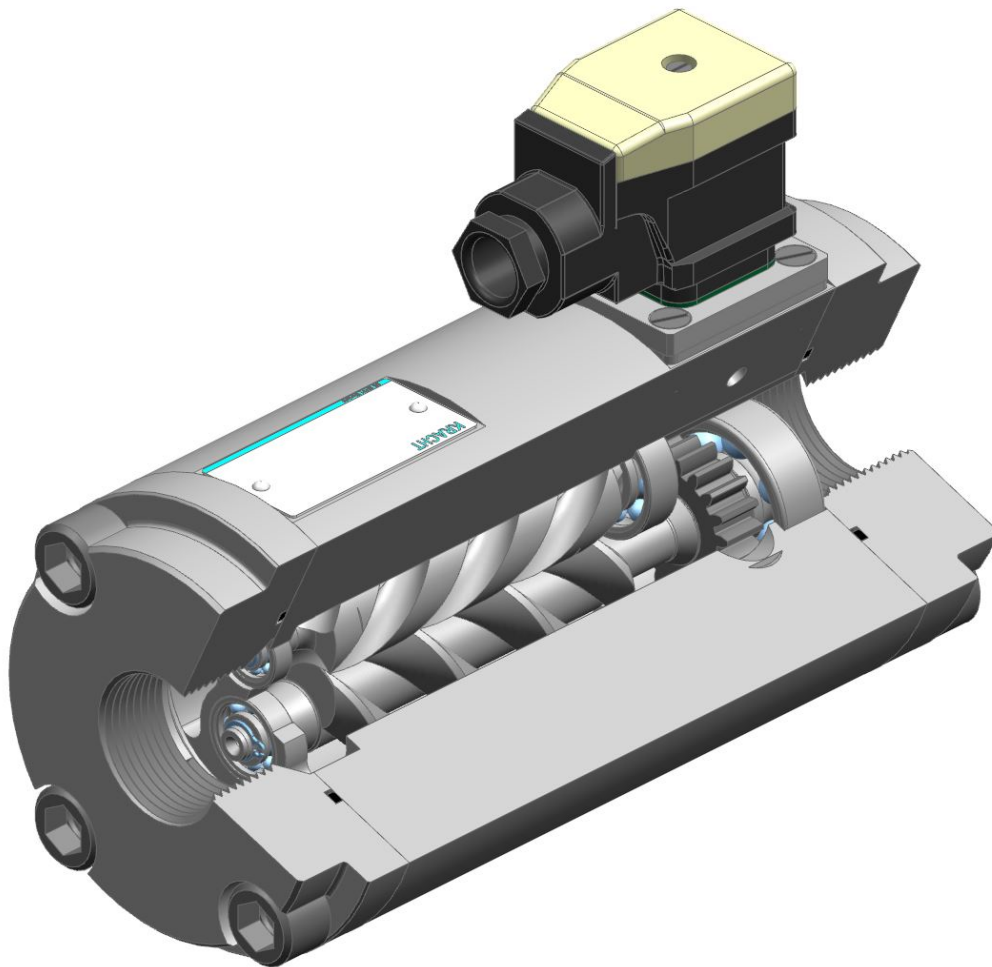


# KRACHT

D.0024770002

Operating instructions (Translation)



Screw-type flow meter SVC 4 - 250  
English

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# 1 General

## 1.1 About the documentation

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

### **Gear type flow meter VC 0.025 – 16**

These operating instructions are a component of the device and must be kept accessible for the personnel near the device at all times.

The device is manufactured in different versions. Information about the version concerned in the individual case can be found on the device's type plate.

If you have any questions about these operating instructions, please contact the manufacturer.

## 1.2 Manufacturer address

KRACHT GmbH  
Gewerbestraße 20  
DE 58791 Werdohl  
Tel: +49 2392 935-0  
Fax: +49 2392 935-209  
Email: [info@kracht.eu](mailto:info@kracht.eu)  
Web: [www.kracht.eu](http://www.kracht.eu)

## 1.3 Applicable documents

In addition to these instructions, also observe the corresponding instructions for the existing or planned systems or system parts.

## 1.4 Symbols



### **DANGER**

Identification of an immediate hazard, which would result in death or severe bodily injury if not avoided.



### **WARNING**

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



### **CAUTION**

Identification of a low risk hazard, which could lead to minor or medium bodily injury if not avoided.

### **ATTENTION**

Flagging of notices to prevent property damage.



### **NOTICE**

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



### **TIPP**

Flagging of special user tips and other especially useful or important information.

## 2 Safety

### 2.1 Intended use

1. The device has been designed for operation with fluid.  
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 Personnel qualification and training

The personnel designated to assemble, operate and service the device must be properly qualified.

This can be through training or specific instruction.

Personnel must be familiar with the contents of this operating instructions.



#### NOTICE

Read the operating instructions thoroughly before use.

## 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!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

- a) Before all work, ensure that existing drives are voltage-free and pressure-free.
- b) Securely prevent restarting during all 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) Depressurize the system before all work.
- 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.

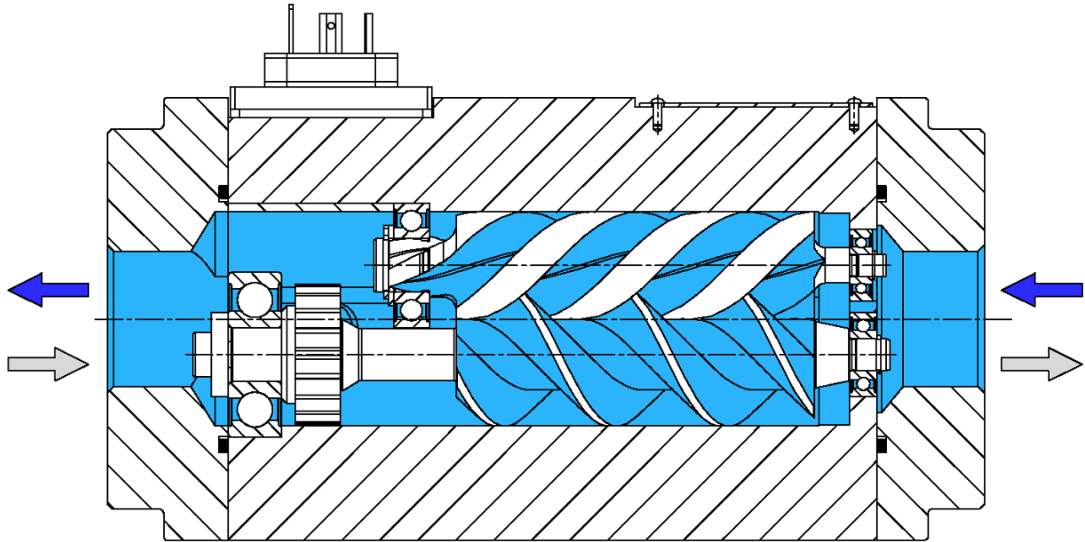
Risk of injury due to fluid spurting out.

- 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.

## 3 Device description

### 3.1 Functional principle

The measuring element is driven by the liquid flow.



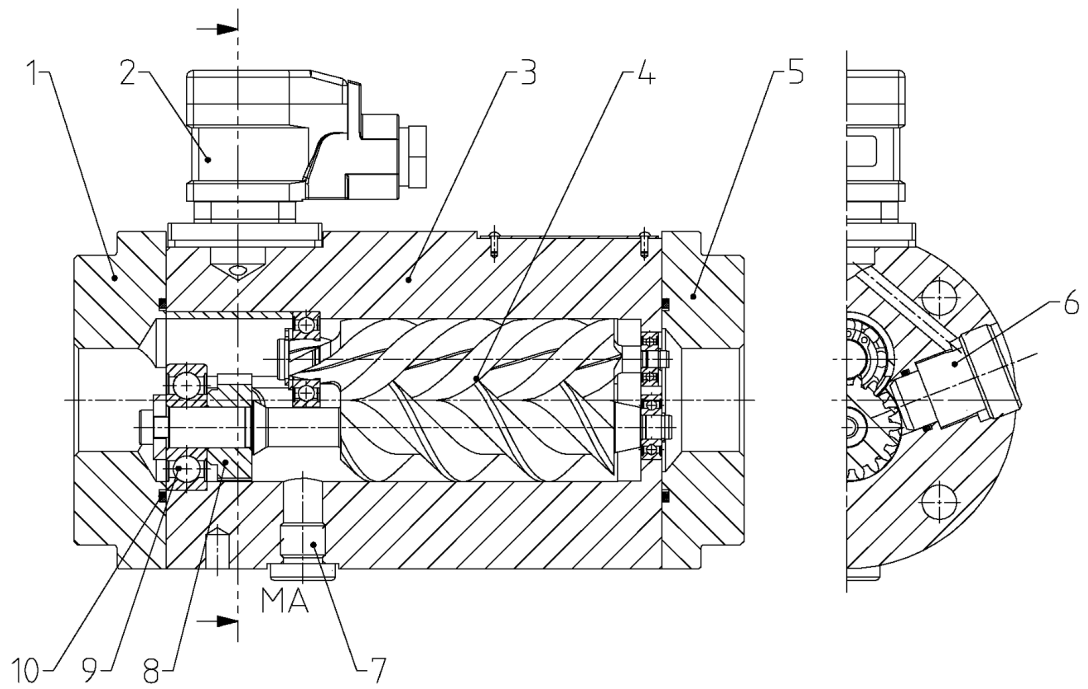
The device is a displacement counter. Two measuring spindles with pitched profile are meshed. They are supported by anti-friction bearings and encased.

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

A transmitter wheel fixed to the measuring spindle is scanned without contact by two sensors and transformed into electrical signals. The use of two sensors allows determination of the direction of flow and any direction of cross-flow. Flow in and out takes place without hardly 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 |                     |

### 3.2.1 Screw-type flow meter

### 3.2.2 Sensor

## 3.3 Type key

Ordering example															
SVC		10		K	1		F	1		R	2		S		H
1.		2.		3.	4.		5.	6.		7.	8.		9.	10.	11.

Explanation of type key			
<b>1. Product name</b>			
<b>2. Nominal size (Rated volume)</b>			
<b>V<sub>gz</sub></b>	4; 10; 40; 100; 250		
<b>3. Bearing</b>			
<b>K</b>	Ball bearing	<b>T</b>	shielded bearings (only Nominal size 4 and 10)
<b>4. Material</b>			
<b>1</b>	Housing: EN-GJS-400-15 (GGG-40) : Steel	<b>3</b>	Housing: EN-GJS-600 (GGG-60) : Steel
<b>5. Seal</b>			
<b>F</b>	FKM	<b>L</b>	FKM Low temperature
<b>E</b>	EPDM	<b>P</b>	FEP
<b>6. Surface</b>			
<b>1</b>	Standard (painted)	<b>3</b>	Without
<b>2</b>	Paint Skydrol resistant		
<b>7. Type of connection</b>			
<b>R</b>	Pipe connection	<b>S</b>	SAE flange
<b>D</b>	DIN flange		
<b>8. Sensor system</b>			
<b>2</b>	2 Sensors	<b>6</b>	(only Nominal size 4 and 10)
<b>5</b>	Encoder (only Nominal size 10)		
<b>9. Version of the sensor system</b>			
<b>S</b>	Standard	<b>KX</b>	ATEX High temperature PLUS
<b>H</b>	High temperature	<b>L</b>	IO-Link
<b>K</b>	High temperature PLUS	<b>V</b>	Without Preamplifier
<b>X</b>	ATEX	<b>E</b>	Encoder
<b>10. Cable length</b>			
	Without Cable	<b>5</b>	With 5 m Cable
<b>2</b>	With 2 m Cable	<b>10</b>	With 10 m Cable
<b>11. Electrical connection</b>			
<b>H</b>	Hirschmann plug (Standard)	<b>V</b>	Without
<b>M</b>	Hirschmann plug (M12x1/-4pole)	<b>512</b>	Encoder 512 pulse/rev (M12x1/-4pole)
<b>C</b>	Aluminium terminal box (Cannon plug)	<b>2500</b>	Encoder 2500 pulse/Rev (M12x1/-4pole)

## 3.4 Important special numbers

<b>226</b>	High temperature cable gland connection Pocket on housing for wiring
------------	---

## 4 Technical data

### 4.1 General information

General information		
<b>Type of connection</b>		See <b>Connection type</b> [▶ 15]
<b>Mounting position</b>		Any
<b>Flow direction</b>		Any
<b>Viscosity ( flow depend-ent. )</b>	$v_{\min}$	1 mm <sup>2</sup> /s
	$v_{\max}$	1,000,000 mm <sup>2</sup> /s
<b>Operating pressure</b>	<b>p</b>	See <b>Operating pressure</b> [▶ 16]
<b>Permissible pressure loss</b>	$\Delta p_{\max}$	25 bar (momentary)
		7 bar (permanent; at 50% of max flow rate)
<b>Fluid temperature</b>	$\vartheta_m$	See <b>Permissible temperature range</b> [▶ 16]
<b>Ambient temperature</b>	$\vartheta_u$	
<b>Material</b>		See <b>Material data</b> [▶ 17]
<b>Measuring range</b>		See <b>Overview nominal sizes</b> [▶ 15]
<b>Starting point</b>		
<b>Permissible media</b>		Lubricating and poorly lubricating fluids in the frame of the specified operating parameters. (Petrols, solvents, etc. are not permissible.) Please consult the manufacturer in cases of doubt.
<sup>(1)</sup> See <b>Abrasive Media</b> [▶ 6]		

## 4.2 Overview nominal sizes

Nominal size		4	10	40	100	250
$Q_{\min}$	[l/min]	0.4	1.0	4.0	10.0	25.0
$Q_{\text{nenn}}$	[l/min]	40	100	400	1000	2500
$Q_{\max}$	[l/min]	60	150	600	1500	3750
Impulse volume	[cm <sup>3</sup> /pulse]	0.255	1.418	5.130	9.820	18.25
Resolution (K factor)	[pulse/l]	3,921.6	705.2	194.9	101.8	54.8
Resolution (K factor) 4-fach	[pulse/l]	15,686.3	2820.9	779.7	407.3	219.2
Impulse frequency (bei $Q_{\text{nenn}}$ )	[Hz]	2,614	1,175	1,300	1,697	2,283
Measuring range	-	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
Measuring accuracy from $\geq 20 \text{ mm}^2/\text{s}$	[%]	$\pm 0.3$	$\pm 0.2$			
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	[ $\mu\text{m}$ ]	100	250	400	500	

## 4.3 Connection type

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

## 4.4 Operating pressure

Maximum allowable pressure $p_{\max}$ [bar]					
Version	Nominal size				
	4	10	40	100	250
Standard	-	250	250	140	40
High pressure	480	480	480	-	-

## 4.5 Permissible temperature range

Sealing material	Ambient temperature	
	$\vartheta_{u \min}$ [°C]	$\vartheta_{u \max}$ [°C]
FKM	-15	80 - 150 (detached electronics)
EPDM	-30	
FFKM	-15	
FEP with FKM-core (till 2019)	-30	
FEP with silicone-core (from 2020)		
FVMQ	-40	

Version of the sensor system	Standard	High temperature	IO-Link	without preamplifier	Encoder	High temperature PLUS
<b>Sealing material</b>	<b>Fluid temperature in °C</b>					
FKM	-30 ... 120	-30 ... 150	-15 ... 80	-40 ... 120	-15 ... 80	-
EPDM		-	-30 ... 80		-	
FEP with silicone-core (ab 2020)		-30 ... 150	-30 ... 80		-20 ... 80	-30 ... 210
FEP with FKM-core (bis 2019)		-15 ... 80				
FKM (Low temperature)	-40 ... 120	-40 ... 150	-	-	-	-40 ... 150



## 4.6 Material data

Nominal size	Housing / Connecting flange	Measuring unit	Seal	Bearing
<b>4</b>	EN-GJS-400-15 (GGG-40)	Heat-treated steel	FKM	Anti-friction bearing steel
<b>10</b>			---	
<b>40</b>			EPDM	
<b>100</b>			---	
<b>250</b>			FEP with FKM-core (till 2019) FEP with silicone-core (from 2020) --- FKM(Low temperature)	

## 4.7 Weight

Nominal size	Type of connection	Material	Weight [kg]
<b>4</b>	S	1	4.7
	R	3	
	S	3	5.0
<b>10</b>	R	1	9.6
	S	1	
	R	3	11.3
	S	3	
	D	1	17.2
	D	3	17.3
<b>40</b>	R	1	18.0
	S	1	18.9
	R	3	36.0
	S	3	
	D	1	24.7
	D	3	27.5
<b>100</b>	R	1	39.1
	S	1	38.7
	D	1	46.2
<b>250</b>	S	1	76.0

## 4.8 Dimensions

Dimensions of the device can be found in the relevant technical data sheets.

# 5 Transport and storage

## 5.1 General

- a) After receipt, check the device for transport damages.
- b) If transport damage is noticed, report this immediately to the manufacturer and the carrier. The device must then be replaced or repaired.
- c) Dispose of packing material and used parts in accordance with the local stipulations.

## 5.2 Transport



### **⚠ WARNING**

#### **Falling or overturning loads!**

Danger of injury while transporting large and heavy loads.

- a) Use only suitable means of conveyance and lifting tackle with sufficient load-bearing capacity.
- b) Attach lifting tackle only to suitable load points.
- c) Attach the lifting tackle in such a manner that it cannot slip.
- d) Pay attention to the load balance point.
- e) Always avoid jerks, impacts and strong vibrations during transportation.
- f) Never walk under suspended loads, never work under suspended loads.



### **TIPP**

#### **Handling aid**

- a) To transport the SVC 100 / SVC 250 can be take using the two supplied eyebolts.

## 5.3 Storage

The device's function is tested in the plant with mineral hydraulic oil. Then all connections are closed. The remaining residual oil preserves the interior parts for up to 6 months.

Metallic exposed exterior parts are protected against corrosion by suitable conservation measures, also up to 6 months.

In case of storage, a dry, dust-free and low-vibration environment is to be ensured. The device is to be protected against influences from weather, moisture and strong fluctuations of temperature. The recommended storage conditions are to be adhered to.

Below the permissible ambient temperature  $\vartheta_U$  elastomer seals lose their elasticity and mechanical loading capacity, since the glass transition temperature is fallen below. This procedure is reversible. A force action on the device is to be avoided in case of storage below the permissible ambient temperature  $\vartheta_U$ .

Devices with EPDM seals are not mineral-oil resistant and are not tested for their function. There is no preservation of the interior parts. If the device is not taken into operation immediately, all corrosion-prone surfaces are to be protected by suitable conservation measures. The same applies for devices which are not tested for other reasons

When storing for a long period of time (> 6 months), treat all surfaces at risk of corrosion again with suitable preserving agents.

If high air humidity or aggressive atmospheres are expected, take additional corrosion-preventing measures.



## NOTICE

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

## ⚠ ATTENTION

### Corrosion/chemical impact

Improper storage can render the device useless.

- a) Protect endangered surfaces by means of suitable conservation measures.
- b) Comply with recommended storage conditions.

## 5.4 Storage conditions



## TIPP

### Recommended storage conditions

- a) Storage temperature: 5 °C – 25 °C
- b) Relative air humidity: < 70 %
- c) Protect elastomer parts from light, especially direct sunlight.
- d) Protect elastomer parts from oxygen and ozone.
- e) Comply with maximum storage times of elastomeric parts:
  - ⇒ 5 Jahre: AU (Polyurethan-Kautschuk)
  - ⇒ 7 Jahre: 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!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

- a) Before all work, ensure that existing drives are voltage-free and pressure-free.
- b) Securely prevent restarting during all 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**

##### **Unshielded gearwheels**

Gearwheels can trap and crush fingers and hands.

- a) Do not engage gearwheels.



#### **⚠ WARNING**

##### **Failure of load-carrying parts due to overload!**

Danger of injury from flying parts.

Danger of injury from spurting fluids.

- a) Depressurise the device and all connection lines before doing any work.
- b) Securely prevent the restoration of pressure while working on the device.

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

Risk of injury from flying parts.  
Risk of injury due to fluid spurting out.

- 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**

Burn injury to skin if touched.

- a) Maßnahmen gegen unbeabsichtigtes Berühren von heißen Oberflächen (> 60 °C) treffen.

## 6.2 Mechanical installation

### 6.2.1 Preparation

- a) Check the product for transport damage and contamination.
- b) Remove any preservative present.
  - ⇒ Only use cleaning agents that are compatible with the materials used.
  - ⇒ Do not use cleaning wool.
- c) 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.
  - ⇒ Comply with the manufacturer's information.
  - ⇒ Do not use any sealing materials such as hemp, Teflon tape or putty.

## 6.3 Pipe connection

- a) Clean all lines.
  - ⇒ Do not use cleaning wool.
  - ⇒ Pickle and flush welded pipes.
- b) Remove the protective plugs.
- c) Mount the lines.
  - ⇒ Comply with the manufacturer's information.

---

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

---

## 6.4 Electrical connection

### 6.4.1 Preparation

#### **ATTENTION**

The power supply line must match the used preamplifier.

Electrical data		24 V
<b>Number of measuring channels</b>		2
<b>Operating voltage</b>		$U_B = 24 \text{ V DC} \pm 20 \%$ Reverse-polarity protection
<b>Impulse amplitude</b>		$U_A \geq 0,8 U_B$
<b>Impulse shape with symmetrical output signal</b>		Rectangular , Pulse duty factor /Channel 1:1 $\pm 15 \%$
<b>Impuls offset between the two channels</b>		$90^\circ \pm 30^\circ$
<b>Power requirement</b>	$P_{b \text{ max}}$	0,9 W
<b>Power output / Channel</b>	$P_{a \text{ max}}$	0,3 W Short-circuit proof
<b>Protection class</b>		IP°65°(DIN°40050)
<b>Signal output</b>		PNP/NPN (Automatic detection)

Pre-condition: A 24 V (DC) supply cable ( $\pm 20\%$ ) must be planned for power supply to the pre-amplifier.



#### **TIPP**

Shielded cable, LIYCY C-grey 4 x 0.25 mm<sup>2</sup>

#### **ATTENTION**

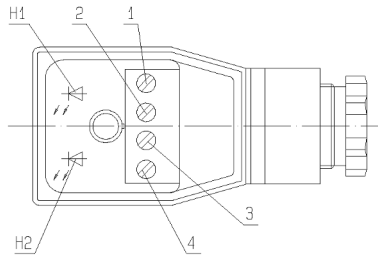
##### **Damage by overvoltage**

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.

## 6.4.2 Plug assignment

The terminal assignment for Channel 1 and 2 influences the displayed direction of rotation of the measuring unit.



1	$U_B$	Brown
2	Channel 1	Green
3	Channel 2	Yellow
4	0	White
H1	Transmitter Channel 1	Red
H2	Transmitter Channel 2	Red



## 7 Operation start-up

### 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.

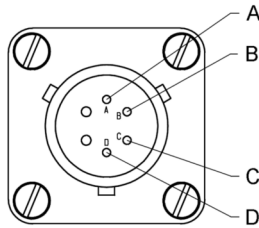
- a) Wear protective gloves at temperatures  $\geq 48^{\circ}\text{C}$ .

### 7.2 Preparation

- a) Before starting the product, 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 unit with media.

## 7.3 PIN assignment

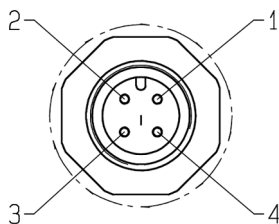
### Cannon plug



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

### Circular plug connector M12x1/-4pole

#### (High temperature PLUS)



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

## 7.4 Further operation start-up

- a) Open existing shut-off elements upstream and downstream of the device.
- b) Adjust pressure relief valves in the system installed for lowest opening pressure.
- c) Run the device for a few minutes depressurised or with low pressure.
- d) Vent the system at the highest possible point.
- e) Gradually increase the pressure load up to the desired operating pressure.
- f) Operate the system for so long until the final operating state is achieved.
- g) Check the operating data.
- h) Document the operating data of the initial start-up for later comparison.
- i) Check the level of the operating medium in the system.
- j) Check the device for leaks.
- k) Check all threaded connections 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.



### TIPP

A lack of signalling can point to a blocked measuring unit.

 **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 removal



### **⚠ 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!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

- a) Before all work, ensure that existing drives are voltage-free and pressure-free.
- b) Securely prevent restarting during all 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**

#### **Unshielded gearwheels**

Gearwheels can trap and crush fingers and hands.

- a) Do not engage gearwheels.



### **⚠ WARNING**

#### **Failure of load-carrying parts due to overload!**

Danger of injury from flying parts.

Danger of injury from spurting fluids.

- a) Depressurise the device and all connection lines before doing any work.
- b) Securely prevent the restoration of pressure while working on the device.

**⚠ CAUTION****Hot surfaces**

Burns of the skin on contact.

- a) At temperatures  $\geq 48^{\circ}\text{C}$  the product must be allowed to cool down 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 Removal

- a) Depressurise and de-energize the system.
- b) Close existing shut-off elements upstream and downstream of the device.
- c) Open existing drain elements and loosen connection lines. Collect and dispose of discharging medium so that no hazard arises for persons or environment.
- d) Dismantle the device.
  - ⇒ Pull the plug off the housing.
  - ⇒ **Pipe connection:** Loosen the pipe connections from the unit and, if applicable, take the unit off the holding fixture..
- e) Clean the device
- f) Close the device connections and lines to prevent dirt penetration.

**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!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

- a) Before all work, ensure that existing drives are voltage-free and pressure-free.
- b) Securely prevent restarting during all 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) Depressurize the system before all work.
- b) Securely prevent the pressure from being restored during work.



### **CAUTION**

#### **Hot surfaces**

Burns of the skin on contact.

- a) At temperatures  $\geq 48^{\circ}\text{C}$  the product must be allowed to cool down first.

## 9.2 Maintenance work



### TIPP

#### Checking and documentation of the operating data

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

- Perform maintenance according to specification.
- Replace defective and worn components
- If required, request spare parts lists and assembly drawings from the manufacturer.
- Document the type and extent of the maintenance work..
- Dispose of packing material and used parts in accordance with the local stipulations.



### NOTICE

#### Protective equipment and notices

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.



### TIPP

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

With the appropriate expertise 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
9.4.9	Inspection: Flow/signal	1				
9.4.2	Inspection: Operating pressure	2				
9.4.3	Inspection: Media temperature	2				
9.4.4	Inspection: Condition of operating fluid	2				
9.4.5	Audiometric monitoring: Unusual noise		1			
9.4.6	Cleaning		1			
9.4.7	Visual inspection: Leakages		1			
9.4.9	Inspection: Flow/signal			1		
9.4.2	Inspection: Operating pressure			2		
9.4.3	Inspection: Media temperature			2		
9.4.4	Inspection: Condition of operating fluid			2		
9.4.8	Inspection: Device temperature			2		
9.4.10	Replace: Other seals				3	

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

### 9.4.2 Inspection: 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 Inspection: 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 Inspection: Condition of operating fluid

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

- Replace operating fluid if necessary.

#### 9.4.5 Audiometric monitoring: Unusual noise

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

- In case of unusual noises, check the individual components of the product, line attachments and the operating media for foam formation.
- Comply with the product-specific data sheets/operating instructions.

#### 9.4.6 Cleaning

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

#### 9.4.7 Visual inspection: Leakages

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.

#### 9.4.8 Inspection: Device temperature

Measure the surface temperature in the area of the bearings.

#### 9.4.9 Inspection: Flow/signal

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

#### 9.4.10 Replace: Other seals

Repairs by manufacturer

Consult the manufacturer

# 10 Repairs

## 10.1 Safety instructions for repair



### **⚠ 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**

#### **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) Depressurize the system before all work.
- b) Securely prevent the pressure from being restored during work.



### **⚠ CAUTION**

#### **Hot surfaces**

Burns of the skin on contact.

- a) At temperatures  $\geq 48^{\circ}\text{C}$  the product must be allowed to cool down first.

## 10.2 General

The repairs covers:

1. Troubleshooting  
Determination of damage, pinpointing and localisation of the damage cause.
2. Elimination of damage  
Elimination of the primary causes and replacement or repair of defective components.  
The repair is generally made by the manufacturer.

### Repairs by manufacturer

Before returning the device, fill in the return notification form. The form can be filled in on-line and is available as a pdf file download.



### NOTICE

#### Device contains hazardous material

If the device was operated with dangerous liquids, it must be cleaned before the return. If this should not be possible, the safety data sheet of the hazardous material is to be provided beforehand.

#### Repair by equipment builder/operator

If corresponding expertise and sufficient equipment is available, the equipment builder/operator can also make the repairs. Please consult the manufacturer about this.

- a) If required, request spare parts lists and assembly drawings from the manufacturer.
- b) Use spare parts approved by the manufacturer only
- c) Dispose of packing material and used parts in accordance with the local stipulations.



### NOTICE

#### Warranty

Any warranty will be void if not executed properly.



### NOTICE

#### Protective equipment and notices

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

## 10.3 Detecting and eliminating failures

<b>Fault</b>	<b>Potential causes</b>	<b>Possible measures</b>
<b>LED display</b>		
Both LED displays flash - however, false values are displayed in the overriding controller	Connection between the device plug and the overriding controller is loose/defective	Check the connection and replace the cable or plug if necessary
An LED display does not illuminate	Wire break	Repairs by manufacturer
	Soldering point defective	
	Sensor defective	
No LED display illuminates	Power failure	Check the supply cable Check the fuses
	Measuring unit is blocked	Put the device out of operation immediately! Repairs by manufacturer
<b>Seal failure / Leakage</b>		
	O-Ring in the device is defective	Repairs by manufacturer
	O-ring between housing and connection plate defective	Repairs by manufacturer
<b>Defective values in the overriding controller</b>		
	Wear	Repairs by manufacturer
In case of unidentified faults, request help from the manufacturer or return the unit to the manufacturer for inspection.		