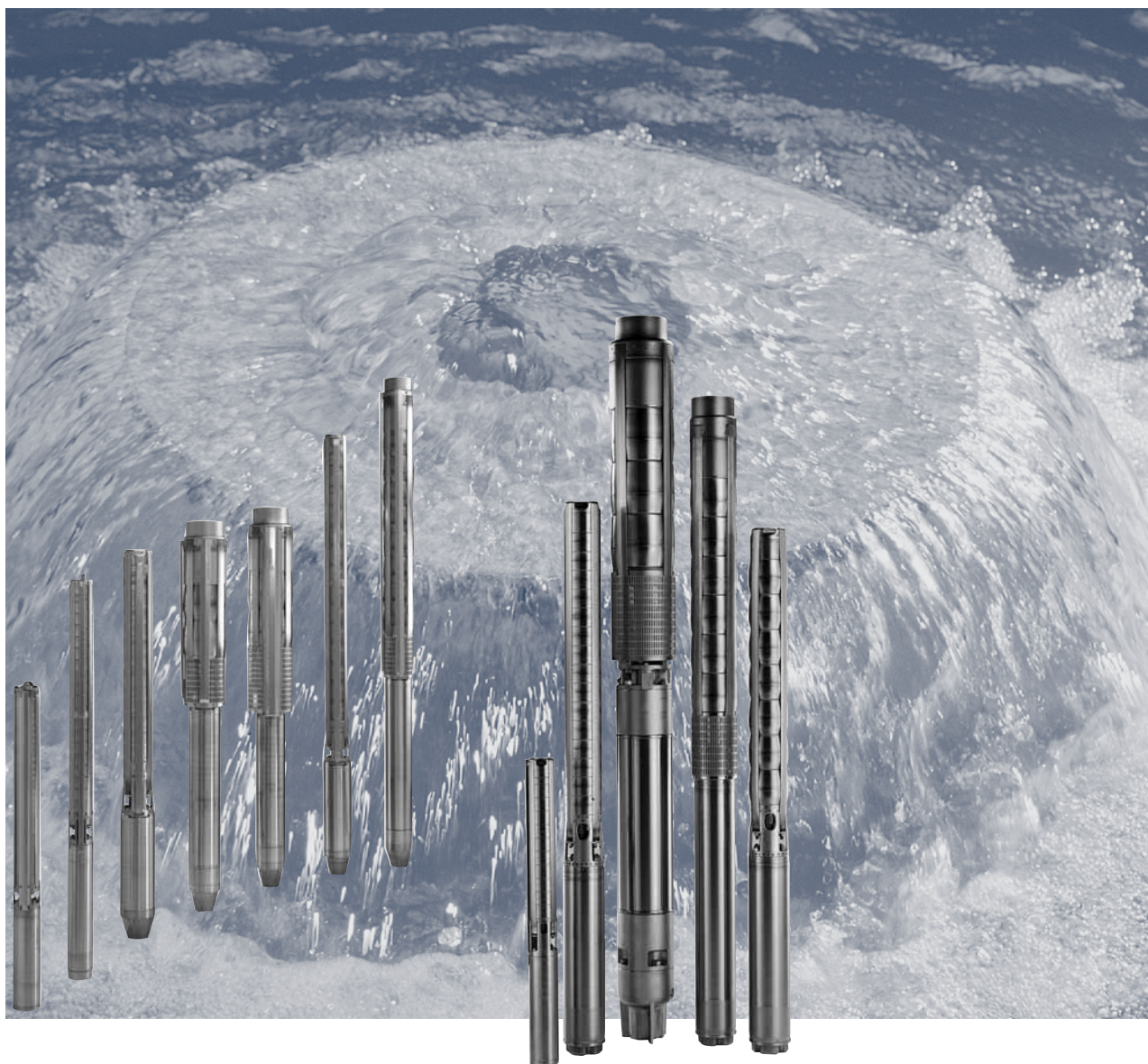


SP A, SP

Submersible pumps, motors and accessories
60 Hz



Contents

General data

| | |
|----------------------------------|---|
| Performance range | 3 |
| Applications | 4 |
| Type key | 4 |
| Pumped liquids | 4 |
| Operating conditions | 4 |
| Curve conditions | 4 |
| Pump range | 5 |
| Motor range | 5 |
| Motor protection and controllers | 5 |

Submersible pumps

| | |
|------------------------|---|
| Features and benefits | 6 |
| Material specification | 8 |

Submersible motors

| | |
|---------------------------------------|----|
| Features and benefits | 9 |
| Shaft seal | 11 |
| Material specification for MS motors | 12 |
| Material specification for MMS motors | 14 |

Performance curves/ Technical data

| | |
|--------|----|
| SP 1A | 16 |
| SP 2A | 18 |
| SP 2A | 20 |
| SP 5A | 22 |
| SP 8A | 24 |
| SP 14A | 26 |
| SP 17 | 28 |
| SP 30 | 33 |
| SP 46 | 38 |
| SP 60 | 43 |
| SP 77 | 48 |
| SP 125 | 58 |
| SP 160 | 63 |
| SP 215 | 68 |

Technical data

| | |
|--|----|
| 1 x 220 V, submersible motors | 73 |
| 1 x 230 V, submersible motors | 73 |
| 3 x 220 V, submersible motors (SF 1.0) | 73 |
| 3 x 220 V, submersible rewindable motors | 74 |
| 3 x 380 V, submersible motors | 74 |
| 3 x 380 V, submersible rewindable motors | 75 |
| 3 x 380 V, submersible motors, MS6 T60 | 75 |
| 3 x 460 V, submersible motors | 76 |
| 3 x 460 V, submersible rewindable motors | 77 |
| 3 x 460 V, submersible industrial motors | 77 |

Accessories

| | |
|---|----|
| MP 204 | 78 |
| Control functions | 81 |
| G100 gateway for communication with Grundfos products | 84 |
| Connecting pieces | 86 |
| Cable termination kit with plug | 87 |
| Cable termination kit, type KM | 87 |
| Cable termination kit, type M0 to M6 | 87 |
| Submersible drop cable | 88 |
| Zinc anodes | 88 |
| Flow sleeves | 89 |
| SA-SPM 5 control boxes | 89 |
| Pt100 | 90 |

Energy consumption

| | |
|---|----|
| Energy consumption of submersible pumps | 91 |
|---|----|

Cable sizing

| | |
|--------|----|
| Cables | 92 |
|--------|----|

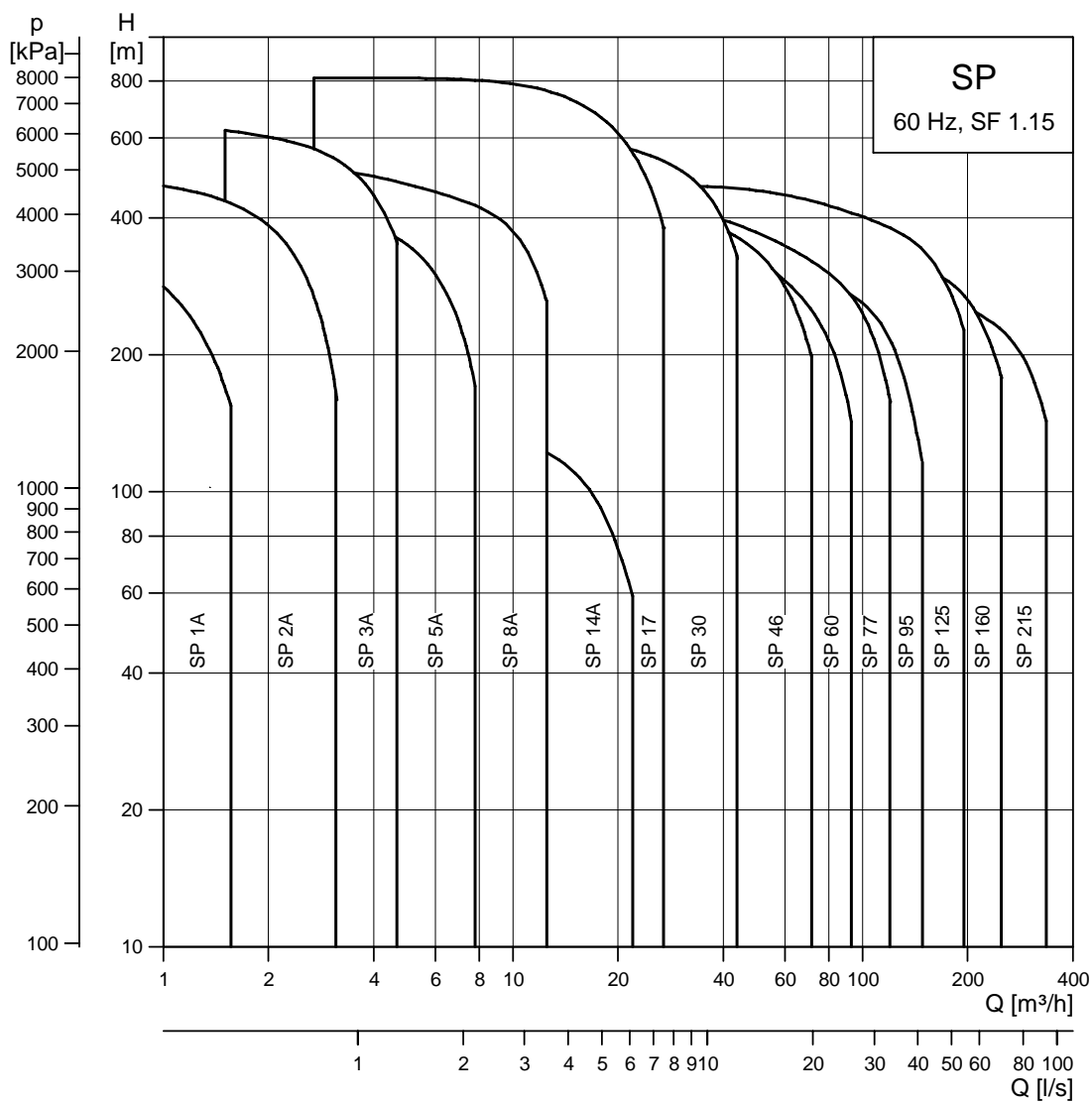
Table of head losses

| | |
|-------------------------------------|----|
| Head losses in ordinary water pipes | 96 |
| Head losses in plastic pipes | 97 |

Further product documentation

| | |
|---------|----|
| WebCAPS | 98 |
| WinCAPS | 99 |

Performance range



TM00 7574 0707

Applications

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

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

Type key

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

Pumped liquids

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

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

Operating conditions

Flow rate, Q: 0.1-335 m³/h.

Head, H: Maximum 810 m.

Maximum liquid temperature

| Motor | Installation | | |
|--|--------------------------|----------|------------|
| | Flow velocity past motor | Vertical | Horizontal |
| Grundfos MS 4" and MS6 T30-versions | 0.15 m/s | 30°C | 30°C |
| Grundfos 4" MS industry versions | 0.15 m/s | 60°C | 60°C |
| Grundfos MS6 T60-versions | 1.0 m/s | 60°C | 60°C |
| Grundfos MMS 6" to 12" rewindable with PVC in the windings | 0.15 m/s | 25°C | 25°C |
| | 0.50 m/s | 30°C | 30°C |
| Grundfos MMS 6" to 12" rewindable with PE/PA in the windings | 0.15 m/s | 40°C | 40°C |
| | 0.50 m/s | 45°C | 45°C |

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

Operating pressure

| Motor | Maximum operating pressure |
|-----------------------------------|----------------------------|
| Grundfos MS 4" and 6" | |
| Grundfos MMS 6" to 10" rewindable | 6 MPa (60 bar) |

Curve conditions

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

General

- Curve tolerances according to ISO 9906, Annex A.
- The performance curves show pump performance at actual speed, cf. standard motor range. The speeds of the motors are approximately these:
 - 4" motors: $n = 3470 \text{ min}^{-1}$
 - 6" motors: $n = 3460 \text{ min}^{-1}$
 - 8" to 10" motors: $n = 3525 \text{ min}^{-1}$
- The measurements were made with airless water at a temperature of 20 °C. The curves apply to a kinematic viscosity of 1 mm²/s (1 cSt). When pumping liquids with a density higher than that of water, use motors with correspondingly higher outputs.
- The **bold** curves indicate the recommended performance range.
- The performance curves are inclusive of possible losses such as non-return valve loss.

SP A curves

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

SP curves

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

Pump range

| Type | | SP 1A | SP 2A | SP 3A | SP 5A | SP 8A | SP 14A | SP 17 | SP 30 | SP 46 | SP 60 | SP 77 | SP 95 | SP 125 | SP 160 | SP 215 |
|---------------------------------------|-----|-------|--------------|-------|--------------|------------|--------|-------------|------------|------------------|----------|-------|-------|--------|--------|--------|
| Steel: DIN 1.4301 AISI 304 | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Steel: DIN 1.4401 AISI 316 | | | | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Steel: DIN 1.4539 AISI 904L | | | | | • | • | | • | • | • | • | • | • | • | • | • |
| Connection ★ | Rp | 1¼ | 1¼ (R 1¼) | 1¼ | 1½ (R 1½) | 2 (R 2) | 2 | 2½ (R 3) | 3 (R 3) | 3 4 (R 4) | 3 4 | 5 | 5 | 6 | 6 | 6 |
| | NPT | 1" | 1¼" | 1¼" | 1½" | 2" | 2" | 3" (3") | 3" (3") | 3" 4" (4") | 3" 4" | 5" | 5" | 6" | 6" | 6" |
| Flange connection: Grundfos flange | | | | | | | | | | | | 5" | 5" | 6" | 6" | 6" |

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

Motor range

| Motor output [kW] | 0.25 | 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 | | | |
|--|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|---|---|---|
| Single-phase | • | • | • | • | • | • | • | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Three-phase | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Industrial motor and MS6 T60-versions | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Rewindable motor | | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Steel: DIN 1.4301 AISI 304 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Steel: DIN 1.4301 and cast iron | | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Steel: DIN 1.4401 AISI 316 | | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Steel: DIN 1.4539 AISI 904L | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Built-in temperature transmitter in motor | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |

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

Soft starter or autotransformer is recommended above 75 kW.

Motors with star/delta are available from 5.5 kW.

Motor protection and controllers

| Motor output [kW] | 0.37 | 0.55 | 0.75 | 1.1 | 1.5 | 2.2 | 3.0 | 3.7 | 4.0 | 5.5 | 7.5 | 9.2 | 11 | 13 | 15 | 18.5 | 22 | 26 | 30 | 37 | 45 | 55 | 63 | 75 | 92 | 110 | 132 | 147 | 170 | 190 | | | | |
|----------------------------------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|---|---|---|---|
| MP 204 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | |
| Pt100 | | | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Zinc anode | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Vertical flow sleeve | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| Horizontal flow sleeve | • | • | • | • | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| SA-SPM | • | • | • | • | • | • | • | • | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R100 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| RS-485 communi- cation module | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| G100 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |

Motor protection of single-phase motors, see "Technical data" on page 73.

Features and benefits

A wide pump range

Grundfos offers energy-efficient submersible pumps ranging from 1 to 335 m³/h. The pump range consists of many pump sizes - and each pump size is available with an optional number of stages to match any duty point.

High pump efficiency

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

Example

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

Material and pumped liquids

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

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

SP N: DIN W.-Nr. 1.4401 (AISI 316)

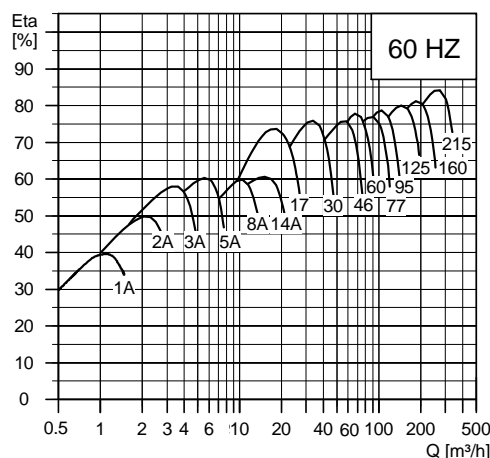
SP R: DIN W.-Nr. 1.4539 (AISI 904L)

Alternatively, a complete range of zinc anodes for cathodic protection is available, see page 88. For example this may be advisable for sea water applications.

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

Low installation costs

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



TM00 7575 2598

Fig. 1 Pump/motor efficiencies in relation to flow



Gr6389 - GrA4019

Fig. 2 Various SP pumps

Bearings with sand channels

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

Inlet strainer

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

Non-return valve

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

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

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

Priming screw

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

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

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

Stop ring

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

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

Example: SP 77

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

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

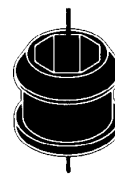


Fig. 3 Bearing

TM00 7301 1096

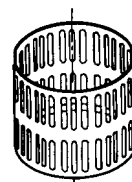


Fig. 4 Inlet strainer

TM00 7302 1096

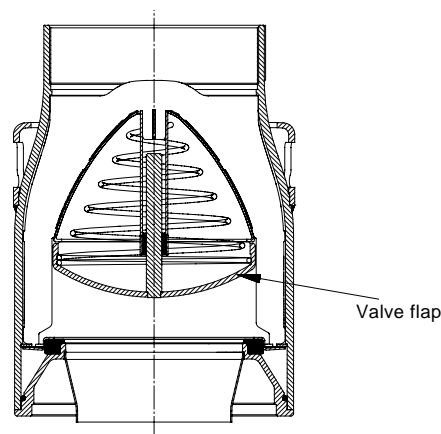


Fig. 5 Non-return valve

TM01 2499 1798

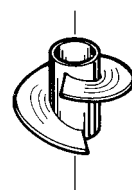


Fig. 6 Priming screw

TM00 7304 1096

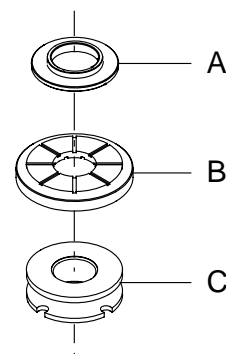


Fig. 7 Stop ring (rotating and stationary part) and the split cone

TM01 3327 3898

Material specification

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

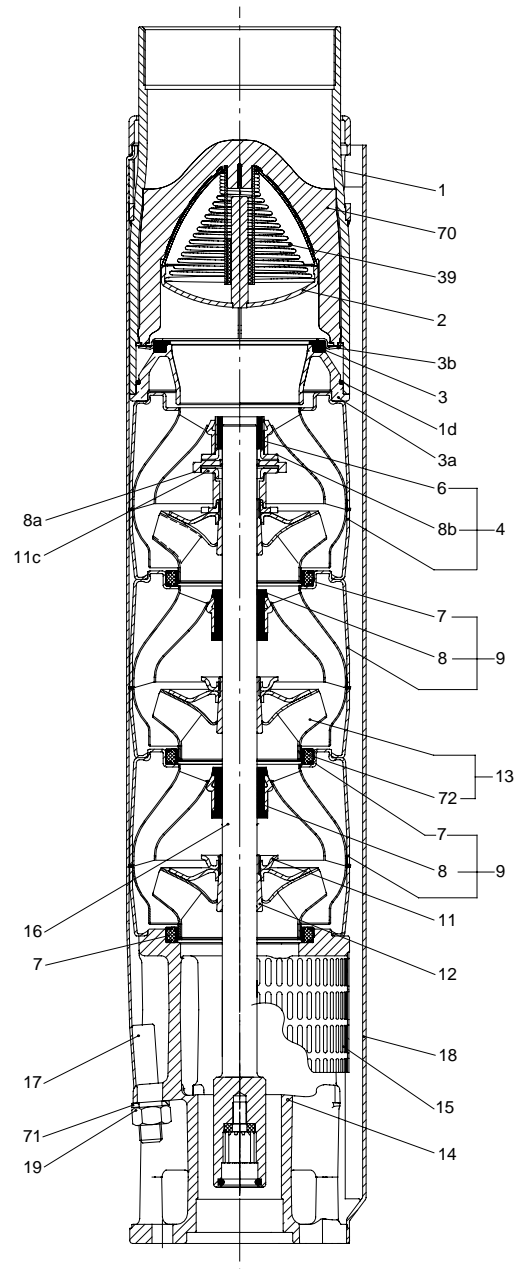


Fig. 8 SP 77

TM01 2359 2301

Features and benefits

A complete motor range

Grundfos offers a complete submersible motor range in different voltages:

Submersible motors, MS:

- 4" motors, single-phase up to 3.7 kW:
 - 2-wire
 - 3-wire
 - PSC (permanent split capacitor)
- 4" motors, three-phase up to 7.5 kW
- 6" motors, three-phase from 5.5 kW to 30 kW

Submersible, rewindable motors, MMS:

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

High motor efficiency

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

Rewindable motors

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

Industrial motors and MS6 T60-versions

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

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

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



Fig. 9 MS motors

TM00 7305 1096 - GrA4011 - GrA4013



Fig. 10 MMS motors

TM01 7873 4799

Overtemperature protection

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

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

- manual restart or
- automatic restart.

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

MS

The Grundfos MS submersible motors except MS 402 are available with a built-in Tempcon temperature transmitter for protection against overtemperature. By means of the transmitter it is possible to read out and/or monitor the motor temperature via an MP 204 or a PR 5714 relay.

The Grundfos MS6 submersible motors can be fitted with a Pt100. The Pt100 is fitted in the motor and connected directly to the MP 204 or monitored by the PR 5714 relay.

MMS

For the protection of the Grundfos MMS submersible motors against overtemperature Grundfos offers the Pt100 temperature sensor as an optional extra.

The Pt100 is fitted in the motor and connected directly to the MP 204 or monitored by the PR 5714 relay.

Protection against upthrust

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

Built-in cooling chambers

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

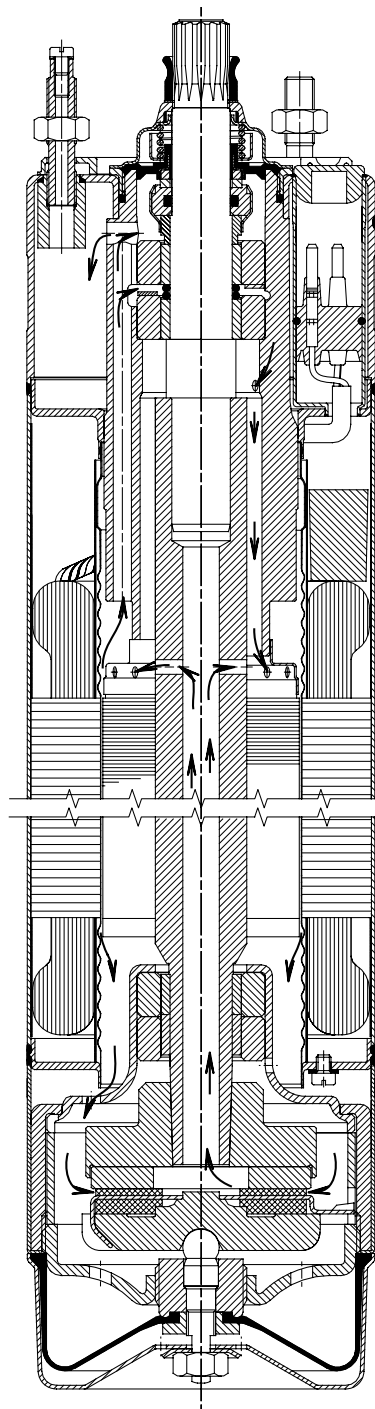


Fig. 11 MS 4000

TM00 5698 0996

Lightning protection

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

Reduced risk of short-circuit

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

Shaft seal

MS 402

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

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

MS 4000, MS6

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

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

MMS rewindable motors

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

The material features good wear resistance and resistance to particles.

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

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

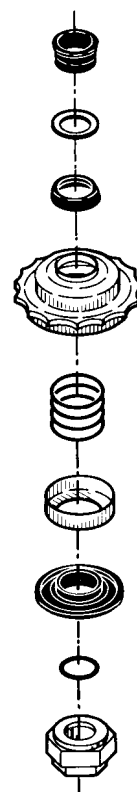


Fig. 12 Shaft seal, MS 4000



Fig. 13 Shaft seal, MS6

TM00 7306 2100

TM03 9225 3607

Material specification for MS motors

MS 402 and MS 4000 submersible motors

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

R-version motor

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

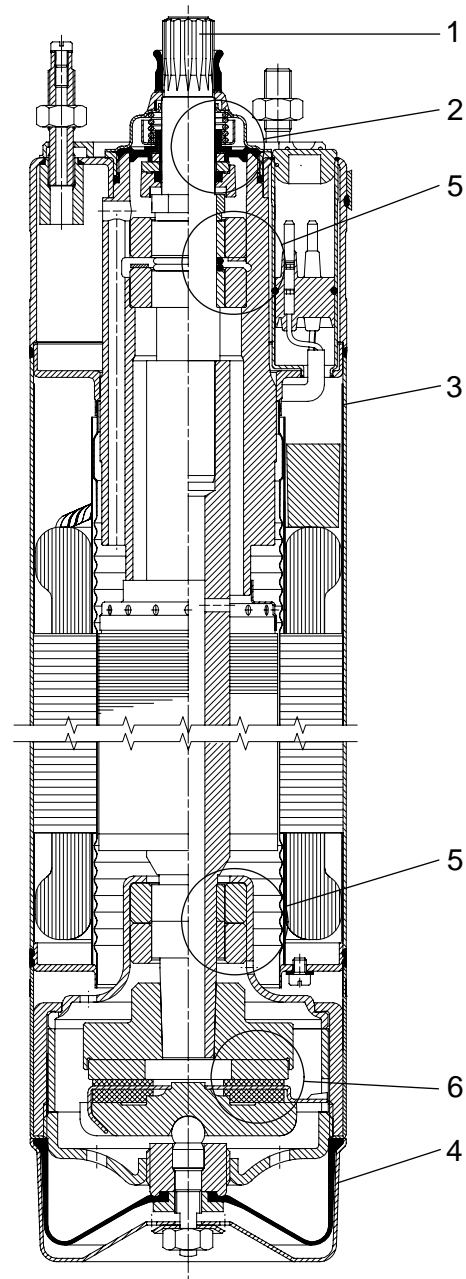


Fig. 14 MS 4000

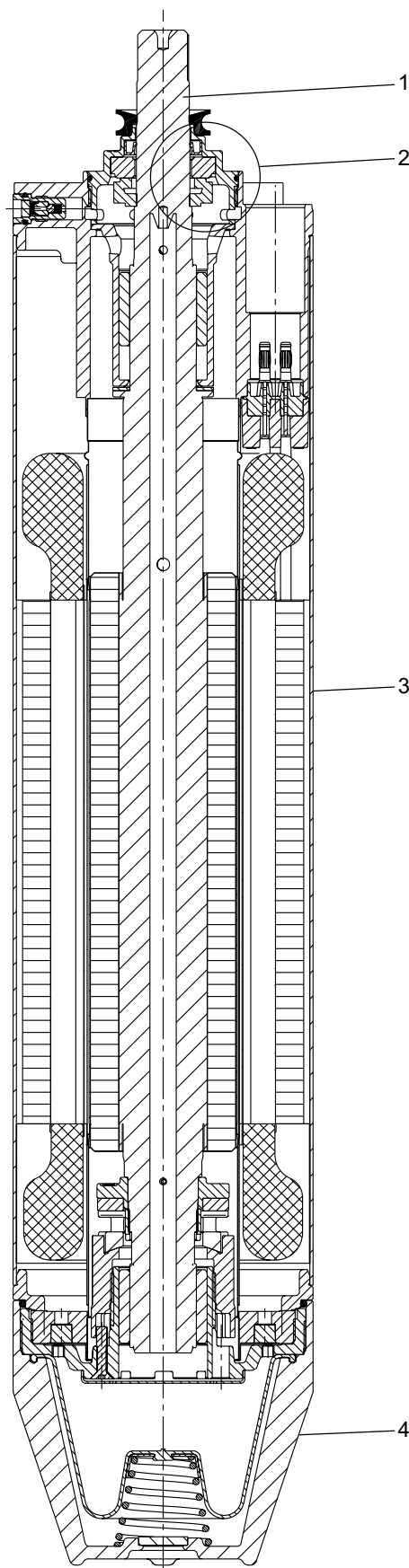
TM00 7865 2196

Material specification for MS6 motors

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

R-version motor

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



TM03 9226 3607

Fig. 15 MS6

Material specification for MMS motors

Submersible rewindable motors

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

N- and R-versions of MMS motors

| Pos. | Component | Material | Version | |
|-------------|--|---|-------------------------|----------------|
| | | | N | R* |
| | | | DIN/EN | DIN/EN |
| 202 | Shaft | Steel | 1.0533 | 1.0533 |
| 202a | Shaft ends | Stainless steel | 1.4460 | 1.4462 |
| 203/ 206 | Thrust bearing Stationary/ rotating part | 6" 3.7 - 15 kW 6" 18.5 - 37 kW 8"-10" | Hardened steel/ EPDM | Ceramic/carbon |
| 204 | Bearing bush | 6"-10" | Carbon | |
| 205 | Bearing housing, upper | Stainless steel | 1.4401 | 1.4539 |
| 212 | Diaphragm | CR | | |
| 213 | Motor end shield | Stainless steel | 1.4401 | 1.4539 |
| 218 | Motor sleeve | Stainless steel | 1.4401 | 1.4539 |
| 220 | Motor cable | EPDM | | |
| 226 | Shaft seal | Ceramic/carbon | | |
| 235 | Intermediate housing | Stainless steel | 1.4401 | 1.4539 |
| 236 | Bearing housing, lower | Stainless steel | 1.4401 | 1.4539 |

* Only MMS 6000 and MMS 8000 are available in R-versions

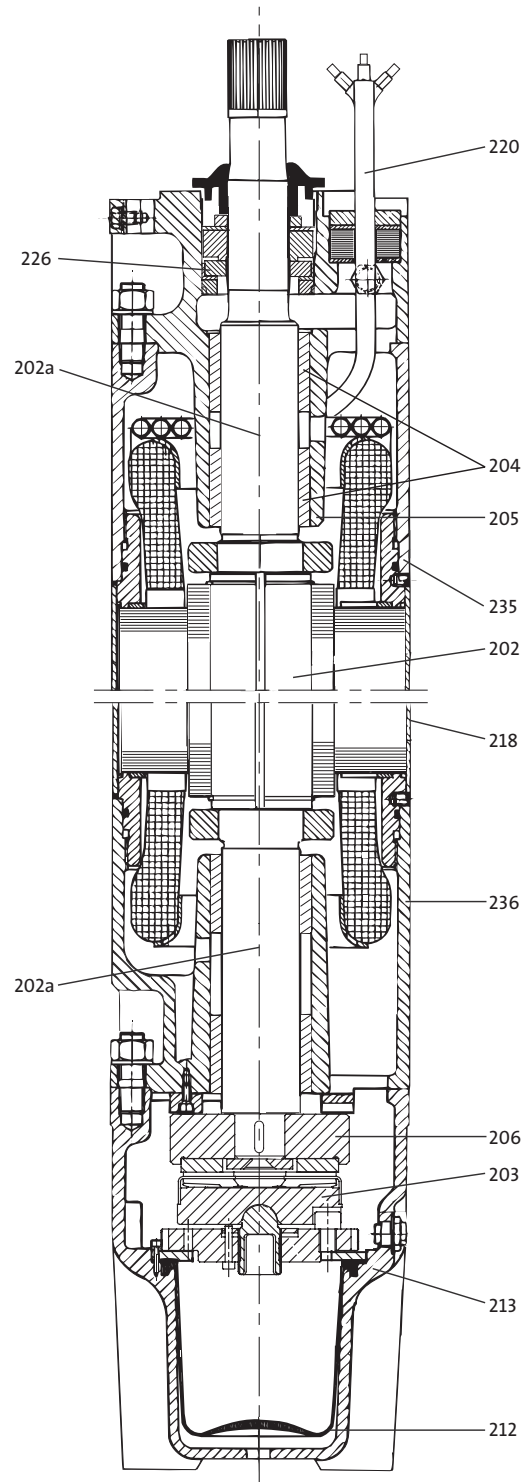
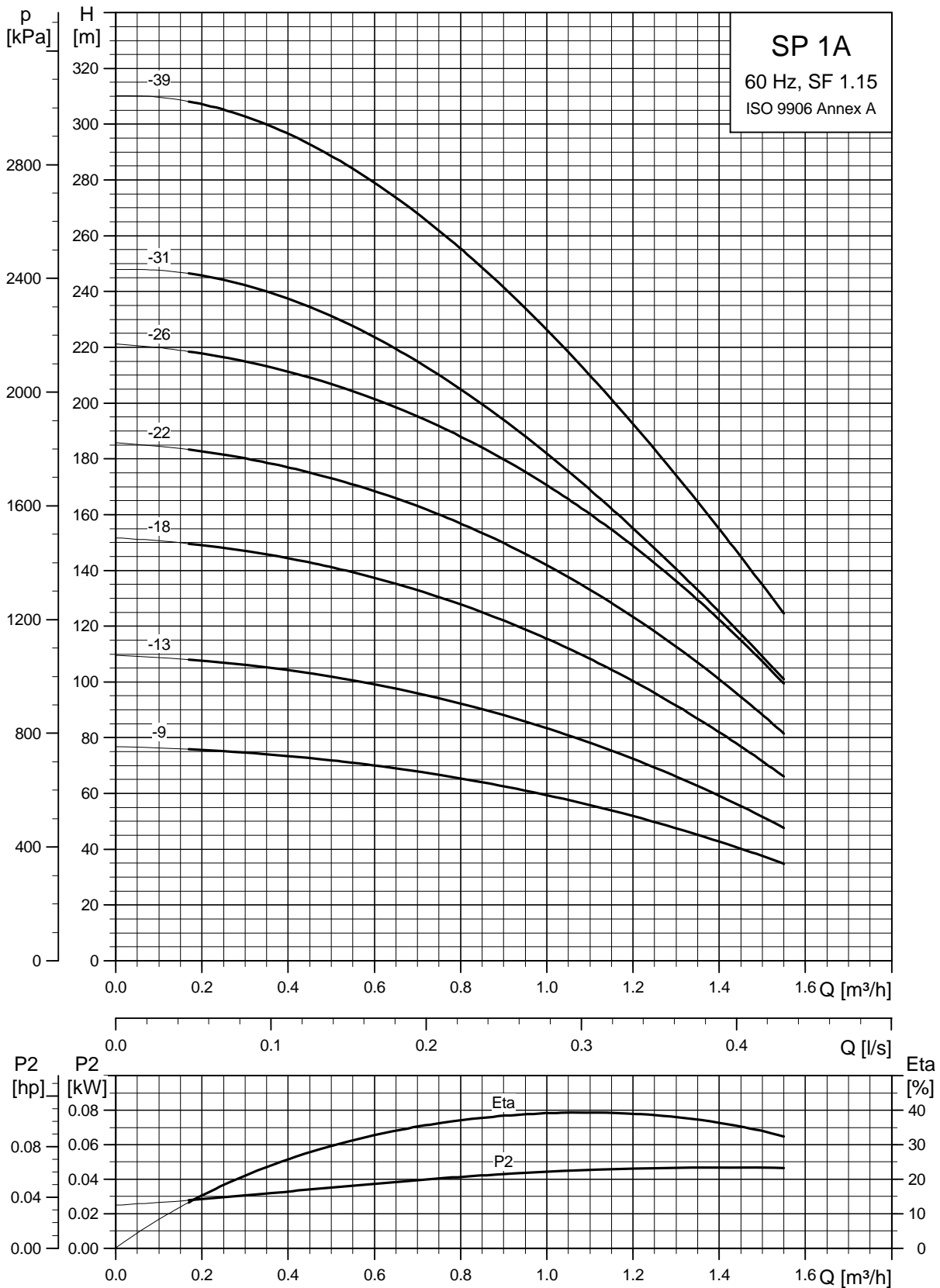


Fig. 16 MMS 10000

TM01 4985 0404

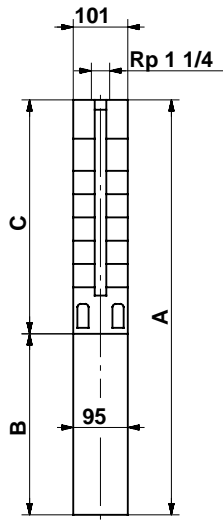
SP 1A



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

TM01 3419 1802

Dimensions and weights

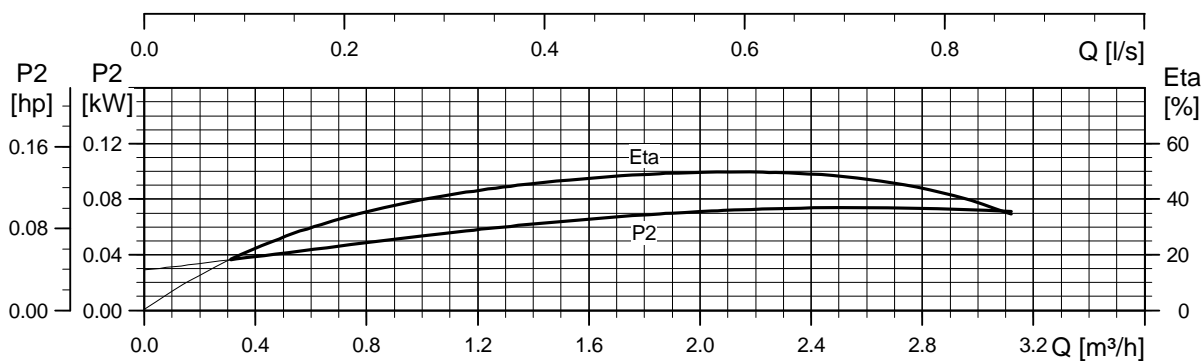
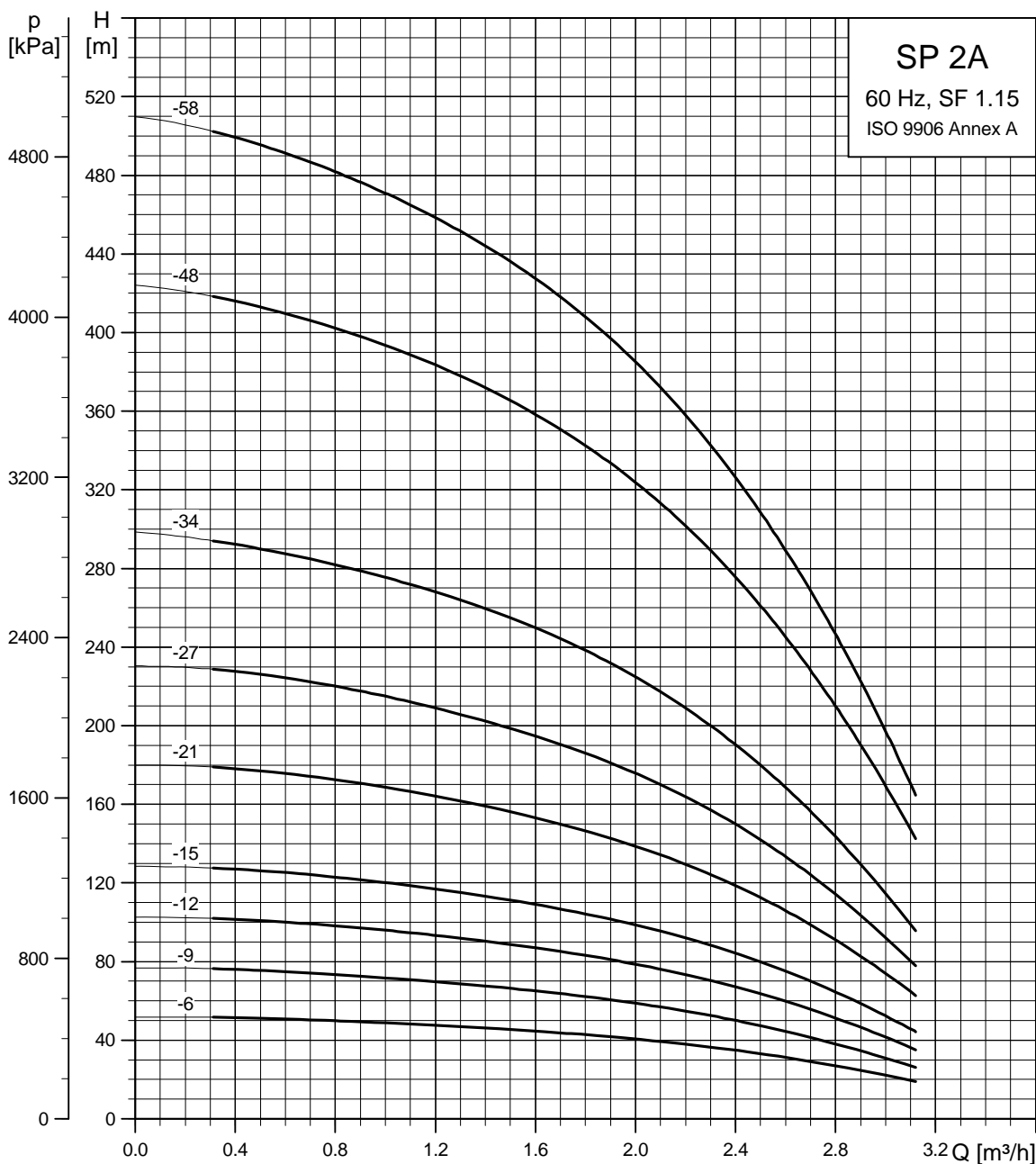


TM00 0955 1196

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

| Pump type | Motor | | C | Dimensions [mm] | | Net weight [kg] |
|-----------|--------|------------|------|-------------------------------------|-------------------------------------|-----------------|
| | Type | Power [kW] | | B | A | |
| | | | | 3 x 220 V 3 x 380 V 3 x 460 V | 3 x 220 V 3 x 380 V 3 x 460 V | |
| SP 1A-9 | MS 402 | 0.37 | 344 | 226 | 570 | 9 |
| SP 1A-13 | MS 402 | 0.37 | 428 | 226 | 654 | 10 |
| SP 1A-18 | MS 402 | 0.55 | 533 | 241 | 774 | 12 |
| SP 1A-22 | MS 402 | 0.75 | 617 | 276 | 893 | 14 |
| SP 1A-26 | MS 402 | 1.1 | 701 | 306 | 1007 | 16 |
| SP 1A-31 | MS 402 | 1.1 | 851 | 306 | 1157 | 22 |
| SP 1A-39 | MS 402 | 1.5 | 1019 | 346 | 1365 | 26 |

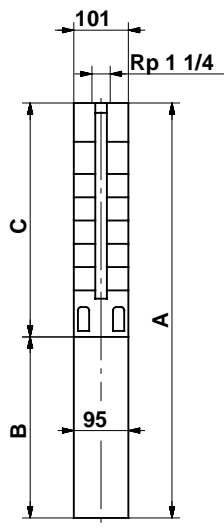
SP 2A



TM01 3420 1802

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

Dimensions and weights



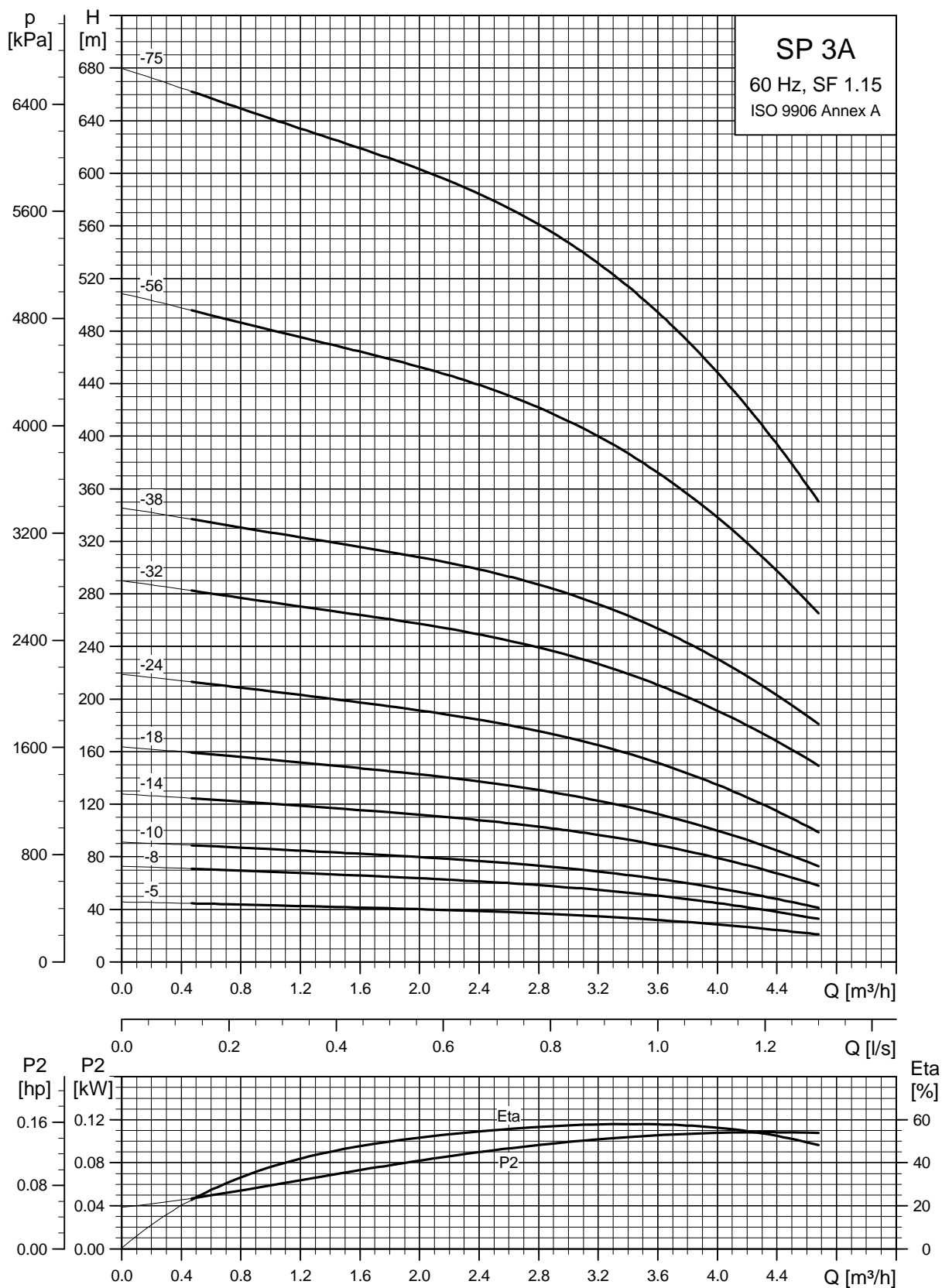
TM00 0955 1196

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

SP 2A-58 are mounted in sleeve for R 1 1/4 connection and with max. diameter 108 mm.

| Pump type | Motor | | Dimensions [mm] | | | | Net weight [kg] | | |
|-----------|---------|------------|-----------------|--------|----------------------------|--------|----------------------------|--------|----------------------------|
| | Type | Power [kW] | C | B | | A | | 1x220V | 3x220V 3x380V 3x460V |
| | | | | 1x220V | 3x220V 3x380V 3x460V | 1x220V | 3x220V 3x380V 3x460V | | |
| SP 2A-6 | MS 402 | 0.25 | 281 | 256 | | 537 | 10 | | |
| SP 2A-6 | MS 402 | 0.37 | 281 | | 226 | 507 | | 9 | |
| SP 2A-9 | MS 402 | 0.37 | 344 | 276 | 226 | 620 | 570 | 12 | |
| SP 2A-12 | MS 402 | 0.55 | 407 | 291 | 241 | 698 | 648 | 13 | |
| SP 2A-15 | MS 402 | 0.75 | 470 | 306 | 276 | 776 | 746 | 14 | |
| SP 2A-21 | MS 402 | 1.1 | 596 | 346 | 306 | 942 | 902 | 17 | |
| SP 2A-27 | MS 402 | 1.5 | 722 | | 346 | | 1068 | 18 | |
| SP 2A-34 | MS 4000 | 2.2 | 914 | | 453 | | 1367 | 30 | |
| SP 2A-48 | MS 4000 | 4.0 | 1208 | | 573 | | 1781 | 39 | |
| SP 2A-58 | MS 4000 | 4.0 | 1597 | | 573 | | 2170 | 50 | |

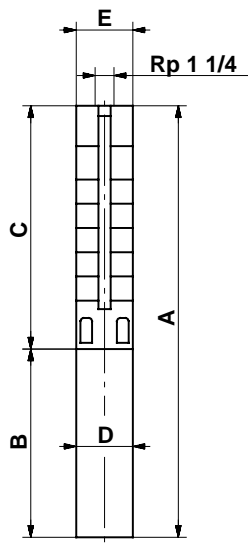
SP 2A



TM01 3421 1802

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

Dimensions and weights



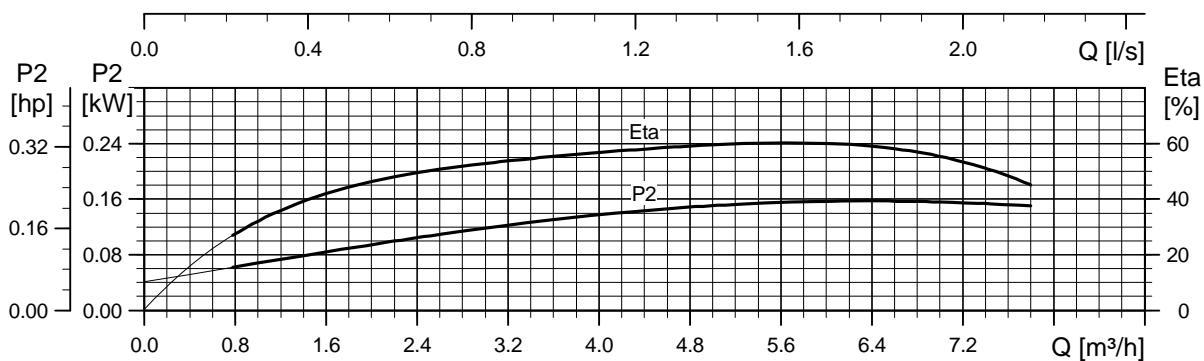
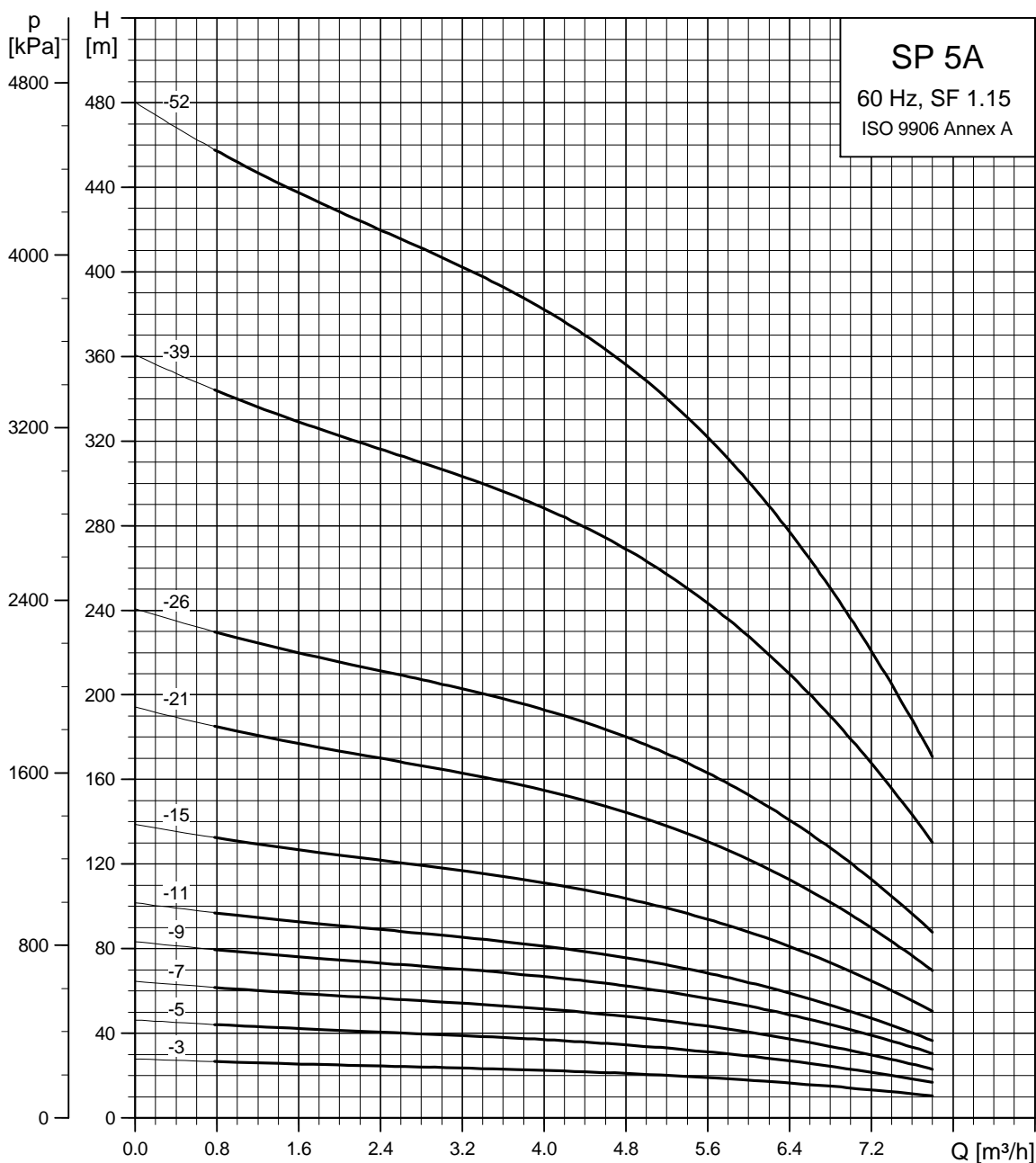
TM00 8521 3196

SP 3A-56 and SP 3A-75 are mounted in sleeve for R 1 1/4 connection.

| Pump type | Motor | | Dimensions [mm] | | | | | | | Net weight [kg] | |
|-----------|----------|------------|-----------------|--------|----------------------------|--------|----------------------------|-----|-----|-----------------|----------------------------|
| | Type | Power [kW] | C | B | | A | | D | E | Net weight [kg] | |
| | | | | 1x220V | 3x220V 3x380V 3x460V | 1x220V | 3x220V 3x380V 3x460V | | | 1x220V | 3x220V 3x380V 3x460V |
| SP 3A-5 | MS 402 | 0.37 | 260 | 256 | 226 | 516 | 486 | 95 | 101 | 11 | 8 |
| SP 3A-5N | MS 4000R | 0.75 | 305 | | 398 | | 703 | 95 | 101 | | 17 |
| SP 3A-8 | MS 402 | 0.55 | 323 | 291 | 241 | 614 | 564 | 95 | 101 | 12 | 10 |
| SP 3A-8N | MS 4000R | 0.75 | 368 | | 398 | | 766 | 95 | 101 | | 18 |
| SP 3A-10 | MS 402 | 0.75 | 365 | 306 | 276 | 671 | 641 | 95 | 101 | 13 | 12 |
| SP 3A-10N | MS 4000R | 0.75 | 410 | | 398 | | 808 | 95 | 101 | | 19 |
| SP 3A-14 | MS 402 | 1.1 | 449 | 346 | 306 | 795 | 755 | 95 | 101 | 15 | 14 |
| SP 3A-14N | MS 4000R | 1.1 | 494 | | 413 | | 907 | 95 | 101 | | 21 |
| SP 3A-18 | MS 402 | 1.5 | 533 | | 346 | | 879 | 95 | 101 | | 16 |
| SP 3A-18N | MS 4000R | 1.5 | 578 | | 413 | | 991 | 95 | 101 | | 23 |
| SP 3A-24 | MS 4000 | 2.2 | 659 | | 453 | | 1112 | 95 | 101 | | 23 |
| SP 3A-24N | MS 4000R | 2.2 | 704 | | 453 | | 1157 | 95 | 101 | | 27 |
| SP 3A-32 | MS 4000 | 3.0 | 872 | | 493 | | 1365 | 95 | 101 | | 30 |
| SP 3A-32N | MS 4000R | 3.0 | 872 | | 493 | | 1365 | 95 | 101 | | 30 |
| SP 3A-38 | MS 4000 | 4.0 | 998 | | 573 | | 1571 | 95 | 101 | | 36 |
| SP 3A-38N | MS 4000R | 4.0 | 998 | | 573 | | 1571 | 95 | 101 | | 36 |
| SP 3A-56 | MS 4000 | 5.5 | 1747 | | 673 | | 2420 | 95 | 101 | | 65 |
| SP 3A-56 | MS6 | 5.5 | 1747 | | 565 | | 2312 | 138 | 140 | | 75 |
| SP 3A-75 | MS6 | 7.5 | 2146 | | 590 | | 2736 | 138 | 140 | | 86 |

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

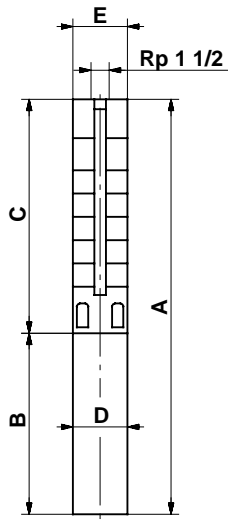
SP 5A



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

TM01 3422 1802

Dimensions and weights



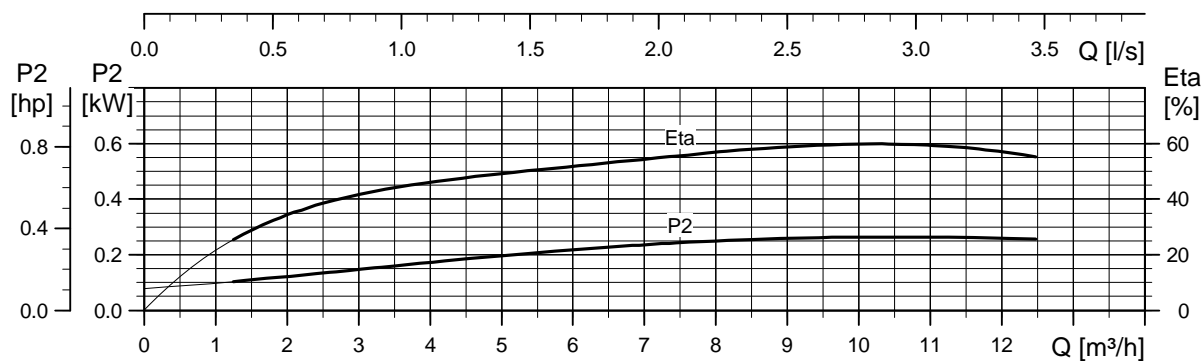
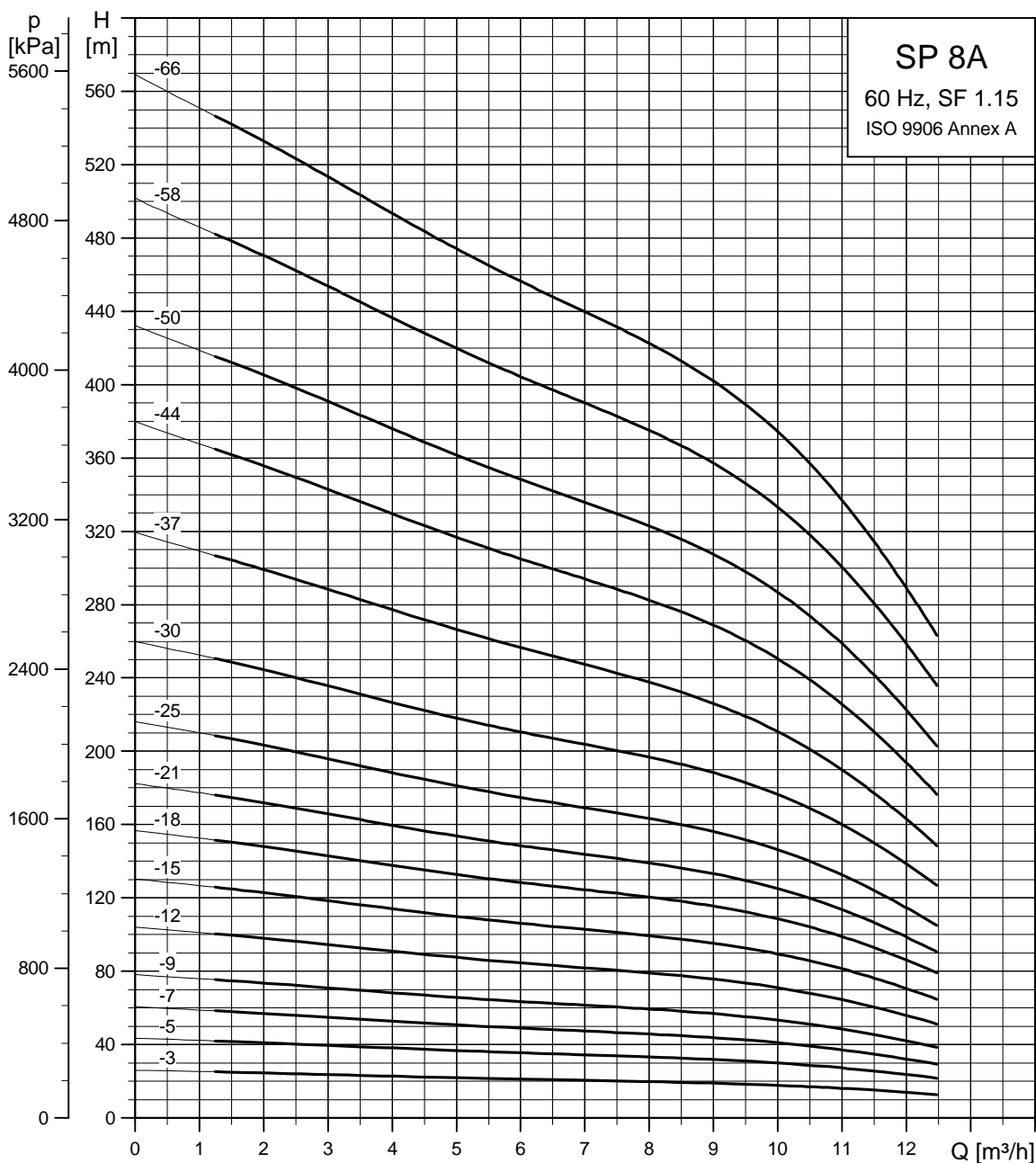
TM00 0956 1196

SP 5A-52 are mounted in sleeve for R 1½ connection.

| Pump type | Motor | | Dimensions [mm] | | | | | | | Net weight [kg] | |
|-----------|----------|------------|-----------------|--------|----------------------------|--------|----------------------------|-----|-----|-----------------|----------------------------|
| | Type | Power [kW] | C | B | | A | | D | E | | |
| | | | | 1x220V | 3x220V 3x380V 3x460V | 1x220V | 3x220V 3x380V 3x460V | | | 1x220V | 3x220V 3x380V 3x460V |
| SP 5A-3 | MS 402 | 0.37 | 219 | 276 | 226 | 495 | 445 | 95 | 101 | 10 | 8 |
| SP 5A-3N | MS 4000R | 0.75 | 263 | | 398 | | 661 | 95 | 101 | | 17 |
| SP 5A-5 | MS 402 | 0.55 | 261 | 291 | 241 | 552 | 502 | 95 | 101 | 11 | 9 |
| SP 5A-5N | MS 4000R | 0.75 | 305 | | 398 | | 703 | 95 | 101 | | 17 |
| SP 5A-7 | MS 402 | 0.75 | 303 | 306 | 276 | 609 | 579 | 95 | 101 | 12 | 11 |
| SP 5A-7N | MS 4000R | 0.75 | 347 | | 398 | | 745 | 95 | 101 | | 18 |
| SP 5A-9 | MS 402 | 1.1 | 345 | 346 | 306 | 691 | 651 | 95 | 101 | 14 | 13 |
| SP 5A-9N | MS 4000R | 1.1 | 389 | | 413 | | 802 | 95 | 101 | | 20 |
| SP 5A-11 | MS 402 | 1.5 | 387 | | 346 | | 733 | 95 | 101 | | 15 |
| SP 5A-11N | MS 4000R | 1.5 | 431 | | 413 | | 844 | 95 | 101 | | 20 |
| SP 5A-15 | MS 4000 | 2.2 | 471 | | 453 | | 924 | 95 | 101 | | 21 |
| SP 5A-15N | MS 4000R | 2.2 | 515 | | 453 | | 968 | 95 | 101 | | 24 |
| SP 5A-21 | MS 4000 | 3.0 | 597 | | 493 | | 1090 | 95 | 101 | | 23 |
| SP 5A-21N | MS 4000R | 3.0 | 641 | | 493 | | 1134 | 95 | 101 | | 26 |
| SP 5A-26 | MS 4000 | 4.0 | 702 | | 573 | | 1275 | 95 | 101 | | 29 |
| SP 5A-26N | MS 4000R | 4.0 | 746 | | 573 | | 1319 | 95 | 101 | | 32 |
| SP 5A-39 | MS 4000 | 5.5 | 1019 | | 673 | | 1692 | 95 | 101 | | 41 |
| SP 5A-39N | MS 4000R | 5.5 | 1019 | | 673 | | 1692 | 95 | 101 | | 41 |
| SP 5A-39 | MS6 | 5.5 | 1081 | | 565 | | 1646 | 143 | 138 | | 55 |
| SP 5A-39N | MS6R | 5.5 | 1081 | | 565 | | 1646 | 143 | 138 | | 55 |
| SP 5A-52 | MS6 | 7.5 | 1663 | | 590 | | 2253 | 143 | 140 | | 74 |

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

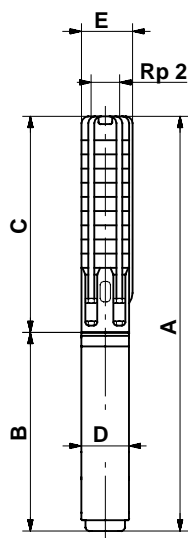
SP 8A



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

TM01 3423 1802

Dimensions and weights



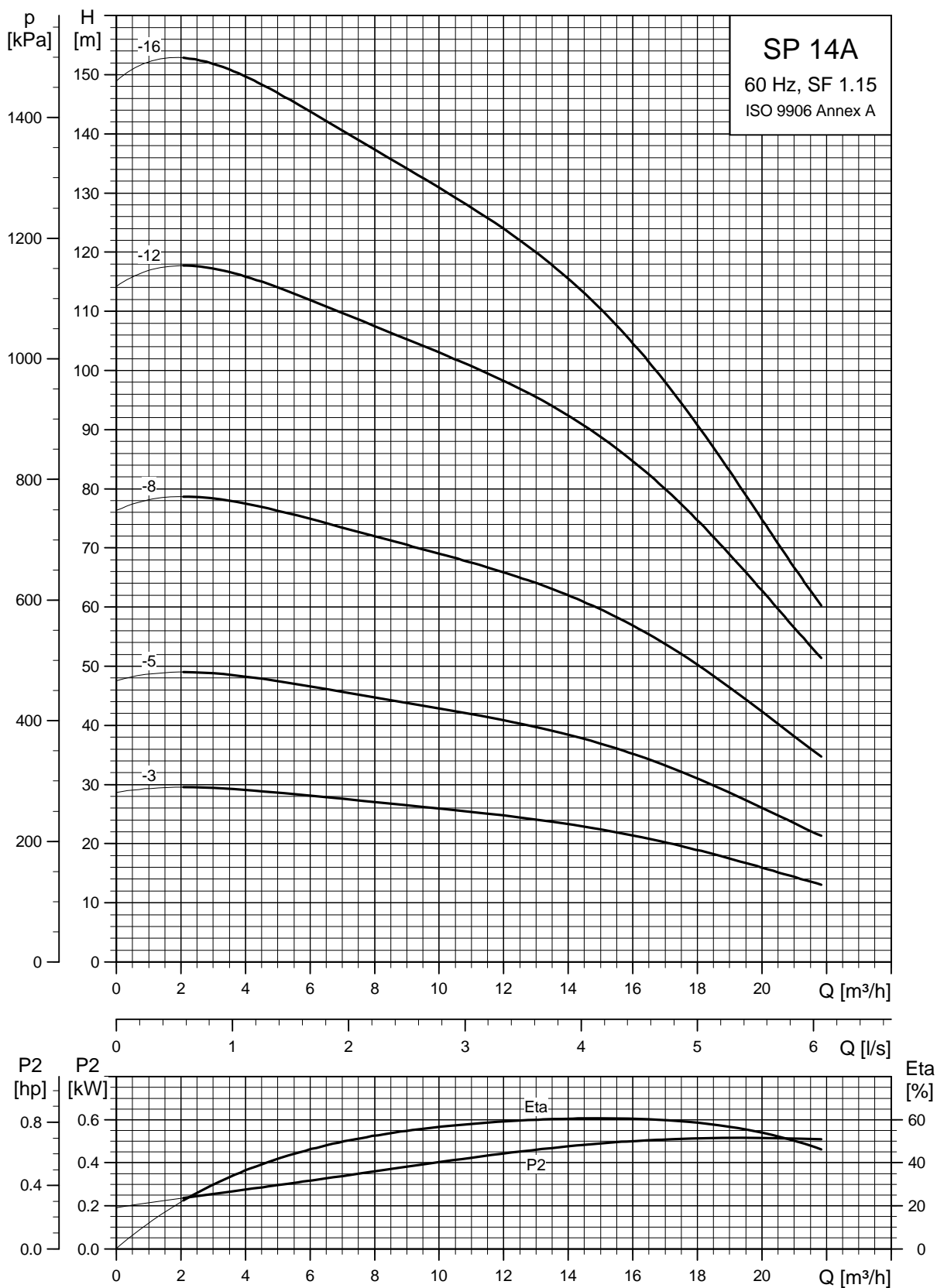
TM00 0957 1196

SP 8A-58(N) to SP 8A-66(N) are mounted in sleeve for R 2 connection.

| Pump type | Motor | | Dimensions [mm] | | | | | | | Net weight [kg] | |
|-----------|----------|------------|-----------------|--------|----------------------------|--------|----------------------------|-----|-----|-----------------|----------------------------|
| | Type | Power [kW] | C | B | | A | | D | E | 1x220V | 3x220V 3x380V 3x460V |
| | | | | 1x220V | 3x220V 3x380V 3x460V | 1x220V | 3x220V 3x380V 3x460V | | | | |
| SP 8A-3 | MS 402 | 0.55 | 325 | 291 | 241 | 616 | 566 | 95 | 101 | 13 | 11 |
| SP 8A-3N | MS 4000R | 0.75 | 325 | | 398 | | 723 | 95 | 101 | | 18 |
| SP 8A-3R | MS 4000R | 0.75 | 325 | | 398 | | 723 | 95 | 101 | | 18 |
| SP 8A-5 | MS 402 | 1.1 | 409 | 346 | 306 | 755 | 715 | 95 | 101 | 16 | 15 |
| SP 8A-5N | MS 4000R | 1.1 | 409 | | 413 | | 822 | 95 | 101 | | 20 |
| SP 8A-5R | MS 4000R | 1.1 | 409 | | 413 | | 822 | 95 | 101 | | 20 |
| SP 8A-7 | MS 402 | 1.5 | 493 | | 346 | | 839 | 95 | 101 | | 17 |
| SP 8A-7N | MS 4000R | 1.5 | 493 | | 413 | | 906 | 95 | 101 | | 21 |
| SP 8A-7R | MS 4000R | 1.5 | 493 | | 413 | | 906 | 95 | 101 | | 21 |
| SP 8A-9 | MS 4000 | 2.2 | 577 | | 453 | | 1030 | 95 | 101 | | 24 |
| SP 8A-9N | MS 4000R | 2.2 | 577 | | 453 | | 1030 | 95 | 101 | | 24 |
| SP 8A-9R | MS 4000R | 2.2 | 577 | | 453 | | 1030 | 95 | 101 | | 24 |
| SP 8A-12 | MS 4000 | 3.0 | 703 | | 493 | | 1196 | 95 | 101 | | 26 |
| SP 8A-12N | MS 4000R | 3.0 | 703 | | 493 | | 1196 | 95 | 101 | | 26 |
| SP 8A-12R | MS 4000R | 3.0 | 703 | | 493 | | 1196 | 95 | 101 | | 26 |
| SP 8A-15 | MS 4000 | 4.0 | 829 | | 573 | | 1402 | 95 | 101 | | 32 |
| SP 8A-15N | MS 4000R | 4.0 | 829 | | 573 | | 1402 | 95 | 101 | | 32 |
| SP 8A-15R | MS 4000R | 4.0 | 829 | | 573 | | 1402 | 95 | 101 | | 32 |
| SP 8A-18 | MS 4000 | 5.5 | 955 | | 673 | | 1628 | 95 | 101 | | 38 |
| SP 8A-18N | MS 4000R | 5.5 | 955 | | 673 | | 1628 | 95 | 101 | | 38 |
| SP 8A-21 | MS 4000 | 5.5 | 1081 | | 673 | | 1754 | 95 | 101 | | 40 |
| SP 8A-21N | MS 4000R | 5.5 | 1081 | | 673 | | 1754 | 95 | 101 | | 40 |
| SP 8A-25 | MS 4000 | 5.5 | 1249 | | 673 | | 1922 | 95 | 101 | | 42 |
| SP 8A-25N | MS 4000R | 5.5 | 1249 | | 673 | | 1922 | 95 | 101 | | 42 |
| SP 8A-30 | MS 4000 | 7.5 | 1459 | | 773 | | 2232 | 95 | 101 | | 50 |
| SP 8A-30N | MS 4000R | 7.5 | 1459 | | 773 | | 2232 | 95 | 101 | | 50 |
| SP 8A-18 | MS6 | 5.5 | 1017 | | 565 | | 1582 | 143 | 138 | | 50 |
| SP 8A-18N | MS6R | 5.5 | 1017 | | 565 | | 1582 | 143 | 138 | | 50 |
| SP 8A-21 | MS6 | 5.5 | 1143 | | 565 | | 1708 | 143 | 138 | | 51 |
| SP 8A-21N | MS6R | 5.5 | 1143 | | 565 | | 1708 | 143 | 138 | | 51 |
| SP 8A-25 | MS6 | 5.5 | 1311 | | 565 | | 1876 | 143 | 138 | | 53 |
| SP 8A-25N | MS6R | 5.5 | 1311 | | 565 | | 1876 | 143 | 138 | | 53 |
| SP 8A-30 | MS6 | 7.5 | 1521 | | 590 | | 2111 | 143 | 138 | | 59 |
| SP 8A-30N | MS6R | 7.5 | 1521 | | 590 | | 2111 | 143 | 138 | | 59 |
| SP 8A-37 | MS6 | 9.2 | 1815 | | 610 | | 2425 | 143 | 138 | | 69 |
| SP 8A-37N | MS6R | 9.2 | 1815 | | 610 | | 2425 | 143 | 138 | | 69 |
| SP 8A-44 | MS6 | 11.0 | 2109 | | 708 | | 2817 | 143 | 138 | | 75 |
| SP 8A-44N | MS6R | 11.0 | 2109 | | 708 | | 2817 | 143 | 138 | | 75 |
| SP 8A-50 | MS6 | 13.0 | 2677 | | 738 | | 3415 | 143 | 140 | | 103 |
| SP 8A-50N | MS6R | 13.0 | 2677 | | 738 | | 3415 | 143 | 140 | | 103 |
| SP 8A-58 | MS6 | 15.0 | 3013 | | 783 | | 3796 | 143 | 140 | | 114 |
| SP 8A-58N | MS6R | 15.0 | 3013 | | 783 | | 3796 | 143 | 140 | | 114 |
| SP 8A-66 | MS6 | 15.0 | 3349 | | 783 | | 4132 | 143 | 140 | | 121 |
| SP 8A-66N | MS6R | 15.0 | 3349 | | 783 | | 4132 | 143 | 140 | | 121 |

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

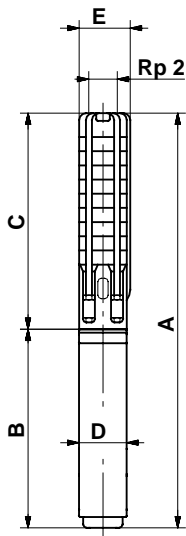
SP 14A



TM01 3424 1802

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

Dimensions and weights

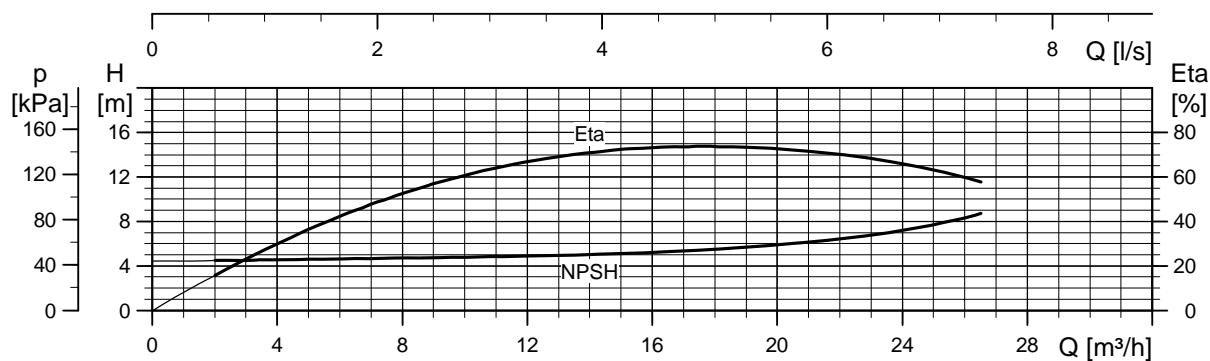
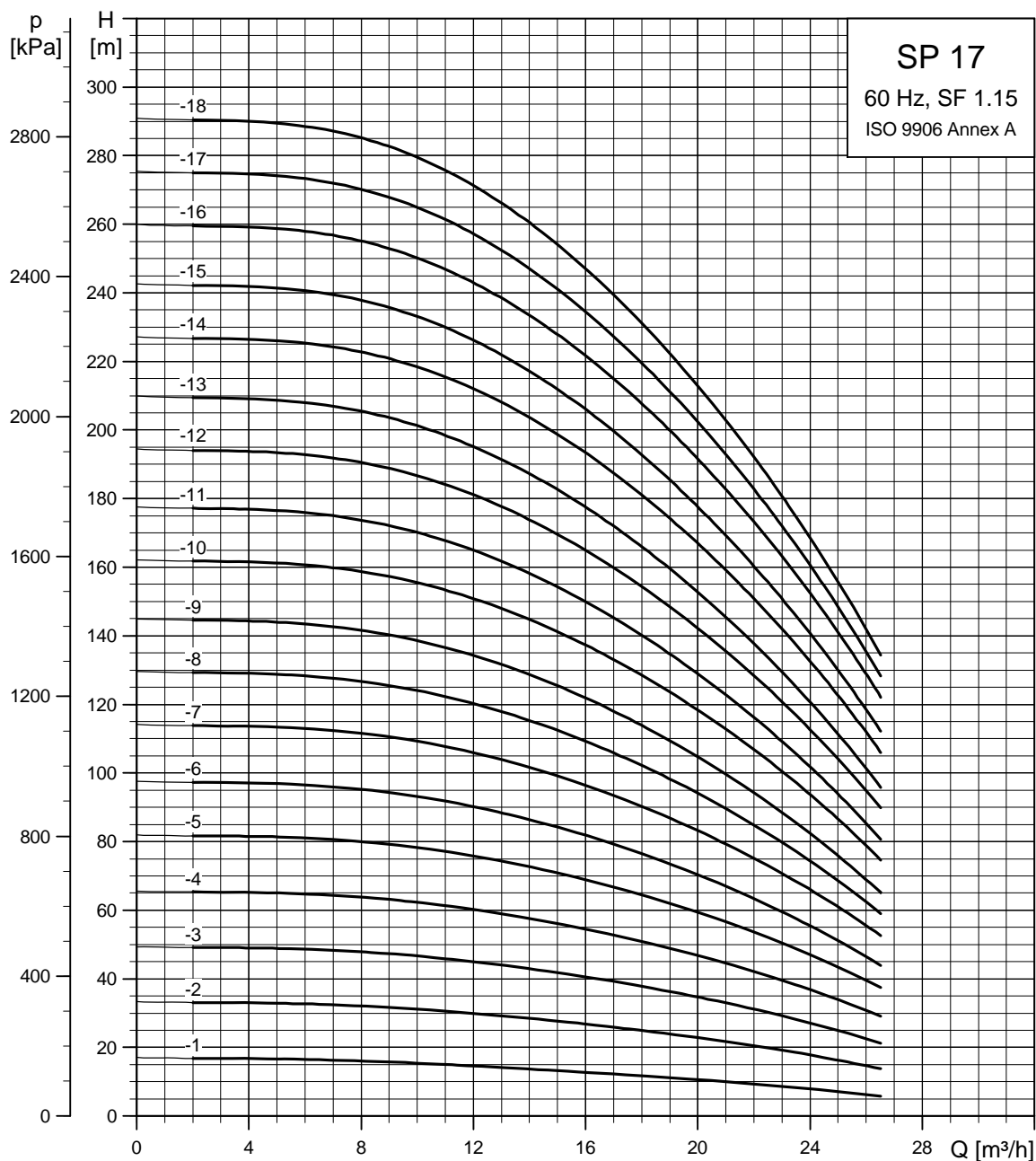


TM00 0957 1196

| Pump type | Motor | | Dimensions [mm] | | | | Net weight [kg] | |
|-----------|---------|------------|-----------------|----------------------------|----------------------------|-----|-----------------|----------------------------|
| | Type | Power [kW] | C | B | | D | E | 3x220V 3x380V 3x460V |
| | | | | 3x220V 3x380V 3x460V | 3x220V 3x380V 3x460V | | | |
| SP 14A-3 | MS 402 | 1.5 | 380 | 346 | 726 | 95 | 101 | 16 |
| SP 14A-5 | MS 4000 | 2.2 | 510 | 453 | 963 | 95 | 101 | 23 |
| SP 14A-8 | MS 402 | 4.0 | 705 | 573 | 1278 | 95 | 101 | 30 |
| SP 14A-12 | MS 4000 | 5.5 | 965 | 673 | 1638 | 95 | 101 | 37 |
| SP 14A-16 | MS 4000 | 7.5 | 1225 | 773 | 1998 | 95 | 101 | 50 |
| SP 14A-12 | MS6 | 5.5 | 1027 | 565 | 1592 | 143 | 138 | 48 |
| SP 14A-16 | MS6 | 7.5 | 1287 | 590 | 1877 | 143 | 138 | 54 |

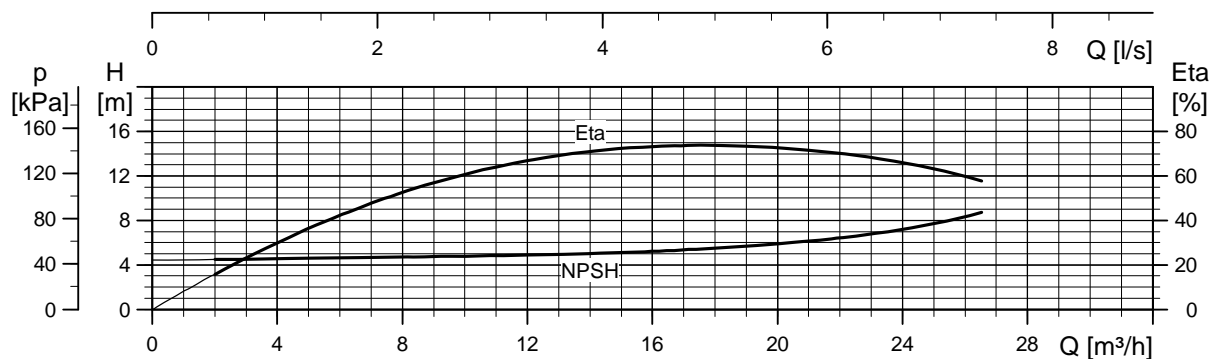
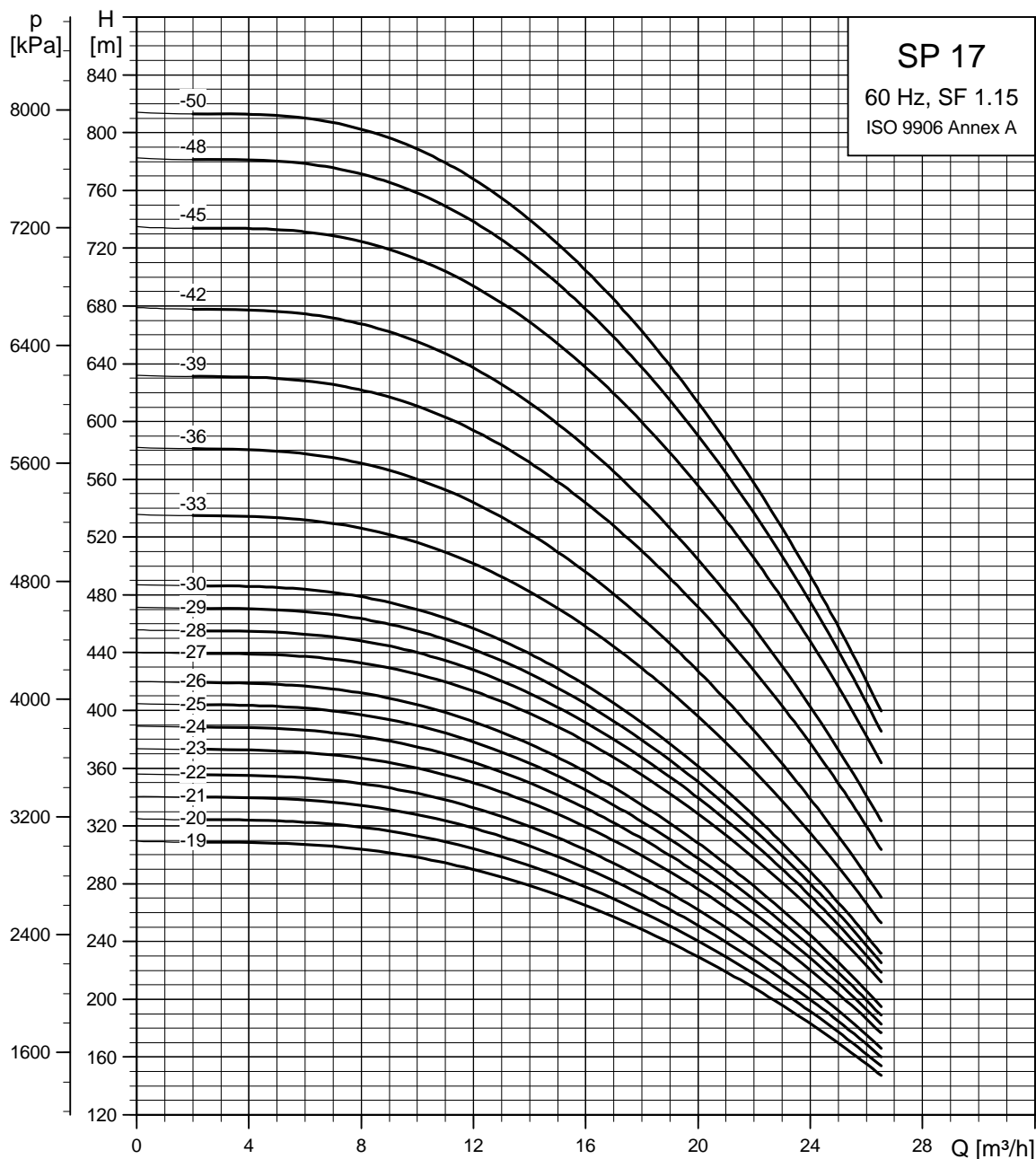
E = Maximum diameter of pump inclusive of cable guard and motor.

SP 17



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

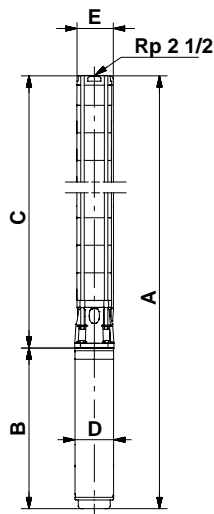
TM01 3309 1802



TM01 3310 1802

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

Dimensions and weights



TM01 2435 1798

SP 17-33 to SP 17-50 are mounted in sleeve for R 3 connection.

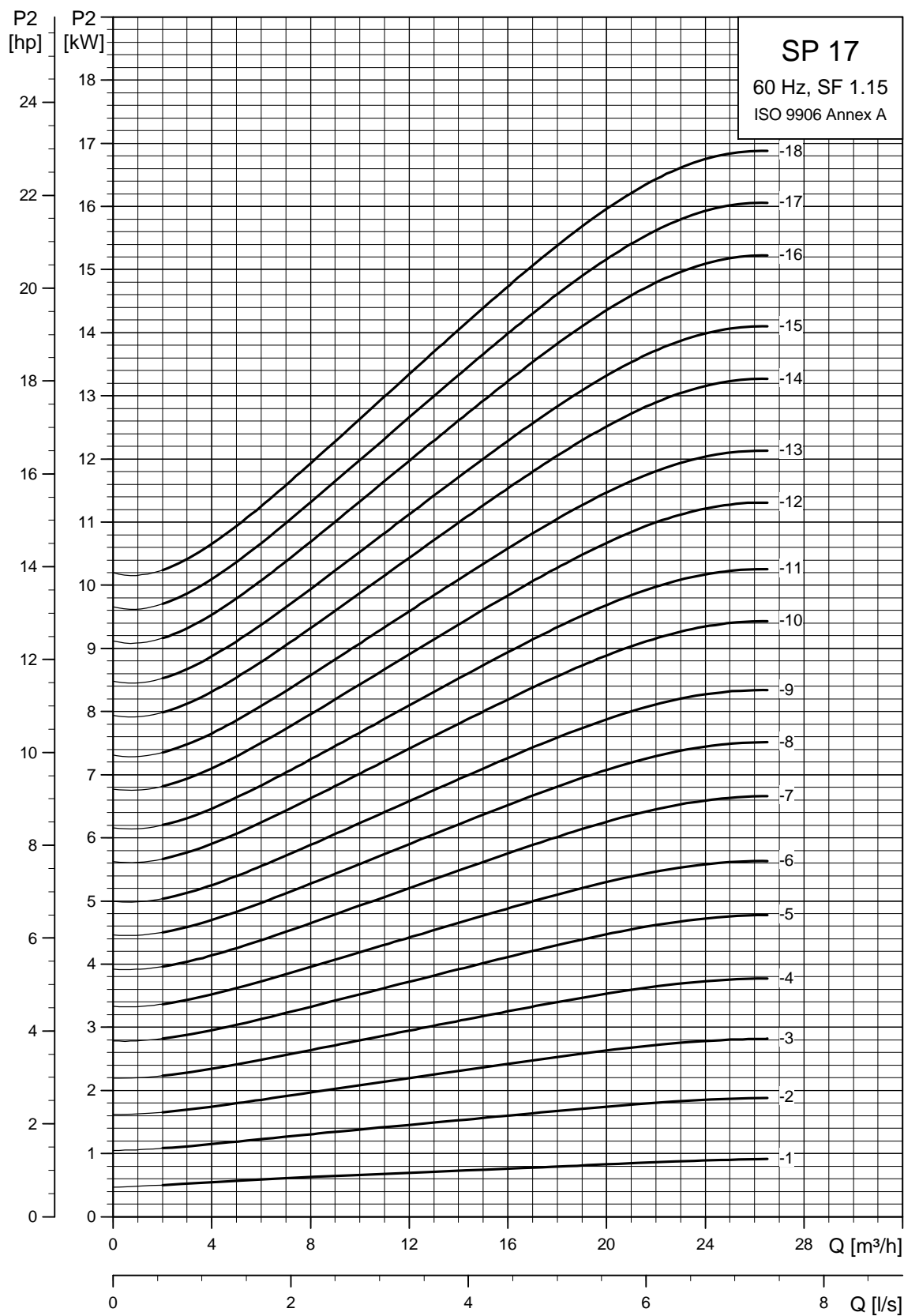
| Pump type | Motor | | Dimensions [mm] | | | | | Net weight [kg] | |
|-----------|----------|------------|-----------------|------|------|-----|-----|-----------------|-----|
| | Type | Power [kW] | C | B | A | D | E* | | E** |
| SP 17-1 | MS 4000 | 1.1 | 314 | 413 | 727 | 95 | 131 | 18 | |
| SP 17-2 | MS 4000 | 2.2 | 374 | 454 | 828 | 95 | 131 | 22 | |
| SP 17-3 | MS 4000 | 3 | 435 | 494 | 929 | 95 | 131 | 24 | |
| SP 17-4 | MS 4000 | 4 | 495 | 574 | 1069 | 95 | 131 | 29 | |
| SP 17-5 | MS 4000 | 5.5 | 556 | 674 | 1230 | 95 | 131 | 35 | |
| SP 17-6 | MS 4000 | 5.5 | 616 | 674 | 1290 | 95 | 131 | 36 | |
| SP 17-7 | MS 4000 | 7.5 | 677 | 773 | 1450 | 95 | 131 | 43 | |
| SP 17-8 | MS 4000 | 7.5 | 737 | 773 | 1510 | 95 | 131 | 44 | |
| SP 17-9 | MS 4000 | 7.5 | 798 | 773 | 1571 | 95 | 131 | 45 | |
| SP 17-5 | MS6 | 5.5 | 572 | 565 | 1137 | 143 | 142 | 47 | |
| SP 17-6 | MS6 | 5.5 | 632 | 565 | 1197 | 143 | 142 | 48 | |
| SP 17-7 | MS6 | 7.5 | 693 | 590 | 1283 | 143 | 142 | 50 | |
| SP 17-8 | MS6 | 7.5 | 753 | 590 | 1343 | 143 | 142 | 51 | |
| SP 17-9 | MS6 | 7.5 | 814 | 590 | 1404 | 143 | 142 | 52 | |
| SP 17-10 | MS6 | 9.2 | 874 | 610 | 1484 | 143 | 142 | 59 | |
| SP 17-11 | MS6 | 9.2 | 935 | 610 | 1545 | 143 | 142 | 60 | |
| SP 17-12 | MS6 | 11 | 995 | 708 | 1703 | 143 | 142 | 64 | |
| SP 17-13 | MS6 | 11 | 1056 | 708 | 1764 | 143 | 142 | 65 | |
| SP 17-14 | MS6 | 13 | 1116 | 738 | 1854 | 143 | 142 | 69 | |
| SP 17-15 | MS6 | 13 | 1177 | 738 | 1915 | 143 | 142 | 71 | |
| SP 17-16 | MS6 | 15 | 1237 | 783 | 2020 | 143 | 142 | 76 | |
| SP 17-17 | MS6 | 15 | 1298 | 783 | 2081 | 143 | 142 | 77 | |
| SP 17-18 | MS6 | 15 | 1358 | 783 | 2141 | 143 | 142 | 78 | |
| SP 17-19 | MS6 | 18.5 | 1419 | 838 | 2257 | 143 | 142 | 85 | |
| SP 17-20 | MS6 | 18.5 | 1479 | 838 | 2317 | 143 | 142 | 87 | |
| SP 17-21 | MS6 | 18.5 | 1540 | 838 | 2378 | 143 | 142 | 88 | |
| SP 17-22 | MS6 | 18.5 | 1600 | 838 | 2438 | 143 | 142 | 89 | |
| SP 17-23 | MS6 | 22 | 1661 | 903 | 2564 | 143 | 142 | 96 | |
| SP 17-24 | MS6 | 22 | 1721 | 903 | 2624 | 143 | 142 | 97 | |
| SP 17-25 | MS6 | 22 | 1782 | 903 | 2685 | 143 | 142 | 99 | |
| SP 17-26 | MS6 | 22 | 1842 | 903 | 2745 | 143 | 142 | 100 | |
| SP 17-27 | MS6 | 26 | 1903 | 968 | 2871 | 143 | 142 | 106 | |
| SP 17-28 | MS6 | 26 | 1963 | 968 | 2931 | 143 | 142 | 107 | |
| SP 17-29 | MS6 | 26 | 2024 | 968 | 2992 | 143 | 142 | 108 | |
| SP 17-30 | MS6 | 26 | 2084 | 968 | 3052 | 143 | 142 | 110 | |
| SP 17-33 | MS6 | 30 | 2513 | 1023 | 3536 | 143 | 175 | 155 | |
| SP 17-36 | MS6 | 30 | 2694 | 1023 | 3717 | 143 | 175 | 160 | |
| SP 17-39 | MMS 6000 | 37 | 2876 | 1425 | 4301 | 136 | 175 | 203 | |
| SP 17-42 | MMS 6000 | 37 | 3057 | 1425 | 4482 | 144 | 175 | 181 | 208 |
| SP 17-45 | MMS 8000 | 45 | 3188 | 1270 | 4458 | 192 | 192 | 192 | 276 |
| SP 17-48 | MMS 8000 | 45 | 3369 | 1270 | 4639 | 192 | 192 | 192 | 281 |
| SP 17-50 | MMS 8000 | 45 | 3490 | 1270 | 4760 | 192 | 192 | 192 | 285 |

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

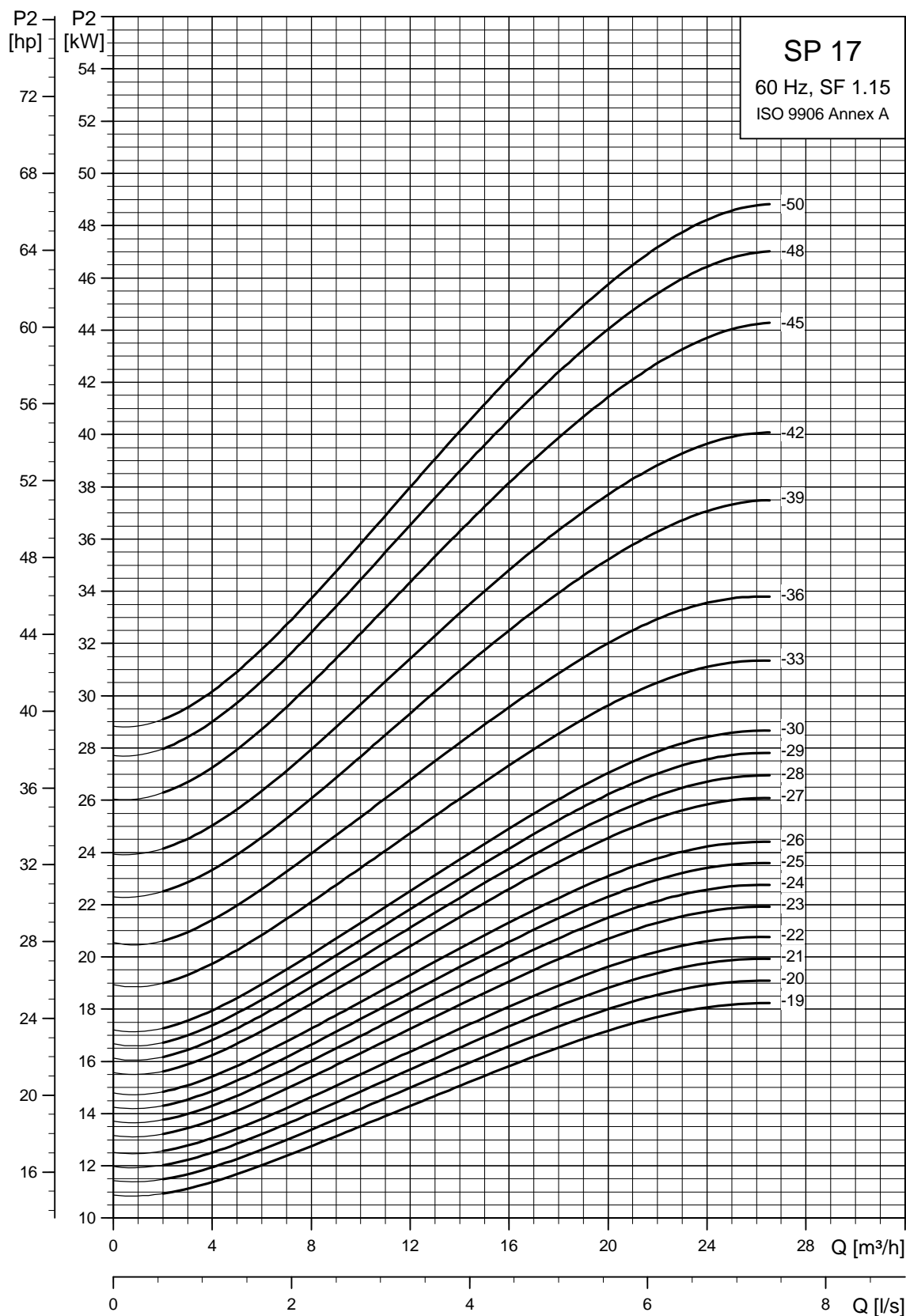
The pump types above are also available in N- and R-versions (R-versions up to and including SP 17-30), see page 5 for further details. Dimensions as above.

Other types of connection are possible by means of connecting flanges, see page 86.



TM01 2342 1802

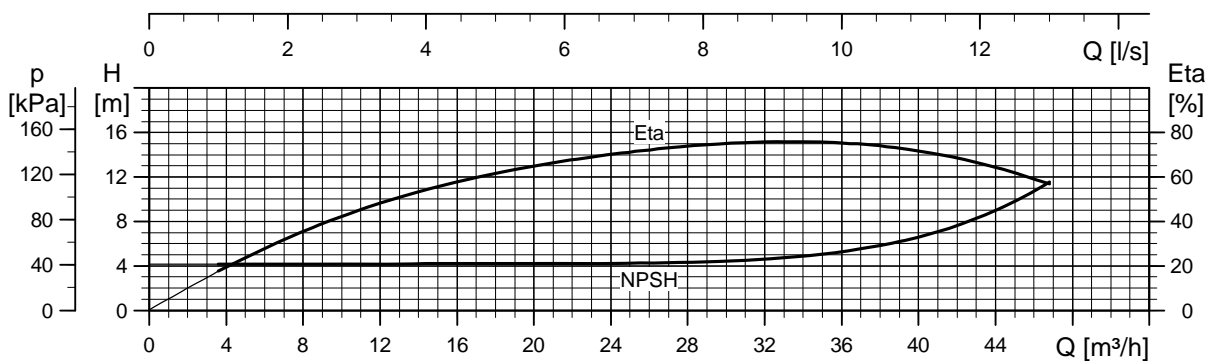
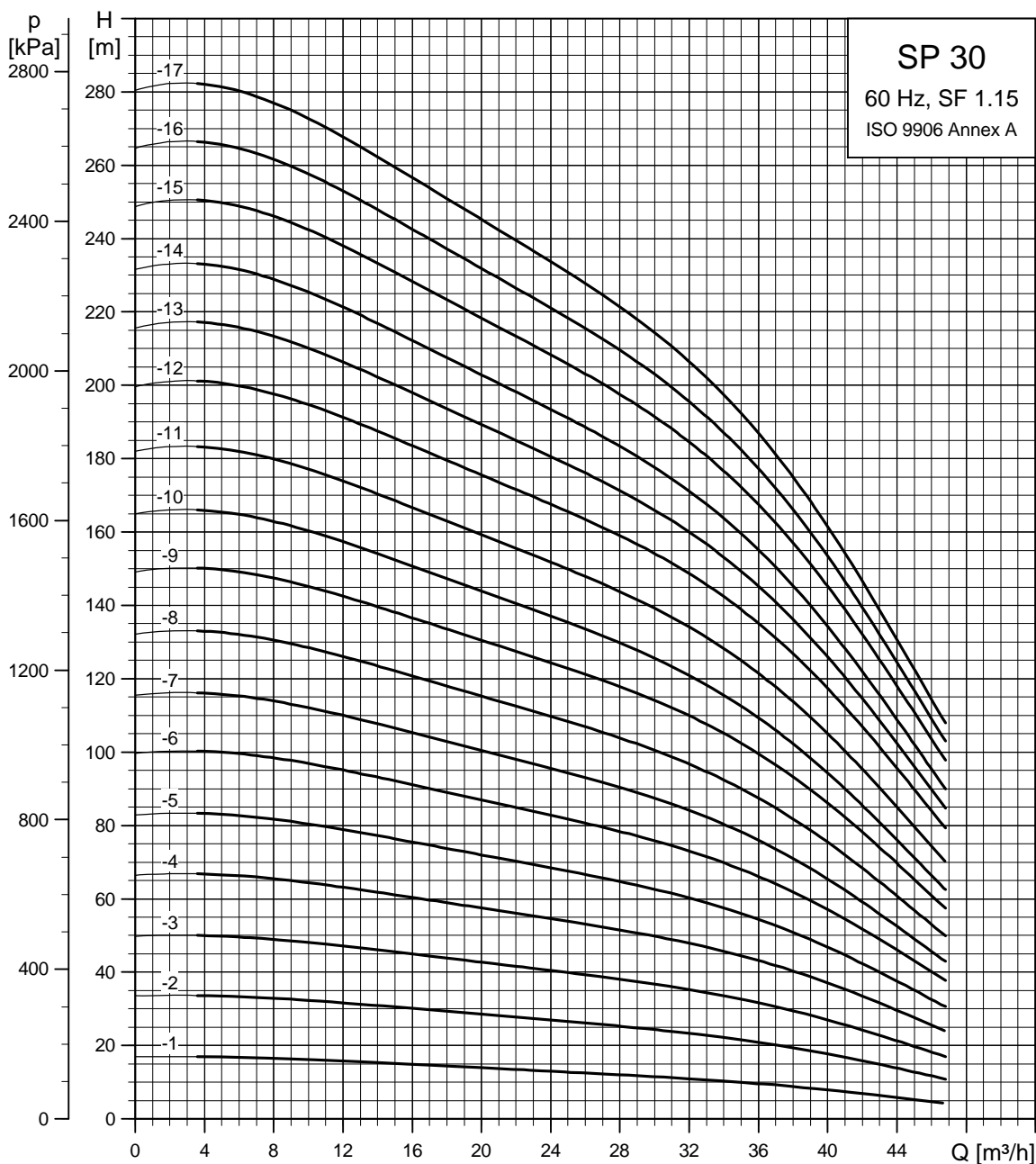
Explanation of efficiency curve, please see "Curve conditions" on page 4.



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

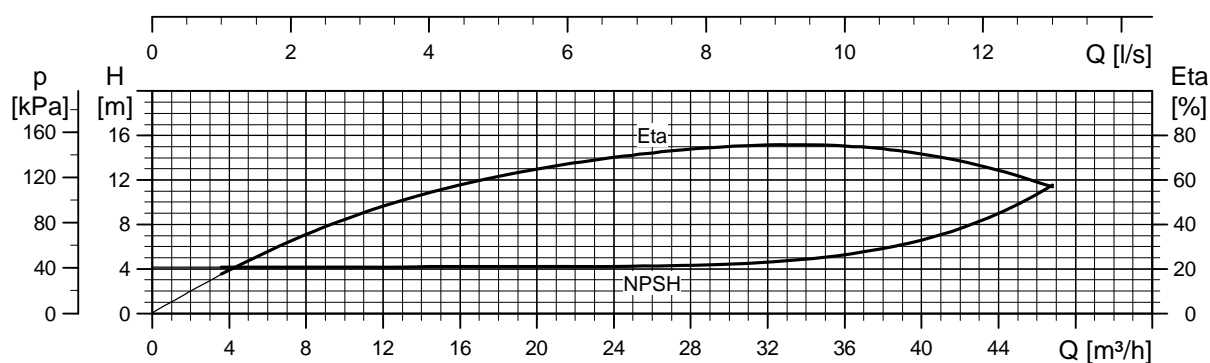
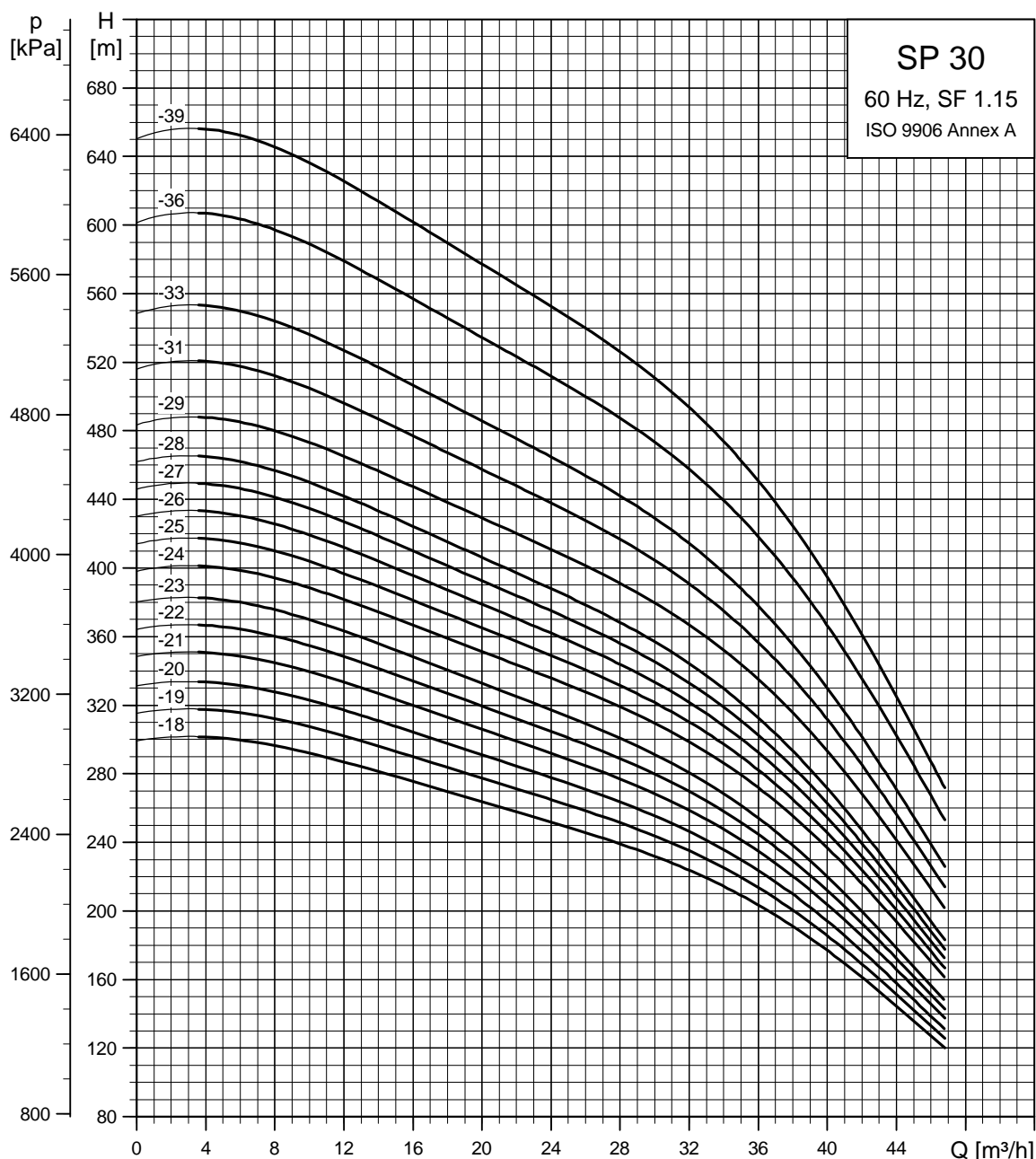
TM01 9243 1802

SP 30



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

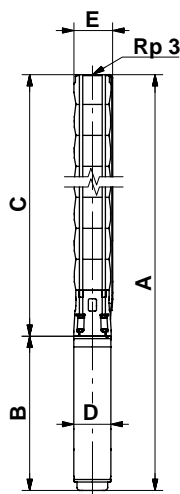
TM01 3311 1802



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

TM01 3312 1802

Dimensions and weights



TM00 0960 1196

SP 30-29 to SP 30-39 are mounted in sleeve for R 3 connection.

| Pump type | Motor | | Dimensions [mm] | | | | | Net weight [kg] |
|-----------|----------|------------|-----------------|------|------|-----|-----|-----------------|
| | Type | Power [kW] | C | B | A | D | E* | |
| SP 30-1 | MS 4000 | 1.5 | 349 | 413 | 762 | 95 | 131 | 21 |
| SP 30-2 | MS 4000 | 3 | 445 | 494 | 939 | 95 | 131 | 24 |
| SP 30-3 | MS 4000 | 4 | 541 | 574 | 1115 | 95 | 131 | 29 |
| SP 30-4 | MS 4000 | 5.5 | 637 | 674 | 1311 | 95 | 131 | 36 |
| SP 30-5 | MS 4000 | 7.5 | 733 | 773 | 1506 | 95 | 131 | 43 |
| SP 30-4 | MS6 | 5.5 | 653 | 565 | 1218 | 143 | 142 | 47 |
| SP 30-5 | MS6 | 7.5 | 749 | 590 | 1339 | 143 | 142 | 50 |
| SP 30-6 | MS6 | 9.2 | 845 | 610 | 1455 | 143 | 142 | 57 |
| SP 30-7 | MS6 | 9.2 | 941 | 610 | 1551 | 143 | 142 | 59 |
| SP 30-8 | MS6 | 11 | 1037 | 708 | 1745 | 143 | 142 | 63 |
| SP 30-9 | MS6 | 13 | 1133 | 738 | 1871 | 143 | 142 | 68 |
| SP 30-10 | MS6 | 13 | 1229 | 738 | 1967 | 143 | 142 | 70 |
| SP 30-11 | MS6 | 15 | 1325 | 783 | 2108 | 143 | 142 | 75 |
| SP 30-12 | MS6 | 18.5 | 1421 | 838 | 2259 | 143 | 142 | 83 |
| SP 30-13 | MS6 | 18.5 | 1517 | 838 | 2355 | 143 | 142 | 84 |
| SP 30-14 | MS6 | 18.5 | 1613 | 838 | 2451 | 143 | 142 | 86 |
| SP 30-15 | MS6 | 22 | 1709 | 903 | 2612 | 143 | 142 | 94 |
| SP 30-16 | MS6 | 22 | 1805 | 903 | 2708 | 143 | 142 | 95 |
| SP 30-17 | MS6 | 22 | 1901 | 903 | 2804 | 143 | 142 | 97 |
| SP 30-18 | MS6 | 26 | 1997 | 968 | 2965 | 143 | 142 | 104 |
| SP 30-19 | MS6 | 26 | 2093 | 968 | 3061 | 143 | 142 | 106 |
| SP 30-20 | MS6 | 26 | 2189 | 968 | 3157 | 143 | 142 | 108 |
| SP 30-21 | MS6 | 30 | 2285 | 1023 | 3308 | 143 | 144 | 117 |
| SP 30-22 | MS6 | 30 | 2381 | 1023 | 3404 | 143 | 144 | 119 |
| SP 30-23 | MS6 | 30 | 2477 | 1023 | 3500 | 143 | 144 | 121 |
| SP 30-24 | MMS 6000 | 37 | 2573 | 1425 | 3998 | 144 | 175 | 170 |
| SP 30-25 | MMS 6000 | 37 | 2669 | 1425 | 4094 | 144 | 175 | 171 |
| SP 30-26 | MMS 6000 | 37 | 2765 | 1425 | 4190 | 144 | 175 | 173 |
| SP 30-27 | MMS 6000 | 37 | 2861 | 1425 | 4286 | 144 | 175 | 175 |
| SP 30-28 | MMS 6000 | 37 | 2957 | 1425 | 4382 | 144 | 175 | 176 |
| SP 30-29 | MMS 8000 | 45 | 3249 | 1270 | 4519 | 192 | 192 | 280 |
| SP 30-31 | MMS 8000 | 45 | 3441 | 1270 | 4711 | 192 | 192 | 285 |
| SP 30-33 | MMS 8000 | 45 | 3633 | 1270 | 4903 | 192 | 192 | 290 |
| SP 30-36 | MMS 8000 | 55 | 3921 | 1350 | 5271 | 192 | 192 | 313 |
| SP 30-39 | MMS 8000 | 55 | 4209 | 1350 | 5559 | 192 | 192 | 322 |

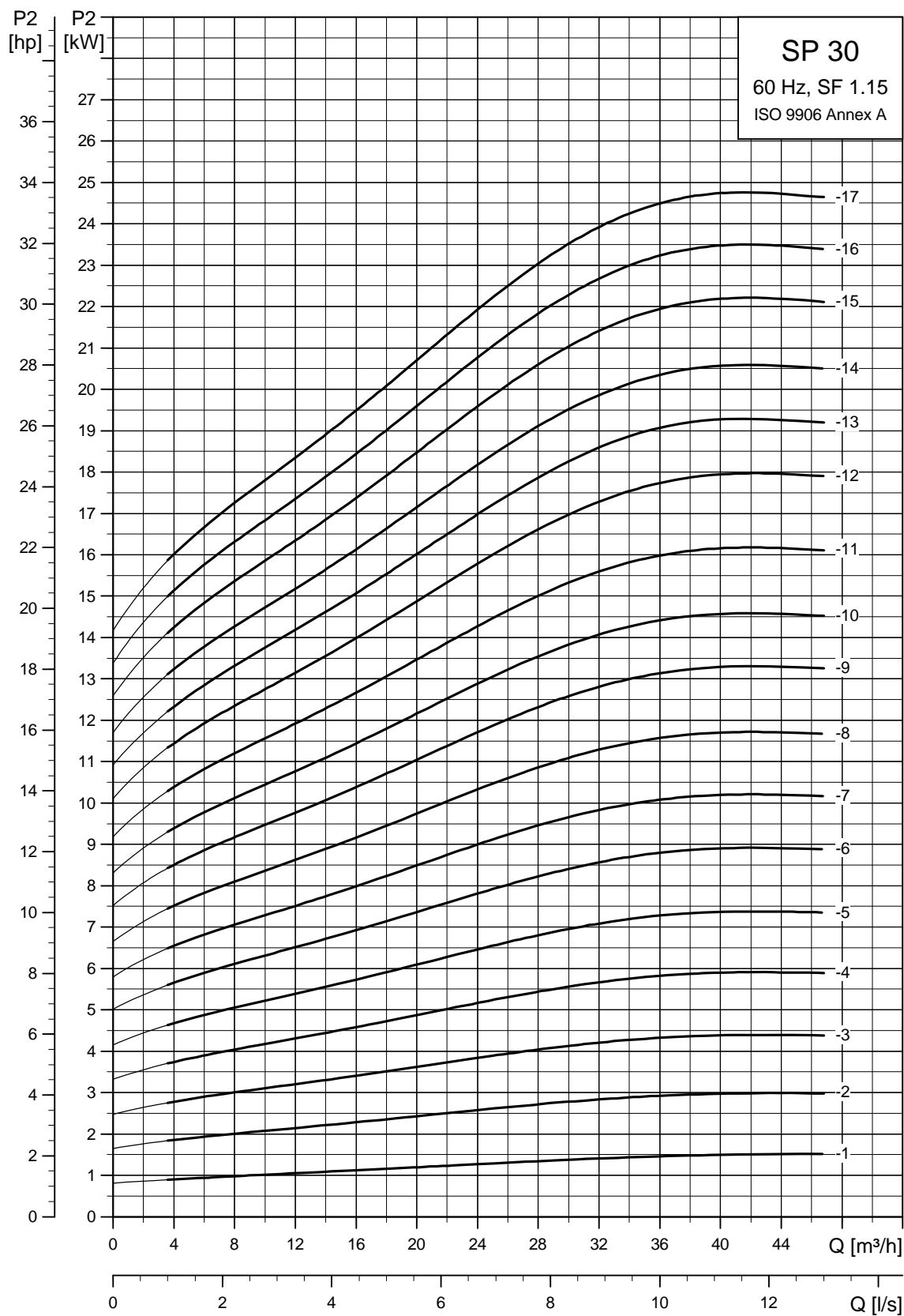
* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

The pump types above are also available in N and R-versions (R-versions up to and including SP 30-28), see page 5 for further details.

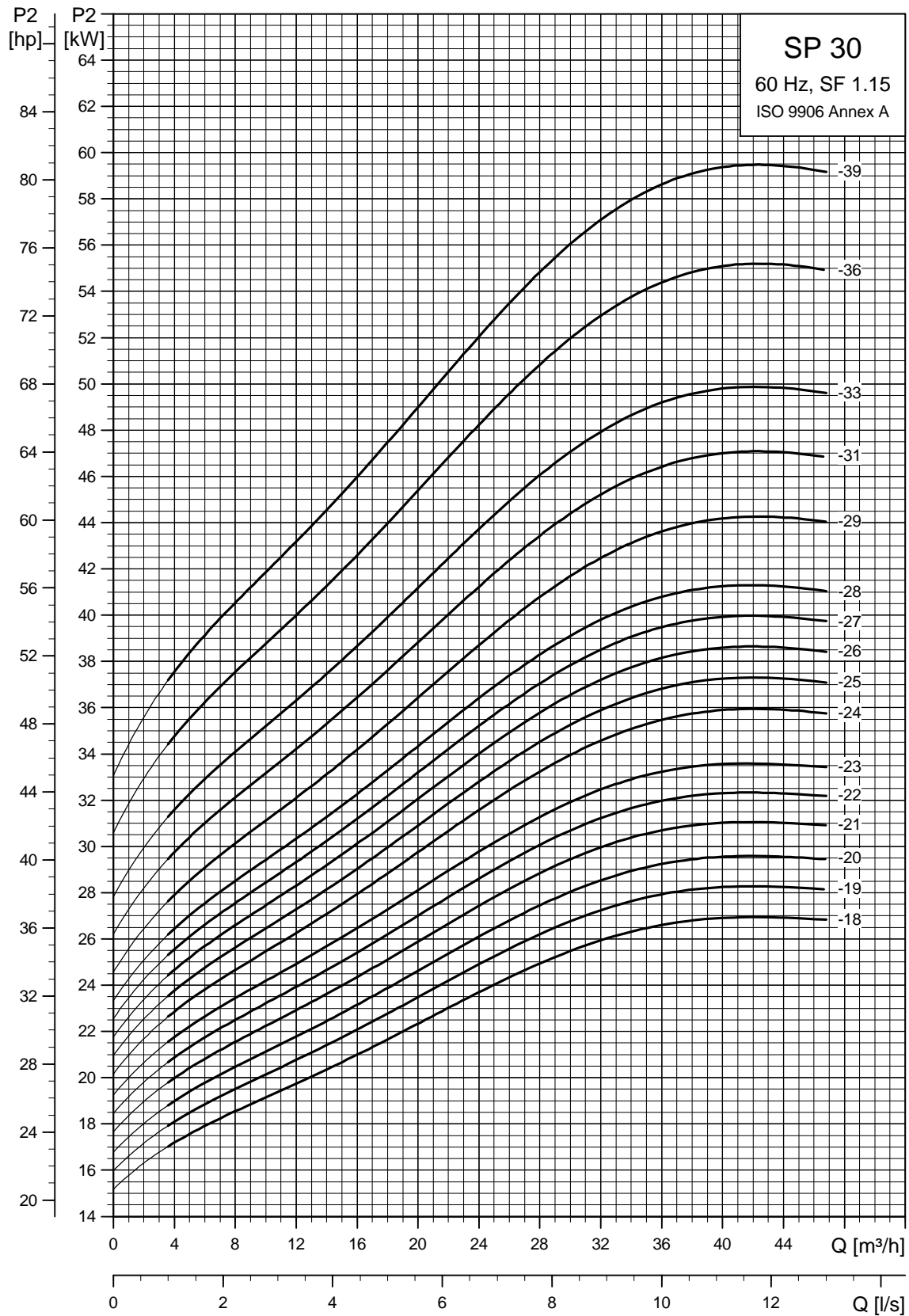
Dimensions as above.

Other types of connection are possible by means of connecting pieces, see page 86.



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

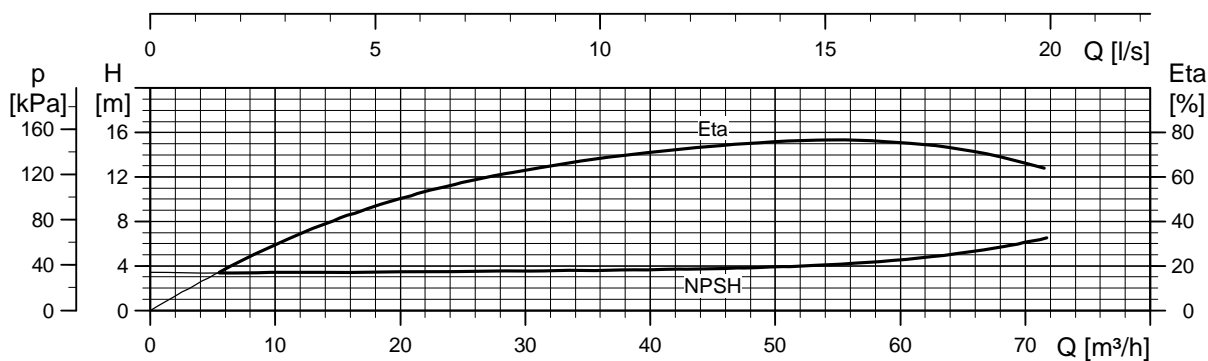
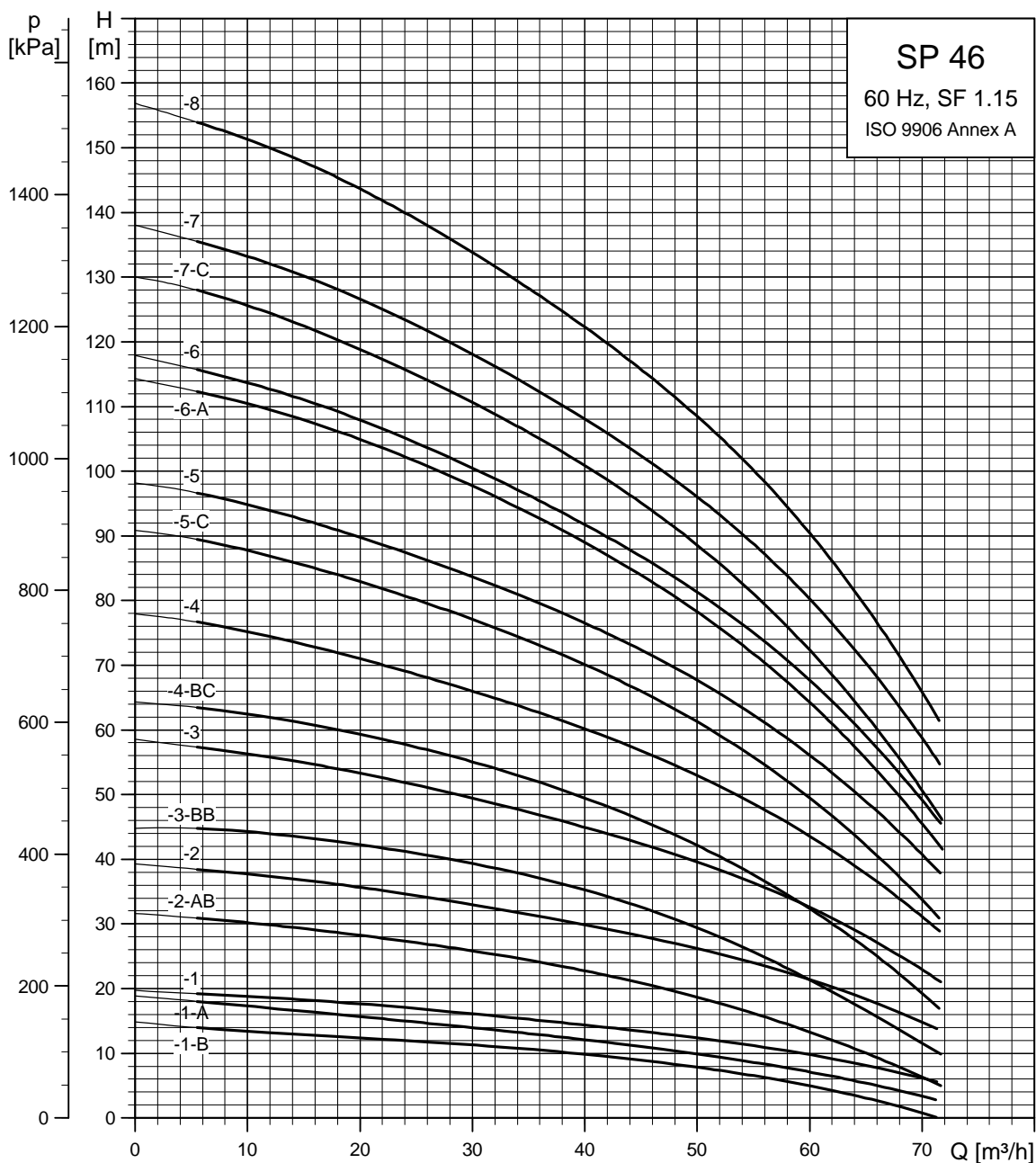
TM01 2266 1802



TM01 9244 1802

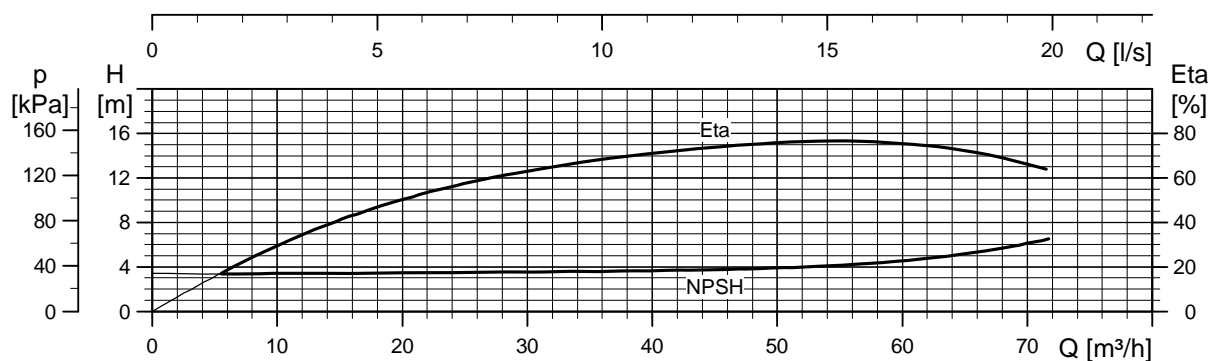
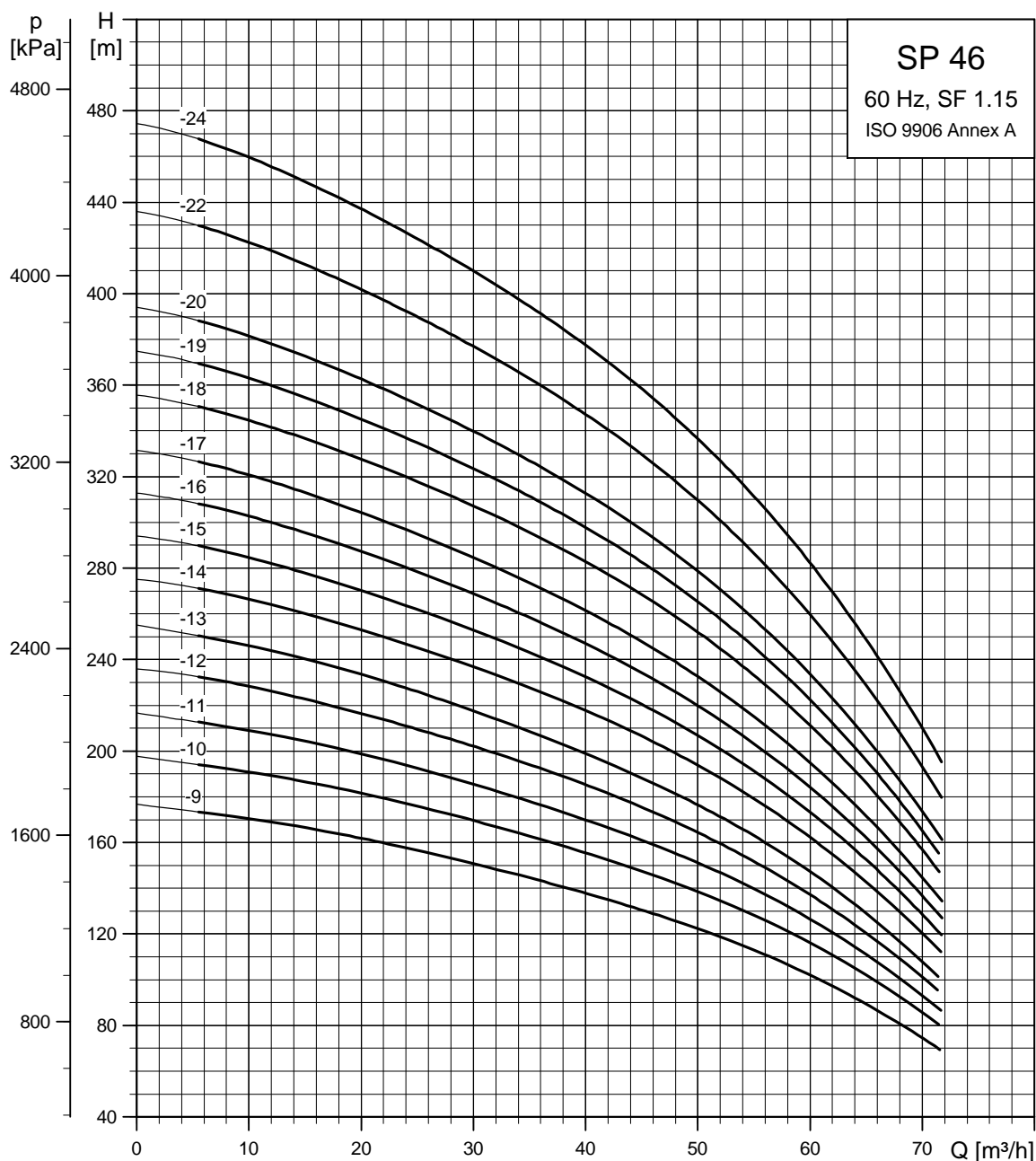
Explanation of efficiency curve, please see "Curve conditions" on page 4.

SP 46



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

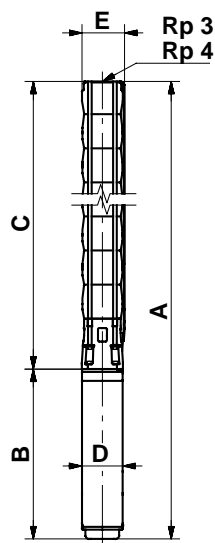
TM01 3313 1802



TM01 3314 1802

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

Dimensions and weights



TM00 0961 1196

SP 46-20 to SP 46-24 are mounted in sleeve for R 4 connection.

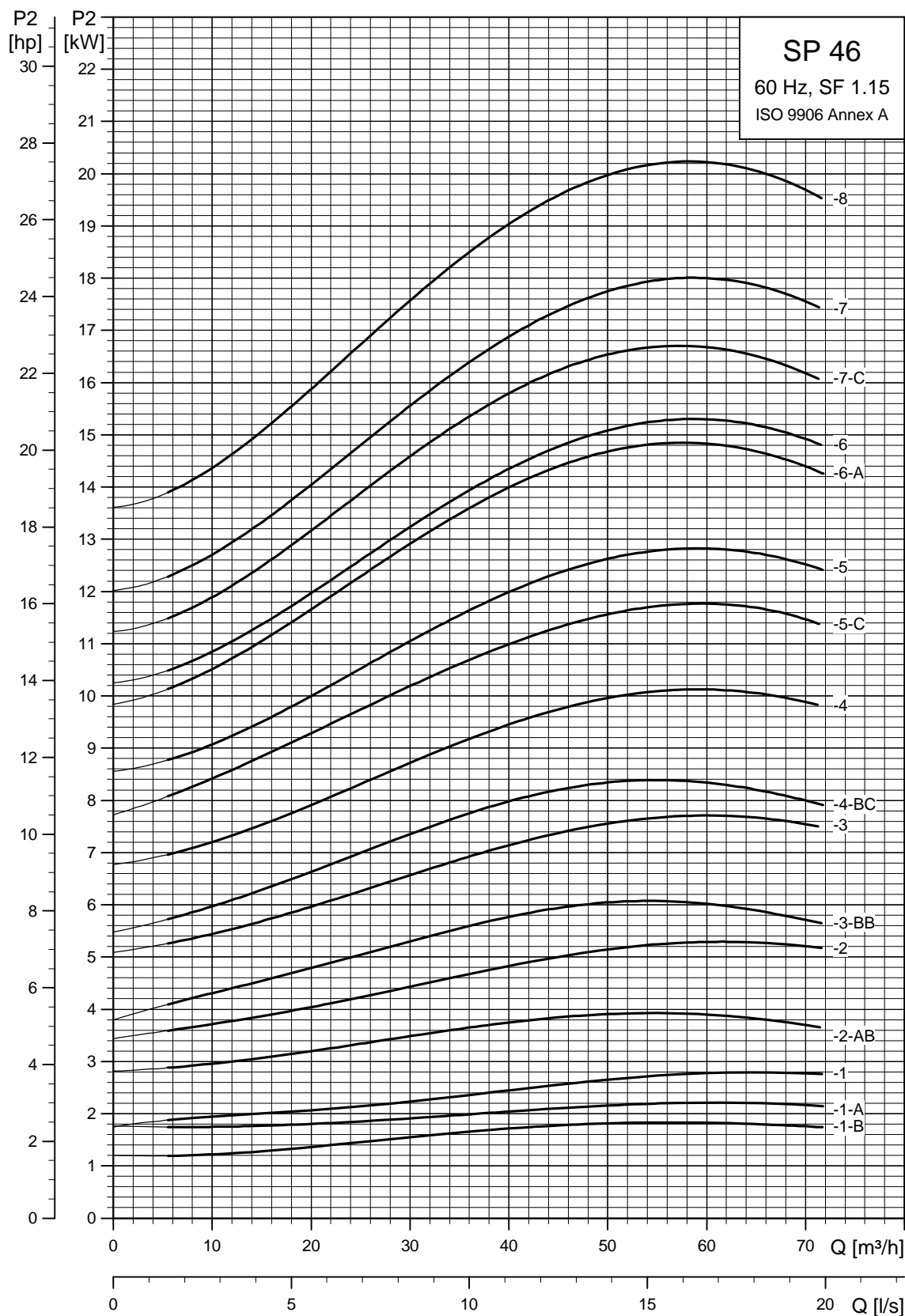
| Pump type | Motor | | Dimensions [mm] | | | | | | | | | | Net weight [kg] |
|------------|----------|------------|-----------------|------|-----|-----|-----------------|------|-----|-----|------|-----|-----------------|
| | Type | Power [kW] | Rp 3 connection | | | | Rp 4 connection | | | | B | D | |
| | | | A | C | E* | E** | A | C | E* | E** | | | |
| SP 46-1-B | MS 4000 | 1.5 | 780 | 367 | 146 | 148 | 783 | 370 | 146 | 148 | 413 | 95 | 20 |
| SP 46-1-B | MS 402 | 1.5 | 713 | 367 | 146 | 148 | 716 | 370 | 146 | 148 | 346 | 95 | 16 |
| SP 46-1-A | MS 4000 | 2.2 | 821 | 367 | 146 | 148 | 824 | 370 | 146 | 148 | 454 | 95 | 22 |
| SP 46-1 | MS 4000 | 3 | 861 | 367 | 146 | 148 | 864 | 370 | 146 | 148 | 494 | 95 | 23 |
| SP 46-2-AB | MS 4000 | 4.0 | 974 | 480 | 146 | 148 | 977 | 483 | 146 | 148 | 494 | 95 | 25 |
| SP 46-2 | MS 4000 | 5.5 | 1154 | 480 | 146 | 148 | 1157 | 483 | 146 | 148 | 674 | 95 | 34 |
| SP 46-3-BB | MS 4000 | 5.5 | 1267 | 593 | 146 | 148 | 1267 | 593 | 146 | 148 | 674 | 95 | 37 |
| SP 46-3 | MS 4000 | 7.5 | 1367 | 593 | 149 | 152 | 1370 | 596 | 149 | 152 | 774 | 95 | 42 |
| SP 46-3 | MS6 | 7.5 | 1199 | 609 | 149 | 152 | 1202 | 612 | 149 | 152 | 590 | 143 | 49 |
| SP 46-4-BC | MS6 | 7.5 | 1312 | 722 | 149 | 152 | 1315 | 725 | 149 | 152 | 590 | 143 | 52 |
| SP 46-4 | MS6 | 9.2 | 1332 | 722 | 149 | 152 | 1335 | 725 | 149 | 152 | 610 | 143 | 57 |
| SP 46-5-C | MS6 | 11 | 1543 | 835 | 149 | 152 | 1546 | 838 | 149 | 152 | 708 | 143 | 63 |
| SP 46-5 | MS6 | 13 | 1573 | 835 | 149 | 152 | 1576 | 838 | 149 | 152 | 738 | 143 | 66 |
| SP 46-6-A | MS6 | 13 | 1686 | 948 | 149 | 152 | 1689 | 951 | 149 | 152 | 738 | 143 | 68 |
| SP 46-6 | MS6 | 15 | 1731 | 948 | 149 | 152 | 1734 | 951 | 149 | 152 | 783 | 143 | 72 |
| SP 46-7-C | MS6 | 15 | 1844 | 1061 | 149 | 152 | 1847 | 1064 | 149 | 152 | 783 | 143 | 75 |
| SP 46-7 | MS6 | 18.5 | 1899 | 1061 | 149 | 152 | 1902 | 1064 | 149 | 152 | 838 | 143 | 80 |
| SP 46-8 | MS6 | 18.5 | 2012 | 1174 | 149 | 152 | 2015 | 1177 | 149 | 152 | 838 | 143 | 83 |
| SP 46-9 | MS6 | 22 | 2190 | 1287 | 149 | 152 | 2193 | 1290 | 149 | 152 | 903 | 143 | 91 |
| SP 46-10 | MS6 | 22 | 2303 | 1400 | 149 | 152 | 2306 | 1403 | 149 | 152 | 903 | 143 | 94 |
| SP 46-11 | MS6 | 26 | 2481 | 1513 | 149 | 152 | 2484 | 1516 | 149 | 152 | 968 | 143 | 102 |
| SP 46-12 | MS6 | 30 | 2649 | 1626 | 149 | 152 | 2652 | 1629 | 149 | 152 | 1023 | 143 | 112 |
| SP 46-13 | MS6 | 30 | 2762 | 1739 | 149 | 152 | 2765 | 1742 | 149 | 152 | 1023 | 143 | 115 |
| SP 46-14 | MMS 6000 | 37 | 3357 | 1932 | 149 | 152 | 3360 | 1935 | 149 | 152 | 1425 | 138 | 168 |
| SP 46-15 | MMS 6000 | 37 | 3470 | 2045 | 149 | 152 | 3473 | 2048 | 149 | 152 | 1425 | 138 | 170 |
| SP 46-16 | MMS 6000 | 37 | 3583 | 2158 | 149 | 152 | 3586 | 2161 | 149 | 152 | 1425 | 138 | 173 |
| SP 46-17 | MMS 6000 | 37 | 3696 | 2271 | 149 | 152 | 3699 | 2274 | 149 | 152 | 1425 | 138 | 175 |
| SP 46-18 | MMS 8000 | 45 | 3603 | 2333 | 192 | 192 | 3606 | 2336 | 192 | 192 | 1270 | 192 | 228 |
| SP 46-19 | MMS 8000 | 45 | 3717 | 2446 | 192 | 192 | 3719 | 2449 | 192 | 192 | 1270 | 192 | 231 |
| SP 46-20 | MMS 8000 | 45 | 3829 | 2559 | 192 | 192 | 3832 | 2562 | 192 | 192 | 1270 | 192 | 234 |
| SP 46-22 | MMS 8000 | 55 | 4298 | 2948 | 193 | 195 | 4301 | 2951 | 193 | 195 | 1350 | 192 | 281 |
| SP 46-24 | MMS 8000 | 55 | | | | | 4527 | 3177 | 193 | 195 | 1350 | 192 | 287 |

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

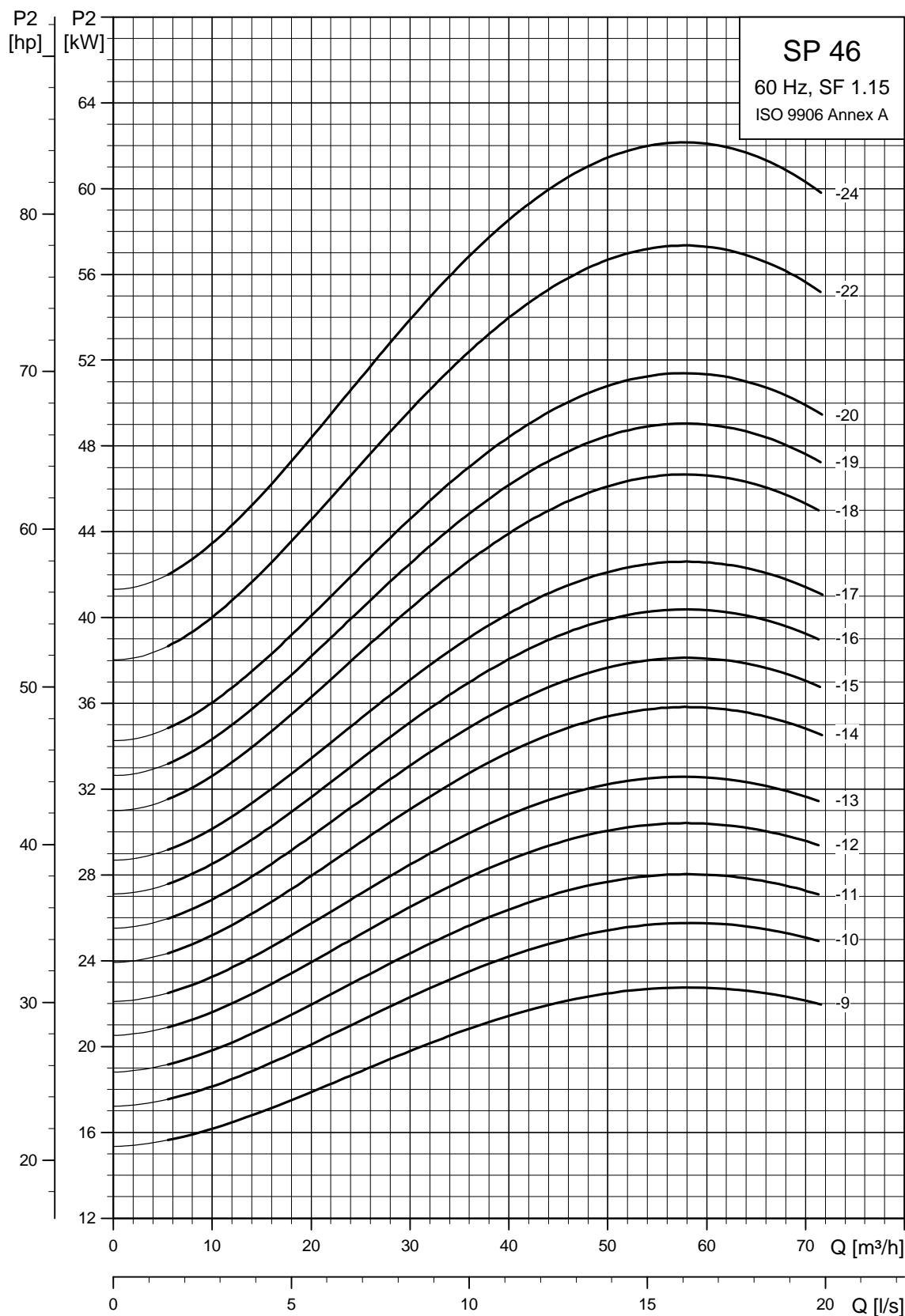
The pump types above are also available in N and R-versions (R-versions up to and including SP 46-17), see page 5 for further details.
Dimensions as above.

Other types of connection are possible by means of connecting pieces, see page 86.



TM00 7515 1802

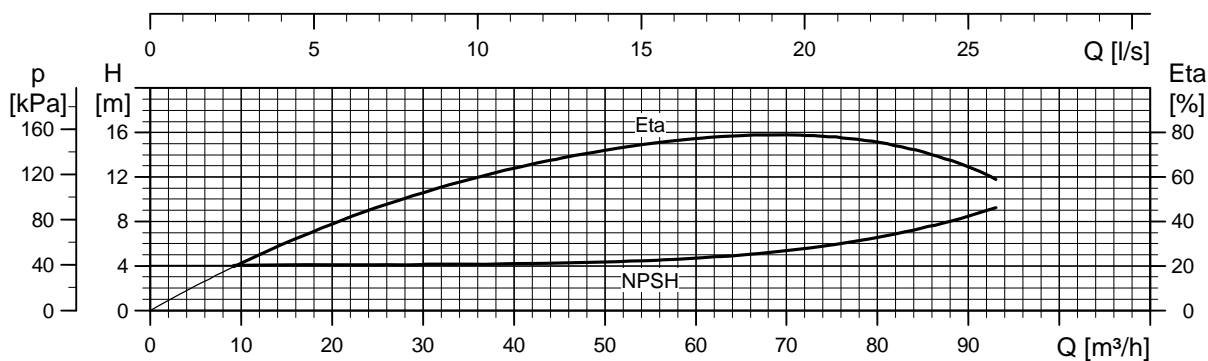
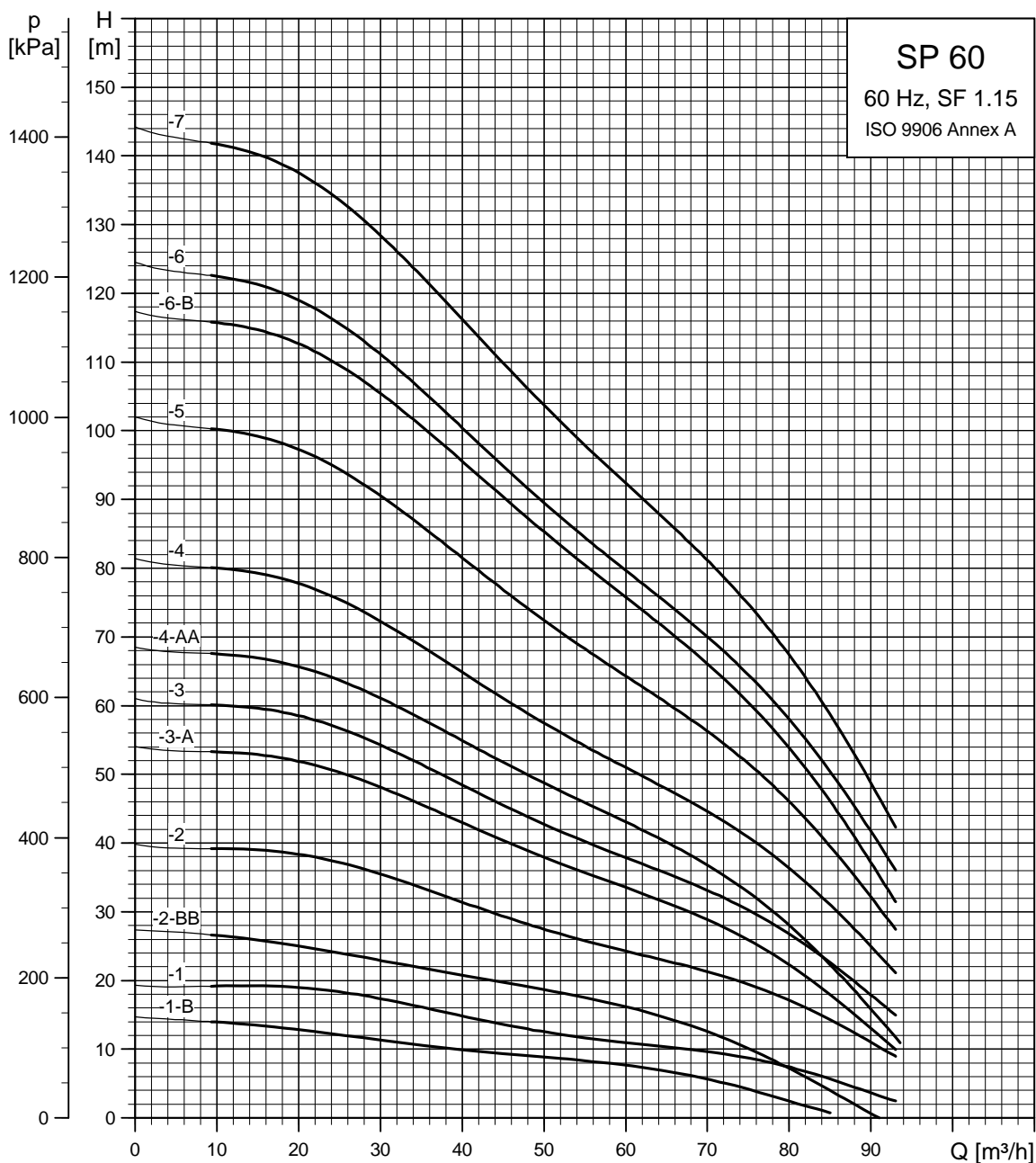
Explanation of efficiency curve, please see "Curve conditions" on page 4.



TM01 9245 1802

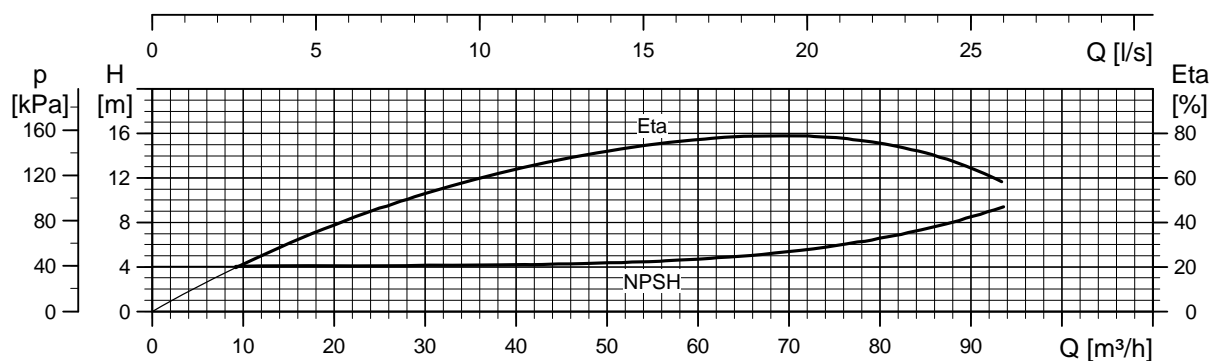
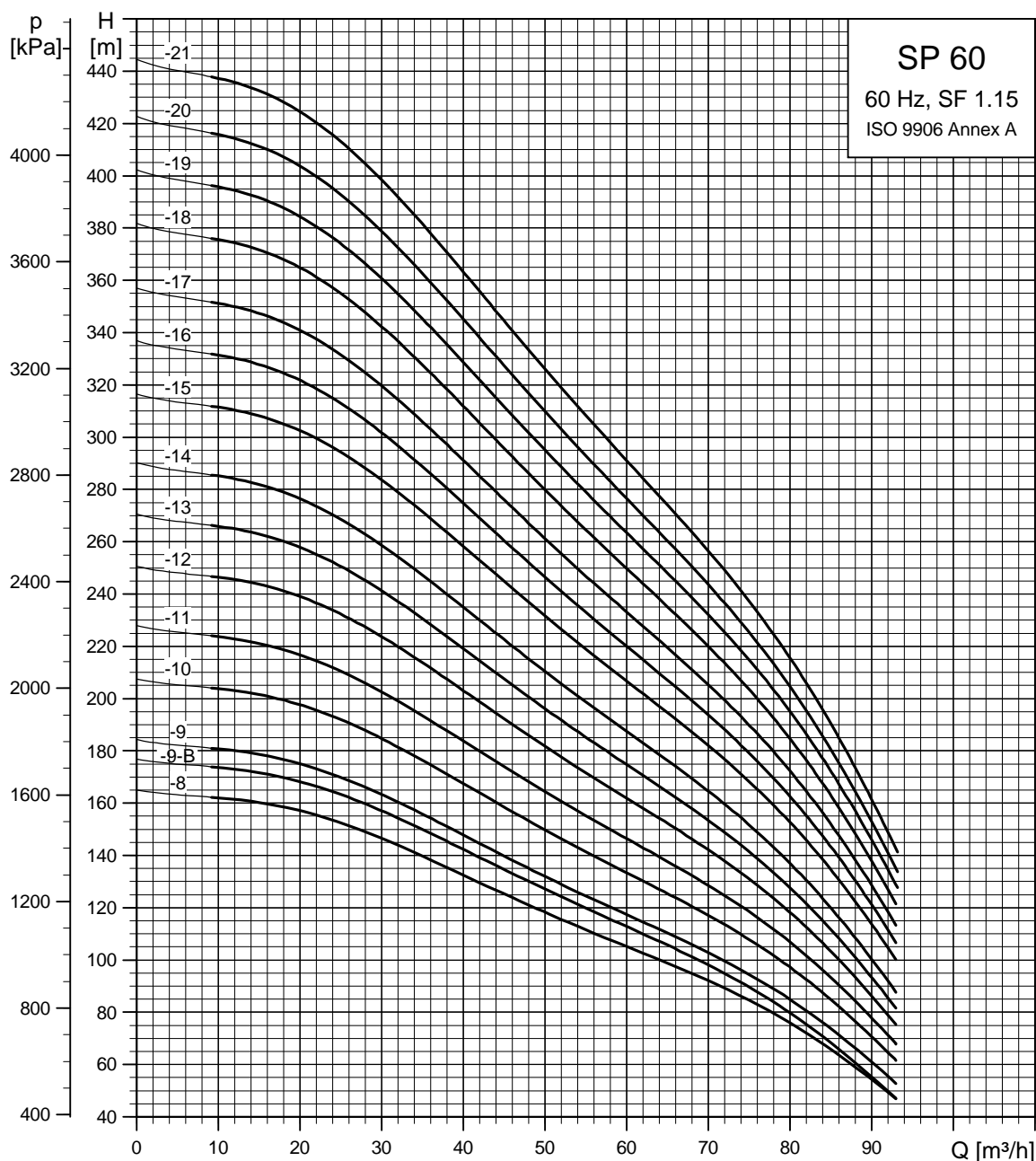
Explanation of efficiency curve, please see "Curve conditions" on page 4.

SP 60



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

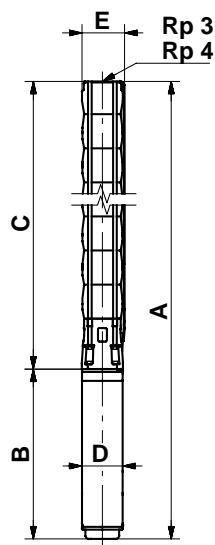
TM01 3315 1802



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

TM01 3316 1802

Dimensions and weights



TM00 0961 1196

SP 60-19 to SP 60-21 are mounted in sleeve for R 4 connection.

| Pump type | Motor | | Dimensions [mm] | | | | | | | | | | Net weight [kg] |
|------------|----------|------------|-----------------|------|-----|-----|-----------------|------|-----|-----|------|-----|-----------------|
| | Type | Power [kW] | Rp 3 connection | | | | Rp 4 connection | | | | B | D | |
| | | | A | C | E* | E** | A | C | E* | E** | | | |
| SP 60-1-B | MS 4000 | 2.2 | 821 | 367 | 146 | 148 | 824 | 370 | 146 | 148 | 454 | 95 | 22 |
| SP 60-1-A | MS 4000 | 3.7 | | | | | 864 | 370 | 146 | 148 | 494 | 95 | 23 |
| SP 60-1 | MS 4000 | 4.0 | 941 | 367 | 146 | 148 | 944 | 370 | 146 | 148 | 574 | 95 | 27 |
| SP 60-2-BB | MS 4000 | 4.0 | 974 | 480 | 146 | 148 | 977 | 483 | 146 | 148 | 494 | 95 | 25 |
| SP 60-2 | MS 4000 | 5.5 | 1154 | 480 | 146 | 148 | 1157 | 483 | 146 | 148 | 674 | 95 | 34 |
| SP 60-3-A | MS 4000 | 7.5 | 1367 | 593 | 146 | 148 | 1370 | 596 | 146 | 148 | 774 | 95 | 39 |
| SP 60-3-A | MS6 | 7.5 | 1199 | 609 | 152 | 156 | 1202 | 612 | 152 | 156 | 590 | 143 | 49 |
| SP 60-3 | MS6 | 9.2 | 1219 | 609 | 152 | 156 | 1219 | 612 | 152 | 156 | 610 | 143 | 55 |
| SP 60-4-AA | MS6 | 9.2 | 1332 | 722 | 152 | 156 | 1335 | 725 | 152 | 156 | 610 | 143 | 57 |
| SP 60-4 | MS6 | 11 | 1430 | 722 | 152 | 156 | 1433 | 725 | 152 | 156 | 708 | 143 | 60 |
| SP 60-5 | MS6 | 13 | 1573 | 835 | 152 | 156 | 1573 | 838 | 152 | 156 | 738 | 143 | 66 |
| SP 60-6-B | MS6 | 15 | 1731 | 948 | 152 | 156 | 1734 | 951 | 152 | 156 | 783 | 143 | 72 |
| SP 60-6 | MS6 | 18.5 | 1786 | 948 | 152 | 156 | 1789 | 951 | 152 | 156 | 838 | 143 | 78 |
| SP 60-7 | MS6 | 18.5 | 1899 | 1061 | 152 | 156 | 1902 | 1064 | 152 | 156 | 838 | 143 | 80 |
| SP 60-8 | MS6 | 22 | 2077 | 1174 | 152 | 156 | 2080 | 1177 | 152 | 156 | 903 | 143 | 89 |
| SP 60-9-B | MS6 | 22 | 2190 | 1287 | 152 | 156 | 2193 | 1290 | 152 | 156 | 903 | 143 | 91 |
| SP 60-9 | MS6 | 26 | 2255 | 1287 | 152 | 156 | 2258 | 1290 | 152 | 156 | 968 | 143 | 97 |
| SP 60-10 | MS6 | 26 | 2368 | 1400 | 152 | 156 | 2371 | 1403 | 152 | 156 | 968 | 143 | 100 |
| SP 60-11 | MS6 | 30 | 2536 | 1513 | 152 | 156 | 2539 | 1516 | 152 | 156 | 1023 | 143 | 110 |
| SP 60-12 | MMS 6000 | 37 | 3131 | 1706 | 152 | 156 | 3134 | 1709 | 152 | 156 | 1425 | 138 | 163 |
| SP 60-13 | MMS 6000 | 37 | 3244 | 1819 | 152 | 156 | 3247 | 1822 | 152 | 156 | 1425 | 138 | 165 |
| SP 60-14 | MMS 6000 | 37 | | | | | 3360 | 1935 | 152 | 156 | 1425 | 138 | 168 |
| SP 60-15 | MMS 8000 | 45 | | | | | 3267 | 1997 | 192 | 192 | 1270 | 192 | 221 |
| SP 60-16 | MMS 8000 | 45 | | | | | 3380 | 2110 | 192 | 192 | 1270 | 192 | 223 |
| SP 60-17 | MMS 8000 | 45 | | | | | 3493 | 2223 | 192 | 192 | 1270 | 192 | 226 |
| SP 60-18 | MMS 8000 | 55 | | | | | 3686 | 2336 | 192 | 192 | 1350 | 192 | 243 |
| SP 60-19 | MMS 8000 | 55 | | | | | 3962 | 2612 | 193 | 195 | 1350 | 192 | 272 |
| SP 60-20 | MMS 8000 | 55 | | | | | 4075 | 2725 | 193 | 195 | 1350 | 192 | 275 |
| SP 60-21 | MMS 8000 | 63 | | | | | 4328 | 2838 | 193 | 195 | 1490 | 192 | 304 |

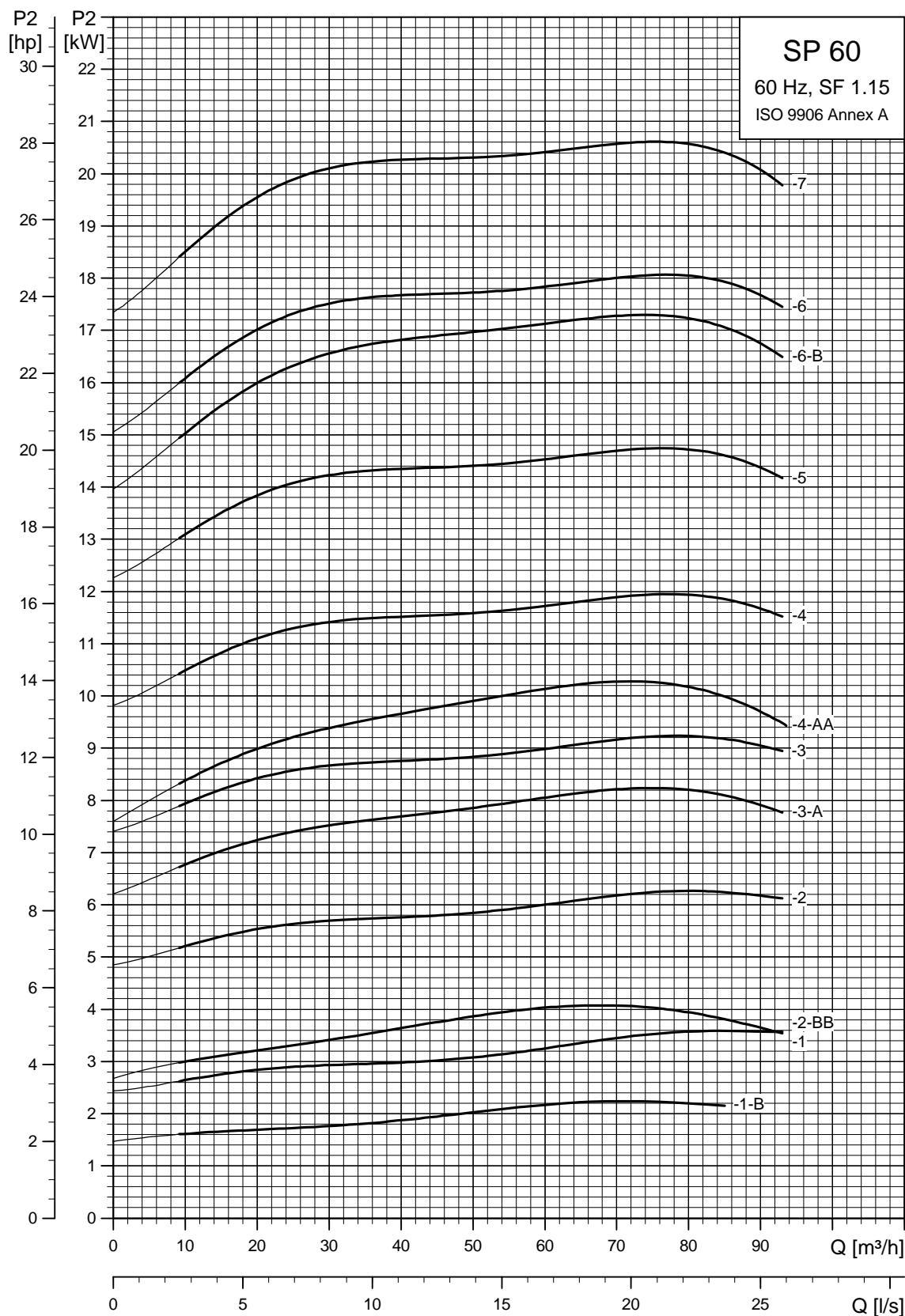
* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

The pump types above are also available in N and R-versions (R-version up to and including SP 60-18), see page 5 for further details.

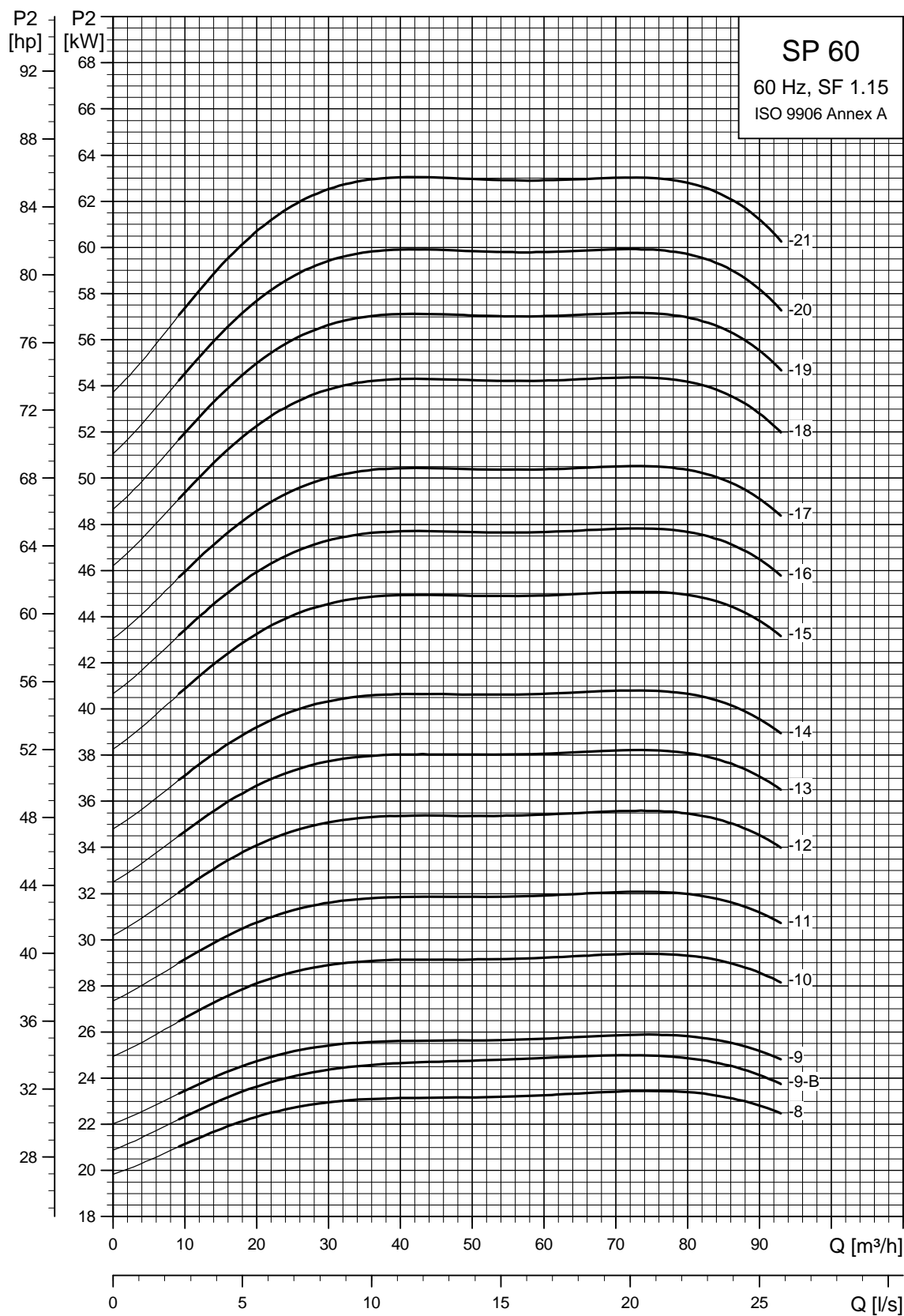
Dimensions as above.

Other types of connection are possible by means of connecting pieces, see page 86.



TM00 8054 1802

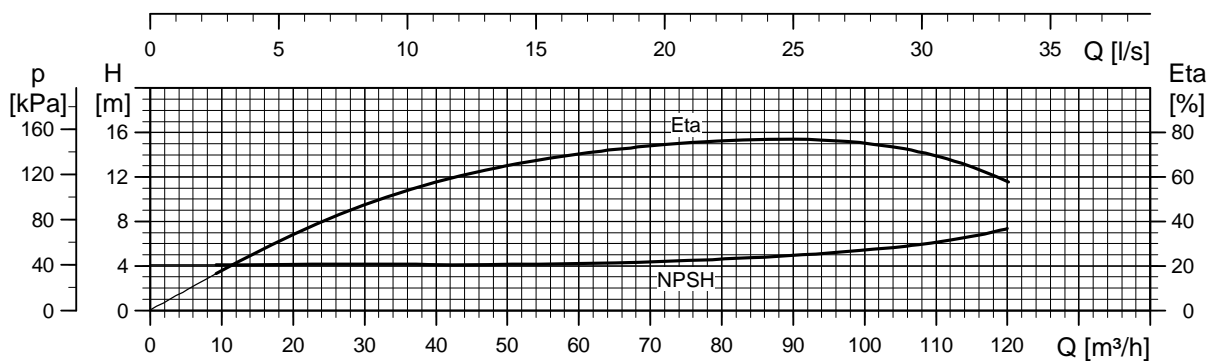
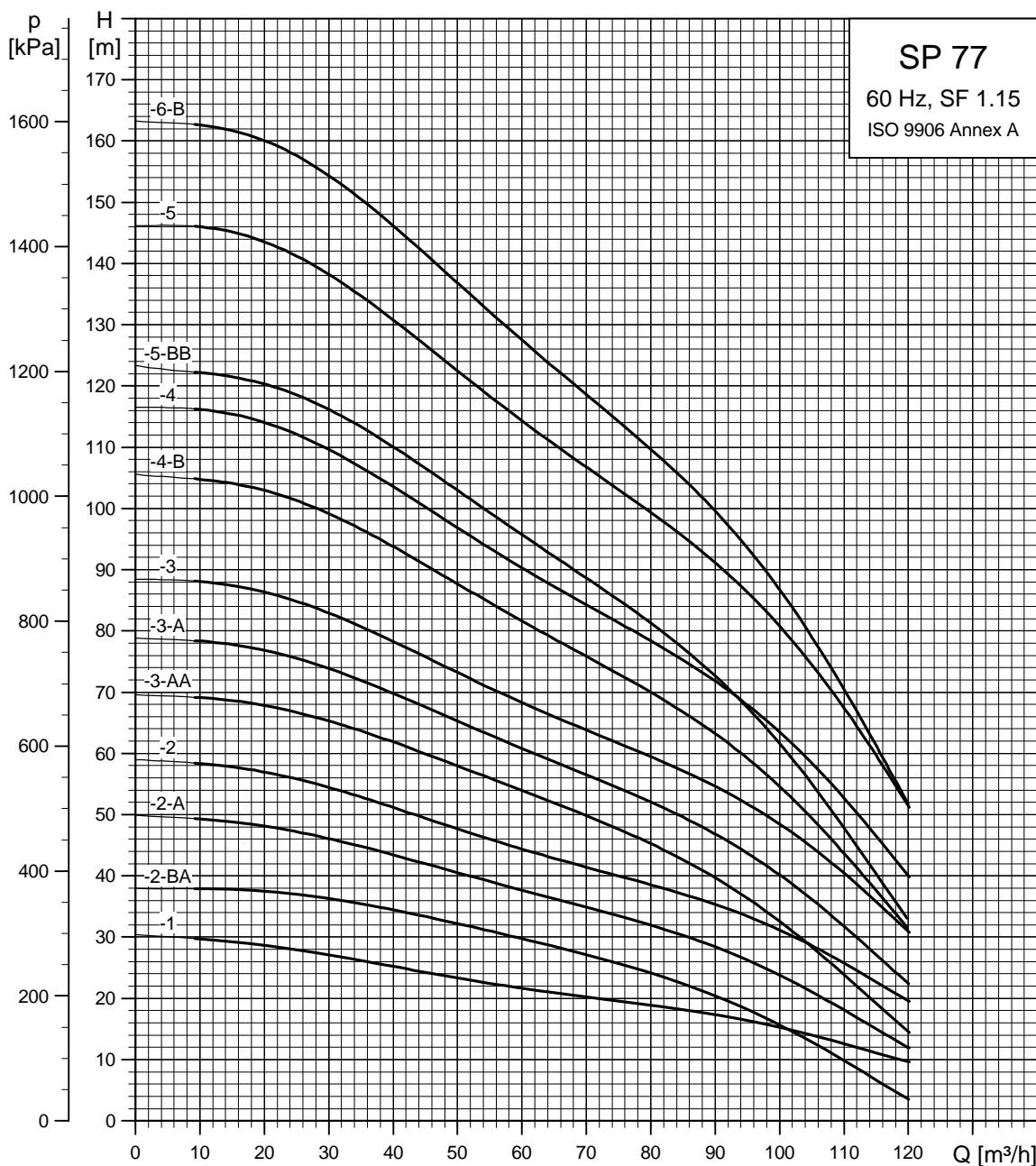
Explanation of efficiency curve, please see "Curve conditions" on page 4.



TM01 9246 1802

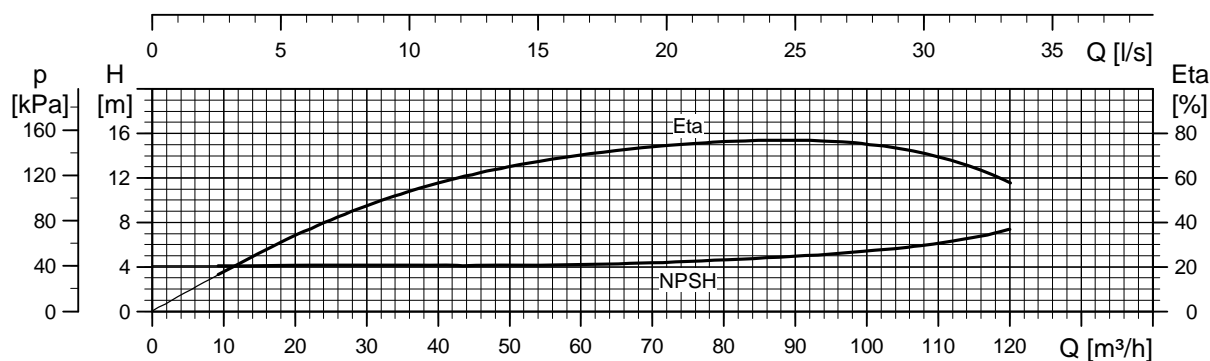
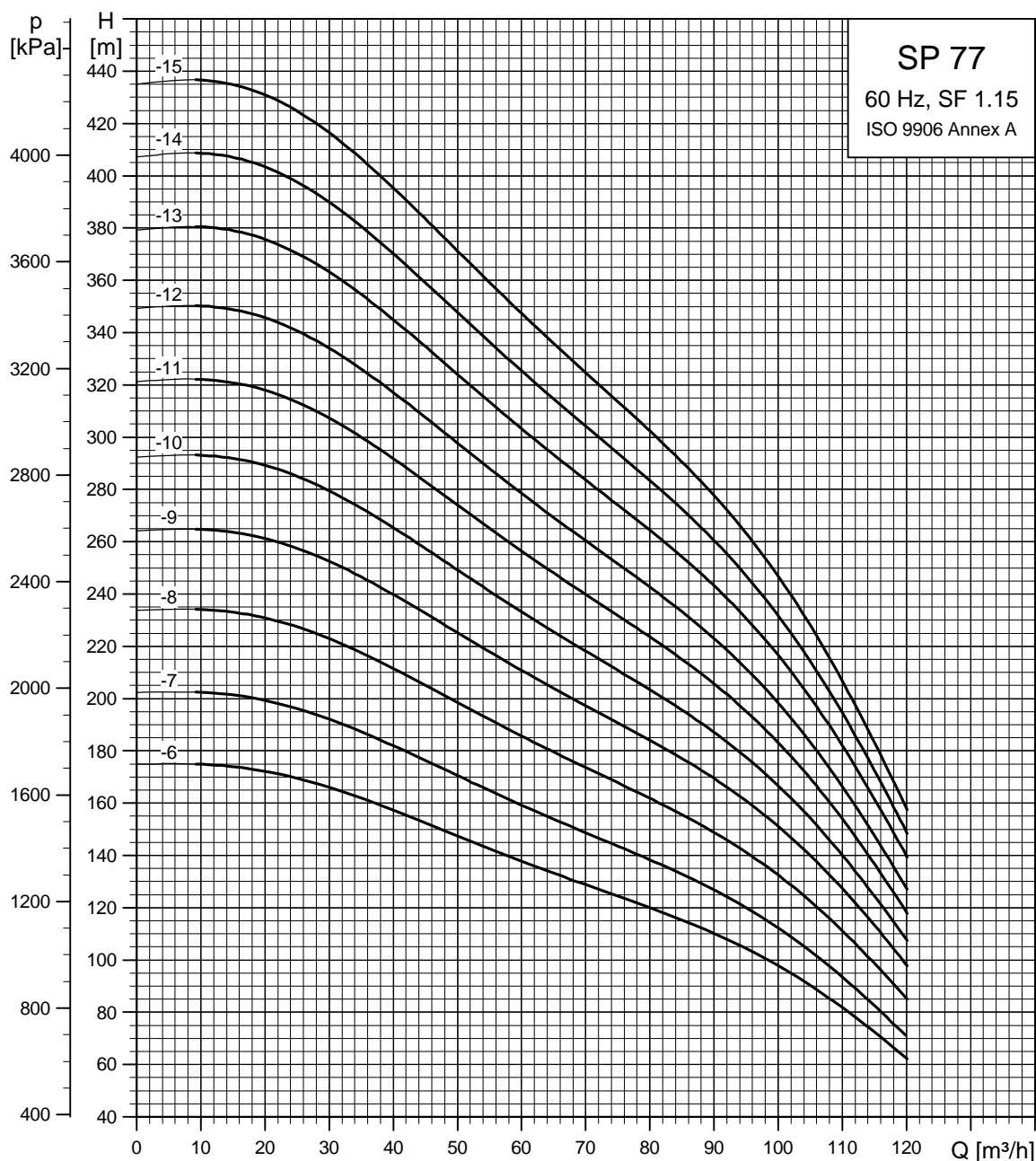
Explanation of efficiency curve, please see "Curve conditions" on page 4.

SP 77



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

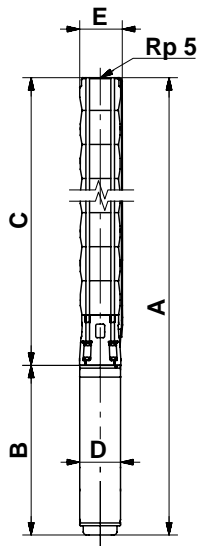
TM01 3317 1802



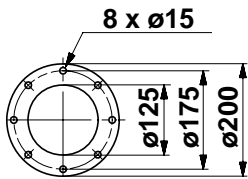
Explanation of efficiency curve, please see "Curve conditions" on page 4.

TM01 3318 1802

Dimensions and weights



TM00 7872 2196



TM00 7323 1798

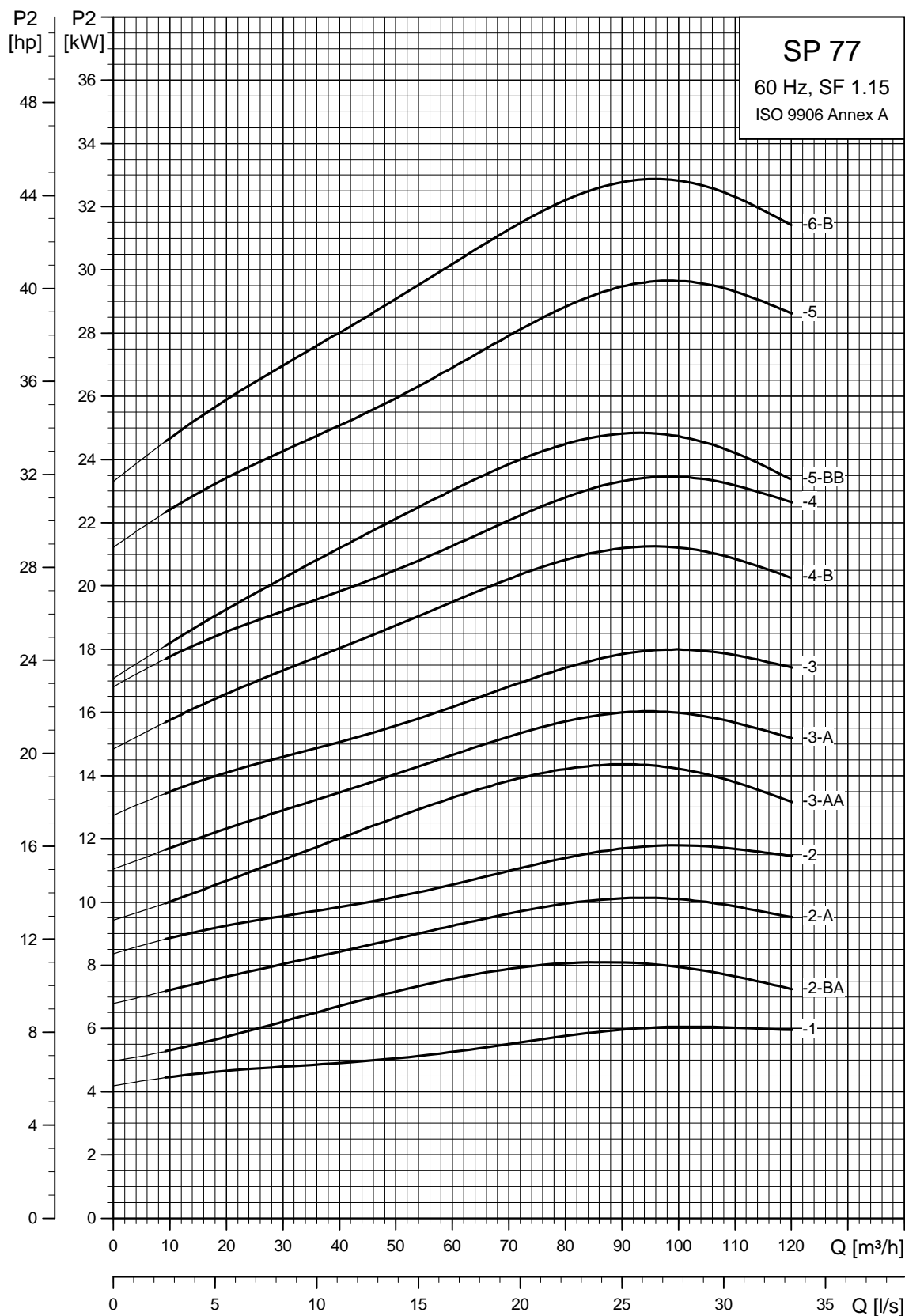
| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|------------|----------|------------|-----------------|------|-----|-----|--------------------|------|-----|-----|-----------------|-----|-----|
| | Type | Power [kW] | Rp 5 connection | | | | 5" Grundfos flange | | | | | | |
| | | | A | C | E* | E** | A | C | E* | E** | | B | D |
| SP 77-1 | MS6 | 5.5 | 1183 | 618 | 178 | 186 | 1183 | 618 | 200 | 200 | 565 | 143 | 55 |
| SP 77-2-BA | MS6 | 7.5 | 1336 | 746 | 178 | 186 | 1336 | 746 | 200 | 200 | 590 | 143 | 63 |
| SP 77-2-A | MS6 | 9.2 | 1356 | 746 | 178 | 186 | 1356 | 746 | 200 | 200 | 610 | 143 | 69 |
| SP 77-2 | MS6 | 11 | 1454 | 746 | 178 | 186 | 1454 | 746 | 200 | 200 | 708 | 143 | 71 |
| SP 77-3-AA | MS6 | 13 | 1612 | 874 | 178 | 186 | 1612 | 874 | 200 | 200 | 738 | 143 | 78 |
| SP 77-3-A | MS6 | 15 | 1657 | 874 | 178 | 186 | 1657 | 874 | 200 | 200 | 783 | 143 | 82 |
| SP 77-3 | MS6 | 18.5 | 1712 | 874 | 178 | 186 | 1712 | 874 | 200 | 200 | 838 | 143 | 87 |
| SP 77-4-B | MS6 | 18.5 | 1840 | 1002 | 178 | 186 | 1840 | 1002 | 200 | 200 | 838 | 143 | 91 |
| SP 77-4 | MS6 | 22 | 1905 | 1002 | 178 | 186 | 1905 | 1002 | 200 | 200 | 903 | 143 | 97 |
| SP 77-5-BB | MS6 | 22 | 2033 | 1130 | 178 | 186 | 2033 | 1130 | 200 | 200 | 903 | 143 | 101 |
| SP 77-5 | MS6 | 26 | 2098 | 1130 | 178 | 186 | 2098 | 1130 | 200 | 200 | 968 | 143 | 106 |
| SP 77-6-B | MS6 | 30 | 2281 | 1258 | 178 | 186 | 2281 | 1258 | 200 | 200 | 1023 | 143 | 118 |
| SP 77-6 | MMS 6000 | 37 | 2683 | 1258 | 178 | 186 | 2683 | 1258 | 200 | 200 | 1425 | 138 | 166 |
| SP 77-7 | MMS 6000 | 37 | 2811 | 1386 | 178 | 186 | 2811 | 1386 | 200 | 200 | 1425 | 138 | 169 |
| SP 77-8 | MMS 8000 | 45 | 2798 | 1528 | 200 | 204 | 2798 | 1528 | 205 | 205 | 1270 | 192 | 225 |
| SP 77-9 | MMS 8000 | 55 | 3006 | 1656 | 200 | 204 | 3006 | 1656 | 205 | 205 | 1350 | 192 | 244 |
| SP 77-10 | MMS 8000 | 55 | 3134 | 1784 | 200 | 204 | 3134 | 1784 | 205 | 205 | 1350 | 192 | 248 |
| SP 77-11 | MMS 8000 | 63 | 3402 | 1912 | 200 | 204 | 3402 | 1912 | 205 | 205 | 1490 | 192 | 277 |
| SP 77-12 | MMS 8000 | 63 | 3530 | 2040 | 200 | 204 | | | | | 1490 | 192 | 281 |
| SP 77-13 | MMS 8000 | 75 | 3758 | 2168 | 200 | 204 | | | | | 1590 | 192 | 304 |
| SP 77-14 | MMS 8000 | 92 | 4426 | 2596 | 200 | 202 | | | | | 1830 | 192 | 361 |
| SP 77-15 | MMS 8000 | 92 | 4554 | 2724 | 200 | 202 | | | | | 1830 | 192 | 365 |

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

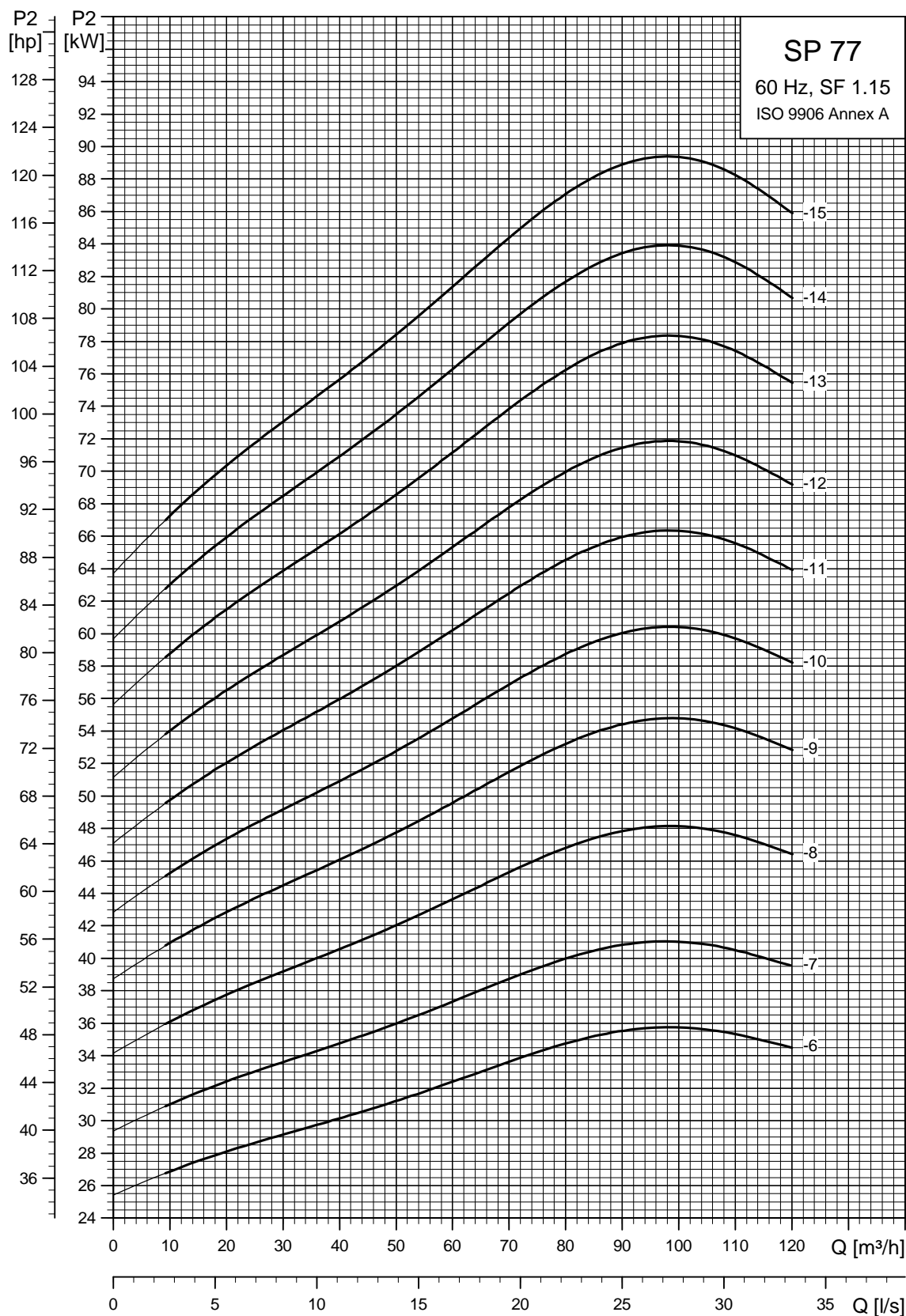
The pump types above are also available in N-version, see page 5 for further details. Dimensions as above.

Other types of connection are possible by means of connecting pieces, see page 86.



TM0 7450 1802

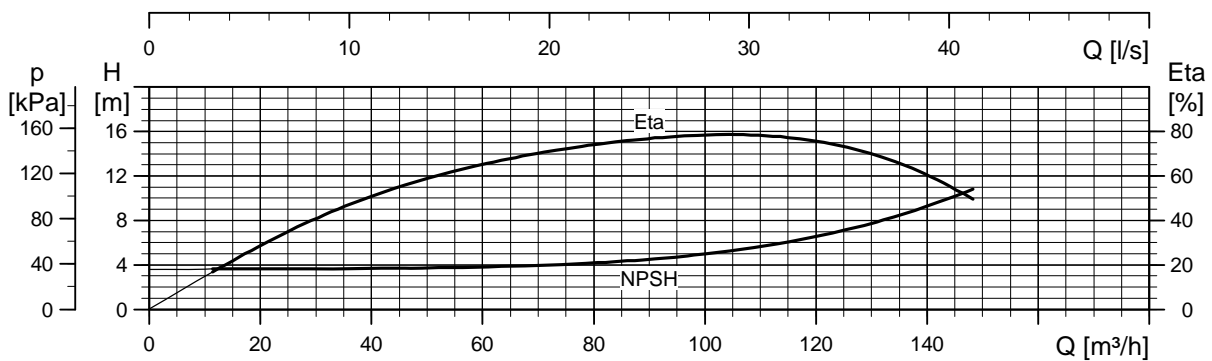
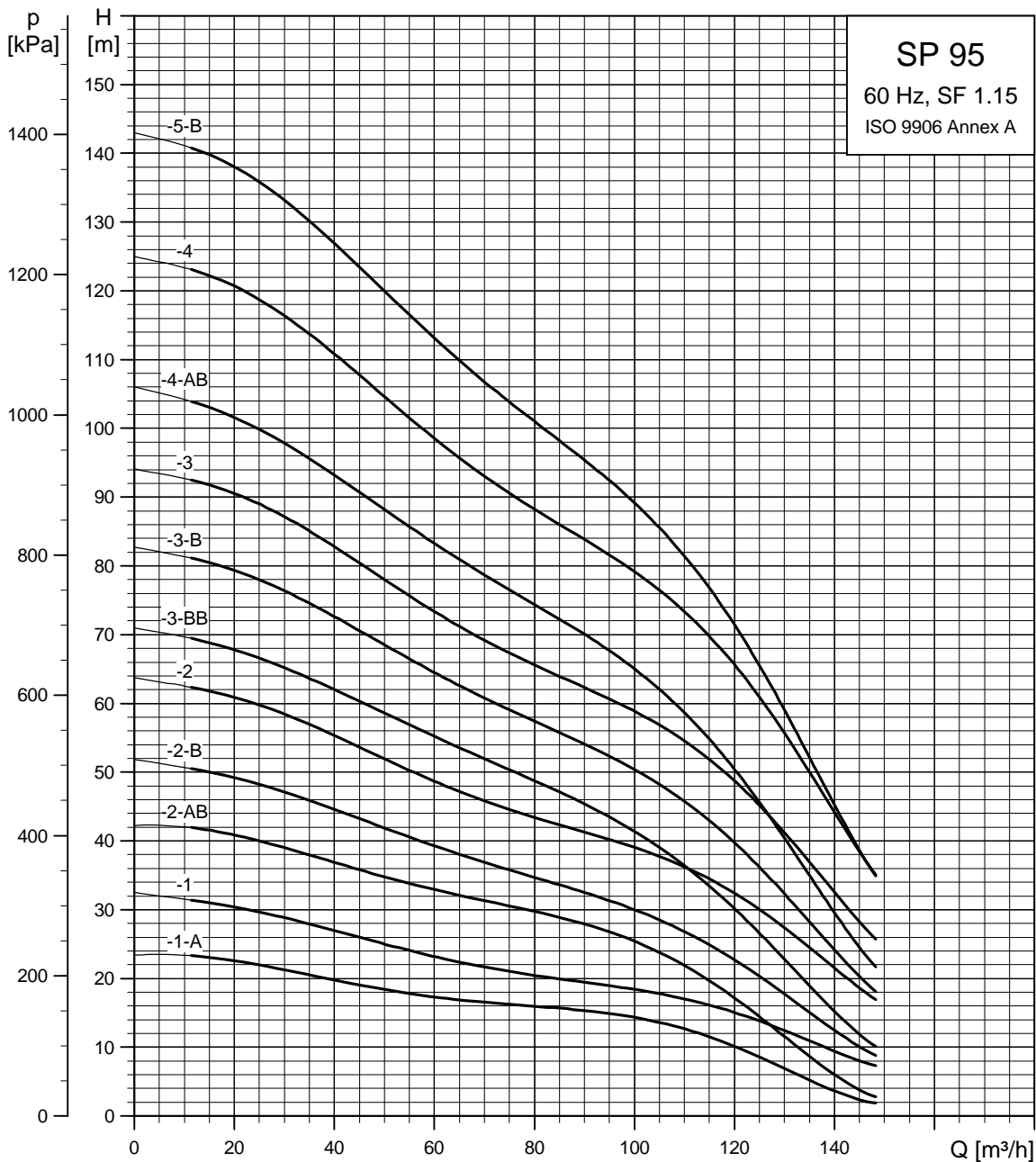
Explanation of efficiency curve, please see "Curve conditions" on page 4.



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

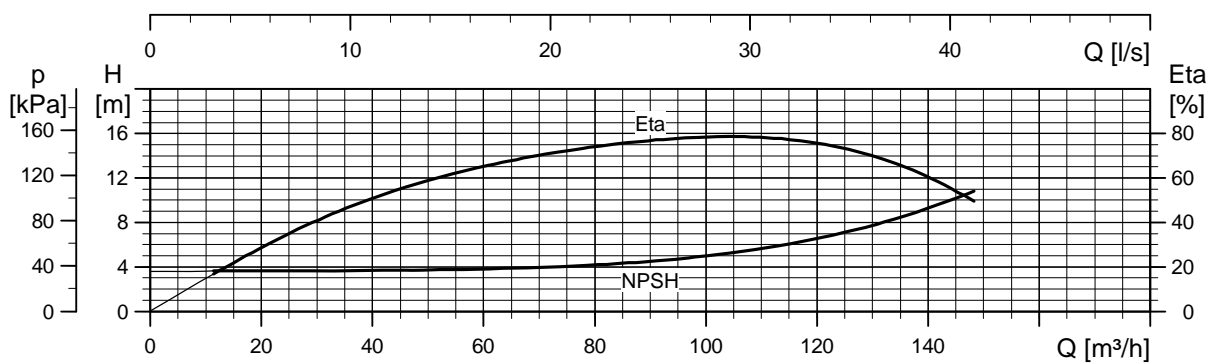
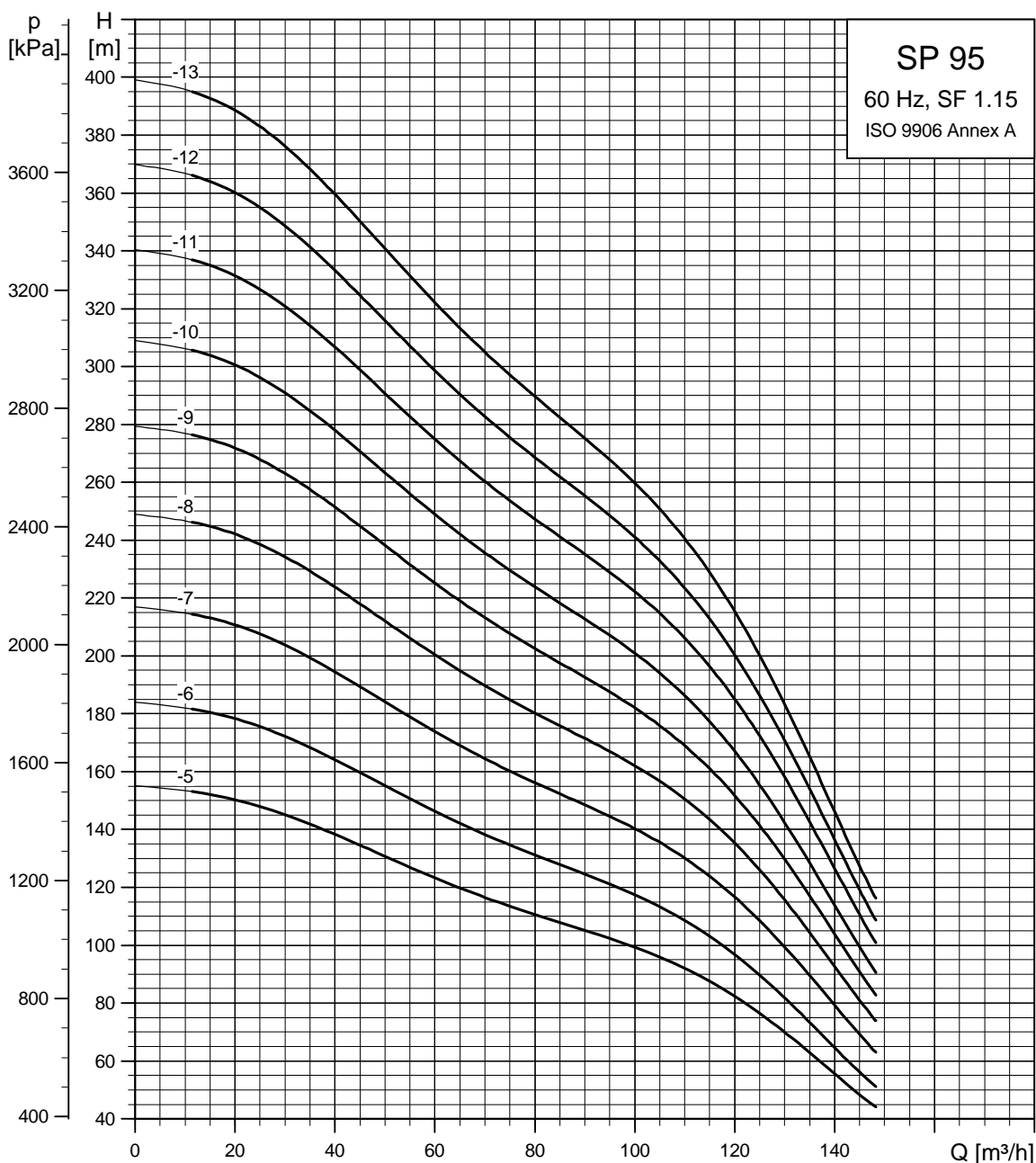
TM01 9247 1802

SP 95



TM01 3319 1802

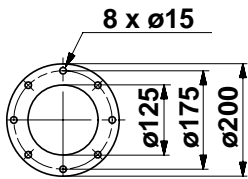
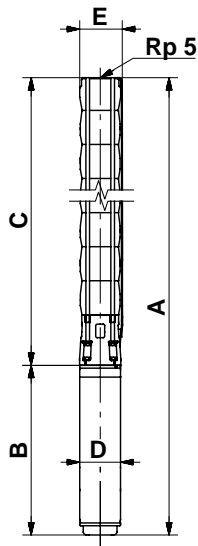
Explanation of efficiency curve, please see "Curve conditions" on page 4.



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

TM01 3320 1802

Dimensions and weights



TM00 7872 2196

TM00 7323 1798

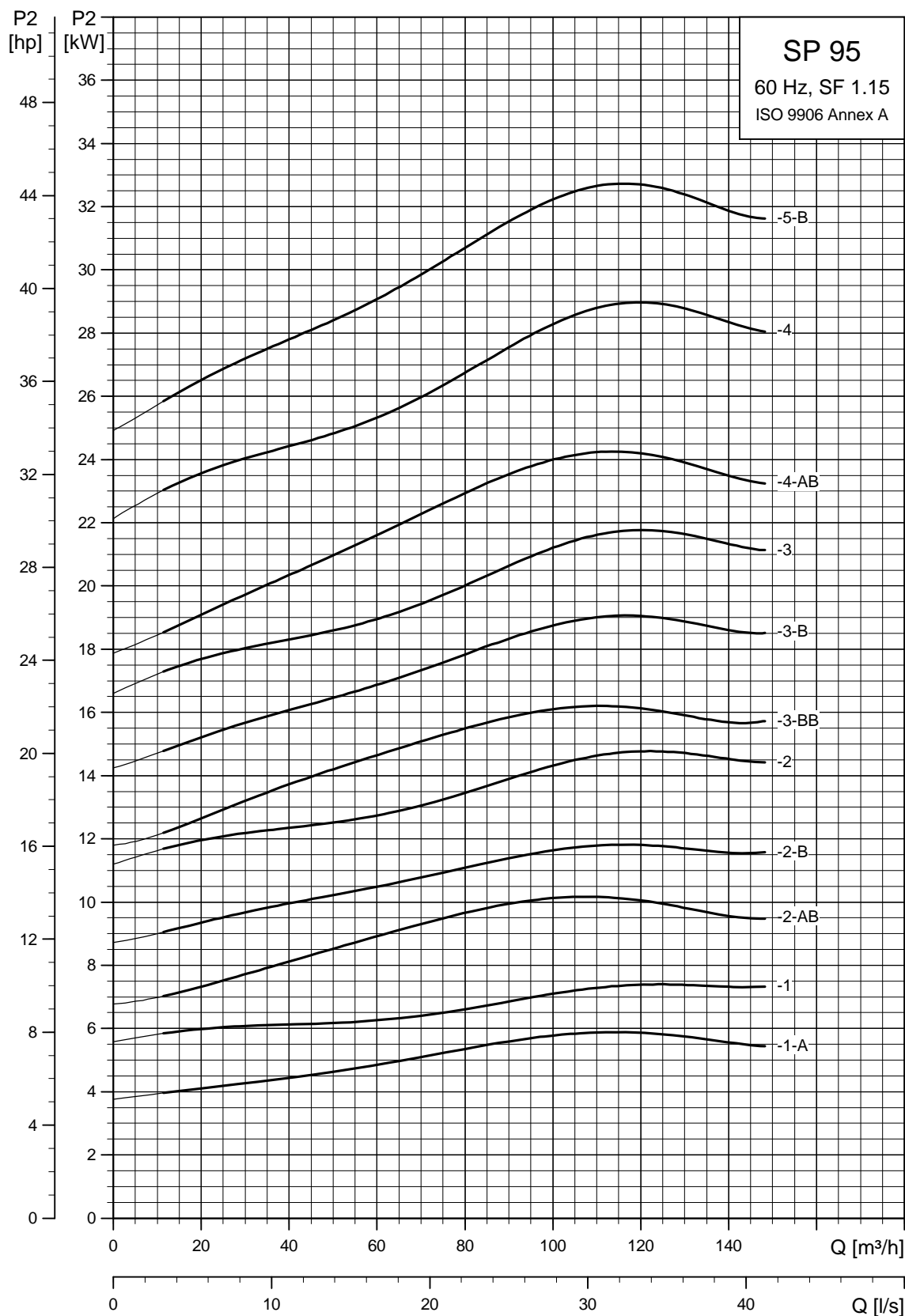
| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|------------|----------|------------|-----------------|------|-----|-----|--------------------|------|-----|-----|-----------------|-----|-----|
| | Type | Power [kW] | Rp 5 connection | | | | 5" Grundfos flange | | | | | | |
| | | | A | C | E* | E** | A | C | E* | E** | | B | D |
| SP 95-1-A | MS6 | 5.5 | 1183 | 618 | 179 | 183 | 1183 | 618 | 200 | 200 | 565 | 143 | 55 |
| SP 95-1 | MS6 | 7.5 | 1208 | 618 | 179 | 183 | 1208 | 618 | 200 | 200 | 590 | 143 | 59 |
| SP 95-2-AB | MS6 | 9.2 | 1356 | 746 | 179 | 183 | 1356 | 746 | 200 | 200 | 610 | 143 | 69 |
| SP 95-2-B | MS6 | 11 | 1454 | 746 | 179 | 183 | 1454 | 746 | 200 | 200 | 708 | 143 | 71 |
| SP 95-2 | MS6 | 13 | 1484 | 746 | 179 | 183 | 1484 | 746 | 200 | 200 | 738 | 143 | 74 |
| SP 95-3-BB | MS6 | 15 | 1657 | 874 | 179 | 183 | 1657 | 874 | 200 | 200 | 783 | 143 | 82 |
| SP 95-3-B | MS6 | 18.5 | 1712 | 874 | 179 | 183 | 1712 | 874 | 200 | 200 | 838 | 143 | 87 |
| SP 95-3 | MS6 | 22 | 1777 | 874 | 179 | 183 | 1777 | 874 | 200 | 200 | 903 | 143 | 93 |
| SP 95-4-AB | MS6 | 22 | 1905 | 1002 | 179 | 183 | 1905 | 1002 | 200 | 200 | 903 | 143 | 97 |
| SP 95-4 | MS6 | 26 | 1970 | 1002 | 179 | 183 | 1970 | 1002 | 200 | 200 | 968 | 143 | 103 |
| SP 95-5-B | MS6 | 30 | 2153 | 1130 | 179 | 183 | 2153 | 1130 | 200 | 200 | 1023 | 143 | 114 |
| SP 95-5 | MMS 6000 | 37 | 2555 | 1130 | 179 | 183 | 2555 | 1130 | 200 | 200 | 1425 | 138 | 162 |
| SP 95-6 | MMS 6000 | 37 | 2683 | 1258 | 179 | 183 | 2683 | 1258 | 200 | 200 | 1425 | 138 | 166 |
| SP 95-7 | MMS 8000 | 45 | 2670 | 1400 | 205 | 205 | 2670 | 1400 | 200 | 202 | 1270 | 192 | 221 |
| SP 95-8 | MMS 8000 | 55 | 2878 | 1528 | 205 | 205 | 2878 | 1528 | 200 | 202 | 1350 | 192 | 240 |
| SP 95-9 | MMS 8000 | 63 | 3146 | 1656 | 205 | 205 | 3146 | 1656 | 200 | 202 | 1490 | 192 | 270 |
| SP 95-10 | MMS 8000 | 63 | 3274 | 1784 | 205 | 205 | 3274 | 1784 | 200 | 202 | 1490 | 192 | 274 |
| SP 95-11 | MMS 8000 | 75 | 3502 | 1912 | 205 | 205 | | | | | 1590 | 192 | 296 |
| SP 95-12 | MMS 8000 | 92 | 3870 | 2040 | 205 | 205 | | | | | 1830 | 192 | 346 |
| SP 95-13 | MMS 8000 | 92 | 3998 | 2168 | 205 | 205 | | | | | 1830 | 192 | 350 |

* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

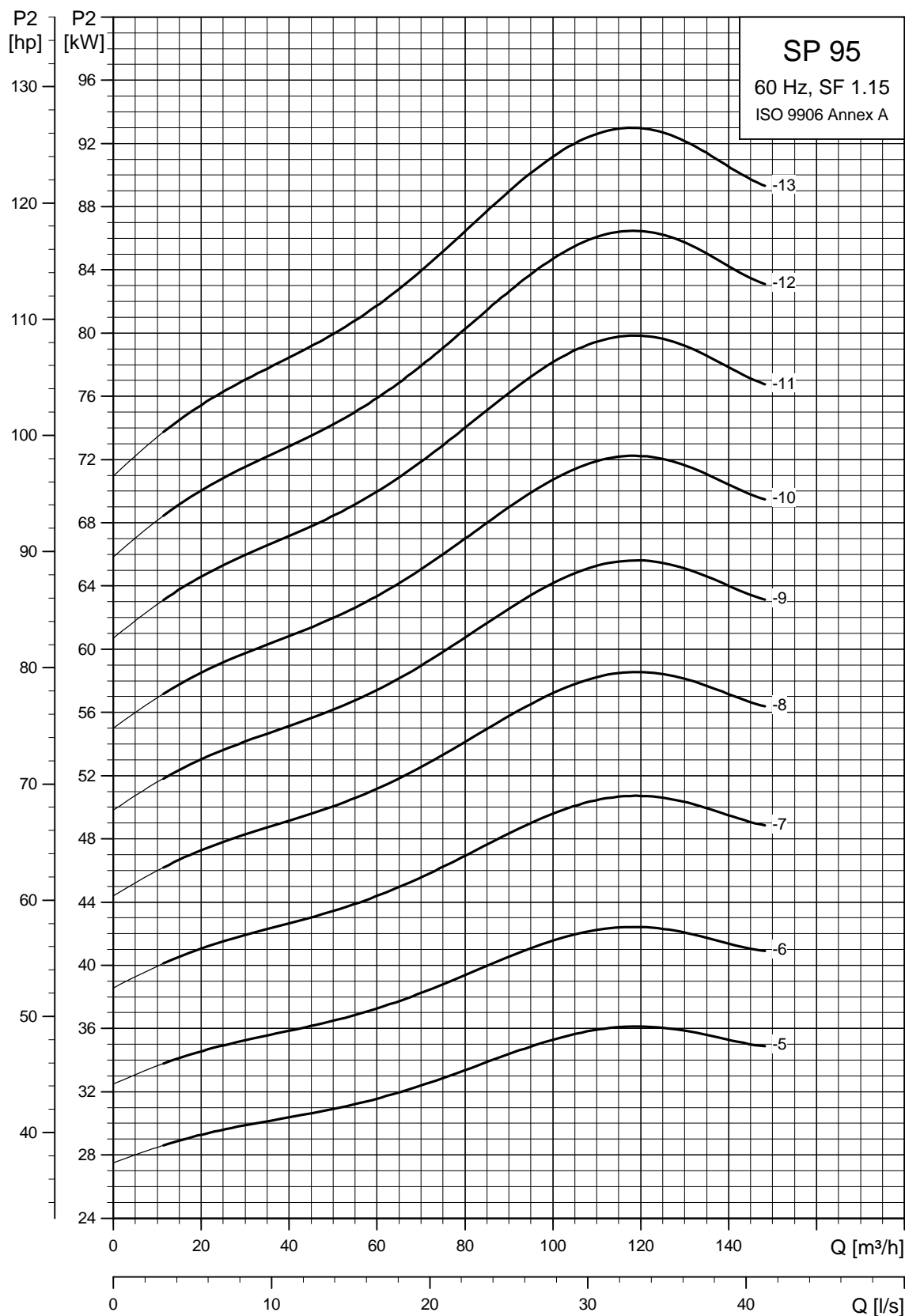
The pump types above are also available in R and N-version, see page 5 for further details. Dimensions as above

Other types of connection are possible by means of connecting pieces, see page 86.



TM00 8458 1802

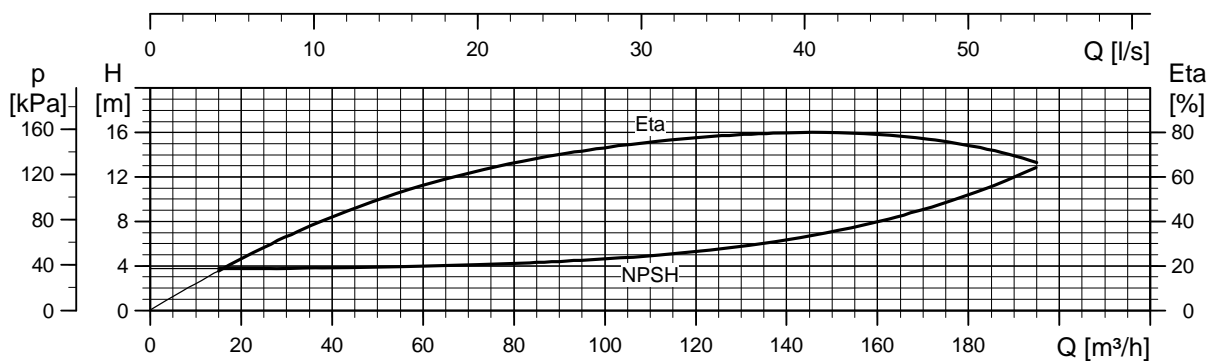
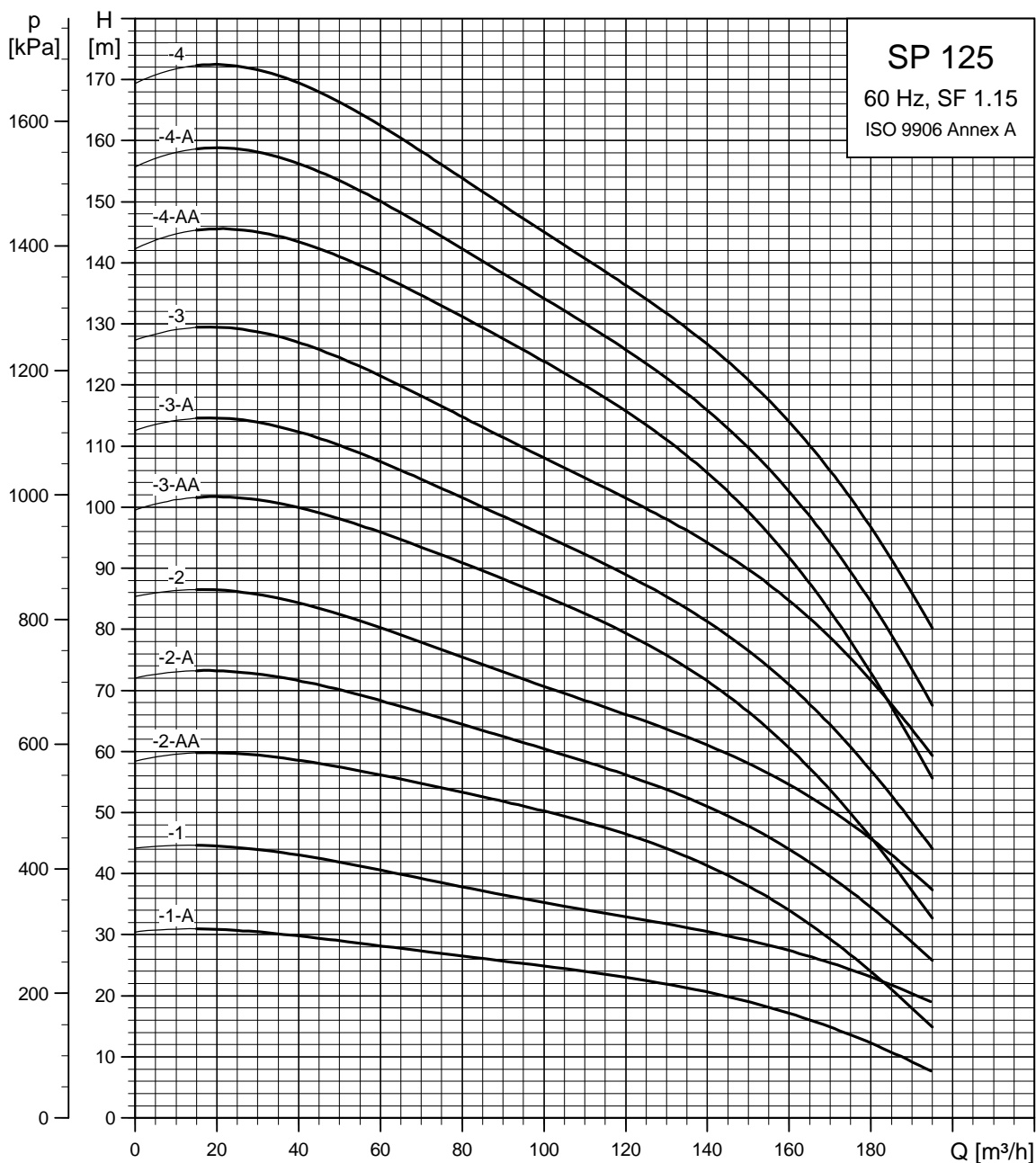
Explanation of efficiency curve, please see "Curve conditions" on page 4.



TM01 9248 1802

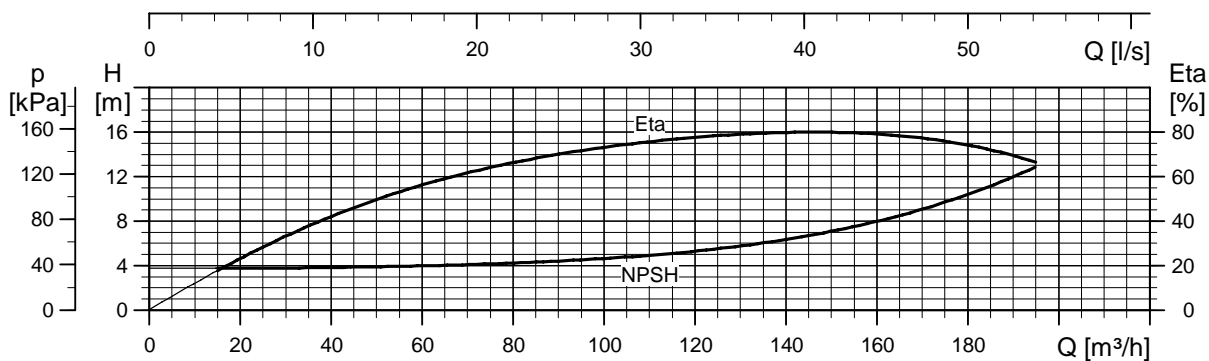
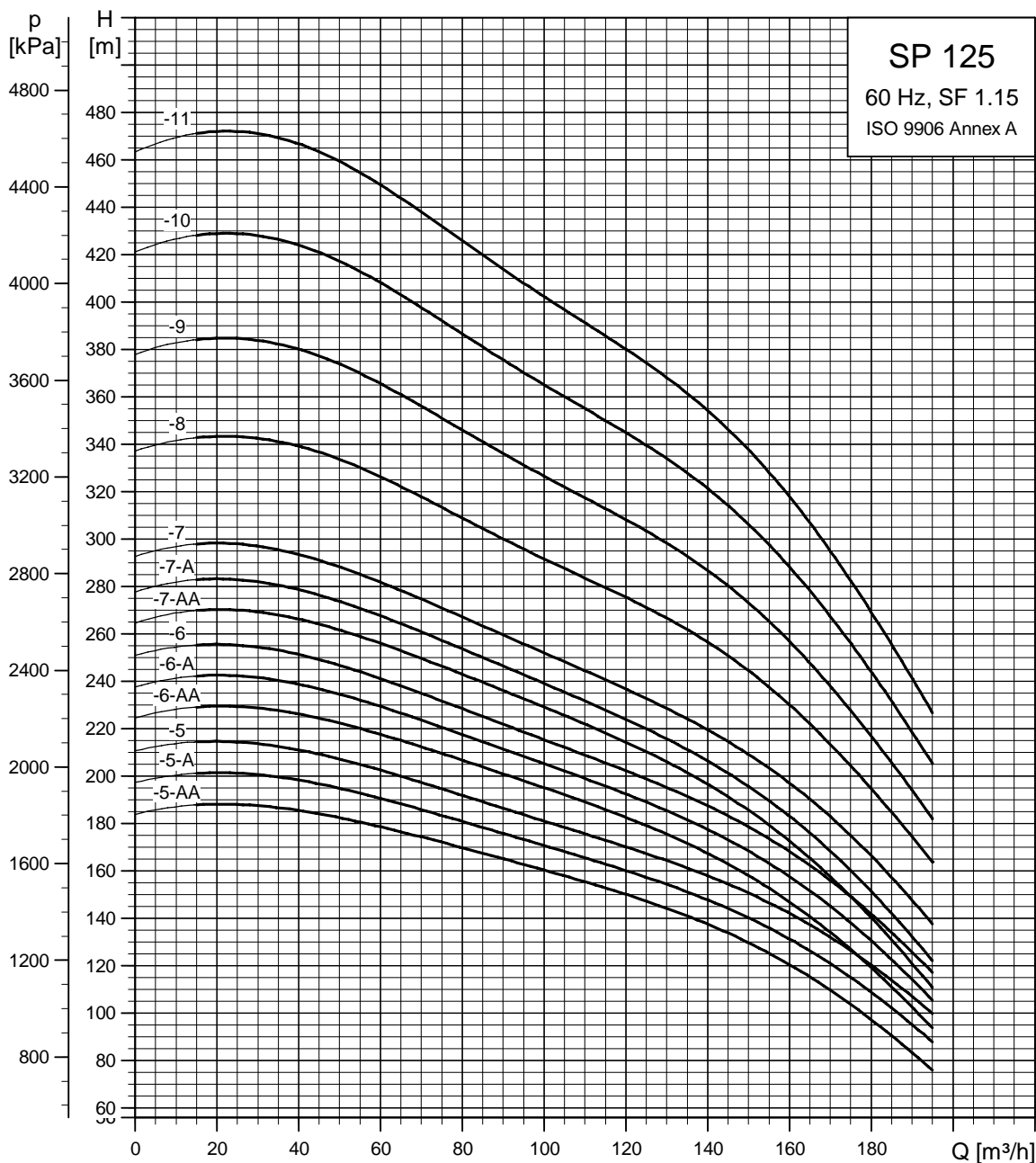
Explanation of efficiency curve, please see "Curve conditions" on page 4.

SP 125



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

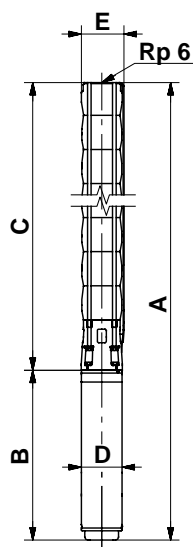
TM01 3321 1802



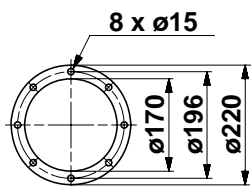
TM01 3322 0707

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

Dimensions and weights



TM00 8760 3596



TM00 7324 1798

| Pump type | Motor | | Dimensions [mm] | | | | | | | | Net weight [kg] | | |
|-------------|-----------|------------|-----------------|------|-----|-----|--------------------|------|-----|-----|-----------------|-----|-----|
| | Type | Power [kW] | Rp 6 connection | | | | 6" Grundfos flange | | | | | | |
| | | | A | C | E* | E** | A | C | E* | E** | | B | D |
| SP 125-1-A | MS6 | 11 | 1360 | 652 | 211 | 215 | 1360 | 652 | 222 | 226 | 708 | 143 | 81 |
| SP 125-1 | MS6 | 18.5 | 1520 | 652 | 211 | 215 | 1520 | 652 | 222 | 226 | 838 | 143 | 93 |
| SP 125-2-AA | MS6 | 22 | 1710 | 807 | 211 | 215 | 1710 | 807 | 222 | 226 | 903 | 143 | 105 |
| SP 125-2-A | MS6 | 26 | 1775 | 807 | 211 | 215 | 1775 | 807 | 222 | 226 | 968 | 143 | 111 |
| SP 125-2 | MS6 | 30 | 1830 | 807 | 211 | 215 | 1830 | 807 | 222 | 226 | 1023 | 143 | 119 |
| SP 125-3-AA | MMS 6000 | 37 | 2388 | 963 | 211 | 215 | 2388 | 963 | 222 | 226 | 1425 | 138 | 172 |
| SP 125-3-A | MMS 6000 | 37 | 2388 | 963 | 211 | 215 | 2388 | 963 | 222 | 226 | 1425 | 138 | 172 |
| SP 125-3 | MMS 8000 | 45 | 2233 | 963 | 213 | 219 | 2233 | 963 | 229 | 232 | 1270 | 192 | 226 |
| SP 125-4-AA | MMS 8000 | 55 | 2468 | 1118 | 213 | 219 | 2468 | 1118 | 229 | 232 | 1350 | 192 | 247 |
| SP 125-4-A | MMS 8000 | 55 | 2468 | 1118 | 213 | 219 | 2468 | 1118 | 229 | 232 | 1350 | 192 | 247 |
| SP 125-4 | MMS 8000 | 63 | 2608 | 1118 | 213 | 219 | 2608 | 1118 | 229 | 232 | 1490 | 192 | 273 |
| SP 125-5-AA | MMS 8000 | 75 | 2864 | 1274 | 213 | 219 | | | | | 1590 | 192 | 296 |
| SP 125-5-A | MMS 8000 | 75 | 2864 | 1274 | 213 | 219 | | | | | 1590 | 192 | 296 |
| SP 125-5 | MMS 8000 | 75 | 2864 | 1274 | 213 | 219 | | | | | 1590 | 192 | 296 |
| SP 125-6-AA | MMS 8000 | 75 | 3019 | 1429 | 213 | 219 | | | | | 1590 | 192 | 302 |
| SP 125-6-A | MMS 8000 | 92 | 3259 | 1429 | 213 | 219 | | | | | 1830 | 192 | 348 |
| SP 125-6 | MMS 8000 | 92 | 3259 | 1429 | 213 | 219 | | | | | 1830 | 192 | 348 |
| SP 125-7-AA | MMS 8000 | 92 | 3415 | 1585 | 213 | 219 | | | | | 1830 | 192 | 354 |
| SP 125-7-A | MMS 8000 | 92 | 3415 | 1585 | 213 | 219 | | | | | 1830 | 192 | 354 |
| SP 125-7 | MMS 8000 | 110 | 3645 | 1585 | 213 | 219 | | | | | 2060 | 192 | 404 |
| SP 125-8 | MMS 10000 | 132 | 3962 | 2092 | 237 | 237 | | | | | 1870 | 237 | 532 |
| SP 125-9 | MMS 10000 | 132 | 4118 | 2248 | 237 | 237 | | | | | 1870 | 237 | 538 |
| SP 125-10 | MMS 10000 | 147 | 4473 | 2403 | 237 | 237 | | | | | 2070 | 237 | 609 |
| SP 125-11 | MMS 10000 | 170 | 4779 | 2559 | 237 | 237 | | | | | 2220 | 237 | 655 |

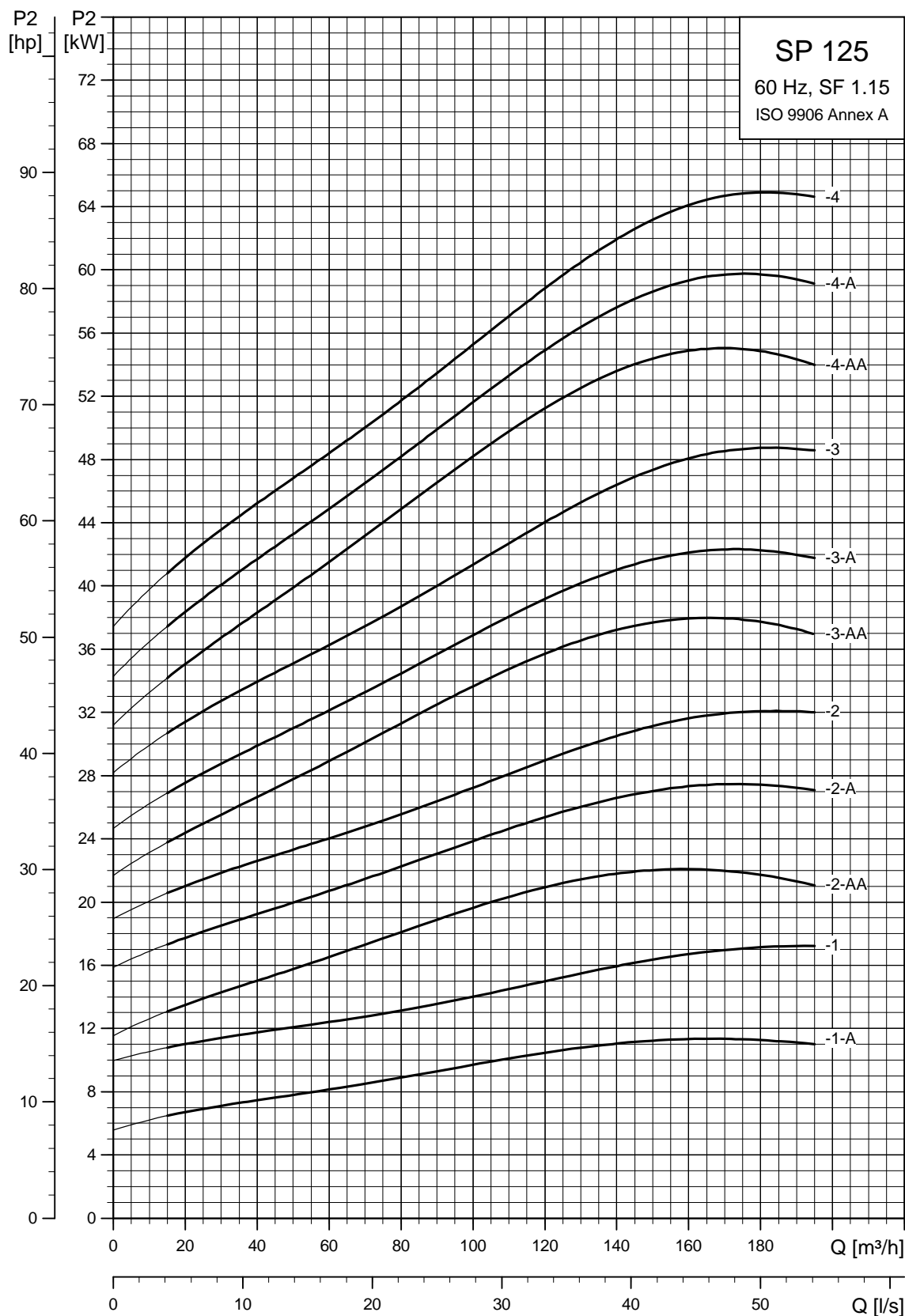
* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

The pump types above are also available in N- and R-versions up to and including SP 125-7, see page 5 for further details.

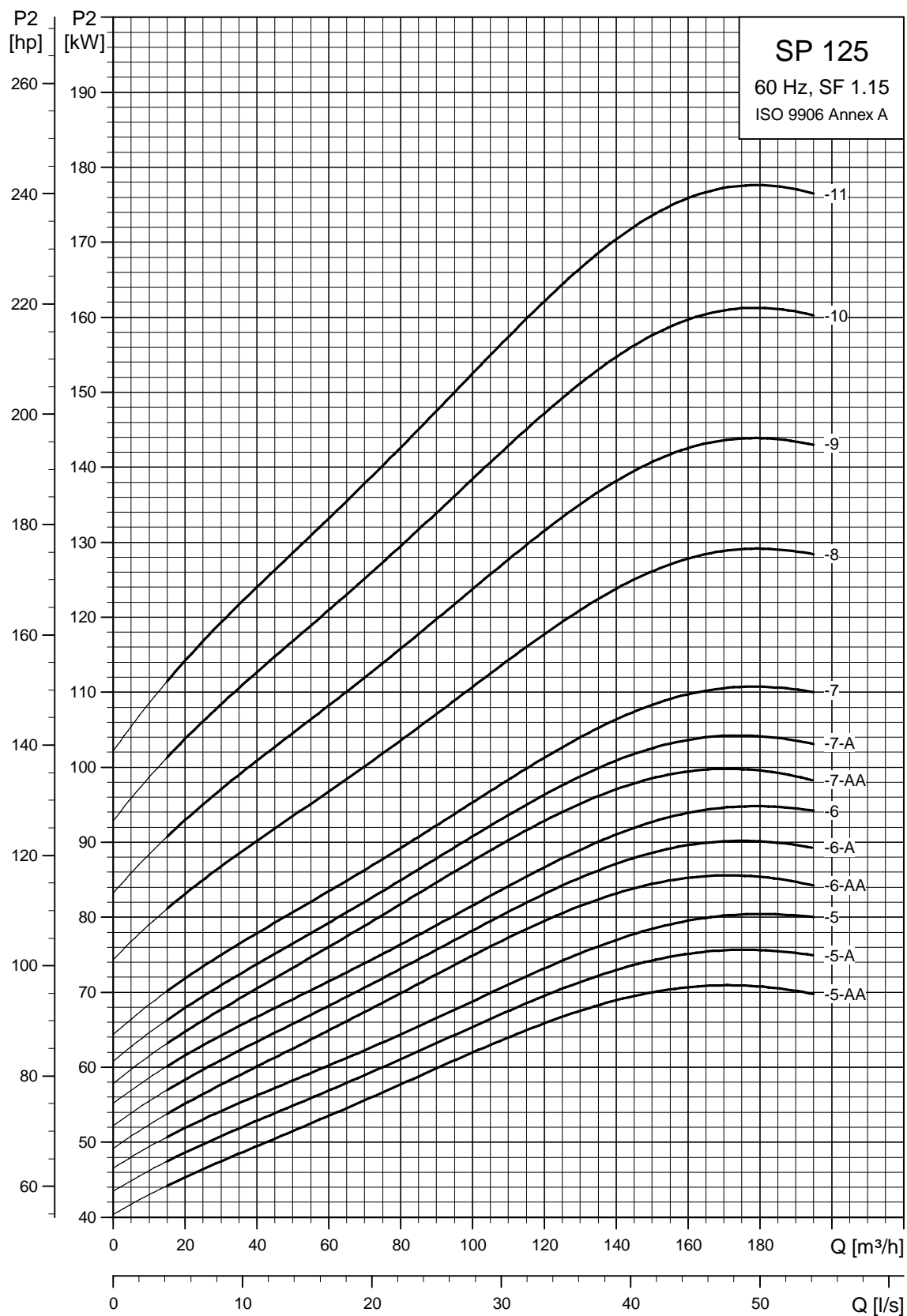
Dimensions as above.

Other types of connection are possible by means of connecting pieces, see page 86.



TM00 7634 1802

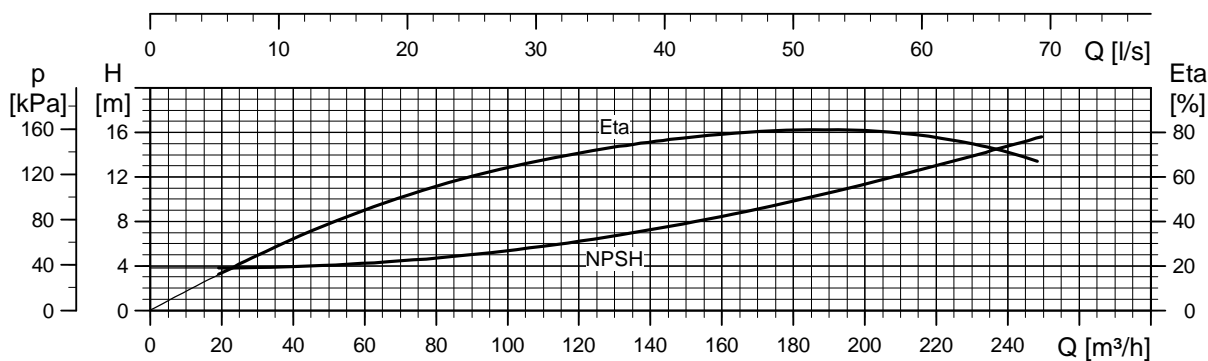
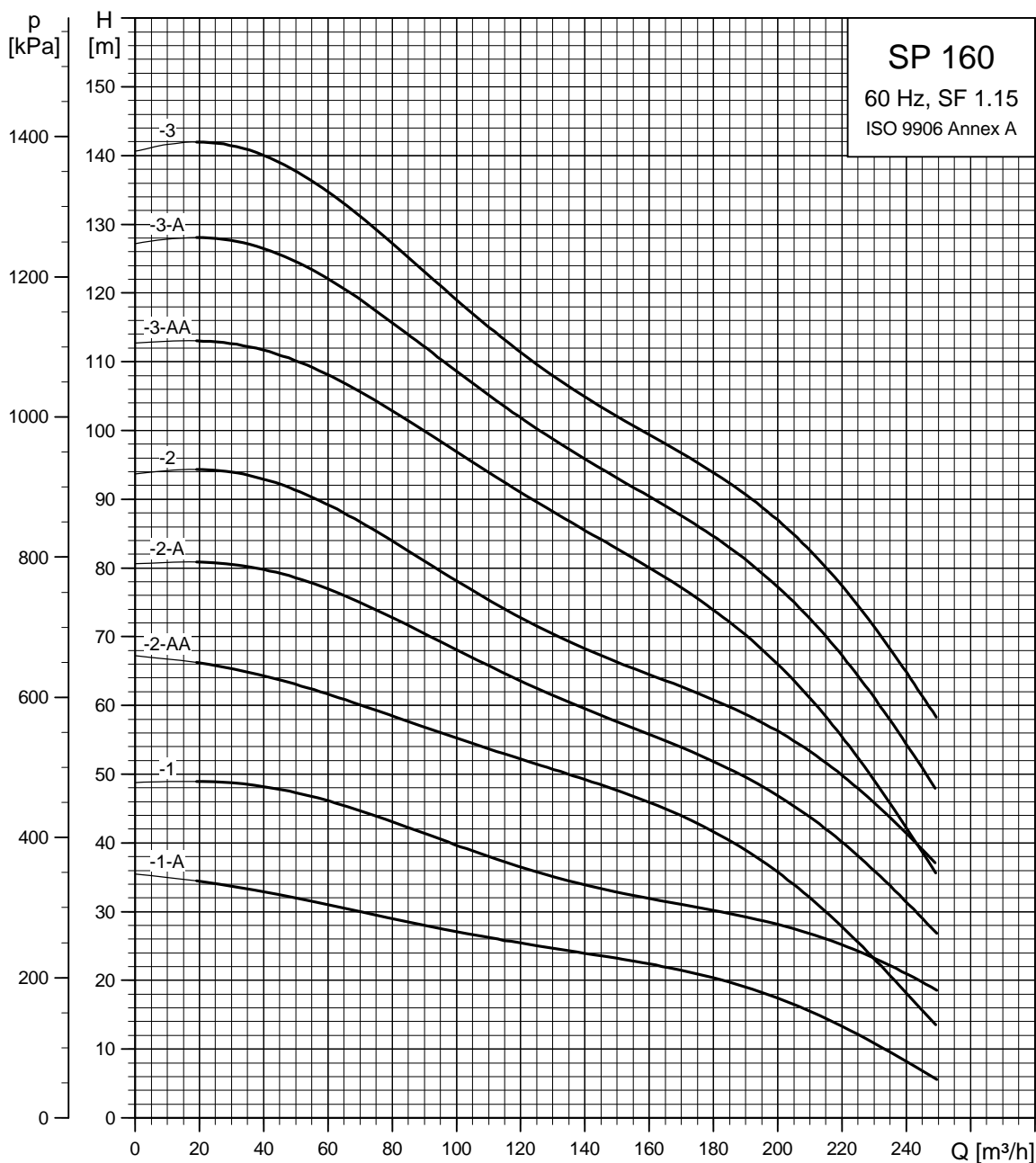
Explanation of efficiency curve, please see "Curve conditions" on page 4.



TM01 9249 0707

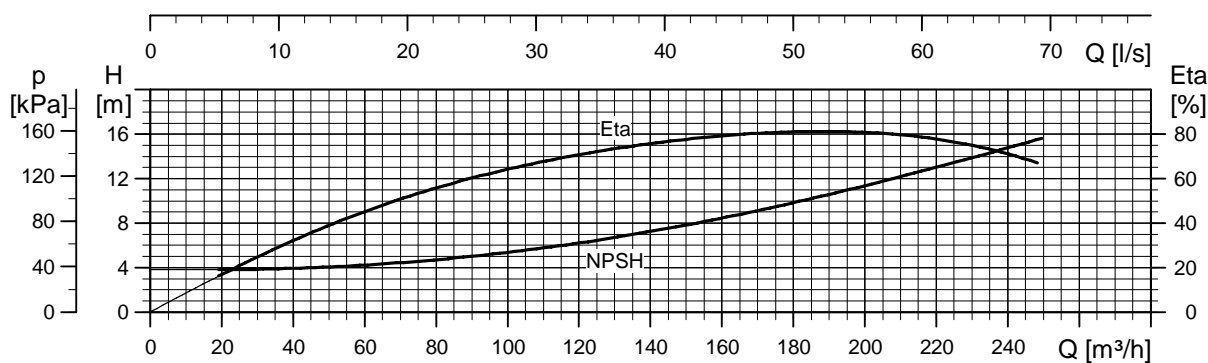
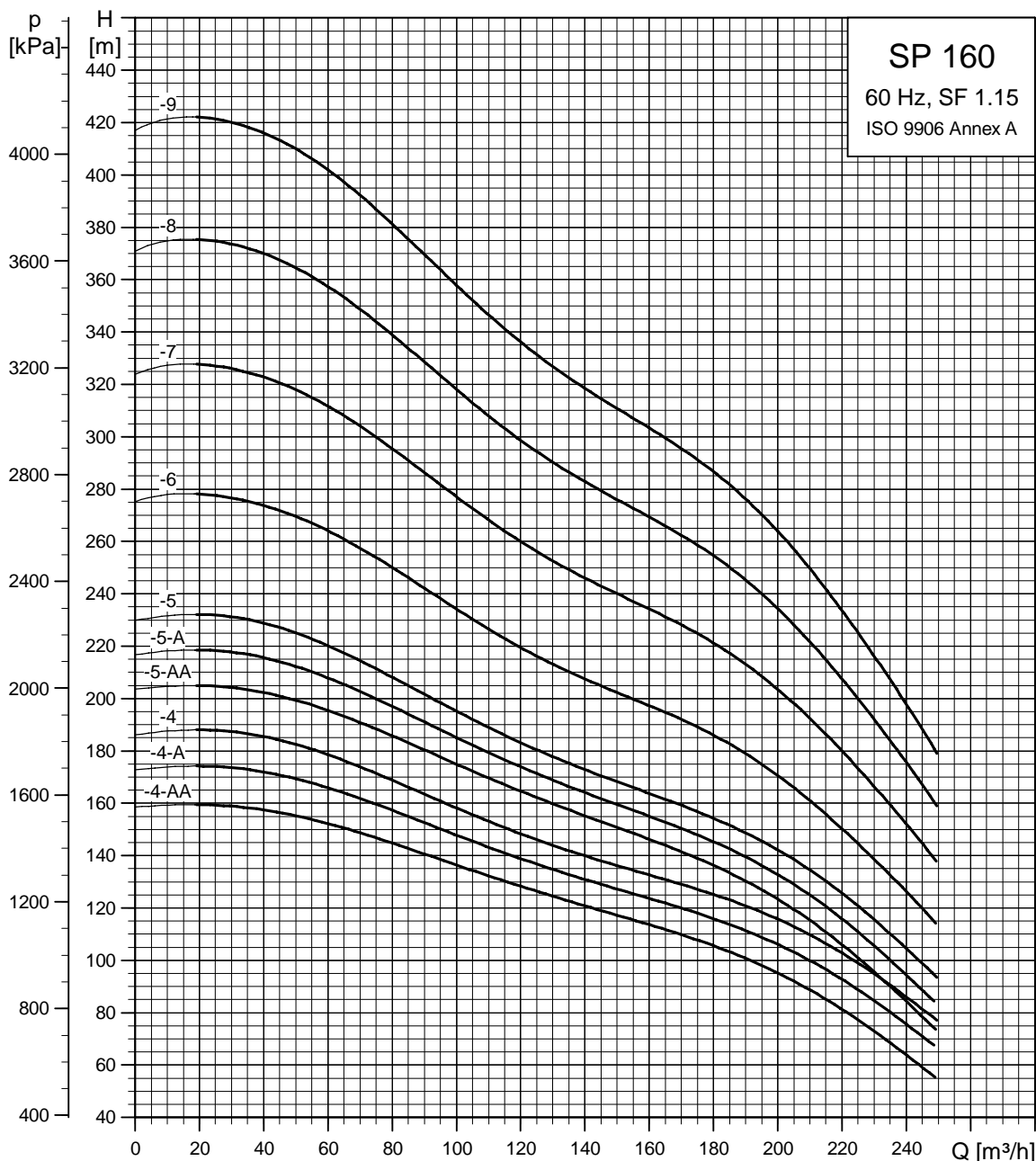
Explanation of efficiency curve, please see "Curve conditions" on page 4.

SP 160



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

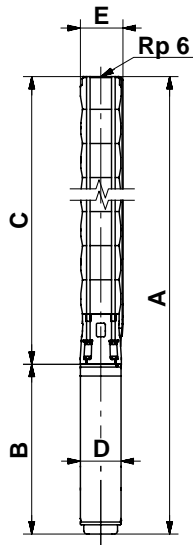
TM01 3323 1802



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

TM01 3324 0707

Dimensions and weights



TM00 8760 3596

| Pump type | Motor | | Dimensions [mm] | | | | | | | | | | Net weight [kg] |
|-------------|-----------|------------|-----------------|------|-----|-----|--------------------|-----|-----|-----|------|-----|-----------------|
| | Type | Power [kW] | Rp 6 connection | | | | 6" Grundfos flange | | | | B | D | |
| | | | A | C | E* | E** | A | C | E* | E** | | | |
| SP 160-1-A | MS6 | 15 | 1435 | 652 | 211 | 215 | 1435 | 652 | 222 | 226 | 143 | 138 | 88 |
| SP 160-1 | MS6 | 22 | 1555 | 652 | 211 | 215 | 1555 | 652 | 222 | 226 | 143 | 138 | 99 |
| SP 160-2-AA | MS6 | 26 | 1775 | 807 | 211 | 215 | 1775 | 807 | 222 | 226 | 143 | 138 | 111 |
| SP 160-2-A | MMS 6000 | 37 | 2232 | 807 | 211 | 215 | 2232 | 807 | 222 | 226 | 1425 | 138 | 166 |
| SP 160-2 | MMS 6000 | 37 | 2232 | 807 | 211 | 215 | 2232 | 807 | 222 | 226 | 1425 | 138 | 166 |
| SP 160-3-AA | MMS 8000 | 45 | 2233 | 963 | 213 | 219 | 2233 | 963 | 229 | 232 | 1270 | 192 | 226 |
| SP 160-3-A | MMS 8000 | 55 | 2313 | 963 | 213 | 219 | 2313 | 963 | 229 | 232 | 1350 | 192 | 241 |
| SP 160-3 | MMS 8000 | 55 | 2313 | 963 | 213 | 219 | 2313 | 963 | 229 | 232 | 1350 | 192 | 241 |
| SP 160-4-AA | MMS 8000 | 63 | 2608 | 1118 | 213 | 219 | | | | | 1490 | 192 | 271 |
| SP 160-4-A | MMS 8000 | 75 | 2708 | 1118 | 213 | 219 | | | | | 1590 | 192 | 290 |
| SP 160-4 | MMS 8000 | 75 | 2708 | 1118 | 213 | 219 | | | | | 1590 | 192 | 290 |
| SP 160-5-AA | MMS 8000 | 92 | 3104 | 1274 | 213 | 219 | | | | | 1830 | 192 | 342 |
| SP 160-5-A | MMS 8000 | 92 | 3104 | 1274 | 213 | 219 | | | | | 1830 | 192 | 342 |
| SP 160-5 | MMS 8000 | 92 | 3104 | 1274 | 213 | 219 | | | | | 1830 | 192 | 342 |
| SP 160-6 | MMS 8000 | 110 | 3789 | 1729 | 213 | 219 | | | | | 2060 | 192 | 408 |
| SP 160-7 | MMS 10000 | 132 | 3807 | 1937 | 237 | 237 | | | | | 1870 | 237 | 526 |
| SP 160-8 | MMS 10000 | 147 | 4162 | 2092 | 237 | 237 | | | | | 2070 | 237 | 597 |
| SP 160-9 | MMS 10000 | 170 | 4468 | 2248 | 237 | 237 | | | | | 2220 | 237 | 643 |

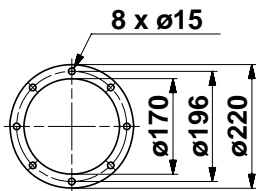
* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

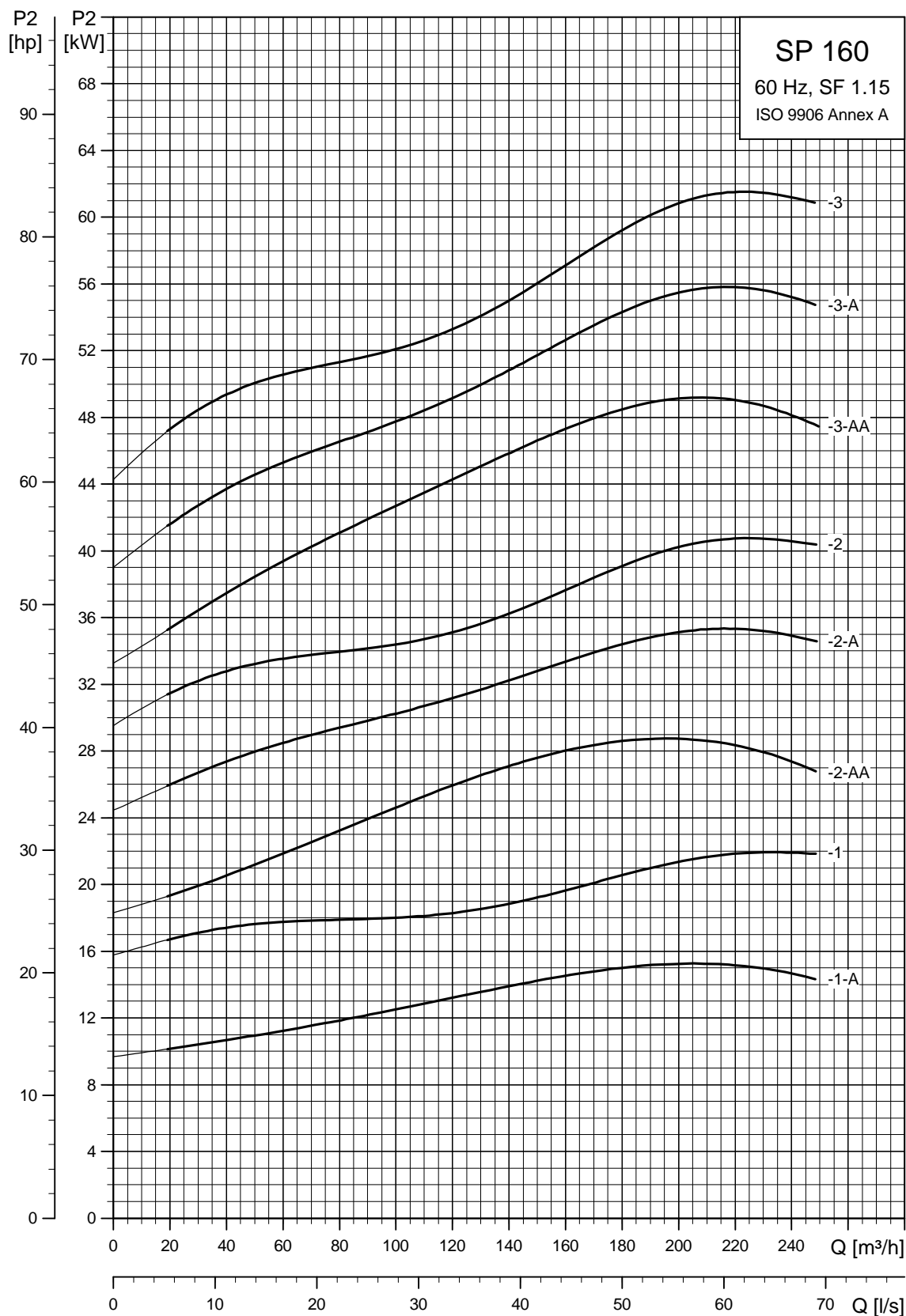
The pump types above are also available in N- and R-versions up to and including SP 160-6, see page 5 for further details.

Dimensions as above.

Other types of connection are possible by means of connecting pieces, see page 86.

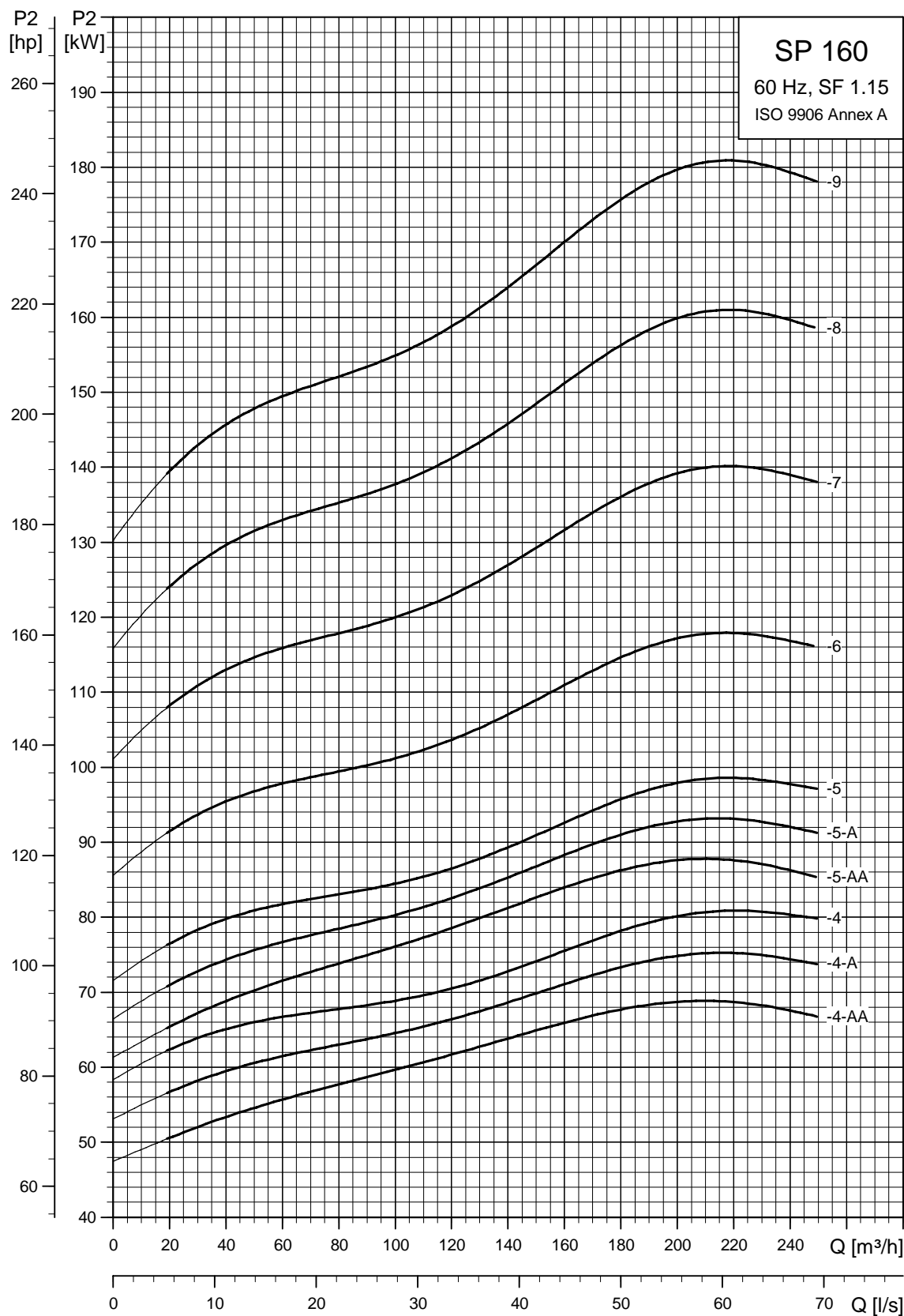


TM00 7324 1798



TM00 7688 1802

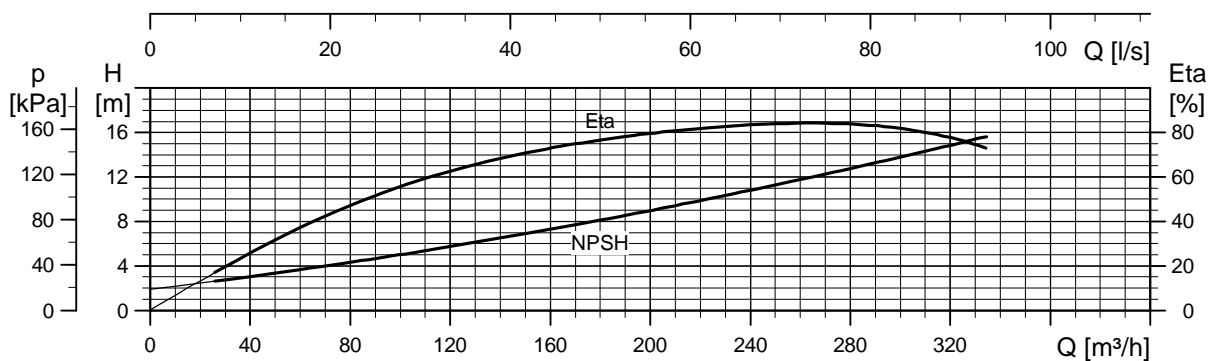
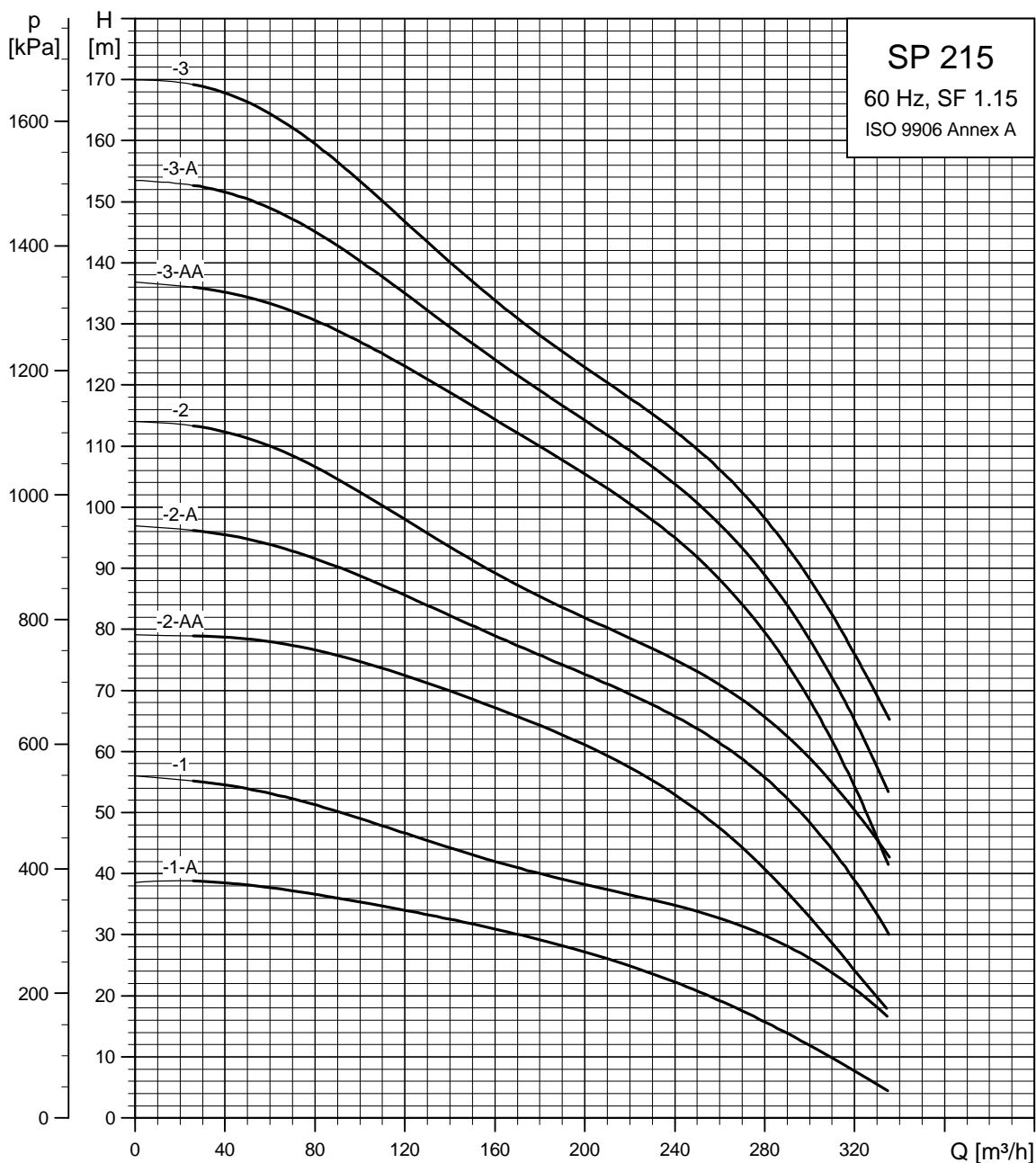
Explanation of efficiency curve, please see "Curve conditions" on page 4.



TM01 9250 0707

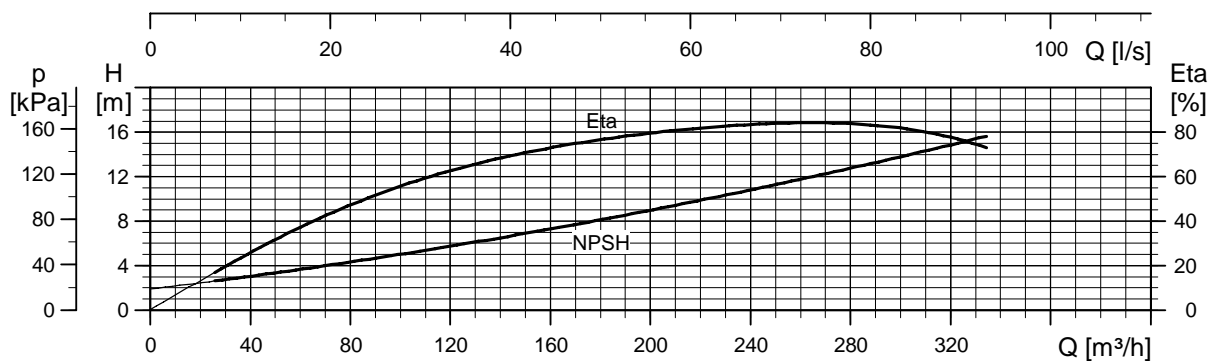
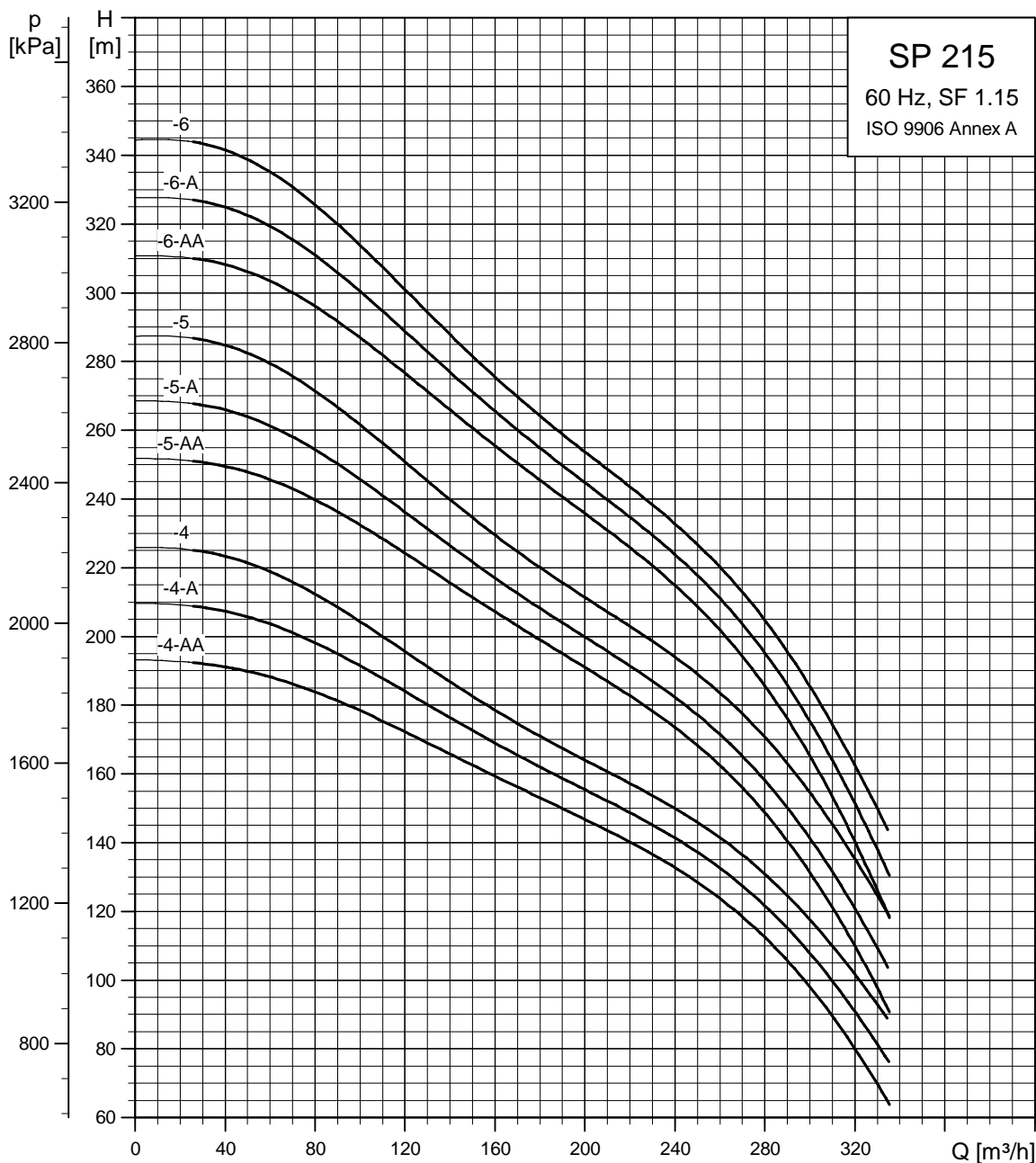
Explanation of efficiency curve, please see "Curve conditions" on page 4.

SP 215



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

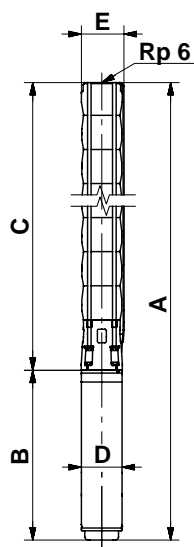
TM01 3325 1802



TM01 3326 0707

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

Dimensions and weights



TM00 8760 3596

| Pump type | Motor | | Dimensions [mm] | | | | | | | | | | Net weight [kg] |
|-------------|-----------|------------|-----------------|------|-----|-----|--------------------|------|-----|-----|------|-----|-----------------|
| | Type | Power [kW] | Rp 6 connection | | | | 6" Grundfos flange | | | | B | D | |
| | | | A | C | E* | E** | A | C | E* | E** | | | |
| SP 215-1-A | MS6 | 22 | 1693 | 790 | 236 | 239 | 1693 | 790 | 241 | 247 | 903 | 143 | 106 |
| SP 215-1 | MS6 | 30 | 1813 | 790 | 236 | 239 | 1813 | 790 | 241 | 247 | 1023 | 143 | 120 |
| SP 215-2-AA | MMS 8000 | 45 | 2236 | 966 | 239 | 244 | 2236 | 966 | 241 | 247 | 1270 | 192 | 231 |
| SP 215-2-A | MMS 8000 | 55 | 2316 | 966 | 239 | 244 | 2316 | 966 | 241 | 247 | 1350 | 192 | 246 |
| SP 215-2 | MMS 8000 | 63 | 2456 | 966 | 239 | 244 | 2456 | 966 | 241 | 247 | 1490 | 192 | 272 |
| SP 215-3-AA | MMS 8000 | 75 | 2732 | 1142 | 239 | 244 | 2732 | 1142 | 241 | 247 | 1590 | 192 | 301 |
| SP 215-3-A | MMS 8000 | 92 | 2972 | 1142 | 239 | 244 | 2972 | 1142 | 241 | 247 | 1830 | 192 | 347 |
| SP 215-3 | MMS 8000 | 92 | 2972 | 1142 | 239 | 244 | 2972 | 1142 | 241 | 247 | 1830 | 192 | 347 |
| SP 215-4-AA | MMS 8000 | 110 | 3378 | 1318 | 239 | 244 | 3378 | 1318 | 241 | 247 | 2060 | 192 | 407 |
| SP 215-4-A | MMS 8000 | 110 | 3378 | 1318 | 239 | 244 | 3378 | 1318 | 241 | 247 | 2060 | 192 | 407 |
| SP 215-4 | MMS 8000 | 110 | 3378 | 1318 | 239 | 244 | 3378 | 1318 | 241 | 247 | 2060 | 192 | 407 |
| SP 215-5-AA | MMS 10000 | 132 | 3364 | 1494 | 250 | 254 | | | | | 1870 | 237 | 519 |
| SP 215-5-A | MMS 10000 | 132 | 3364 | 1494 | 250 | 254 | | | | | 1870 | 237 | 519 |
| SP 215-5 | MMS 10000 | 147 | 3564 | 1494 | 250 | 254 | | | | | 2070 | 237 | 584 |
| SP 215-6-AA | MMS 10000 | 170 | 3890 | 1670 | 250 | 254 | | | | | 2220 | 237 | 634 |
| SP 215-6-A | MMS 10000 | 170 | 3890 | 1670 | 250 | 254 | | | | | 2220 | 237 | 634 |
| SP 215-6 | MMS 10000 | 170 | 3890 | 1670 | 250 | 254 | | | | | 2220 | 237 | 634 |

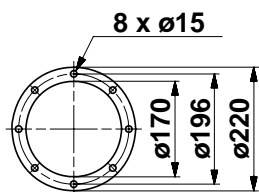
* Maximum diameter of pump with one motor cable.

** Maximum diameter of pump with two motor cables.

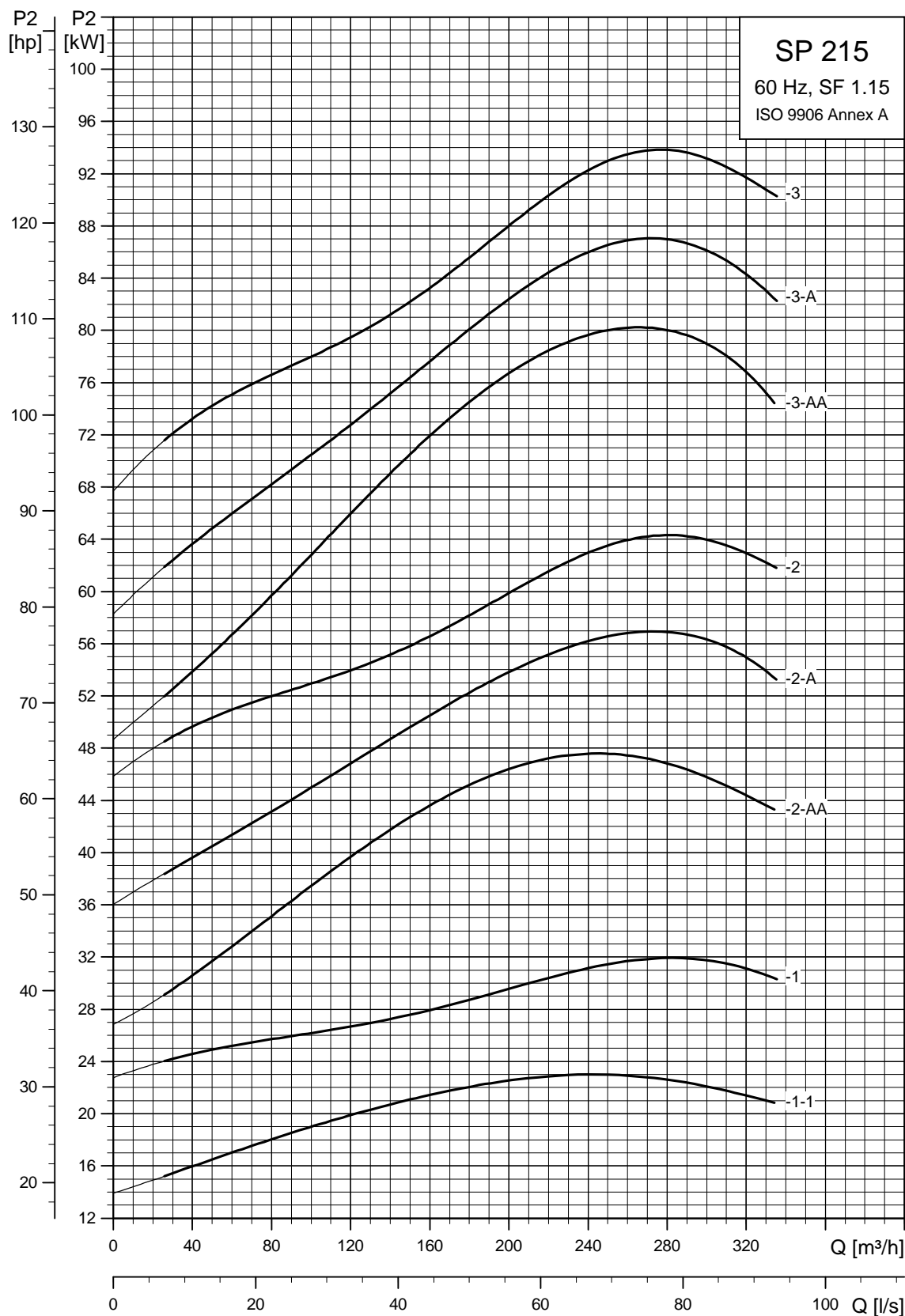
The pump types above are also available in R and N-versions up to and including SP 215-4, see page 5 for further details.

Dimensions as above.

Other types of connection are possible by means of connecting pieces, see page 86.

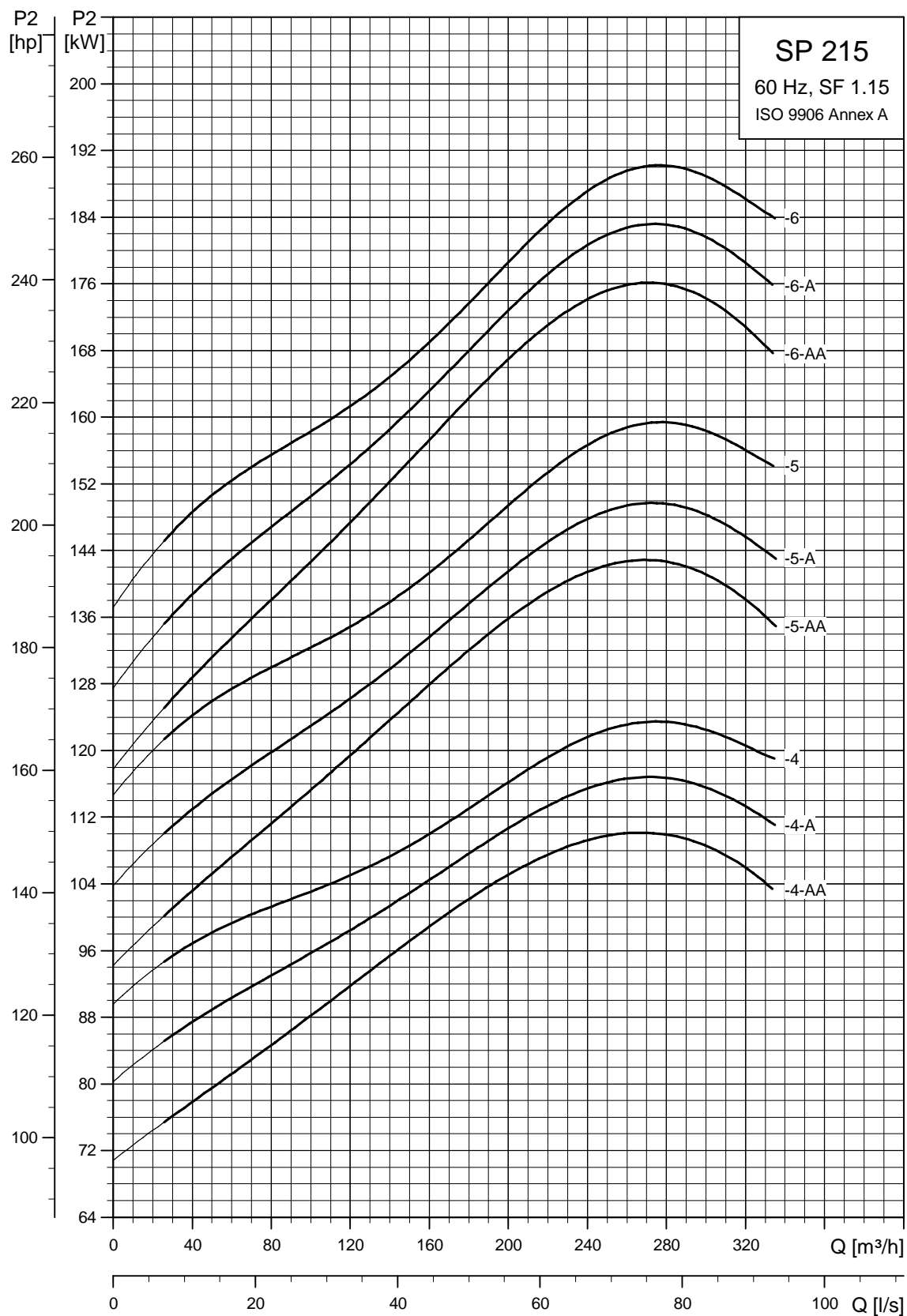


TM00 7324 1798



TM00 7627 1802

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



TM01 9251 0707

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

1 x 220 V, submersible motors

| Type | Electrical data | | | | | | | | | | | Dimensions | | |
|--------|-----------------|------------|------------|--------------------------------------|----------------------|------|-------|--------------|-----------|------------|---------------------------------|------------------------|-------------|-------------|
| | Size | Motor | | Full-load current I _n [A] | Motor efficiency [%] | | | Power factor | | | I _{st} /I _n | Control box for 3-wire | Length [mm] | Weight [kg] |
| | | Power [kW] | Power [hp] | | η50% | η75% | η100% | cos φ 50% | cos φ 75% | cos φ 100% | | | | |
| MS 402 | 4" | 0.25 | 0.33 | 4.40 | 39.0 | 49.0 | 54.0 | 0.48 | 0.51 | 0.64 | 3.0* | SA-SPM 5 | 256 | 6.8 |
| MS 402 | 4" | 0.37 | 0.5 | 5.90 | 43.0 | 52.5 | 56.0 | 0.46 | 0.54 | 0.62 | 3.6* | SA-SPM 5 | 256 | 6.8 |
| MS 402 | 4" | 0.55 | 0.75 | 8.00 | 42.5 | 51.0 | 57.0 | 0.47 | 0.56 | 0.63 | 3.7* | SA-SPM 5 | 291 | 8.2 |
| MS 402 | 4" | 0.75 | 1.0 | 9.60 | 47.0 | 55.5 | 60.0 | 0.50 | 0.60 | 0.70 | 3.8* | SA-SPM 5 | 306 | 8.9 |
| MS 402 | 4" | 1.1 | 1.5 | 11.5 | 53.5 | 62.0 | 67.0 | 0.60 | 0.73 | 0.82 | 4.0* | SA-SPM 5 | 346 | 10.5 |
| MS 402 | 4" | 1.1 | 1.5 | 13.1 | | | 88.0 | | | 0.63 | 4.4** | | 346 | 10.5 |

* Applies to 2- and 3-wire motors.

** Applies to 2-wire motors.

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

1 x 230 V, submersible motors

| Type | Electrical data | | | | | | | | | | | Dimensions | | |
|---------|-----------------|------------|------------|--------------------------------------|----------------------|------|-------|--------------|-----------|------------|---------------------------------|------------------------|-------------|-------------|
| | Size | Motor | | Full-load current I _n [A] | Motor efficiency [%] | | | Power factor | | | I _{st} /I _n | Control box for 3-wire | Length [mm] | Weight [kg] |
| | | Power [kW] | Power [hp] | | η50% | η75% | η100% | cos φ 50% | cos φ 75% | cos φ 100% | | | | |
| MS 4000 | 4" | 1.5 | 2.0 | 13.2 | 0.53 | 0.56 | 0.57 | 0.7 | 0.8 | 0.86 | 4.3* | SA-SPM 5 | 496 | 17.0 |
| MS 4000 | 4" | 2.2 | 3.0 | 17.0 | 0.61 | 0.63 | 0.62 | 0.85 | 0.92 | 0.94 | 4.7* | SA-SPM 5 | 576 | 20.5 |
| MS 4000 | 4" | 3.7 | 5.0 | 27.5 | 0.58 | 0.63 | 0.66 | 0.89 | 0.94 | 0.96 | 4.3* | SA-SPM 5 | 676 | 25.5 |

MS 4000 3-wire motors comes as CSCR versions and do not incorporate motor protection, the motor is connected via a Grundfos SA-SPM 5 control box.

3 x 220 V, submersible motors (SF 1.0)

| Type | Electrical data | | | | | | | | | | | Dimensions | |
|-------------|-----------------|------------|------------|--------------------------------------|----------------------|------|-------|--------------|-----------|------------|---------------------------------|-------------|-------------|
| | Size | Motor | | Full-load current I _n [A] | Motor efficiency [%] | | | Power factor | | | I _{st} /I _n | Length [mm] | Weight [kg] |
| | | Power [kW] | Power [hp] | | η50% | η75% | η100% | cos φ 50% | cos φ 75% | cos φ 100% | | | |
| MS 402 | 4" | 0.37 | 0.5 | 3.30 | 57.5 | 65.0 | 68.0 | 0.52 | 0.63 | 0.72 | 5.0 | 226 | 5.5 |
| MS 402 | 4" | 0.55 | 0.75 | 4.80 | 58.0 | 65.5 | 68.0 | 0.47 | 0.59 | 0.70 | 4.8 | 241 | 6.3 |
| MS 402 | 4" | 0.75 | 1.0 | 5.65 | 61.0 | 67.5 | 71.0 | 0.50 | 0.63 | 0.73 | 5.0 | 276 | 7.7 |
| MS 4000R | 4" | 0.75 | 1.0 | 4.60 | 70.5 | 72.0 | 71.1 | 0.81 | 0.86 | 0.88 | 3.9 | 398 | 13.0 |
| MS 402 | 4" | 1.1 | 1.5 | 7.60 | 65.0 | 71.0 | 73.5 | 0.50 | 0.67 | 0.72 | 5.5 | 306 | 8.9 |
| MS 4000R | 4" | 1.1 | 1.5 | 6.10 | 71.4 | 74.7 | 74.8 | 0.73 | 0.82 | 0.86 | 4.6 | 413 | 14.0 |
| MS 402 | 4" | 1.5 | 2.0 | 9.10 | 67.0 | 73.0 | 75.5 | 0.54 | 0.67 | 0.75 | 5.5 | 346 | 10.5 |
| MS 4000R | 4" | 1.5 | 2.0 | 8.20 | 73.0 | 74.8 | 74.5 | 0.67 | 0.78 | 0.85 | 4.1 | 413 | 14.0 |
| MS 4000 (R) | 4" | 2.2 | 3.0 | 11.4 | 73.9 | 76.6 | 77.2 | 0.58 | 0.71 | 0.80 | 4.7 | 453 | 16.0 |
| MS 4000 (R) | 4" | 3.0 | 4.0 | 14.8 | 76.9 | 79.0 | 78.3 | 0.60 | 0.74 | 0.82 | 4.7 | 493 | 17.0 |
| MS 4000 (R) | 4" | 4.0 | 5.5 | 19.0 | 77.6 | 79.7 | 79.2 | 0.68 | 0.79 | 0.85 | 5.4 | 573 | 21.0 |
| MS 4000 (R) | 4" | 5.5 | 7.5 | 25.0 | 80.0 | 80.5 | 78.0 | 0.67 | 0.80 | 0.87 | 5.1 | 673 | 26.0 |
| MS6 (R) | 6" | 5.5 | 7.5 | 21.8 | 77.8 | 81.9 | 83.2 | 0.72 | 0.80 | 0.84 | 6.3 | 565 | 38 |
| MS6 (R) | 6" | 7.5 | 10 | 29.0 | 78.6 | 82.6 | 83.9 | 0.72 | 0.80 | 0.84 | 6.2 | 610 | 43 |
| MS6 (R) | 6" | 9.2 | 12.5 | 35.5 | 79.2 | 83.0 | 84.1 | 0.72 | 0.80 | 0.84 | 5.9 | 635 | 46 |
| MS6 (R) | 6" | 11 | 15 | 42.5 | 79.8 | 83.4 | 84.4 | 0.72 | 0.82 | 0.86 | 5.6 | 738 | 53 |
| MS6 (R) | 6" | 13 | 17.5 | 50.0 | 80.0 | 83.6 | 84.7 | 0.72 | 0.82 | 0.86 | 5.9 | 783 | 58 |
| MS6 (R) | 6" | 15 | 20 | 58.0 | 79.7 | 83.6 | 84.9 | 0.72 | 0.80 | 0.84 | 6.4 | 838 | 64 |
| MS6 (R) | 6" | 18.5 | 25 | 71.5 | 79.8 | 83.4 | 84.5 | 0.72 | 0.80 | 0.86 | 6.5 | 903 | 71 |
| MS6 (R) | 6" | 22 | 30 | 84.5 | 79.7 | 83.6 | 85.0 | 0.74 | 0.82 | 0.86 | 7.0 | 1023 | 84 |

3 x 220 V, submersible rewindable motors

| Type | Electrical data | | | | | | | | | | Dimensions | | |
|-------------------|-----------------|------------|------------|--------------------------------------|----------------------|------|-------|--------------|-----------|------------|--------------------------------|-------------|-------------|
| | Size | Motor | | Full-load current I _n [A] | Motor efficiency [%] | | | Power factor | | | I _{st} I _n | Length [mm] | Weight [kg] |
| | | Power [kW] | Power [hp] | | η50% | η75% | η100% | Cos φ 50% | Cos φ 75% | Cos φ 100% | | | |
| MMS 6000 (N) | 6" | 3.7 | 5.0 | 19.6 | 66 | 72 | 74 | 0.68 | 0.76 | 0.80 | 4.3 | 630 | 45 |
| MMS 6000 (N) | 6" | 5.5 | 7.5 | 27.5 | 74 | 77 | 75 | 0.72 | 0.80 | 0.83 | 3.8 | 660 | 48 |
| MMS 6000 (N) | 6" | 7.5 | 10 | 37.0 | 77 | 79 | 77 | 0.73 | 0.81 | 0.84 | 3.5 | 690 | 50 |
| MMS 6000 (N) | 6" | 9.2 | 12.5 | 45.0 | 74 | 77 | 76 | 0.74 | 0.82 | 0.85 | 3.5 | 720 | 55 |
| MMS 6000 (N) | 6" | 11 | 15 | 51.5 | 79 | 81 | 79 | 0.77 | 0.84 | 0.86 | 3.5 | 780 | 60 |
| MMS 6000 (N) | 6" | 13 | 17.5 | 60.5 | 80 | 82 | 80 | 0.78 | 0.82 | 0.85 | 3.6 | 915 | 72 |
| MMS 6000 (N) | 6" | 15 | 20 | 69.0 | 79 | 82 | 81 | 0.82 | 0.86 | 0.86 | 3.5 | 975 | 78 |
| MMS 6000 (N) | 6" | 18.5 | 25 | 81.0 | 82 | 84 | 83 | 0.85 | 0.88 | 0.88 | 4.6 | 1085 | 90 |
| MMS 6000 (N) | 6" | 22 | 30 | 96.0 | 82 | 84 | 84 | 0.84 | 0.88 | 0.88 | 4.9 | 1195 | 100 |
| MMS 6000 (N) | 6" | 26 | 35 | 114 | 83 | 85 | 83 | 0.77 | 0.84 | 0.87 | 4.4 | 1315 | 115 |
| MMS 6000 (N) | 6" | 30 | 40 | 130 | 84 | 85 | 84 | 0.77 | 0.84 | 0.87 | 4.4 | 1425 | 125 |
| MMS 6000 (-N, -R) | 6" | 37 | 50 | 166 | 83 | 85 | 84 | 0.68 | 0.88 | 0.84 | 4.8 | 1425 | 125 |
| MMS 8000 (-N, -R) | 8" | 22 | 30 | 102 | 75 | 79 | 80 | 0.80 | 0.85 | 0.86 | 4.4 | 1010 | 126 |
| MMS 8000 (-N, -R) | 8" | 26 | 35 | 118 | 75 | 79 | 80 | 0.82 | 0.87 | 0.87 | 4.3 | 1050 | 134 |
| MMS 8000 (-N, -R) | 8" | 30 | 40 | 134 | 77 | 81 | 82 | 0.77 | 0.84 | 0.87 | 5.2 | 1110 | 146 |
| MMS 8000 (-N, -R) | 8" | 37 | 50 | 164 | 78 | 82 | 82 | 0.77 | 0.84 | 0.86 | 5.0 | 1160 | 156 |
| MMS 8000 (-N, -R) | 8" | 45 | 60 | 192 | 80 | 84 | 85 | 0.75 | 0.83 | 0.86 | 5.7 | 1270 | 177 |
| MMS 8000 (-N, -R) | 8" | 55 | 75 | 232 | 82 | 85 | 85 | 0.79 | 0.86 | 0.88 | 5.3 | 1350 | 192 |
| MMS 8000 (-N, -R) | 8" | 63 | 85 | 265 | 83 | 85 | 85 | 0.84 | 0.89 | 0.90 | 4.8 | 1490 | 218 |
| MMS 8000 (-N, -R) | 8" | 75 | 100 | 315 | 83 | 86 | 85 | 0.85 | 0.89 | 0.90 | 4.8 | 1590 | 237 |
| MMS 10000 (N) | 10" | 75 | 100 | 320 | 83 | 85 | 84 | 0.83 | 0.87 | 0.88 | 4.7 | 1400 | 280 |
| MMS 10000 (N) | 10" | 92 | 125 | 395 | 82 | 85 | 85 | 0.77 | 0.84 | 0.87 | 4.9 | 1500 | 330 |
| MMS 10000 (N) | 10" | 110 | 150 | 470 | 82 | 85 | 85 | 0.85 | 0.88 | 0.89 | 4.5 | 1690 | 385 |
| MMS 10000 (N) | 10" | 132 | 180 | 570 | 82 | 85 | 84 | 0.86 | 0.89 | 0.89 | 4.2 | 1870 | 435 |

3 x 380 V, submersible motors

| Type | Electrical data | | | | | | | | | | Dimensions | | |
|-------------|-----------------|------------|------------|--------------------------------------|----------------------|------|-------|--------------|-----------|------------|--------------------------------|-------------|-------------|
| | Size | Motor | | Full load current I _n [A] | Motor efficiency [%] | | | Power factor | | | I _{st} I _n | Length [mm] | Weight [kg] |
| | | Power [kW] | Power [hp] | | η50% | η75% | η100% | Cos φ 50% | Cos φ 75% | Cos φ 100% | | | |
| MS 402 | 4" | 0.37 | 0.5 | 1.90 | 57.0 | 67.0 | 69.0 | 0.52 | 0.64 | 0.72 | 5.0 | 226 | 5.5 |
| MS 402 | 4" | 0.55 | 0.75 | 2.80 | 58.0 | 65.5 | 69.0 | 0.47 | 0.59 | 0.70 | 4.8 | 241 | 6.3 |
| MS 402 | 4" | 0.75 | 1.0 | 3.25 | 61.0 | 67.0 | 71.0 | 0.50 | 0.63 | 0.73 | 5.0 | 276 | 7.7 |
| MS 4000R | 4" | 0.75 | 1.0 | 2.65 | 68.8 | 71.3 | 71.3 | 0.77 | 0.83 | 0.87 | 4.2 | 398 | 13.0 |
| MS 402 | 4" | 1.1 | 1.5 | 4.40 | 65.0 | 72.0 | 72.0 | 0.49 | 0.62 | 0.72 | 5.5 | 306 | 8.9 |
| MS 4000R | 4" | 1.1 | 1.5 | 3.65 | 72.9 | 74.8 | 74.4 | 0.68 | 0.79 | 0.85 | 4.9 | 413 | 14.0 |
| MS 402 | 4" | 1.5 | 2.0 | 5.25 | 67.5 | 73.0 | 76.0 | 0.53 | 0.67 | 0.75 | 5.5 | 346 | 10.5 |
| MS 4000R | 4" | 1.5 | 2.0 | 4.90 | 72.0 | 74.5 | 75.2 | 0.60 | 0.73 | 0.82 | 4.5 | 413 | 14.0 |
| MS 4000 (R) | 4" | 2.2 | 3.0 | 7.00 | 70.0 | 75.0 | 76.2 | 0.52 | 0.66 | 0.75 | 4.9 | 453 | 16.0 |
| MS 4000 (R) | 4" | 3.0 | 4.0 | 9.10 | 73.4 | 77.3 | 78.0 | 0.54 | 0.68 | 0.78 | 4.9 | 493 | 17.0 |
| MS 4000 (R) | 4" | 4.0 | 5.5 | 11.4 | 77.1 | 79.8 | 79.9 | 0.60 | 0.74 | 0.82 | 5.7 | 573 | 21.0 |
| MS 4000 (R) | 4" | 5.5 | 7.5 | 15.2 | 79.5 | 80.7 | 81.0 | 0.60 | 0.74 | 0.82 | 5.3 | 673 | 26.0 |
| MS6 (R) | 6" | 5.5 | 7.5 | 14.2 | 80.4 | 82.9 | 82.8 | 0.78 | 0.84 | 0.86 | 4.9 | 565 | 38 |
| MS6 (R) | 6" | 7.5 | 10 | 19.2 | 81.1 | 83.6 | 83.5 | 0.78 | 0.84 | 0.86 | 5.0 | 590 | 41 |
| MS6 (R) | 6" | 9.2 | 12.5 | 23.6 | 81.2 | 83.8 | 83.9 | 0.74 | 0.82 | 0.86 | 5.1 | 610 | 43 |
| MS6 (R) | 6" | 11 | 15 | 28.5 | 81.1 | 83.9 | 84.1 | 0.72 | 0.80 | 0.86 | 5.1 | 708 | 49 |
| MS6 (R) | 6" | 13 | 17.5 | 34.0 | 80.8 | 83.7 | 84.1 | 0.70 | 0.80 | 0.84 | 5.0 | 738 | 53 |
| MS6 (R) | 6" | 15 | 20 | 38.5 | 81.7 | 84.4 | 84.8 | 0.72 | 0.82 | 0.86 | 5.2 | 783 | 58 |
| MS6 (R) | 6" | 18.5 | 25 | 47.0 | 82.3 | 84.8 | 84.9 | 0.74 | 0.82 | 0.86 | 5.2 | 838 | 64 |
| MS6 (R) | 6" | 22 | 30 | 55.5 | 82.3 | 84.7 | 84.8 | 0.74 | 0.82 | 0.86 | 5.4 | 903 | 71 |
| MS6 (R) | 6" | 26 | 35 | 65.5 | 82.6 | 84.9 | 85.0 | 0.76 | 0.84 | 0.86 | 5.5 | 968 | 78 |
| MS6 (R) | 6" | 30 | 40 | 76.0 | 82.4 | 84.9 | 85.0 | 0.74 | 0.82 | 0.86 | 5.7 | 1023 | 84 |

3 x 380 V, submersible rewindable motors

| Type | Electrical data | | | | | | | | | | Dimensions | | |
|-------------------|-----------------|------------|------------|-----------------------------|----------------------|---------------|----------------|-----------------------|-----------------------|------------------------|-------------|-------------|-------------|
| | Size | Motor | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | I_{st} In | Length [mm] | Weight [kg] |
| | | Power [kW] | Power [hp] | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | $\cos \varphi_{50\%}$ | $\cos \varphi_{75\%}$ | $\cos \varphi_{100\%}$ | | | |
| MMS 6000 (N) | 6" | 3.7 | 5.0 | 11.4 | 66 | 72 | 74 | 0.69 | 0.77 | 0.80 | 4.2 | 630 | 45 |
| MMS 6000 (N) | 6" | 5.5 | 7.5 | 16.0 | 74 | 77 | 75 | 0.72 | 0.80 | 0.83 | 3.8 | 660 | 48 |
| MMS 6000 (N) | 6" | 7.5 | 10 | 21.4 | 77 | 79 | 77 | 0.73 | 0.81 | 0.84 | 3.5 | 690 | 50 |
| MMS 6000 (N) | 6" | 9.2 | 12.5 | 26.0 | 74 | 78 | 76 | 0.75 | 0.82 | 0.85 | 3.5 | 720 | 55 |
| MMS 6000 (N) | 6" | 11 | 15 | 29.5 | 79 | 81 | 79 | 0.77 | 0.84 | 0.86 | 3.6 | 780 | 60 |
| MMS 6000 (N) | 6" | 13 | 17.5 | 35.0 | 80 | 82 | 80 | 0.75 | 0.82 | 0.85 | 3.7 | 915 | 72 |
| MMS 6000 (N) | 6" | 15 | 20 | 40.5 | 79 | 82 | 80 | 0.78 | 0.84 | 0.86 | 3.5 | 975 | 78 |
| MMS 6000 (N) | 6" | 18.5 | 25 | 46.5 | 82 | 85 | 83 | 0.79 | 0.85 | 0.87 | 4.7 | 1085 | 90 |
| MMS 6000 (N) | 6" | 22 | 30 | 55.5 | 83 | 85 | 84 | 0.78 | 0.85 | 0.87 | 4.9 | 1195 | 100 |
| MMS 6000 (N) | 6" | 26 | 35 | 65.5 | 84 | 85 | 84 | 0.78 | 0.85 | 0.87 | 4.6 | 1315 | 115 |
| MMS 6000 (N) | 6" | 30 | 40 | 75.5 | 84 | 85 | 84 | 0.76 | 0.84 | 0.87 | 4.7 | 1425 | 125 |
| MMS 6000 (-N, -R) | 6" | 37 | 50 | 94.5 | 84 | 85 | 83 | 0.76 | 0.84 | 0.87 | 4.5 | 1425 | 125 |
| MMS 8000 (-N, -R) | 8" | 22 | 30 | 59.0 | 75 | 79 | 80 | 0.80 | 0.85 | 0.86 | 4.4 | 1010 | 126 |
| MMS 8000 (-N, -R) | 8" | 26 | 35 | 69.0 | 75 | 79 | 80 | 0.81 | 0.86 | 0.87 | 4.4 | 1050 | 134 |
| MMS 8000 (-N, -R) | 8" | 30 | 40 | 77.0 | 77 | 81 | 82 | 0.78 | 0.84 | 0.87 | 5.1 | 1110 | 146 |
| MMS 8000 (-N, -R) | 8" | 37 | 50 | 94.0 | 79 | 83 | 83 | 0.79 | 0.85 | 0.87 | 4.9 | 1160 | 156 |
| MMS 8000 (-N, -R) | 8" | 45 | 60 | 110 | 81 | 85 | 85 | 0.80 | 0.86 | 0.88 | 5.5 | 1270 | 177 |
| MMS 8000 (-N, -R) | 8" | 55 | 75 | 132 | 82 | 85 | 86 | 0.83 | 0.88 | 0.89 | 5.0 | 1350 | 192 |
| MMS 8000 (-N, -R) | 8" | 63 | 85 | 152 | 83 | 85 | 85 | 0.81 | 0.87 | 0.89 | 5.3 | 1490 | 218 |
| MMS 8000 (-N, -R) | 8" | 75 | 100 | 182 | 84 | 86 | 85 | 0.86 | 0.89 | 0.90 | 4.7 | 1590 | 237 |
| MMS 8000 (-N, -R) | 8" | 92 | 125 | 220 | 85 | 87 | 86 | 0.85 | 0.89 | 0.90 | 4.8 | 1830 | 283 |
| MMS 8000 (-N, -R) | 8" | 110 | 150 | 260 | 83 | 86 | 86 | 0.84 | 0.89 | 0.90 | 5.0 | 2060 | 333 |
| MMS 10000 (N) | 10" | 75 | 100 | 182 | 82 | 85 | 86 | 0.81 | 0.86 | 0.88 | 5.0 | 1400 | 280 |
| MMS 10000 (N) | 10" | 92 | 125 | 224 | 82 | 86 | 87 | 0.77 | 0.84 | 0.87 | 5.1 | 1500 | 330 |
| MMS 10000 (N) | 10" | 110 | 150 | 265 | 83 | 86 | 87 | 0.84 | 0.88 | 0.89 | 4.7 | 1690 | 385 |
| MMS 10000 (N) | 10" | 132 | 180 | 315 | 84 | 86 | 87 | 0.84 | 0.88 | 0.89 | 4.8 | 1870 | 435 |
| MMS 10000 (N) | 10" | 147 | 200 | 355 | 83 | 86 | 87 | 0.78 | 0.85 | 0.87 | 5.6 | 2070 | 500 |
| MMS 10000 (N) | 10" | 170 | 230 | 415 | 83 | 86 | 87 | 0.75 | 0.83 | 0.86 | 5.4 | 2220 | 540 |
| MMS 10000 (N) | 10" | 190 | 260 | 475 | 82 | 86 | 87 | 0.69 | 0.79 | 0.85 | 5.7 | 2400 | 580 |

3 x 380 V, submersible motors, MS6 T60

| Type | Electrical data | | | | | | | | | | Dimensions | | |
|------------|-----------------|------------|------------|-----------------------------|----------------------|---------------|----------------|-----------------------|-----------------------|------------------------|-------------|-------------|-------------|
| | Size | Motor | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | I_{st} In | Length [mm] | Weight [kg] |
| | | Power [kW] | Power [hp] | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | $\cos \varphi_{50\%}$ | $\cos \varphi_{75\%}$ | $\cos \varphi_{100\%}$ | | | |
| MS6 (R)T60 | 6" | 4 | 5.5 | 10.4 | 79.1 | 82.2 | 82.6 | 0.76 | 0.82 | 0.86 | 5.0 | 535 | 35 |
| MS6 (R)T60 | 6" | 5.5 | 7.5 | 14.2 | 80.0 | 83.0 | 83.4 | 0.76 | 0.84 | 0.86 | 5.4 | 565 | 38 |
| MS6 (R)T60 | 6" | 7.5 | 10.0 | 19.2 | 80.5 | 83.4 | 83.7 | 0.78 | 0.84 | 0.86 | 5.2 | 610 | 43 |
| MS6 (R)T60 | 6" | 9.2 | 12.5 | 23.6 | 80.6 | 83.7 | 84.3 | 0.74 | 0.82 | 0.86 | 5.3 | 635 | 46 |
| MS6 (R)T60 | 6" | 11.0 | 15.0 | 28.0 | 81.0 | 83.9 | 84.2 | 0.74 | 0.82 | 0.86 | 5.0 | 738 | 53 |
| MS6 (R)T60 | 6" | 13.0 | 17.5 | 32.5 | 81.5 | 84.3 | 84.7 | 0.76 | 0.84 | 0.86 | 5.2 | 783 | 58 |
| MS6 (R)T60 | 6" | 15.0 | 20.0 | 37.5 | 81.7 | 84.4 | 84.7 | 0.78 | 0.84 | 0.86 | 5.3 | 838 | 64 |
| MS6 (R)T60 | 6" | 18.5 | 25.0 | 46.5 | 81.8 | 84.6 | 85.1 | 0.76 | 0.84 | 0.86 | 5.7 | 903 | 71 |
| MS6 (R)T60 | 6" | 22.0 | 30.0 | 55.0 | 81.9 | 84.6 | 85.0 | 0.78 | 0.86 | 0.88 | 5.8 | 1023 | 84 |

3 x 460 V, submersible motors

| Type | Electrical data | | | | | | | | | | Dimensions | | |
|-------------|-----------------|------------|------------|-----------------------------|----------------------|---------------|----------------|-----------------------|-----------------------|------------------------|----------------|-------------|-------------|
| | Motor | | | Full load current I_n [A] | Motor efficiency [%] | | | Power factor | | | I_{st} I_n | Length [mm] | Weight [kg] |
| | Size | Power [kW] | Power [hp] | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | $\cos \varphi_{50\%}$ | $\cos \varphi_{75\%}$ | $\cos \varphi_{100\%}$ | | | |
| MS 402 | 4" | 0.37 | 0.5 | 1.60 | 58.0 | 65.0 | 68.5 | 0.51 | 0.64 | 0.73 | 5.0 | 226 | 5.5 |
| MS 402 | 4" | 0.55 | 0.75 | 2.30 | 58.5 | 65.5 | 68.5 | 0.47 | 0.59 | 0.69 | 4.8 | 241 | 6.3 |
| MS 402 | 4" | 0.75 | 1.0 | 2.70 | 61.5 | 67.0 | 71.0 | 0.50 | 0.63 | 0.73 | 5.0 | 276 | 7.7 |
| MS 4000R | 4" | 0.75 | 1.0 | 2.20 | 68.0 | 71.2 | 71.3 | 0.76 | 0.83 | 0.87 | 4.5 | 398 | 13.0 |
| MS 402 | 4" | 1.1 | 1.5 | 3.65 | 64.5 | 70.5 | 73.5 | 0.49 | 0.62 | 0.72 | 5.5 | 306 | 8.9 |
| MS 4000R | 4" | 1.1 | 1.5 | 3.00 | 72.0 | 74.5 | 75.0 | 0.69 | 0.79 | 0.85 | 5.0 | 413 | 14.0 |
| MS 402 | 4" | 1.5 | 2.0 | 4.35 | 68.0 | 72.5 | 75.5 | 0.54 | 0.66 | 0.76 | 5.5 | 346 | 10.5 |
| MS 4000R | 4" | 1.5 | 2.0 | 4.05 | 71.0 | 74.5 | 75.2 | 0.60 | 0.73 | 0.82 | 4.4 | 413 | 14.0 |
| MS 4000 (R) | 4" | 2.2 | 3.0 | 5.80 | 70.0 | 75.0 | 76.2 | 0.52 | 0.65 | 0.75 | 4.8 | 453 | 16.0 |
| MS 4000 (R) | 4" | 3.0 | 4.0 | 7.50 | 73.4 | 77.3 | 78.0 | 0.54 | 0.68 | 0.78 | 4.9 | 493 | 17.0 |
| MS 4000 (R) | 4" | 4.0 | 5.5 | 9.45 | 77.1 | 79.8 | 80.0 | 0.60 | 0.74 | 0.82 | 5.7 | 573 | 21.0 |
| MS 4000 (R) | 4" | 5.5 | 7.5 | 12.6 | 79.5 | 80.7 | 81.0 | 0.60 | 0.74 | 0.82 | 5.3 | 673 | 26.0 |
| MS 4000 (R) | 4" | 7.5 | 10 | 18.0 | 78.5 | 80.7 | 80.6 | 0.56 | 0.69 | 0.79 | 5.2 | 773 | 31.0 |
| MS6 (R) | 6" | 5.5 | 7.5 | 11.6 | 80.6 | 82.9 | 82.7 | 0.80 | 0.84 | 0.86 | 4.7 | 565 | 38 |
| MS6 (R) | 6" | 7.5 | 10 | 15.8 | 81.1 | 83.4 | 83.2 | 0.78 | 0.84 | 0.86 | 4.9 | 590 | 41 |
| MS6 (R) | 6" | 9.2 | 12.5 | 19.4 | 81.4 | 83.8 | 83.7 | 0.76 | 0.84 | 0.86 | 5.0 | 610 | 43 |
| MS6 (R) | 6" | 11 | 15 | 23.4 | 81.1 | 83.9 | 84.2 | 0.72 | 0.80 | 0.84 | 5.1 | 708 | 49 |
| MS6 (R) | 6" | 13 | 17.5 | 28.0 | 81.1 | 84.0 | 84.3 | 0.70 | 0.80 | 0.84 | 5.0 | 738 | 53 |
| MS6 (R) | 6" | 15 | 20 | 31.5 | 81.6 | 84.3 | 84.6 | 0.72 | 0.82 | 0.86 | 5.1 | 783 | 58 |
| MS6 (R) | 6" | 18.5 | 25 | 39.0 | 82.1 | 84.7 | 85.0 | 0.72 | 0.82 | 0.86 | 5.3 | 838 | 64 |
| MS6 (R) | 6" | 22 | 30 | 46.0 | 82.3 | 84.8 | 85.0 | 0.74 | 0.82 | 0.86 | 5.4 | 903 | 71 |
| MS6 (R) | 6" | 26 | 35 | 54.5 | 82.2 | 84.8 | 85.1 | 0.72 | 0.82 | 0.86 | 5.7 | 968 | 78 |
| MS6 (R) | 6" | 30 | 40 | 63.0 | 82.2 | 84.8 | 85.1 | 0.72 | 0.80 | 0.86 | 5.9 | 1023 | 84 |

3 x 460 V, submersible rewindable motors

| Type | Electrical data | | | | | | | | | | Dimensions | | |
|-------------------|-----------------|------------|------------|--------------------------------|----------------------|---------------|----------------|-----------------------|-----------------------|------------------------|-------------------|-------------|-------------|
| | Size | Motor | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | I_{st} I_n | Length [mm] | Weight [kg] |
| | | Power [kW] | Power [hp] | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | $\cos \varphi_{50\%}$ | $\cos \varphi_{75\%}$ | $\cos \varphi_{100\%}$ | | | |
| MMS 6000 (N) | 6" | 3.7 | 5.0 | 9.75 | 64 | 69 | 70 | 0.63 | 0.74 | 0.80 | 4.2 | 630 | 45 |
| MMS 6000 (N) | 6" | 5.5 | 7.5 | 13.8 | 73 | 76 | 74 | 0.63 | 0.74 | 0.80 | 4.0 | 660 | 48 |
| MMS 6000 (N) | 6" | 7.5 | 10 | 18.0 | 77 | 79 | 78 | 0.61 | 0.73 | 0.79 | 3.8 | 690 | 50 |
| MMS 6000 (N) | 6" | 9.2 | 12.5 | 22.0 | 74 | 77 | 77 | 0.65 | 0.76 | 0.81 | 3.7 | 720 | 55 |
| MMS 6000 (N) | 6" | 11 | 15 | 25.5 | 78 | 80 | 79 | 0.65 | 0.76 | 0.82 | 3.8 | 780 | 60 |
| MMS 6000 (N) | 6" | 13 | 17.5 | 29.5 | 80 | 82 | 80 | 0.65 | 0.76 | 0.82 | 4.0 | 915 | 72 |
| MMS 6000 (N) | 6" | 15 | 20 | 33.5 | 80 | 82 | 81 | 0.68 | 0.78 | 0.83 | 4.0 | 975 | 78 |
| MMS 6000 (N) | 6" | 18.5 | 25 | 39.0 | 83 | 85 | 85 | 0.65 | 0.77 | 0.83 | 5.5 | 1085 | 90 |
| MMS 6000 (N) | 6" | 22 | 30 | 46.0 | 85 | 85 | 85 | 0.67 | 0.78 | 0.83 | 5.6 | 1195 | 100 |
| MMS 6000 (N) | 6" | 26 | 35 | 54.5 | 84 | 86 | 84 | 0.69 | 0.80 | 0.85 | 5.0 | 1315 | 115 |
| MMS 6000 (N) | 6" | 30 | 40 | 62.5 | 85 | 86 | 85 | 0.68 | 0.79 | 0.85 | 5.1 | 1425 | 125 |
| MMS 6000 (-N, -R) | 6" | 37 | 50 | 79.0 | 84 | 85 | 84 | 0.65 | 0.75 | 0.83 | 4.7 | 1425 | 125 |
| MMS 8000 (-N, -R) | 8" | 22 | 30 | 48.5 | 75 | 79 | 81 | 0.73 | 0.81 | 0.84 | 5.3 | 1010 | 126 |
| MMS 8000 (-N, -R) | 8" | 26 | 35 | 56.5 | 76 | 80 | 81 | 0.77 | 0.83 | 0.86 | 5.1 | 1050 | 134 |
| MMS 8000 (-N, -R) | 8" | 30 | 40 | 64.0 | 78 | 82 | 83 | 0.74 | 0.82 | 0.85 | 5.8 | 1110 | 146 |
| MMS 8000 (-N, -R) | 8" | 37 | 50 | 78.0 | 80 | 83 | 84 | 0.74 | 0.82 | 0.85 | 5.5 | 1160 | 156 |
| MMS 8000 (-N, -R) | 8" | 45 | 60 | 92.5 | 82 | 85 | 86 | 0.71 | 0.80 | 0.85 | 6.4 | 1270 | 177 |
| MMS 8000 (-N, -R) | 8" | 55 | 75 | 112 | 82 | 85 | 86 | 0.73 | 0.82 | 0.86 | 5.8 | 1350 | 192 |
| MMS 8000 (-N, -R) | 8" | 63 | 85 | 126 | 83 | 86 | 86 | 0.72 | 0.82 | 0.86 | 6.0 | 1490 | 218 |
| MMS 8000 (-N, -R) | 8" | 75 | 100 | 150 | 84 | 86 | 87 | 0.72 | 0.82 | 0.86 | 5.7 | 1590 | 237 |
| MMS 8000 (-N, -R) | 8" | 92 | 125 | 184 | 85 | 87 | 87 | 0.74 | 0.83 | 0.87 | 6.0 | 1830 | 283 |
| MMS 8000 (-N, -R) | 8" | 110 | 150 | 220 | 84 | 86 | 86 | 0.75 | 0.83 | 0.87 | 5.8 | 2060 | 333 |
| MMS 10000 (N) | 10" | 75 | 100 | 154 | 81 | 85 | 87 | 0.72 | 0.80 | 0.84 | 5.7 | 1400 | 280 |
| MMS 10000 (N) | 10" | 92 | 125 | 190 | 82 | 86 | 87 | 0.69 | 0.78 | 0.83 | 5.5 | 1500 | 330 |
| MMS 10000 (N) | 10" | 110 | 150 | 224 | 82 | 86 | 88 | 0.72 | 0.80 | 0.84 | 5.8 | 1690 | 385 |
| MMS 10000 (N) | 10" | 132 | 180 | 265 | 83 | 86 | 88 | 0.73 | 0.82 | 0.85 | 5.7 | 1870 | 435 |
| MMS 10000 (N) | 10" | 147 | 200 | 305 | 82 | 86 | 87 | 0.66 | 0.77 | 0.82 | 6.2 | 2070 | 500 |
| MMS 10000 (N) | 10" | 170 | 230 | 355 | 82 | 86 | 87 | 0.66 | 0.76 | 0.82 | 5.9 | 2220 | 540 |
| MMS 10000 (N) | 10" | 190 | 260 | 405 | 82 | 85 | 87 | 0.62 | 0.73 | 0.79 | 6.1 | 2400 | 580 |

3 x 460 V, submersible industrial motors

| Type | Electrical data | | | | | | | | | | Dimensions | | |
|---------|-----------------|------------|------------|--------------------------------|----------------------|---------------|----------------|-----------------------|-----------------------|------------------------|-------------------|-------------|-------------|
| | Size | Motor | | Full-load current I_n [A] | Motor efficiency [%] | | | Power factor | | | I_{st} I_n | Length [mm] | Weight [kg] |
| | | Power [kW] | Power [hp] | | $\eta_{50\%}$ | $\eta_{75\%}$ | $\eta_{100\%}$ | $\cos \varphi_{50\%}$ | $\cos \varphi_{75\%}$ | $\cos \varphi_{100\%}$ | | | |
| MS 4000 | 4" | 2.2 | 3.0 | 5.70 | 72.4 | 76.3 | 77.8 | 0.62 | 0.74 | 0.81 | 5.3 | 493 | 17 |
| MS 4000 | 4" | 3.0 | 4.0 | 7.55 | 75.2 | 78.6 | 80.3 | 0.61 | 0.74 | 0.81 | 5.6 | 573 | 21 |
| MS 4000 | 4" | 3.7 | 5.0 | 9.05 | 75.4 | 79.0 | 79.6 | 0.68 | 0.79 | 0.83 | 5.7 | 673 | 26 |
| MS 4000 | 4" | 4.0 | 5.5 | 9.55 | 75.9 | 78.8 | 80.0 | 0.69 | 0.70 | 0.85 | 5.3 | 673 | 26 |
| MS 4000 | 4" | 5.5 | 7.5 | 13.8 | 76.2 | 79.9 | 81.3 | 0.55 | 0.68 | 0.77 | 5.5 | 773 | 31 |

MP 204

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

The motor protector consists of:

- a cabinet incorporating transformers and electronics
- a control panel with operating buttons and display for reading of data.

The MP 204 operates with two sets of limits:

- a set of warning limits and
- 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 MP 204 display.

Some values only have a warning limit.

The warning can also be read out by means of the Grundfos R100 remote control.

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

Applications

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

The MP 204 can be monitored via a Grundfos GENibus.

The power supply to the MP 204 is in parallel with the supply to the motor. Motor currents up to 120 A are passed directly through the MP 204. The MP 204 protects the motor primarily by measuring the motor current by means of a true RMS measurement. The MP 204 disconnects the contactor if, for example, the current exceeds the preset value.

Secondarily, the motor is protected via temperature measuring by a Tempcon sensor, a Pt100/Pt1000 sensor and a PTC sensor/thermal switch.

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

Benefits

The MP 204 offers these benefits:

- Suitable for both single- and three-phase motors
- Dry-running protection
- Overload protection
- Very high accuracy
- Made for submersible pumps.

The MP 204 - many monitoring options

The MP 204 monitors the following parameters:

- Insulation resistance before start-up
- Temperature (Tempcon, Pt sensor and PTC/thermal switch)
- Overload/underload
- Overvoltage/undervoltage
- Phase sequence
- Phase failure
- Power factor
- Power consumption
- Harmonic distortion
- Operating hours and number of starts.



Fig. 17 MP 204

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

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



Fig. 18 Single-turn transformers

Product numbers

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

TM03 1471 2205

TM03 2033 3505

Functions

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

Tripping conditions

- Overload
- Underload (dry running)
- Temperature (Tempcon sensor, PTC/thermal switch and Pt sensor)
- Phase failure
- Phase sequence
- Overvoltage
- Undervoltage
- Power factor ($\cos \varphi$)
- Current unbalance.

Warnings

- Overload
 - Underload
 - Temperature (Tempcon and Pt sensor)
 - Overvoltage
 - Undervoltage
 - Power factor ($\cos \varphi$)
- Note:** In connection with single- and three-phase connection.
- Run capacitor (single-phase operation)
 - Starting capacitor (single-phase operation)
 - Loss of communication in network
 - Harmonic distortion.

Learning function

- Phase sequence (three-phase operation)
- Run capacitor (single-phase operation)
- Starting capacitor (single-phase operation)
- Identification and measurement of Pt100/Pt1000 sensor circuit.

External current transformers

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

Remote control R100

The R100 remote control from Grundfos allows for wireless infrared remote control of your MP 204 unit.

With the R100, you get access to a full range of options such as factory setting adjustment, service and fault finding.


Ready for bus communication

The MP 204 allows for monitoring and communication via GENIbus - a Grundfos-designed bus for exchange of pump data, alarms, status information, and setpoints. This enables users to connect the MP 204 to, for instance, SCADA systems.

Technical data - MP 204

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

| | Measuring range | Accuracy | Resolution |
|---|-------------------------|----------|------------|
| Current without external current transformers | 3-120 A | ±1 % | 0.1 A |
| Current with external current transformers | 120-999 A | ±1 % | 1 A |
| Phase-to-phase voltage | 80-610 VAC | ±1 % | 1 V |
| Frequency | 47-63 Hz | ±1 % | 0.5 Hz |
| Power | 0-1 MW | ±2 % | 1 W |
| Power factor | 0-0.99 | ±2 % | 0.01 |
| Energy consumption | 0-4x10 ⁹ kWh | ±5 % | 1 kWh |

| IO 112 | Description | Product number |
|---|--|----------------|
|  | <p>The IO 112 is a measuring module and a 1-channel protection unit for use in connection with the MP 204 motor protection unit. The module can be used for protection of pump against other factors than the electrical conditions, for instance dry-running. It can also be used as a stand-alone protection module.</p> <p>The IO 112 interface has three inputs for measured values one potentiometer for setting of limits indicator lights indicating the</p> <ul style="list-style-type: none"> measured value of the input value of the limit set alarm source pump status. <p>Electrical data:</p> <ul style="list-style-type: none"> Supply voltage: 24 VAC ±10% 50/60 Hz or 24 VDC ±10% Supply current: Min. 2.4 A; max. 8 A Power consumption: Max. 5 W Ambient temperature: -25°C to +65°C Enclosure class: IP 20 | 96651601 |

Control functions

This table describes the protection provided by MP 204.

| Control parameters | Function | Problem | Advantages |
|----------------------------|--|---|--|
| Temperature | <p>MS</p> <p>The motor temperature is measured by means of the built-in Tempcon temperature transmitter and a signal is sent to MP 204 via the phase leads. In MP 204 the measured temperature is compared with the factory-set value (75 °C).</p> | Overload, frequent starts/stops, operation against blocked discharge pipe, insufficient flow velocity past the motor. | Longer motor life, safe operating conditions, service indication. |
| | <p>MMS</p> <p>The motor temperature is measured by means of the Pt100. The signal is sent to the MP 204 where the measured temperature is compared with the factory-set value. Temperature protection requires a submersible motor with a Pt100.</p> <p>The motor temperature must be monitored during frequency converter operation.</p> | | |
| Overvoltage/ under-voltage | If the set trip value is exceeded, the motor will stop. | The installation is close to a transformer. The mains do not absorb load variations. | Important installation parameter, possibility of improving operating conditions. |
| Overload | The motor power input is measured on each of the three phases. The registered power input is an average of these three values. If the factory-set value is exceeded, the motor will stop. | Incorrect sizing of pump/motor, voltage supply failure, defective cable, blocking, wear or corrosion. | Longer pump life, safe operating conditions, service indication. |
| Underload (dry running) | The motor power input is measured on each of the three phases. The registered power input is an average of these three values. If the average value is lower than the factory-set value, the motor will stop. | Pump exposed to dry running or underload, for example caused by wear. | Traditional dry-running protection is no longer necessary, no extra cables. |
| Current unbalance | The power input of the motor is measured on each of the three phases. | Mains load is uneven, incipient motor defect, phase voltages diverging. | Motor protection against overload, service indication. |
| Phase sequence | MP 204 and motor are installed so that the phase sequence corresponds to correct direction of rotation. MP 204 monitors changes in the phase sequence. | Two phases are wrongly connected. | Ensures correct pump performance. |
| Phase failure | MP 204 checks the phases connected, phase failure will cause an alarm. | Phase failure | Indication of phase failure, and alarm. |

R100 menus

0. GENERAL

See the operating instructions for the R100.

1. OPERATION

- Operating mode
- Actual trip
- Actual warning 1
- Actual warning 2
- Alarm log 1
- Alarm log 2
- Alarm log 3
- Alarm log 4
- Alarm log 5.

2. STATUS

Display of

- Supply overview
- Average current
- Average voltage
- Tempcon sensor
- Pt100/Pt1000 sensor
- **Power input and energy consumption** (described in the following)
- Energy trip counter
- Phase sequence
- Current unbalance
- Operating hours and number of starts
- Trip counter of hours and starts
- Starting capacitor
- Run capacitor
- Insulation resistance
- Cos φ
- Harmonic distortion.

3. LIMITS

Display and setting of warning and trip limits.

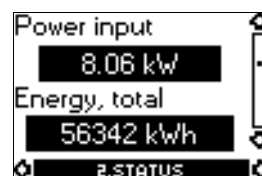
- Tempcon sensor
- Pt sensor
- Tripping current
- Current warning
- Nominal voltage
- Voltage limits
- Current unbalance
- Starting capacitor
- Run capacitor
- Insulation resistance
- Cos φ trip
- Cos φ warning.

4. INSTALLATION

Setting and display of

- Supply mains
- **Trip class** (described in the following)
- Trip delay
- External current transformers
- Power-on delay
- Restarting (described in the following)
- Automatic restarting (described in the following)
- Tempcon sensor
- Pt sensor
- Insulation resistance measurement
- PTC/thermal switch
- Resetting of trip counters
- Service interval
- Number of automatic restarts
- Units/display
- MP 204 display
- GENIbus ID number
- Learning function.

Power input and energy consumption



Actual input power and motor energy consumption.

The energy consumption is an accumulated value which cannot be reset.

The power is calculated like this:

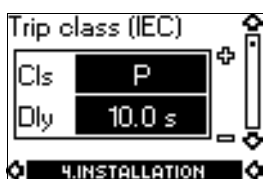
$$U_{\text{average}} = \frac{U_{L1-L2} + U_{L2-L3} + U_{L3-L1}}{3} [\text{V}]$$

$$I_{\text{average}} = \frac{I_{L1} + I_{L2} + I_{L3}}{3} [\text{A}]$$

$$\cos \varphi_{\text{average}} = \frac{\cos \varphi_{L1} + \cos \varphi_{L2} + \cos \varphi_{L3}}{3} [-]$$

$$P = (U_{\text{average}} \times I_{\text{average}} \times \sqrt{3} \times \cos \varphi_{\text{average}}) [\text{W}]$$

Trip class



Line 1: Select IEC trip class (1 to 45).

If manual indication of trip delay in the case of overload is required, select trip class "P".

Factory setting:

- Cls (trip class): P.

Line 2: Select trip delay.

Factory setting:

- Dly (trip delay): 10 s.

Restarting



Set whether restarting after tripping is to be

- **Automatic** (factory setting)
- *Manual*.

Setting of time, see section "Automatic restarting".

Automatic restarting



Set the time after which the MP 204 is to attempt automatic restarting of motor after cut-out.

The time runs from the moment when the value which triggered the fault has returned to normal.

Factory setting:

- 300 s.

G100 gateway for communication with Grundfos products

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

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



Fig. 19 G100

GR5940

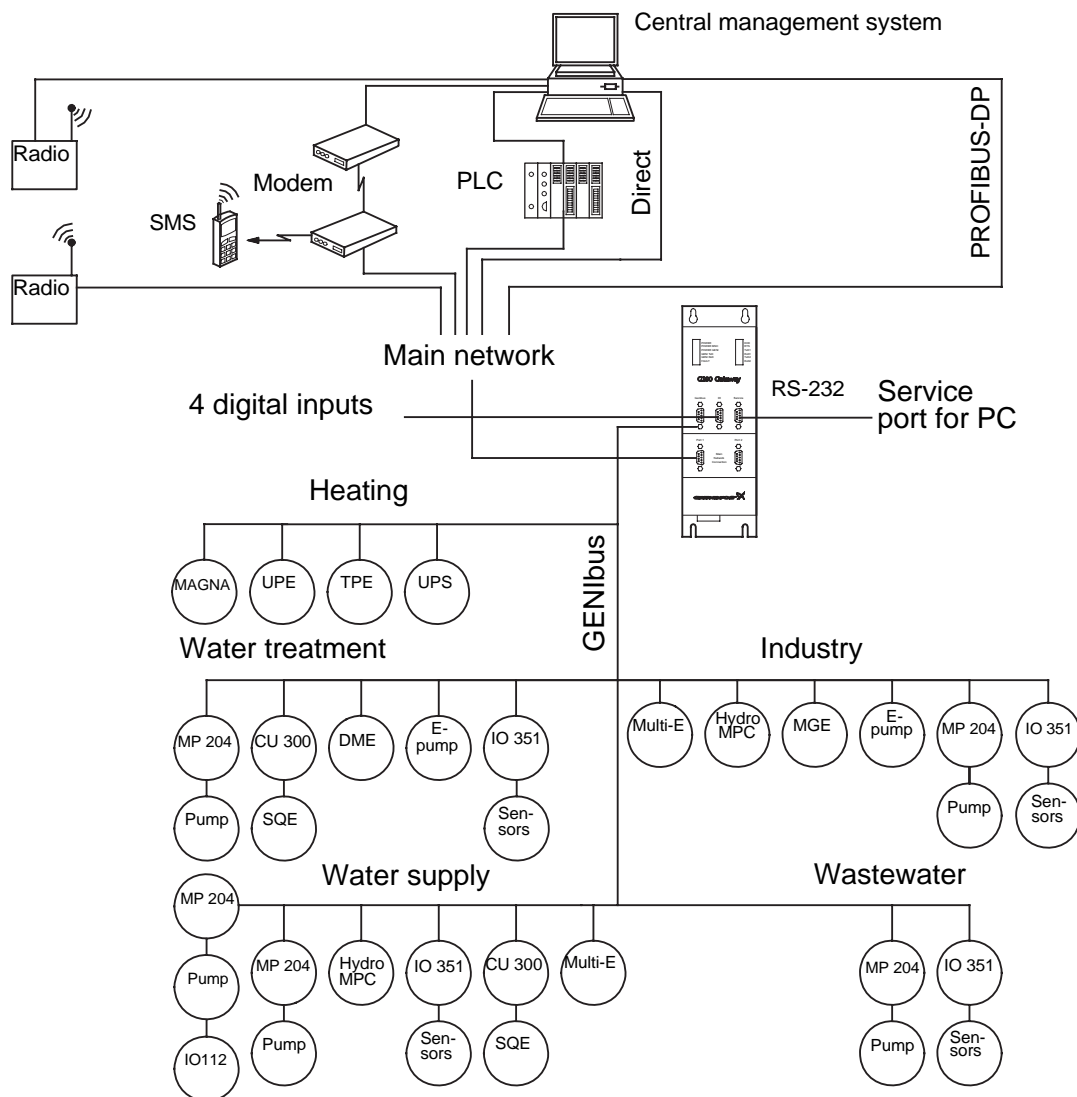


Fig. 20 Examples of G100 applications

TM03 9224 3607

Product description

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

As indicated in the illustration on page 84, the G100 is suitable for use in applications such as water supply, water treatment, wastewater, building automation and industry.

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

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

Data logging

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

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

Other features

- Four digital inputs.
- Stop of all pumps in case of failing communication with the management system (optional).
- Access code for modem communication (optional).
- Alarm log.

Installation

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

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

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

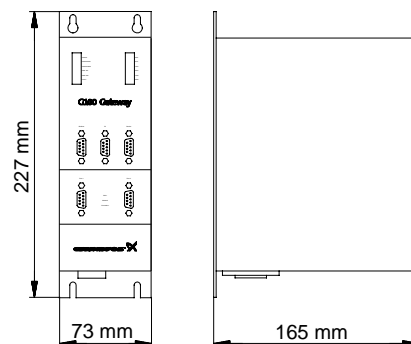


Fig. 21 Dimensional sketch

Technical data

Overview of protocols

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

Other possible connections

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

Accessories

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

Product numbers

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

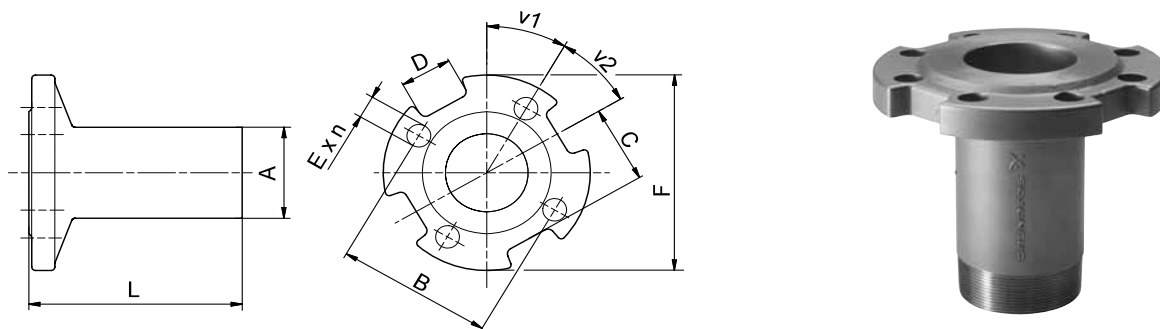
* CD-ROM with G100 Support Files included.

TM01 0621 1102

Connecting pieces

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

Thread-to-flange



TM01 2396 2506 - GrA2552

Fig. 22 Dimensional sketch and photo of the connecting pieces thread-to-flange

| Type | Pump outlet | Connecting piece | Thread-to-flange | | | | | | | | | | Product number | |
|----------------------------|--------------|----------------------|------------------|---------|------|----|---------|------|-----|------|----|----|-------------------|-------------------|
| | | | Dimensions [mm] | | | | | | | | | | DIN W.-Nr. 1.4308 | DIN W.-Nr. 1.4517 |
| | | | A | B | C | D | E | F | L | V1 | V2 | n | | |
| SP 17 | Rp 2.5 | R 2½ →DN 50 PN 16/40 | R 2½ | 125 | 65 | 40 | ∅19 | ∅165 | 170 | 60 | 90 | 4 | 120125 | 120911 |
| | | R 2½ →DN 65 PN 16/40 | R 2½ | 145 | 71 | 30 | ∅19 | ∅185 | 170 | 22.5 | 45 | 8 | 120126 | 120910 |
| | | R 2½ →DN 80 PN 16/40 | R 2½ | 160 | 82.5 | 40 | ∅19 | ∅200 | 170 | 22.5 | 45 | 8 | 120127 | 120909 |
| SP 30 | Rp 3 | R 3 →DN 65 PN 16/40 | R 3 | 145 | 71 | 30 | ∅19 | ∅185 | 170 | 22.5 | 45 | 8 | 130187 | 130920 |
| | | R 3 →DN 80 PN 16/40 | R 3 | 160 | 82.5 | 40 | ∅19 | ∅200 | 170 | 22.5 | 45 | 8 | 130188 | 130921 |
| | | R 3 →DN 100 PN 16/40 | R 3 | 180/190 | 100 | 40 | ∅19/∅23 | ∅235 | 170 | 22.5 | 45 | 8 | 130189 | 130922 |
| SP 46 SP 60 | Rp 3 Rp 4 | R 3 →DN 65 PN 16 | R 3 | 145 | 71 | 30 | ∅19 | ∅185 | 170 | 22.5 | 45 | 8 | 130187 | 130920 |
| | | R 3 →DN 80 PN 16 | R 3 | 160 | 82.5 | 40 | ∅19 | ∅200 | 170 | 22.5 | 45 | 8 | 130188 | 130921 |
| SP 77 SP 95 | Rp 5 | R 3 →DN 100 PN 16 | R 3 | 180/190 | 100 | 40 | ∅19/∅23 | ∅235 | 170 | 22.5 | 45 | 8 | 130189 | 130922 |
| | | R 4 →DN 100 PN 16 | R 4 | 180/190 | 100 | 40 | ∅19/∅23 | ∅235 | 180 | 22.5 | 45 | 8 | 140071 | 140577 |
| SP 125 SP 160 SP 215 | Rp 6 | R 5 →DN 100 PN 16/40 | R 5 | 180/190 | 82 | 35 | ∅19/∅23 | ∅235 | 195 | 22.5 | 45 | 8 | 160148 | 160646 |
| | | R 5 →DN 125 PN 16/40 | R 5 | 210/220 | 99 | 37 | ∅19/∅28 | ∅270 | 195 | 22.5 | 45 | 8 | 160149 | 160647 |
| | | R 5 →DN 150 PN 16/40 | R 5 | 240/250 | 115 | 36 | ∅23/∅28 | ∅300 | 195 | 22.5 | 45 | 8 | 160150 | 160648 |
| SP 125 SP 160 SP 215 | Rp 6 | R 6 →DN 125 PN 16/40 | R 6 | 210/220 | 99 | 36 | ∅19/∅28 | ∅270 | 195 | 22.5 | 45 | 8 | 170159 | 170596 |
| | | R 6 →DN 150 PN 16/40 | R 6 | 240 | 114 | 36 | ∅23/∅28 | ∅300 | 195 | 22.5 | 45 | 8 | 170160 | 170597 |
| | | R 6 →DN 200 PN 16 | R 6 | 295 | 134 | 36 | ∅23 | ∅340 | 195 | 15 | 30 | 12 | 170161 | 170598 |
| | | R 6 →DN 200 PN 40 | R 6 | 320 | 151 | 36 | ∅31 | ∅375 | 200 | 15 | 30 | 12 | 170162 | 170599 |

Thread-to-thread



TM01 2397 1698 - GrA2555

Fig. 23 Dimensional sketch and photo of connecting piece thread-to-thread

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

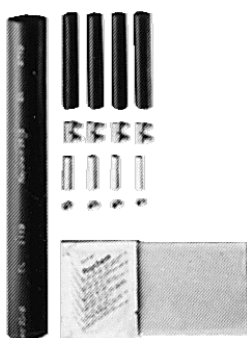
Cable termination kit with plug



TM00 7883 2296

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

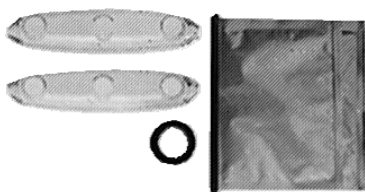
Cable termination kit, type KM



TM00 7885 2296

| Description | Version | | | Prod. no. |
|---|--|--------------------|-----------------|-----------|
| | Motor cable | [mm ²] | Number of leads | |
| For watertight shrink-joining of motor cable and submersible drop cable. | Flat cable | 1.5 - 6.0 | 3 | 116251 |
| | | 1.5 - 4.0 | 4 | |
| Enables the joining of: • cables of equal size. • cables of different sizes. • a cable lead and a single-lead. | Flat cable | 6 - 10 | 4 | 116252 |
| | | 10 - 16 | 3 | |
| The joint is ready for use after a few minutes and requires no long hardening time as do resin joints. | Flat cable | 16 - 25 | 3 | 116255 |
| | | | 4 | |
| The joint cannot be separated. | 3 single leads | 1.5 - 6.0 | 3 | 116253 |
| | 3 single leads | 10 - 25 | 3 | 116254 |
| | 4 single leads | 1.5 - 4.0 | 4 | 116257 |
| | 4 single leads | 6 - 16 | 4 | 116258 |
| | Single lead | 35 - 120 | 1 | 116256 |
| | For watertight joining of motor cable and submersible drop cable. By means of shrink-screw-glue casting | Screw-shrinking | 6 - 50 | 4 |
| | | 19 - 95 | 96636868 | |
| | | 35 - 185 | 96637278 | |
| | | 70 - 240 | 96637279 | |
| Reduce from 3 or 4 to one as from drop cable to single leads | Reducer-shrinking | 10 - 50 | 3 | 96637318 |
| | | 10 - 50 | 4 | 96637330 |
| | | 16 - 70 | 3 | 96637331 |
| | | 16 - 70 | 4 | 96637332 |

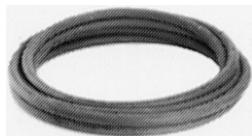
Cable termination kit, type M0 to M6



TM00 7884 2296

| Description | Version | | | Prod. no. |
|--|---------|--|-----------------------------------|-----------|
| | Type | Diameter of cable joint [mm ²] | Fit cables with outer diameter of | |
| For watertight shrink-joining of motor cable and submersible drop cable. | M0 | ø40 | ø6 to ø15 | ID8903 |
| | M1 | ø46 | ø9 to ø23 | ID8904 |
| | M2 | ø52 | ø17 to ø31 | ID8905 |
| | M3 | ø77 | ø26 to ø44 | ID8906 |
| | M4 | ø97 | ø29 to ø55 | 91070700 |
| | M5 | ø110 | ø40 to ø62 | 96496918 |
| | M6 | ø144 | ø50 to ø80 | 96496919 |
| Accessories for cable kit, type M0-6 Screw connectors only | | Diameter of the lead [mm ²] | Number of connectors | Prod. no. |
| | | 6 - 50 | 4 | 96626021 |
| | | 19 - 95 | | 96626022 |
| | | 35 - 185 | | 96626023 |
| | | 70 - 240 | | 96626028 |

Submersible drop cable



TM00 7682 2296

| Description | Description | | | |
|---|--|---|---------------|-------------|
| | Number of leads and nominal cross section [mm ²] | Outer diameter Min./Max. [mm ²] | Weight [kg/m] | Product no. |
| Suitable for | 1 x 25 | 12.5 / 16.5 | 0.410 | ID4072 |
| • continuous application in groundwater and potable water (approved for potable applications) | 1 x 35 | 14.0 / 18.5 | 0.560 | ID4073 |
| • connection of electrical equipment such as submersible motors | 1 x 50 | 16.5 / 21.0 | 0.740 | ID4074 |
| • installation depths up to 500 metres and average loads. | 1 x 70 | 18.5 / 23.5 | 1.000 | ID4075 |
| Insulation and sheath are made of special EPR-based elastomer materials adapted to applications in water. | 1 x 95 | 21.0 / 26.5 | 1.300 | ID4076 |
| Maximum permissible water temperature: 60 °C. | 1 x 120 | 23.5 / 28.5 | 1.650 | ID4077 |
| Maximum permissible lead service temperature: 90 °C. | 1 x 150 | 26.0 / 31.5 | 2.000 | ID4078 |
| Further cable sizes are available on request. | 1 x 185 | 27.5 / 34.5 | 2.500 | ID4079 |
| | 3 x 25 | 26.5 / 34.0 | 1.450 | ID4062 |
| | 4G1.5 | 10.5 / 13.5 | 0.190 | ID4063 |
| | 4G2.5 | 12.5 / 15.5 | 0.280 | ID4064 |
| | 4G4.0 | 14.5 / 18.0 | 0.390 | ID4065 |
| | 4G6.0 | 16.5 / 22.0 | 0.520 | ID4066 |
| | 4G10 | 22.5 / 24.5 | 0.950 | ID4067 |
| | 4G16 | 26.5 / 28.5 | 1.400 | ID4068 |
| | 4G25 | 32.0 / 34.0 | 1.950 | ID4069 |
| | 4G35 | 33.0 / 42.5 | 2.700 | 96432949 |
| | 4G50 | 38.0 / 48.5 | 3.600 | 96432950 |
| | 4G70 | 43.0 / 54.5 | 4.900 | 96432951 |

Zinc anodes

Application

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

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

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

Please contact Grundfos for further details.

Liquid temperatures

Seawater: Up to 35 °C.

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

Anode life

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

Product numbers of zinc anodes

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

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

Flow sleeves

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

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

Note: More information about accessories is available on request.



TM01 0751 2197 - TM01 0750 2197

Fig. 24 Flow sleeves

SA-SPM 5 control boxes

Application

SA-SPM 5 control boxes are used as starting units for single-phase, 3-wire motors, types MS 402B with power input lower than or equal to 1.1 kW (1.5 hp).

SA-SPM 5 is available in two versions, standard and DeLuxe. The standard version incorporates a motor - protective circuit breaker and thus protects the motor against overload. The DeLuxe version is identical to the standard version with the following addition a motor contactor is included for connection and disconnection of the power supply.

Technical data

Enclosure class: IP 42.

Ambient temperature: -20 °C to 60 °C.

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



TM03 8150 0607

Fig. 25 SA-SPM 5 control box

Product numbers

| Product | Description | | | | | Product number |
|-----------------------------|---------------|-----------------|-----------------|-----------------|-----------------|----------------|
| | 1 x 220-230 V | 1.1 kW (1.5 hp) | 1.5 kW (2.0 hp) | 2.2 kW (3.0 hp) | 3.7 kW (5.0 hp) | |
| SA-SPM 5 (Standard version) | ● | ● | | | | 91126212 |
| SA-SPM 5 (DeLuxe version) | ● | ● | | | | 91126213 |
| SA-SPM 5 (Standard version) | ● | | ● | | | 91126214 |
| SA-SPM 5 (DeLuxe version) | ● | | ● | | | 91126215 |
| SA-SPM 5 (Standard version) | ● | | | ● | | 91126216 |
| SA-SPM 5 (DeLuxe version) | ● | | | ● | | 91126217 |
| SA-SPM 5 (Standard version) | ● | | | | ● | 91126218 |
| SA-SPM 5 (DeLuxe version) | ● | | | | ● | 91126219 |

Pt100

The Pt100 sensor offers these features:

- Continuous monitoring of the motor temperature
- Protection against too high motor temperature.

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

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


- Pt100 sensor
- Relay, type PR 5714
- Cable.


The PR 5714 relay is fitted with a Pt100 module. For both relays the following temperature limits are preset on delivery:


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


Technical data

| Relay type | |
|---------------------|--|
| PR 5714 | |
| Enclosure class | IP 65 (mounted in a control panel) |
| Ambient temperature | -20 °C to +60 °C |
| Relative humidity | 95 % (condensating) |
| Voltage variation | • 1 x 24-230 VAC ±10 %, 50 - 60 Hz. • 24-250 VDC ±20 %. |
| Approvals | UL, DNV |
| Mark | CE |

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

| PR 5714 relay | Voltage | Product number |
|---|-----------------------------------|----------------|
|  | 24-230 VAC, 50/60 Hz / 24-250 VDC | 96621274 |

| Pt100 sensor including cable | Cable length | Product number | |
|---|--------------|-----------------------------|------------------------|
| | | MS6 MMS 6000 MMS 8000 | MMS 10000 MMS 12000 |
|  | 20 m | 96408957 | 96437784 |
| | 40 m | 96408684 | 96437785 |
| | 60 m | 96408958 | 96437786 |
| | 80 m | 96408959 | 96437787 |
| | 100 m | 96408960 | 96437788 |

| Staybolts for Pt100 | Description | Product number |
|---|------------------------------|----------------|
|  | Bolt KIT for Pt100 (for MS6) | 96611899 |

Energy consumption of submersible pumps

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

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

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

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

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

c = specific energy price (EURO/kWh)

h = operating hours/year (hours)

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

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

SP 125-3 with MS 8000, 45 kW, 3 x 460 V, 60 Hz.

Duty point:

Flow rate: Q = 120 m³/h

Total head: H = 102 m

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

Operating hours/year: h = 3200.

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

Q = m³/h

H = m

Density ρ = kg/dm³ (assumed 1)

367 = conversion factor

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

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

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

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

P₂ = 26 kW (power requirement of SP 125-3 pump at 120 m³/h, from curve P₂ / Q on page 61).

Calculation of motor efficiency at duty point

As standard the SP 125-3 is equipped with a 45 kW MS6 motor.

At duty point (Q = 120 m³/h) the pump requires 44 kW, thus:

a motor load of 87 % (44 kW / 45 kW) and a power reserve of 2 %.

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

84.6 % at a load of 75 %. (η_{75%})

85.6 % at a load of 100 %. (η_{100%})

The interpolated value in this example is

η_{motor} = 85.1 %, η_{motor} = 0.851.

$$P_1 = \frac{44}{0.851} = 51.7 \text{ kW}$$

E = 0.1 EURO/kWh x 3200 h x 51.7 kW.

The annual energy costs amount to EURO 16544.

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

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

Cable sizing

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

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

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

Cables

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

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

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

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

Tables indicating cable dimension in borehole

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

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

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

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

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

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

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

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

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

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

where

U = Rated voltage [V]

ΔU = Voltage drop [%]

I = Rated current of the motor [A]

q = Cross-section of submersible drop cable [mm²]

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

$\cos \varphi$ = Power factor

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

ρ = Specific resistance: 0.02 [Ω mm²/m]

Example

Motor size: 30 kW, MMS 8000

Rated current: 64.0 A

Rated voltage: 3 x 460 V, 60 Hz

Starting method: Direct-on-line

Power factor: $\cos \varphi = 0.85$

Voltage drop: 3 %

Cross-section: 16 mm²

$\sin \varphi$: 0.53

$$L = \frac{460 \times 3}{64.0 \times 1.73 \times 100 \times \left(0.85 \times \frac{0.02}{16} + 0.53 \times 0.078 \times 10^{-3} \right)}$$

L = 113 m

Cable dimensions at 1 x 220 V, 60 Hz

| Motor | kW | I_n [A] | 1.5 mm ² | 2.5 mm ² | 4 mm ² | 6 mm ² | 10 mm ² |
|-------|------|-----------|---------------------|---------------------|-------------------|-------------------|--------------------|
| 4" | 0.25 | 3.3 | 96 | 159 | 254 | 379 | 624 |
| | 0.37 | 4.4 | 73 | 121 | 192 | 286 | 472 |
| | 0.55 | 6.6 | 48 | 80 | 127 | 189 | 311 |
| | 0.75 | 7.7 | 37 | 62 | 98 | 147 | 243 |
| | 1.1 | 9.0 | 30 | 50 | 79 | 118 | 196 |

Maximum cable length in metres from motor starter to pump.

Cable dimensions at 3 x 460 V, 60 Hz, DOL

Voltage drop: 1 %

| Motor | kW | I _n [A] | Cosφ 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 | 1.6 | 0.73 | 170 | 282 | 448 | 668 | | | | | | | | | | | | | |
| 4" | 0.55 | 2.3 | 0.69 | 125 | 207 | 329 | 490 | 804 | | | | | | | | | | | | |
| 4" | 0.75 | 2.7 | 0.73 | 101 | 167 | 266 | 396 | 650 | | | | | | | | | | | | |
| 4" | 1.1 | 3.65 | 0.72 | 75 | 125 | 199 | 296 | 487 | 763 | | | | | | | | | | | |
| 4" | 1.5 | 4.35 | 0.76 | 60 | 100 | 159 | 236 | 389 | 610 | 927 | | | | | | | | | | |
| 4" | 2.2 | 5.8 | 0.75 | 46 | 76 | 120 | 179 | 295 | 463 | 703 | 954 | | | | | | | | | |
| 4" | 3.0 | 7.5 | 0.78 | 34 | 56 | 90 | 134 | 220 | 346 | 526 | 716 | 981 | | | | | | | | |
| 4" | 4.0 | 9.45 | 0.82 | 26 | 43 | 68 | 101 | 167 | 263 | 401 | 548 | 754 | | | | | | | | |
| 4" | 5.5 | 12.6 | 0.82 | 19 | 32 | 51 | 76 | 125 | 197 | 301 | 411 | 566 | 756 | 970 | | | | | | |
| 4" | 7.5 | 18 | 0.79 | 14 | 23 | 37 | 55 | 91 | 143 | 217 | 296 | 406 | 539 | 689 | 822 | 963 | | | | |
| 6" | 5.5 | 13.2 | 0.76 | 20 | 33 | 52 | 78 | 128 | 201 | 305 | 415 | 567 | 751 | 955 | | | | | | |
| 6" | 7.5 | 17 | 0.79 | 15 | 25 | 39 | 58 | 96 | 151 | 230 | 313 | 429 | 571 | 730 | 870 | | | | | |
| 6" | 9.2 | 21.4 | 0.8 | | 19 | 31 | 46 | 75 | 119 | 181 | 246 | 338 | 451 | 577 | 689 | 809 | 931 | | | |
| 6" | 11 | 24.5 | 0.82 | | 16 | 26 | 39 | 64 | 101 | 155 | 211 | 291 | 389 | 499 | 598 | 704 | 813 | 959 | | |
| 6" | 13 | 29 | 0.81 | | | 22 | 33 | 55 | 87 | 132 | 180 | 248 | 330 | 423 | 507 | 596 | 687 | 809 | 918 | |
| 6" | 15 | 33 | 0.82 | | | 19 | 29 | 48 | 75 | 115 | 157 | 216 | 289 | 370 | 444 | 523 | 604 | 712 | 810 | |
| 6" | 18.5 | 41 | 0.8 | | | | 24 | 39 | 62 | 94 | 129 | 177 | 235 | 301 | 360 | 422 | 486 | 571 | 647 | |
| 6" | 22 | 46.5 | 0.83 | | | | | 34 | 53 | 81 | 110 | 152 | 204 | 262 | 314 | 370 | 429 | 507 | 578 | |
| 6" | 26 | 55.5 | 0.83 | | | | | 28 | 44 | 68 | 92 | 127 | 171 | 219 | 263 | 310 | 359 | 425 | 484 | |
| 6" | 30 | 64 | 0.85 | | | | | | 38 | 58 | 79 | 109 | 146 | 189 | 227 | 269 | 312 | 371 | 424 | |
| 6" | 37 | 81.5 | 0.79 | | | | | | | 48 | 65 | 90 | 119 | 152 | 182 | 213 | 245 | 287 | 324 | |
| 8" | 22 | 48.5 | 0.84 | | | | | 32 | 50 | 77 | 105 | 145 | 194 | 250 | 300 | 355 | 411 | 488 | 557 | |
| 8" | 26 | 56.5 | 0.86 | | | | | 27 | 42 | 65 | 88 | 122 | 165 | 213 | 257 | 304 | 354 | 422 | 484 | |
| 8" | 30 | 64 | 0.85 | | | | | | 38 | 58 | 79 | 109 | 146 | 189 | 227 | 269 | 312 | 371 | 424 | |
| 8" | 37 | 78 | 0.85 | | | | | | 31 | 47 | 65 | 89 | 120 | 155 | 186 | 220 | 256 | 304 | 348 | |
| 8" | 45 | 92.5 | 0.85 | | | | | | | 40 | 55 | 75 | 101 | 130 | 157 | 186 | 216 | 257 | 294 | |
| 8" | 55 | 112 | 0.86 | | | | | | | | 45 | 62 | 83 | 107 | 129 | 154 | 179 | 213 | 244 | |
| 8" | 63 | 126 | 0.86 | | | | | | | | | 55 | 74 | 95 | 115 | 136 | 159 | 189 | 217 | |
| 8" | 75 | 150 | 0.86 | | | | | | | | | 46 | 62 | 80 | 97 | 115 | 133 | 159 | 182 | |
| 8" | 92 | 184 | 0.87 | | | | | | | | | | 50 | 65 | 79 | 93 | 109 | 130 | 150 | |
| 8" | 110 | 220 | 0.87 | | | | | | | | | | | 54 | 66 | 78 | 91 | 109 | 125 | |
| 10" | 75 | 154 | 0.84 | | | | | | | | | | | 61 | 79 | 95 | 112 | 130 | 154 | 175 |
| 10" | 92 | 190 | 0.83 | | | | | | | | | | | 50 | 64 | 77 | 91 | 105 | 124 | 141 |
| 10" | 110 | 224 | 0.84 | | | | | | | | | | | | 54 | 65 | 77 | 89 | 106 | 121 |
| 10" | 132 | 265 | 0.85 | | | | | | | | | | | | | 55 | 65 | 75 | 90 | 103 |
| 10" | 147 | 305 | 0.82 | | | | | | | | | | | | | | 57 | 65 | 77 | 88 |
| 10" | 170 | 355 | 0.82 | | | | | | | | | | | | | | | 56 | 66 | 75 |
| 10" | 190 | 405 | 0.79 | | | | | | | | | | | | | | | | 58 | 65 |
| Max.current for cable [A]★ | | | | 18.5 | 25 | 34 | 43 | 60 | 80 | 101 | 126 | 153 | 196 | 238 | 276 | 319 | 364 | 430 | 497 | |

★ At particularly favourable heat dissipation conditions.
Maximum cable length in metres from motor starter to pump.

Cable dimensions at 3 x 460 V, 60 Hz, DOL

Voltage drop: 3 %

| Motor | kW | I _n [A] | Cosφ 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 | 1.6 | 0.73 | 509 | 845 | | | | | | | | | | | | | | | |
| 4" | 0.55 | 2.3 | 0.69 | 374 | 621 | 988 | | | | | | | | | | | | | | |
| 4" | 0.75 | 2.7 | 0.73 | 302 | 501 | 797 | | | | | | | | | | | | | | |
| 4" | 1.1 | 3.65 | 0.72 | 226 | 375 | 597 | 889 | | | | | | | | | | | | | |
| 4" | 1.5 | 4.35 | 0.76 | 180 | 299 | 476 | 709 | | | | | | | | | | | | | |
| 4" | 2.2 | 5.8 | 0.75 | 137 | 227 | 361 | 538 | 885 | | | | | | | | | | | | |
| 4" | 3.0 | 7.5 | 0.78 | 102 | 169 | 269 | 401 | 660 | | | | | | | | | | | | |
| 4" | 4.0 | 9.45 | 0.82 | 77 | 128 | 203 | 303 | 500 | 788 | | | | | | | | | | | |
| 4" | 5.5 | 12.6 | 0.82 | 58 | 96 | 153 | 228 | 375 | 591 | 903 | | | | | | | | | | |
| 4" | 7.5 | 18 | 0.79 | 42 | 70 | 111 | 165 | 272 | 428 | 651 | 887 | | | | | | | | | |
| 6" | 5.5 | 13.2 | 0.76 | 59 | 98 | 157 | 234 | 384 | 603 | 916 | | | | | | | | | | |
| 6" | 7.5 | 17 | 0.79 | 44 | 74 | 117 | 175 | 288 | 453 | 689 | 939 | | | | | | | | | |
| 6" | 9.2 | 21.4 | 0.8 | | 58 | 92 | 137 | 226 | 356 | 542 | 739 | | | | | | | | | |
| 6" | 11 | 24.5 | 0.82 | | 49 | 78 | 117 | 193 | 304 | 464 | 634 | 873 | | | | | | | | |
| 6" | 13 | 29 | 0.81 | | | 67 | 100 | 165 | 260 | 396 | 540 | 743 | 991 | | | | | | | |
| 6" | 15 | 33 | 0.82 | | | 58 | 87 | 143 | 226 | 345 | 470 | 648 | 866 | | | | | | | |
| 6" | 18.5 | 41 | 0.8 | | | | 72 | 118 | 186 | 283 | 386 | 530 | 706 | 903 | | | | | | |
| 6" | 22 | 46.5 | 0.83 | | | | | 101 | 159 | 242 | 331 | 456 | 611 | 785 | 942 | | | | | |
| 6" | 26 | 55.5 | 0.83 | | | | | 84 | 133 | 203 | 277 | 382 | 512 | 658 | 789 | 931 | | | | |
| 6" | 30 | 64 | 0.85 | | | | | | 113 | 173 | 236 | 327 | 438 | 566 | 681 | 806 | 936 | | | |
| 6" | 37 | 81.5 | 0.79 | | | | | | | 144 | 196 | 269 | 357 | 457 | 545 | 638 | 734 | 860 | 973 | |
| 8" | 22 | 48.5 | 0.84 | | | | | 95 | 150 | 230 | 315 | 434 | 582 | 750 | 901 | | | | | |
| 8" | 26 | 56.5 | 0.86 | | | | | 80 | 126 | 194 | 265 | 367 | 494 | 639 | 770 | 913 | | | | |
| 8" | 30 | 64 | 0.85 | | | | | | 113 | 173 | 236 | 327 | 438 | 566 | 681 | 806 | 936 | | | |
| 8" | 37 | 78 | 0.85 | | | | | | 93 | 142 | 194 | 268 | 360 | 464 | 559 | 661 | 768 | 913 | | |
| 8" | 45 | 92.5 | 0.85 | | | | | | | 119 | 164 | 226 | 303 | 391 | 471 | 558 | 648 | 770 | 881 | |
| 8" | 55 | 112 | 0.86 | | | | | | | | 134 | 185 | 249 | 322 | 388 | 461 | 536 | 638 | 732 | |
| 8" | 63 | 126 | 0.86 | | | | | | | | | 165 | 221 | 286 | 345 | 409 | 476 | 567 | 651 | |
| 8" | 75 | 150 | 0.86 | | | | | | | | | 138 | 186 | 241 | 290 | 344 | 400 | 477 | 547 | |
| 8" | 92 | 184 | 0.87 | | | | | | | | | | 151 | 195 | 236 | 280 | 327 | 390 | 449 | |
| 8" | 110 | 220 | 0.87 | | | | | | | | | | | 163 | 197 | 234 | 273 | 326 | 375 | |
| 10" | 75 | 154 | 0.84 | | | | | | | | | | 183 | 236 | 284 | 335 | 389 | 461 | 526 | |
| 10" | 92 | 190 | 0.83 | | | | | | | | | | 149 | 192 | 231 | 272 | 315 | 372 | 424 | |
| 10" | 110 | 224 | 0.84 | | | | | | | | | | | 162 | 195 | 230 | 267 | 317 | 362 | |
| 10" | 132 | 265 | 0.85 | | | | | | | | | | | | 165 | 195 | 226 | 269 | 308 | |
| 10" | 147 | 305 | 0.82 | | | | | | | | | | | | | 170 | 196 | 231 | 263 | |
| 10" | 170 | 355 | 0.82 | | | | | | | | | | | | | | 168 | 199 | 226 | |
| 10" | 190 | 405 | 0.79 | | | | | | | | | | | | | | | 173 | 196 | |
| Max.current for cable [A]★ | | | | 18.5 | 25 | 34 | 43 | 60 | 80 | 101 | 126 | 153 | 196 | 238 | 276 | 319 | 364 | 430 | 497 | |

★ At particularly favourable heat dissipation conditions.
Maximum cable length in metres from motor starter to pump.

Dimensioning of cable

Calculation of the cross-section of the cable

Formula designations

U = Rated voltage [V]

ΔU = Voltage drop [%]

I = Rated current of the motor [A]

q = Cross-section [mm²]

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

cos ϕ = Power factor

sin ϕ = $\sqrt{1 - \cos^2 \phi}$

L = Length of cable [m]

Δp = Power loss [W]

ρ = $1/\chi$

Materials of cable:

Copper: $\chi = 52$ m/ $\Omega \times$ mm²

Aluminium: $\chi = 35$ m/ $\Omega \times$ mm²

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

DOL

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

Star-delta

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

The values of the rated current (I) and the power factor (cos ϕ) can be read in the tables on pages 73-77.

Calculation of the power loss

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

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

Example:

Motor size: 45 kW, MMS 8000

Rated current: $I_n = 92.5$ A

Voltage: 3 x 460 V, 60 Hz

Starting method: Direct-on-line

Required cable length: 200 m

Power factor: Cos $\phi_{100\%} = 0.85$

Water temperature: 30 °C

Cable selection:

Choice A: 3 x 150 mm²

Choice B: 3 x 185 mm²

Calculation of power loss

Choice A:

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

$$\Delta p_A = \frac{3 \times 200 \times 0.02 \times 92.5^2}{150}$$

$$\Delta p_A = 685 \text{ W}$$

Choice B:

$$\Delta p_B = \frac{3 \times 200 \times 0.02 \times 92.5^2}{185}$$

$$\Delta p_B = 555 \text{ W}$$

Savings

Operating hours/year: h = 4000.

Annual saving (A):

$$A = (\Delta p_A - \Delta p_B) \times h = (685 \text{ W} - 555 \text{ W}) \times 4000 = 520000 \text{ Wh} = 520 \text{ kWh}$$

By choosing the cable size 3 x 185 mm² instead of 3 x 150 mm², an annual saving of 520 kWh is achieved.

Operating time: 10 years

Saving after 10 years (A_{10}):

$$A_{10} = A \times 10 = 520 \times 10 = 5200 \text{ kWh}$$

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

Table of head losses

SP A, SP

Head losses in ordinary water pipes

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

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

| Quantity of water | | | Head losses in ordinary water pipes | | | | | | | | | | | | | | | |
|-----------------------------|-------------|-------------|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--|--|--|--|
| m ³ /h | Litres/min. | Litres/sec. | Nominal pipe diameter in inches and internal diameter in [mm] | | | | | | | | | | | | | | | |
| | | | ½" | ¾" | 1" | 1¼" | 1½" | 2" | 2½" | 3" | 3½" | 4" | 5" | 6" | | | | |
| 0.6 | 10 | 0.16 | 0.855 9.910 | 0.470 2.407 | 0.292 0.784 | | | | | | | | | | | | | |
| 0.9 | 15 | 0.25 | 1.282 20.11 | 0.705 4.862 | 0.438 1.570 | 0.249 0.416 | | | | | | | | | | | | |
| 1.2 | 20 | 0.33 | 1.710 33.53 | 0.940 8.035 | 0.584 2.588 | 0.331 0.677 | 0.249 0.346 | | | | | | | | | | | |
| 1.5 | 25 | 0.42 | 2.138 49.93 | 1.174 11.91 | 0.730 3.834 | 0.415 1.004 | 0.312 0.510 | | | | | | | | | | | |
| 1.8 | 30 | 0.50 | 2.565 69.34 | 1.409 16.50 | 0.876 5.277 | 0.498 1.379 | 0.374 0.700 | 0.231 0.223 | | | | | | | | | | |
| 2.1 | 35 | 0.58 | 2.993 91.54 | 1.644 21.75 | 1.022 6.949 | 0.581 1.811 | 0.436 0.914 | 0.269 0.291 | | | | | | | | | | |
| 2.4 | 40 | 0.67 | | 1.879 27.66 | 1.168 8.820 | 0.664 2.290 | 0.499 1.160 | 0.308 0.368 | | | | | | | | | | |
| 3.0 | 50 | 0.83 | | 2.349 41.40 | 1.460 13.14 | 0.830 3.403 | 0.623 1.719 | 0.385 0.544 | 0.229 0.159 | | | | | | | | | |
| 3.6 | 60 | 1.00 | | 2.819 57.74 | 1.751 18.28 | 0.996 4.718 | 0.748 2.375 | 0.462 0.751 | 0.275 0.218 | | | | | | | | | |
| 4.2 | 70 | 1.12 | | 3.288 76.49 | 2.043 24.18 | 1.162 6.231 | 0.873 3.132 | 0.539 0.988 | 0.321 0.287 | 0.231 0.131 | | | | | | | | |
| 4.8 | 80 | 1.33 | | 2.335 30.87 | 1.328 7.940 | 0.997 3.988 | 0.616 1.254 | 0.367 0.363 | 0.263 6.164 | | | | | | | | | |
| 5.4 | 90 | 1.50 | | 2.627 38.30 | 1.494 9.828 | 1.122 4.927 | 0.693 1.551 | 0.413 0.449 | 0.269 0.203 | | | | | | | | | |
| 6.0 | 100 | 1.67 | | 2.919 46.49 | 1.660 11.90 | 1.247 5.972 | 0.770 1.875 | 0.459 0.542 | 0.329 0.244 | 0.248 0.124 | | | | | | | | |
| 7.5 | 125 | 2.08 | | 3.649 70.41 | 2.075 17.93 | 1.558 8.967 | 0.962 2.802 | 0.574 0.809 | 0.412 0.365 | 0.310 0.185 | 0.241 0.101 | | | | | | | |
| 9.0 | 150 | 2.50 | | | 2.490 25.11 | 1.870 12.53 | 1.154 3.903 | 0.668 1.124 | 0.494 0.506 | 0.372 0.256 | 0.289 0.140 | | | | | | | |
| 10.5 | 175 | 2.92 | | | 2.904 33.32 | 2.182 16.66 | 1.347 5.179 | 0.803 1.488 | 0.576 0.670 | 0.434 0.338 | 0.337 0.184 | | | | | | | |
| 12 | 200 | 3.33 | | | 3.319 42.75 | 2.493 21.36 | 1.539 6.624 | 0.918 1.901 | 0.659 0.855 | 0.496 0.431 | 0.385 0.234 | 0.251 0.084 | | | | | | |
| 15 | 250 | 4.17 | | | 4.149 64.86 | 3.117 32.32 | 1.924 10.03 | 1.147 2.860 | 0.823 1.282 | 0.620 0.646 | 0.481 0.350 | 0.314 0.126 | | | | | | |
| 18 | 300 | 5.00 | | | | 3.740 45.52 | 2.309 14.04 | 1.377 4.009 | 0.988 1.792 | 0.744 0.903 | 0.577 0.488 | 0.377 0.175 | 0.263 0.074 | | | | | |
| 24 | 400 | 6.67 | | | | 4.987 78.17 | 3.078 24.04 | 1.836 6.828 | 1.317 3.053 | 0.992 1.530 | 0.770 0.829 | 0.502 0.294 | 0.351 0.124 | | | | | |
| 30 | 500 | 8.33 | | | | | 3.848 36.71 | 2.295 10.40 | 1.647 4.622 | 1.240 2.315 | 0.962 1.254 | 0.628 0.445 | 0.439 0.187 | | | | | |
| 36 | 600 | 10.0 | | | | | 4.618 51.84 | 2.753 14.62 | 1.976 6.505 | 1.488 3.261 | 1.155 1.757 | 0.753 0.623 | 0.526 0.260 | | | | | |
| 42 | 700 | 11.7 | | | | | | 3.212 19.52 | 2.306 8.693 | 1.736 4.356 | 1.347 2.345 | 0.879 0.831 | 0.614 0.347 | | | | | |
| 48 | 800 | 13.3 | | | | | | 3.671 25.20 | 2.635 11.18 | 1.984 5.582 | 1.540 3.009 | 1.005 1.066 | 0.702 0.445 | | | | | |
| 54 | 900 | 15.0 | | | | | | 4.130 31.51 | 2.964 13.97 | 2.232 6.983 | 1.732 3.762 | 1.130 1.328 | 0.790 0.555 | | | | | |
| 60 | 1000 | 16.7 | | | | | | 4.589 38.43 | 3.294 17.06 | 2.480 8.521 | 1.925 4.595 | 1.256 1.616 | 0.877 0.674 | | | | | |
| 75 | 1250 | 20.8 | | | | | | | 4.117 26.10 | 3.100 13.00 | 2.406 7.010 | 1.570 2.458 | 1.097 1.027 | | | | | |
| 90 | 1500 | 25.0 | | | | | | | 4.941 36.97 | 3.720 18.42 | 2.887 9.892 | 1.883 3.468 | 1.316 1.444 | | | | | |
| 105 | 1750 | 29.2 | | | | | | | | 4.340 24.76 | 3.368 13.30 | 2.197 4.665 | 1.535 1.934 | | | | | |
| 120 | 2000 | 33.3 | | | | | | | | 4.960 31.94 | 3.850 17.16 | 2.511 5.995 | 1.754 2.496 | | | | | |
| 150 | 2500 | 41.7 | | | | | | | | | 4.812 26.26 | 3.139 9.216 | 2.193 3.807 | | | | | |
| 180 | 3000 | 50.0 | | | | | | | | | | 3.767 13.05 | 2.632 5.417 | | | | | |
| 240 | 4000 | 66.7 | | | | | | | | | | | 5.023 22.72 | 3.509 8.926 | | | | |
| 300 | 5000 | 83.3 | | | | | | | | | | | | 4.386 14.42 | | | | |
| 90° bends; slide valves | | | 1.0 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.6 | 1.7 | 2.0 | 2.5 | | | | |
| T-pieces, non-return valves | | | 4.0 | 4.0 | 4.0 | 5.0 | 5.0 | 5.0 | 6.0 | 6.0 | 6.0 | 7.0 | 8.0 | 9.0 | | | | |

The table is calculated in accordance with H. Lang's new formula $a = 0.02$ and for a water temperature of 10 °C.

The head loss in bends, slide valves, T-pieces and non-return valves is equivalent to the metres of straight pipes stated in the last two lines of the table. To find the head loss in foot valves multiply the loss in T-pieces by two.

Table of head losses

SP A, SP

Head losses in plastic pipes

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

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

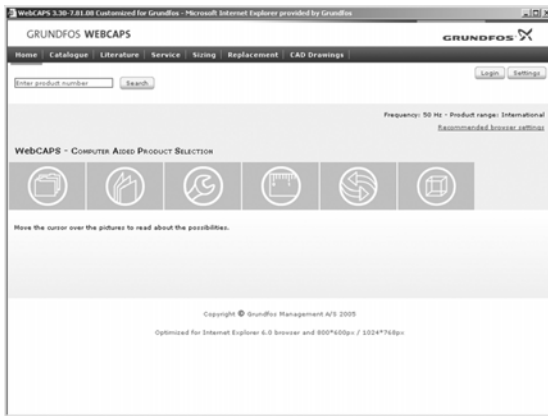
| Quantity of water | | | PELM/PEH PN 10 | | | | | | | | | | | |
|-------------------|-------------|-------------|----------------|--------------|--------------|---------------|--------------|---------------|---------------|---------------|--------------|---------------|---------------|---------------|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

The table is based on a nomogram.

Roughness: K = 0.01 mm.

Water temperature: t = 10 °C.

WebCAPS

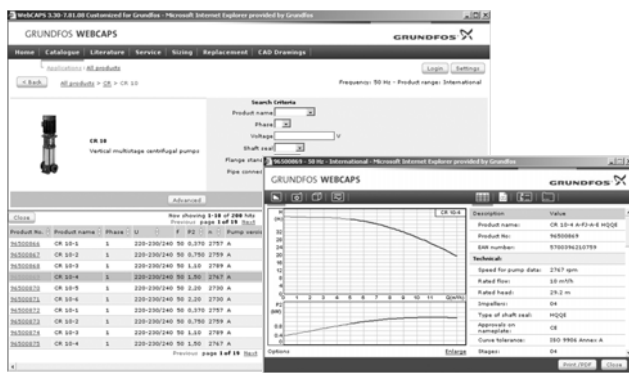


WebCAPS is a **Web**-based **Computer Aided Product Selection** program available on www.grundfos.com.

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

In WebCAPS, all information is divided into 6 sections:

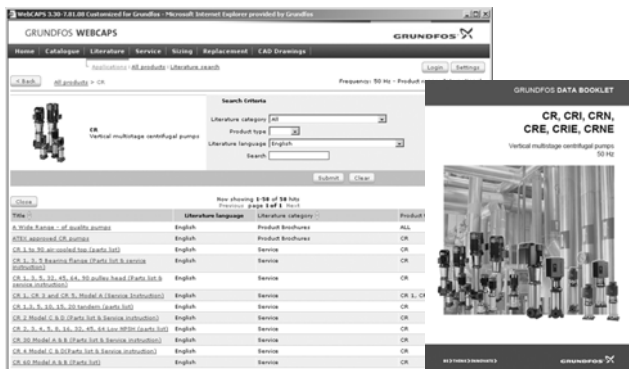
- Catalogue
- Literature
- Service
- Sizing
- Replacement
- CAD drawings.



Catalogue

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

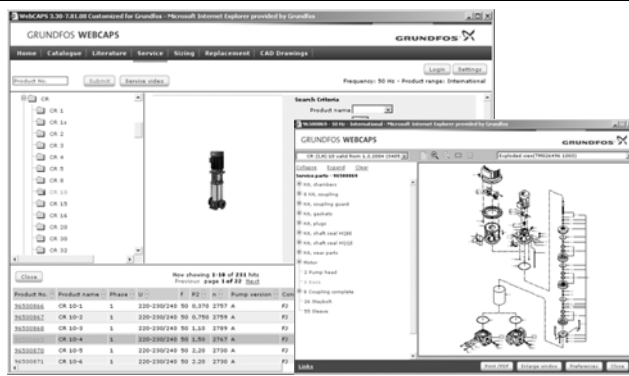
- technical data
- curves (QH, Eta, P1, P2, etc) which can be adapted to the density and viscosity of the pumped liquid and show the number of pumps in operation
- product photos
- dimensional drawings
- wiring diagrams
- quotation texts, etc.



Literature

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

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



Service

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

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



Sizing

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

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



Replacement

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

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



CAD drawings

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

These formats are available in WebCAPS:

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

WinCAPS



Fig. 26 WinCAPS CD-ROM

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

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

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

| | |
|----------------------|-----------|
| V7013316 0907 | GB |
| Repl. V7013316 0307 | |

Subject to alterations.