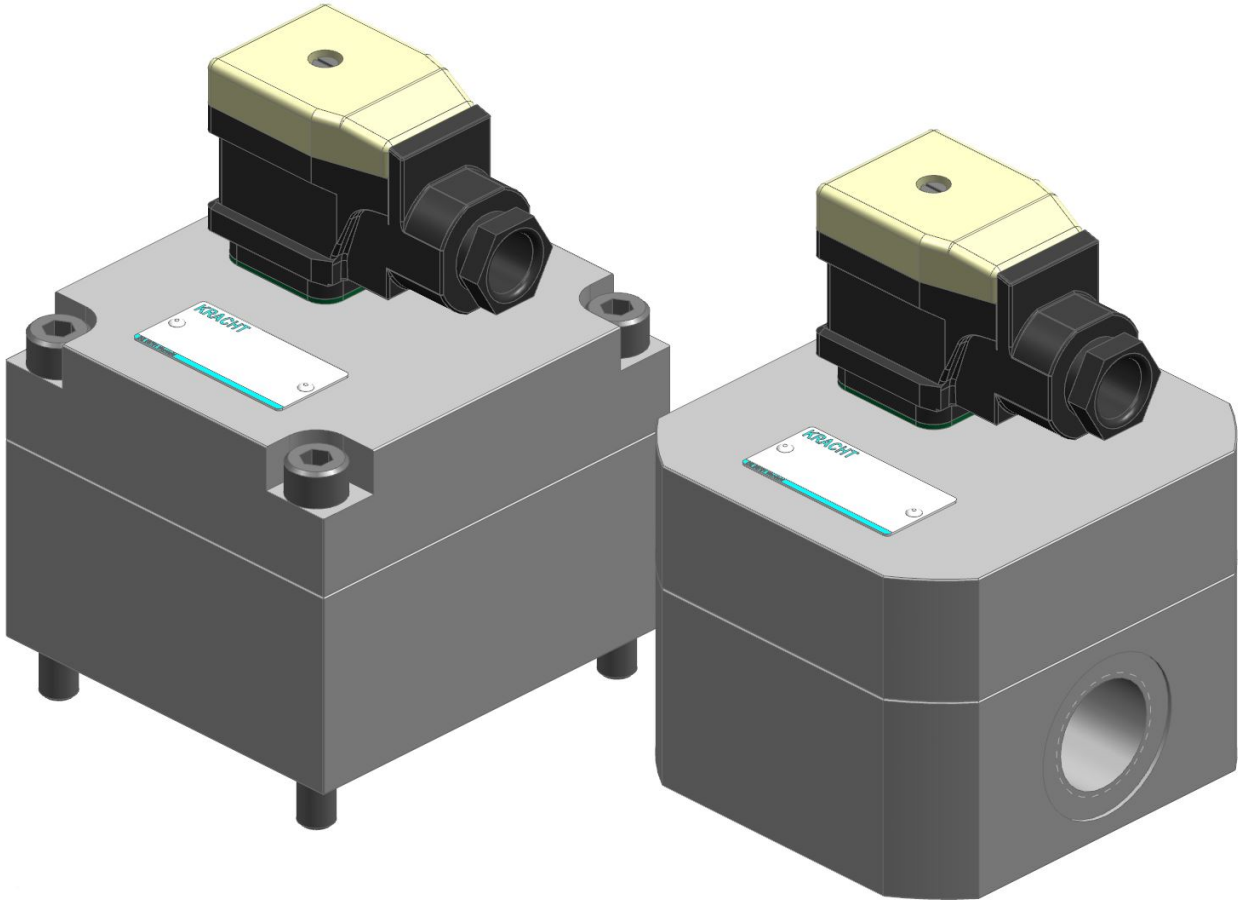
KRACHT

Operating instructions (Translation)



Gear-type flow meter VCA/VCN/VCG
English

11 • 18/08/2021

Table of content

1 General

1.1 About the documentation

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

Gear type flow meter VCA / VCN / VCG

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

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DE 58791 Werdohl

Tel: +49 2392 935-0

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E-Mail: info@kracht.eu

Web: www.kracht.eu

1.3 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.

TIP

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 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.

2.3 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.

2.4 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.

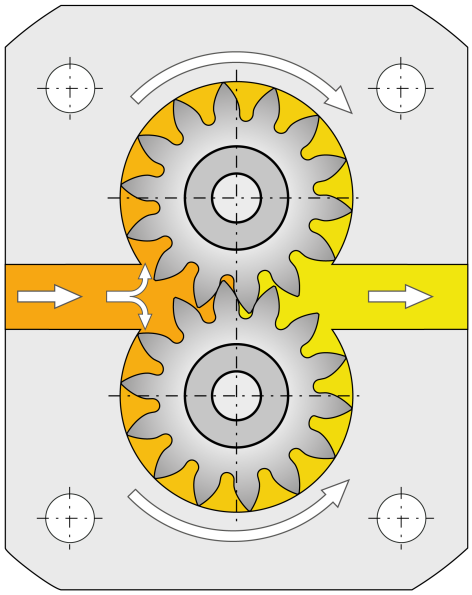
b) Securely prevent the permissible pressures from being exceeded, e.g. by using pressure relief valves or bursting discs.

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 unit is driven by the flow of fluid based on the principle of a gear motor.



The gears run in a contactless manner in the measuring chamber. The lowfriction bearings or plain bearings act as the bearing elements.

The gear movement is sampled in a contactless manner through the sensors installed in the cover. There is a pressure-resistant amagnetic division between the sensor space and measuring chamber.

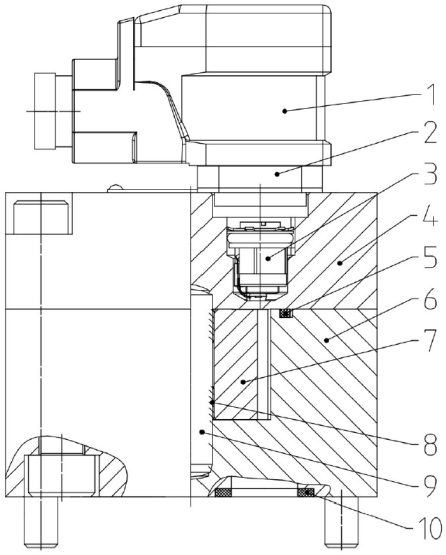
During the rotation of the measuring unit by one tooth pitch, a signal occurs per sensor that corresponds to the so-called geometric tooth volume of V_{gz}. A value that is stated in technical documents as the nominal volume to specify the unit size.

The 1-channel scan measures the flow but does not recognise its direction.

The two-channel scanning facilitates a higher measuring resolution and detection of the direction of the flow rate.

In the gear type flow meter, the drive direction of the flow of fluid is independent of the direction.

3.2 Basic design



1 Cable socket
2 Equipment plug
3 Sensor
4 Cover
5 O-ring
6 Housing
7 Gears
8 Plain bearing bush
9 Bearing journal
10 O-ring

3.3 Type key

Ordering example															
VCA		**0.2**		**K**	**4**		**F**	**4**		**P**	**2**		**S**		**H**
1.		2.		3.	4.		5.	6.		7.	8.		9.	10.	11.

Explanation of type key			
1. Product name			
VCA; VCN; VCG			
2. Nominal size **(** Rated volume**)**			
$\mathbf{V}_{gz}$	0.04; 0.1; 0.2; 2; 5		
3. Bearing			
K	Ball bearing	**M**	Multi layer friction bearings
U	Plastic plain bearings		
4. Material			
1	Housing: EN-GJS-400-15 (GGG-40) Gears: Steel	**2**	Housing: Stainless steel Gears: Stainless steel
4	Housing: Aluminium Gears: Stainless steel	**5**	Housing: Aluminium Gears: Steel
5. Seal			
F	FKM	**P**	FEP
N	NBR		
6. Surface			
1	painted	**4**	hardcoated
3	Without	**5**	anodized
7. Type of connection			
P	Plate structure	**R**	Pipe connection
8. Sensor system			
1	1 Sensor	**3**	Without
2	2 Sensors	**4**	2 Sensors protected against vibration and condensation
9. Electronics			
S	Standard	**V**	without preamplifier (for Plug-in display unit SD 1)
K	High temperature PLUS		
10. Cable length			
	Without Cable	**5**	With 5 m Cable
2	With 2 m Cable	**10**	With 10 m Cable
11. Electrical connection			
H	Equipment plug/socket (Standard)	**M**	Equipment plug/socket (M12x1)
V	Without		

3.4 Special numbers

Special number	Description
40	Housing connection: VCA 2...:Whitworth pipe thread G 1"

4 Technical data

4.1 General

General information		
Design		Gear motor
Housing connection (1)		Plate structure / Pipe thread
Mounting position		Any
Flow direction		Any
Viscosity		**Overview nominal sizes [** 14]
Operating pressure	**p**	
Permissible pressure loss	**Δp_{max}**	
Fluid temperature	**ϑ_m**	**Permissible temperature range [** 15]
Ambient temperature	**ϑ_u**	
Material		**Material data [** 15]
Measuring accuracy		**Overview nominal sizes [** 14]
Permissible size of foreign particles in the medium		
Permissible media		Lubricating fluids without abrasive components. The medium must be compatible with the materials used in the device. (Please consult the manufacturer in cases of doubt)

4.2 Overview nominal sizes

Product name		VCA	VCN	VCA	VCA	VCN	VCA	VCN	VCA	VCG
Nominal size[1]		**0.04**		**0,1**	**0.2**		**2**		**5**	
Geom. tooth volume	**V_{gz} [cm³/r]**	0.04		0,1	0.2		2		5.222	
Resolution	**[pulse/l]**	25000		100000	5000		500		191.5	
Max. operating pressure	**[bar]**	200	160	200	160		160	315	80	315
Pressure peaks	**[bar]**	240	190	240	200		200	350	100	350
Perm. number of load alternations of the peak pressure		-							$1x10^6$	
Measuring range[2]	**[l/min]**	0.02...4		0.08...10	0.25...10		1...65		1...200	3...240
Max. pressure loss	**[bar]**	10					16			
Measuring accuracy starting from viscosity in mm²/s		± 2% 20			± 3% 20		± 2.5% 20		± 1% 20	± 2.5% 20
Viscosity	**mm²/s**	20....4000							1...3000	
Lubricating properties of the operating fluid		good								
Sound pressure level	**L_{pA} [dBA]**	< 60								

[1] See type key and type designation at device

[2] The measuring range may be restricted at higher pumping medium viscosity.

Nominal size	Permissible size of foreign particles in the medium [µm]		
	Product name		
	VCA	VCN	VCG
0.04	30	30	-
0.1		-	
0.2		30	
2		-	30
5	20		20

4.3 Permissible temperature range

Sealing material	Fluid temperature ϑ_m (1)	
	$\vartheta_{m\ min}$ [°C]	$\vartheta_{m\ max}$ [°C]
FKM **EPDM** **FEP with FKM-core (till 2019)** **FEP with silicone-core (from 2020)**	-10 VCG: -15	80 VCG: 120
(1) Comply with media-specific properties		

Sealing material	Ambient temperature ϑ_u	
	$\vartheta_{u\ min}$ [°C]	$\vartheta_{u\ max}$ [°C]
FKM **EPDM** **FEP with FKM-core (till 2019)** **FEP with silicone-core (from 2020)**	-10 VCG: -15	80 VCG: 120

4.4 Material data

Product name		VCN		VCG		
Nominal size		**0.04**	**0.2**	**2**		**5**
Bearing		K	U	U	M	M
Material		4	4	5	5	5
Material	**Housing / Cover**	Stainless steel (1.4462)		EN-GJS-400-15 (GGG-40)		
	Measuring unit	Stainless steel (1.4462)	Stainless steel (1.4462)	Case-hardened steel (1.7139)		
	Bearing	Anti-friction bearing steel	Iglidur® X		Steel , sintered bronze , PTFE	
	Bearing pin	Stainless steel (1.4462)	Stainless steel (1.4462)	Hardened steel		
Type of bearing		Ball bearing	Plastic plain bearings		Multi layer friction bearings	

Product name		VCA							
Nominal size		0,4	0,1	0,2	2		5		
Bearing		K	K	U	U	M	U	K	K
Material		4	5	4	4	5	4	5	4
Material	Housing / Cover	Aluminium Al Mg Si F30		Aluminium Al Mg Si F30 (hardcoated)					
	Measuring unit	Stainless steel (1.4462)	Case-hardened steel (1.7139)	Stainless steel (1.4462)		Case-hardened steel (1.7139)	Stainless steel (1.4462)	Case-hardened steel (1.7139)	Stainless steel (1.4462)
	Bearing	Anti-friction bearing steel		Iglidur® X		Steel, sintered bronze, PTFE	Iglidur® X	Anti-friction bearing steel	
	Bearing pin	Stainless steel (1.4462)	Hardened steel	Stainless steel (1.4462)		Hardened steel	Stainless steel (1.4462)	Hardened steel	Stainless steel (1.4462)
Type of bearing		Ball bearing		Plastic plain bearings		Multi layer friction bearings	Plastic plain bearings	Ball bearing	

4.5 Weight

Nominal size	Product name	Weight [kg]	
		Pipe connection	Plate structure
0,04	VCA	0.5	-
	VCN	1.2	-
0.1	VCA	0.6	-
0.2	VCA	0.5	0.7
	VCN	1.2	-
2	VCA	1.9	2.0
	VCG	-	5.0
5	VCA	6.0	-
	VCG	-	13.2

4.6 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.

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 ϑ_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 ϑ_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

TIP

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 Years: AU (Polyurethane rubber)
- ⇨ 7 Years: NBR, HNBR, CR
- ⇨ 10 Years: EPM, EPDM, FEP/PFTE, FEPM, FKM, FFKM, VMQ, FVMQ

6 Installation

6.1 Important notes about explosion protection

⚠ 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) Take measures against accidental touching of hot surfaces (> 60 °C).

6.2 Mechanical installation

6.2.1 Preparation

a) Check the device for transport damage and dirt.

b) Remove existing preservatives.

⇨ Use only those cleaning agents that are compatible with the materials used in the device.

⇨ Do not use cleaning wool.

c) Compare the environmental and ambient conditions at the place of installation to the permissible conditions.

⇨ Expose the device only to small vibrations, see IEC 60034-14.

⇨ Secure sufficient access for maintenance and repair.

⇨ Comply with the manufacturer's information.

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

6.2.2 Plate connection

⚠ CAUTION

Hot surfaces

Burn injury to skin if touched.

a) Take measures against accidental touching of hot surfaces (> 60 °C).

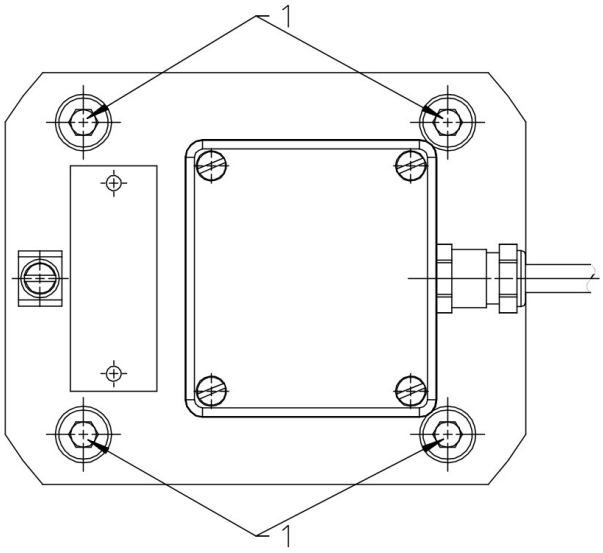
⚠ ATTENTION

Dirt or small parts

Dirt or small parts may cause damage or dysfunction to the device or the system.

a) Before installing the device, check the connection faces of the device for dirt or small parts and clean if necessary.

a) Position the housing on the connection plate.
   ⇨ Make sure that the seal fit properly.
   ⇨ The contact surface must be free of dirt, residual paint etc.
b) Tighten all fastening screws with the specified torque.
   ⇨ Rule out any distortion of the device.
   ⇨ Pay attention to sufficient screw-in depth of the fastening screws.



1 Fastening screws

Tightening torques Fastening screws				
Nominal size	**0.2**	**2**		**5**
Product name	**VCA**	**VCA**	**VCG**	**VCG**
Screw size	M8	M8		M12
Strength class	10.9	10.9	12.9	10.9
Tightening torques	13 Nm	52 Nm	69 Nm	120 Nm

External manufacturer connection plate/valve block

NOTICE

Use only connection plates or valve blocks from external manufacturers with specified surface and shape tolerances.

Nominal size		0.025	0.04	0.1	0.2	0.4	1	3	5	12	16
Evenness	**[µm]**	10					20				
Roughness height R_t	**[µm]**	10					10				

6.2.3 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.

6.3 Electrical connection

6.3.1 Preamplifier (S, H , K)

Electrical data		**preamplifier**	
		24 V	**12 V** (1)
Number of measuring channels		2	2
Operating voltage		U_B = 24 V DC ± 20 % Reverse-polarity protection	U_B = 12 V DC ± 20 % Reverse-polarity protection
Impulse amplitude		$U_A \geq 0.8\ _{UB}$	$U_A \geq 0.8\ _{UB}$
Impulse shape with symmetrical output signal		Rectangular , Pulse duty factor / Channel 1:1 ±15 %	Rectangular , Pulse duty factor / Channel 1:1 ±15 %
Impuls offset between the two channels		90° ± 30°	90° ± 30°
Power requirement	$p_{b\ max}$	0.9 W	0.9 W
Output power/ Channel	$P_{a\ max}$	0.3 W Short-circuit proof	0.3 W Short-circuit proof
Protection class		IP 65 (DIN 40050)	IP 65 (DIN 40050)
Signal output		PNP/NPN (Automatic detection)	PNP/NPN (Automatic detection)
(1) **Special numbers** [▶ 12]			

TIP

Shielded cable, LIYCY C-grey 4 x 0.25 mm²

⚠ ATTENTION

Damage by overvoltage

Excessive voltage can cause damage and dysfunction to the product.

a) Use the product only with the correct voltage.

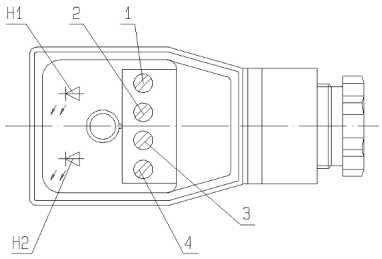
b) Please consult the manufacturer in cases of doubt.

⚠ ATTENTION

The power supply line must match the used preamplifier.

6.3.1.1 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 Volt	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

Burn injury to skin if touched.

a) Wear protective gloves at temperatures ≥ 48°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 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.

TIP

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 ≥48°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.

⇨ **Plate structure**: Release the unit from the connection plate.

⇨ **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.

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⚠ 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 ≥48°C the product must be allowed to cool down first.

9.2 Maintenance work

TIP

Checking and documentation of the operating data

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

- Perform 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 scope of the maintenance work along with the operating data.
- Compare the operating data with the values of the first commissioning. Determine the cause in case of major non-compliances (> 10 %).
- 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.

9.2.1 Cleaning - Desposits in the measuring device

⚠ ATTENTION

Leaks or increased wear

Damaged gasket faces and gears lead to leaks and faults in later operation.

a) When disassembling housing components, do not use screwdrivers or the like as a lever to separate the joints.

b) Do not remove the gears from the housing with pliers.

a) Loose fastening screws.
b) Remove the cover from the housing.
c) Remove the gears from housing.
d) Remove the bearing journals from the housing.
e) Clean the device
f) Replace O-ring.
g) Insert bearing journal and gears into the housing.
h) Put the cover on the housing.
i) Tighten the fastening screws with the stated torque.

Tightening torques Housing with threaded connection						
Nominal size		**0.04**	**0.1**	**0.2**	**2**	**5**
Tightening torques M_A	**VCA**	13	13	20	13	65
	VCN	14	-	14	-	-
	VCG	-	-	-	69	120
(1)Screws/Nuts with min. strength class 10.9/10						

9.3 Maintenance instructions

The following information provides recommendations for maintenance work and maintenance intervals for the product in use.

Depending on the actual loads occurring during operation, the type, scope and interval of the maintenance work may deviate from the recommendations. A mandatory maintenance plan must be drawn up by the installer/operating company.

TIP

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

With the appropriate 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	6000 Operating hours	As required	Additional information
9.4.2	Inspection: Discharge flow	2					
9.4.3	Inspection: Operating pressure	2					
9.4.4	Inspection: Media temperature	2					
9.4.5	Inspection: Check the potential compensation (if existing)	2					
9.4.6	Inspection: Condition of operating fluid	2					
9.4.7	Audiometric monitoring: Unusual noise		1				
9.4.8	Cleaning		1				
9.4.9	Visual inspection: Leakages		1				
9.4.2	Inspection: Discharge flow			2			
9.4.3	Inspection: Operating pressure			2			
9.4.4	Inspection: Media temperature			2			
9.4.5	Inspection: Check the potential compensation (if existing)			2			
9.4.6	Inspection: Condition of operating fluid			2			
9.4.10	Inspection: Device temperature			2			
9.4.11	Visual inspection: Measuring unit status				3		
9.4.12	Visual inspection: Condition of housing parts				3		
9.4.13	Visual inspection: Bearing status				3		
9.4.14	Replace: Other seals					4	
9.4.15	Cleaning Desposits in the measuring device					4	

1 - 0,1 h; 2 - 0,2 h; 3 - 0,3 h; 4 - 0,5 h

9.4.2 Inspection: Discharge flow

The discharge flow is measured via the flow rate volume counters.

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

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

9.4.3 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.

9.4.4 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.

9.4.5 Inspection: Check the potential compensation (if existing)

Check potential equalization for tight fit and function.

9.4.6 Inspection: Condition of operating fluid

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

- Replace operating fluid if necessary.

9.4.7 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.

9.4.8 Cleaning

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

9.4.9 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.

9.4.10 Inspection: Device temperature

Measure the surface temperature in the area of the bearings.

9.4.11 Visual inspection: Measuring unit status

In this case, attention must be paid to the measuring unit of the product

Cleaning - Desposits in the measuring device [30].

9.4.12 Visual inspection: Condition of housing parts

In this case, attention must be paid to the housing parts of the product.

9.4.13 Visual inspection: Bearing status

In this case, attention must be paid to the bearing of the product.

Cleaning - Desposits in the measuring device [30].

9.4.14 Replace: Other seals

Cleaning - Desposits in the measuring device [30].

9.4.15 Cleaning Desposits in the measuring device

Cleaning - Desposits in the measuring device [30].

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.

⚠ 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.

⚠ 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 ≥48°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 online 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

TIP

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

Fault	Potential causes	Possible measures
LED display		
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! Products with bearings K, C or H: Repairs by manufacturer Products with bearings G or B: Clean the device
Seal failure / Leakage		
	O-ring in the housing is defective	Products with bearings K, C or H: Repairs by manufacturer Products with bearings G or B: Check material compatibility Replace O-ring
	O-ring between housing and connection plate defective	Replace O-ring
Defective values in the overriding controller		
	Wear	Products with bearings K, C or H: Repairs by manufacturer Products with bearings G or B: Check the measuring unit
In case of unidentified faults, request help from the manufacturer or return the unit to the manufacturer for inspection.		