Operating and maintenance instructions SVC

BSVC0094EN

BSVC0094EN_D.0024770002_V01

Englisch

2009-11-05

KRACHT

Table of Content

1 General points

1.1 About the documentation

These operating instructions describe the installation, operation and maintenance of the screw spindle counter, type **SPV**, also referred to below as the unit.

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.

The structure of the type designation and a more detailed description of the individual series and nominal sizes can be found in the chapter "Device description" and in the chapter "Technical data".

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

1.2 Manufacturer´s adress

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1.3 Intended use

The screw spindle counter is a measuring device for the continual flow measurement of combustible and non-combustible fluids.

The different seal materials allow the use of media of different viscosity and lubricating ability.

It must be guaranteed that the medium is compatible with the materials used in the device (see chapter "Device description").
The chemical competence is necessary for this.
The maximum permissible operating data listed in the "Technical data" chapter must always be observed.

Deviations from the specified data and operating conditions require express approval by KRACHT GmbH and/or are specified on the type plate.

Type plates or other references on the device must not be removed nor made illegile or irrecognisable.

In cases of noncompliance, all warranty claims against KRACHT GmbH shall be void.

2 Safety

2.1 Safety instructions and symbols

The safety notices in these operating instructions are marked with caution symbols.
Non-compliance can lead to hazards for people and the device.
In addition, the safety instructions are marked with signal words. They have the meanings as explained below:
Caution: Identification of a low risk hazard, which could lead to minor or medium 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.
Danger: Identification of an immediate hazard, which can lead to death or severe bodily injury if not avoided.

Notice: Flagging of notices to prevent property damage.

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

2.2 Staff qualification and training

The staff designated to install, operate and service the device must be properly qualified. This can be through training or specific instruction. Staff must be familiar with the contents of this operating manual.

2.3 General safety instructions

The operational safety of the device delivered is only guaranteed when it is used for the intended purpose (see section "General points").
The limit values given must never be exceeded (see chapter "Technical data").
National regulations concerning accident prevention and health and safety at work must be observed, as well as internal regulations laid down by the operator, even if these are not specifically mentioned in this manual.
The operator must ensure that this operating manual is accessible to the staff responsible at all times.

2.4 Hazard statements

DANGER

Hazard caused by breakage or fluids spurting out

If the device is blocked it acts like a closed gate. The uncontrollable pressure levels that occur in this case can result in damage to the device and to the upstream system elements. For this reason, use of a pressure limiter upstream from the device is essential.

DANGER

Hazard caused by hazardous fluids

When operating the device with hazardous fluids, comply with the safety datasheets and the regulations on handling these fluids.

Leaks of hazardous transport materials must be collected in such a manner that no hazards arise for people and the environment.

Always comply with the existing national and international regulations applicable at the place of installation.

DANGER

Gefahr durch elektrische Spannung

Bei allen Arbeiten an elektrischen Anlagen sind die speziellen Sicherheitsbestimmungen einzuhalten. Diese Arbeiten dürfen nur von einer Elektrofachkraft ausgeführt werden!

CAUTION

Hazard caused by hot surfaces

At operating temperature above 60°C the device must be allowed to cool down first. Danger of scalding.

3 Device description

3.1 Structure and function

The basic structure of the individual design sizes is shown in the diagram below using size 10 as an example.

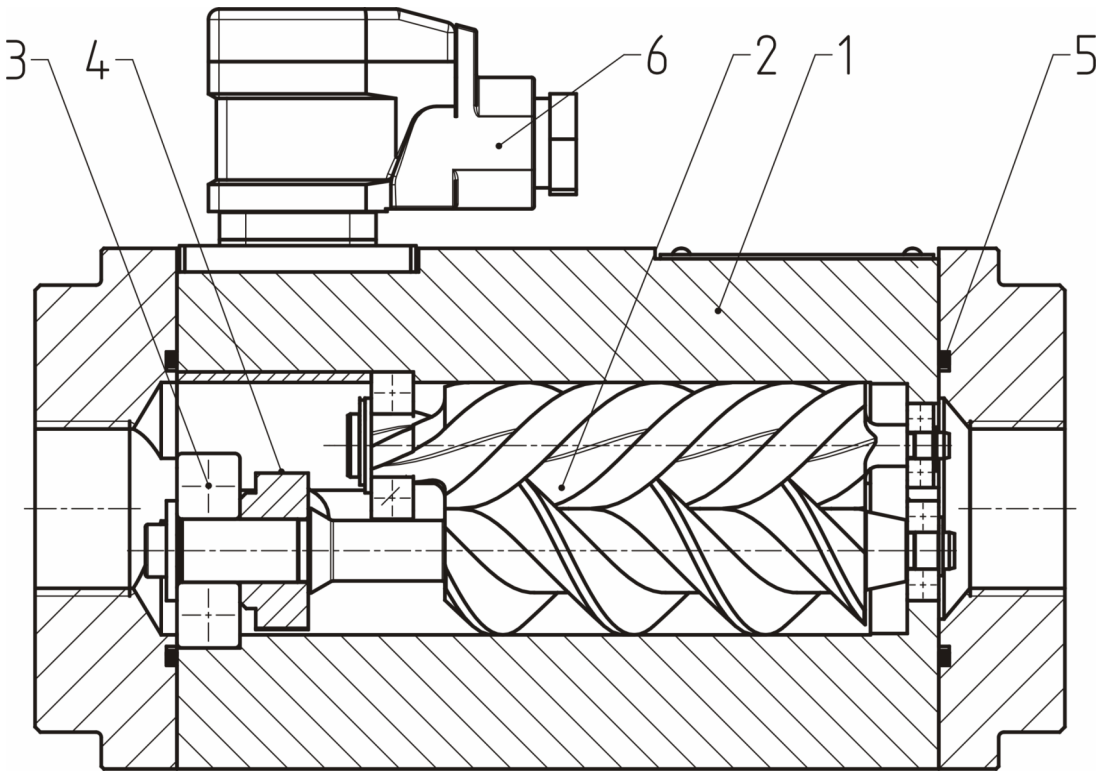
The device is a displacement counter. Two measuring spindles (pos. 2) with screw-shaped profile are engaged with one another. They are supported anti-friction bearings (pos. 3) and surrounded by a housing (pos. 1).

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 pulsation.

A transmitter wheel (pos. 4) 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.

Tab. 3.1:



3.2 Type key

Tab. 3.2: Order example

SVC	10	A	1	G1	F	1	S	1
1.	2.	3.	4.	5.	6.	7.	8.	9.

Tab. 3.3: Explanation of type key SVC

1.	**Product name**	
2.	**Nominal size**	
	10	Q_{nom}= 100 l/min
	40	Q_{nom}= 400 l/min
3.	**Series**	
	A	Standard
	H	High pressure
4.	**Spindle bearing**	
	1	Anti-friction bearing
5.	**Attachment**	
	G1	Pipe thread
	F1	SAE-flange 3000 psi
6.	**Seal material**	
	F	FKM
	N	NBR
7.	**Specified internally**	
8.	**Electronics**	
	S	Standard
	H	High temperature
9.	**Plug variant**	
	1	Hirschmann plug

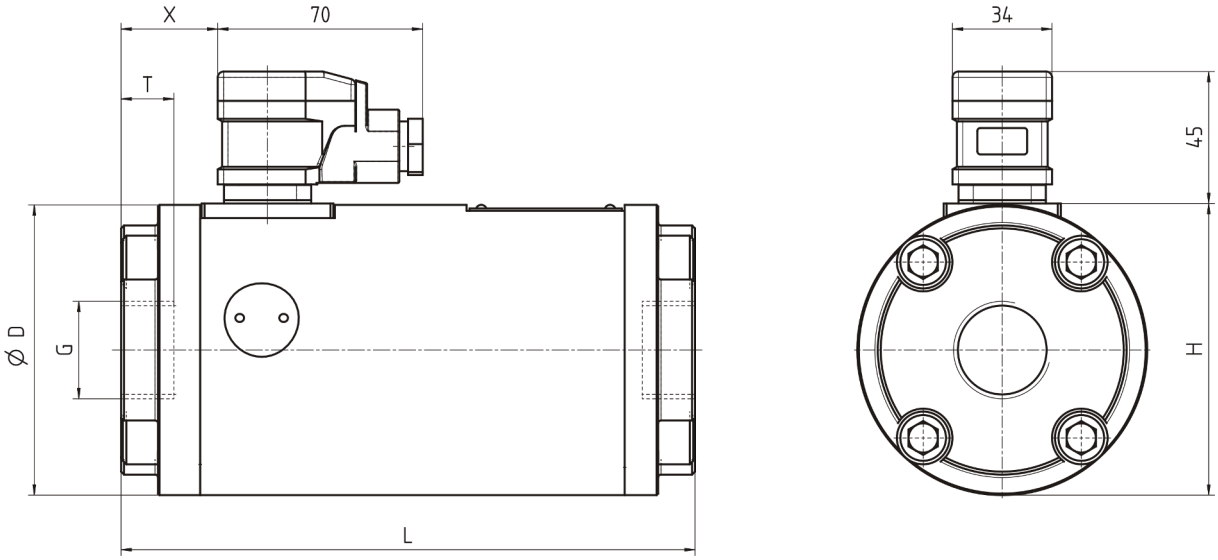
3.3 Dimensions

Series A / Attachment G1, F1 / Electronics S

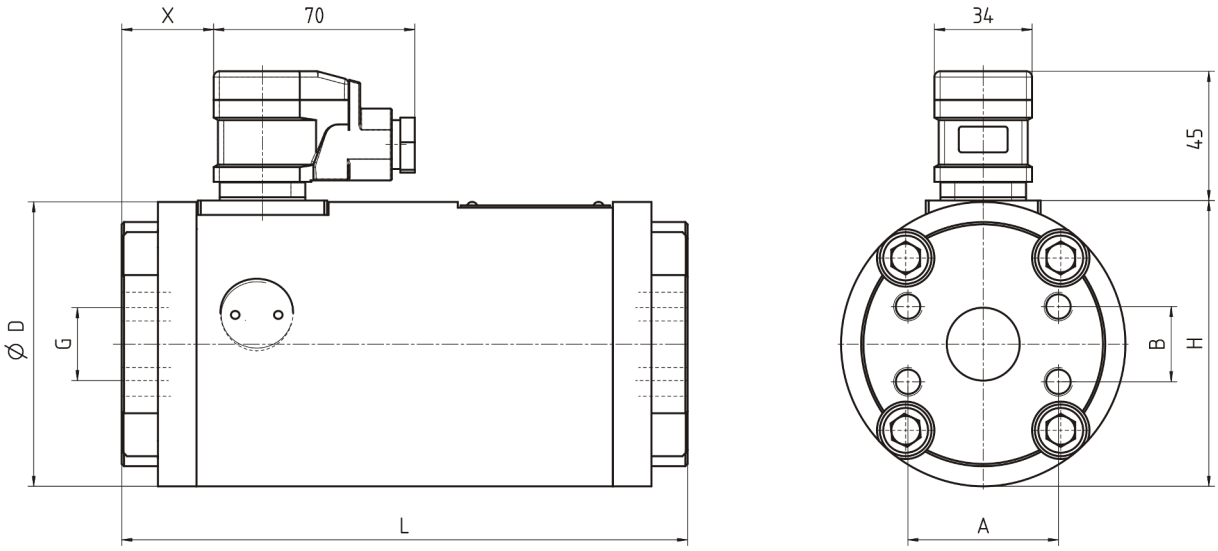
Tab. 3.4:

Nominal size	Weight kg	Dimensions							
	m	A	B	D	G	H	L	T	X
10 A1 F1	9,6	52,37	26,19	99	25	100	197		32
10 A1 G1	9,6			99	G1	100	196	19	33

Tab. 3.5:



Tab. 3.6:



3.4 Types of seals

Tab. 3.7:

Seal variant	**Version S** (Standard) [°C]
N = NBR	-30...100
F = FKM	-15...120
E = EPDM	-30...120
P = FEP	-30...120

4 Technical data

4.1 General characteristics

Tab. 4.1:

General characteristics	
Material: screw jacks	Heat-treated steel
Material: housing	EN-GJS-400-15
Pipe connection	Pipe thread, SAE connection
Installation position / direction of flow	any
Permissible ambient temperature	-30...+80°C

4.2 Overview of nominal sizes

Tab. 4.2:

Nominal size		10
Q_{max}	l/min	150
Q_{nom}	l/min	100
Q_{min}	l/min	0,5
Measuring range	-	1:300
max. operating pressure	bar	250
Pressure peak	bar	300
Volume of measuring chamber	cm^3	26,98
Impulse volume	cm^3/Imp	1,42
Speed (Q_{nom})	min^{-1}	3698
K-factor	Imp/l	704,2
K-factor (x 4)*	Imp/l	2816,2
Impulse frequency (Q_{nom})	Hz	2347
Measuring range	l/min	0,5...150
*Resolution with 4-times evaluation of the two measuring channels		

5 Transport and storage

5.1 Transport and shipping

Inspect the device for shipping damage as soon as the delivery has been received.

If shipping damage is discovered, inform the shipping company.

If proper operation of the device is impaired by the damage, the device must be replaced or repaired. In that case, contact the manufacturer.

WARNING

Hazard caused by falling and tipping loads
During transport, accidents can occur due to the size and weight of the device.
Use only suitable means of conveyance and lifting tackle with sufficient load-bearing capacity.
Never walk under suspended loads.
Never work under suspended loads.

5.2 Corrosion protection

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

The device must not be exposed to the influence of the weather and major fluctuations in temperature during transport and storage and must be stored in a dry place.

If the device is stored over a longer period, it must be treated on the inside and outside with a suitable corrosion protection oil. In addition, it must be protected from humidity by a humidity-absorbing agent.

If high air humidity or aggressive atmosphere is to be expected during transport, suitable corrosion prevention measures must be carried out.

NOTICE

Care must be taken that the preserving agent is compatible with the materials and elastomers used. In addition, compatibility with the media used must be guaranteed.

6 Installation

6.1 General points

NOTICE

All work on the device may only be carried out by trained and professionally qualified staff.
During all work, care must be taken that everything remains absolutely clean.

6.2 Mechanical installation

The device was tested in the factory before delivery and can be used immediately following installation and connection of the electrical cables.

How much space is required for the installed device is specified in the chapter Device description.

The built-in measuring device should also be safely accessible for visual inspection at any time during operation.

In case of any damage to the device there must be a pressure safeguard in the system to prevent the maximum permissible pressure of the volume sensor or other system components being exceeded (pressure limiting valves).
Care must be taken that the device is only held by the housing during installation and transport, and never by the plug!

Depending on the type of connection the device is connected to the system via a connection plate or connections within the housing.

Only connection pipelines and connections approved for the pressure range to be expected may be used.
The respective manufacturer's regulations must be heeded!

The device must be installed in such a way that it is not exposed to any impermissible vibrations.

Hot parts must not be installed since any escaping fluids could ignite.

During operation start-up, the device must be checked for leaks under operating conditions.

6.3 Pipeline connections

- Clean the pipeline system sufficiently before installing the device.
- Connect the connection pipelines to the inlet and outlet points on the measuring device. Always heed the respective manufacturer's instructions.
- The screw-in depth of the connection pipelines must never be greater than the device's thread length as otherwise the parts inside the device can become damaged.
- During installation make sure that no sealant gets into the connection pipeline.

The devcie must not become twisted during installation!

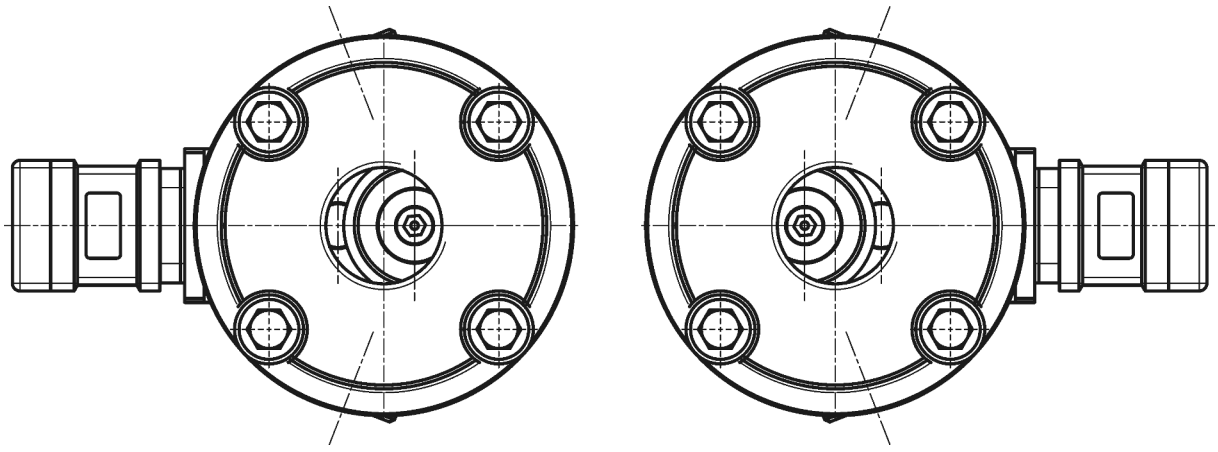
- After the system has been put into operation, check all connections for air-tightness.

6.4 Installation position

Basically, the device can be installed and operated in any position at all.

In the case of particle-charged media, heavy soiling or coarse filtering, a horizontal installation position is recommended (see diagram below).

Tab. 6.1:



6.5 Electrical connection

Tab. 6.2: Electrical data

Number of measuring channels	2
Operating voltage	U_B = 24 V DC ± 20%, protected against reverse polarity
Impulse amplitude	$U_A \geq 0.8\ U_B$
Impulse shape with symmetrical output signal	Rectangular, pulse-duty factor/ channel 1:1 ± 15%
Impulse offset between the two channels	90° ± 30°
Power requirement	P_b = 0.9 W
Power output / channel	$P_{a\ max}$ = 0.3 W, short-circuit resistant
Normal protective rating	IP 65 (DIN 40500)

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

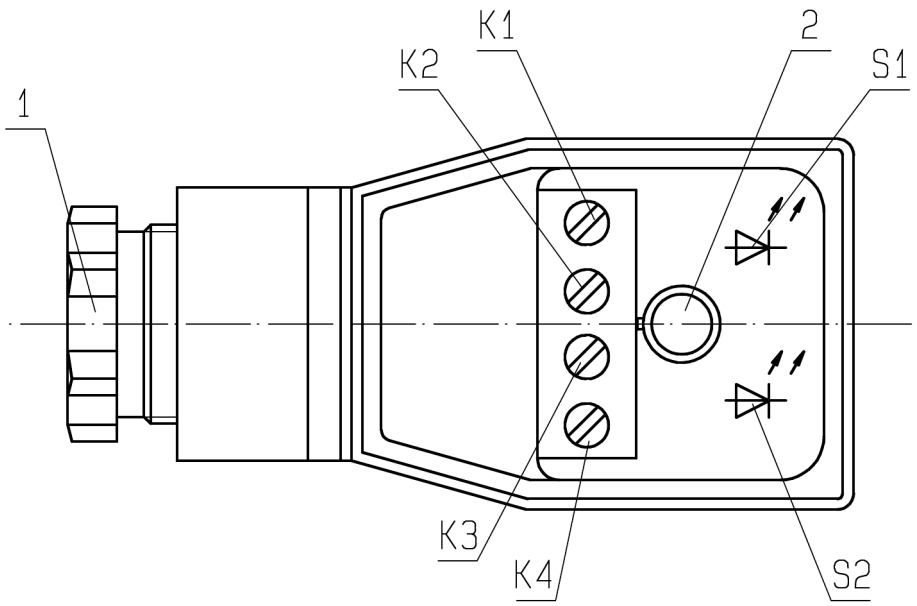
6.5.1 Standard plug version

- The electrical connections have to be carried out according to the assignment diagram shown below.

To make work more convenient, the plug may be pulled off the housing cover for cable connection.

The assignment of the terminals for channel 1 and channel 2 influences the direction of rotation of the measuring unit indicated and thus the sign with which the measured volume flow is indicated in the evaluation unit.

Fig. 6.1:



1 = Cable screw connection

2 = Attachment

S1 = Signalling channel 2

S2 = Signalling channel 1

K1 = 0 Volt

K2 = Channel 2

K3 = Channel 1

K4 = 24 Volt

After installation, the fastening screw (slightly) and the cable screw connection have to be tightened.
This work may only be carried out by a qualified electrician.

7 Operation start-up

7.1 Preparation

NOTICE

All work on the device may only be carried out by trained and professionally qualified staff.
During all work, care must be taken that everything remains absolutely clean.

- Check the permissible operating data against the operating states to be expected.

7.2 General points about operation start-up

CAUTION

The device may only be operated within the given limit values (see chapter "Technical data" for the values).
It must be guaranteed that the medium to be measured does not corrode the materials the device is made of.
The medium must not contain any abrasive particles. If in doubt please contact the manufacturer.
The device has been designed for operation with fluids. Dry operation is not permitted.

The device was tested in the factory before delivery. It can be put into operation immediately, as soon as the mechanical and electrical connections have been set up. During operation, the two LEDs in the device plug light up as long as there is a continual flow of fluid through the measuring unit. See the chapter "Detecting and eliminating problems" to see what is to be done in the case of a fault. The system must be switched off immediately if the counter signal fails unexpectedly.

CAUTION

The flow resistance Δp must not be allowed to exceed 25 bar even briefly, since this will otherwise lead to mechanical damage.

The limiting values specified in the Technical data must be observed for the ambient conditions.

7.3 Further operation start-up

Special conditions or restrictions apply for the safe use of the device in the approved environment. These must be guaraneed by the customer or operator through suitable technical and/or organisational measures.
Operation is only permitted within the specified enviromental and ambient conditions.
The device may only be used when its materials are resistant to mechanical and/or chemical influences or corrosion under the respective operating conditions.
The medium must have a minimum lubricating ability.
The device has been designed for operation with fluids. Dry operation is not permitted. Operation is not permitted outside the approved parameters.
A filter must be installed if required to avoid the device blocking on account of contaminants. If media are soiled, filtering using a mesh size of max. 400 µm is necessary.
The installation, servicing and repair specifications contained in the operating manuals must always be complied with.
The device may only be operated when closed and must not be exposed to any impermissible vibrations.
Only use original spare parts for service and maintenance.

8 Removal

8.1 Removing the device

It must be guaranteed that the pipes have been made pressure-less and the electrical connection is voltage-free.
The device and the pipelines can be filled with the pumping medium or a cleaning agent.
All the requirements for dealing with the medium pumped last must always be heeded!
Sufficiently large collecting tanks must be provided.
Make sure the workstation is sufficiently ventilated if necessary.

- If operating at high temperatures, wait until the device has cooled to ambient temperature.
- Loosen the attachment screw on the plug.
- Pull the plug off the housing.
- *Connection:* Loosen the housing connections or take the housing off the fixture.

CAUTION

If hardening media are involved, the device must be cleaned with suitable cleaning agents as quickly as possible!

9 Servicing

9.1 General points

NOTICE

Regular servicing work is essential for safe operation. Scope and intervals must be adapted to requirements. The first check-up must be carried out directly after the device has been put into operation.
The length of servicing intervals must be defined by the operator. During visual inspections, particular attention must be paid to possible damage. In this case, the device may no longer be used.
Type and scope of servicing work as well as measured values should be documented. This is the quickest way to determine changes in operating data.

When designed to the conditions of use and fitted correctly, the devices are able to be used for long and problem-free operation. They only require a little maintenance. This is absolutely essential for problem-free operation, however. Experience shows that a high percentage of the problems and damage that occur can be traced back to dirt and lack of servicing.

The scope and time intervals for inspections and servicing are generally specified by the manufacturer in a respective plan.

☞ Regular checking of all operating data such as pressure, temperature, current consumption, degree of filter soiling etc. contributes to early problem detection.

NOTICE

During all work, care must be taken that everything remains absolutely clean. The surrounding external area must be cleaned before screw joints are loosened.
The connection pipelines must be made pressure-less before any work is done on the device and prior to removal.
It must also be guaranteed that no pressure can build up again during work on the device.
Repair, servicing and installation work may only be carried out by trained and professionally qualified staff.
When the device is disassembled, the components must always be protected from damage and soiling.

CAUTION

Hazard caused by hot surfaces
At operating temperature above 60°C the device must be allowed to cool down first. Danger of scalding.

DANGER

Hazard caused by breakage or fluids spurting out
Damaged pipes and hoses must be replaced immediately.

DANGER

Hazard caused by hazardous fluids
When operating the device with hazardous fluids, comply with the safety datasheets and the regulations on handling these fluids.
Leaks of hazardous transport materials must be collected in such a manner that no hazards arise for people and the environment.
Always comply with the existing national and international regulations applicable at the place of installation.

9.2 Unusual noises

Some damage is indicated by unusual noises. If there is a change in the device's operating noise, a thorough examination of the cause must always take place.

9.3 Static seals

The static seals on the device's separation joints and the connection lines must be periodically checked for leakproofness.

If there are any visible leaks, immediately stop plant operation.

If the leaks cannot be stopped by simply retightening the connection, replace all affected seals.

9.4 Screw joints

All the screw joints must be checked at regular intervals to make sure they are a tight fit. Loose screw joints must be tightened and, if necessary, secured against loosening by e.g. Loctite (medium strength).

9.5 Surface temperature

The temperatures at the device surface can be checked to prevent premature wear or detect device overload. This temperatures should never be much higher than the media temperature at the device inlet. If the temperature on the device surface is much higher, this is an indication of a device malfunction. In this case the device must be replaced immediately.

9.6 Cleaning

The device is basically maintenance-free. If, however, fluids are pumped that can lead to deposits in the measuring device, the device may need cleaning. Otherwise the device can be cleaned within the context of normal system cleaning. A change in measuring accuracy can be an indication of wear. Customers are recommended to check this regularly.

If hardening media are involved, the device must be cleaned with suitable cleaning agents as quickly as possible.

10 Repairs

10.1 General points

The term repairs covers:

- **Troubleshooting**, in other words establishing damage, determining and localising the reason for the damage.
- **Elimination of the damage**, in other words eliminating the primary causes and replacing or repairing faulty components.

10.2 Troubleshooting

Leaks are the most frequent problem. If these occur on the pipelines, they can be eliminated by straightforward tightening of the screw joints.

If the device itself is leaking, the respective seals have to be replaced (see spare parts list).

10.3 Return

If the device has to be repaired or checked over on the manufacturer's premises, it must be packed suitably for transport. In addition, a safety data sheet for the medium used must be enclosed with the device. In the case of well-known mineral oils, at least the exact type description is required.

If hardening or agglutinative media are involved, the device must be cleaned before it is returned.

Cleaning is also necessary if the device has been operated with hazardous fluids.

10.4 Detecting and eliminating problems

10.4.1 Electrical problem analysis

If the device does not function properly, the electrical components should be checked first. The measuring device must remain in operation for this.

This work may only be carried out by a qualified electrician.

10.4.2 Troubleshooting table

If there is no analytical evaluation software available, the following troubleshooting table is to be used for problem analysis.

Tab. 10.1:

Fault	Possible cause	Remedy
Both LEDs on the disconnection amplifier are lit, but incorrect values are displayed.	The connection between device and evaluation device is faulty.	Check the connection and replace the cables or plugs if necessary.
One LED does not light up during operation.	The wiring between sensor and board or individual solder spots on the board is damaged.	Send the measuring device back to the manufacturer for repair.
	The respective sensor is faulty.	
Both LEDs do not light up during operation.	Power failure	Check supply cable and fuses.
	Since it is improbable that both sensors fail at the same time, it must be assumed that the measuring unit has stopped.	Put the device out of operation immediately! The device can be dismantled and cleaned (see chapter "Servicing").
Leaks, media escaping	O-ring in the housing not airtight.	Check seal compatibility, consult the manufacturer if necessary and fit new set of seals (purchase from the manufacturer)
	O-ring between device and connection plate not airtight.	Check seal compatibility, install new O-rings.
Decrease in measuring accuracy	Wear	Check the measuring device or send it back to the manufacturer for repair.