

Programmable differential pressure transmitter for pressure or flow measurement, supervision and control.

MF-PFA

Instruction : mi-206gb_070316

NOTE !

Read the entire instruction carefully before start.

Application

MicaFlex PFA is a differential pressure transmitter for pressure or flow measurement, supervision and control. Two voltage free alarm contacts 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 mounting in a recessed position, 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".

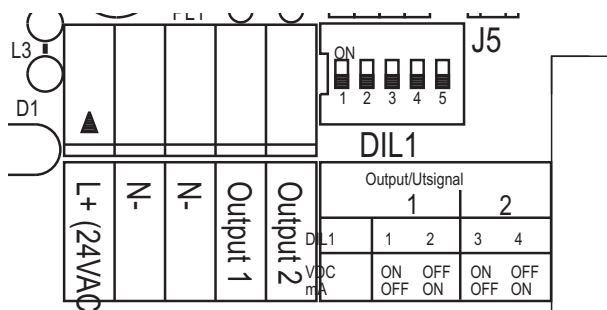


Fig 2

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

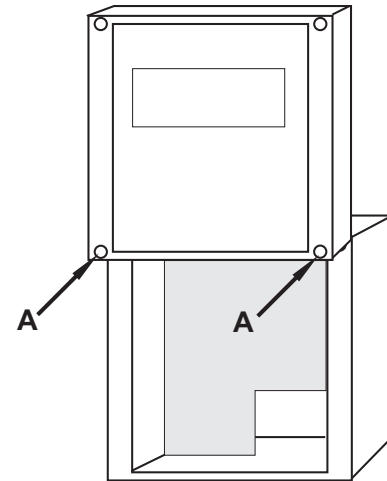


Fig 1

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.

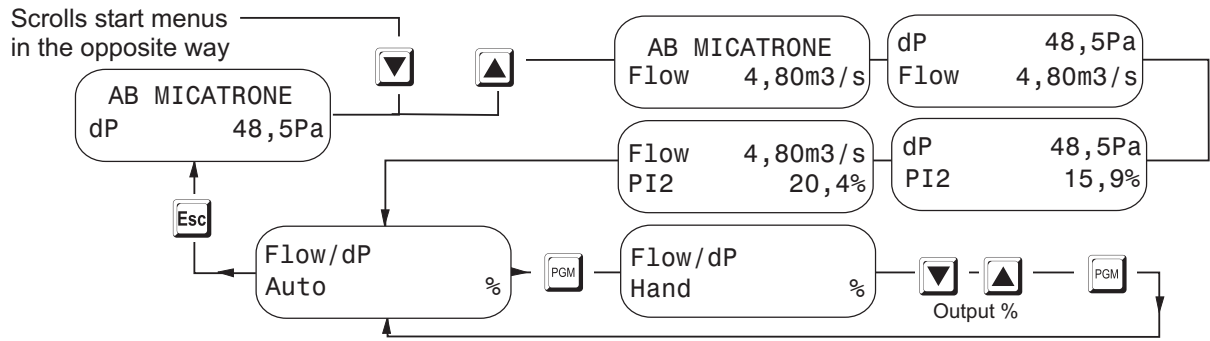
1. Current values
2. System settings
3. Outputs
4. Pressure
5. Flow
6. Alarm
7. PI2 controller
8. Communication
9. Internals

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**

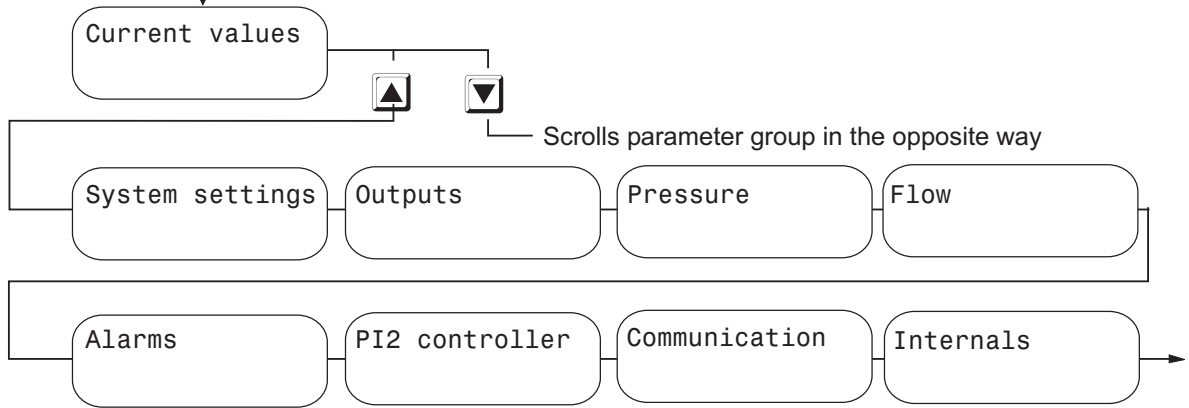
Par.no:	Par. name	Range	Value
Internals			
	Prog ver	0.00...9.99	
Current values			
	dP	-32768...32767	
	Flow	0...32767	
	PI2	0.00...100.00	
	PI2 CSP	-32768...32767	
	Mute input	OPEN CLOSED	
System settings			
	Display	dP FLOW dP+FLW dP+PI2 FLW+PI2	
	Damping[s]	0...9	
(hidden)	Access code	0...9999	
Outputs			
	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	
	Set flow	0...32767	

Par.no:	Par. name	Range	Value
Alarms			
	Alarm 1	OFF HIGH LOW	
	Source 1	dP FLOW	
	Level 1	-32768...32767	
	Delay 1[s]	0...3600	
	Reset 1	OFF ON MANUAL	
	Alarm 2	OFF HIGH LOW	
	Source 2	dP FLOW	
	Level 2	-32768...32767	
	Delay 2[s]	0...3600	
	Reset 2	OFF ON MANUAL	
	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	
Communication			
	Address	1...247	
	Location	0...32767	
	Protocol	COMLI	
	Baud	600 b 1200 b 2400 b 4800 b 9600 b	
	Protect	NO YES	



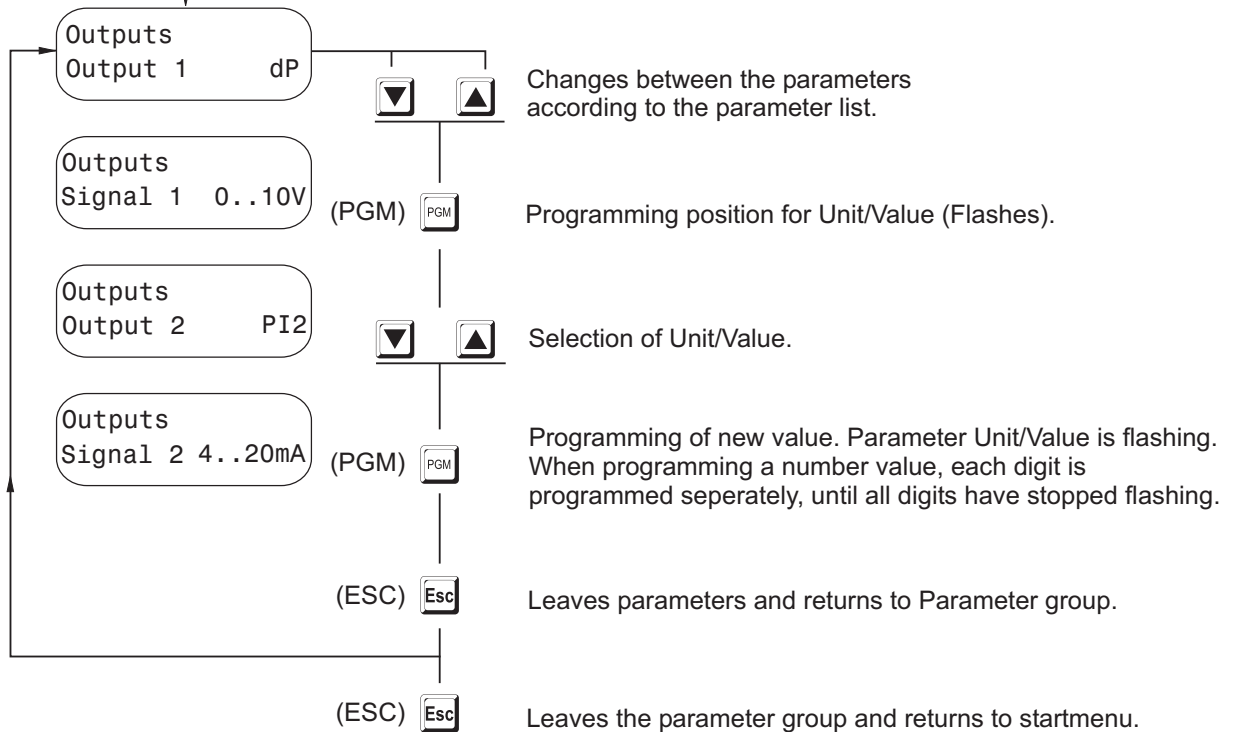
(PGM)

Press key until displayed text disappears.



(PGM)

Opens parameter group and allows the parameters to be selected.



Changes between the parameters according to the parameter list.

Programming position for Unit/Value (Flashes).

Selection of Unit/Value.

Programming of new value. Parameter Unit/Value is flashing. When programming a number value, each digit is programmed separately, until all digits have stopped flashing.

Leaves parameters and returns to Parameter group.

Leaves the parameter group and returns to startmenu.

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	

Shows the actual values.

2. System settings

	Display	dP FLOW dP+FLW dP+PI2 FLW+PI2	
	Damping[s]	0...9	
(hidden)	Access code	0...9999	

Select the start menu to be displayed. Select the time constant (damping) for the flow and pressure measurement 0...9 seconds, normally 1...3 seconds.

Key lock is a hidden parameter if the function is activated and no code has been entered. This function is available from program version 2.10 or higher.

The key lock is to be used when then transmitters settings must be protected from unwanted alteration. The 4-digit code must be entered before accessing the program and function menu. For Micaflex with built-in control function the code must also be entered to switch between AUTO and HAND operation.

Indication of the measured values and operating state is accessible without entering the code.

At delivery the code is programmed to "0000" unless nothing else is agreed to. With factory default code "0000" the key lock is in-active. I.e no protection for alternating the settings.

Activating the key lock

To activate the key lock settings must be programmed into the parameter 'Access code' which is found below the parameter group 'System settings'. The code must be different from "0000" unless the lock will be in-active. After programming a 4-digit code into the parameter this code must be used to access the program and function menus.

In-activating the key lock

The key lock can be in-activated by setting the value of parameter 'Access code' to "0000". Since the setting is done from the program menu the already programmed code must be known to inactivate the key lock.

Contact Micatrone if the code has been lost!

Entering code

To access the program or function menu or to switch between AUTO-HAND function the code must be entered.

Example to access the program menu:

Press the **PGM**-key to open the program menu. Keep the key pressed until following screen appears.

MF - xxx
PROGRAM - MENU

Instead of the text 'xxx' the actual model for the present type is indicated.

Release the **PGM**-key. If the key lock is activated the following screen appears.

ENTER CODE : 0***
PROGRAM - MENU

The first digit (0) is flashing to indicate that the first digit of the code must be entered by using the arrow-keys. Press the **PGM**-key to jump to the second digit, etc.

When all four digits are entered press a final time the **PGM**-key. The entered code is now compared with the settings in the parameter 'Access code'. If they match the program menu is accessed.

Current values

The menu is accessible until the **ESC**-key is

pressed one or several times and the preset start menu is displayed. Example:

AB MICATRONE	
dP	4 Pa

If the code does not match the programmed settings following screen appears

INVALID CODE PROGRAM-MENU

for a period of 2 second before shifting to the "Enter code" screen again.

ENTER CODE: 0*** PROGRAM-MENU

By pressing the **ESC**-key during the operations the programming of the code is aborted and the preset start menu is displayed.

AB MICATRONE	
dP	4 Pa

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 m3/s m3/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 manufacturers 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.

Alarms

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

MicaFlex MF-PFA includes an alarm function with two separate alarms, "Alarm 1" / "Alarm 2", for high or low level, "Level 1" / "Level 2", and with separate time

delays, "Delay 1" / "Delay 2". Both alarms can be selected to monitor the differential pressure or flow/velocity, "Source 1" / "Source 2". Each alarm has its own 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 relays can be programmed individually for each alarm. If the parameter "Reset 1" and/or "Reset 2" is set to "ON", the selected alarm relay will also be resetted 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 resetted 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" and/or "Reset 2" must be programmed "ON" for the alarm relay output to shift.

During programming mode the buzzer is blocked.

The parameter "Reset 1" and/or "Reset 2" can be programmed to "MANUAL". This means that the associated alarm no longer resets itself automatically. The alarm can only be reset manually when the current monitored value is at a safe level, high or low depending on the alarm programming. The reset is done with **ESC**. As long as **ESC** is pressed the display also indicates the current test and alarm state.

If the alarm reset is programmed to be "MANUAL" the alarm state is also preserved after power off and this means that if the alarm has been tripped it will have to be reset by pressing **ESC**.

8. 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

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.

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.

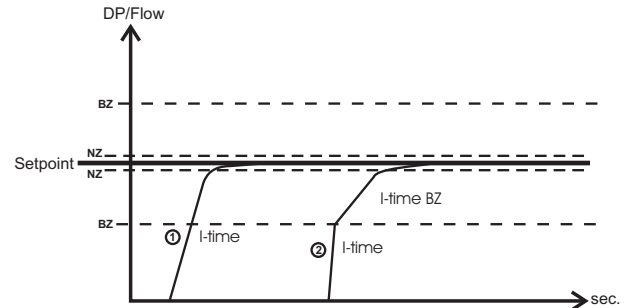


Fig 3
I-time, I-time BZ, BZ and NZ

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**.

Zero setting of the pressure transmitter

Disconnect the pressure tubes or set the manifold valve in the calibration position.

With the startmenu 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.

Technical Data:

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: Two separate shifting alarm-
relay outputs, high&low alarm.
Red LED alarm indication and
Buzzer.

Relay output,
Max load: 48 VAC - 5A / 48 VDC - 1,5A

Buzzer: 85 dB (10cm)

Power supply: 24 VAC ±15 %
20...32 VDC

Power
consumption: 5 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 122 x 120 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.

Electrical connection main circuit board

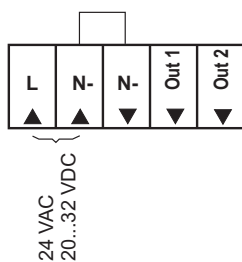


Fig 4

Electrical connection alarm module

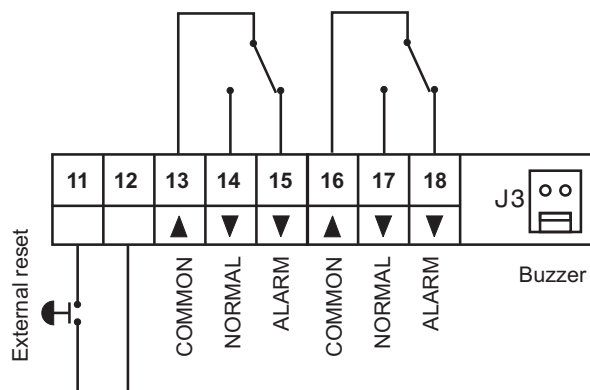


Fig 5

Contacts in fallen/unpowered state

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