Manual mic-one

Massflow Sensor

mic-GmbH
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Attention:

For a proper and safe use oft the sensor it is important that everything in this manual is considered carefully.
(Any) changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

1. Description

The mic-sensor measures the mass current in all metal pipes of flowing granulate substances and all kinds of rubble. The mic-sensor doesn't protrude the pipes and therefore it can not wear out.

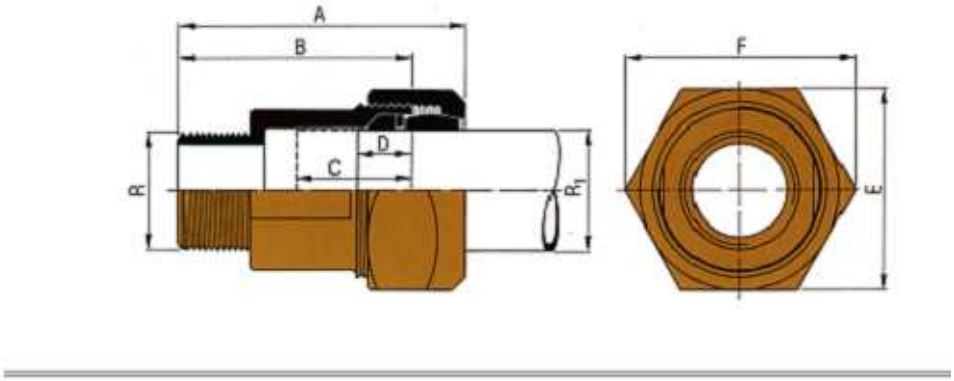
1.1 Principle of Functioning

This sensor works with microwaves of 24.125 GHz with less than 5 mW transmission power. By a patented procedure the mass current gets measured through the reflected signal. In order to transfer this measured signal in weight per period of time i.e. kg/h one must join an evaluation unit to the sensor. If the pipes have a larger diameter (bigger than DK250) one should connect two sensors on one pipe. In this case the sensors get switched on and off sequently so they can not interfere each others measurements.

2. Installation

Whilst installing the sensor, please take care that the pipes are completely empty and not even gas is being transported through the pipe. Otherwise material could escape from the opening with high velocity and eventually harm you. Please wear safety goggles and adequate clothing.

First connect the brass holder in order to install the mic-sensor.



Thread R	Weight [g]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
1/2"	233	63	48	28	16	41

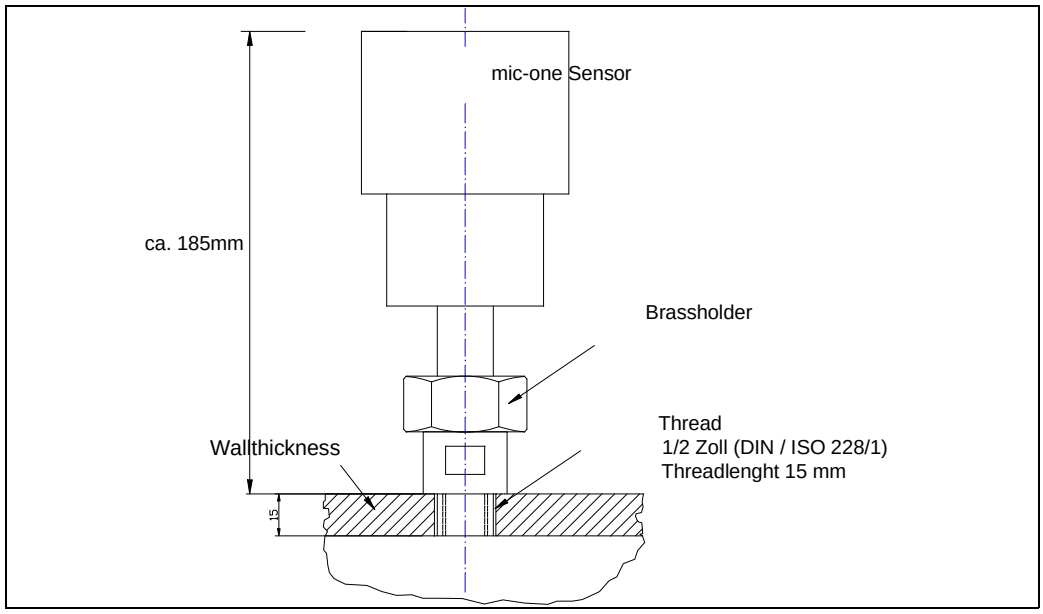
Pic1: Brassholder for Sensor

A suitable place for installing the mic-sensor must have at least 300 mm space around it, so that one can screw of the lid without problems.

One must cut a 1 ½ inch thread in order to connect the brass holder. Take care that the hole gets drilled straight.

The installment must be done very thoroughly all burrs have to be clearly removed before connecting the mic-sensor to the pipe. Be sure that the brass holder doesn't protrude the inner pipe wall. The end of the brass holder mustn't have a distance of more than 1mm to the inner pipe wall.

If the pipe wall is not 15 mm thick one has to use washers to compensate the difference. If the pipes walls are too thin, for 1 ½ inch thread one has to construct a special connecting piece and weld it to the pipe see pictures 3 and 4.

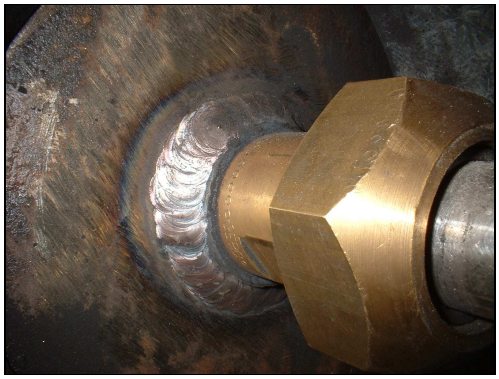


Pic 2: Installment of the brass holder and mic-sensor

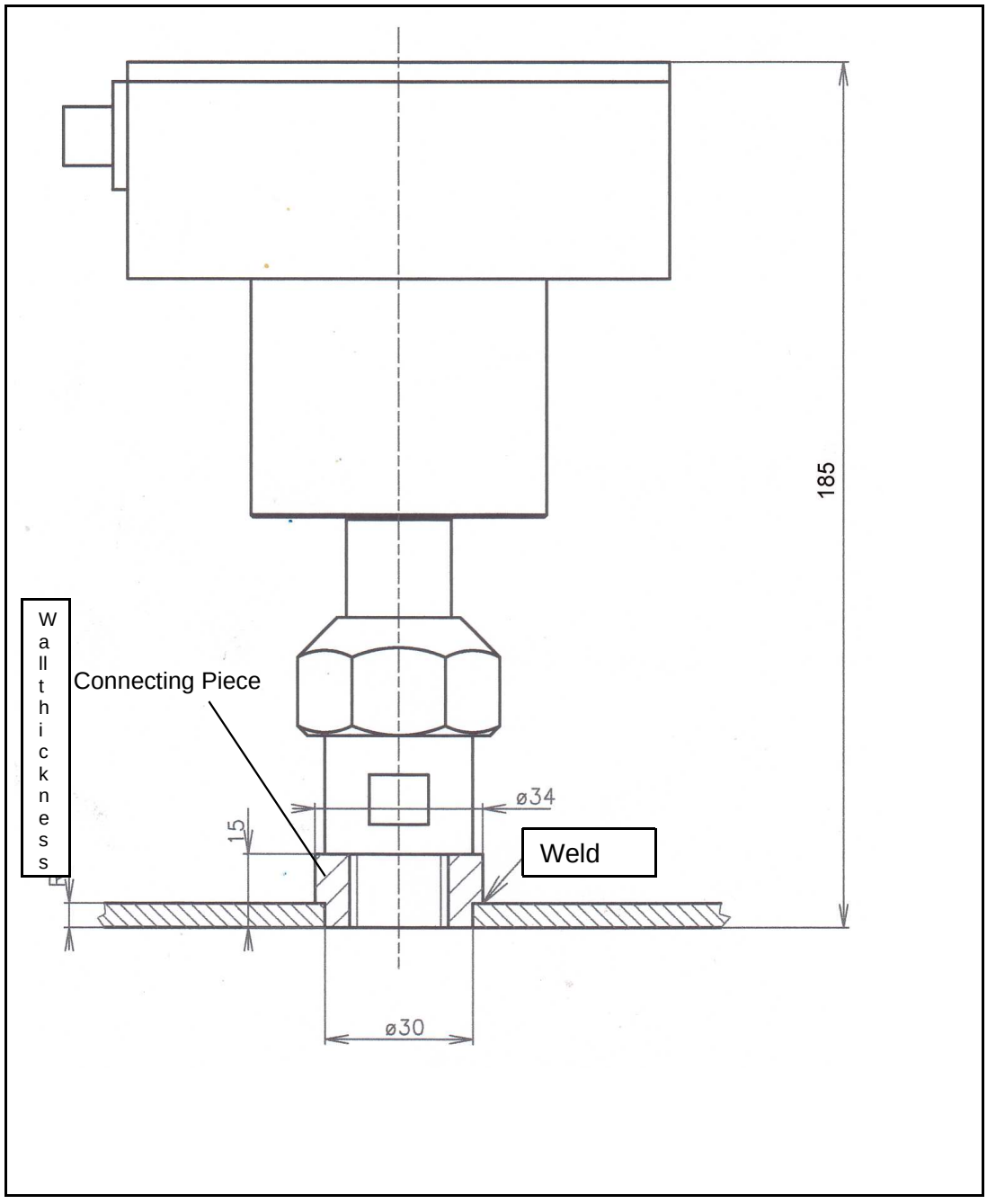
To avoid turbulence the connecting piece shouldn't protrude the inner pipe wall. The end of the connecting piece mustn't have a distance of more than 1mm to the inner pipe wall. If using a connecting piece the end of the brass holder has to be flush to the end of the connecting piece by +/- 0.5 mm.

The connecting piece is not in the delivery because it has to be specially made for the pipes wall thickness. On request it can be delivered.

We recommend a connecting piece as shown on picture no.4. One has to drill a 30 mm hole in the pipe in order to mount the connecting piece.



Pic 3: Brass holder



Pic 4: Brass holder with connecting piece

The connecting piece hast o be welded on the pipe. Make sure that the axis of the connecting piece has a 90° angle to the axis of the pipe. Next the brass holder had to be screwed.

2.1 Mechanical commissioning of the Sensor

Unscrew the brass nut and put it over the end of the mic-sensor.
Caution: Inside the brass holder are a larger circlip a seal and a ring, after removing the brass nut they can easily get lost.

Next strap the circlip over the end of the mic-sensor followed by the ring and at last the seal. The tilted surface of the seal has to be parallel to the sealing surface inside the brass holder.

Put the sensor with all attached things in the brass holder and tighten the brass nut thoroughly.

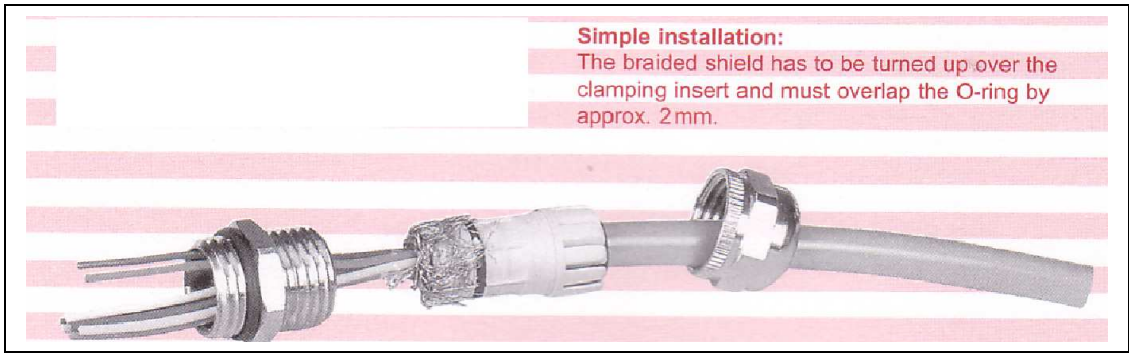
Do not use a spanner or wrench with full force. The seal would definitely get ruined.

2.2 Connecting the mic-Sensors

Before connecting the mic-sensor to a suitable evaluation unit make sure that it has zero potential. Use a suitable voltmeter to prove it.

The cable gland must provide a possibility that the shield can be connected electrically to the housing oft he sensor.

Assemble a 4 wired connection cable with shielding. Skin the wires and clamp on a suitable wire end. Only small wire ends must be used otherwise they do not fit into the clamp on the circuit board. The shield must not be cut of completely. It must covers the clamping insert approximately 2 mm, see picture 5. Otherwise there is no electrical connection between housing and electrical ground.



Pic 5: Screwed cable gland i.e. HUGRO Art.Nr.157.1710.10

The braided shield of the cable has to be connected to the electrical earth of the evaluation unit. The electrical earth of the evaluation unit has to be connected to earth; otherwise the housing of the mic-sensor is not grounded.

2.3 Description of the Electronic

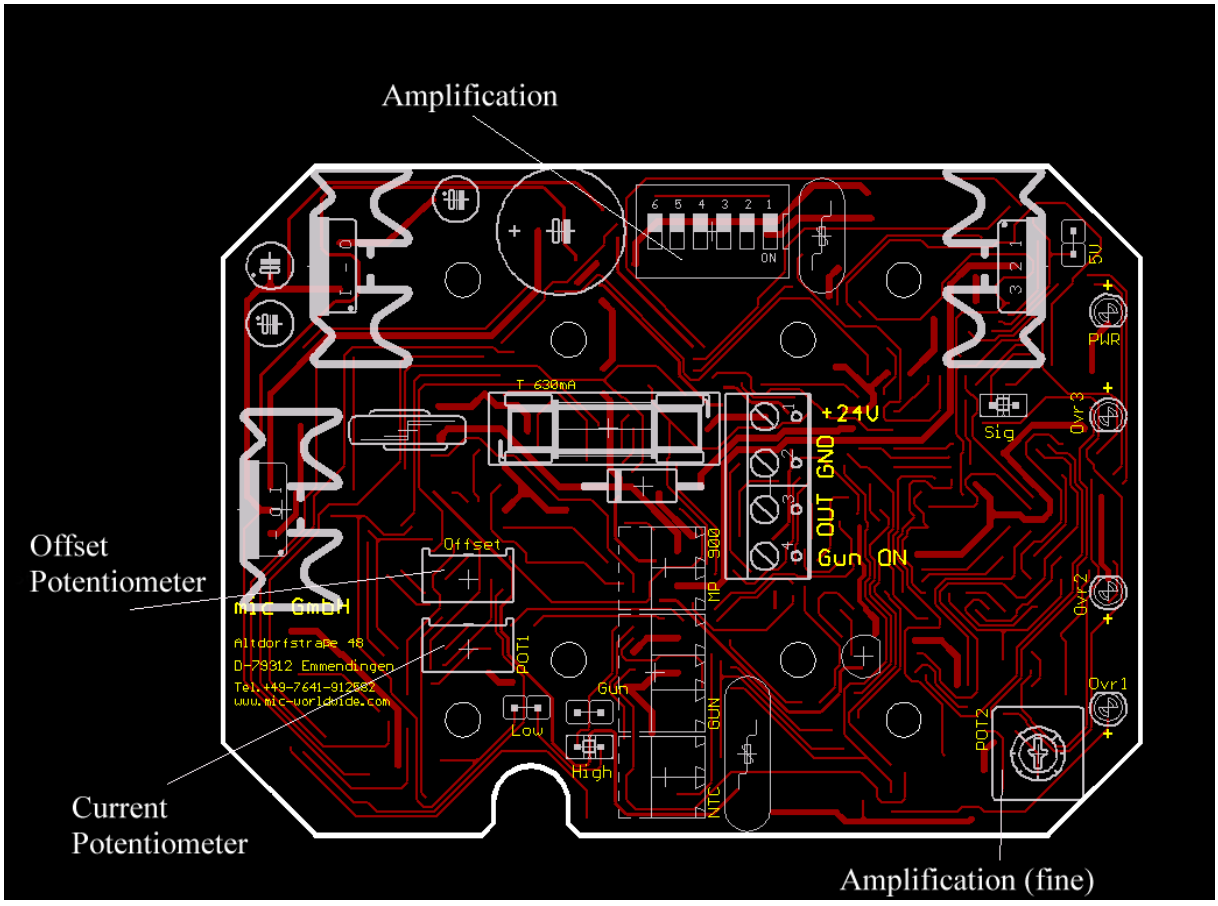
Inside the sensor is a circuit board, see picture 6.

The amplifier of the mic-sensor must be adjusted with extreme care. The amplification has to be set as high as possible without clipping the signal. A clipping is indicated by the red leds.

These sensors have been designed for all kinds of powders or rubble and everything that can be transported pneumatically. Each product has its own density and speed while passing through different pipe sizes. In addition to this, each product gets individually "scanned" by the microwave and this is the reason why we are not able to adjust the sensor in general during production.

Depending on the pipes size, one needs one ore two sensors. If two get used, the sensors get switched on and off sequential so they can not interfere each other.

First the screws on the lid of the top of the sensor have to be loosened then take of the lid.



Pic 6: Circuit Board inside sensor

At the connection terminal 24V, Gnd and the signal has to be connected.

LEDs:

When power is turned on the green LED is permanently on. The yellow LED flashes slowly with approx. 1 Hz)

The signal strength gets adjusted by using the dip-switch and the potentiometer. The dip-switch changes the the amplification in big steps. Use the potentiometer for fine tuning.

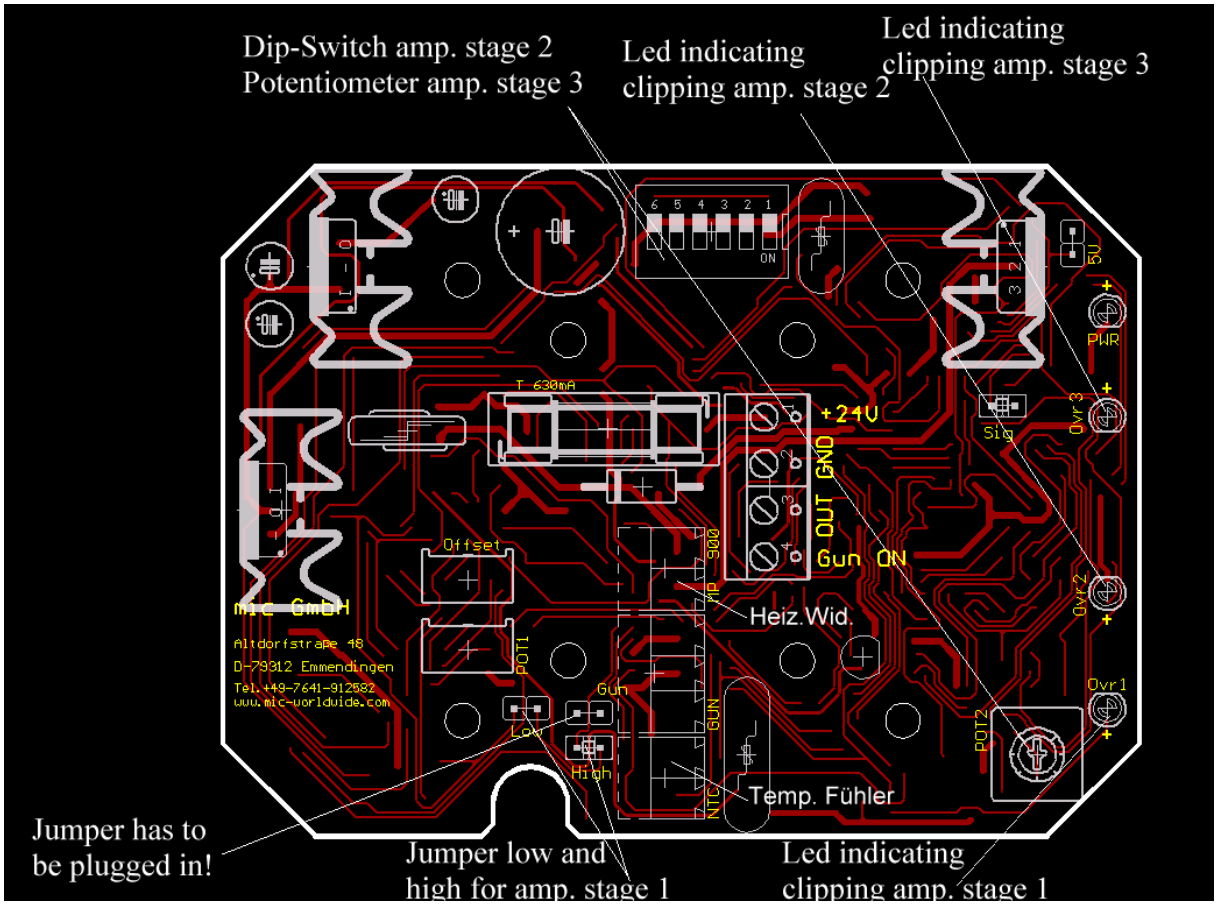
Neither adjust the offset potentiometer nor the current potentiometer because they have been set properly during production.

The sensor has to be built in properly before the signal strength can be adjusted (comp. 2.1 Installing the mic-sensor). The evaluation unit must also be properly connected and switched on. In addition to this, rubble or whatever kind of products in use must now pass through the prepared pipes at a maximum mass current.

If the green LED is not running measure with a appropriate device the voltage. Do not assume that there is now power. It could be that the LED is broken or the cables are mixed up.

If the red LED is flashing or is permanently turned on the signal is to strong. You have to adjust the amplification, see chapter 2.4!

2.4 Adjusting Amplification



Pic 7: Setting the Amplification

The amplification has to be adjusted. The amplification must be strong enough to have a clear signal. If the amplification is to strong the signal is distorted. If the signal is distorted the red LED is turned on or may flash. Since the sensor is for a variety of different bulk and solids there is no general setting.

To adjust the amplification the sensor hast o be installed properly and the power hast o be turned on. **In the pipe should be the maximum flow that may occur at normal operation. After turning he power on wait for 15 min to stabilize the temperature inside the temperature!**

On the board are three amplification stages. If the red LED turns on or starts to flash during adjusting the amplification you must lower the amplification!

If the LED for amplification stage 1 is on set the jumper from high to low position, see picture 7.

If the red LED for amplification stage 2 is not turned on and not flashing increase the amplification with the dip-switch step by step until the red LED starts to flash. Then go one step backwards. If the red LED is already flashing or turned on lower the amplification slowly step by step until the red LED is permanently turned off.

If the red LED for amplification stage 3 is not turned on and not flashing increase the amplification with the potentiometer step by step until the red LED starts to flash. Then lower the amplification slightly until the LED turns off. If the red LED is already flashing or turned on

lower the amplification slowly with the potentiometer until the red LED is permanently turned off.

After adjusting watch the red LED for some time, and adjust the amplification again if necessary.

Attention:

Any change of the amplification requires a new calibration.

During adjusting take care not to create shortcuts on the circuit board!.

The setup has to be done by trained personal only!.

3. Maintenance Details

If the sensor is installed properly and not protruding the inner diameter of the pipe the mic-Sensor has no mechanical wear out, no maintenance will be needed at all but it is recommended that the proper detection of the flow by the sensor is checked once in a year.

4. Technical Specifications

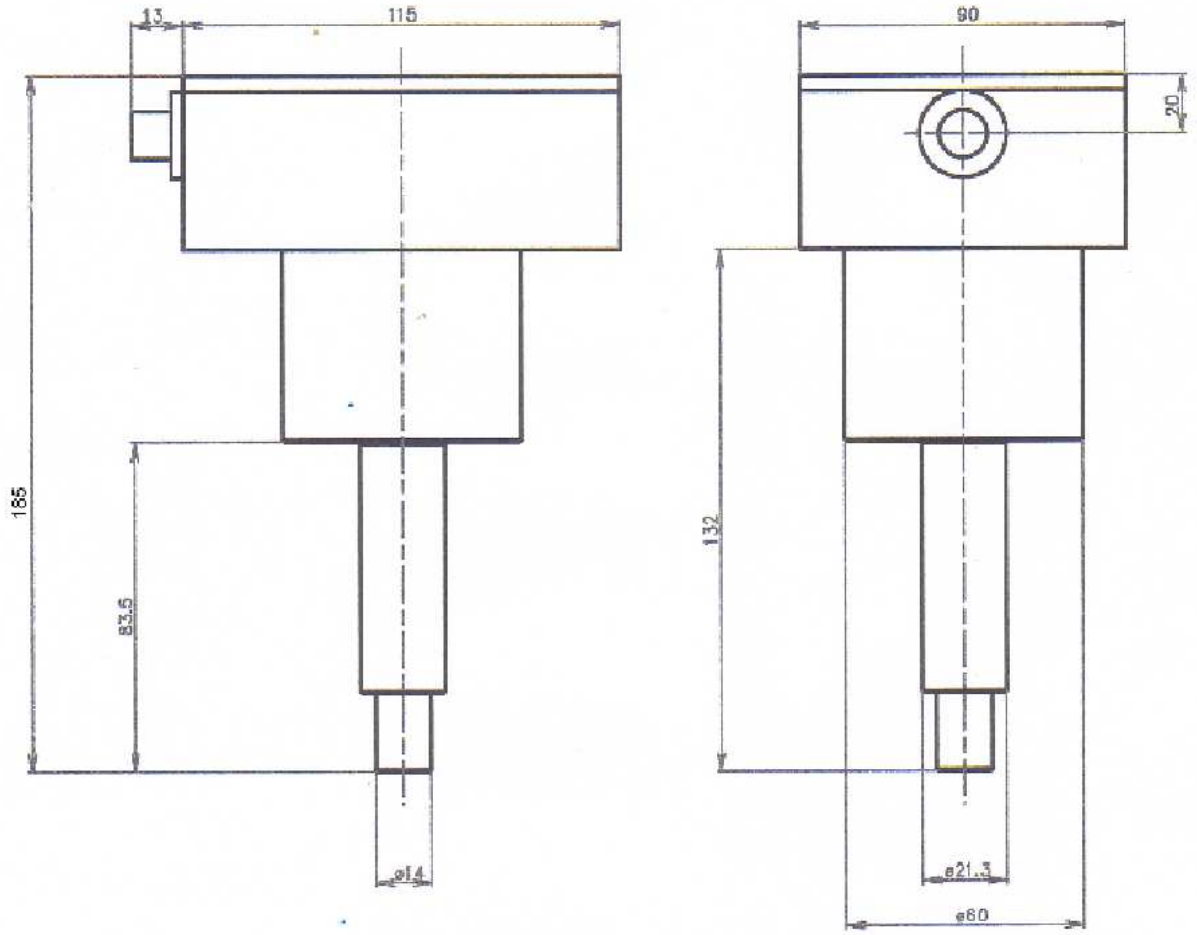
mic-FlowNoFlow
Type: Standard

Power Supply:	**24 V / DC +/- 10 %**
Current:	max. 450 mA
Output Signal:	semiconductor relay 300 V DC max, Current through Relay 150mA !NOT FUSED!
Temperature around pipe:	-10°C to +55°C
Temperature inside pipe (Standard)	-10°C to 60°C higher Temperatures are possible on request
Gauge pressure in pipe (Standard)	100 mBar, higher pressures on request
Housing:	Aluminium and Steel
Sizes (BxHxT):	approx.. 185 x 115 x 90 mm
Protection Class	like IP 65

mic-FlowNoFlow
Typ: Ex-Sensor

Temperature inside pipe (Standard)	-10°C bis 60°C higher Temperatures up to 100°C are possible on request
Sizes (BxHxT):	approx. 185 x 115 x 90 mm
Protection Class	IP 65

5. Annex (Drawings)



Pic 9: Sensor

6. Potential Dangers

During installation it is important to take care that no material is conveyed inside the pipe. That would be a risk for the assembler and others standing around the workplace when material is blown out of the opening in the pipe. The assembler has to wear suitable working clothes and protection goggles.

CE-Connectiondetails:

- The shield of the cable connected to the sensor has to be connected safe to electrical earth in the cabinet. Otherwise you have to make sure that there is another connection that connects the housing with electrical earth.

7.1 EG-Declaration of Conformity

according to FTEG and the directive 1999/5/EG (R&TTE)

The company **mic-GmbH**
Grimbartweg 1
23564 Lübeck

Germany

declares that the product

mic-one-Sensor

to measure the mass flow of bulk solids, of devices class 1

fulfills the elementary requests of article § 3 and the other relevant regulations of the FTEG (chapter 3 of the R&TTE) when used as intended.

The product is in conformity with following standards or normative document(s):

Electromagnetic compatibility and radio spectrum matters (ERM) - Electromagnetic Compatibility (EMC) (§ 3 (1) 2, chapter 3 *(1) b)* **EN 301 489-3 V1.4.1**

Electromagnetic compatibility and Radio spectrum Matters (ERM) - Short range devices - § 3(2) (chapter 3(2) **EN 300 440-2 V1.1.1**

Lübeck, the 07.02.2007 _____