

## Micaflex FD ver 4.1 Differential pressure and flow transmitter

## MF-FD ver 4.1

### NOTE !

Read through the entire manual before you begin installation and programming.

### APPLICATION

Micaflex FD (MF-FD) is a pressure transmitter designed for measuring flow measurement. MF-FD is intended to be used with flowsensor type Micatrone MFS and similar or fans with flow measurement outlet.

MF-FD convert the flow to a corresponding output signal in Volt or mA.

The primary function is to measure the differential pressure over a flowsensor. MF-FD convert and calculate the differential pressure to a flow linearized output signal related to the flow inside the duct during normalized operating conditions (1013 mBar and 20°C).

A traceable factory calibration certificate is included upon delivery. If necessary, a 5-point user calibration can be performed on site (field-calibration) which is stored in a user separate table (registry).

### MOUNTING

MF-FD is designed for vertical wall mounting but can be fitted with an optional frame kit, MFM-PANEL, for recessed mounting on a wall or through a cabinet door.

MF-FD is screwed to the wall using four screws, max  $\varnothing$  4mm. Location of screw holes are shown on the back of the enclosure.

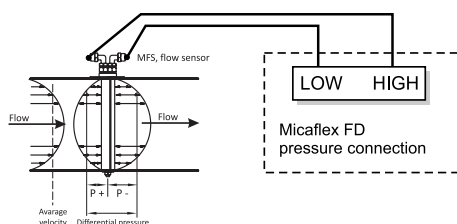
### ELECTRICAL CONNECTION

MF-FD is connected to 24 VAC or 20...32 VDC as standard. See wiring diagram on page 6.

### PRESSURE CONNECTIONS

Pressure connection can be made with mounting kit VR-DR or HT-plastic tube 8/6 mm.

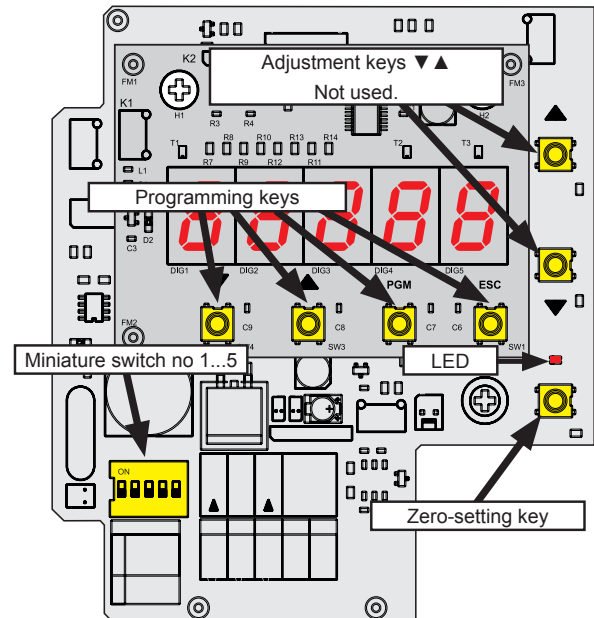
Correct pressure connection:



### OUTPUT SIGNAL SELECTION

MF-FD is intended for flow measurement but can also be programmed for a pressure linear output signal in parameter "P07".

Volt and mA signal have different wiring terminals. Check that the correct output is connected.



### ZERO ADJUSTMENT

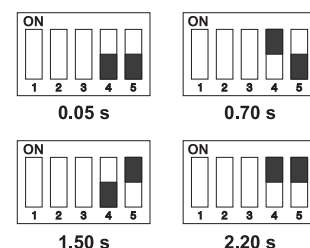
Switch on the main supply and wait at least 60 sec. Set the manifold valve in position "calibration" (if there is no valve, loosen the pressure tubes from the MF-FD). Remove the cover to access the Zero-setting key on the main circuit board. Check that the miniature switch no 2 is in position "OFF".



Press down the Zero-setting key, the LED starts flashing. Keep the key pressed until the LED turns off. Release the key and the zero-setting is finished.

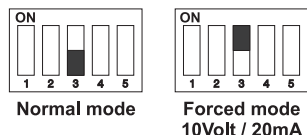
### SETTING OF DAMPING

MF-FD offers a possibility to set different damping (time constant). At delivery of MF-FD, the damping is set to 1,5 seconds damping. Setting is adjusted with the miniature switch no 4 and 5 (the switch is situated on the bottom left edge of the main circuit board).



## FORCED OUTPUT SIGNAL

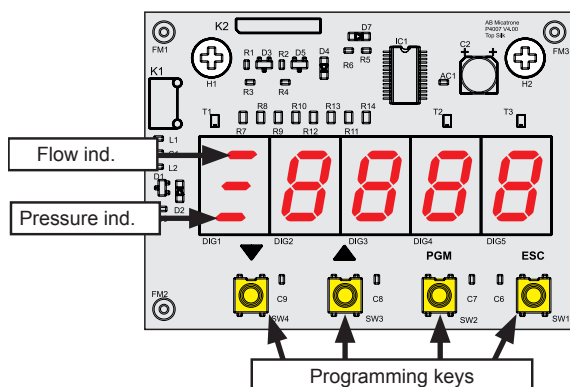
Max output signal (10 Volt and 20 mA) is obtained when miniature switch no 3 is set to position "ON". This function can be used to check the receiving system.



## DISPLAY UNIT

MF-FD is fitted with a 4-digit LED display and LED's for flow or pressure indication.

Programming of all parameters is done by four keys on the display circuit board. Selected unit (e.g. l/s or m<sup>3</sup>/h) can be marked on the lid using attached label. Use arrow keys ▼▲ to show either flow or differential pressure readings in the display.



## PROGRAMMING

MF-FD is programmable and include following parameters that can be affected:

No	Description	Min	Max	Preset
P01	Alarm limit [Flow]	0000	[P05]	0000
P02	Time delay [seconds]	000	600	000
P03	Alarm function <div> <div>OFF</div> = Off  <div>HI</div> = High alarm  <div>LO</div> = Low alarm </div>	<div>OFF</div> <div>HI</div> <div>LO</div>	<div>LO</div> <div>HI</div> <div>OFF</div>	<div>OFF</div> <div>HI</div> <div>LO</div>
P05	Flow at max. differential pressure	0000	9999	0000
P06	Number of decimals for flow indication	0	3	0
P07	Selection of output <div> <div>P</div> = Pressure linear  <div>F</div> = Flow linear </div>	<div>P</div> <div>F</div>	<div>F</div> <div>P</div>	<div>F</div> <div>P</div>
P08	SW version motherboard			X.XX
P09	SW version display			X.XX
P14	Calibration table	<div>OFF</div> <div>15-5</div>	<div>15-5</div> <div>OFF</div>	<div>OFF</div> <div>15-5</div>

Keep the **PGM** key pressed until **P** is shown in display. Use the arrow-keys to select the parameter to change. Press the **PGM** key to access the selected parameter.

### P01, P02, P05 & P06:

To change the value of the parameter, press the **PGM** key again. The first digit will begin to flash, indicating that the digit can be changed. Adjust the value of the digit by pressing the arrow-keys. Confirm each digit by pressing the **PGM** key. When the last digit is programmed and confirmed with the **PGM** key, all digits will flash fast and then turn to show the parameter.

### P03 & P07:

To change the value of the parameter, press the **PGM** key again. The display will begin to flash, indicating that the value can be changed. Adjust the value by pressing the arrow-keys. Confirm by pressing the **PGM** key. The display will flash fast and then turn to show the parameter.

Press the **ESC** key to return to normal indication of actual pressure. After 5 minutes, with no key has been used, the programming is terminated automatically.

## ALARM

MF-FD include a visual alarm indicated by a flashing display on alarm state, if this function is activated. By using an optional plug-in module, MFM-L1, a potential free changing relay output can be obtained.

### P01, Alarm limit [Flow]

Parameter for the flow at which the alarm will be triggered. Low alarm limit is always the lowest flow compared to the atmospheric pressure.

### P02, Time delay [seconds]

Parameter for setting the time delay in seconds before the alarm is triggered.

### P03, Alarm function

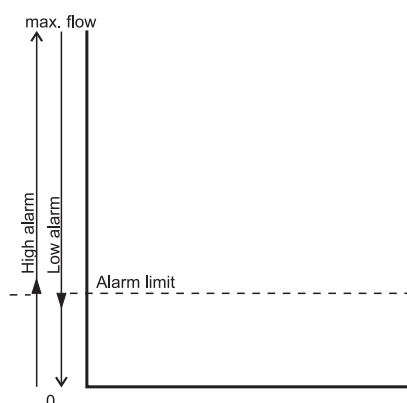
Parameter to obtain alarm at increasing flow (High alarm), decreasing flow (Low alarm) or no alarm (Off)

Parameter:	P01	P02	P03
<i>Exempel 1:</i>	024.0 l/s	010 s	<div>HI</div>

Alarm is triggered when the flow is above 24 l/s (i.e. 24.5 l/s) for more than 10 seconds.

Parameter:	P01	P02	P03
<i>Exempel 2:</i>	05.00 m <sup>3</sup> /h	060 s	<div>LO</div>

Alarm is triggered when the flow is below 5 m<sup>3</sup>/h (i.e. 4.8 m<sup>3</sup>/h) for more than 60 seconds. The alarm is reset automatically when alarm condition no longer exists..



## FLOW AT MAX DIFFERENTIAL PRESSURE

Micatrone flow transmitter MF-FD measures the differential pressure over Micatrone flowsensor's high [+] and low [-] pressure connections. For the transmitter to convert, calculate and display actual flow inside the duct, the maximum differential pressure needs to be converted to a corresponding flow. The measuring range is stated on the label situated on the enclosure (e.g. 0...500 Pa).

If Micatrone's flow sensors type MFS, MFS-SS or MFS-FI is used, the calculation may be done using the Excel spread sheet found on [www.micatrone.se](http://www.micatrone.se).

### Example:

In a circular duct with a diameter of 200 mm and where a transmitter with a range of 0...500 Pa is used.

1. Enter 200 mm and 500 Pa in the cells according to picture below. The flow is calculated to 0.578 m<sup>3</sup>/s.
2. Programme the value 0578 (four digits) into parameter P05.
3. Programme the value 3 for three decimals into parameter P06.
4. Check that parameter P05 is showing 0.578.

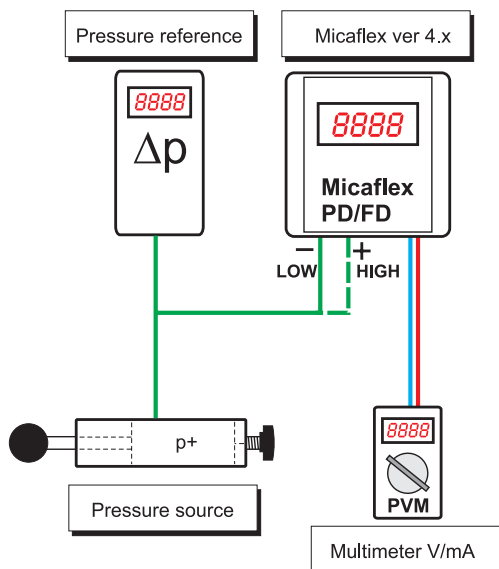
Input data		Achieved data	
Diameter of the duct (mm)	200	Area	0,031 m <sup>2</sup>
Flow sensor constant		Km	0,822
Static pressure Pa	0	Actual density	1,20
Actual barometric pressure mBar	1013	<b>Rec. Material</b>	
Actual temperature °C	20	Qty of sensors	1 pcs MFS-C- 200
Density at 0 °C	1,293	Con.kit	0 pcs MTS-F- 1
<b>Normal = Normal m3 at 0 °C 1013 mBa</b>			
Specify Δp Pa	500	Actual	0,578 m <sup>3</sup> /s
		Normal	0,538 m <sup>3</sup> /s
		Actual velocity	18,392 m/s

If you are using flow sensors of other brand or fans with measuring outlet, you will need their specific formula and K-factor and make a manual calculation. Should be available from the supplier or manufacturer.

## USER CALIBRATION

### MF-FD five-point user adjustment

MF-FD/FD is calibrated and factory adjusted on delivery. For users with requirements for periodic reference measurements, there is the possibility of user adjustment in five points. For this purpose, a reference instrument with a higher accuracy than MF-FD and a pressure source is needed. The factory setting can easily be restored at any time



User adjustment in 5 points is possible to perform on MF-FD with software version 4.20 or later for the motherboard (P08) and version 4.10 or later for display module (P09). The software version is shown in parameter P08 and P09. For earlier version, use operating manual Mi-336 which is available on [www.micatrone.se](http://www.micatrone.se).

The five adjustment points are stored in a separate table and are expressed as a percentage of the transmitters total measuring range. Zero percent corresponds to zero Pascal.

Example	Positive measuring range	
Adj. point	0...500 Pa	
0 %	0 Pa	
25 %	125 Pa	
50 %	250 Pa	
75 %	375 Pa	
100 %	500 Pa	

### Adjustment process step-by-step:

The user adjustment is stored in a table of user data. Once the process is started, it cannot be undone. Therefore, have reference instruments and pressure source available before the process begins. If the measurement of any point fails, the procedure must be restarted from the beginning. This is done by either turning miniature switch no 2 to "OFF" and then turning the switch back "ON", or by stepping through the entire process and then starting over.

- Remove the pressure tubes from the sensor
- Note how the damping is set (miniature switches 4 and 5) and then set them to "OFF".
- To reset zero, hold down the zero point adjustment key until the LED goes out. Then release the key and the zero point adjustment is complete.
- To put the transmitter into programming mode, set miniature switch no 2 to "ON" position.
- Press **PGM** for more than three seconds to display P01.
- Browse with ▼▲ until parameter P14 is displayed. In this table, the factory adjustment is activated when set to "oFF" mode, and the last user adjustment is activated under "uSr5". Press **PGM** and make sure that the "uSr5" mode is set. If not, press **PGM** again until the display flashes and select "uSr5" with ▼▲. Save the setting by pushing **PGM**.
- Scroll with ▼▲ until table P15 is displayed. In parameter P15, the last user adjustment is implemented and saved.
- Press **PGM**. P000 is displayed. Connect zero percent pressure of the measuring area (see withstanding sample table) according to figure on page 5.
- Press **PGM** again to begin the adjustment process. P000 starts flashing. (If the adjustment has been accidentally started, it can now be canceled by pressing **ESC**.) Wait a few seconds to get a stable reference pressure and press **PGM** to save the measurement. P000 flashes three times and P15 is displayed.
- Press **PGM** and the next adjustment value appears. Add 25 percent pressure to the reference instrument. Wait for stable reference pressure and set the measuring point with **PGM**. Repeat these steps for all five adjustment points P000, P025, P050, P075, and P100.
- When the last point P100 is adjusted, press **PGM** once more. "Done" is shown in the display.
- After completing the adjustment, put the miniature switch no 2 back into "OFF" position and reset the damping with miniature switches no 4 and 5 (see paragraph 2).
- Press **ESC** to return to normal pressure or flow indication.
- MF-FD is now using the latest user calibration.
- Factory-adjusted setting is activated by programming P14 to "oFF". Scroll with ▼▲ to parameter P14, press **PGM** until the display flashes and set "oFF" with ▼▲. Confirm the selection with **PGM**.

- Programme parameter P07 to Pressure linear

## TECHNICAL DATA

<b>Supply voltage:</b>	24 ± 15% VAC, 20...32 VDC 24, 115, 230 VAC (with transformer) 50/60 Hz
<b>Power consumption:</b>	Max 4 VA (24 VAC) Max 2 W (24 VDC) Max 8 VA (230 VAC)
<b>Range:</b>	0...50 Pa 0...100 Pa 0...200 Pa 0...500 Pa 0...1 kPa 0...2 kPa 0...5 kPa Other ranges on request.
<b>Overload:</b>	Max 50 kPa
<b>Accuracy:</b>	< ± 0,5 % of the full range plus ± 0,5 Pa (Min. ± 1 Pa)
<b>Temperature drift:</b>	< ± 0,5 % /10 °C
<b>Damping:</b>	Selectable time constants of 0.05, 0.7, 1.5 and 2.2 s.
<b>Output signal:</b>	4...20 mA max $R_L = 400 \text{ Ohm}$ 0...10 Volt $R_L = 0 \text{ Ohm}$ Both mA and Volt signal can be used simultaneously. 0 ... 20 mA can be ordered. Inverted signal can be ordered.
<b>Ambient temp.:</b>	0...50°C
<b>Degree of protec.:</b>	IP 65, ABS plastic
<b>El. connections,</b>	
- solid conductor:	1 x 2,5 mm <sup>2</sup> / terminal
- stranded conductor:	1 x 1,5 mm <sup>2</sup> / terminal
<b>Cable entries:</b>	2 pcs threaded holes M16x1,5 (cable glands not included)
<b>Pressure. conn.:</b>	8/6 mm HT-plastic tube
<b>Dimensions:</b>	WxHxD = 122x120x90 mm
<b>Weight:</b>	0.77 kg



## CE AND UKCA CONFORMITY

AB Micatrone declare under sole responsibility that this product is in conformity with the essential requirements in CE and UKCA directives at time of sale. The full text of Manufacturers declaration of conformity is available on Micatrone's website.

## SERVICE

MF-FD normally needs no service, but we recommend to check the zero point once a year.

## CLEANING

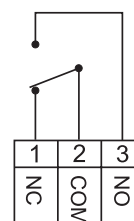
MF-FD should be cleaned with a soft cloth and a light detergent. Do not use scouring powder or solvent.

## TRANSFORMER MFM-TX (OPTIONAL)

The output signal is normally not galvanically separated from the supply voltage. To obtain galvanic separation between the output signal and the supply voltage on a standard transmitter, the apparatus must be equipped with a plug-in transformer. Plug-in transformer can be obtained for 24, 115 or 230 VAC.

## ALARM MODULE MFM-L1 (OPTIONAL)

The MF-FD can be fitted with a built-in alarm module. The alarm module include a potential-free change-over relay output for max. 48 volt / 5 A. The figure show the relay output in an unpowered state [NC], i.e. alarm state.

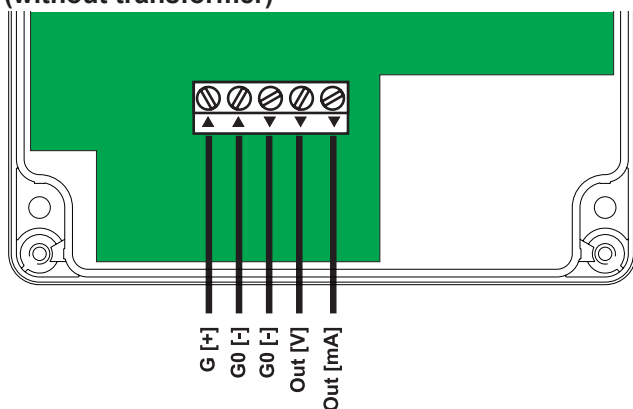


## MODBUS RTU (OPTIONAL)

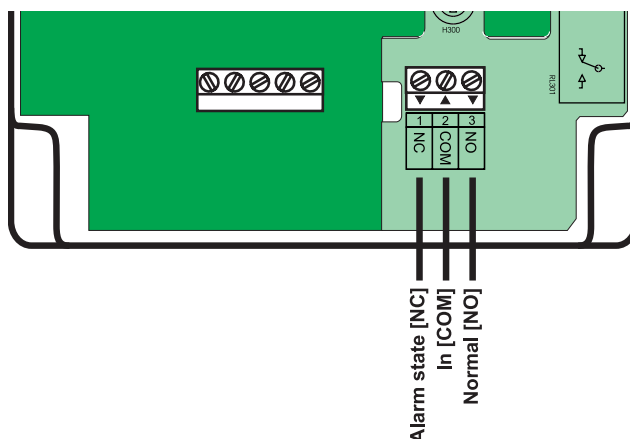
MF-FD can be fitted with a built-in expansion module for network communication with a computer via RS-485 serial connection. See separate instruction for Modbus RTU.

Modbus RTU can NOT be used with alarm module or built-in transformer.

### CONNECTION 24 VAC / 20...32 VDC (without transformer)



### CONNECTION ALARM MODULE (Alarm module and Transformer can't be used at the same time.)



### CONNECTION 24 / 115 / 230 VAC (with built-in transformer)

