



CM03x980

Electronic Preset Counter
 With two presets
 LCD negative, red-green backlighting

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1 Preface



Please read this instruction manual carefully before installation and start-up. Please observe all warnings and advice, both for your own safety and for general plant safety. If the device is not used in accordance with this instruction manual, then the intended protection can be impaired.

2 Safety Instructions and Warnings



Please use the device only if its technical condition is perfect. It should be used only for its intended purpose. Please bear in mind safety aspects and potential dangers and adhere to the operating instructions at all times.

2.1 Use according to the intended purpose

The preset counter CM03 detects and measures pulses, times and frequencies up to max. 60 kHz and offers a wide variety of different operating modes. At the same time, the preset counter processes programmed presets. Use for any purpose over and beyond this will be deemed as not in accordance with its intended purpose and thus not complying with the requirements.

The application area for this device lies in industrial processes and controls, in the fields of manufacturing lines for the metal, wood, plastics, paper, glass, textile and other like industries. Over-voltages at the terminals of the device must be kept within the limits of Over-voltage Category II.

The device must only be operated when mounted in a panel in the correct way and in accordance with the section "Technical Data".

Correct operation of the device requires the mandatory use of the appropriate external safety fuse. Advice concerning the recommended fuse-protection can be found under "Technical Data".

The device is not suitable for use in hazardous areas and for areas excluded in EN 61010 Part 1.

If the device is used to monitor machines or processes in which, in the event of a failure of the device or an error made by the operator, there might be the risk of damaging the machine or causing an accident to the operators, then it is your responsibility to take the appropriate safety measures.

2.2 Mounting in a control panel



CAUTION

Mount the device away from heat sources and avoid direct contact with corrosive liquids, hot steam or similar.

Mounting instructions

1. Remove mounting clip from the device.
2. Insert the device from the front into the panel cut-out, ensuring the front-panel gasket is correctly seated.
3. Slide the fixing clip from the rear onto the housing, until the spring clamps are under tension and the upper and lower latching lugs have snapped into place.

2.3 Electrical Installation



DANGER

The device must be disconnected from the power supply, before any installation or maintenance work is carried out. AC-powered devices must only be connected to the low-voltage network via a switch or circuit breaker. Installation or maintenance work must only be carried out by qualified personnel.

Advice on noise immunity

All connections are protected against external sources of interference. The installation location should be chosen so that inductive or capacitive interference does not affect the device or its connecting lines! Interference (e.g. from switch-mode power supplies, motors, clocked controllers or contactors) can be reduced by means of appropriate cable routing and wiring.

Measures to be taken:

Use only shielded cable for signal and control lines. Connect cable shield at both ends.

The conductor cross-section of the cables should be a minimum of 0.4 mm².

The shield connection to the equipotential bonding should be as short as possible and with a contact area as large as possible (low-impedance).

Only connect the shields to the control panel, if the latter is also earthed.

Install the device as far away as possible from noise-containing cables.

Avoid routing signal or control cables parallel to power lines.

Cables and their insulation should be in accordance with the intended temperature and voltage ranges.

3 Description

6-digit multifunction LCD display

Easy-to-read 2-line LCD-display with annunciators for both the displayed preset and the status of the two outputs

Simultaneous display of the actual value and of the presets or auxiliary counters

Versions with/without backlit display

Add./Sub. Preset counter with two presets
 Relay or optocoupler outputs
 Easy-to-program
 Simple preset entry via the front keys or via the Teach-In function
 Step or tracking preset
 Pulse, frequency, time or batch counter
 Preset counter, Batch counter or Total Counter (cumulative count)
 Set function for pulse and time counter
 Multiplication and division factor (00.0001 .. 99.9999) for pulse counter and frequency meter
 Averaging and Start Delay for frequency meter

Input modes:

Pulse counter: cnt.dir , up.dn , up.up , quad , quad2 , quad4 , A/B , (A-B)/Ax100%

Frequency meter: A , A - B , A + B , quad , A/B , (A-B)/Ax100%

Timer: FrErun , Auto , InpA.InpB , InpB.InpB

Output operations:

Add , Sub , AddAr , SubAr , AddBat , SubBat , AddTot , SubTot , Trail , TrailAr

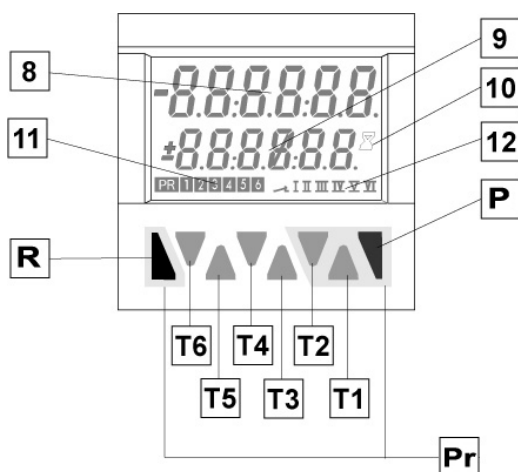
4-stage RESET-Mode

3-stage keypad locking (Lock)

MPI input for Display Latch, Teach-In function or Set function

Supply voltage 90 .. 260 VAC, 24 VAC or 10 .. 30 VDC

4 Display/Operating elements



T1-6 Decade key T1 ... T6

P Prog/Mode key

R Reset key

8 Current count value / main counter

9 Preset value/ Total count/ Batch counter

10 Run display for Timer

11 Shows which preset value is being displayed

12 Shows which preset output is active

Pr Keys necessary for programming the parameters (highlighted in grey)

5 Inputs

5.1 INP A, INP B

Signal inputs: function acc. to operating mode. Max. frequency 60 kHz, can be damped in the programming menu to 30 Hz.

Pulse counter: Count inputs
 Frequency meter: Frequency inputs
 Timer: Start input or Start/Stop inputs

5.2 RESET

Dynamic reset input: resets the pulse counter or timer to zero (adding mode) or to preset value 2 (subtracting mode). The reset input can be inhibited in the programming menu.

Pulse counter: RESET input
 Frequency meter: no function
 Timer: RESET input

5.3 GATE

Static gate input: function depending on operating mode.

Pulse counter: no counting while active
 Frequency meter: no counting while active
 Timer: no time measurement while active (Gate.hi)
 no time measurement while not active (Gate.Lo).

5.4 LOCK INPUT

Static keypad lock input for presets or programming. Lock-out level can be set in the programming menu.

5.5 MPI

Input. Programmable as Display Latch, Set or Teach-In input.

6 Outputs



6.1 Output 1




Relay with potential-free make (NO) contact or optocoupler with open emitter and collector

6.2 Output 2

Relay with potential-free make (NO) contact or optocoupler with open emitter and collector.


6.3 Active Outputs

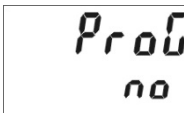
An active output will be shown on the display as  or .


For safety switching the relays or optocoupler outputs can be inverted, i.e. the relay will be de-energized or the optocoupler output disabled when the presets are reached. To do this, the parameters Pr.OUT1 and Pr.OUT2 must be set to  (for permanent signal) or  or  (for timed signal).


7 Programming

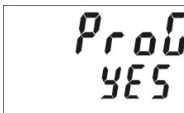
7.1 Entering the programming


 Press the Reset key and Prog/Mode key simultaneously for 3 s

 ⇒ The security prompt appears in the display


 Programming can be exited again using the Prog/Mode key.

 Press key T2 to continue with the programming


 ⇒ The security prompt appears in the display

 Enter the main menu by pressing the Prog/Mode key


7.2 Choice of main menus

 The menus are selected using the keys T2 (next) and T1 (back)

7.3 Entering a Submenu

 The Submenu is opened with the Prog/Mode key and the first menu item is displayed.

7.4 Selecting the menu items

 The Prog/Mode key is used to select a menu item within the Submenu

7.5 Setting the menu items



The T2 key is used to select the individual settings for the menu items



When setting count values, each decade has a key assigned to it. Each time the key is pressed, the value increments by one



7.6 Accepting the setting



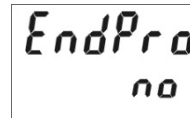
Pressing the Prog/Mode key causes the current setting to be accepted. Programming then switches to the next menu item.

7.7 Ending the programming

During programming, it is possible to exit the programming at each menu item by pressing the reset key.



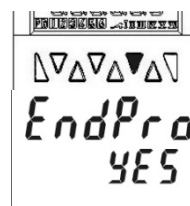
Press the Reset key



⇒ The security prompt appears in the display



Pressing the Prog/Mode key acknowledges this prompt and causes the programming menu to start again from the beginning. The previously-programmed values are preserved. These can now be changed or checked again.

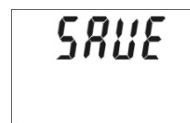


Pressing the decade key T2 selects the termination of the programming

⇒ The security prompt appears in the display



Pressing the Prog/Mode key acknowledges this prompt and terminates the programming; the modified settings are saved in the EEPROM.



⇒ The text SAVE is displayed for 2 s

7.8 Programming Menu

7.8.1 Default parameters



Note: Three default parameter sets have been permanently stored; these can be adapted as required. With each acknowledgment of the parameter sets, all parameters will be reset to the values listed in the table. The dEFAuL P.USEr can be freely programmed.

	P.SET 1	P.SET 2	P.SET 3
dP	0	0	0.00
SEtPt	000000	000000	0000.00
CoLor	red.Grn	red.Grn	red.Grn
rESmd	Man.EL	Man.EL	Man.EL
PrES 1	on	on	on
Pr.Out 1			
t.Out 1		00.10	
Pr.Out 2			
t.Out 2		00.10	00.10



Menu Parameter Sets



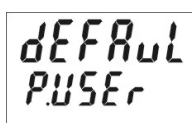
Default setting
Parameter set 1



Default setting
Parameter set 2



Default setting
Parameter set 3

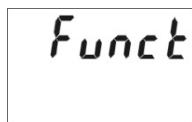


Freely programmable
User settings



Factory settings are highlighted in grey

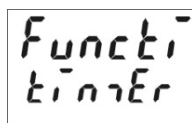
7.8.3 Setting the Basic Function



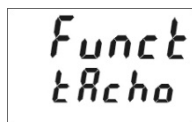
Basic function menu



Programming menu
Pulse counter (7.8.4)



Programming menu
Timer/Hour meter (7.8.6)



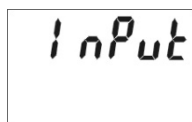
Programming menu
Tacho/Frequency meter (7.8.5)

7.8.2 Table: Parameter Sets

	P.SET 1	P.SET 2	P.SET 3
Func	Count	Count	Count
InP.PoL	PnP	PnP	PnP
FiLteR	on	oFF	oFF
Count	Cnt.dir	uP.dn	Quad
MPi	LAth	LAth	Set
Loc.InP	ProG	ProG	ProG
ModE	Add	Sub	TrAiL
FActoR	01.0000	01.0000	01.0000
diViSo	01.0000	01.0000	01.0000

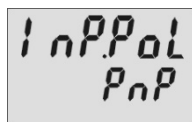
7.8.4 Pulse Counter

7.8.4.1 Mainmenu for the Signal and Control inputs

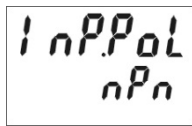


Mainmenu for programming the signal and control inputs

Input polarity

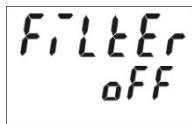


PNP: switching to Plus for all inputs in common

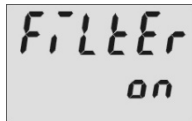


NPN: switching to 0 V for all inputs in common

Filter for the signal inputs InpA and InpB

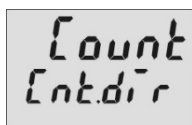


Maximum count frequency



Damped to approx. 30 Hz (for control with mechanical contacts)

Count Input mode



Count/Direction
INP A: count input
INP B: count direction input



Differential counting [A – B]
INP A: count input add
INP B: count input sub



Totalising [A + B]
INP A: count input add
INP B: count input add



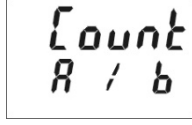
Quadrature input
INP A: count input 0°
INP B: count input 90°



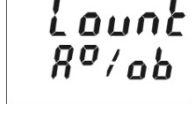
Quadrature with pulse doubling
INP A: count input 0°
INP B: count input 90°
Each pulse edge of INP A will be counted



Quadrature x4
INP A: count input 0°
INP B: count input 90°
Each pulse edge of INP A and INP B will be counted.



Ratio measurement [A / B]
Inp A: count input A
Inp B: count input B



Percentage differential counting [(A – B) / A in %]
Inp A: count input A
Inp B: count input B

User input



When the MPI input is activated the display is “frozen” and remains “frozen” until the MPI input is deactivated. Internally the preset counter continues counting.

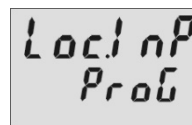


When the MPI input is activated the current count value for the preset that has just been selected will be adopted as the new preset value. See also 7.9

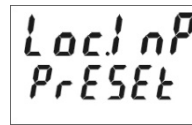


When the MPI input is activated the preset counter will be set to the value specified in the parameter *SEtPt*. See also 7.10

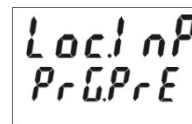
Lock input



When the Lock input is activated the programming is inhibited.



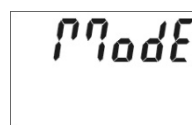
When the Lock input is activated the setting of the preset values is inhibited.



When the Lock input is activated the setting of the preset values and the programming are both inhibited.

7.8.4.2 Mainmenu for Output operations

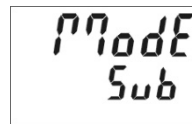
operations



Mainmenu for determining the operation of the outputs



Count mode ADD
Outputs active when count status \geq preset value
Reset to zero

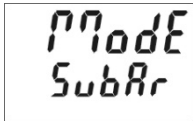


Count mode SUBTRACT
Output 1 active when count status \leq preset value 1
Output 2 active when count status ≤ 0
Reset to preset 2



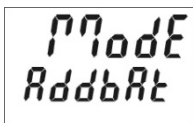
Count mode ADDING with automatic reset
Output 1 active when count status \geq preset value 1

Output 2 (timed signal) active when count status = preset value 2
 Automatic reset to zero when count status = preset value 2
 Reset to zero



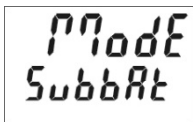
Count mode SUBTRACTING with automatic reset

Output 1 active when count status \leq preset value 1
 Output 2 (timed signal) active when count status = 0
 Automatic reset to preset 2 when count status = 0
 Reset to preset 2



Count mode ADDING with automatic reset and Batch counter

Output 2 (timed signal) active when main counter = preset value 2
 Automatic reset to zero when main counter = preset 2
 Batch counter counts the number of automatic repetitions of preset 2
 Output 1 active when Batch counter \geq preset 1
 Manual reset sets both counters to zero.
 Electrical reset only sets the main counter to zero.



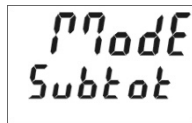
Count mode SUBTRACTING with automatic reset and Batch counter

Output 2 (timed signal) active when main counter = zero
 Automatic reset to preset 2 when main counter = zero
 Batch counter counts the number of automatic repetitions of preset 2
 Output 1 active when Batch counter \geq preset 1
 Manual reset sets main counter to preset value 2 , batch counter to zero
 Electrical reset only sets the main counter to preset value 2



Count mode ADDING with automatic reset and Total counter

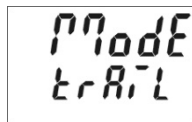
Output 2 (timed signal) active when main counter = preset value 2
 Automatic reset to zero when main counter = preset value 2
 Total counter counts all the count pulses from the main counter
 Output 1 active when total counter \geq preset value 1
 Manual Reset sets both counters to zero



Electrical reset only sets the main counter to zero

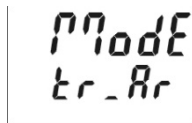
Count mode SUBTRACTING with automatic reset and Total counter

Output 2 (timed signal) active when main counter = zero
 Automatic reset to preset value 2 when main counter = zero
 Total counter counts (sub from preset value 1) all count pulses from main counter
 Output 1 active when Total counter \leq zero
 Manual reset sets both counters to the preset values
 Electrical reset sets only main counter to preset value 2



Tracking Preset mode

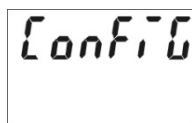
When preset 2 is changed then preset 1 automatically tracks it.
 Reset to zero
 Preset 1 relative to preset 2 (see also section 17. Output operations)



Tracking Preset mode with automatic reset

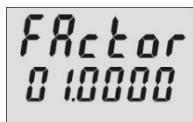
When preset 2 is changed then preset 1 automatically tracks it.
 Reset to zero.
 Automatic reset to zero when main counter = preset value 2.
 Preset 1 relative to Preset 2 (see also section 17. Output operations)

7.8.4.3 Mainmenu for configuration



Mainmenu for matching the input pulses and display

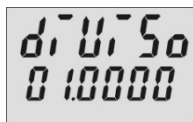
Multiplication factor



Multiplication factor can be programmed from 00.0001 to 99.9999.

The setting 00.0000 will not be accepted

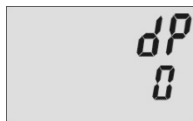
Division factor



Division factor can be programmed from 01.0000 to 99.9999.

The setting <01.0000 will not be accepted

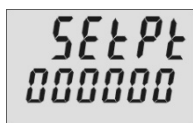
Decimal point setting



Decimal point (only optical function)

- 0 no decimal place
- 0.0 1 decimal place
- 0.00 2 decimal places
- 0.000 3 decimal places
- 0.00004 4 decimal places
- 0.00000 5 decimal places

Set value



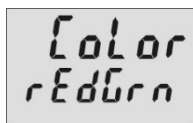
Set value can be programmed from -999999 to 999999

A previously programmed decimal point will be displayed

Display colour (for device 6.92x.x1x3.xx0)

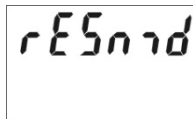


Display colour
upper line red
lower line red

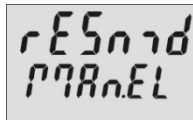


Display colour
upper line red
lower line green

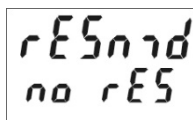
7.8.4.4 Mainmenu for reset mode



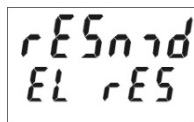
Setting the reset mode



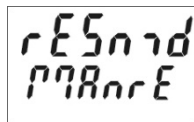
Manual reset (with red key) and electrical reset (reset input)



No reset possible (red key and reset input inhibited)



Only electrical reset possible (reset input)



Only manual reset possible (red key)

7.8.4.5 Preset 1

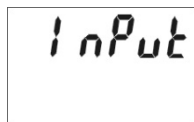
See below 7.8.6.5

7.8.4.6 Preset 2

See below 7.8.6.8

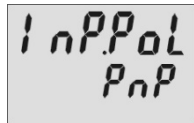
7.8.5 Tacho/Frequency meter

7.8.5.1 Mainmenu for the Signal and Control inputs



Mainmenu for programming the signal and control inputs

Input polarity

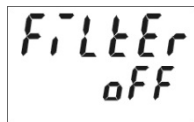


PNP: switching to Plus for all inputs in common

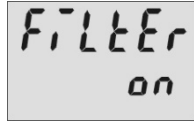


NPN: switching to 0 V for all inputs in common

Filter for the signal inputs Inp A and Inp B

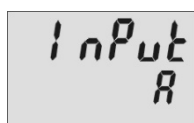


maximum count frequency



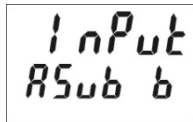
damped to approx. 30 Hz (for control with mechanical contacts)

Input mode Frequency Measurement



Simple frequency measurement

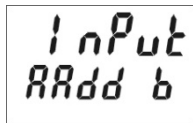
Inp A: Frequency input
Inp B: no function



Differential measurement

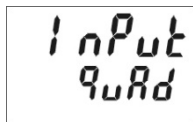
[A - B]

Inp A: Frequency input A
Inp B: Frequency input B



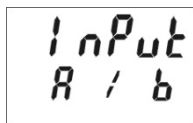
Total measurement [A + B]

Inp A: Frequency input A
Inp B: Frequency input B



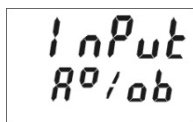
Frequency measurement with direction recognition [Quad]

Inp A: Frequency input 0°
Inp B: Frequency input 90°



Ratio measurement [A / B]

Inp A: Frequency input A
Inp B: Frequency input B



Percentage differential measurement [(A-B) / A in %]

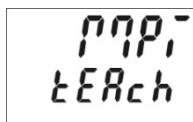
Inp A: Frequency input A
Inp B: Frequency input B

User input



When the MPI input is activated the display is "frozen" and remains "frozen" until the MPI input is deactivated.

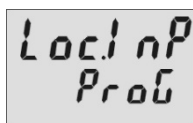
Internally the frequency meter continues running.



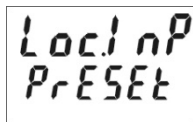
When the MPI input is activated the current frequency for the preset that has just been selected will be adopted as the new preset value.

See also 7.9

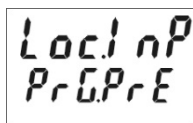
Lock input



When the Lock input is activated the programming is inhibited.

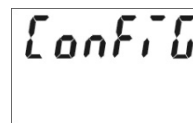


When the Lock input is activated the setting of the preset values is inhibited.



When the Lock input is activated the setting of the preset values and the programming are both inhibited

7.8.5.2 Mainmenu for configuration



Mainmenu for matching the input pulses and display

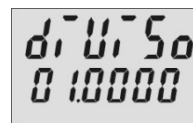
Multiplication factor



Multiplication factor can be programmed from 00.0001 to 99.9999.

The setting 00.0000 will not be accepted

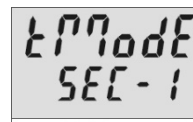
Division factor



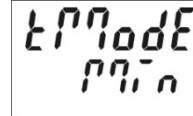
Division factor can be programmed from 01.0000 to 99.9999.

The setting <01.0000 will not be accepted

Display mode



Calculation and display of the frequency / speed in 1/s



Calculation and display of the frequency / speed in 1/min

Decimal point setting



Decimal point (determines the resolution)

0 no decimal place

0.0 1 decimal place

0.00 2 decimal places

0.000 3 decimal places

Moving average



Moving average calculated

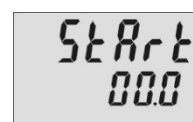
AVG 2 over 2 measurements

AVG 5 over 5 measurements

AVG 10 over 10 measurements

AVG 20 over 20 measurements

Start delay

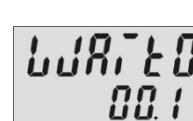


Start delay

Programmable from 00.0 to 99.9 s

At the start of a measurement the measurement results within this time-period are ignored.

Waiting time



Waiting time

Programmable from 00.1 to

99.9 s.

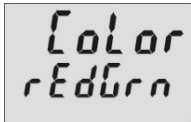
This value specifies how much time

should elapse, after the last valid edge, before zero is to be displayed.

Display colour (for device 6.92x.x1x3.xx0)



Display colour
Upper line red
Lower line red



Display colour
Upper line red
Lower line green

7.8.5.3 Preset 1

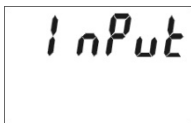
See below 7.8.6.5

7.8.5.4 Preset 2

See below 7.8.6.6

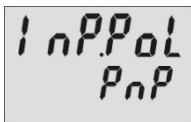
7.8.6 Timer

7.8.6.1 Mainmenu for the Signal and Control inputs

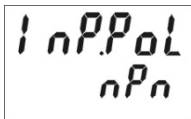


Mainmenu for programming the signal and control inputs

Input polarity

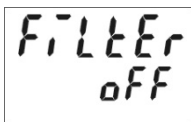


PNP: switching to Plus for all inputs in common



nPn: switching to 0 V for all inputs in common

Filter for the signal inputs Inp A and Inp B

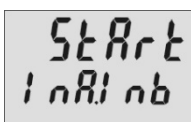


for electronic control of the signal inputs

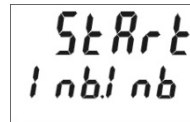


for mechanical control of the signal inputs (for control with mechanical contacts)

Input mode Time measurement



Start: Edge to Inp A
Stop: Edge to Inp B



Start: 1. Edge to Inp B
Stop: 2. Edge to Inp B



Timing can only be controlled via the Gate input

Inp A and Inp B: no function



The timer is reset by means of a RESET (to zero when adding, to preset 2 when subtracting) and then starts timing again.

Timing is stopped with adding operations when preset 2 is reached.

Timing is stopped with subtracting operations when zero is reached.

A RESET during the timing process also causes this to stop.

Inp A and Inp B: no function.

Gate control for Timing



Timing takes place when the Gate input is not active.



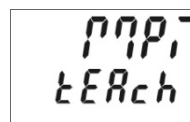
Timing takes place when the Gate input is active

User input

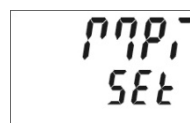


When the MPI input is activated the display is "frozen" and remains "frozen" until the MPI input is deactivated.

Internally the preset timer continues counting.

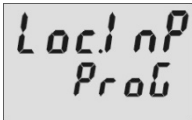


When the MPI input is activated the current count value for the preset that has just been selected will be adopted as the new preset value. See also 7.9

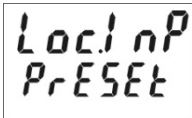


When the MPI input is activated the preset timer will be set to the value specified in the parameter *SEtPt*. See also 7.10

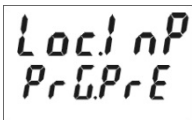
Lock input



When the Lock input is activated the programming is inhibited.



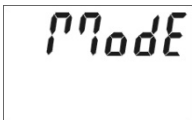
When the Lock input is activated the setting of the preset values is inhibited.



When the Lock input is activated the setting of the preset values and the programming are both inhibited.

7.8.6.2 Mainmenu for the

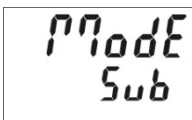
output operations



Mainmenu for determining the operation of the outputs



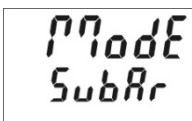
Count mode ADD
Outputs active when count status \geq preset value
Reset to zero



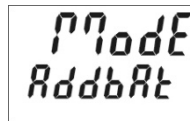
Count mode SUBTRACT
Output 1 active when count status \leq preset value 1
Output 2 active when count status ≤ 0
Reset to preset 2



Count mode ADDING with automatic reset
Output 1 active when count status \geq preset value 1
Output 2 (timed signal) active when count status = preset value 2
Automatic reset to zero when count status = preset value 2
Reset to zero



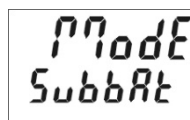
Count mode SUBTRACTING with automatic reset
Output 1 active when count status \leq preset value 1
Output 2 (timed signal) active when count status = 0
Automatic reset to preset 2 when



count status = 0
Reset to preset 2

Count mode ADDING with automatic reset and Batch counter

Output 2 (timed output) active when main counter = preset value 2
Automatic reset to zero when main counter = preset value 2
Batch counter counts the number of automatic repetitions of preset 2
Output 1 active when batch counter \geq preset 1
manual reset sets both counters to zero
electrical reset sets only main counter to zero



Count mode SUBTRACTING with automatic reset and Batch counter

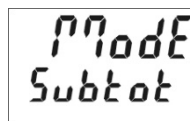
Output 2 (timed signal) active when main counter = zero
Automatic reset to preset 2 when main counter = zero
Batch counter counts the number of automatic repetitions of preset 2
Output 1 active bei Batchzähler \geq Preset 1

Manual reset sets main counters to preset value 2 and batch counter to zero
Electronic reset only sets the main counter to preset value 2



Count mode ADDING with automatic reset and Total counter

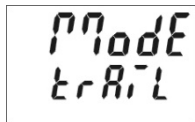
Output 2 (timed signal) active when main counter = preset value 2
Automatic reset to zero when main counter = preset value 2
Total counter counts all the count pulses from the main counter
Output 1 active when total counter \geq preset value 1
Manual Reset sets both counters to zero
Electronic reset only sets the main counter to zero



Count mode SUBTRACTING with automatic reset and Total counter
Output 2 (timed signal) active when main counter = zero
Automatic reset to preset value 2 when main counter = zero
Total counter counts (sub from preset value 1) all count pulses from main counter

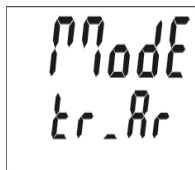
Output 1 active when Total counter \leq zero
 Manual reset sets both counters to the preset values
 Electronic reset sets only main counter to preset value 2

Tracking preset mode



When preset 2 is changed then preset 1 automatically tracks it.
 Reset to zero

Preset 1 relative to preset 2 (see also section 17. Output operations)



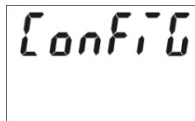
Tracking Preset mode with automatic reset

When preset 2 is changed then preset 1 automatically tracks it.
 Reset to zero.

Automatic reset to zero when main counter = preset value 2.
 Preset 1 relative to Preset 2

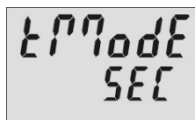
(see also section 17. Output operations)

7.8.6.3 Mainmenu for configuration

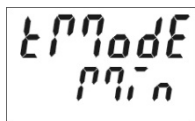


Mainmenu for matching the time ranges and display

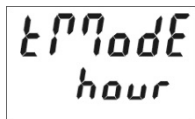
Unit of time



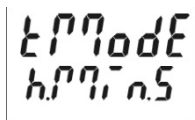
Unit of time: seconds
 Decimal point setting determines the resolution



Unit of time: minutes
 Decimal point setting determines the resolution

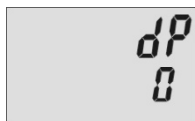


Unit of time: hours
 Decimal point setting determines the resolution



Unit of time: Hrs. Min. Sec.

Decimal point setting (Resolution)



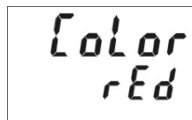
Decimal place (determines the resolution)
 0 no decimal place
 0.0 1 decimal place
 0.00 2 decimal places
 0.000 3 decimal places

Set value

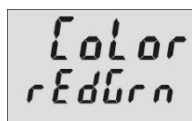


Set value can be programmed from 000000 to 999999
 A previously programmed decimal point will be displayed

Display colour (for 6.92x.x1x3.xx0]

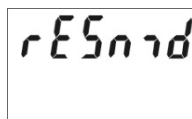


Display colour
 upper line red
 lower line red

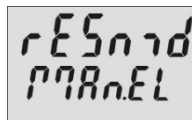


Display colour
 upper line red
 lower line green

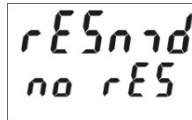
7.8.6.4 Mainmenu for reset mode



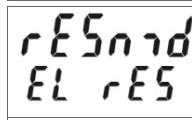
Setting the reset mode



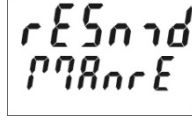
Manual reset (with red key) and electrical reset (reset input)



No reset possible (red key and reset input inhibited)

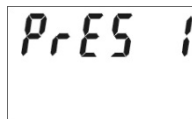


Only electrical reset possible (reset input)

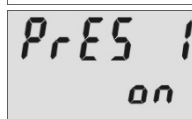


Only manual reset possible (red key)

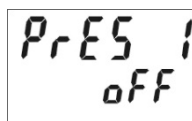
7.8.6.5 Mainmenu for Preset 1



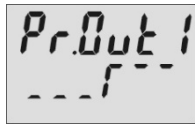
Mainmenu for turning preset 1 ON/OFF



Preset 1 ON

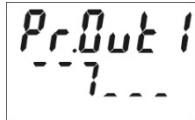


Preset 1 OFF and no function



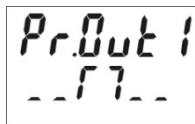
ADD mode output operations:
permanent signal at Output 1,
becomes active when count \geq Preset 1

SUB mode output operations:
permanent signal at Output 1,
becomes active when count \leq Preset 1



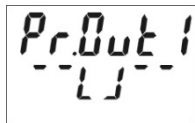
ADD mode output operations:
permanent signal at Output 1,
becomes passive when count \geq Preset 1

SUB mode output operations:
permanent signal at Output 1,
becomes passive when count \leq Preset 1



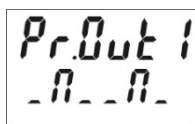
ADD mode output operations:
timed signal at Output 1, becomes
active when count \geq Preset 1.
(Activation only in positive direction)

SUB mode output operations:
timed output at Output 1, becomes
active when count \leq Preset 1
(Activation only in negative direction)



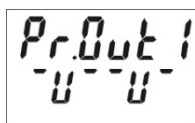
ADD mode output operations:
timed signal at Output 1, becomes
passive when count \geq Preset 1.
(Deactivation only in positive
direction)

SUB mode output operations:
timed output at Output 1, becomes
passive when count \leq Preset 1.
(Deactivation only in negative
direction).



ADD mode output operations:
timed signal at Output 1, becomes
active with positive direction and
when count \geq Preset 1 and
subsequently active with negative
direction and when count \leq Preset 1

SUB mode output operations:
timed signal at Output 1, becomes
active with negative direction and
when count \leq Preset 1 and
subsequently active with positive
direction and when count \geq Preset 1



ADD mode output operations:
timed signal at Output 1, becomes
passive with positive direction and
when count \geq Preset 1 and
subsequently passive with negative
direction and when count \leq Preset 1

SUB mode output operations:
timed output at Output 1, becomes

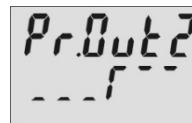
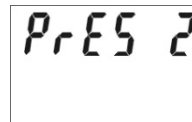


passive with negative direction and
when count \leq Preset 1 and
subsequently passive with positive
direction and when count \geq Preset 1

Duration of timed signal of Output 1,
programmable from 00.01 to 99.99 s.
Timed signal is post-triggered

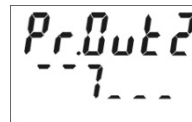
7.8.6.6 Mainmenu for Preset 2

Mainmenu for Preset 2



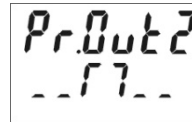
ADD mode output operations:
permanent signal at Output 2,
becomes active when count \geq Preset 2

SUB mode output operations:
permanent signal at Output 2,
becomes active when count \leq zero



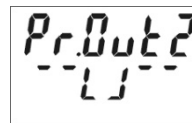
ADD mode output operations:
permanent signal at Output 2,
becomes passive when count \geq Preset 2

SUB mode output operations:
permanent signal at Output 2,
becomes passive when count \leq zero



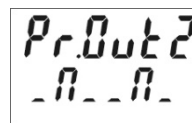
ADD mode output operations:
timed signal at Output 2, becomes
active when count \geq Preset 2
(Activation only in positive direction).

SUB mode output operations:
permanent signal at Output 2,
becomes active when count \leq zero
(Activation only in negative direction)



ADD mode output operations:
timed signal at Output 2, becomes
passive when count \geq Preset 2
(Deactivation only in positive
direction)

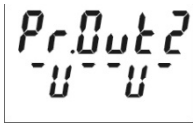
SUB mode output operations:
permanent signal at Output 2,
becomes passive when count \leq zero
(Deactivation only in negative
direction).



ADD mode output operations:
timed signal at Output 2, becomes
active with positive direction and
when count \geq Preset 2 and
subsequently with negative direction
and when count \leq Preset 2

SUB mode output operations:
timed signal at Output 2, becomes
active with negative direction and

when count \leq zero and subsequently with positive direction and when count \geq zero



ADD mode output operations: timed signal at Output 2, becomes passive with positive direction and when count \geq Preset 2 and subsequently with negative direction and when count \leq Preset 2
 SUB mode output operations: timed signal at Output 2, becomes passive with negative direction and when count \leq zero and subsequently with positive direction and when count \geq zero



Duration of timed signal of Output 1, programmable from 00.01 to 99.99 s. Timed output is post-triggered.



Active:
Relay or optocoupler are activated when the preset value is reached.

Passive:
Relay becomes de-energized or the optocoupler disabled when the preset value is reached.

7.9 Setting the presets

7.9.1 Setting via Decade Keys

In programming mode Preset 2 will always be displayed in the lower line. This is except for the output operations AddBat, SubBat, AddTot and SubTot.



Press the Prog/Mode key until the preset to be changed is displayed - **PR1** or **PR2**.



Press any decade key

⇒ Display switches to the editor mode

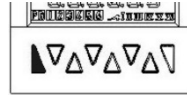


Set the desired preset value using the decade keys



Press the Prog/Mode key to confirm the value and save it

⇒ Display switches to the editor mode of the next preset **PR2** or **PR1**



Approx. 3 s after the last press of the decade keys or by pressing the Reset key the new preset value will be accepted and the counter will switch back to operating mode.

7.9.2 Setting with Teach-In Function



Program the MPI input to **tERch**



In programming mode, select the preset to be changed using the Prog/Mode key

Briefly activate the MPI (NPN or PNP input logic)

⇒ The current count value will be adopted as the new preset value



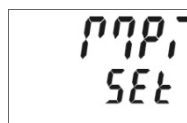
The preset value can subsequently be further modified via the decade keypad.

7.9.3 Setting the tracking presets (trail)

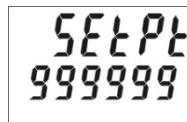
If a tracking preset has been programmed, the value for Preset 2 can be set either via the decade keypad or via the Teach-IN function. However the value for Preset 1 must be entered via the decade keypad. In this instance, it is not possible to use the Teach-In function.

7.10 Set Function

Both the pulse counter and the timer can be set to a default value by means of the Set function.



Programme the MPI input to **SEt**



Set menu item **SEtPt** to the desired value

Briefly activate the MPI (NPN or PNP input logic)

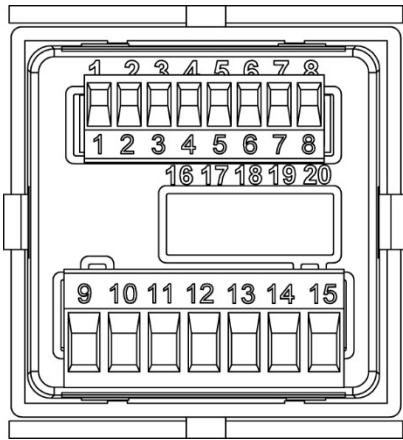
⇒ For add. output operations the pulse counter or timer will be set to the **SEtPt** default value

⇒ For sub. output operations the pulse counter or timer will be set to the amount of the value of Preset 2 and the value of **SEtPt**.

8 Error message

Err 1	Set value is outside the permitted range
-------	--

9 Connections



9.1 Signal and Control Inputs

N°	Designation	Function
1	AC: 24V DC/80mA DC: UB connected through	Sensor supply voltage
2	GND (0 VDC)	Common connection Signal and Control inputs
3	INP A	Signal input A
4	INP B	Signal input B
5	RESET	Reset input
6	LOCK	Keypad lock
7	GATE	Gate input
8	MPI	User input

9.2 Supply voltage and Outputs

9.2.1 Version with relays

N°	Designation	Function
9	Relay contact C.1	Output 1
10	Relay contact N.O.1	
11	Relay contact C.2	Output 2
12	Relay contact N.O.2	
13	Relay contact N.C.2	
14	AC: 90...260V AC N~ AC: 24V AC N~ DC: 10...30 VDC	Supply voltage
15	AC: 90...260V AC L~ AC: 24V AC L~ DC: GND (0V DC)	Supply voltage

10 Technical Data

10.1 General Data

Display	LCD positive or negative, backlit
	2 x 6-digit
Digit height	upper line 9mm lower line 7mm special characters 2mm
Overload/ Underload	Blinking, 1s Counter loses up to 1 decade no pulses
Data retention	> 10 years, EEPROM
Operation	8 keys

10.2 Pulse counter

Count frequency	max. 55kHz (see section 13. frequencies typ.)
Response time of the outputs:	
Relays	
Add/Sub/Trail	< 13ms
With automatic repeat	< 13ms
A/B ; (A-B)/A	< 34ms

10.3 Tacho/Frequency meter

Frequency range	0,01Hz to 65kHz (see section 13. frequencies typ.)
Measuring principle	≤ 76.3Hz Time interval (period measurement) > 76.3Hz Gate time Gate time approx.13.1ms
Measuring error	< 0.1% per channel
Response time of the outputs:	
1-channel operation	< 100ms @ 40kHz < 350ms @ 65kHz
2-channel operation	< 150ms @ 40kHz < 600ms @ 65kHz

10.4 Timer

Seconds	0.001s ... 999 999s
Minutes	0.001min ... 999 999min
Hours	0.001h .. 999 999h
h.min.s	00h.00min.01s ... 99h.59min.59s
Min. time measurable	500µs
Measuring error	< 50ppm
Response time of the outputs:	

Relays

< 13ms

ext. fuse protection T 0.2A

10.5 Signal and Control inputs

Polarity:	programmable NPN/PNP for all inputs in common	
Input resistance	5kΩ	
Pulse shape	any	
Switching level with AC supply:		
HTL level	Low:	0 ... 4V DC
	High:	12 ... 30V DC
Switching level with DC supply:		
HTL level	Low:	0 ... 0,2 x U _B
	High:	0,6 x U _B ... 30V DC

Minimum pulse length of the Reset input: 1ms
Minimum pulse length of the Control inputs: 10ms

10.6 Outputs

Output 1

Relay with make contact programmable as NC or NO	
Switching voltage	max. 250 VAC/ 110 VDC
Switching current	max. 3 A AC/ V DC min. 30 mA DC
Switching capacity	max. 750 VA / 90 W
Mechanical service life (switching cycles)	2x10 ⁷
N° of switching cycles at 3 A/ 250 V AC	1x10 ⁵
N° of switching cycles at 3 A/ 30 V DC	1x10 ⁵

Output 2

Relay with changeover contact	
Switching voltage	max. 250 VAC/ 150 VDC
Switching current	max. 3 A AC/ A DC min. 30 mA DC
Switching capacity	max. 750 VA/ 90 W
Mechanical service life (switching cycles)	20x10 ⁶
N° of switching cycles at 3 A/ 250 V AC	5x10 ⁴
N° of switching cycles at 3 A/ 30 V DC	5x10 ⁴

10.7 Supply voltage

AC supply:	90 ... 260V AC / max. 9VA 50/ 60Hz ext. fuse protection: T 0.1A 24V AC +/- 10% / max. 6VA 50 / 60Hz ext. fuse protection: T 0,315A
DC supply:	10 ... 30V DC/ max. 4.5W reverse polarity protection

10.8 Sensor supply voltage

AC supply:	24V DC ±15%, 80mA
DC supply:	max. 80mA, external voltage supply is connected through

10.9 Climatic Conditions

Operating temperature:	-20°C ... +65°C
Storage temperature:	-25°C ... +75°C
Relative humidity: RH.	93% at +40°C, non-condensing to 2000m
Altitude:	

10.10 EMC

Noise immunity:	EN61000-6-2 with shielded signal and control cables
Noise emission:	EN55011 Class B

10.11 Device safety

Design to:	EN61010 Part 1
Protection Class:	Class 2
Application area:	Soiling Level 2

10.12 Mechanical Data

Housing:	Panel-mount housing to DIN 43 700, RAL 7021
Dimensions:	48 x 48 x 91mm
Panel cut-out:	45 ^{+0,6} x 45 ^{+0,6} mm
Installation depth:	ca. 107mm incl. terminals
Weight:	ca. 125g
Protection:	IP 65 (front)
Housing material:	Polycarbonate UL94 V-2
Vibration resistance: 10 - 55Hz / 1mm / XYZ (EN60068-2-6):	30min in each direction
Shock resistance (EN60068-2-27):	100G / XYZ 3 times in each direction
(EN60068-2-29):	10G/6 ms/XYZ 2000 times in each direction
Cleaning:	The front of the unit should only be cleaned using a soft damp (water!) cloth.

10.13 Connections

Supply voltage and outputs:	
Plug-in screw terminal, 7-pin, RM5.08	
Core cross section, max. 2.5mm ²	
Signal and control inputs:	
Plug-in screw terminal, 8-pin, RM 3.81	

Core cross-section, max. 1.5 mm²

11 Scope of Delivery

Delivery includes:

- Preset counter
- Mounting clip
- Instruction manual

12 Ordering codes

- CM030980:** Supply Voltage 10 ... 30V DC
- CM034980:** Supply Voltage 90 ... 260V AC

13 Frequencies (typical)

13.1 Pulse counter

HTL level

AC supply	typ. Low	2,5V
	typ. High	22,0V
DC supply 12V	typ. Low	2,0V
	typ. High	10,0V
DC supply 24V	typ. Low	2,5V
	typ. High	22,0V

	Add Sub Trail	AddAr SubAr AddBat SubBat TrailAr	AddTot SubTot
Cnt.Dir	55kHz	2,8kHz	2,7kHz
Up.Dn Up.Up	29kHz	2,8kHz	2,7kHz
Quad Quad 2	28kHz	1,4kHz	1,3kHz
Quad 4	18kHz	1,2kHz	0,9kHz
A/B (A-B)/A	29kHz		

13.2 Frequency meter

HTL level

AC supply	typ. Low	2,5V
	typ. High	22,0V
DC supply 12V	typ. Low	2,0V
	typ. High	10,0V
DC supply 24V	typ. Low	2,5V
	typ. High	22,0V

NOTE: Switching levels of the input

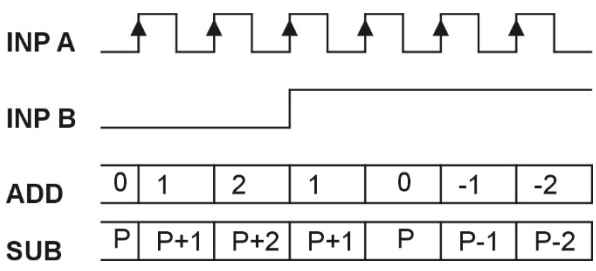
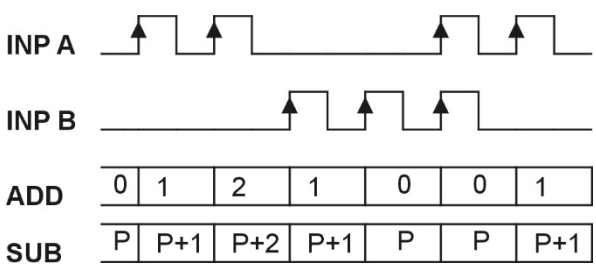
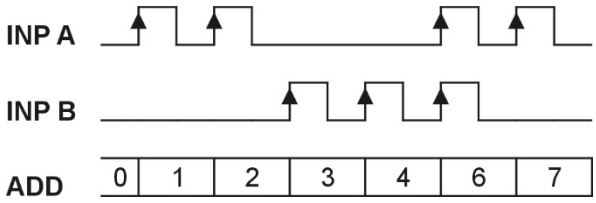
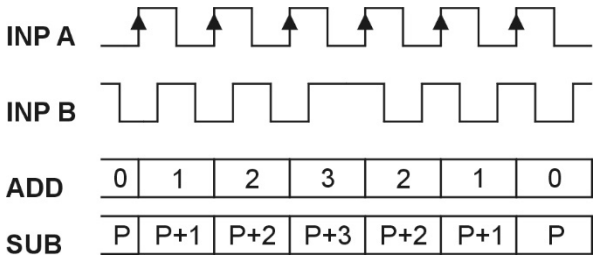
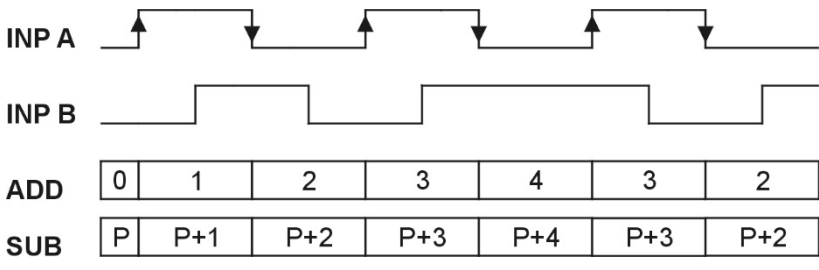
Switching levels with AC supply:

HTL level	Low:	0 ... 4V DC
	High:	12 ... 30V DC

Switching levels with DC supply:

HTL level	Low:	0 ... 0,2 x UB
-----------	------	----------------

High: 0,6 x UB ... 30 VDC

<p>Function</p>	<p>Diagram</p> <p>Note: No counting when GATE input is active P = Preset</p>	<p>PNP: Count on rising edge NPN: Count on falling edge</p>														
<p>Cnt.Dir</p>	 <p>INP A </p> <p>INP B </p> <p>ADD <table border="1" data-bbox="375 649 869 694"> <tr> <td>0</td><td>1</td><td>2</td><td>1</td><td>0</td><td>-1</td><td>-2</td> </tr> </table></p> <p>SUB <table border="1" data-bbox="375 705 869 750"> <tr> <td>P</td><td>P+1</td><td>P+2</td><td>P+1</td><td>P</td><td>P-1</td><td>P-2</td> </tr> </table></p>	0	1	2	1	0	-1	-2	P	P+1	P+2	P+1	P	P-1	P-2	<p>Inp A: Count input Inp B: Count direction Add: Display 0 --> Preset Sub: Display Preset -> 0</p>
0	1	2	1	0	-1	-2										
P	P+1	P+2	P+1	P	P-1	P-2										
<p>Up.Dn</p>	 <p>INP A </p> <p>INP B </p> <p>ADD <table border="1" data-bbox="375 974 869 1019"> <tr> <td>0</td><td>1</td><td>2</td><td>1</td><td>0</td><td>0</td><td>1</td> </tr> </table></p> <p>SUB <table border="1" data-bbox="375 1030 869 1075"> <tr> <td>P</td><td>P+1</td><td>P+2</td><td>P+1</td><td>P</td><td>P</td><td>P+1</td> </tr> </table></p>	0	1	2	1	0	0	1	P	P+1	P+2	P+1	P	P	P+1	<p>Inp A: Count input add Inp B: Count input sub Add: Display 0 --> Preset Sub: Display Preset -> 0</p>
0	1	2	1	0	0	1										
P	P+1	P+2	P+1	P	P	P+1										
<p>Up.Up</p>	 <p>INP A </p> <p>INP B </p> <p>ADD <table border="1" data-bbox="375 1299 869 1344"> <tr> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>6</td><td>7</td> </tr> </table></p> <p>SUB <table border="1" data-bbox="375 1355 869 1400"> <tr> <td>P</td><td>P+1</td><td>P+2</td><td>P+3</td><td>P+2</td><td>P+1</td><td>P</td> </tr> </table></p>	0	1	2	3	4	6	7	P	P+1	P+2	P+3	P+2	P+1	P	<p>Inp A: Count input 1 add Inp B: Count input 2 add Add: Display 0 --> Preset</p>
0	1	2	3	4	6	7										
P	P+1	P+2	P+3	P+2	P+1	P										
<p>Quad</p>	 <p>INP A </p> <p>INP B </p> <p>ADD <table border="1" data-bbox="375 1579 869 1624"> <tr> <td>0</td><td>1</td><td>2</td><td>3</td><td>2</td><td>1</td><td>0</td> </tr> </table></p> <p>SUB <table border="1" data-bbox="375 1635 869 1680"> <tr> <td>P</td><td>P+1</td><td>P+2</td><td>P+3</td><td>P+2</td><td>P+1</td><td>P</td> </tr> </table></p>	0	1	2	3	2	1	0	P	P+1	P+2	P+3	P+2	P+1	P	<p>A 90° B Inp A: Count input Count on one edge Inp B: Reverse direction Add: Display 0 --> Preset Sub: Display Preset -> 0</p>
0	1	2	3	2	1	0										
P	P+1	P+2	P+3	P+2	P+1	P										
<p>Quad 2</p>	 <p>INP A </p> <p>INP B </p> <p>ADD <table border="1" data-bbox="375 1904 1093 1948"> <tr> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>3</td><td>2</td> </tr> </table></p> <p>SUB <table border="1" data-bbox="375 1960 1093 2004"> <tr> <td>P</td><td>P+1</td><td>P+2</td><td>P+3</td><td>P+4</td><td>P+3</td><td>P+2</td> </tr> </table></p>	0	1	2	3	4	3	2	P	P+1	P+2	P+3	P+4	P+3	P+2	<p>A 90° B Inp A: Count input Count on rising and on falling edges Inp B: Reverse direction Add: Display 0 --> Preset Sub: Display Preset -> 0</p>
0	1	2	3	4	3	2										
P	P+1	P+2	P+3	P+4	P+3	P+2										




14 Input modes: Pulse counting

Function	Diagram Note: No counting when GATE input is active	PNP: Count on rising edge NPN: Count on falling edge
Quad 4	<p>INP A</p> <p>INP B</p> <p>ADD: 0 1 2 3 4 5 6 7 6 5 4 3</p> <p>SUB: P P+1 P+2 P+3 P+4 P+5 P+6 P+7 P+6 P+5 P+4 P+3</p>	<p>A 90° B</p> <p>Inp A: Count input Count on rising and on falling edges</p> <p>Inp B: Count input Count on rising and on falling edges,</p> <p>Reverse direction</p> <p>Add: Display 0 --> Preset</p> <p>Sub: Display Preset -> 0</p>
A / B	<p>INP A</p> <p>Counts A: 0 1 1 1 2 3 4</p> <p>INP B</p> <p>Counts B: 0 1 2 3 3 4 4</p> <p>Display: 0 1 0,5 0,33 0,66 0,75 1</p>	<p>Inp A: Count input 1 Inp B: Count input 2</p> <p>Formula: A / B</p>
(A-B)/A	<p>INP A</p> <p>Counts A: 0 1 1 1 2 3 4</p> <p>INP B</p> <p>Counts B: 0 1 2 3 3 4 4</p> <p>Display: 0% 0% -100% -200% -50% -33% 0%</p>	<p>Inp A: Count input 1 Inp B: Count input 2</p> <p>Formula: (A – B)/A x100</p>






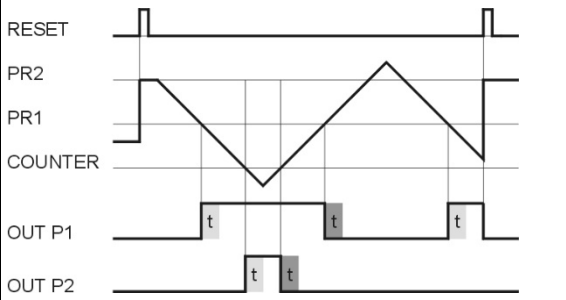
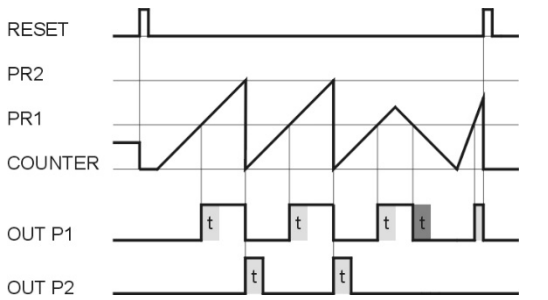
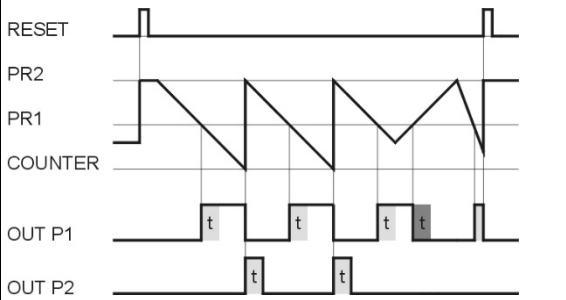
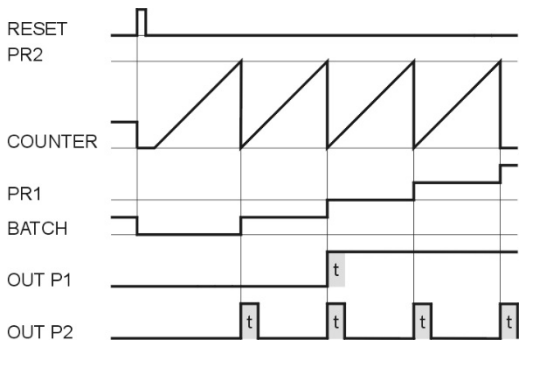
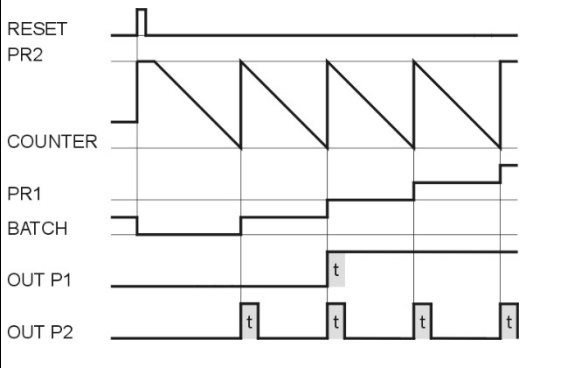
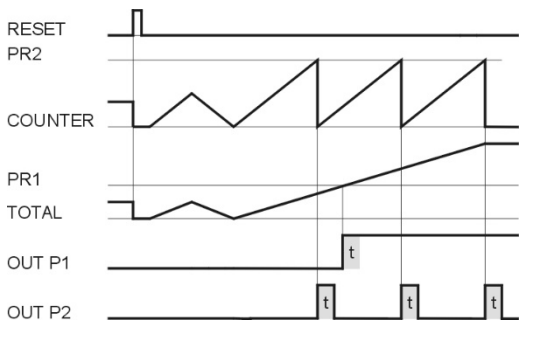
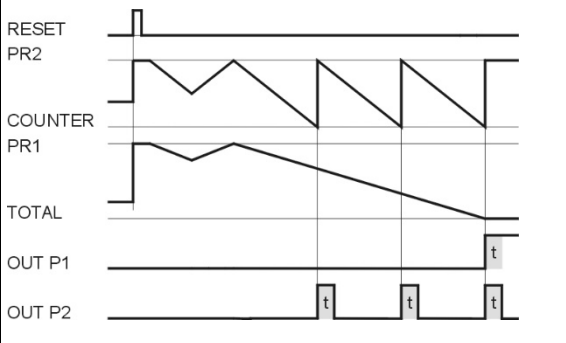
15 Input modes: Timing

Function	Diagram	PNP: Count on rising edge NPN: Count on falling edge
InA.InB	<p>INP A</p> <p>INP B</p> <p>GATE</p> <p>ADD</p> <p>SUB</p>	<p>Inp A: Start Inp B: Stop</p> <p>Add: Display 0 --> Preset Sub: Display Preset -> 0</p>
InB.InB	<p>INP B</p> <p>GATE</p> <p>ADD</p> <p>SUB</p>	<p>Inp A: no function Inp B: Start/Stop</p> <p>Add: Display 0 --> Preset Sub: Display Preset -> 0</p>
FrRrun	<p>GATE</p> <p>ADD</p> <p>SUB</p>	<p>Inp A: no function Inp B: no function</p> <p>Control of the timing only via the GATE input</p> <p>Add: Display 0 --> Preset Sub: Display Preset -> 0</p>
Auto	<p>GATE</p> <p>RESET</p> <p>PRESET</p> <p>ADD</p> <p>SUB</p>	<p>Inp A: no function Inp B: no function</p> <p>Control of the timing via RESET (manual or electrical)</p> <p>Add: Display 0 --> Preset Sub: Display Preset -> 0</p>

16 Input modes: Frequency meter

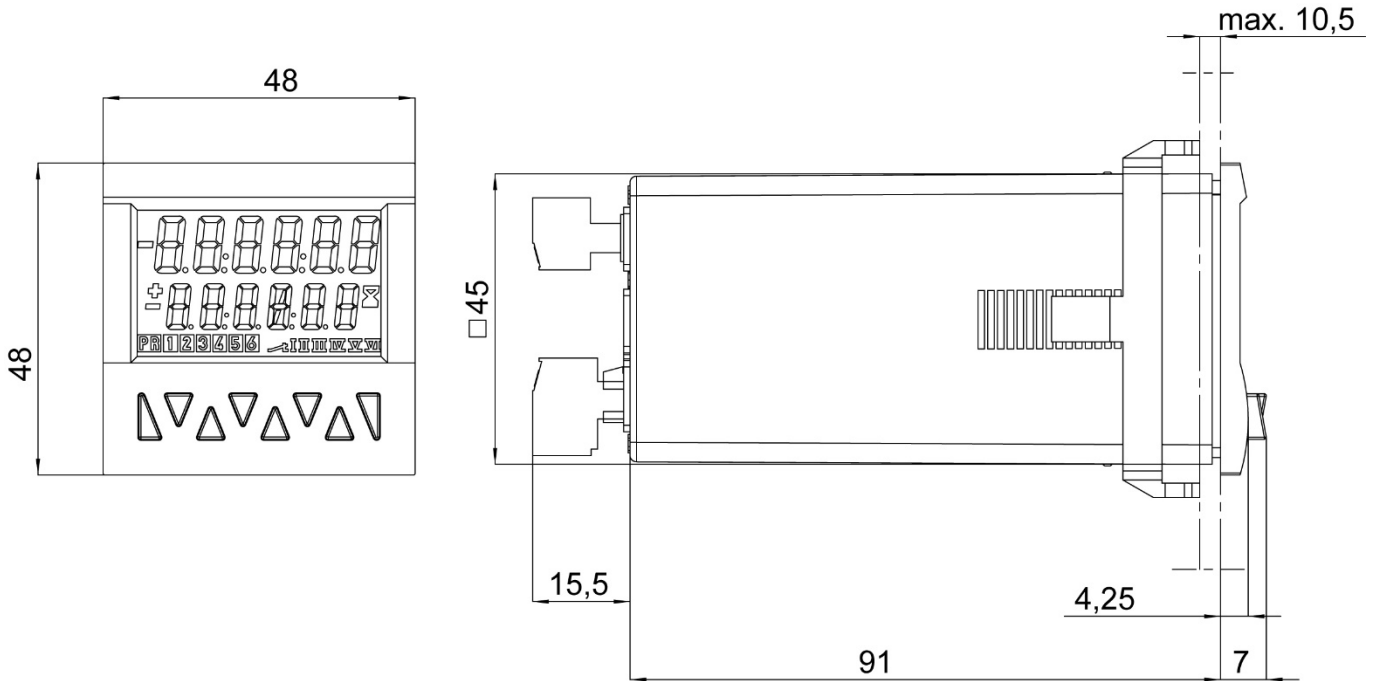
Function	Diagram	PNP: Count on rising edge NPN: Count on falling edge
A	<p>INP A 0 F_{A0} F_{A1} F_{A2} 0 x</p> <p>Display 0 0 F_{A0} F_{A1} F_{A2} 0</p>	Inp A: Frequency input Inp B: no function
AsubB	<p>INP A 0 F_{A0} F_{A1} F_{A2} 0 x</p> <p>INP B 0 0 F_{B0} F_{B1} F_{B2} x</p> <p>Display 0 0 F_{A0} F_{A0} - F_{B0} F_{A1} - F_{B1} - F_{B2}</p>	Inp A: Frequency input 1 Inp B: Frequency input 2 Formula: A - B
AaddB	<p>INP A 0 F_{A0} F_{A1} F_{A2} 0 x</p> <p>INP B 0 0 F_{B0} F_{B1} F_{B2} x</p> <p>Display 0 0 F_{A0} F_{A0} + F_{B0} F_{A1} + F_{B1} F_{B2}</p>	Inp A: Frequency input 1 Inp B: Frequency input 2 Formula: A + B
Quad	<p>Inp A </p> <p>Inp B </p> <p></p> <p>Display 0 0 F_{A0} F_{A1} F_{A2} - F_{A3} - F_{A4}</p>	A 90° B Inp A: Frequency input 1 Inp B: Reverse direction
A / B	<p>INP A 0 F_{A0} F_{A1} 0 0 x</p> <p>INP B 0 0 F_{B0} F_{B1} F_{B2} x</p> <p>Display 0 0 0 F_{A0}/F_{B0} F_{A1}/F_{B1} 0</p>	Inp A: Frequency input 1 Inp B: Frequency input 2 Formula: A / B
(A-B)/A	<p>INP A 0 F_{A0} F_{A1} 0 0 x</p> <p>INP B 0 0 F_{B0} F_{B1} F_{B2} x</p> <p>Display 0 0 100% F_{A0}%F_{B0} F_{A1}%F_{B1} 0</p>	Inp A: Frequency input 1 Inp B: Frequency input 2 Formula: (A - B)/A x100

17 Output operations

Mode	Diagram	Mode	Diagram
	<p>t Only in the mode  and </p>		<p>t Additionally in the mode  and </p>
Add		Sub	
AddAr		SubAr	
AddBat		SubBat	
AddTot		SubTot	

Mode	Diagram
Trail	
TrailAr	

18 Dimensional Drawings



Panel cut-out

