

### Programmable differential pressure transmitter for pressure or flow measurement and control with purging function for flow sensors.

## MF-PFTT

Instruction : mi-261gb\_090212

#### NOTE !

Read the entire instruction carefully before start.

#### Application

MicaFlex PFTT is a pressure and flow transmitter with built in PI-controller and a temperature input which makes it possible to compensate flow measurement for temperature changes.

MF-PFTT can be programmed to activate a purging unit, MF-PU-2, for automatic cleaning of flow sensors with compressed air on set intervals.

With the four key pad, **▼**, **▲**, **PGM** and **ESC**, the desired function is selected as well as setting and scaling is done. The dual row LCD display clearly indicates the selected function.

#### Installation

MF-PFTT 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 Fig 2. 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-PFTT has two analogue outputs to be used for actual value of pressure and flow, temperature, purging unit 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".

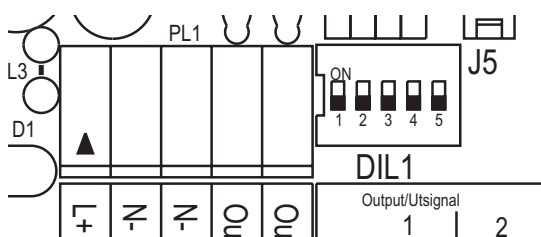


Fig 1

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

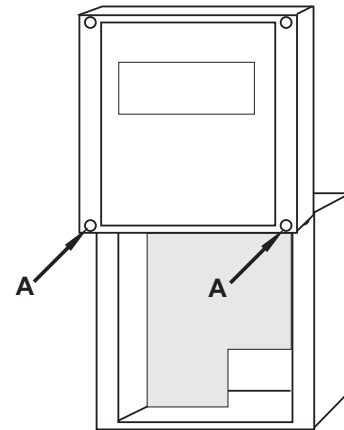


Fig 2

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 **▼▲** it is possible to scroll 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 "PROGRAM-MENU" appears. Release the key and the display shows parameter group, see table on page 2.

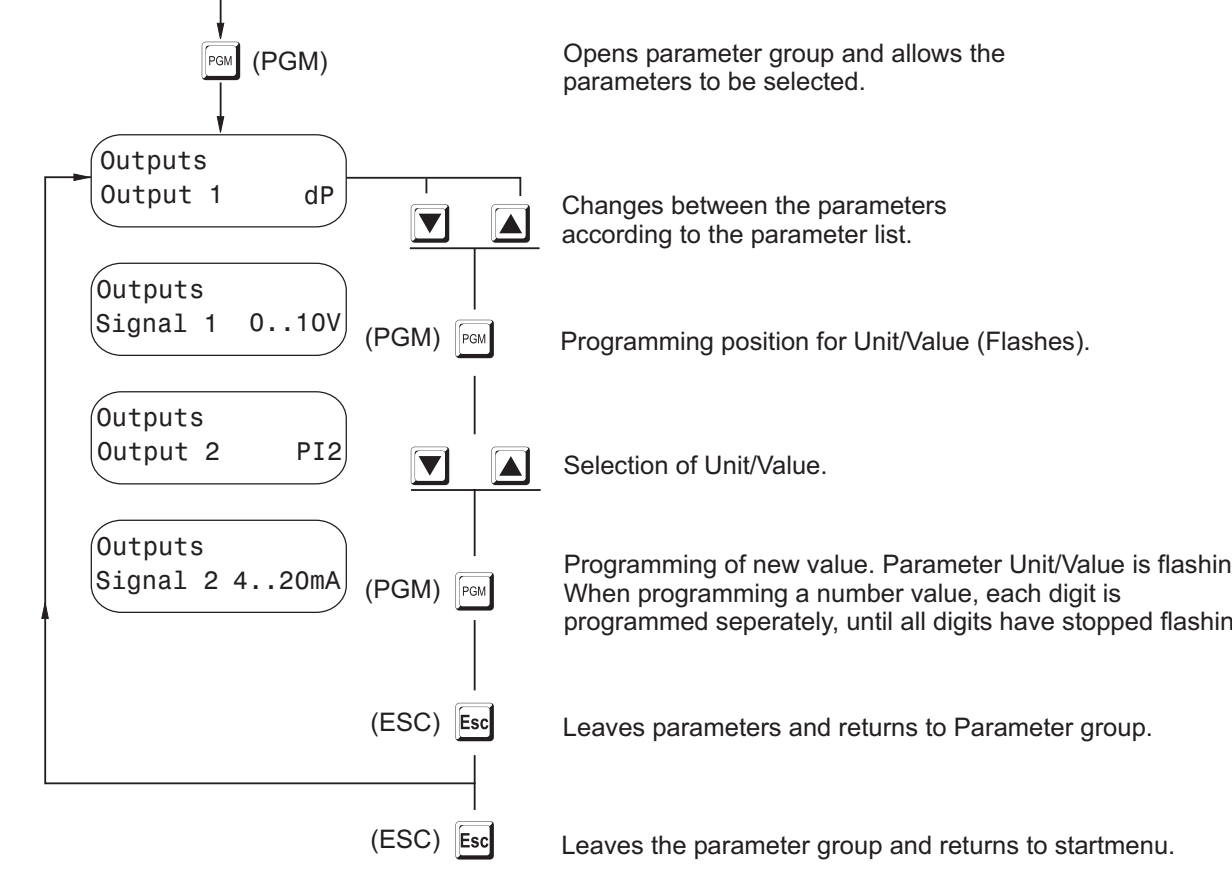
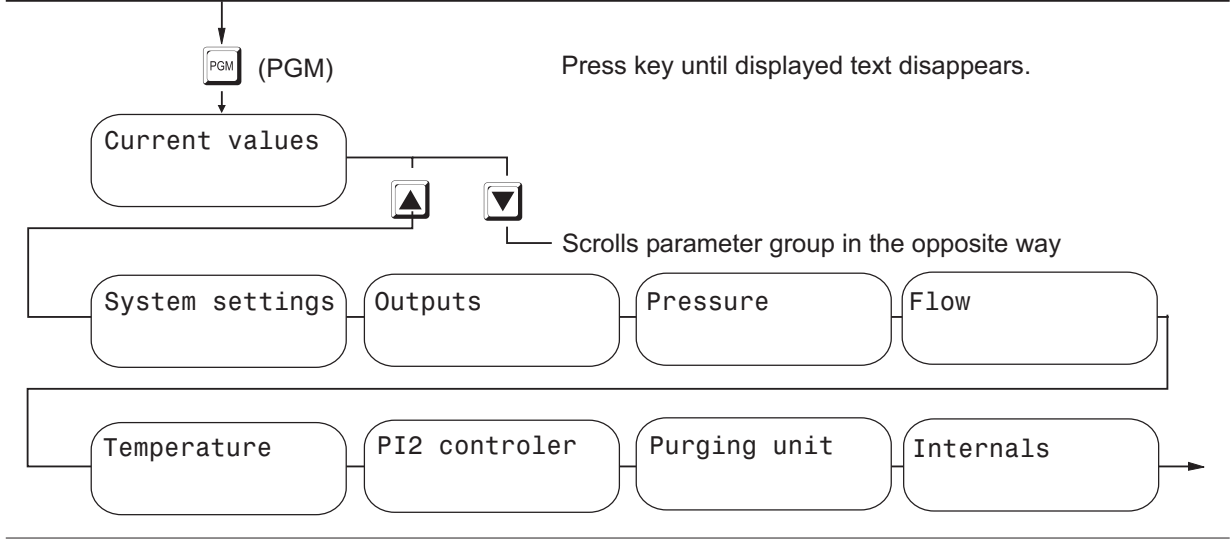
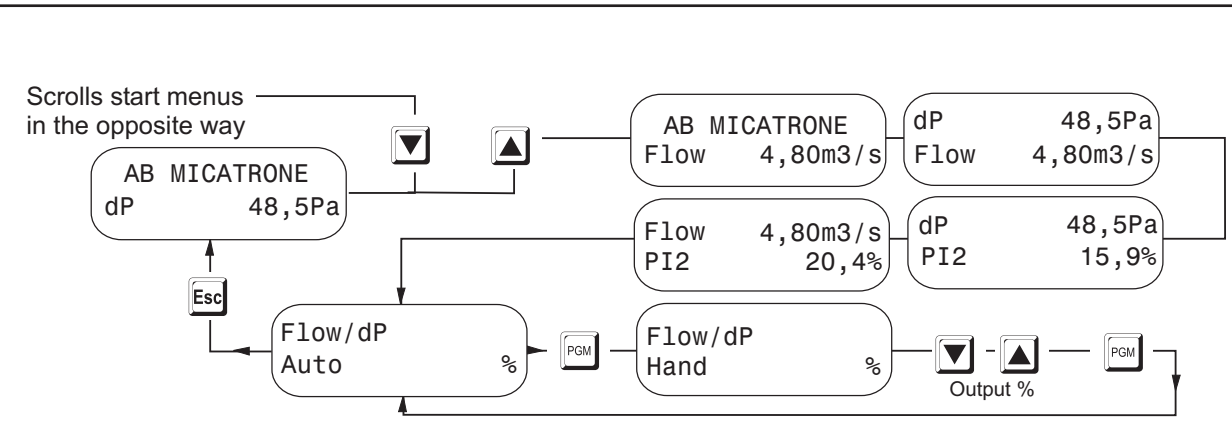
With **▼▲** it is possible to scroll through the parameter groups.

1. Current values
2. System settings
3. Outputs
4. Pressure
5. Flow
6. Temperature
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 **▼▲** select the parameter to be programmed and press **PGM**.

Par.no:	Parameter	Range	Value
<b>Internals</b>			
0	Prog ver	0.00...9.99	
<b>Current values</b>			
100	dP	-32768...32767	
101	Flow	-32768...32767	
102	PI2	0.00...100.00	
103	PI2 CSP	-32768...32767	
109	Temp	-3276,8...3276,7	
110	Purging	OFF PRE CLEAN POST PAUSE TEST	
<b>System settings</b>			
4	Display	dP FLOW dP+FLOW dP+PI2 FLOW+PI2 dP+TEMP FLW+TEMP	
5	Damping[s]	0...9	
(hidden)	Access code	0...9999	
<b>Outputs</b>			
19	Output 1	dP FLOW PI2 TEMP CLEAN	
20	Signal 1	0..10V 2..10V 0..20mA 4..20mA	
21	Output 2	dP FLOW PI2 TEMP CLEAN	
22	Signal 2	0..10V 2..10V 0..20mA 4..20mA	
<b>Pressure</b>			
23	MinCal[Pa]	-32768...32767	
24	MaxCal[Pa]	-32768...32767	
25	Unit dP	Pa PaDec mbar iwc	
26	Min Range	-32768...32767	
27	Max Range	-32768...32767	
28	Min Output	-32768...32767	
29	Max Output	-32768...32767	
30	Sign dP	POS NEG	
<b>Flow</b>			
31	Unit flow	L/s m3/s m3/h m/s cfm	
32	Max flow	0...32767	

Par.no:	Parameter	Range	Value
33	Scale flw	0...32767	
34	Set flow	0...32767	
92	Compens	OFF ACTUAL NORMAL 0	
<b>Temperature</b>			
93	Input	OFF 0..10V 2..10V 0..20mA 4..20mA Pt-100L Pt-100H Pt-1000L Pt-1000H	
94	Min Input	-30...600	
95	Max Input	-30...600	
<b>PI2 Controller</b>			
35	Source	OFF dP FLOW	
36	Mode	AUTO HAND	
37	Output	DIRECT REVERSE	
52	Temp 1	-30...600	
53	SP1	-32768...32767	
54	Temp 2	-30...600	
55	SP2	-32768...32767	
56	SPC	OFF TEMP	
39	NZ [%]	1...50	
40	P-band	0...9999	
41	I-time [s]	0...999	
42	BZ [%]	0...100	
43	I-time BZ	0...999	
96	Min out	0,00...100,00	
97	Max out	0,00...100,00	
<b>Purging unit</b>			
62	Mode	OFF ON TEST	
63	On Time [s]	0...99	
64	Pause [s]	30...3600	
<b>Communication</b>			
47	Adress	1...247	
48	Location	0...32767	
49	Protocol	Comli	
50	BAUD	600 b 1200 b 2400 b 4800 b 9600 b	
51	Protect	NO YES	



**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 is displayed press **PGM** until "PROGRAM-MENU" appears. Then release the **PGM** key.

### 1. Current values

100	dP	-32768...32767	
101	Flow	-32768...32767	
102	PI2	0.00...100.00	
103	PI2 CSP	-32768...32767	
109	Temp	-3276,8...3276,7	
110	Purging	OFF PRE CLEAN POST PAUSE TEST	

Shows the actual values and the state of the purging function.

### 2. System settings

4	Display	dP FLOW dP+FLOW dP+PI2 FLOW+PI2 dP+TEMP FLW+TEMP	
5	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.

The key lock is to be used when transmitters settings must be protected from unwanted alteration. The 4-digit code must be entered before accessing

the program and function menu.

For units 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 inactive. 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 - PFTT  
PROGRAM-MENU

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  
Flow 12.34 m3/s

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  
Flow 12.34 m3/s

### 3. Outputs

19	Output 1	dP FLOW PI2 TEMP CLEAN	
20	Signal 1	0..10V 2..10V 0..20mA 4..20mA	
21	Output 2	dP FLOW PI2 TEMP CLEAN	
22	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,

actual value for temperature measurement and purging control (CLEAN).

**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.

When controlling the purging function, the signal output is 0 mA in OFF position and 20 mA in purging condition. The output signal controls a relay inside the purging unit, therefore the signal must be set to mA-output and be programmed for 0...20mA.

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

23	MinCal[Pa]	-32768...32767	
24	MaxCal[Pa]	-32768...32767	
25	Unit dP	Pa PaDec mbar iwc	
26	Min Range	-32768...32767	
27	Max Range	-32768...32767	
28	Min Out	-32768...32767	
29	Max Out	-32768...32767	
30	Sign dP	POS NEG	

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

MF-PFTT is 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-PFTT 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

31	Unit flow	L/s m <sup>3</sup> /s m <sup>3</sup> /h m/s cfm	
32	Max flow	0...32767	
33	Scale flw	0...32767	
34	Set flow	0...32767	
92	Compens	OFF ACTUAL NORMAL 0	

If the unit isn't to be used for flow measurement, nothing has to be programmed under the parameter group "Flow".

Programme the unit for flow l/s, m<sup>3</sup>/s, m<sup>3</sup>/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 at 20 °C is then programmed under "Max flow" in the selected unit. The flow range for max. output signal is programmed in "Scale flw", e.g. 3,5 m<sup>3</sup>/s = 10 VDC.

In parameter "Scale Flw", the flow should be entered at actual temperature or in normal flow if temperature compensation is activated. The output signal is linear compared to the flow or velocity.

**NOTE !** If the range is not scaled, the same value in parameter "Max flow" must also be programmed into parameter "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 (PGM-key is pressed).

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 "Scale flw" and the output signal must be programmed in the connecting system.

With the parameter "Compens", the calculated flow can automatically be compensated for changes in the air density due to temperature changes. With the parameter set to "ACTUAL" the flow is calculated by the current temperature. With the parameter set to "NORMAL 0", the flow will be calculated as if the temperature was 0 °C.

When the parameter is set to "ACTUAL", the letter "A" is displayed in front of the selected flow unit, e.g. Am<sup>3</sup>/s, and when set to "NORMAL 0", the letter "N" is displayed in front of the selected flow unit, e.g. Nm<sup>3</sup>/h. This is to indicate that the flow is calculated for the current temperature or in normal flow.

## 6. Temperature

93	Input	OFF 0..10V 2..10V 0..20mA 4..20mA Pt-100L Pt-100H Pt-1000L Pt-1000H	
94	Min Input	-30...600	
95	Max Input	-30...600	

Within this parameter group, the temperature sensor input is selected. It is possible to use an analogue signal, 0/2...10 VDC or 0/4...20 mA, Pt-100 or Pt-1000 sensor.

When using an analogue signal the signal must be scaled in parameter "Min Input" and "Max Input".

Pt-100 and Pt-1000 has two measuring ranges, either low (L) or high (H).

The low selection has a temperature range of -30...80 °C and the high selecting has a temperature range of 0...600 °C. The setting of parameters "Min Input" and "Max Input" will automatically be set for the low or the high range.

Change the setting of the DIL-switch located in the upper right corner on the temperature input circuit board, to correspond with the programmed settings, VDC, mA, Pt-100 or Pt-1000. See figure on the last page.

## 7. PI2 controller

35	Source	OFF dP FLOW	
36	Mode	AUTO HAND	
37	Output	DIRECT REVERSE	
52	Temp 1	-30...600	
53	SP1	-32768...32767	
54	Temp 2	-30...600	
55	SP2	-32768...32767	
56	SPC	OFF TEMP	
39	NZ [%]	1...50	
40	P-band	0...9999	
41	I-time [s]	0...999	
42	BZ [%]	0...100	
43	I-time BZ	0...999	
96	Min out	0,00...100,00	
97	Max out	0,00...100,00	

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

MF-PFTT 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 P-band. There are two programmable I-times. 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 "SP1" in the earlier programmed unit for dP or Flow.

Allowed limits are:

**dP** Pressure/Min Out .. Pressure/Max Out.

**FLOW** 0 .. Flow/Scale flw.

With the parameter "SPC", the set value can be compensated for temperature changes. Select "TEMP" to automatically have the unit to change the set value between two different linear values.

Selecting "Temp 1" will use "SP1" as the set value. Selecting "Temp 2" will use "SP2" as the set value. Current set point value can be read in parameter group "Current values" and parameter "PI2 CSP".

Programme the neutral zone NZ 1...50 % 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 dampermotor 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.

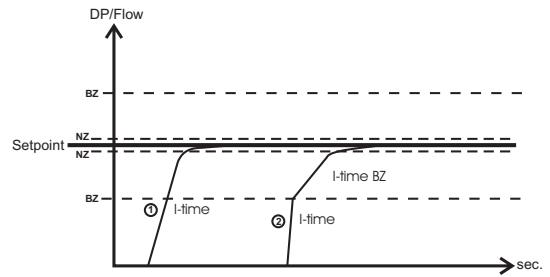


Fig 3  
I-time, Itime BZ, BZ and NZ

**Min out & Max out**

The output signal from the PI-controller can be limited within a specified range. The range is programmed in percent into parameter "Min out" and "Max out".

Example: If "Min out" is set to 30,00 and "Max out" is set to 75,00, the output signal will be limited to 3,00...7,50 V (with 0...10 V setting) or 8,8...16,0 mA (with 4...20 mA setting).

**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  $\nabla/\blacktriangle$ .

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

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

**8. Purging unit**

62	Mode	OFF ON TEST	
63	On Time [s]	0...99	
64	Pause [s]	30...3600	

The purging function can be programmed in three different states, OFF, ON or TEST -mode. "OFF" will result in a inactivated mode. In "ON" mode the purging function is activated and cleaning will be performed with even intervals. If the parameter is set to "TEST", the purging function is active and will perform constantly. This is used to check the purging function.

In parameter "On Time" it is possible to set the time for each interval to be during purging. The time is programmed in seconds. Parameter "Pause" is used to set the time between each purging. This parameter is also programmed in seconds, 3600 seconds = 1 hour.

During the pause, the LED "Normal" is lit. Measurement and control are in operation. Two seconds before the purging begin, the LED "Normal" goes out and the measurement is stopped with the latest read value stored and the control output signal is frozen at the current level. When the purging begin,

the LED "Clean" is lit and the purging control signal to the purging unit is activated.

After completed purging interval, the LED "Clean" goes out and after an additional 5 seconds the measurement and control output is restored. The LED "Normal" is lit and a new "Pause" time begin.

### Technical Data



Indicator:	Alphanumeric LCD 2 rows, 2 x 16 characters
Pressure range:	see label on the unit
Flow ranges:	l/s: 0...32767 m <sup>3</sup> /s: 0...327,67 m <sup>3</sup> /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...9 sec.
Temp. input:	Sensor Pt-100, Pt-1000 and 0/2...10 VDC, 0/4...20 mA
Outputs:	Two analogue outputs 0/2...10 VDC, 0/4...20 mA selectable and scaleable
Ambient temp:	0...50 °C'
Power supply:	24 VAC ±15 % 20...32 VDC
Power consumption:	3 VA
Housing class.:	IP 65
Electric connections	
-rigid wire	1 x 2,5 mm <sup>2</sup> / terminal
-flexible wire	1 x 1,5 mm <sup>2</sup> / terminal
Cable entry:	2 x M16x1.5mm (cable glands not included)
Dimensions WxHxD:	122 x 120 x 90mm
Conformity:	
-EMC	SS-EN 50081-1
-LVD	SS-EN 50082-2 SS-EN 610101-1

### Maintenance

Check the zero point every 6:th month.

#### 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   until the display shows:

ZERO OFFSET

Release the keys when the display shows:

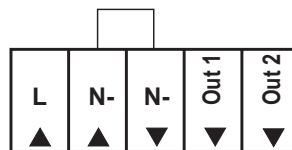
ZERO OFFSET  
ADJUSTING

When zero set is ready, the unit displays

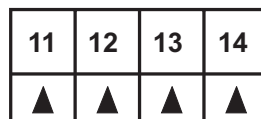
ZERO OFFSET DONE

and automatically returns to start menu.

### Electrical connection:



24 VAC  
20...32 VDC



Pt-100  
Pt-1000      mA  
Volt

### Input type for temperature sensor

DIL-switch located in top right corner on PCB.

Volt:



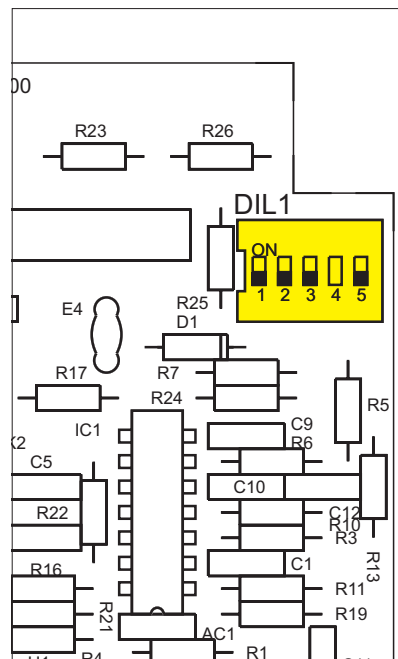
mA:



Pt-100:



Pt-1000:



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