles
- Reduction of counter pressure caused for instance by pipe fracture, severe corrosion of riser main and extremely high consumption.

To calculate the required installation depth to prevent cavitation, the following formula is applied:

$$H = H_b - NPSH - H_{loss} - H_v - H_s$$

H_b = barometric pressure

NPSH = Net Positive Suction Head

H_{loss} = pressure loss in suction pipe

H_v = vapour pressure

H_s = safety factor

When the formula gives a positive H value, this means that the pump will be able to operate at suction lift. In that case, the standard indication of minimum installation depth is valid.

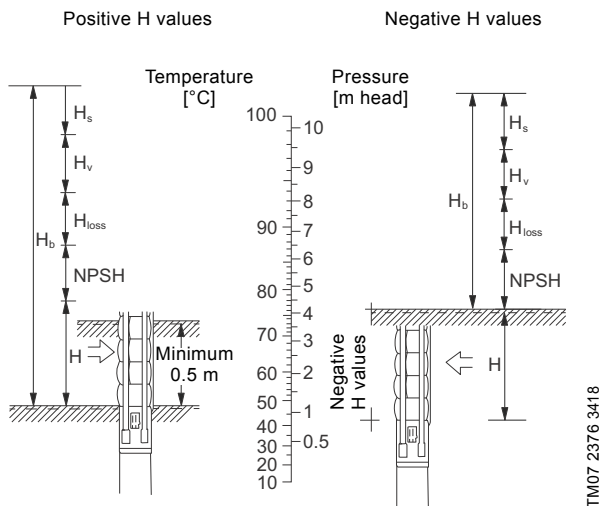


Fig. 20 Installation depth

Example:

An SP 60 at a flow of 78 m³/h.

H_b 10.0 m

NPSH from data sheet 4.2 m

H_{loss} 0.0 m

H_v at 32 °C 0.5 m

H_s 1.0 m

$$H = 10 - 4.2 - 0 - 0.5 - 1.0 = 4.3 \text{ m}$$

As H is positive, this means that the pump is able to create a vacuum of 0.43 bar without being damaged. That means that no special precautions have to be taken. In case of corrosion of the riser main resulting in a 20 mm hole, there will be no counter pressure and the pump flow will increase to more than 90 m³/h.

H_b is unchanged 10.0 m

NPSH will increase to 8.0 m

H_{loss} 0.0 m

H_v will increase due to recirculation in well to 4.6 m

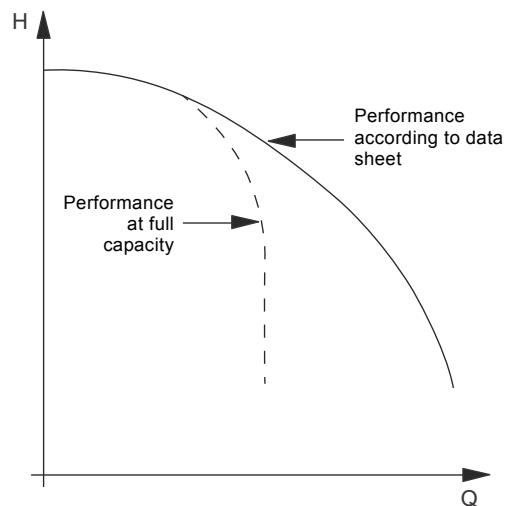
H_s is unchanged 1.0 m

This will give

$$H = 10 - 8 - 0 - 4.6 - 1.0 = -3.6 \text{ m}$$

This value of H means that the pump inlet must be at least 3.6 m below the dynamic water level, otherwise the pump will cavitate.

If a pump cavitates, it will not give full performance, see figure below.

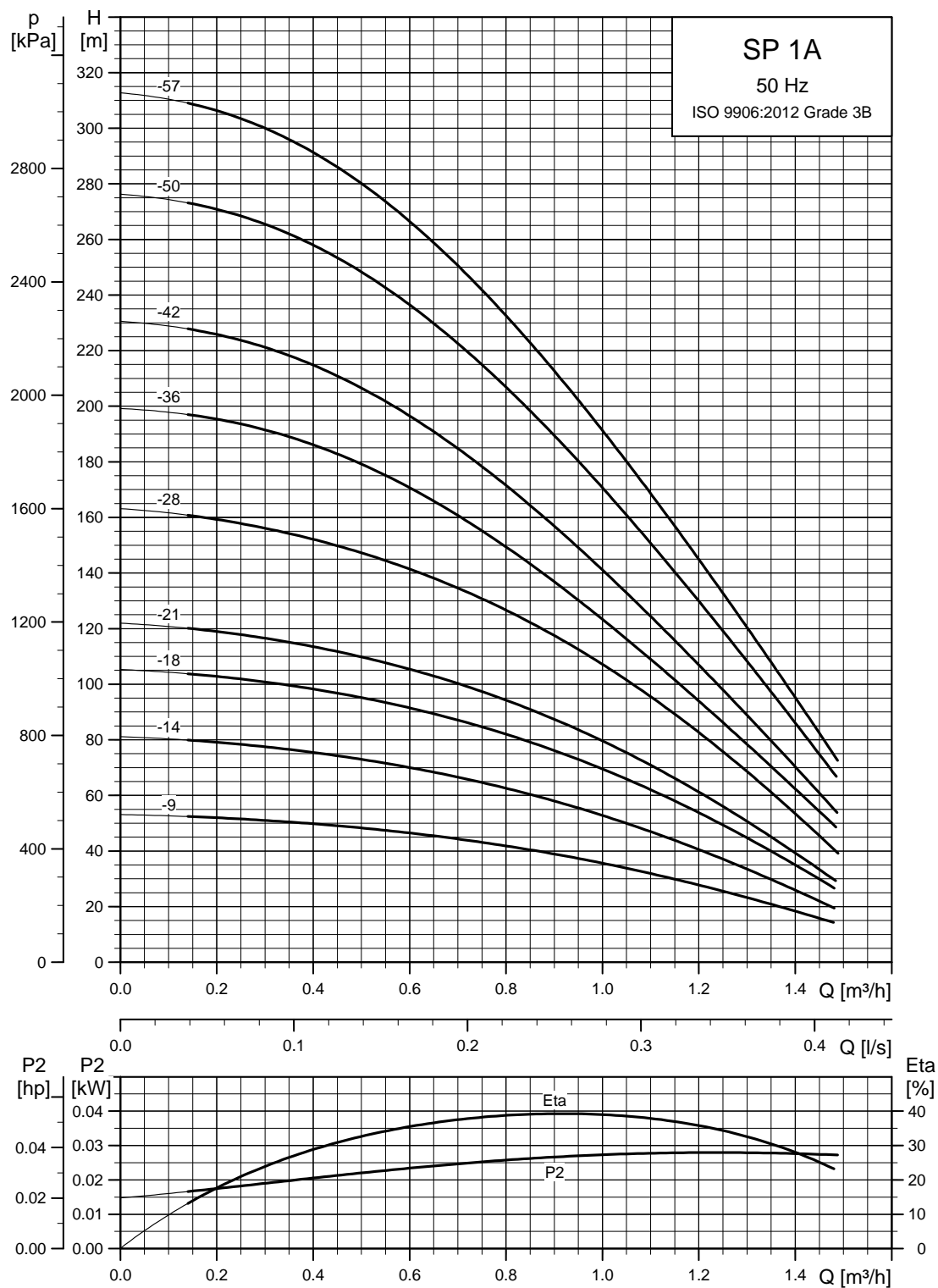


TM07 2377 3418

6. Performance curves and technical data

SP 1A

Performance curves

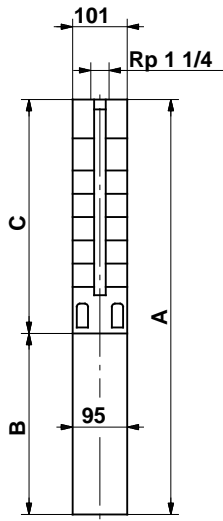


See also section *How to read the curve charts* on page 24.

NPSH: Minimum inlet pressure 0.5 m.

TM00 7271 4702

Dimensions and weights



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

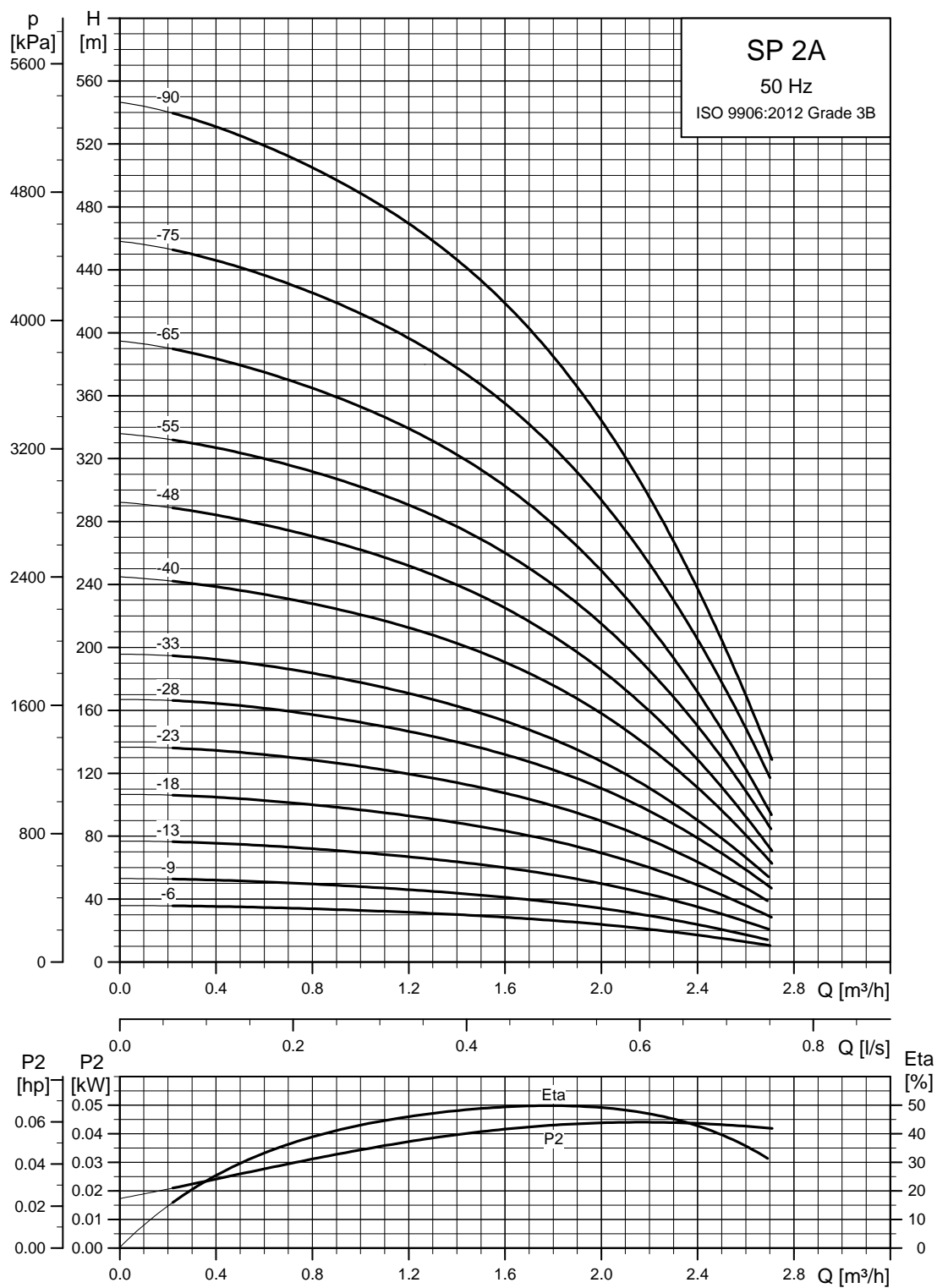
TM00 0955 1196

| Pump type | Motor | | Dimensions [mm] | | | Net weight [kg] |
|------------------------------------|--------|------------|-----------------|-----|------|-----------------|
| | Type | Power [kW] | C | B | A | |
| Single-phase, 1 x 230 V | | | | | | |
| SP 1A-9 | MS 402 | 0.37 | 344 | 256 | 600 | 11 |
| SP 1A-14 | MS 402 | 0.37 | 449 | 256 | 705 | 12 |
| SP 1A-18 | MS 402 | 0.55 | 533 | 291 | 824 | 14 |
| SP 1A-21 | MS 402 | 0.55 | 596 | 276 | 869 | 14 |
| SP 1A-28 | MS 402 | 0.75 | 743 | 306 | 1049 | 16 |
| SP 1A-36 | MS 402 | 1.1 | 956 | 346 | 1302 | 25 |
| SP 1A-42 | MS 402 | 1.1 | 1082 | 346 | 1428 | 27 |
| SP 1A-50 | MS 402 | 1.5 | 1250 | 346 | 1596 | 30 |
| SP 1A-57 | MS 402 | 1.5 | 1397 | 346 | 1743 | 32 |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | |
| SP 1A-9 | MS 402 | 0.37 | 344 | 226 | 570 | 9 |
| SP 1A-14 | MS 402 | 0.37 | 449 | 226 | 675 | 10 |
| SP 1A-18 | MS 402 | 0.55 | 533 | 241 | 774 | 12 |
| SP 1A-21 | MS 402 | 0.55 | 596 | 241 | 837 | 12 |
| SP 1A-28 | MS 402 | 0.75 | 743 | 276 | 1019 | 15 |
| SP 1A-36 | MS 402 | 1.1 | 956 | 306 | 1262 | 23 |
| SP 1A-42 | MS 402 | 1.1 | 1082 | 306 | 1388 | 25 |
| SP 1A-50 | MS 402 | 1.5 | 1250 | 346 | 1596 | 29 |
| SP 1A-57 | MS 402 | 1.5 | 1397 | 346 | 1743 | 32 |

SP 1A-9 up to SP 1A-33 are pumps with spline shaft.
 SP 1A-34 up to SP 1A-57 are pumps with smooth shaft.
 All the pumps are only available in stainless steel EN 1.4301/ 304.

SP 2A

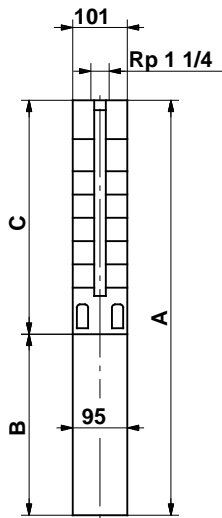
Performance curves



See also section *How to read the curve charts* on page 24.

NPSH: Minimum inlet pressure 0.5 m.

Dimensions and weights



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

TM00 0955 1196

| Pump type | Motor | | Dimensions [mm] | | | Net weight [kg] |
|------------------------------------|---------|------------|-----------------|-----|------|-----------------|
| | Type | Power [kW] | C | B | A | |
| Single-phase, 1 x 230 V | | | | | | |
| SP 2A-6 | MS 402 | 0.37 | 281 | 256 | 537 | 10 |
| SP 2A-9 | MS 402 | 0.37 | 344 | 256 | 600 | 11 |
| SP 2A-13 | MS 402 | 0.55 | 428 | 276 | 704 | 13 |
| SP 2A-18 | MS 402 | 0.75 | 533 | 306 | 839 | 15 |
| SP 2A-23 | MS 402 | 1.1 | 638 | 346 | 984 | 17 |
| SP 2A-28 | MS 402 | 1.5 | 743 | 346 | 1089 | 19 |
| SP 2A-33 | MS 402 | 1.5 | 844 | 346 | 1190 | 20 |
| SP 2A-40 | MS 4000 | 2.2 | 1040 | 573 | 1613 | 37 |
| SP 2A-48 | MS 4000 | 2.2 | 1208 | 573 | 1781 | 39 |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | |
| SP 2A-6 | MS 402 | 0.37 | 281 | 226 | 507 | 9 |
| SP 2A-9 | MS 402 | 0.37 | 344 | 226 | 570 | 9 |
| SP 2A-13 | MS 402 | 0.55 | 428 | 241 | 669 | 11 |
| SP 2A-18 | MS 402 | 0.75 | 533 | 276 | 809 | 13 |
| SP 2A-23 | MS 402 | 1.1 | 638 | 306 | 944 | 16 |
| SP 2A-28 | MS 402 | 1.5 | 743 | 346 | 1089 | 18 |
| SP 2A-33 | MS 402 | 1.5 | 844 | 346 | 1190 | 19 |
| SP 2A-40 | MS 402 | 2.2 | 1040 | 346 | 1386 | 27 |
| 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 ¹⁾ | MS 4000 | 4.0 | 1954 | 573 | 2527 | 57 |
| SP 2A-90 ¹⁾ | MS 4000 | 4.0 | 2269 | 573 | 2842 | 64 |

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

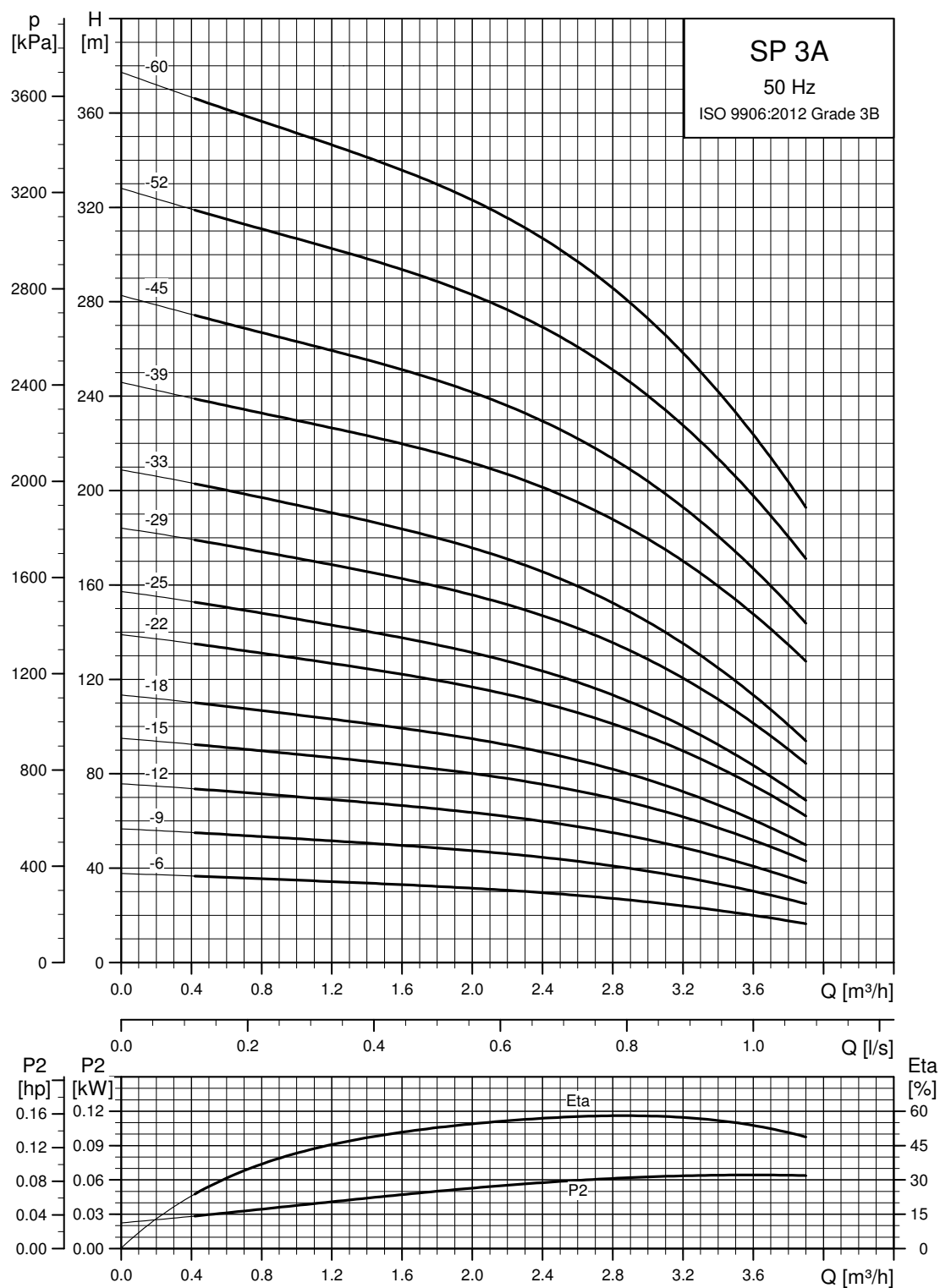
SP 2A-6 up to SP 2A-33 are pumps with spline shaft.

SP 2A-34 up to SP 2A-90 are pumps with smooth shaft.

All the pumps are only available in stainless steel EN 1.4301/ 304.

SP 3A

Performance curves

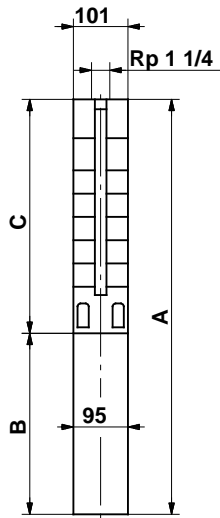


See also section *How to read the curve charts* on page 24.

NPSH: Minimum inlet pressure 0.5 m.

TM00 7273 4618

Dimensions and weights



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

TM00 0955 1196

| Pump type | Motor | | Dimensions [mm] | | | Net weight [kg] |
|------------------------------------|-----------|------------|-----------------|-----|------|-----------------|
| | Type | Power [kW] | C | B | A | |
| Single-phase, 1 x 230 V | | | | | | |
| SP 3A-6 | MS 402 | 0.37 | 281 | 256 | 537 | 10 |
| SP 3A-9 | MS 402 55 | 0.55 | 344 | 276 | 620 | 12 |
| SP 3A-12 | MS 402 | 0.75 | 407 | 306 | 713 | 13 |
| SP 3A-15 | MS 402 | 1.1 | 470 | 346 | 816 | 16 |
| SP 3A-18 | MS 402 | 1.1 | 533 | 346 | 879 | 16 |
| SP 3A-22 | MS 402 | 1.5 | 617 | 346 | 963 | 18 |
| SP 3A-25 | MS 402 | 1.5 | 680 | 346 | 1026 | 18 |
| SP 3A-29 | MS 4000 | 2.2 | 764 | 573 | 1337 | 29 |
| SP 3A-33 | MS 4000 | 2.2 | 848 | 573 | 1421 | 30 |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | |
| SP 3A-6 | MS 402 | 0.37 | 281 | 226 | 507 | 9 |
| SP 3A-9 | MS 402 | 0.55 | 344 | 241 | 585 | 10 |
| SP 3A-12 | MS 402 | 0.75 | 407 | 276 | 683 | 12 |
| SP 3A-15 | MS 402 | 1.1 | 470 | 306 | 776 | 14 |
| SP 3A-18 | MS 402 | 1.1 | 533 | 306 | 839 | 15 |
| SP 3A-22 | MS 402 | 1.5 | 617 | 346 | 963 | 17 |
| SP 3A-25 | MS 402 | 1.5 | 680 | 346 | 1026 | 18 |
| SP 3A-29 | MS 402 | 2.2 | 764 | 346 | 1110 | 20 |
| SP 3A-33 | MS 402 | 2.2 | 848 | 346 | 1194 | 21 |
| SP 3A-39 | MS 4000 | 3.0 | 1019 | 493 | 1512 | 32 |
| SP 3A-45 | MS 4000 | 3.0 | 1145 | 493 | 1638 | 34 |
| SP 3A-52 | MS 4000 | 4.0 | 1292 | 573 | 1865 | 41 |
| SP 3A-60 | MS 4000 | 4.0 | 1460 | 573 | 2033 | 43 |

SP 3A-6 up to SP 3A-33 are pumps with spline shaft as standard

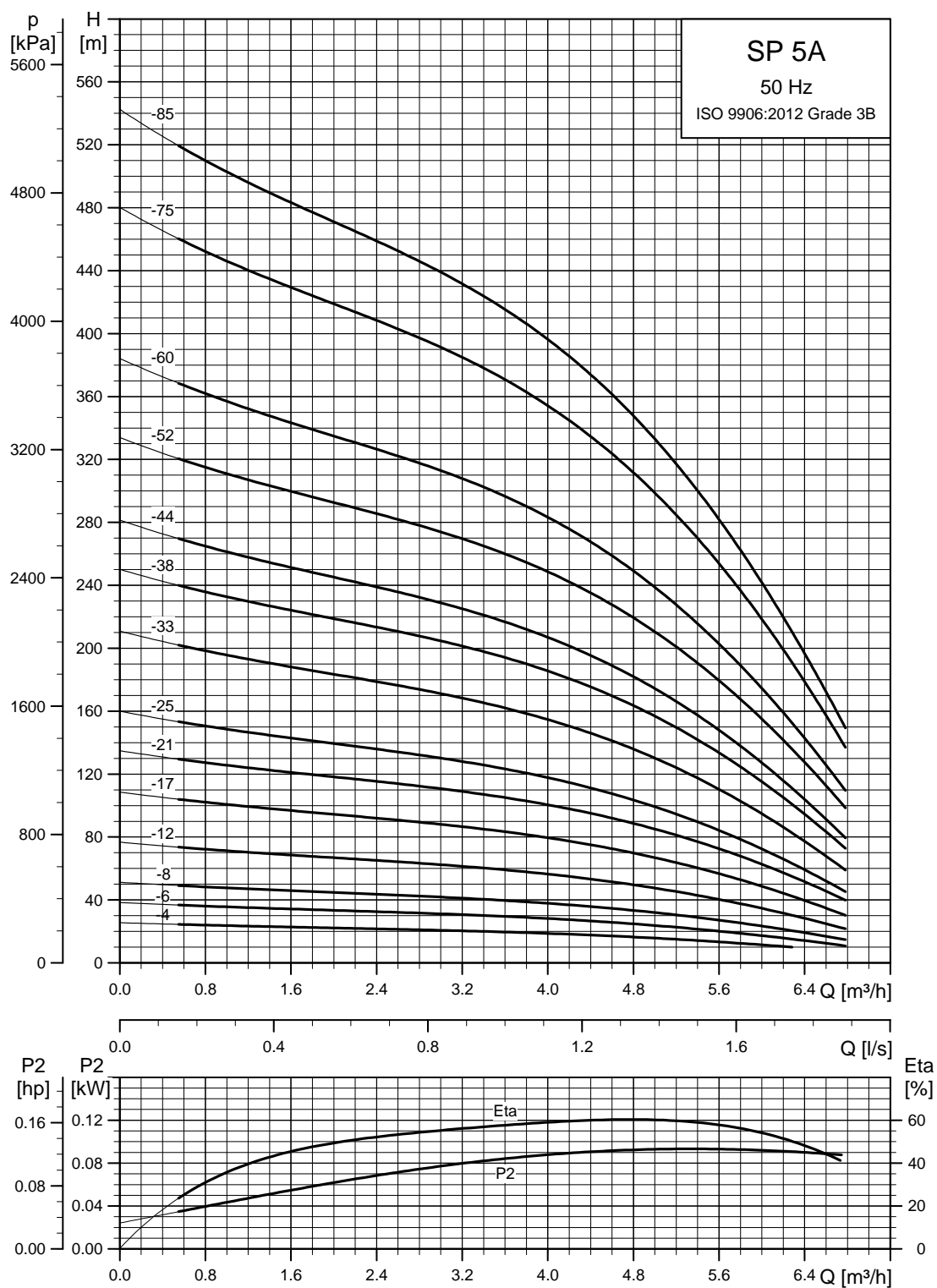
SP 3A-34 up to SP 3A-60 are pumps with smooth shaft as standard.

Pumps with spline shaft are only available in stainless steel EN 1.4301. Pumps with smooth shaft are also available in N (EN 1.4401) version with MS4000R. See page 6.

It is also possible to get the SP 3A-6 and up with smooth shaft.

SP 5A

Performance curves

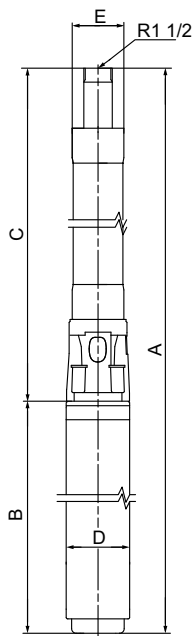
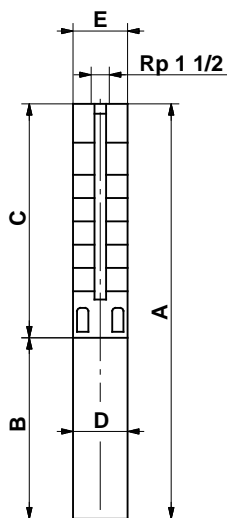


See also section *How to read the curve charts* on page 24.

NPSH: Minimum inlet pressure 0.5 m.

TM00 7274 4702

Dimensions and weights



Pump in sleeve

TM00 0956 1196

TM01 4202 4218

| Pump type | Motor | | Dimensions [mm] | | | | | Net weight [kg] |
|------------------------------------|---------|------------|-----------------|-----|------|-------|-------|-----------------|
| | Type | Power [kW] | C | B | A | D | E | |
| Single-phase, 1 x 230 V | | | | | | | | |
| SP 5A-4 | MS 402 | 0.37 | 240 | 256 | 496 | 95 | 101 | 10 |
| SP 5A-6 | MS 402 | 0.55 | 282 | 276 | 558 | 95 | 101 | 11 |
| SP 5A-8 | MS 402 | 0.75 | 324 | 306 | 630 | 95 | 101 | 13 |
| SP 5A-12 | MS 402 | 1.1 | 408 | 346 | 754 | 95 | 101 | 15 |
| SP 5A-17 | MS 402 | 1.5 | 513 | 346 | 859 | 95 | 101 | 17 |
| SP 5A-21 | MS 4000 | 2.2 | 597 | 573 | 1170 | 95 | 101 | 27 |
| SP 5A-25 | MS 4000 | 2.2 | 681 | 573 | 1254 | 95 | 101 | 28 |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | | | |
| SP 5A-4 | MS 402 | 0.37 | 240 | 226 | 466 | 95 | 101 | 8 |
| SP 5A-6 | MS 402 | 0.55 | 282 | 241 | 523 | 95 | 101 | 10 |
| SP 5A-8 | MS 402 | 0.75 | 324 | 276 | 600 | 95 | 101 | 11 |
| SP 5A-12 | MS 402 | 1.1 | 408 | 306 | 714 | 95 | 101 | 13 |
| SP 5A-17 | MS 402 | 1.5 | 513 | 346 | 859 | 95 | 101 | 16 |
| SP 5A-21 | MS 402 | 2.2 | 597 | 346 | 943 | 95 | 101 | 18 |
| SP 5A-25 | MS 402 | 2.2 | 681 | 346 | 1027 | 95 | 101 | 19 |
| SP 5A-33 | MS 4000 | 3.0 | 849 | 493 | 1342 | 95 | 101 | 26 |
| SP 5A-38 | MS 4000 | 4.0 | 998 | 573 | 1571 | 95 | 101 | 36 |
| SP 5A-44 | MS 4000 | 4.0 | 1124 | 573 | 1697 | 95 | 101 | 38 |
| SP 5A-52 | MS 4000 | 5.5 | 1292 | 673 | 1965 | 95 | 101 | 46 |
| SP 5A-60 | MS 4000 | 5.5 | 1460 | 673 | 2133 | 95 | 101 | 48 |
| SP 5A-52 | MS 6000 | 5.5 | 1354 | 547 | 1901 | 139.5 | 139.5 | 60 |
| SP 5A-60 | MS 6000 | 5.5 | 1522 | 547 | 2069 | 139.5 | 139.5 | 63 |
| SP 5A-75 ¹⁾ | MS 6000 | 7.5 | 2146 | 577 | 2723 | 139.5 | 139.5 | 86 |
| SP 5A-85 ¹⁾ | MS 6000 | 7.5 | 2356 | 577 | 2933 | 139.5 | 139.5 | 92 |

¹⁾ SP 5A-75 and SP 5A-85 are mounted in sleeve for R 1/2 connection and with a maximum diameter of 108 mm.

SP 5A-4 up to SP 5A-33 are pumps with spline shaft as standard.

SP 5A-34 up to SP 5A-85 are pumps with smooth shaft as standard.

Pumps with spline shaft are only available in stainless steel EN 1.4301.

Pumps with smooth shaft are also available in N (EN 1.4401) and R (EN 1.4539) version with MS4000R. See page 6.

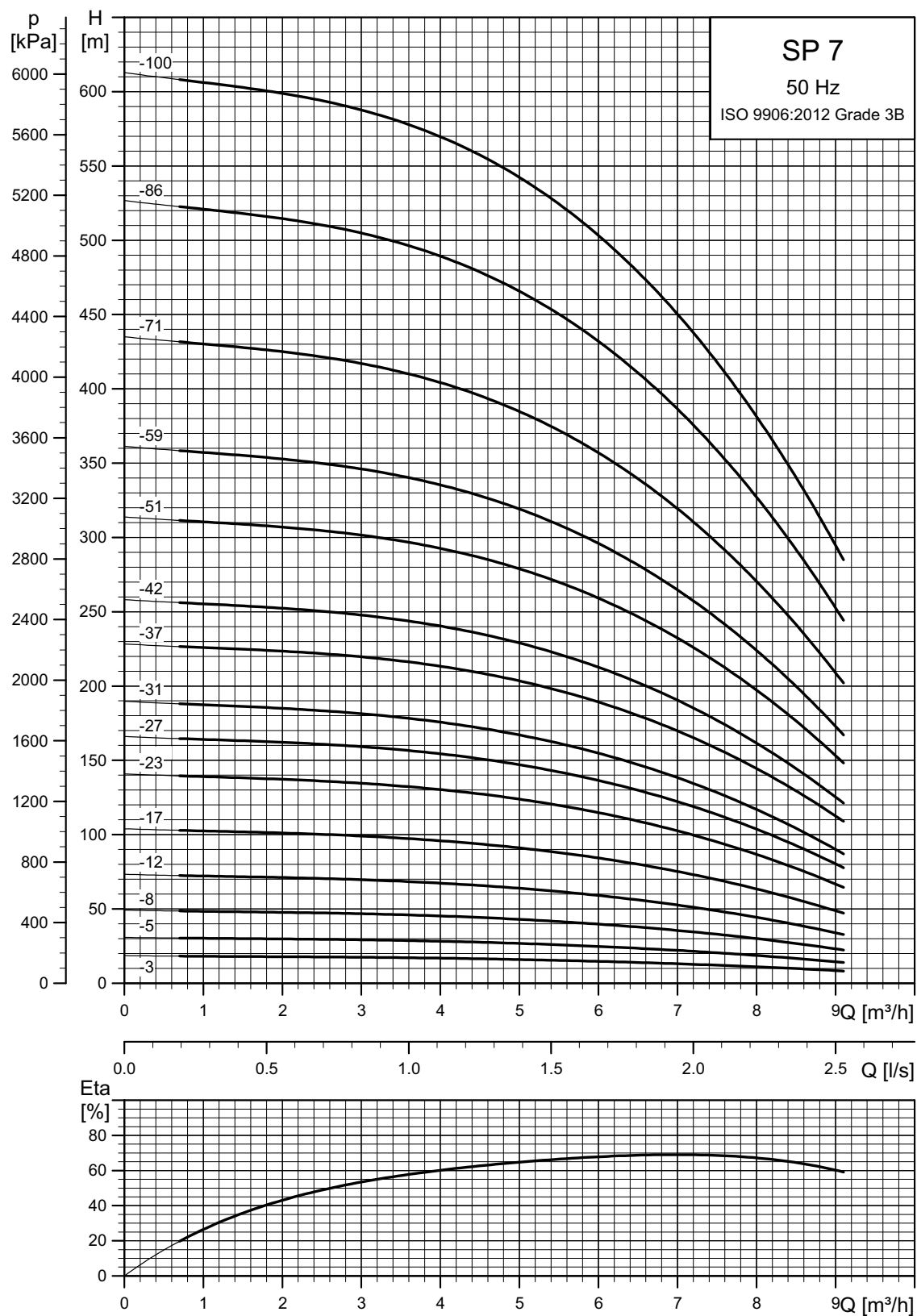
It is also possible to get the SP 5A-4 and up with smooth shaft.

Pumps mounted in sleeve "SP5A-75 and up" are only available in standard and N-versions.

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

SP 7

Performance curves

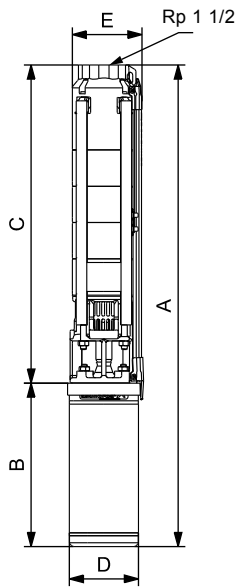


TM06 43 16 1915

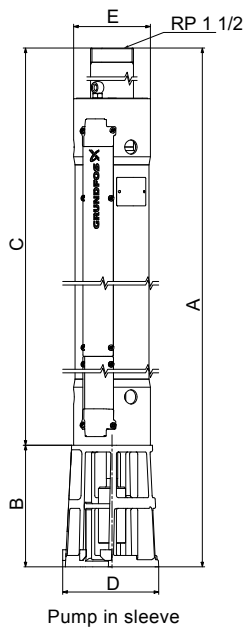
See also section *How to read the curve charts* on page 24.

NPSH: Minimum inlet pressure 0.5 m.

Dimensions and weights



TM06 5396 0818



TM07 3068 4618

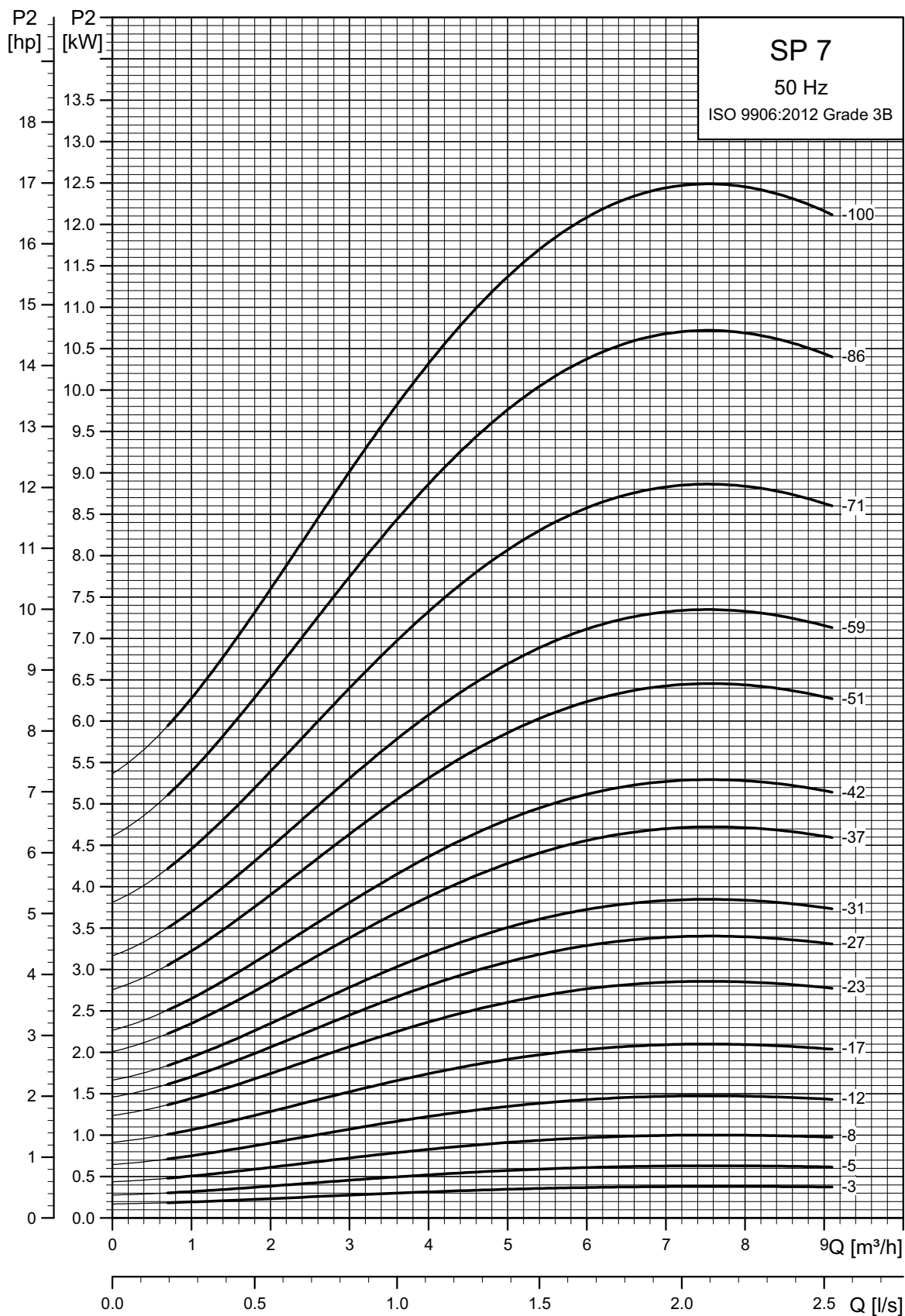
| Pump type | Motor | | Dimensions [mm] | | | | | Net weight [kg] |
|--|---------|------------|-----------------|-----|------|-------|-------|-----------------|
| | Type | Power [kW] | C | B | A | D | E | |
| Single-phase, 1 x 230 V / 1 x 240 V | | | | | | | | |
| SP 7-3 | MS 402 | 0.55 | 388 | 276 | 664 | 95 | 101 | 14.0 |
| SP 7-5 | MS 402 | 0.75 | 488 | 306 | 835 | 95 | 101 | 16.4 |
| SP 7-8 | MS 402 | 1.1 | 638 | 346 | 1025 | 95 | 101 | 20.1 |
| SP 7-12 | MS 402 | 1.5 | 838 | 346 | 1184 | 95 | 101 | 22.3 |
| SP 7-17 | MS 4000 | 2.2 | 1088 | 577 | 1665 | 95 | 101 | 35.7 |
| Three-phase, 3 x 220-230 V / 3 x 380-400-415 V | | | | | | | | |
| SP 7-3 | MS 402 | 0.55 | 388 | 241 | 629 | 95 | 101 | 12.5 |
| SP 7-5 | MS 402 | 0.75 | 488 | 276 | 764 | 95 | 101 | 15.2 |
| SP 7-8 | MS 402 | 1.1 | 638 | 306 | 944 | 95 | 101 | 18.3 |
| SP 7-12 | MS 402 | 1.5 | 838 | 346 | 1184 | 95 | 101 | 22.3 |
| SP 7-17 | MS 402 | 2.2 | 1088 | 346 | 1434 | 95 | 101 | 26.6 |
| SP 7-5 | MS 4000 | 0.75 | 488 | 402 | 890 | 95 | 101 | 19.7 |
| SP 7-8 | MS 4000 | 1.1 | 638 | 417 | 1055 | 95 | 101 | 22.5 |
| SP 7-12 | MS 4000 | 1.5 | 838 | 417 | 1255 | 95 | 101 | 24.8 |
| SP 7-17 | MS 4000 | 2.2 | 1088 | 457 | 1545 | 95 | 101 | 29.7 |
| SP 7-23 | MS 4000 | 3 | 1388 | 497 | 1885 | 95 | 101 | 35.1 |
| SP 7-27 | MS 4000 | 4 | 1588 | 577 | 2165 | 95 | 101 | 41.4 |
| SP 7-31 | MS 4000 | 4 | 1788 | 577 | 2365 | 95 | 101 | 43.7 |
| SP 7-37 | MS 4000 | 5.5 | 2088 | 677 | 2765 | 95 | 101 | 52.2 |
| SP 7-42 | MS 4000 | 5.5 | 2338 | 677 | 3015 | 95 | 101 | 55.1 |
| SP 7-51 | MS 4000 | 7.5 | 2788 | 777 | 3565 | 95 | 101 | 64.4 |
| SP 7-59 | MS 4000 | 7.5 | 3188 | 777 | 3965 | 95 | 101 | 69.1 |
| SP 7-37 | MS 6000 | 5.5 | 2151 | 547 | 2698 | 139.5 | 139.5 | 63.4 |
| SP 7-42 | MS 6000 | 5.5 | 2401 | 547 | 2948 | 139.5 | 139.5 | 66.3 |
| SP 7-51 | MS 6000 | 7.5 | 2851 | 577 | 3428 | 139.5 | 139.5 | 74.7 |
| SP 7-59 | MS 6000 | 7.5 | 3251 | 577 | 3828 | 139.5 | 139.5 | 79.4 |
| SP 7-71 ¹⁾ | MS 6000 | 9.2 | 4146 | 607 | 4753 | 139.5 | 139.5 | 120.1 |
| SP 7-86 ¹⁾ | MS 6000 | 11 | 4896 | 637 | 5533 | 139.5 | 139.5 | 136.1 |
| SP 7-100 ¹⁾ | MS 6000 | 13 | 5596 | 667 | 6263 | 139.5 | 139.5 | 151.3 |

¹⁾ SP 7-71 to SP 7-100 are mounted in sleeve for R2 connection.

The pump types above are also available in N- and R-versions. See page 6.

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

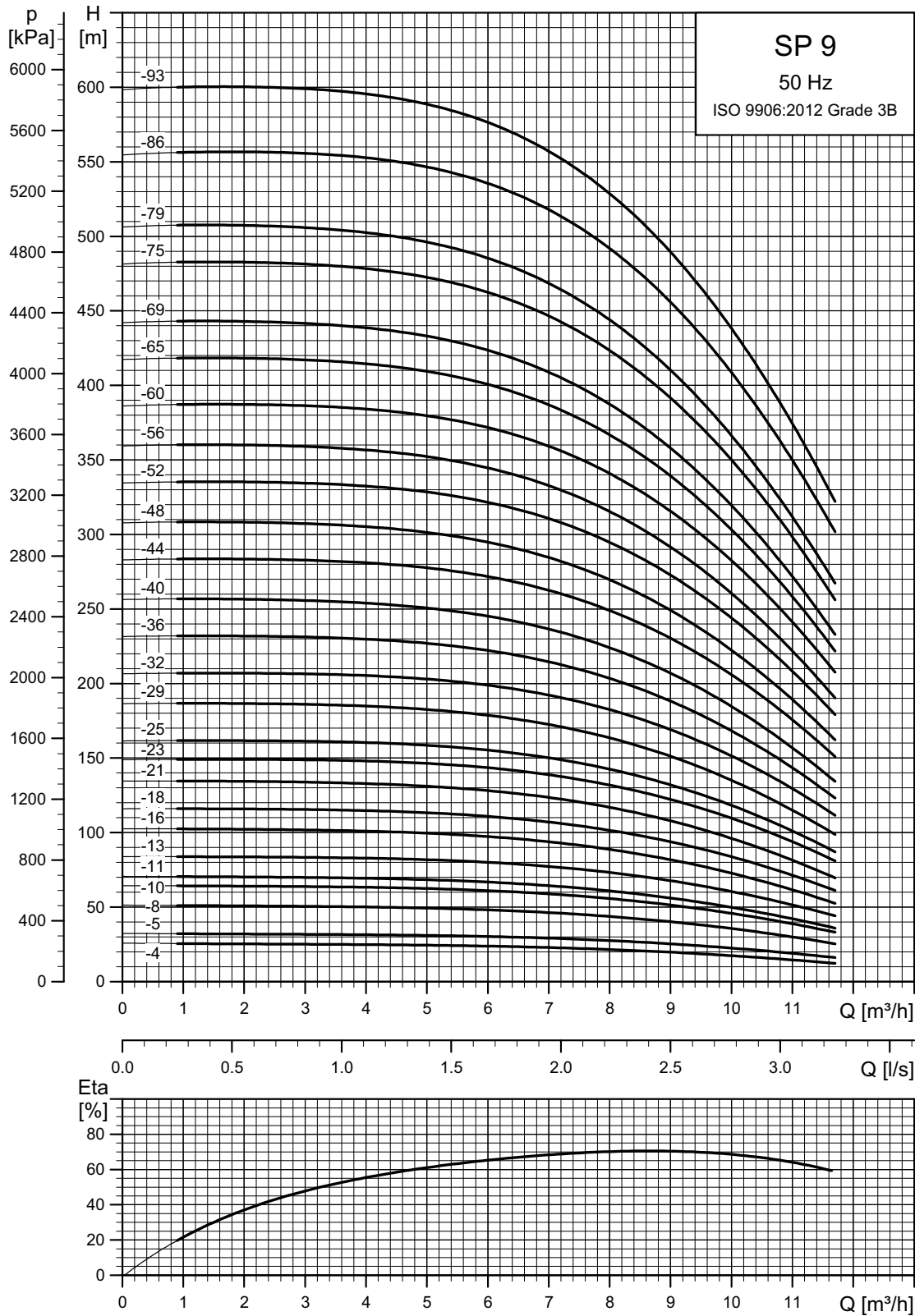
Power curves



TM06 4317 1915

SP 9

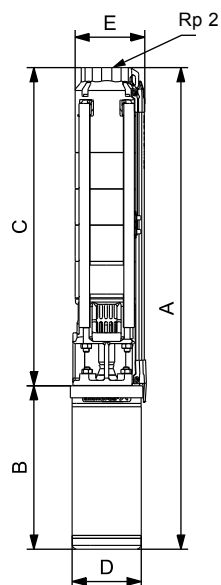
Performance curves



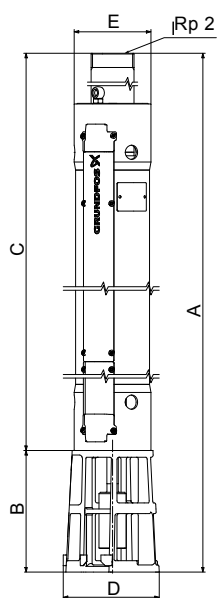
See also section *How to read the curve charts* on page 24.
NPSH: Minimum inlet pressure 0.5 m.

TM06 1424 2414

Dimensions and weights



TM06 5396 0818



Pump in sleeve

TM07 3068 4618

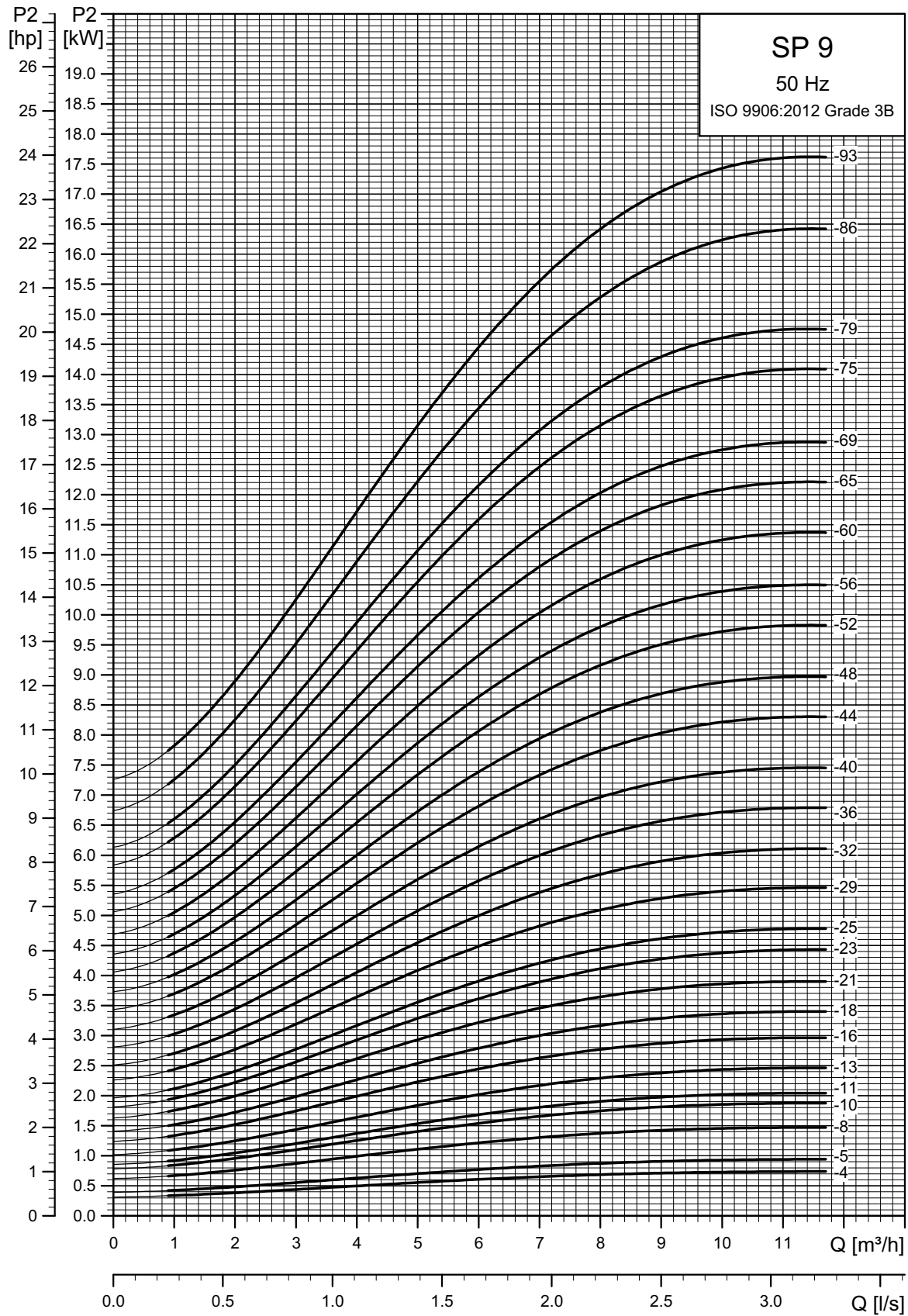
| Pump type | Motor | | Dimensions [mm] | | | | | Net weight [kg] |
|--|---------|------------|-----------------|-----|------|-------|-------|-----------------|
| | Type | Power [kW] | C | B | A | D | E | |
| Single-phase, 1 x 230 V / 1 x 240 V | | | | | | | | |
| SP 9-4 | MS 402 | 0.75 | 438 | 306 | 744 | 95 | 101 | 15.9 |
| SP 9-5 | MS 402 | 1.1 | 488 | 346 | 834 | 95 | 101 | 18.3 |
| SP 9-8 | MS 402 | 1.5 | 638 | 346 | 984 | 95 | 101 | 20.0 |
| SP 9-10 | MS 4000 | 2.2 | 738 | 577 | 1315 | 95 | 101 | 31.6 |
| SP 9-11 | MS 4000 | 2.2 | 788 | 577 | 1365 | 95 | 101 | 32.2 |
| Three-phase, 3 x 220-230 V / 3 x 380-400-415 V | | | | | | | | |
| SP 9-4 | MS 402 | 0.75 | 438 | 276 | 714 | 95 | 101 | 14.7 |
| SP 9-5 | MS 402 | 1.1 | 488 | 306 | 794 | 95 | 101 | 16.5 |
| SP 9-8 | MS 402 | 1.5 | 638 | 346 | 984 | 95 | 101 | 20.0 |
| SP 9-10 | MS 402 | 2.2 | 738 | 346 | 1084 | 95 | 101 | 22.5 |
| SP 9-11 | MS 402 | 2.2 | 788 | 346 | 1134 | 95 | 101 | 23.1 |
| SP 9-4 | MS 4000 | 0.75 | 438 | 402 | 840 | 95 | 101 | 19.2 |
| SP 9-5 | MS 4000 | 1.1 | 488 | 417 | 905 | 95 | 101 | 20.7 |
| SP 9-8 | MS 4000 | 1.5 | 638 | 417 | 1055 | 95 | 101 | 22.5 |
| SP 9-10 | MS 4000 | 2.2 | 738 | 457 | 1195 | 95 | 101 | 25.6 |
| SP 9-11 | MS 4000 | 2.2 | 788 | 457 | 1245 | 95 | 101 | 26.2 |
| SP 9-13 | MS 4000 | 3 | 888 | 497 | 1385 | 95 | 101 | 29.3 |
| SP 9-16 | MS 4000 | 3 | 1038 | 497 | 1535 | 95 | 101 | 31.0 |
| SP 9-18 | MS 4000 | 4 | 1138 | 577 | 1715 | 95 | 101 | 36.2 |
| SP 9-21 | MS 4000 | 4 | 1288 | 577 | 1865 | 95 | 101 | 37.9 |
| SP 9-23 | MS 4000 | 5.5 | 1388 | 677 | 2065 | 95 | 101 | 44.1 |
| SP 9-25 | MS 4000 | 5.5 | 1488 | 677 | 2165 | 95 | 101 | 45.2 |
| SP 9-29 | MS 4000 | 5.5 | 1688 | 677 | 2365 | 95 | 101 | 47.7 |
| SP 9-32 | MS 4000 | 7.5 | 1838 | 777 | 2615 | 95 | 101 | 53.4 |
| SP 9-36 | MS 4000 | 7.5 | 2038 | 777 | 2815 | 95 | 101 | 55.7 |
| SP 9-40 | MS 4000 | 7.5 | 2238 | 777 | 3015 | 95 | 101 | 58.0 |
| SP 9-23 | MS 6000 | 5.5 | 1451 | 547 | 1998 | 139.5 | 139.5 | 55.0 |
| SP 9-25 | MS 6000 | 5.5 | 1551 | 547 | 2098 | 139.5 | 139.5 | 56.2 |
| SP 9-29 | MS 6000 | 5.5 | 1751 | 547 | 2298 | 139.5 | 139.5 | 58.6 |
| SP 9-32 | MS 6000 | 7.5 | 1901 | 577 | 2478 | 139.5 | 139.5 | 63.4 |
| SP-9-36 | MS 6000 | 7.5 | 2101 | 577 | 2678 | 139.5 | 139.5 | 65.8 |
| SP-9-40 | MS 6000 | 7.5 | 2301 | 577 | 2878 | 139.5 | 139.5 | 68.1 |
| SP 9-44 | MS 6000 | 9.2 | 2501 | 607 | 3108 | 139.5 | 139.5 | 78.2 |
| SP 9-48 | MS 6000 | 9.2 | 2701 | 607 | 3308 | 139.5 | 139.5 | 80.6 |
| SP 9-52 | MS 6000 | 11 | 2901 | 637 | 3538 | 139.5 | 139.5 | 86.1 |
| SP 9-56 ¹⁾ | MS 6000 | 11 | 3396 | 637 | 4033 | 139.5 | 140 | 110.0 |
| SP 9-60 ¹⁾ | MS 6000 | 13 | 3596 | 667 | 4263 | 139.5 | 140 | 116.5 |
| SP 9-65 ¹⁾ | MS 6000 | 13 | 3846 | 667 | 4513 | 139.5 | 140 | 120.9 |
| SP 9-69 ¹⁾ | MS 6000 | 13 | 4046 | 667 | 4713 | 139.5 | 140 | 124.3 |
| SP 9-75 ¹⁾ | MS 6000 | 15 | 4346 | 702 | 5048 | 139.5 | 140 | 133.6 |
| SP 9-79 ¹⁾ | MS 6000 | 15 | 4546 | 702 | 5248 | 139.5 | 140 | 137.1 |
| SP 9-86 ¹⁾ | MS 6000 | 18.5 | 4896 | 757 | 5653 | 139.5 | 140 | 147.6 |
| SP 9-93 ¹⁾ | MS 6000 | 18.5 | 5246 | 757 | 6003 | 139.5 | 140 | 153.7 |

¹⁾ SP 9-56 to SP 9-86 are mounted in sleeve for R2 connection.

The pump types above are also available in N- and R-versions. See page 6.

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

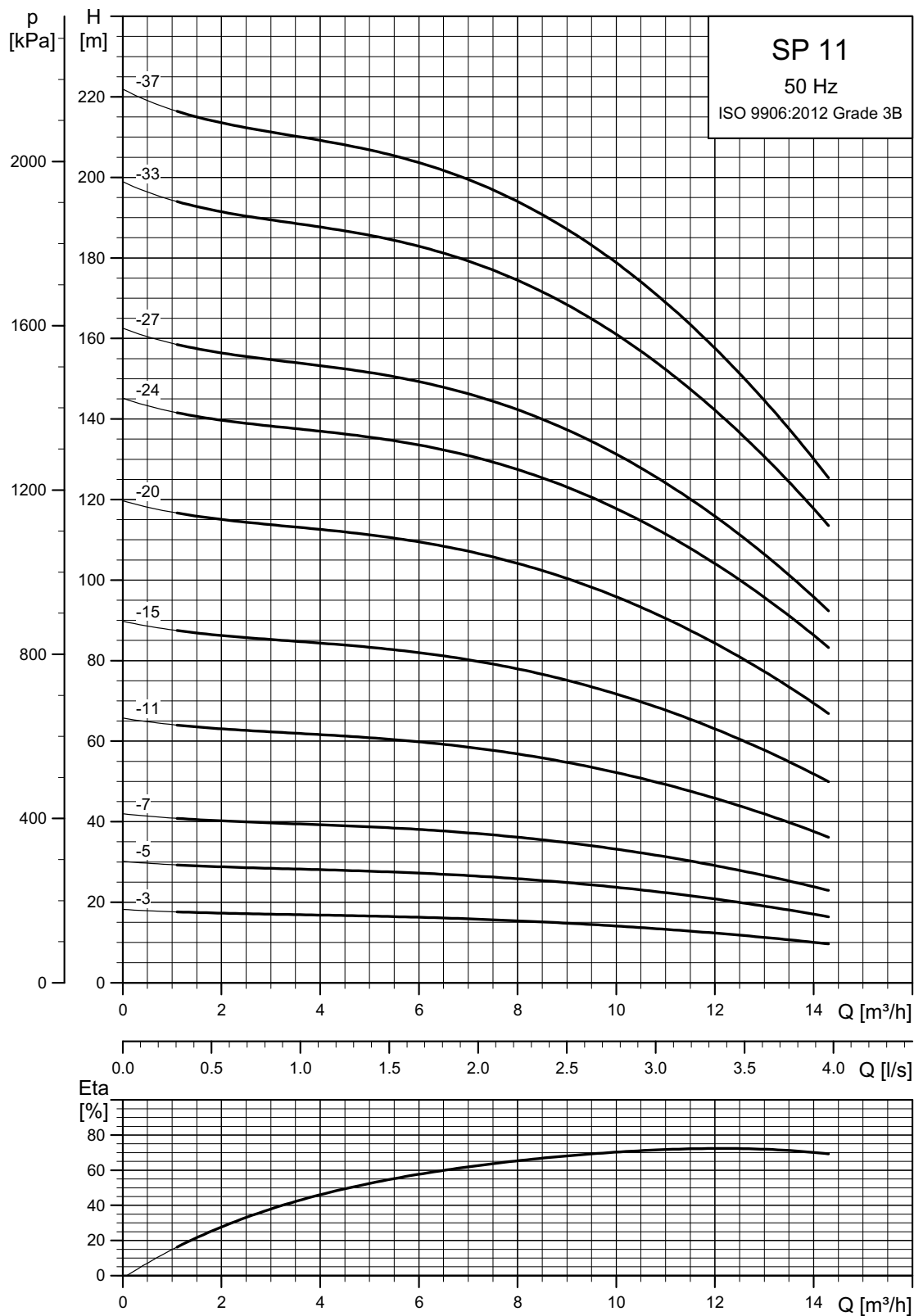
Power curves



TM06 1425 2414

SP 11

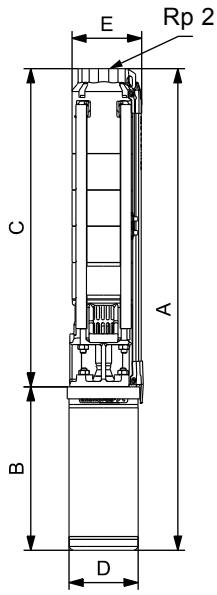
Performance curves



See also section *How to read the curve charts* on page 24.

NPSH: Minimum inlet pressure 0.5 m.

Dimensions and weights



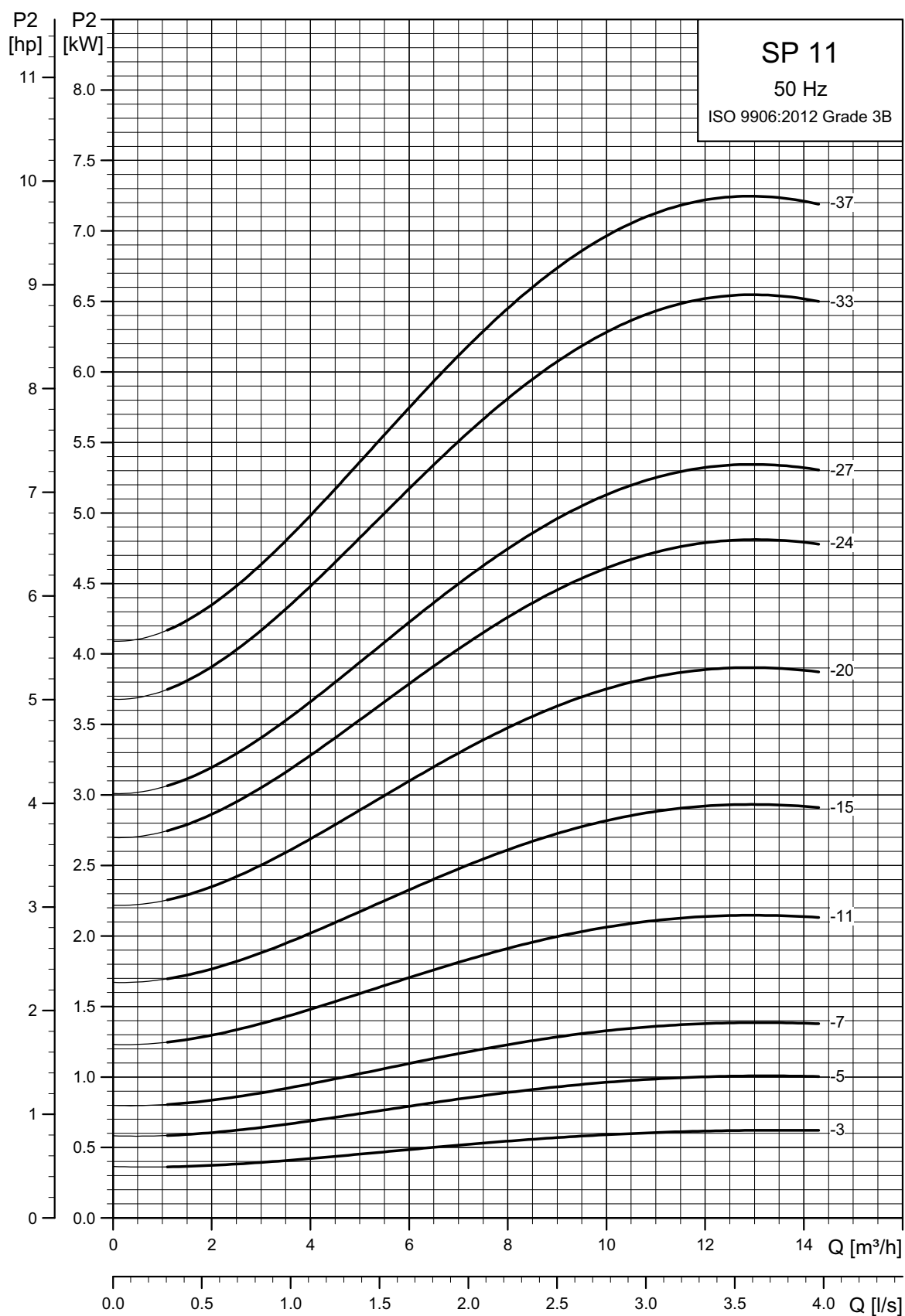
TM06 5396 0818

| Pump type | Motor | | Dimensions [mm] | | | | | Net weight [kg] |
|--|---------|------------|-----------------|-----|------|-------|-------|-----------------|
| | Type | Power [kW] | C | B | A | D | E | |
| Single-phase, 1 x 230 V / 1 x 240 V | | | | | | | | |
| SP 11-3 | MS 402 | 0.75 | 463 | 306 | 769 | 95 | 101 | 16.0 |
| SP 11-5 | MS 402 | 1.1 | 613 | 346 | 959 | 95 | 101 | 19.5 |
| SP 11-7 | MS 402 | 1.5 | 763 | 346 | 1109 | 95 | 101 | 21.0 |
| SP 11-11 | MS 4000 | 2.2 | 1063 | 577 | 1640 | 95 | 101 | 34.7 |
| Three-phase, 3 x 220-230 V 50 Hz / 3 x 380-400-415 V 50 Hz | | | | | | | | |
| SP 11-3 | MS 402 | 0.75 | 463 | 276 | 739 | 95 | 101 | 14.8 |
| SP 11-5 | MS 402 | 1.1 | 613 | 306 | 919 | 95 | 101 | 17.7 |
| SP 11-7 | MS 402 | 1.5 | 763 | 346 | 1109 | 95 | 101 | 21.0 |
| SP 11-11 | MS 402 | 2.2 | 1063 | 346 | 1409 | 95 | 101 | 25.6 |
| SP 11-3 | MS 4000 | 0.75 | 463 | 402 | 865 | 95 | 101 | 19.3 |
| SP 11-5 | MS 4000 | 1.1 | 613 | 417 | 1030 | 95 | 101 | 21.9 |
| SP 11-7 | MS 4000 | 1.5 | 763 | 417 | 1180 | 95 | 101 | 23.5 |
| SP 11-11 | MS 4000 | 2.2 | 1063 | 457 | 1520 | 95 | 101 | 28.7 |
| SP 11-15 | MS 4000 | 3 | 1363 | 497 | 1860 | 95 | 101 | 33.8 |
| SP 11-20 | MS 4000 | 4 | 1738 | 577 | 2315 | 95 | 101 | 41.9 |
| SP 11-24 | MS 4000 | 5.5 | 2038 | 677 | 2715 | 95 | 101 | 50.0 |
| SP 11-27 | MS 4000 | 5.5 | 2263 | 677 | 2940 | 95 | 101 | 52.3 |
| SP 11-33 | MS 4000 | 7.5 | 2713 | 777 | 3490 | 95 | 101 | 61.2 |
| SP 11-37 | MS 4000 | 7.5 | 3013 | 777 | 3790 | 95 | 101 | 64.4 |
| SP 11-24 | MS 6000 | 5.5 | 2101 | 547 | 2648 | 139.5 | 139.5 | 60.4 |
| SP 11-27 | MS 6000 | 5.5 | 2326 | 547 | 2873 | 139.5 | 139.5 | 62.8 |
| SP 11-33 | MS 6000 | 7.5 | 2776 | 577 | 3353 | 139.5 | 139.5 | 70.5 |
| SP 11-37 | MS 6000 | 7.5 | 3076 | 577 | 3653 | 139.5 | 139.5 | 73.7 |

The pump types above are also available in N- and R-versions. See page 6.

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

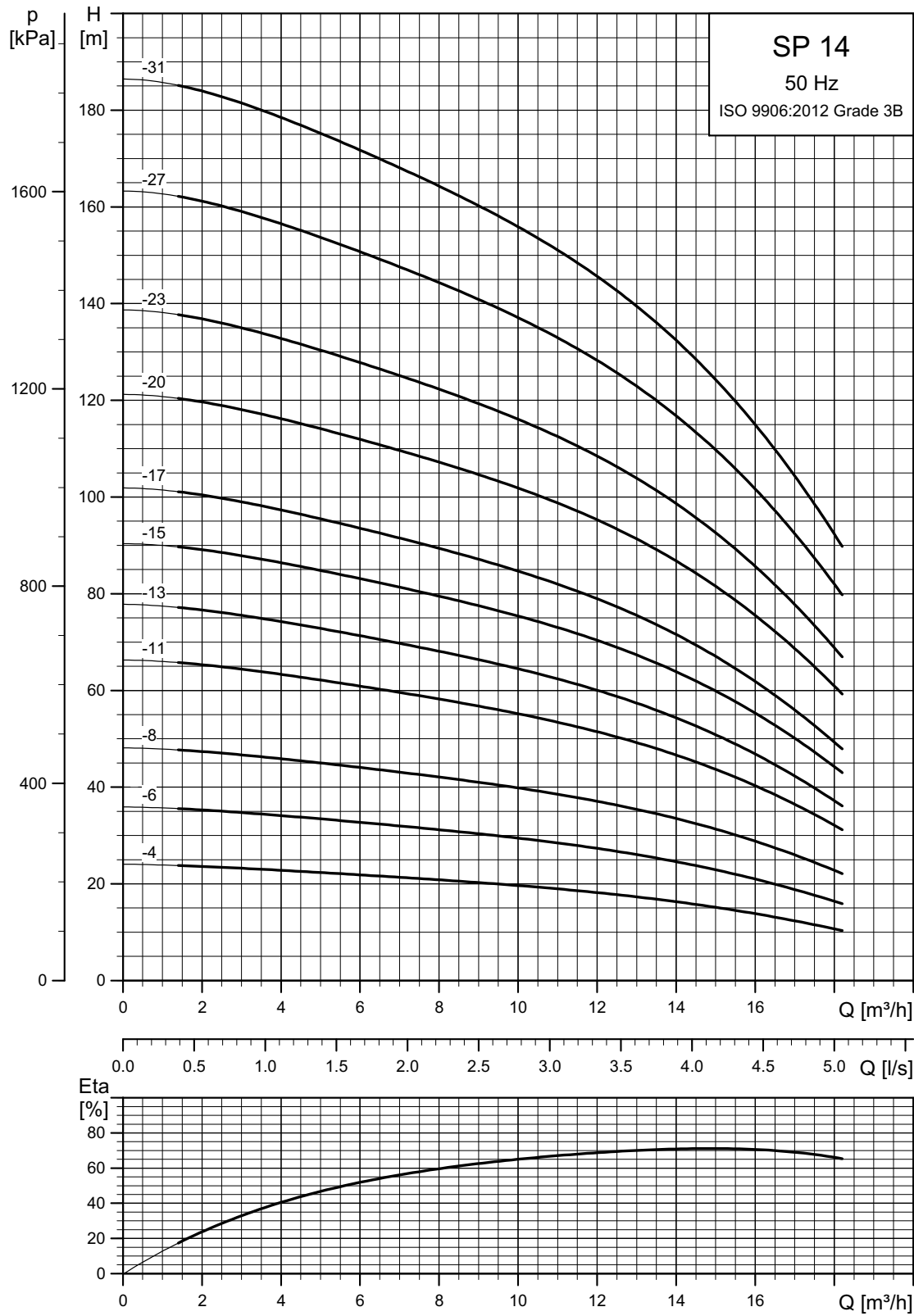
Power curves



TM06 1426 2414

SP 14

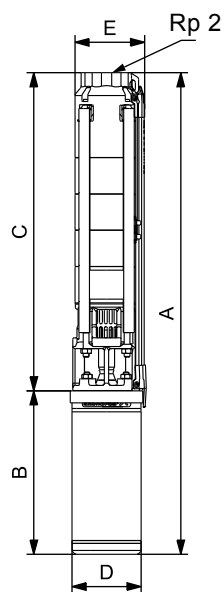
Performance curves



TM06 1427 2414

See also section *How to read the curve charts* on page 24.
NPSH: Minimum inlet pressure 0.5 m.

Dimensions and weights



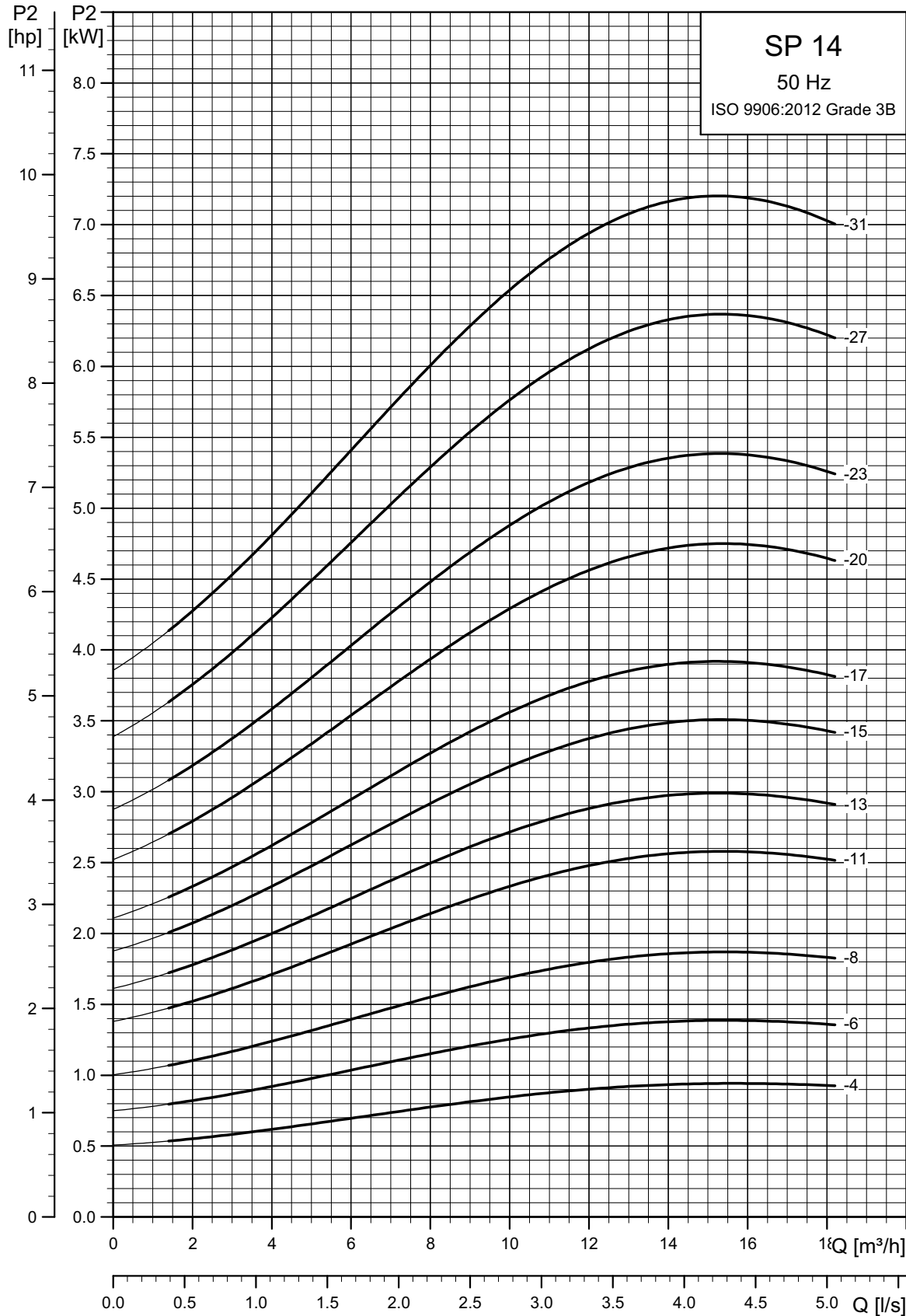
TM06 5396 0818

| Pump type | Motor | | Dimensions [mm] | | | | | Net weight [kg] |
|--|---------|------------|-----------------|-----|------|-------|-------|-----------------|
| | Type | Power [kW] | C | B | A | D | E | |
| Single-phase, 1 x 230 V / 1 x 240 V | | | | | | | | |
| SP 14-4 | MS 402 | 1.1 | 538 | 346 | 884 | 95 | 101 | 18.7 |
| SP 14-6 | MS 402 | 1.5 | 688 | 346 | 1034 | 95 | 101 | 20.2 |
| SP 14-8 | MS 4000 | 2.2 | 838 | 577 | 1415 | 95 | 101 | 32.3 |
| Three-phase, 3 x 220-230 V 50 Hz / 3 x 380-400-415 V 50 Hz | | | | | | | | |
| SP 14-4 | MS 402 | 1.1 | 538 | 306 | 844 | 95 | 101 | 16.9 |
| SP 14-6 | MS 402 | 1.5 | 688 | 346 | 1034 | 95 | 101 | 20.2 |
| SP 14-8 | MS 402 | 2.2 | 838 | 346 | 1084 | 95 | 101 | 23.2 |
| SP 14-4 | MS 4000 | 1.1 | 538 | 417 | 955 | 95 | 101 | 21.1 |
| SP 14-6 | MS 4000 | 1.5 | 688 | 417 | 1105 | 95 | 101 | 22.7 |
| SP 14-8 | MS 4000 | 2.2 | 838 | 457 | 1295 | 95 | 101 | 26.3 |
| SP 14-11 | MS 4000 | 3 | 1063 | 497 | 1560 | 95 | 101 | 30.6 |
| SP 14-13 | MS 4000 | 3 | 1213 | 497 | 1710 | 95 | 101 | 32.2 |
| SP 14-15 | MS 4000 | 4 | 1363 | 577 | 1940 | 95 | 101 | 37.8 |
| SP 14-17 | MS 4000 | 4 | 1513 | 577 | 2090 | 95 | 101 | 39.5 |
| SP 14-20 | MS 4000 | 5.5 | 1738 | 677 | 2415 | 95 | 101 | 46.9 |
| SP 14-23 | MS 4000 | 5.5 | 1963 | 677 | 2640 | 95 | 101 | 49.2 |
| SP 14-27 | MS 4000 | 7.5 | 2263 | 777 | 3040 | 95 | 101 | 56.4 |
| SP 14-31 | MS 4000 | 7.5 | 2563 | 777 | 3340 | 95 | 101 | 59.6 |
| SP 14-20 | MS 6000 | 5.5 | 1801 | 547 | 2348 | 139.5 | 139.5 | 57.3 |
| SP 14-23 | MS 6000 | 5.5 | 2026 | 547 | 2573 | 139.5 | 139.5 | 59.6 |
| SP 14-27 | MS 6000 | 7.5 | 2326 | 577 | 2903 | 139.5 | 139.5 | 65.8 |
| SP 14-31 | MS 6000 | 7.5 | 2626 | 577 | 3203 | 139.5 | 139.5 | 69.0 |

The pump types above are also available in N- and R-versions. See page 6.

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

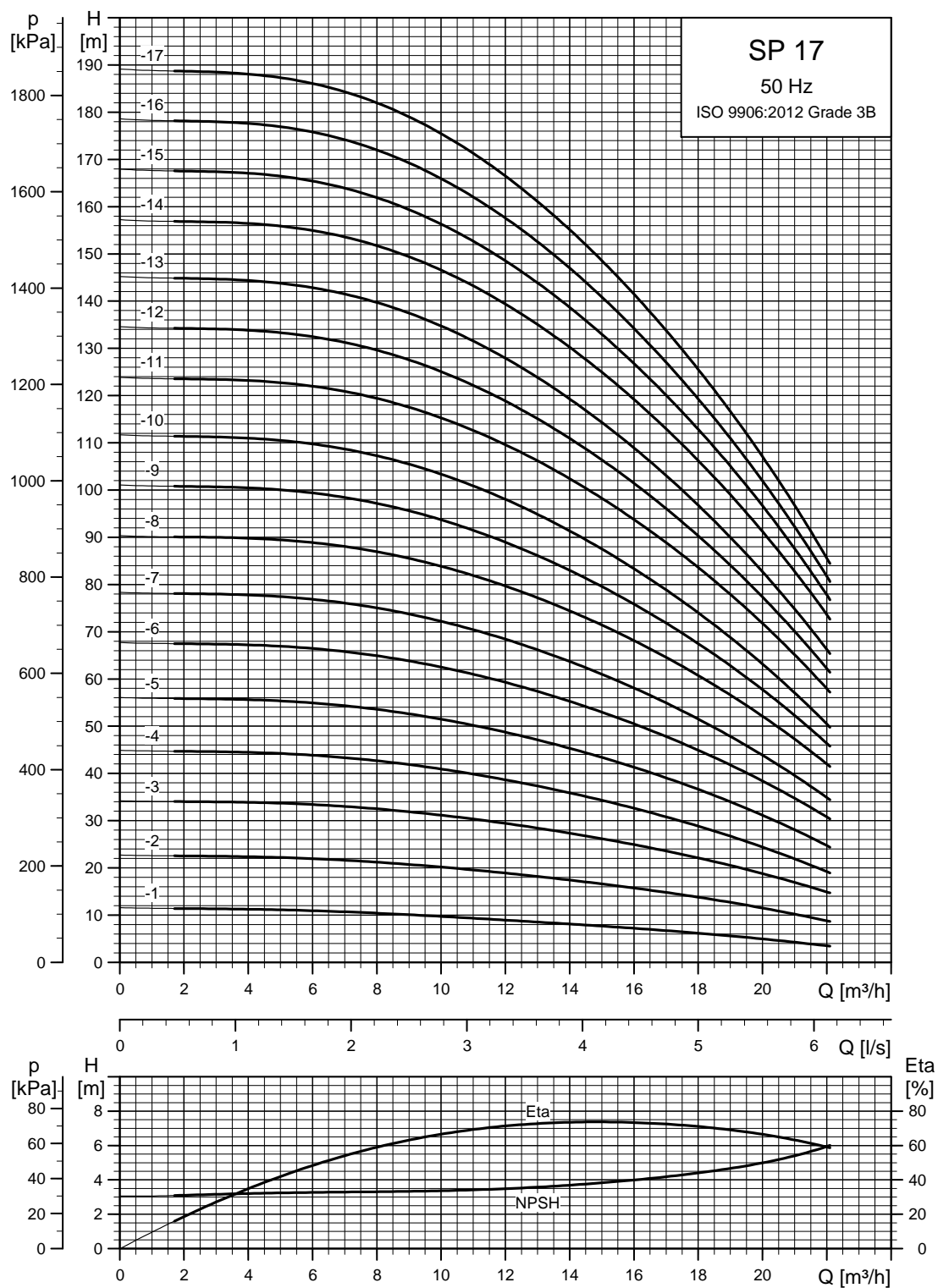
Power curves



TM06 1428 2414

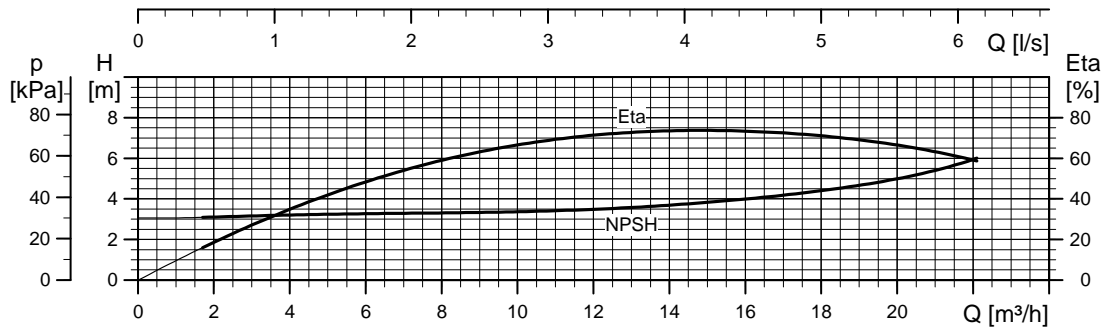
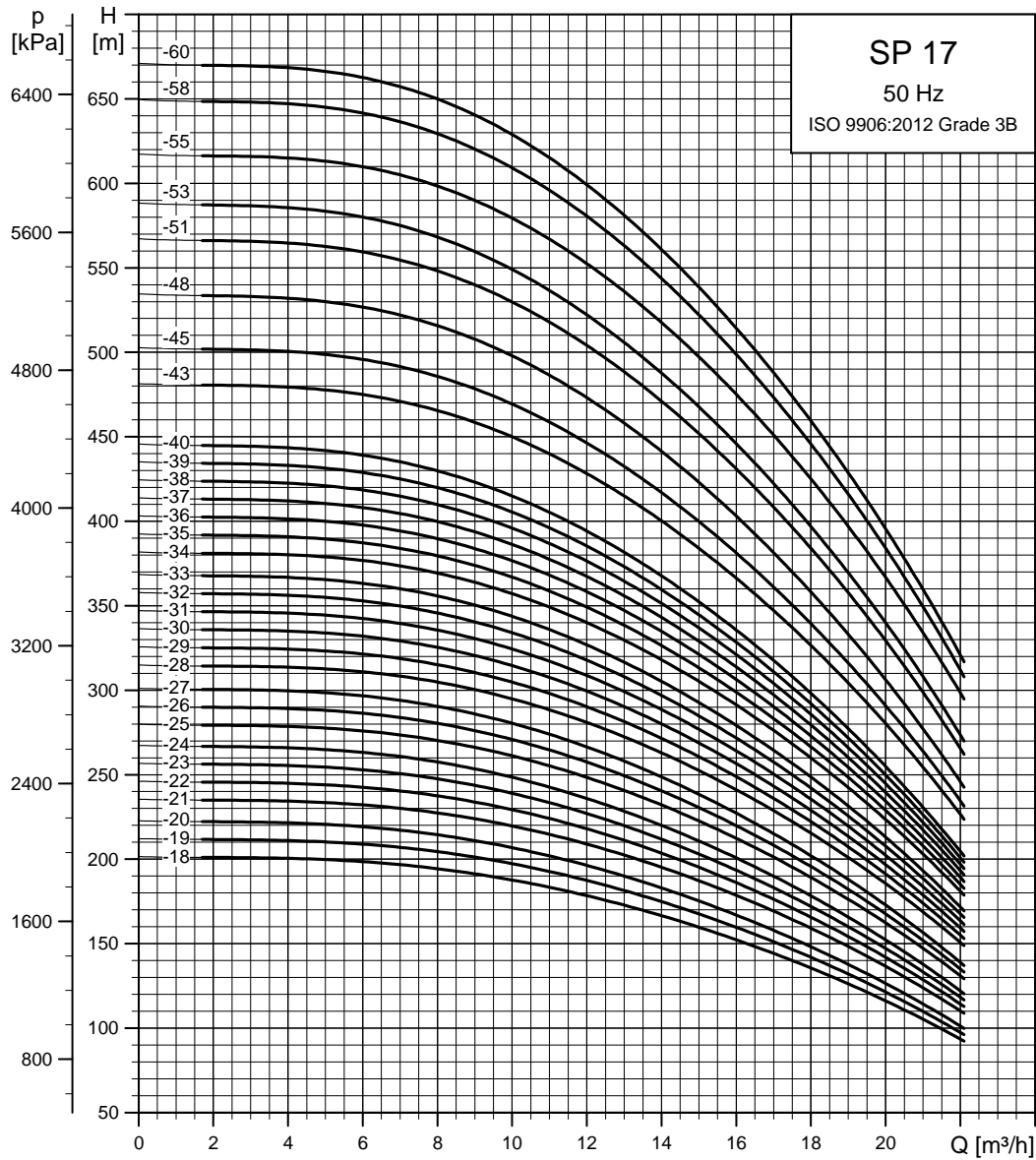
SP 17

Performance curves



TM01 8757 4702

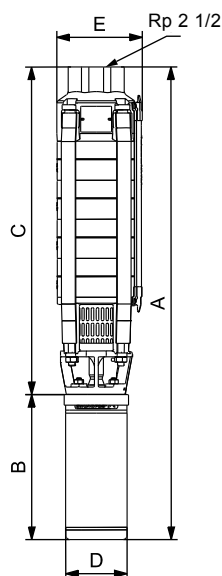
See also section *How to read the curve charts* on page 24.



See also section *How to read the curve charts* on page 24.

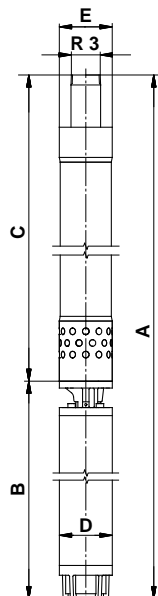
TM01 8758 4702

Dimensions and weights



TM06 5397 0818

The pump types listed are also available in N- and R-versions. See page 6.
Other types of connection are possible by means of connecting pieces. See page 114.



TM01 4197 4118

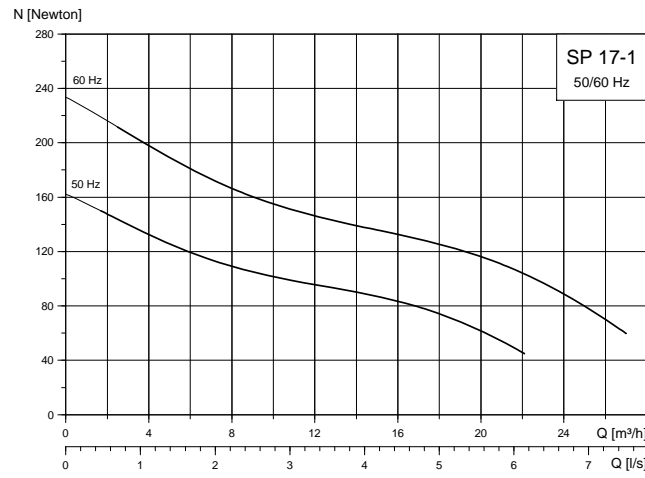
3) SP 17-43 to SP 17-60 are mounted in sleeve for R 3 connection. Pumps mounted in sleeve are only available in standard and N-versions.

| Pump type | Motor | | Dimensions [mm] | | | | | Net weight [kg] | |
|------------------------------------|---------|------------|-----------------|------|------|-------|-----------------|-----------------|-----------------|
| | Type | Power [kW] | C | B | A | D | E ¹⁾ | | E ²⁾ |
| Single-phase, 1 x 230 V | | | | | | | | | |
| SP 17-1 | MS 402 | 0.55 | 324 | 291 | 615 | 95 | 134 | 12 | |
| SP 17-1 | MS 4000 | 2.2 | 324 | 577 | 901 | 95 | 134 | 26 | |
| SP 17-2 | MS 402 | 1.1 | 384 | 346 | 730 | 95 | 134 | 17 | |
| SP 17-2 | MS 4000 | 2.2 | 384 | 577 | 961 | 95 | 134 | 27 | |
| SP 17-3 | MS 4000 | 2.2 | 444 | 577 | 1021 | 95 | 134 | 28 | |
| SP 17-4 | MS 4000 | 2.2 | 504 | 577 | 1081 | 95 | 134 | 30 | |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | | | | |
| SP 17-1 | MS 402 | 0.55 | 324 | 241 | 565 | 95 | 134 | 11 | |
| SP 17-1 | MS 4000 | 0.75 | 324 | 402 | 726 | 95 | 134 | 18 | |
| SP 17-2 | MS 402 | 1.1 | 384 | 306 | 690 | 95 | 134 | 15 | |
| SP 17-2 | MS 4000 | 1.1 | 384 | 417 | 801 | 95 | 134 | 20 | |
| SP 17-3 | MS 402 | 2.2 | 444 | 356 | 790 | 95 | 134 | 19 | |
| SP 17-3 | MS 4000 | 2.2 | 444 | 457 | 901 | 95 | 134 | 23 | |
| SP 17-4 | MS 402 | 2.2 | 504 | 346 | 850 | 95 | 134 | 21 | |
| SP 17-4 | MS 4000 | 2.2 | 504 | 457 | 961 | 95 | 134 | 25 | |
| SP 17-5 | MS 4000 | 3.0 | 564 | 497 | 1061 | 95 | 134 | 27 | |
| SP 17-6 | MS 4000 | 4.0 | 624 | 577 | 1201 | 95 | 134 | 32 | |
| SP 17-7 | MS 4000 | 4.0 | 684 | 577 | 1261 | 95 | 134 | 34 | |
| SP 17-8 | MS 4000 | 5.5 | 744 | 677 | 1421 | 95 | 134 | 40 | |
| SP 17-9 | MS 4000 | 5.5 | 804 | 677 | 1481 | 95 | 134 | 42 | |
| SP 17-10 | MS 4000 | 5.5 | 864 | 677 | 1541 | 95 | 134 | 43 | |
| SP 17-11 | MS 4000 | 7.5 | 924 | 777 | 1701 | 95 | 134 | 50 | |
| SP 17-12 | MS 4000 | 7.5 | 984 | 777 | 1761 | 95 | 134 | 51 | |
| SP 17-13 | MS 4000 | 7.5 | 1044 | 777 | 1821 | 95 | 134 | 53 | |
| SP 17-8 | MS 6000 | 5.5 | 763 | 547 | 1310 | 139.5 | 142 | 144 | 49 |
| SP 17-9 | MS 6000 | 5.5 | 823 | 547 | 1370 | 139.5 | 142 | 144 | 50 |
| SP 17-10 | MS 6000 | 5.5 | 883 | 547 | 1430 | 139.5 | 142 | 144 | 52 |
| SP 17-11 | MS 6000 | 7.5 | 943 | 577 | 1520 | 139.5 | 142 | 144 | 56 |
| SP 17-12 | MS 6000 | 7.5 | 1003 | 577 | 1580 | 139.5 | 142 | 144 | 58 |
| SP 17-13 | MS 6000 | 7.5 | 1063 | 577 | 1640 | 139.5 | 142 | 144 | 59 |
| SP 17-14 | MS 6000 | 9.2 | 1123 | 607 | 1730 | 139.5 | 142 | 144 | 66 |
| SP 17-15 | MS 6000 | 9.2 | 1183 | 607 | 1790 | 139.5 | 142 | 144 | 67 |
| SP 17-16 | MS 6000 | 9.2 | 1243 | 607 | 1850 | 139.5 | 142 | 144 | 69 |
| SP 17-17 | MS 6000 | 9.2 | 1303 | 607 | 1910 | 139.5 | 142 | 144 | 70 |
| SP 17-18 | MS 6000 | 11 | 1363 | 637 | 2000 | 139.5 | 142 | 144 | 75 |
| SP 17-19 | MS 6000 | 11 | 1423 | 637 | 2060 | 139.5 | 142 | 144 | 76 |
| SP 17-20 | MS 6000 | 11 | 1483 | 637 | 2120 | 139.5 | 142 | 144 | 77 |
| SP 17-21 | MS 6000 | 13 | 1543 | 667 | 2210 | 139.5 | 142 | 144 | 82 |
| SP 17-22 | MS 6000 | 13 | 1603 | 667 | 2270 | 139.5 | 142 | 144 | 83 |
| SP 17-23 | MS 6000 | 13 | 1663 | 667 | 2330 | 139.5 | 142 | 144 | 84 |
| SP 17-24 | MS 6000 | 13 | 1723 | 667 | 2390 | 139.5 | 142 | 144 | 86 |
| SP 17-25 | MS 6000 | 15 | 1783 | 702 | 2485 | 139.5 | 142 | 144 | 91 |
| SP 17-26 | MS 6000 | 15 | 1843 | 702 | 2545 | 139.5 | 142 | 144 | 92 |
| SP 17-27 | MS 6000 | 15 | 1903 | 702 | 2605 | 139.5 | 142 | 144 | 94 |
| SP 17-28 | MS 6000 | 18.5 | 1963 | 757 | 2720 | 139.5 | 142 | 144 | 101 |
| SP 17-29 | MS 6000 | 18.5 | 2023 | 757 | 2780 | 139.5 | 142 | 144 | 102 |
| SP 17-30 | MS 6000 | 18.54 | 2083 | 757 | 2840 | 139.5 | 142 | 144 | 103 |
| SP 17-31 | MS 6000 | 18.5 | 2143 | 757 | 2900 | 139.5 | 142 | 144 | 105 |
| SP 17-32 | MS 6000 | 18.5 | 2203 | 757 | 2960 | 139.5 | 142 | 144 | 106 |
| SP 17-33 | MS 6000 | 18.5 | 2263 | 757 | 3020 | 139.5 | 142 | 144 | 108 |
| SP 17-34 | MS 6000 | 22 | 2323 | 817 | 3140 | 139.5 | 142 | 144 | 115 |
| SP 17-35 | MS 6000 | 22 | 2383 | 817 | 3200 | 139.5 | 142 | 144 | 116 |
| SP 17-36 | MS 6000 | 22 | 2443 | 817 | 3260 | 139.5 | 142 | 144 | 118 |
| SP 17-37 | MS 6000 | 22 | 2503 | 817 | 3320 | 139.5 | 142 | 144 | 119 |
| SP 17-38 | MS 6000 | 22 | 2563 | 817 | 3380 | 139.5 | 142 | 144 | 120 |
| SP 17-39 | MS 6000 | 22 | 2623 | 817 | 3440 | 139.5 | 142 | 144 | 122 |
| SP 17-40 | MS 6000 | 22 | 2683 | 817 | 3500 | 139.5 | 142 | 144 | 123 |
| SP 17-43 ³⁾ | MS 6000 | 26 | 3215 | 877 | 4092 | 139.5 | 175 | 181 | 164 |
| SP 17-45 ³⁾ | MS 6000 | 26 | 3335 | 877 | 4212 | 139.5 | 175 | 181 | 167 |
| SP 17-48 ³⁾ | MS 6000 | 26 | 3515 | 877 | 4392 | 139.5 | 175 | 181 | 173 |
| SP 17-51 ³⁾ | MS 6000 | 30 | 3695 | 947 | 4642 | 139.5 | 175 | 181 | 186 |
| SP 17-53 ³⁾ | MS 6000 | 30 | 3815 | 947 | 4762 | 139.5 | 175 | 181 | 189 |
| SP 17-55 ³⁾ | MMS 6 | 37 | 3935 | 1312 | 5247 | 144 | 175 | 181 | 234 |
| SP 17-58 ³⁾ | MMS 6 | 37 | 4115 | 1312 | 5427 | 144 | 175 | 181 | 240 |
| SP 17-60 ³⁾ | MMS 6 | 37 | 4235 | 1312 | 5547 | 144 | 175 | 181 | 243 |

¹⁾ Maximum diameter of pump with one motor cable.

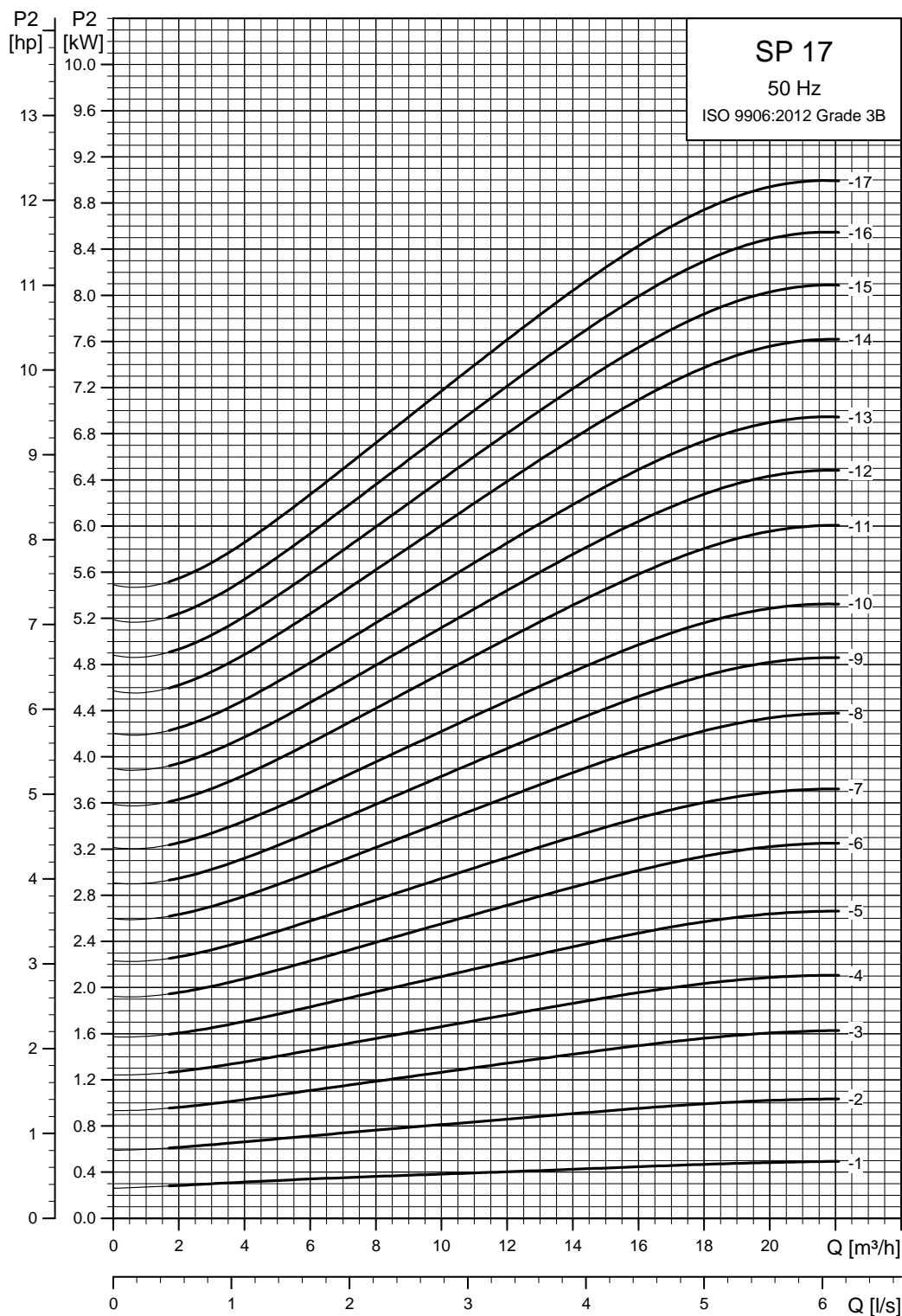
²⁾ Maximum diameter of pump with two motor cables.

Single-stage curves, axial thrust

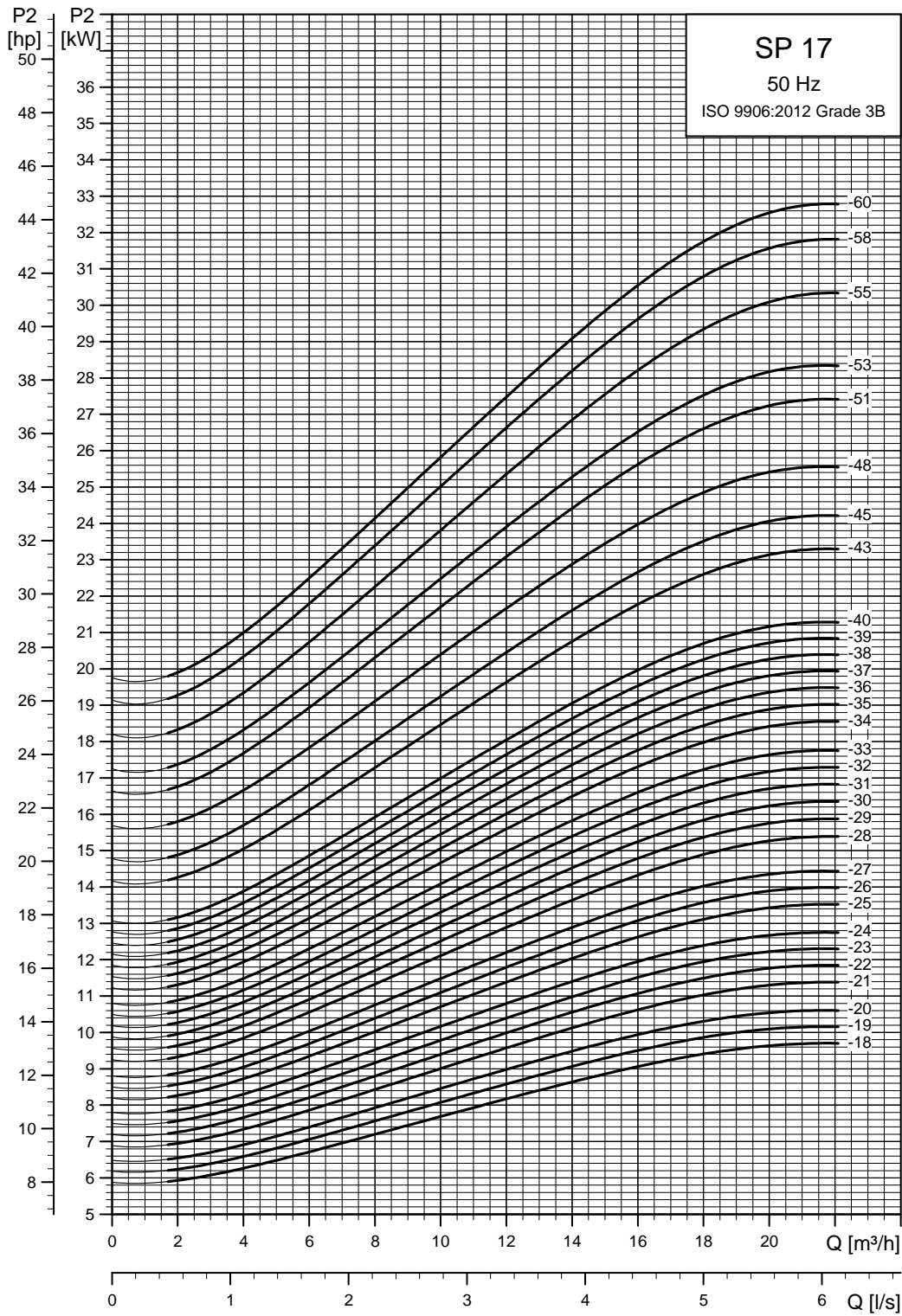


TMD1 9009 1100

Power curves



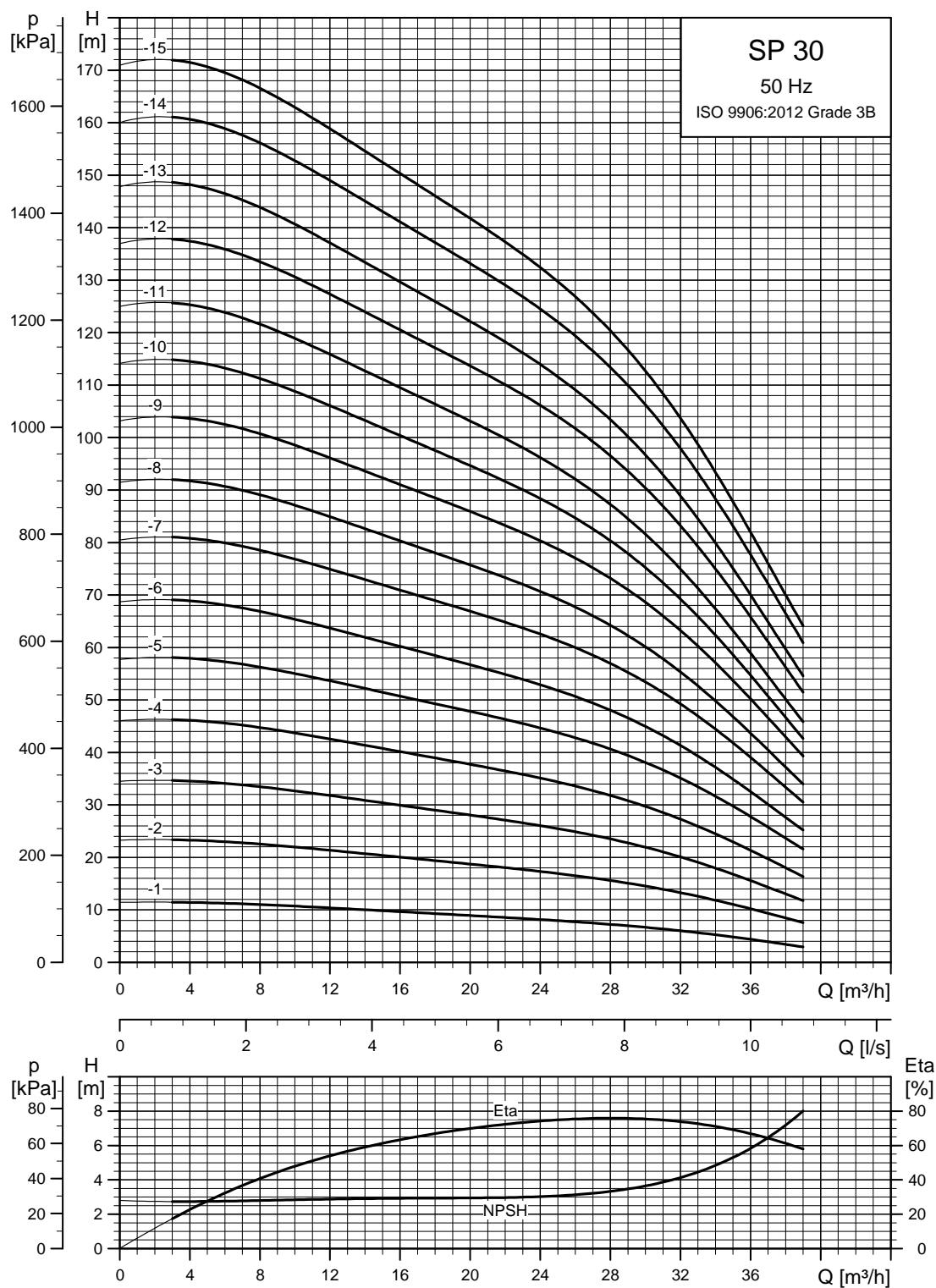
TM01 8759 4702



TM01 8760 4702

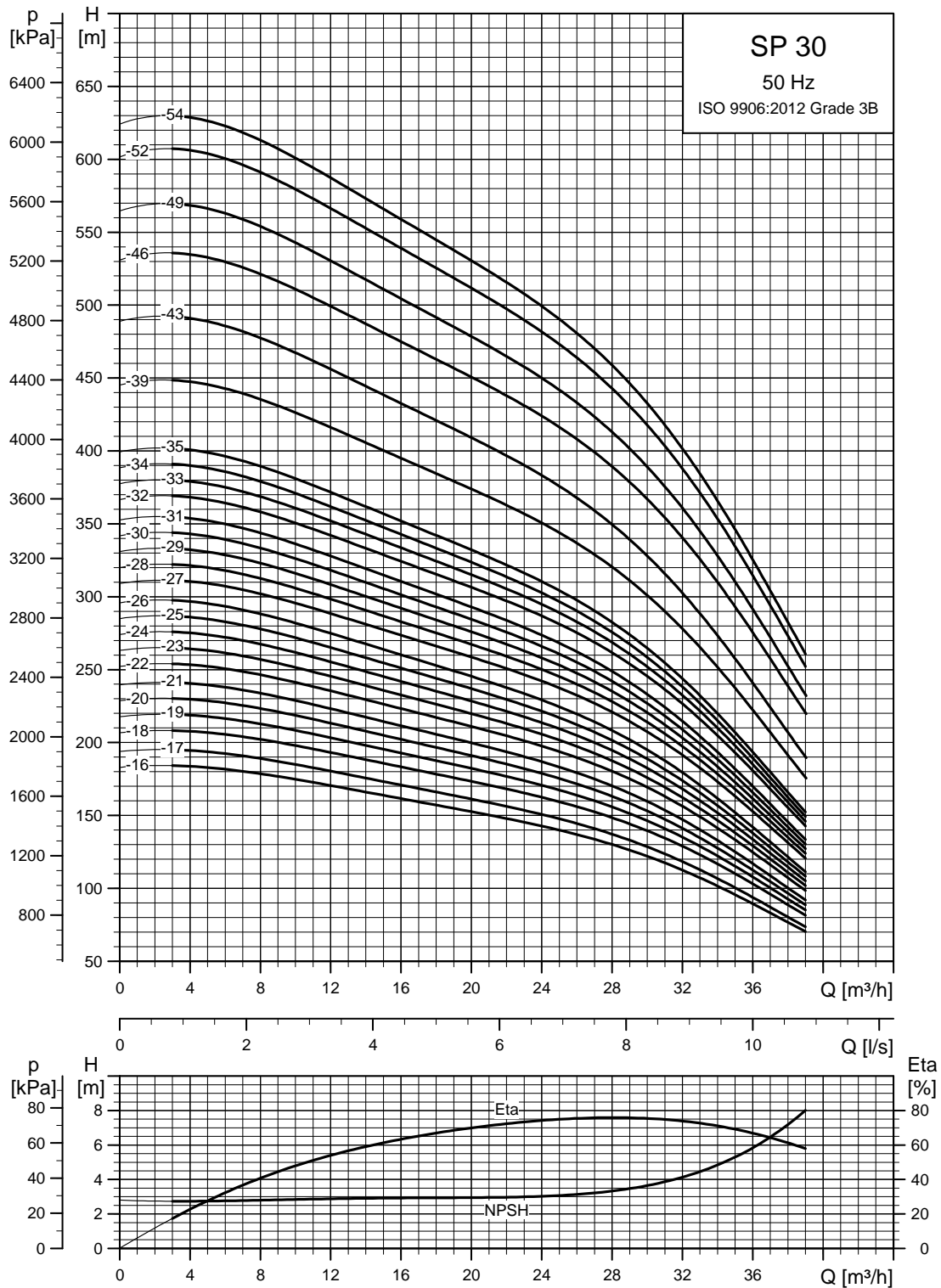
SP 30

Performance curves



See also section *How to read the curve charts* on page 24.

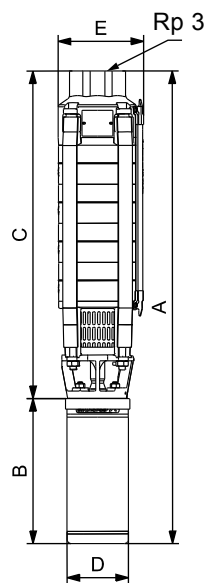
TM01 8761 4702



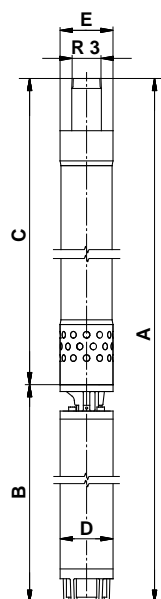
See also section *How to read the curve charts* on page 24.

TM01 8762 4702

Dimensions and weights



The pump types above are also available in N- and R-versions. See page 6. Other types of connection are possible by means of connecting pieces. See page 114.



³⁾ SP 30-39 to SP 30-54 are mounted in sleeve for R3 connection. Pumps mounted in sleeve are only available in standard and N-versions.

TM06 5398 0818

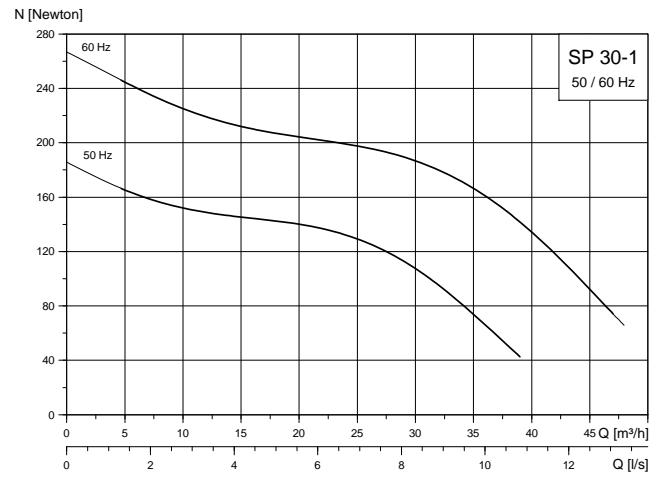
TM01 4197 4118

| Pump type | Motor | | Dimensions [mm] | | | | | Net weight [kg] | |
|------------------------------------|----------|------------|-----------------|------|------|-------|-----------------|-----------------|-----------------|
| | Type | Power [kW] | C | B | A | D | E ¹⁾ | | E ²⁾ |
| Single-phase, 1 x 230 V | | | | | | | | | |
| SP 30-1 | MS 402 | 1.1 | 358 | 346 | 704 | 95 | 134 | 16 | |
| SP 30-1 | MS 4000 | 2.2 | 358 | 577 | 935 | 95 | 134 | 27 | |
| SP 30-2 | MS 4000 | 2.2 | 454 | 577 | 1031 | 95 | 134 | 29 | |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | | | | |
| SP 30-1 | MS 402 | 1.1 | 358 | 306 | 664 | 95 | 134 | 15 | |
| SP 30-1 | MS 4000 | 1.1 | 358 | 417 | 775 | 95 | 134 | 20 | |
| SP 30-2 | MS 402 | 2.2 | 454 | 346 | 800 | 95 | 134 | 19 | |
| SP 30-2 | MS 4000 | 2.2 | 454 | 457 | 911 | 95 | 134 | 24 | |
| SP 30-3 | MS 4000 | 3.0 | 550 | 497 | 1047 | 95 | 134 | 26 | |
| SP 30-4 | MS 4000 | 4.0 | 646 | 577 | 1223 | 95 | 134 | 32 | |
| SP 30-5 | MS 4000 | 5.5 | 742 | 677 | 1419 | 95 | 134 | 39 | |
| SP 30-6 | MS 4000 | 5.5 | 838 | 677 | 1515 | 95 | 134 | 41 | |
| SP 30-7 | MS 4000 | 7.5 | 934 | 777 | 1711 | 95 | 134 | 48 | |
| SP 30-8 | MS 4000 | 7.5 | 1030 | 777 | 1807 | 95 | 134 | 50 | |
| SP 30-5 | MS 6000 | 5.5 | 761 | 547 | 1308 | 139.5 | 142 | 144 | 47 |
| SP 30-6 | MS 6000 | 5.5 | 857 | 547 | 1404 | 139.5 | 142 | 144 | 49 |
| SP 30-7 | MS 6000 | 7.5 | 953 | 577 | 1530 | 139.5 | 142 | 144 | 55 |
| SP 30-8 | MS 6000 | 7.5 | 1049 | 577 | 1626 | 139.5 | 142 | 144 | 57 |
| SP 30-9 | MS 6000 | 9.2 | 1145 | 607 | 1752 | 139.5 | 142 | 144 | 64 |
| SP 30-10 | MS 6000 | 9.2 | 1241 | 607 | 1848 | 139.5 | 142 | 144 | 66 |
| SP 30-11 | MS 6000 | 9.2 | 1337 | 607 | 1944 | 139.5 | 142 | 144 | 68 |
| SP 30-12 | MS 6000 | 11 | 1433 | 637 | 2070 | 139.5 | 142 | 144 | 73 |
| SP 30-13 | MS 6000 | 11 | 1529 | 637 | 2166 | 139.5 | 142 | 144 | 75 |
| SP 30-14 | MS 6000 | 13 | 1625 | 667 | 2292 | 139.5 | 142 | 144 | 80 |
| SP 30-15 | MS 6000 | 13 | 1721 | 667 | 2388 | 139.5 | 142 | 144 | 82 |
| SP 30-16 | MS 6000 | 15 | 1817 | 702 | 2519 | 139.5 | 142 | 144 | 88 |
| SP 30-17 | MS 6000 | 15 | 1913 | 702 | 2615 | 139.5 | 142 | 144 | 90 |
| SP 30-18 | MS 6000 | 18.5 | 2009 | 757 | 2766 | 139.5 | 142 | 144 | 97 |
| SP 30-19 | MS 6000 | 18.5 | 2105 | 757 | 2862 | 139.5 | 142 | 144 | 99 |
| SP 30-20 | MS 6000 | 18.5 | 2201 | 757 | 2958 | 139.5 | 142 | 144 | 101 |
| SP 30-21 | MS 6000 | 18.5 | 2297 | 757 | 3054 | 139.5 | 142 | 144 | 103 |
| SP 30-22 | MS 6000 | 22 | 2393 | 817 | 3210 | 139.5 | 142 | 144 | 111 |
| SP 30-23 | MS 6000 | 22 | 2489 | 817 | 3306 | 139.5 | 142 | 144 | 113 |
| SP 30-24 | MS 6000 | 22 | 2585 | 817 | 3402 | 139.5 | 142 | 144 | 115 |
| SP 30-25 | MS 6000 | 22 | 2681 | 817 | 3498 | 139.5 | 142 | 144 | 117 |
| SP 30-26 | MS 6000 | 22 | 2777 | 817 | 3594 | 139.5 | 142 | 144 | 119 |
| SP 30-27 | MS 6000 | 26 | 2873 | 877 | 3750 | 139.5 | 142 | 144 | 126 |
| SP 30-28 | MS 6000 | 26 | 2969 | 877 | 3846 | 139.5 | 142 | 144 | 128 |
| SP 30-29 | MS 6000 | 26 | 3065 | 877 | 3942 | 139.5 | 142 | 144 | 130 |
| SP 30-30 | MS 6000 | 26 | 3161 | 877 | 4038 | 139.5 | 142 | 144 | 132 |
| SP 30-31 | MS 6000 | 26 | 3257 | 877 | 4134 | 139.5 | 142 | 144 | 134 |
| SP 30-32 | MS 6000 | 30 | 3353 | 947 | 4300 | 139.5 | 142 | 144 | 144 |
| SP 30-33 | MS 6000 | 30 | 3449 | 947 | 4396 | 139.5 | 142 | 144 | 146 |
| SP 30-34 | MS 6000 | 30 | 3545 | 947 | 4492 | 139.5 | 142 | 144 | 148 |
| SP 30-35 | MS 6000 | 30 | 3641 | 947 | 4588 | 139.5 | 142 | 144 | 150 |
| SP 30-39 ³⁾ | MMS 6 | 37 | 4377 | 1312 | 5689 | 144 | 175 | 181 | 248 |
| SP 30-43 ³⁾ | MMS 6 | 37 | 4761 | 1312 | 6073 | 144 | 175 | 181 | 259 |
| SP 30-46 ³⁾ | MMS 8000 | 45 | 4993 | 1270 | 6263 | 192 | 192 | 192 | 326 |
| SP 30-49 ³⁾ | MMS 8000 | 45 | 5281 | 1270 | 6551 | 192 | 192 | 192 | 334 |
| SP 30-52 ³⁾ | MMS 8000 | 55 | 5569 | 1350 | 6919 | 192 | 192 | 192 | 357 |
| SP 30-54 ³⁾ | MMS 8000 | 55 | 5761 | 1350 | 7111 | 192 | 192 | 192 | 362 |

¹⁾ Maximum diameter of pump with one motor cable.

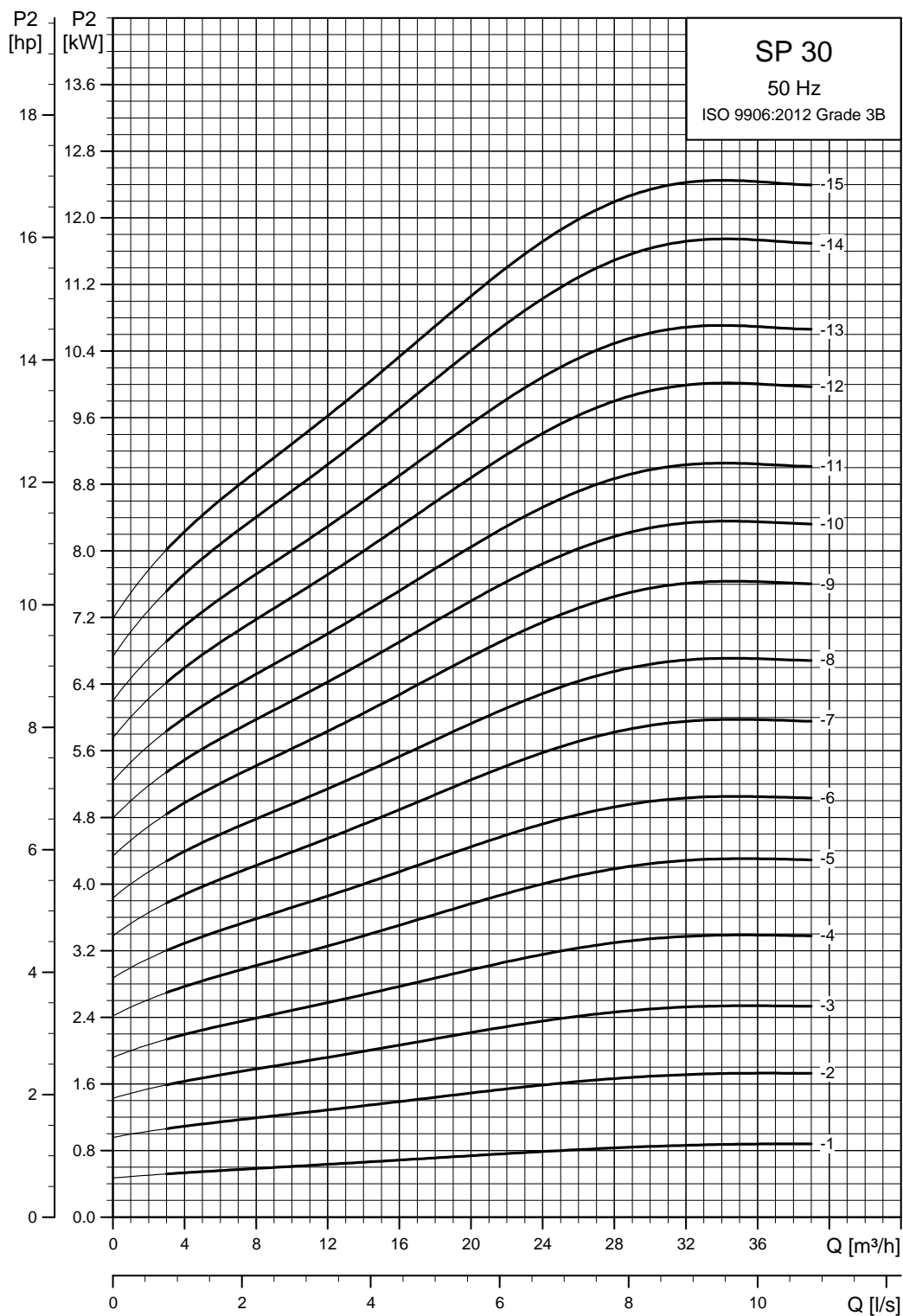
²⁾ Maximum diameter of pump with two motor cables.

Single-stage curves, axial thrust

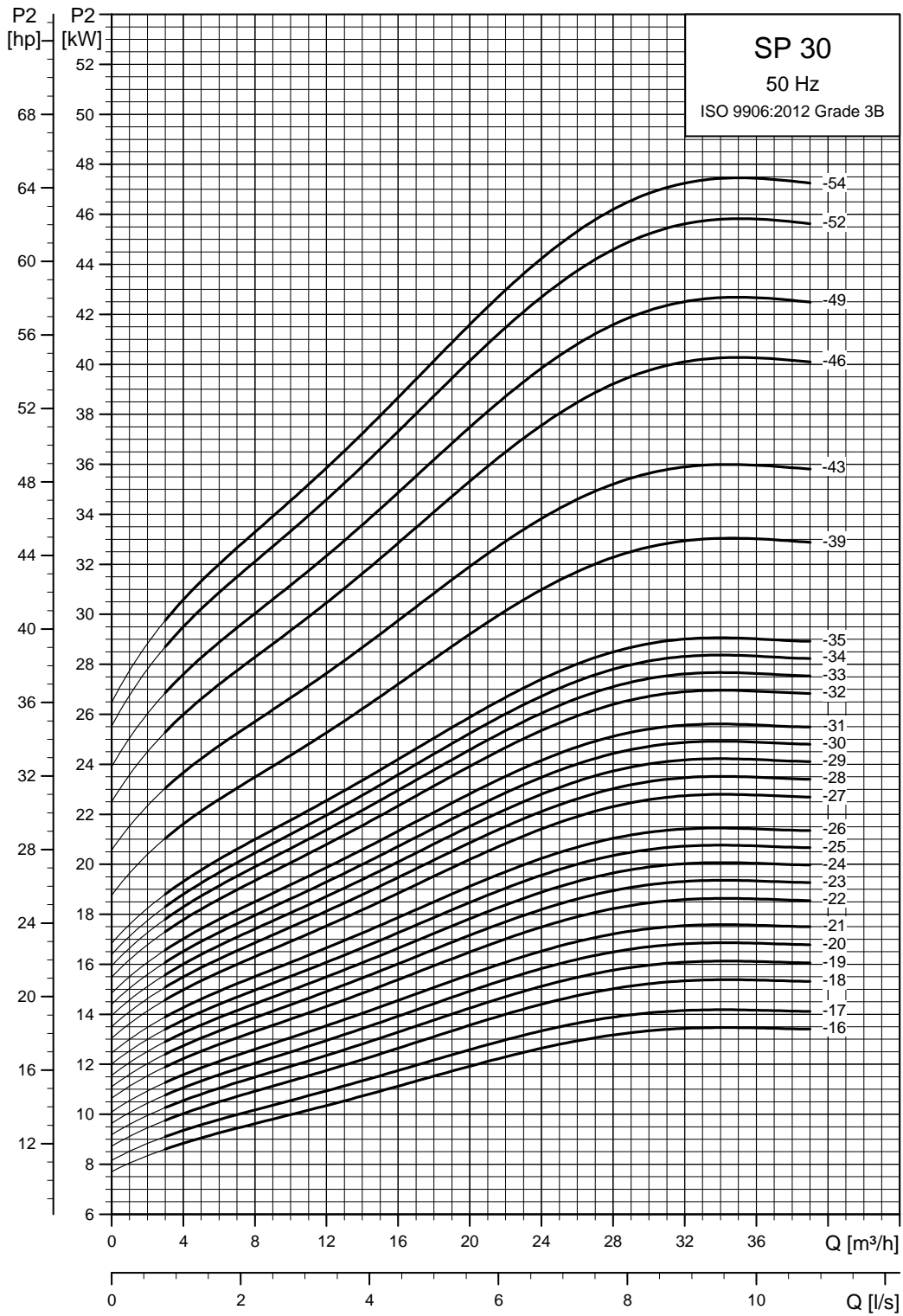


TM01 9010 1100

Power curves



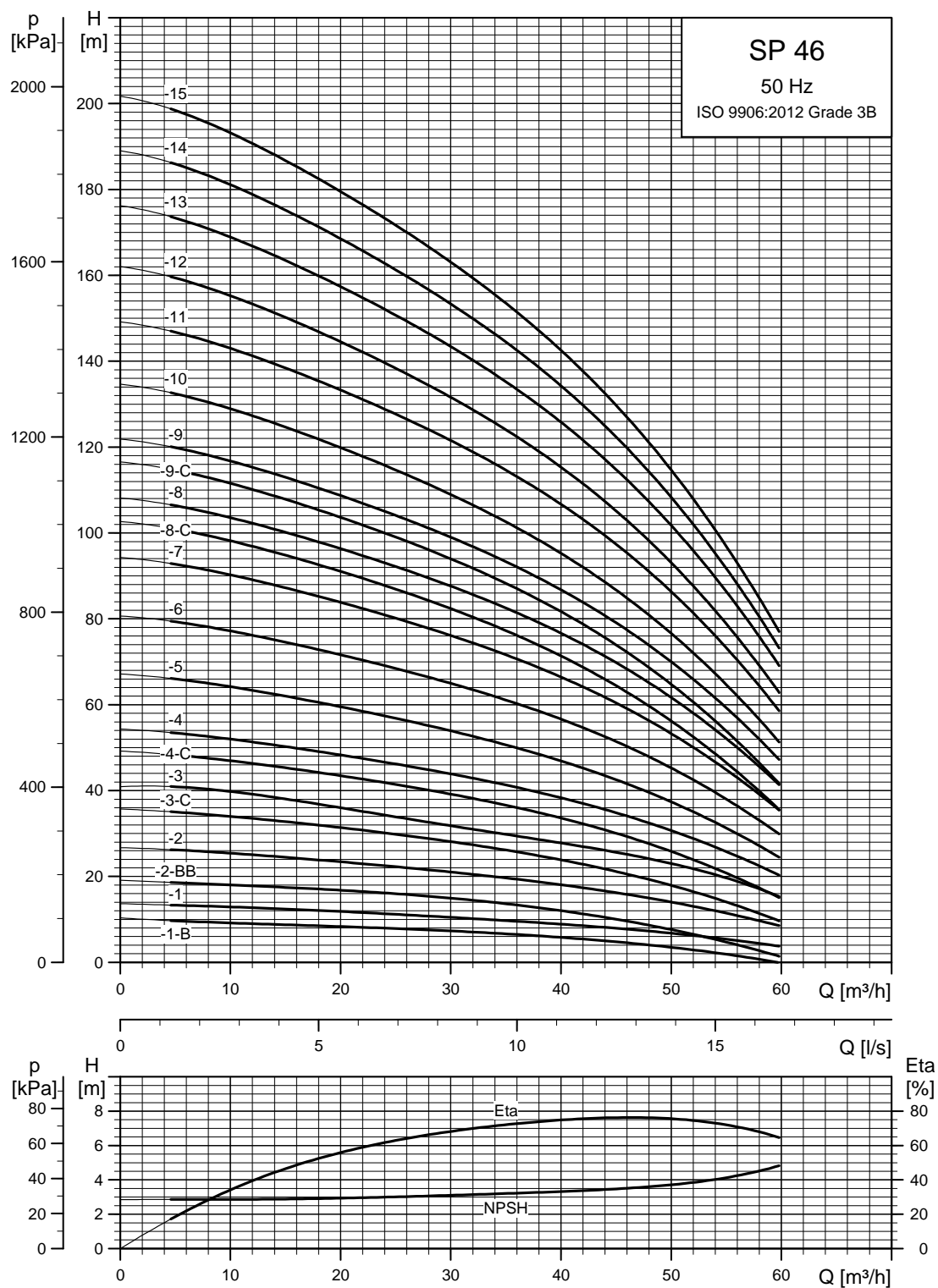
TM01 8763 4702



TM01 8764 4702

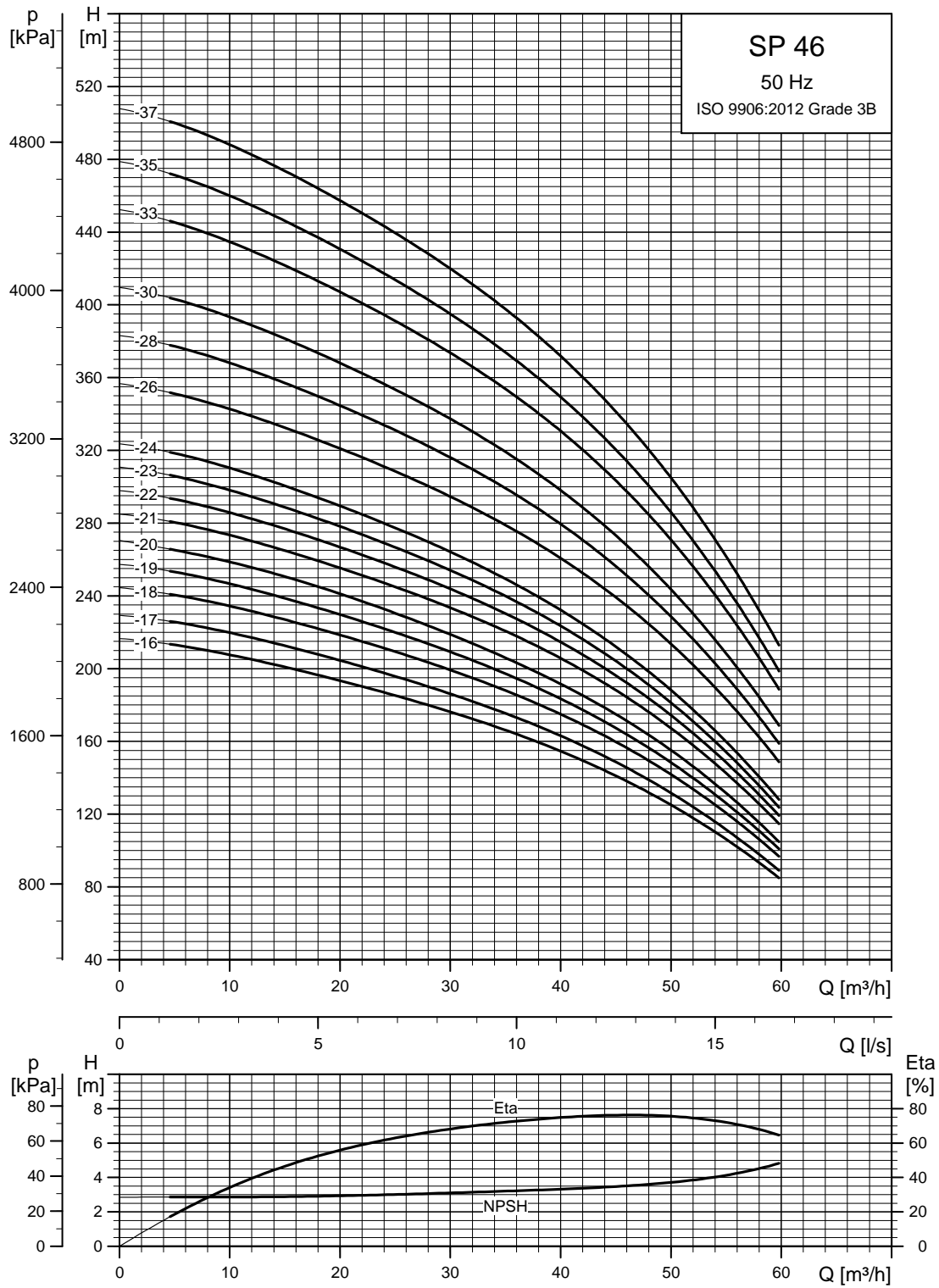
SP 46

Performance curves



See also section *How to read the curve charts* on page 24.

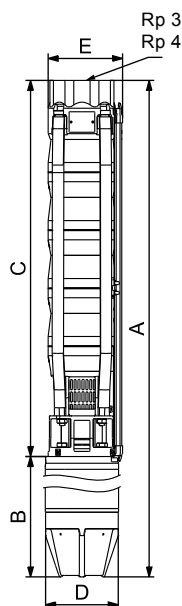
TM01 8765 4702



TM01 8766 4702

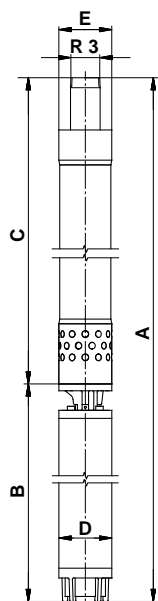
See also section *How to read the curve charts* on page 24.

Dimensions and weights



The pump types above are also available in N-and R-versions. See page 6.

Other types of connection are possible by means of connecting pieces. See page 114.



3) SP 46-26 to SP 46-37 are mounted in sleeve for R4 connection. Pumps mounted in sleeve are only available in standard and N-versions.

TM06 6399 0818

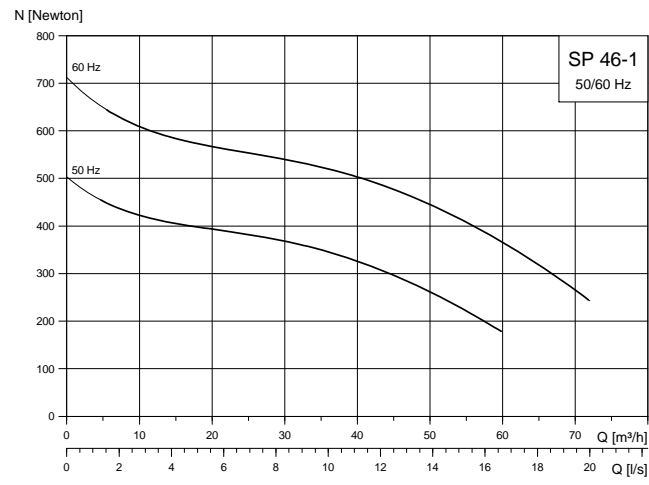
TM01 4197 4118

| Pump type | Motor | | Dimensions [mm] | | | | | Net weight [kg] | |
|------------------------------------|----------|------------|-----------------|------|------|-------|-----------------|-----------------|-----------------|
| | Type | Power [kW] | C | B | A | D | E ¹⁾ | | E ²⁾ |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | | | | |
| SP 46-1-B | MS 4000 | 1.1 | 378 | 417 | 795 | 95 | 146 | 21 | |
| SP 46-1 | MS 4000 | 2.2 | 378 | 457 | 835 | 95 | 146 | 23 | |
| SP 46-2-BB | MS 4000 | 2.2 | 491 | 457 | 948 | 95 | 146 | 26 | |
| SP 46-2 | MS 4000 | 3.0 | 491 | 497 | 988 | 95 | 146 | 27 | |
| SP 46-3-C | MS 4000 | 4.0 | 604 | 577 | 1181 | 95 | 146 | 33 | |
| SP 46-3 | MS 4000 | 5.5 | 604 | 677 | 1281 | 95 | 146 | 38 | |
| SP 46-4-C | MS 4000 | 5.5 | 717 | 677 | 1394 | 95 | 146 | 40 | |
| SP 46-4 | MS 4000 | 7.5 | 717 | 777 | 1494 | 95 | 146 | 45 | |
| SP 46-5 | MS 4000 | 7.5 | 830 | 777 | 1607 | 95 | 146 | 48 | |
| SP 46-3 | MS 6000 | 5.5 | 620 | 547 | 1167 | 139.5 | 148 | 151 | 48 |
| SP 46-4-C | MS 6000 | 5.5 | 733 | 547 | 1280 | 139.5 | 148 | 151 | 51 |
| SP 46-4 | MS 6000 | 7.5 | 733 | 577 | 1310 | 139.5 | 148 | 151 | 54 |
| SP 46-5 | MS 6000 | 7.5 | 846 | 577 | 1423 | 139.5 | 148 | 151 | 57 |
| SP 46-6 | MS 6000 | 9.2 | 959 | 607 | 1566 | 139.5 | 148 | 151 | 64 |
| SP 46-7 | MS 6000 | 11 | 1072 | 637 | 1709 | 139.5 | 148 | 151 | 70 |
| SP 46-8-C | MS 6000 | 11 | 1185 | 637 | 1822 | 139.5 | 148 | 151 | 72 |
| SP 46-8 | MS 6000 | 13 | 1185 | 667 | 1852 | 139.5 | 148 | 151 | 75 |
| SP 46-9-C | MS 6000 | 13 | 1298 | 667 | 1965 | 139.5 | 148 | 151 | 78 |
| SP 46-9 | MS 6000 | 15 | 1298 | 702 | 2000 | 139.5 | 148 | 151 | 82 |
| SP 46-10 | MS 6000 | 15 | 1411 | 702 | 2113 | 139.5 | 148 | 151 | 84 |
| SP 46-11 | MS 6000 | 18.5 | 1524 | 757 | 2281 | 139.5 | 148 | 151 | 92 |
| SP 46-12 | MS 6000 | 18.5 | 1637 | 757 | 2394 | 139.5 | 148 | 151 | 94 |
| SP 46-13 | MS 6000 | 22 | 1766 | 817 | 2583 | 139.5 | 148 | 151 | 103 |
| SP 46-14 | MS 6000 | 22 | 1879 | 817 | 2696 | 139.5 | 148 | 151 | 106 |
| SP 46-15 | MS 6000 | 22 | 1992 | 817 | 2809 | 139.5 | 148 | 151 | 108 |
| SP 46-16 | MS 6000 | 26 | 2105 | 877 | 2982 | 139.5 | 148 | 151 | 116 |
| SP 46-17 | MS 6000 | 26 | 2218 | 877 | 3095 | 139.5 | 148 | 151 | 118 |
| SP 46-18 | MS 6000 | 30 | 2331 | 947 | 3278 | 139.5 | 148 | 151 | 129 |
| SP 46-19 | MS 6000 | 30 | 2444 | 947 | 3391 | 139.5 | 148 | 151 | 131 |
| SP 46-20 | MS 6000 | 30 | 2557 | 947 | 3504 | 139.5 | 148 | 151 | 134 |
| SP 46-21 | MMS 6 | 37 | 2670 | 1312 | 3982 | 144 | 150 | 153 | 176 |
| SP 46-22 | MMS 6 | 37 | 2783 | 1312 | 4095 | 144 | 150 | 153 | 179 |
| SP 46-23 | MMS 6 | 37 | 2896 | 1312 | 4208 | 144 | 150 | 153 | 181 |
| SP 46-24 | MMS 6 | 37 | 3009 | 1312 | 4321 | 144 | 150 | 153 | 183 |
| SP 46-26 ³⁾ | MMS 8000 | 45 | 3511 | 1270 | 4781 | 192 | 192 | 192 | 278 |
| SP 46-28 ³⁾ | MMS 8000 | 45 | 3737 | 1270 | 5007 | 192 | 192 | 192 | 284 |
| SP 46-30 ³⁾ | MMS 8000 | 45 | 3963 | 1270 | 5233 | 192 | 192 | 192 | 290 |
| SP 46-33 ³⁾ | MMS 8000 | 55 | 4302 | 1350 | 5652 | 192 | 192 | 192 | 314 |
| SP 46-35 ³⁾ | MMS 8000 | 55 | 4528 | 1350 | 5878 | 192 | 192 | 192 | 320 |
| SP 46-37 ³⁾ | MMS 8000 | 63 | 4754 | 1490 | 6244 | 192 | 192 | 192 | 352 |

1) Maximum diameter of pump with one motor cable.

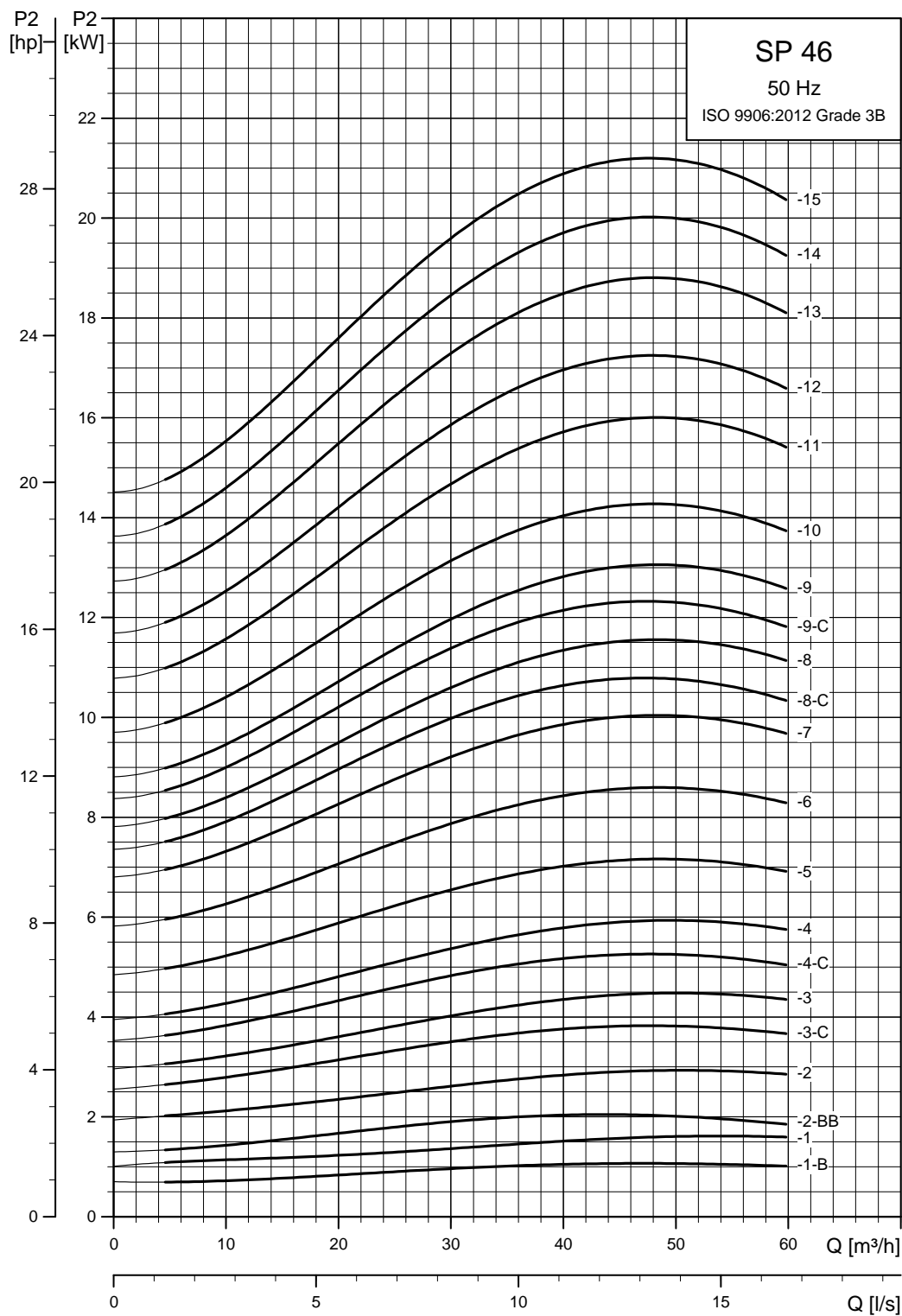
2) Maximum diameter of pump with two motor cables.

Single-stage curves, axial thrust

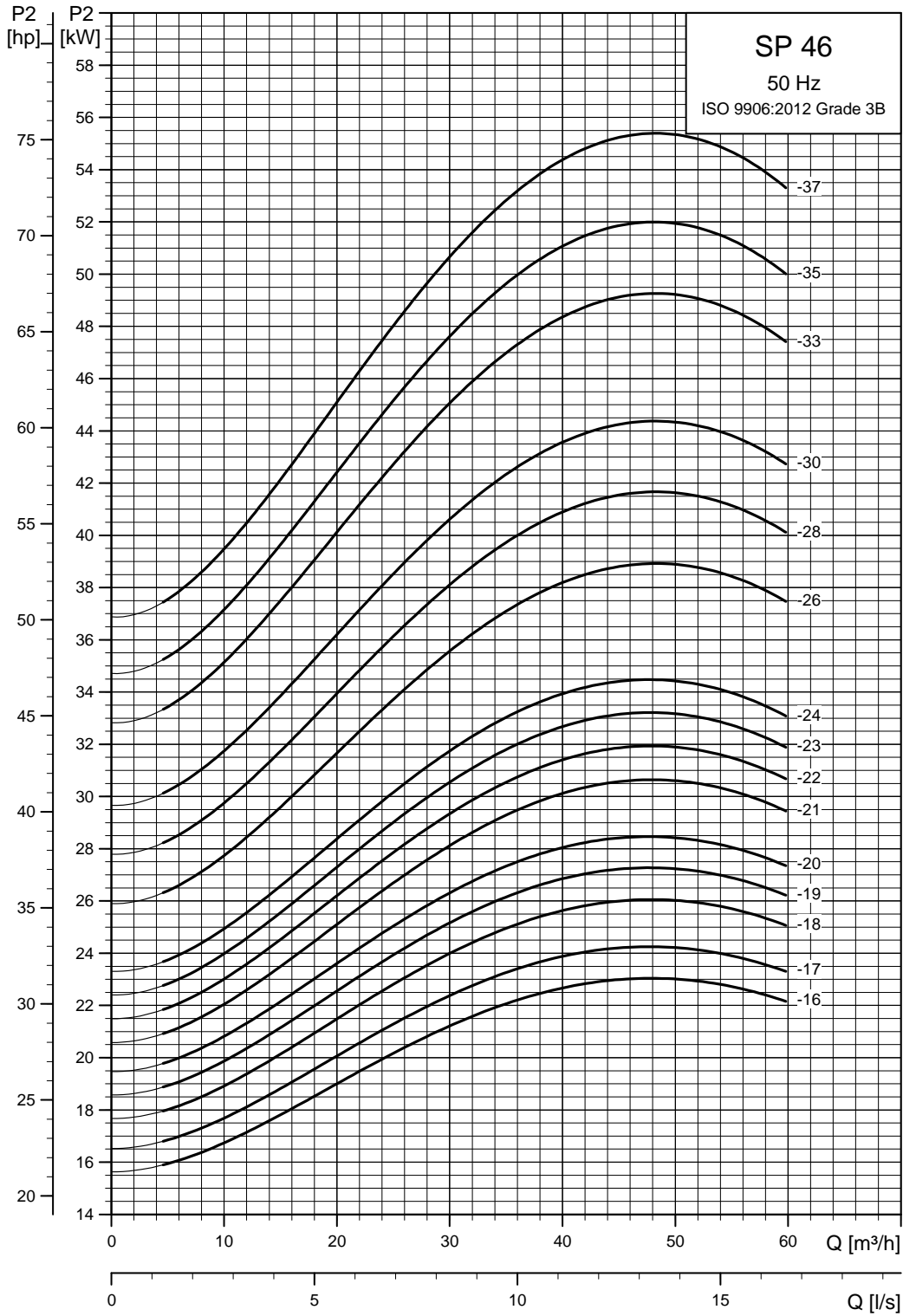


TMD1 9011 1100

Power curves



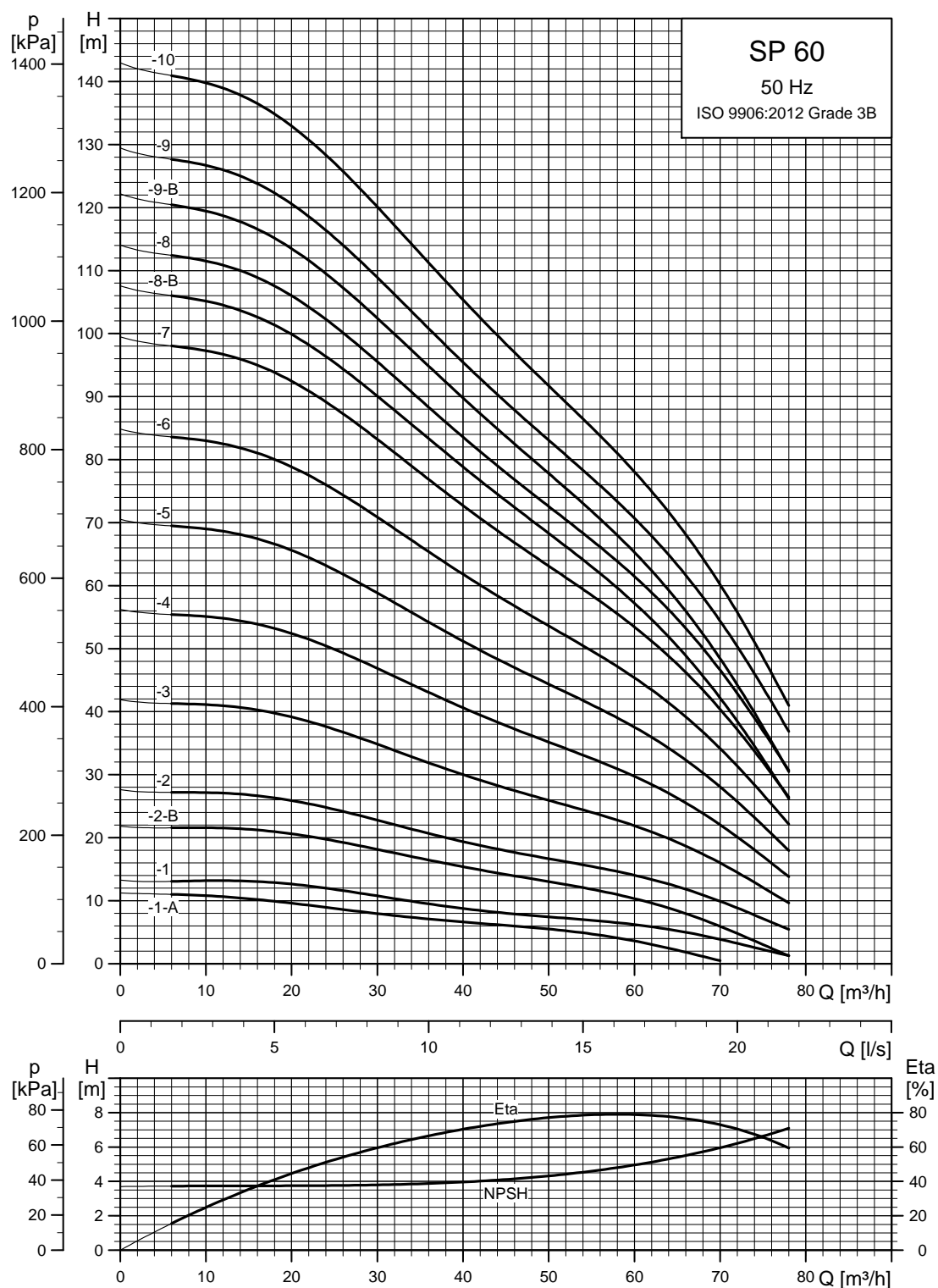
TM01 8767 4702



TM01 8768 4702

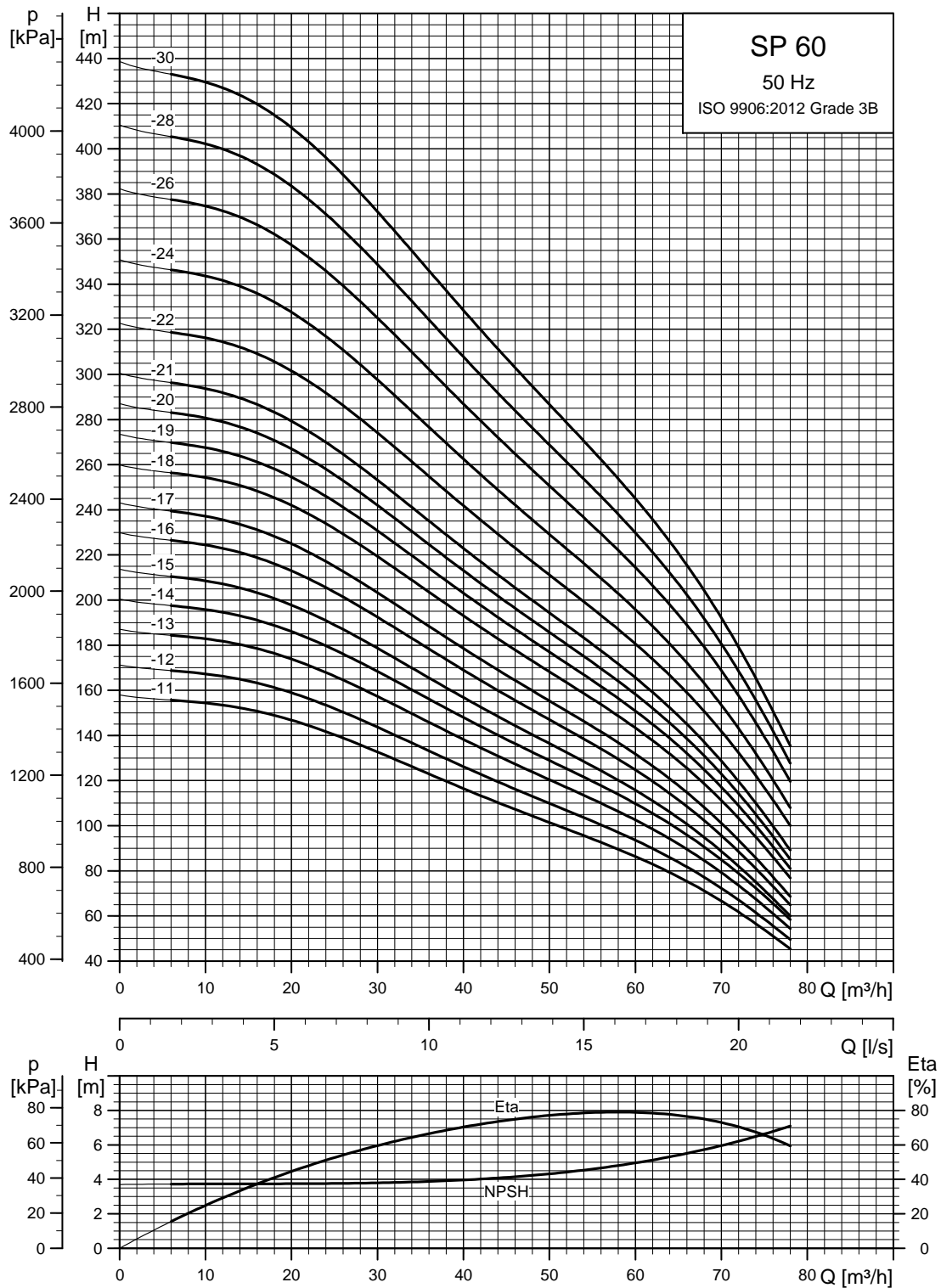
SP 60

Performance curves



See also section *How to read the curve charts* on page 24.

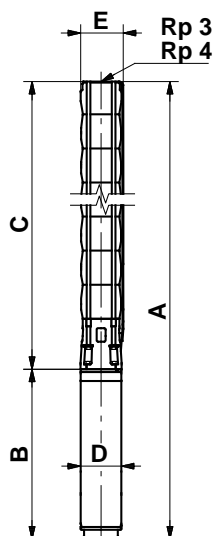
TM01 8826 4702



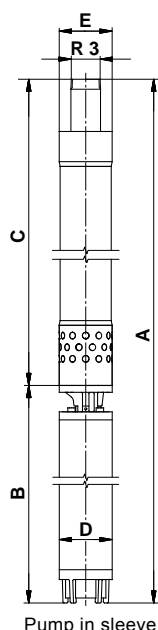
TM01 8827 4702

See also section *How to read the curve charts* on page 24.

Dimensions and weights



TM00 0961 1196



TM01 4197 4118

Pump in sleeve

| Pump type | Motor | | Dimensions [mm] | | | | | Net weight [kg] | |
|------------------------------------|----------|------------|----------------------|------|-----------------|-----------------|------|-----------------|-----|
| | Type | Power [kW] | Rp 3/Rp 4 connection | | | | | | |
| | | | A | C | E ¹⁾ | E ²⁾ | B | | D |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | | | | |
| SP 60-1-A | MS 4000 | 1.5 | 795 | 378 | 146 | | 417 | 95 | 21 |
| SP 60-1 | MS 4000 | 2.2 | 835 | 378 | 146 | | 457 | 95 | 23 |
| SP 60-2-B | MS 4000 | 3.0 | 988 | 491 | 146 | | 497 | 95 | 27 |
| SP 60-2 | MS 4000 | 4.0 | 1068 | 491 | 146 | | 577 | 95 | 31 |
| SP 60-3 | MS 4000 | 5.5 | 1281 | 604 | 146 | | 677 | 95 | 38 |
| SP 60-4 | MS 4000 | 7.5 | 1494 | 717 | 146 | | 777 | 95 | 45 |
| SP 60-3 | MS 6000 | 5.5 | 1167 | 620 | 148 | 151 | 547 | 139.5 | 48 |
| SP 60-4 | MS 6000 | 7.5 | 1310 | 733 | 148 | 151 | 577 | 139.5 | 54 |
| SP 60-5 | MS 6000 | 9.2 | 1453 | 846 | 148 | 151 | 607 | 139.5 | 62 |
| SP 60-6 | MS 6000 | 11 | 1596 | 959 | 148 | 151 | 637 | 139.5 | 67 |
| SP 60-7 | MS 6000 | 13 | 1739 | 1072 | 148 | 151 | 667 | 139.5 | 73 |
| SP 60-8-B | MS 6000 | 13 | 1852 | 1185 | 148 | 151 | 667 | 139.5 | 75 |
| SP 60-8 | MS 6000 | 15 | 1887 | 1185 | 148 | 151 | 702 | 139.5 | 79 |
| SP 60-9-B | MS 6000 | 15 | 2000 | 1298 | 148 | 151 | 702 | 139.5 | 82 |
| SP 60-9 | MS 6000 | 18.5 | 2055 | 1298 | 148 | 151 | 757 | 139.5 | 87 |
| SP 60-10 | MS 6000 | 18.5 | 2168 | 1411 | 148 | 151 | 757 | 139.5 | 90 |
| SP 60-11 | MS 6000 | 22 | 2341 | 1524 | 148 | 151 | 817 | 139.5 | 98 |
| SP 60-12 | MS 6000 | 22 | 2454 | 1637 | 148 | 151 | 817 | 139.5 | 100 |
| SP 60-13 | MS 6000 | 26 | 2643 | 1766 | 148 | 151 | 877 | 139.5 | 109 |
| SP 60-14 | MS 6000 | 26 | 2756 | 1879 | 148 | 151 | 877 | 139.5 | 111 |
| SP 60-15 | MS 6000 | 26 | 2869 | 1992 | 148 | 151 | 877 | 139.5 | 114 |
| SP 60-16 | MS 6000 | 30 | 3052 | 2105 | 148 | 151 | 947 | 139.5 | 124 |
| SP 60-17 | MS 6000 | 30 | 3165 | 2218 | 148 | 151 | 947 | 139.5 | 126 |
| SP 60-18 | MMS 6 | 37 | 3643 | 2331 | 150 | 153 | 1312 | 144 | 169 |
| SP 60-19 | MMS 6 | 37 | 3756 | 2444 | 150 | 153 | 1312 | 144 | 171 |
| SP 60-20 | MMS 6 | 37 | 3869 | 2557 | 150 | 153 | 1312 | 144 | 174 |
| SP 60-21 | MMS 6 | 37 | 3982 | 2670 | 150 | 153 | 1312 | 144 | 176 |
| SP 60-22 | MMS 8000 | 45 | 4082 | 2812 | 192 | 192 | 1270 | 192 | 239 |
| SP 60-24 ³⁾ | MMS 8000 | 45 | 4555 | 3285 | 192 | 192 | 1270 | 192 | 272 |
| SP 60-26 ³⁾ | MMS 8000 | 55 | 4861 | 3511 | 192 | 192 | 1350 | 192 | 293 |
| SP 60-28 ³⁾ | MMS 8000 | 55 | 5087 | 3737 | 192 | 192 | 1350 | 192 | 299 |
| SP 60-30 ³⁾ | MMS 8000 | 55 | 5313 | 3963 | 192 | 192 | 1350 | 192 | 305 |

1) Maximum diameter of pump with one motor cable.

2) Maximum diameter of pump with two motor cables.

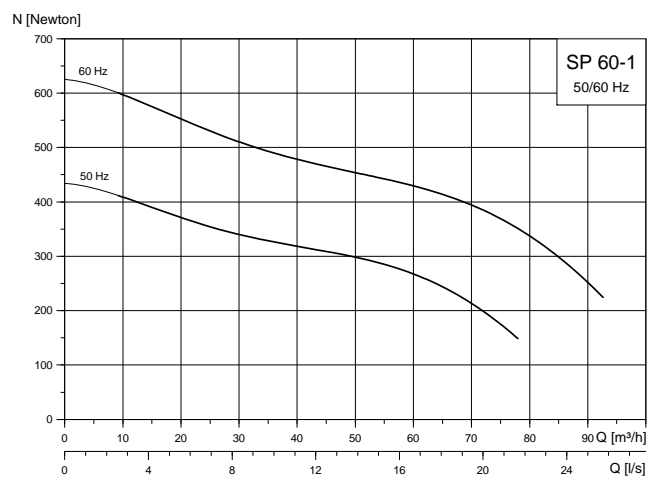
3) SP 60-24 to SP 60-30 are mounted in sleeve for R4 connection.

Pumps mounted in sleeve are only available in standard and N-versions.

The pump types above are also available in N- and R-versions. See page 6.

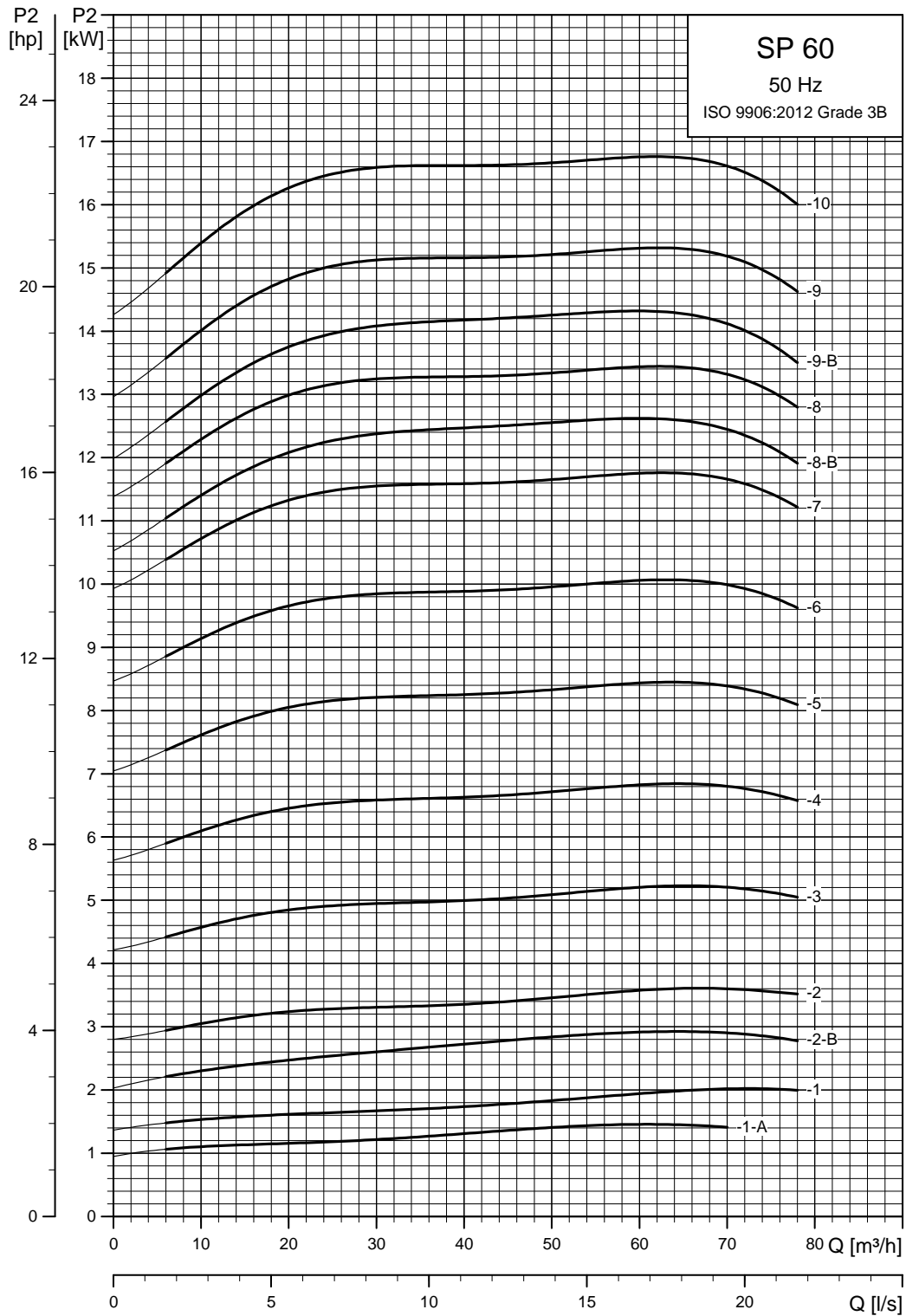
Other types of connection are possible by means of connecting pieces. See page 114.

Single-stage curves, axial thrust

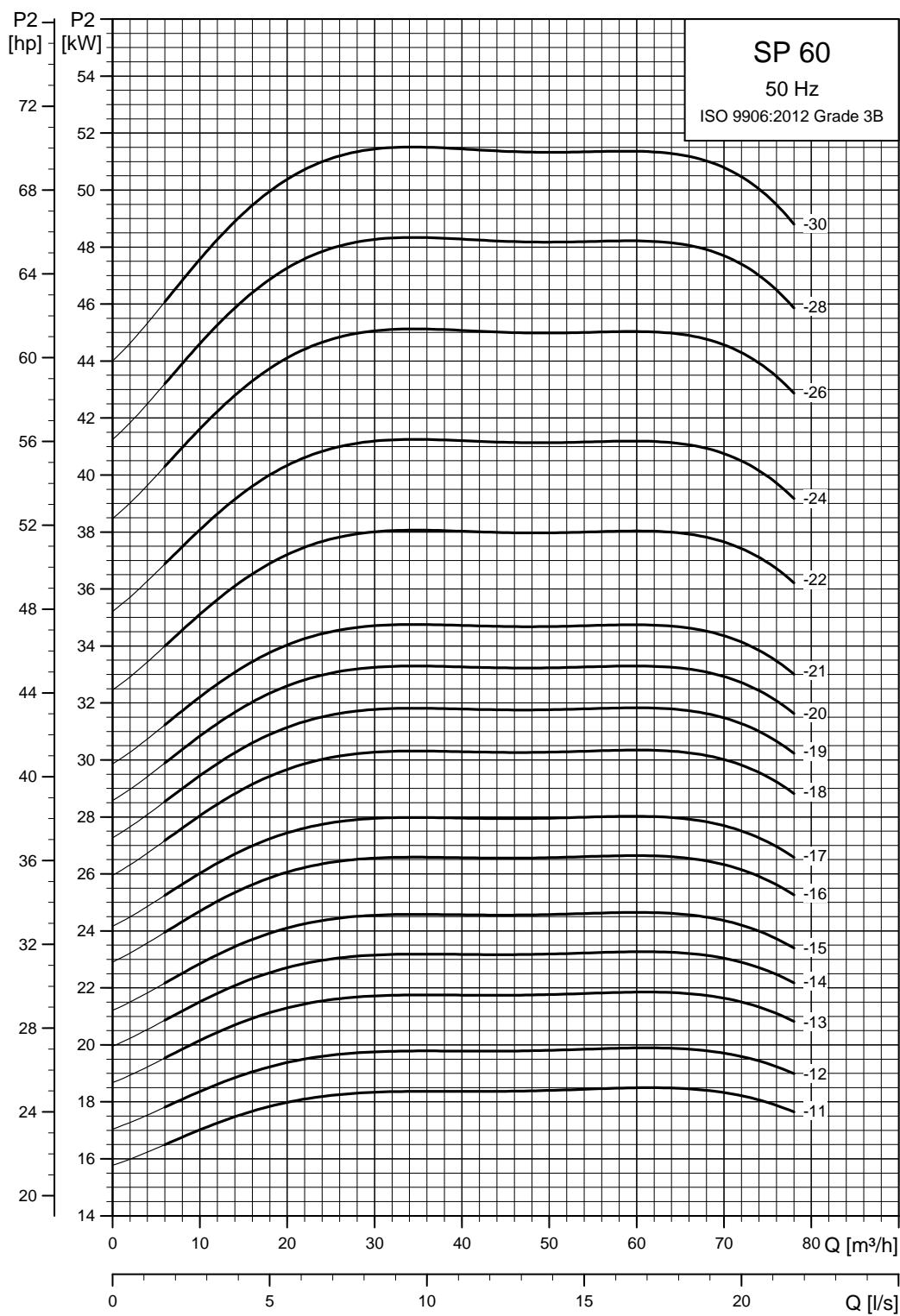


TM01 9012 1100

Power curves



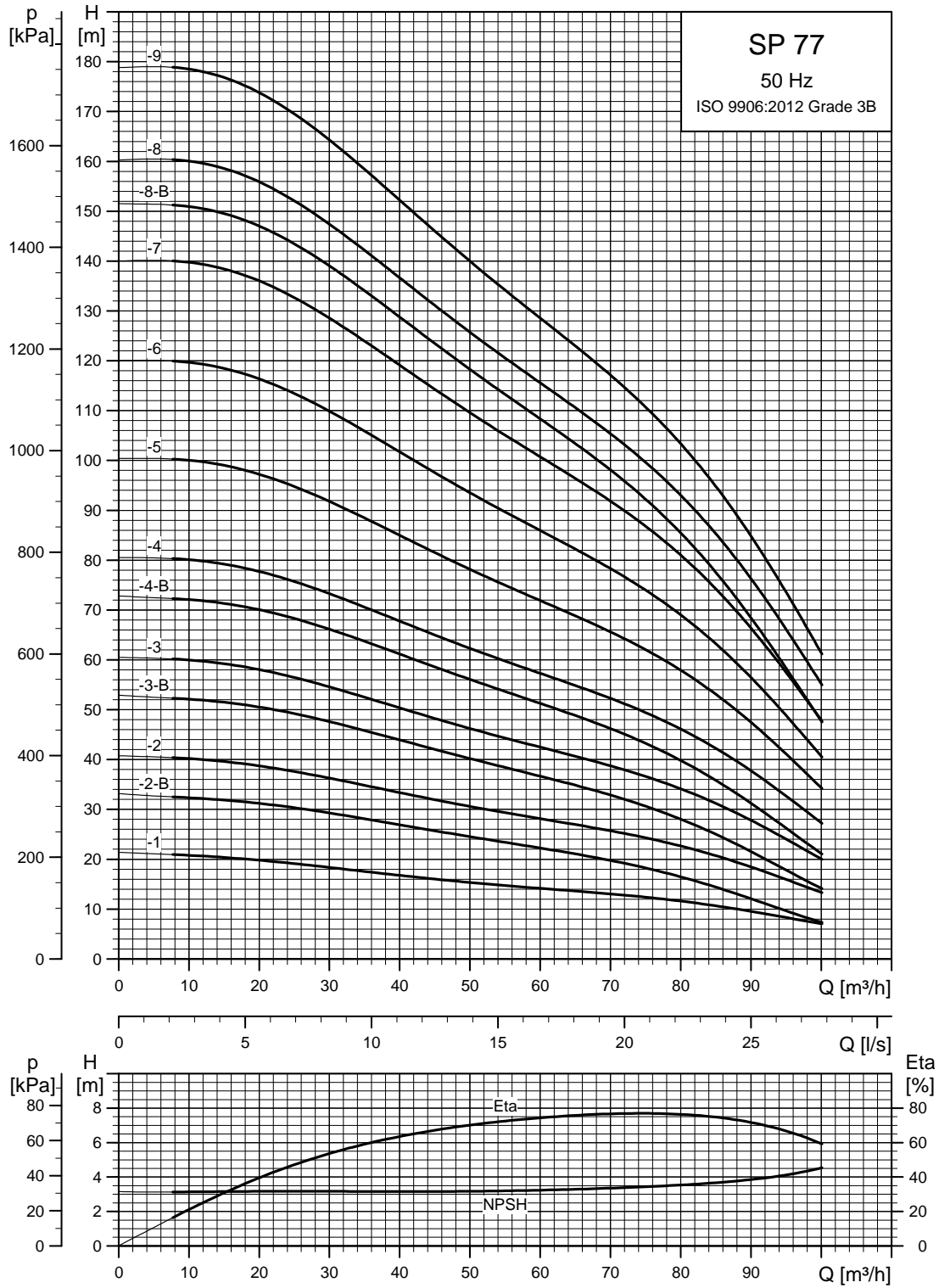
TM01 8828 4702



TM01 8829 4702

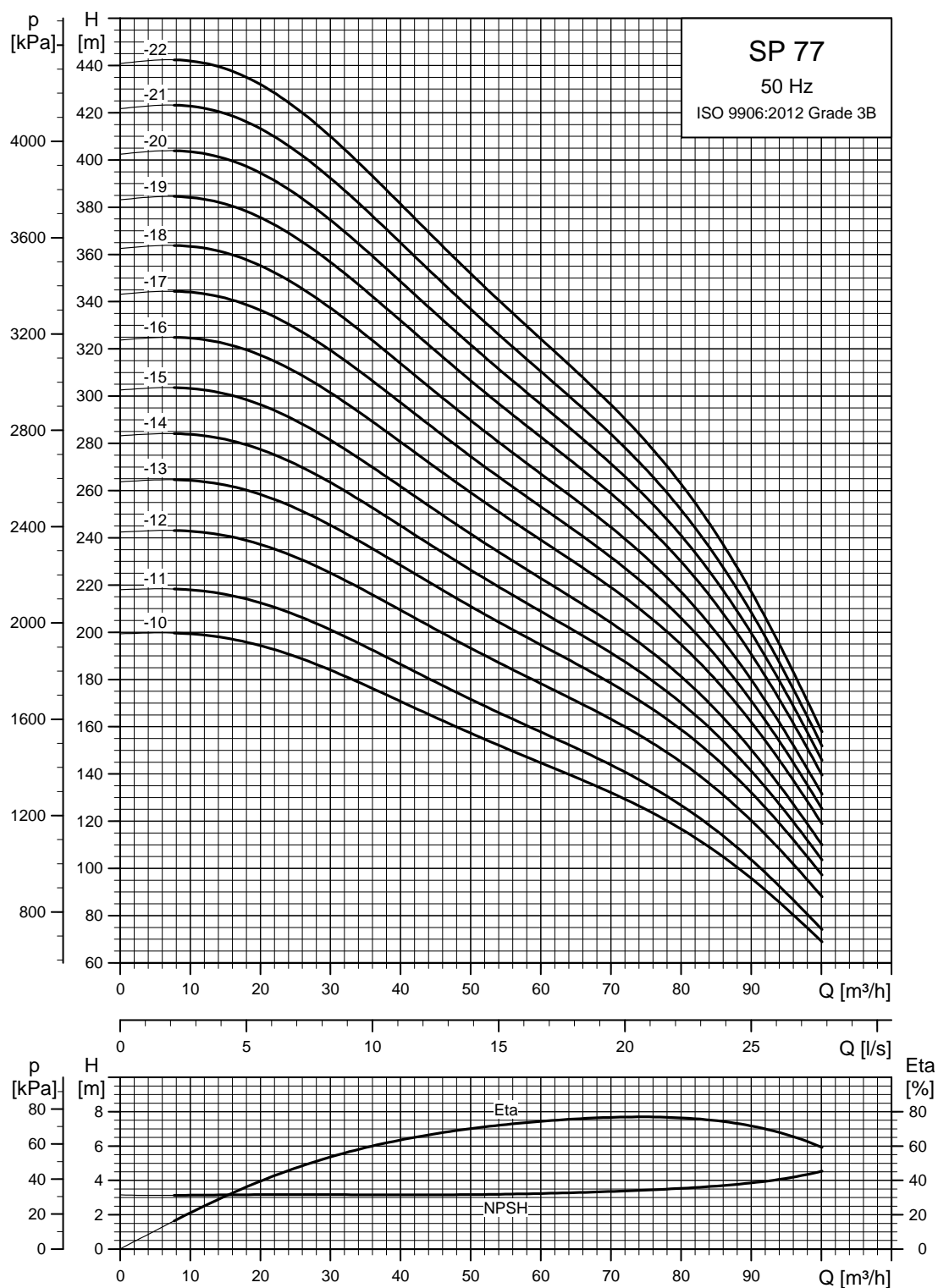
SP 77

Performance curves



See also section *How to read the curve charts* on page 24.

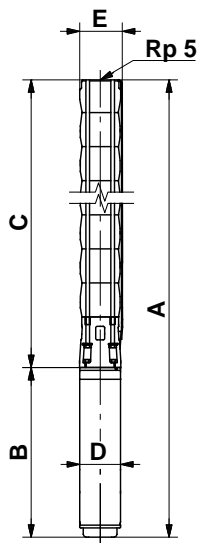
TM01 8769 4702



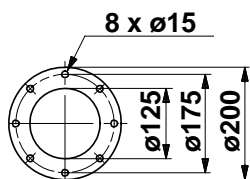
TM01 8770 4702

See also section *How to read the curve charts* on page 24.

Dimensions and weights



TM00 7872 2196



Pump with Grundfos flange

TM00 7323 1798

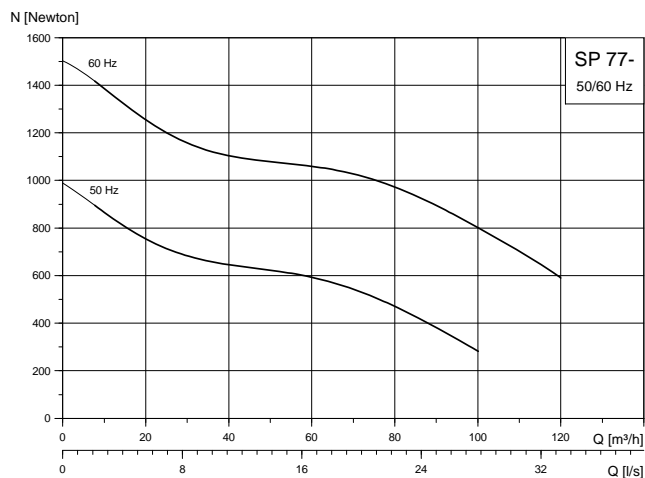
| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|------------------------------------|----------|------------|-----------------|------|-----------------|-----------------|--------------------|------|-----------------|-----------------|-----------------|-------|-----|
| | Type | Power [kW] | Rp 5 connection | | | | 5" Grundfos flange | | | | | | |
| | | | A | C | E ¹⁾ | E ²⁾ | A | C | E ¹⁾ | E ²⁾ | | B | D |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | | | | | | | | |
| SP 77-1 | MS 6000 | 5.5 | 1165 | 618 | 178 | 186 | 1162 | 618 | 200 | 200 | 547 | 139.5 | 55 |
| SP 77-2-B | MS 6000 | 5.5 | 1293 | 746 | 178 | 186 | 1290 | 746 | 200 | 200 | 547 | 139.5 | 59 |
| SP 77-2 | MS 6000 | 7.5 | 1323 | 746 | 178 | 186 | 1320 | 746 | 200 | 200 | 577 | 139.5 | 63 |
| SP 77-3-B | MS 6000 | 9.2 | 1481 | 874 | 178 | 186 | 1478 | 874 | 200 | 200 | 607 | 139.5 | 72 |
| SP 77-3 | MS 6000 | 11 | 1511 | 874 | 178 | 186 | 1508 | 874 | 200 | 200 | 637 | 139.5 | 75 |
| SP 77-4-B | MS 6000 | 13 | 1670 | 1003 | 178 | 186 | 1667 | 1003 | 200 | 200 | 667 | 139.5 | 82 |
| SP 77-4 | MS 6000 | 15 | 1705 | 1003 | 178 | 186 | 1702 | 1003 | 200 | 200 | 702 | 139.5 | 86 |
| SP 77-5 | MS 6000 | 18.5 | 1888 | 1131 | 178 | 186 | 1885 | 1131 | 200 | 200 | 757 | 139.5 | 95 |
| SP 77-6 | MS 6000 | 22 | 2076 | 1259 | 178 | 186 | 2073 | 1259 | 200 | 200 | 817 | 139.5 | 105 |
| SP 77-7 | MS 6000 | 26 | 2264 | 1387 | 178 | 186 | 2261 | 1387 | 200 | 200 | 877 | 139.5 | 114 |
| SP 77-8-B | MS 6000 | 26 | 2392 | 1515 | 178 | 186 | 2389 | 1515 | 200 | 200 | 877 | 139.5 | 118 |
| SP 77-8 | MS 6000 | 30 | 2462 | 1515 | 178 | 186 | 2459 | 1515 | 200 | 200 | 947 | 139.5 | 126 |
| SP 77-9 | MS 6000 | 30 | 2590 | 1643 | 178 | 186 | 2587 | 1643 | 200 | 200 | 947 | 139.5 | 129 |
| SP 77-10 | MMS 6 | 37 | 3083 | 1771 | 178 | 186 | 3083 | 1771 | 200 | 200 | 1312 | 143 | 176 |
| SP 77-11 | MMS 6 | 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 |

- 1) Maximum diameter of pump with one motor cable.
- 2) Maximum diameter of pump with two motor cables.

The pump types above are also available in N- and R-versions. See page 6.

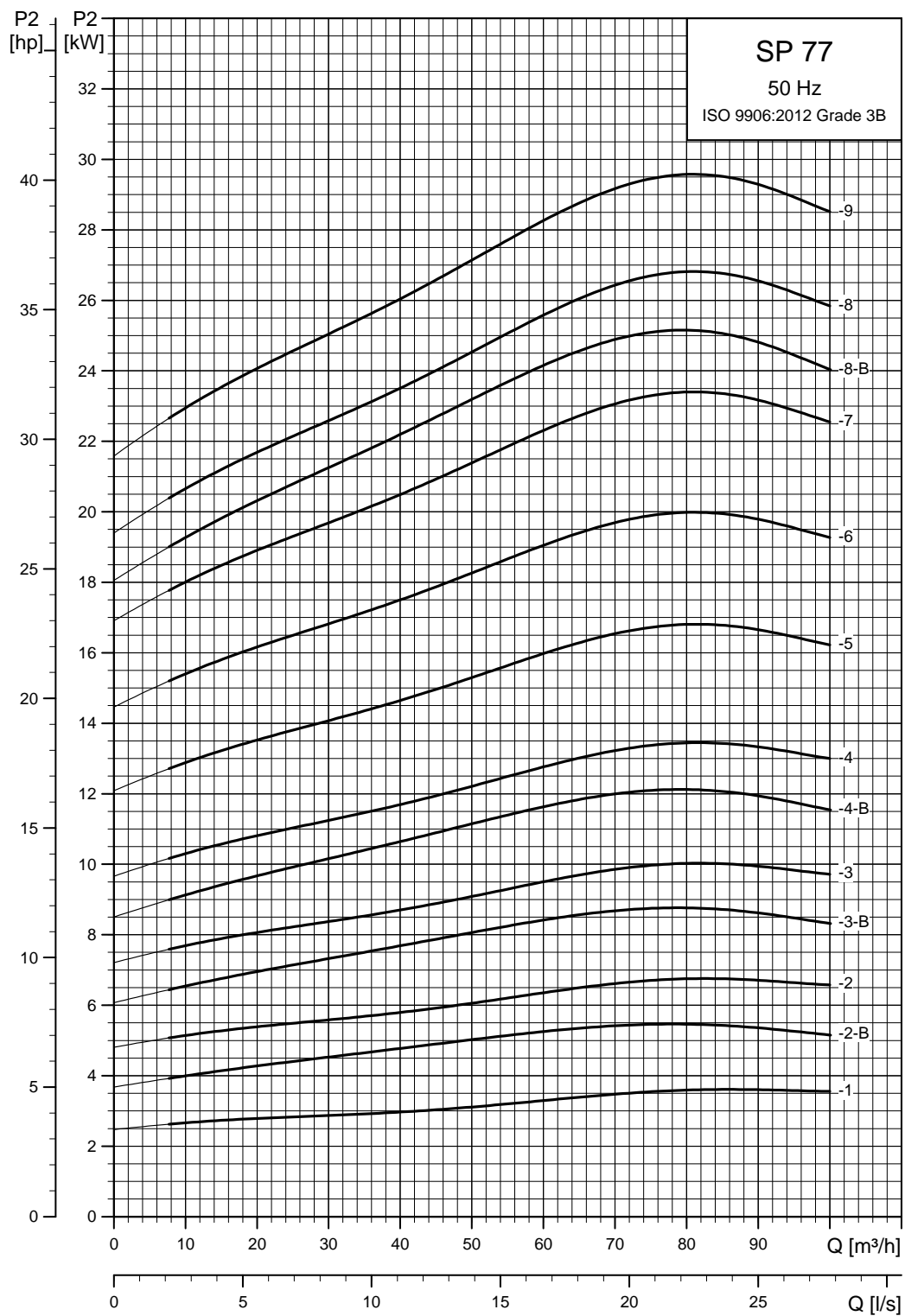
Other types of connection are possible by means of connecting pieces. See page 114.

Single-stage curves, axial thrust

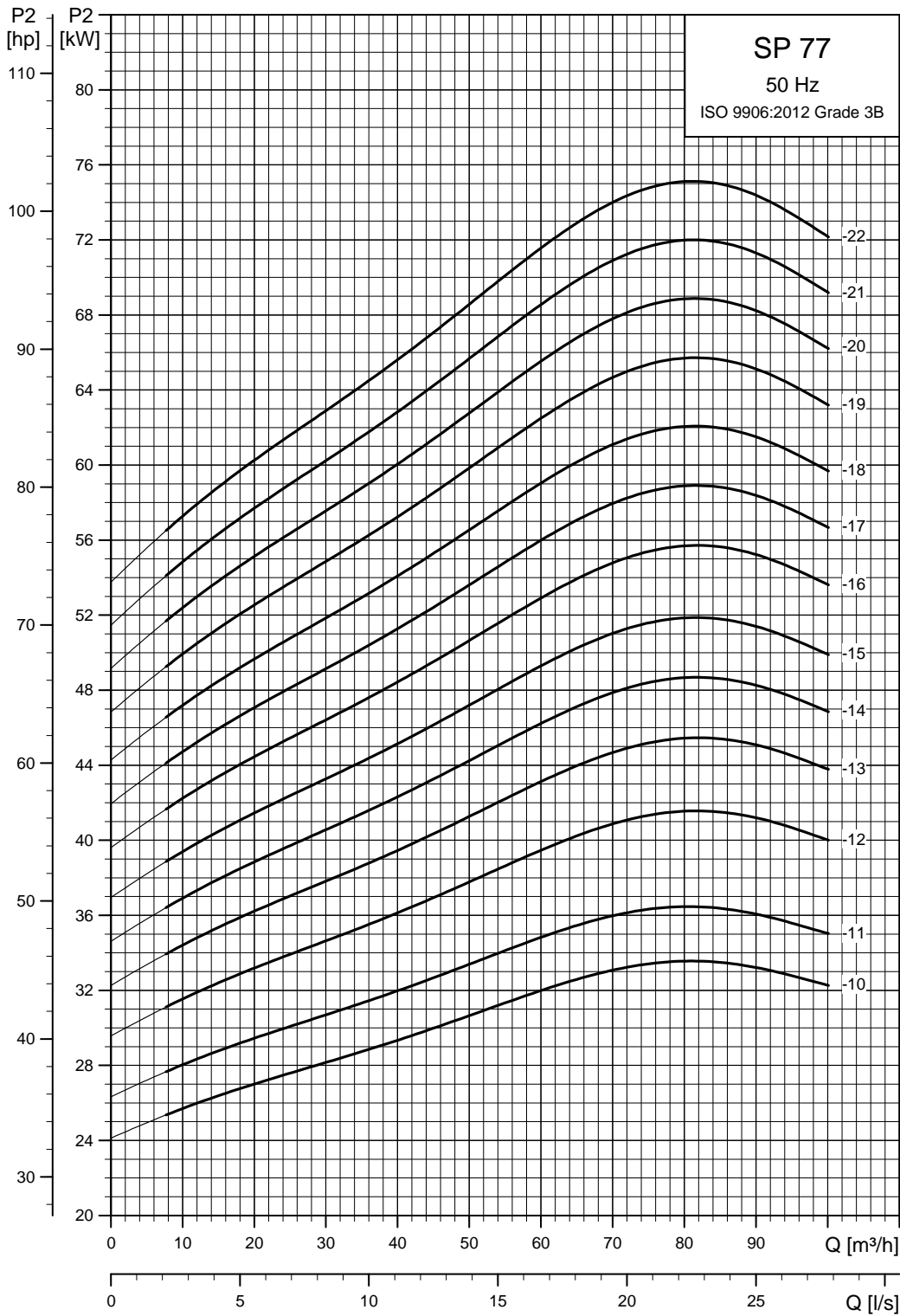


TM01 9013 1100

Power curves



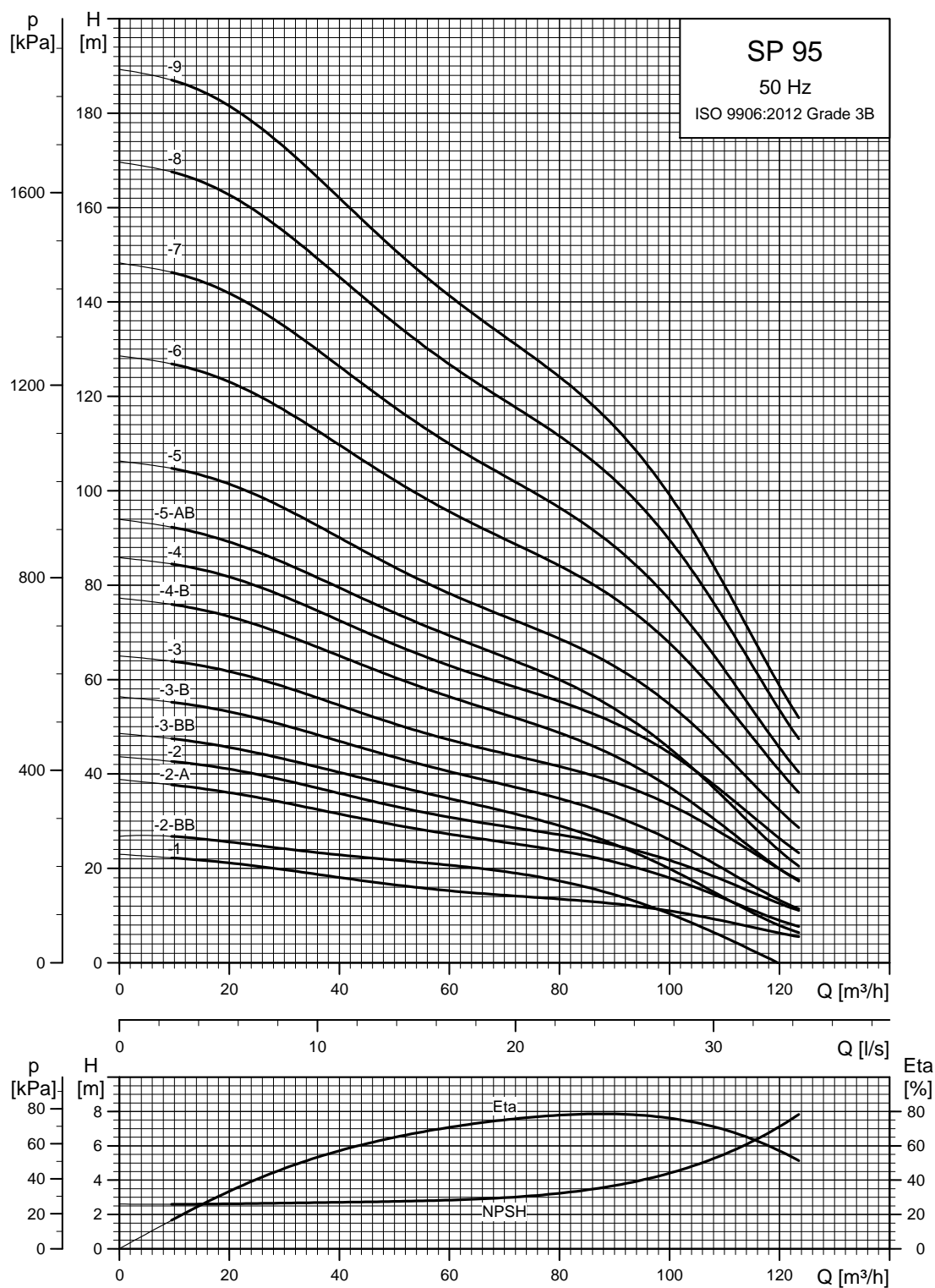
TM01 8771 4702



TM01 8772 4702

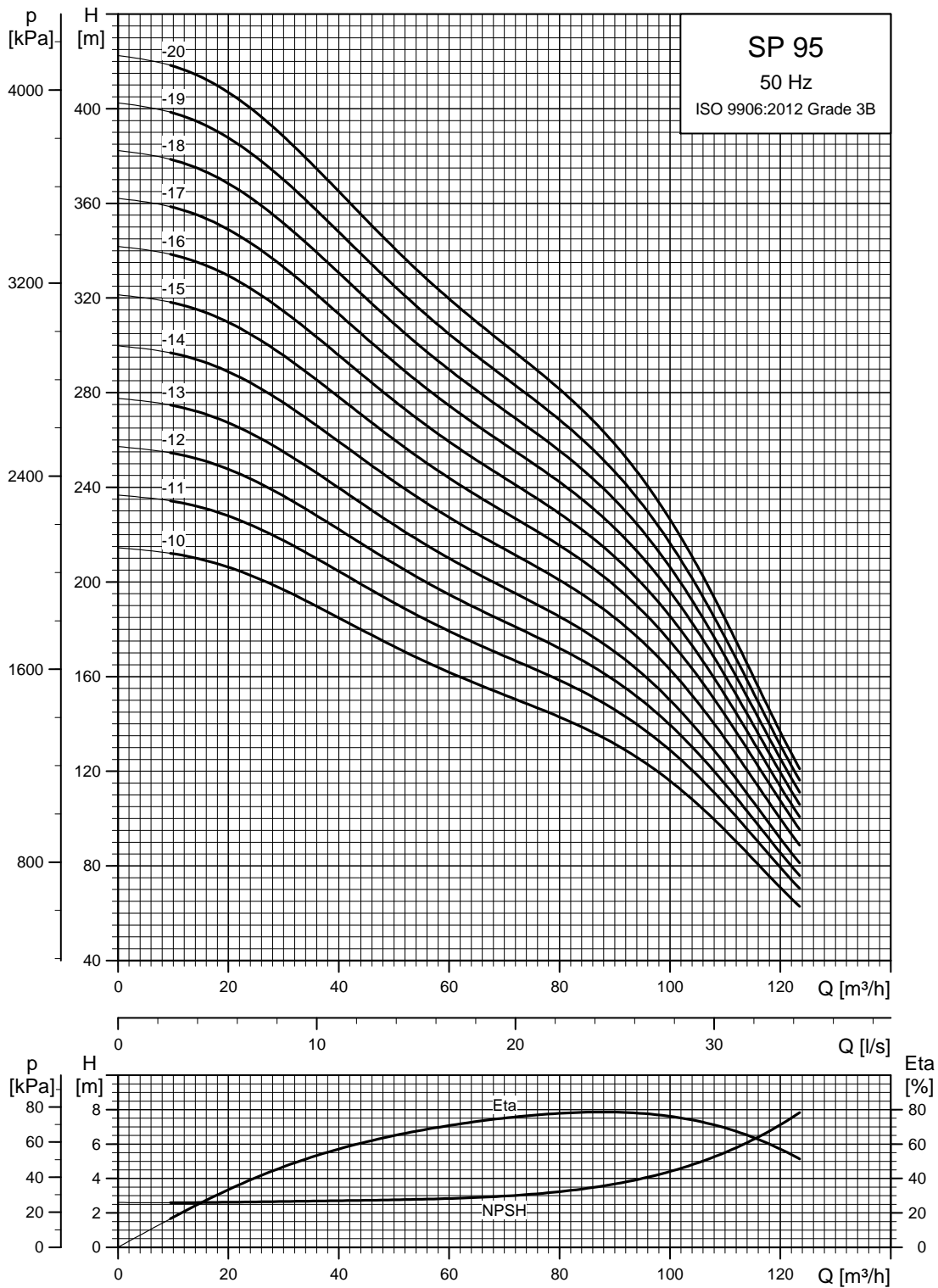
SP 95

Performance curves



See also section *How to read the curve charts* on page 24.

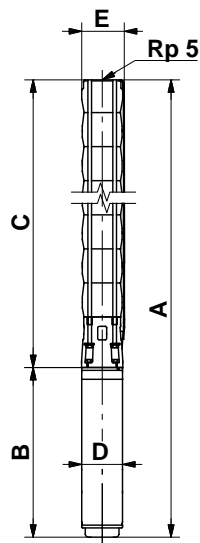
TM01 8773 4702



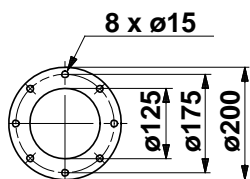
TM01 8774 4702

See also section *How to read the curve charts* on page 24.

Dimensions and weights



TM00 7872 2196



TM00 7323 1798

Pump with Grundfos flange

| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|------------------------------------|----------|------------|-----------------|------|-----------------|-----------------|--------------------|------|-----------------|-----------------|-----------------|-------|-----|
| | Type | Power [kW] | Rp 5 connection | | | | 5" Grundfos flange | | | | | B | D |
| | | | A | C | E ¹⁾ | E ²⁾ | A | C | E ¹⁾ | E ²⁾ | | | |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | | | | | | | | |
| SP 95-1 | MS 6000 | 5.5 | 1165 | 618 | 178 | 186 | 1162 | 618 | 200 | 200 | 547 | 139.5 | 55 |
| SP 95-2-BB | MS 6000 | 5.5 | 1293 | 746 | 178 | 186 | 1290 | 746 | 200 | 200 | 547 | 139.5 | 72 |
| SP 95-2-A | MS 6000 | 7.5 | 1323 | 746 | 178 | 186 | 1320 | 746 | 200 | 200 | 577 | 139.5 | 63 |
| SP 95-2 | MS 6000 | 9.2 | 1353 | 746 | 178 | 186 | 1350 | 746 | 200 | 200 | 607 | 139.5 | 68 |
| SP 95-3-BB | MS 6000 | 9.2 | 1481 | 874 | 178 | 186 | 1478 | 874 | 200 | 200 | 607 | 139.5 | 72 |
| SP 95-3-B | MS 6000 | 11 | 1511 | 874 | 178 | 186 | 1508 | 874 | 200 | 200 | 637 | 139.5 | 75 |
| SP 95-3 | MS 6000 | 13 | 1541 | 874 | 178 | 186 | 1538 | 874 | 200 | 200 | 667 | 139.5 | 78 |
| SP 95-4-B | MS 6000 | 15 | 1705 | 1003 | 178 | 186 | 1702 | 1003 | 200 | 200 | 702 | 139.5 | 86 |
| SP 95-4 | MS 6000 | 18.5 | 1760 | 1003 | 178 | 186 | 1757 | 1003 | 200 | 200 | 757 | 139.5 | 91 |
| SP 95-5-AB | MS 6000 | 18.5 | 1888 | 1131 | 178 | 186 | 1885 | 1131 | 200 | 200 | 757 | 139.5 | 95 |
| SP 95-5 | MS 6000 | 22 | 1948 | 1131 | 178 | 186 | 1945 | 1131 | 200 | 200 | 817 | 139.5 | 101 |
| SP 95-6 | MS 6000 | 26 | 2136 | 1259 | 178 | 186 | 2133 | 1259 | 200 | 200 | 877 | 139.5 | 110 |
| SP 95-7 | MS 6000 | 30 | 2334 | 1387 | 178 | 186 | 2331 | 1387 | 200 | 200 | 947 | 139.5 | 122 |
| SP 95-8 | MMS 6 | 37 | 2827 | 1515 | 178 | 186 | 2827 | 1515 | 200 | 200 | 1312 | 143 | 168 |
| SP 95-9 | MMS 6 | 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 |

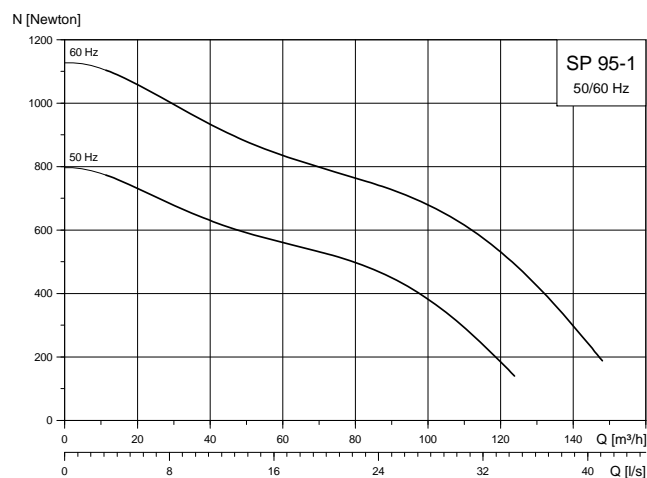
1) Maximum diameter of pump with one motor cable.

2) Maximum diameter of pump with two motor cables.

The pump types above are also available in N- and R-versions. See page 6.

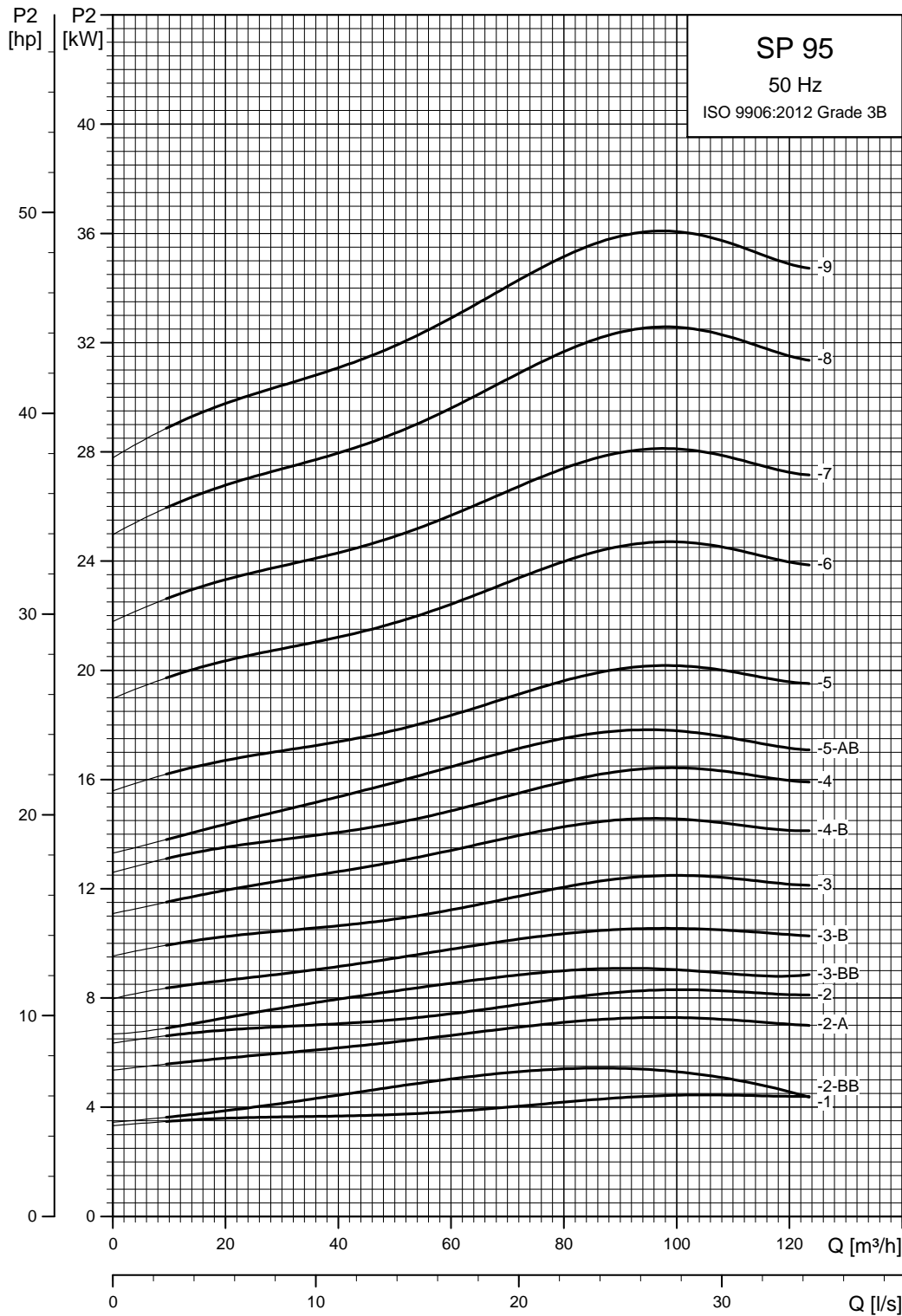
Other types of connection are possible by means of connecting pieces. See page 114.

Single-stage curves, axial thrust

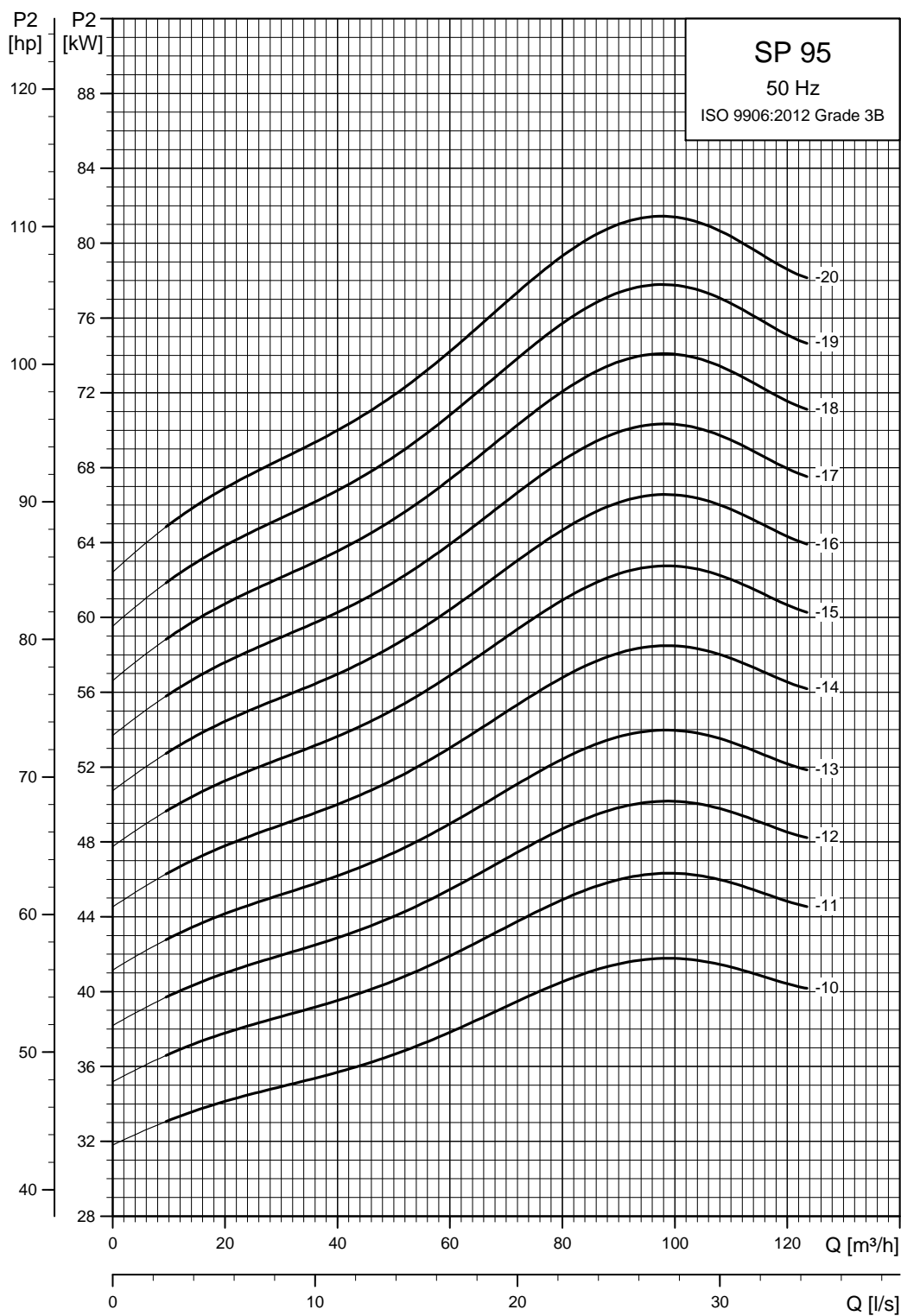


TM01 9014 1100

Power curves



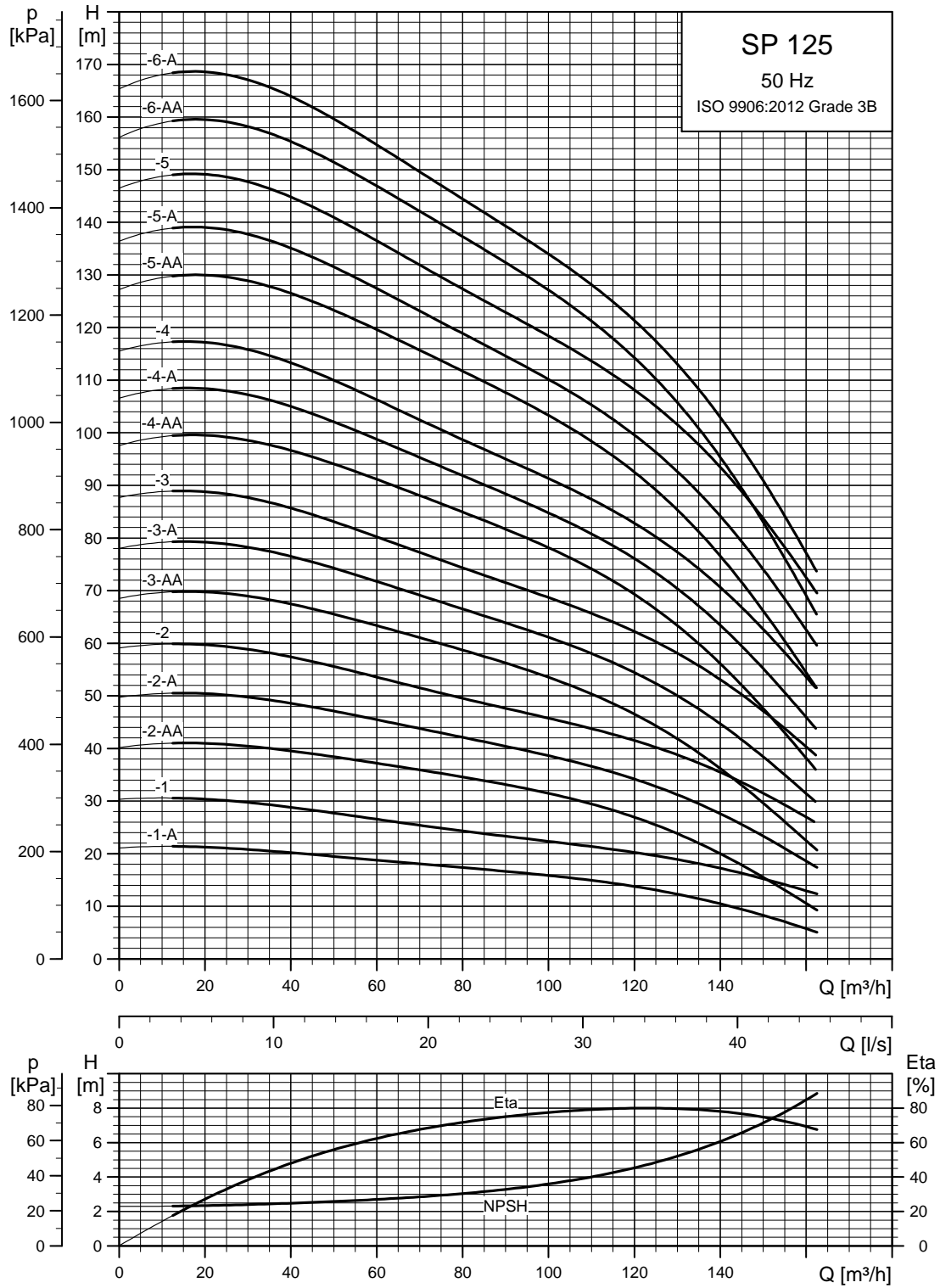
TM01 8775 4702



TM01 8776 4702

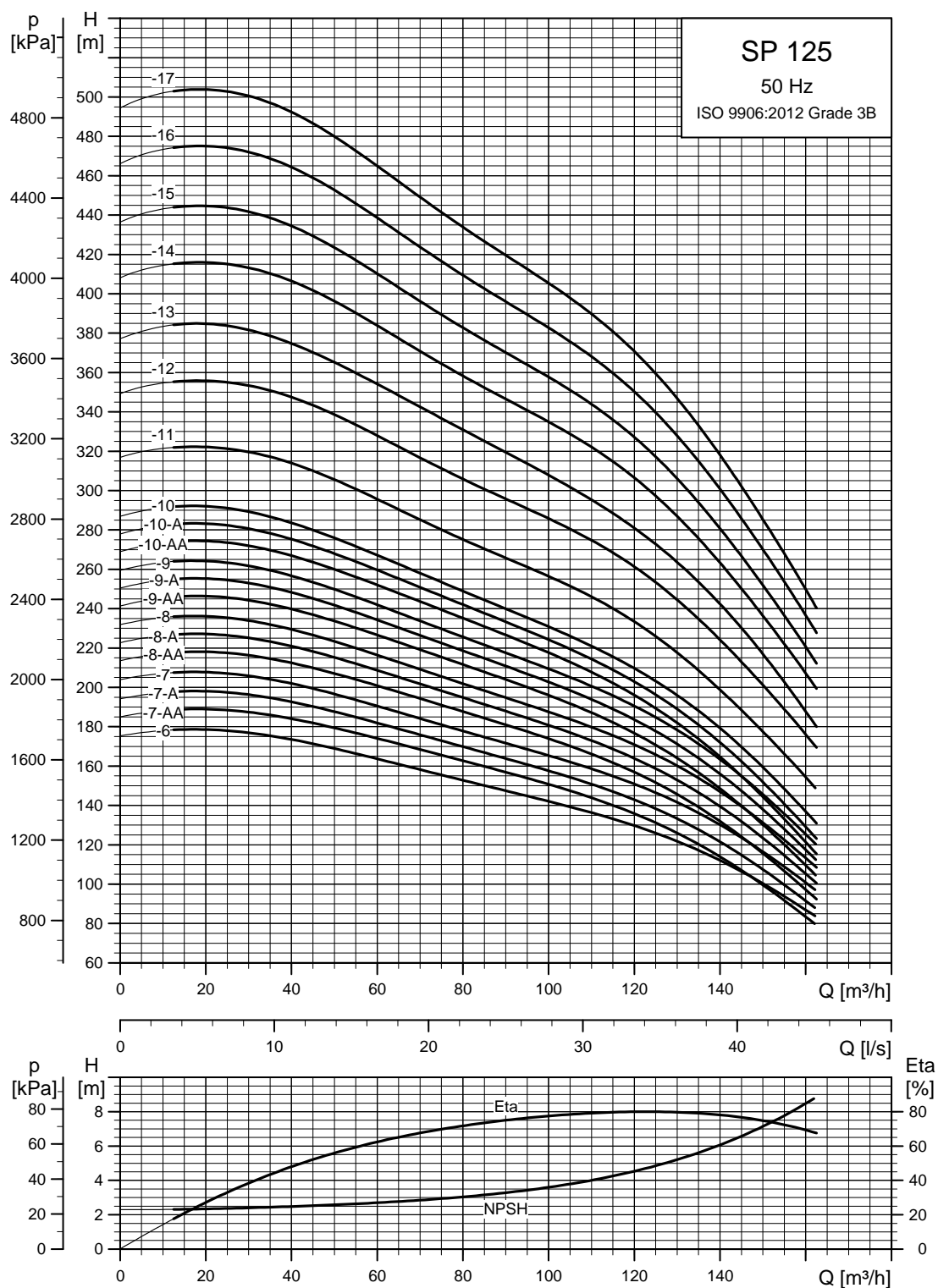
SP 125

Performance curves



See also section *How to read the curve charts* on page 24.

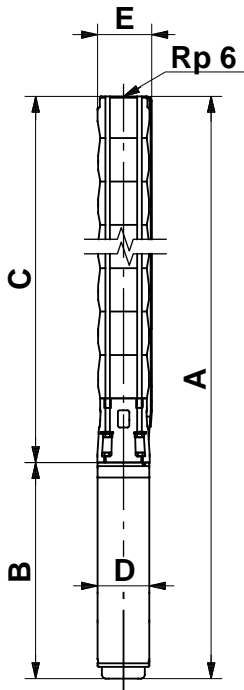
TM01 8777 4702



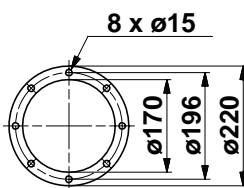
TM01 8778 4702

See also section *How to read the curve charts* on page 24.

Dimensions and weights



TM00 8760 3596



Pump with Grundfos flange

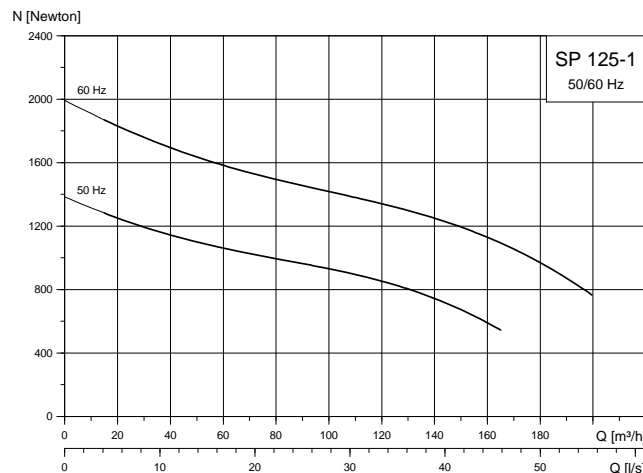
TM00 7324 1798

| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|------------------------------------|-----------|------------|-----------------|------|-----------------|-----------------|--------------------|------|-----------------|-----------------|-----------------|-------|-----|
| | Type | Power [kW] | Rp 6 connection | | | | 6" Grundfos flange | | | | | | |
| | | | A | C | E ¹⁾ | E ²⁾ | A | C | E ¹⁾ | E ²⁾ | | B | D |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | | | | | | | | |
| SP 125-1-A | MS 6000 | 7.5 | 1228 | 651 | 211 | 218 | 1225 | 651 | 222 | 226 | 577 | 139.5 | 70 |
| SP 125-1 | MS 6000 | 11 | 1288 | 651 | 211 | 218 | 1285 | 651 | 222 | 226 | 637 | 139.5 | 79 |
| SP 125-2-AA | MS 6000 | 13 | 1474 | 807 | 211 | 218 | 1471 | 807 | 222 | 226 | 667 | 139.5 | 88 |
| SP 125-2-A | MS 6000 | 18.5 | 1564 | 807 | 211 | 218 | 1561 | 807 | 222 | 226 | 757 | 139.5 | 97 |
| SP 125-2 | MS 6000 | 22 | 1624 | 807 | 211 | 218 | 1621 | 807 | 222 | 226 | 817 | 139.5 | 103 |
| SP 125-3-AA | MS 6000 | 22 | 1780 | 963 | 211 | 218 | 1777 | 963 | 222 | 226 | 817 | 139.5 | 109 |
| SP 125-3-A | MS 6000 | 26 | 1840 | 963 | 211 | 218 | 1837 | 963 | 222 | 226 | 877 | 139.5 | 115 |
| SP 125-3 | MS 6000 | 30 | 1910 | 963 | 211 | 218 | 1907 | 963 | 222 | 226 | 947 | 139.5 | 123 |
| SP 125-4-AA | MMS 6 | 37 | 2431 | 1119 | 211 | 218 | 2431 | 1119 | 222 | 226 | 1312 | 143 | 171 |
| SP 125-4-A | MMS 6 | 37 | 2431 | 1119 | 211 | 218 | 2431 | 1119 | 222 | 226 | 1312 | 143 | 171 |
| SP 125-4 | MMS 6 | 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 |

- 1) Maximum diameter of pump with one motor cable.
- 2) Maximum diameter of pump with two motor cables.

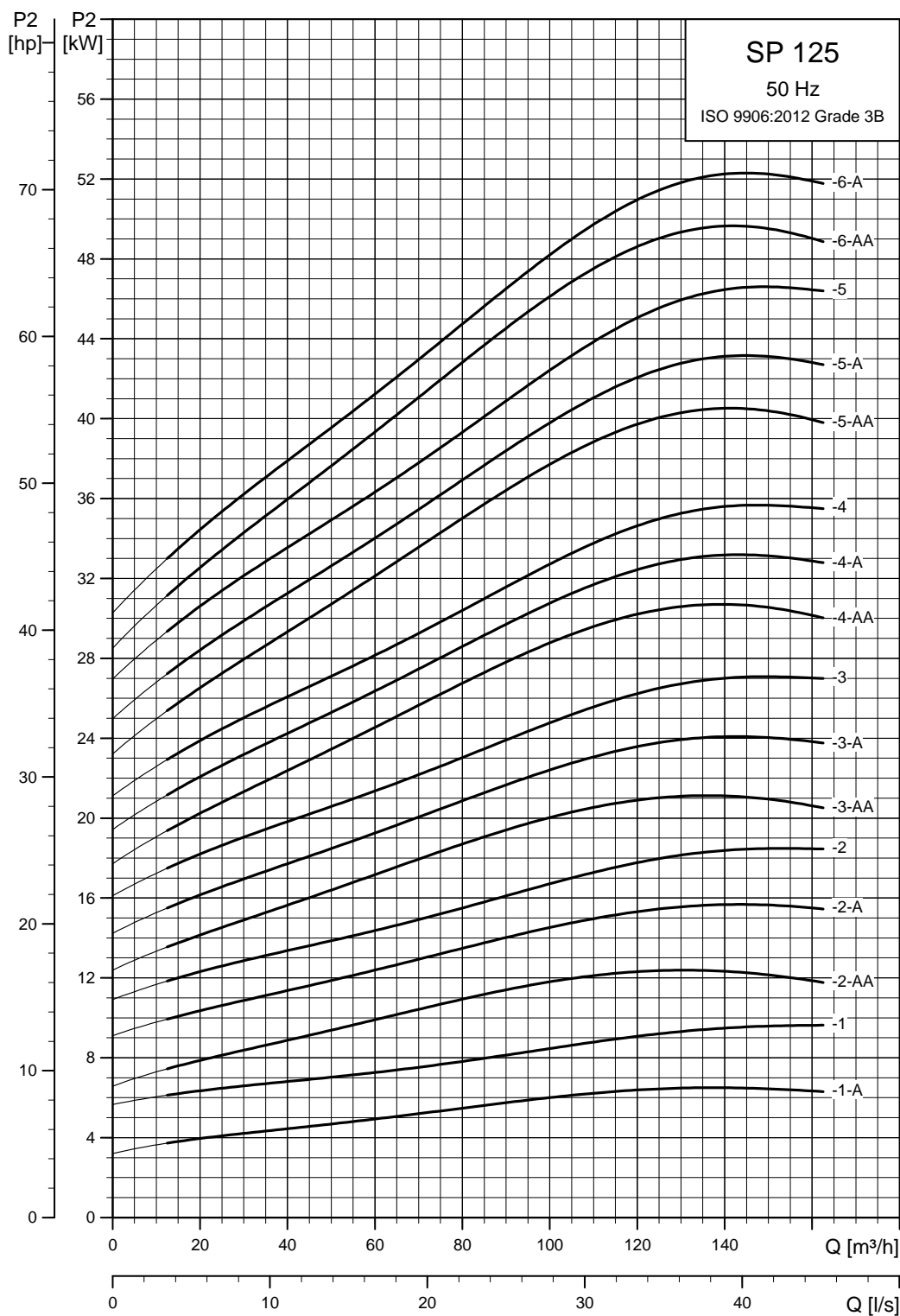
The pump types above are also available in N- and R-versions. See page 6.
Other types of connection are possible by means of connecting pieces. See page 114.

Single-stage curves, axial thrust

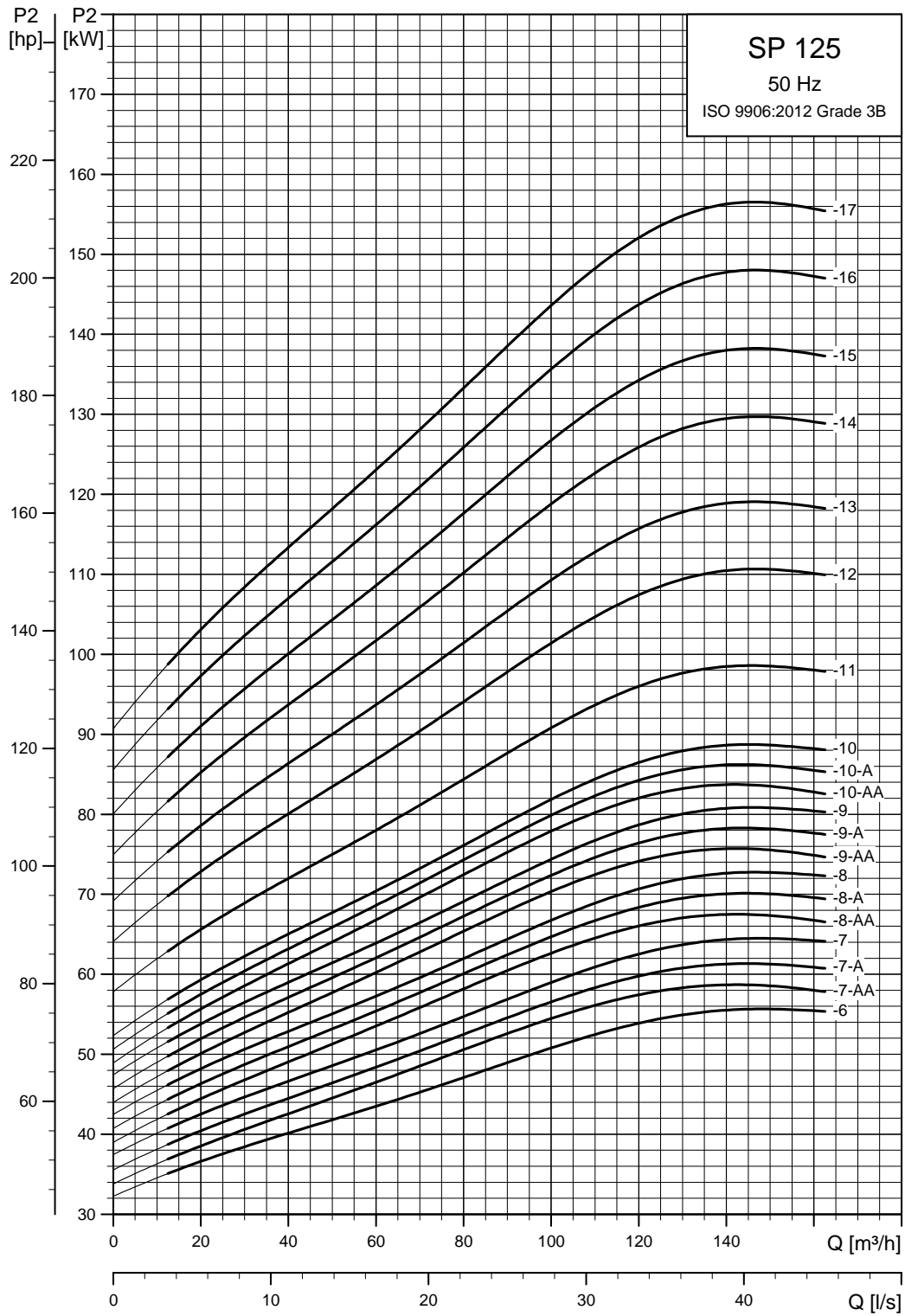


TM01 9015 1100

Power curves



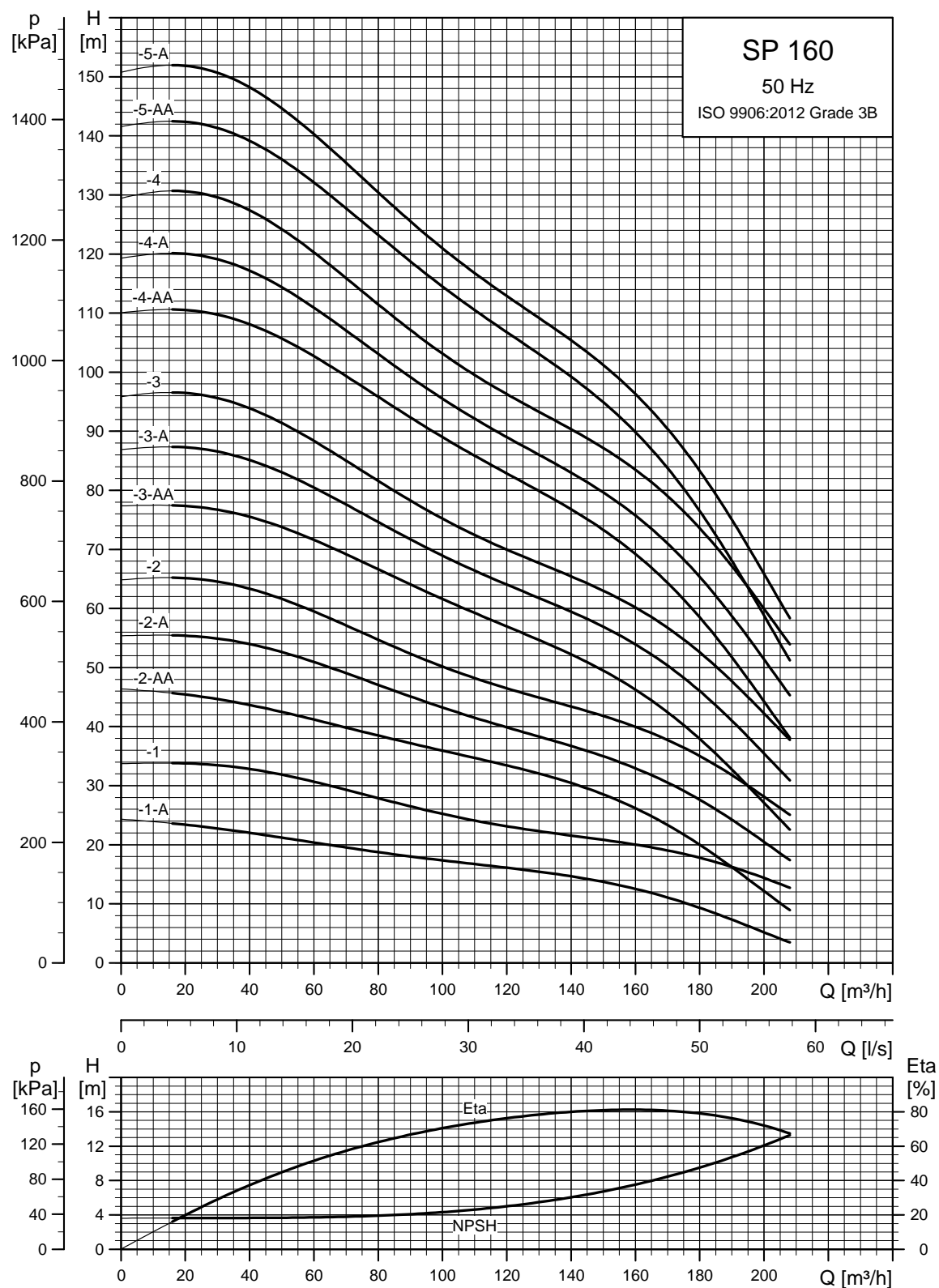
TM01 8779 4702



TM01 8780 4702

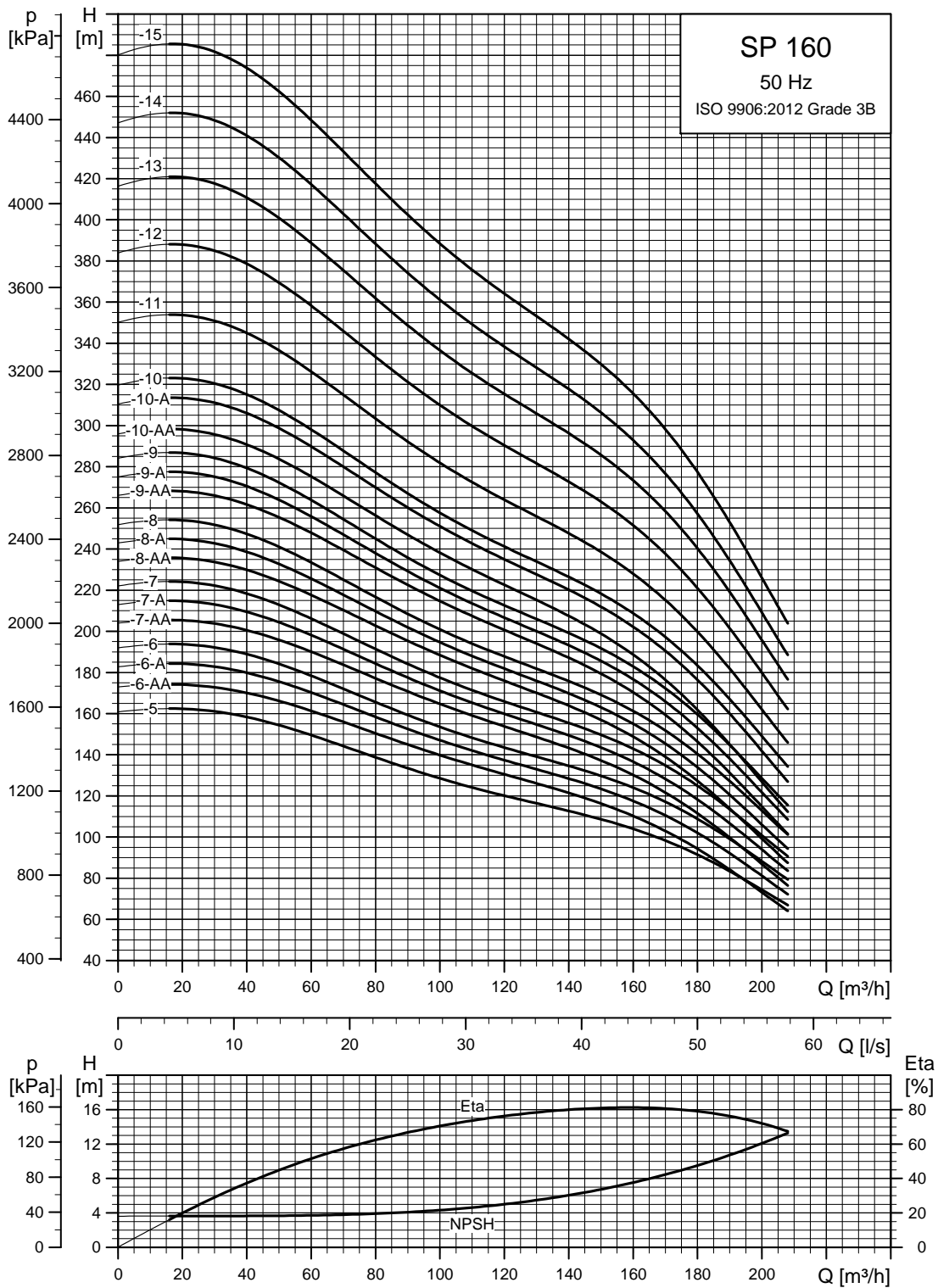
SP 160

Performance curves



TM01 8781 4702

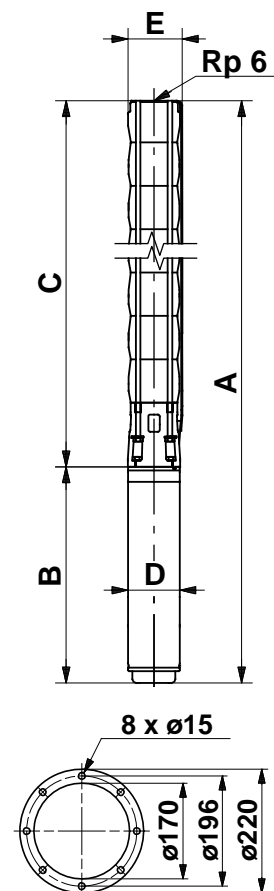
See also section *How to read the curve charts* on page 24.



TM00 8782 4702

See also section *How to read the curve charts* on page 24.

Dimensions and weights



Pump with Grundfos flange

TM00 8760 3596

TM00 7324 1798

| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|------------------------------------|-----------|------------|-----------------|------|-----------------|-----------------|--------------------|------|-----------------|-----------------|-----------------|-------|-----|
| | Type | Power [kW] | Rp 6 connection | | | | 6" Grundfos flange | | | | | | |
| | | | A | C | E ¹⁾ | E ²⁾ | A | C | E ¹⁾ | E ²⁾ | | B | D |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | | | | | | | | |
| SP 160-1-A | MS 6000 | 9.2 | 1258 | 651 | 211 | 218 | 1255 | 651 | 222 | 226 | 607 | 139.5 | 76 |
| SP 160-1 | MS 6000 | 13 | 1318 | 651 | 211 | 218 | 1315 | 651 | 222 | 226 | 667 | 139.5 | 82 |
| SP 160-2-AA | MS 6000 | 18.5 | 1564 | 807 | 211 | 218 | 1561 | 807 | 222 | 226 | 757 | 139.5 | 97 |
| SP 160-2-A | MS 6000 | 22 | 1624 | 807 | 211 | 218 | 1621 | 807 | 222 | 226 | 817 | 139.5 | 103 |
| SP 160-2 | MS 6000 | 26 | 1684 | 807 | 211 | 218 | 1681 | 807 | 222 | 226 | 877 | 139.5 | 109 |
| SP 160-3-AA | MS 6000 | 30 | 1910 | 963 | 211 | 218 | 1907 | 963 | 222 | 226 | 947 | 139.5 | 123 |
| SP 160-3-A | MMS 6 | 37 | 2275 | 963 | 211 | 218 | 2275 | 963 | 222 | 226 | 1312 | 143 | 165 |
| SP 160-3 | MMS 6 | 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 |

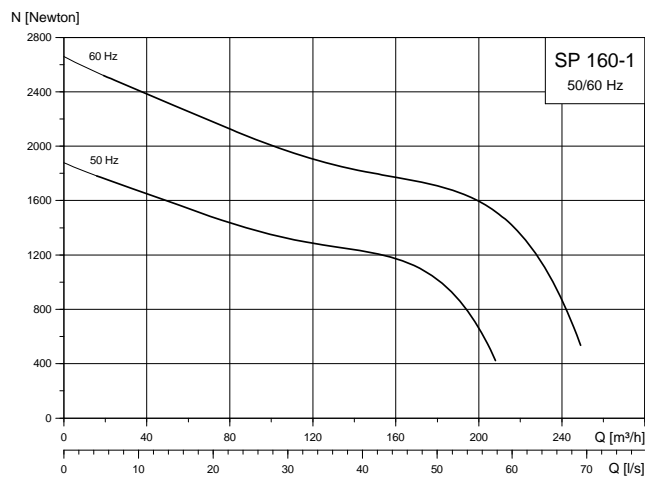
1) Maximum diameter of pump with one motor cable.

2) Maximum diameter of pump with two motor cables.

The pump types above are also available in N- and R-versions. See page 6.

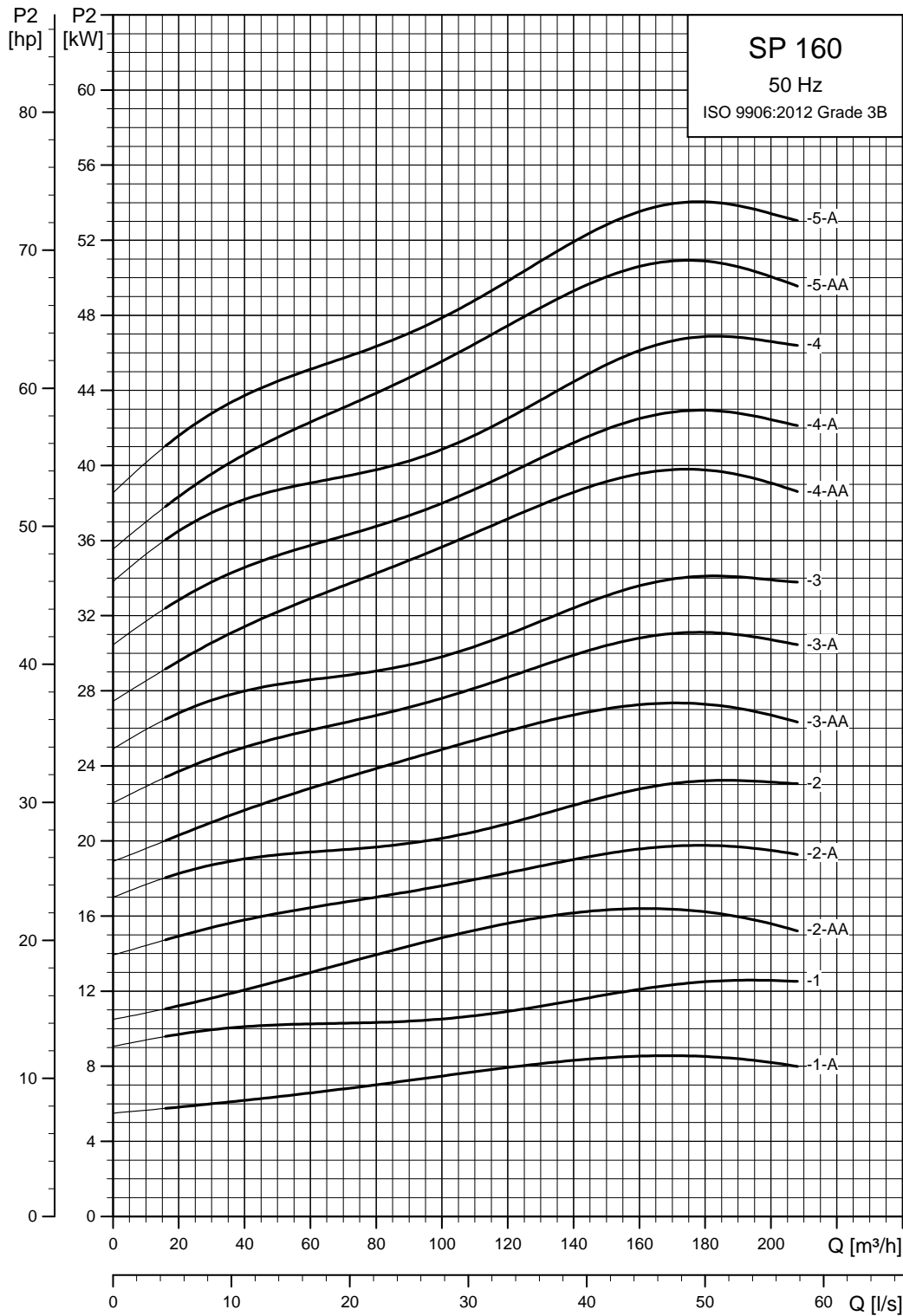
Other types of connection are possible by means of connecting pieces. See page 114.

Single-stage curves, axial thrust

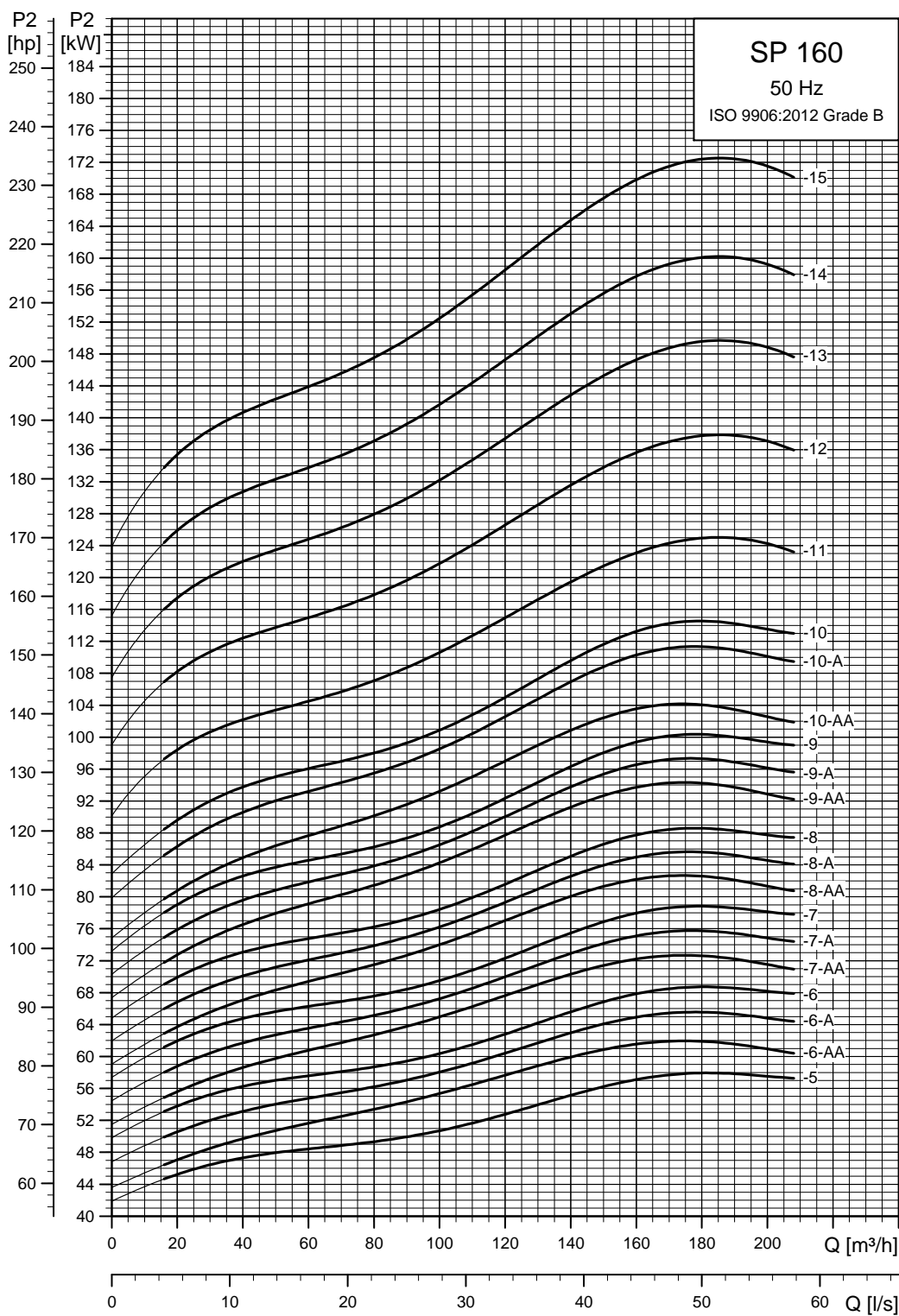


TM01 9016 1100

Power curves



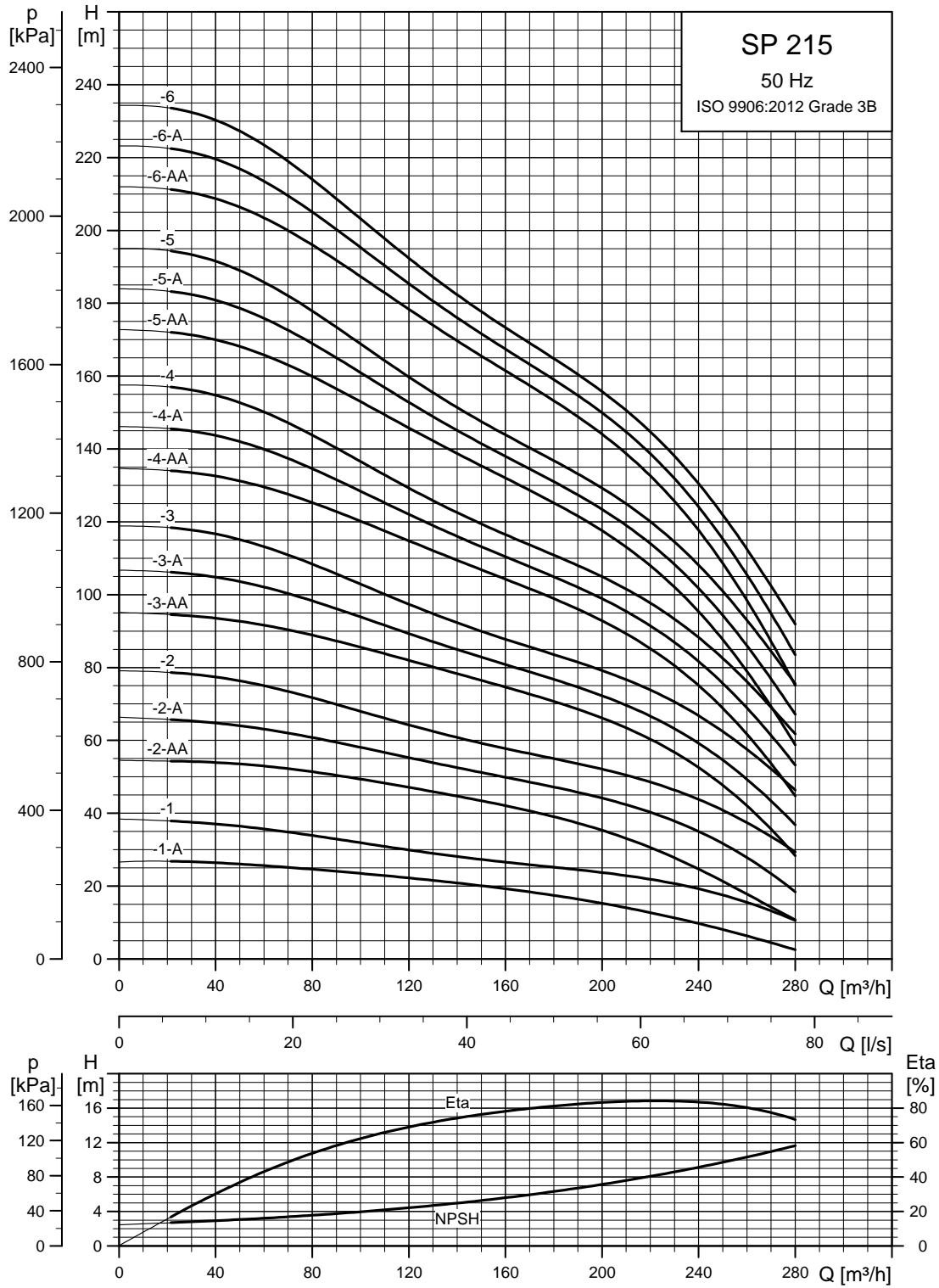
TM00 8783 4702



TM00 8784 4702

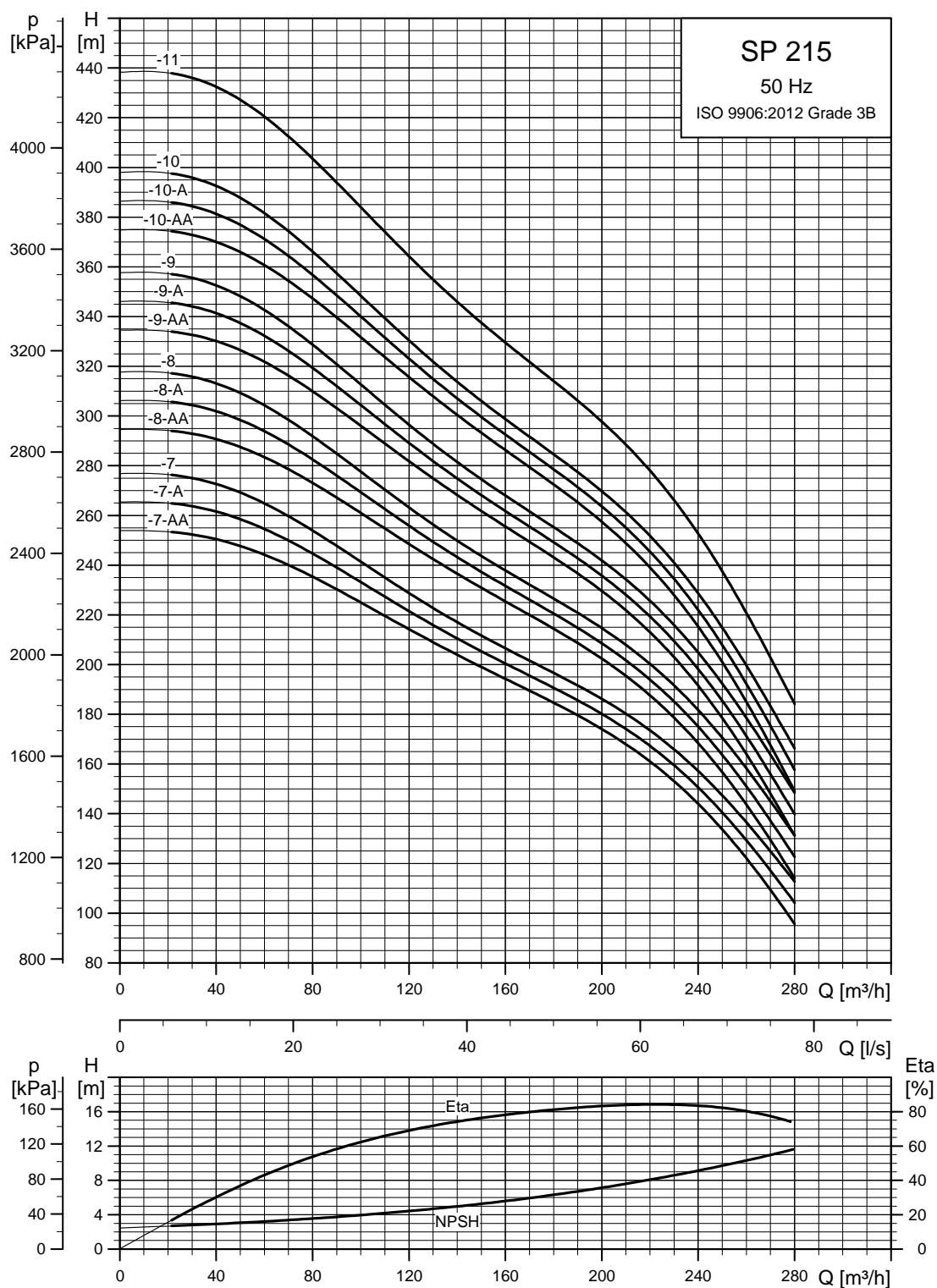
SP 215

Performance curves



See also section *How to read the curve charts* on page 24.

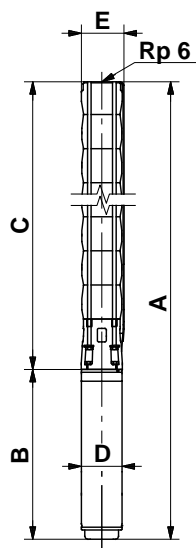
TM00 8785 4702



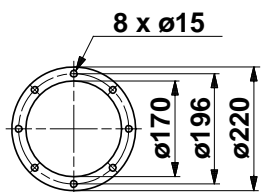
See also section *How to read the curve charts* on page 24.

TM01 8786 4702

Dimensions and weights



TM00 8760 3596



TM00 7324 1798

Pump with Grundfos flange

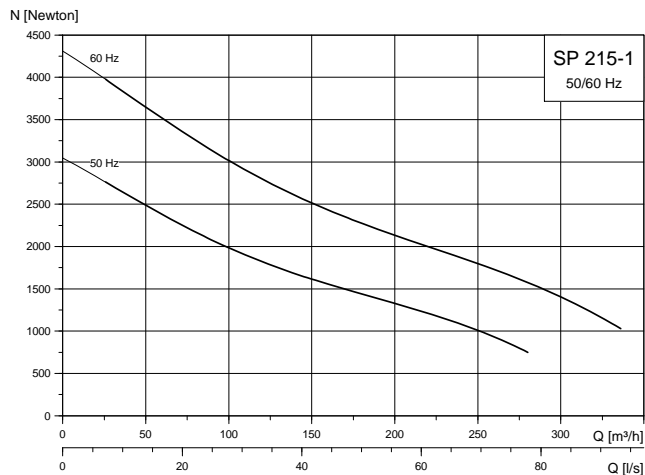
| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|------------------------------------|-----------|------------|-----------------|------|-----------------|-----------------|--------------------|------|-----------------|-----------------|-----------------|-------|-----|
| | Type | Power [kW] | Rp 6 connection | | | | 6" Grundfos flange | | | | | | |
| | | | A | C | E ¹⁾ | E ²⁾ | A | C | E ¹⁾ | E ²⁾ | | B | D |
| Three-phase, 3 x 230 V / 3 x 400 V | | | | | | | | | | | | | |
| SP 215-1-A | MS 6000 | 15 | 1492 | 790 | 241 | 247 | 1489 | 790 | 241 | 247 | 702 | 139.5 | 92 |
| SP 215-1 | MS 6000 | 18.5 | 1547 | 790 | 241 | 247 | 1544 | 790 | 241 | 247 | 757 | 139.5 | 97 |
| SP 215-2-AA | MS 6000 | 30 | 1913 | 966 | 241 | 247 | 1910 | 966 | 241 | 247 | 947 | 139.5 | 127 |
| SP 215-2-A | MMS 6 | 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 | 241 | 247 | | | | | 2220 | 237 | 672 |
| SP 215-9-A | MMS 10000 | 170 | 4718 | 2498 | 241 | 247 | | | | | 2220 | 237 | 672 |
| SP 215-9 | MMS 10000 | 170 | 4718 | 2498 | 241 | 247 | | | | | 2220 | 237 | 672 |
| SP 215-10-AA | MMS 12000 | 190 | 4654 | 2674 | 286 | 286 | | | | | 1980 | 286 | 793 |
| SP 215-10-A | MMS 12000 | 190 | 4654 | 2674 | 286 | 286 | | | | | 1980 | 286 | 793 |
| SP 215-10 | MMS 12000 | 190 | 4654 | 2674 | 286 | 286 | | | | | 1980 | 286 | 793 |
| SP 215-11 | MMS 12000 | 220 | 4990 | 2850 | 286 | 286 | | | | | 2140 | 286 | 853 |

- 1) Maximum diameter of pump with one motor cable.
- 2) Maximum diameter of pump with two motor cables.

The pump types above are also available in N- and R-versions. See page 6.

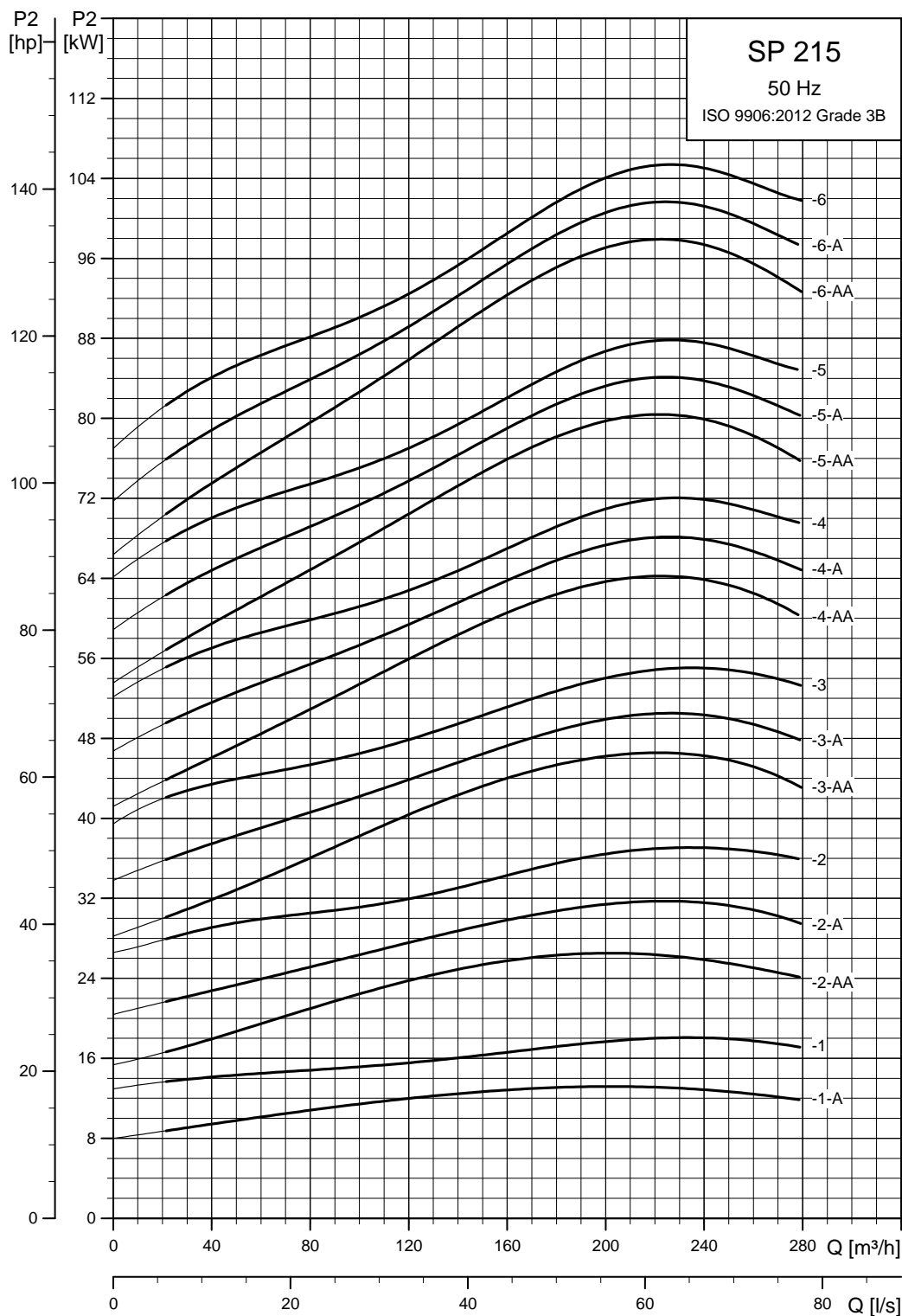
Other types of connection are possible by means of connecting pieces. See page 114.

Single-stage curves, axial thrust

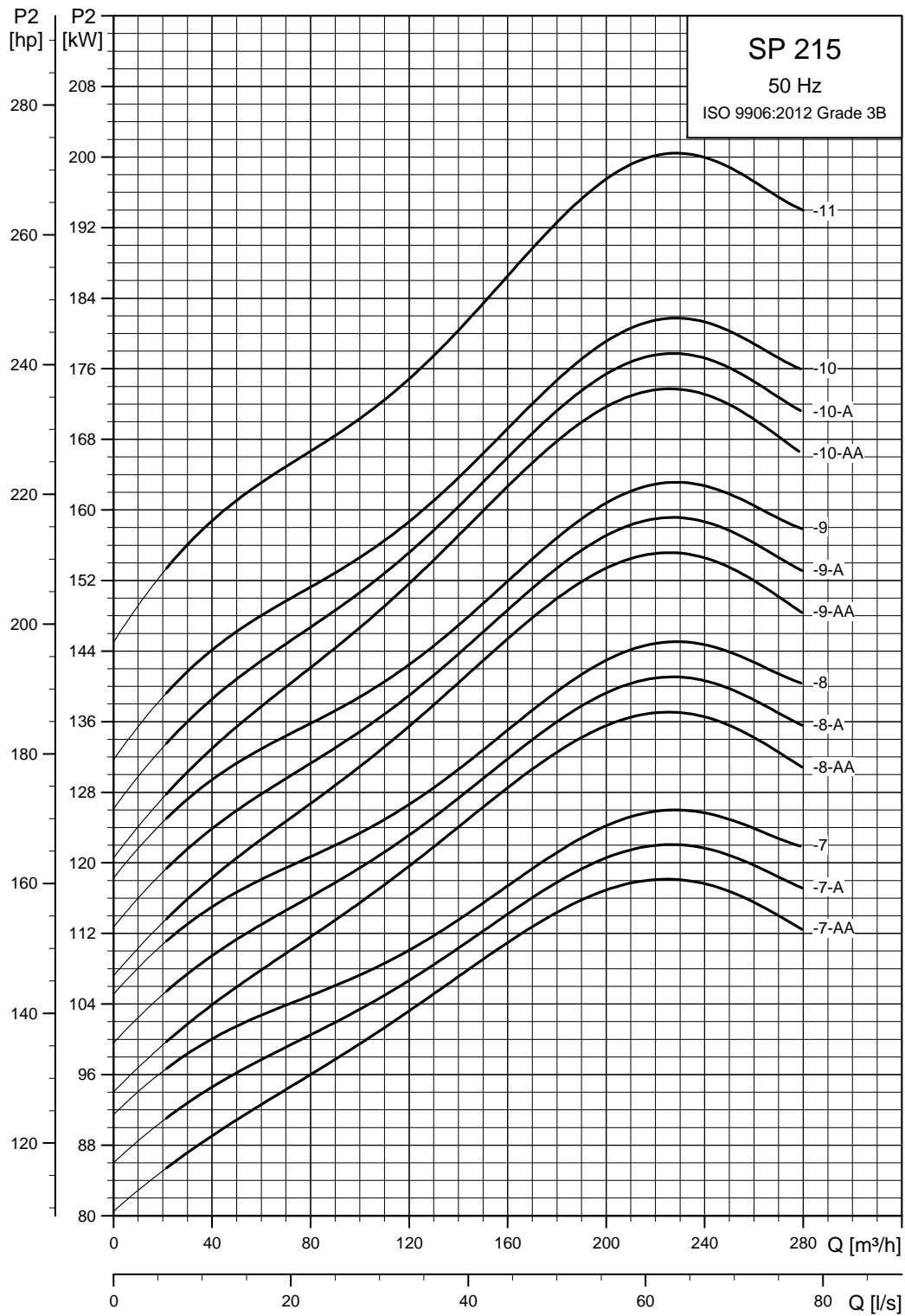


TM01 9017 1100

Power curves



TM01 8787 4702



TM01 8788 4702

7. Electrical data

1 x 230 V, submersible motors "MS"

| Electrical data | | | | | | | | | | Dimensions | | | |
|-----------------|------|---------------|--------------------------------|----------------------|---------------|----------------|--------------------|--------------------|---------------------|----------------------|------------------|-------------------------------|----------------|
| Motor | | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | $\frac{I_{st}}{I_n}$ | Diameter [mm] | Build in length [mm] | Weight [kg] |
| Type | Size | Power [kW] | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | $\cos \phi_{50\%}$ | $\cos \phi_{75\%}$ | $\cos \phi_{100\%}$ | | | | |
| MS 402 | 4" | 0.37 | 3.95 | 48.0 | 54.0 | 57.0 | 0.58 | 0.68 | 0.77 | 3.4* | 95 | 259 | 6.8 |
| MS 402 | 4" | 0.55 | 5.80 | 49.5 | 56.5 | 59.5 | 0.52 | 0.65 | 0.74 | 3.5* | 95 | 279 | 8.2 |
| MS 402 | 4" | 0.75 | 7.45 | 52.0 | 58.0 | 60.0 | 0.57 | 0.69 | 0.79 | 3.6* | 95 | 309 | 8.9 |
| MS 402 | 4" | 1.1 | 7.30 | 62.0 | 69.5 | 72.5 | 0.99 | 0.99 | 0.99 | 4.3* | 95 | 349 | 10.5 |
| MS 402 | 4" | 1.5 | 10.2 | 56.5 | 66.5 | 71.0 | 0.91 | 0.96 | 0.98 | 3.9 | 95 | 349 | 11.0 |
| MS 4000 (R) | 4" | 2.2 | 14.0 | 67.0 | 73.0 | 75.0 | 0.91 | 0.94 | 0.96 | 4.4 | 95 | 576 | 21.0 |

* Applies to 3-wire motors.

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

3 x 230 V, submersible motors "MS"

| Electrical data | | | | | | | | | | Dimensions | | | |
|-----------------|------|---------------|--------------------------------|----------------------|---------------|----------------|--------------------|--------------------|---------------------|----------------------|------------------|-------------------------------|----------------|
| Motor | | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | $\frac{I_{st}}{I_n}$ | Diameter [mm] | Build in length [mm] | Weight [kg] |
| Type | Size | Power [kW] | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | $\cos \phi_{50\%}$ | $\cos \phi_{75\%}$ | $\cos \phi_{100\%}$ | | | | |
| MS 402 | 4" | 0.37 | 2.55 | 51.0 | 59.5 | 64.0 | 0.44 | 0.55 | 0.64 | 3.7 | 95 | 229 | 5.5 |
| MS 402 | 4" | 0.55 | 4.00 | 48.5 | 57.0 | 64.0 | 0.42 | 0.52 | 0.64 | 3.5 | 95 | 244 | 6.3 |
| MS 402 | 4" | 0.75 | 4.20 | 64.0 | 69.5 | 73.0 | 0.50 | 0.62 | 0.72 | 4.6 | 95 | 279 | 7.7 |
| MS 4000R | 4" | 0.75 | 3.35 | 66.8 | 71.1 | 72.9 | 0.66 | 0.76 | 0.82 | 5.1 | 95 | 401 | 13.0 |
| MS 402 | 4" | 1.1 | 6.20 | 62.5 | 69.0 | 73.0 | 0.47 | 0.59 | 0.72 | 4.6 | 95 | 309 | 8.9 |
| MS 4000R | 4" | 1.1 | 5.00 | 69.1 | 73.2 | 75.0 | 0.57 | 0.70 | 0.78 | 5.2 | 95 | 416 | 14.0 |
| MS 402 | 4" | 1.5 | 7.65 | 68.0 | 73.0 | 75.0 | 0.50 | 0.64 | 0.75 | 5.0 | 95 | 349 | 10.5 |
| MS 4000R | 4" | 1.5 | 7.40 | 66.6 | 71.4 | 72.9 | 0.53 | 0.66 | 0.74 | 4.5 | 95 | 416 | 14.0 |
| MS 402 | 4" | 2.2 | 10.0 | 72.5 | 75.5 | 76.0 | 0.56 | 0.71 | 0.82 | 4.7 | 95 | 349 | 11.9 |
| MS 4000 (R) | 4" | 2.2 | 11.6 | 64.5 | 70.8 | 73.3 | 0.44 | 0.58 | 0.69 | 4.2 | 95 | 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 | 95 | 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 | 95 | 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 | 95 | 676 | 26.0 |
| MS 6000 (R) | 6" | 5.5 | 24.8 | 77.0 | 79.0 | 80.0 | 0.51 | 0.64 | 0.73 | 4.5 | 139.5 | 547 | 35.5 |
| MS 6000 (R) | 6" | 7.5 | 32.0 | 79.0 | 82.0 | 82.0 | 0.55 | 0.68 | 0.77 | 4.6 | 139.5 | 577 | 37.0 |
| MS 6000 (R) | 6" | 9.2 | 39.5 | 77.0 | 80.0 | 80.0 | 0.56 | 0.70 | 0.78 | 4.8 | 139.5 | 607 | 42.5 |
| MS 6000 (R) | 6" | 11 | 45.0 | 81.0 | 82.5 | 82.5 | 0.60 | 0.72 | 0.79 | 4.8 | 139.5 | 637 | 45.5 |
| MS 6000 (R) | 6" | 13 | 54.5 | 81.0 | 82.5 | 82.5 | 0.58 | 0.71 | 0.78 | 4.8 | 139.5 | 667 | 48.5 |
| MS 6000 (R) | 6" | 15 | 62.0 | 82.0 | 83.5 | 83.5 | 0.59 | 0.71 | 0.78 | 5.2 | 139.5 | 702 | 52.5 |
| MS 6000 (R) | 6" | 18.5 | 76.5 | 82.5 | 84.5 | 84.0 | 0.56 | 0.69 | 0.77 | 5.3 | 139.5 | 757 | 58.0 |
| MS 6000 (R) | 6" | 22 | 87.5 | 84.5 | 85.0 | 84.0 | 0.61 | 0.74 | 0.81 | 5.2 | 139.5 | 817 | 64.0 |
| MS 6000 (R) | 6" | 26 | 104 | 83.5 | 84.0 | 83.5 | 0.61 | 0.73 | 0.81 | 5.0 | 139.5 | 877 | 69.5 |
| MS 6000 (R) | 6" | 30 | 120 | 83.0 | 84.0 | 83.0 | 0.59 | 0.72 | 0.80 | 5.0 | 139.5 | 947 | 77.5 |

MS 402: Data applies to 3 x 220 V.

3 x 230 V, submersible rewindable motors "MMS"

| Motor | | Electrical data | | | | | | | | Dimensions | | | |
|------------------|------|-----------------|--------------------------------------|----------------------|-------|--------|--------------|------------|-------------|----------------------------------|---------------|----------------------|-------------|
| Type | Size | Power [kW] | Full-load current I _n [A] | Motor efficiency [%] | | | Power factor | | | I _{st} / I _n | Diameter [mm] | Build in length [mm] | Weight [kg] |
| | | | | η50 % | η75 % | η100 % | Cos φ 50 % | Cos φ 75 % | Cos φ 100 % | | | | |
| MMS 6 (N, R) | 6" | 5.5 | 25.0 | 71 | 75 | 76 | 0.61 | 0.72 | 0.78 | 3.5 | 144 | 807 | 50 |
| MMS 6 (N, R) | 6" | 7.5 | 33.5 | 72 | 76 | 77 | 0.59 | 0.71 | 0.78 | 3.5 | 144 | 837 | 53 |
| MMS 6 (N, R) | 6" | 9.2 | 40.5 | 74 | 77 | 78 | 0.59 | 0.71 | 0.78 | 3.6 | 144 | 867 | 55 |
| MMS 6 (N, R) | 6" | 11 | 50.0 | 74 | 78 | 79 | 0.53 | 0.66 | 0.74 | 3.8 | 144 | 897 | 60 |
| MMS 6 (N, R) | 6" | 13 | 56.0 | 77 | 80 | 80 | 0.57 | 0.69 | 0.77 | 3.9 | 144 | 927 | 65 |
| MMS 6 (N, R) | 6" | 15 | 62.5 | 79 | 82 | 82 | 0.58 | 0.71 | 0.79 | 4.3 | 144 | 997 | 77 |
| MMS 6 (N, R) | 6" | 18.5 | 75.0 | 80 | 82 | 82 | 0.61 | 0.75 | 0.81 | 4.2 | 144 | 1057 | 83 |
| MMS 6 (N, R) | 6" | 22 | 87.0 | 82 | 84 | 83 | 0.61 | 0.74 | 0.81 | 5.3 | 144 | 1087 | 95 |
| MMS 6 (N, R) | 6" | 26 | 106 | 81 | 83 | 83 | 0.57 | 0.7 | 0.78 | 5.6 | 144 | 1157 | 105 |
| MMS 6 (N, R) | 6" | 30 | 118 | 82 | 83 | 82 | 0.63 | 0.76 | 0.82 | 4.8 | 144 | 1212 | 110 |
| MMS 6 (N, R) | 6" | 37 | 148 | 82 | 84 | 83 | 0.59 | 0.72 | 0.81 | 5.4 | 144 | 1312 | 120 |
| MMS 8000 (N, R) | 8" | 22 | 82.5 | 80 | 84 | 84 | 0.71 | 0.80 | 0.84 | 5.3 | 192 | 1010 | 126 |
| MMS 8000 (N, R) | 8" | 26 | 95.5 | 81 | 84 | 84 | 0.76 | 0.83 | 0.86 | 5.1 | 192 | 1050 | 134 |
| MMS 8000 (N, R) | 8" | 30 | 110 | 83 | 85 | 86 | 0.71 | 0.80 | 0.84 | 5.7 | 192 | 1110 | 146 |
| MMS 8000 (N, R) | 8" | 37 | 134 | 83 | 86 | 86 | 0.73 | 0.82 | 0.85 | 5.7 | 192 | 1160 | 156 |
| MMS 8000 (N, R) | 8" | 45 | 168 | 84 | 87 | 88 | 0.62 | 0.74 | 0.81 | 6.0 | 192 | 1270 | 177 |
| MMS 8000 (N, R) | 8" | 55 | 214 | 84 | 87 | 88 | 0.57 | 0.70 | 0.77 | 5.9 | 192 | 1350 | 192 |
| MMS 8000 (N, R) | 8" | 63 | 210 | 87 | 89 | 89 | 0.81 | 0.87 | 0.90 | 5.7 | 192 | 1490 | 218 |
| MMS 10000 (N, R) | 10" | 75 | 270 | 84 | 86 | 86 | 0.72 | 0.81 | 0.85 | 5.4 | 237 | 1500 | 330 |
| MMS 10000 (N, R) | 10" | 92 | 345 | 83 | 85 | 86 | 0.65 | 0.77 | 0.82 | 5.6 | 237 | 1690 | 385 |
| MMS 10000 (N, R) | 10" | 110 | 385 | 85 | 86 | 86 | 0.80 | 0.86 | 0.88 | 5.7 | 237 | 1870 | 435 |

3 x 400 V, submersible motors "MS"

| Motor | | Electrical data | | | | | | | | Dimensions | | | |
|-------------|------|-----------------|--------------------------------------|----------------------|-------|--------|--------------|------------|-------------|----------------------------------|---------------|----------------------|-------------|
| Type | Size | Power [kW] | Full-load current I _n [A] | Motor efficiency [%] | | | Power factor | | | I _{st} / I _n | Diameter [mm] | Build in length [mm] | Weight [kg] |
| | | | | η50 % | η75 % | η100 % | 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 | 95 | 229 | 5.5 |
| MS 402 | 4" | 0.55 | 2.20 | 48.5 | 57.0 | 64.0 | 0.42 | 0.52 | 0.64 | 3.5 | 95 | 244 | 6.3 |
| MS 402 | 4" | 0.75 | 2.30 | 64.0 | 69.5 | 73.0 | 0.50 | 0.62 | 0.72 | 4.7 | 95 | 279 | 7.7 |
| MS 4000R | 4" | 0.75 | 1.84 | 68.1 | 71.6 | 72.8 | 0.69 | 0.79 | 0.84 | 4.9 | 95 | 401 | 13.0 |
| MS 402 | 4" | 1.1 | 3.40 | 62.5 | 69.0 | 73.0 | 0.47 | 0.59 | 0.72 | 4.6 | 95 | 309 | 8.9 |
| MS 4000R | 4" | 1.1 | 2.75 | 70.3 | 74.0 | 74.4 | 0.62 | 0.74 | 0.82 | 5.1 | 95 | 416 | 14.0 |
| MS 402 | 4" | 1.5 | 4.20 | 68.0 | 73.0 | 75.0 | 0.50 | 0.64 | 0.75 | 5.0 | 95 | 349 | 10.5 |
| MS 4000R | 4" | 1.5 | 4.00 | 69.1 | 72.7 | 73.7 | 0.55 | 0.69 | 0.78 | 4.3 | 95 | 416 | 14.0 |
| MS 402 | 4" | 2.2 | 5.50 | 72.5 | 75.5 | 76.0 | 0.56 | 0.71 | 0.82 | 4.7 | 95 | 349 | 11.9 |
| MS 4000 (R) | 4" | 2.2 | 6.05 | 67.9 | 73.1 | 74.5 | 0.49 | 0.63 | 0.74 | 4.5 | 95 | 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 | 95 | 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 | 95 | 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 | 95 | 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 | 95 | 777 | 31.0 |
| MS 6000 (R) | 6" | 5.5 | 13.6 | 78.0 | 80.0 | 80.5 | 0.55 | 0.67 | 0.77 | 4.4 | 139.5 | 547 | 35.5 |
| MS 6000 (R) | 6" | 7.5 | 17.6 | 81.5 | 82.0 | 82.0 | 0.60 | 0.73 | 0.80 | 4.3 | 139.5 | 577 | 37.0 |
| MS 6000 (R) | 6" | 9.2 | 21.8 | 78.0 | 80.0 | 79.5 | 0.61 | 0.73 | 0.81 | 4.6 | 139.5 | 607 | 42.5 |
| MS 6000 (R) | 6" | 11 | 24.8 | 82.0 | 83.0 | 82.5 | 0.65 | 0.77 | 0.83 | 4.7 | 139.5 | 637 | 45.5 |
| MS 6000 (R) | 6" | 13 | 30.0 | 82.5 | 83.5 | 82.0 | 0.62 | 0.74 | 0.81 | 4.6 | 139.5 | 667 | 48.5 |
| MS 6000 (R) | 6" | 15 | 34.0 | 82.0 | 83.5 | 83.5 | 0.64 | 0.76 | 0.82 | 5.0 | 139.5 | 702 | 52.5 |
| MS 6000 (R) | 6" | 18.5 | 42.0 | 83.5 | 84.5 | 83.5 | 0.62 | 0.73 | 0.81 | 5.1 | 139.5 | 757 | 58.0 |
| MS 6000 (R) | 6" | 22 | 48.0 | 84.5 | 85.0 | 83.5 | 0.67 | 0.77 | 0.84 | 5.0 | 139.5 | 817 | 64.0 |
| MS 6000 (R) | 6" | 26 | 57.0 | 84.5 | 85.0 | 84.0 | 0.66 | 0.77 | 0.84 | 4.9 | 139.5 | 877 | 69.5 |
| MS 6000 (R) | 6" | 30 | 66.5 | 84.5 | 85.0 | 84.0 | 0.64 | 0.77 | 0.83 | 4.9 | 139.5 | 947 | 77.5 |

3 x 400 V, submersible motors "MS T60" (60 °C)

| Electrical data | | | | | | | | | | Dimensions | | | |
|-----------------|------|------------|--------------------------------|----------------------|---------------|----------------|-----------------|-----------------|------------------|----------------------|---------------|----------------------|-------------|
| Motor | | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | $\frac{I_{st}}{I_n}$ | Diameter [mm] | Build in length [mm] | Weight [kg] |
| Type | Size | Power [kW] | | η_{50} % | η_{75} % | η_{100} % | Cos ϕ 50 % | Cos ϕ 75 % | Cos ϕ 100 % | | | | |
| MS 4000 T60 (R) | 4" | 2.2 | 5.9 | 72.5 | 76.5 | 77.0 | 0.59 | 0.71 | 0.80 | 5.0 | 95 | 496 | 17.0 |
| MS 4000 T60 (R) | 4" | 3.0 | 7.5 | 75.0 | 79.0 | 80.0 | 0.58 | 0.71 | 0.79 | 5.4 | 95 | 576 | 21.0 |
| MS 4000 T60 (R) | 4" | 4.0 | 9.75 | 75.5 | 79.5 | 79.5 | 0.67 | 0.78 | 0.84 | 5.3 | 95 | 676 | 26.0 |
| MS 4000 T60 (R) | 4" | 5.5 | 14.4 | 77.5 | 79.6 | 79.8 | 0.55 | 0.69 | 0.79 | 5.0 | 95 | 776 | 42.5 |
| MS 6000 T60 (R) | 6" | 5.5 | 13.2 | 75.0 | 79.0 | 80.0 | 0.63 | 0.74 | 0.80 | 6.0 | 139.5 | 607 | 42.5 |
| MS 6000 T60 (R) | 6" | 7.5 | 17.0 | 79.5 | 81.0 | 81.5 | 0.71 | 0.80 | 0.84 | 4.9 | 139.5 | 637 | 45.5 |
| MS 6000 T60 (R) | 6" | 9.2 | 20.2 | 80.0 | 82.5 | 82.5 | 0.72 | 0.80 | 0.85 | 5.5 | 139.5 | 667 | 48.5 |
| MS 6000 T60 (R) | 6" | 11 | 24.2 | 82.0 | 83.0 | 83.0 | 0.74 | 0.83 | 0.86 | 5.0 | 139.5 | 702 | 52.5 |
| MS 6000 T60 (R) | 6" | 13 | 28.5 | 82.0 | 83.5 | 84.0 | 0.71 | 0.80 | 0.84 | 5.4 | 139.5 | 757 | 58.0 |
| MS 6000 T60 (R) | 6" | 15 | 33.0 | 82.0 | 83.5 | 84.0 | 0.68 | 0.79 | 0.84 | 5.9 | 139.5 | 817 | 64.0 |
| MS 6000 T60 (R) | 6" | 18.5 | 39.5 | 84.0 | 85.5 | 85.0 | 0.71 | 0.80 | 0.85 | 5.8 | 139.5 | 877 | 69.5 |
| MS 6000 T60 (R) | 6" | 22 | 48.0 | 83.5 | 84.5 | 84.5 | 0.71 | 0.80 | 0.85 | 5.6 | 139.5 | 947 | 77.5 |

3 x 400 V, submersible rewindable motors "MMS"

| Electrical data | | | | | | | | | | Dimensions | | | |
|------------------|------|------------|--------------------------------|----------------------|---------------|----------------|-----------------|-----------------|------------------|----------------------|---------------|----------------------|-------------|
| Motor | | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | $\frac{I_{st}}{I_n}$ | Diameter [mm] | Build in length [mm] | Weight [kg] |
| Type | Size | Power [kW] | | η_{50} % | η_{75} % | η_{100} % | Cos ϕ 50 % | Cos ϕ 75 % | Cos ϕ 100 % | | | | |
| MMS 6 (N, R) | 6" | 5.5 | 14.4 | 71 | 75 | 76 | 0.60 | 0.71 | 0.77 | 3.5 | 144 | 807 | 50 |
| MMS 6 (N, R) | 6" | 7.5 | 19.2 | 72 | 76 | 77 | 0.59 | 0.71 | 0.78 | 3.6 | 144 | 837 | 53 |
| MMS 6 (N, R) | 6" | 9.2 | 22.8 | 75 | 78 | 78 | 0.61 | 0.73 | 0.79 | 3.5 | 144 | 867 | 55 |
| MMS 6 (N, R) | 6" | 11 | 27.5 | 74 | 78 | 78 | 0.58 | 0.71 | 0.79 | 3.7 | 144 | 897 | 60 |
| MMS 6 (N, R) | 6" | 13 | 32.0 | 77 | 79 | 79 | 0.63 | 0.75 | 0.79 | 3.8 | 144 | 927 | 65 |
| MMS 6 (N, R) | 6" | 15 | 36.5 | 76 | 79 | 79 | 0.59 | 0.72 | 0.80 | 4.2 | 144 | 997 | 77 |
| MMS 6 (N, R) | 6" | 18.5 | 43.5 | 79 | 81 | 81 | 0.60 | 0.72 | 0.80 | 4.5 | 144 | 1057 | 83 |
| MMS 6 (N, R) | 6" | 22 | 51.5 | 81 | 83 | 83 | 0.57 | 0.70 | 0.79 | 5.5 | 144 | 1087 | 95 |
| MMS 6 (N, R) | 6" | 26 | 61.0 | 81 | 83 | 83 | 0.57 | 0.70 | 0.78 | 5.7 | 144 | 1157 | 105 |
| MMS 6 (N, R) | 6" | 30 | 68.2 | 83 | 84 | 84 | 0.61 | 0.73 | 0.81 | 5.0 | 144 | 1212 | 110 |
| MMS 6 (N, R) | 6" | 37 | 84.5 | 82 | 84 | 83 | 0.60 | 0.73 | 0.81 | 5.1 | 144 | 1312 | 120 |
| MMS 8000 (N, R) | 8" | 22 | 48.0 | 80 | 82 | 82 | 0.72 | 0.81 | 0.84 | 5.3 | 192 | 1010 | 126 |
| MMS 8000 (N, R) | 8" | 26 | 56.5 | 80 | 82 | 82 | 0.76 | 0.83 | 0.85 | 5.1 | 192 | 1050 | 134 |
| MMS 8000 (N, R) | 8" | 30 | 64.0 | 82 | 84 | 84 | 0.74 | 0.82 | 0.85 | 5.7 | 192 | 1110 | 146 |
| MMS 8000 (N, R) | 8" | 37 | 78.5 | 82 | 84 | 84 | 0.74 | 0.82 | 0.85 | 5.7 | 192 | 1160 | 156 |
| MMS 8000 (N, R) | 8" | 45 | 96.5 | 84 | 86 | 86 | 0.65 | 0.76 | 0.82 | 6.0 | 192 | 1270 | 177 |
| MMS 8000 (N, R) | 8" | 55 | 114 | 84 | 86 | 86 | 0.72 | 0.81 | 0.85 | 5.9 | 192 | 1350 | 192 |
| MMS 8000 (N, R) | 8" | 63 | 132 | 85 | 87 | 87 | 0.66 | 0.78 | 0.83 | 5.7 | 192 | 1490 | 218 |
| MMS 8000 (N, R) | 8" | 75 | 152 | 86 | 87 | 87 | 0.71 | 0.82 | 0.86 | 5.8 | 192 | 1590 | 237 |
| MMS 8000 (N, R) | 8" | 92 | 186 | 87 | 88 | 87 | 0.72 | 0.82 | 0.86 | 5.9 | 192 | 1830 | 283 |
| MMS 8000 (N, R) | 8" | 110 | 224 | 86 | 87 | 87 | 0.73 | 0.83 | 0.87 | 5.8 | 192 | 2060 | 333 |
| MMS 10000 (N, R) | 10" | 75 | 156 | 84 | 86 | 87 | 0.70 | 0.80 | 0.84 | 5.4 | 237 | 1400 | 280 |
| MMS 10000 (N, R) | 10" | 92 | 194 | 84 | 87 | 87 | 0.67 | 0.78 | 0.82 | 5.6 | 237 | 1500 | 330 |
| MMS 10000 (N, R) | 10" | 110 | 228 | 85 | 87 | 88 | 0.70 | 0.79 | 0.84 | 5.7 | 237 | 1690 | 385 |
| MMS 10000 (N, R) | 10" | 132 | 270 | 85 | 88 | 88 | 0.71 | 0.81 | 0.84 | 5.7 | 237 | 1870 | 435 |
| MMS 10000 (N, R) | 10" | 147 | 315 | 84 | 87 | 87 | 0.64 | 0.75 | 0.81 | 6.2 | 237 | 2070 | 500 |
| MMS 10000 (N, R) | 10" | 170 | 365 | 84 | 86 | 87 | 0.64 | 0.75 | 0.81 | 6.0 | 237 | 2220 | 540 |
| MMS 10000 (N, R) | 10" | 190 | 425 | 83 | 86 | 87 | 0.60 | 0.72 | 0.79 | 5.9 | 237 | 2400 | 580 |
| MMS 12000 (N, R) | 12" | 147 | 305 | 84 | 87 | 88 | 0.66 | 0.77 | 0.83 | 6.2 | 286 | 1790 | 565 |
| MMS 12000 (N, R) | 12" | 170 | 345 | 85 | 87 | 88 | 0.69 | 0.79 | 0.85 | 6.1 | 286 | 1880 | 605 |
| MMS 12000 (N, R) | 12" | 190 | 390 | 85 | 87 | 88 | 0.68 | 0.79 | 0.84 | 6.2 | 286 | 1980 | 650 |
| MMS 12000 (N, R) | 12" | 220 | 445 | 85 | 87 | 88 | 0.69 | 0.80 | 0.85 | 6.1 | 286 | 2140 | 700 |
| MMS 12000 (N, R) | 12" | 250 | 505 | 85 | 87 | 88 | 0.69 | 0.80 | 0.85 | 5.9 | 286 | 2290 | 775 |

3 x 500 V, submersible motors "MS"

| Electrical data | | | | | | | | | | Dimensions | | | |
|-----------------|------|------------|--------------------------------|----------------------|---------------|----------------|--------------------|--------------------|---------------------|----------------------|---------------|----------------------|-------------|
| Motor | | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | $\frac{I_{st}}{I_n}$ | Diameter [mm] | Build in length [mm] | Weight [kg] |
| Type | Size | Power [kW] | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | $\cos \phi_{50\%}$ | $\cos \phi_{75\%}$ | $\cos \phi_{100\%}$ | | | | |
| MS 4000R | 4" | 0.75 | 1.5 | 69.1 | 72.7 | 73.7 | 0.55 | 0.69 | 0.78 | 4.7 | 95 | 401 | 13.0 |
| MS 4000R | 4" | 1.1 | 2.2 | 70.3 | 74.0 | 74.4 | 0.62 | 0.74 | 0.82 | 5.0 | 95 | 416 | 14.0 |
| MS 4000R | 4" | 1.5 | 3.2 | 69.1 | 72.7 | 73.7 | 0.55 | 0.69 | 0.78 | 4.4 | 95 | 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 | 95 | 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 | 95 | 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 | 95 | 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 | 95 | 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 | 95 | 776 | 31.0 |
| MS 6000 (R) | 6" | 5.5 | 10.8 | 78.0 | 80.0 | 80.5 | 0.56 | 0.67 | 0.77 | 4.4 | 139.5 | 547 | 35.5 |
| MS 6000 (R) | 6" | 7.5 | 14.0 | 81.0 | 82.5 | 82.5 | 0.60 | 0.72 | 0.8 | 4.5 | 139.5 | 577 | 37.0 |
| MS 6000 (R) | 6" | 9.2 | 17.4 | 78.0 | 80.0 | 80.0 | 0.62 | 0.73 | 0.81 | 4.6 | 139.5 | 607 | 42.5 |
| MS 6000 (R) | 6" | 11 | 19.8 | 82.0 | 83.5 | 82.0 | 0.65 | 0.77 | 0.83 | 4.7 | 139.5 | 637 | 45.5 |
| MS 6000 (R) | 6" | 13 | 24.0 | 82.5 | 83.5 | 82.5 | 0.62 | 0.74 | 0.81 | 4.6 | 139.5 | 667 | 68.5 |
| MS 6000 (R) | 6" | 15 | 27.0 | 82.0 | 83.0 | 83.0 | 0.65 | 0.76 | 0.82 | 5.0 | 139.5 | 702 | 52.5 |
| MS 6000 (R) | 6" | 18.5 | 33.5 | 83.5 | 84.5 | 84.0 | 0.61 | 0.73 | 0.81 | 5.1 | 139.5 | 757 | 58.0 |
| MS 6000 (R) | 6" | 22 | 38.5 | 84.5 | 85.0 | 84.0 | 0.67 | 0.77 | 0.84 | 5.0 | 139.5 | 817 | 64.0 |
| MS 6000 (R) | 6" | 26 | 45.5 | 84.5 | 85.0 | 84.0 | 0.66 | 0.77 | 0.84 | 4.9 | 139.5 | 877 | 69.5 |
| MS 6000 (R) | 6" | 30 | 53.0 | 85.0 | 84.5 | 83.5 | 0.64 | 0.76 | 0.83 | 4.9 | 139.5 | 948 | 77.5 |

3 x 500 V, submersible motors "MS T60"

| Electrical data | | | | | | | | | | Dimensions | | | |
|-----------------|------|------------|--------------------------------|----------------------|---------------|----------------|--------------------|--------------------|---------------------|----------------------|---------------|----------------------|-------------|
| Motor | | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | $\frac{I_{st}}{I_n}$ | Diameter [mm] | Build in length [mm] | Weight [kg] |
| Type | Size | Power [kW] | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | $\cos \phi_{50\%}$ | $\cos \phi_{75\%}$ | $\cos \phi_{100\%}$ | | | | |
| MS 4000 T60 (R) | 4" | 2.2 | 4.7 | 72.5 | 76.5 | 77.0 | 0.59 | 0.71 | 0.80 | 4.9 | 95 | 496 | 17.0 |
| MS 4000 T60 (R) | 4" | 3.0 | 6.2 | 75.0 | 79.0 | 80.0 | 0.58 | 0.71 | 0.79 | 5.4 | 95 | 576 | 21.0 |
| MS 4000 T60 (R) | 4" | 4.0 | 7.8 | 75.5 | 79.5 | 79.5 | 0.67 | 0.78 | 0.84 | 5.2 | 95 | 676 | 26.0 |
| MS 4000 T60 (R) | 4" | 5.5 | 11.6 | 77.0 | 79.5 | 80.0 | 0.55 | 0.68 | 0.78 | 5.0 | 95 | 776 | 31.0 |
| MS 6000 T60 (R) | 6" | 5.5 | 10.6 | 75.0 | 78.5 | 80.0 | 0.63 | 0.74 | 0.80 | 6.0 | 139.5 | 607 | 42.5 |
| MS 6000 T60 (R) | 6" | 7.5 | 13.6 | 79.5 | 81.0 | 81.5 | 0.71 | 0.80 | 0.84 | 4.9 | 139.5 | 637 | 45.5 |
| MS 6000 T60 (R) | 6" | 9.2 | 16.2 | 80.0 | 83.0 | 83.0 | 0.72 | 0.81 | 0.84 | 5.5 | 139.5 | 667 | 48.5 |
| MS 6000 T60 (R) | 6" | 11 | 19.4 | 82.0 | 83.5 | 83.5 | 0.74 | 0.82 | 0.86 | 5.0 | 139.5 | 702 | 52.5 |
| MS 6000 T60 (R) | 6" | 13 | 22.8 | 82.5 | 83.5 | 84.0 | 0.71 | 0.80 | 0.84 | 5.4 | 139.5 | 757 | 58.0 |
| MS 6000 T60 (R) | 6" | 15 | 26.4 | 82.0 | 84.0 | 84.5 | 0.71 | 0.79 | 0.84 | 5.9 | 139.5 | 817 | 64.0 |
| MS 6000 T60 (R) | 6" | 18.5 | 31.5 | 84.5 | 85.5 | 85.0 | 0.71 | 0.81 | 0.85 | 5.8 | 139.5 | 877 | 69.5 |
| MS 6000 T60 (R) | 6" | 22 | 38.5 | 84.0 | 84.5 | 84.5 | 0.71 | 0.80 | 0.85 | 5.6 | 139.5 | 947 | 77.5 |

3 x 500 V, submersible rewindable motors "MMS"

| Electrical data | | | | | | | | | | | Dimensions | | |
|------------------|------|------------|--------------------------------|----------------------|---------------|----------------|--------------------|--------------------|---------------------|----------------------|---------------|----------------------|-------------|
| Motor | | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | $\frac{I_{st}}{I_n}$ | Diameter [mm] | Build in length [mm] | Weight [kg] |
| Type | Size | Power [kW] | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | $\cos \phi_{50\%}$ | $\cos \phi_{75\%}$ | $\cos \phi_{100\%}$ | | | | |
| MMS 6 (N, R) | 6" | 9.2 | 18.6 | 72 | 75 | 75 | 0.61 | 0.74 | 0.81 | 3.5 | 144 | 867 | 55 |
| MMS 6 (N, R) | 6" | 11 | 21.8 | 74 | 77 | 76 | 0.64 | 0.75 | 0.81 | 3.5 | 144 | 897 | 60 |
| MMS 6 (N, R) | 6" | 13 | 25.0 | 76 | 78 | 78 | 0.62 | 0.75 | 0.81 | 3.7 | 144 | 927 | 65 |
| MMS 6 (N, R) | 6" | 15 | 28.0 | 77 | 80 | 79 | 0.65 | 0.77 | 0.82 | 3.9 | 144 | 997 | 77 |
| MMS 6 (N, R) | 6" | 18.5 | 34.5 | 78 | 80 | 79 | 0.65 | 0.77 | 0.83 | 4.0 | 144 | 1057 | 83 |
| MMS 6 (N, R) | 6" | 22 | 39.5 | 82 | 82 | 80 | 0.69 | 0.80 | 0.84 | 4.8 | 144 | 1087 | 95 |
| MMS 6 (N, R) | 6" | 26 | 47.0 | 81 | 82 | 80 | 0.67 | 0.79 | 0.84 | 5.0 | 144 | 1157 | 105 |
| MMS 6 (N, R) | 6" | 30 | 54.5 | 80 | 81 | 79 | 0.67 | 0.79 | 0.84 | 4.5 | 144 | 1212 | 110 |
| MMS 6 (N, R) | 6" | 37 | 66.5 | 81 | 82 | 80 | 0.66 | 0.78 | 0.85 | 5.1 | 144 | 1312 | 120 |
| MMS 8000 (N, R) | 8" | 22 | 37.5 | 81 | 83 | 83 | 0.79 | 0.85 | 0.87 | 4.7 | 144 | 1010 | 126 |
| MMS 8000 (N, R) | 8" | 26 | 44.0 | 81 | 84 | 83 | 0.80 | 0.85 | 0.86 | 4.8 | 192 | 1050 | 134 |
| MMS 8000 (N, R) | 8" | 30 | 49.5 | 83 | 85 | 85 | 0.78 | 0.85 | 0.86 | 5.6 | 192 | 1110 | 146 |
| MMS 8000 (N, R) | 8" | 37 | 60.5 | 84 | 85 | 85 | 0.82 | 0.87 | 0.87 | 5.6 | 192 | 1160 | 156 |
| MMS 8000 (N, R) | 8" | 45 | 72.0 | 85 | 87 | 87 | 0.73 | 0.82 | 0.86 | 6.2 | 192 | 1270 | 177 |
| MMS 8000 (N, R) | 8" | 55 | 88.5 | 86 | 88 | 88 | 0.71 | 0.81 | 0.86 | 6.1 | 192 | 1350 | 192 |
| MMS 8000 (N, R) | 8" | 63 | 96.5 | 87 | 89 | 88 | 0.82 | 0.88 | 0.90 | 6.1 | 192 | 1490 | 218 |
| MMS 8000 (N, R) | 8" | 75 | 114 | 88 | 89 | 88 | 0.85 | 0.89 | 0.90 | 5.6 | 192 | 1590 | 237 |
| MMS 8000 (N, R) | 8" | 92 | 142 | 88 | 87 | 88 | 0.81 | 0.87 | 0.89 | 5.3 | 192 | 1830 | 283 |
| MMS 8000 (N, R) | 8" | 110 | 182 | 86 | 88 | 88 | 0.67 | 0.78 | 0.84 | 5.3 | 192 | 2060 | 333 |
| MMS 10000 (N, R) | 10" | 75 | 122 | 85 | 87 | 87 | 0.77 | 0.84 | 0.86 | 5.3 | 237 | 1400 | 280 |
| MMS 10000 (N, R) | 10" | 92 | 150 | 85 | 87 | 87 | 0.74 | 0.82 | 0.85 | 5.3 | 237 | 1500 | 330 |
| MMS 10000 (N, R) | 10" | 110 | 178 | 85 | 87 | 88 | 0.76 | 0.84 | 0.86 | 5.4 | 237 | 1690 | 385 |
| MMS 10000 (N, R) | 10" | 132 | 210 | 86 | 88 | 87 | 0.82 | 0.87 | 0.88 | 5.0 | 237 | 1870 | 435 |
| MMS 10000 (N, R) | 10" | 147 | 236 | 85 | 88 | 88 | 0.74 | 0.83 | 0.86 | 5.8 | 237 | 2070 | 500 |
| MMS 10000 (N, R) | 10" | 170 | 270 | 86 | 88 | 88 | 0.78 | 0.85 | 0.87 | 5.4 | 237 | 2220 | 540 |
| MMS 10000 (N, R) | 10" | 190 | 305 | 86 | 88 | 87 | 0.80 | 0.86 | 0.87 | 5.3 | 237 | 2400 | 580 |
| MMS 12000 (N, R) | 12" | 147 | 218 | 86 | 89 | 90 | 0.80 | 0.88 | 0.91 | 6.9 | 286 | 1790 | 565 |
| MMS 12000 (N, R) | 12" | 170 | 265 | 87 | 89 | 90 | 0.74 | 0.82 | 0.86 | 6.0 | 286 | 1880 | 605 |
| MMS 12000 (N, R) | 12" | 190 | 220 | 88 | 90 | 91 | 0.85 | 0.91 | 0.93 | 7.8 | 286 | 1980 | 650 |
| MMS 12000 (N, R) | 12" | 220 | 335 | 88 | 90 | 90 | 0.79 | 0.86 | 0.88 | 5.8 | 286 | 2140 | 700 |
| MMS 12000 (N, R) | 12" | 250 | 375 | 87 | 90 | 91 | 0.75 | 0.85 | 0.89 | 6.3 | 286 | 2290 | 775 |

8. Electrical accessories

MP 204 motor protector



TM055456 3712

Fig. 21 MP 204 motor protector

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

You cannot use the motor protector in installations where a frequency converter is installed.

The motor protector operates with two sets of limits:

- a set of warning limits
- a set of trip limits.

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

Some values only have a warning limit.

You can read out the warning with Grundfos GO.

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

Applications

You can use MP 204 as a stand-alone motor protector.

You can monitor the motor protector via a Grundfos GENibus.

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

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

Benefits

The motor protector offers these benefits:

- suitable for both single- and three-phase motors
- dry-running protection
- overload protection
- very high accuracy
- made for submersible pumps.
- monitor motor temperature via motor cable (only motors with tempcon sensor.)

The many monitoring options of the motor protector

The motor protector monitors the following parameters:

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

Note that monitoring of motor temperature is not possible when you use single-turn transformers.



TM03 2033 3505

Fig. 22 Single-turn transformers

Product numbers, MP 204

| Product | Product number |
|--|----------------|
| MP 204 | 96079927 |
| Single-turn transformers | |
| Current transformer ratio: 200:5, $I_{max.} = 120$ A | 96095274 |
| Current transformer ratio: 300:5, $I_{max.} = 300$ A | 96095275 |
| Current transformer ratio: 500:5, $I_{max.} = 500$ A | 96095276 |
| Current transformer ratio: 750:5, $I_{max.} = 750$ A | 96095277 |
| Current transformer ratio: 1000:5, $I_{max.} = 1000$ A | 96095278 |

Technical data, MP 204

| | |
|-----------------------------|--------------------------------|
| Enclosure class | IP20 |
| Ambient temperature | -20 - 60 °C |
| Relative 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 - 30 s |
| Voltage variation | - 25 %/+ 15 % of rated voltage |
| Approvals | EN 60947, EN 60335, UL/CSA 508 |
| Marking | CE, cUL, C-tick |
| Consumption | Maximum 5 W |
| Plastic type | Black PC/ABS |

Electrical data, MP 204

| | 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 |

For further information about MP 204 and pump controls, see the literature available in Grundfos Product Center at <https://product-selection.grundfos.com>.

Grundfos GO

The pump is designed for wireless communication with the Grundfos GO app which communicates with the pump via radio communication.

Note that the radio communication between the pump and Grundfos GO is encrypted to protect against misuse.

The Grundfos GO app is available from Apple App Store and Android market.

The Grundfos GO app must be used in conjunction with one of the following mobile interface devices:

| Mobile interface | Product number |
|------------------|----------------|
| Grundfos MI 202 | 98046376 |
| Grundfos MI 204 | 98424092 |
| Grundfos MI 301 | 98046408 |

The Grundfos GO concept replaces the Grundfos R100 remote control. This means that all products supported by the R100 are supported by Grundfos GO. For functions and connection to the pump, see separate installation and operating instructions for the desired type of Grundfos GO setup.

Mobile interface

The available mobile interface devices are described in the following.

MI 202 and MI 204

MI 202 and MI 204 are add-on modules with built-in infrared and radio communication. MI 202 can be used in conjunction with Apple devices with 30-pin connector (iPhone 4, 4S and iPod touch 4G).

MI 204 can be used in conjunction with Apple devices with lightning connector (iPhone 5, 5C, 5S and iPod touch 5G, and newer IOS devices).



TM05 3887 1612 - TM05 7704 1513

Fig. 23 MI 202 and MI 204

The following are supplied with the product:

- Grundfos MI 202 or 204
- sleeve
- quick guide
- charger cable.

MI 301

MI 301 is a module with built-in infrared and radio communication. MI 301 must be used in conjunction with an Android or iOS-based Smartphone with a Bluetooth connection. MI 301 has a rechargeable Li-ion battery that you must charge separately.



TM05 3887 1612

Fig. 24 MI 301

The following are supplied with the product:

- Grundfos MI 301
- sleeve
- battery charger
- quick guide.

Supported units

| Make | Model | Operating system | MI 202 | MI 204 | MI 301 |
|---------|-------------------------------------|------------------------|--------|--------|--------|
| Apple | iPod touch 4G | iOS 5.0 or later | • | - | • |
| | iPhone 4, 4S | | • | - | • |
| | iPod touch 5G and newer versions | iOS 6.0 or later | - | • | • |
| | iPhone 5, 5C, 5S and newer versions | | - | • | • |
| HTC | Desire S | Android 2.3.3 or later | - | - | • |
| | Sensation | Android 2.3.4 or later | - | - | • |
| Samsung | Galaxy S II | Android 2.3.4 or later | - | - | • |
| | Galaxy Nexus | Android 4.0 or later | - | - | • |
| LG | Google Nexus 4 | Android 4.2 or later | - | - | • |

Note that similar Android and iOS-based devices may work as well, but Grundfos does not support these devices.

CUE frequency converter



GrA404 3407

Fig. 25 The CUE range

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 overload protection. If overheating protection of motor windings is desired, Pt100/1000 together with MCB 114 sensor input module can provide this protection.

If the motors have built in Tempcon sensor, this sensor will be disconnected when exposed to frequency convert drive. A internal fuse in the motor blows and cannot be replaced. The motor will work without the sensor, but it is not possible to restore tempcon functionality.

CUE offers quick and easy setup and commissioning compared to a standard frequency converter because of the startup guide. Simply key in application-specific variables such as motor data, pump family, control function (for example constant pressure), sensor type and setpoint, and CUE automatically sets all necessary parameters.

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 | | | • | • | | | |

CUE is available in two enclosure classes:

- IP20/21
- IP54/55.

RFI filters

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

| Voltage [V] | Typical shaft power, P ₂ [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 | Domestic and industry |
| | 110-250 | C2 | |
| 3 x 525-600 | 0.75 - 7.5 | C3 | Industry |
| 3 x 525-690 | 11-25 | C3 | |

Functions

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

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

CUE features

- Startup guide
CUE incorporates an innovative startup guide for the general setting of CUE including the setting of the correct direction of rotation. The startup guide is started the first time CUE is connected to the power supply.
- Check of direction of rotation.
- Duty and standby operation.
- Dry-running protection.
- Low-flow stop function.

Sensors

The following sensors can be used in connection with 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.

Accessories for CUE

Grundfos offers various accessories for CUE.

MCB 114 sensor input module

MCB 114 offers additional analog inputs for CUE:

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

Output filters

Output filters protect the motor from overvoltage and increased operating temperature. The filters reduce voltage stress on the motor windings and stress on the motor insulation system. The filters also decrease acoustic noise from the frequency converter-driven motor.

Grundfos offers two types of output filters as CUE accessories

- dU/dt filters
- sine-wave filters.

dU/dt filters

dU/dt filters reduce the voltage peaks and dU/dt of the pulses at the motor terminals. The voltage at the motor terminals is pulse-shaped; the motor current has a sine-wave shape without commutation spikes.

Sine-wave filters

Sine-wave filters have a higher degree of filtering, resulting in high reduction of motor insulation stress and elimination of switching acoustic noise from the motor. The motor losses are reduced as the motor is fed with a sine-wave voltage and because the filter eliminates the pulse reflections in the motor cable.

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. For MS and MMS motors, Grundfos recommends sine-wave filters.

The selection depends on these factors:

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

| Pump type | Motor type | dU/dt filter [motor cable length] | Sine-wave filter [motor cable length] |
|---------------------------|------------|---|--|
| SP with up to 380 V motor | MS, MMS | 0-100 m | 0-300 m |
| SP with above 380 V motor | MS, MMS | NA | 0-300 m |

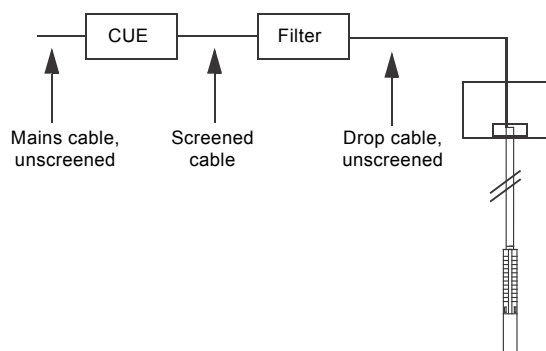
Cables used in CUE installations

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

- installation in EMC-insensitive sites. See fig. 26.
- installation in EMC-sensitive sites. See fig. 27.

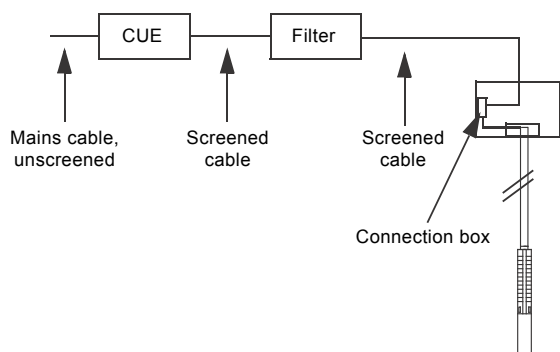
The two types of installation are different when it comes to the use of screened cable.

Note that drop cables are always unshielded.



TM04 4296 1109

Fig. 26 Example of installation in EMC-insensitive sites



TM04 4295 1109

Fig. 27 Example of installation in EMC-sensitive sites

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

CUE is the right choice of frequency converter in SP installations as it meets all basic issues.

CUE has a pre-installed startup 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. Note that Tempcon sensors do not work with frequency converter operation. |
| Reduce peak voltages (maximum 800 V peaks). | Never exceed peak voltages of 850 V at motor leads. |
| For MS and MMS, we recommend using motors with 10 % extra in given duty point. For MMS, always use motors wound PE2-PA. | 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) must be limited to a maximum of 1000 V/μs. It is determined by the equipment in 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 CUE. |
| Constant operation at minimum 30 Hz. | Too low speed => low flow and thereby poor lubrication of journal bearings. |
| Size 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 minimum m/s along the stator housing must be considered. |
| Ensure that the pump is used within the range of the pump curve. | Focus on outlet pressure and sufficient Net Positive Suction Head, as vibrations will 'kill' the motor. |

CIU communication interface units



GrA6118 3908

Fig. 28 Grundfos CIU communication interface unit

The Communication Interface Unit (CIU) enables data communication via open and interoperable networks, such as:

- PROFIBUS DP
- PROFINET
- Modbus RTU
- Modbus TPC
- LONWorks
- BACnet MS/TP
- BACnet/IP
- GSM/GPRS
- Grundfos Remote Management (GRM) for complete control of pump systems.

Applications

The range of Grundfos CIU communication interface units offers ease of installation and commissioning as well as user-friendliness. All units are based on standard functional profiles for an easy integration into the network.

The CIU units enable communication of operating data, such as measured values and setpoints, between pumps and PLCs, SCADA system and building management system.

Benefits

CIU offers these benefits:

- open communication standards
- complete process control
- one concept for Grundfos products
- 24-240 VAC/DC power supply in CIU modules
- simple configuration and easy to install
- prepared for DIN rail or wall mounting.

For data communication between an SP pump and a main network, a CIU unit together with a CUE frequency converter or an MP 204 motor protector is required.



TM05 5456 3712 - GrA4 412 3307

Fig. 29 MP 204 motor protector and CUE frequency converter

Fieldbus support for these products is shown in the following table:

| CIU unit | Fieldbus protocol | CUE | MP 204 |
|--------------|-------------------|-----|--------|
| CIU 100 | LONWorks | • | - |
| CIU 150 | PROFIBUS DP | • | • |
| CIU 200 | Modbus RTU | • | • |
| CIU 250 | GSM/GPRS | • | • |
| CIU 270/271* | GRM | • | • |
| CIU 300 | BACnet MS/TP | • | - |
| CIU 500 | PROFINET | | |
| | Modbus TPC | • | • |
| | BACnet/IP | | |
| | GRM IP** | | |

* Grundfos Remote Management (GRM) is an easy-to-install low-cost solution for wireless monitoring and management of Grundfos products.

** Requires external 3G/4G modem

CIU Product numbers

| CIU unit | Fieldbus protocol | Product number |
|----------|-------------------|----------------|
| CIU 100 | LONWorks | 96753735 |
| CIU 150 | PROFIBUS | 96753081 |
| CIU 200 | Modbus RTU | 96753082 |
| CIU 250* | GSM/GPRS | 96787106 |
| CIU 270* | GRM | 98176136 |
| CIU 271* | GRM | 96898819 |
| CIU 300 | BACnet MS/TP | 96893769 |
| CIU 500 | PROFINET | |
| | Modbus TPC | 96953894 |
| | BACnet/IP | |
| | GRM IP** | |

* Antenna not included. See below.

Antennas for CIU 250 and 270/271

| Description | Product number |
|------------------|----------------|
| Antenna for roof | 97631956 |
| Antenna for desk | 97631957 |

Motor starters for MS402 and MS 4000 CSIR/CSCR motors

Applications

SA-SPM control boxes are used as starting units for 200-240 V motors.



Fig. 30 Motor starter for MS 402 and MS 4000

Product numbers

| | Product number | CS | CR |
|--------------------------------|----------------|------------|------------|
| | | [μ F] | [μ F] |
| Motor starter - CSIR - 0.37 kW | 98582272 | 65 | - |
| Motor starter - CSIR - 0.55 kW | 98582277 | 98 | - |
| Motor starter - CSIR - 0.75 kW | 98582295 | 119 | - |
| Motor starter - CSCR - 1.1 kW | 98582296 | 143 | 40 |
| Motor starter - CSCR - 1.5 kW | 98582381 | 160 | 50 |
| Motor starter - CSCR - 2.2 kW | 98582401 | 268 | 60 |

PSC motor capacitors

The MS 402 and MS 4000 single-phase, 3-wire, PSC motors must be connected to the mains via a motor capacitor that is permanently connected during operation.

Product numbers

| Capacitors for MS 402 PSC and MS 4000 PSC | | |
|---|------------|-----------|
| Capacitor size | Power [kW] | Capacitor |
| 16 μ F, 400 V, 50 Hz | 0.37 | 96279800 |
| 20 μ F, 400 V, 50 Hz | 0.55 | 96279732 |
| 30 μ F, 400 V, 50 Hz | 0.75 | 96279808 |
| 40 μ F, 400 V, 50 Hz | 1.1 | 96279810 |

PR 5714 with Pt100 sensor



Fig. 31 PR 5714 with Pt100 sensor

PR 5714 with 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 life is reduced. The Pt100 sensor 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 following temperature limits are preset on delivery:

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









To set the warning limit, observe the temperature at normal operation and add 10 °C. Additionally add 10 °C for stop limit.

Technical data

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

GrA3187

TM06 4358 2015

| PR 5714 relay | Voltage | Product number |
|---|--|----------------|
|  | 24-230 VAC, 50/60 Hz / 24-250 VDC | 96913234 |
| GrA3186 0407 | | |
| Pt100 sensor, including cable for standard-, N- and R-versions | Cable length [m] | Product number |
|  | 20 | 96913237 |
| | 40 | 96913253 |
| | 60 | 96913256 |
| | 80 | 96913260 |
| | 100 | 96913263 |
| GrA3190 0407 | | |
| Staybolt kits for Pt100 in MS 6000 | Description | Product number |
|  | Staybolt kit for Pt100/Pt1000. Material: EN 1.4401/AISI 316. | 97550639 |
| | Staybolt kit for Pt100. Material: EN 1.4539/AISI 90L. | 96803373 |
| GrA3191 0407 | | |
| Insertion probe for MMS 10000 and MMS 12000 | Description | Product number |
|  | Insertion probe for Pt100/Pt1000 in MMS 10000 and MMS 12000. Material: EN 1.4401/316 (N-version). | 96913215 |
| | Insertion probe for Pt100/Pt1000 in MMS 10000 and MMS 12000. Material: EN 1.4539/AISI 904L (R-version) | 99298250 |
| TM04 3560 4508 | | |
| Pt1000 sensor, including cable | Cable length [m] | Product number |
|  | 20 | 96804042 |
| | 40 | 96804044 |
| | 60 | 96804064 |
| | 80 | 96804065 |
| | 100 | 96804067 |
| TM04 3563 4508 | | |
| Staybolt kits for Pt1000 in MS 402 and MS 4000 | Description | Product number |
|  | Staybolt kit for Pt1000. Material: EN 1.4401/AISI 316. | 98090278 |
| | Staybolt kit for Pt1000. Material: EN 1.4539/AISI 904. | 98090341 |
| TM05 3694 1612 | | |
| Extension kit for sensor cable for Pt100/Pt1000 | Description | Product number |
|  | Extension kit for Pt100/Pt1000 sensor cable. For watertight shrink-joining of the sensor cable. Extra sensor cable must be ordered separately. | 99039717 |
| TM00 7885 2296 | | |
| Sensor cable | Description | Product number |
|  | Drop cable for extension: 4x1 mm ² Mention length when ordering. Maximum recommended length: 350 m. | 00RM5271 |
| TM00 7882 2296 | | |

MS motor cables

See the following tables for information about additional motor cables for the MS 402, MS 4000, and MS 6000 range.

Drinking water approval

TML-B cables are drinking water compatible with ACS and KTW approvals.

For more information on sizing cables, see *Cable sizing* on page 121.

Note that the maximum permissible voltage drop in the motor cable is 3 %.

Note that always dimension motor cables that are not submerged in the pumped liquid as submersible drop cables.

MS 402 three-phase motor cables

| TML-B motor cables with EPR outer sheath (ethylene propylene rubber) | | | | | |
|--|------------|------------------|----------------------------------|---------------------|----------------|
| Motor type | Length [m] | Plug steel grade | Cross-section [mm ²] | Plug for drop cable | Product number |
| MS 402 | 10 | Standard | 4 G 1.5 | No | 00795752 |
| | 15 | | | | 00795753 |
| | 20 | | | | 00795754 |
| | 30 | | | | 00795755 |
| | 40 | | | | 00798890 |
| | 50 | | | | 00795800 |
| | 60 | | | | 98115565 |
| | 70 | | | | 98162757 |
| | 80 | | | | 98162787 |
| | 90 | | | | 98162790 |
| | 110 | | | | 98162804 |
| | 120 | | | | 98163288 |
| MS 402 | 1.7 | Standard | 4 G 1.5 | Yes | 00795712 |
| | 2.5 | | | | 00795739 |
| | 5 | | | | 00798891 |
| | 10 | | | | 00798892 |

MS 4000 three-phase motor cables

| TML-B motor cables with EPR outer sheath (ethylene propylene rubber) | | | | | |
|--|------------|----------------------------------|---------------------|---------------------------|--------------------|
| Motor type | Length [m] | Cross-section [mm ²] | Plug for drop cable | Product numbers | |
| | | | | Plug steel grade standard | Plug steel grade R |
| MS 4000 | 10 | 4 G 1.5 | Yes | 00795620 | 00795861 |
| | 20 | | | 00795621 | 00795862 |
| | 30 | | | 00795622 | 00795863 |
| | 40 | | | 00795623 | 00795864 |
| | 50 | | | 00795624 | 00795865 |
| | 60 | | | 00795625 | 00799924 |
| | 70 | | | 00795626 | 00799923 |
| MS 4000 | 10 | 4 G 1.5 | No | 00795632 | 00795873 |
| | 20 | | | 00795633 | 00795872 |
| | 30 | | | 00795634 | 00795871 |
| | 40 | | | 00795635 | 00795870 |
| | 50 | | | 00795636 | 00795869 |
| | 60 | | | 00795637 | 00799926 |
| | 70 | | | 00795638 | 00799925 |
| MS 4000 | 50 | 4G 2.5 | | - | 96800534 |
| | 80 | | | - | 97949530 |
| | 130 | | | - | 96893810 |
| | 150 | | | - | 96893838 |
| | 170 | | | - | 96893844 |

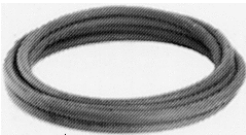
MS 4000 environmental three-phase motor cables

| PTFE motor cables with teflon outer sheath | | | | |
|--|------------|----------------------------------|---------------------|--------------------|
| Motor type | Length [m] | Cross-section [mm ²] | Plug for drop cable | Product numbers |
| | | | | Plug steel grade R |
| MS 4000 | 10 | 4 G 2.5 | No | 00795667 |
| | 20 | | | 00795668 |
| | 30 | | | 00795669 |
| | 40 | | | 00795670 |
| | 50 | | | 00795671 |
| | 60 | | | 00795672 |
| | 70 | | | 00795673 |
| | 80 | | | 00795674 |
| | 90 | | | 00795675 |
| | 100 | | | 00795676 |
| | 110 | | | 96476404 |
| | 120 | | | 96426909 |
| | 200 | | | 96432567 |

MS 6000 three-phase motor cables


| TML-B motor cables EPR outer sheath (ethylene propylene rubber) | | | | | |
|---|------------|----------------------------------|---------------------|--------------------|--------------------|
| Motor type | Length [m] | Cross-section [mm ²] | Plug for drop cable | Product numbers | |
| | | | | Plug steel grade N | Plug steel grade R |
| MS 6000 | 10 | 4G 6.0 | | 96164211 | 96300113 |
| | 20 | | | 96164212 | 96300115 |
| | 30 | | | 96164213 | 96300117 |
| MS 6000 | 10 | 4G 10.0 | No | 96164215 | 96300124 |
| | 20 | | | 96164216 | 96300126 |
| | 30 | | | 96164217 | 96300128 |
| | 40 | | | 99522680 | 96300129 |
| | 50 | | | 96164218 | 96300130 |

Submersible drop cable

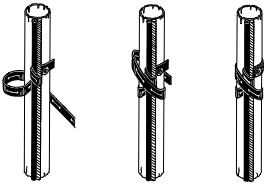
| Product | Description | Number of leads and nominal cross-section [mm ²] | Outer cable diameter min. / max. [mm] | Weight [kg/m] | Product number |
|---|-------------|--|---------------------------------------|---------------|----------------|
|  <p>Suitable for these applications:</p> <ul style="list-style-type: 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 600 metres and average loads. <p>Insulation and sheath of special EPR-based elastomer materials adapted to applications in water. Maximum permissible water temperature: 70 °C. Maximum permissible lead service temperature: 90 °C. Further cable sizes are available on request.</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">TM00 7682 2296</p> | | 1 x 25 | 12.5 / 16.5 | 0.410 | 00ID4072 |
| | | 1 x 35 | 14.0 / 18.5 | 0.560 | 00ID4073 |
| | | 1 x 50 | 16.5 / 21.0 | 0.740 | 00ID4074 |
| | | 1 x 70 | 18.5 / 23.5 | 1.000 | 00ID4075 |
| | | 1 x 95 | 21.0 / 26.5 | 1.300 | 00ID4076 |
| | | 1 x 120 | 23.5 / 28.5 | 1.650 | 00ID4077 |
| | | 1 x 150 | 26.0 / 31.5 | 2.000 | 00ID4078 |
| | | 1 x 185 | 27.5 / 34.5 | 2.500 | 00ID4079 |
| | | 4G1.5 | 10.5 / 13.5 | 0.190 | 00ID4063 |
| | | 4G2.5 | 12.5 / 15.5 | 0.280 | 00ID4064 |
| | | 4G4.0 | 14.5 / 18.0 | 0.390 | 00ID4065 |
| | | 4G6.0 | 16.5 / 22.0 | 0.520 | 00ID4066 |
| | | 4G10 | 22.5 / 24.5 | 0.950 | 00ID4067 |
| | | 4G16 | 26.5 / 28.5 | 1.400 | 00ID4068 |
| | | 4G25 | 32.0 / 34.0 | 1.950 | 00ID4069 |
| | | 4G35 | 33.0 / 42.5 | 2.700 | 96432949 |
| | | 4G50 | 38.0 / 48.5 | 3.600 | 96432950 |
| | | 4G70 | 43.0 / 54.5 | 4.900 | 96432951 |

Submersible drop cables with plug

Submersible drop cable with plug to MS402 MS4000 with 2 plug motor cable.


| Product | Cable length [m] | Product number | |
|---|-------------------------|-------------------------|----------|
|  <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Gr-1016935</p> | 4 x 1.5 mm ² | | |
| | | 15 | 0079H001 |
| | | 20 | 0079H002 |
| | | 25 | 0079H003 |
| | | 30 | 0079H004 |
| | | 40 | 0079H005 |
| | | 50 | 0079H006 |
| | | 70 | 0079H008 |
| | | 100 | 0079H009 |
| | | 4 x 2.5 mm ² | |
| | | 15 | 0079H021 |
| | | 20 | 0079H022 |
| | | 25 | 0079H023 |
| | | 30 | 0079H024 |
| | | 40 | 0079H025 |
| | | 50 | 0079H026 |
| | | 70 | 0079H028 |
| | | 100 | 0079H029 |
| | | 4 x 4 mm ² | |
| | | 15 | 0079H041 |
| | | 20 | 0079H042 |
| | | 25 | 0079H043 |
| | | 30 | 0079H044 |
| | | 40 | 0079H045 |
| | | 50 | 0079H046 |
| | | 70 | 0079H048 |

Cable clips

| Product | Description | Product number |
|---|---|----------------|
|  | <p>For fastening of cable and straining wire to the riser pipe. The clips must be fitted every 3 metres. One set for approximately 45 m riser pipe.</p> <ul style="list-style-type: none"> • 16 cable buttons. • 7.5 m rubber band. | 00115016 |

TM00 1369 5092

Cable termination kit with plug for MS4000 and MS402

| Product | Description | Version | Product number | |
|---|--|--|----------------|-----------|
| | | | N-version | R-version |
|  | <p>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.</p> | For cables up to 4 x 2.5 mm ² | 00799901 | 00799955 |
| | | For cables up to 4 x 6 mm ² | 00799902 | 00799918 |

TM00 7883 2296

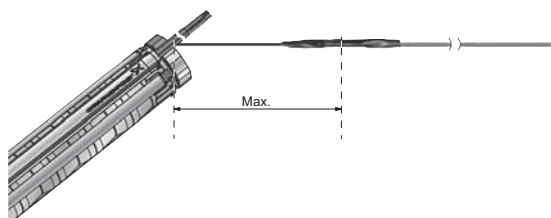
Cable termination kit, type KM

For instruction on how to make the cable termination between motor cable and drop cable, see the KM quick guide available in Grundfos Product Center at <http://net.grundfos.com/qr/i/V7065924>.

Grundfos recommendation

First termination of motor cable and drop cable should be placed maximum 1/2 meter above the pump end.

Do not attempt to join two cables that have a larger cross-section span than stated in the following table.



TM06 9876 0817

| Motor cable [mm ²] | Drop cable, maximum increase per step. [mm ²] | | | |
|--------------------------------|---|-------|-------|-------|
| 2.5 | 6.0 | 16.0 | 50.0 | - |
| 6.0 | 16.0 | 35.0 | 70.0 | 150.0 |
| 10.0 | 25.0 | 50.0 | 120.0 | 240.0 |
| 16.0 | 50.0 | 120.0 | 240.0 | - |
| 25.0 | 70.0 | 150.0 | 240.0 | - |
| 35.0 | 70.0 | 150.0 | 240.0 | - |
| 50.0 | 120.0 | 240.0 | - | - |
| 70.0 | 150.0 | 240.0 | - | - |

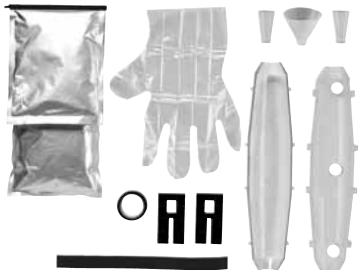
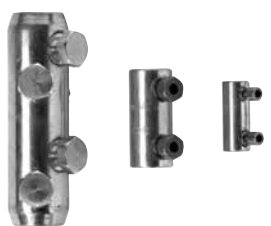
| Possible cable termination | | Content of kit | Motor cable [mm ²] | Drop cable [mm ²] | Number of leads | Product number |
|----------------------------|------------|----------------|-----------------------------------|-------------------------------|-----------------|----------------|
| Motor cable | Drop cable | | | | | |
| | | | KM kits with pressed connections: | | | |
| | | | 1.5 - 6 | 1.5 - 6 | 4 | 00116251 |
| | | | 6-16 | 6-16 | 4 | 00116252 |
| | | | 10-25 | 10-25 | 4 | 00116255 |
| | | | KM kits with screw connectors: | | | |
| | | | 6-35 | 6-35 | 4 | 96636867 |
| | | | 25-70 | 25-70 | 4 | 96636868 |

| Possible cable termination | | Content of kit | Motor cable [mm ²] | Drop cable [mm ²] | Number of leads | Product number |
|----------------------------|------------|----------------|-----------------------------------|-------------------------------|-----------------|----------------|
| Motor cable | Drop cable | | | | | |
| | | | KM kits with pressed connections: | | | |
| | | | 1.5 - 6 | 1.5 - 6 | 4 | 00116257 |
| | | | 6-16 | 6-16 | 4 | 00116258 |
| | | | 10-50 | 10-50 | 4 | 96637330 |
| | | | 16-70 | 16-70 | 4 | 96637332 |
| | | | 1.5 - 6 | 1.5 - 6 | 3 | 00116253 |
| | | | 10-25 | 10-25 | 3 | 00116254 |
| | | | 10-50 | 10-50 | 3 | 96637318 |
| | | | 16-70 | 16-70 | 3 | 96637331 |

| Possible cable termination | | Content of kit | Motor cable [mm ²] | Drop cable [mm ²] | Number of leads | Product number |
|----------------------------|------------|----------------|-----------------------------------|-------------------------------|-----------------|----------------|
| Motor cable | Drop cable | | | | | |
| | | | KM kits with pressed connections: | | | |
| | | | 10-70 | 10-70 | 1 | 96828296 |
| | | | 32-120 | 32-120 | 1 | 00116256 |
| | | | KM kits with screw connectors: | | | |
| | | | 90-240 | 90-240 | 1 | 96637279 |

Note that a KM termination kit for single conductors only consist of material for one connection. When ordering, keep in mind how many kits are needed for a complete cable termination.

Cable termination kit, types M0 to M4

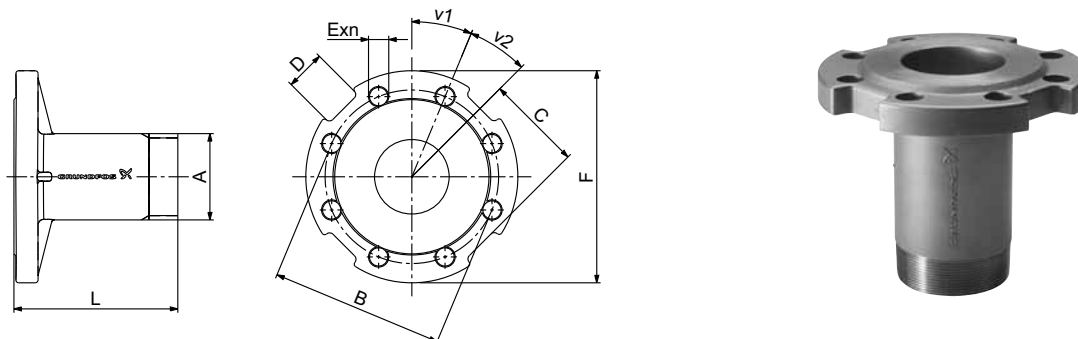
| Product | Description | Version | | | |
|---|--|--|------------------------------|-----------------------------|-----------------------|
| | | Type | Diameter of cable joint [mm] | Outer cable diameter [mm] | Product number |
|  <p>TM04 4981 2309</p> | <p>For watertight joining of motor cable and submersible drop cable. The joint is encapsulated by the glue which is part of the kit.</p> | M0 | Ø40 | Ø6 - Ø15 | ID8903 |
| | | M1 | Ø46 | Ø9 - Ø23 | ID8904 |
| | | M2 | Ø52 | Ø17 - Ø31 | ID8905 |
| | | M3 | Ø77 | Ø26 - Ø44 | ID8906 |
| | | M4 | Ø97 | Ø29 - Ø55 | 91070700 |
|  <p>GRA8251 2209</p> | <p>Accessories for cable kits M0 to M4. Screw connectors only.</p> | Cross-section of leads [mm²] | | Number of connectors | Product number |
| | | 6-25 | | 4 | 96626021 |
| | | 16-95 | | | 96626022 |
| | | 35-185 | | | 96626023 |
| 70-240 | | 96626028 | | | |

9. Mechanical accessories

Connecting pieces / Adaptors

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

Thread-to-flange (standard flange to EN 1092-1)

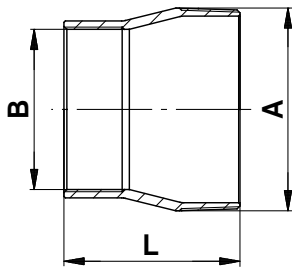


TM01 2396 4508 - GrA2552 3706

Fig. 32 Dimensional sketch and photo of the connecting piece thread-to-flange

| Type | Pump outlet | Connecting piece | Thread-to-flange | | | | | | | | | Product number | | |
|----------------------------|-------------|--------------------------|------------------|-----|------|----|-----|------|-----|------|------|----------------|-----------|-----------|
| | | | Dimensions [mm] | | | | | | | v1 | v2 | n | EN 1.4308 | EN 1.4517 |
| | | | A | B | C | D | E | F | L | | | | | |
| 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 | 30 | 30 | 4 | 00120125 | 00120911 |
| | | R 2 1/2 → DN 65 PN 16/40 | R 2 1/2 | 145 | 71 | 30 | ∅19 | ∅185 | 170 | 22.5 | 22.5 | 8 | 00120126 | 00120910 |
| | | R 2 1/2 → DN 80 PN 16/40 | R 2 1/2 | 160 | 82.5 | 40 | ∅19 | ∅200 | 170 | 22.5 | 22.5 | 8 | 00120127 | 00120909 |
| SP 30 SP 46 SP 60 | Rp 3 | R 3 → DN 65 PN 16/40 | R 3 | 145 | 71 | 30 | ∅19 | ∅185 | 170 | 22.5 | 22.5 | 8 | 00130187 | 00130920 |
| | | R 3 → DN 80 PN 16/40 | R 3 | 160 | 82.5 | 40 | ∅19 | ∅200 | 170 | 22.5 | 22.5 | 8 | 00130188 | 00130921 |
| | | R 3 → DN 100 PN 40 | R 3 | 190 | 100 | 40 | ∅23 | ∅235 | 170 | 22.5 | 22.5 | 8 | 00130189 | 00130922 |
| SP 46 SP 60 | Rp 4 | R 3 → DN 100 PN 16 | R 3 | 180 | 100 | 40 | ∅19 | ∅220 | 170 | 22.5 | 22.5 | 8 | 00130210 | 00130867 |
| | | R 4 → DN 100 PN 16 | R 4 | 180 | 100 | 40 | ∅19 | ∅235 | 180 | 22.5 | 22.5 | 8 | 00140077 | 00140737 |
| SP 46 SP 60 | Rp 4 | R 4 → DN 100 PN 40 | R 4 | 190 | 100 | 40 | ∅23 | ∅235 | 180 | 22.5 | 22.5 | 8 | 00140071 | 00140577 |
| | | R 5 → DN 100 PN 16 | R 5 | 180 | 82 | 35 | ∅19 | ∅220 | 195 | 22.5 | 22.5 | 8 | 00160159 | 00160657 |
| SP 77 SP 95 | Rp 5 | R 5 → DN 100 PN 40 | R 5 | 190 | 82 | 35 | ∅23 | ∅235 | 195 | 22.5 | 22.5 | 8 | 00160148 | 00160646 |
| | | R 5 → DN 125 PN 16 | R 5 | 210 | 99 | 37 | ∅19 | ∅250 | 195 | 22.5 | 22.5 | 8 | 00160157 | 00160655 |
| | | R 5 → DN 125 PN 40 | R 5 | 220 | 99 | 37 | ∅28 | ∅270 | 195 | 22.5 | 22.5 | 8 | 00160149 | 00160647 |
| | | R 5 → DN 150 PN 16 | R 5 | 240 | 115 | 36 | ∅23 | ∅285 | 195 | 22.5 | 22.5 | 8 | 00160161 | 00160659 |
| | | R 5 → DN 150 PN 40 | R 5 | 250 | 115 | 36 | ∅28 | ∅300 | 195 | 22.5 | 22.5 | 8 | 00160150 | 00160648 |
| SP 125 SP 160 SP 215 | Rp 6 | R 6 → DN 125 PN 16 | R 6 | 210 | 99 | 36 | ∅19 | ∅250 | 195 | 22.5 | 22.5 | 8 | 00170170 | 00170694 |
| | | R 6 → DN 125 PN 40 | R 6 | 220 | 99 | 36 | ∅28 | ∅270 | 195 | 22.5 | 22.5 | 8 | 00170159 | 00170596 |
| | | R 6 → DN 150 PN 16 | R 6 | 240 | 114 | 36 | ∅23 | ∅285 | 195 | 22.5 | 22.5 | 8 | 98518437 | 98518487 |
| | | R 6 → DN 150 PN 40 | R 6 | 250 | 114 | 36 | ∅28 | ∅300 | 195 | 22.5 | 22.5 | 8 | 00170160 | 00170597 |
| | | R 6 → DN 200 PN 16 | R 6 | 295 | 134 | 36 | ∅23 | ∅340 | 195 | 15 | 15 | 12 | 00170161 | 00170598 |
| | | R 6 → DN 200 PN 40 | R 6 | 320 | 151 | 36 | ∅31 | ∅375 | 200 | 15 | 15 | 12 | 00170162 | 00170599 |

Thread-to-thread



TM01 2397 4508 - TM06 9783 3317

Fig. 33 Dimensional sketch and photo of a connecting piece thread-to-thread

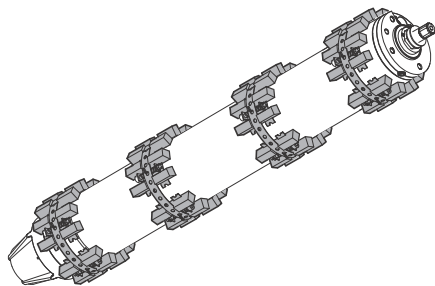
| Type | Pump outlet | Connecting piece | Dimensions | | | Product number | | |
|----------------------------|-------------|------------------|------------------|--------|--------|----------------|-----------|-----------|
| | | | Thread-to-thread | | L [mm] | EN 1.4301 | EN 1.4401 | EN 1.4539 |
| | | | A | B | | | | |
| SP 77 SP 95 | Rp 5 | R 5 → Rp 4 | R 5 | Rp 4 | 121 | 00190063 | 00190585 | 96917293 |
| | | R 5 → Rp 6 | R 5 | Rp 6 | 150 | 00190069 | 00190591 | 96917296 |
| SP 125 SP 160 SP 215 | 5" NPT | 5" NPT → 4" NPT | 5" NPT | 4" NPT | 121 | 00190064 | 00190586 | 00190964 |
| | | 5" NPT → 6" NPT | 5" NPT | 6" NPT | 150 | 00190070 | 00190592 | 00190965 |
| SP 125 SP 160 SP 215 | Rp 6 | R 6 → Rp 5 | R 6 | Rp 5 | 150 | 00200130 | 00200640 | 00200971 |
| | | 6" NPT → 5" NPT | 6" NPT | 5" NPT | 150 | 00200135 | 00200645 | 00200970 |

Zinc anodes

Applications

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. See fig. 34.



TM05 0537 1211

Fig. 34 Submersible motor fitted with anode strings

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

Please contact Grundfos for further details.

More information about zinc anodes and product numbers are available in SP accessories data booklet.

Flow sleeves

Grundfos offers a complete range of stainless-steel flow sleeves for both vertical and horizontal operation. We recommend flow sleeves 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 a high thermal load such as current unbalance, dry running, overload, high ambient temperature, and 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.

See example

More information about flow sleeves and product numbers are available in SP accessories data booklet.

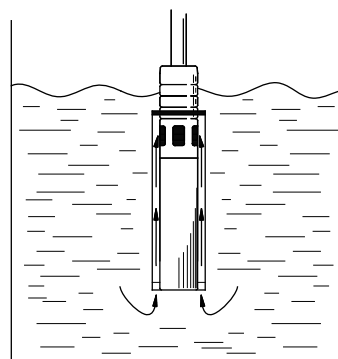


TM01 0751 2197 - TM01 0750 2197

Fig. 35 Flow sleeves

Example of calculated flow sleeve

The flow sleeve is fitted to the submersible motor so that the liquid passes close by the motor on its way towards the pump suction interconnector, thus ensuring optimum cooling of the motor. See fig. 36.



TM01 0509 1297

Fig. 36 Flow sleeve function

The flow sleeve is designed so that the flow velocity past the motor is minimum 0.5 m/s and maximum 3 m/s to ensure optimum pump operating conditions. Use this formula to calculate the flow velocity:

$$V = \frac{Q \times 353}{D^2 - d^2} \text{ [m/s]}$$

| | | |
|---|-------------------|-----------------|
| Q | m ³ /h | Flow rate |
| D | mm | Sleeve diameter |
| d | mm | Pump diameter |

10. Certificates

Grundfos SP offers a number of certificates and reports.

When you want a certificate or a report, the request must be stated on the order.

The certificate or the report will then be put into the bill of materials and thus included in the product number of the pump.

Certificates or reports have to be confirmed for every order.

SP certificates

| Part number | Description |
|-------------|--|
| 96643421 | Test certificate non- specified. Inspec+test |
| 96643425 | Inspection certificate internal |
| 96699829 | Inspection certificate 3. party |
| 96643428 | Material specification report |
| 96643430 | Cleaned and dried pump report |
| 96553738 | Certificate of compliance with the order |

ISO 9906:2012 test report

| Part number | Test report title |
|-------------|------------------------------|
| 96643427 | F. SP pump Grade 3B |
| 98354724 | F. SP pump Grade 3B, Witness |
| 97686936 | F. SP Pump Grade 2B |
| 98354729 | F. SP Pump Grade 2B, Witness |
| 98354721 | F. SP pump Grade 2U |
| 98354735 | F. SP Pump Grade 2U, Witness |
| 97686935 | F. SP pump Grade 1B |
| 98354726 | F. SP pump Grade 1B, Witness |
| 98354697 | F. SP pump Grade 1U |
| 98354731 | F. SP pump Grade 1U, Witness |
| 98354699 | F. SP pump Grade 1E |
| 98354734 | F. SP pump Grade 1E, Witness |

ISO 9906:2012 tolerance factors

| | Grade 1 | | | Grade 2 | | Grade 3 | Independent of grade P2 ≤ 10 kW | |
|----------------------------|---------|-------|-------|---------|--------|---------|------------------------------------|-----------|
| | 1U | 1E | 1B | 2B | 2U | 3B | | |
| Flow rate [τ_Q] | + 10 % | ± 5 % | ± 5 % | ± 8 % | ± 16 % | ± 9 % | ± 10 % | Mandatory |
| Head [τ_H] | + 6 % | ± 3 % | ± 3 % | ± 5 % | ± 10 % | ± 7 % | ± 8 % | |
| Efficiency [τ_η] | ≥ 0 % | ≥ 0 % | - 3 % | - 5 % | - 5 % | - 7 % | - $[10(1 - \frac{P_2}{10}) + 7]$ % | Optional |

Note that acc. to ISO 9906:2012 these tolerance factors apply ≤ 10 kW independent of Grade. However Grundfos has decided not to use this possibility.

Example of certificate

Test certificate non- specified. Inspec+test

Test certificate Non-specific inspection and testing

EN 10204 2.2

Complete pump :

| | |
|--------------------|-------------------|
| Customer name | |
| Customer order no. | |
| Manufactured by | Grundfos A/S - DK |
| Grundfos order no. | |

| Pump | | Motor | |
|-------------------|-------------------|-------------|--|
| Pump type | | Part number | |
| Motor make | | Part number | |
| Flow | m ³ /h | | |
| Head | m | | |
| Power P2 | kW | | |
| Voltage | V | | |
| Frequency | Hz | | |
| Full load current | A | | |
| Motor speed | min ⁻¹ | | |

We the undersigned hereby guarantee and certify that the materials and/or parts for the above mentioned product were manufactured, tested, inspected, and conform to the full requirements of the appropriate catalogues, drawings and / or specifications relative thereto.

Grundfos authorized Department

GRUNDFOS
Date: _____
Signature: _____
Name: _____
Dept.: _____

Part no 96643421

be think innovate



Inspection certificate 3rd party

Inspection certificate 3.1/3.2 (Annex A) EN 10204

Complete pump :

| | |
|--------------------|-------------------|
| Customer name | |
| Customer order no. | |
| Manufactured by | Grundfos A/S - DK |
| Grundfos order no. | |

| Pump | | Motor | |
|-------------------------------|----------|------------------------|--|
| Pump type | | Make | |
| Part number | | Part number | |
| Serial number | | Serial number | |
| Flow rate (m ³ /h) | | P2 (kW) | |
| Head (m) | | Voltage (V) | |
| | Din / EN | Current (A) | |
| Chamber | | n (min ⁻¹) | |
| Impeller | | Frequency (Hz) | |
| Shaft | | Insulation class | |
| Suction Interconnector | | Power factor | |
| Valve casing | | | |
| Straps | | | |

| Customer's requirements | |
|-------------------------------|----------|
| Flow rate (m ³ /h) | Head (m) |

| Test result ref. requirements. According to ISO9906, Annex A | | | | | | |
|--|------|-----------------------|------|--------|--|--|
| Q(m ³ /h) | H(m) | n(min ⁻¹) | I(A) | P1(kW) | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

The pump has been marked

Inspected by

Surveyor signature: _____ GRUNDFOS
Date: _____
Tested date: _____ Signature: _____
Name: _____
Dept.: _____

Part no 96699629

be think innovate



Inspection certificate internal

Inspection certificate 3.1/3.2 (Annex A) EN 10204

Complete pump :

| | |
|--------------------|-------------------|
| Customer name | |
| Customer order no. | |
| Manufactured by | Grundfos A/S - DK |
| Grundfos order no. | |

| Pump | | Motor | |
|-------------------------------|----------|------------------------|--|
| Pump type | | Make | |
| Part number | | Part number | |
| Serial number | | Serial number | |
| Flow rate (m ³ /h) | | P2 (kW) | |
| Head (m) | | Voltage (V) | |
| | Din / EN | Current (A) | |
| Chamber | | n (min ⁻¹) | |
| Impeller | | Frequency (Hz) | |
| Shaft | | Insulation class | |
| Suction Interconnector | | Power factor | |
| Valve casing | | | |
| Straps | | | |

| Customer's requirements | |
|-------------------------------|----------|
| Flow rate (m ³ /h) | Head (m) |

| Test result ref. requirements. According to ISO9906, Annex A | | | | | | |
|--|------|-----------------------|------|--------|--|--|
| Q(m ³ /h) | H(m) | n(min ⁻¹) | I(A) | P1(kW) | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

The pump has been marked :

Inspected by : Grundfos authorized Department

Surveyor signature: _____ GRUNDFOS
Date: _____
Tested date: _____ Signature: _____
Name: _____
Dept.: _____

Part no 96643425

be think innovate



Material specification report

Material specification report.

Complete pump :

| | |
|--------------------|-------------------|
| Customer name | |
| Customer order no. | |
| Manufactured by | Grundfos A/S - DK |
| Grundfos order no. | |

| Pump type | |
|-----------------|--|
| Part number | |
| Production code | |

| Pump | Raw Material no. | DIN W.-Nr. | AISI / ASTM |
|------------------------|------------------|------------|-------------|
| Chamber | | | |
| Impeller | | | |
| Shaft | | | |
| Suction Interconnector | | | |
| Valve casing | | | |
| Straps | | | |

We the undersigned hereby guarantee and certify that the materials and/or parts for the above mentioned product were manufactured, tested, inspected, and conform to the full requirements of the appropriate catalogues, drawings and/or specifications relative thereto.

Grundfos authorized Department

GRUNDFOS
Date: _____
Signature: _____
Name: _____
Dept.: _____

Part no 96643425

be think innovate



TM07 3151 4718

TM07 3152 4718

TM07 3153 4718

TM07 3154 4718

Cleaned and dried pump report

Cleaned and dried pump

Complete pump : _____

| | |
|--------------------|-------------------|
| Customer name | |
| Customer order no. | |
| Manufactured by | Grundfos A/S - DK |
| Grundfos order no. | |

| | |
|-----------------|--|
| Pump type | |
| Part number | |
| Produktion code | |

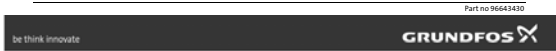
Grundfos hereby confirms that prior to assembly, pump components are washed in pure, hot soap water, rinsed in de-ionized water and dried.

The pump is wrapped in a plastic bag before being packed.

The pump has not been performance-tested.

Grundfos authorized Department.

GRUNDFOS _____
 Date:
 Signature:
 Name:
 Dept.:



TM07 3155 4718

Certificate of compliance with the order

Certificate of compliance with the order

Complete pump : _____

| | |
|--------------------|-------------------|
| Customer name | |
| Customer order no. | |
| Manufactured by | Grundfos A/S - DK |
| Grundfos order no. | |
| Product type | |

We the undersigned hereby guarantee and certify that the materials and/or parts for the above mentioned product were manufactured by Grundfos, tested, inspected, and conform to the full requirements of the appropriate catalogues, drawings and/or specifications relative thereto.

Grundfos authorized Department

GRUNDFOS _____
 Date:
 Signature:
 Name:
 Dept.:



TM07 3156 4718

ISO 9906:2012 test report - F. SP pump Grade 3B

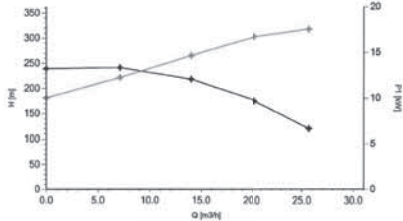
Test Report for SP Pump

ISO 9906: 2012 Grade 3B

Customer:
Order Number: 98357225p312410001
Operator: 18/10/2012 13:38
Certificate Part Number: 96643427
Serial number: 98357225p312410001
Date: 18/10/2012 13:38
Testbed: 508276

Pump type: SP1715 RP 2 1/2 Motor manufacturer: M560 00
Product Number: 98357225

Measured values for tested pump



Result:

Table with 7 columns: Qm, Hm, n, n_nom, EtaD, EtaG, EtaGP. Contains 5 data points.

Table with 11 columns: U1, U2, U3, I, I_Avg, IT, ID, ID, ID, Cos(phi), PIn. Contains 5 data points.

Page 1 of 1

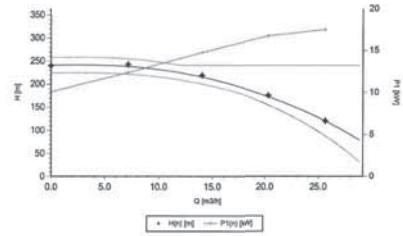


Test Report for SP Pump

ISO 9906: 2012 Grade 3B

Customer:
Order Number: 98357225p312410001
Operator: 18/10/2012 13:38
Certificate Part Number: 96643427
Serial number: 98357225p312410001
Date: 18/10/2012 13:38
Testbed: 508276

Measured values calculated to nominal speed n_nom



Result:

Table with 5 columns: Qm, Hm, PIn, n_nom, n. Contains 5 data points.



Page 2 of 1



Test Report for SP Pump

ISO 9906: 2012 Grade 3B

Customer:
Order Number: 98357225p312410001
Operator: 18/10/2012 13:38
Certificate Part Number: 96643427
Serial number: 98357225p312410001
Date: 18/10/2012 13:38
Testbed: 508276

Measured values

U = Voltage Cos(phi) = Power factor
f = Frequency n = Speed
I_Avg = Average current
Qm = Measured flow
Hm = Measured Total Head
PIn = Measured Motor Power Input

Calculated values

Qn0 = Flow at nominal speed eta_tot = Total Efficiency
Hn0 = Total Head at nominal speed eta_pump = Pump efficiency
PIn0 = Motor Power Input at nominal speed EtaG = Specific energy consumption

Formula

Qn0 = Qm * (n_nom/n)
Hn0 = Hm * (n_nom/n)^2
PIn0 = PIn * (n_nom/n)^3
eta_tot = (Qn0 * Hn0) / PIn0
eta_pump = (Qn0 * Hn0) / (PIn0 - PIn0_n)
EtaG = PIn0 / Qn0

Legend and test conditions

Measurements were made with clean water at approximately 20 °C and a dynamic viscosity of 1.002 mPa·s
The test bed is calibrated according to ISO 9001
Calibration Date:

Test Facility:

Grundfos Danmark
GL Viborgvej 79
Aalstrup
9630
Danmark
Phone: 24/01/2013 13:02:04
Signed by: www.grundfos.com
Fac: www.grundfos.com

Page 3 of 1



TM07 2188 4718

TM07 2189 4718

TM07 2190 4718

11. Cable sizing

Cables

Grundfos offers submersible drop cables for all applications: 4-core cable, single conductors. 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. See *Submersible drop cable* on page 110.

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.

Note that a cable sizing tool is available on Grundfos insite.

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

Fig. 37 Cable sizing tool

Maximum cable length for a single-phase submersible pump:

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

Maximum cable length for a three-phase submersible pump:

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

Formula designations

- U = Rated voltage [V]
- ΔU = Voltage drop [%]
- I = Rated current of the motor [A]
- cos φ = Power factor
- ρ = Specific resistance: 0.025 [$\Omega \text{ mm}^2$]
- q = Cross-section of submersible drop cable [mm^2]
- sin φ = $\sqrt{1 - \cos^2 \varphi}$
- 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 φ): 0.85
- Specific resistance (ρ): 0.025
- Cross-section (q): 25 mm^2
- sin φ : 0.54
- Inductive resistance (X_L): 0.078×10^{-3} [Ω/m]

$$L = \frac{400 \times 3}{64.0 \times 1.73 \times 100 \times (0.85 \times \frac{0.025}{25} + 0.54 \times 0.078 \times 10^{-3})}$$

L = 120 m.

Calculation of cable cross-section

Formula designations

- U = Rated voltage [V]
- ΔU = Voltage drop [%]
- I = Rated current of the motor [A]
- cos φ = Power factor
- ρ = $1/\chi$
- Materials of cable: Copper: $\chi = 40 \text{ m}/\Omega \times \text{mm}^2$
- q = Cross-section [mm^2]
- sin φ = $\sqrt{1 - \cos^2 \varphi}$
- X_L = Inductive resistance 0.078×10^{-3} [Ω/m]
- L = Length of cable [m]
- Δp = Power loss [W].

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

Direct on line

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

Star-delta

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

You can read the values of the rated current (I) and the power factor (cos φ) in the tables on pages 123.

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 mm².

Choice B: 3 x 185 mm².

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):

$$A = (\Delta p_A - \Delta p_B) \times h = (745 \text{ W} - 604 \text{ W}) \times 4000 = 564,000 \text{ Wh} = 564 \text{ kWh.}$$

By choosing the cable size 3 x 185 mm² instead of 3 x 150 mm², you achieve an annual saving of 564 kWh.

Operating time: 10 years.

Saving after 10 years (A_{10}):

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

You must calculate the saved amount in the local currency.

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 | 462 | 767 | | | | | | | | | | | | | | | |
| 4" | 0.55 | 2.2 | 0.64 | 294 | 488 | 777 | | | | | | | | | | | | | | |
| 4" | 0.75 | 2.3 | 0.72 | 250 | 416 | 662 | 987 | | | | | | | | | | | | | |
| 4" | 1.1 | 3.4 | 0.72 | 169 | 281 | 448 | 668 | | | | | | | | | | | | | |
| 4" | 1.5 | 4.2 | 0.75 | 132 | 219 | 348 | 520 | 857 | | | | | | | | | | | | |
| 4" | 2.2 | 5.5 | 0.82 | 92 | 153 | 244 | 364 | 602 | 951 | | | | | | | | | | | |
| 4" | 3 | 7.85 | 0.77 | 69 | 114 | 182 | 271 | 447 | 705 | | | | | | | | | | | |
| 4" | 4 | 9.6 | 0.8 | 54 | 90 | 143 | 214 | 353 | 557 | 853 | | | | | | | | | | |
| 4" | 5.5 | 13 | 0.81 | 39 | 66 | 104 | 156 | 258 | 407 | 624 | 855 | | | | | | | | | |
| 4" | 7.5 | 18.8 | 0.78 | 28 | 47 | 75 | 112 | 185 | 291 | 445 | 609 | 841 | | | | | | | | |
| 6" | 4 | 9.2 | 0.82 | 55 | 91 | 146 | 218 | 359 | 566 | 867 | | | | | | | | | | |
| 6" | 5.5 | 13.6 | 0.77 | 40 | 66 | 105 | 157 | 258 | 407 | 622 | 850 | | | | | | | | | |
| 6" | 7.5 | 17.6 | 0.8 | 29 | 49 | 78 | 117 | 193 | 304 | 465 | 637 | 882 | | | | | | | | |
| 6" | 9.2 | 21.8 | 0.81 | 23 | 39 | 62 | 93 | 154 | 243 | 372 | 510 | 706 | 950 | | | | | | | |
| 6" | 11 | 24.8 | 0.83 | | 34 | 53 | 80 | 132 | 209 | 320 | 440 | 610 | 823 | | | | | | | |
| 6" | 13 | 30 | 0.81 | | 28 | 45 | 68 | 112 | 176 | 270 | 370 | 513 | 690 | 893 | | | | | | |
| 6" | 15 | 34 | 0.82 | | | 39 | 59 | 97 | 154 | 236 | 324 | 449 | 604 | 783 | 947 | | | | | |
| 6" | 18.5 | 42 | 0.81 | | | | 48 | 80 | 126 | 193 | 265 | 366 | 493 | 638 | 770 | 914 | | | | |
| 6" | 22 | 48 | 0.84 | | | | 41 | 67 | 107 | 164 | 225 | 313 | 422 | 549 | 665 | 793 | 927 | | | |
| 6" | 26 | 57 | 0.84 | | | | | 57 | 90 | 138 | 189 | 263 | 355 | 462 | 560 | 667 | 781 | 937 | | |
| 6" | 30 | 66.5 | 0.83 | | | | | 49 | 78 | 119 | 164 | 227 | 307 | 398 | 482 | 574 | 670 | 803 | 926 | |
| 6" | 37 | 85.5 | 0.79 | | | | | | 63 | 97 | 133 | 183 | 246 | 317 | 382 | 452 | 525 | 624 | 714 | |
| 8" | 22 | 48 | 0.84 | | | | 41 | 67 | 107 | 164 | 225 | 313 | 422 | 549 | 665 | 793 | 927 | | | |
| 8" | 26 | 56.5 | 0.85 | | | | | 57 | 90 | 138 | 189 | 263 | 356 | 464 | 563 | 672 | 787 | 947 | | |
| 8" | 30 | 64 | 0.85 | | | | | 50 | 79 | 122 | 167 | 233 | 314 | 409 | 497 | 593 | 695 | 836 | 968 | |
| 8" | 37 | 78.5 | 0.85 | | | | | | 65 | 99 | 136 | 190 | 256 | 334 | 405 | 483 | 567 | 682 | 789 | |
| 8" | 45 | 96.5 | 0.82 | | | | | | 54 | 83 | 114 | 158 | 213 | 276 | 334 | 396 | 462 | 553 | 636 | |
| 8" | 55 | 114 | 0.85 | | | | | | | 68 | 94 | 131 | 177 | 230 | 279 | 333 | 390 | 469 | 544 | |
| 8" | 63 | 132 | 0.83 | | | | | | | | 83 | 115 | 155 | 201 | 243 | 289 | 338 | 404 | 466 | |
| 8" | 75 | 152 | 0.86 | | | | | | | | 70 | 97 | 132 | 171 | 208 | 249 | 292 | 353 | 409 | |
| 8" | 92 | 186 | 0.86 | | | | | | | | | 79 | 107 | 140 | 170 | 204 | 239 | 288 | 335 | |
| 8" | 110 | 224 | 0.87 | | | | | | | | | | 89 | 116 | 141 | 169 | 198 | 240 | 279 | |
| 10" | 75 | 156 | 0.84 | | | | | | | | 69 | 96 | 130 | 169 | 205 | 244 | 285 | 343 | 396 | |
| 10" | 92 | 194 | 0.82 | | | | | | | | | 79 | 106 | 137 | 166 | 197 | 230 | 275 | 316 | |
| 10" | 110 | 228 | 0.84 | | | | | | | | | | 89 | 116 | 140 | 167 | 195 | 234 | 271 | |
| 10" | 132 | 270 | 0.84 | | | | | | | | | | | 98 | 118 | 141 | 165 | 198 | 229 | |
| 10" | 147 | 315 | 0.81 | | | | | | | | | | | | 103 | 122 | 142 | 169 | 194 | |
| 10" | 170 | 365 | 0.81 | | | | | | | | | | | | | 105 | 122 | 146 | 168 | |
| 10" | 190 | 425 | 0.79 | | | | | | | | | | | | | | 106 | 125 | 144 | |
| 12" | 147 | 305 | 0.83 | | | | | | | | | | | | | 105 | 125 | 146 | 175 | 202 |
| 12" | 170 | 345 | 0.85 | | | | | | | | | | | | | 92 | 110 | 129 | 155 | 180 |
| 12" | 190 | 390 | 0.84 | | | | | | | | | | | | | 98 | 114 | 137 | 158 | |
| 12" | 220 | 445 | 0.85 | | | | | | | | | | | | | | 100 | 120 | 139 | |
| 12" | 250 | 505 | 0.85 | | | | | | | | | | | | | | | 106 | 123 | |
| Max. current for cable [A]* | | | | 23 | 30 | 41 | 53 | 74 | 99 | 131 | 162 | 202 | 250 | 301 | 352 | 404 | 461 | 547 | 633 | |

* At particularly favourable heat dissipation conditions. Maximum cable length in metres from motor starter to pump. For motors with star-delta starting, the cable length can be calculated by multiplying the relevant cable length from the above table by $\sqrt{3}$.

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 | 0.25 0.09 |
| 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 2.94 4.4 |
| 240 | 4000 | 66.7 | | | | | | | | 8.13 43.0 | 6.47 24.0 | 4.96 13.0 | 3.92 7.5 | 3.92 7.5 |
| 300 | 5000 | 83.3 | | | | | | | | | 8.08 33.0 | 6.2 18.0 | 4.89 11.0 | 4.89 11.0 |

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

13. Grundfos Product Center

Online search and sizing tool to help you make the right choice.



This drop-down menu enables you to set the search function to "Products" or "Literature".

"SIZING" enables you to size a pump based on entered data and selection choices.

"REPLACEMENT" enables you to find a replacement product. Search results will include information on the following:

- the lowest purchase price
- the lowest energy consumption
- the lowest total life cycle cost.

"CATALOGUE" gives you access to the Grundfos product catalogue.

"LIQUIDS" enables you to find pumps designed for aggressive, flammable or other special liquids.

All the information you need in one place

Performance curves, technical specifications, pictures, dimensional drawings, motor curves, wiring diagrams, spare parts, service kits, 3D drawings, documents, system parts. The Product Center displays any recent and saved items - including complete projects - right on the main page.

Downloads

On the product pages, you can download installation and operating instructions, data booklets, service instructions, etc. in PDF format.

| |
|----------------------|
| V7023747 1218 |
| ECM: 1250782 |