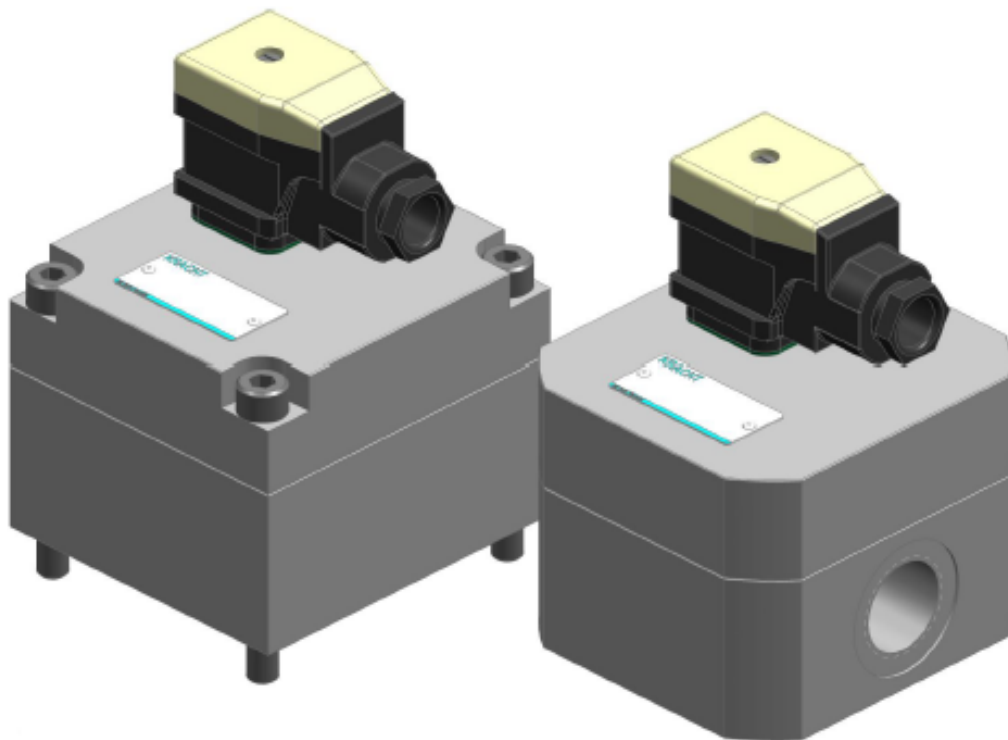


D.0025530002

Operating instructions (Translation)



Gear type flow meter VCA/VCN/VCG
English

Table of content

1 General	4
1.1 About the documentation	4
1.2 Manufacturer address	4
1.3 Other applicable documents	4
1.4 Symbols.....	5
2 Safety.....	6
2.1 Intended use.....	6
2.2 Personal qualification	6
2.3 Basic safety instructions	7
2.4 Fundamental hazards	7
3 Device description.....	9
3.1 Functional principle.....	9
3.1.1 Gear type flow meter	9
3.2 Basic design.....	10
3.3 Type key.....	11
3.4 Special numbers	12
4 Technical data.....	13
4.1 General.....	13
4.1.1 Gear type flow meter	13
4.2 Nominal sizes.....	14
4.3 Permissible temperature range	15
4.4 Material data.....	16
4.4.1 Gear type flow meter	16
4.5 Weight.....	17
4.6 Dimensions.....	17
5 Transport and storage	18
5.1 General.....	18
5.2 Transport	18
5.3 Storage.....	18
5.4 Storage conditions	19
6 Installation	20
6.1 Safety instructions for installation.....	20
6.2 Mechanical installation	21
6.2.1 Preparation.....	21
6.2.2 Plate connection	22
6.2.3 pipe connection	23
6.3 Electrical connection.....	24
6.3.1 Preamplifier (S, H, K).....	24

7 Commissioning	26
7.1 Safety instructions for start-up.....	26
7.2 Preparation.....	26
7.3 Additional commissioning.....	27
8 Removal	28
8.1 Safety instructions for disassembly.....	28
8.2 Dismantling	29
9 Maintenance	30
9.1 Safety instructions for maintenance	30
9.2 Maintenance work.....	31
9.2.1 Cleaning - deposits in the measuring device	31
9.3 Maintenance instructions.....	32
9.4 Maintenance table.....	33
9.4.1 Maintenance table.....	33
9.4.2 Check the rate of flow.....	33
9.4.3 Check the operating pressure.....	34
9.4.4 Check the media temperature.....	34
9.4.5 Check the device temperature	34
9.4.6 Check the equipotential bonding	34
9.4.7 Check the condition of the operating fluid.....	34
9.4.8 Auditory check Unusual noises	34
9.4.9 Cleaning	34
9.4.10 Visual inspection for leakage.....	34
9.4.11 Visual check of the condition of the measuring element.....	34
9.4.12 Visual check of the condition of housing parts.....	35
9.4.13 Visual check of the condition of the bearings.....	35
9.4.14 Replacing other seals.....	35
9.4.15 Cleaning to remove deposits in the measuring device	35
10 Repair	36
10.1 Safety instructions for repairs	36
10.2 General.....	37
10.3 Fault table	38

1 General

1.1 About the documentation

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

Gear type flow meters VCA/VCN/VCG

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

product and accessible to the personnel at all time.

Different versions of the product are produced. Which version is concerned is stated on the device's type plate.

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

1.2 Manufacturer address

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

1.3 Other applicable documents

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

1.4 Symbols



DANGER

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



WARNING

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



CAUTION

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

ATTENTION

Identification of notes to prevent property damage.



NOTICE

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



TIP

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

2 Safety

2.1 Intended use

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

2.2 Personal qualification

The personnel charged with the assembly, operation and maintenance of the product must have the necessary qualifications.

This can be achieved through training or appropriate instruction.

The personnel must be familiar with the contents of these operating instructions.



NOTICE

Read the operating instructions in full before using the product.

2.3 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

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

- a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.
- b) Safely prevent restarting during the work.



⚠ DANGER

Exposed electrical components

Risk of fatal electric shock.

- a) Adhere to the special safety regulations for all work on electrical systems. Switch off electrical systems and secure them against being switched on again.
- b) Work on electrical systems may only be carried out by a qualified electrician.
- c) Use only connection lines that are resistant to ambient influences and media.

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

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.

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

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Use only connections and lines approved for the expected pressure range.
- b) Securely prevent the permissible pressures from being exceeded, e.g. by using pressure relief valves or bursting discs.
- c) Pipelines must be designed in such a way that no tension e.g. caused by changes in length due to fluctuations in temperature can be transferred to the product.

⚠ ATTENTION**Pressure increase due to blocked measuring unit**

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

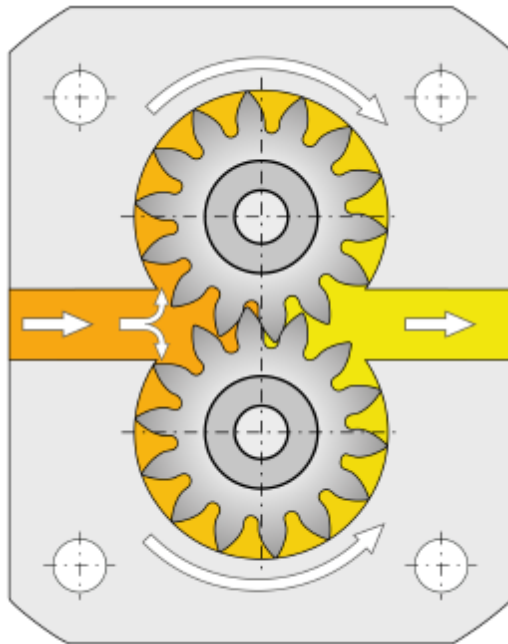
- a) In case of the absence of the signal, take the unit or the plant out of service.

3 Device description

3.1 Functional principle

3.1.1 Gear type flow meter

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



The gears run without contact in the measuring chamber. The bearing elements are low friction ball bearings or plain bearings.

The gear movement is scanned contact-free by the sensors in the cover. There is a pressure-resistant amagnetic separator between the sensor space and the measuring chamber.

When the measuring element turns by one tooth pitch, each sensor generates a signal that corresponds to the so-called geometric tooth volume V_{gz} . A value stated in technical documents as the nominal volume to identify the device size.

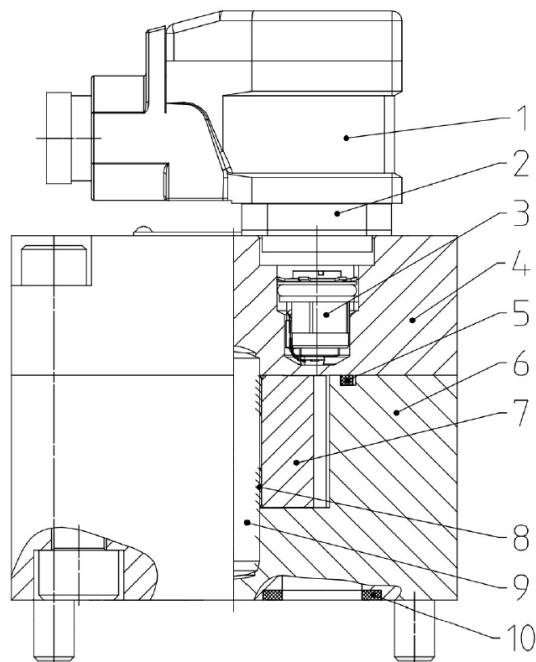
This signal is transmitted from the preamplifier to the evaluation electronics as a rectangular pulse or according to the IO link protocol (IO link mode - process data; SIO mode - rectangular pulse).

The dual-channel scanning enables higher measured value resolution and detection of the direction of flow.

In the gear-type flowmeter, the driving direction of the fluid flow is independent of the direction

3.2 Basic design

Gear type flow meters



- | | | | |
|---|-----------------------|----|-----------------|
| 1 | Cable socket | 6 | Housing |
| 2 | Equipment plug/socket | 7 | Measuring unit |
| 3 | Sensor | 8 | Bearing |
| 4 | Cover | 9 | Bearing journal |
| 5 | O-ring | 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 (Rated volume)			
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. Materials			
1	Housing: EN-GJS-400-15 Gears: Steel (St)	4	Housing: Aluminium (Al) Gears: Stainless steel
2	Housing: Stainless steel Gears: Stainless steel	5	Housing: Aluminium (Al) Gears: Steel (St)
5. Seal type			
F	FKM	P	FEP
N	NBR		
6. Surface			
1	Standard (painted)	4	hartcoatiert
3	Without	5	anodized
7. Type of connection			
P	Plate structure	R	Pipe connection
8. Sensor system			
1	1 Sensor	3	Without Sensor system
2	2 Sensors	4	2 Sensors protected against vibration and condensation
9. Version of the sensor system			
S	Standard	V	Without Pre amplifier (for Plug-indisplay unit SD 1)
K	High temperature PLUS	X	ATEX
10. Cable length			
No specification	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 G1"

4 Technical data

4.1 General

4.1.1 Gear type flow meter

General information		
Design		Gear motor
Housing connection		Plate structure / Pipe thread
Mounting position		Any
Flow direction		Any
Viscosity		Nominal sizes [▶ 14]
Operating pressure	p	
Permissible pressure loss	$\Delta p_{\max.}$	Permissible temperature range [▶ 15]
Fluid temperature	ϑ_m	
Ambient temperature	ϑ_u	
Materials		Material data [▶ 16]
Measuring accuracy		Nominal sizes [▶ 14]
Permissible size of foreign particles in the medium		
Permissible media		Lubricating and poorly lubricating fluids in the frame of the specified operating parameters (Petrols, solvents, etc. are not permissible) (Please consult the manufacturer in cases of doubt)

4.2 Nominal sizes

Product name		VCA	VCN	VCA	VCA	VCN	VCA	VCN	VCA	VCG
Nominal ⁽¹⁾		0.04		0.1	0.2		2		5	
Geom. tooth volume	V_{gz} [cm ³ /r]	0.04		0.1	0.2		2		5.222	
Resolution	[Imp/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%			± 3%		± 2.5%		± 1%	± 2.5%
		20			20		20		20	20
Viscosity	mm ² /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	Permissible size of foreign particles in the medium [µm]		
	Product name		
	VCA	VCN	VCG
0.04	30	30	-
0.1		-	
0.2		30	
2	20	-	30
5		-	20

4.3 Permissible temperature range

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

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



NOTICE

Note media-specific properties.

4.4 Material data

4.4.1 Gear type flow meter

Product name		VCA								
Nominal		0,04	0,1	0,2		2		5		
Bearing		K	K	U	U	U	M	U	K	K
Materials		4	5	5	4	4	5	4	5	4
Materials	Housing / Cover	Aluminium (Al) Al Mg Si F30			Aluminium (Al) Al Mg Si F30 (hartcoatiert)					
	Measuring unit	Casehardened steel (1.7139)			Stainless steel (1.4462)		Stainless steel (1.7139)	Stainless steel (1.4462)	Casehardened steel (1.7139)	Stainless steel (1.4462)
	Bearing	Roller bearings steel			Iglidur® X		Hardened steel	Stainless steel (1.4462)	Hardened steel	Stainless steel (1.4462)
	Bearing pin	Stainless steel (1.4462)	Hardened steel	Stainless steel (1.4462)	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	

Product name		VCN				VCG		
Nominal		0.04	0.2		2		5	
Bearing		K	U	U	U	M	M	
Materials		4	5	4		5	5	5
Materials	Housing / Cover	Stainless steel (1.4462)				EN-GJS-400-15		
	Measuring unit	Roller bearings steel	Casehardened steel	Stainless steel (1.4462)		Casehardened steel (1.7139)		
	Bearing	Roller bearings steel	Iglidur® X			Steel (St), Sinter- bronze , PTFE		
	Bearing pin	Stainless steel (1.4462)	Hardened steel	Stainless steel (1.4462)		Hardened steel		
Type of bearing		Ball bearing	Plastic plain bearings			Multi layer friction bearings		

4.5 Weight

Nominal	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

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

5 Transport and storage

5.1 General

- a) After receiving the delivery, check the product for transport damage.
- b) If transport damage is found, the manufacturer and the transport company must be notified immediately. The product must then be replaced or repaired.
- c) Dispose of packaging materials and used parts according to local regulations.

5.2 Transport



⚠ WARNING

Falling or toppling loads

Risk of injury during transport of large and heavy loads.

- a) Use only suitable means of transport and lifting gear with sufficient load-bearing capacity.
- b) Attach lifting gear only to suitable places on the load.
- c) Attach the lifting gear so that it cannot slip.
- d) Note the centre of gravity of the load.
- e) Avoid sudden, jerky movements, impacts and strong vibrations during transport.
- f) Do not step under overhead loads, do not work under overhead loads.

5.3 Storage

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

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

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

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

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

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

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



NOTICE

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

⚠ ATTENTION

Corrosion/chemical attack

Improper storage can make the product unusable.

- a) Use suitable preservation measures to protect exposed surfaces.
- b) Comply with the recommended storage conditions.

5.4 Storage conditions



TIP

Recommended storage conditions

- a) Storage temperature: 5 °C – 25 °C
- b) Relative humidity: < 70 %
- c) Protect elastomer parts from light, particularly direct sunlight.
- d) Protect elastomer parts from oxygen and ozone.
- e) Note the maximum storage period of elastomer parts:
 - ⇒ 5 years: AU (polyurethane rubber)
 - ⇒ 7 years: NBR, HNBR, CR
 - ⇒ 10 years: EPM, EPDM, FEP/PFTE, FEPM, FKM, FFKM, VMQ, FVMQ

6 Installation

6.1 Safety instructions for installation



⚠ DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



⚠ DANGER

Rotating parts

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

- a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.
- b) Safely prevent restarting during the work.



⚠ DANGER

Exposed electrical components

Risk of fatal electric shock.

- a) Adhere to the special safety regulations for all work on electrical systems. Switch off electrical systems and secure them against being switched on again.
- b) Work on electrical systems may only be carried out by a qualified electrician.
- c) Use only connection lines that are resistant to ambient influences and media.



⚠ WARNING

Exposed gears

Gearwheels can trap and crush fingers and hands.

- a) Do not engage gearwheels.



⚠ WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.

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

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Use only connections and lines approved for the expected pressure range.
- b) Securely prevent the permissible pressures from being exceeded, e.g. by using pressure relief valves or bursting discs.
- c) Pipelines must be designed in such a way that no tension e.g. caused by changes in length due to fluctuations in temperature can be transferred to the product.

**⚠ CAUTION****Hot surfaces**

Burns of the skin on contact.

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

6.2 Mechanical installation

6.2.1 Preparation

- a) Check the product for transport damage and contamination.
- b) Remove any preservative present.
- c) Clean all lines.
 - ⇒ Only use cleaning agents that are compatible with the materials used.
 - ⇒ Do not use cleaning wool.
- d) Compare the environmental and ambient conditions at the place of use with the permissible conditions.
 - ⇒ Expose the product only to low vibrations, see IEC 60034-14.
 - ⇒ Ensure sufficient accessibility for maintenance and repair.
- e) Die hydraulischen Anschlüsse herstellen.
 - ⇒ Comply with the manufacturer's instructions.
 - ⇒ Do not use any sealing materials such as hemp, Teflon tape or putty.
- f) Remove existing protective plugs.

6.2.2 Plate connection



CAUTION

Hot surfaces

Burns of the skin on contact.

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

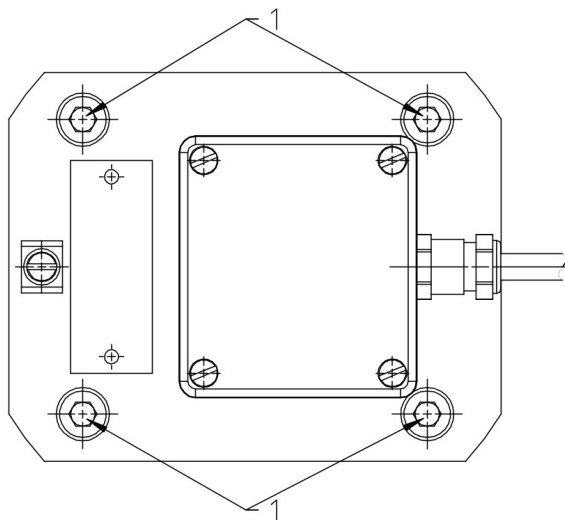
ATTENTION

Contamination or small parts

Damage or malfunctions of the product and the system caused by dirt or small parts.

- a) Before installing, check the connection surfaces for dirt or small parts and clean if necessary.

- a) Position the housing on the connection plate.
 - ⇒ Make sure that the seal fits correctly.
 - ⇒ The contact surface must be free from dirt, paint residues, etc.
- b) Tighten the fastening screws to the specified torque.
 - ⇒ Prevent stressing of the product.
 - ⇒ Make sure the fastening screws have sufficient depth of engagement.



1 Fastening screws

Tightening torques fastening screws				
Nominal	0.2	2		5
Product name	VCA	VCA	VCG	VCG
Screw size	M8	M8		M12
Property 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

Nominal		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					

**NOTICE**

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

6.2.3 pipe connection

- a) Clean all lines.
 - ⇒ Do not use cleaning wool.
 - ⇒ Pickle and rinse welded pipes.
- b) Remove existing protective plugs.
- c) Install the lines.
 - ⇒ Comply with the manufacturer's instructions.
 - ⇒ Do not use any sealing materials such as hemp, Teflon tape or putty.

6.3 Electrical connection

6.3.1 Preamplifier (S, H, K)

Electrical data		Pre amplifier	
		24 V	12 V
Number of measuring channels		2	2
Operating voltage		UB = 24 V DC ± 20 % Reverse-polarity protection	UB = 12 V DC ± 20 % Reverse-polarity protection
Impulse amplitude		UA ≥ 0,8 UB	UA ≥ 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
Power requirement / 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)
Special numbers [▶ 12]			



TIP

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

⚠ ATTENTION

Damage by overvoltage

Excessive voltage can cause damage and dysfunction to the product.

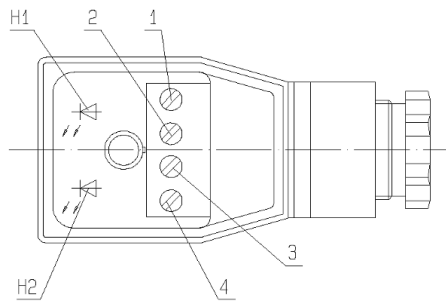
- Use the product only with the correct voltage.
- Please consult the manufacturer in cases of doubt.

⚠ ATTENTION

The power supply line must match the used preamplifier.

6.3.1.1 Connection plug arrangement

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



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

7 Commissioning

7.1 Safety instructions for start-up



DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



CAUTION

Hot surfaces

Burns of the skin on contact.

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

7.2 Preparation

- a) Before starting the system make sure that a sufficient quantity of the service fluid is extant to avoid dry running. This must be taken into account especially with large line volumes.
- b) Check all fastening screws on the product.
- c) Fill the product with medium.

7.3 Additional commissioning

- a) Open existing shut-off elements in front of and behind the product.
- b) Set pressure relief valves installed in the system to the lowest opening pressure.
- c) Run the product pressureless or at low pressure for a few minutes.
- d) Vent the system at the highest possible point.
- e) Gradually increase the pressure up to the required operating pressure.
- f) Operate the system until the final operating condition is reached.
- g) Check the operating data.
 - ⇒ **Maintenance table [▶ 33]**
- h) Document the operating data of the initial commissioning for later comparison.
- i) Check the level of the operating medium in the system.
- j) Check the product for leaks.
- k) Check all fittings for leaks and retighten if necessary.

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



TIP

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 disassembly



⚠ DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



⚠ DANGER

Rotating parts

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

- a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.
- b) Safely prevent restarting during the work.



⚠ DANGER

Exposed electrical components

Risk of fatal electric shock.

- a) Adhere to the special safety regulations for all work on electrical systems. Switch off electrical systems and secure them against being switched on again.
- b) Work on electrical systems may only be carried out by a qualified electrician.
- c) Use only connection lines that are resistant to ambient influences and media.



⚠ WARNING

Exposed gears

Gearwheels can trap and crush fingers and hands.

- a) Do not engage gearwheels.



⚠ WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.

**CAUTION****Hot surfaces**

Burns of the skin on contact.

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

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

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

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

8.2 Dismantling

- a) Depressurise and de-energise the system.
- b) Close existing shut-off elements in front of and behind the product.
- c) Open existing drain elements and undo connection lines. Collect and dispose of leaking media so that no hazard is created for persons or the environment.
- d) Dismantle the product.
 - ⇒ Den Stecker vom Gehäuse abziehen.
 - ⇒ **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 product.
- f) Seal the process connections and lines to prevent the ingress of dirt.

**NOTICE**

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

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

9 Maintenance

9.1 Safety instructions for maintenance



⚠ DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



⚠ DANGER

Rotating parts

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

- a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.
- b) Safely prevent restarting during the work.



⚠ DANGER

Exposed electrical components

Risk of fatal electric shock.

- a) Adhere to the special safety regulations for all work on electrical systems. Switch off electrical systems and secure them against being switched on again.
- b) Work on electrical systems may only be carried out by a qualified electrician.
- c) Use only connection lines that are resistant to ambient influences and media.



⚠ WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.



⚠ CAUTION

Hot surfaces

Burns of the skin on contact.

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

9.2 Maintenance work



TIP

Checking and documentation of the operating data

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

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



NOTICE

Protective devices and notes

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

9.2.1 Cleaning - deposits in the measuring device

ATTENTION

Device damage

Improper cleaning of the measuring unit can damage the device.

- a) Only by the manufacturer:
 - ⇒ Cleaning the measuring element in products with ball bearing
 - b) Can be carried out by the customer:
 - ⇒ Cleaning the measuring element in products with plain bearing
- ⇒ Exception: Special numbers

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) Undo the 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 product.
- 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 to the specified torque.

Tightening torques Housing with threaded connection [Nm]						
Nominal		0.04	0.1	0.2	2	5
Tightening torques M_A	VCA	13	13	20	13	65
	VCN	14	-	14	-	-
	VCG	-	-	-	69	120
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 know-how and sufficient equipment, the repair can also be carried out by the installer/operating company.

If necessary, request spare parts lists and assembly drawings from the manufacturer. Please consult the manufacturer for this purpose.



NOTICE

Warranty

Any warranty will be void if not executed properly.

9.4 Maintenance table

9.4.1 Maintenance table

		Firstly:after max. 24 h	Daily	3000 Operating hours	6000 Operating hours	As required	Additional in-formation
9.4.2	Check the rate of flow	2					
9.4.3	Check the operating pressure	2					
9.4.4	Check the media temperature	2					
9.4.5	Check the device temperature	2					
9.4.6	Check the equipotential bonding	2					
9.4.7	Check the condition of the operating fluid	2					
9.4.8	Auditory check Unusual noises		1				
9.4.9	Cleaning		1				
9.4.10	Visual inspection for leakage		1				
9.4.2	Check the rate of flow			2			
9.4.3	Check the operating pressure			2			
9.4.4	Check the media temperature			2			
9.4.5	Check the device temperature			2			
9.4.6	Check the equipotential bonding			2			
9.4.7	Check the condition of the operating fluid			2			
9.4.11	Visual check of the condition of the measuring element				3		
9.4.12	Visual check of the condition of housing parts				3		
9.4.13	Visual check of the condition of the bearings				3		
9.4.14	Replacing other seals					4	
9.4.15	Cleaning to remove deposits in the measuring device					4	

1 - 0,1 h; 2 - 0,2 h; 3 - 0,75 h; 4 - 0,5 h

9.4.2 Check the rate of flow

The rate of flow is measured via the volumetric flow meter.

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 Check the operating pressure

The operating pressure is indicated by the pressure gauges.

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

9.4.4 Check the media temperature

The media temperature is measured through the temperature sensor.

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

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

9.4.5 Check the device temperature

Measure the surface temperature in the area of the bearing.

9.4.6 Check the equipotential bonding

Check the equipotential bonding for tight fit and proper functioning.

9.4.7 Check the condition of the operating fluid

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

- Replace operating fluid if necessary.

9.4.8 Auditory check Unusual noises

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

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

9.4.9 Cleaning

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

9.4.10 Visual inspection for leakage

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

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

9.4.11 Visual check of the condition of the measuring element

Look for damage to the measuring element.

Cleaning - deposits in the measuring device [▶ 31]

9.4.12 Visual check of the condition of housing parts

Look for damage to the housing.

9.4.13 Visual check of the condition of the bearings

Look for damage to the bearings.

Cleaning - deposits in the measuring device [▶ 31]

9.4.14 Replacing other seals

Cleaning - deposits in the measuring device [▶ 31]

9.4.15 Cleaning to remove deposits in the measuring device

Cleaning - deposits in the measuring device [▶ 31]

10 Repair

10.1 Safety instructions for repairs



⚠ DANGER

Hazardous fluids

Danger to life when handling hazardous fluids

- a) Comply with the safety data sheets and regulations on handling the hazardous fluids.
- b) Collect and dispose of hazardous fluids so that no hazard is created for persons or the environment.



⚠ DANGER

Rotating parts

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

- a) Before carrying out any work, disconnect any drives and actuators from the power supply or depressurise them.
- b) Safely prevent restarting during the work.



⚠ DANGER

Exposed electrical components

Risk of fatal electric shock.

- a) Adhere to the special safety regulations for all work on electrical systems. Switch off electrical systems and secure them against being switched on again.
- b) Work on electrical systems may only be carried out by a qualified electrician.
- c) Use only connection lines that are resistant to ambient influences and media.



⚠ WARNING

Failure of pressure bearing parts due to overload

Risk of injury from flying parts.

Risk of injury due to splashing fluids.

- a) Before carrying out any work, depressurise the product and all connection pipes.
- b) Securely prevent the pressure from being restored during work.



⚠ CAUTION

Hot surfaces

Burns of the skin on contact.

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

10.2 General

Corrective maintenance includes:

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

Repair by the manufacturer

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



NOTICE

Device contains hazardous substances

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

Repair by the installer/operating company

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

- a) If necessary, request spare parts lists and assembly drawings from the manufacturer.
- b) Only use spare parts approved by the manufacturer.
- c) Dispose of packaging materials and used parts according to local regulations.



NOTICE

Warranty

Any warranty will be void if not executed properly.



NOTICE

Protective devices and notes

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

10.3 Fault table



TIP

If the product does not function properly, the electrical components should be tested 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:	
		Measuring unit is blocked	
Consult the manufacturer in the event of unidentifiable faults			