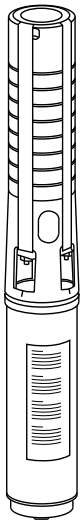
**EN Translation of original operation manual**

# SUPS



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## Table of contents

# 1 About this document

## 1.1 Using this manual

This manual is a component of the pump/unit. The pump/unit was manufactured and tested according to the generally accepted rules of technology. However, if the pump/unit is used incorrectly, not serviced enough or tampered with, danger to life and limb or material damage could result.

➔ Read the manual carefully before use.
➔ Keep the manual during the service life of the product.
➔ Provide access to the manual for operating and service personnel at all times.
➔ Pass the manual on to any future owners or operators of the product.

## 1.2 Target group

This instruction manual is intended for qualified professionals.

### 1.2.1 Symbols and means of representation

Warnings are used in this manual to warn you of personal injury.

➔ Always read and observe warnings.

**⚠ DANGER**

Danger for people.
Non-observance results in death or serious injury.

**⚠ WARNING**

Danger for people.
Non-observance can result in death or serious injury.

**⚠ CAUTION**

Danger for people.
Non-observance can result in light to moderate injury.

**NOTICE**

Notes to prevent material damage, for better understanding or to optimise the workflow.

Important information and technical notes are specially marked to explain correct operation.

| Symbol | Meaning |
|---|---|
| ➔ | Instructions for a one-step action. |
| 1.<br>2. | Directions for a multi-step action.<br>➔ Observe the order of the steps. |

# 2 Safety

## 2.1 Intended use

The underwater pump is for handling clean, non-aggressive water in process and domestic water supplies, pressure boosting, irrigation, fountain units, deep well units and heat pumps. A sand proportion of 150 g/m³ is permitted.

Observing the following information is vital for intended use:

- This manual

The pump/unit may only be operated within the application limits and characteristics, as specified in this manual.

Any other use or use exceeding this is **not** an intended use and must first be authorised by the manufacturer/supplier.

### 2.1.1 Possible misuse

- Installing the pump/unit with stress on the pipes.
- The pump/unit is not attached sufficiently.
- Opening and servicing of the pump/unit by unqualified personnel.

## 2.2 Personnel qualification

This pump can be used by **children** aged 8 and over as well as by persons with limited physical, sensory or mental capacity or by people with a lack of experience or knowledge, provided that they are supervised or have been instructed in the safe use of the pump and understand the resulting dangers. **Children** may not play with the pump. Cleaning and **user maintenance** may not be carried out by **children** without supervision.

➔ Ensure that the following work is only performed by trained professionals with the following qualifications:
  - For mechanical work, for example replacing ball bearings or mechanical seals: qualified mechanics.
  - For work on the electric system: electricians

➔ Ensure that the following requirements are fulfilled:
  - Personnel who do not yet have the appropriate qualifications must receive the required training before being allowed to work on the system.
  - The personnels' responsibilities, for example working on the product, electric equipment or hydraulic systems, are set based on their qualifications and the job description.
  - The personnel have read this manual and understand the necessary working steps.

## 2.3 Safety regulations

The operator of the system is responsible for the adherence to all relevant statutory regulations and guidelines.

➔ Observe the following regulations when using the pump/unit:
  - This manual
  - Warning and information signs on the product
  - The valid national regulations for accident prevention
  - The internal occupational, operational and safety regulations of the operator

## 2.4 Protective equipment

Reaching into moving parts, e.g. coupling and/or impeller, can cause serious injury.

➔ Never operate the pump/unit without protective covers (basket).

## 2.5 Structural modifications and spare parts

Alterations or modifications can affect operational safety.

➔ Never modify or alter the pump/unit without the manufacturer's permission.

➔ Only use original spare parts and accessories authorised by the manufacturer.

## 2.6 Signs

➔ Ensure that all the signs on the complete pump/unit remain legible.

## 2.7 Residual risk

### 2.7.1 Falling parts

➔ Attach the pump unit to both hooks.
➔ Only use hoisting and load-bearing equipment which is suitable and technically sound.
➔ Do not stand under suspended loads.

### 2.7.2 Rotating parts

There is a risk of shearing and crushing due to exposed rotating parts.
➔ Only perform servicing when the pump/unit is not in operation.
➔ Prior to servicing, ensure the pump/unit cannot be switched back on.
➔ Immediately after finishing servicing, reattach or reactivate all protective equipment.

### 2.7.3 Electrical energy

Electrical protective earth conductors which were not installed correctly can also result in electric shocks, for example due to oxidation or cable breakage.
➔ Observe VDE and utility company regulations.
➔ Before working on the electrical system, take the following measures:
- Disconnect system from the power supply.
- Attach a warning sign: “Do not switch on! The system is being worked on.”
- Ensure that the system is free of voltage.

➔ Check the electrical system regularly to ensure it is in proper working condition.

### 2.7.4 Hot surfaces

➔ Do not touch the motor during operation.
➔ Allow the pump/unit to cool down before servicing it.

### 2.7.5 Hazardous materials

➔ Ensure that leaks of dangerous pumped fluids/gases are led away without endangering people or the environment.
➔ Decontaminate the pump completely during disassembly.

### 2.7.6 Suction danger

Ensure that the suction openings conform to current guidelines, standards and instructions.

## 2.8 Faults

➔ In case of a fault, immediately switch the pump off and remove it from operation.
➔ Have all faults repaired immediately.

**Seized pump**

If a pump seizes, and is switched on several times repeatedly, the motor can be damaged. Observe the following points:
➔ Do not switch the pump/unit on repeatedly.
➔ Clean pump.

## 2.9 Preventing material damage

### 2.9.1 Leakage and pipe breakage

If the pipe forces are exceeded, leaks can occur at the screwed connection or the pump itself.
➔ Do not use the pump as a fixed point for the pipe line.
➔ Connect pipes free of load and mount them elastically. Install compensators if necessary.
➔ If the pump leaks, the unit may not be operated and must be disconnected from the mains power supply.

### 2.9.2 Dry running

Various components can be damaged within seconds due to dry running.
➔ Do not allow the pump to run dry.
➔ Ventilate the pump/unit.

### 2.9.3 Cavitation

Pipes which are too long increase resistance. This results in risk of cavitation.
➔ Only switch the pump on when the valve on the delivery side is opened halfway.

### 2.9.4 Overheating

The following factors can lead to the pump overheating:

- Insufficient cooling of the pump.
- Closed valve in the pressure line.

➔ Do not let the pump run dry.

➔ Do not operate the pump with closed valves.

### 2.9.5 Pressure surges

Valves which close suddenly can cause pressure surges which far exceed the maximum permissible housing pressure of the pump.

➔ Install shock absorber or air vessel.

➔ Avoid valves which close suddenly or, if present, close them slowly.

### 2.9.6 Blockages in the pump

Dirt particles can clog and block the pump.

➔ Check how easily the pump rotates before starting it up and after longer idle or storage periods.

### 2.9.7 Risk of frost

➔ Drain the pump/unit and pipes at risk of freezing in plenty of time.

➔ Remove the pump/unit during periods of frost and store it in a dry room.

### 2.9.8 Water temperature

The water temperature must not exceed 30 °C.

### 2.9.9 Safe use of the product

Safe use of the product is no longer guaranteed in the following instances:

- If the pipework is not in proper condition.
- If the pump seizes. See point  on page .
- If protective devices are damaged or missing, e.g. protection against accidental contact.
- If there is stress on the pump/unit or pipes during installation.

# 3 Description

## 3.1 Design

### 3.1.1 Pump

The interior components of the SUPS range, such as impellers, intermediate stages with diffusers, shafts and housing, are made from stainless steel.

### 3.1.2 Motor

The pump is driven by a special motor which is connected to the pump with four mounting bolts. The torque is transmitted via an interlocked coupling. Thus, in case of replacement, the pump and motor can easily be separated from one another.

The motor connection cable can be detached from the motor. The motor housing is made from stainless steel. The gaps in the motor winding are filled with synthetic resin. In addition, a reliable shaft seal and the stainless can in the gap between the rotor and stator protect the motor winding.

The motor is filled with a special frost-protected fluid by the manufacturer. There is a declaration of clearance for the composition of the fluid (protection against the contamination of drinking water).

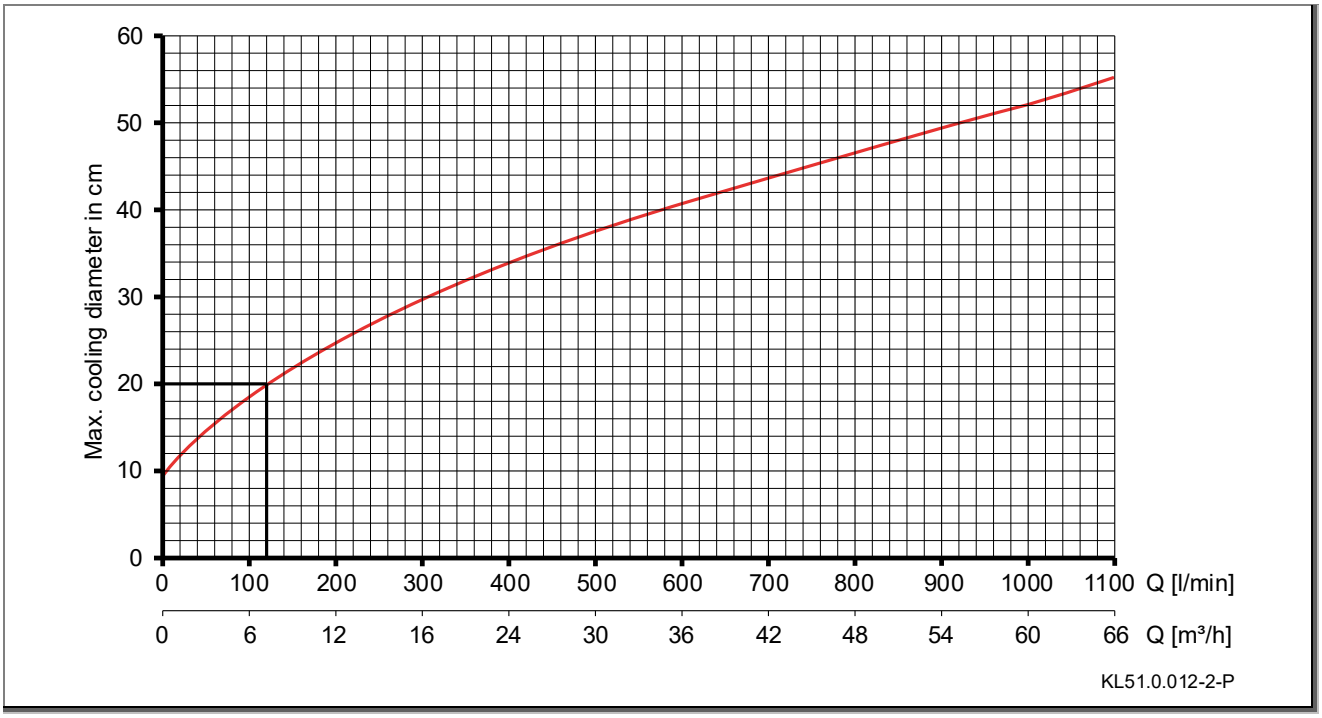
**NOTICE**

The freezing point of the motor fluid is -15 °C.

## 3.2 Ambient temperature of the motor

The underwater motors are designed for operation with a nominal load in water up to 30 °C. They require a minimum coolant velocity along the motor of 8 cm/s for 4” motors and 16 cm/s for 6” motors.

**Determining the minimum coolant quantity along the motor**




**Example:**

Well Ø20 cm

Motor: Ø4“

Minimum coolant quantity = 120 l/min

Should the quantity fall below that of the minimum coolant quantity (for example in standing water), a cooling jacket must be used.

## 3.3 Ambient temperatures for 1~-start-up devices

A temperature from -20 °C to +40 °C is permitted.

Should these temperatures be exceeded, the switching devices must be protected accordingly. The cold reduces the capacity of the capacitor and therefore also lowers the starting torque.

Too strong a heat exposure will result in unnecessary deactivation of the thermal motor protection.

The protection class of the start-up device is IP54.

# 4 Transport and intermediate storage

## 4.1 Transport

➔ Check the delivery conditions:
- Check the packaging for transport damage.
- Determine damages, document them with photographs and contact the distributor.

## 4.2 Lifting the pump

**⚠ DANGER**

Goods being transported can fall and result in death or crushing of limbs!

➔ Attach the pump unit to the suspension points provided.
➔ Only use suitable and technically sound hoisting equipment with sufficient load bearing capacity.
➔ Do not stand under suspended loads.
➔ Never lift or transport the pump/unit using electrical connection cables.

## 4.3 Storage

**NOTICE**

Corrosion is possible due to storage in humid conditions with fluctuating temperatures!
Condensation can corrode windings and metal parts.

➔ Store the pump/unit in a dry environment at a temperature which is as constant as possible.

**NOTICE**

There is a risk of damage to the winding and entry of foreign matter due to open ports!

➔ Do not remove the port covers until the pipes are ready to be connected.

**NOTICE**

Damage or loss of individual parts!

➔ Do not open the original packaging until installation or keep individual parts in the original packaging until installation.

- The pump should generally be stored upright.
- During storage, the pump may not be subject to a bending load.
- Storage and transport at temperatures of -20 °C to +60 °C.
- The connection cable may not be bent or compressed.

## 4.4 Returns

➔ Drain the pump/unit completely.
➔ Rinse and clean the pump/unit with clear water.
➔ Pack the pump/unit in a box and send it to the specialist retailer or manufacturer.

# 5 Installation

## 5.1 Installation

### 5.1.1 Installation position

The pump can either be installed in a horizontal or vertical position.

### 5.1.2 Installation depth

The suction strainer should lie minimum 1.0 m below the lowered water level. The pump should always be covered by the water level.

### 5.1.3 Contamination in the well

With old wells, determine whether there are any contaminations. These must be removed. With new wells, request a pump trial from the well drilling company that is carried out until the water is mined free of sand.

### 5.1.4 Avoiding damage to cables

In order to avoid damage to the motor's power cable whilst being lowered into the well, this should be fastened to the pressure line using cable clamps. Fastening them together at two meter intervals is recommended.

Handle the cable with care. Protect it from blows and strong pressure, do not subject it to traction stress, do not bend and do not lay or pull over sharp edges. The cable ends must be protected from damp.

### 5.1.5 Pressure vessel operation

When operating a pressure vessel and using ventilation valves, the non-return valve built into the pump must be removed.

## 5.2 Pipes

### 5.2.1 Pipe sizing

➔ All pumps have a (inner thread) threaded connector.
➔ We recommend using pipes made from plastic.

### 5.2.2 Laying pipes

➔ Keep the pressure line as straight as possible.
➔ Avoid sudden changes to the cross-section and direction.
➔ An appropriately dimensioned and rust-free rope can be attached to the pump in order to of lower it.

**Horizontal installation:**

The pump and pressure lines should be laid so that no force is transferred from the pipes to the pump. (tension, weight, vibration, …).

### 5.2.3 Setting the preload pressure in the diaphragm container

The diaphragm pressure vessel built into the unit is preloaded with nitrogen. After six months of operation, the pre-compaction must be tested and replenished if necessary. Preload pressure = 10 % under the pump's starting pressure. Instead of nitrogen, pressurised air can also be used if need be. However under no circumstances may oxygen be used. The diaphragm pressure vessel must always be tested in a pressure less and drained state.

## 5.3 Installation

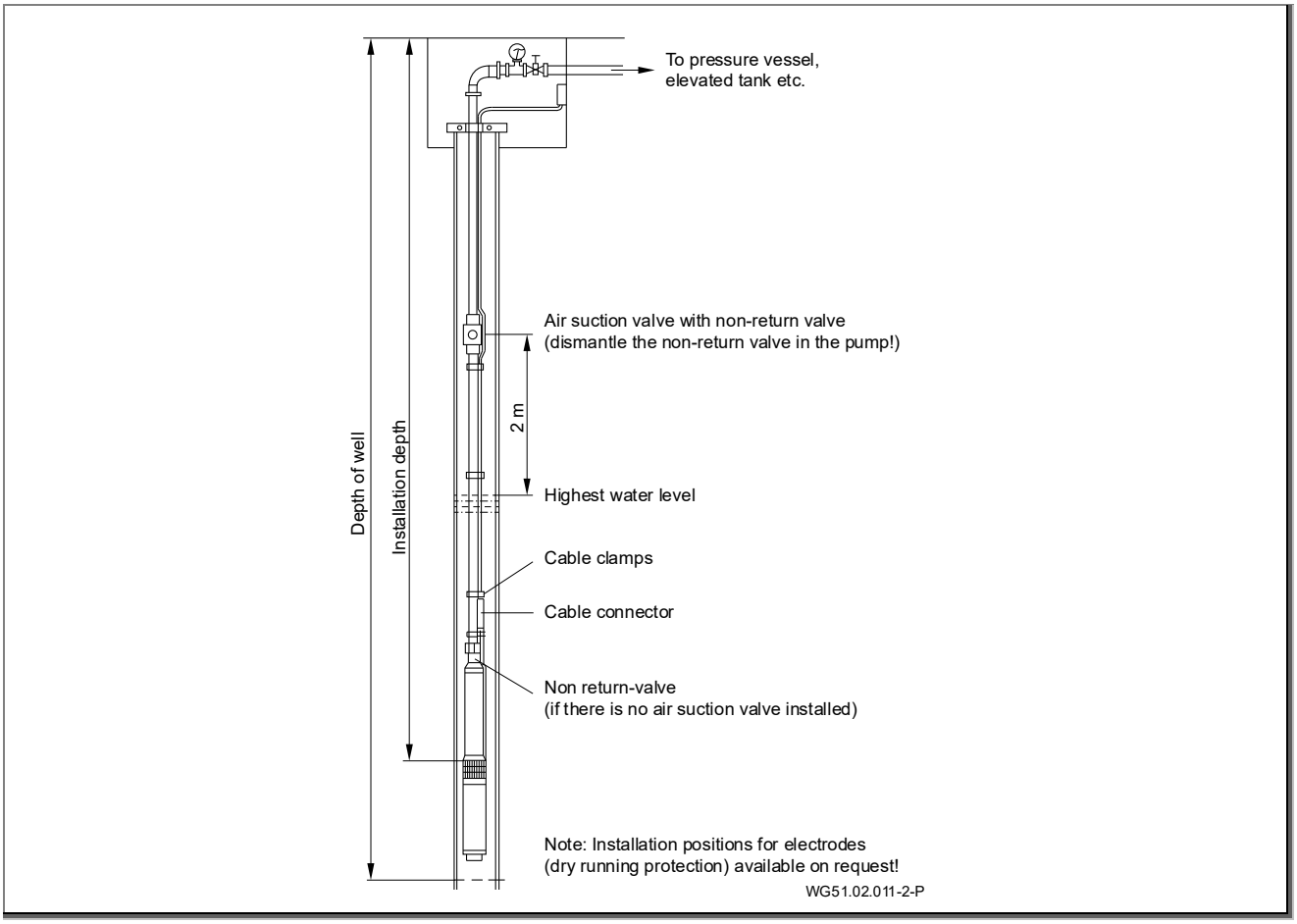



Fig. 1

**NOTICE**

The motor may not be connected to the power supply before the pump's installation, as even a few seconds of running dry will damage the pump.

- ➔ Check lifting devices and safety stand for safety.
- ➔ Position the pump safely.
- ➔ Connect the riser pipe to the pump.
- ➔ Lift the pump set and lower it into the well.
- ➔ Install with alternating use of suitable support clamps.

## 5.4 Electrical connection

**⚠ WARNING**

Risk of electric shock due to incorrect connections!

- ➔ Electrical connections must always be carried out by authorised specialists.
- ➔ Observe VDE and utility company regulations.
- ➔ Install pumps for swimming pools and their protection according to DIN VDE 0100-702.

- ➔ Install a disconnecting device with at least a 3 mm contact gap per pole to interrupt the power supply.
- ➔ Protect power supply with a ground fault circuit interrupter, nominal residual current $I_{FN} \leq 30$ mA.
- ➔ Only use suitable pipe types according to regional regulations.
- ➔ Adjust minimum diameter of the electrical pipes to accommodate the motor output and pipe length.
- ➔ If hazardous situations can occur, provide an emergency off switch according to DIN EN 809. The builder/operator must make a decision according to this standard.

### 5.4.1 Lightening protection device

A lightening protection device is recommended for underwater motors as protection against atmospheric overloads.

**⚠ WARNING**

Electric shock due to overvoltage!

➔ Build sufficiently dimensioned earth connectors corresponding to the motor performance and considering DIN 57100 C62.11 – 1993.

### 5.4.2 Electrical testing before and during installation

➔ Measure the isolation resistance frequently.

➔ Check the winding resistance (only when reusing used motors). Measure between all three motor connections on 3~ motors. The values must be approximately even.

**Three phase motor connection for direct start-up (3~)**

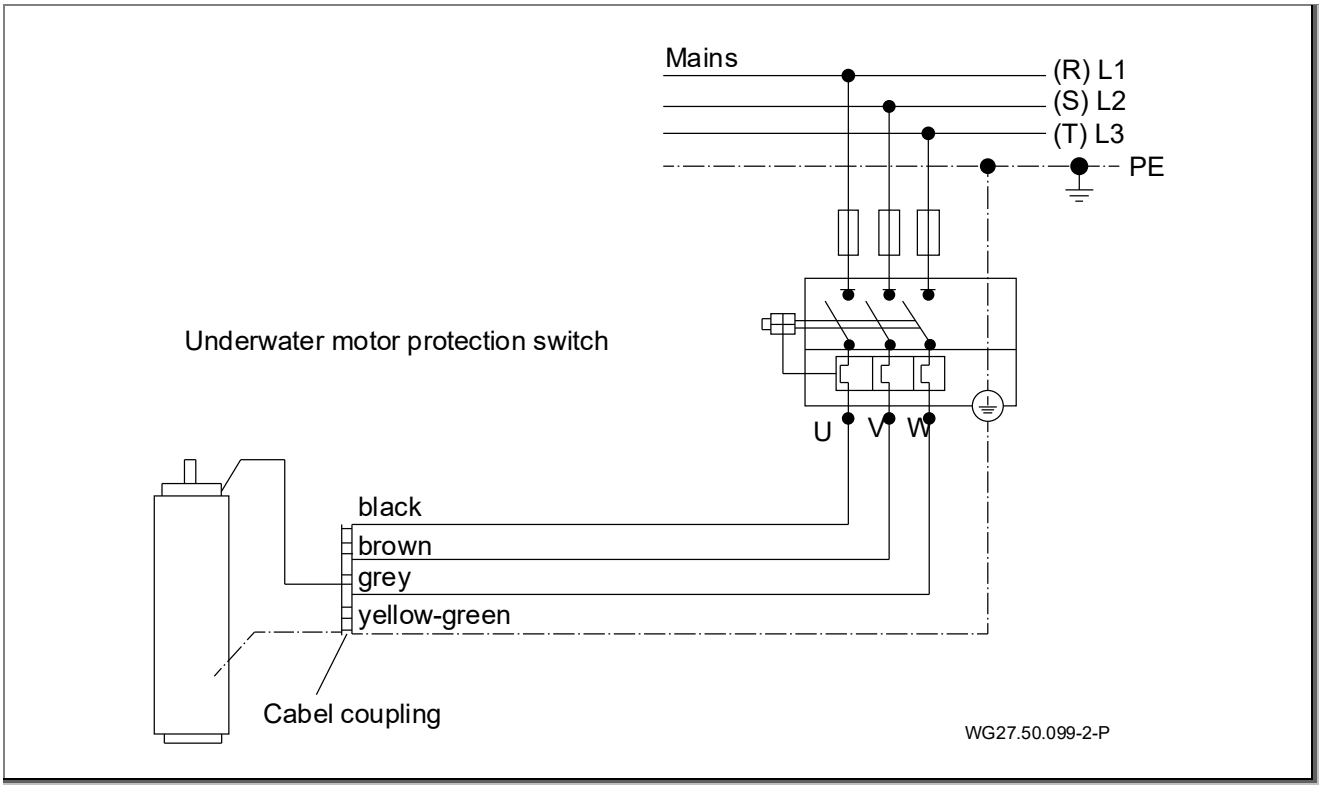



Fig. 2

### Three-phase motor connection for star-delta starting (3~)

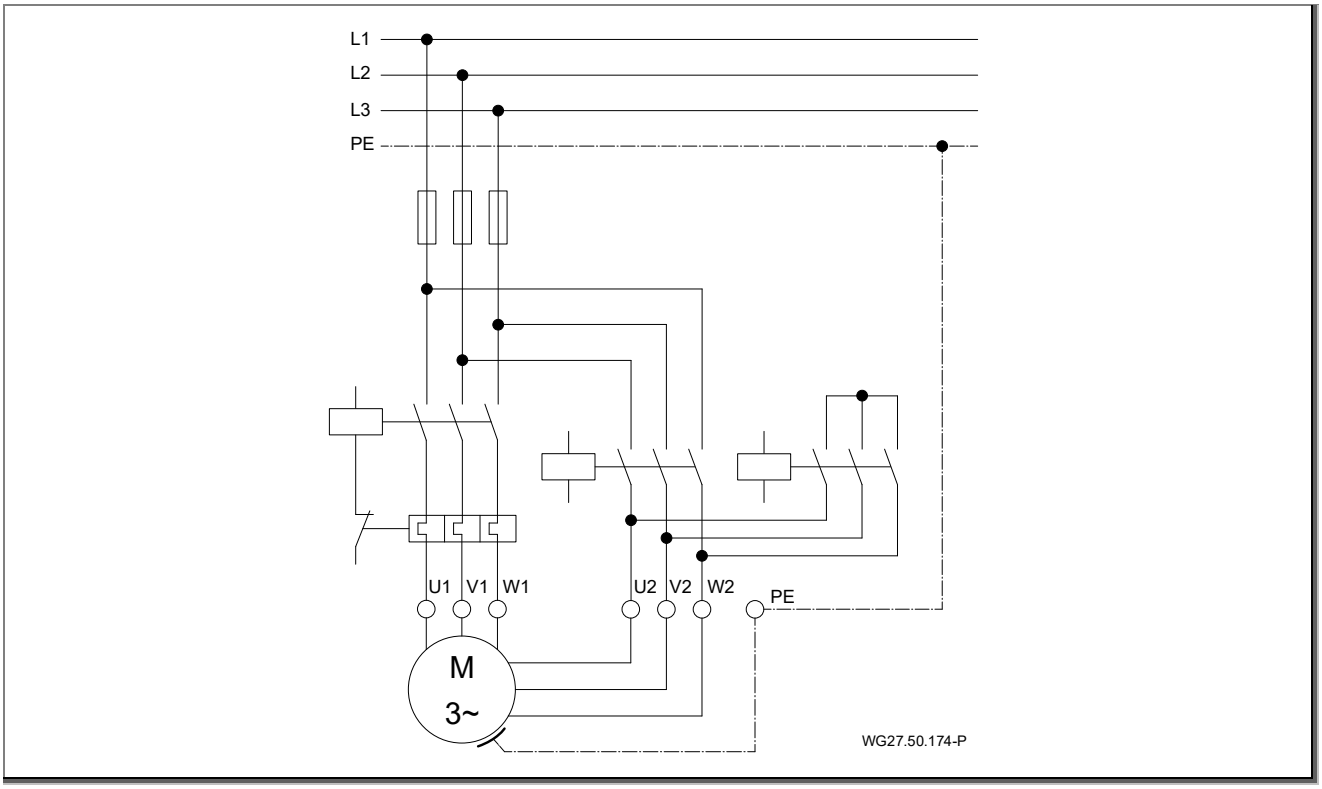



Fig. 3

Power supply:

| | | | |
|---|---|---|---|
| U1: | L2 | U2: | L1 |
| V1: | L1 | V2: | L3 |
| W1: | L3 | W2: | L2 |

### PSC motor connection (1~)

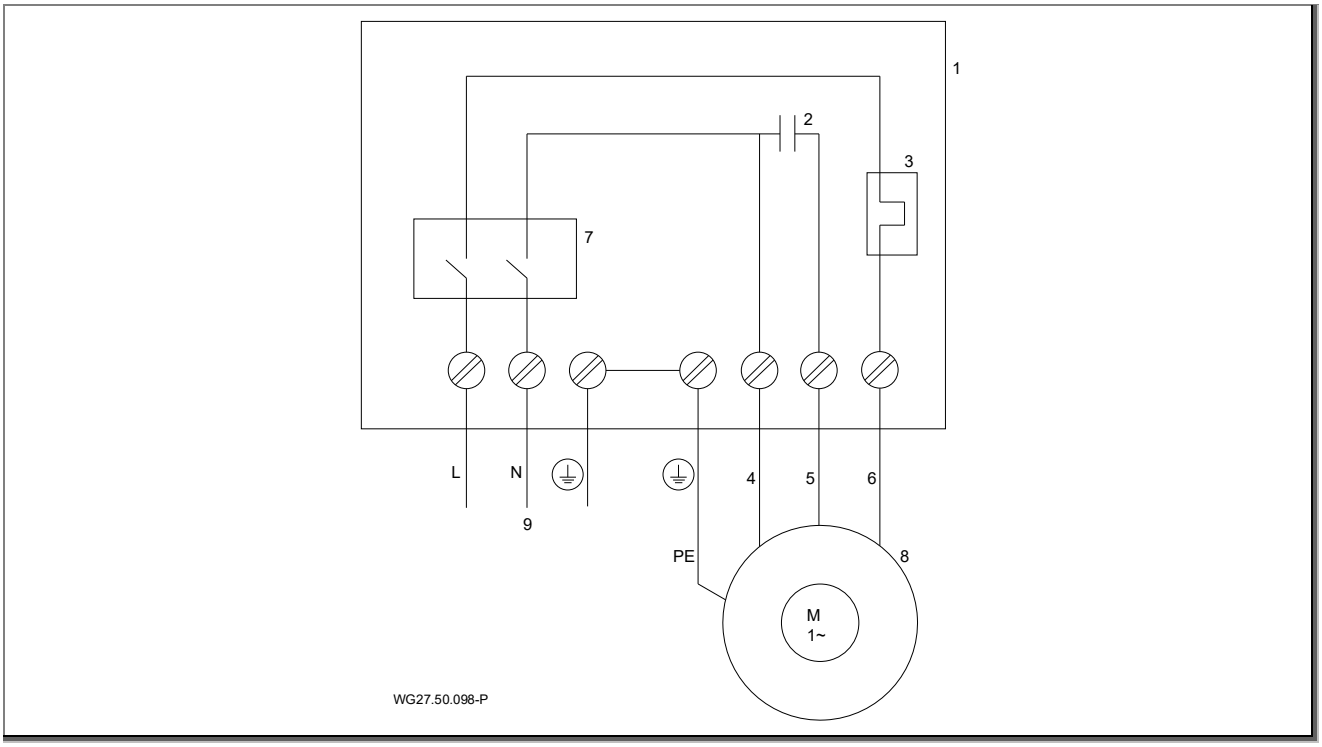



Fig. 4

| | | | |
|---|---|---|---|
| 1 | Housing | 6 | Black |
| 2 | Capacitor | 7 | On/off switch |
| 3 | Motor protection, thermal | 8 | PSC motor |
| 4 | Grey | 9 | 230 V |
| 5 | Brown | PE | Earthing |

**3 wire motor connection (1~)**

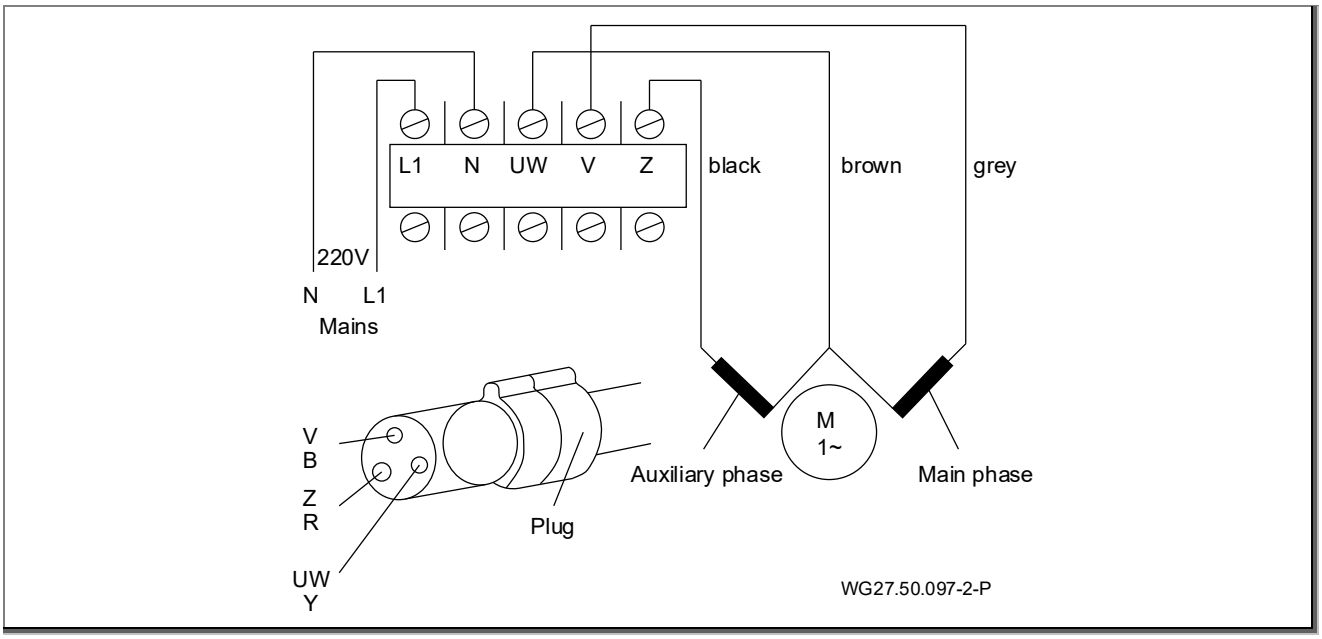



Fig. 5

# 6 Commissioning/Decommissioning

## 6.1 Commissioning

**NOTICE**

The pump/unit can be damaged if it runs dry!

➔ Ensure that the pump/unit is always full of water. This also applies to checking the rotation direction.

### 6.1.1 Mechanics

**NOTICE**

Open the valve in new well units slowly so that the pump doesn't carry any sand. If possible, only open the valve hallway for the first 14 days.

➔ If the pump flow rate exceeds the productivity of the well, operate the pump with a restricted valve.
➔ Never operate the pump against a closed valve.
➔ Install dry running protection if the pump could run dry due to the water level sinking too sharply.
➔ Following commissioning, determine the operating data (power consumption) and compare with the specifications in the technical data in this operating manual.

### 6.1.2 Electrics

**Motor protection:**

**NOTICE**

The motor may only be turned on following the installation of a correctly set motor protection switch (thermal and magnetic) which protects the motor from overloads and phase failure.

**Thermal trigger:**

Only thermal triggers corresponding to VDE 0600 with 20 °C – 40 °C temperature compensation in classes T1 or T2 may be used to protect underwater pumps from overloading. The tripping delay for 500 %/$I_N$ with a cold bimetal must be within 10 seconds in order for example to protect the winding from damage if the motor blocks. Protection relays with differential protection are recommended.

Set: to the measured value of the operating current, however maximum to the motor's nominal current, should the engine load require.

➔ Before commissioning check whether all phases have the full mains voltage. Installation of a voltage monitor is recommended for weak supply networks!
➔ Check all electric connections as well as protection switch settings and fuse sizes and turn the motor on.
➔ Filling the motor with water is not necessary as the motor is already full and hermetically sealed before shipping.
➔ Measure the motor's operating current in all phases and compare with the nominal ratings on the performance plate.

**NOTICE**

Exceeding the motor's nominal current is not permitted!

➔ Measure the mains voltage in operation.

**NOTICE**

Permitted voltage tolerances ± 5 % according to VDE 0530.

**Franklin motors:**

1. Remove the protection cap for the motor connection cable on the motor.
2. Check the cleanliness of the plug connection and clean it if necessary.
3. Lightly coat the cable connection plug with silicone oil, insert it and tighten (4.5 – 5.0 Nm).
4. Remove the pump's cable protection track.
5. Align the pump according to the motor (mounting bolts).
6. Tighten the mounting nuts diagonally. If possible, check the torque with a power wrench.

| Motor Ø | UNF thread | Torque (NM) |
|---|---|---|
| 4“ | 5/16“ – 24 | 20 - 27 |
| 6“ | 1/2“ – 20 | 30 - 40 |

7. Align the motor cable lengthways along the pump and fasten it below the cable protection track.

**Connection of underwater motors/start-up devices for single-phase motors**

1. Assemble the start-up device supplied with the built-in motor protection vertically.
2. Connect motors according to the circuit diagram.

### 6.1.3 Direction of rotation for pumps and motors

In order to determine the direction of rotation, carry out the following steps:

1. Close the shut-off valve between the pump and pressure vessel.
2. Read the pressure value (highest pressure minus installation depth/water level) from the built-in pressure gauge (between pump and shut-off valve).
3. If the pressure is too low, 2 phases (for three phase motors) must be swapped.

### 6.1.4 Switching frequency

A switching frequency of max. 20 switches per second is recommended in order to increase the operating life of the pump. Switching time three minutes, recommended standstill ratio 50:50.

➔ Should the values differ, contact the supplier.

### 6.1.5 Connection for switching device

See the switching diagrams on pages 22 and 23 for the phase descriptions of a single-phase motor.

**Connect the switching devices as follows:**

1. Disconnect the motor from the switching device.
2. Randomly number the four strands from 1 to 4.
3. Measure and note the ohmic value between all four strands against each other.

   **Evaluation:**

   The smallest resistance is in the main phase connections (brown to grey). The next largest resistance is in the auxiliary phase connections (brown to black).
   The mutual connection from a and b is the UW phase (brown). The connection shown infinitely on the ohmmeter is the earthing connection yellow/green.

# 7 Faults

## 7.1 Overview

**Problem:** Pump doesn’t run.

| Possible cause | Solution |
|---|---|
| No voltage. | ➔ Contact the energy supplier. |
| Burnt fuse | ➔ Replace the fuse; if the problem recurs check the electrical connection. |
| Motor protection triggered. | ➔ Turn the motor protection on; if the problem recurs check the electrical connection. |
| Magnetic coil in the motor protection switch/ contactor is short circuited (does not turn on). | ➔ Replace coil, check the coil voltage. |
| Contacts in the motor protection switch/contactor are damaged. | ➔ Replace motor protection switch/contactor. |
| Control current cycle failed or is damaged. | ➔ Check the control fuse/ control current cycle and contacts in the control unit. |
| Pump is turned off due to running dry. | ➔ Check the installation height of the dry run protection.<br>➔ Check and adjust the pressure switch settings. |
| Motor or cable is damaged. | ➔ Check the motor and cable using resistance measures. |

**Problem:** No flow rate; motor turns

| Possible cause | Solution |
|---|---|
| Insufficient fluid level. | ➔ Check whether the water level is min. 1 m above the pump’s inlet section during operation. |
| Non-return valve is blocked in closed position. | ➔ Remove the power supply and replace or repair the valve. |
| Strainer basket is clogged. | ➔ Remove the power supply and clean the strainer basket in the inlet section. |
| Pump is damaged. | ➔ Remove the power supply, disassemble the pump, clean it and check it. Replace damaged parts. |

**Problem:** Pump turns on without water extraction

| Possible cause | Solution |
|---|---|
| Pipework is leaky. | ➔ Check and repair pipework. |
| Riser is damaged. | ➔ Repair or replace riser. |
| Non-return valve is leaky. | ➔ Repair or replace non-return valve. |

**Problem:** Too low a flow rate in the pump.

| Possible cause | Solution |
|---|---|
| Incorrect direction of rotation (3~). | ➔ Correct the direction of rotation. |
| Drop in the water level is greater than anticipated. | ➔ Check the drop during operation and compare it to the well and pump data.<br>➔ Install the pump deeper, reduce the drop or replace the pump with a smaller model. |
| Valves in the pressure line are partly closed/blocked. | ➔ Maintain the valves. |
| Pressure line partly blocked due to impurities. | ➔ Clean or replace pressure line.<br>➔ Exchange the pump for a model with a higher pressure head. |
| Pump or non-return valve blocked. | ➔ Repair or replace valve. |
| Pump or pipework dirty or partly blocked. | ➔ Disassemble, clean and check the pump and pipework.<br>➔ Replace damaged and/or worn parts. |
| Pump is damaged. | ➔ Disassemble, clean and check the pump.<br>➔ Replace damaged and/or worn parts. |
| Riser is damaged. | ➔ Repair or replace pipework. |

**Problem:** Frequent stopping and starting of the pump.

| Possible cause | Solution |
|---|---|
| The difference in the pressure switch between switching on and off is too small. | ➔ Increase the difference (switch-off pressure may not exceed the operating pressure of the vessel; switch-on pressure must be high enough to guarantee sufficient water supply). |
| Electrodes in the water level control or water level switch in the container are not installed correctly. | ➔ Set the intervals for the electrodes so that a reasonable amount of time is left between switching the pump on and off (if there is no automatic set up, reduce the pump performance via the throttle). |
| Non-return valve is leaky. | ➔ Repair or replace non-return valve. |
| Too low an air volume in the pressure vessel/diaphragm pressure vessel. | ➔ Pump air in (galvanised vessel: until the air pressure is approx. 2/3 of the whole pressure vessel volume when switching on).<br>➔ Check and if necessary expand the pre-compression every 6 months for diaphragm pressure vessels. |
| Pressure vessel/diaphragm pressure vessel is too small. | ➔ Increase the volume of the vessel. |

# 8 Maintenance

➔ The submersible pumps are generally maintenance-free.

**NOTICE**

Only carry work out on the pump with the power switched off.

| When? | What? |
|---|---|
| Regularly | ➔ Check power consumption.<br>➔ Check dynamic head (if possible). |

Contact customer services if the power cable is faulty.

## 8.1 Suggestion for winter conditions

For pumps that could be subjected to frost during the winter.

➔ Drain the piping.

➔ The pump should be removed during the frost period and stored vertically in a dry room.

## 8.2 Warranty

The warranty includes the devices delivered and all components. However natural wear and tear (DIN 3151/DIN-EN 13306) on all turning and dynamically loaded components, including electronic components under tension, is not covered under the warranty.

Failure to comply with the safety instructions may void the warranty.

# 9 Disposal

➔ Collect harmful media and dispose of it according to the regulations.

➔ At the end of its service life, the pump/unit or individual components must be disposed of correctly. Disposal in the household waste is not permitted!

➔ Dispose of the packaging materials in the household waste in accordance with the local regulations.

# 10 Technical data

**2850 rpm underwater motors**

| **Motor performance [kW]** | **0.25** | **0.37** | **0.55** | **0.75** | **1.10** | **1.50** | **2.20** |
|---|---|---|---|---|---|---|---|
| Power consumption $I_N$ for 3~ 400 V [A] | 0.68 | 1.10 | 1.60 | 2.00 | 2.80 | 3.90 | 5.50 |
| Power consumption $I_N$ for 1~ 230 V [A] | 2.40 | 3.30 | 4.30 | 5.70 | 8.40 | 10.7 | 14.7 |

| **Motor performance [kW]** | **3.00** | **3.70** | **4.00** | **5.50** | **7.50** | **9.30** | **11.0** |
|---|---|---|---|---|---|---|---|
| Power consumption $I_N$ for 3~ 400 V [A] | 7.50 | 9.00 | 9.90 | 12.5 | 16.0 | 20.7 | 23.3 |
| Power consumption $I_N$ for 1~ 230 V [A] | - | - | - | - | - | - | - |

| **Motor performance [kW]** | **15.0** | **18.5** | **22.0** | **30.0** |
|---|---|---|---|---|
| Power consumption $I_N$ for 3~ 400 V [A] | 31.3 | 38.5 | 45.3 | 63.5 |
| Power consumption $I_N$ for 1~ 230 V [A] | - | - | - | - |

**50 Hz winding resistance for underwater motors**

| 4“ [kW] | 230 V 1~ [Ohm] | |
|---|---|---|
| | Main phase | Auxiliary phase |
| 0.25 | 8.20 – 10.0 | 31.1 – 38.1 |
| 0.37 | 6.70 – 8.10 | 21.7 – 26.5 |
| 0.55 | 4.40 – 5.40 | 13.6 – 16.6 |
| 0.75 | 3.30 – 4.10 | 8.10 – 9.90 |
| 1.10 | 2.30 – 2.80 | 6.80 – 8.30 |
| 1.50 | 1.80 – 2.20 | 4.70 – 5.70 |
| 2.20 | 1.20 – 1.50 | 3.20 – 3.90 |

| 4“ [kW] | 400 V 3~ [Ohm] |
|---|---|
| 0.25 | 66.0 |
| 0.37 | 44.8 – 54.8 |
| 0.55 | 34.2 – 41.8 |
| 0.75 | 23.2 – 28.3 |
| 1.10 | 13.8 – 16.8 |
| 1.50 | 10.9 – 13.4 |
| 2.20 | 7.10 – 8.60 |
| 3.00 | 4.70 – 5.80 |
| 3.70 | 3.70 – 4.50 |
| 4.00 | 3.30 – 4.00 |
| 5.50 | 2.60 – 3.20 |
| 7.50 | 1.90 – 2.30 |

| 6“ [kW] | 400 V 3~ [Ohm], direct | 400 V 3~ [Ohm], Y/Δ |
|---|---|---|
| 5.50 | 2.20 – 2.70 | 3.70 – 4.50 |
| 7.50 | 1.70 – 2.20 | 2.40 – 2.90 |
| 9.30 | 1.25 – 1.55 | 1.94 – 2.38 |
| 11.0 | 1.05 – 1.30 | 1.64 – 2.00 |
| 15.0 | 0.75 – 0.94 | 1.22 – 1.50 |
| 18.5 | 0.59 – 0.73 | 0.93 – 1.15 |
| 22.0 | 0.48 – 0.60 | 0.74 – 0.92 |
| 30.0 | 0.32 – 0.40 | 0.50 – 0.61 |
| 37.0 | 0.25 – 0.32 | 0.36 – 0.45 |

**Required cable cross sections**

| Cable length [m] | 20 | 30 | 40 | 50 | 70 | 100 | $I_A$ [A] |
|---|---|---|---|---|---|---|---|
| P2 [kW] | Cable cross section [mm²] | | | | | | * |
| **Single-phase 230 V** | | | | | | | |
| 0.25 | 1.50 | 1.50 | 1.50 | 1.50 | 2.50 | 2.50 | 9.40 |
| 0.37 | 1.50 | 1.50 | 1.50 | 1.50 | 2.50 | 2.50 | 12.6 |
| 0.55 | 1.50 | 1.50 | 1.50 | 2.50 | 2.50 | 4.00 | 17.7 |
| 0.75 | 1.50 | 1.50 | 2.50 | 2.50 | 4.00 | 4.00 | 22.7 |
| 1.10 | 1.50 | 2.50 | 2.50 | 4.00 | 4.00 | 6.00 | 33.9 |
| 1.50 | 1.50 | 2.50 | 4.00 | 4.00 | 6.00 | 10.0 | 41.7 |
| 2.20 | 2.50 | 4.00 | 4.00 | 6.00 | 10.0 | 10.0 | 61.8 |
| **Three phase 400 V: Direct start-up** | | | | | | | |
| 0.25 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 3.67 |
| 0.37 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 5.41 |
| 0.55 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 7.40 |
| 0.75 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 10.6 |
| 1.10 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 16.0 |
| 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 20.7 |
| 2.20 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 2.50 | 29.8 |
| 3.00 | 1.50 | 1.50 | 1.50 | 1.50 | 2.50 | 2.50 | 42.0 |
| 3.70 | 1.50 | 1.50 | 1.50 | 1.50 | 2.50 | 2.50 | 52.3 |
| 4.00 | 1.50 | 1.50 | 1.50 | 1.50 | 2.50 | 4.00 | 57.0 |
| 5.50 | 1.50 | 1.50 | 2.50 | 2.50 | 4.00 | 4.00 | 77.2 |
| 7.50 | 2.50 | 2.50 | 4.00 | 4.00 | 6.00 | 6.00 | 99.3 |
| **Three phase 400 V: Star-delta start-up** | | | | | | | |
| 5.50 | 1.50 | 1.50 | 1.50 | 1.50 | 2.50 | 2.50 | 64.0 |
| 7.50 | 1.50 | 1.50 | 1.50 | 2.50 | 2.50 | 4.00 | 83.0 |
| 9.3 | 1.50 | 1.50 | 2.50 | 2.50 | 4.00 | 6.00 | 112 |
| 11.0 | 2.50 | 2.50 | 2.50 | 4.00 | 4.00 | 6.00 | 129 |
| 15.0 | 2.50 | 2.50 | 4.00 | 4.00 | 6.00 | 6.00 | 169 |
| 18.5 | 2.50 | 4.00 | 4.00 | 4.00 | 6.00 | 10.0 | 231 |
| 22.0 | 4.00 | 4.00 | 4.00 | 6.00 | 10.0 | 10.0 | 268 |
| 30.0 | 6.00 | 6.00 | 6.00 | 6.00 | 10.0 | 16.0 | 393 |
| 37.0 | 10.0 | 10.0 | 10.0 | 10.0 | 16.0 | 16.0 | 411 |

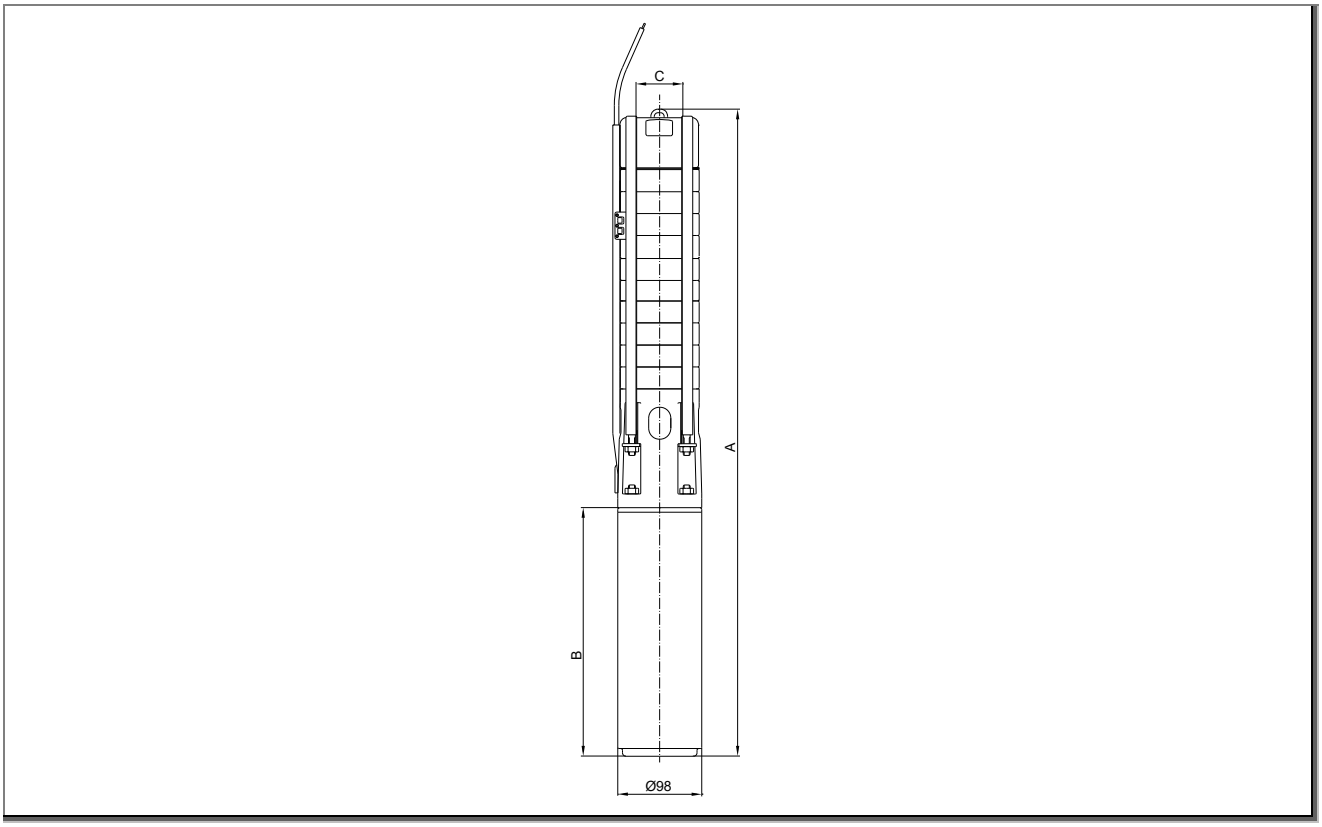
For 400 V Y/Δ two cables are required each (for example 2 x 4 x 4 mm²).

*:Starting current $I_A$

The cables are configured according to the maximum permitted safeguarding and power load according to VDE. Laying a standard power cable (earth cable) well above the maximum water level is recommended, as an underwater cable is not necessary and expensive. In the bordering area the cable should be configured one cross section larger, especially when it is subjected to higher ambient temperatures (direct sunlight).

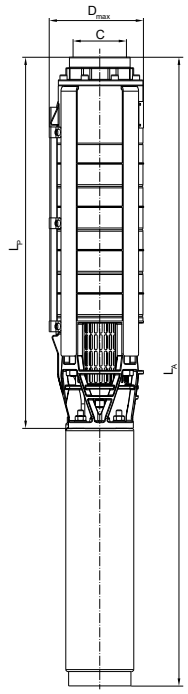
## 10.1 Dimensional drawing

**SUPS 4“**

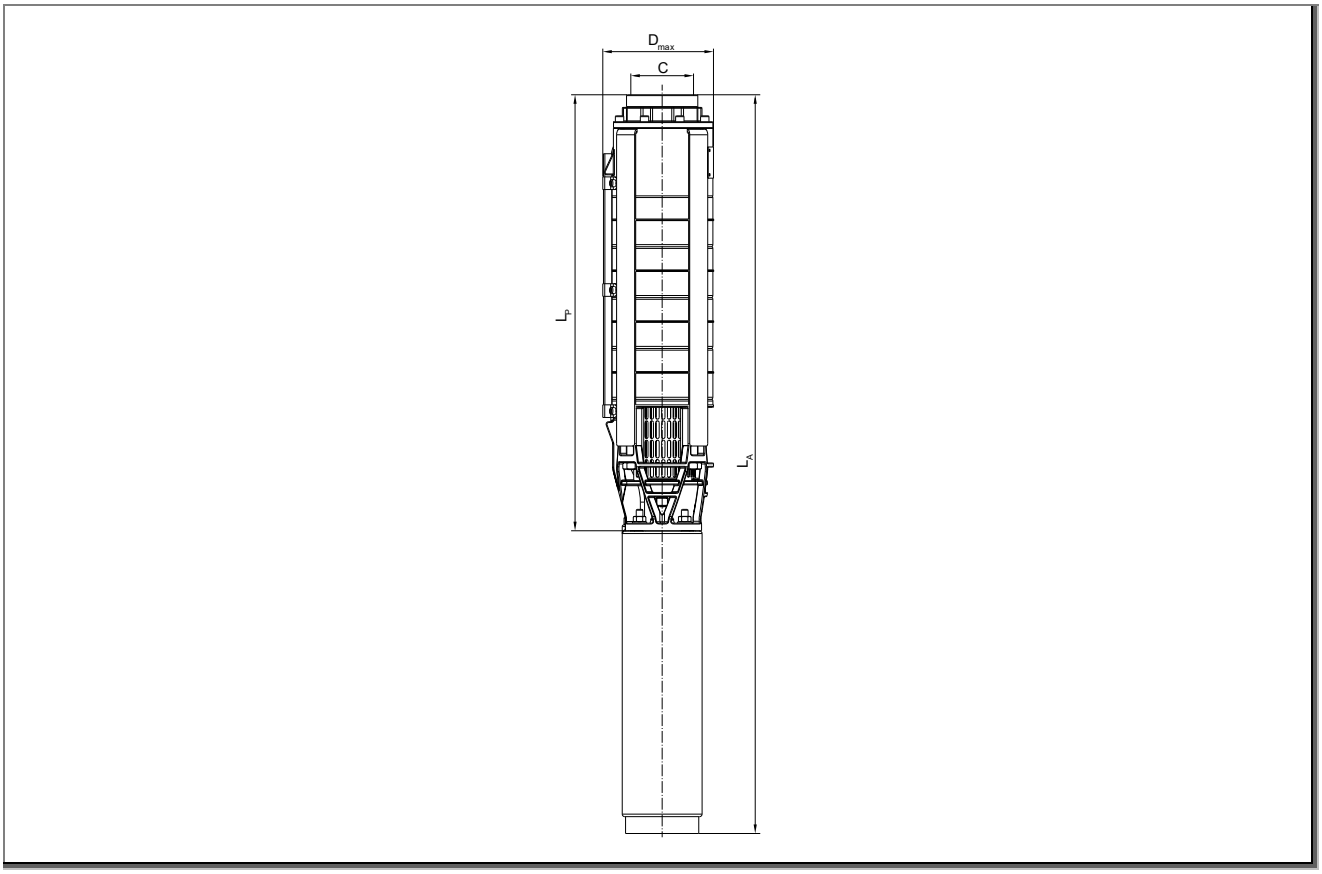



| SUPS | A 3~/1~ | B 3~/1~ | C [Rp] | | SUPS | A 3~/1~ | B 3~/1~ | C [Rp] |
|---|---|---|---|---|---|---|---|---|
| **3-6** | 557/571 | 237/251 | 1 ¼ | | **9-3** | 529/546 | 237/251 | 1 ½ |
| **3-9** | 646/671 | 251/276 | 1 ¼ | | **9-4** | 580/605 | 251/276 | 1 ½ |
| **3-12** | 741/767 | 271/297 | 1 ¼ | | **9-6** | 674/700 | 271/297 | 1 ½ |
| **3-15** | 842/866 | 297/321 | 1 ¼ | | **9-9** | 811/835 | 297/321 | 1 ½ |
| **3-19** | 942/966 | 297/321 | 1 ¼ | | **9-12** | 946/978 | 321/353 | 1 ½ |
| **3-22** | 1041/1073 | 321/353 | 1 ¼ | | **9-15** | 1089/1187 | 353/451 | 1 ½ |
| **3-25** | 1116/1148 | 321/353 | 1 ¼ | | **9-19** | 1237/1335 | 353/451 | 1 ½ |
| **3-29** | 1248/1346 | 353/451 | 1 ¼ | | **9-22** | 1403/- | 408/- | 1 ½ |
| **3-33** | 1348/1446 | 353/451 | 1 ¼ | | **9-25** | 1514/- | 408/- | 1 ½ |
| **3-40** | 1523/1621 | 353/451 | 1 ¼ | | **9-28** | 1737/- | 520/- | 1 ½ |
| | | | | | **9-31** | 1848/- | 520/- | 1 ½ |
| | | | | | **9-34** | 1982/- | 543/- | 1 ½ |
| **5-5** | 532/546 | 237/251 | 1 ½ | | **15-2** | 590/- | 251/- | 2 |
| **5-7** | 596/621 | 251/276 | 1 ½ | | **15-4** | 751/- | 282/- | 2 |
| **5-9** | 666/692 | 271/297 | 1 ½ | | **15-5** | 841/- | 307/- | 2 |
| **5-12** | 767/791 | 297/321 | 1 ½ | | **15-8** | 1068/- | 339/- | 2 |
| **5-15** | 842/866 | 297/321 | 1 ½ | | **15-11** | 1318/- | 394/- | 2 |
| **5-19** | 966/998 | 321/353 | 1 ½ | | **15-14** | 1639/- | 520/- | 2 |
| **5-24** | 1123/1221 | 353/451 | 1 ½ | | **15-15** | 1727/- | 543/- | 2 |
| **5-29** | 1248/1346 | 353/451 | 1 ½ | | **15-18** | 2032/- | 653/- | 2 |
| **5-35** | 1453/- | 408/- | 1 ½ | | **15-21** | 2227/- | 653/- | 2 |
| | | | | | **15-24** | 2500/- | 731/- | 2 |
| | | | | | **15-27** | 2695/- | 731/- | 2 |
| | | | | | **15-29** | 2825/- | 731/- | 2 |

**SUPS 6“**



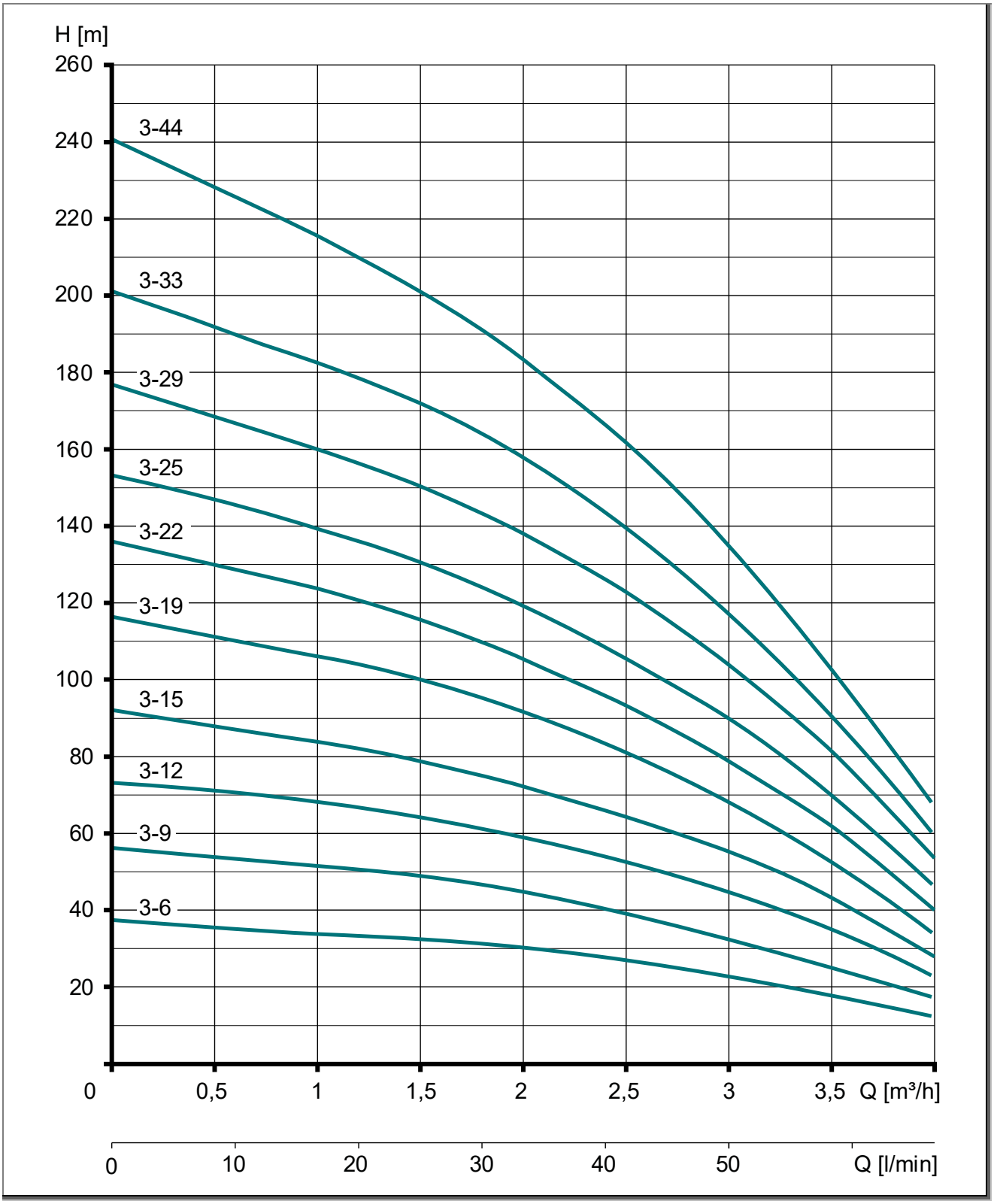

| SUPS | Motor-Ø | $L_A$ | $L_P$ | Dmax | C |
|---|---|---|---|---|---|
| 18-1 | 4“ | 572 | 321 | 138 | 2 ½ |
| 18-2 | 4“ | 678 | 381 | 138 | 2 ½ |
| 18-3 | 4“ | 785 | 442 | 138 | 2 ½ |
| 18-4 | 4“ | 855 | 502 | 138 | 2 ½ |
| 18-5 | 4“ | 971 | 563 | 138 | 2 ½ |
| 18-6 | 4“ | 1166 | 623 | 138 | 2 ½ |
| 18-7 | 4“ | 1227 | 684 | 138 | 2 ½ |
| 18-8 | 6“ | 1351 | 747 | 140 | 2 ½ |
| 18-9 | 6“ | 1412 | 808 | 140 | 2 ½ |
| 18-10 | 6“ | 1472 | 868 | 140 | 2 ½ |
| 18-11 | 6“ | 1565 | 929 | 140 | 2 ½ |
| 18-12 | 6“ | 1625 | 989 | 140 | 2 ½ |
| 18-13 | 6“ | 1686 | 1050 | 140 | 2 ½ |
| 18-14 | 6“ | 1778 | 1110 | 140 | 2 ½ |
| 18-15 | 6“ | 1738 | 1171 | 140 | 2 ½ |
| 18-16 | 6“ | 1899 | 1231 | 140 | 2 ½ |
| 18-17 | 6“ | 1960 | 1292 | 140 | 2 ½ |
| 28-1 | 4“ | 665 | 368 | 139 | 3 |
| 28-2 | 4“ | 817 | 464 | 139 | 3 |
| 28-3 | 4“ | 968 | 560 | 139 | 3 |
| 28-4 | 4“ | 1199 | 656 | 139 | 3 |
| 28-5 | 6“ | 1362 | 758 | 142 | 3 |
| 28-6 | 6“ | 1458 | 854 | 142 | 3 |
| 28-7 | 6“ | 1586 | 950 | 142 | 3 |
| 28-8 | 6“ | 1682 | 1046 | 142 | 3 |
| 28-9 | 6“ | 1410 | 1142 | 142 | 3 |
| 28-10 | 6“ | 1906 | 1238 | 142 | 3 |
| 28-11 | 6“ | 2002 | 1334 | 142 | 3 |
| 28-12 | 6“ | 2141 | 1430 | 142 | 3 |
| 28-13 | 6“ | 2237 | 1526 | 142 | 3 |
| 28-14 | 6“ | 2398 | 1622 | 142 | 3 |
| 28-15 | 6“ | 2494 | 1718 | 142 | 3 |
| 28-16 | 6“ | 2590 | 1814 | 142 | 3 |
| 28-17 | 6“ | 2686 | 1910 | 142 | 3 |



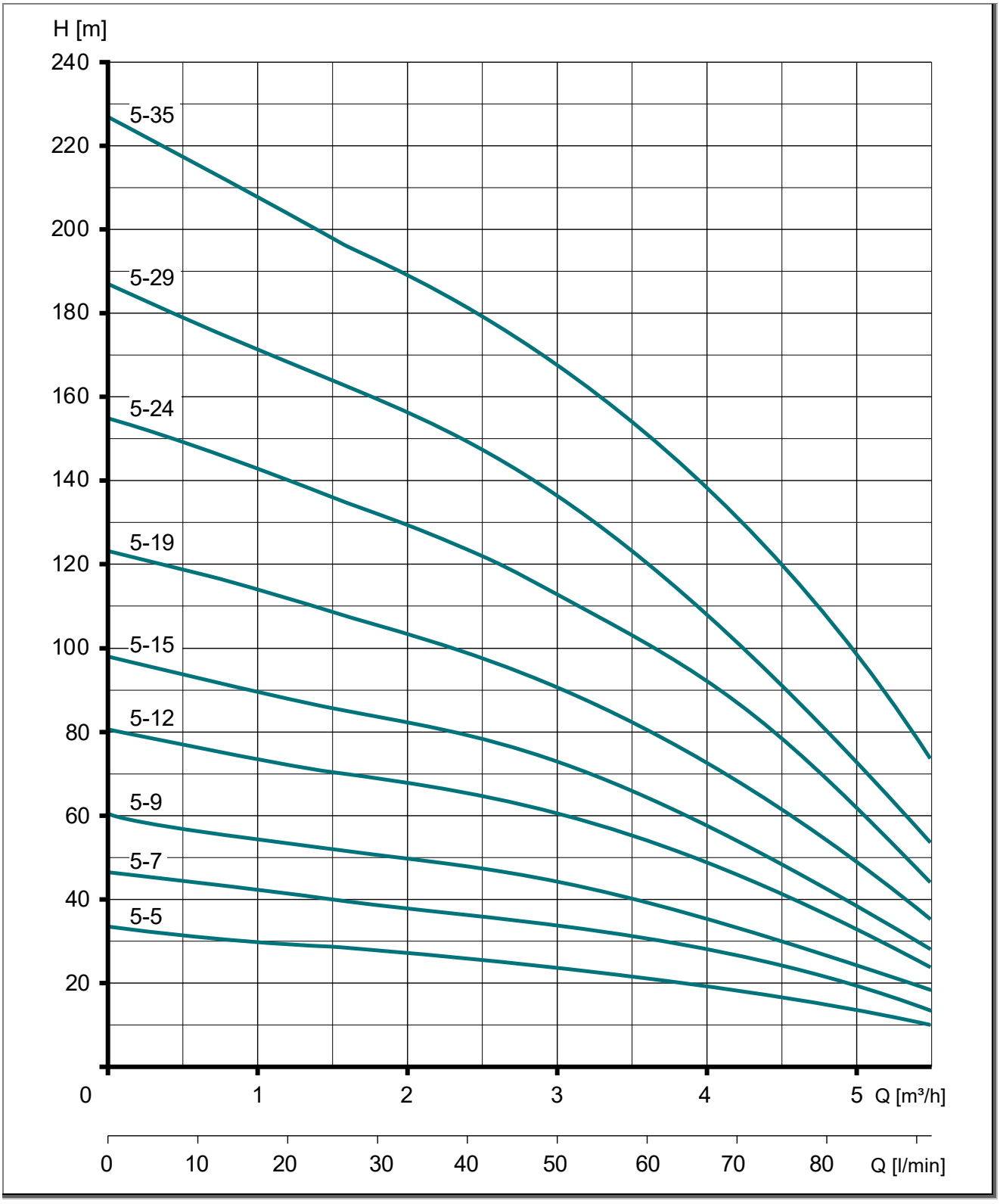

| SUPS | Motor-Ø | $L_A$ | $L_P$ | Dmax | C |
|---|---|---|---|---|---|
| 46-1 | 4“ | 738 | 385 | 150 | 3 |
| 46-2 | 4“ | 906 | 498 | 150 | 3 |
| 46-3 | 6“ | 1218 | 614 | 150 | 3 |
| 46-4 | 6“ | 1363 | 727 | 150 | 3 |
| 46-5 | 6“ | 1476 | 840 | 150 | 3 |
| 46-6 | 6“ | 1621 | 953 | 150 | 3 |
| 46-7 | 6“ | 1777 | 1066 | 150 | 3 |
| 46-8 | 6“ | 1955 | 1179 | 150 | 3 |
| 46-9 | 6“ | 2068 | 1292 | 150 | 3 |
| 46-10 | 6“ | 2181 | 1405 | 150 | 3 |
| 46-11 | 6“ | 2360 | 1518 | 150 | 3 |
| 46-12 | 6“ | 2473 | 1631 | 150 | 3 |
| 46-13 | 6“ | 2651 | 1744 | 150 | 3 |
| 46-14 | 6“ | 2764 | 1857 | 150 | 3 |
| 46-15 | 6“ | 2877 | 1970 | 150 | 3 |
| 58-1 | 4“ | 711 | 358 | 150 | 4 |
| 58-2 | 4“ | 1057 | 498 | 150 | 4 |
| 58-3 | 6“ | 1218 | 614 | 150 | 4 |
| 58-4 | 6“ | 1363 | 727 | 150 | 4 |
| 58-5 | 6“ | 1508 | 840 | 150 | 4 |
| 58-6 | 6“ | 1664 | 953 | 150 | 4 |
| 58-7 | 6“ | 1842 | 1066 | 150 | 4 |
| 58-8 | 6“ | 1955 | 1179 | 150 | 4 |
| 58-9 | 6“ | 2134 | 1292 | 150 | 4 |
| 58-10 | 6“ | 2247 | 1405 | 150 | 4 |
| 58-11 | 6“ | 2424 | 1518 | 150 | 4 |
| 58-12 | 6“ | 2538 | 1631 | 150 | 4 |
| 58-13 | 6“ | 2781 | 1744 | 150 | 4 |
| 58-14 | 6“ | 2894 | 1857 | 150 | 4 |
| 58-15 | 6“ | 3007 | 1970 | 150 | 4 |

## 10.2 Characteristics

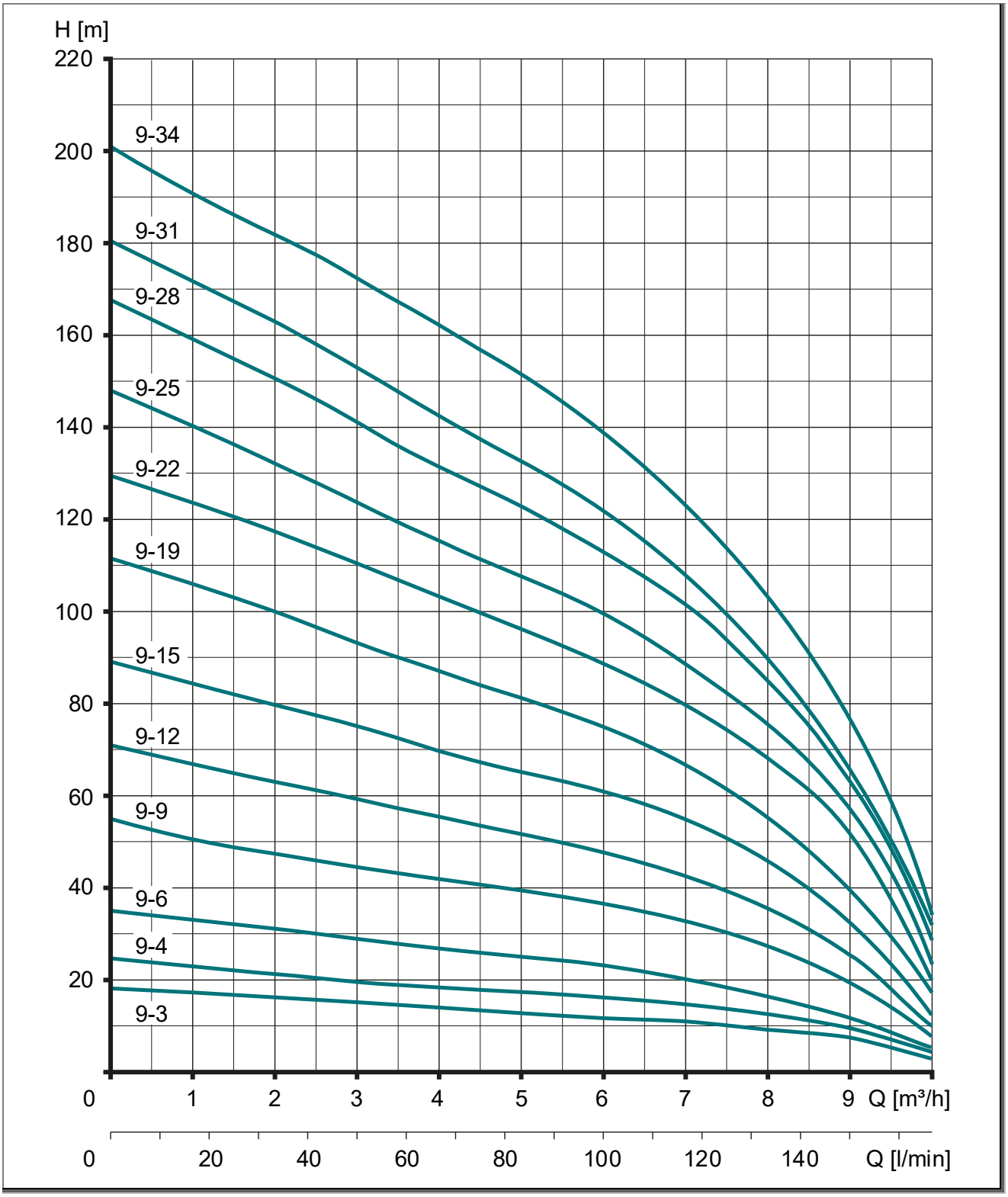
**SUPS 3**



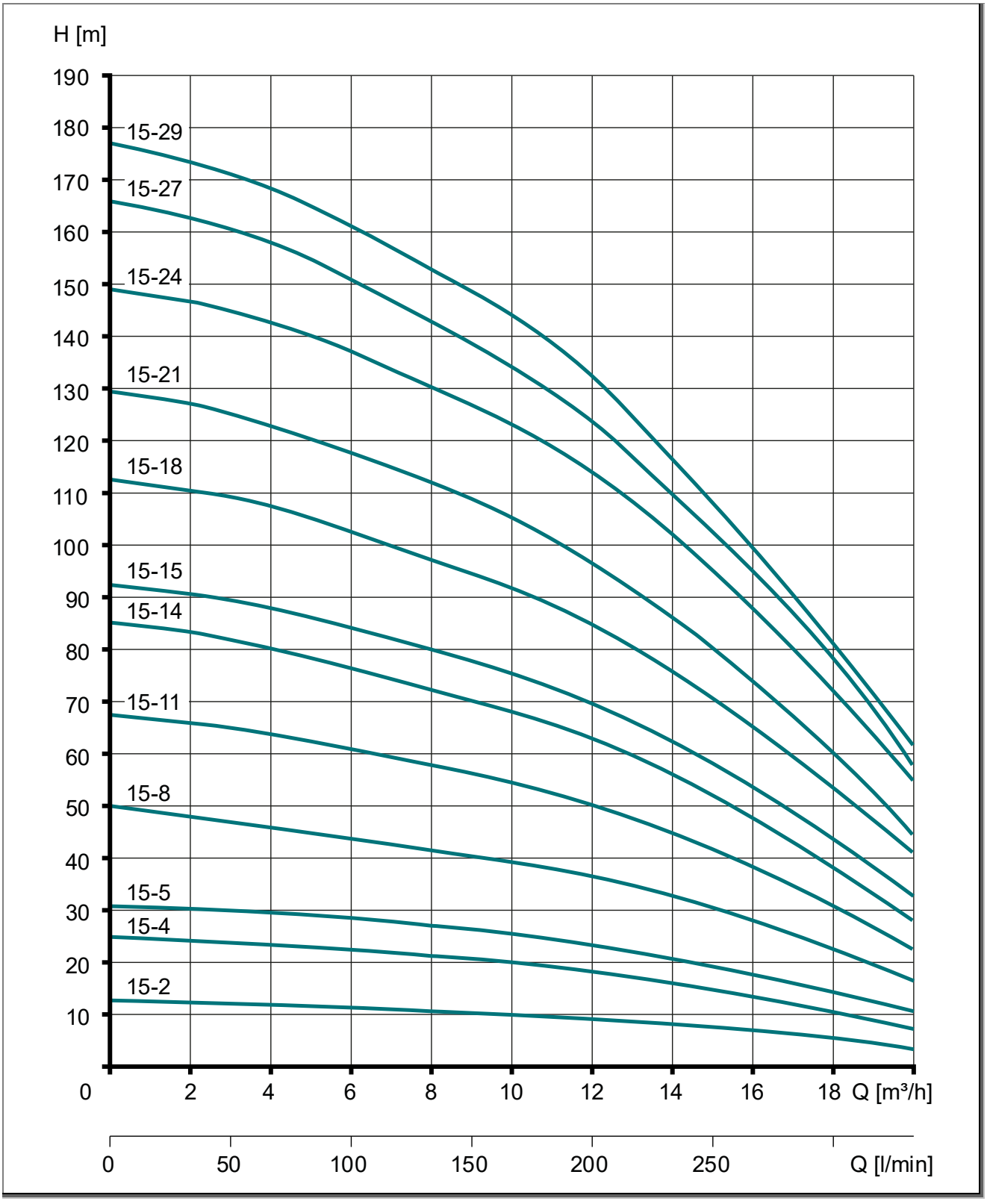
**SUPS 5**


H [m]
240
220
200
180
160
140
120
100
80
60
40
20
0
5-35
5-29
5-24
5-19
5-15
5-12
5-9
5-7
5-5
1
2
3
4
5
Q [m³/h]
0
10
20
30
40
50
60
70
80
Q [l/min]

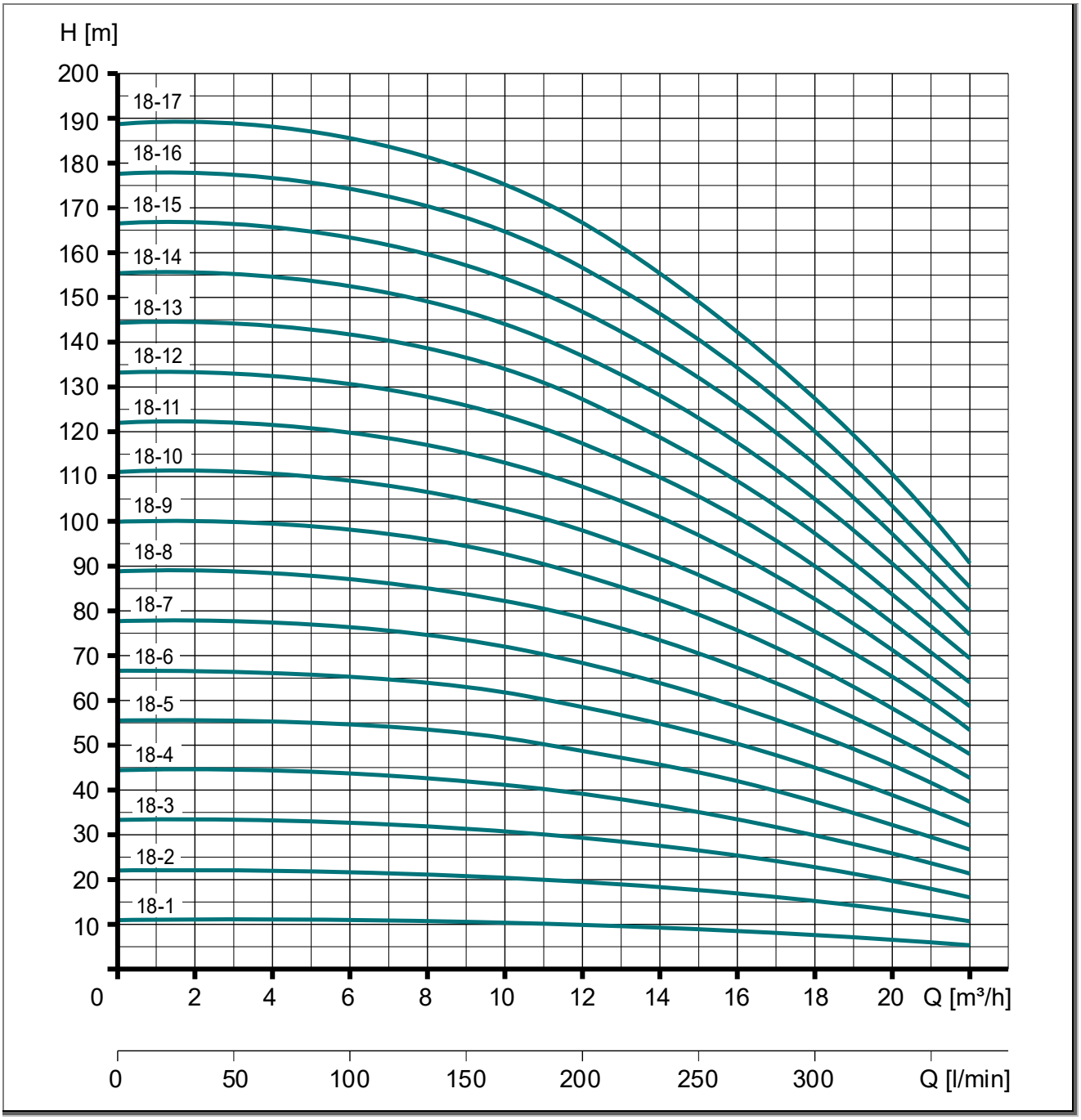
**SUPS 9**


H [m]
220
200
180
160
140
120
100
80
60
40
20
9-34
9-31
9-28
9-25
9-22
9-19
9-15
9-12
9-9
9-6
9-4
9-3
0
1
2
3
4
5
6
7
8
9
Q [m³/h]
0
20
40
60
80
100
120
140
Q [l/min]

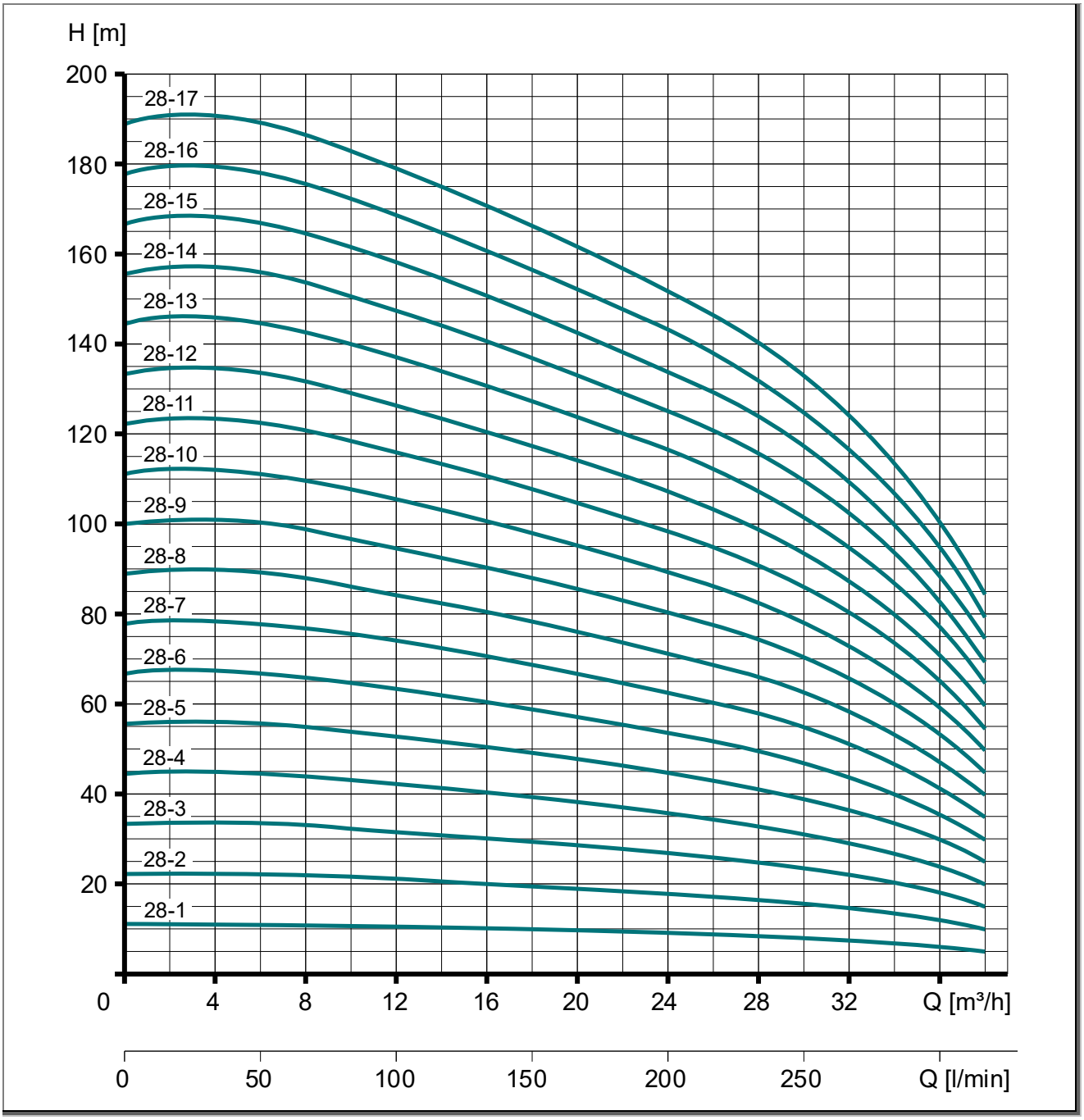
**SUPS 15**


H [m]
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
15-29
15-27
15-24
15-21
15-18
15-15
15-14
15-11
15-8
15-5
15-4
15-2
0
2
4
6
8
10
12
14
16
18
Q [m³/h]
0
50
100
150
200
250
Q [l/min]

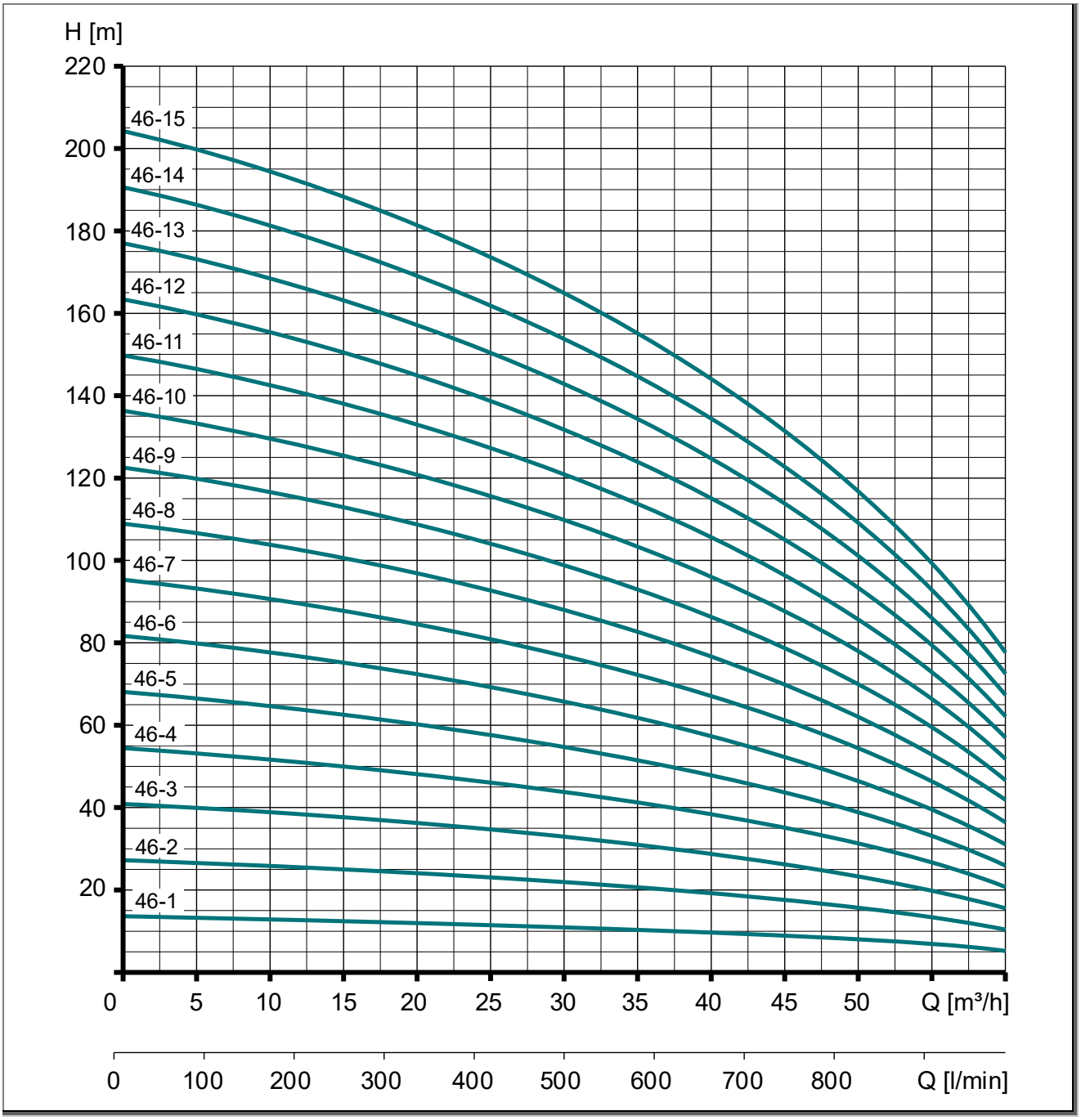
**SUPS 18**


H [m]
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
18-17
18-16
18-15
18-14
18-13
18-12
18-11
18-10
18-9
18-8
18-7
18-6
18-5
18-4
18-3
18-2
18-1
0
2
4
6
8
10
12
14
16
18
20
Q [m³/h]
0
50
100
150
200
250
300
Q [l/min]

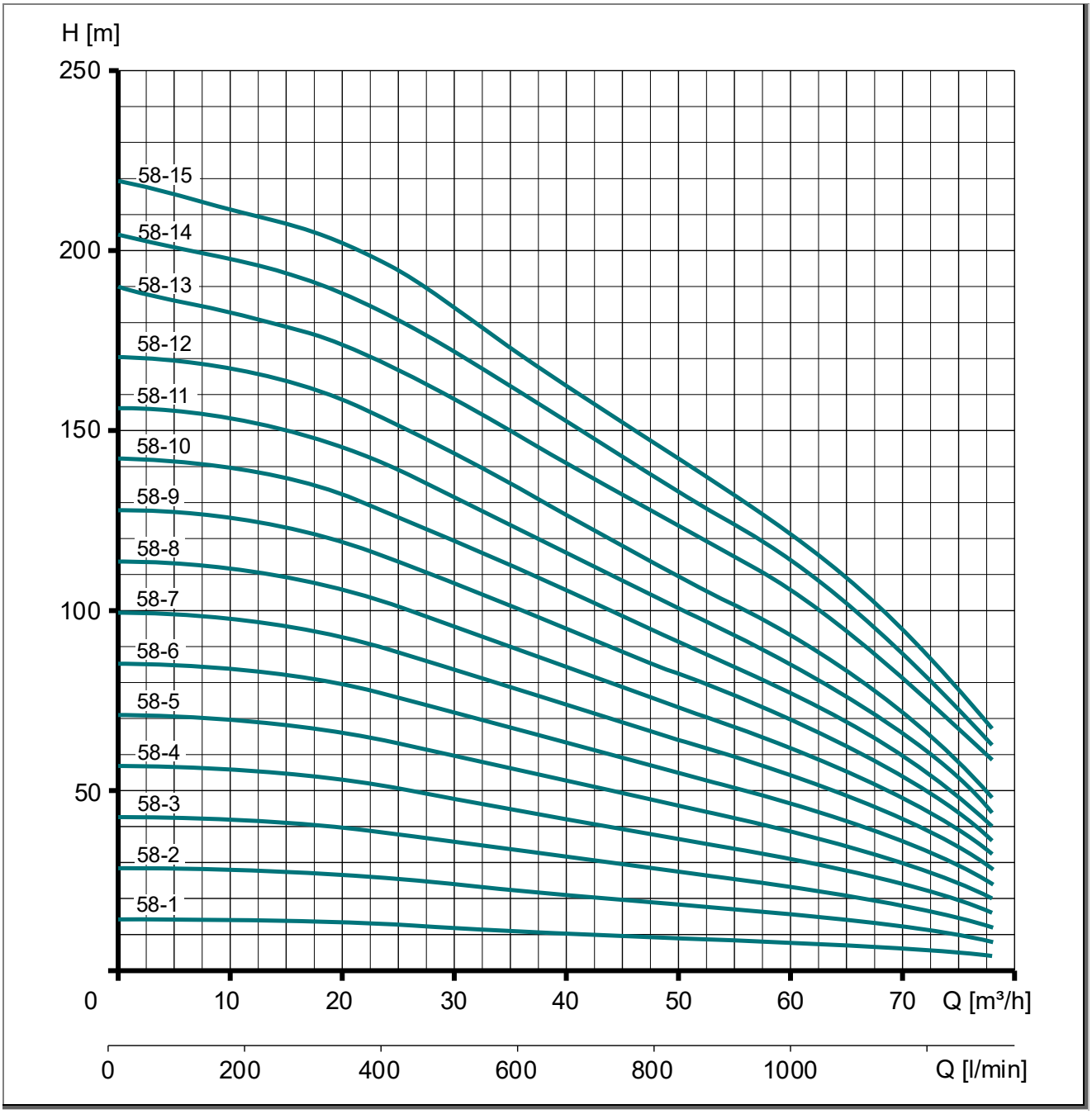
**SUPS 28**


H [m]
200
180
160
140
120
100
80
60
40
20
28-17
28-16
28-15
28-14
28-13
28-12
28-11
28-10
28-9
28-8
28-7
28-6
28-5
28-4
28-3
28-2
28-1
0
4
8
12
16
20
24
28
32
Q [m³/h]
0
50
100
150
200
250
Q [l/min]

**SUPS 46**


H [m]
220
200
180
160
140
120
100
80
60
40
20
46-15
46-14
46-13
46-12
46-11
46-10
46-9
46-8
46-7
46-6
46-5
46-4
46-3
46-2
46-1
0
5
10
15
20
25
30
35
40
45
50
Q [m³/h]
0
100
200
300
400
500
600
700
800
Q [l/min]

**SUPS 58**


H [m]
250
200
150
100
50
0
58-15
58-14
58-13
58-12
58-11
58-10
58-9
58-8
58-7
58-6
58-5
58-4
58-3
58-2
58-1
0
10
20
30
40
50
60
70
Q [m³/h]
0
200
400
600
800
1000
Q [l/min]

## 10.3 Exploded drawing

**SUPS 3-, 5-, 9- & 15-**

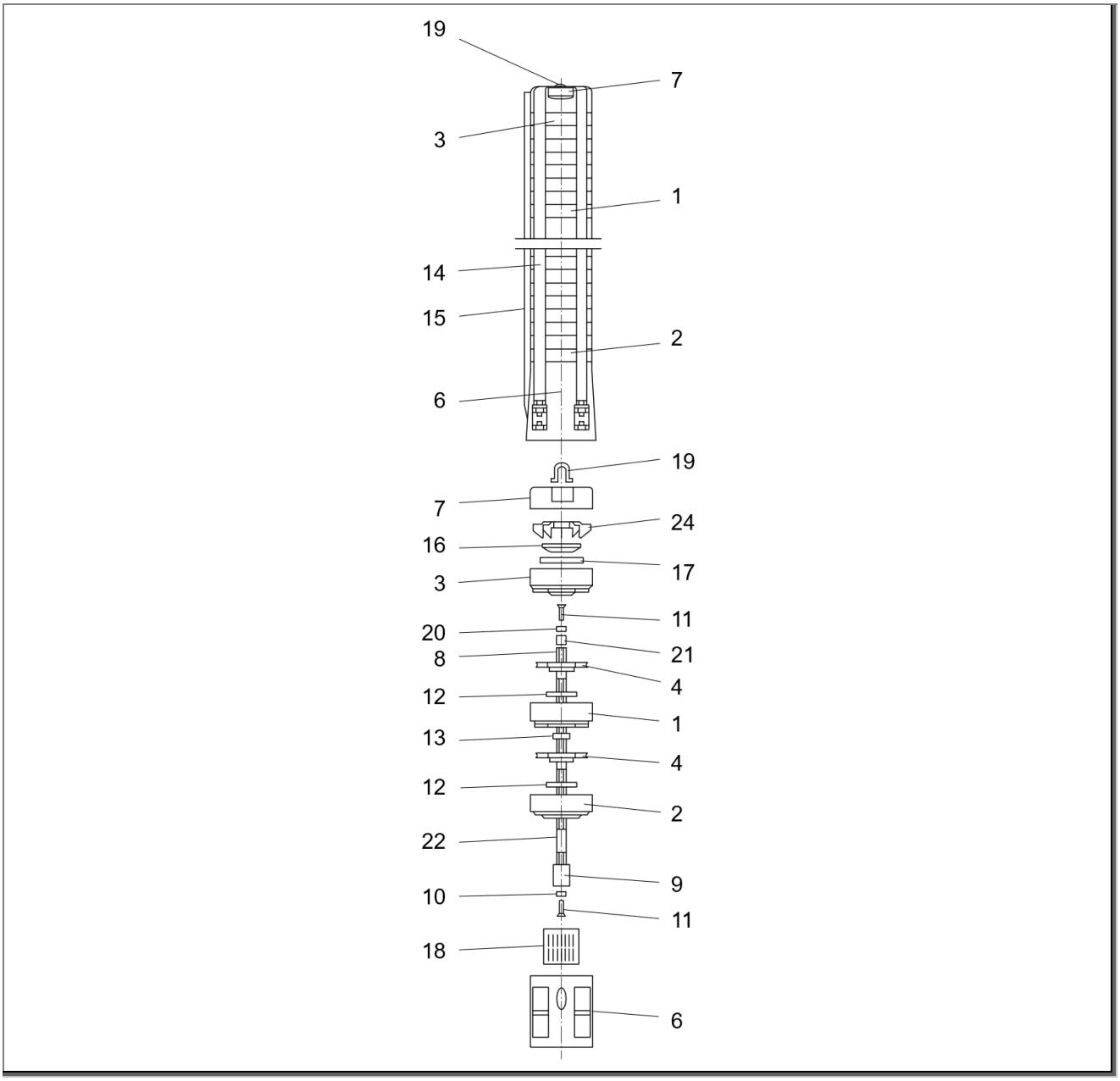



Fig. 6

| | | | |
|---|---|---|---|
| 1 | Diffuser | 13 | Shaft bearing |
| 2 | Lower diffuser with suction strainer support | 14 | Fitting belts |
| 3 | Top Diffuser | 15 | Cable guard |
| 4 | Impeller | 16 | Valve |
| 6 | Motor coupling flange – suction corp | 17 | Valve fencer |
| 7 | Discharge casing with two security rings | 18 | Suction strainer |
| 8 | Shaft | 19 | Security ring |
| 9 | Coupling (shaft pump end/ shaft motor) | 20 | Top washer |
| 10 | Lower washer | 21 | Top bush |
| 11 | Screw | 22 | Lower bush |
| 12 | Impeller fence | 24 | Spider (valve guide) |

**SUPS 18-, 28-, 46- & 48-**

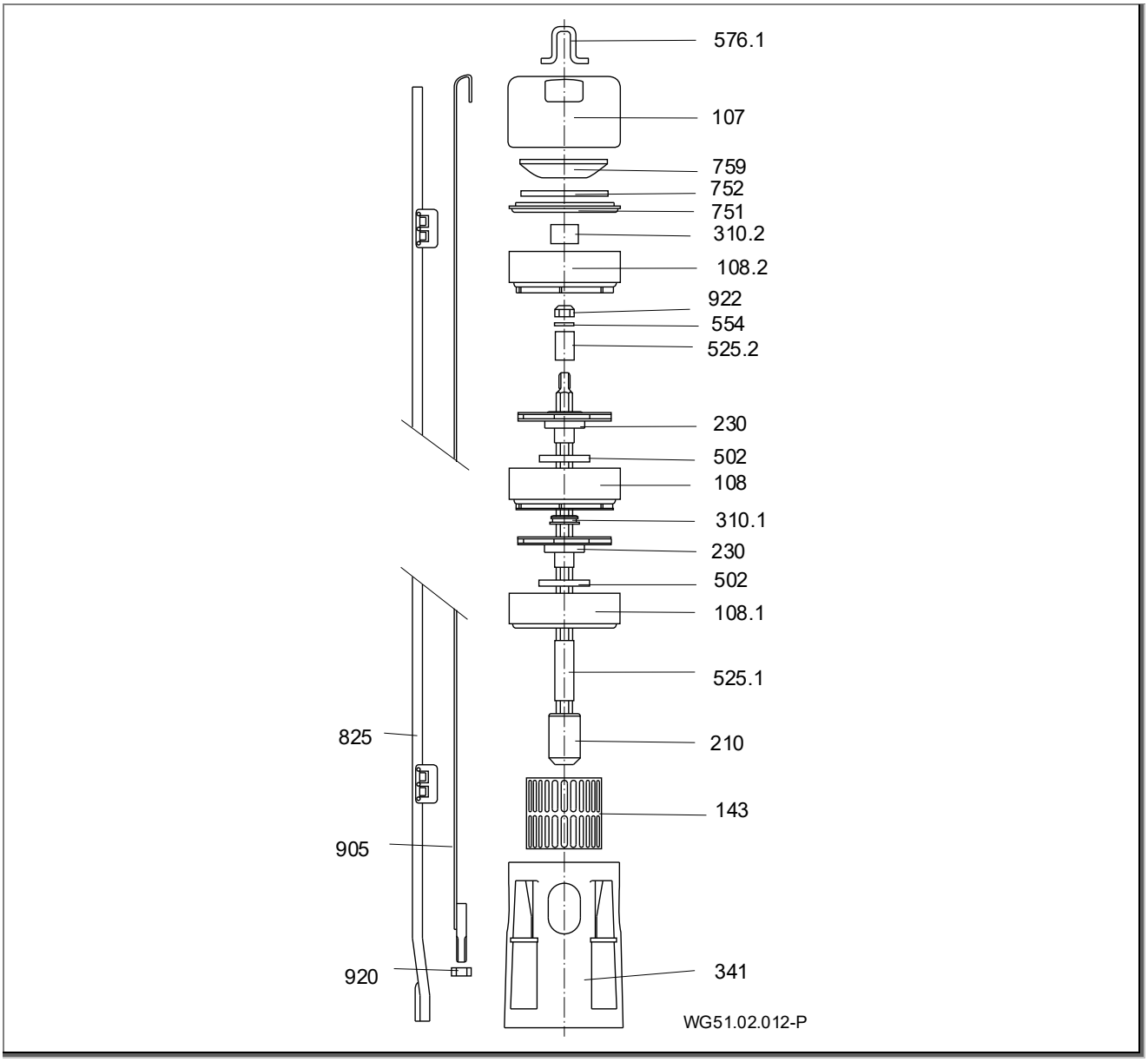



Fig. 7

| | | | |
|---|---|---|---|
| 107 | Pressure housing | 525.1 | Spacer sleeve (lower) |
| 108 | Stage casing | 525.2 | Spacer sleeve (upper) |
| 108.1 | Suction stage casing | 554 | Valve |
| 108.2 | Pressure stage casing | 576.1 | Lifting lug |
| 135 | Wearing ring all 5 stages (only for SUPS 4-7) | 751 | Valve housing |
| 143 | Suction strainer | 752 | Valve seat |
| 210 | Shaft with coupling | 759 | Valve plate |
| 230 | Impeller | 825 | Cable protection |
| 310.1 | Intermediate bearing | 905 | Tension rail |
| 310.2 | Thrust bearing | 920 | M8 hexagon nut |
| 341 | Lantern with suction casing | 922 | M8 hexagon nut |
| 502 | Wear ring | | |

# 11 Index

**UKCA Declaration of Conformity**

Herewith we declare that the pump unit

SUPS

Applied standard in particular:

**BS EN 60034-1:2010**
Rotating electrical machines – Part 1

**BS (NEMA MG 1-2016: 18.157, 18.170, 18.181)**

**UKCA Authorised Representative**
Comply Express Ltd
Unit C2 Coalport House
Stafford Park 1
Telford, TF3 3BD
UK

i.V. Sebastian Watolla
Technical director

Armin Herger
Managing Director

91233 Neunkirchen am Sand, 24.07.2025

SPECK Pumpen Verkaufsgesellschaft GmbH
Hauptstraße 3, 91233 Neunkirchen am Sand, Germany

## EG-Konformitätserklärung

EC declaration of conformity

Hiermit erklären wir, dass das Pumpenaggregat/Maschine
Hereby we declare that the pump unit

Baureihe
Series

SUPS

folgenden einschlägigen Bestimmungen entspricht:
is in accordance with the following standards:

**EG-Maschinenrichtlinie 2006/42/EG**
EC-Machine directive 2006/42/EC

**EMV-Richtlinie 2014/30/EU**
EMC-Machine directive 2014/30/EU

**EG-Richtlinie 2012/19/EG (WEEE)**
Directive 2012/19/EC (WEEE)

**EG-Richtlinie 2011/65/EG (RoHS)**
Directive 2011/65/EC (RoHS)

Angewendete harmonisierte Normen, insbesondere
According to the provisions of the harmonized standard for pumps in particular

i.V. Sebastian Watolla
Technischer Leiter | Technical director

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91233 Neunkirchen am Sand, 24.07.2025

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