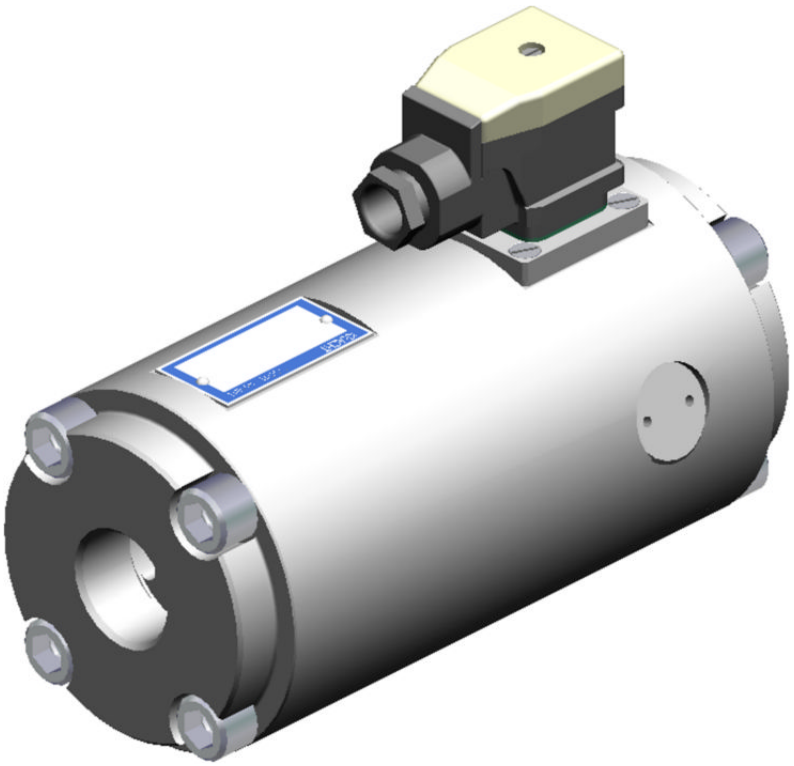
Operating instructions

BSVC0094EN



Screw-type flow meter SVC

BSVC0094EN_D0024770002_03

Englisch

2011-01-13

KRACHT

Table of Content

1 General points

1.1 About the documentation

These operating instructions describe the installation, operation and maintenance of the screw-type flow meter **SVC**, also referred to below as the device.

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 3 “Device description” and in the chapter 4 “Technical data”.

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

1.2 Manufacturer´s address

Kracht GmbH

Gewerbestraße 20

DE 58791 Werdohl

phone: +49 (0) 23 92 / 935-0

fax: +49 (0) 23 92 / 935-209

email: info@kracht.eu

web: www.kracht.eu

1.3 Intended use

The screw-type flow meter 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.

The device has been designed for operation with fluids. Dry operation is not permitted. The medium must guarantee a minimum lubrication.

Operation is only permitted within the specified enviromental and ambient conditions.

Use in explosive areas is **not** permissible.

It must be guaranteed that the medium is compatible with the materials used in the device (see section 4.4 “Overview materials”). The chemical competence is necessary for this. Be careful with ethylene oxide and/or other catalytic and/or exothermic and/or self-decomposing materials! Please consult the manufacturer in cases of doubt.

The device may only be used when its materials are resistant to mechanical and/or chemical influences or corrosion under the respective operating conditions.

A filter must be installed if required to avoid the device blocking on account of contaminants.

The device may only be operated when closed and must not be exposed to any impermissible vibrations.

The maximum permissible operating data listed in the chapter 4 “Technical data” must always be observed.

Deviations from the above-mentioned data and operating conditions require express approval by the manufacturer and/or are specified on the type plate.

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

In cases of noncompliance, all warranty claims and manufacturer responsibility 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 would lead to death or severe bodily injury if not avoided.
Danger: Identification of an immediate hazard, which would result in 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 maintenance 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 chapter 1 “General points”).
The limit values given must never be exceeded (see chapter 4 “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

Danger due to breakage or squirting fluids!

If the device is blocked it acts like a closed gate. The pressure level that occure in this case can result in damage to the device and to the up or downstream plant elements. Breakage can lead to parts flying around uncontrolled or to fluids squirting out which can lead to accidents and severe injuries or even result in death.

- A pressure relief valve or other kind of over-pressure safeguard must be installed before the device. The pressure relief device must be dimensioned so that the volume flow can be conducted through it with the lowest possible pressure or must be depressurized.
- Do **not** put the unit into operation without a pressure relief valve.

DANGER

Danger due to pressure loaded lines.

When working on pressure loaded lines, uncontrolled or squirting fluids can lead to accidents and severe injuries or even result in death.

- Always depressurize all lines during all work on the unit and before disassembly.

DANGER

Danger due to breakage or squirting fluids!

Using unsuitable connections and lines can lead to breakage. Parts flying around uncontrolled or squirting fluids can lead to accidents with severe injuries or even lead to death.

- Use only connections and lines approved for the expected pressure range.
- Comply with each manufacturer's regulations.

DANGER

Danger due to breakage or squirting fluids!

Using damaged connections and lines can cause parts to fly around uncontrolled or fluids to squirt out, which can lead to accidents and severe injuries or even result in death.

- Immediately replace damaged connections, pipes and hose lines.

DANGER

Danger due to electric voltage!

Danger of death due to electric shock.

- Follow the special safety regulations during all work on electrical installations.
- Only allow electricians to work on electrical systems.

WARNING

Danger due to hazardous fluid!

Danger of death upon contact with hazardous fluids and when inhaling vapours from these liquids.

- Comply with the safety data sheets and regulations on handling the hazardous liquids!
- Collect and dispose leaks of hazardous materials so that no hazards arise for people or the environment.
- Comply with national and international rules at the place of installation.
- Wear suitable protective clothing.

WARNING

Danger due to falling loads and or loads falling over!

Due to the size and weight of the device, accidents can occur resulting in severe injuries or death during transport and shipping.

- Compliance with applicable industrial safety requirements is mandatory.
- Use only suitable means of conveyance and lifting tackle with sufficient load-bearing capacity.
- Attach the lifting tackle in such a manner that it cannot slip.
- Secure the device so that toppling over and falling down is impossible.
- Always avoid jerks, impacts and strong vibrations during transportation.
- Never walk under suspended loads, never work under suspended loads.
- To prevent damage to the device, be extremely cautious when shipping or transporting.
- Wear suitable protective clothing.

CAUTION

Danger due to hot surfaces!

When operating the device with hot media, there is a danger of being burned and scalded when touching the hot surfaces.

- At medium temperatures above 60 °C, take measures against unintended contact.
- Wear safety gloves.

CAUTION

Danger due to hot surfaces!

When operating the device with hot media, there is a danger of being burned and scalded when touching the hot surfaces.

- Let the device cool off first when the medium temperature is over 48 °C.
- Wear safety gloves.

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.

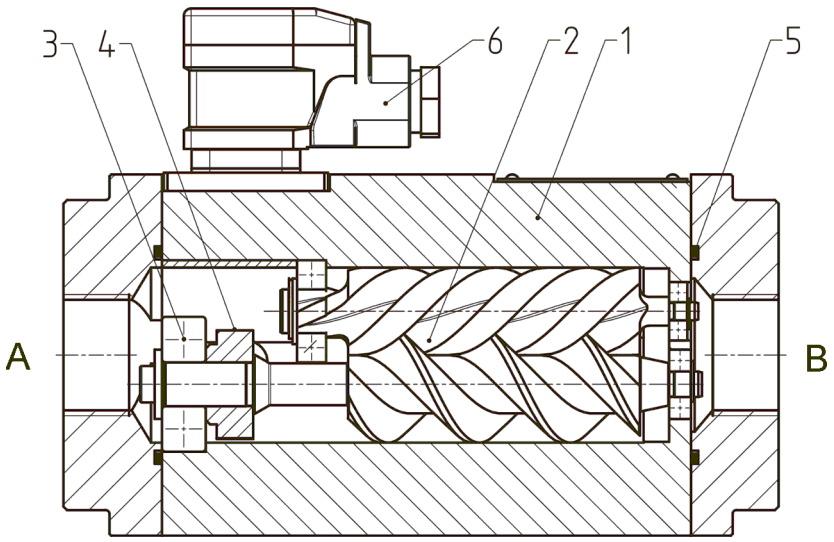
The device is a displacement counter. Two measuring spindles (pos. 2) with screw-shaped profile are engaged with one another. They are supported by anti-friction bearings (pos. 3) and surrounded by a housing (pos. 1).

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: Basic structure SVC



1. Housing
2. Screw spindles (Measuring unit)
3. Roller bearing (Bearing)
4. Transmitter wheel and sensor
5. O-Ring (Seal)
6. Device plug

3.2 Type key

Tab. 3.2: Ordering example

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

Tab. 3.3: Explanation type key SVC

Explanation type key				
1.	**Product name**			
2.	**Nominal size**			
	10	Q_{nenn}= 100 l/min (Q_{max}= 150 l/min)		
	40	Q_{nenn}= 400 l/min (Q_{max}= 600 l/min)		
	100	Q_{nenn}= 1000 l/min (Q_{max}= 1500 l/min)		
3.	**Series**			
	A	Standard		
4.	**Spindel bearing**			
	1	Roller bearing unsealed	**2**	Roller bearing sealed *
5.	**Attachement**			
	G1	Pipe thread	**F1**	SAE-flange SAE J518 Code 61
	D.	DIN-flange DIN EN 1092		
6.	**Seal material**			
	F	FKM	**E**	EPDM
	N	NBR	**P**	FEP
7.	**Specified internally**			
8.	**Electronics**			
	S	Standard	**H**	High temperature
	V	Without pre-amplifier		
9.	**Steckervariante**			
	1	Hirschmann plug		
10.	**Special number for specific types**			
* only for nominal size 10				

4 Technical data

4.1 General characteristics

Tab. 4.1: General characteristics SVC

General characteristics	
Materials	See section 4.4 “Overview materials”
Pipe connection	Pipe connection, SAE connection
Installation position / direction of flow	Any
Permissible ambient temperature ϑ	-15 ... 80 °C (seal material F)
	-30 ... 80 °C (seal materials N, E, P)

4.2 Overview of nominal size

Tab. 4.2: Nominal sizes SVC

Nominal size*		10	40	100
Q_{max}	l/min	150	600	1500
Q_{nenn}	l/min	100	400	1000
Q_{min}	l/min	1,0	4,0	10,0
Span	-	1:150	1:150	1:150
Max. operating pressure	bar	250	200	140
Pressure peak	bar	300	240	170
Volume of measuring chamber	cm^3	27,04	123,6	354,6
Impulse volume	cm^3/Imp	1,423	5,15	9,85
Speed (Q_{nenn})	1/min	3698	3236	2820
Resolution (K-Faktor)	Imp/l	702,7	194,2	101,5
Resolution (K-Faktor) 4-fach **	Imp/l	2811	776,7	405,1
Impulse frequency (Q_{nenn})	Hz	1171	1295	1889
* See type key and type description on the device: SVC ... **Resolution with 4-times evaluation of the two measuring channels				

4.3 Permissible operating fluid temperature

Tab. 4.3: Permissible temperature of operating media SVC

Seal variant *	**Version S (Standard)** [°C]	**Version H (High temperature)** [°C]
N = NBR	-30...100	-
F = FKM	-15...120	-15...150
E = EPDM	-30...120	-
P = FEP	-30...120	-30...150
Spindle bearing	Version 2 [°C]: max. + 110	
* See type key and type description on the device: SVC ...		

4.4 Overview materials

Tab. 4.4: Materials SVC

Nominal size		**10**	**40**	**100**
Materials	**Housing / flange connections**	EN-GJS-400-15 (GGG 40)		
	Measuring unit	Heat-treated steel		
	Bearing	Heat-treated steel		
	Seals*	NBR, FKM, EPDM, FEP		
Type of bearing		Anti-friction bearing		
Viscosity of the operating fluid in mm^2/s		1 ... 1.000.000 (depending on the flow)		
Lubricating properties of the operating fluid		good		
Permissible size of foreign particles in operating fluid in µm		400		
* See type key and type description on the device: SVC ...				

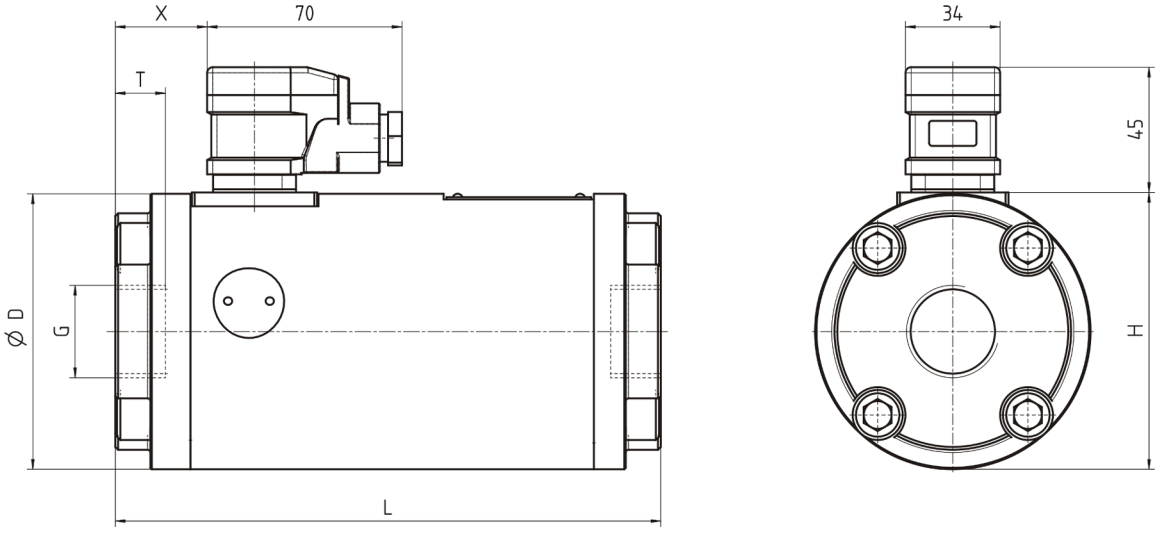
4.5 Dimensions and weights

4.5.1 Series A; Attachment G1, F1; Electronics S, H; Nominal size 10

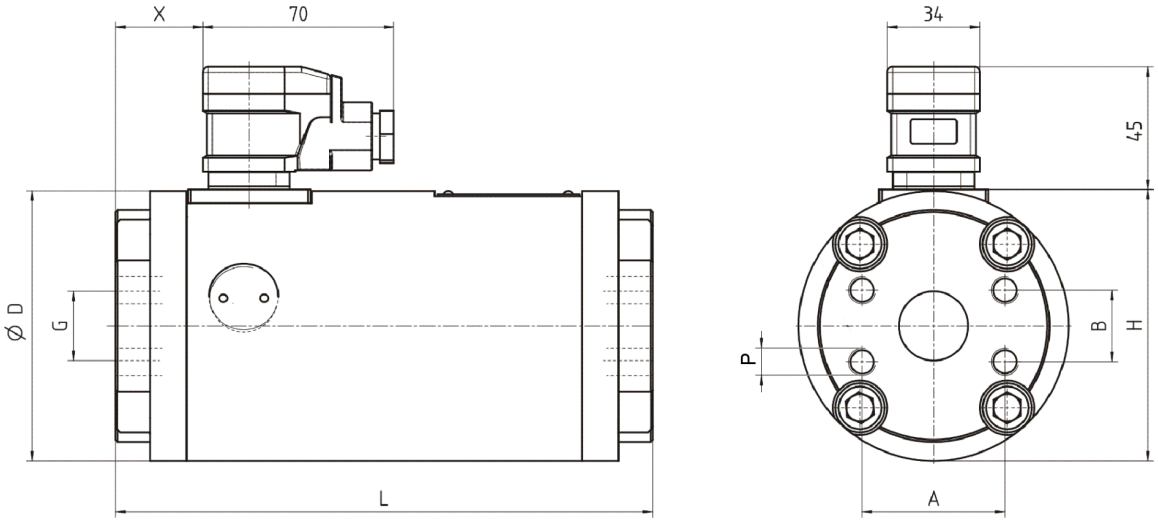
Tab. 4.5: Series A; Attachment G1, F1; Electronics S, H; Nominal size 10

Type code	Weight [kg]	Dimensions [mm]								
		A	B	D	G	H	L	P	T	X
SVC 10 A. G1 .1 S1	9,6	-	-	99	1"	101,5	196	-	19	33
SVC 10 A. F1 .1 S1	9,6	52,4	26,2	99	Ø25	101,5	197	M10 - 17 deep	-	32
SVC 10 A. G1 .1 H1	9,6	-	-	99	1"	104,5	196	-	19	33
SVC 10 A. F1 .1 H1	9,6	52,4	26,2	99	Ø25	104,5	197	M10 - 17 deep	-	32

Tab. 4.6: SVC 10 A. G1 .1 .1



Tab. 4.7: SVC 10 A. F1 .1 .1

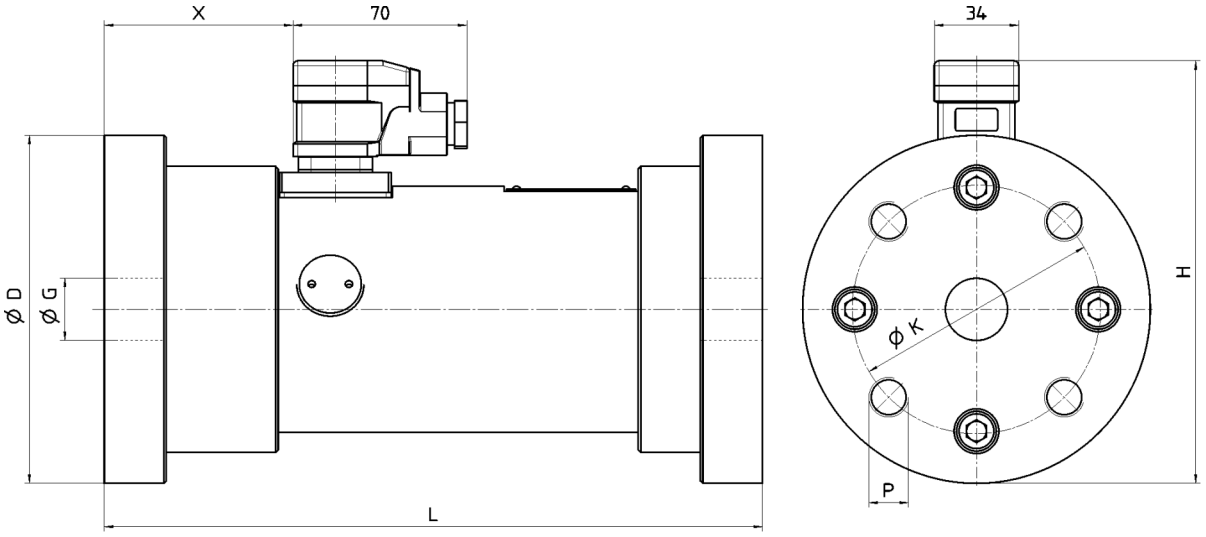


4.5.2 Series A; Attachment D; Electronics S, H; Nominal size 10

Tab. 4.8: Series A; Attachment D; Electronics S, H; Nominal size 10

Type code	Weigt [kg]	Dimensions [mm]						
		D	G	H	K	L	P	X
SVC 10 A. D1 .1 S1	17,20	140	32	167	100	265	M16 - 25 deep	76
SVC 10 A. D2 .1 S1	17,30	140	25	167	100	265	M16 - 25 deep	76
SVC 10 A. D3 .1 S1	19,15	150	25	172	105	275	M20 - 30 deep	81
SVC 10 A. D1 .1 H1	17,20	140	32	170	100	265	M16 - 25 deep	76
SVC 10 A. D2 .1 H1	17,30	140	25	170	100	265	M16 - 25 deep	76
SVC 10 A. D3 .1 H1	19,15	150	25	175	105	275	M20 - 30 deep	81

Tab. 4.9: SVC 10 A. D. .1 .1



Tab. 4.10: Available DIN-flange version SVC 10

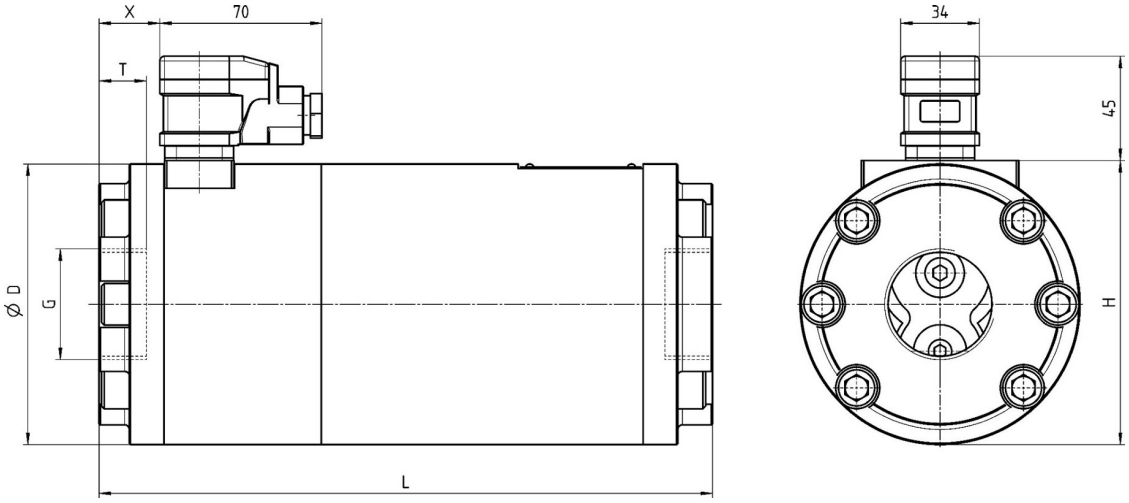
	Nominal width NW [mm]	Compression P_N [bar]
D1	32	40
D2	25	160
D3	25	250

4.5.3 Series A; Attachment G1, F1; Electronics S, H; Nominal size 40

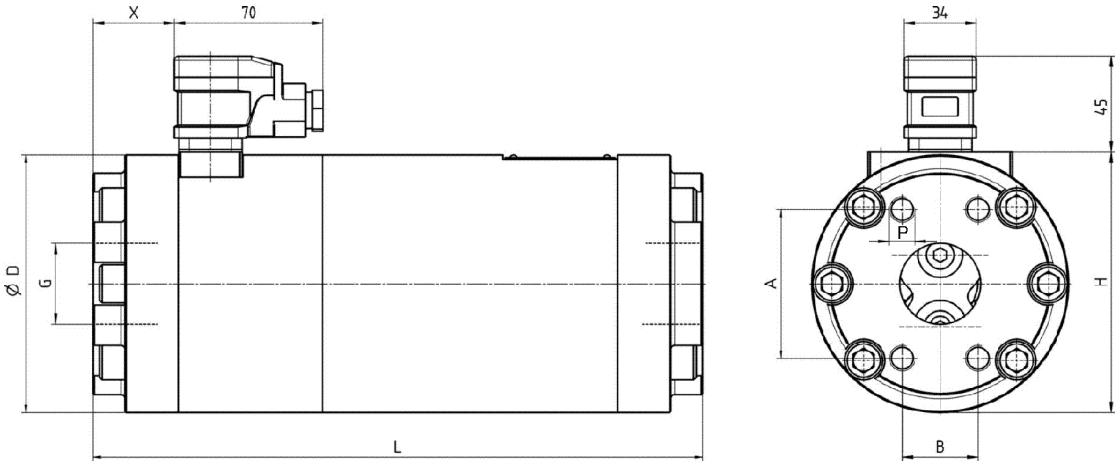
Tab. 4.11: Series A; Attachment G1, F1; Electronics S, H; Nominal size 40

Type code	Weight [kg]	Dimensions [mm]								
		A	B	D	G	H	L	P	T	X
SVC 40 A. G1 .1 S1	17,15	-	-	121	1 1/2"	123,5	265	-	23	26
SVC 40 A. F1 .1 S1	17,90	69,9	35,7	121	Ø38	123,5	287	M12 - 27 deep	-	38
SVC 40 A. G1 .1 H1	17,15	-	-	121	1 1/2"	134,5	265	-	23	26
SVC 40 A. F1 .1 H1	17,90	69,9	35,7	121	Ø38	134,5	287	M12 - 27 deep	-	38

Tab. 4.12: SVC 40 A. G1 .1 .1



Tab. 4.13: SVC 40 A. F1 .1 .1

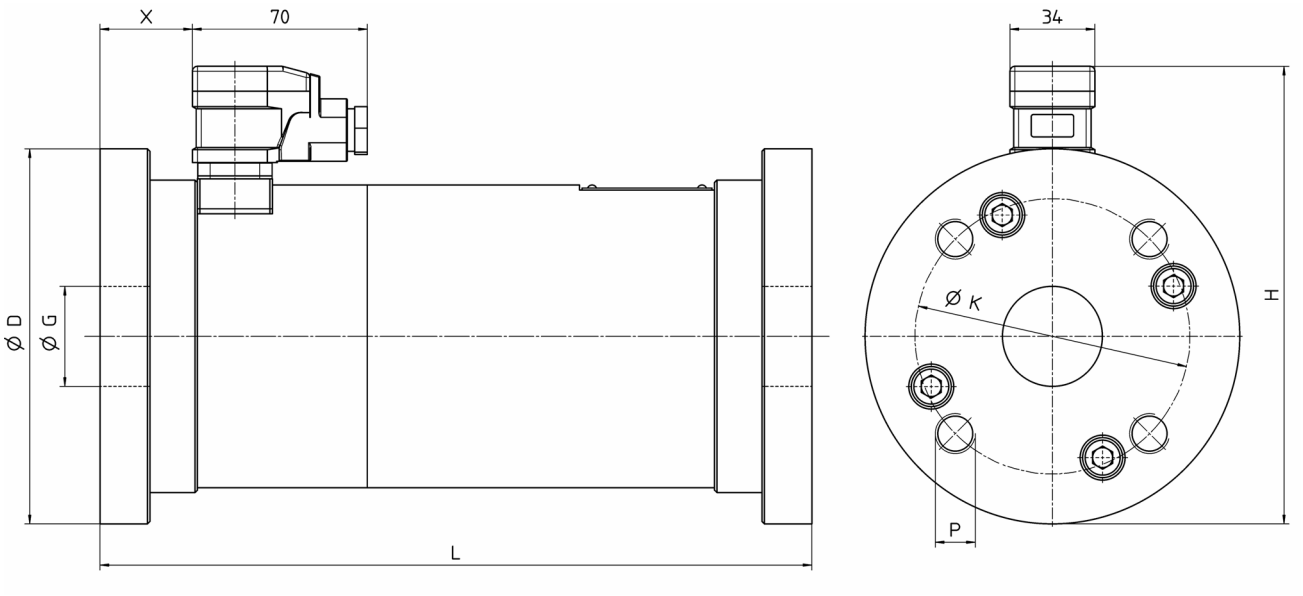


4.5.4 Series A; Attachment D; Electronics S, H; Nominal size 40

Tab. 4.14: Series A; Attachment D; Electronics S, H; Nominal size 40

Type code	Weight [kg]	Dimensions [mm]						
		D	G	H	K	L	P	X
SVC 40 A. D1 .1 S1	24,65	150	40	183	110	285	M16 - 20 deep	37
SVC 40 A. D2 .1 S1	27,50	170	40	193	125	295	M20 - 25 deep	42
SVC 40 A. D1 .1 H1	24,65	150	40	183	110	285	M16 - 20 deep	37
SVC 40 A. D2 .1 H1	27,50	170	40	193	125	295	M20 - 25 deep	42

Tab. 4.15: SVC 40 A. D. .1 .1



Tab. 4.16: Available DIN-flange version SVC 40

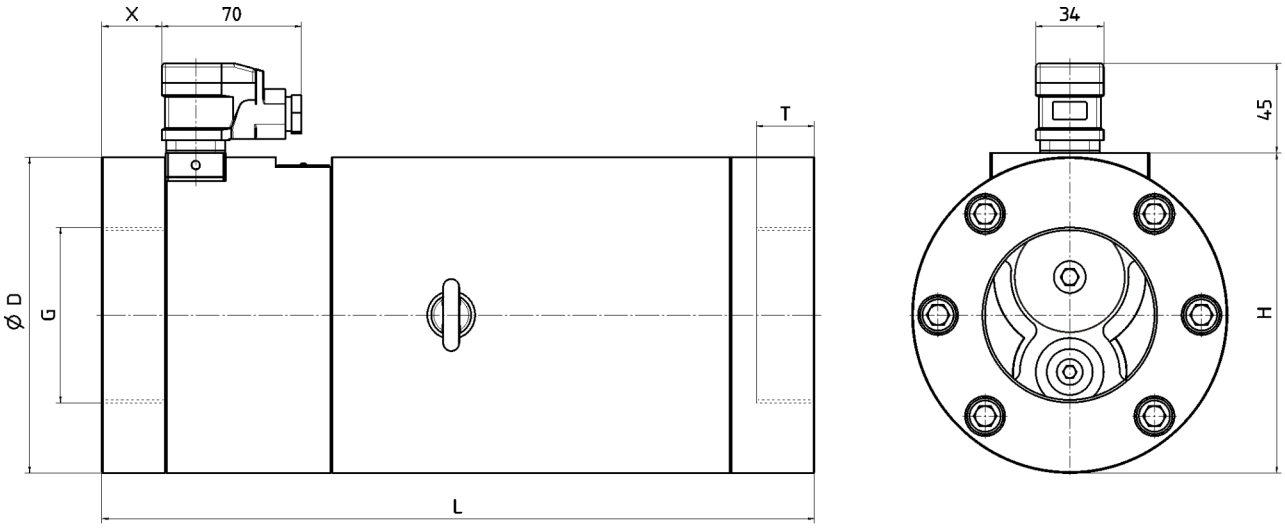
	Nominal width NW [mm]	Compression P_N [bar]
D1	40	40
D2	40	160

4.5.5 Series A; Attachment G1, F1; Electronics S, H; Nominal size 100

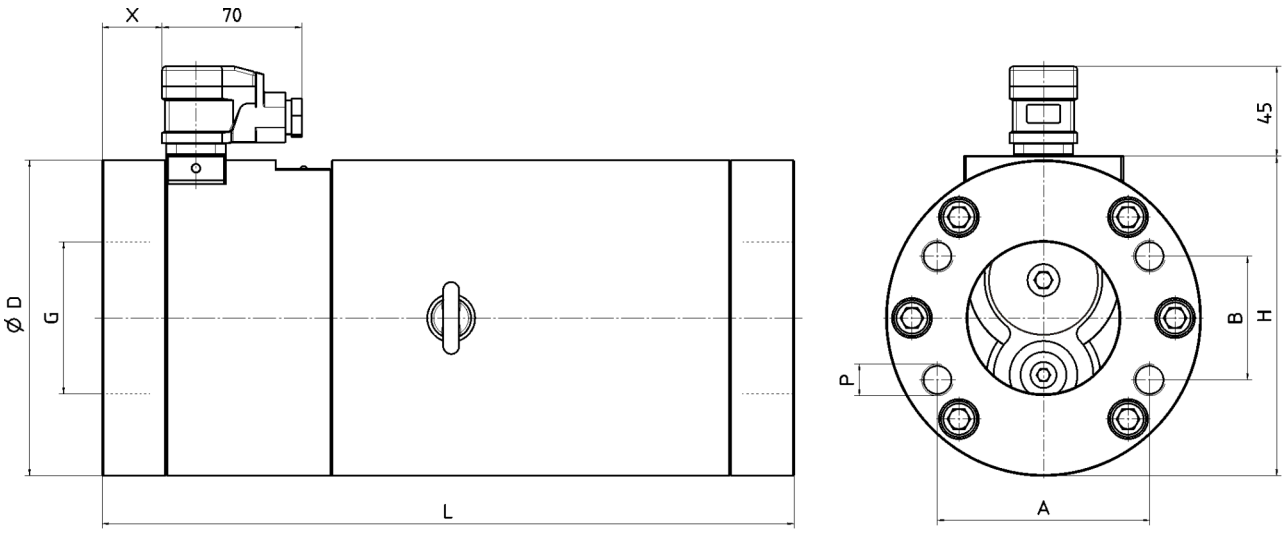
Tab. 4.17: Series A; Attachment G1, F1; Electronics S, H; Nominal size 100

Type code	Weight [kg]	Dimensions [mm]								
		A	B	D	G	H	L	P	T	X
SVC 100 A. G1 .1 S1	39,1	-	-	158	3"	160	357	-	32	30
SVC 100 A. F1 .1 S1	38,7	106,4	61,9	158	Ø76	160	347	M16 - 32 deep	-	32
SVC 100 A. G1 .1 H1	39,1	-	-	158	3"	171	357	-	32	30
SVC 100 A. F1 .1 H1	38,7	106,4	61,9	158	Ø76	171	347	M16 - 32 deep	-	32

Tab. 4.18: SVC 100 A. G1 .1 .1



Tab. 4.19: SVC 100 A. F1 .1 .1

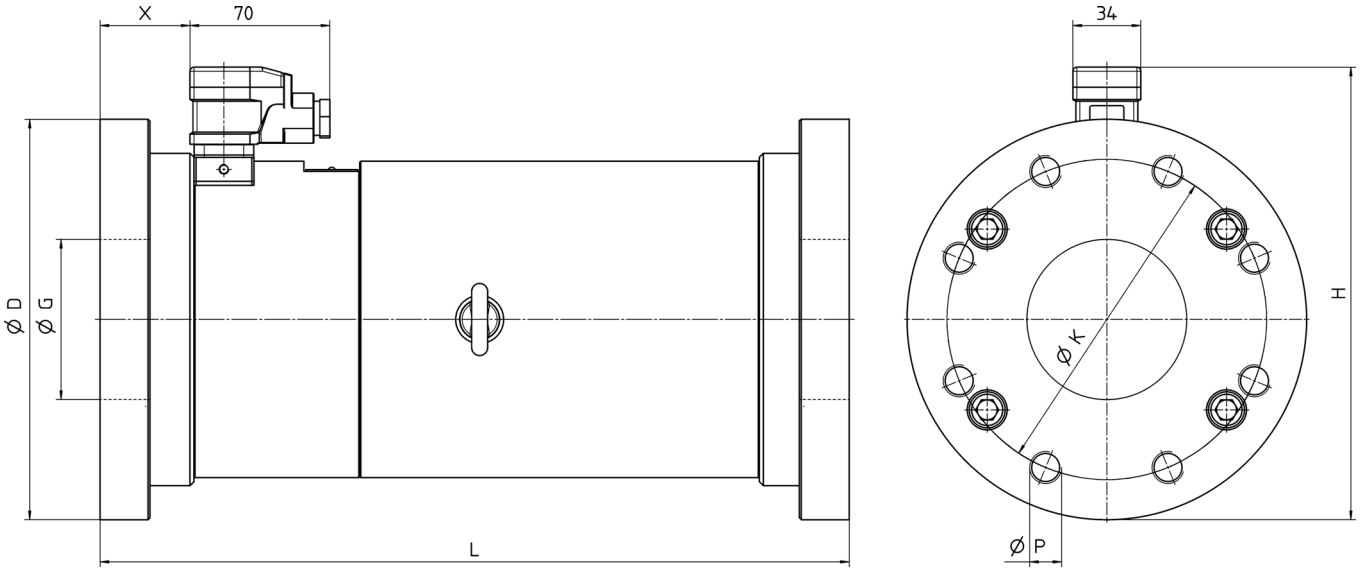


4.5.6 Series A; Attachment D; Electronics S, H; Nominal size 100

Tab. 4.20: Series A; Attachment D; Electronics S, H; Nominal size 100

Type code	Weight [kg]	Dimensions [mm]						
		D	G	H	K	L	P	X
SVC 100 A. D1 .1 S1	46,20	200	80	226	160	365	M16 - 25 deep	45
SVC 100 A. D1 .1 H1	46,20	200	80	226	160	365	M16 - 25 deep	45

Tab. 4.21: SVC 100 A. D. .1 .1



Tab. 4.22: Available DIN-flange version SVC 100

	Nominal width NW [mm]	Compression P_N [bar]
D1	80	40

5 Transport and storage

5.1 Transport damage

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.

5.2 Transport

WARNING

Danger due to falling loads and or loads falling over!

Due to the size and weight of the device, accidents can occur resulting in severe injuries or death during transport and shipping.

- Compliance with applicable industrial safety requirements is mandatory.
- Use only suitable means of conveyance and lifting tackle with sufficient load-bearing capacity.
- Attach the lifting tackle in such a manner that it cannot slip.
- Secure the device so that toppling over and falling down is impossible.
- Always avoid jerks, impacts and strong vibrations during transportation.
- Never walk under suspended loads, never work under suspended loads.
- To prevent damage to the device, be extremely cautious when shipping or transporting.
- Wear suitable protective clothing.

☞ **Handling aid**

- The transport of the SVC 100 can be made using the two supplied eye-bolts.

5.3 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.

Clean bare outer metal parts have also been protected by anti-corrosive oil or protective metal paint for a period of 6 months against corrosion.

The device must not be exposed in 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 protecting 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

Corrosion damage on units with EPDM seals

The functionality of units with EPDM seals is not tested. There is no preservation of the interior parts. If the unit is not put into operation immediately, corrosion damage can occur.

- Protect the unit by using suitable corrosion-preventing measures.

NOTICE

Chemical impact on the device and the sealing materials

Incompatibility between the preservation agents and the materials and elastomers used in the device can lead to damage of the device and the seals being used.

- Check to make sure the preservation agent is compatible with the materials and elastomers used in the device.
- Check to make sure the preservation agent is compatible with the media to be pumped.

6 Installation

6.1 General points

DANGER

Danger due to pressure loaded lines.

When working on pressure loaded lines, uncontrolled or squirting fluids can lead to accidents and severe injuries or even result in death.

- Always depressurize all lines during all work on the unit and before disassembly.

NOTICE

Danger of property damage due to insufficiently qualified personnel

Improper work can lead to damages and malfunctions in the device and in the plant.

- Permit only expert and technically qualified personnel to work on the device.

NOTICE

Danger of property damage due to a lack of cleanliness

During installation, foreign bodies can get into the interior of the device or the plant due to a lack of cleanliness and cause malfunctions there.

- Pay attention to cleanliness during all work.

6.2 Mechanical installation

DANGER

Danger due to breakage or squirting fluids!

If the device is blocked it acts like a closed gate. The pressure level that occure in this case can result in damage to the device and to the up or downstream plant elements. Breakage can lead to parts flying around uncontrolled or to fluids squirting out which can lead to accidents and severe injuries or even result in death.

- A pressure relief valve or other kind of over-pressure safeguard must be installed before the device. The pressure relief device must be dimensioned so that the volume flow can be conducted through it with the lowest possible pressure or must be depressurized.
- Do **not** put the unit into operation without a pressure relief valve.

DANGER

Danger due to breakage or squirting fluids!
Using unsuitable connections and lines can lead to breakage. Parts flying around uncontrolled or squirting fluids can lead to accidents with severe injuries or even lead to death.

- Use only connections and lines approved for the expected pressure range.
- Comply with each manufacturer's regulations.

CAUTION

Danger due to hot surfaces!
When operating the device with hot media, there is a danger of being burned and scalded when touching the hot surfaces.

- At medium temperatures above 60 °C, take measures against unintended contact.
- Wear safety gloves.

NOTICE

Danger of property damage due to incorrect installation
Incorrect installation can cause malfunctions or damage the device and / or the system.

- During transport and installation, the device must always be held by the housing and never by the plug.
- 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 fluid could ignite.
- It must be guaranteed that all lines and connections are tight and no leakages can occur
- During operation start-up, the device must be checked for leaks under operating conditions.

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

The space required for the device is specified in the chapter 4 “Technical data”.

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

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

- Before installation, the device must be checked for transport damage and soiling.

- Any preserving agents must be removed before installation using benzine or solvent.
- Clean the pipework of dirt, scale, sand, swarf, etc. prior to installation. Welded pipes in particularly must be pickled or flushed. Cotton waste must not be used for cleaning.

6.3 Pipe connections

NOTICE

Danger of device damage due to collision

For devices with threaded connection, a too long thread of the connecting cable can cause damage on the internal parts of the device.

- Make sure that the thread lenght of the cable is **not** greater than the thread depth in the device port (see section 4.5 “Dimensions and weights”).

NOTICE

Danger of property damage caused by foreign bodies in the device

During installation, when using unsuitable sealing materials foreign bodies can get into the interior of the device or the plant due to a lack of cleanliness and cause malfunctions there.

- During installation, do not use **any** hemp or filler as sealing material.

NOTICE

Danger of property damage due to distortion

The load on the device due to impermissible external loads can lead to malfunctions or to breakage of the flange or housing.

- Pipelines must be fitted absolutely tension-free to the device connections.
- 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 device.

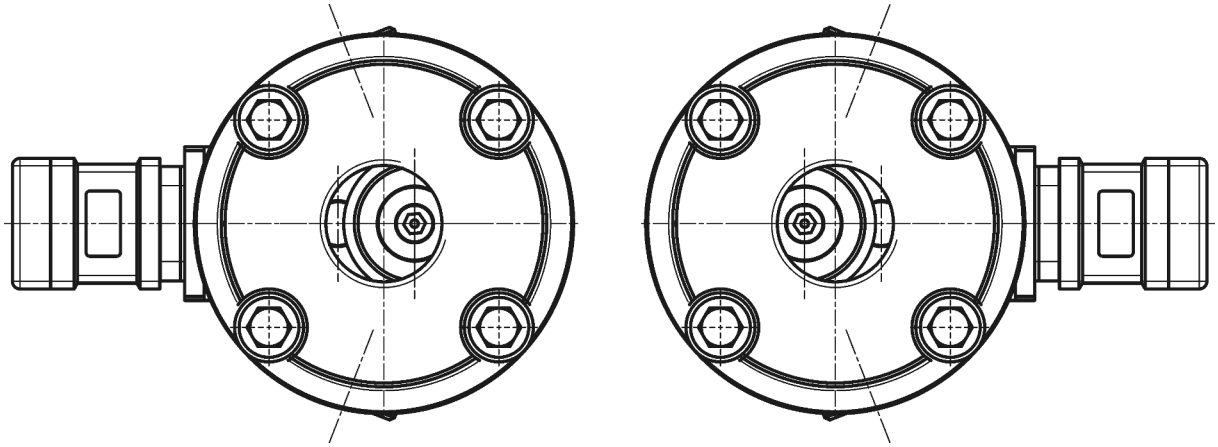
- Connect the connection pipelines to the inlet and outlet points on the measuring devices. Always heed the respective manufacturer's instructions.
- After the system has been put into operation, check all connections for air-tightness.

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 Assembly with further components and devices

NOTICE

Danger of property damage if installation is not correct

Incorrect assembly with components or devices from other manufacturers can lead to breakdowns.

- Comply with each manufacturer's operating instructions when assembling with additional components or devices.

6.6 Electrical connection

DANGER

Danger due to electric voltage!
Danger of death due to electric shock.

- Follow the special safety regulations during all work on electrical installations.
- Only allow electricians to work on electrical systems.

Tab. 6.2: Electrical data

Electrical data for standard configuration 24 V	
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	$P_{b\ max}$ = 0,9 W
Power output / channel	$P_{a\ max}$ = 0,3 W, short-circuit resistant
Normal protective rating	IP 65 (DIN 40050)
Signal output	PNP

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

NOTICE

Damage by overvoltage
Devices that are designed for an operation voltage of 12 V DC (polarity protected) shall not be operated at a voltage of 24 V DC. The excessively high voltage can cause damage and malfunction of the device. This applies to devices with the special numbers 74, 75, 90, 110, 137, 138, 151 and 167.

- Operate the equipment only with the correct voltage (12 V DC or 24 V DC).
- If you are not sure which version is present, please consult the manufacturer.

6.6.1 Standard plug version

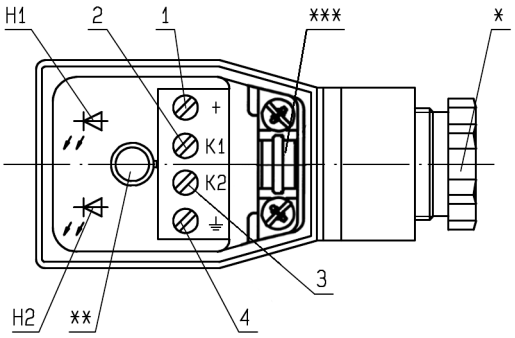
- The electrical connections have to be carried out according to the assignment diagram shown below.

Comfortable work

- To make wake 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.

Tab. 6.3: Assignment standard plug



H1: Status display channel 1	1: 24 Volt (brown)
H2: Status display channal 2	2: Channel 1 (green)
* Cable screw connection	3: Channel 2 (yellow)
** Attachment screw cover	4: 0 Volt (white)
*** Strain relief	

NOTICE

Danger of malfunction due to incorrect installation

Loose cable or connections may cause malfunction of the device..

- After installation, the fastening screws *(slightly)* an the cable screw connection have to be tightened.

7 Operation start-up

7.1 Preparation

NOTICE

Danger of proerty damage due to incorrect commisioning

Improper commissioning can lead to damages and malfunctions in the device and in the plant.

- All work on the device may only be carried out by trained and professionally qualified staff.
- Comply with the permissible operating data such as rotational speed, pressure temperature, permissible media, etc. (see chapter 4 “Technical data”).
- Pay attention to cleanliness during all work.
- The medium must guarantee a minimum lubrication.
- Before starting the system make sure that a sufficient quantity of the service fluid is extant to avoid dry running.
- Before starting the plant, the device must be filled with operating fluid to prevent damage during dry operation.
- It must be guaranteed that all lines and connections are tight and no leakages can occur

WARNING

Danger due to hazardous fluid!

Danger of death upon contact with hazardous fluids and when inhaling vapours from these liquids.

- Comply with the safety data sheets and regulations on handling the hazardous liquids!
- Collect and dispose leaks of hazardous materials so that no hazards arise for people or the environment.
- Comply with national and international rules at the place of installation.
- Wear suitable protective clothing.

CAUTION

Danger due to hot surfaces!

When operating the device with hot media, there is a danger of being burned and scalded when touching the hot surfaces.

- At medium temperatures above 60 °C, take measures against unintended contact.
- Wear safety gloves.

- Check the permissible operating data against the operating states to be expected.
- Check all fastening screws on the device.
- Fill the device with operating fluid.

7.2 Further operation start-up

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.

NOTICE

Danger of propery damage due to blocked measuring plant

A lack of counter signal may indicate a blockage mechanism. The resulting increase in pressure before the device can lead to further damage of the device and / or the system.

- The system must be switched off **immediately** if the counter signal fails unexpectedly.
- Remove the cause of the disorder.

7.3 Permissible limits for operation

The device may only be operated within the given limit values (see section 1.3 “Intended use” and chapter 4 “Technical data”).

NOTICE

Danger of device damage due to overload

A too high flow resistance Δp can cause mechanical damage on the device.

- The maximum pressure loss in the device must **not** exceed **25 bar**.
- The permanent permissible pressure loss is max. 7 bar at max. 50 % of nominal volume.

For the ambient conditions, the limit values giben in the chapter 4 “Technical data” must be observed.

8 Removal

8.1 General points

NOTICE

Danger of property damage due to insufficiently qualified personnel

Improper work can lead to damages and malfunctions in the device and in the plant.

- Permit only expert and technically qualified personnel to work on the device.

NOTICE

Danger of property damage due to a lack of cleanliness

A lack of cleanliness can lead to damages and malfunctions in the device and in the plant.

- Pay attention to cleanliness during all work.
- Close all openings with protective caps to prevent dirt from penetrating into the system.

8.2 Removing the device

DANGER

Danger due to pressure loaded lines.

When working on pressure loaded lines, uncontrolled or squirting fluids can lead to accidents and severe injuries or even result in death.

- Always depressurize all lines during all work on the unit and before disassembly.

DANGER

Danger due to electric voltage!

Danger of death due to electric shock.

- Follow the special safety regulations during all work on electrical installations.
- Only allow electricians to work on electrical systems.

WARNING

Danger due to hazardous fluid!

Danger of death upon contact with hazardous fluids and when inhaling vapours from these liquids.

- Comply with the safety data sheets and regulations on handling the hazardous liquids!
- Collect and dispose leaks of hazardous materials so that no hazards arise for people or the environment.
- Comply with national and international rules at the place of installation.
- Wear suitable protective clothing.

CAUTION

Danger due to hot surfaces!

When operating the device with hot media, there is a danger of being burned and scalded when touching the hot surfaces.

- Let the device cool off first when the medium temperature is over 48 ° C.
- Wear safety gloves.

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

NOTICE

Danger of malfunction due to curing liquids

Curing liquids can engage the device mechanically and make it unusable.

- Immediately clean the pump or store it in such a way that curing is definitely prevented in cases where the pump was operated with curing liquids.

9 Maintenance

9.1 General points

NOTICE

Danger of property damage due to insufficiently qualified personnel
Improper work can lead to damages and malfunctions in the device and in the plant.

- Permit only expert and technically qualified personnel to work on the device.

NOTICE

Danger of damages and malfunctions due to a lack of maintenance
If the device is not regularly maintained, damage that is not discovered or not repaired can lead to malfunctions and to the failure of the device.

- Maintain the device regularly.
- Check the device initially right after commissioning.
- Adapt the scope and time between maintenance intervals to the demands posed by the location.
- During visual inspections, look purposefully for possible damages.
- The device must not be used if visible damages are found.
- Document the type and extent of the maintenance work. That allows the fastest possible detection of a change in operating performance.

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 maintenance.

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. We recommend checking this regularly.

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

Barriers and instructions

- All removed barrieres and warning signs must be put back to their original position on completing maintenance and/or repair.

Checking the operating data

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

NOTICE

Danger of property damage due to a lack of cleanliness

A lack of cleanliness can lead to damages and malfunctions in the device and in the plant.

- Pay attention to cleanliness during all work.
- Close all openings with protective caps to prevent dirt from penetrating into the system.

DANGER

Danger due to pressure loaded lines.

When working on pressure loaded lines, uncontrolled or squirting fluids can lead to accidents and severe injuries or even result in death.

- Always depressurize all lines during all work on the unit and before disassembly.

DANGER

Danger due to breakage or squirting fluids!

Using damaged connections and lines can cause parts to fly around uncontrolled or fluids to squirt out, which can lead to accidents and severe injuries or even result in death.

- Immediately replace damaged connections, pipes and hose lines.

WARNING

Danger due to hazardous fluid!

Danger of death upon contact with hazardous fluids and when inhaling vapours from these liquids.

- Comply with the safety data sheets and regulations on handling the hazardous liquids!
- Collect and dispose leaks of hazardous materials so that no hazards arise for people or the environment.
- Comply with national and international rules at the place of installation.
- Wear suitable protective clothing.

DANGER

Danger due to electric voltage!
Danger of death due to electric shock.

- Follow the special safety regulations during all work on electrical installations.
- Only allow electricians to work on electrical systems.

CAUTION

Danger due to hot surfaces!
When operating the device with hot media, there is a danger of being burned and scalded when touching the hot surfaces.

- Let the device cool off first when the medium temperature is over 48 ° C.
- Wear safety gloves.

9.2 Unusual noises

Some damage is indicated by unusual noises. If there is a change in the decive'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 tight fit. Loose screw joints must be tightened and, if necessary, secured against loosening by e.g. Loctite (medium stregth).

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. We recommend checking this regularly.

NOTICE

Danger of malfunction due to curing liquids

Curing liquids can engage the device mechanically and make it unusable.

- Immediately clean the pump or store it in such a way that curing is definitely prevented in cases where the pump was operated with curing liquids.

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 occure 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.

10.3 Elimination of damage

Repair damage onsite, predominantly by replacing the defective device. The device itself is generally repaired by the manufacturer.

If correspinding expertise and sufficient equipment is available, the consumer or OEM can also make the repairs. For support **spare part lists** and **sectional drawings** are available. They can be requested from the manufacturer.

NOTICE

Danger of property damage due to incorrect work and use of non-original spare parts

Improper work can lead to damages and malfunctions in the device and in the plant. That also applies to the use of non-original spare parts.

- Permit only expert and technically qualified personnel to work on the device.
- Use only genuine original spare parts.

Warranty

The screws of the sensor fittings are marked with a seal point. If the seal point is damaged the warranty will be void.

10.4 Return

If the device has to be repaired or checked over 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 case of well-known mineral oils, at least the exact type description is required.

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

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

Any openings must be closed.

10.5 Disposal

Disposal of the packaging and used parts must be carried out according to the regualtions valid in the country where the device is installed.

10.6 Detecting and eliminating problems

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

DANGER

Danger due to electric voltage!
Danger of death due to electric shock.

- Follow the special safety regulations during all work on electrical installations.
- Only allow electricians to work on electrical systems.

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

Tab. 10.1:

Fault	Potential causes	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 an 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 9 “Maintenance”).
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 pipeline 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.