

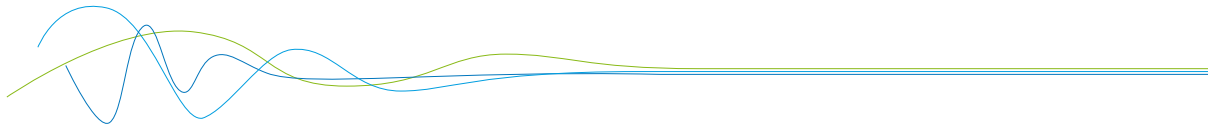


OPERATING INSTRUCTIONS

FlowJam

BULK FLOW DETECTION





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1. System overview

A measuring point consists of the following components:

- Sensor
- Processadapter (optional)
- G-1½“ sensor mount for welding on the pipe

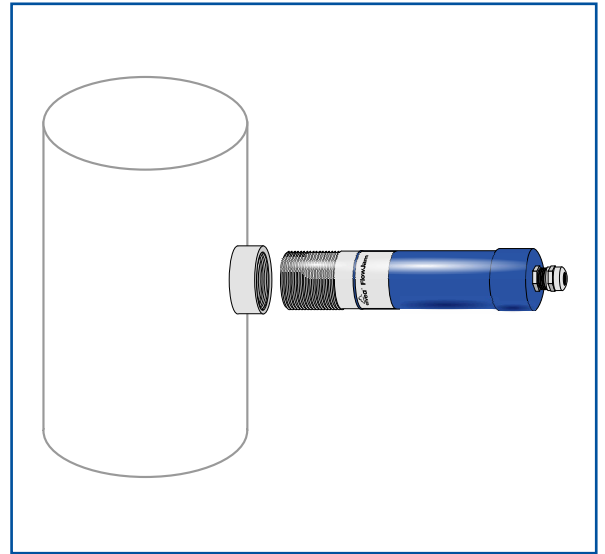


Fig. 1: Overview FlowJam measuring point

2. Function

The radar flow detector FlowJam indicates the flow of bulk materials which move through the detection range (fig. 1) at a minimal required speed of 0.1 m/s.

The detection is executed by evaluating the Doppler's effect, thus independent of the flow direction.

The material flow, which can be in metallic or nonmetallic tubes, wells, free fall distances and discharge points, is indicated by a relay.

The sensor distinguishes between two conditions:

- material flow
- material jam or standstill.

FlowJam can be adapted to extreme process conditions like high process temperature by a separating flange equipped with a window especially for microwaves.

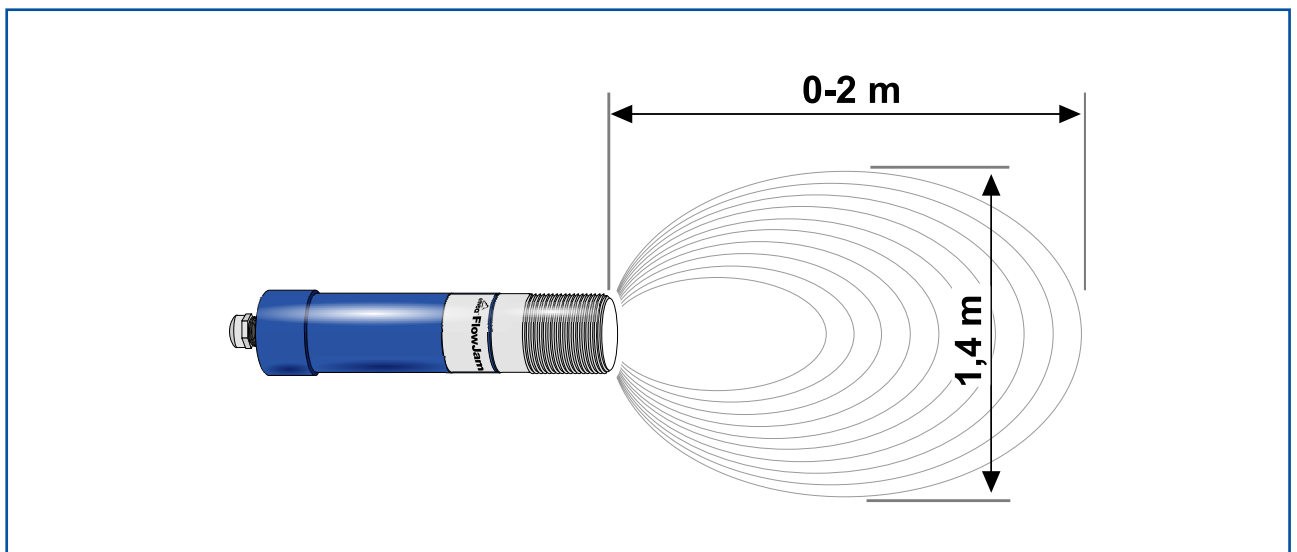


Fig. 2: Detection range

3. Safety

The sensor FlowJam was designed, built and tested to be safe and was shipped in safe condition. Nevertheless persons or objects may be endangered by components of the system if these are operated in an inexpert manner. Therefore the operational instructions must be read completely and the safety notes must be followed.

In case of inexpert or irregular use, the manufacturer will refuse any liability or warranty.

3.1 Regular use

- Only original spare parts and accessories of ENVEA Process must be used.
- The measuring system may only be used for material detection. Other uses and modifications of the measuring system are not permitted.

3.2 Identification of hazards

- Possible dangers when using the measuring system are highlighted in the operating instructions with the following symbols:



Warning!

- This symbol is used in the operating manual to denote actions which, if not performed correctly may result in death or injury.



Attention!

- This symbol is used in the operating manual to denote actions which may result in danger to property.

3.3 Operational safety

- The sensor must be installed by trained and authorised personnel only.
- Switch off the power supply for all maintenance, cleaning or inspection works on the tubes or on components of the FlowJam.
- Before hot work the sensor must be removed from the installation place.
- The components and electrical connections must be checked for damages regularly. If a damage is found, it is to be repaired before further operation of the instrument.

3.4 Technical progress

- The manufacturer reserves the right to adapt technical data to the technical progress without particular advance notice. If you have any questions, ENVEA Process will be pleased to inform you on possible changes and extensions of the operating instructions.

4. Mounting and installation

4.1 A measuring point consists of the following components:

- Sensor
- Processadapter (optional)
- G-1½" sensor mount for welding on the pipe
- Installation instructions

4.2 Required equipment

- Suitable tool for installing the sensor mount
- Approved tools for electrical connection

4.3 Sensor installation

Proceed as follows to install the sensor:

- The sensor should be installed in a low-vibration environment.
- Make sure that there are no moving parts in the detection area. If this is unavoidable, it is strongly recommended to shield the moving parts.
- For horizontal or inclined installation situations, installation from above is recommended.
- An installation angle to the flow direction between 45 ° - 90 ° should be maintained.
- When used on delivery lines made of non-conductive material, the measurement is made through the wall. There is no need for a separate recess in the line. In order to eliminate possible interfering signals from the environment, ENVEA Process offers individual solutions.
- The measuring point can be installed in the following variants:
 - in a G 1½ " sensor mount (Fig. 3)
 - with a flange (Fig. 4)
 - mounted by means of a pipe clamp (Fig. 5)
 - for high-temperature and high-pressure applications with a separating flange (Fig.6)

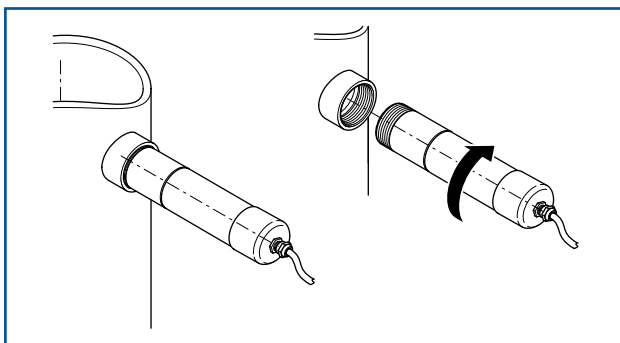


Fig. 3: Thread mounting

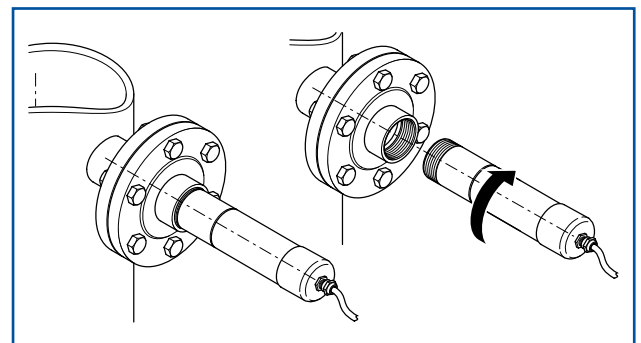


Fig. 4: Flange mounting

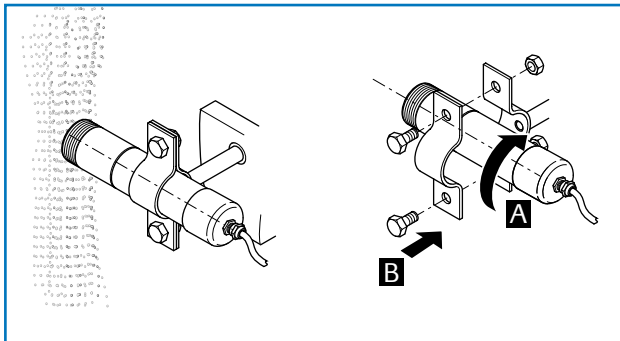


Fig. 5: Mounting with pipe clamp

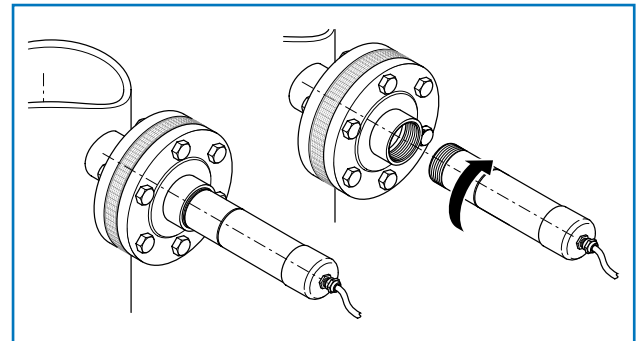


Fig. 6: Mounting with separating flange

4.4 Installation of the sensor on conveyor belts

If possible, the installation on conveyor belts is to be executed in the area of the discharge point.

If FlowJam is installed directly above a conveyor belt or if the bulk material to be detected does not show much profile, the sensor should be mounted at an angle of approx. 70 - 80° (fig. 7).

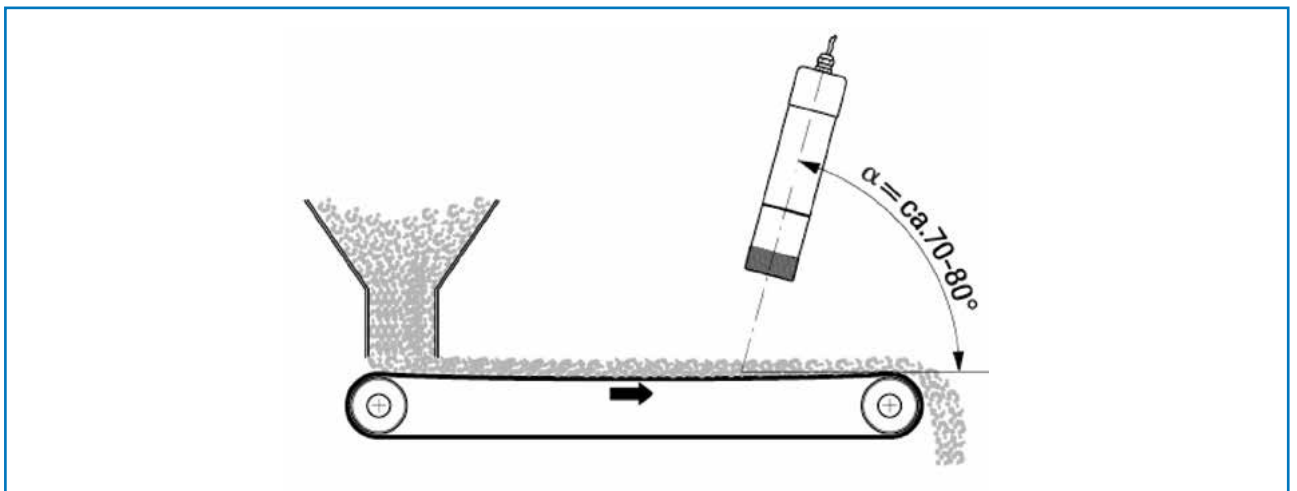
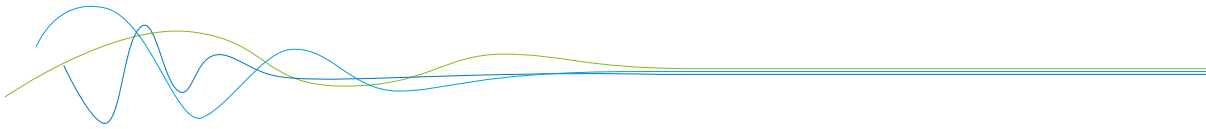


Fig. 7: Installation above conveyor belt



5. Electrical connection

The cable length between power supply and measuring point is a maximum of 200 m. A double insulated shielded cable with a minimum cross section of 0.75 mm² is recommended. From a cable length of 100 m, the cable cross-section must be increased to 1 mm².

The sensor has an EMV cable gland, this serves for laying a cable shield. The shield should only be placed on sensor site.

5.1 Electrical connection sensor

1	U _{in} +24 V
2	U _{in} 0 V
3	Relay contact NC (make contact)
4	Relay contact COM
5	Relay contact NO (break contact)

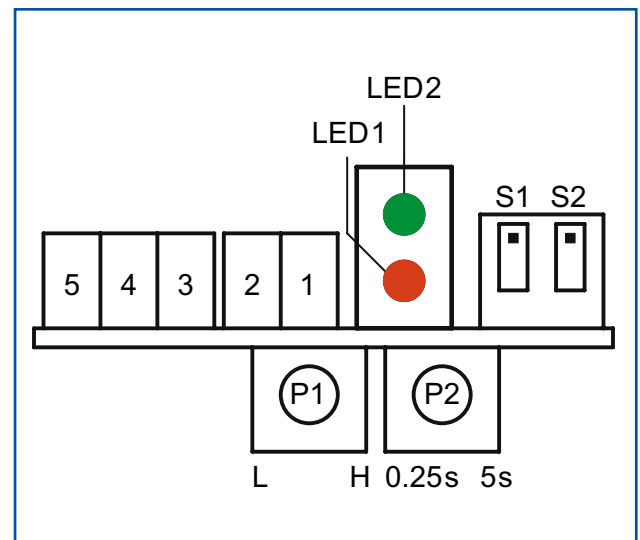


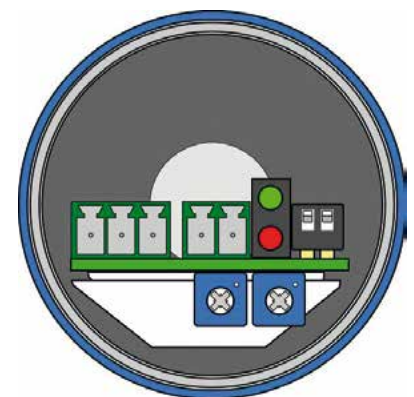
Fig. 8: Electrical connection and control elements

5.2 Control elements

Status LED

- LED 1 red** The flashing frequency of the red LED provides information about the signal strength:
- Fast flashing = high signal strength
 - Slow flashing = low signal strength
 - Continuous flashing = indication of sensor defect
 - LED off = no received signal

- LED 2 green** The green LED provides information about the switching state of the relay contact
- LED on = relay is energized
 - LED off = relay has dropped
- The flashing is independent of the position of the dip switch S1.



Dip switch

S1 The position of switch S1 determines, whether the relay is attracted up or released at material flow.

Position "1" (up) causes alarm in case of material flow:

- Material flow: - relay is energized
- contacts 4 + 5 closed
- No material flow: - relay is released
- contacts 3 + 4 closed

Position "2" (down) causes alarm when there is no material flow:

- Material flow: - relay is released
- contacts 3 + 4 closed
- No material flow: - relay is energized
- contacts 4 + 5 closed

S2 The sensitivity can be adjusted with the dip switch S2.

Position 2 (down): Sensor is set to insensitive

Position 1 (up): Sensor is set to sensitive

Potentiometer

P1 Adjustment of the threshold based on the sensitivity

Left stop = lowest sensitivity

Right stop = highest sensitivity

P2 Setting for time delay on the relay contact

Left stop = 0.25 s

Right stop = 5 s

6. Commissioning

The potentiometer P1 is used to set the threshold to which the relay should switch. The measurement signal is adjusted so that a clear distinction between material flow and no material flow can be made.

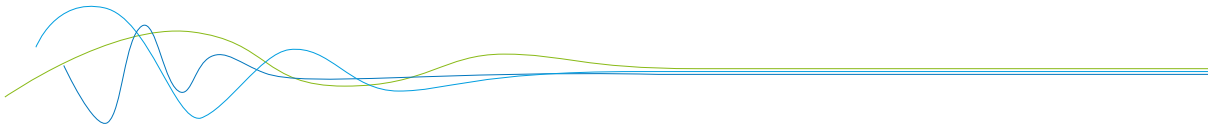
Procedure:

Put the process into operation so that a material flow is guaranteed. LED 1 must now light up depending on the material flow. If it does not light up, switch S2 must be set to position "1" (up). If the LED 1 still does not light up, the installation situation should be checked. Alternatively, a highly sensitive sensor can be obtained via ENVEA Process. If the material is detected, DIP switch S1 can be used to select whether the relay should be energized (position "1") or released (position "2") when material flows.

The threshold of the alarm relay is set via the potentiometer P1. P1 must be turned to the right at least until LED 2 lights up and the relay is energized.

If the material flow is interrupted, LED 1 should switch off and the relay and LED 2 should switch off at the latest after the set delay time has expired.

The delay time is set with the potentiometer P2 to the application requirements in the range of 0.25 - 15 s.



6.1 Default settings

The control elements are set in the following positions when delivered:

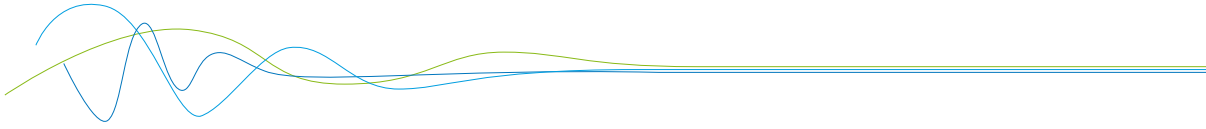
- Potentiometer P1 (fine adjustment of sensitivity): left stop = insensitive
- Switch S2 (coarse adjustment of sensitivity): switch to position „2“ (below) = insensitive
- Potentiometer P2 (delay time): left stop = minimum delay of 0.25 s

7. Fault clearance

Error	Cause	Action
Relay doesn't switch at material flow	Incorrect sensor parameter	Check installation situation; set measuring point to maximum sensitivity: - P1 right stop - P2 left stop - S2 position „1“ (up) Repeat commissioning
	Too big distance between sensor and material	
	Incorrect sensor position	
LED 1 lights up without material flow	Incorrect sensor parameter	Check installation situation; shield foreign movements; Set measuring point to maximum insensitivity: - P1 left stop - S2 position „2“ (down) Repeat commissioning
	Detection of vibrations or other moving parts within process	
LED 1 is flashing continuously	Incorrect cabling	Check cable connection and power supply Contact ENVEA Process
	Sensor defect	

8. Notice

- Avoidance of reflection by vibration or moving line parts.
- Avoid strong vibrations.
- Various process adapters are available to protect the sensor, observe ATEX zones or solve difficult process conditions .
- Setting of the sensitivity by potentiometer P1 up to the switching threshold (LED 2 lightening).



9. Technical data

Housing	Stainless steel 1.4571
Protective system	IP65
Process temperature	-20 ... +80 °C -20 ... +220 °C (with processadapter) Max. 1000 °C (with ceramicflange)
Ambient temperature	-20 ... +60 °C
Dimensions	Housing: L 216 mm / Ø 52 mm / Thread: L 30 mm / G 1½"
Cable fitting	M16 (Ø 5-10 mm)
Max. working pressure	1 bar
Detection range	0 ... 2 m (dependent on application)
Min. required material speed for detection	0.1 m/s
Power supply	24 V DC / AC ± 10 %
Power consumption	approx. 1.7 VA
Current consumption	70 mA at 24 V
Relay contact	Max. switching capacity: 250 V AC Max. start-up current: 6 A Max. breaking capacity 230 V AC: 250 VA Max. switching current DC1: 3/110/220 V: 3/0.35/0.2 A Min. breaking capacity: 500 mW (10 V/5 mA)
Fall-delay time	250 ms ... 15 s (continuously adjustable)
Measuring frequency	K-Band 24.125 GHz / ± 100 MHz
Transmitting power	max. 5 mW
Approvals	FTZ and PTT
Weight	1.0 kg

