

Programmable flow transmitter for measurement, supervision and control with special purge function

MicaFlex PFA / PU

Instruction : Mi-224gb_060607

NOTE !

Read the entire instruction carefully before start.

Application

MicaFlex PFA with purge function is a differential pressure transmitter for pressure or flow measurement, supervision and control. One voltage free alarm contact and buzzer as standard. With the four keypads ∇ , \blacktriangle , **PGM** and **ESC** the desired function is selected as well as setting and scaling. The dual row LCD display clearly indicates the selected function.

Installation

MF-PFA is designed to be placed on a wall or for recessed mounting through a wall or cabin door. When recessed mounting, a mounting kit, MFM-PANEL is used. The unit is fixed to the wall by four screws, max 4 mm. The location of the holes is shown at the back of the enclosure.

Unscrew the four screws of the front cover and use the bottom screws to attach the front cover on the upper end of the casing, see figure 1. This makes installation and electrical connection easier.

Connect power supply according to the electrical connection.

To each front cover the CPU is mounted, since the I/O calibration of the main circuit board is stored on the CPU-board, it is not possible to move the front cover between different units.

Output signal

MF-PFA has two analogue outputs to be used for actual value of pressure and flow, or PI-control output for pressure or flow. VDC or mA output signal must be set by the DIL-switch (DIL1). The same programming must then also be done under "Outputs".

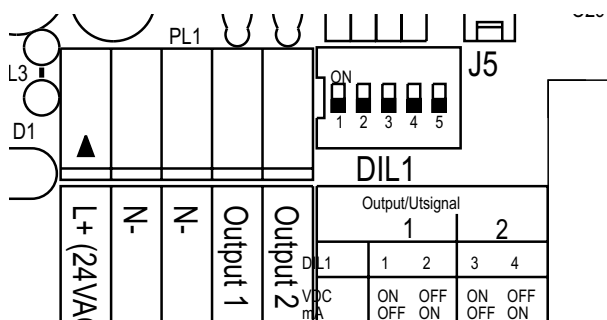


Fig 2

DIL 1: 1 on, 2 off volt output 1
 3 on, 4 off volt output 2
 1 off, 2 on mA output 1
 3 off, 4 on mA output 2

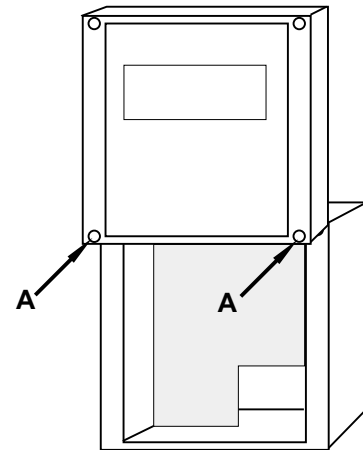


Fig 1

Use the front cover bottom screws (marked **A**) to fix the front cover at the enclosures top edge during installation.

Basic programming instruction

When the power supply is connected a start menu will be displayed. With ∇/\blacktriangle it is possible to go through the different start menus. To always have the same start menu, the selection is programmed under "System settings". Pressing **ESC** when some other menu is displayed returns to the menu programmed under "Display".

Programming

Press **PGM** until displayed text disappears. Display shows parameter group, see table on page 2. With ∇/\blacktriangle it is possible to scroll through the parameter groups.

1. **Current values**
2. **System settings**
3. **Outputs**
4. **Pressure**
5. **Flow**
6. **Alarms**
7. **PI2 controller**
8. **Purging unit**
9. **Communication**
10. **Internals**

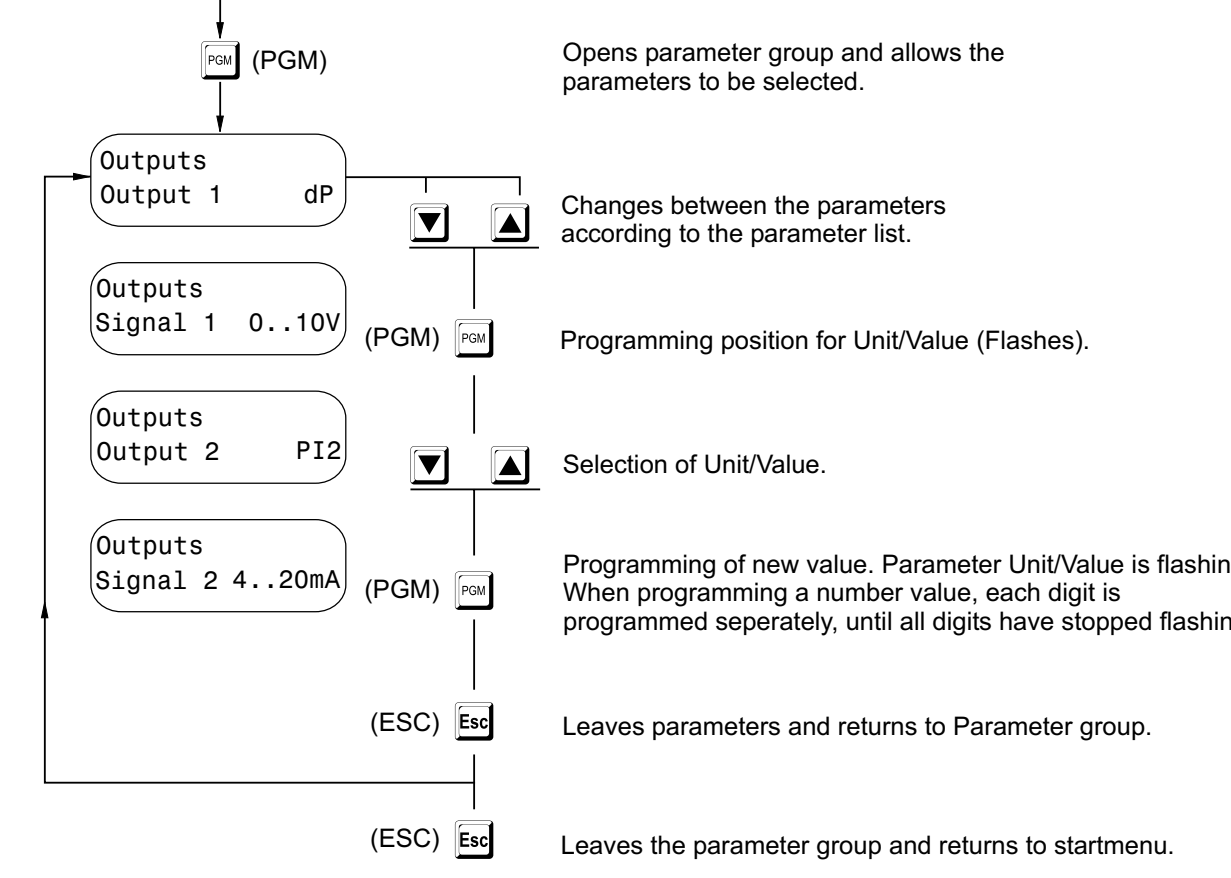
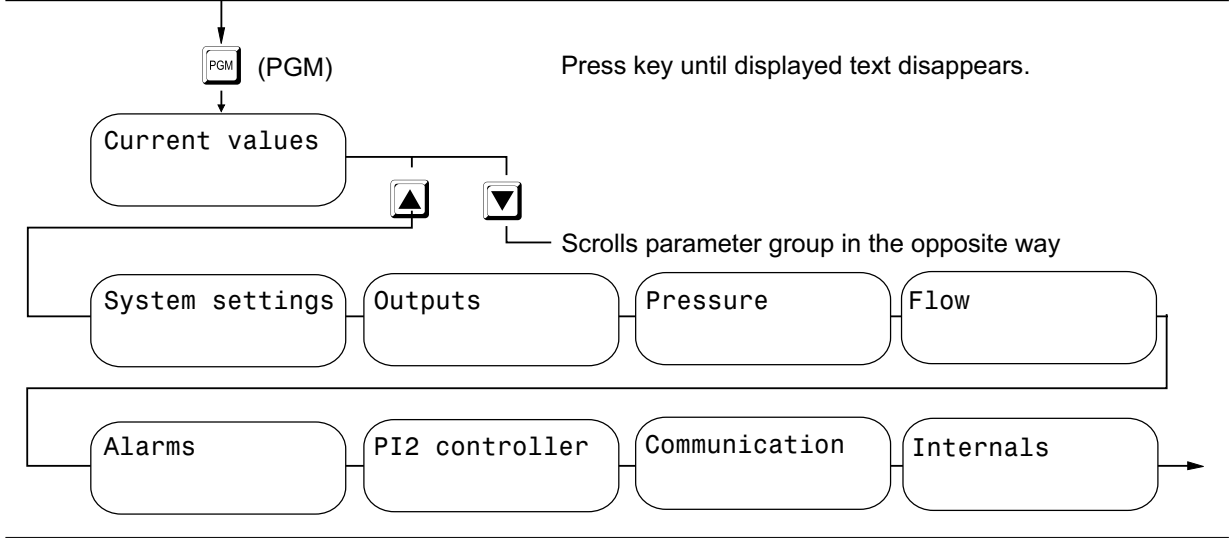
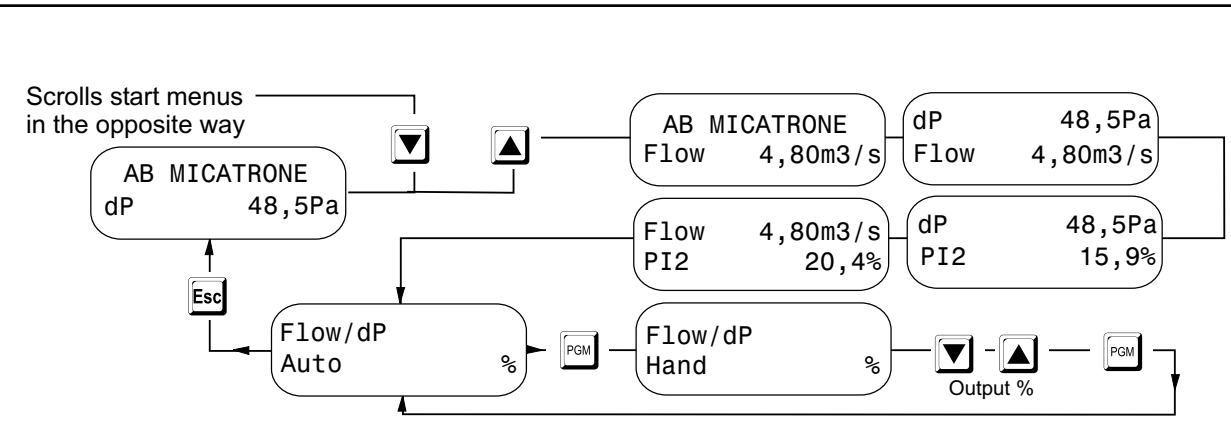
When the parameter group to be programmed is shown, press **PGM**.

The parameters are then shown, with ∇/\blacktriangle select the parameter to be programmed and press **PGM**

Par.no:	Par. name	Range	Value
Internals			
	Prog ver	0.00...9.99	
Current values			
	dP	-32768...32767	
	Flow	0...32767	
	PI2	0.00...100.00	
	PI2 CSP	-32768...32767	
	Mute input	OPEN CLOSED	
	Purge rel	OFF ON TEST	
System settings			
	Display	dP FLOW dP+FLW dP+PI2 FLW+PI2 ALMSTAT	
	Damping[s]	0.0...9.9	
Outputs			
	Output 1	dP FLOW PIR	
	Signal 1	0..10V 2..10V 0..20mA 4..20mA	
	Output 2	dP FLOW PIR	
	Signal 2	0..10V 2..10V 0..20mA 4..20mA	
Pressure			
	MinCal[Pa]	-32768...32767	
	MaxCal[Pa]	-32768...32767	
	Unit dP	Pa PaDec mbar iwc	
	Min range	-32768...32767	
	Max range	-32768...32767	
	Min out	-32768...32767	
	Max out	-32768...32767	
	Sign dP	POS NEG	
Flow			
	Unit flow	l/s m3/s m3/h m/s cfm	
	Max flow	0...32767	
	Scale flw	0...32767	

Par.no:	Par. name	Range	Value
	Set flow	0...32767	
Alarms			
	Alarm 1	OFF HIGH LOW	
	Source 1	dP FLOW	
	Level 1	-32768...32767	
	Delay 1[s]	0...3600	
	Reset 1	OFF ON	
	Alarm 2	OFF HIGH LOW	for purging use OFF.
	Source 2	dP FLOW	
	Level 2	-32768...32767	
	Delay 2[s]	0...3600	
	Reset 2	OFF ON	
	Res hold	FOREVER TIMED	
	Hold [s]	0...3600	
	Beeper	OFF ALARM 1 ALARM 2 AL1+AL2	
PI2 controller			
	Source	OFF dP FLOW	
	Mode	AUTO HAND	
	Output	DIRECT REVERSE	
	Set point	-32768...32767	
	NZ [%]	1...50	
	P-band	0...9999	
	I-time[s]	0...999	
	BZ	0...100	
	I-time BZ	0...999	
	Min Out	0,00...100,00	
	Max Out	0,00...100,00	
Purging unit			
	Purge	Off On Test	
	On time [s]	0...3600	
	Off time [s]	0...3600	

© AB MICATRONE 2006-06-07 [Mi-224gb_060607]



Always note the programmed data beside the parameter in the programming protocol for future documentation

Digit programming

Every digit is separately programmed. Press **▲** for 1...9, after 9 if negative values are accepted -9...0. Digit to be changed is flashing. When all digits are programmed press **PGM** and the entire row will flash. To stop incorrect programming press **ESC** and then **PGM** to execute new programming.

Unit or value programming

Press **▼▲** to change unit/value. When selected press **PGM** then the entire row will flash. Press **ESC** to return to parameter group. Press **ESC** to leave the parameter group and return to start menu.

Cancel the current programming

It is always possible to stop an incorrect programming with **ESC** if you have not pressed **PGM** after the last digit or unit/value selection.

Programming instruction

We recommend you to follow this instruction. When any of the start menus are displayed press **PGM** until the displayed text disappears.

1. Current values

	dP	-32768...32767	
	Flow	0...32767	
	PI2	0.00...100.00	
	PI2 CSP	-32768...32767	
	Mute input	OPEN CLOSED	
	Purge rel	OFF ON TEST	

Shows the actual values.

2. System settings

	Display	dP FLOW dP+FLW dP+PI2 FLW+PI2 ALMSTAT	
	Damping[s]	0.0...9.9	

Select the start menu to be displayed. Selecting ALMSTAT as start menu means that the only way to leave the start menu is to press PGM and program another start menu under "Display". Select the time constant (damping) for the flow and pressure measurement 0...9,9 seconds, normally 1...3 seconds.

3. Outputs

	Output 1	dP FLOW PI2	
--	----------	-------------------	--

	Signal 1	0..10V 2..10V 0..20mA 4..20mA	
	Output 2	dP FLOW PI2	
	Signal 2	0..10V 2..10V 0..20mA 4..20mA	

Select the sources for the two analogue outputs. The selection is possible between actual value of pressure or flow, PI-control output for pressure or flow.

NOTE ! There is only one controller in the unit. The source for the PI-controller is programmed under "PI2 controller".

To measure and control flow or velocity it is necessary to connect the unit to a flow measurement device mounted in the duct or fan inlet etc.

Select the output signal for the two outputs, 0/2...10 VDC or 0/4...20 mA. You must also set the DIL-switch on the circuit board for VDC or mA output.

It is possible to have VDC on one output and mA on the other.

4. Pressure

	MinCal[Pa]	-32768...32767	
	MaxCal[Pa]	-32768...32767	
	Unit dP	Pa PaDec mbar iwc	
	Min range	-32768...32767	
	Max range	-32768...32767	
	Min out	-32768...32767	
	Max out	-32768...32767	
	Sign dP	POS NEG	

If the unit is used for flow measurement, you do not need to do any programming under "Pressure".

All units are factory calibrated to a special range. The range is marked on the label on the right side of the casing. The calibration is always in Pa. Under "Pressure" you also find the calibrated range, "Min Cal" and "Max Cal". These values are only notes and are not possible to change.

If you want to change to another unit programme "Unit dP". Select Pa, Pa Dec (Pa with decimal), mbar or iwc (inch water). When programming a new unit the actual range is shown under "Min range" and "Max range". These values are only notes and not possible to change.

To change the range in selected unit or factory programmed unit, programme "Min output" and "Max output". The programmed values shall always be in the selected unit (Pa, Pa,dec, mbar, iwc). When

scaling, note that the accuracy always is in % of the factory scaled range.

Sign for dP

When measuring a negative pressure normally the MF-PFA will show the same as measuring a positive pressure (no sign). When programming "Sign dP" NEG you get a negative (-) sign before the actual value.

5. Flow

	Unit flow	l/s m ³ /s m ³ /h m/s cfm	
	Max flow	0...32767	
	Scale flw	0...32767	
	Set flow	0...32767	

If MF-PFA isn't to be used for flow measurement, nothing has to be programmed under "Flow".

Programme the unit for flow l/s, m³/s, m³/h, m/s or cfm (cubic feet / minute).

The basic flow calculation used is made with \sqrt{dP} . To have the display and the output corresponding to the actual flow or velocity in the selected unit it is necessary to make some calculations.

Different manufactures of flow measurement devices have different calculation, but common for all is \sqrt{dP} .

Use the actual formula to calculate the max flow for the factory calibrated measure range. The calculated flow or velocity is then programmed under "Max flow" in the selected unit. It is possible to scale the flow range under "Scale flw". When scaling the flow, note that the accuracy depends on the "Max flow" range.

If adjustment of the displayed actual flow or velocity must be done, it is possible to do under "Set flow". Programme the actual flow coming from a reference flow sensor or equal.

NOTE ! The programming must be done at the same time as the reference values are measured.

Automatically the "Max flow" programming will be changed for the new values. If the unit is connected to a BMS system or equal, the "Max flow" or if scaled, the "Scaled flw" and the output signal must be programmed in the connecting system.

Eg 3,5 m³/s = 10 VDC. The output signal is linear to the flow or velocity.

6. Alarms

	Alarm 1	OFF HIGH LOW	
	Source 1	dP FLOW	
	Level 1	-32768...32767	
	Delay 1[s]	0...3600	

	Reset 1	OFF ON	
	Alarm 2	OFF HIGH LOW	for purging use OFF.
	Source 2	dP FLOW	
	Level 2	-32768...32767	
	Delay 2[s]	0...3600	
	Reset 2	OFF ON	
	Res hold	FOREVER TIMED	
	Hold [s]	0...3600	
	Beeper	OFF ALARM 1 ALARM 2 AL1+AL2	

MicaFlex PFA includes an alarm function with one alarm, "Alarm 1", for high or low level, "Level 1" with time delay, "Delay 1". The alarm can be selected to monitor the differential pressure or flow/velocity, "Source 1". MF-PFA with purging control function has only one alarm relay with potential free output selectable for either normally open (NO) or normally closed (NC). The built-in buzzer can be programmed under "Beeper" to sound when alarm occur.

In normal operation the green LED on the front cover is lit. When passing the alarm limit the red LED will lit and after the programmed delay the LED starts flashing and the alarm relay output will shift to alarm state. If the buzzer is programmed for the current alarm it will sound.

By pressing the **ESC** (Reset) button on the front cover the buzzer is silenced when an alarm occurs. The Reset function for the alarm relay can be programmed. If the parameter "Reset 1" is set to "ON", the alarm relay will also be reset and the alarm output will shift to normal state. Reset can also be done externally by short circuiting terminal 11 and 12. The state of the external reset can be monitored under "Mute input".

Resetting of an alarm condition, "Res Hold", can be programmed to last forever "FOREVER" or to last for a specified time "TIMED". The time is programmed under "Hold [s]".

The "TIMED" function will keep the alarm reset during a specified time, when the time has elapsed the buzzer will sound again and the alarm relay output will shift to alarm state if an alarm condition exists. By using the "FOREVER" function the alarm is reset for as long as the current alarm condition exists.

The alarm function, both buzzer and alarm relay output, can be checked in normal operating mode by pressing the **ESC** (Test) key on the front cover. When testing the buzzer it must be programmed to sound under "Beeper" otherwise no sound will be heard. When testing alarm relay output, "Reset 1" must be programmed "ON" for the alarm relay output to shift.

In programming mode the alarm functions are blocked and the green LED is lit on the front cover.

NOTE ! The alarm relay is controlled by both alarm limits.

7. PI2 controller

Source	OFF dP FLOW
Mode	AUTO HAND
Output	DIRECT REVERSE
Set point	-32768...32767
NZ [%]	1...50
P-band	0...9999
I-time[s]	0...999
BZ	0...100
I-time BZ	0...999
Min Out	0,00...100,00
Max Out	0,00...100,00

If the PI-controller is not used you do not need to do any programming under "PI-controller".

MF-PFA has a PI-controller specially made for pressure and flow control. The controller has two programmable integral times.

The controller could be programmed as a standard PI-controller, but in most of the applications together with pressure and flow control we recommend to program it as an integral controller without the P-band. There are two programmable I-times. E.g. outside a desired limit on both sides of the set point it is possible to have a shorter I-time and inside the limits a longer I-time.

Programming

Select source: dP, FLOW or OFF.

Select mode: AUTO or HAND, Normally AUTO.

Select output to be: DIRECT or REVERSE.

Normally reverse (if the pressure or flow is higher than the set point the output signal will decrease).

Programme the set point in the earlier programmed unit for dP or Flow. Limits for SP are:

dP Min Output .. Max Output

Flow 0 .. Scale Flw

Programme the neutral zone NZ 1...9 % of the selected pressure or flow range, normally 1...5 %. The NZ is in % of the scaled pressure or flow range with half of the neutral zone on each side of the set point.

You can restrict the output from the controller to be within the limits set with Min Out and Max Out. The limits are set in %, e.g. setting Min Out = 30,00 and Max Out = 75,00 will restrict the output between 3,00 ... 7,50 V (0..10 V), or 8,8 ... 16,0 mA (4..20 mA).

P-band

Normally not used for pressure and flow control.

I-time

When programming as an I-controller there are two possibilities.

1. The same I-time over the whole range. Normally used. Program BZ = 000 and I-time BZ = 000. The I-time should normally be longer than the time for the damper motor etc to go from min to max.
2. Shifting between two I-times. The reason for working with two I-times is often that outside a set pressure or flow limit you want to have a fast response and inside a slow response (see Fig 3). BZ: limit for switching I-time. BZ is in % of the scaled pressure or flow range. Half the Bz is on each side of the set point. If the control output is not entering a stable position, increase the I-time, you could also try to increase the neutral zone.

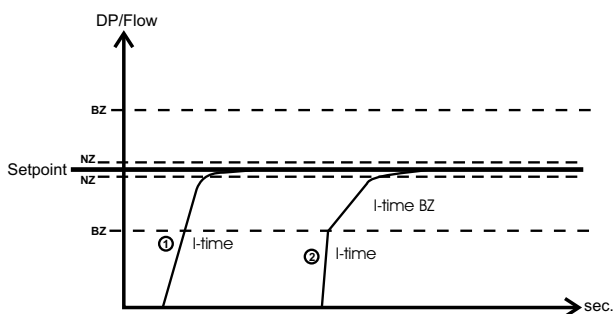


Fig 3
I-time, I-time BZ, BZ and NZ

Hand position

Return to start menu and select the menu displaying the PI-controller together with either the pressure or flow value.

"Flow / dP"

"Auto 50.00 %"

Press **PGM**, "Auto" will shift to "Hand" and make it possible to set the output in % with ∇/\blacktriangle .

To return to "Auto" press **PGM**.

To return to start menu press **ESC**.

8. Purge function

Purge	Off On Test
On time [s]	0...300
Off time [s]	0...3600

Select purge function "Off, On, Test".

In position "Off" the function is switched off.

In position "On" the purge function relay is activated accordingly to set time. "Off time" means time between each purge. "On time" means time length of each purge.

Selection "Test" means that the purge relay is acti-

vated and contact 16 & 17 are closed. The output signal is frozen during purging.

Zero setting of the pressure transmitter

Disconnect the pressure tubes or set the manifold valve in the calibration position. With the start menu displayed, press simultaneously both the keys ∇ \blacktriangle until the display shows:

ZERO OFFSET

Release the keys when the display shows:

ZERO OFFSET
ADJUSTING

When zero set is ready, the unit displays

ZERO OFFSET DONE

and automatically returns to start menu.

MICAFLEX PU, PURGING UNIT.

MF-PU is designed for use together with Micaflex PFA with purge function. The MF-PFA includes a relay which controls the cleaning of connected flow sensors by compressed air.

The pause time is possible to set between 0...3600 seconds and purging 0...300 seconds.

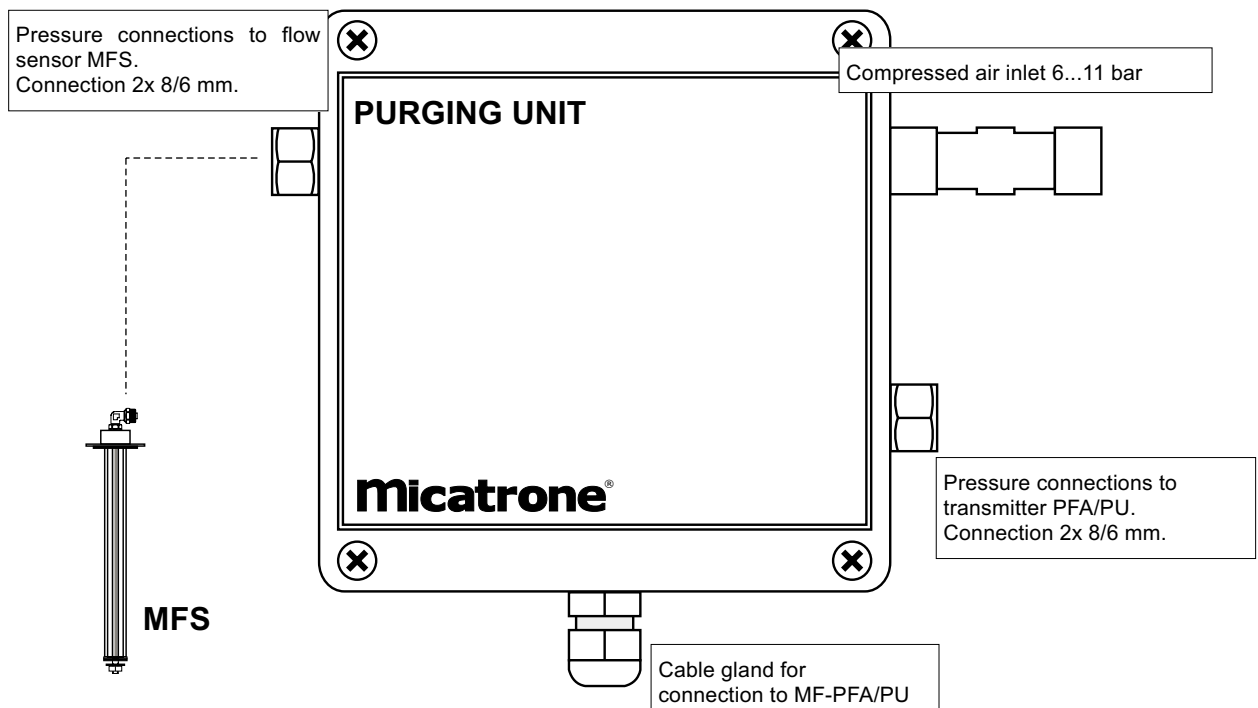
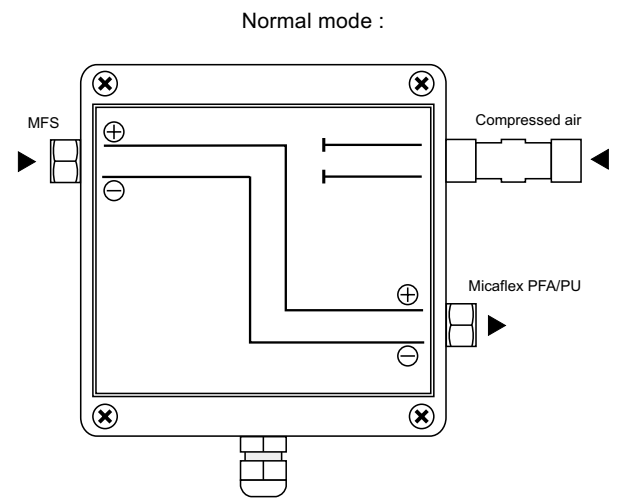
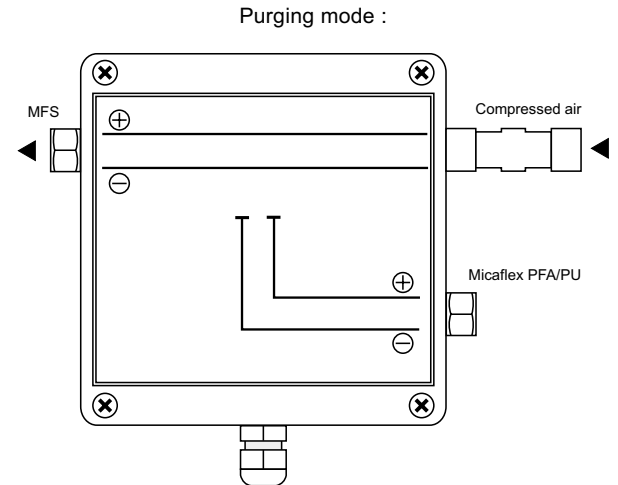
The output from MF-PFA is frozen during purging.

Design

MicaFlex PU purging unit consists of two electrical solenoid valves for switching between the transmitter and the compressed air inlet to MFS flow sensors. During the pause period the flow sensor is connected to the transmitter PFA.

During purging the two electric solenoid valves closes against the transmitter PFA and opens to the compressed air inlet which allows the flow sensor to be cleaned.

Valve function:



Technical Data Purging Unit:

Solenoid valves: 2 pcs 24 VAC
Connections to:
MF-PFA/PU: R1/8" internal thread
MFS flow sensor: R1/8" internal thread
Compressed air: R1/8" internal thread
Dimension: 120 x 122 mm [WxH]
(only the enclosure)

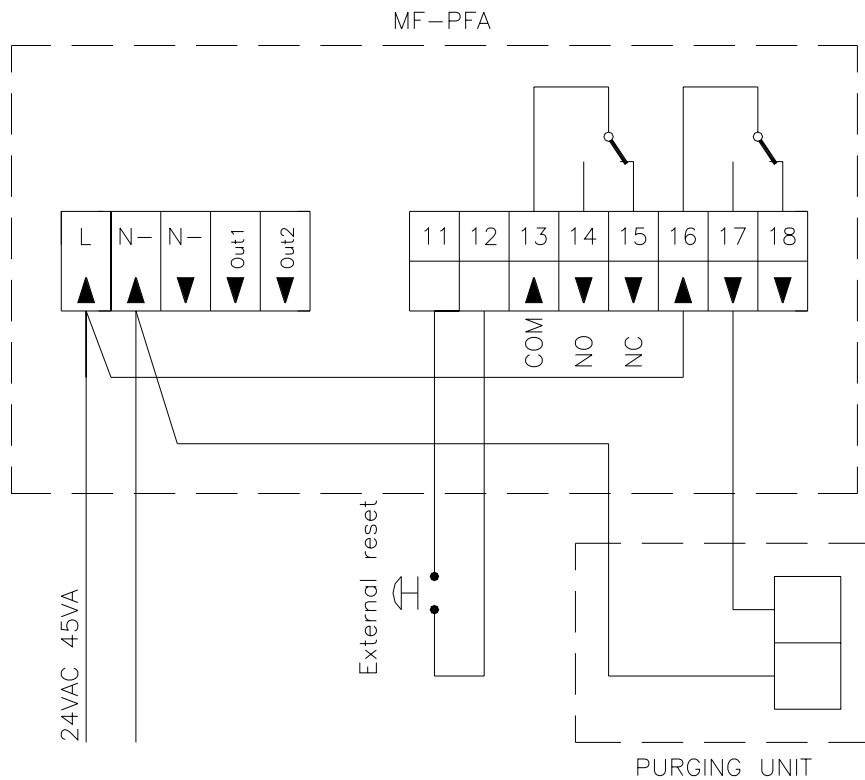
Technical Data Controller PFA:

Indicator, Alphanumeric LCD,
2 rows, 2 x 16 characters
Pressure range: see label on the unit
Flow ranges: l/s 0...32767
m³/s 0...327,67
m³/s 0...32767
m/s 0...327,67
cfm 0...32767
Accuracy: ± 0,5 % of pressure range
Temperature drift: < ±0,5 % /10 °C
Time delay: 0,0...9,9 sec.
Outputs: Two analogue outputs
0/2...10 VDC, 0/4...20 mA
selectable and scalable
Ambient temp: 0...50 °C
Alarm: Alarm relay outputs,
high&low alarm. Red LED alarm
indication and Buzzer.
Relay Max load: 48 VAC - 5A / 48 VDC - 1,5A

Buzzer: 85 dB (10cm)
Purge control: Relay contacts 16, 17
24 VAC, 45 VA
Power supply: 24 VAC ±15 %
20...32 VDC
Power consumption: 3 VA
Housing class.: IP 65
Electric connection,
- rigid wire : 1 x 2.5mm² / terminal
- flexible wire : 1 x 1.5mm² / terminal
Cable entry: 3 x M16x1,5mm
(cable glands not included)
Dimensions: WxHxD 120 x 122 x 90mm
Weight: 0,7 kg
Conformity: EMC SS-EN 50081-1
SS-EN 50082-2
LVD SS-EN 610101-1

Maintenance

Check the zero point every 6 months.



AB Micatrone
Åldermansvägen 3
SE-171 48 SOLNA
SWEDEN

Telephone: +46 8-470 25 00
Fax: +46 8-470 25 99
Internet: www.micatrone.se
E-mail: info@micatrone.se