

## Flow sensor type MFS-C and MFS-R

## MFS

Instruction : Mi-210gb\_050601

### Flow constant

The MFS is to be installed in a circular or rectangular duct.

The average value of the air flow over the whole length of the sensor results in a pressure difference, out of which the total air flow or air velocity may be calculated.

These formulas are valid for air at 20 °C and 1013 mbar.

$$v = K_m \times \sqrt{\Delta p} \text{ m/s}$$

$$Q = A \times K_m \times \sqrt{\Delta p} \text{ m}^3/\text{s}$$

Where the included variables represents:

- v = velocity in m/s
- K<sub>m</sub> = the constant of the sensor
- Δp = the pressure difference in Pa
- A = the area of the duct in m<sup>2</sup>
- ρ = The density of the air in kg/m<sup>3</sup>
- B = actual barometric pressure in mbar
- t = the actual temperature in °C

With a different temperature or barometric pressure of the air , the values must be calculated for the change in the density of the air according to the formulas below:

$$\rho = 1,293 \times \frac{B}{1013} \times \frac{273}{273 + t} \text{ kg/m}^3$$

$$v = K_m \times \sqrt{\Delta p \times \frac{12}{\rho}} \text{ m/s}$$

$$Q = A \times K_m \times \sqrt{\Delta p \times \frac{12}{\rho}} \text{ m}^3/\text{s}$$

The constant of the sensor (K<sub>m</sub>) is found on the small sign, which is attached to the sensor. The constant depends both on the size and shape of the duct. For rectangular ducts there are different constants for different duct-widths. For a rectangular duct, the length of the sensor shall always equal the longest side of the duct.

The "duct-width" is always the side of the duct where the sensor or sensors are mounted through.

### Error in measurement

The error in measurement depends partly on the sensor and partly on the flow profile in the duct. With a proper flow profile, the maximum error in the measurement is normally ± 3 %.

### Maintenance

Normally the sensor does not need any maintenance. If the air is very polluted, it is appropriate to dismount the sensor once a year and to clean it off with compressed air.

No part of the sensor will get damaged during normal cleaning. It is allowed to use compressed air both on the outer side of the sensor and through the pressure taps. Make sure that the sensor is not connected to the transmitter during cleaning.

### Installation

To achieve a good result, the sensor should be installed at least 7 times its own length from a 90° bend or any other source of disturbance. For advice in other kinds of installation, contact Micatrone.

Mark the point of installation.

Drill a Ø 25 mm hole for the sensor, and a Ø 7 mm hole at the opposite end of the duct.

Insert the sensor into the duct and fasten it through the 7 mm hole.

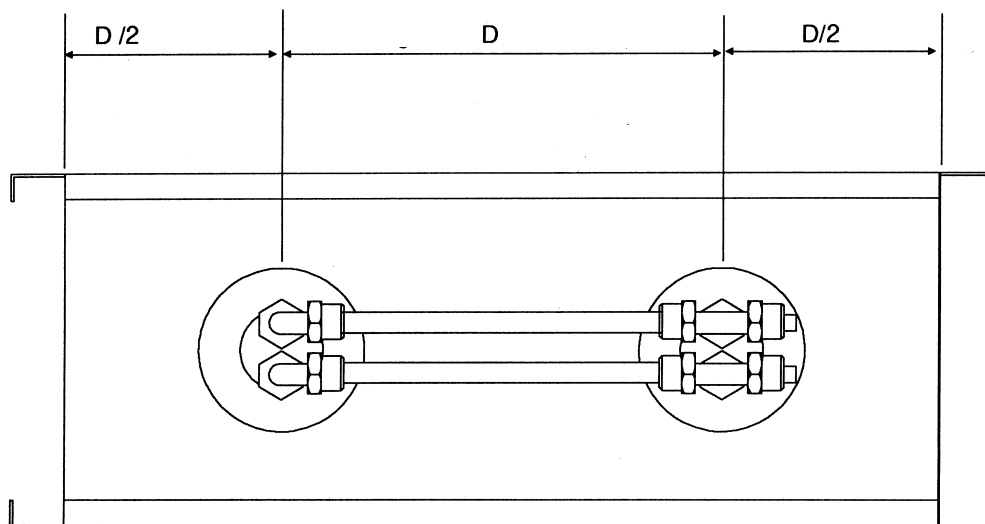
Adjust the position of the sensor to meet the flow direction and drill four 2,8 mm holes by the use of the top plate as pattern. Use the attached screws to fasten the sensor.

Connect the sensor to a flow transmitter Micaflex MF-FD or MF-PFT with a rigid 8/6 mm HT plastic tube. The measured pressure will be converted to a flow linear output signal in the Micaflex.

### Installation in rectangular duct

If one sensor should be mounted it should be placed as close to the centre of the duct as possible. If two or more sensors are to be connected, the pressure connections of all sensors except one must be changed to T-shape connections. Connect the sensors with 8/6 mm HT plastic tube.

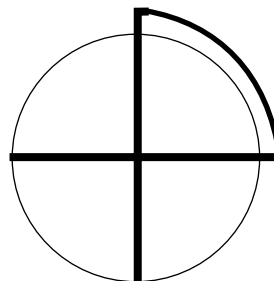
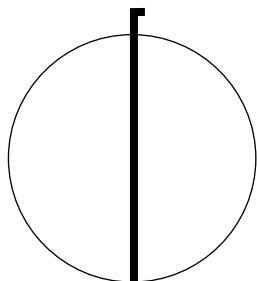
Determine the hole pitch, marked D, by dividing the width of the rectangular duct with the number of sensors to be installed. Mount the sensors according to figure below.



### Installation in circular duct

With one sensor in a circular duct, the sensor must be mounted vertically in the duct.

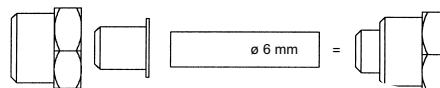
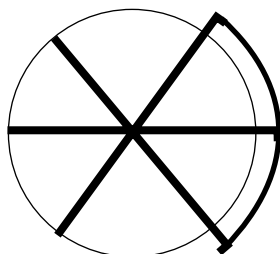
With two sensors in a circular duct, one sensor must be mounted vertically and the other horizontally.



With three sensors in a circular duct, the duct is split into six parts with an angle of 60° between.

### Temporary measurement

If the sensor should be used for temporary measurement the connections must be plugged to prevent dirt from entering the sensors and air-leakage when not in use.



Press the attached plastic plugs into the nut with a  $\varnothing$  6 mm drift.

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