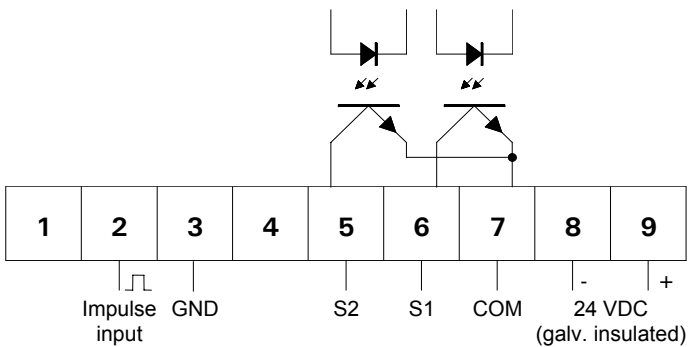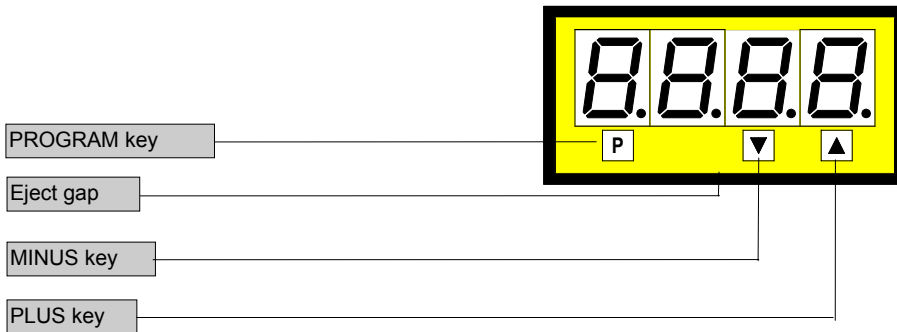# Frequency metering with 2 set points - microprocessor based technology

- Free scalable indication and set points from 0 up to +9999
- Standard: min/max memory - option: analogue output
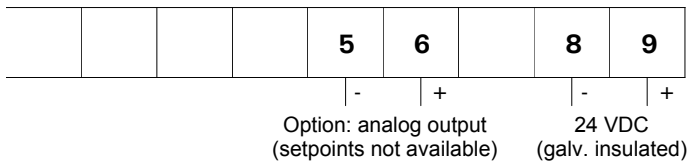- Allows to be placed side by side in grid and mosaics systems

48x24

PROGRAM key

Eject gap

MINUS key

PLUS key

ORDER NUMBER OF TYPE
PFE 4.007.7782B

1	2	3	4	5	6	7	8	9
	Impulse input	GND		S2	S1	COM	-	+
							24 VDC (galv. insulated)	

Connections for Namur and 3-wire NPN and PNP see last page.
(externally 24 VDC neccessary)

|				5	6		8	9
				-	+		-	+
				Option: analog output (setpoints not available)			24 VDC (galv. insulated)	

Options

- green LED
- Protection IP54
- Plug in terminal with protection IP40
- Plug in terminal with protection IP54
- Analog output 0-10 VDC - (12 bit)
- Analog output 0-20 mA/load 500 Ω
- Analog output 4-20 mA/load 500 Ω
 With analog output setpoints S1 and S2 not available!
- Set points as open emitter
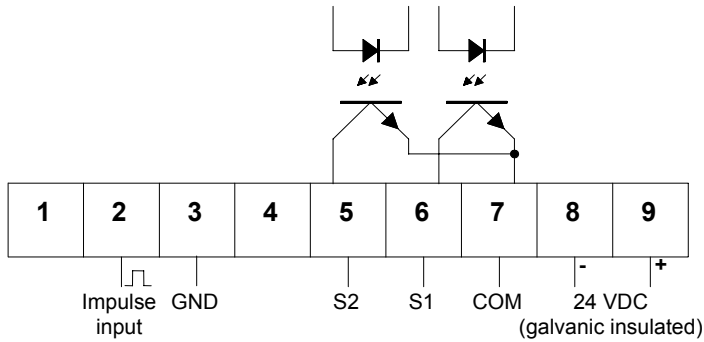- Dimension strip selectable (max. 8 characters)

Technical data

Dimensions	Housing	48 x 24 x 90 mm, including screw terminal
	Assembly cut out	$45.0^{+0.6}$ x $22.2^{+0.3}$ mm
	Fastening	special quick plastic clamp proper to fix in wall thickness up to 50 mm
	Housing material	PC/ABS-Blend, colour black, UL94V-0
	Protective system	at the front IP40
		connection IP00
	weight	approx. 75 g
	connection	at the rear side via plug in connector up to 1.5 mm^2
Input	Sensors	Namur, 3-wire pick up, impulse input
		High/low level ---> 10 V/< 6 V
	Input resistance	Ri at 10 V = 10 KΩ
	Input frequency	1 Hz up to 500 KHz
Output	Open collector	2 outputs
		supply by customers (U_B=5-40 V/I_{max}=100 mA)
	Analogue output	0-10 VDC (12 bit)
		0-20 mA/load 500 Ohm (12 bit)
		4-20 mA/load 500 Ohm (12 bit)
Accuracy	Resolution	0 up to +9999
	Measuring fault	+/-0.04% of the input frequency
	Measuring principle	frequency/pulse width measuring
	Temp. Drift	40 ppm/K
Power unit	Supply voltage	24 VDC +/-10 % galvanic insulated
	Power consumption	approx. 2 VA
Indication	Display	LED with 7 segments, 10 mm high, red
		4 digits = indication 9999
	Overflow	indication of four transversal bars
	Time of indication	adjustable from 0.2 to 10.0 seconds
Ambient conditions	Working temperature	0 up to + 60 $^{\circ}$C
	Storing temperature	-20 up to + 80°C
Gehäuse:		

77 mm

48 mm

24 mm

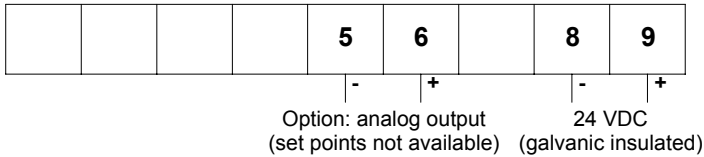21 mm

91 mm
(with plug in terminal 101 mm)

42 mm

86 mm
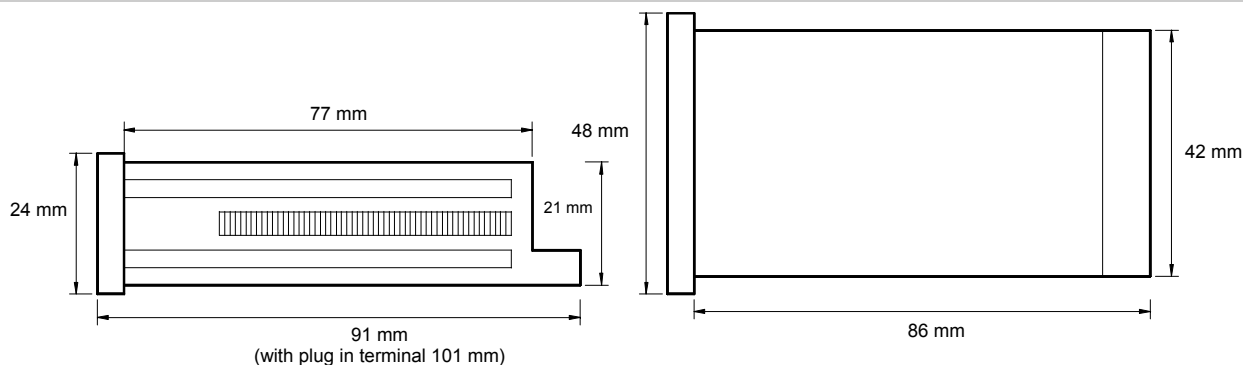
CE-sign
For unlimited use of the instrument within the directives for electromagnetic compatibility 89/336/EC frequency input wires have to be used with shielded cable and cable's shield connected to earth ground at one end only.

Connection diagram, programming, remarks

1	2	3	4	5	6	7	8	9

Impulse input   GND   S2   S1   COM   24 VDC
(galvanic insulated)

Connections for Namur and 3-wire
NPN and PNP see last page.
(externally 24 VDC neccessary)

			5	6		8	9
			-	+		-	+

Option: analog output   24 VDC
(set points not available)   (galvanic insulated)

Setting
1. Connect the instrument according to the wiring diagramm.
2. After power on, the instruments runs into a lamptest and returns back to the standard mode.
3. Connect the desired input frequency to the measuring input.
4. Pressing the **P**-key enters the programm mode with indication of „**P1**" on the display.
5. Pressing the **P** und ▲ key simultaneously steps through the different programm numbers.
6. Pressing ▲ oder ▼ key shows the current values.
7. To change values use ▲ oder ▼ key.
8. Otherwise the remaining values will be memorized automatically 7 seconds after the last touch of key with leaving program mode.

Additional key-functions in standard-mode for indication of min/max values.

Simultaneously pressing of ▼ and ▲ key deletes and actualizes min/max-memory.
▲ key enters max-memory.
▼ key enters min-memory.

Instructions

After power on the instrument with the inbuilt microcontroller starts with an initial program activating lamp test and readout of memorized parameters in an EEPROM. In case of loosing parameters or any defects in hardware the system generates an error message „HELP". This function prevents damage from the peripherals and human life, totally reset is required. After a new power on, the system remains in lamptest while pressing **P**-key. Then the unit storages the default parameters and is ready for a new programming.
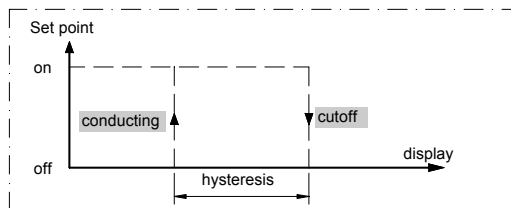
Setpoints

The following diagrams are showing the switching operation of PFE4 open collector outputs, the hysteresis is free programmable.
There are two kinds of operation:

Example: operation current
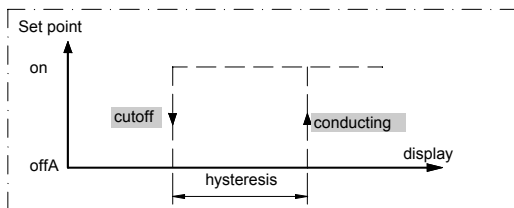
Example: quiescent current

Operation current means that the open collector will be conducted if reaching the adjusted setpoint.

Quiescent current means that the open collector will be cutoff if reaching the adjusted setpoint.

Program table, example of programming

Program table 1

Program-Number (PN)	Function	Remark	Display	Basic parameter after reset
1	Input of desired indication value		0 up to +9999	1000
2	Setting of decimal point	Press ▲ until desired decimal point will be shown.		no dec. point
3	Setting of input frequency	Setting in Khz, dec. point unconsidered.		1.000
4	Setting of decimal point for input frequency	(Minimum one decimal point is necessary) Press ▲ until desired decimal point will be shown		decimal point on first digit
5	Input of final value for analog output	Option	0 up to +9999	1000
6	Input of offset for analog output	Option	0 up to +9999	0
8	Input of display time		0.2 up to 10.0 s	1.0

Program table 2 (Set points)

S1	S2	Function	Display	Basic parameter after reset
PN	PN			
61	66	Setpoint	0 up to +9999	500 / 600
62	67	Hysteresis	0 up to +9999	1
63	68	Quiescent current	0	-
		Operating current	1	1

Example for programming

Input: frequency
Measuring value: 0-85 KHz
Indication: 0 Hz = 0.0   85.00 KHz = 300.0
Display refres. time: 2.0 seconds
Setpoints: S1 ==>   60.0 and quiescent current
open collctor conducting = 58.0 ==> hysteresis 2.0
S2 ==>   150.0 and operating current
open collector cut off = 80.0 ==> hysteresis 70.0
Analog output: 0 V output   ==>   display 0.0   ==>   measuring value 0 Hz
(no setpoints) 10 V output   ==>   display 300.0   ==>   measuring value 85.00 KHz
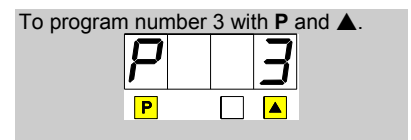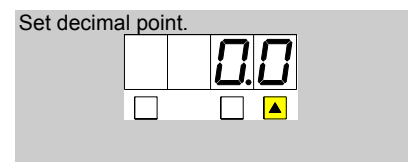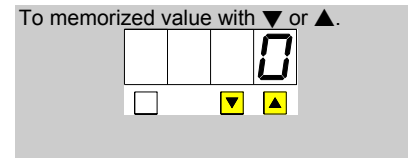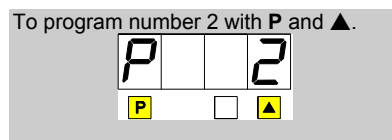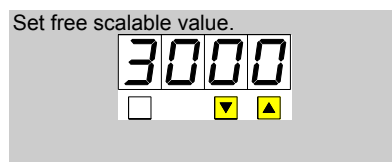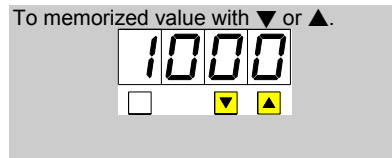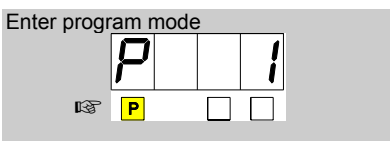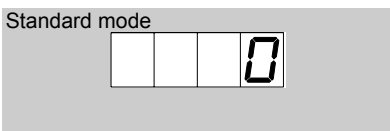

Program key **P** | MINUS key ▼ | PLUS key▲
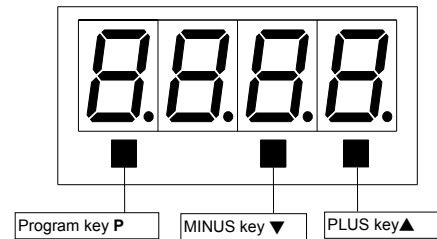
The basic adjustments concerning to the following program example are the ground parameters after a total reset occuring through a power on with pressing **P**-key (see previous page).

Program advices

Pressing the **P**-key enters **always** the program mode with program number **1**. The „**P1**" begins to blink in change with the current value after 3 seconds. After further 4 seconds the system leaves the program mode and turns to the standard mode. In Program mode pressing ▼ or ▲ key selects the current values which are free scalable with both the keys. All parameters will be memorized automatically after leaving program mode.
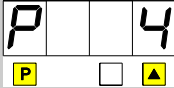
Programming.
Switch power on!

Lamp test

Standard mode

Enter program mode

To memorized value with ▼ or ▲.

Set free scalable value.

To program number 2 with **P** and ▲.

To memorized value with ▼ or ▲.

Set decimal point.

To program number 3 with **P** and ▲.

Example for programming

To memorized value with ▼ or ▲.

```
1.00
```
☐ ▼ ▲

Set the free scalable input frequency in Khz. Decimal point unconsidered.

```
8.500
```
☐ ▼ ▲

To program number 4 with **P** and ▲.

```
P    4
```
P ☐ ▲

To memorized value with ▼ or ▲.

```
8.500
```
☐ ▼ ▲

Set decimal point.

```
85.00
```
☐ ▼ ▲

To program number 8 with **P** and ▲.

```
P    8
```
P ☐ ▲

To memorized value with ▼ or ▲.

```
1.0
```
☐ ▼ ▲

Set display time.

```
2.0
```
☐ ▼ ▲
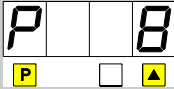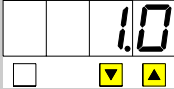
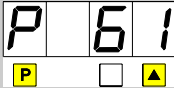**The following programming steps are necessary for the set point programming of S1 and S2 only.**
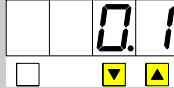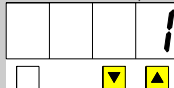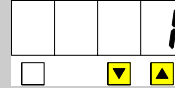
To program number 61 with **P** and ▲.

```
P   61
```
P ☐ ▲

To memorized value with ▼ or ▲.

```
50.0
```
☐ ▼ ▲

Set free scalable value for set point S1.

```
60.0
```
☐ ▼ ▲

To program number 62 with **P** and ▲.

```
P   62
```
P ☐ ▲

To memorized value with ▼ or ▲.

```
0.1
```
☐ ▼ ▲

Set hysteresis of S1.

```
2.0
```
☐ ▼ ▲

To program number 63 with **P** and ▲.

```
P   63
```
P ☐ ▲

To memorized value with ▼ or ▲.

```
1
```
☐ ▼ ▲
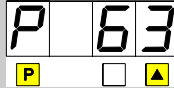
Set quiescent current.

```
0
```
☐ ▼ ▲
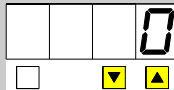
To program number 66 with **P** and ▲.

```
P   66
```
P ☐ ▲

To memorized value with ▼ or ▲.

```
60.0
```
☐ ▼ ▲

Set free scalable value for set point S2.

```
150.0
```
☐ ▼ ▲

To program number 67 with **P** and ▲.

```
P   67
```
P ☐ ▲

To memorized value with ▼ or ▲.

```
0.1
```
☐ ▼ ▲

Set hysteresis of S2.

```
70.0
```
☐ ▼ ▲

To program number 68 with **P** and ▲.
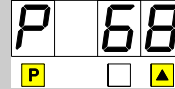
```
P   68
```
P ☐ ▲

To memorized value with ▼ or ▲.

```
1
```
☐ ▼ ▲
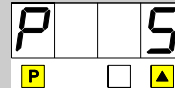
Programming finished.
All programmed values are memorized after 7 seconds. Jumps back into standard mode automatically.

The program numbers 5 and 6 are available with option analogue output only.

To program number 5 with **P** and ▲.

```
P    5
```
P ☐ ▲

To memorized value with ▼ or ▲.

```
200.0
```
☐ ▼ ▲

Set free scalable final indication value for analog output.

```
300.0
```
☐ ▼ ▲

To program number 6 with **P** and ▲.
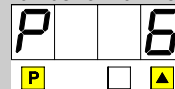
```
P    6
```
P ☐ ▲

To memorized value with ▼ or ▲.
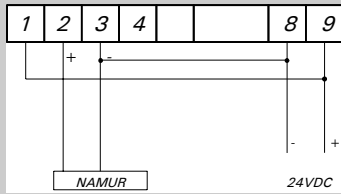
```
0.0
```
☐ ▼ ▲

Programming finished.
All programmed values are memorized after 7 seconds. Jumps back into standard mode automatically.

Connection diagrams
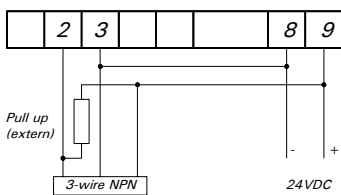
Terminal holding for different sensors

Namur

1	2	3	4			8	9

+   -

NAMUR   24VDC

-    +

3-wire NPN

	2	3				8	9

Pull up
(extern)

3-wire NPN   24VDC

-    +

3-wire PNP

	2	3				8	9

Pull up
(extern)

3-wire PNP   24VDC

-    +