

Operating Instructions 3.96.3 (ed. 5.97)

Electronic Preset Counter

Type Series 904

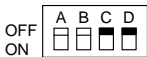
1. Description

- 6 digit preset counter, 2 presets, add./subtr.
- bright 2-line LCD display with symbols for activated outputs and current preset values
- count and preset range – 999999 to 999999, over- or underflow without count loss up to 1 decade (will be indicated by flashing of the display with 1 Hz frequency)
- programmable to operate as a preset counter, timer or frequency meter
- one or two preset values (selectable)
- relay or optocoupler outputs
- programming of count functions/operating parameters via the setting keys. During programming the display guides the user with text prompts.
- programmable features:
 - operating mode (output signal at zero or at preset point, with or without automatic reset)
 - decimal point
 - polarity of the inputs (NPN or PNP)
 - input mode and scaling factor
 - output signals to be permanent or timed
 - gate time when programmed as a frequency meter
 - resolution when programmed as a timer (s, min, h or h:min:s)
- supply voltage 230 VAC, 115 VAC, 48 VAC, 24 VAC or 11...30 VDC
- backlit display (optional)

2. Inputs

2.1 INP A, INP B

Count inputs; max. count frequency 30 Hz or 10 kHz separately selectable for both inputs via programming switches C and D at the right side of the housing.



Microswitch	INP A		INP B	
	30 Hz	10 kHz	30 Hz	10 kHz
D	ON	OFF		
C			ON	OFF

2.2 Gate

Static input; no counting while this input is activated. If operated as a timer (only h, min and 0.1min resolutions), the decimal point between the 5th and 6th decade flashes while gate input is not activated (operating indication).

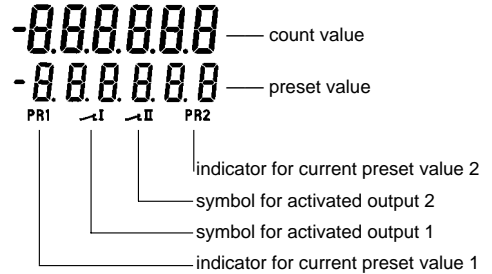
2.3 Reset

Dynamic input; sets the counter to zero (adding mode) or to preset value 2 (subtracting mode).

2.4 Key

Static keyboard lock input. While this input is activated, it is neither possible to reset the counter nor to change the preset values.

3. Display



4. Outputs

4.1 Output 1

Relay with potentialfree make or break contact or optocoupler with open collector and emitter.

4.2 Output 2

Relay with potentialfree change-over contact or optocoupler with open collector and emitter.

4.3 Activated outputs

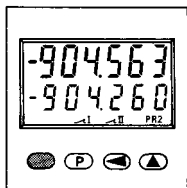
will be indicated by I and II symbols.

For safety circuits the operation of the relay, resp. the optocoupler may be inversed. Thus the relay coil will be dead, resp. the optocoupler will be locked when reaching the preset point / zero. For that the output signals Out 1 and Out 2 must be set to \perp (permanent signal) or \perp (timed signal) during the programming routine.

Caution: For all operating modes with automatic repetition (AddAr, SubAr, AddbAt, SubbAt) the duration of the timed signal for output 2 has to be programmed, otherwise the output signal has no defined duration (see programming Out 2).

5. Setting of the operating parameters

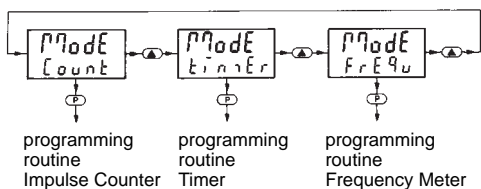
- connect to supply voltage
- set microswitch "A" (right side of the housing) to "ON" for a short time. Display will show 1st menu item "Mode".
- select required function via \uparrow -key
- press P-key to store selected function/enter data and to change over to next menu item.
- select again the required function via \uparrow -key resp. enter data (prescaling factor, duration of timed signal, gate time, resolution) directly via the two arrow-keys.
- After programming the last menu item (permanent or timed signal), the programming routine will be left by pressing the P-key, if microswitch "A" is set to "OFF". If it is still set to "ON", the programming routine will be passed through once again.



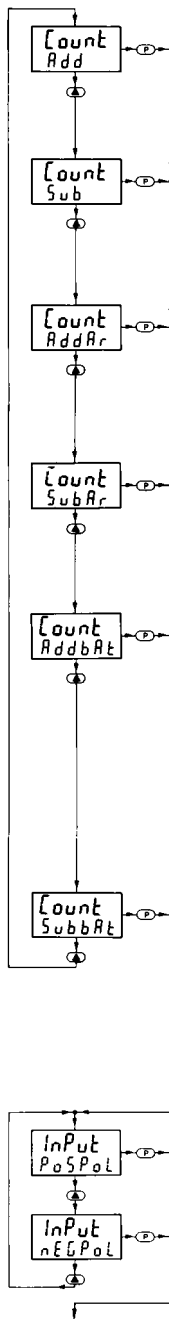
6. Setting of the operating mode

6.1 Selection of basic function

After microswitch "A" has been switched to "ON" for a short time, one of the basic functions will be displayed as follows:



6.2.1 Programming routine Impulse Counter



Operating mode Add:

Adding mode
Permanent signal at count value \geq preset 1 and at count value \geq preset 2
Timed signal at count value \geq preset 1 and at count value \geq preset 2
Reset to zero

Operating mode Sub:

Subtracting mode
Permanent signal at count value \leq preset 1 and at count value \leq zero
Timed signal at count value \leq preset 1 and at count value \leq zero
Reset to preset 2

Operating mode AddAr:

Adding mode
Permanent signal at count value \geq preset 1 or timed signal at count value = preset 1 and at count value = preset 2
Automatic reset to zero

Operating mode SubAr:

Subtracting mode
Permanent signal at count value \leq preset 1 or timed signal at count value = preset 1 and at count value = zero
Automatic reset to preset 2

Operating mode AddbAt:

Adding mode
Timed signal at count value = preset 2 and automatic reset to zero.
A second adding preset counter (batch counter), programmed preset value = 1, counts the number of automatic repetitions of preset 2.
Permanent signal at count value \geq preset 1 or timed signal at count value = preset value 1
The reset key sets both counters to zero, the reset input only sets the impulse counter to zero.

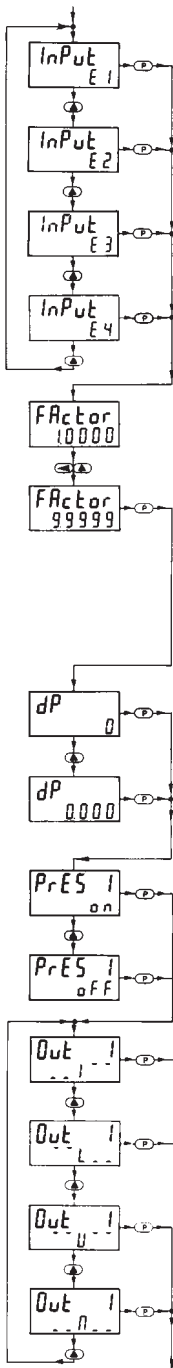
Operating mode SubbAt:

Subtracting mode
Timed signal at count value = zero and automatic reset to preset 2.
Batch counter same as in mode AddbAt.
The reset key sets the impulse counter to zero, the batch counter to zero, the reset input only sets the impulse counter to preset 2.

Polarity of the inputs:

pospol: positive polarity (PNP) switching to +24 V

negpol: negative polarity (NPN) switching to 0 V



Input modes:
E1: INP A = count input
 INP B = count direction input
E2: INP A = count input adding
 INP B = count input subtr.
E3: Quadrature input
 INP A = count input 0°
 INP B = count input 90°
E4: same as E3, but with pulse doubling.
 Each pulse edge of INP A will be counted.

Scaling factor:
 0.0001...9.9999
 Setting with ← and ↑-keys
 Factor 0.0000 won't be accepted
 Caution! In operating modes Sub, SubAr and SubAt (output signal at count value = zero) the preset value has to be integerly divisible by the factor, otherwise the counter – when reset – will be set to the following integer multiple of the factor.

Decimal point (only optical function):
 0 = no decimal point
 0.0 = one decimal place
 0.00 = two decimal places
 0.000 = three decimal places

Preset 1 on-off
 on = on

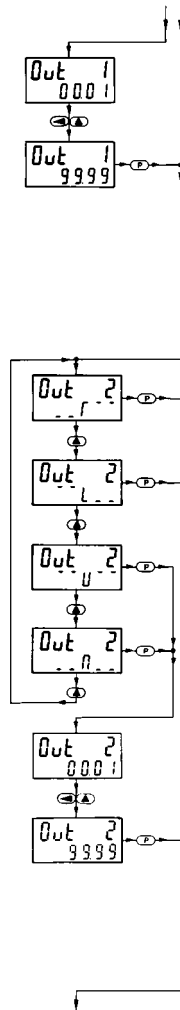
oFF = off

Permanent signal of output 1, activated at count value \geq preset 1 in adding mode and at count value \leq preset 1 in subtracting mode*

Permanent signal of output 1, will become passive at count value \geq preset 1 in adding mode and at count value \leq preset 1 in subtracting mode**

Timed signal of output 1, will become passive at count value = preset 1**

Timed signal of output 1, activated at count value = preset 1*



Duration of timed signal of output 1, can be set from 00.01 s to 99.99 s.

* Activation of relay coil resp. optocoupler when reaching the preset value

** Relay coil becomes dead resp. optocoupler will be locked when reaching the preset value

Permanent signal of output 2, activated at count value \geq preset 2 in adding mode and at count value \leq zero in subtracting mode*

Permanent signal of output 2, will become passive at count value \geq preset 2 in adding mode and at count value \leq zero in subtracting mode**

Timed signal of output 2, will become passive at count value = preset 2 in adding mode and at count value = zero in subtracting mode**

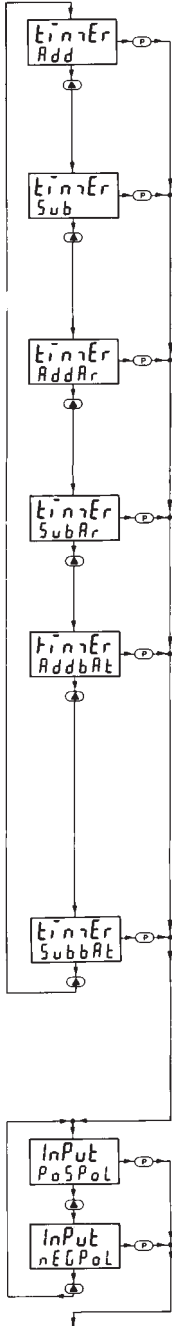
Timed signal of output 2, activated at count value = preset 2 in adding mode and at count value = zero in subtracting mode*

Duration of timed signal of output 2, can be set from 00.01 s to 99.99 s.

* Activation of relay coil resp. optocoupler when reaching the preset value

** Relay coil becomes dead resp. optocoupler will be locked when reaching the preset value

6.2.2 Programming routine Timer



Operating mode Add:

Adding mode
Permanent signal at count value \geq preset 1 and at count value \geq preset 2
Timed signal at count value = preset 1 and at count value = preset 2
Reset to zero

Operating mode Sub:

Subtracting mode
Permanent signal at count value \leq preset 1 and at count value \leq zero
Timed signal at count value = preset 1 and at count value = zero
Reset to preset 2

Operating mode AddAr:

Adding mode
Permanent signal at count value \geq preset 1 or timed signal at count value = preset 1 and at count value = preset 2
Automatic reset to zero

Operating mode SubAr:

Subtracting mode
Permanent signal at count value \leq preset 1 or timed signal at count value = preset 1 and at count value = zero
Automatic reset to preset 2

Operating mode AddbAt:

Adding mode
Timed signal at count value = preset 2 and automatic reset to zero.
A second adding preset counter (batch counter), programmed preset value = 1, counts the number of automatic resets of preset 2.
Permanent signal at count value \geq preset 1 or timed signal at count value = preset 1
The reset key sets both counters to zero, the reset input only sets the timer to zero.

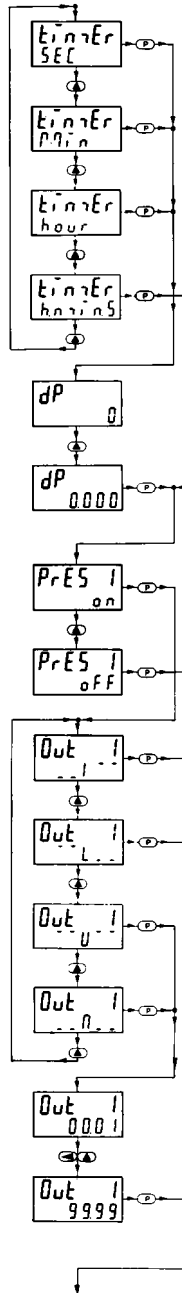
Operating mode SubbAt:

Subtracting mode
Timed signal at count value = zero and automatic reset to preset 2.
Batch counter same as in mode AddbAt.
The reset key sets the timer to preset 2 and the batch counter to zero, the reset input only sets the timer to preset 2.

Polarity of the inputs:

pospol: positive polarity (PNP) switching to +24 V

negpol: negative polarity (NPN) switching to 0 V



Unit of time:

Timing in s, 0.1 s, 0.01 s or 0.001 s*

Timing in min, 0.1 min, 0.01 min or 0.001 min*

Timing in h, 0.1 h, 0.01 h or 0.001 h*

* depending on position of the decimal point

Timing in h:min:s

Decimal point (resolution):

0 = no decimal point
0.0 = one decimal place
0.00 = two decimal places
0.000 = three decimal places

Preset 1 on-off
on = on

oFF = off

Permanent signal of output 1, activated at count value \geq preset 1 in adding mode and at count value \leq preset 1 in subtracting mode*

Permanent signal of output 1, will become passive at count value \geq preset 1 in adding mode and at count value \leq preset 1 in subtracting mode**

Timed signal of output 1, will become passive at count value = preset 1**

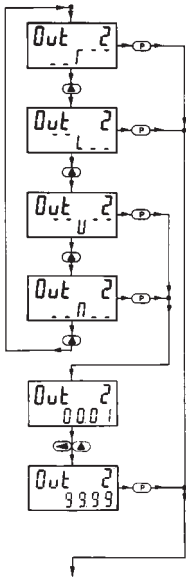
Timed signal of output 1, activated at count value = preset 1*

Duration of timed signal of output 1, can be set from 00.01 s to 99.99 s.

* Activation of relay coil resp. optocoupler when reaching the preset value

** Relay coil becomes dead resp. optocoupler will be locked when reaching the preset value

6.2.3 Programming routine Frequency Meter



Permanent signal of output 2, activated at count value \geq preset 2 in adding mode and at count value \leq zero in subtracting mode*

Permanent signal of output 2, will become passive at count value \geq preset 2 in adding mode and at count value \leq zero in subtracting mode**

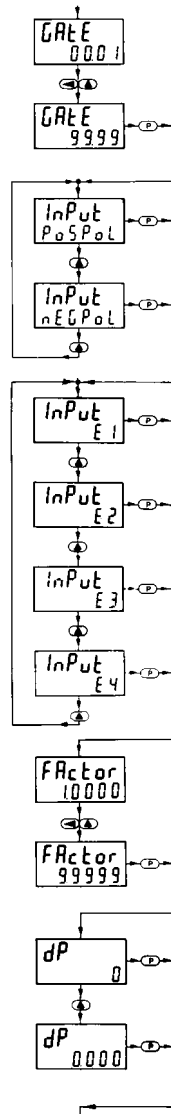
Timed signal of output 2, will become passive at count value = preset 2 in adding mode and at count value = zero in subtracting mode**

Timed signal of output 2, activated at count value = preset 2 in adding mode and at count value = zero in subtracting mode*

Duration of timed signal of output 2, can be set from 00.01 s to 99.99 s.

* Activation of relay coil resp. optocoupler when reaching the preset value

** Relay coil becomes dead resp. optocoupler will be locked when reaching the preset value



Gate time = within this period the incoming pulses will be counted and displayed.
Programmable range from 00.01 s to 99.99 s
Setting with \leftarrow and \uparrow -keys
00.00 won't be accepted

Polarity of the inputs:
pospol: positive polarity (PNP) switching to +24 V

negpol: negative polarity (NPN) switching to 0 V

Input modes:

E1: INP A = count input
INP B = count direction input

E2: INP A = count input adding
INP B = count input subtr.

E3: Quadrature input
INP A = count input 0°
INP B = count input 90°

E4: same as E3, but with pulse doubling.
Each pulse edge of INP A will be counted.

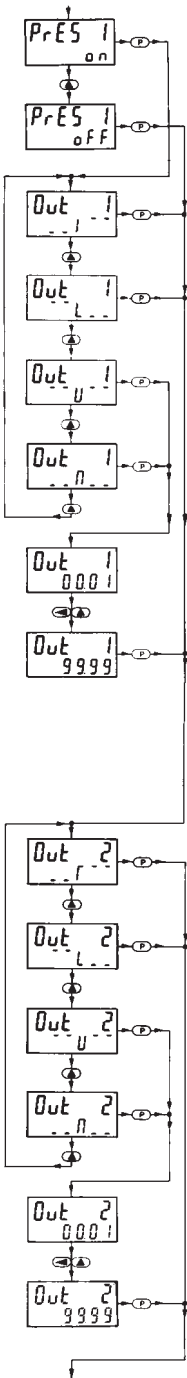
Scaling factor:

0.0001...9.9999
Setting with \leftarrow and \uparrow -keys

Factor 0.0000 won't be accepted

Decimal point

(only optical function):
0 = no decimal point
0.0 = one decimal place
0.00 = two decimal places
0.000 = three decimal places



Preset 1 on-off
on = on

off = off

Permanent signal of output 1,
activated at count value \geq
preset 1*

Permanent signal of output 1,
will become passive at count
value \geq preset 1**

Timed signal of output 1, will be-
come passive at count value =
preset 1**

Timed signal of output 1, activa-
ted at count value = preset 1*

Duration of timed signal of output
1, can be set from 00.01 s to
99.99 s.

* Activation of relay coil resp.
optocoupler when reaching the
preset value

** Relay coil becomes dead
resp. optocoupler will be locked
when reaching the preset value

Permanent signal of output 2,
activated at count value \geq
preset 2*

Permanent signal of output 2,
will become passive at count va-
lue \geq preset 2**

Timed signal of output 2, will be-
come passive at count value =
preset 2**

Timed signal of output 2, activa-
ted at count value = preset 2*

Duration of timed signal of output
2, can be set from 00.01 s to
99.99 s.

* Activation of relay coil resp.
optocoupler when reaching the
preset value

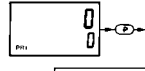
** Relay coil becomes dead resp.
optocoupler will be locked
when reaching the preset value

7. Programming of the Preset Value:

After pressing one of the arrow keys, the leading zero blanking will be suppressed for approx. 4 seconds and the least significant digit of the preset value flashes with a frequency of 1 Hz.

The value of the flashing digit can be increased by using the \uparrow -key. With the \leftarrow key it will be changed to the next digit. If no key is pressed for 4 seconds, the leading zero blanking will be activated automatically again.

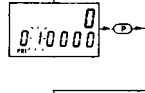
In operating mode Impulse Counter and Frequency Me-
ter the new value will be taken over now.



Setting Preset 1



Setting of the 5th decade



Setting Preset 2



Setting of the 6th decade



7.1 Setting of the sign

Select the sign by using the \leftarrow key. The sign will start to flash now and can be assigned to the preset value resp. eliminated by using the \uparrow -key. If no key is pressed for 4 seconds, the leading zero blanking will be activated automatically again. Preset value and count value are displayed now with the corresponding sign.

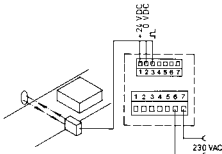
Caution! In case of automatic resets no negative values are to be set for preset 2.



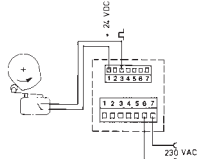
Setting the sign for preset 1



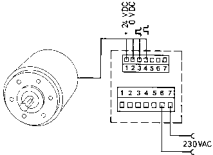
8. Examples for application connections



Count pulses from a light barrier

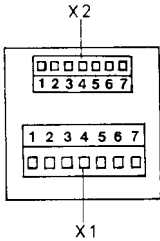


Count pulses from contact closure (programmed polarity PNP)



Count pulses from a shaft encoder

9. Connections



9.1 Plug connection X1

Terminal No.	230, 115, 48 and 24 VAC	11...30 VDC-version
1	Output 1, relay contact optocoupler output collector	
2	Output 1, relay contact optocoupler output emitter	
3	Output 2, relay output common contact (C) optocoupler output emitter	
4	Output 2, relay output normally open contact (NO)	
5	Output 2, relay output normally closed contact (NC) optocoupler output collector	
6	230 VAC/115 VAC/ 48 VAC/24 VAC	11...30 VDC operating voltage
7	230 VAC/115 VAC 48 VAC/24 VAC	0 VDC (GND)

Caution! For settings \lrcorner and \lrcorner (inverted operation of relay or optocoupler) the connections of terminal 4 and 5 change as follows:

Terminal No.	AC- and DC version
4	relay output normally closed contact (NC)
5	relay output normally open contact (NO)

9.2 Plug connection X2

Terminal No.	Designation	Function 230 VAC/115 VAC 48 VAC/24 VAC	Function 11...30 VDC- version
1	+ 24 VDC	Transmitter voltage	—
2	GND	0 VDC reference voltage	—
3	INP A	count input A	
4	INP B	count input B	
5	RESET	reset input	
6	GATE	gate input	
7	KEY	keyboard lock input	

10. Technical Data

Supply voltage:

230 VAC, 115 VAC, 48 VAC, 24 VAC,
50/60 Hz, $\pm 10\%$,
max. 4 VA
or 11...30 VDC, max. 0.1 A

Display: 6 digit, 2-line 7 segment LCD display with sign
count value 9 mm high characters
preset value 7 mm high characters
symbols for displayed preset and closed output contacts

Polarity of input signals:
programmable, all inputs in common

Input sensitivity:
approx. 10 kOhm

Count frequency:
via DIL switches separately selectable for INP A and INP B
30 Hz
10 kHz (7 kHz for input modes E3 and E4, quadrature inputs)
in case of automatic reset 900 Hz without count losses (500 Hz for input mode E4)

Min. pulse length of the control inputs:
5 ms

Input sensitivity:
For AC supply voltages
Log "0": 0...4 VDC
Log "1": 12...30 VDC
For DC supply voltage U_b
Log "0": 0...0.2 x U_b
Log "1": 0.6 x U_b ...30 VDC

Pulse shape:
variable (Schmitt Trigger characteristic)

Output 1: Relay with potentialfree make or break contact
switching voltage max. 250 VAC/125 VDC
switching current max. 3 A
switching current for DC min. 30 mA
switching performance max. 90 W for DC and max. 750 VA for AC
or
optocoupler with open collector and emitter
switching performance: 30 VDC/15 mA
 U_{cesat} at $I_c = 15$ mA: max. 2.0 V
 U_{cesat} at $I_c = 5$ mA: max. 0.4 V

Output 2: Relay with potentialfree change-over contact
 switching voltage max. 250 VAC/300 VDC
 switching current max. 3 A
 switching current for DC min. 30 mA
 switching performance max. 50 W for DC and max. 2000 VA for AC
 or
 optocoupler with open collector and emitter
 switching performance: 30 VDC/15 mA
 Ucesat at I_c = 15 mA: max. 2.0 V
 Ucesat at I_c = 5 mA: max. 0.4 V

Storage temperature:
 -25°C...+70°C

Weight: approx. 240 g (AC-version with relay)

Protection: IP 65 (front)

Colour of housing:
 black

Cleaning: The front of the unit is only to be cleaned with a soft and wet (water!) cloth.

Responding time of outputs:

Relay: approx. 6 ms
 Optocoupler: approx. 1 ms

Data retention:

min. 10 years or 10⁶ memory cycles

Transmitter voltage:

24 VDC -40%/+15%, 80 mA
 unstabilized for AC-versions
 for option "backlit LCD"
 24 VDC -40%/+15% 60mA
 unstabilized

Fuse protection:

recommended fuse
 for DC: 0,125 AT
 for 230 VAC: 0,05 AT
 for 115 VAC: 0,1 AT
 for 48 VAC: 0,2 AT
 for 24 VAC: 0,4 AT

Noise immunity:

EN 55011 class B and EN 50082-2
 with shielded data inputs

Ambient temperature:

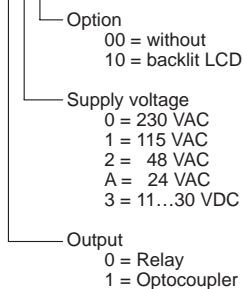
0...50°C

11. Delivery includes

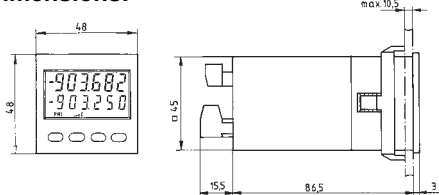
- Counter 904
- Screw terminal plug 7 poles, reference grid 5.08 mm
- Screw terminal plug 7 poles, reference grid 3.81 mm
- Bezel for screw mount, panel cut-out 50 x 50 mm
- Bezel for clip mount, panel cut-out 50 x 50 mm
- Bezel for clip mount, panel cut-out 45 x 45 mm
- Panel mounting clip

12. Ordering Code

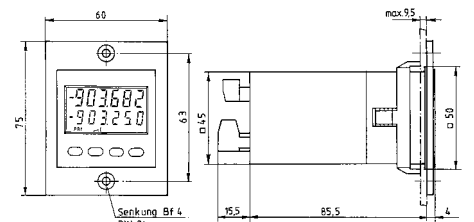
6.904.010.000



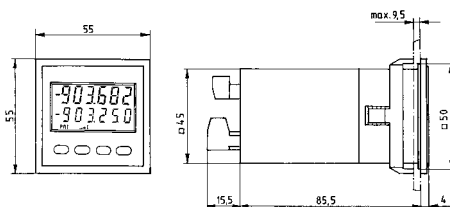
Dimensions:



panel cut-out 45 x 45 mm



with front frame No. 3 panel cut-out 50 x 50 mm



with front frame No. 2 panel cut-out 50 x 50 mm