

# SP accessories



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## 1. General description

This data booklet contain information on SP accessories.

**For pump related information see pump data booklets:**



SP 50 Hz Data Booklet

<http://net.grundfos.com/qr/i/V7165881>



SP 60 Hz Data Booklet

<http://net.grundfos.com/qr/i/V7013316>

**For accessory related mounting instructions see quick guides:**



Zinc Anode Quick guide

<http://net.grundfos.com/qr/i/98445638>



Flow sleeves Quick guide

<http://net.grundfos.com/qr/i/97759492>



Pt 100 / Pt 1000 Quick guide

<http://net.grundfos.com/qr/i/98445663>

## 2. Electrical accessories

### MP 204 motor protector



Fig. 1 MP 204 motor protector

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

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

The motor protector operates with two sets of limits:

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

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

Some values only have a warning limit.

You can read out the warning with Grundfos GO.

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

#### Applications

You can use MP 204 as a stand-alone motor protector. You can monitor the motor protector via a Grundfos GENibus.

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

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

#### Benefits

The motor protector offers these benefits:

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

#### The many monitoring options of the motor protector

The motor protector monitors the following parameters:

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

**Note:** Monitoring of motor temperature is not possible when you use single-turn transformers.

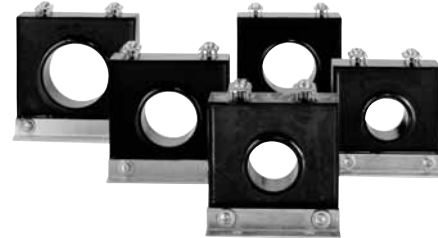


Fig. 2 Single-turn transformers

TM055456 3712

TM03 2033 3505

**Product numbers, MP 204**

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

**Technical data, MP 204**

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

**Electrical data, MP 204**

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

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

## Grundfos GO



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

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

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

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

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

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

### Mobile interface

The available mobile interface devices are described in the following.

#### MI 202 and MI 204

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

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



Fig. 3 MI 202 and MI 204

TM05 3887 1612 - TM05 7704 1513

The following are supplied with the product:

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

#### MI 301

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



TM05 3887 1612

Fig. 4 MI 301

The following are supplied with the product:

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

#### Supported units??ABUN:Skal listen opdateres med nyere modeller?

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

**Note:** Similar Android and iOS-based devices may work as well, but Grundfos does not support these devices.

## CUE frequency converter



GrA404 3407

Fig. 5 The CUE range

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

When a CUE is installed, the motor requires no further overload protection. If overheating protection of motor windings is desired, Pt100/1000 together with MCB 114 sensor input module can provide this protection.

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

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

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

## Overview of the CUE range

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

CUE is available in two enclosure classes:

- IP20/21
- IP54/55.

### RFI filters

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

| Voltage [V] | Typical shaft power, P <sub>2</sub> [kW] | RFI filter type | Application           |
|-------------|--|-----------------|-----------------------|
| 1 x 200-240 | 1.1 - 7.5                                | C1              | Domestic              |
| 3 x 200-240 | 0.75 - 45                                | C1              |                       |
| 3 x 380-500 | 0.55 - 90                                | C1              | Domestic and industry |
|             | 110 - 250                                | C2              |                       |
| 3 x 525-600 | 0.75 - 7.5                               | C3              | Industry              |
| 3 x 525-690 | 11 - 25                                  | C3              |                       |

### Functions

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

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



## CUE features

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

## Sensors

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

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

## Accessories for CUE

Grundfos offers various accessories for CUE.

### MCB 114 sensor input module

MCB 114 offers additional analog inputs for CUE:

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

### Output filters

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

Grundfos offers two types of output filters as CUE accessories

- dU/dt filters
- sine-wave filters.

### dU/dt filters

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

### Sine-wave filters

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

### Use of output filters

The table below shows in which cases an output filter is required. From the table, it can be seen if a filter is needed, and which type to use. For MS and MMS motors Grundfos recommend sine-wave filters.

The selection depends on these factors:

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

| Pump type                   | Motor type | dU/dt filter<br>[motor cable<br>length] | Sine-wave<br>filter<br>[motor cable<br>length] |
|-----------------------------|------------|---|--|
| SP with up to 400V<br>motor | MS, MMS    | 0-100 m                                 | 0-300 m  |
| SP with above 400V<br>motor | MS, MMS    | NA                                      | 0-300 m  |



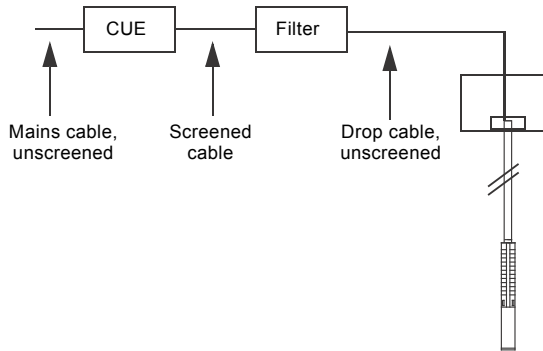
**Cables used in CUE installations**

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

- installation in EMC-insensitive sites. See fig. 6.
- installation in EMC-sensitive sites. See fig. 7.

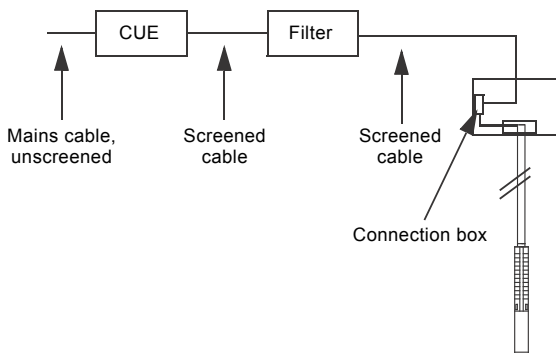
The two types of installation are different when it comes to the use of screened cable.

**Note:** Drop cables are always unshielded.



TM04 4296 1109

**Fig. 6** Example of installation in EMC-insensitive sites



TM04 4295 1109

**Fig. 7** Example of installation in EMC-sensitive sites

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

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

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

| Issues to be considered   | Explanation   |
|---|---|
| Ramp (up and down):<br>Maximum 3 seconds.   | The journal bearings must be lubricated in order to limit wear and overheating of windings.   |
| Use temperature monitoring by Pt sensor.  | Overheating of the motor => low insulation resistance => sensitive to voltage peaks.<br><b>Note:</b> Tempcon sensors do not work with frequency converter operation.  |
| Reduce peak voltages (maximum 800 V peaks).   | Never exceed peak voltages of 850 V at motor leads.   |
| For MS and MMS, we recommend to use motors with 10 % extra in given duty point.<br>For MMS, always use motors wound PE2-PA. | Grundfos CUE with output filter is a safe solution.   |
| Remember output filter.   | Cables act as an amplifier => measure peaks at the motor.   |
| Rise time (dU/dt) must be limited to a maximum of 1000 V/µs. It is determined by the equipment in CUE.                      | Time between switches is an expression of losses, so in the future, we might have to exceed the limit of 1000 V/µs.<br>The solution is not higher insulation of the motor, but filter in the output from CUE. |
| Constant operation at minimum 30 Hz.  | Too low speed => low flow and thereby poor lubrication of journal bearings.   |
| Size CUE in respect of the current, not the power output.   | Can end up with a too small CUE.  |
| Size cooling provision for stator tube at duty point with lowest flow rate.   | Flow minimum m/s along the stator housing must be considered.   |
| Ensure that the pump is used within the range of the pump curve.  | Focus on outlet pressure and sufficient Net Positive Suction Head, as vibrations will "kill" the motor.   |

## CIU communication interface units



GrA6118 3908

**Fig. 8** Grundfos CIU communication interface unit

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

- Profibus DP,
- Profinet
- Modbus RTU,
- Modbus TPC
- LonWorks,
- BACnet MS/TP,
- BACnet/IP
- GSM/GPRS
- Grundfos Remote Management (GRM) for complete control of pump systems.

### Applications

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

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

### Benefits

CIU offers these benefits:

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

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



TM05 5456 3712 - GrA4 412 3307

**Fig. 9** MP 204 motor protector and CUE frequency converter

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

| CIU unit     | Fieldbus protocol                               | CUE | MP 204 |
|--------------|---|-----|--------|
| CIU 100      | LonWorks  | •   | -      |
| CIU 150      | Profibus DP                                     | •   | •      |
| CIU 200      | Modbus RTU                                      | •   | •      |
| CIU 250      | GSM/GPRS  | •   | •      |
| CIU 270/271* | GRM   | •   | •      |
| CIU 300      | BACnet MS/TP                                    | •   | -      |
| CIU 500      | Profinet<br>Modbus TPC<br>BACnet/IP<br>GRM IP** | •   | •      |

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

\*\* Requires external 3G/4G modem

### CIU Product numbers

| CIU unit | Fieldbus protocol                               | Product number |
|----------|---|----------------|
| CIU 100  | LonWorks  | 96753735       |
| CIU 150  | Profibus DP                                     | 96753081       |
| CIU 200  | Modbus RTU                                      | 96753082       |
| CIU 250* | GSM/GPRS  | 96787106       |
| CIU 270* | GRM   | 98176136       |
| CIU 271* | GRM   | 96898819       |
| CIU 300  | BACnet MS/TP                                    | 96893769       |
| CIU 500  | Profinet<br>Modbus TPC<br>BACnet/IP<br>GRM IP** | 96953894       |

\* Antenna not included. See below.

### Antennas for CIU 250 and 270/271

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

## Motor starters for MS402 and MS 4000 CSIR/CSCR motors

### Applications

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



TM06 4358 2015

Fig. 10 Motor starter for MS 402 and MS 4000

### Product numbers

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

### PSC motor capacitors

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

### Product numbers

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

## PR 5714 with Pt100 sensor

PR 5714 with Pt100 sensor offers these features:

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

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

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

- Pt100 sensor
- PR 5714 relay
- cable.









The following temperature limits are preset on delivery:

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

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

### Technical data

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

| PR 5714 relay   | Voltage  | Product number |
|---|--|----------------|
|    | 24-230 VAC, 50/60 Hz / 24-250 VDC  | 96913234       |
| GRA3186 0407  |  |                |
| Pt100 sensor, including cable for standard-, N- and R-versions                      | Cable length [m]   | Product number |
|    | 20   | 96913237       |
|   | 40   | 96913253       |
|   | 60   | 96913256       |
|   | 80   | 96913260       |
|   | 100  | 96913263       |
| GRA3190 0407  |  |                |
| Staybolt kits for Pt100 in MS 6000  | Description  | Product number |
|    | Staybolt kit for Pt100/Pt1000.<br>Material: EN 1.4401/AISI 316.  | 97550639       |
|   | Staybolt kit for Pt100.<br>Material: EN 1.4539/AISI 90L.   | 96803373       |
| GRA3191 0407  |  |                |
| Insertion probe for MMS 10000 and MMS 12000   | Description  | Product number |
|   | Insertion probe for Pt100/Pt1000 in MMS 10000 and MMS 12000.<br>Material: EN 1.4401/316 (N-version).   | 96913215       |
|   | Insertion probe for Pt100/Pt1000 in MMS 10000 and MMS 12000.<br>Material: EN 1.4539/AISI 904L (R-version)  | 99298250       |
| TM04 3560 4508  |  |                |
| Pt1000 sensor, including cable  | Cable length [m]   | Product number |
|  | 20   | 96804042       |
|   | 40   | 96804044       |
|   | 60   | 96804064       |
|   | 80   | 96804065       |
|   | 100  | 96804067       |
| TM04 3563 4508  |  |                |
| Staybolt kits for Pt1000 in MS 402 and MS 4000                                      | Description  | Product number |
|  | Staybolt kit for Pt1000.<br>Material: EN 1.4401/AISI 316.  | 98090278       |
|   | Staybolt kit for Pt1000.<br>Material: EN 1.4539/AISI 904.  | 98090341       |
| TM05 3694 1612  |  |                |
| Extension kit for sensor cable for Pt100/Pt1000                                     | Description  | Product number |
|  | Extension kit for Pt100/Pt1000 sensor cable.<br>For watertight shrink-joining of the sensor cable.<br>Extra sensor cable must be ordered separately. | 99039717       |
| TM00 7885 (tm)  |  |                |
| Sensor cable  | Description  | Product number |
|  | Drop cable for extension: 4#1 mm <sup>2</sup><br>Mention length when ordering.<br>Maximum recommended length: 350 m.                                 | 00RM5271       |
| TM00 7882 2296  |  |                |

## MS motor cables

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

### Drinking water approval

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

For more information on sizing cables, see [Length of motor](#) on page 43.

**Note:** The maximum permissible voltage drop in the motor cable is 3 %.

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

### MS 402 three-phase motor cables

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

## MS 4000 three-phase motor cables

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

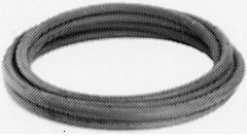
## MS 4000 environmental three-phase motor cables

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

## MS 6000 three-phase motor cables


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

## Submersible drop cable

| Product   | Description | Number of leads and nominal cross-section [mm <sup>2</sup> ] | Outer cable diameter min./max. [mm] | Weight [kg/m] | Product number |
|---|-------------|--|-------------------------------------|---------------|----------------|
|  <p>Suitable for these applications:</p> <ul style="list-style-type: none"> <li>• continuous application in groundwater and potable water (approved for potable-water applications)</li> <li>• connection of electrical equipment, such as submersible motors</li> <li>• installation depths up to 600 metres and average loads.</li> </ul> <p>Insulation and sheath of special EPR-based elastomer materials adapted to applications in water.</p> <p>Maximum permissible water temperature: 70 °C.<br/>Maximum permissible lead service temperature: 90 °C.</p> <p>Further cable sizes are available on request.</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">TM00 7882 2296</p> |             | 1 x 25   | 12.5 / 16.5                         | 0.410         | 00ID4072       |
|   |             | 1 x 35   | 14.0 / 18.5                         | 0.560         | 00ID4073       |
|   |             | 1 x 50   | 16.5 / 21.0                         | 0.740         | 00ID4074       |
|   |             | 1 x 70   | 18.5 / 23.5                         | 1.000         | 00ID4075       |
|   |             | 1 x 95   | 21.0 / 26.5                         | 1.300         | 00ID4076       |
|   |             | 1 x 120  | 23.5 / 28.5                         | 1.650         | 00ID4077       |
|   |             | 1 x 150  | 26.0 / 31.5                         | 2.000         | 00ID4078       |
|   |             | 1 x 185  | 27.5 / 34.5                         | 2.500         | 00ID4079       |
|   |             | 4G1.5  | 10.5 / 13.5                         | 0.190         | 00ID4063       |
|   |             | 4G2.5  | 12.5 / 15.5                         | 0.280         | 00ID4064       |
|   |             | 4G4.0  | 14.5 / 18.0                         | 0.390         | 00ID4065       |
|   |             | 4G6.0  | 16.5 / 22.0                         | 0.520         | 00ID4066       |
|   |             | 4G10   | 22.5 / 24.5                         | 0.950         | 00ID4067       |
|   |             | 4G16   | 26.5 / 28.5                         | 1.400         | 00ID4068       |
|   |             | 4G25   | 32.0 / 34.0                         | 1.950         | 00ID4069       |
|   |             | 4G35   | 33.0 / 42.5                         | 2.700         | 96432949       |
|   |             | 4G50   | 38.0 / 48.5                         | 3.600         | 96432950       |
|   |             | 4G70   | 43.0 / 54.5                         | 4.900         | 96432951       |

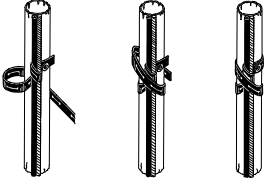
## Submersible drop cables with plug

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

| Product   | Cable length [m]      | Product number |
|---|-----------------------|----------------|
|  | 4x1.5 mm <sup>2</sup> |                |
|   | 15                    | 0079H001       |
|   | 20                    | 0079H002       |
|   | 25                    | 0079H003       |
|   | 30                    | 0079H004       |
|   | 40                    | 0079H005       |
|   | 50                    | 0079H006       |
|   | 70                    | 0079H008       |
|   | 100                   | 0079H009       |
|   | 4x2.5mm <sup>2</sup>  |                |
|   | 15                    | 0079H021       |
|   | 20                    | 0079H022       |
|   | 25                    | 0079H023       |
|   | 30                    | 0079H024       |
|   | 40                    | 0079H025       |
|   | 50                    | 0079H026       |
|   | 70                    | 0079H028       |
|   | 100                   | 0079H029       |
|   | 4x4mm <sup>2</sup>    |                |
|   | 15                    | 0079H041       |
|   | 20                    | 0079H042       |
|   | 25                    | 0079H043       |
|   | 30                    | 0079H044       |
|   | 40                    | 0079H045       |
|   | 50                    | 0079H046       |
|   | 70                    | 0079H048       |




## Cable clips

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

TM00 1369 5092

## Cable termination kit with plug for MS4000 and MS402

| Product   | Description  | Version   | Product number |           |
|---|--|---|----------------|-----------|
|   |  |   | N-version      | R-version |
|  | <p>For watertight joining of motor cable and submersible drop cable in an acrylic tube filled with resin. Used for both single- and multi-core cables during installation of submersible pumps.<br/>24 hours of hardening is required.</p> | <p>For cables up to 4 x 2.5 mm<sup>2</sup></p> <p>For cables up to 4 x 6 mm<sup>2</sup></p> | 00799901       | 00799955  |
|   |  |   | 00799902       | 00799918  |

TM00 7883 2296

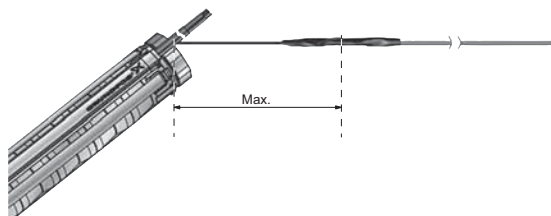
## Cable termination kit, type KM

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

### Grundfos recommendation

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

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



TM06 9876 0817

| Motor cable [mm <sup>2</sup> ] | Drop cable, maximum increase per step. [mm <sup>2</sup> ] |       |       |       |
|--------------------------------|---|-------|-------|-------|
| 2,5                            | 6,0   | 16,0  | 50,0  | -     |
| 6,0                            | 16,0  | 35,0  | 70,0  | 150,0 |
| 10,0                           | 25,0  | 50,0  | 120,0 | 240,0 |
| 16,0                           | 50,0  | 120,0 | 240,0 | -     |
| 25,0                           | 70,0  | 150,0 | 240,0 | -     |
| 35,0                           | 70,0  | 150,0 | 240,0 | -     |
| 50,0                           | 120,0   | 240,0 | -     | -     |
| 70,0                           | 150,0   | 240,0 | -     | -     |


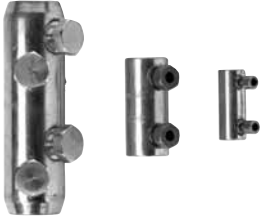
| Possible cable termination |            | Content of kit | Motor cable [mm <sup>2</sup> ]    | Drop cable [mm <sup>2</sup> ] | Number of leads | Product number |
|----------------------------|------------|----------------|-----------------------------------|-------------------------------|-----------------|----------------|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

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

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

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

## Cable termination kit, types M0 to M4

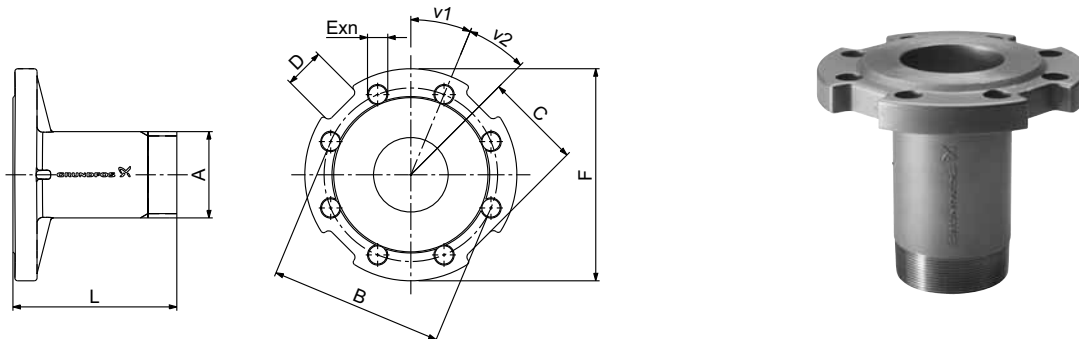
| Product   | Description  | Version  |  |                             |                       |
|---|--|----------|--|-----------------------------|-----------------------|
|   |  | Type     | Diameter of cable joint [mm]                   | Outer cable diameter [mm]   | Product number        |
|  <p>TM04 4981 2309</p> | <p>For watertight joining of motor cable and submersible drop cable. The joint is encapsulated by the glue which is part of the kit.</p> | M0       | Ø40  | Ø6 - Ø15                    | ID8903                |
|   |  | M1       | Ø46  | Ø9 - Ø23                    | ID8904                |
|   |  | M2       | Ø52  | Ø17 - Ø31                   | ID8905                |
|   |  | M3       | Ø77  | Ø26 - Ø44                   | ID8906                |
|   |  | M4       | Ø97  | Ø29 - Ø55                   | 91070700              |
|  <p>GrA8251 2209</p>   | <p>Accessories for cable kits M0 to M4. Screw connectors only.</p>   |          | <b>Cross-section of leads [mm<sup>2</sup>]</b> | <b>Number of connectors</b> | <b>Product number</b> |
|   |  |          | 6-25   | 4                           | 96626021              |
|   |  |          | 16-95  |                             | 96626022              |
|   |  |          | 35-185   |                             | 96626023              |
|   | 70-240   | 96626028 |  |                             |                       |

### 3. Mechanical accessories

#### Connecting pieces / Adaptors

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

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

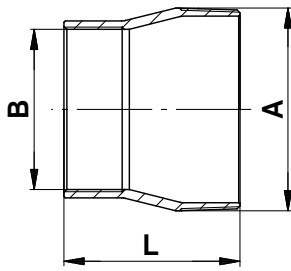


TM01 2396 4508 - GrA2552 3706

Fig. 11 Dimensional sketch and photo of the connecting piece thread-to-flange

| Type                       | Pump outlet | Connecting piece         | Thread-to-flange |                 |      |    |         |      |     |      |      |    | Product number |           |
|----------------------------|-------------|--------------------------|------------------|-----------------|------|----|---------|------|-----|------|------|----|----------------|-----------|
|                            |             |                          | A                | Dimensions [mm] |      |    |         |      |     | v1   | v2   | n  | EN 1.4308      | EN 1.4517 |
|                            |             |                          |                  | B               | C    | D  | E       | F    | L   |      |      |    |                |           |
| SP 17                      | Rp 2 1/2    | R 2 1/2 → DN 50 PN 16/40 | R 2 1/2          | 125             | 65   | 40 | ∅19     | ∅165 | 170 | 30   | 30   | 4  | 00120125       | 00120911  |
|                            |             | R 2 1/2 → DN 65 PN 16/40 | R 2 1/2          | 145             | 71   | 30 | ∅19     | ∅185 | 170 | 22.5 | 22.5 | 8  | 00120126       | 00120910  |
|                            |             | R 2 1/2 → DN 80 PN 16/40 | R 2 1/2          | 160             | 82.5 | 40 | ∅19     | ∅200 | 170 | 22.5 | 22.5 | 8  | 00120127       | 00120909  |
| SP 30<br>SP 46<br>SP 60    | Rp 3        | R 3 → DN 65 PN 16/40     | R 3              | 145             | 71   | 30 | ∅19     | ∅185 | 170 | 22.5 | 22.5 | 8  | 00130187       | 00130920  |
|                            |             | R 3 → DN 80 PN 16/40     | R 3              | 160             | 82.5 | 40 | ∅19     | ∅200 | 170 | 22.5 | 22.5 | 8  | 00130188       | 00130921  |
|                            |             | R 3 → DN 100 PN 40       | R 3              | 180/190         | 100  | 40 | ∅19/∅23 | ∅235 | 170 | 22.5 | 22.5 | 8  | 00130189       | 00130922  |
| SP 46<br>SP 60             | Rp 4        | R 3 → DN 100 PN 16       | R 3              | 180/190         | 100  | 40 | ∅19/∅23 | ∅235 | 180 | 22.5 | 22.5 | 8  | 00130210       | 00130867  |
|                            |             | R 4 → DN 100 PN 16       | R 4              | 180             | 100  | 40 | ∅19     | ∅235 | 180 | 22.5 | 22.5 | 8  | 00140077       | 00140737  |
|                            |             | R 4 → DN 100 PN 40       | R 4              | 190             | 100  | 40 | ∅23     | ∅235 | 180 | 22.5 | 22.5 | 8  | 00140071       | 00140577  |
| SP 77<br>SP 95             | Rp 5        | R 5 → DN 100 PN 16       | R 5              | 180             | 82   | 35 | ∅19     | ∅220 | 195 | 22.5 | 22.5 | 8  | 00160159       | 00160657  |
|                            |             | R 5 → DN 100 PN 40       | R 5              | 190             | 82   | 35 | ∅23     | ∅235 | 195 | 22.5 | 22.5 | 8  | 00160148       | 00160646  |
|                            |             | R 5 → DN 125 PN 16       | R 5              | 210             | 99   | 37 | ∅19/∅28 | ∅250 | 195 | 22.5 | 22.5 | 8  | 00160157       | 00160655  |
|                            |             | R 5 → DN 125 PN 40AAA    | R 5              | 220             | 99   | 37 | ∅19/∅28 | ∅270 | 195 | 22.5 | 22.5 | 8  | 00160149       | 00160647  |
|                            |             | R 5 → DN 150 PN 16       | R 5              | 240             | 115  | 36 | ∅23     | ∅285 | 195 | 22.5 | 22.5 | 8  | 00160161       | 00160659  |
| SP 125<br>SP 160<br>SP 215 | Rp 6        | R 5 → DN 150 PN 40       | R 5              | 250             | 115  | 36 | ∅28     | ∅300 | 195 | 22.5 | 22.5 | 8  | 00160150       | 00160648  |
|                            |             | R 6 → DN 125 PN 16       | R 6              | 210             | 99   | 36 | ∅19     | ∅250 | 195 | 22.5 | 22.5 | 8  | 00170170       | 00170694  |
|                            |             | R 6 → DN 125 PN 40       | R 6              | 220             | 99   | 36 | ∅28     | ∅270 | 195 | 22.5 | 22.5 | 8  | 00170159       | 00170596  |
|                            |             | R 6 → DN 150 PN 16       | R 6              | 240             | 114  | 36 | ∅23     | ∅285 | 195 | 22.5 | 22.5 | 8  | 98518437       | 98518487  |
|                            |             | R 6 → DN 150 PN 40       | R 6              | 250             | 114  | 36 | ∅28     | ∅300 | 195 | 22.5 | 22.5 | 8  | 00170160       | 00170597  |
|                            |             | R 6 → DN 200 PN 16       | R 6              | 295             | 134  | 36 | ∅23     | ∅340 | 195 | 15   | 15   | 12 | 00170161       | 00170598  |
|                            |             | R 6 → DN 200 PN 40       | R 6              | 320             | 151  | 36 | ∅31     | ∅375 | 200 | 15   | 15   | 12 | 00170162       | 00170599  |

## Thread-to-thread



TM01 2397 4508 - TM06 9783 3317

Fig. 12 Dimensional sketch and photo of a connecting piece thread-to-thread

| Type                       | Pump outlet | Connecting piece | Dimensions       |        |        | Product number |           |           |
|----------------------------|-------------|------------------|------------------|--------|--------|----------------|-----------|-----------|
|                            |             |                  | Thread-to-thread |        | L [mm] | EN 1.4301      | EN 1.4401 | EN 1.4539 |
|                            |             |                  | A                | B      |        |                |           |           |
| SP 77<br>SP 95             | Rp 5        | R 5 → Rp 4       | R 5              | Rp 4   | 121    | 190063         | 190585    | 96917293  |
|                            |             | R 5 → Rp 6       | R 5              | Rp 6   | 150    | 190069         | 190591    | 96917296  |
| SP 125<br>SP 160<br>SP 215 | 5" NPT      | 5" NPT → 4" NPT  | 5" NPT           | 4" NPT | 121    | 190064         | 190586    | 00190964  |
|                            |             | 5" NPT → 6" NPT  | 5" NPT           | 6" NPT | 150    | 190070         | 190592    | 00190965  |
| SP 125<br>SP 160<br>SP 215 | Rp 6        | R 6 → Rp 5       | R 6              | Rp 5   | 150    | 200130         | 200640    | 00200971  |
|                            |             | 6" NPT → 5" NPT  | 6" NPT           | 5" NPT | 150    | 200135         | 200645    | 00200970  |

## 4. Flow sleeves

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

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

### Maximum liquid temperature

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

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

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

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

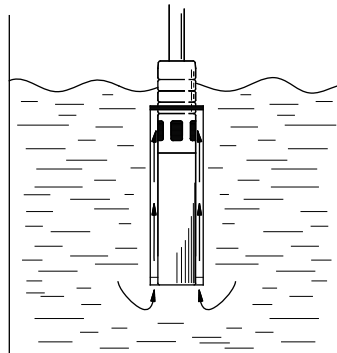


TM01 0751 2197 - TM01 0750 2197

Fig. 13 Flow sleeves

### Example of calculated flow sleeve

The flow sleeve is fitted to the submersible motor so that the liquid passes close by the motor on its way towards the pump suction interconnector, thus ensuring optimum cooling of the motor. See fig. 14.



TM01 0509 1297

Fig. 14 Flow sleeve function

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

Use this formula to calculate flow velocity:

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

|   |                   |                 |
|---|-------------------|-----------------|
| Q | m <sup>3</sup> /h | Flow rate       |
| D | mm                | Sleeve diameter |
| d | mm                | Motor diameter  |

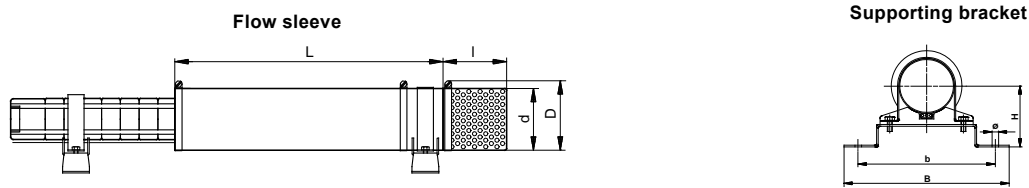
### Submersible motor diameter

| Motor type | Diameter (d) [mm] |
|------------|-------------------|
| MS402      | 95                |
| MS4000     | 95                |
| MS6000     | 139.5             |
| MMS6       | 144               |
| MMS8000    | 192               |
| MMS10000   | 237               |
| MMS12000   | 286               |

### Over-sized motor

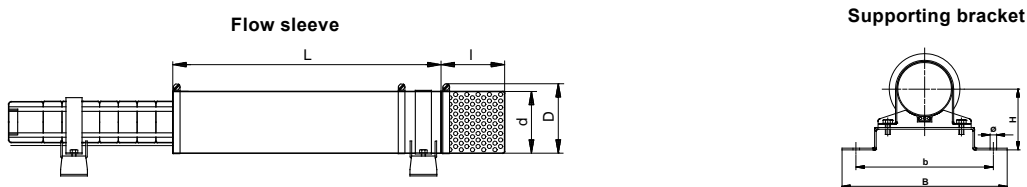
Flow sleeves for pumps with oversize motor and for pumps with non-standard motor are available on request.

## 5. Flow sleeve, standard version EN 1.4301/AISI 304

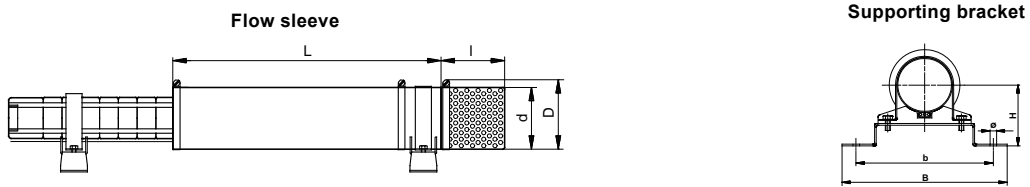


| Pump type   |   | Flow sleeve  | Strainer                                     | Supporting brackets   |
|---|---|--|--|---|
| 50 Hz   | 60 Hz   | Dimensions, d (D) x L<br>Motor type, P2<br>Weight  | Product number<br>Dimensions d x l<br>Weight | Product number<br>Description   |
| SP1A-9 to -28<br>SP2A-6 to -18<br>SP3A-6 to -12<br>SP5A-4 to -8   | SP1A-9 to -22<br>SP2A-6 to -15<br>SP3A-5 to -10<br>SP5A-3 to -7   | <ul style="list-style-type: none"> <li>d115 (130) x L400</li> <li>Motor 4", up to 0.75 kW</li> <li>1.5 kg</li> </ul>           | 96937110                                     |   |
| SP1A-36 to -57<br>SP2A-23 to -33<br>SP3A-15 to -25<br>SP5A-12 to -17<br>SP7-1 to -12<br>SP9-1 to -11<br>SP11-1 to -11<br>SP14-1 to -6 | SP1A-26 to -39<br>SP2A-21 to -27<br>SP3A-14 to -18<br>SP5A-9 to -11<br>SP 7 - 1 to 8<br>SP9-4 to -7<br>SP11-3 to -7<br>SP14-1 to -4 | <ul style="list-style-type: none"> <li>d115 (130) x 500</li> <li>Motor 4", up to 2.2 kW</li> <li>7 kg</li> </ul>               | 96937111                                     | 96957450<br>(1 set = 2 brackets)<br>1.1 kg<br>H100, b185, B220  |
| SP2A-40 to -65<br>SP3A-29 to -60<br>SP5A-21 to -60<br>SP7 - 13 to 42<br>SP9-13 to -29<br>SP11-11 to -27<br>SP14-7 to -23              | SP2A-34 to -48<br>SP3A-24 to -38<br>SP5A-15 to -39<br>SP7-8 to -28<br>SP9-4 to -18<br>SP11-3 to -18<br>SP14-5 to -15                | <ul style="list-style-type: none"> <li>d115 (130) x 800</li> <li>Motor 4", up to 5.5 kW</li> <li>2.5 kg</li> </ul>             | 96937179                                     | d115 x 117<br>0.4 kg<br><br>96958279  |
| SP7 -42 to -59<br>SP9 -30 to -40<br>SP11 -28 to -37<br>SP14 -24 to -31  | SP7 -29 to -38<br>SP9 -19 to -25<br>SP11 -19 to -24<br>SP14 -16 to -20  | <ul style="list-style-type: none"> <li>d115 (130) x 1000</li> <li>Motor 4", 7.5 kW (MS 4000)</li> <li>3.1 kg</li> </ul>        | 96937204                                     | (1 set = 2 brackets)<br>1.4 kg<br>H100, b235, B275  |
| SP5A -52 to -60<br>SP7 -32 to -59<br>SP9 -23 to -40<br>SP11 -21 to -37<br>SP14-18 to -31  | SP5A-39<br>SP7 -21 to -38<br>SP9 -17 to -25<br>SP11 -14 to -24<br>SP14 -12 to -20   | <ul style="list-style-type: none"> <li>d160 (180) x 800</li> <li>Motor 6", up to 7.5 kW (MS 6000)</li> <li>4.0 kg</li> </ul>   | 96937231                                     | 98557132<br>(1 set = 2 brackets)<br>1.4 kg<br>H125, b185, B220  |
| SP9-41 to -55   | SP9-26 to -38   | <ul style="list-style-type: none"> <li>d160 (180) x 1000</li> <li>Motor 6" up to 11 kW (MS 6000)</li> <li>4,0 kg</li> </ul>    | 98779730                                     | 97942230<br><br>96957525  |
| SP2A-75 to -90  | SP2A-58<br>SP3A-56  | <ul style="list-style-type: none"> <li>d160 (180) x 1000</li> <li>Motor 4", 7.5 kW (MS 4000)</li> <li>4.3 kg</li> </ul>        | 96937205                                     | (1 set = 2 brackets)<br>1.4 kg<br>H125, b185, B220<br>96957529  |
| SP5A-75 to -85<br>SP7 -60 to 100<br>SP9-56 to -93   | SP3A-56 to -75<br>SP5A-52<br>SP7 -41 to -67<br>SP9-39 to -63  | <ul style="list-style-type: none"> <li>d160 (180) x 1000</li> <li>Motor 6", up to 18.5 kW (MS 6000)</li> <li>4.9 kg</li> </ul> | 96937244                                     | (1 set = 2 brackets)<br>1.4 kg<br>H140, b300, B350  |
| SP17-1  |   | <ul style="list-style-type: none"> <li>d145 (160) x 450</li> <li>Motor 4", up to 2.2 kW (MS 4000)</li> <li>1.9 kg</li> </ul>   | 96937139                                     |   |
| SP17-2<br>SP17-3<br>SP30-1 to -2  | SP17-1 to -2<br>SP30-1  | <ul style="list-style-type: none"> <li>d145 (160) x 550</li> <li>Motor 4", up to 2.2 kW (MS 4000)</li> <li>2.2 kg</li> </ul>   | 96937140                                     | 97942214<br>(1 set = 2 brackets)<br>2.0 kg<br>H115, b185, B220<br>for pumps up to 50 kg / 4" up to 7.5 kW |
| SP17-4 to -7<br>SP30-3 to -4  | SP17-3 to -6<br>SP30-2 to -3  | <ul style="list-style-type: none"> <li>d145 (160) x 800</li> <li>Motor 4", up to 4 kW (MS 4000)</li> <li>3.1 kg</li> </ul>     | 96937180                                     |   |
| SP17-8 to -13<br>SP30-5 to -8   | SP17-7 to -9<br>SP30-4 to -5  | <ul style="list-style-type: none"> <li>d145 (160) x 1000</li> <li>Motor 4", 5.5 - 7.5 kW (MS 4000)</li> <li>3.8 kg</li> </ul>  | 96937182                                     |   |

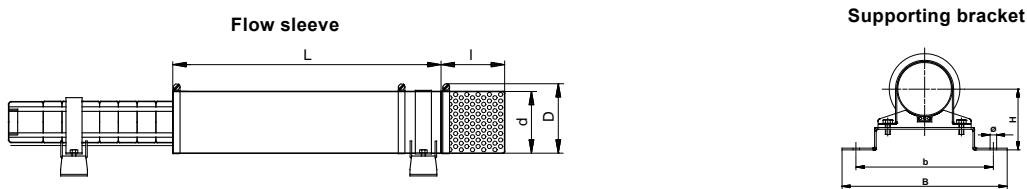




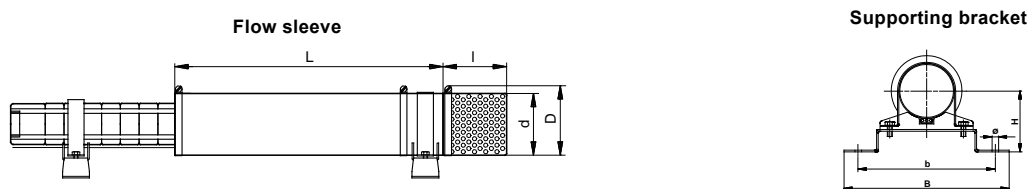
| Pump type  |  | Flow sleeve   | Strainer                                     | Supporting brackets  |
|--|--|---|--|--|
| 50 Hz  | 60 Hz  | Dimensions, d (D) x L<br>Motor type, P2<br>Weight   | Product number<br>Dimensions d x l<br>Weight | Product number<br>Description  |
| SP17-8 to -24<br>SP30-5 to -15                             | SP17-5 to -15<br>SP30-3 to -10                                   | <ul style="list-style-type: none"> <li>d180 (200) x 800</li> <li>Motor 6", up to 13 kW (MS 6000)</li> <li>4.0 kg</li> </ul>   |  |  |
| SP17-25 to -40<br>SP30-16 to -26                           | SP17-16 to -26<br>SP30-11 to -17                                 | <ul style="list-style-type: none"> <li>d180 (200) x 1000</li> <li>Motor 6", up to 22 kW (MS 6000)</li> <li>4.9 kg</li> </ul>  | 96937245                                     | 96957529<br>(1 set = 2 brackets)<br>2.1 kg<br>H140, b300, B350   |
| SP30-27 to -35   | SP17-27 to -30<br>SP30-18 to -23                                 | <ul style="list-style-type: none"> <li>d180 (200) x 1250</li> <li>Motor 6", 26 to 30 kW (MS 6000)</li> <li>6.0 kg</li> </ul>  | 96937249                                     | d180 x 192<br>0.9 kg   |
|  | SP30-24 to -28   | <ul style="list-style-type: none"> <li>d180 (200) x 1700</li> <li>Motor 6", up to 26-37 kW (MMS6)</li> <li>8.5 kg</li> </ul>  | 96937313                                     | 96957531<br>(1 set = 3 brackets)<br>3.1 kg<br>H140, b300, B350   |
| SP17-43 to -53   | SP17-33 to -36   | <ul style="list-style-type: none"> <li>d200 (220) x 1250</li> <li>Motor 6", 26-30 kW (MS 6000)</li> <li>Pump in sleeve d154</li> <li>6.6 kg</li> </ul>              | 96937246                                     | 96957544<br>(1 set = 2 brackets)<br>2.3 kg<br>H150, b320, B370   |
| SP17-43 to -60<br>SP30-39 to -43                           | SP17-39 to -42   | <ul style="list-style-type: none"> <li>d200 (220) x 1700</li> <li>Motor 6", 26-37 kW (MMS6)</li> <li>Pump in sleeve d154</li> <li>9.3 kg</li> </ul>                 | 96937315                                     | 97942247<br>d200 x 192<br>1.0 kg<br>97695369<br>(1 set = 3 brackets)<br>3.2 kg<br>H150, b320, B370           |
| SP17-55 to -60<br>SP30-39 to -49                           | SP17-45 to -50   | <ul style="list-style-type: none"> <li>d200 (220) x 1700</li> <li>Motor 6", 37-45 kW (Franklin 6")</li> <li>Pump in sleeve d154</li> <li>9.3 kg</li> </ul>          | 96937447                                     |  |
| SP17-45<br>SP17-48<br>SP30-46 to -54                       | SP17-42 to -50<br>SP30-29 to -39                                 | <ul style="list-style-type: none"> <li>d254 (270) x 1500</li> <li>Motor 8", 37-55 kW (MMS 8000/Franklin 8")</li> <li>Pump in sleeve d154</li> <li>9.8 kg</li> </ul> | 96937462                                     | 97942263<br>d256 x 325<br>1.9 kg<br>96957561<br>(1 set = 3 brackets)<br>6.3 kg<br>H200, b380, B430           |
| SP46-1-B<br>SP46-1<br>SP46-2-BB<br>SP60-1-A<br>SP60-1      | SP46-1-B<br>SP46-1-B<br>SP46-1-A<br>SP60-1-B                     | <ul style="list-style-type: none"> <li>d180 (200) x 550</li> <li>Motor 4", up to 2.2 kW (MS 402/MS 4000)</li> <li>2.9 kg</li> </ul>                                 | 96937178                                     |  |
| SP46-2<br>SP46-3-C<br>SP60-2-B<br>SP60-2                   | SP46-1<br>SP46-2-AB<br>SP60-1-A<br>SP60-1<br>SP60-2-BB           | <ul style="list-style-type: none"> <li>d180 (200) x 800</li> <li>Motor 4" 3.0 - 4.0 kW (MS 4000)</li> <li>4.0 kg</li> </ul>   | 96937187                                     | 96957524<br>(1 set = 2 brackets)<br>1.2 kg<br>H140, b225, B260<br>for pumps up to<br>50 kg / 4" up to 7.5 kW |
| SP46-3<br>SP46-4-C<br>SP46-4<br>SP46-5<br>SP60-3<br>SP60-4 | SP46-2<br>SP46-3-BB<br>SP46-3<br>SP46-4-BC<br>SP60-2<br>SP60-3-A | <ul style="list-style-type: none"> <li>d180 (200) x 1000</li> <li>Motor 4", 5.5 - 7.5 kW (MS 4000)</li> <li>4.9 kg</li> </ul>                                       | 96937190                                     |  |



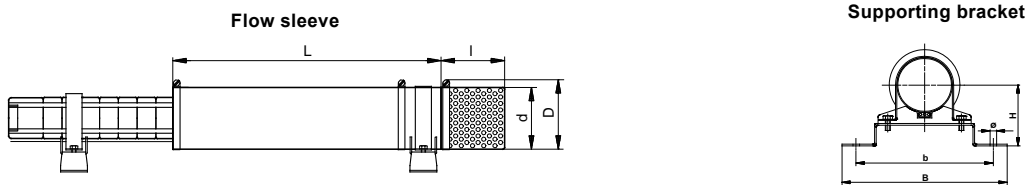
| Pump type  |   | Flow sleeve   |                | Strainer                                     | Supporting brackets  |
|--|---|---|----------------|--|--|
| 50 Hz  | 60 Hz   | Dimensions, d (D) x L<br>Motor type, P2<br>Weight   | Product number | Product number<br>Dimensions d x l<br>Weight | Product number<br>Description                                  |
| SP46-3<br>SP46-4-C<br>SP46-4 to -10<br>SP60-3 to -9B | SP46-2<br>SP46-3BB<br>SP46-3<br>SP46-4-BC<br>SP46-4 to 7C<br>SP60-2<br>SP60-3-A<br>SP60-3 to 6B | <ul style="list-style-type: none"> <li>d200 (220) x 800</li> <li>Motor 6", up to 15 kW (MS 6000)</li> <li>5.4 kg</li> </ul>   | 96937322       |  | 96957545   |
| SP46-8 to -15<br>SP60-7 to -12                       |   | <ul style="list-style-type: none"> <li>d200 (220) x 1000</li> <li>Motor 6", up to 22 kW (MS 6000)</li> <li>6.4 kg</li> </ul>  | 96937323       | 97942247                                     | (1 set = 2 brackets)<br>2.2 kg<br>H150, b320, B370             |
| SP46-13 to -20<br>SP60-11 to -17                     | SP46-7 to -13<br>SP60-6 to -11  | <ul style="list-style-type: none"> <li>d200 (220) x 1250</li> <li>Motor 6", 18.5 - 30 kW (MS 6000)</li> <li>6.6 kg</li> </ul>                                       | 96937317       | d200 x 192<br>1.0 kg                         |  |
| SP46-16 to -24<br>SP60-13 to -21                     | SP46-14 to -17<br>SP60-12 to -14  | <ul style="list-style-type: none"> <li>d200 (220) x 1700</li> <li>Motor 6", 26-37 kW (MMS6)</li> <li>9.3 kg</li> </ul>  | 96937318       |  | 96957549   |
| SP46-21 to -24<br>SP60-18 to -22                     | SP60-12 to -17  | <ul style="list-style-type: none"> <li>d200 (220) x 1700</li> <li>Motor 6", 26-37 kW (Franklin 6")</li> <li>9.3 kg</li> </ul>                                       | 96937448       |  | (1 set = 3 brackets)<br>3.4 kg<br>H150, b320, B370             |
| SP46-21 to -24<br>SP60-18 to -22                     | SP46-14 to -17<br>SP60-12 to -14  | <ul style="list-style-type: none"> <li>d254 (270) x 1500</li> <li>Motor 8", 37-45 kW (MMS 8000)</li> <li>9.8 kg</li> </ul>  | 96937463       |  | 96957592<br>(1 set = 3 brackets)<br>6.0 kg<br>H200, b380, B430 |
| SP60-22  | SP46-18 to -19<br>SP60-15 to -18  | <ul style="list-style-type: none"> <li>d254 (270) x 1250</li> <li>Motor 8", 55 kW (Franklin 8")</li> <li>8.8 kg</li> </ul>  | 96937465       | 97942263                                     | 98095530<br>(1 set = 2 brackets)<br>6.0 kg<br>H200, b380, B430 |
| SP46-26 to -35<br>SP60-24 to -30                     | SP46-20 to -24<br>SP60-19 to -20  | <ul style="list-style-type: none"> <li>d254 (270) x 1500</li> <li>Motor 8", 45-55 kW (MMS 8000/Franklin 8")</li> <li>Pump in sleeve d154</li> <li>9.8 kg</li> </ul> | 96937472       | d256 x 325<br>1.9 kg                         | 96957561   |
| SP46-37  | SP60-21   | <ul style="list-style-type: none"> <li>d254 (270) x 1700</li> <li>Motor 8", 63-75 kW (MMS 8000/Franklin 8")</li> <li>Pump in sleeve d154</li> <li>9.8 kg</li> </ul> | 96937474       |  | (1 set = 3 brackets)<br>6.3 kg<br>H200, b380, B430             |



| Pump type  |   | Flow sleeve  | Strainer                                     | Supporting brackets  |
|--|---|--|--|--|
| 50 Hz  | 60 Hz   | Dimensions, d (D) x L<br>Motor type, P2<br>Weight  | Product number<br>Dimensions d x l<br>Weight | Product number<br>Description  |
| SP77-1 to -4<br>SP95-1 to -4B                                      | SP77-1<br>SP77-2BA<br>SP77-2-A<br>SP77-2<br>SP77-3-AA<br>SP77-3-A<br>SP95-1-A<br>SP95-1<br>SP95-2-AB<br>SP95-2-B<br>SP95-2<br>SP95-3-BB | <ul style="list-style-type: none"> <li>d210 (225) x 1000</li> <li>Motor 6", up to 18.5 kW (MS 6000)</li> <li>5.6 kg</li> </ul>             | 96937332                                     | 96957546<br><br>(1 set = 2 brackets)<br>2.5 kg<br>H160, b330, B380                             |
| SP77-5 to -9<br>SP95-4<br>SP95-5-AB<br>SP95-5 to -7                | SP77-3 to -6-B<br>SP95-3-B<br>SP95-3<br>SP95-4-AB<br>SP95-4<br>SP95-5-B   | <ul style="list-style-type: none"> <li>d210 (225) x 1250</li> <li>Motor 6", up to 30 kW (MS 6000)</li> <li>6.9 kg</li> </ul>               | 96937440                                     | 97942261<br><br>d210 x 192<br>1.1 kg   |
| SP77-7 to -11<br>SP95-8 to -9                                      | SP77-6<br>SP77-7<br>SP95-5<br>SP95-6  | <ul style="list-style-type: none"> <li>d210 (225) x 1700</li> <li>Motor 6", 26-37 kW (MMS6)</li> <li>10.6 kg</li> </ul>                    | 96937319                                     | 96957553<br><br>(1 set = 3 brackets)<br>6.0 kg<br>H160, b330, B370                             |
| SP77-10 to -12<br>SP95-8 to -10                                    | SP77-6 to -8<br>SP95-5 to -7  | <ul style="list-style-type: none"> <li>d210 (225) x 1700</li> <li>Motor 6", 37-45 kW (Franklin 6")</li> <li>9 kg</li> </ul>                | 96937449                                     |  |
| SP77-10 to -15<br>SP95-8 to -13                                    | SP77-6 to -10<br>SP95-5 to -8   | <ul style="list-style-type: none"> <li>d254 (270) x 1500</li> <li>Motor 8", 37-55 kW (MMS 8000/Franklin 8")</li> <li>12.4 kg</li> </ul>    | 96937475                                     |  |
| SP77-16 to -21<br>SP95-14 to -17                                   | SP77-11 to -13<br>SP95-9 to -11   | <ul style="list-style-type: none"> <li>d254 (270) x 1700</li> <li>Motor 8", 63-75 kW (MMS 8000/Franklin 8")</li> <li>11 kg</li> </ul>      | 96937476                                     | 97942263<br><br>d256 x 325<br>1.9 kg<br><br>(1 set = 3 brackets)<br>5.8 kg<br>H200, b380, B430 |
| SP77-22<br>SP95-18 to -20  | SP77-14<br>SP77-15<br>SP95-12<br>SP95-13  | <ul style="list-style-type: none"> <li>d254 (270) x 2000</li> <li>Motor 8", up to 92 kW (MMS 8000/Franklin 8")</li> <li>13.4 kg</li> </ul> | 96937477                                     |  |
| SP77-19 to -20<br>SP95-15 to -17                                   | SP95-11   | <ul style="list-style-type: none"> <li>d285 (300) x 1500</li> <li>Motor 10", up to 75 kW (MMS 10000)</li> <li>11.4 kg</li> </ul>           | 96937507                                     | 97942269<br><br>97695337<br><br>(1 set = 3 brackets)<br>10.1 kg<br>H225, b410, B460            |
| SP77-22<br>SP95-18 to -20  | SP95-12<br>SP95-13  | <ul style="list-style-type: none"> <li>d285 (300) x 2000</li> <li>Motor 10", 92 kW (MMS 10000)</li> <li>15.1 kg</li> </ul>                 | 96937508                                     | d285 x 385<br>2.7 kg   |
| SP125-1-A<br>SP125-1<br>SP125-2-AA<br>SP160-1-A<br>SP160-1         | SP125-1-A<br>SP125-1<br>SP160-1-A   | <ul style="list-style-type: none"> <li>d254 (270) x 1000</li> <li>Motor 6", up to 18.5 kW (MS 6000)</li> <li>6.7 kg</li> </ul>             | 96937441                                     | 96957548<br><br>(1 set = 2 brackets)<br>3.4 kg<br>H200, b380, B430                             |
| SP125-2-A<br>SP125-2<br>SP125-3/A/AA<br>SP160-2/A/AA<br>SP160-3-AA | SP125-2-AA<br>SP125-2-A<br>SP125-2<br>SP160-1<br>SP160-2-AA   | <ul style="list-style-type: none"> <li>d254 (270) x 1250</li> <li>Motor 6", up to 30 kW (MS 6000)</li> <li>8.3 kg</li> </ul>               | 96937443                                     | 97942263   |
| SP125-3/3A<br>SP125-4/A/AA<br>SP160-2<br>SP160-3/A/AA              | SP125-3-AA<br>SP125-3-A<br>SP160-2-A<br>SP160-2<br>SP160-3-AA   | <ul style="list-style-type: none"> <li>d254 (270) x 1700</li> <li>Motor 6", 26-37 kW (MMS6)</li> <li>11.4 kg</li> </ul>                    | 96937320                                     | d256 x 325<br>1.9 kg<br><br>96957560<br><br>(1 set = 3 brackets)<br>5.2 kg<br>H200, b380, B430 |
| SP125-4/A/AA<br>SP125-5-A/AA<br>SP160-3-A<br>SP160-4-A/AA          | SP125-3-AA<br>SP125-3-A<br>SP125-3<br>SP160-2-A/-2<br>SP160-3-AA  | <ul style="list-style-type: none"> <li>d254 (270) x 1700</li> <li>Motor 6", 37-45 kW (Franklin 6")</li> <li>11.4 kg</li> </ul>             | 96937450                                     |  |

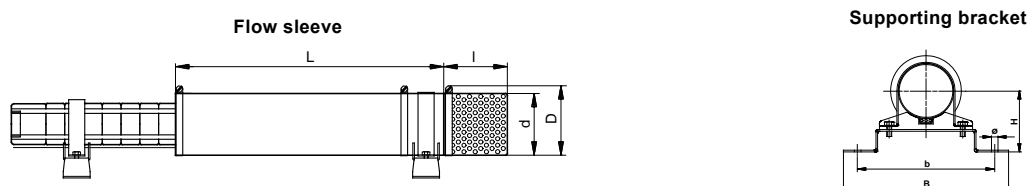


| Pump type  |   | Flow sleeve  | Strainer                                     | Supporting brackets   |
|--|---|--|--|---|
| 50 Hz  | 60 Hz   | Dimensions, d (D) x L<br>Motor type, P2<br>Weight  | Product number<br>Dimensions d x l<br>Weight | Product number<br>Description   |
| SP125-4/A/AA<br>SP125-5/A/AA<br>SP125-6-AA/6-A<br>SP160-3/3-A<br>SP160-4/A/AA<br>SP160-5-AA/5-A              | SP125-3-AA<br>SP125-3-A<br>SP125-3<br>SP125-4-AA<br>SP125-4-A<br>SP160-3-AA<br>SP160-3-A<br>SP160-3 | <ul style="list-style-type: none"> <li>d285 (300) x 1500</li> <li>Motor 8", 37-55 kW (MMS 8000/Franklin 8")</li> <li>11.4 kg</li> </ul>        | 96937478                                     |   |
| SP125-6<br>SP125-7/A/AA<br>SP125-8/A/AA<br>SP160-5<br>SP160-6/A/AA<br>SP160-7-AA                             | SP125-4<br>SP125-5-AA<br>SP125-5-A<br>SP125-5<br>SP125-6-AA<br>SP160-4-AA<br>SP160-4-A<br>SP160-4   | <ul style="list-style-type: none"> <li>d285 (300) x 1700</li> <li>Motor 8", 63-75 kW (MMS 8000/Franklin 8")</li> <li>12.8 kg</li> </ul>        | 96937479                                     | 97942269<br>d285 x 385<br>2.7 kg<br>96957595<br>(1 set = 3 brackets)<br>10.1 kg<br>H225, b410, B460 |
| SP125-9/A/AA<br>SP125-10/A/AA<br>SP125-11<br>SP160-7/A<br>SP160-8/A/AA<br>SP160-9/A/AA<br>SP160-10-AA        | SP125-6-A/-6<br>SP125-7-AA<br>SP125-7-A<br>SP125-7<br>SP160-5-AA<br>SP160-5-A<br>SP160-5 to -6      | <ul style="list-style-type: none"> <li>d285 (300) x 2250</li> <li>Motor 8", up to 92-110 kW (MMS 8000/Franklin 8")</li> <li>16.8 kg</li> </ul> | 96937487                                     |   |
| SP125-7/A/AA<br>SP125-8/A/AA<br>SP125-9/A/AA<br>SP125-10/A/AA<br>SP160-6/6-A<br>SP160-7/A/AA<br>SP160-8/A/AA |   | <ul style="list-style-type: none"> <li>d330 (350) x 1700</li> <li>Motor 10", 75-92 kW (MMS 10000)</li> <li>14.4 kg</li> </ul>                  | 96937510                                     | 97942268<br>d330 x 385<br>1.9 kg<br>96957597<br>(1 set = 3 brackets)<br>10.5 kg<br>H225, b410, B460 |
|  | SP125-8 to -10<br>SP160-7 to -8   | <ul style="list-style-type: none"> <li>d285 (300) x 2600</li> <li>Motor 8", up to 150 kW (Franklin 8")</li> <li>19.1 kg</li> </ul>             | 96937503                                     | 97942269<br>d285 x 385<br>2.7 kg<br>96957595<br>(1 set = 3 brackets)<br>10.1 kg<br>H225, b410, B460 |
| SP125-12 to -13<br>SP160-8 to 9/A/AA<br>SP160-10/A<br>SP160-11   | 96507609<br>(2502.0261.260)   | <ul style="list-style-type: none"> <li>d330 (350) x 2000</li> <li>Motor 10", up to 132 kW (MMS 10000)</li> <li>17.2 kg</li> </ul>              | 96937522                                     | 97942268<br>96957597<br>(1 set = 3 brackets)<br>10.5 kg<br>H225, b450, B460                         |
| SP125-14 to -17<br>SP160-12 to -14   | SP125-10 to -11<br>SP160-8 to -9  | <ul style="list-style-type: none"> <li>d330 (350) x 2500</li> <li>Motor 10", up to 147-170 kW (MMS 10000)</li> <li>21.2 kg</li> </ul>          | 96937524                                     | d330 x 385<br>1.9 kg  |
|  | SP125-11 to -13<br>SP160-9 to -10   | <ul style="list-style-type: none"> <li>d380 (400) x 2000</li> <li>Motor 12", up to 190 kW (MMS 12000)</li> <li>19.6 kg</li> </ul>              | 96937555                                     | 97942272<br>96957599<br>(1 set = 3 brackets)<br>12.1 kg<br>H270, b550, B600                         |
| SP160-15   |   | <ul style="list-style-type: none"> <li>d380 (400) x 2250</li> <li>Motor 12", 190 kW (MMS 12000)</li> <li>21.9 kg</li> </ul>                    | 96937529                                     | d380 x 385<br>4.1 kg  |

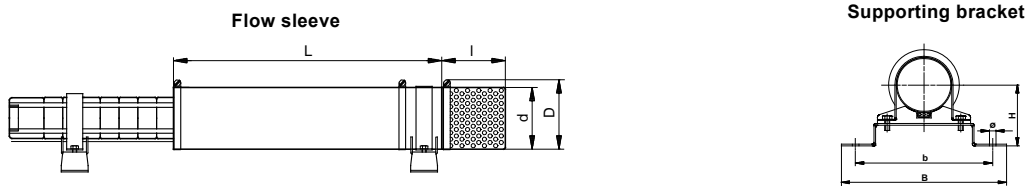


| Pump type   |  | Flow sleeve   | Strainer   | Supporting brackets   |
|---|--|---|--|---|
| 50 Hz   | 60 Hz  | Dimensions, d (D) x L<br>Motor type, P2<br>Weight   | Product number<br>Dimensions d x l<br>Weight         | Product number<br>Description                                   |
| SP215-1-A<br>SP215-1<br>SP215-2-AA  | SP215-1-A<br>SP215-1   | <ul style="list-style-type: none"> <li>d330 (350) x 1250</li> <li>Motor 6", up to 30 kW (MS 6000)</li> <li>10.6 kg</li> </ul>               |  | 96958364<br>(1 set = 2 brackets)<br>10.0 kg<br>H250, b500, B550 |
| SP215-2-AA<br>SP215-2A  | SP215-1  | <ul style="list-style-type: none"> <li>d330 (350) x 1800</li> <li>Motor 6", 30-37 kW (MMS6)</li> <li>16.5 kg</li> </ul>                     |  |   |
| SP215-2-A<br>SP215-2  | SP215-2-AA   | <ul style="list-style-type: none"> <li>d330 (350) x 1800</li> <li>Motor 6", 37-45 kW (Franklin 6")</li> <li>16.5 kg</li> </ul>              |  |   |
| SP215-2-A<br>SP215-2<br>SP215-3-AA<br>SP215-3-A<br>SP215-3<br>SP215-4-AA<br>SP215-4-A<br>SP215-4  | SP215-2<br>SP215-2A<br>SP215-2AA<br>SP215-3-AA                           | <ul style="list-style-type: none"> <li>d330 (350) x 1800</li> <li>Motor 8", up to 75 kW (MMS 8000/Franklin 8")</li> <li>14.6 kg</li> </ul>  |  |   |
| SP215-5-AA<br>SP215-5-A<br>SP215-5<br>SP215-6-AA<br>SP215-6-A   | SP215-3-A<br>SP215-3<br>SP215-4-AA<br>SP215-4-A<br>SP215-4               | <ul style="list-style-type: none"> <li>d330 (350) x 2250</li> <li>Motor 8", up to 110 kW (MMS 8000/Franklin 8")</li> <li>19.1 kg</li> </ul> | 97942268   |   |
| SP215-7-AA<br>SP215-7-A<br>SP215-7  | SP215-5-AA<br>SP215-5-A  | <ul style="list-style-type: none"> <li>d330 (350) x 2500</li> <li>Motor 8", 130 kW (Franklin 8")</li> <li>21.1 kg</li> </ul>                | d330 x 385<br>1.9 kg                                 | 96957555<br>(1 set = 3 brackets)<br>10.7 kg<br>H250, b500, B550 |
| SP215-8-AA<br>SP215-8-A<br>SP215-8  | SP215-5  | <ul style="list-style-type: none"> <li>d330 (350) x 2700</li> <li>Motor 8", 150 kW (Franklin 8")</li> <li>22.8 kg</li> </ul>                |  |   |
| SP215-4-AA<br>SP215-4-A<br>SP215-4<br>SP215-5-AA<br>SP215-5-A<br>SP215-5  |  | <ul style="list-style-type: none"> <li>d330 (350) x 1800</li> <li>Motor 10", up to 92 kW (MMS 10000)</li> <li>16.5 kg</li> </ul>            |  |   |
| SP215-6-AA<br>SP215-6-A<br>SP215-6<br>SP215-7-AA<br>SP215-7-A<br>SP215-7  | SP215-5-AA<br>SP215-5-A  | <ul style="list-style-type: none"> <li>d330 (350) x 2250</li> <li>Motor 10", up to 132 kW (MMS 10000)</li> <li>19.1 kg</li> </ul>           |  |   |
| SP215-8-AA<br>SP215-8-A<br>SP215-8<br>SP215-9-AA<br>SP215-9-A<br>SP215-9  | SP215-5<br>SP215-6-AA<br>SP215-6-A<br>SP215-6                            | <ul style="list-style-type: none"> <li>d330 (350) x 2500</li> <li>Motor 10", up to 170 kW (MMS 10000)</li> <li>21.2 kg</li> </ul>           |  |   |
| SP215-7-AA<br>SP215-7-A<br>SP215-7<br>SP215-8-AA<br>SP215-8-A<br>SP215-8<br>SP215-9-AA<br>SP215-9-A<br>SP215-9<br>SP215-10-AA<br>SP215-10-A<br>SP215-10 | SP215-6-AA<br>SP215-6-A<br>SP215-6<br>SP215-7-AA<br>SP215-7-A<br>SP215-7 | <ul style="list-style-type: none"> <li>d380 (400) x 2250</li> <li>Motor 12", up to 190 kW (MMS 12000)</li> <li>21.9 kg</li> </ul>           | 96937531<br><br>97942272<br><br>d380 x 385<br>4.0 kg | 96957600<br>(1 set = 3 brackets)<br>12 kg<br>H270, b550, B600   |
| SP215-11  |  | <ul style="list-style-type: none"> <li>d380 (400) x 2500</li> <li>Motor 12", 220 kW (MMS 12000)</li> <li>24.2 kg</li> </ul>                 |  |   |

## 6. Flow sleeve SP-G EN 1.4301/AISI 304



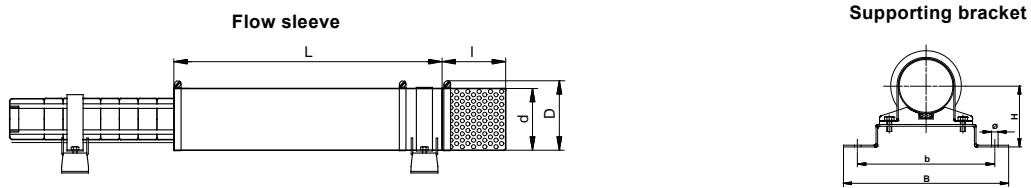
| Pump type                                  |                     | Flow sleeve   | Strainer                                     | Supporting brackets   |
|--|---------------------|---|--|---|
| 50 Hz                                      | 60 Hz               | Dimensions, d (D) x L<br>Motor type, P2<br>Weight   | Product number<br>Dimensions d x l<br>Weight | Product number<br>Description                                   |
| SP270-1L G                                 |                     | <ul style="list-style-type: none"> <li>d380 (400) x 1250</li> <li>Motor 8", 22 kW (MMS 8000)</li> <li>19.8 kg</li> </ul>    |  | 97513263<br>(1 set = 2 brackets)<br>9.0 kg<br>H270, b500, B550  |
| SP270-1F G to -1D G<br>SP300-1N G to -1L G |                     | <ul style="list-style-type: none"> <li>d380 (400) x 1400</li> <li>Motor 8", 26-30 kW (MMS 8000)</li> <li>27.1 kg</li> </ul> | 97535185                                     |   |
| SP270-1A G to -2L G<br>SP300-1D G to -1A G | SP270-1G G to -1A G | <ul style="list-style-type: none"> <li>d380 (400) x 1500</li> <li>Motor 8", 37-45 kW (MMS 8000)</li> <li>28.1 kg</li> </ul> | 97535197                                     |   |
| SP270-2D G to -2A G<br>SP300-2L G to -2F G | SP270-2N G          | <ul style="list-style-type: none"> <li>d380 (400) x 1800</li> <li>Motor 8", 55-63 kW (MMS 8000)</li> <li>30.8 kg</li> </ul> | 97535198                                     |   |
| SP270-V G<br>SP300-2D G to -3L G           | SP270-2G G          | <ul style="list-style-type: none"> <li>d380 (400) x 2000</li> <li>Motor 8", 75 kW (MMS 8000)</li> <li>32.5 kg</li> </ul>    | 97535200                                     | 97942272  |
| SP270-3A G<br>SP300-3F G                   | SP270-2A G          | <ul style="list-style-type: none"> <li>d380 (400) x 2250</li> <li>Motor 8", 92 kW (MMS 8000)</li> <li>34.9 kg</li> </ul>    | 97535212                                     | 97512818<br>(1 set = 3 brackets)<br>13.3 kg<br>H270, b500, B550 |
| SP270-4D G<br>SP300-3D G                   |                     | <ul style="list-style-type: none"> <li>d380 (400) x 2500</li> <li>Motor 8", 110 kW (MMS 8000)</li> <li>38.9 kg</li> </ul>   | 97535438                                     |   |
| SP270-4D G<br>SP300-3D G                   | SP270-3L G          | <ul style="list-style-type: none"> <li>d380 (400) x 2000</li> <li>Motor 10", 110 kW (MMS 10000)</li> <li>34.5 kg</li> </ul> | 97535442                                     |   |
| SP270-4A G to -6W G<br>SP300-3A G to -4F G | SP270-3F G to -3D G | <ul style="list-style-type: none"> <li>d380 (400) x 2250</li> <li>Motor 10", 132 kW (MMS 10000)</li> <li>36.7 kg</li> </ul> | 97535444                                     |   |
| SP270-6F G<br>SP300-4D G to -5G G          | SP270-3A G to -4F G | <ul style="list-style-type: none"> <li>d380 (400) x 2500</li> <li>Motor 10", 147 kW (MMS 10000)</li> <li>39.1 kg</li> </ul> | 97535445                                     |   |



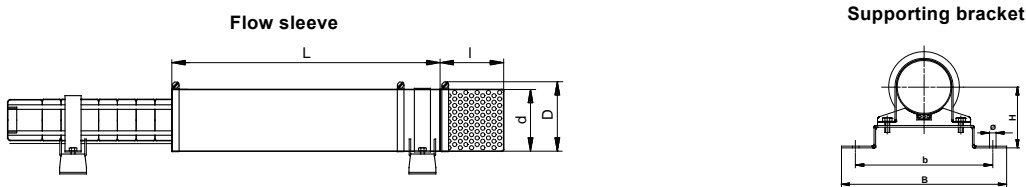
| Pump type                                  |       | Flow sleeve   | Strainer   | Supporting brackets   |
|--|-------|---|--|---|
| 50 Hz                                      | 60 Hz | Dimensions, d (D) x L<br>Motor type, P2<br>Weight   | Product number<br>Product number<br>Dimensions d x l<br>Weight | Product number<br>Description   |
| SP270-6D G to -6A G<br>SP300-5F G to -6F G |       | <ul style="list-style-type: none"> <li>d420 (450) x 2250</li> <li>Motor 12", 170-190 kW (MMS 12000)</li> <li>34.7 kg</li> </ul> | 97714558   |   |
| SP270-7A G to -8A G<br>SP300-6D G to -7D G |       | <ul style="list-style-type: none"> <li>d420 (450) x 2500</li> <li>Motor 12", 220-250 kW (MMS 12000)</li> <li>37.4 kg</li> </ul> | 97549359   |   |
| SP360-1L G to -1F G                        |       | <ul style="list-style-type: none"> <li>d420 (450) x 1500</li> <li>Motor 8", 37-45 kW (MMS 8000)</li> <li>32.5 kg</li> </ul>     | 97714571   |   |
| SP360-1A G to -2N G                        |       | <ul style="list-style-type: none"> <li>d420 (450) x 1750</li> <li>Motor 8", 55-63 kW (MMS 8000)</li> <li>36.5 kg</li> </ul>     | 97714573   |   |
| SP360-2L G                                 |       | <ul style="list-style-type: none"> <li>d420 (450) x 2000</li> <li>Motor 8", 75 kW (MMS 8000)</li> <li>37.7 kg</li> </ul>        | 97535440   | 97942443<br>97512833  |
| SP360-2F G                                 |       | <ul style="list-style-type: none"> <li>d420 (450) x 2250</li> <li>Motor 8", 92 kW (MMS 8000)</li> <li>38.9 kg</li> </ul>        | 97535441   | d420 x 385<br>4.5 kg<br>(1 set = 3 brackets)<br>12.5 kg<br>H300, b575, B625 |
| SP360-2A G to -3L G                        |       | <ul style="list-style-type: none"> <li>d420 (450) x 2500</li> <li>Motor 8", 110 kW (MMS 8000)</li> <li>41.5 kg</li> </ul>       | 97549345   |   |
| SP360-2A G to -3L G                        |       | <ul style="list-style-type: none"> <li>d420 (450) x 2000</li> <li>Motor 10", 110 kW (MMS 10000)</li> <li>36.2 kg</li> </ul>     | 97535446   |   |
| SP360-3G G to -3F G                        |       | <ul style="list-style-type: none"> <li>d420 (450) x 2250</li> <li>Motor 10", 132 kW (MMS 10000)</li> <li>38.7 kg</li> </ul>     | 97549349   |   |
| SP360-3D G                                 |       | <ul style="list-style-type: none"> <li>d420 (450) x 2500</li> <li>Motor 10", 147 kW (MMS 10000)</li> <li>41.3 kg</li> </ul>     | 97549355   |   |
| SP360-3A G to -5G G                        |       | <ul style="list-style-type: none"> <li>d420 (480) x 2250</li> <li>Motor 12", 170-190 kW (MMS 12000)</li> <li>40.8 kg</li> </ul> | 97535447   | 97942462<br>97513065  |
| SP360-5F G to -6F G                        |       | <ul style="list-style-type: none"> <li>d420 (480) x 2500</li> <li>Motor 12", 220-250 kW (MMS 12000)</li> <li>42.8 kg</li> </ul> | 97535448   | d420 x 385<br>5.3 kg<br>(1 set = 3 brackets)<br>14.3 kg<br>H315, b500, B550 |



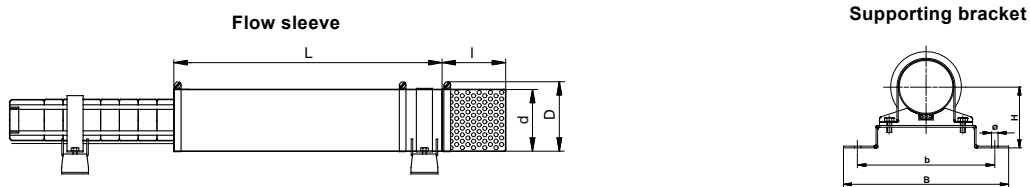
## 7. Flow sleeve, R-version, EN 1.4539/AISI 904L



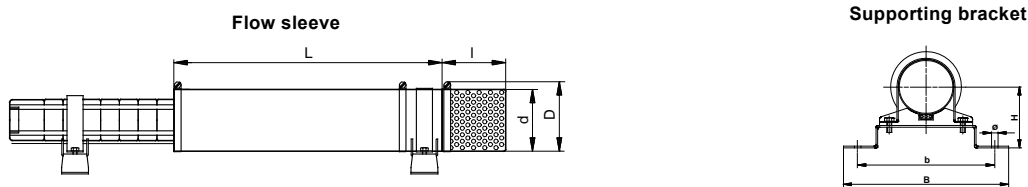
| Pump type  |   | Flow sleeve   | Strainer                    | Supporting brackets  |
|--|---|---|-----------------------------|--|
| 50 Hz  | 60 Hz   | Description:<br>Dimensions, d (D) x L<br>Motor type, P2<br>Weight   | Product number:<br>Grundfos | Product number:<br>Grundfos<br>Description   |
| SP5A-4 to -8   | SP5A-3 to -7  | <ul style="list-style-type: none"> <li>d115 (130) x 400</li> <li>Motor 4", up to 0.75 kW (MS 4000)</li> <li>1.5 kg</li> </ul>                               | 96898594                    |  |
| SP3A -6 to -33<br>SP5A -4 to -33<br>SP5A-12 to -17<br>SP7 - 1 to -12<br>SP9- 1to - 11<br>SP11-1 to -11<br>SP14-1 to -6 | SP3A-5 to 24<br>SP5A-3 to 26<br>SP5A-9 to -11<br>SP 7 - 1 to -8<br>SP9 -4 to -7<br>SP11-3 to -7<br>SP14-1 to -4 | <ul style="list-style-type: none"> <li>d115 (130) x 550</li> <li>Motor 4", up to 2.2 kW (MS 4000)</li> <li>1.7 kg</li> </ul>                                | 96937598                    | 96958367<br>(1 set = 2 brackets)<br>0.7 kgH100, b185, B220<br>for pumps up to<br>50 kg / 4" up to 5.5 kW |
| SP3A-6 to 33<br>SP5A-4 to -60<br>SP7 - 13 to 42<br>SP9-8 to -32<br>SP11-11 to -27<br>SP14-7 to -23                     | SP5A-15 to -39<br>SP7 - 8 to 28<br>SP9-7 to -19<br>SP11 -3 to -18<br>SP14-5 to -15                              | <ul style="list-style-type: none"> <li>d115 (130) x 800</li> <li>Motor 4", up to 5.5 kW (MS 4000)</li> <li>2.5 kg</li> </ul>                                | 96937633                    | d115 x 117<br>0.4 kg<br><br>96958371   |
| SP7 - 42 to 59<br>SP9-32 to -40<br>SP11-28 to -37<br>SP14-24 to -31  | SP7 - 29 to 38<br>SP9-19 to -25<br>SP11-19 to -24<br>SP14-16 to -20   | <ul style="list-style-type: none"> <li>d115 (130) x 1000</li> <li>Motor 4", 7.5 kW (MS 4000)</li> <li>3.1 kg</li> </ul>                                     | 96898643                    | (1 set = 2 brackets)<br>0.9 kg<br>H100, b235, B275   |
| SP5A-52 to -60<br>SP7 -32 to -59<br>SP9-23 to -40<br>SP11-21 to -37<br>SP14-18 to -31                                  | SP5A-39<br>SP7 - 21 to -38<br>SP9-17 to -25<br>SP11-19 to -24<br>SP14-12 to -20                                 | <ul style="list-style-type: none"> <li>d160 (180) x 800</li> <li>Motor 6", up to 7.5 kW (MS 6000)</li> <li>4.9 kg</li> </ul>                                | 96937224                    | 98557134<br>(1 set = 2 brackets)<br>1.4 kg<br>H115, b185, B220   |
| SP9 -41 to -55   | SP9 -26 to -38  | <ul style="list-style-type: none"> <li>d160 (180) x 1000</li> <li>Motor 6", up to 11 kW (MS 6000)</li> <li>4.0 kg</li> </ul>                                | 98779731                    | 97941790<br>d160 x 158<br>0.8 kg   |
| SP2A-75 to -90   | SP2A-58<br>SP3A-56  | <ul style="list-style-type: none"> <li>d160 (180) x 1000</li> <li>Motor 4", up to 7.5 kW (MS 4000)</li> <li>Pump in sleeve d108</li> <li>4.3 kg</li> </ul>  | 96898645                    | 96958373<br>(1 set = 2 brackets)<br>1.4 kg<br>H125, b185, B220   |
| SP5A-75 to -85<br>SP7 - 60 to 100<br>SP9 -56 to -93  | SP3A-56 to -75<br>SP5A-52<br>SP7 - 41 to 67<br>SP9-39 to -63  | <ul style="list-style-type: none"> <li>d180 (200) x 1000</li> <li>Motor 6", up to 18.5 kW (MS 6000)</li> <li>Pump in sleeve d108</li> <li>4.9 kg</li> </ul> | 96937690                    | 97941786<br>d180 x 192<br>0.8 kg<br>96958375<br>(1 set = 2 brackets)<br>2.0 kg<br>H140, b300, B350       |
| SP17-1 to 4<br>SP30-1 to 2   |   | <ul style="list-style-type: none"> <li>d145 (160) x 625</li> <li>Motor 4", up to 2.2 kW (MS 4000)</li> <li>3.7 kg</li> </ul>                                | 96898600                    |  |
| SP17-2<br>SP17-3 (3~)<br>SP30-1 to -2  | SP17-1 to -2<br>SP30-1  | <ul style="list-style-type: none"> <li>d145 (160) x 550</li> <li>Motor 4", up to 2.2 kW (MS 4000)</li> <li>2.2 kg</li> </ul>                                | 96898601                    | 97941782<br>d145 x 158<br>0.6 kg<br>96958368<br>(1 set = 2 brackets)<br>0.8 kg                           |
| SP17-3 (1~)<br>SP17-4 to -7<br>SP30-3 to -4  | SP17-3 to -6<br>SP30-2 to -3  | <ul style="list-style-type: none"> <li>d145 (160) x 800</li> <li>Motor 4", up to 4 kW (MS 4000)</li> <li>3.1 kg</li> </ul>                                  | 96898638                    | for pumps up to<br>50 kg / 4" up to 7.5 kW<br>H115, b185, B220   |
| SP17-8 to -13<br>SP30-5 to -8  | SP17-7 to -9<br>SP30-4 to -5  | <ul style="list-style-type: none"> <li>d145 (160) x 1000</li> <li>Motor 4", 5.5 - 7.5 kW (MS 4000)</li> <li>3.8 kg</li> </ul>                               | 96898640                    |  |



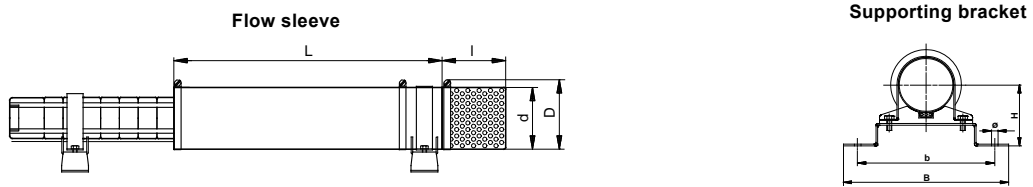
| Pump type  |  | Flow sleeve   | Strainer  | Supporting brackets  |
|--|--|---|---|--|
| 50 Hz  | 60 Hz  | Description:<br>Dimensions, d (D) x L<br>Motor type, P2<br>Weight   | Product number:<br>Grundfos<br>Dimensions d x l<br>Weight | Product number:<br>Grundfos<br>Description   |
| SP17-8 to -24<br>SP30-5 to -15                             | SP17-5 to -15<br>SP30-4 to -10                                   | <ul style="list-style-type: none"> <li>d180 (200) x 800</li> <li>Motor 6", 6 to 13 kW (MS 6000)</li> <li>5.6 kg</li> </ul>  | 96937689  |  |
| SP17-25 to -40<br>SP30-16 to -26                           | SP17-16 to -26<br>SP30-11 to -17                                 | <ul style="list-style-type: none"> <li>d180 (200) x 1000</li> <li>Motor 6", up to 22 kW (MS 6000)</li> <li>5.4 kg</li> </ul>  | 96937691  | 96958375<br>(1 set = 2 brackets)<br>2.0 kg<br>H140, b300, B350   |
| SP30-27 to -35   | SP17-27 to -30<br>SP30-18 to -23                                 | <ul style="list-style-type: none"> <li>d180 (200) x 1250</li> <li>Motor 6", 26 to 30 kW (MS 6000)</li> <li>4.9 kg</li> </ul>  | 96937723  | d180 x 192<br>0.9 kg   |
| SP30-27 to -35   | SP30-24 to -28   | <ul style="list-style-type: none"> <li>d180 (200) x 1700</li> <li>Motor 6", up to 26-30 kW (MMS6)</li> <li>8.5 kg</li> </ul>  | 96898633  | 96958376<br>(1 set = 3 brackets)<br>2.3 kg<br>H140, b310, B350   |
| SP17-43 to -53   | SP17-33 to -36   | <ul style="list-style-type: none"> <li>d200 (220) x 1250</li> <li>Motor 6", 26-30 kW (MS 6000)</li> <li>Pump in sleeve d154</li> <li>6.0 kg</li> </ul>              | 96937722  | 96960265<br>(1 set = 2 brackets)<br>2.3 kg<br>H150, b320, B370   |
| SP17-43 to -60<br>SP30-39 to -43                           | SP17-39 to -42   | <ul style="list-style-type: none"> <li>d200 (220) x 1700</li> <li>Motor 6", 26-37 kW (MMS6)</li> <li>Pump in sleeve d154</li> <li>9.3 kg</li> </ul>                 | 96898634  | 97941767<br>d200 x 192<br>1.0 kg<br>97757234   |
| SP17-55 to -60<br>SP30-39 to -49                           | SP17-45 to -50   | <ul style="list-style-type: none"> <li>d200 (220) x 1700</li> <li>Motor 6", 37-45 kW (Franklin 6")</li> <li>Pump in sleeve d154</li> <li>10.8 kg</li> </ul>         | 96898650  | (1 set = 3 brackets)<br>3.3 kg<br>H150, b340, B370   |
| SP30-46 to -54   | SP17-42 to -50<br>SP30-29 to -39                                 | <ul style="list-style-type: none"> <li>d254 (270) x 1500</li> <li>Motor 8", 45-55 kW (MMS 8000/Franklin 8")</li> <li>Pump in sleeve d154</li> <li>9.8 kg</li> </ul> | 96900228  | 96958411<br>(1 set = 3 brackets)<br>4.7 kg<br>H200, b380, B430   |
| SP46-1-B<br>SP46-1<br>SP46-2-BB<br>SP60-1-A<br>SP60-1      | SP46-1-B<br>SP46-1-B<br>SP46-1-A<br>SP60-1-B                     | <ul style="list-style-type: none"> <li>d180 (200) x 625</li> <li>Motor 4", up to 2.2 kW (MS 4000)</li> <li>2.9 kg</li> </ul>  | 96898632  |  |
| SP46-2<br>SP46-3-C<br>SP60-2-B<br>SP60-2                   | SP46-1<br>SP46-2-AB<br>SP60-1-A<br>SP60-1<br>SP60-2-BB           | <ul style="list-style-type: none"> <li>d180 (200) x 800</li> <li>Motor 4" 3.0 - 4.0 kW (MS 4000)</li> <li>6.9 kg</li> </ul>   | 96898641  | 96958370<br>(1 set = 2 brackets)<br>1.2 kg<br>H140, b225, B260<br>for pumps up to<br>50 kg / 4" up to 7.5 kW |
| SP46-3<br>SP46-4-C<br>SP46-4<br>SP46-5<br>SP60-3<br>SP60-4 | SP46-2<br>SP46-3-BB<br>SP46-3<br>SP46-4-BC<br>SP60-2<br>SP60-3-A | <ul style="list-style-type: none"> <li>d180 (200) x 1000</li> <li>Motor 4", 5.5 - 7.5 kW (MS 4000)</li> <li>4.9 kg</li> </ul>                                       | 96898642  |  |



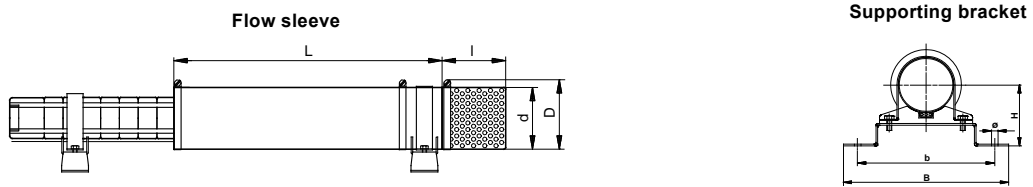
| Pump type  |   | Flow sleeve  | Strainer  | Supporting brackets  |
|--|---|--|---|--|
| 50 Hz  | 60 Hz   | Description:<br>Dimensions, d (D) x L<br>Motor type, P2<br>Weight  | Product number:<br>Grundfos<br>Dimensions d x l<br>Weight | Product number:<br>Grundfos<br>Description                         |
| SP46-3<br>SP46-4-C<br>SP46-4 to -12<br>SP60-3 to -10 | SP46-3<br>SP46-4-BC<br>SP46-4 to -8<br>SP60-3-A<br>SP60-3 to -7   | <ul style="list-style-type: none"> <li>d200 (220) x 1000</li> <li>Motor 6", up to 22 kW (MS 6000)</li> <li>5.4 kg</li> </ul>   | 96937744  | 96958381<br><br>(1 set = 2 brackets)<br>2.2 kg<br>H150, b320, B370 |
| SP46-13 to -20<br>SP60-11 to -17                     | SP46-9 to -13<br>SP60-8 to -11  | <ul style="list-style-type: none"> <li>d200 (220) x 1250</li> <li>Motor 6", 22-30 kW (MS 6000)</li> <li>6.6 kg</li> </ul>  | 96898635  | 97941767   |
| SP46-16 to -24<br>SP60-13 to -21                     | SP46-14 to -17<br>SP60-12 to -14  | <ul style="list-style-type: none"> <li>d200 (220) x 1700</li> <li>Motor 6", 26-37 kW (MMS6)</li> <li>9.3 kg</li> </ul>   | 96898636  | d200 x 192<br>1.0 kg   |
| SP46-21 to -24<br>SP60-18 to -22                     | SP60-12 to -17  | <ul style="list-style-type: none"> <li>d200 (220) x 1700</li> <li>Motor 6", 26-37 kW (Franklin 6")</li> <li>9.3 kg</li> </ul>  | 96898651  | 96958389<br><br>(1 set = 3 brackets)<br>3.4 kg<br>H150, b380, B370 |
| SP46-21 to -24<br>SP60-18 to -22                     | SP46-14 to -17<br>SP60-12 to -14  | <ul style="list-style-type: none"> <li>d254 (270) x 1500</li> <li>Motor 8", 37-45 kW (MMS 8000)</li> <li>9.8 kg</li> </ul>   | 96900357  | 96958412<br><br>(1 set = 3 brackets)<br>6.0 kg<br>H200, b320, B430 |
| SP60-22  | SP46-18 to -19<br>SP60-15 to -18  | <ul style="list-style-type: none"> <li>d256 (270) x 1250</li> <li>Motor 8", 45 kW (Franklin 8")</li> <li>10.9 kg</li> </ul>  | 96900358  | 98095556<br><br>(1 set = 2 brackets)<br>4.5 kg<br>H200, b380, B430 |
| SP46-26 to -35<br>SP60-24 to -30                     | SP46-20 to -24<br>SP60-19 to -20  | <ul style="list-style-type: none"> <li>d254 (270) x 1500</li> <li>Motor 8", 45-55 kW (MMS 8000/Franklin 8")</li> <li>Pump in sleeve d154</li> <li>9.8 kg</li> </ul>  | 96900360  | d256 x 325<br>1.9 kg   |
| SP46-37  | SP60-21   | <ul style="list-style-type: none"> <li>d254 (270) x 1700</li> <li>Motor 8", 63-75 kW (MMS 8000/Franklin 8")</li> <li>Pump in sleeve d154</li> <li>12.4 kg</li> </ul> | 96900361  | 96958411<br><br>(1 set = 3 brackets)<br>6.3 kg<br>H200, b380, B430 |
| SP77-1 to -4<br>SP95-1 to -4B                        | SP77-1<br>SP77-2BA<br>SP77-2-A<br>SP77-2<br>SP77-3-AA<br>SP77-3-A<br>SP95-1-A<br>SP95-1<br>SP95-2-AB<br>SP95-2-B<br>SP95-2<br>SP95-3-BB | <ul style="list-style-type: none"> <li>d210 (225) x 900 (1000)</li> <li>Motor 6", up to 15 kW (MS 6000)</li> <li>5.6 kg</li> </ul>                                   | 96937749  | 96958385<br><br>(1 set = 2 brackets)<br>2.5 kg<br>H160, b330, B380 |
| SP77-5 to -9<br>SP95-4<br>SP95-5-AB<br>SP95-5 to -7  | SP77-3 to -6-B<br>SP95-3-B<br>SP95-3<br>SP95-4-AB<br>SP95-4<br>SP95-5-B   | <ul style="list-style-type: none"> <li>d210 (225) x 1250</li> <li>Motor 6", up to 30 kW (MS 6000)</li> <li>6.9 kg</li> </ul>   | 96937750  | 97941757   |
| SP77-7 to -11<br>SP95-8 to -9                        | SP77-6<br>SP77-7<br>SP95-5<br>SP95-6  | <ul style="list-style-type: none"> <li>d210 (225) x 1700</li> <li>Motor 6", 26-37 kW (MMS6)</li> <li>10.6 kg</li> </ul>  | 96898646  | 96958405   |
| SP77-10 to -12<br>SP95-8 to -10                      | SP77-6 to -8<br>SP95-5 to -7  | <ul style="list-style-type: none"> <li>d210 (225) x 1700</li> <li>Motor 6", 37 kW (Franklin 6" Rw = Rewindable)</li> <li>9 kg</li> </ul>                             | 96898712  | (1 set = 3 brackets)<br>6.0 kg<br>H160, b330, B380                 |



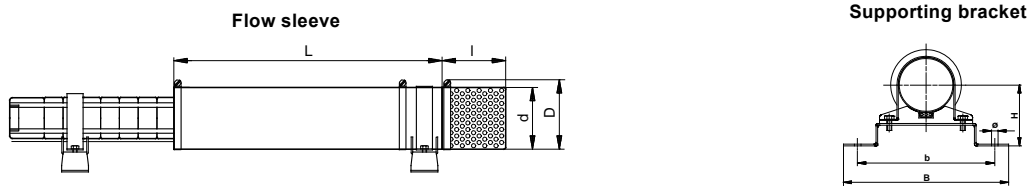
| Pump type  |   | Flow sleeve  | Strainer  | Supporting brackets   |
|--|---|--|---|---|
| 50 Hz  | 60 Hz   | Description:<br>Dimensions, d (D) x L<br>Motor type, P2<br>Weight  | Product number:<br>Grundfos<br>Dimensions d x l<br>Weight | Product number:<br>Grundfos<br>Description  |
| SP77-10 to -15<br>SP95-8 to -13  | SP77-6 to -10<br>SP95-5 to -8   | <ul style="list-style-type: none"> <li>d254 (270) x 1500</li> <li>Motor 8", 37-55 kW (MMS 8000/Franklin 8")</li> <li>9.8 kg</li> </ul>                       | 96900372  |   |
| SP77-16 to -21<br>SP95-14 to -17   | SP77-11 to -13<br>SP95-9 to -11   | <ul style="list-style-type: none"> <li>d254 (270) x 1700</li> <li>Motor 8", 63-75 kW (MMS 8000/Franklin 8")</li> <li>11 kg</li> </ul>                        | 96900373  | 97941815<br>d256 x 325<br>1.9 kg<br>96958414<br>(1 set = 3 brackets)<br>6.0 kg<br>H200, b380, B430  |
| SP77-22<br>SP95-18 to -20  | SP77-14<br>SP77-15<br>SP95-12<br>SP95-13  | <ul style="list-style-type: none"> <li>d254 (270) x 2000</li> <li>Motor 8", up to 92 kW (MMS 8000/Franklin 8")</li> <li>13.4 kg</li> </ul>                   | 96900374  |   |
| SP77-19 to -20<br>SP95-15 to -17   | SP95-11   | <ul style="list-style-type: none"> <li>d285 (300) x 1500</li> <li>Motor 10", up to 75 kW (MMS 10000)</li> <li>11.4 kg</li> </ul>                             | 96900398  | 97941547<br>97695339  |
| SP77-22<br>SP95-18 to -20  | SP95-12<br>SP95-13  | <ul style="list-style-type: none"> <li>d285 (300) x 2000</li> <li>Motor 10", 92 kW (MMS 10000)</li> <li>15.1 kg</li> </ul>                                   | 96900400  | d285 x 385<br>2.7 kg<br>(1 set = 3 brackets)<br>10.1 kg<br>H225, b410, B460                         |
| SP125-1-A R<br>SP160-1-A R   | SP125-1-A R<br>SP160-1-A R  | <ul style="list-style-type: none"> <li>d254 (270) x 1000</li> <li>Motor 6", up to 13 kW (MS 6000)</li> <li>6.7 kg</li> </ul>                                 | 96937751  | 96958386  |
| SP125-2-A<br>SP125-2<br>SP125-3/A/AA<br>SP160-2/A/AA<br>SP160-3-AA   | SP125-2-AA<br>SP125-2-A<br>SP125-2<br>SP160-1<br>SP160-2-AA   | <ul style="list-style-type: none"> <li>d254 (270) x 1250</li> <li>Motor 6", up to 30 kW (MS 6000)</li> <li>8.3 kg</li> </ul>                                 | 96937754  | (1 set = 2 brackets)<br>3.4 kg<br>H200, b380, B430  |
| SP125-3/3A<br>SP125-4/A/AA<br>SP160-2<br>SP160-3/A/AA  | SP125-3-AA<br>SP125-3-A<br>SP160-2-A<br>SP160-2<br>SP160-3-AA                                       | <ul style="list-style-type: none"> <li>d254 (270) x 1700</li> <li>Motor 6", 26-37 kW (MMS6)</li> <li>11.4 kg</li> </ul>                                      | 96898647  | 97941815<br>d256 x 325<br>1.9 kg<br>96958410  |
| SP125-4/A/AA<br>SP160-3-A  | SP125-3-AA<br>SP125-3-A<br>SP160-2-A/ -2  | <ul style="list-style-type: none"> <li>d254 (270) x 1700</li> <li>Motor 6", 37 kW (Franklin 6" Rw*)</li> <li>11.4 kg</li> <li>(* Rw = Rewindable)</li> </ul> | 96900223  | (1 set = 3 brackets)<br>5.2 kg<br>H200, b380, B430  |
| SP125-4/A/AA<br>SP125-5/A/AA<br>SP125-6-AA/6-A<br>SP160-3/3-A<br>SP160-4/A/AA<br>SP160-5-AA/5-A              | SP125-3-AA<br>SP125-3-A<br>SP125-3<br>SP125-4-AA<br>SP125-4-A<br>SP160-3-AA<br>SP160-3-A<br>SP160-3 | <ul style="list-style-type: none"> <li>d285 (300) x 1500</li> <li>Motor 8", 37-55 kW (MMS 8000/Franklin 8")</li> <li>11.4 kg</li> </ul>                      | 96937759  |   |
| SP125-6<br>SP125-7/A/AA<br>SP125-8/A/AA<br>SP160-5<br>SP160-6/A/AA<br>SP160-7-AA                             | SP125-4 to 125-6AA<br>SP160-4-AA<br>SP160-4-A<br>SP160-4  | <ul style="list-style-type: none"> <li>d285 (300) x 1700</li> <li>Motor 8", 63-75 kW (MMS 8000/Franklin 8")</li> <li>12.8 kg</li> </ul>                      | 96900376  | 97941547<br>d285 x 385<br>2.7 kg<br>96958416<br>(1 set = 3 brackets)<br>10.1 kg<br>H225, b410, B460 |
| SP125-9/A/AA<br>SP125-10/A/AA<br>SP125-11<br>SP160-7/A<br>SP160-8/A/AA<br>SP160-9/A/AA<br>SP160-10-AA        | SP125-6-A/-6<br>SP125-7-AA<br>SP125-7-A<br>SP125-7<br>SP160-5-AA<br>SP160-5-A<br>SP160-5 to -6      | <ul style="list-style-type: none"> <li>d285 (300) x 2250</li> <li>Motor 8", up to 92-110 kW (MMS 8000/Franklin 8")</li> <li>16.8 kg</li> </ul>               | 96900379  |   |
| SP125-7/A/AA<br>SP125-8/A/AA<br>SP125-9/A/AA<br>SP125-10/A/AA<br>SP160-6/6-A<br>SP160-7/A/AA<br>SP160-8/A/AA |   | <ul style="list-style-type: none"> <li>d330 (350) x 1700</li> <li>Motor 10", 75-92 kW (MMS 10000)</li> <li>14.4 kg</li> </ul>                                | 96900401  | 97941751<br>d330 x 385<br>1.9 kg<br>96958418<br>(1 set = 3 brackets)<br>10.5 kg<br>H225, b450, B500 |



| Pump type |   | Flow sleeve   |                             | Strainer  | Supporting brackets   |
|-----------|---|---|-----------------------------|---|---|
| 50 Hz     | 60 Hz   | Description:<br>Dimensions, d (D) x L<br>Motor type, P2<br>Weight   | Product number:<br>Grundfos | Product number:<br>Grundfos<br>Dimensions d x l<br>Weight | Product number:<br>Grundfos<br>Description                      |
|           | SP125-8 to -10<br>SP160-7 to -8                           | <ul style="list-style-type: none"> <li>d285 (300) x 2600</li> <li>Motor 8", up to 150 kW (Franklin 8")</li> <li>19.1 kg</li> </ul>    | 96900394                    | 97941547<br>d285 x 385<br>1.9 kg                          | 96958416<br>(1 set = 3 brackets)<br>10.1 kg<br>H225, b410, B460 |
|           | SP125-12 to -13<br>SP160-9/A/AA<br>SP160-10/A<br>SP160-11 | <ul style="list-style-type: none"> <li>d330 (350) x 2000</li> <li>Motor 10", up to 132 kW (MMS 10000)</li> <li>17.2 kg</li> </ul>     | 96900432                    | 97941751<br>d330 x 385<br>1.9 kg                          | 96958418<br>(1 set = 3 brackets)<br>10.5 kg<br>H225, b450, B500 |
|           | SP125-14 to -17<br>SP160-12 to -14                        | <ul style="list-style-type: none"> <li>d330 (350) x 2500</li> <li>Motor 10", up to 147-170 kW (MMS 10000)</li> <li>21.2 kg</li> </ul> | 96900434                    |   |   |
|           | SP125-11 to -13<br>SP160-9 to -10                         | <ul style="list-style-type: none"> <li>d380 (400) x 2000</li> <li>Motor 12", up to 190 kW (MMS 12000)</li> <li>19.6 kg</li> </ul>     | 96900455                    | 97941817  | 96958419<br>(1 set = 3 brackets)<br>12.1 kg<br>H270, b550, B600 |
|           | SP160-15  | <ul style="list-style-type: none"> <li>d380 (400) x 2250</li> <li>Motor 12", 190 kW (MMS 12000)</li> <li>21.9 kg</li> </ul>           | 96900439                    | d380 x 385<br>4.1 kg                                      |   |



| Pump type  |  | Flow sleeve   | Strainer  | Supporting brackets                                 |
|--|--|---|---|---|
| 50 Hz  | 60 Hz  | Description:<br>Dimensions, d (D) x L<br>Motor type, P2<br>Weight   | Product number:<br>Grundfos<br>Dimensions d x l<br>Weight | Product number:<br>Grundfos<br>Description          |
| SP215-1- A R   |  | <ul style="list-style-type: none"> <li>d330 (350) x 1000</li> <li>Motor 6", up to 15 kW (MS 6000)</li> <li>12 kg</li> </ul>                 | 96937756  | 97695341  |
| SP215-1-A<br>SP215-1<br>SP215-2-AA   | SP215-1-A<br>SP215-1                                       | <ul style="list-style-type: none"> <li>d330 (350) x 1250</li> <li>Motor 6", up to 30 kW (MS 6000)</li> <li>15 kg</li> </ul>                 | 96937757  | (1 set = 2 brackets)<br>10.0 kg<br>H250, b500, B550 |
| SP215-2-AA<br>SP215-2A   | SP215-1  | <ul style="list-style-type: none"> <li>d330 (350) x 1800</li> <li>Motor 6", 30-37 kW (MMS6)</li> <li>16.5 kg</li> </ul>                     | 96898649  |   |
| SP215-2-A<br>SP215-2   | SP215-2-AA   | <ul style="list-style-type: none"> <li>d330 (350) x 1800</li> <li>Motor 6", 37-45 kW (Franklin 6")</li> <li>16.5 kg</li> </ul>              | 96900226  |   |
| SP215-2-A R  |  | <ul style="list-style-type: none"> <li>d330 (350) x 1500</li> <li>Motor 8", up to 35 kW (MMS 8000/Franklin 8")</li> <li>14.1 kg</li> </ul>  | 96937758  |   |
| SP215-2-A<br>SP215-2<br>SP215-3-AA<br>SP215-3-A<br>SP215-3<br>SP215-4-AA<br>SP215-4-A<br>SP215-4 | SP215-2<br>SP215-3-AA                                      | <ul style="list-style-type: none"> <li>d330 (350) x 1800</li> <li>Motor 8", up to 75 kW (MMS 8000/Franklin 8")</li> <li>14.6 kg</li> </ul>  | 96900377  |   |
| SP215-5-AA<br>SP215-5-A<br>SP215-5<br>SP215-6-AA<br>SP215-6-A                                    | SP215-3-A<br>SP215-3<br>SP215-4-AA<br>SP215-4-A<br>SP215-4 | <ul style="list-style-type: none"> <li>d330 (350) x 2250</li> <li>Motor 8", up to 110 kW (MMS 8000/Franklin 8")</li> <li>19.1 kg</li> </ul> | 96900381  | 97941751<br>d330 x 385<br>1.9 kg<br>97757301        |
| SP215-7-AA<br>SP215-7-A<br>SP215-7   | SP215-5-AA<br>SP215-5-A                                    | <ul style="list-style-type: none"> <li>d330 (350) x 2500</li> <li>Motor 8", 130 kW (Franklin 8")</li> <li>21.2 kg</li> </ul>                | 96900392  | (1 set = 3 brackets)<br>10.7 kg<br>H250, b500, B550 |
| SP215-8-AA<br>SP215-8-A<br>SP215-8   | SP215-5  | <ul style="list-style-type: none"> <li>d330 (350) x 2700</li> <li>Motor 8", 150 kW (Franklin 8")</li> <li>22.8 kg</li> </ul>                | 96900393  |   |
| SP215-4-AA<br>SP215-4-A<br>SP215-4<br>SP215-5-AA<br>SP215-5-A<br>SP215-5                         |  | <ul style="list-style-type: none"> <li>d330 (350) x 1800</li> <li>Motor 10", up to 92 kW (MMS 10000)</li> <li>16.5 kg</li> </ul>            | 96900435  |   |
| SP215-6-AA<br>SP215-6-A<br>SP215-6<br>SP215-7-AA<br>SP215-7-A<br>SP215-7                         | SP215-5-AA<br>SP215-5-A                                    | <ul style="list-style-type: none"> <li>d330 (350) x 2250</li> <li>Motor 10", up to 132 kW (MMS 10000)</li> <li>19.1 kg</li> </ul>           | 96900436  |   |
| SP215-8-AA<br>SP215-8-A<br>SP215-8<br>SP215-9-AA<br>SP215-9-A<br>SP215-9                         | SP215-5<br>SP215-6-AA<br>SP215-6-A<br>SP215-6              | <ul style="list-style-type: none"> <li>d330 (350) x 2500</li> <li>Motor 10", up to 170 kW (MMS 10000)</li> <li>21.2 kg</li> </ul>           | 96900437  |   |



| Pump type                             |                                    | Flow sleeve   |                             | Strainer  | Supporting brackets                               |
|---------------------------------------|------------------------------------|---|-----------------------------|---|---|
| 50 Hz                                 | 60 Hz                              | Description:<br>Dimensions, d (D) x L<br>Motor type, P2<br>Weight   | Product number:<br>Grundfos | Product number:<br>Grundfos<br>Dimensions d x l<br>Weight | Product number:<br>Grundfos<br>Description        |
| SP215-7-AA<br>SP215-7-A<br>SP215-7    |                                    |   |                             |   |   |
| SP215-8-AA<br>SP215-8-A<br>SP215-8    | SP215-6-AA<br>SP215-6-A<br>SP215-6 | <ul style="list-style-type: none"> <li>d380 (400) x 2250</li> <li>Motor 12", up to 190 kW (MMS 12000)</li> <li>21.9 kg</li> </ul> | 96900440                    | 97941817  | 96958420  |
| SP215-9-AA<br>SP215-9-A<br>SP215-9    | SP215-7-AA<br>SP215-7-A<br>SP215-7 |   |                             | d380 x 385<br>4.0 kg                                      | (1 set = 3 brackets)<br>12 kg<br>H270, b550, B600 |
| SP215-10-AA<br>SP215-10-A<br>SP215-10 |                                    |   |                             |   |   |
| SP215-11                              |                                    | <ul style="list-style-type: none"> <li>d380 (400) x 2500</li> <li>Motor 12", 220 kW (MMS 12000)</li> <li>24.2 kg</li> </ul>       | 96900441                    |   |   |

Flow sleeves, strainers and supporting brackets are not available for SPG of EN 1.4539/AISI 904L.

## 8. Zinc anodes

### Galvanic cathodic protection

#### Applications

Galvanic cathodic protection enables protection of SQF, SP A, SP and SPG pumps as well as submersible motors against corrosion caused by chloride-containing liquids, such as seawater and brackish water.

Pumps in sleeves cannot be protected using zinc anodes.

#### Applicable on these versions:

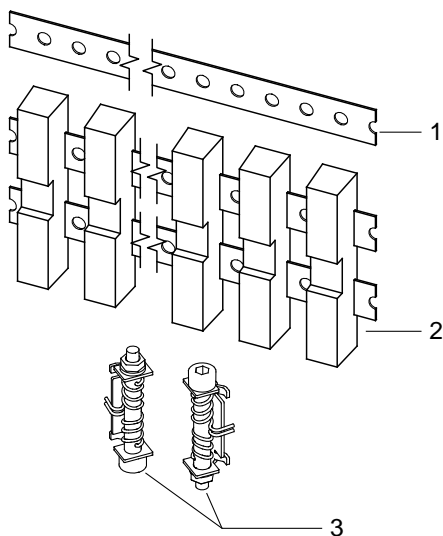
| Pump/motor         | Version  |
|--------------------|--|
| Pump               | N or R version   |
| Motor, Grundfos    | R version  |
| Motor, other makes | Seawater-resistant materials, for example bronze, N or R version |

#### Pumped liquids

Water containing more than 1500 ppm chloride at temperatures up to 35 °C.

We do not recommend galvanic cathodic protection in liquids with a pH value lower than 6.

#### Construction



TM01 4430 0199

Fig. 1 Anode string

| Pos. | Description  |
|------|--|
| 1    | Stainless-steel clamp  |
| 2    | Zinc anodes cast around the clamp                              |
| 3    | Spring device ensuring direct metallic contact with pump/motor |

During operation, the size of the zinc anodes will be reduced and gradually the anodes become covered by corrosion products obstructing the direct metallic contact between anode and pump/motor. To counteract this, the metallic contact must be ensured via the clamp keeping tight contact with pump/motor by means of the spring device.

#### Fitting the anode strings

The anode strings are to be fitted according to the installation and operating instructions.

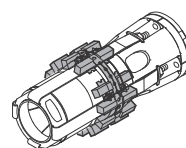
The number of anode strings to be fitted is shown in [Anode strings on pumps](#) on page 38 and [Position of anode strings on motors](#).

**Important:** Ensure that the anode strings are fastened tightly and that the electric/metallic contact between clamp and pump/motor is good.

The diameter of the pump/motor is increased by minimum 40 mm when the anode string is fitted.

#### Position of anode strings on pumps

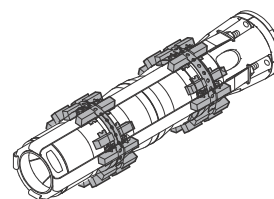
##### One anode string



TM05 0533 1211

Fig. 2 One anode string

##### Two anode strings

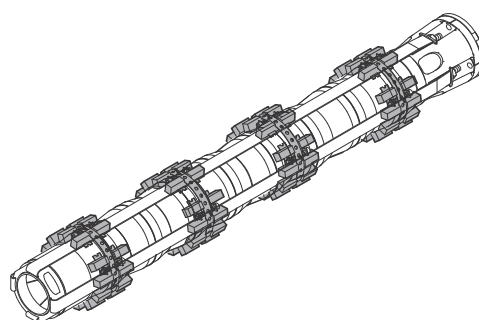


TM05 0534 1211

Fig. 3 Two anode strings

##### More than two anode strings

The distances between the anode strings must be identical.



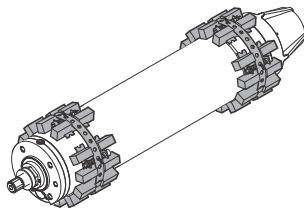
TM05 0535 1211

Fig. 4 More than two anode strings



## Position of anode strings on motors

### Two anode strings

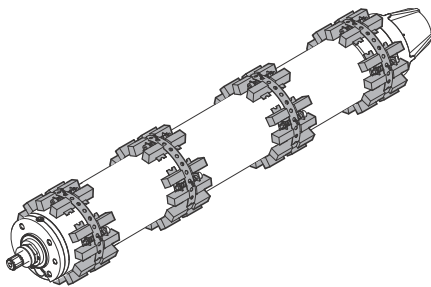


TIM05 0536 1211

Fig. 5 Two anode strings

### More than two anode strings

The distances between the anode strings must be identical.



TIM05 0537 1211

Fig. 6 More than two anode strings

## Maintenance

### Anode life

The life of a zinc anode is 1 to 4 years, depending on the operating conditions (temperature, flow, content of chloride, etc.).

### Inspection

Inspections must be made at regular intervals in order to ensure the functioning of the galvanic cathodic protection system. The first inspection must be made after six months and subsequently approximately once a year.

### Precipitation

White and yellow corrosion products will build up on the anodes as these are reduced in size. Furthermore, a thin lime incrustation may build up on the pump. However, such precipitation is harmless.

### Replacing the anode string

In order to ensure a good electric/metallic contact between clamp and pump/motor, the surface must be cleaned thoroughly before a new anode string is fitted.

### Anode strings on pumps

The following sections show the number of anode strings required per pump and the corresponding product numbers.

DOL = Direct-On-Line starting.

SD = Start-Delta starting.

## Product range

The following sections show the number of anode strings required per pump and the corresponding product numbers.

DOL = Direct-On-Line starting.

SD = Start-Delta starting.

### SQF

| SQF         |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 2-7         | 2                       | 97645697          | -                |

### SP1A

| SP1A        |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 3-36        | 1                       | 993226959         | ---              |
| 37-57       | 2                       |                   |                  |

### SP2A

| SP2A        |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 3-23        | 1                       | 99326959          | 99326959         |
| 24-55       | 2                       |                   |                  |
| 39 - 60     | 3                       |                   |                  |

### SP3A

| SP3A        |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 6 - 15      | 1                       | 99326959          | -                |
| 18 - 33     | 2                       |                   |                  |
| 56-60       | 3                       |                   |                  |

### SP5A

| SP5A        |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 4 - 21      | 1                       | 99326959          | 99326959         |
| 25 - 38     | 2                       |                   |                  |
| 44 - 60     | 3                       |                   |                  |
| 52 - 75     | 4                       |                   |                  |

### SP7/ SP9

| SP7 / SP98A |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1 - 7       | 1                       | 99326959          | 99326959         |
| 8 - 12      | 2                       |                   |                  |
| 13 - 25     | 3                       |                   |                  |
| 26 - 33     | 4                       |                   |                  |
| 34 - 42     | 5                       |                   |                  |
| 43 - 52     | 6                       |                   |                  |
| 53 - 59     | 7                       |                   |                  |

**SP11/ SP14**

| SP11 / SP1414A |                         |                   |                  |
|----------------|-------------------------|-------------------|------------------|
| Pump stages    | Number of anode strings | Product number    |                  |
|                |                         | Anode string, DOL | Anode string, SD |
| 1 - 6          | 1                       |                   |                  |
| 7 - 12         | 2                       |                   |                  |
| 13 - 18        | 3                       |                   |                  |
| 19 - 24        | 4                       | 99326959          | 99326959         |
| 25 - 30        | 5                       |                   |                  |
| 31 - 37        | 6                       |                   |                  |

**SP17**

| SP17        |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1 - 5       | 1                       |                   |                  |
| 6 - 13      | 2                       |                   |                  |
| 14 - 25     | 3                       |                   |                  |
| 26 - 35     | 4                       |                   |                  |
| 36 - 42     | 5                       | 97645875          | 97645875         |
|             |                         |                   |                  |
|             |                         |                   |                  |
|             |                         |                   |                  |

**SP30**

| SP30        |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1 - 3       | 1                       |                   |                  |
| 4 - 9       | 2                       |                   |                  |
| 10 - 15     | 3                       |                   |                  |
| 16 - 22     | 4                       |                   |                  |
| 23 - 28     | 5                       |                   |                  |
| 29 - 34     | 6                       |                   |                  |
| 35 - 38     | 7                       | 97645875          | 97645875         |
|             |                         |                   |                  |
|             |                         |                   |                  |
|             |                         |                   |                  |

**SP46**

| SP46        |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1 - 3       | 1                       |                   |                  |
| 4 - 8       | 2                       |                   |                  |
| 9 - 13      | 3                       |                   |                  |
| 14 - 18     | 4                       | 97645875          | 97645910         |
| 19 - 23     | 5                       |                   |                  |
| 24 - 25     | 6                       |                   |                  |

**SP60**

| SP60        |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1 - 3       | 1                       |                   |                  |
| 4 - 8       | 2                       |                   |                  |
| 9 - 13      | 3                       |                   |                  |
| 14 - 18     | 4                       | 97645875          | 97645910         |
| 19 - 23     | 5                       |                   |                  |
| 24 - 25     | 6                       |                   |                  |

**SP77**

| SP77        |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1           | 1                       |                   |                  |
| 2 - 5       | 2                       |                   |                  |
| 6 - 10      | 3                       |                   |                  |
| 11 - 14     | 4                       | 97645914          | 97646114         |
| 15 - 18     | 5                       |                   |                  |
| 19 - 22     | 6                       |                   |                  |

**SP95**

| SP95        |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1           | 1                       |                   |                  |
| 2 - 5       | 2                       |                   |                  |
| 6 - 10      | 3                       |                   |                  |
| 11 - 14     | 4                       | 97645914          | 97646114         |
| 15 - 18     | 5                       |                   |                  |
| 19 - 22     | 6                       |                   |                  |

**SP125**

| SP125       |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1           | 1                       |                   |                  |
| 2 - 4       | 2                       |                   |                  |
| 5 - 8       | 3                       |                   |                  |
| 9 - 11      | 4                       | 97646116          | 97646117         |
| 12 - 14     | 5                       |                   |                  |
| 15 - 17     | 6                       |                   |                  |

**SP160**

| SP160       |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1           | 1                       |                   |                  |
| 2 - 4       | 2                       |                   |                  |
| 5 - 8       | 3                       |                   |                  |
| 9 - 11      | 4                       | 97646116          | 97746117         |
| 12 - 14     | 5                       |                   |                  |
| 15 - 17     | 6                       |                   |                  |

**SP215**

| SP215       |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1           | 1                       |                   |                  |
| 2 - 3       | 2                       |                   |                  |
| 4 - 6       | 3                       | 97646118          | 97646137         |
| 7 - 8       | 4                       |                   |                  |
| 9 - 11      | 5                       |                   |                  |

**SPG 270**

| SPG 270     |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1 - 2       | 2                       |                   |                  |
| 3 - 4       | 3                       |                   |                  |
| 5 - 6       | 4                       | 97646138          | 97762380         |
| 7 - 8       | 5                       |                   |                  |

**SPG 300**

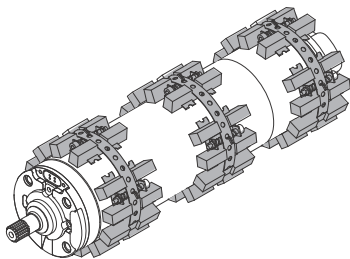
| SPG 300     |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1 - 2       | 2                       |                   |                  |
| 3 - 4       | 3                       |                   |                  |
| 5 - 6       | 4                       | 97646138          | 97762380         |
| 7 - 8       | 5                       |                   |                  |

**SPG 360**

| SPG 360     |                         |                   |                  |
|-------------|-------------------------|-------------------|------------------|
| Pump stages | Number of anode strings | Product number    |                  |
|             |                         | Anode string, DOL | Anode string, SD |
| 1 - 2       | 2                       |                   |                  |
| 3 - 4       | 3                       |                   |                  |
| 5 - 6       | 4                       | 97646138          | 97762380         |
| 7 - 8       | 5                       |                   |                  |

## Anode strings on motors

The table below shows the number of anode strings required per motor and the corresponding product numbers.



TM05 9668 0316

Fig. 7 Anode strings on MS motor

| Zinc anodes for MS and MMS motors |                 |                         |                |
|-----------------------------------|-----------------|-------------------------|----------------|
| Motor                             | B = length [mm] | Number of anode strings | Product number |
| MS402 - MS4000" motor             | Up to 350       | 2                       | 96856060       |
| MS402 - MS4000" motor             | 351 to 680      | 3                       |                |
| MS402 - MS4000" motor             | 681 - 780       | 4                       |                |
| MS 6000" motor                    | Up to 690       | 3                       | 97645910       |
| MS 6000" motor                    | 691 - 975       | 4                       |                |
| MS 6000" motor                    | 976 - 1050      | 5                       |                |
| MMS 6" motor                      | Up to 690       | 3                       | 97645914       |
| MMS 6" motor                      | 691 - 975       | 4                       |                |
| MMS 6" motor                      | 976 - 1315      | 5                       |                |
| MMS 6" motor                      | 1316 - 1425     | 6                       | 97646116       |
| MMS 8" motor                      | Up to 1160      | 5                       |                |
| MMS 8" motor                      | 1161 - 1490     | 6                       |                |
| MMS 8" motor                      | 1491 - 2060     | 8                       | 97646118       |
| MMS 10" motor                     | Up to 1690      | 7                       |                |
| MMS 10" motor                     | 1691 - 2070     | 8                       |                |
| MMS 10" motor                     | 2071 - 2400     | 9                       | 97646138       |
| MMS 12" motor                     | Up to 1980      | 8                       |                |
| MMS 12" motor                     | 1981 - 2290     | 9                       |                |



TM06 6355 0316

Fig. 8 Length of motor

## 9. Cable sizing

### Cables

Grundfos offers submersible drop cables for all applications: 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. See [Submersible drop cable](#) on page 15.

#### Tables indicating cable dimension in borehole

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

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

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

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

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

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

Figure 9 shows two tables for cable sizing. The top table is titled 'Voltage drop in %, for a one, three or four core flexible Grundfos drop cable' and 'CALCULATE GRUNDGOS DROP CABLE "VOLTAGE DROP" "Direct On Line"'. The bottom table is titled 'CALCULATE GRUNDGOS DROP CABLE "VOLTAGE DROP" "Star-Delta"'. Both tables have columns for rated voltage (U), rated current (I), and cable length (L) for various cable cross-sections (q). The tables are organized into columns for different cable types and lengths.

Fig. 9 Cable sizing tool

Maximum cable length for a single-phase submersible pump:

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

Maximum cable length for a three-phase submersible pump:

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

#### Formula designations

U = Rated voltage [V]

$\Delta U$  = Voltage drop [%]

I = Rated current of the motor [A]

$\cos \varphi$  = Power factor

$\rho$  = Specific resistance: 0.025 [ $\Omega \text{ mm}^2$ ]

q = Cross-section of submersible drop cable [ $\text{mm}^2$ ]

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

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

#### Example

Motor size: 30 kW, MMS 8000

Starting method: Direct on line

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

Voltage drop ( $\Delta U$ ): 3 %

Rated current (I): 64.0 A

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

Specific resistance ( $\rho$ ): 0.025

Cross-section (q): 25  $\text{mm}^2$

$\sin \varphi$ : 0.54

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

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

L = 120 m.

#### Calculation of cable cross-section

##### Formula designations

U = Rated voltage [V]

$\Delta U$  = Voltage drop [%]

I = Rated current of the motor [A]

$\cos \varphi$  = Power factor

$\rho = 1/\chi$

Materials of cable:

Copper:  $\chi = 40 \text{ m}/\Omega \times \text{mm}^2$

q = Cross-section [ $\text{mm}^2$ ]

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

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

L = Length of cable [m]

$\Delta p$  = Power loss [W].

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

#### Direct on line

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

#### Star-delta

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

You can read the values of the rated current (I) and the power factor ( $\cos \varphi$ ) in the tables on pages 46.

## Calculation of the power loss

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

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

### Example

|                            |                  |
|----------------------------|------------------|
| Motor size:                | 45 kW, MMS 8000  |
| Voltage:                   | 3 x 400 V, 50 Hz |
| Starting method:           | Direct on line   |
| Rated current ( $I_n$ ):   | 96.5 A           |
| Required cable length (L): | 200 m            |
| Water temperature:         | 30 °C.           |

### Cable selection

Choice A: 3 x 150 mm<sup>2</sup>.

Choice B: 3 x 185 mm<sup>2</sup>.

### Calculation of power loss

#### Choice A

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

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

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

#### Choice B

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

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

### Savings

Operating hours/year:  $h = 4000$ .

Annual saving (A):

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

By choosing the cable size 3 x 185 mm<sup>2</sup> instead of 3 x 150 mm<sup>2</sup>, you achieve an annual saving of 564 kWh.

Operating time: 10 years.

Saving after 10 years ( $A_{10}$ ):

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

You must calculate the saved amount in the local currency.



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

Voltage drop: 3 %

| Motor                       | kW   | I <sub>n</sub> [A] | Cos φ 100 % | Dimensions [mm <sup>2</sup> ] |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----------------------------|------|--------------------|-------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                             |      |                    |             | 1.5                           | 2.5 | 4   | 6   | 10  | 16  | 25  | 35  | 50  | 70  | 95  | 120 | 150 | 185 | 240 | 300 |     |
| 4"                          | 0.37 | 1.4                | 0.64        | 462                           | 767 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 4"                          | 0.55 | 2.2                | 0.64        | 294                           | 488 | 777 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 4"                          | 0.75 | 2.3                | 0.72        | 250                           | 416 | 662 | 987 |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 4"                          | 1.1  | 3.4                | 0.72        | 169                           | 281 | 448 | 668 |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 4"                          | 1.5  | 4.2                | 0.75        | 132                           | 219 | 348 | 520 | 857 |     |     |     |     |     |     |     |     |     |     |     |     |
| 4"                          | 2.2  | 5.5                | 0.82        | 92                            | 153 | 244 | 364 | 602 | 951 |     |     |     |     |     |     |     |     |     |     |     |
| 4"                          | 3    | 7.85               | 0.77        | 69                            | 114 | 182 | 271 | 447 | 705 |     |     |     |     |     |     |     |     |     |     |     |
| 4"                          | 4    | 9.6                | 0.8         | 54                            | 90  | 143 | 214 | 353 | 557 | 853 |     |     |     |     |     |     |     |     |     |     |
| 4"                          | 5.5  | 13                 | 0.81        | 39                            | 66  | 104 | 156 | 258 | 407 | 624 | 855 |     |     |     |     |     |     |     |     |     |
| 4"                          | 7.5  | 18.8               | 0.78        | 28                            | 47  | 75  | 112 | 185 | 291 | 445 | 609 | 841 |     |     |     |     |     |     |     |     |
| 6"                          | 4    | 9.2                | 0.82        | 55                            | 91  | 146 | 218 | 359 | 566 | 867 |     |     |     |     |     |     |     |     |     |     |
| 6"                          | 5.5  | 13.6               | 0.77        | 40                            | 66  | 105 | 157 | 258 | 407 | 622 | 850 |     |     |     |     |     |     |     |     |     |
| 6"                          | 7.5  | 17.6               | 0.8         | 29                            | 49  | 78  | 117 | 193 | 304 | 465 | 637 | 882 |     |     |     |     |     |     |     |     |
| 6"                          | 9.2  | 21.8               | 0.81        | 23                            | 39  | 62  | 93  | 154 | 243 | 372 | 510 | 706 | 950 |     |     |     |     |     |     |     |
| 6"                          | 11   | 24.8               | 0.83        |                               | 34  | 53  | 80  | 132 | 209 | 320 | 440 | 610 | 823 |     |     |     |     |     |     |     |
| 6"                          | 13   | 30                 | 0.81        |                               | 28  | 45  | 68  | 112 | 176 | 270 | 370 | 513 | 690 | 893 |     |     |     |     |     |     |
| 6"                          | 15   | 34                 | 0.82        |                               |     | 39  | 59  | 97  | 154 | 236 | 324 | 449 | 604 | 783 | 947 |     |     |     |     |     |
| 6"                          | 18.5 | 42                 | 0.81        |                               |     |     | 48  | 80  | 126 | 193 | 265 | 366 | 493 | 638 | 770 | 914 |     |     |     |     |
| 6"                          | 22   | 48                 | 0.84        |                               |     |     | 41  | 67  | 107 | 164 | 225 | 313 | 422 | 549 | 665 | 793 | 927 |     |     |     |
| 6"                          | 26   | 57                 | 0.84        |                               |     |     |     | 57  | 90  | 138 | 189 | 263 | 355 | 462 | 560 | 667 | 781 | 937 |     |     |
| 6"                          | 30   | 66.5               | 0.83        |                               |     |     |     | 49  | 78  | 119 | 164 | 227 | 307 | 398 | 482 | 574 | 670 | 803 | 926 |     |
| 6"                          | 37   | 85.5               | 0.79        |                               |     |     |     |     | 63  | 97  | 133 | 183 | 246 | 317 | 382 | 452 | 525 | 624 | 714 |     |
| 8"                          | 22   | 48                 | 0.84        |                               |     |     | 41  | 67  | 107 | 164 | 225 | 313 | 422 | 549 | 665 | 793 | 927 |     |     |     |
| 8"                          | 26   | 56.5               | 0.85        |                               |     |     |     | 57  | 90  | 138 | 189 | 263 | 356 | 464 | 563 | 672 | 787 | 947 |     |     |
| 8"                          | 30   | 64                 | 0.85        |                               |     |     |     | 50  | 79  | 122 | 167 | 233 | 314 | 409 | 497 | 593 | 695 | 836 | 968 |     |
| 8"                          | 37   | 78.5               | 0.85        |                               |     |     |     |     | 65  | 99  | 136 | 190 | 256 | 334 | 405 | 483 | 567 | 682 | 789 |     |
| 8"                          | 45   | 96.5               | 0.82        |                               |     |     |     |     | 54  | 83  | 114 | 158 | 213 | 276 | 334 | 396 | 462 | 553 | 636 |     |
| 8"                          | 55   | 114                | 0.85        |                               |     |     |     |     |     | 68  | 94  | 131 | 177 | 230 | 279 | 333 | 390 | 469 | 544 |     |
| 8"                          | 63   | 132                | 0.83        |                               |     |     |     |     |     |     | 83  | 115 | 155 | 201 | 243 | 289 | 338 | 404 | 466 |     |
| 8"                          | 75   | 152                | 0.86        |                               |     |     |     |     |     |     | 70  | 97  | 132 | 171 | 208 | 249 | 292 | 353 | 409 |     |
| 8"                          | 92   | 186                | 0.86        |                               |     |     |     |     |     |     |     | 79  | 107 | 140 | 170 | 204 | 239 | 288 | 335 |     |
| 8"                          | 110  | 224                | 0.87        |                               |     |     |     |     |     |     |     |     | 89  | 116 | 141 | 169 | 198 | 240 | 279 |     |
| 10"                         | 75   | 156                | 0.84        |                               |     |     |     |     |     |     | 69  | 96  | 130 | 169 | 205 | 244 | 285 | 343 | 396 |     |
| 10"                         | 92   | 194                | 0.82        |                               |     |     |     |     |     |     |     | 79  | 106 | 137 | 166 | 197 | 230 | 275 | 316 |     |
| 10"                         | 110  | 228                | 0.84        |                               |     |     |     |     |     |     |     |     | 89  | 116 | 140 | 167 | 195 | 234 | 271 |     |
| 10"                         | 132  | 270                | 0.84        |                               |     |     |     |     |     |     |     |     |     | 98  | 118 | 141 | 165 | 198 | 229 |     |
| 10"                         | 147  | 315                | 0.81        |                               |     |     |     |     |     |     |     |     |     |     | 103 | 122 | 142 | 169 | 194 |     |
| 10"                         | 170  | 365                | 0.81        |                               |     |     |     |     |     |     |     |     |     |     |     | 105 | 122 | 146 | 168 |     |
| 10"                         | 190  | 425                | 0.79        |                               |     |     |     |     |     |     |     |     |     |     |     |     | 106 | 125 | 144 |     |
| 12"                         | 147  | 305                | 0.83        |                               |     |     |     |     |     |     |     |     |     |     |     | 105 | 125 | 146 | 175 | 202 |
| 12"                         | 170  | 345                | 0.85        |                               |     |     |     |     |     |     |     |     |     |     |     | 92  | 110 | 129 | 155 | 180 |
| 12"                         | 190  | 390                | 0.84        |                               |     |     |     |     |     |     |     |     |     |     |     | 98  | 114 | 137 | 158 |     |
| 12"                         | 220  | 445                | 0.85        |                               |     |     |     |     |     |     |     |     |     |     |     |     | 100 | 120 | 139 |     |
| 12"                         | 250  | 505                | 0.85        |                               |     |     |     |     |     |     |     |     |     |     |     |     |     | 106 | 123 |     |
| Max. current for cable [A]* |      |                    |             | 23                            | 30  | 41  | 53  | 74  | 99  | 131 | 162 | 202 | 250 | 301 | 352 | 404 | 461 | 547 | 633 |     |

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

# 10. Table of head losses

## 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 <sup>3</sup> /h | Litres/min. | Litres/sec. | Nominal pipe diameter in inches and internal diameter in [mm] |                |                |                |                |                |                |                |                |                |                |                |     |  |  |  |  |  |
|                   |             |             | 1/2"  | 3/4"           | 1"             | 1 1/4"         | 1 1/2"         | 2"             | 2 1/2"         | 3"             | 3 1/2"         | 4"             | 5"             | 6"             |     |  |  |  |  |  |
| 0.6               | 10          | 0.16        | 0.855<br>9.910  | 0.470<br>2.407 | 0.292<br>0.784 |                |                |                |                |                |                |                |                |                |     |  |  |  |  |  |
| 0.9               | 15          | 0.25        | 1.282<br>20.11  | 0.705<br>4.862 | 0.438<br>1.570 | 0.249<br>0.416 |                |                |                |                |                |                |                |                |     |  |  |  |  |  |
| 1.2               | 20          | 0.33        | 1.710<br>33.53  | 0.940<br>8.035 | 0.584<br>2.588 | 0.331<br>0.677 | 0.249<br>0.346 |                |                |                |                |                |                |                |     |  |  |  |  |  |
| 1.5               | 25          | 0.42        | 2.138<br>49.93  | 1.174<br>11.91 | 0.730<br>3.834 | 0.415<br>1.004 | 0.312<br>0.510 |                |                |                |                |                |                |                |     |  |  |  |  |  |
| 1.8               | 30          | 0.50        | 2.565<br>69.34  | 1.409<br>16.50 | 0.876<br>5.277 | 0.498<br>1.379 | 0.374<br>0.700 | 0.231<br>0.223 |                |                |                |                |                |                |     |  |  |  |  |  |
| 2.1               | 35          | 0.58        | 2.993<br>91.54  | 1.644<br>21.75 | 1.022<br>6.949 | 0.581<br>1.811 | 0.436<br>0.914 | 0.269<br>0.291 |                |                |                |                |                |                |     |  |  |  |  |  |
| 2.4               | 40          | 0.67        |   | 1.879<br>27.66 | 1.168<br>8.820 | 0.664<br>2.290 | 0.499<br>1.160 | 0.308<br>0.368 |                |                |                |                |                |                |     |  |  |  |  |  |
| 3.0               | 50          | 0.83        |   | 2.349<br>41.40 | 1.460<br>13.14 | 0.830<br>3.403 | 0.623<br>1.719 | 0.385<br>0.544 | 0.229<br>0.159 |                |                |                |                |                |     |  |  |  |  |  |
| 3.6               | 60          | 1.00        |   | 2.819<br>57.74 | 1.751<br>18.28 | 0.996<br>4.718 | 0.748<br>2.375 | 0.462<br>0.751 | 0.275<br>0.218 |                |                |                |                |                |     |  |  |  |  |  |
| 4.2               | 70          | 1.12        |   | 3.288<br>76.49 | 2.043<br>24.18 | 1.162<br>6.231 | 0.873<br>3.132 | 0.539<br>0.988 | 0.321<br>0.287 | 0.231<br>0.131 |                |                |                |                |     |  |  |  |  |  |
| 4.8               | 80          | 1.33        |   | 2.335<br>30.87 | 1.328<br>7.940 | 0.997<br>3.988 | 0.616<br>3.988 | 0.367<br>1.254 | 0.263<br>0.363 | 0.164          |                |                |                |                |     |  |  |  |  |  |
| 5.4               | 90          | 1.50        |   | 2.627<br>38.30 | 1.494<br>9.828 | 1.122<br>4.927 | 0.693<br>4.927 | 0.413<br>1.551 | 0.269<br>0.203 |                |                |                |                |                |     |  |  |  |  |  |
| 6.0               | 100         | 1.67        |   | 2.919<br>46.49 | 1.660<br>11.90 | 1.247<br>5.972 | 0.770<br>1.875 | 0.459<br>0.542 | 0.329<br>0.244 | 0.248<br>0.124 |                |                |                |                |     |  |  |  |  |  |
| 7.5               | 125         | 2.08        |   | 3.649<br>70.41 | 2.075<br>17.93 | 1.558<br>8.967 | 0.962<br>2.802 | 0.574<br>0.809 | 0.412<br>0.365 | 0.310<br>0.185 | 0.241<br>0.101 |                |                |                |     |  |  |  |  |  |
| 9.0               | 150         | 2.50        |   | 2.490<br>25.11 | 1.870<br>12.53 | 1.154<br>3.903 | 0.668<br>1.124 | 0.494<br>0.506 | 0.372<br>0.256 | 0.289<br>0.140 |                |                |                |                |     |  |  |  |  |  |
| 10.5              | 175         | 2.92        |   | 2.904<br>33.32 | 2.182<br>16.66 | 1.347<br>5.179 | 0.803<br>1.488 | 0.576<br>0.670 | 0.434<br>0.338 | 0.337<br>0.184 |                |                |                |                |     |  |  |  |  |  |
| 12                | 200         | 3.33        |   | 3.319<br>42.75 | 2.493<br>21.36 | 1.539<br>6.624 | 0.918<br>1.901 | 0.659<br>0.855 | 0.496<br>0.431 | 0.385<br>0.234 | 0.251<br>0.084 |                |                |                |     |  |  |  |  |  |
| 15                | 250         | 4.17        |   | 4.149<br>64.86 | 3.117<br>32.32 | 1.924<br>10.03 | 1.147<br>2.860 | 0.823<br>1.282 | 0.620<br>0.646 | 0.481<br>0.350 | 0.314<br>0.126 |                |                |                |     |  |  |  |  |  |
| 18                | 300         | 5.00        |   |                |                | 3.740<br>45.52 | 2.309<br>14.04 | 1.377<br>4.009 | 0.988<br>1.792 | 0.744<br>0.903 | 0.577<br>0.488 | 0.377<br>0.175 | 0.263<br>0.074 |                |     |  |  |  |  |  |
| 24                | 400         | 6.67        |   |                |                | 4.987<br>78.17 | 3.078<br>24.04 | 1.836<br>6.828 | 1.317<br>3.053 | 0.992<br>1.530 | 0.770<br>0.829 | 0.502<br>0.294 | 0.351<br>0.124 |                |     |  |  |  |  |  |
| 30                | 500         | 8.33        |   |                |                |                |                | 3.848<br>45.52 | 2.295<br>14.04 | 1.647<br>4.622 | 1.240<br>2.315 | 0.962<br>1.254 | 0.628<br>0.445 | 0.439<br>0.187 |     |  |  |  |  |  |
| 36                | 600         | 10.0        |   |                |                |                |                | 4.618<br>51.84 | 2.753<br>14.62 | 1.976<br>6.505 | 1.488<br>3.261 | 1.155<br>1.757 | 0.753<br>0.623 | 0.526<br>0.260 |     |  |  |  |  |  |
| 42                | 700         | 11.7        |   |                |                |                |                | 3.212<br>19.52 | 2.306<br>8.693 | 1.736<br>4.356 | 1.347<br>2.345 | 0.879<br>0.831 | 0.614<br>0.347 |                |     |  |  |  |  |  |
| 48                | 800         | 13.3        |   |                |                |                |                | 3.671<br>25.20 | 2.635<br>11.18 | 1.984<br>5.582 | 1.540<br>3.009 | 1.005<br>1.066 | 0.702<br>0.445 |                |     |  |  |  |  |  |
| 54                | 900         | 15.0        |   |                |                |                |                | 4.130<br>31.51 | 2.964<br>13.97 | 2.232<br>6.983 | 1.732<br>3.762 | 1.130<br>1.328 | 0.790<br>0.555 |                |     |  |  |  |  |  |
| 60                | 1000        | 16.7        |   |                |                |                |                | 4.589<br>38.43 | 3.294<br>17.06 | 2.480<br>8.521 | 1.925<br>4.595 | 1.256<br>1.616 | 0.877<br>0.674 |                |     |  |  |  |  |  |
| 75                | 1250        | 20.8        |   |                |                |                |                |                |                | 4.117<br>26.10 | 3.100<br>13.00 | 2.406<br>7.010 | 1.570<br>2.458 | 1.097<br>1.027 |     |  |  |  |  |  |
| 90                | 1500        | 25.0        |   |                |                |                |                |                |                | 4.941<br>36.97 | 3.720<br>18.42 | 2.887<br>9.892 | 1.883<br>3.468 | 1.316<br>1.444 |     |  |  |  |  |  |
| 105               | 1750        | 29.2        |   |                |                |                |                |                |                | 4.340<br>24.76 | 3.368<br>13.30 | 2.197<br>4.665 | 1.535<br>1.934 |                |     |  |  |  |  |  |
| 120               | 2000        | 33.3        |   |                |                |                |                |                |                | 4.960<br>31.94 | 3.850<br>17.16 | 2.511<br>5.995 | 1.754<br>2.496 |                |     |  |  |  |  |  |
| 150               | 2500        | 41.7        |   |                |                |                |                |                |                |                | 4.812<br>26.26 | 3.139<br>9.216 | 2.193<br>3.807 |                |     |  |  |  |  |  |
| 180               | 3000        | 50.0        |   |                |                |                |                |                |                |                |                | 3.767<br>13.05 | 2.632<br>5.417 |                |     |  |  |  |  |  |
| 240               | 4000        | 66.7        |   |                |                |                |                |                |                |                |                |                | 5.023<br>22.72 | 3.509<br>8.926 |     |  |  |  |  |  |
| 300               | 5000        | 83.3        |   |                |                |                |                |                |                |                |                |                |                | 4.386<br>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.

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

The table is based on a nomogram.

Roughness:  $K = 0.01$  mm.

Water temperature:  $t = 10$  °C.

# 11. Grundfos Product Center

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

<http://product-selection.grundfos.com>



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

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

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

The screenshot shows the Grundfos Product Center website. At the top, there is a navigation bar with the logo and 'PRODUCT CENTER' text. Below it, a menu includes 'HOME', 'FIND PRODUCT', 'COMPARE', 'YOUR PROJECTS', 'SAVED ITEMS', and 'HELP'. A search bar is prominently displayed with the text 'Input a product number or a whole or partial product name'. Below the search bar are four main navigation buttons: 'SIZING' (with a subtext 'Enter pump sizing'), 'CATALOGUE' (with a subtext 'Products and services'), 'REPLACEMENT' (with a subtext 'Replace an old pump with a new'), and 'LIQUIDS' (with a subtext 'Find pump by liquid'). The 'QUICK SIZING' section is visible, featuring input fields for 'Flow (Q)\*' (m³/h) and 'Head (H)\*' (m), and radio buttons for 'Select what to size by': 'Size by application', 'Size by pump design', and 'Size by pump family'. A 'START SIZING' button is located to the right of these options. At the bottom of the screenshot, there are links for 'ADVANCED SIZING' with sub-options for 'Advanced sizing by application' and 'Guided selection'.

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

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

**All the information you need in one place**

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

**Downloads**

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

Subject to alterations.

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