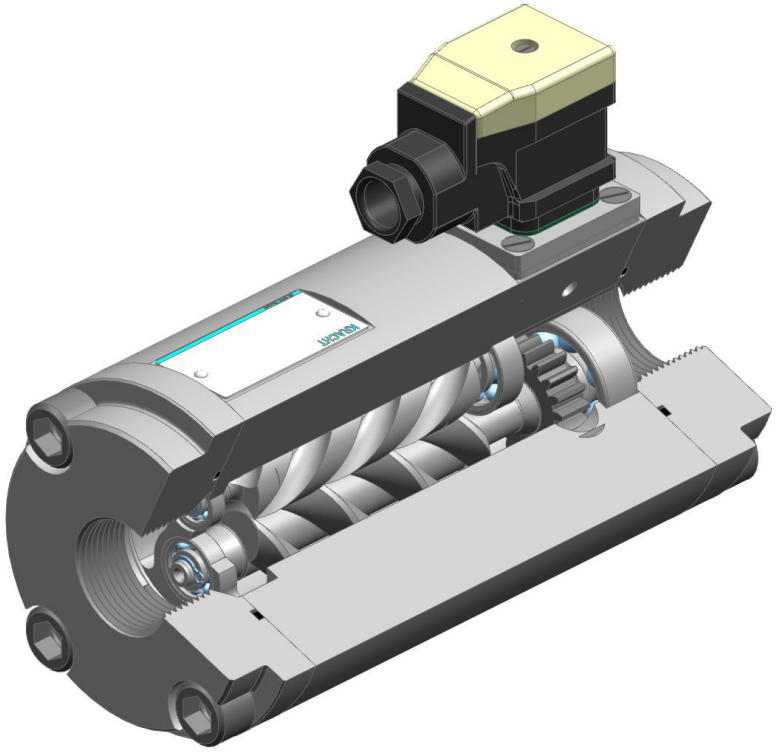
KRACHT

D.0024770002

# Operating instructions (Translation)



## Screw type flow meter SVC
English

16 • 11/01/2024

# Table of content

# 1 General

## 1.1 About the documentation

These operating instructions describe the installation, operation and maintenance of the following product:

**Screw type flow meters SVC 4 - 250**

These operating instructions are an integral part of the product and must be kept in the immediate vicinity of the

product and accessible to the personnel at all time.

Different versions of the product are produced. Which version is concerned

is stated on the device's type plate.

If you have any questions about this operating manual, please contact the manufacturer.

## 1.2 Manufacturer address

KRACHT GmbH
Gewerbestraße 20
D-58791 Werdohl
Tel: +49 2392 935-0
Fax: +49 2392 935-209
Email: info@kracht.eu
Web: www.kracht.eu

## 1.3 Other applicable documents

In addition to these instructions, also comply with the relevant instructions of plants or plant parts available or planned on site.

## 1.4 Symbols

**⚠ DANGER**

Identification of an immediate hazard, which can lead to death or severe bodily injury if not avoided.

**⚠ WARNING**

Identification of a potential medium risk hazard, which can lead to death or severe bodily injury if not avoided.

**⚠ CAUTION**

Identification of a possible low-risk hazard that can result in minor or moderate physical injury if not avoided.

**⚠ ATTENTION**

Identification of notes to prevent property damage.

**NOTICE**

Identification of basic safety instructions. Non-compliance can lead to hazards for people and the product

**TIP**

Identification of special user tips and other particularly useful or important information

# 2 Safety

## 2.1 Intended use

1. The product has been designed for operation with fluids.
   Dry operation is not permitted.
2. The product may only be operated when completely filled.
3. The fluid must be compatible with the materials used in the product. Chemical expertise is required for that. Be careful with ethylene oxide or other catalytically or exothermically reacting or self-decomposing substances. Please consult the manufacturer in cases of doubt.
4. The product may only be used in normal industrial atmospheres. If there are any aggressive substances in the air, always consult the manufacturer.
5. The product may only be operated in compliance with these operating instructions and the applicable documents.
   Deviating operating conditions require the express approval of the manufacturer.
6. Use of the product for purposes other than those for which it is intended invalidates any warranty.

## 2.2 Abrasive Media

In certain cases the device will be used to pump abrasive media. This is permissible under the following conditions:

1. The medium is known and can be judged as to its wear behaviour.
2. The frequency of the visual and detailed inspection for buildup of heat, smooth operation of the device and possible leaks is significantly increased, for instance to a weekly interval (depending on the wear behaviour).
3. Shut down and replace device immediately at the first sign of wear-related faults such as significant buildup of heat, uneven operation or initial small leaks. The usual straightforward sensory monitoring approach fails when confronted with first faults, such as a pressure or flow monitor.

## 2.3 Personal qualification

The personnel charged with the assembly, operation and maintenance of the product must have the necessary qualifications.
This can be achieved through training or appropriate instruction.
The personnel must be familiar with the contents of these operating instructions.

**NOTICE**

Read the operating instructions in full before using the product.

## 2.4 Basic safety instructions

**NOTICE**

**Basic safety instructions**

Non-compliance can lead to hazards for people and the unit.

a) Follow existing regulations for accident prevention and safety at work as well as the internal regulations of the operating company.

b) Ensure the greatest possible cleanliness.

c) Wear suitable personal protective equipment.

d) Do not remove type plates or other information or make them illegible or unrecognisable.

e) Do not make any technical modifications.

f) Comply with maintenance intervals.

g) Only use spare parts approved by the manufacturer.

## 2.5 Fundamental hazards

**⚠ DANGER**

**Hazardous fluids**

Danger to life when handling hazardous fluids

a) Comply with the safety data sheets and regulations on handling the hazardous fluids.

b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.

**⚠ DANGER**

**Rotating parts**

Risk to life due to entanglement or winding of parts of the body, hair or clothing items.

a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.

b) Safely prevent restarting during the work.

**⚠ DANGER**

**Exposed electrical components**

Risk of fatal electric shock.

a) Adhere to the special safety regulations for all work on electrical systems. Switch off electrical systems and secure them against being switched on again.

b) Work on electrical systems may only be carried out by a qualified electrician.

c) Use only connection lines that are resistant to ambient influences and media.

## ⚠ WARNING

**Failure of pressure bearing parts due to overload**

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

a) Before carrying out any work, depressurise the product and all connection pipes.

b) Securely prevent the pressure from being restored during work.

## ⚠ WARNING

**Failure of pressure bearing parts due to overload**

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

a) Use only connections and lines approved for the expected pressure range.

b) Securely prevent the permissible pressures from being exceeded, e.g. by using pressure relief valves or bursting discs.

c) Pipelines must be designed in such a way that no tension e.g. caused by changes in length due to fluctuations in temperature can be transferred to the product.

## ⚠ ATTENTION

**Pressure increase due to blocked measuring unit**

Pressure increase in front of the unit can lead to damage to the unit and/or plant.

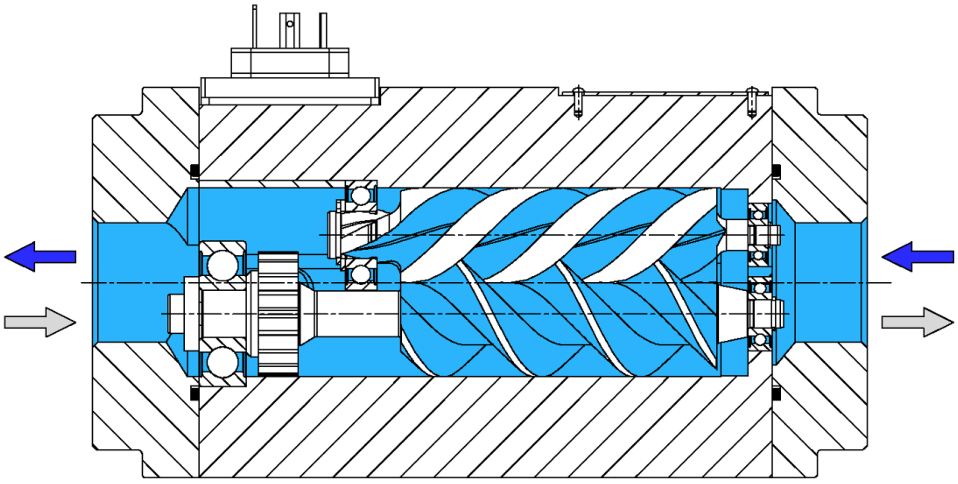
a) In case of the absence of the signal, take the unit or the plant out of service.

# 3 Device description

## 3.1 Functional principle

### 3.1.1 Screw-type flow meter

The measuring element is driven by the liquid flow.



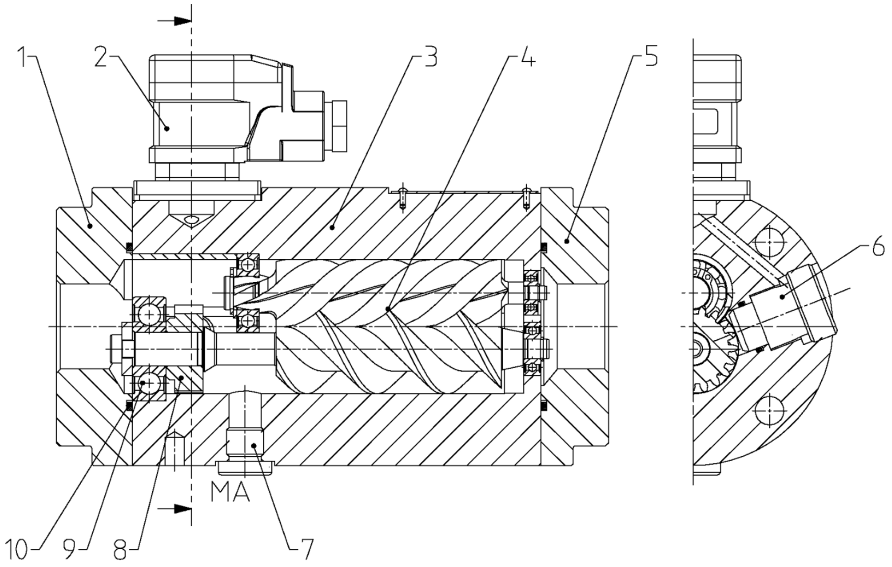
The device is a displacement counter. Two measuring spindles with pitched profile aremeshed. They are supported by anti-friction bearings and encased.

The liquid flow makes the spindles rotate and runs through the device in axial direction. Dur-ing this, closed part volumes are formed that are continually filled and emptied. The measur-ing principle does not cause any pressure or volume flow pulsations.

A transmitter wheel fixed to the measuring spindle is scanned without contact by twosensors and transformed into electrical signals. The use of two sensors allows determinationof the direction of flow and any direction of cross-flow. Flow in and out takes place withouthardly any deflection, which means the device only loses comparatively little pressure.

This measuring principle means there is no need for steadying areas at the inlet and outlet.All moving parts are lubricated by the measuring medium.

# 3.2 Basic design




| | | | |
|---|---|---|---|
| 1 | Connecting flange | 6 | Sensor |
| 2 | Equipment plug/socket | 7 | Screw plug |
| 3 | Housing | 8 | Transmitter wheel |
| 4 | Measuring unit | 9 | Bearing |
| 5 | Connecting flange | 10 | O-ring |
| MA | Measurement connection | | |

# 3.3 Type key

| **Ordering example** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SVC** | | **10** | | **K** | **1** | | **F** | **1** | | **R** | **2** | | **X** | | **H** |
| 1. | | 2. | | 3. | 4. | | 5. | 6. | | 7. | 8. | | 9. | 10. | 11. |

| **Explanation of type key** | | | |
|---|---|---|---|
| **1. Product name** | | | |
| **2. Nominal (** Rated volume**)** | | | |
| $V_{gz}$ | 4; 10; 40; 100; 250 | | |
| **3. Bearing** | | | |
| **K** | Ball bearing | **T** | shielded bearings (only Nominalsize 4 and 10) |
| **4. Materials** | | | |
| **1** | Housing: EN-GJS-400-15<br>Spindles: Steel | **3** | Housing: EN-GJS-600<br>Spindles: Steel |
| **5. Seal** | | | |
| **F** | FKM | **L** | FKM Low temperature |
| **E** | EPDM | **P** | FEP |
| **6. Surface** | | | |
| **1** | Standard (painted) | **3** | Without |
| **2** | Paint Skydrol resistant | | |
| **7. Type of connection** | | | |
| **R** | Pipe connection | **S** | SAE-Flange |
| **D** | DIN-Flange | | |
| **8. Sensor system** | | | |
| **2** | 2 Sensors | **6** | High-resolution (only Nominal size 4 and 10) |
| **5** | Encoder (only Nominal size 10) | | |
| **9. Version of the sensor system** | | | |
| **S** | Standard | **KX** | ATEX High temperature PLUS |
| **H** | High temperature | **L** | IO-Link |
| **K** | High temperature PLUS | **V** | Without Pre amplifier |
| **X** | ATEX | **E** | Encoder |
| **10. Cable length** | | | |
| **No specification** | Without cable | **5** | With 5 m cable |
| **2** | With 2 m cable | **10** | With 10 m cable |

| Explanation of type key | | | |
|---|---|---|---|
| **11. Electrical connection** | | | |
| **H** | Hirschmann plug (Standard) | **V** | Without |
| **M** | Hirschmann plug<br>(M12x1/-4 pole) | **512** | Encoder 512 Imp/U<br>(M12x1/-4 pole) |
| **C** | Aluminium (Al) - terminal box<br>(Cannon- plug) | **2500** | Encoder 2500 Imp/U<br>(M12x1/-4 pole) |

## 3.4 Special numbers

| Special number | Description |
|---|---|
| **226** | High temperature cable gland connection<br>Pocket on housing for wiring |

# 4 Technical data

## 4.1 General

### 4.1.1 Screw-type flow meter

| **General information** | | |
|---|---|---|
| **Mounting position** | | Any |
| **Flow direction** | | Any |
| **Viscosity** (flow dependent.) | $\nu_{min}$ | 1 $mm^2/s$ |
| | $\nu_{max}$ | 1.000.000 $mm^2/s$ |
| **Operating pressure** | **p** | **Operating pressure [▷ 14]** |
| **Permissible pressure loss** | $\Delta p_{max.}$ | 25 bar (momentary) |
| | | 7 bar (permanent; at 50% of max flow rate) |
| **Fluid temperature** | $\vartheta_m$ | **Permissible temperature range [▷ 15]** |
| **Ambient temperature** | $\vartheta_u$ | |
| **Materials** | | **Material data [▷ 16]** |
| **Messspanne** | | **Nominal sizes [▷ 13]** |
| **Messwerkanlauf** | | |
| **Permissible media** | | Lubricating and poorly lubricating fluids in the frame of the specified operating parameters.<br>(Petrols, solvents, etc. are not permissible)<br>(Please consult the manufacturer in cases of doubt.) |

## 4.2 Nominal sizes

| **Nominal** | | **4** | **10** | **40** | **100** | **250** |
|---|---|---|---|---|---|---|
| $Q_{min}$ | **[l/min]** | 0.4 | 1.0 | 4.0 | 10.0 | 25.0 |
| $Q_{nenn}$ | **[l/min]** | 40 | 100 | 400 | 1000 | 2500 |
| $Q_{max}$ | **[l/min]** | 60 | 150 | 600 | 1500 | 3750 |
| **Impulse volume** | **[$cm^3$/lmp]** | 0.255 | 1.418 | 5.130 | 9.820 | 18.25 |
| **Resolution (K-Factor)** | **[lmp/l]** | 3.921.6 | 705.2 | 194.9 | 101.8 | 54.8 |
| **Resolution (K-Factor) fourfold** | **[lmp/l]** | 15.686.3 | 2820.9 | 779.7 | 407.3 | 219.2 |
| **Impulse frequency (at $Q_{nenn}$)** | **[Hz]** | 2.614 | 1.175 | 1.300 | 1.697 | 2.283 |
| **Span** | **-** | 1:150 | | | | |
| **Starting point (horizontal Mounting position)** | **[l/min]** | 0.03 | 0.05 | 0.10 | 0.15 | 0.90 |
| **Starting point (vertical Mounting position)** | **[l/min]** | 0.01 | 0.02 | | 0.03 | 0.06 |

| Nominal | | 4 | 10 | 40 | 100 | 250 |
|---|---|---|---|---|---|---|
| **Measuring accuracy from ≥ 20 mm²/s** | **[%]** | ± 0.3 | ± 0.2 | | | |
| **Measuring range** | **[l/min]** | 0.4 - 60 | 1.0 - 150 | 4.0 - 600 | 10.0 – 1.500 | 25.0 – 3.750 |
| **Permissible size of foreign particles in the medium** | **[µm]** | 100 | 250 | 400 | 500 | |

## 4.3 Connection sizes

| Nominal | Materials | Sensor | Type of connection | | |
|---|---|---|---|---|---|
| | | | R | S | D |
| | | | Pipe connection | SAE-flange | DIN-flange |
| **4** | 3 | 6 | G3/4 | SAE 3/4 | - |
| **10** | 1 | 2 | G1 | SAE 1 | DN32 |
| | 3 | 6 | | SAE 3/4 | - |
| | 1 | 5 | | SAE 1 | - |
| **40** | 1 | 2 | G1 1/2 | SAE 1 1/2 | DN40 |
| | 3 | 2 | | | - |
| **100** | 1 | 2 | G3 | SAE 3 | DN80 |
| **250** | 1 | 2 | - | SAE 4 | - |

## 4.4 Operating pressure

| Maximum allowable pressure $p_{max}$ [bar] | | | | | |
|---|---|---|---|---|---|
| **Version** | **Nominal** | | | | |
| | **4** | **10** | **40** | **100** | **250** |
| Standard | - | 250 | 250 | 140 | 40 |
| Low temperature -40 °C | 80 | 50 | 50 | 30 | - |
| Hochdruck | 480 | 480 | 480 | - | - |

**⚠ ATTENTION**

Restricted pressure range for seal variants down to -40 °C Media temperature

# 4.5 Permissible temperature range

| Version of the sensor system | Standard | High temperature | IO-Link | Without Pre amplifier | Encoder | High temperature PLUS |
|---|---|---|---|---|---|---|
| **Sealing material** | **Fluid temperature [°C]** | | | | | |
| **FKM** | -30 ... 120 | -30 ... 150 | -15 ... 80 | -40 ... 120 | -15 ... 80 | - |
| **EPDM** | | - | -30 ... 80 | | -20 ... 80 | - |
| **FEP with silicone-core (ab 2020)** | | -30 ...150 | -30 ... 80 | | | -30 ... 210 |
| **FEP with FKM-core (bis 2019)** | | | -15 ... 80 | | | |
| **FKM ( Low temperature)** | -40 ... 120 | -40 ... 150 | - | - | - | -40 ... 150 |

| Sealing material | Ambient temperature | |
|---|---|---|
| | $\vartheta_{u\ min}$ [°C] | $\vartheta_{u\ max}$ [°C] |
| **FKM** | -15 | 80<br>-<br>150<br>(with remote electronics) |
| **EPDM** | -30 | |
| **FFKM** | -15 | |
| **FEP with FKM-core (up to 2019)** | -30 | |
| **FEP with silicone-core (from 2020)** | | |
| **FVMQ** | -40 | |

**NOTICE**

Note media-specific properties.

# 4.6 Material data

## 4.6.1 Screw-type flow meter

| Nominal | Housing / Connecting flange | Measuring unit | Seal | Bearing |
|---|---|---|---|---|
| **4** | EN-GJS-400-15 | Heat-treated steel | FKM<br>- - -<br>EPDM<br>- - -<br>FEP with FKM-core (till 2019)<br>- - -<br>FEP with silicone-core (from 2020)<br>- - -<br>FKM Low temperature | Roller bearings steel |
| **10** | | | | |
| **40** | | | | |
| **100** | | | | |
| **250** | | | | |

# 4.7 Weight

| Nominal | Type of connection | Materials | Weight [kg] |
|---|---|---|---|
| **4** | S | 1 | 4.7 |
| | R | 3 | |
| | S | 3 | 5.0 |
| **10** | R | 1 | 9.6 |
| | S | 1 | |
| | R | 3 | 11.3 |
| | S | 3 | |
| | D | 1 | 17.2 |
| | D | 3 | 17.3 |
| **40** | R | 1 | 18.0 |
| | S | 1 | 18.9 |
| | R | 3 | 36.0 |
| | S | 3 | |
| | D | 1 | 24.7 |
| | D | 3 | 27.5 |
| **100** | R | 1 | 39.1 |
| | S | 1 | 38.7 |
| | D | 1 | 46.2 |
| **250** | S | 1 | 76.0 |

# 4.8 Dimensions

The dimensions of the product are given in the technical data sheets.

# 5 Transport and storage

## 5.1 General

a) After receiving the delivery, check the product for transport damage.

b) If transport damage is found, the manufacturer and the transport company must be notified immediately. The product must then be replaced or repaired.

c) Dispose of packaging materials and used parts according to local regulations.

## 5.2 Transport

**⚠ WARNING**

**Falling or toppling loads**

Risk of injury during transport of large and heavy loads.

a) Use only suitable means of transport and lifting gear with sufficient load-bearing capacity.

b) Attach lifting gear only to suitable places on the load.

c) Attach the lifting gear so that it cannot slip.

d) Note the centre of gravity of the load.

e) Avoid sudden, jerky movements, impacts and strong vibrations during transport.

f) Do not step under overhead loads, do not work under overhead loads.

**NOTICE**

To transport can be take using the two supplied eyebolts.

## 5.3 Storage

The product's function is tested in the factory with mineral hydraulic oil. The connections are then closed. The remaining residual oil preserves the internal parts for up to 6 months.

Bright metallic external parts are also protected against corrosion by suitable preservation measures for up to 6 months.

During storage, ensure a dry, dust-free and low-vibration environment. The product must be protected from weather, moisture and large temperature fluctuations. Comply with the recommended storage conditions.

Below the permissible ambient temperature $\vartheta_U$, elastomer seals lose their elasticity and mechanical loading capacity, as the temperature is below the glass transition temperature. This process is reversible. Avoid the application of force on the product during storage below the permissible ambient temperature $\vartheta_U$.

Products with EPDM seals are not mineral oil resistant and their function is not tested. The internal parts are not preserved. If the product is not put into operation immediately, all surfaces exposed to corrosion must be protected by suitable preservation measures. The same applies to products that are not tested for other reasons.

In case of storage for a longer period (> 6 months), all surfaces exposed to corrosion must be retreated with suitable preservatives.

If high humidity or an aggressive atmosphere is to be expected, additional suitable corrosion prevention measures must be taken.

**NOTICE**

Storage in corrosion protection bags (VCI) for maximum 6 months.

**⚠ ATTENTION**

**Corrosion/chemical attack**

Improper storage can make the product unusable.

a) Use suitable preservation measures to protect exposed surfaces.

b) Comply with the recommended storage conditions.

## 5.4 Storage conditions

**TIP**

**Recommended storage conditions**

a) Storage temperature: 5 °C – 25 °C

b) Relative humidity: < 70 %

c) Protect elastomer parts from light, particularly direct sunlight.

d) Protect elastomer parts from oxygen and ozone.

e) Note the maximum storage period of elastomer parts:

⇨ 5 years: AU (polyurethane rubber)

⇨ 7 years: NBR, HNBR, CR

⇨ 10 years: EPM, EPDM, FEP/PFTE, FEPM, FKM, FFKM, VMQ, FVMQ

# 6 Installation

## 6.1 Safety instructions for installation

**⚠ DANGER**

**Hazardous fluids**

Danger to life when handling hazardous fluids

a) Comply with the safety data sheets and regulations on handling the hazardous fluids.

b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.

**⚠ DANGER**

**Rotating parts**

Risk to life due to entanglement or winding of parts of the body, hair or clothing items.

a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.

b) Safely prevent restarting during the work.

**⚠ DANGER**

**Exposed electrical components**

Risk of fatal electric shock.

a) Adhere to the special safety regulations for all work on electrical systems. Switch off electrical systems and secure them against being switched on again.

b) Work on electrical systems may only be carried out by a qualified electrician.

c) Use only connection lines that are resistant to ambient influences and media.

**⚠ WARNING**

**Exposed gears**

Gearwheels can trap and crush fingers and hands.

a) Do not engage gearwheels.

**⚠ WARNING**

**Failure of pressure bearing parts due to overload**

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

a) Before carrying out any work, depressurise the product and all connection pipes.

b) Securely prevent the pressure from being restored during work.

## ⚠ WARNING

**Failure of pressure bearing parts due to overload**

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

a) Use only connections and lines approved for the expected pressure range.

b) Securely prevent the permissible pressures from being exceeded, e.g. by using pressure relief valves or bursting discs.

c) Pipelines must be designed in such a way that no tension e.g. caused by changes in length due to fluctuations in temperature can be transferred to the product.

## ⚠ CAUTION

**Hot surfaces**

Burns of the skin on contact.

a) Take measures to prevent accidental touching of hot surfaces (< 60 °C).

# 6.2 Mechanical installation

## 6.2.1 Preparation

a) Check the product for transport damage and contamination.

b) Remove any preservative present.

c) Clean all lines.

⇨ Only use cleaning agents that are compatible with the materials used.

⇨ Do not use cleaning wool.

d) Compare the environmental and ambient conditions at the place of use with the permissible conditions.

⇨ Expose the product only to low vibrations, see IEC 60034-14.

⇨ Ensure sufficient accessibility for maintenance and repair.

e) Die hydraulischen Anschlüsse herstellen.

⇨ Comply with the manufacturer's instructions.

⇨ Do not use any sealing materials such as hemp, Teflon tape or putty.

f) Remove existing protective plugs.

### 6.2.2 Pipe connection

a) Clean all lines.

⇨ Do not use cleaning wool.

⇨ Pickle and rinse welded pipes.

b) Remove existing protective plugs.

c) Install the lines.

⇨ Comply with the manufacturer's instructions.

⇨ Do not use any sealing materials such as hemp, Teflon tape or putty.

## 6.3 Electrical connection

### 6.3.1 Preamplifier (S, H, K)

| **Electrical data** | | **Pre amplifier** |
|---|---|---|
| | | **24 V** |
| **Number of measuring channels** | | 2 |
| **Operating voltage** | | UB = 24 V DC ± 20 %<br>Reverse-polarity protection |
| **Impulse amplitude** | | UA ≥ 0,8 UB |
| **Impulse shape with symmetrical output signal** | | Rectangular / Pulse duty factor / Channel 1:1 ±15 % |
| **Impuls offset between the two channels** | | 90° ± 30° |
| **Power requirement** | $\mathbf{p}_{b\ max}$ | 0.9 W |
| **Power requirement / Channel** | $\mathbf{p}_{a\ max}$ | 0.3 W<br>Short-circuit proof |
| **Protection class** | | IP 65 (DIN 40050) |
| **Signal output** | | PNP/NPN<br>(Automatic detection) |

Pre-condition: A 24 V (DC) supply cable (± 20%) must be planned for power supply to the preamplifier.

**TIP**

Kabel abgeschirmt, LIYCY C-grau 4 x 0,25 mm²

**⚠ ATTENTION**

**Damage by overvoltage**

Excessive voltage can cause damage and dysfunction to the product.

a) Use the product only with the correct voltage.

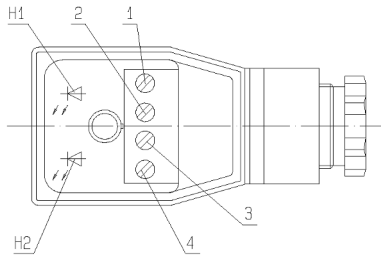
b) Please consult the manufacturer in cases of doubt.

**⚠ ATTENTION**

The power supply line must match the used preamplifier.

### 6.3.1.1 Connection plug arrangement

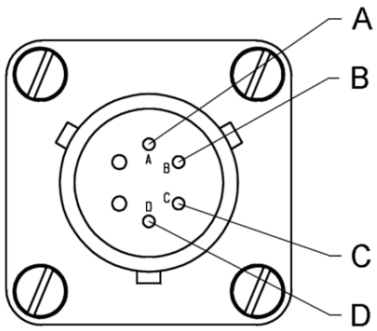
The terminal assignment for channel 1 and channel 2 influences the direction of rotation displayed by the measuring element.




| | | |
|---|---|---|
| 1 | $U_B$ | Brown |
| 2 | channel 1 | Green |
| 3 | channel 2 | Yellow |
| 4 | 0 Volt | White |
| H1 | Signal generator, channel 1 | Red |
| H2 | Signal generator, channel 1 | Red |

### 6.3.1.2 PIN assignment

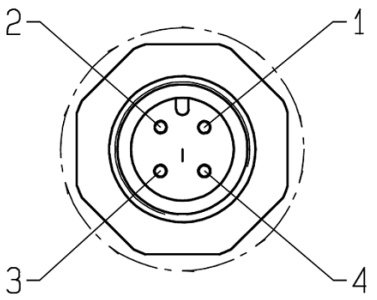
**Cannon-plug**




| | |
|---|---|
| A | $U_B$ |
| B | Channel 1 |
| C | Channel 2 |
| D | GND |

**Circular plug connector** M12x1/-4 pole

**(** High temperature PLUS**)**




| | |
|---|---|
| 1 | $U_B$ |
| 2 | Channel 1 |
| 3 | GND |
| 4 | Channel 2 |

# 7 Commissioning

## 7.1 Safety instructions for start-up

**⚠ DANGER**

**Hazardous fluids**

Danger to life when handling hazardous fluids

a) Comply with the safety data sheets and regulations on handling the hazardous fluids.

b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.

**⚠ CAUTION**

**Hot surfaces**

Burns of the skin on contact.

a) Wear protective gloves at temperatures ≥48°C.

## 7.2 Preparation

a) Before starting the system make sure that a sufficient quantity of the service fluid is extant to avoid dry running. This must be taken into account especially with large line volumes.

b) Check all fastening screws on the product.

c) Fill the product with medium.

## 7.3 Additional commissioning

a) Open existing shut-off elements in front of and behind the product.
b) Set pressure relief valves installed in the system to the lowest opening pressure.
c) Run the product pressureless or at low pressure for a few minutes.
d) Vent the system at the highest possible point.
e) Gradually increase the pressure up to the required operating pressure.
f) Operate the system until the final operating condition is reached.
g) Check the operating data.
⇨ **Maintenance table [▷ 29]**
h) Document the operating data of the initial commissioning for later comparison.
i) Check the level of the operating medium in the system.
j) Check the product for leaks.
k) Check all fittings for leaks and retighten if necessary.

During operation, the two LED displays in the equipment plug flash as long as there is a continual flow of fluid through the measuring unit.

**TIP**

Ein Ausbleiben der Signalgebung kann auf ein blockiertes Messwerk hindeuten.

**⚠ ATTENTION**

**Pressure increase due to blocked measuring unit**

Pressure increase in front of the unit can lead to damage to the unit and/or plant.

a) In case of the absence of the signal, take the unit or the plant out of service.

# 8 Removal

## 8.1 Safety instructions for disassembly

**⚠ DANGER**

**Hazardous fluids**

Danger to life when handling hazardous fluids

a) Comply with the safety data sheets and regulations on handling the hazardous fluids.

b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.

**⚠ DANGER**

**Rotating parts**

Risk to life due to entanglement or winding of parts of the body, hair or clothing items.

a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.

b) Safely prevent restarting during the work.

**⚠ DANGER**

**Exposed electrical components**

Risk of fatal electric shock.

a) Adhere to the special safety regulations for all work on electrical systems. Switch off electrical systems and secure them against being switched on again.

b) Work on electrical systems may only be carried out by a qualified electrician.

c) Use only connection lines that are resistant to ambient influences and media.

**⚠ WARNING**

**Exposed gears**

Gearwheels can trap and crush fingers and hands.

a) Do not engage gearwheels.

**⚠ WARNING**

**Failure of pressure bearing parts due to overload**

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

a) Before carrying out any work, depressurise the product and all connection pipes.

b) Securely prevent the pressure from being restored during work.

**⚠ CAUTION**

**Hot surfaces**

Burns of the skin on contact.

a) At temperatures ≥48 °C, allow the product to cool first.

**⚠ ATTENTION**

**Blocking of the product due to curing media**

Curing media can mechanically block the product and make it unusable.

a) Clean the product immediately after operation with curing media.

## 8.2 Dismantling

a) Depressurise and de-energise the system.

b) Close existing shut-off elements in front of and behind the product.

c) Open existing drain elements and undo connection lines. Collect and dispose of leaking media so that no hazard is created for persons or the environment.

d) Dismantle the product.

⇨ Den Stecker vom Gehäuse abziehen.

⇨ **Pipe connection**: Loosen the pipe connections from the unit and, if applicable, take the unit off the holding fixture.

e) Clean the product.

f) Seal the process connections and lines to prevent the ingress of dirt.

**NOTICE**

The concrete procedure for cleaning depends on the media being used.

a) See the safety data sheet of the media in use.

# 9 Maintenance

## 9.1 Safety instructions for maintenance

**⚠ DANGER**

**Hazardous fluids**

Danger to life when handling hazardous fluids

a) Comply with the safety data sheets and regulations on handling the hazardous fluids.

b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.

**⚠ DANGER**

**Rotating parts**

Risk to life due to entanglement or winding of parts of the body, hair or clothing items.

a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.

b) Safely prevent restarting during the work.

**⚠ DANGER**

**Exposed electrical components**

Risk of fatal electric shock.

a) Adhere to the special safety regulations for all work on electrical systems. Switch off electrical systems and secure them against being switched on again.

b) Work on electrical systems may only be carried out by a qualified electrician.

c) Use only connection lines that are resistant to ambient influences and media.

**⚠ WARNING**

**Failure of pressure bearing parts due to overload**

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

a) Before carrying out any work, depressurise the product and all connection pipes.

b) Securely prevent the pressure from being restored during work.

**⚠ CAUTION**

**Hot surfaces**

Burns of the skin on contact.

a) At temperatures ≥48 °C, allow the product to cool first.

## 9.2 Maintenance work

**TIP**

**Checking and documentation of the operating data**

Regular checking and documentation of all operating data helps to detect faults at an early stage.

- Perform the maintenance work according to specifications.
- Replace defective or worn components.
- If necessary, request spare parts lists and assembly drawings from the manufacturer.
- Document the type and scope of the maintenance work along with the operating data.
- Compare the operating data with the values of the initial commissioning.
  In case of large deviations (> 10 %), determine the cause.
- Dispose of packaging materials and used parts according to local regulations.

**NOTICE**

**Protective devices and notes**

After maintenance and/or repair, reattach all protective devices and notices removed in the process to their original position.

## 9.3 Maintenance instructions

The following information provides recommendations for maintenance work and maintenance intervals for the product in use.
Depending on the actual loads occurring during operation, the type, scope and interval of the maintenance work may deviate from the recommendations. A mandatory maintenance plan must be drawn up by the installer/operating company.

**TIP**

In the course of preventive maintenance, it is advisable to replace wearing parts before the wear limit is reached.

With the appropriate know-how and sufficient equipment, the repair can also be carried out by the installer/operating company.
If necessary, request spare parts lists and assembly drawings from the manufacturer.
Please consult the manufacturer for this purpose.

**NOTICE**

**Warranty**

Any warranty will be void if not executed properly.

# 9.4 Maintenance table

## 9.4.1 Maintenance table

| | | Firstly:after max. 24 h | Daily | 3000 Operating hours | As required | Additional information |
|---|---|---|---|---|---|---|
| **9.4.11** | **Inspection: Flow/signal** | 1 | | | | |
| **9.4.2** | **Check the operating pressure** | 2 | | | | |
| **9.4.3** | **Check the media temperature** | 2 | | | | |
| **9.4.4** | **Check the device temperature** | 2 | | | | |
| **9.4.5** | **Check the equipotential bonding** | 2 | | | | |
| **9.4.6** | **Check the condition of the operating fluid** | 2 | | | | |
| **9.4.7** | **Auditory check Unusual noises** | | 1 | | | |
| **9.4.8** | **Cleaning** | | 1 | | | |
| **9.4.9** | **Visual inspection for leakage** | | 1 | | | |
| **9.4.11** | **Inspection: Flow/signal** | | | 1 | | |
| **9.4.2** | **Check the operating pressure** | | | 2 | | |
| **9.4.3** | **Check the media temperature** | | | 2 | | |
| **9.4.4** | **Check the device temperature** | | | 2 | | |
| **9.4.5** | **Check the equipotential bonding** | | | 2 | | |
| **9.4.6** | **Check the condition of the operating fluid** | | | 2 | | |
| **9.4.10** | **Replace Other seals** | | | | 3 | |

1 - 0,1 h; 2 - 0,2 h; 3 - 1 h

## 9.4.2 Check the operating pressure

The operating pressure is indicated by the pressure gauges.

- If there is no operating pressure, check the individual components of the product.
- Comply with the product-specific data sheets/operating instructions.

## 9.4.3 Check the media temperature

The media temperature is measured through the temperature sensor.

The values are displayed by the built-in controller in the electrical control system.

- If the media temperature is too high or too low, check the product components.
- Comply with the product-specific data sheets/operating instructions.

### 9.4.4 Check the device temperature

Measure the surface temperature in the area of the bearing.

### 9.4.5 Check the equipotential bonding

Check the equipotential bonding for tight fit and proper functioning.

### 9.4.6 Check the condition of the operating fluid

Pay attention to colour (dark colouring), odour and milky turbidity.

- Replace operating fluid if necessary.

### 9.4.7 Auditory check Unusual noises

In this case, attention must be paid to increased noise or uneven operation (pump unit).

- In case of unusual noises, examine the individual components of the product and line fixings and check the operating medium for foaming.
- Comply with the product-specific data sheets/operating instructions.

### 9.4.8 Cleaning

Remove dust deposits and dirt with a damp, clean cloth.

### 9.4.9 Visual inspection for leakage

Care must be taken here to ensure that there is no leakage from the connections.

- In the event of leaks in the connections, the glands must be tightened and, if necessary, the seals replaced.

### 9.4.10 Replace Other seals

Repairs by manufacturer.

Consult the manufacturer.

### 9.4.11 Inspection: Flow/signal

If there is no constant signal or no constant flow rate, a blocked measuring unit may be there-ason.

# 10 Repair

## 10.1 Safety instructions for repairs

**⚠ DANGER**

**Hazardous fluids**

Danger to life when handling hazardous fluids

a) Comply with the safety data sheets and regulations on handling the hazardous fluids.

b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.

**⚠ DANGER**

**Rotating parts**

Risk to life due to entanglement or winding of parts of the body, hair or clothing items.

a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.

b) Safely prevent restarting during the work.

**⚠ DANGER**

**Exposed electrical components**

Risk of fatal electric shock.

a) Adhere to the special safety regulations for all work on electrical systems. Switch off electrical systems and secure them against being switched on again.

b) Work on electrical systems may only be carried out by a qualified electrician.

c) Use only connection lines that are resistant to ambient influences and media.

**⚠ WARNING**

**Failure of pressure bearing parts due to overload**

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

a) Before carrying out any work, depressurise the product and all connection pipes.

b) Securely prevent the pressure from being restored during work.

**⚠ CAUTION**

**Hot surfaces**

Burns of the skin on contact.

a) At temperatures ≥48 °C, allow the product to cool first.

## 10.2 General

Corrective maintenance includes:

1. Troubleshooting
   Finding damage, determining and localising the cause of the damage.
2. Damage repair
   Removing the primary causes and replacing or repairing defective components. Repairs are generally carried out by the manufacturer.

**Repair by the manufacturer**

Before returning the product, fill out the return form. The form can be filled out online and is available to download as a pdf file or can be requested from the manufacturer.

**NOTICE**

**Device contains hazardous substances**

If the device has been operated with hazardous fluids it must be cleaned before it is returned. If this is not possible, the safety data sheet of the hazardous material must be provided in advance.

**Repair by the installer/operating company**

With the appropriate know-how and sufficient equipment, the repair can also be carried out by the installer/operating company. Please consult the manufacturer for this purpose.

a) If necessary, request spare parts lists and assembly drawings from the manufacturer.

b) Only use spare parts approved by the manufacturer.

c) Dispose of packaging materials and used parts according to local regulations.

**NOTICE**

**Warranty**

Any warranty will be void if not executed properly.

**NOTICE**

**Protective devices and notes**

After maintenance and/or repair, reattach all protective devices and notices removed in the process to their original position.

## 10.3 Fault table

| Fault | Potential causes | Possible measures |
|---|---|---|
| **LED display** | | |
| Both LED displays flash -however, false values are displayed in the overrid-ing controller | Connection between the device plug and the overriding control-ler is loose/defective | Check the connection and replace the cable or plug if neces-sary |
| An LED display does not illuminate | Wire break | Repairs by manufacturer |
| | Soldering point defective | |
| | Sensor defective | |
| No LED display illumin-ates | Power failure | Check the supply cable |
| | | Check the fuses |
| | Measuring unit is blocked | Put the device out of operation immediately! |
| | | Repairs by manufacturer |
| **Seal failure / Leckage** | | |
| | O-ring in the housing is defect-ive | Repairs by manufacturer |
| | O-ring between housing and connection plate defective | |
| **Defective values in the overriding controller** | | |
| | Wear | Repairs by manufacturer |
| Consult the manufacturer in the event of unidentifiable faults | | |