bürkert
FLUID CONTROL SYSTEMS

Type 8012

Flowmeter with paddle-wheel
Durchfluss-Messgerät mit Flügelrad
Débitmètre à ailette

Operating Instructions

Bedienungsanleitung
Manuel d'utilisation

MAN 1000290630 EN Version: BStatus: RL (released | freigegeben) printed: 22.09.2017

Operating Instructions 1703/3_EU-ML 00563643 / Original FR

MAN 1000290630 EN Version: BStatus: RL (released | freigegeben) printed: 22.09.2017

1 ABOUT THESE OPERATING INSTRUCTIONS

The Operating Instructions describe the entire life cycle of the device. Please keep the Operating Instructions in a safe place, accessible to all users and any new owners.

The Operating Instructions contain important safety information.

Failure to comply with these instructions can lead to hazardous situations. Pay attention in particular to the chapters 3 Basic safety information and 2 Intended use.

- Whatever the version of the product, the Operating Instructions must be read and understood.

1.1. Definition of the word "device"

The word "device" used in these Operating Instructions always refer to the flowmeter type 8012.

1.2. Symbols used

DANGER

Warns against an imminent danger.

- Failure to observe this warning can result in death or in serious injury.

WARNING

Warns against a potentially dangerous situation.

- Failure to observe this warning can result in serious injury or even death.

CAUTION

Warns against a possible risk.

- Failure to observe this warning can result in substantial or minor injuries.

NOTE

Warns against material damage.

Indicates additional information, advice or important recommendations.

Refers to information contained in these Operating Instructions or in other documents.

- Indicates an instruction to be carried out to avoid a danger, a warning or a possible risk.

→ Indicates a procedure to be carried out.

Indicates the result of a specific instruction.

2 INTENDED USE

Use of the flowmeter that does not comply with the instructions could present risks to people, nearby installations and the environment.

The flowmeter type 8012 is intended exclusively to measure flow rate in liquids.

- This device must be protected against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of climatic conditions.
- This device must be used in compliance with the characteristics and commissioning and use conditions specified in the contractual documents and in the Operating Instructions.
- Requirements for the safe and proper operation of the device are proper transport, storage and installation, as well as careful operation and maintenance.
- Only use the device as intended.

3 BASIC SAFETY INFORMATION

This safety information does not take into account any contingencies or occurrences that may arise during installation, use and maintenance of the product.

The operating company is responsible for the respect of the local safety regulations including for the staff safety.

Danger due to high pressure in the installation.

Danger due to electrical voltage.

Danger due to high temperatures of the fluid.

Danger due to the nature of the fluid.

Various dangerous situations

To avoid injury take care:

- to prevent any unintentional power supply switch-on.
- to ensure that installation and maintenance work are carried out by qualified, authorised personnel in possession of the appropriate tools.
- to guarantee a defined or controlled restarting of the process, after a power supply interruption.

Various dangerous situations

To avoid injury take care:

- to use the device only if in perfect working order and in compliance with the instructions provided in the Operating Instructions.
- to observe the general technical rules when installing and using the device.
- not to use this device in explosive atmospheres.
- not to use the device for the measurement of gas flow rates.
- not to use fluid that is incompatible with the materials the device is made of.
- not to use this device in an environment incompatible with the materials it is made of.
- not to subject the device to mechanical loads (e.g. by placing objects on top of it or by using it as a step).
- not to make any external modifications to the device. Do not paint any part of the device.

NOTE

The device may be damaged by the fluid in contact with.

- Systematically check the chemical compatibility of the component materials of the device and the fluids likely to come into contact with it (for example: alcohols, strong or concentrated acids, aldehydes, alkaline compounds, esters, aliphatic compounds, ketones, halogenated aromatics or hydrocarbons, oxidants and chlorinated agents).

NOTE

Elements / Components sensitive to electrostatic discharges

- This device contains electronic components sensitive to electrostatic discharges. They may be damaged if they are touched by an electrostatically charged person or object. In the worst case scenario, these components are instantly destroyed or go out of order as soon as they are activated.
- To minimise or even avoid all damage due to an electrostatic discharge, take all the precautions described in the EN 61340-5-1 norm.
- Also ensure that you do not touch any of the live electrical components.

4 GENERAL INFORMATION

4.1. Manufacturer's address and international contacts

To contact the manufacturer of the device use following address:

Bürkert SAS

Rue du Giessen

BP 21

F-67220 TRIEMBACH-AU-VAL

You may also contact your local Bürkert sales office.

The addresses of our international sales offices are available on the internet at: www.burkert.com

4.2. Warranty conditions

The condition governing the legal warranty is the conforming use of the 8012 in observance of the operating conditions specified in these Operating Instructions.

4.3. Information on the Internet

You can find the Operating Instructions and technical data sheets regarding the type 8012 at: www.burkert.com

5 DESCRIPTION

5.1. Area of application

The 8012 flowmeter with magnetic sensor is intended to measure the flow rate of neutral or slightly aggressive liquids free of solid particles.

The 8012 flowmeter with optical sensor is intended exclusively for measuring the flow rate of liquids that allow the passage of infrared rays.

5.2. General description

5.2.1. Construction

The 8012 flowmeter comprises the SE12 electronics incorporating the measuring paddle-wheel and an S012 fitting allowing the device to be fitted to all types of pipes from DN6 to DN65.

The sensor detects the rotation of the paddle-wheel; it generates a signal in which the frequency f is proportional to the rotation frequency of the paddle-wheel.

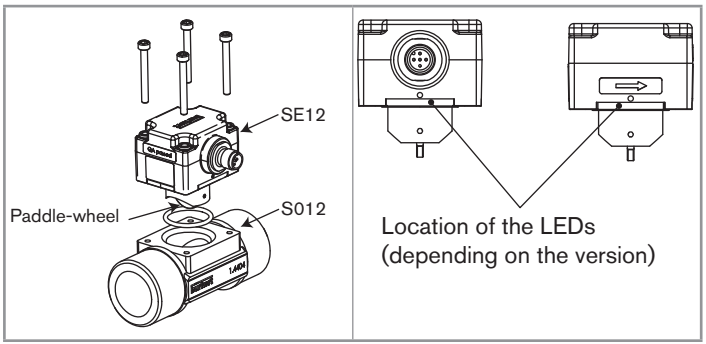
The electronic module is fitted with 2 LEDs visible by transparency on the side of the housing:

- A **green** LED is on when the device is energized (the paddle-wheel is not running) and then flashes proportionally to the rotation frequency of the paddle-wheel.
- A **red** LED signals a malfunction of the flowmeter (see chap. 10.4.1).

Depending on the version, the electrical connection is made using a 1 m long cable or a multi-pin M12 fixed connector which position can be adjusted.

Depending on the version, the device is equipped:

- with one pulse output
- or one pulse output and one 4...20 mA current output.



5.2.2. Version with pulse output

On the 16 basic versions of the SE12 module (see chap. 5.5), the NPN pulse output generates a signal with a frequency f proportional to the rotation frequency of the paddle-wheel.

To obtain a flow rate Q, this frequency must be divided by a proportionality factor K according to the following formula:

$$Q = f/K$$

Table 1: Characteristics of the pulse output

Characteristic of the pulse output	Possible configurations (on request)	Pulse output of the basic versions
Transistor wiring	▪ NPN ▪ or PNP	NPN
Behaviour of the output	▪ Frequency proportional to the rotation of the paddle-wheel (see above) ▪ or frequency proportional to a volume (see chap. 9.2.1) ▪ or switching mode (see chap. 9.2.2) ▪ or mode detecting the immediate or delayed change of circulation direction of the fluid (only on versions with optical sensor) (see chap. 9.2.3)	Frequency proportional to the rotation of the paddle-wheel

5.2.3. Version with pulse output and current output

Pulse output

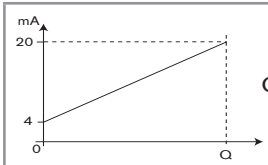
The characteristics of the pulse output are identical to those on a version with pulse output only. See chap. 5.2.2.

Current output

The current output on the basic versions is connected in sink mode and delivers a current I, an image of the rotation frequency f of the paddle-wheel:

$$I = 8f/125 + 4$$

As f = KQ, the flow Q is therefore proportional to this current:



$$Q = \frac{125}{8K}(I - 4)$$

Q: flow rate [litre/s]
K: K factor [pulse/litre]
I: current [mA]

Current attenuation variations

When the flow varies quickly, the current output signal from your device can be stabilised. On the basic versions, the current variations are slightly attenuated.

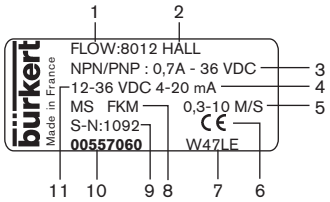
Generation of an alarm current (versions with optical sensor only)

On the basic versions, an "alarm" current of 22 mA is generated when the circulation direction of the fluid is the opposite of the direction of the arrow on the side of the housing.

Table 2: Current output data

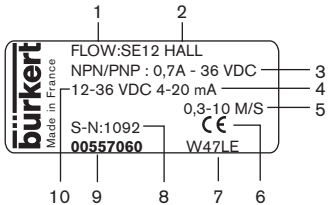
Characteristic	Possible configurations (on request)	Configuration on a basic version
Wiring	▪ source ▪ or sink	sink
Current output range and associated measuring range	▪ 4...20 mA, corresponding to the rotation frequency range 0...250 Hz of the paddle-wheel (see above) ▪ or 4...20 mA, corresponding to a flow range, in the unit specific to the application (see chap. 9.3.1) ▪ or 4...21.6 mA, corresponding to the rotation frequency range 0...275 Hz of the paddle-wheel (see chap. 9.3.1) ▪ or 4...21.6 mA, corresponding to a flow range, in the unit specific to the application (see chap. 9.3.2)	4...20 mA, corresponding to the 0...250 Hz rotation frequency range of the paddle-wheel
Current attenuation variations	Ten possible attenuation levels: ranging from "no attenuation" to "maximum attenuation" (see chap. 9.3.3)	Slight attenuation of the current variations

5.3. Description of the name plate of the 8012



1. Measured value and type of the device
2. Type of sensor
3. Characteristics of the pulse output
4. Type of current output
5. Flow range
6. Conformity marking
7. Manufacturing code
8. Materials the fitting and the seal in contact with the fluid are made of
9. Serial number
10. Order code
11. Supply voltage

5.4. Description of the name plate of the SE12



1. Measured value and type of the device
2. Type of sensor
3. Characteristics of the pulse output
4. Type of current output
5. Flow range
6. Conformity marking
7. Manufacturing code
8. Serial number
9. Order code
10. Supply voltage

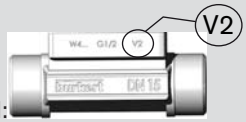
5.5. Order codes for the basic versions of the SE12 module

The fitting S012 is not available as a separate part.

Two versions of the S012 in DN15 and DN20 exist, having different K factors.
Only version 2, identified by the "v2" marking, is available from March 2012. The "v2" marking can be found:

- on the bottom of the DN15 or DN20 fitting in plastic:

- on the side of the DN15 or DN20 fitting in metal:



Supply voltage	Measurement principle	Fitting	Electrical connection	Outputs	Order code
12...36 V DC	Hall	DN6, DN8, DN15 v2 and DN20 v2	Male 5-pin M12 fixed connector	Pulse, NPN	**557 054**
				Pulse, NPN + 4...20 mA	**557 058**
			Cable gland, including 1 m cable	Pulse, NPN	**557 056**
				Pulse, NPN + 4...20 mA	**557 060**
		DN15 to DN65 (except DN15 v2 and DN20 v2)	Male 5-pin M12 fixed connector	Pulse, NPN	**557 053**
				Pulse, NPN + 4...20 mA	**557 057**
			Cable gland, including 1 m cable	Pulse, NPN	**557 055**
				Pulse, NPN + 4...20 mA	**557 059**

Supply voltage	Measurement principle	Fitting	Electrical connection	Outputs	Order code
12...36 V DC	Optical	DN6, DN8, DN15 v2 and DN20 v2	Male 5-pin M12 fixed connector	Pulse, NPN	**557 062**
				Pulse, NPN + 4...20 mA	**557 066**
			Cable gland, including 1 m cable	Pulse, NPN	**557 064**
				Pulse, NPN + 4...20 mA	**557 068**
		DN15 to DN65 (except DN15 v2 and DN20 v2)	Male 5-pin M12 fixed connector	Pulse, NPN	**557 061**
				Pulse, NPN + 4...20 mA	**557 065**
			Cable gland, including 1 m cable	Pulse, NPN	**557 063**
				Pulse, NPN + 4...20 mA	**557 067**

6 TECHNICAL DATA

6.1. Conditions of use

Ambient temperature	–15 to +60 °C
Air humidity	< 80%, non condensated
Protection class acc. to EN 60529	▪ IP67 (version with M12 fixed connector), female connector wired, plugged in and tightened ▪ IP65 (version with cable gland)

6.2. Conformity to standards and directives

The applied standards, which verify conformity with the EU Directives, can be found on the EU Type Examination Certificate and/or the EU Declaration of Conformity (if applicable).

- Pressure: according to article 4§1 of the Pressure Equipment Directive 2014/68/EU, the product can only be used in the following cases (depending on the max. pressure, the DN of the pipe and the fluid):

Type of fluid	Conditions
Fluid group 1, art. 4 §1.c.i	DN ≤ 25
Fluid group 2, art. 4 §1.c.i	DN ≤ 32 or PNxDN ≤ 1000
Fluid group 1, art. 4 §1.c.ii	DN ≤ 25 or PNxDN ≤ 2000
Fluid group 2, art. 4 §1.c.ii	DN ≤ 200 or PN ≤ 10 or PNxDN ≤ 5000

6.3. Mechanical data

Component	Material
SE12 electronic housing	PPS
Cable gland, M12 fixed connector	PA
Cable, 1 m	PVC, T_{max} = 80 °C
Seal exposed to the fluid	FKM (EDPM on request)
Seal exposed to the ambient air	EDPM
Paddle-wheel holder	PVDF
Paddle-wheel	PVDF
Paddle-wheel axis and bearings	ceramic
Body of the S012 fitting	stainless steel (316L/DIN1.4404), brass, PVC, PP, PVDF
Screws	Stainless steel A4

6.4. Dimensions of device

→ please refer to the technical data sheets regarding the type 8012 available at: www.burkert.com

6.5. Fluid data

Type of fluid (optical sensor)	transparent to infrared rays
Max. temperature of the fluid	▪ Fitting in stainless steel, brass, PVDF: - a) 100 °C if the ambient temperature ≤ +45 °C - b) 90 °C if the ambient temperature is between 45 °C and 60 °C ▪ Fitting in PP: 80 °C ▪ Fitting in PVC: 60 °C
Min. fluid temperature	▪ Fitting in stainless steel, brass: −15 °C ▪ Fitting in PP or PVC: +5 °C ▪ Fitting in PVDF: −15 °C
Fluid pressure	depends on the fitting material; see Fig. 1 in chap. 7.1
Fluid viscosity	300 cSt max.
Rate of solid particles	1% max.
Measurement range	0.3 m/s to 10 m/s

Measurement deviation	
▪ standard K factor ▪ Teach-In	▪ + 2.5% of the measured value* ▪ ± 1% of the measured value*
Linearity	± 0.5 % of the full scale (10 m/s)
Repeatability	± 0.4% of the measured value*
Measuring element	magnetic or optical sensor

* Values determined in the following reference conditions:
medium = water, water and ambient temperatures 20 °C, min. upstream and downstream distances respected, appropriate pipe dimensions

6.6. Electrical data

Power supply	12...36 V DC, filtered and regulated
Current consumption	max. 60 mA (at 12 V DC for the version with current output - no load)
Protection against polarity reversal	yes
Protection against spike voltages	yes
Protection against short circuits	yes, for the pulse output
Pulse output	transistor, NPN by default (can be configured as PNP, on request), open collector, 700 mA max., NPN output: 0.2...36 V DC and PNP output: supply voltage, frequency up to 300 Hz (frequency = K factor x flow rate). Configurable on request
Current output (depending on version)	4...20 mA, sinking wiring by default, equals the rotation frequency of the paddle-wheel (by default). Configurable on request
▪ max. loop impedance	▪ 1125 Ω at 36 V DC ▪ 650 Ω at 24 V DC ▪ 140 Ω at 12 V DC

6.7. Electrical connections

Version	Type
With a cable gland	Cable, 1 m
With a fixed connector	5-pin M12 fixed connector, adjustable in position

6.8. K factors

The K factors have all been determined in the following reference conditions:

medium = water, water and ambient temperatures 20 °C, min. upstream and downstream distances respected, appropriate pipe dimensions

Two versions of the S012 in DN15 and DN20 exist, having different K factors.

Only version 2, identified by the "v2" marking, is available from March 2012. The "v2" marking can be found:

- on the bottom of the DN15 or DN20 fitting in plastic:

- on the side of the DN15 or DN20 fitting in metal:

The names of the following norms have changed in the Operating Instructions:

- for the welding ends, norm BS 4825 is renamed BS 4825-1
- for the clamp connections:
  - norm BS 4825 is renamed BS 4825-3
  - norm ISO (for pipes acc. to EN ISO 1127 / ISO 4200) is renamed DIN 32676 series B
  - norm DIN 32676 is renamed DIN 32676 series A
- for the flange connections, norm EN 1092-1 is renamed EN1092-1 / B1 / PN16

Material	Type of connections and standard	K factor [pulse/litre] 1)										
		DN6	DN8	DN15	DN15 v2	DN20	DN20 v2	DN25	DN32	DN40	DN50	DN65
Stainless steel	**welding ends acc. to**											
	▪ SMS 3008	-	-	-	-	97,0	73,4	61,5	47,5	29.5	18.9	10.5
	▪ DIN 11866 series C / BS 4825-1 / ASME BPE	-	-	-	-	97,0	73,4	61,5	47,5	29.5	18.9	10.5
	▪ DIN 11866 series B / ISO 1127 / ISO 4200	450	288	97,0	73,4	61,5	-	47,5	29,5	18,9	10,5	-
	▪ DIN 11850 series 2 / DIN 11866 series A / EN 10357 series A	-	288	97,0	73,4	97,0	73,4	61,5	47,5	29.5	18.9	-
Stainless steel	**external threads acc. to**											
	▪ SMS 1145	-	-	-	-	97,0	73,4	61,5	47,5	29.5	18.9	10.5
	▪ G	450	288	97,0	73,4	61,5	-	47,5	29,5	18,9	10,5	-
Stainless steel	**internal threads acc. to**											
	▪ G, Rc, NPT	450	288	97,0	73,4	61,5	-	47,5	29,5	18,9	10,5	-

Material	Type of connections and standard	K factor [pulse/litre] [1]										
		DN6	DN8	DN15	DN15 v2	DN20	DN20 v2	DN25	DN32	DN40	DN50	DN65
Stainless steel	**Clamp acc. to**											
	▪ SMS 3017	-	-	-	-	97,0	73,4	61,5	47,5	29.5	18.9	10.5
	▪ BS 4825-3 / ASME BPE	-	-	-	-	97,0	73,4	61,5	47,5	29.5	18.9	10.5
	▪ DIN 32676 series B	450	288	97,0	73,4	61,5	-	47,5	29,5	18,9	10,5	-
	▪ DIN 32676 series A	-	288	97,0	73,4	97,0	73,4	61,5	47,5	29.5	18.9	-
Stainless steel	**flanges acc. to**											
	▪ EN1092-1 / B1 / PN16 ▪ ANSI B16-5 ▪ JIS 10K	450	288	97,0	73,4	61,5	-	47,5	29,5	18,9	10,5	-
Brass	all	450	288	97,0	73,4	61,5	-	47,5	29,5	18,9	10,5	-
PVC	all	450	288	110	83,5	76,5	-	51,5	28,2	17,5	10,2	-
PP	all	-	-	115	86,6	77,0	-	52,0	29,2	17,0	10,0	-
PVDF	all	450	288	120	89,6	73,2	-	52,5	29,5	18,0	10,3	-

[1] **K factor in pulse/US gallon = K factor in pulse/l x 3,785;**
K factor in pulse/UK gallon = K factor in pulse/l x 4,546

7 INSTALLATION AND WIRING

7.1. Safety instructions

DANGER

Danger due to high pressure in the installation.

- Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

Danger due to electrical voltage.

- Shut down and isolate the electrical power source before carrying out work on the system.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Danger due to high temperatures of the fluid.

- Use safety gloves to handle the device.
- Stop the circulation of fluid and drain the pipe before loosening the process connections.

Danger due to the nature of the fluid.

- Respect the prevailing regulations on accident prevention and safety relating to the use of aggressive fluids.

WARNING

Risk of injury due to non-conforming installation.

- The electrical and fluid installation can only be carried out by qualified and skilled staff with the appropriate tools.
- Install appropriate safety devices (correctly rated fuse and/or circuit-breaker).

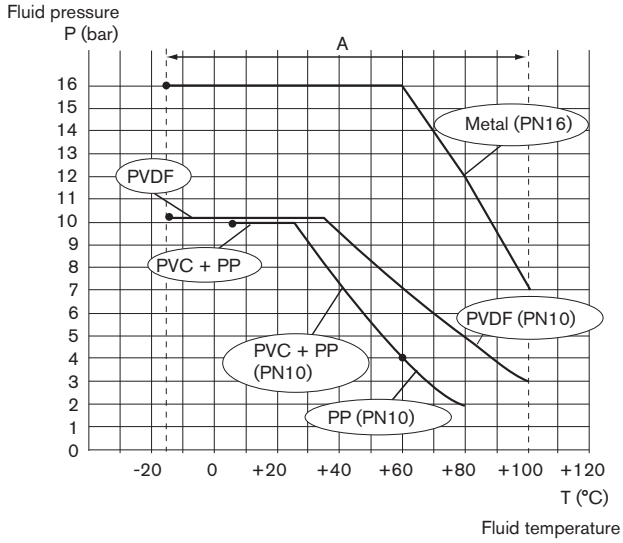
Risk of injury due to unintentional switch on of power supply or uncontrolled restarting of the installation.

- Take appropriate measures to avoid unintentional activation of the installation.
- Guarantee a defined or controlled restarting of the process subsequent to the installation of the device.

WARNING

Risk of injury if the fluid pressure/ temperature dependency is not respected.

- Take the fluid pressure / temperature dependency into account according to the nature of the material of the fitting used (see Fig. 1).



A : range of use for the complete device

Fig. 1: Fluid pressure /temperature dependency curves

7.2. Installation onto the pipe

DANGER

Danger due to high pressure in the installation.

- Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

Danger due to high temperatures of the fluid.

- Use safety gloves to handle the device.
- Stop the circulation of fluid and drain the pipe before loosening the process connections.

Danger due to the nature of the fluid.

- Respect the prevailing regulations on accident prevention and safety relating to the use of aggressive fluids.

7.2.1. Recommandations for installing the 8012 on the pipe

When installing an 8012 with optical sensor:

- Protect the device from strong light intensity to prevent any disruption of measurements.
- Ensure that the arrow on the side of the housing is in line with the flow direction of the fluid.

Check that the DN of the fitting is dimensioned to the process according to the graphs in chap. 7.3.

→ Install the device on the pipe in such a way that the upstream and downstream distances are respected according to the design of the pipes, as per Fig. 2 and the EN ISO 5167-1 standard.

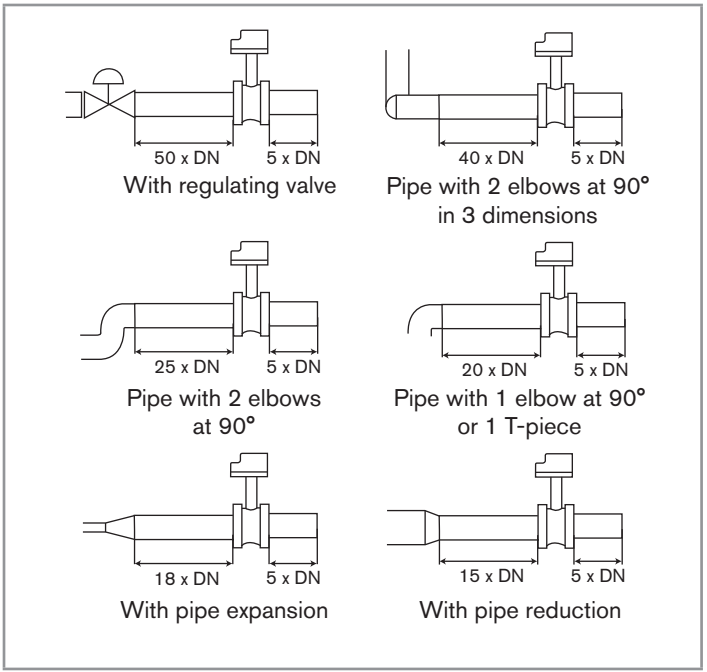


Fig. 2: Upstream and downstream distances depending on the design of the pipes.

→ If necessary, use a flow conditioner to improve measurement precision.

→ Install the device in such a way that the paddle-wheel axis is horizontal (Fig. 3).

→ Prevent the formation of air bubbles in the pipe in the section around the device (Fig. 4).

→ Ensure that the pipe is always filled in the section around the device (Fig. 5).

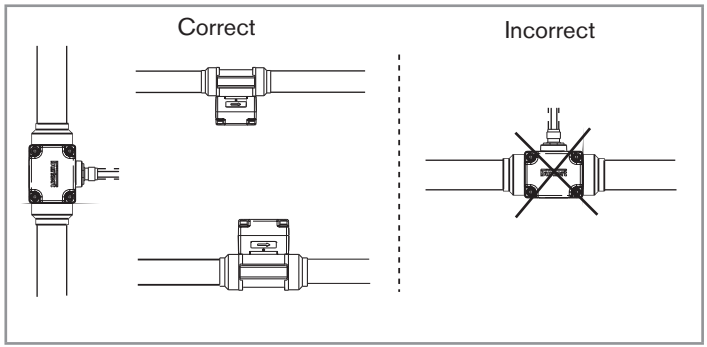


Fig. 3: The paddle-wheel axis must be horizontal

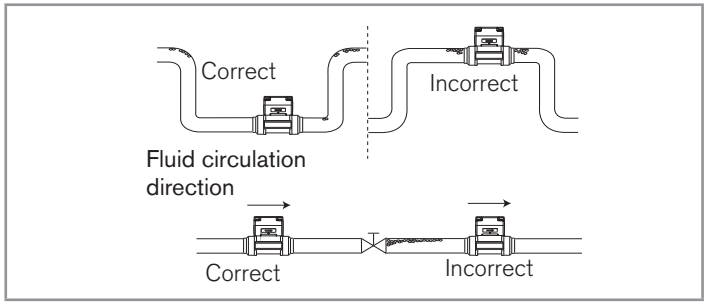


Fig. 4: Air bubbles within the pipe

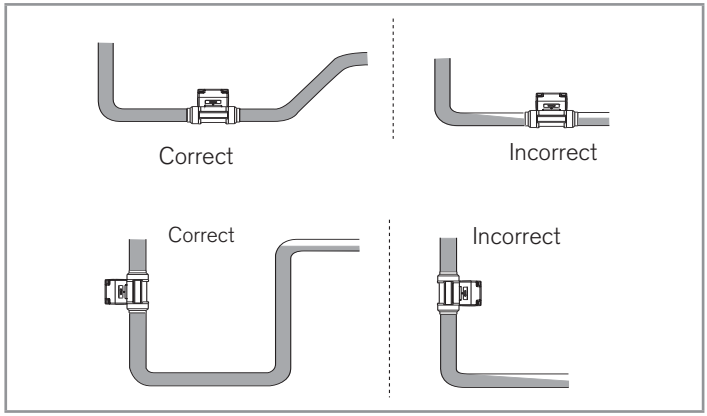


Fig. 5: Filling the pipe

7.2.2. Installing a device with welding ends

NOTE

The SE12 electronic module and the seal may be damaged when welding the connections to the pipe.

- ▸ Before welding to the pipe, unscrew the 4 locking screws on the SE12 electronic module.
- ▸ Remove the electronic module.
- ▸ Remove the seal.

→ Follow the installation recommendations in chap. 7.2.2.

→ Weld the connections.

→ After welding the connections to the pipe, correctly replace the seal.

→ Properly replace the electronic module.

→ Tighten the 4 screws in an alternating pattern, applying a torque of 1.5 Nm.

7.2.3. Installing a device with Clamp connections

→ Follow the installation recommendations in chap. 7.2.1.

- Check that the seals are in good condition.
- Place the seals, that have been chosen depending on the process temperature and fluid, into the grooves of the Clamp connections.

→ Fit the Clamp connections to the pipe using a clamping collar.

7.2.4. Installing a device with flange connections

→ Follow the installation recommendations in chap. 7.2.1.

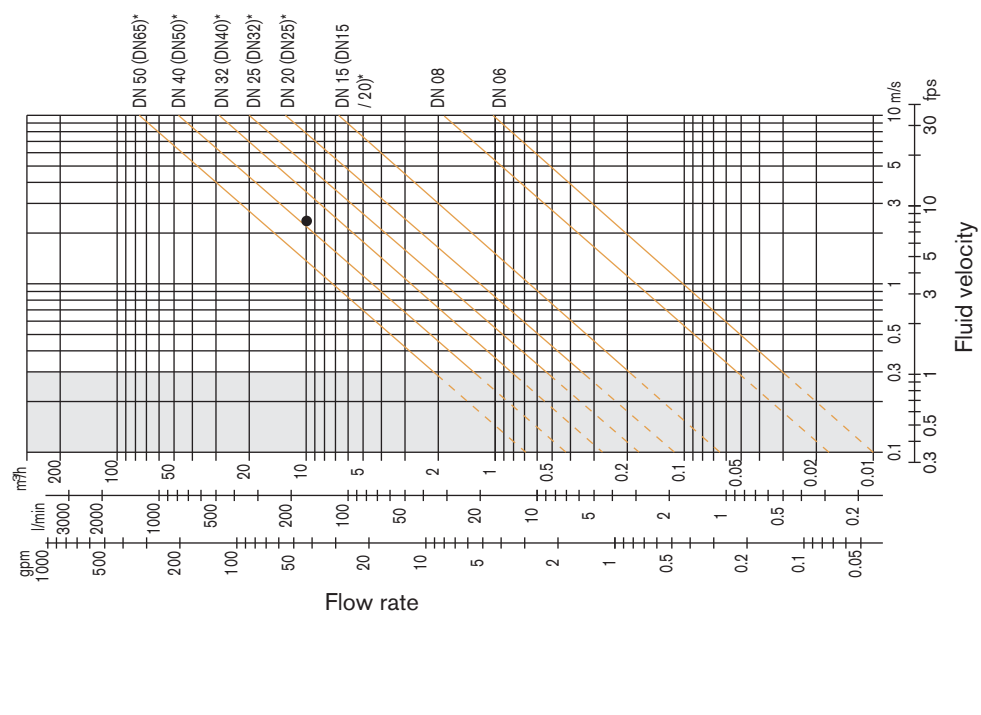
- Check that the seals are in good condition.
- Insert a seal, that has been chosen depending on the process temperature and fluid, into the grooves of the connections.

Make sure the seal remains in its groove when tightening the flange.

→ Tighten the flange to mount the device to the pipe.

7.3. Graphs

These graphs are used to determine the DN of the pipe and the fitting appropriate to the application, according to the fluid velocity and the flow rate.



* For fittings:

- with external thread connections acc. to SMS 1145,
- with welding end connections acc. to SMS 3008, DIN 11866 series C / BS 4825-1 / ASME BPE, DIN 11850 series 2 / DIN 11866 series A / EN 10357 series A
- with clamp connections acc. to SMS 3017, BS 4825-3 / ASME BPE, DIN 32676 series A

Selection example:

The flow rate in the pipe is 10 m³/h. If the ideal fluid velocity is 2 to 3 m/s, then use a DN40 (or DN50)* pipe according to the graphs.

7.4. Electrical wiring

DANGER

Risk of injury due to electrical discharge

- Shut down and isolate the electrical power source before carrying out work on the system.
- Observe all applicable accident protection and safety regulations for electrical equipment.

NOTE

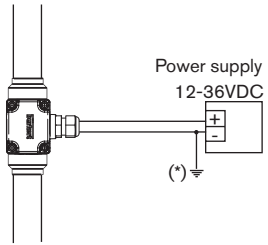
- Use cables with an operating temperature limit suitable for your application.

Use a high quality electrical power supply (filtered and regulated).

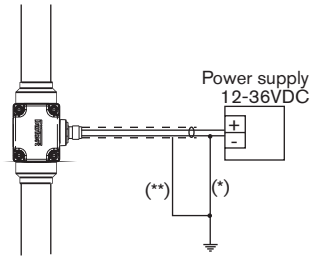
- Under normal conditions of use, cable with a cross section of 0.75 mm^2 should be enough to transmit the signal.
- Do not install the cable near high voltage or high frequency cables.
- If this is unavoidable, keep a minimum distance of 30 cm.

Make sure the installation is equipotential (power supply - 8012):

- Connect the different earth connections of the installation to one another in order to remove any differences in potential which may arise between two earth connections.
- Correctly connect the cable shielding to the earth.
- Connect the negative power supply terminal to the earth to eradicate the effects of common mode currents. If this connection cannot be made directly, a 100 nF / 50 V capacitor can be fitted between the negative power supply terminal and the earth.



8012 with cable gland

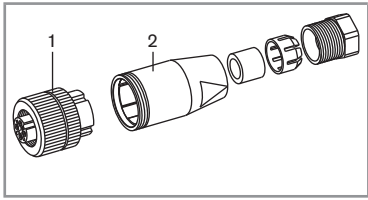


8012 with M12 fixed connector

*) If a direct earth connection is not possible, fit a 100 nF / 50 V condenser between the negative power supply terminal and the earth

**) If the cable used is shielded.

7.4.1. Assembling the M12 female connector



→ Completely unscrew the nut [1]

→ Remove the rear section of the connector [2].

→ Wire the device (see chap. 9.2.3)

Fig. 6: M12 multi-pin connector (not supplied, ordering code 917116)

7.4.2. Wiring a version with adjustable M12 fixed connector

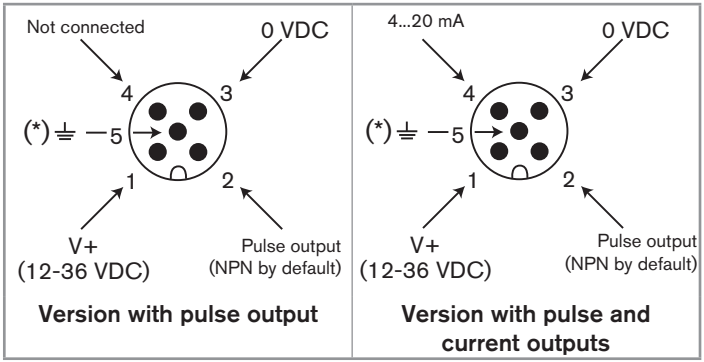


Fig. 7: Pin assignment of the M12 male fixed connector

Pin of the M12 female cable available as accessory equipment (order code 438680)	Colour of the wire
1	brown
2	white
3	blue
4	black
5	grey

The M12 fixed connector of the device is adjustable in position:

→ Unscrew the locknut.

→ Turn the fixed connector to the desired position, by 360° max. so as not to twist the cables inside the enclosure.

→ Tighten the locknut using a spanner, while keeping the fixed connector in the desired position.

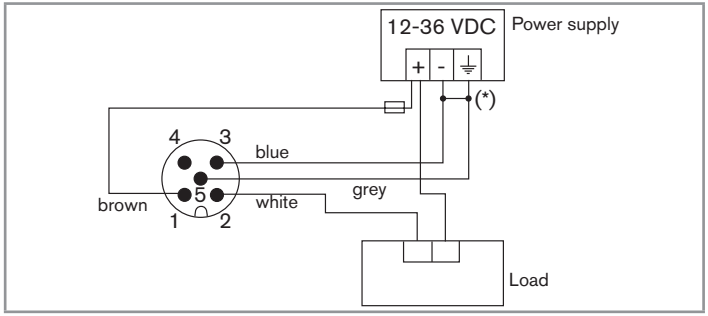


Fig. 8: NPN wiring (default) of the pulse output of a version with M12 fixed connector

(*) Functional earth; If a direct earth connection is not possible, fit a 100 nF / 50 V capacitor between the negative power supply terminal and the earth.

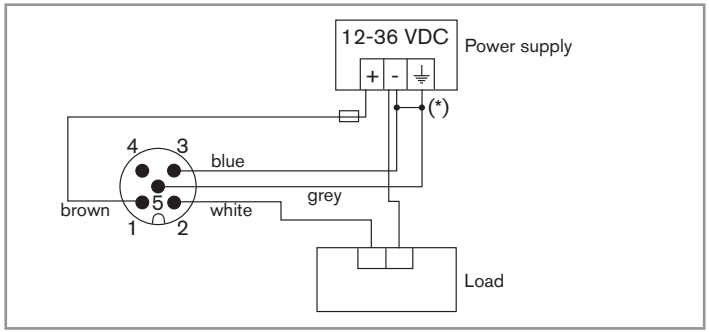


Fig. 9: PNP wiring of the pulse output of a version with M12 fixed connector

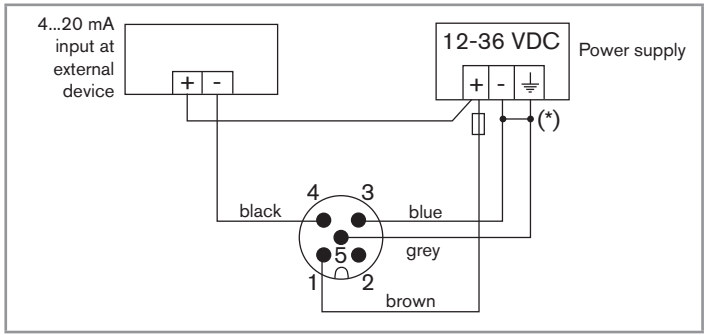


Fig. 10: Wiring the current output in sinking mode (by default) on a version with M12 fixed connector.

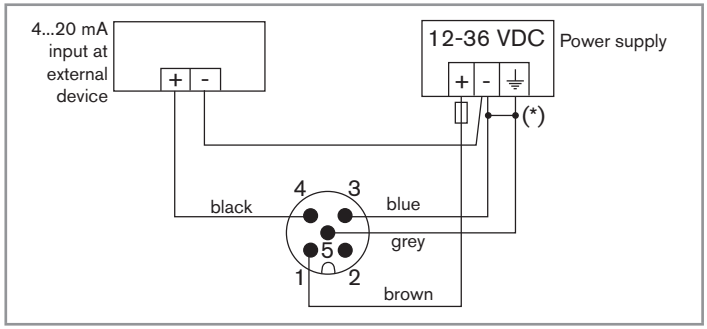


Fig. 11: Wiring the current output in sourcing mode on a version with M12 fixed connector

(*) Functional earth; If a direct earth connection is not possible, fit a 100 nF / 50 V capacitor between the negative power supply terminal and the earth.

7.4.3. Wiring a version with cable gland

Colour of the wire	BN (brown)	WH (white)	GN (green)	YE (yellow)	GY (grey)
Signal on a version with pulse output	V+ (12...36 V DC)	0 V DC	Functional earth	Not connected	NPN or PNP
Signal on a version with pulse and current outputs	V+ (12...36 V DC)	0 V DC	Functional earth	Current in mA	NPN or PNP

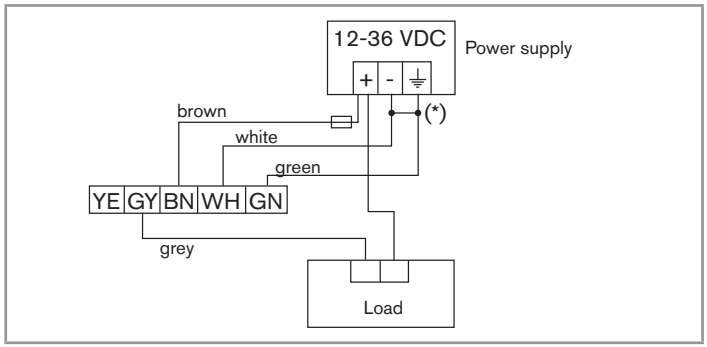


Fig. 12: NPN wiring (default) of the pulse output of a version with cable gland

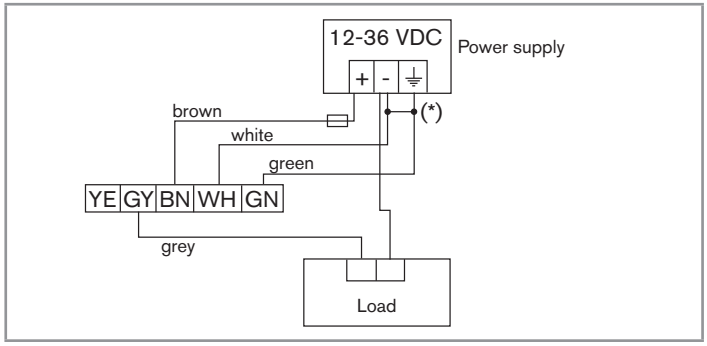


Fig. 13: PNP wiring of the pulse output of a version with cable gland

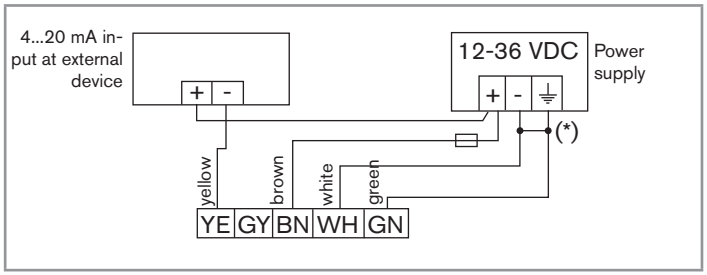


Fig. 14: Wiring the current output in sinking mode (by default) on a version with cable gland

(*) Functional earth; If a direct earth connection is not possible, fit a 100 nF / 50 V capacitor between the negative power supply terminal and the earth.

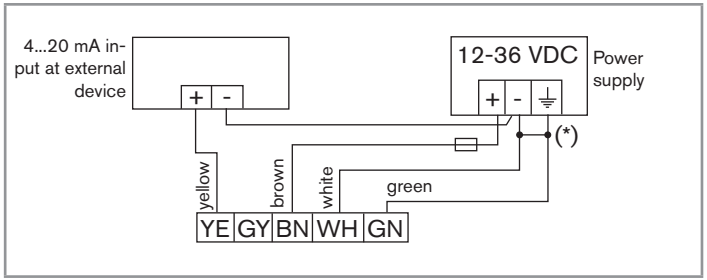


Fig. 15: Wiring the current output in sourcing mode on a version with cable gland

(*) Functional earth; If a direct earth connection is not possible, fit a 100 nF / 50 V capacitor between the negative power supply terminal and the earth.

8 COMMISSIONING

8.1. Safety instructions

WARNING

Danger due to nonconforming commissioning.

Non conforming commissioning may lead to injuries and damage the device and its surroundings.

- Before commissioning, make sure that the staff in charge have read and fully understood the contents of the Operating Instructions.
- In particular, observe the safety recommendations and intended use.
- The device / the installation must only be commissioned by suitably trained staff.

NOTE

Risk of damage to the device due to the environment

- Protect this device against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of the climatic conditions.

9 ADJUSTMENT AND FUNCTIONS

9.1. Safety instructions

WARNING

Risk of injury due to non-conforming adjustment.

Non-conforming adjustment could lead to injuries and damage the device and its surroundings.

- The operators in charge of adjustment must have read and understood the contents of these Operating Instructions.
- In particular, observe the safety recommendations and intended use.
- The device/installation must only be adjusted by suitably trained staff.

9.2. Pulse output

The pulse output of the device can be parametered with one of the following functions.

9.2.1. Frequency proportional to a volume

This function is used to generate a pulse each time a predetermined volume of fluid passed.

9.2.2. Switching function

The pulse output of the 8012 can be parametered to switch a solenoid valve or activate an alarm.

The following parameters can be preset:

- hysteresis or window operating, inverted or not
- the switching thresholds, low and high
- immediate or delayed switching

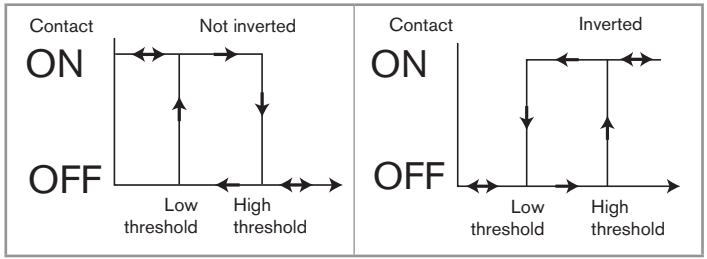


Fig. 16: NPN pulse output, hysteresis operating, non inverted and inverted

Hysteresis operating

The output status changes when a threshold is reached:

- by increasing flow rate, the output status changes when the high threshold is reached.
- by decreasing flow rate, the output status changes when the low threshold is reached.

The behaviour of the output depends on the output wiring, NPN or PNP.

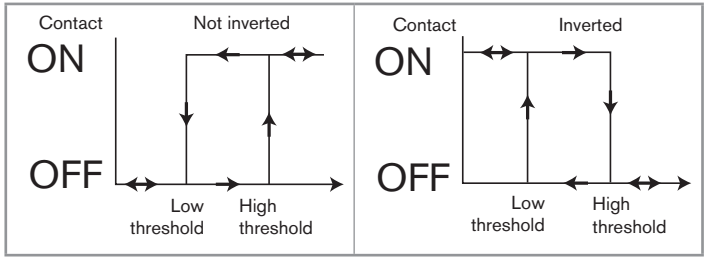


Fig. 17: PNP pulse output, hysteresis operating, non inverted and inverted

Window operating

The output status changes when either threshold is reached. The behaviour of the output depends on the output wiring, NPN or PNP.

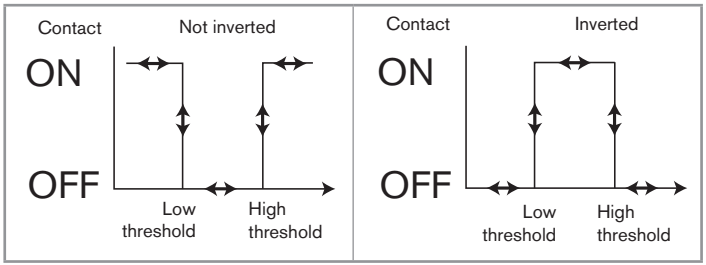


Fig. 18: NPN pulse output, window operating, non inverted and inverted

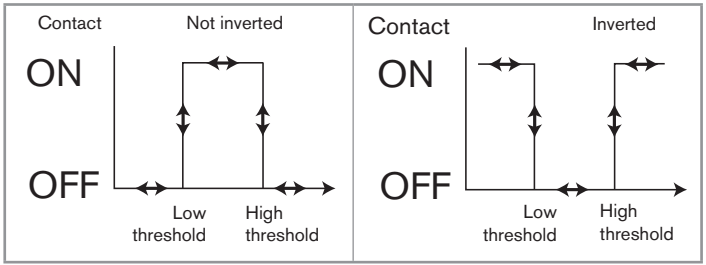


Fig. 19: PNP pulse output, window operating, non inverted and inverted

9.2.3. Detection of a change in the fluid direction (only 8012 with optical sensor)

On an 8012 with optical sensor, the pulse output can be configured to indicate a change in the fluid circulation direction. Furthermore the change of direction can be indicated immediately or after a configurable time delay.

The behaviour of the output depends on the output wiring, NPN or PNP, and on the operating, inverted or not.

F = Fluid direction same as direction of the arrow on the housing

T = Time delay before switching

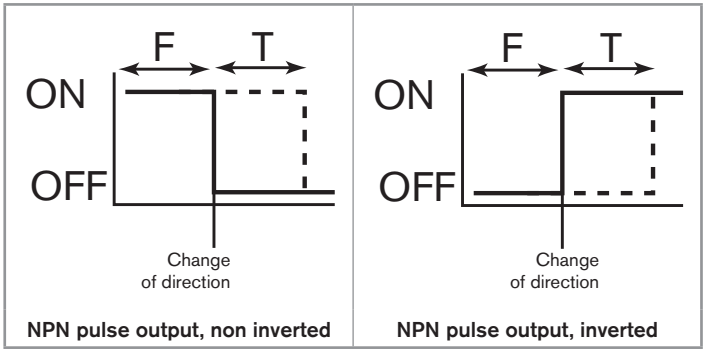


Fig. 20: Detection of the change in fluid circulation direction; NPN pulse output, not inverted and inverted

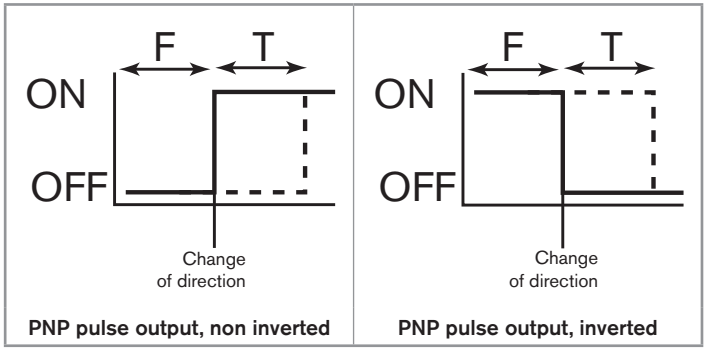


Fig. 21: Detection of the change in fluid circulation direction; PNP pulse output, not inverted and inverted

Time delay before switching

Switching occurs if one of the thresholds (low, high) is exceeded for a duration higher than the parametered time delay. The time delay is applied to both switching thresholds. If the time delay equals 0, switching occurs immediately.

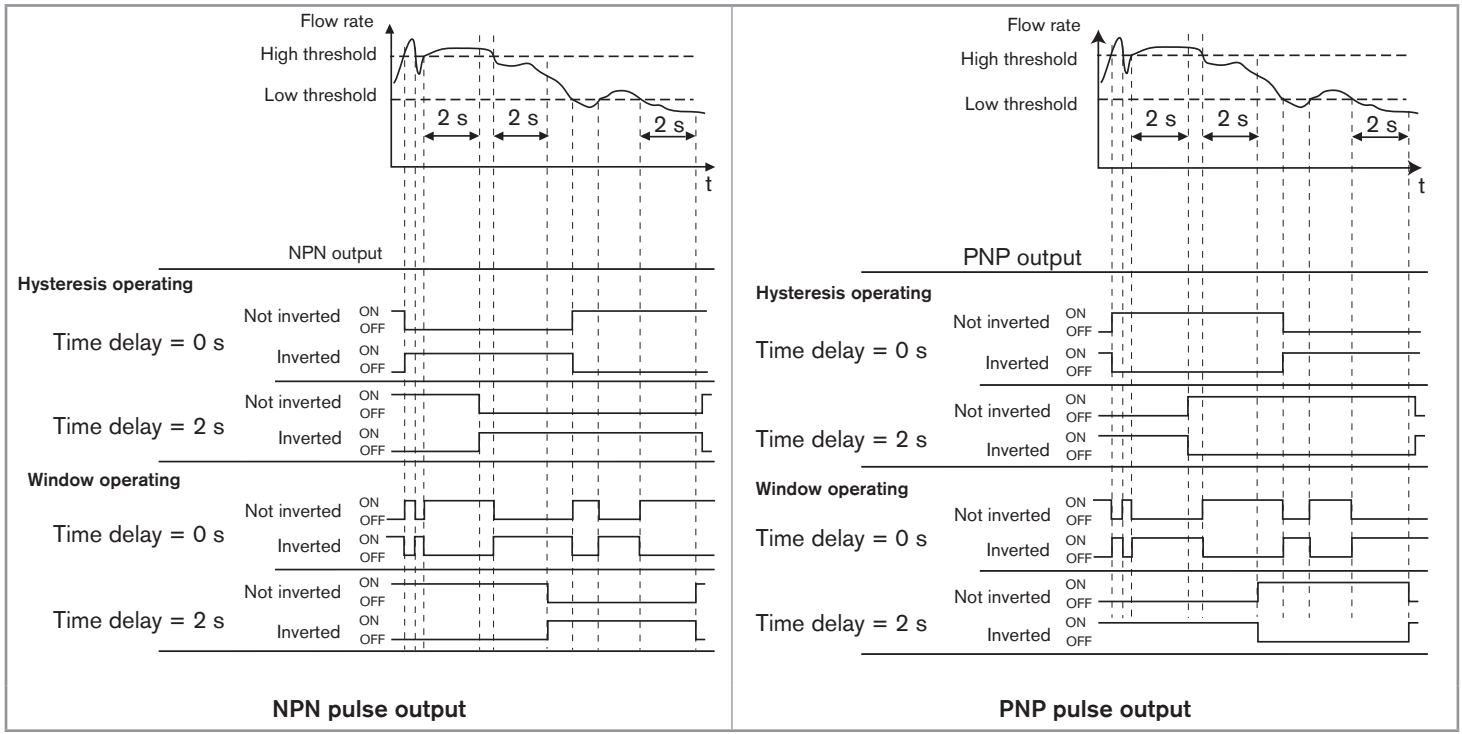


Fig. 22: Examples of behaviour of the 8012 depending on the flow rate in the pipe and the switching operating chosen for the pulse output

9.3. Current output

The current output, if one exists, can be parametered with the following functions:

- an extended output range or the current output range corresponding to a flow range
- an attenuation of the current variations, different from that of the basic versions.

9.3.1. Extension of the current range

The current output of the device can be configured to deliver a current varying from 4 to 21.6 mA, depending on the paddle-wheel rotation frequency.

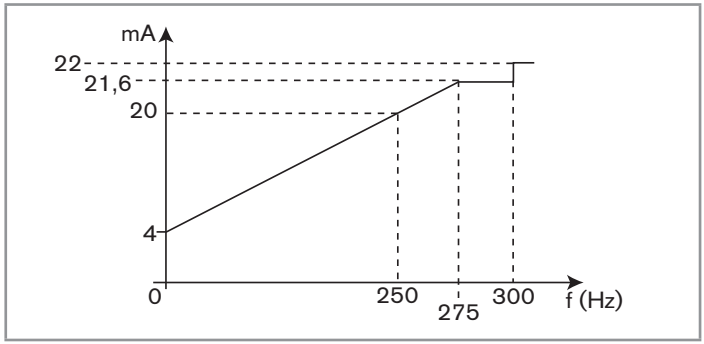


Fig. 23: Curve for the current proportional to the paddle-wheel rotation frequency

9.3.2. Conversion of the frequency into a flow rate

The 8012 can be parametered to convert the paddle-wheel rotation frequency into a flow rate, in a unit specific to the application.

In this case, the 8012 is parametered with the K factor of the device and the desired flow rate unit.

The following flow units are available:
l/s, l/min., l/h, m3/min., m3/h, Ga/s, Ga/min., Ga/h, USGa/s, USGa/min., USGa/h.

The current output then delivers a current of 4 to 20 mA or 4 to 21.6 mA proportional to a flow rate range:

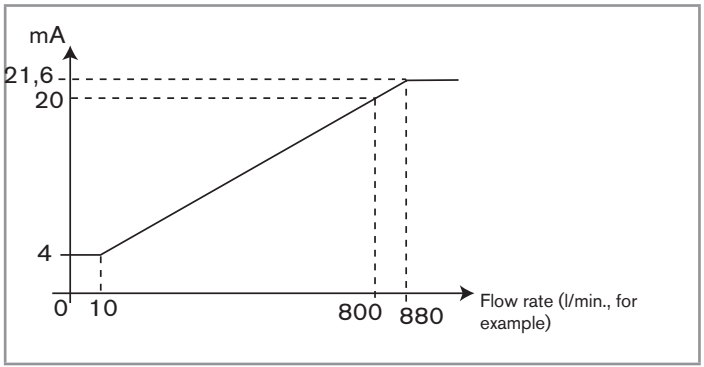


Fig. 24: Curve for the current proportional to the flow rate

9.3.3. Current attenuation variations

When the flow varies quickly, the current output signal from your device can be stabilised.

The device can be configured with one of the 10 filter levels available, varying from no filter to maximum filter.

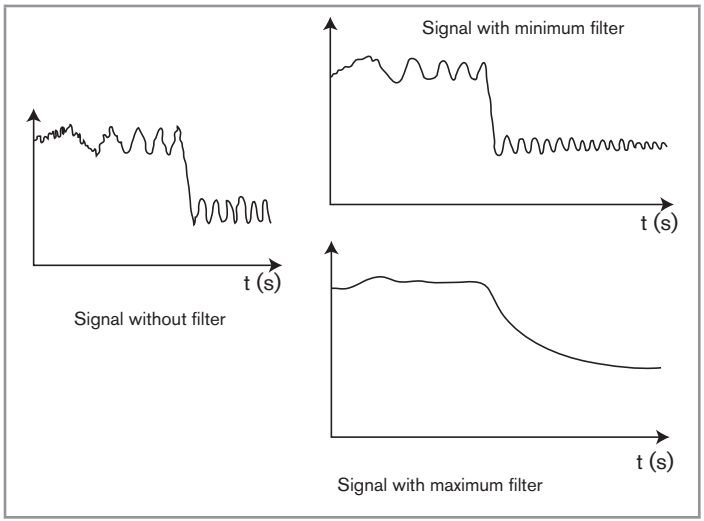


Fig. 25: Different filter levels for current fluctuations

10 MAINTENANCE AND TROUBLESHOOTING

10.1. Safety instructions

DANGER

Risk of injury due to high pressure in the installation.

- Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

Risk of injury due to electrical voltage.

- Shut down and isolate the electrical power source before carrying out work on the system.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to high fluid temperatures.

- Use safety gloves to handle the device.
- Stop the circulation of fluid and drain the pipe before loosening the process connections.

Risk of injury due to the nature of the fluid.

- Respect the prevailing regulations on accident prevention and safety relating to the use of aggressive fluids.

WARNING

Risk of injury due to non-conforming maintenance.

- Maintenance must only be carried out by qualified and skilled staff with the appropriate tools.
- Ensure that the restart of the installation is controlled after any interventions.

10.2. Cleaning

Depending on the nature of the fluid, regularly check for clogging of the paddle-wheel.

NOTE

The device may be damaged by the cleaning liquid.

- Clean the device with a cloth slightly dampened with water or a cleaning liquid compatible with the materials the device is made of.

10.3. Replacing the seal

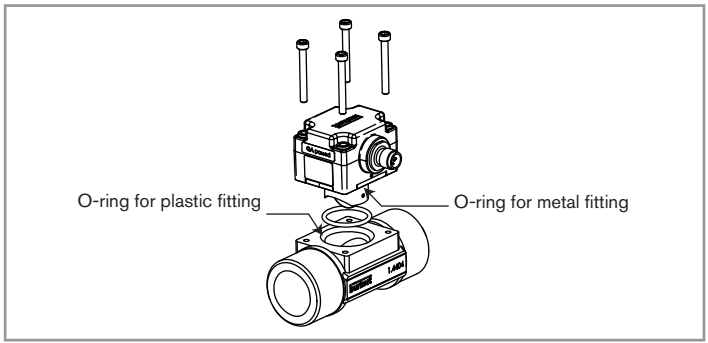


Fig. 26: Exploded view of the 8012

→ Unscrew the 4 screws in the electronic module and remove it from the fitting.

→ Remove the used seal.

→ Clean the surfaces on which the seal is placed.

→ Insert the new seal (see Fig. 26).

→ Position the electronic module on the fitting so that the arrow points in the fluid direction on versions with optical sensor.

→ Insert the 4 screws into the electronic module (use the long screws for a plastic S012, DN6 or DN8 fitting).

→ Tighten the 4 screws in an alternating pattern, to a torque of 1.5 Nm.

10.4. Problem solving

DANGER

Risk of injury due to high pressure in the installation.

- Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

Risk of injury due to electrical voltage.

- Shut down and isolate the electrical power source before carrying out work on the system.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to high fluid temperatures.

- Use safety gloves to handle the device.
- Stop the circulation of fluid and drain the pipe before loosening the process connections.

Risk of injury due to the nature of the fluid.

- Respect the prevailing regulations on accident prevention and safety relating to the use of aggressive fluids.

10.4.1. Problems signalled by the LEDs

Status red LED	Status green LED	Status current output	Possible cause	Recommended action
Flashes 3 times every second	Off	22 mA	Full scale exceeded (flow rate in the pipe is too high)	Check the process parameters
On	Off	22 mA	Memory problem	Switch the power supply off then on. If the error persists, contact your Bürkert retailer.
Off	Flashes twice every second	22 mA	The device with optical detection is mounted in the wrong direction	Mount the device, ensuring that the arrow on the side of the housing indicates the direction of the fluid.

10.4.2. Problems not signalled by the LEDs

Problem	Recommended action	See chap.
The device does not function	▪ Check the wiring ▪ Check that the device is energized	7.4
The pulse output does not work	Check whether the wiring is suitable for the output type, NPN or PNP	7.4
The current output does not work	Check whether the wiring is suitable for the output type, source or sink	7.4
The flow rate measurement is incorrect	Recalculate and change the setting of the K factor	6.8

11 SPARE PARTS AND ACCESSORIES

CAUTION

Risk of injury and/or damage caused by the use of unsuitable parts.

Incorrect accessories and unsuitable spare parts may cause injuries and damage the device and the surrounding area.

▸ Use only original accessories and original spare parts from Bürkert.

Spare part	Order code
Seal for metal fitting (Fig. 27)	
FKM (DN6 to DN65)	**426 340**
EPDM (DN6 to DN65)	**426 341**
Set of 2 O-rings for the end pieces (true union connections only) + 1 flat seal and 1 O-ring for the SE12 electronic module connection (Fig. 28)	
FKM - DN8	**448 679**
FKM - DN15	**431 555**
FKM - DN20	**431 556**
FKM - DN25	**431 557**
FKM - DN32	**431 558**
FKM - DN40	**431 559**

Spare part	Order code
FKM - DN50	431 560
EPDM - DN8	448 680
EPDM - DN15	431 561
EPDM - DN20	431 562
EPDM - DN25	431 563
EPDM - DN32	431 564
EPDM - DN40	431 565
EPDM - DN50	431 566
Set of screws: 4 short screws (M4x35 - A4) + 4 long screws (M4x60 - A4)	555 775

Accessory	Order code
5-pin M12 female connector, moulded on shielded cable (2 m)	438 680
5-pin M12 female connector, to be wired	917 116
Set including: ▪ 1 CD with TACT (TrAnsmitter Configuration Tool) configuration software ▪ 1 TACT interface board ▪ 2 connection cables	556 500
Set of connection cables for the TACT interface	556 160

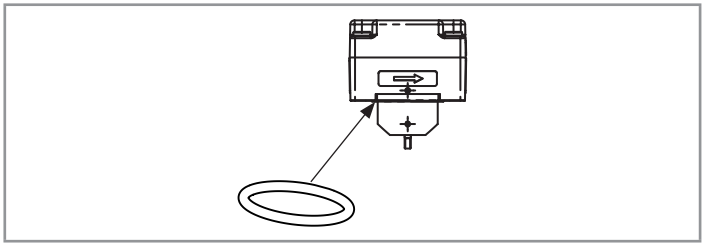


Fig. 27: Seal for metal fitting

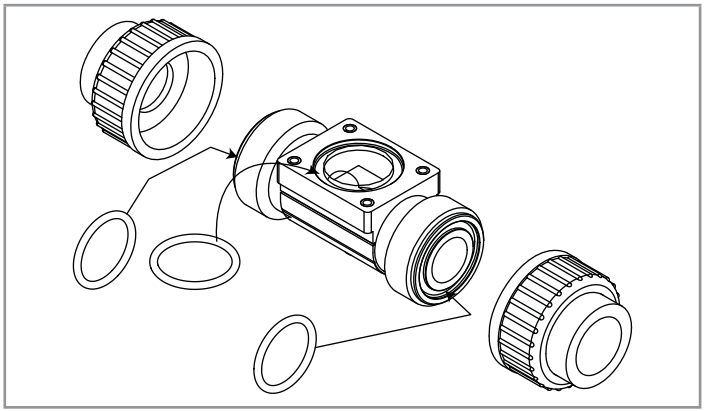


Fig. 28: Seals for plastic fitting

12 PACKAGING, TRANSPORT, STORAGE

CAUTION

Damage due to transport

- Transport may damage an insufficiently protected part.
- Transport the device in shock-resistant packaging and away from humidity and dirt.
- Do not expose the device to temperatures that may exceed the admissible storage temperature range.
- Protect the electrical interfaces using protective plugs.

Poor storage can damage the device.

- Store the device in a dry place away from dust.
- Storage temperature: –15 to +60 °C.

13 DISPOSAL OF THE PRODUCT

→ Dispose of the device and its packaging in an environmentally-friendly way.

NOTE

Damage to the environment caused by parts contaminated by the fluid.

- Comply with the national and/or local regulations which concern the area of waste disposal.