CXQ 312

Electronic Preset Counter

With one preset

Models

LCD positive
LCD positive, green backlighting
LCD negative, red backlighting
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 CXQ312 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.

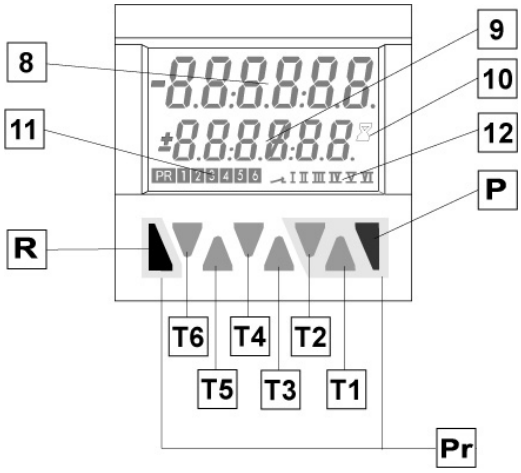
Avoid routing signal or control cables parallel to power lines.

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 output
- Simultaneous display of the actual value and of the preset or auxiliary counters
- Versions with/without backlit display
- Add./Sub. Preset counter with one preset
- Relay output
- Easy-to-program
- Simple preset entry via the front keys or via the Teach-In function
- Pulse, frequency, time or hours run meter
- 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
- 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 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	Indicator for preset value in the display
12	Indicator for active preset output
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 the preset value (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 preset 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 Output

6.1 Output

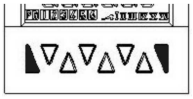
Relay with potential-free changeover contact

6.2 Active Output

The active output will be shown on the display as  .
For safety switching the relay output can be inverted, i.e. the relay will be de-energized when the preset is reached.
To do this, the parameter Pr.OUT1 must be set to  (for permanent signal) or  or  (for timed signal).

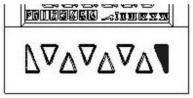
7 Programming

7.1 Entering the programming

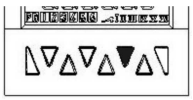


Press the Reset key and Prog/Mode key simultaneously for 3 s

⇨ The security prompt appears in the display

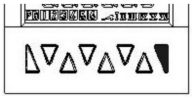


Programming can be exited again using the Prog/Mode key.



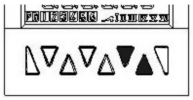
Press key T2 to continue with the programming

⇨ The security prompt appears in the display



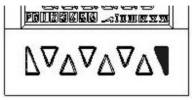
Enter the main menu by pressing the Prog/Mode key

7.2 Choice of main menus



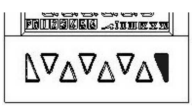
The menus are selected using the keys T2 (next) and T1 (back)

7.3 Entering a sub-menu



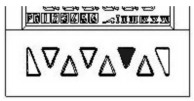
The sub-menu is opened with the Prog/Mode key and the first menu item is displayed.

7.4 Selecting the menu items



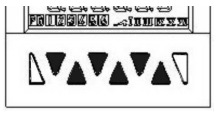
The Prog/Mode key is used to select a menu item within the sub-menu

7.5 Setting the menu items

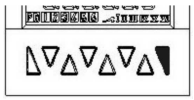


The T2 key is used to select the individual settings for the menu items

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



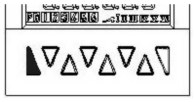
7.6 Accepting the setting



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

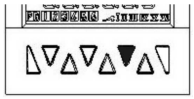
During programming, it is possible to exit the programming at each menu item by pressing the reset key.



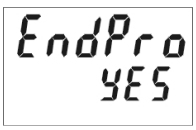
Press the Reset key

⇨ The security prompt appears in the display

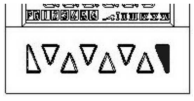
Pressing the Prog/Mode key acknowledges this prompt and causes the programming menu to start again from the beginning. The previously-programmed values are preserved. These can now be changed or checked again.



Pressing the decade key T2 selects the termination of the programming



⇨ The security prompt appears in the display



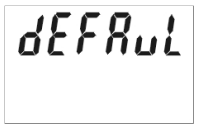
Pressing the Prog/Mode key acknowledges this prompt and terminates the programming; the modified settings are saved in the EEPROM.

⇨ 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.



Menu Parameter Sets

Default setting
Parameter set 1

Default setting
Parameter set 2

Default setting
Parameter set 3

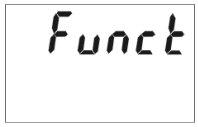
Freely programmable
User settings

Factory settings are highlighted in grey

7.8.2 Table: Parameter Sets

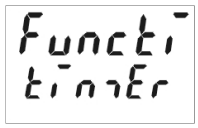
	P.SEt 1	P.SEt 2	P.SET 3
Func	Count	Count	Count
InP.PoL	PnP	PnP	PnP
FiLtEr	on	oFF	oFF
Count	Cnt.dir	uP.dn	Quad
MPi	LAtch	LAtch	Set
Loc.InP	ProG	ProG	ProG
ModE	Add	Sub	Add
FActor	01.0000	01.0000	01.0000
diViSo	01.0000	01.0000	01.0000
dP	0	0	0.00
SEtPt	000000	000000	0000.00
CoLor	red.Grn	red.Grn	red.Grn
rESmd	Man.EL	Man.EL	Man.EL
Pr.Out 1			
t.Out 1		00.10	

7.8.3 Setting the Basic Function



Basic function menu

Programming menu
Pulse counter (7.8.4)

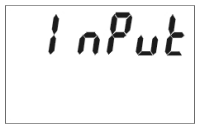


Programming menu
Timer/Hour meter (7.8.6)

Programming menu
Tacho/Frequency meter (7.8.5)

7.8.4 Pulse Counter

7.8.4.1 Submenu for the Signal and Control inputs



Menu for programming the signal and control inputs

Input polarity

PNP: switching to Plus
for all inputs in common

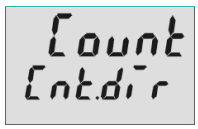
NPN: switching to 0 V
for all inputs in common

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

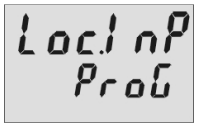
User input

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 will be adopted as the new preset value. See also 7.9

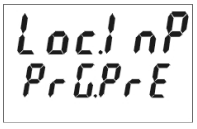
When the MPI input is activated the preset counter will be set to the value specified in the parameter *SEtPt*. See also 7.10

Lock input



When the Lock input is activated the programming is inhibited.

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

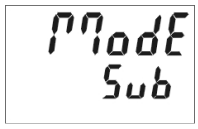


When the Lock input is activated the setting of the preset value and the programming are both inhibited.

7.8.4.2 Submenu for Output operations

Submenu for determining the operation of the output

Count mode ADD
Output active when count status ≥ preset value
Reset to zero



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

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

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

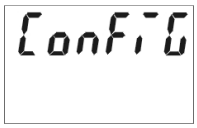
Count mode ADDING with automatic reset and Batch counter
Output (timed signal) active when main counter = preset value
Automatic reset to zero when main counter = preset value
Batch counter counts the number of automatic repetitions of the preset
Manual reset sets both counters to zero.
Electrical reset sets only the main counter to zero.

Count mode SUBTRACTING with automatic reset and Batch counter
Output (timed signal) active when main counter = zero
Automatic reset to preset when

main counter = zero
Batch counter counts the number of automatic repetitions of the preset
Manual reset sets main counter to preset value, batch counter to zero
Electrical reset sets only the main counter to the preset value

Count mode ADDING with automatic reset and Total counter
Output (timed signal) active when main counter = preset value
Automatic reset to zero when main counter = preset value
Total counter counts all the count pulses from the main counter
Manual Reset sets both counters to zero
Electrical reset sets only the main counter to zero

7.8.4.3 Submenu for configuration



Submenu 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

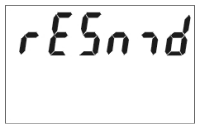
Decimal point (only optical function)

0	no decimal place
0.0	1 decimal place
0.00	2 decimal places
0.000	3 decimal places
0.0000	4 decimal places
0.00000	5 decimal places

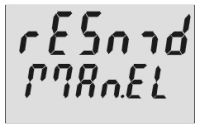
Set value

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

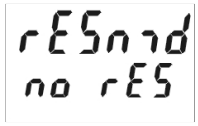
7.8.4.4 Submenu for reset mode



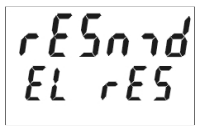
Setting the reset mode



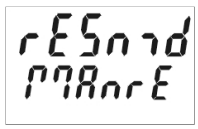
Manual reset (with red key) and electrical reset (reset input)



No reset possible (red key and reset input inhibited)



Only electrical reset possible (reset input)



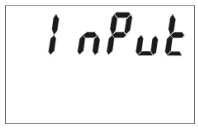
Only manual reset possible (red key)

7.8.4.5 Preset

See below 7.8.6.5

7.8.5 Tacho/Frequency meter

7.8.5.1 Submenu for the Signal and Control inputs



Submenu for programming the signal and control inputs

Input polarity

PNP: switching to Plus for all inputs in common

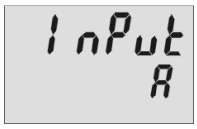
NPN: switching to 0 V for all inputs in common

Filter for the signal inputs Inp A and Inp B

maximum count frequency

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

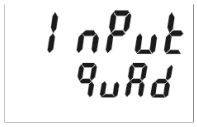
Input mode Frequency Measurement



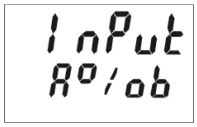
Simple frequency measurement
Inp A: Frequency input
Inp B: no function

Differential measurement [A – B]
Inp A: Frequency input A
Inp B: Frequency input B

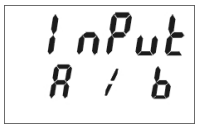
Total measurement [A + B]
Inp A: Frequency input A
Inp B: Frequency input B



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

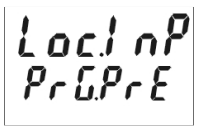
When the MPI input is activated the display is “frozen” and remains “frozen” until the MPI input is deactivated.
Internally the frequency meter continues running.

When the MPI input is activated the current frequency for the preset 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 value is inhibited.



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

7.8.5.2 Submenu for configuration

Submenu for matching the input pulses and display

Multiplication factor
Multiplication factor can be programmed from 00.0001 to 99.9999.

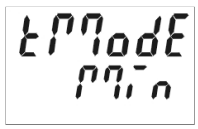
The setting 00.0000 will not be accepted

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)

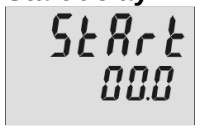
0	no decimal place
0.0	1 decimal place
0.00	2 decimal places
0.000	3 decimal places

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



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

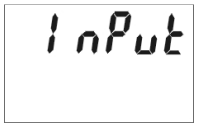
Waiting time Programmable from 00.1 to 99.9 s. This value specifies how much time should elapse, after the last valid edge, before zero is to be displayed.

7.8.5.3 Preset 1

See below 7.8.6.5

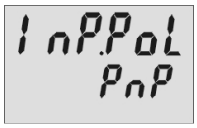
7.8.6 Timer

7.8.6.1 Submenu for the Signal and Control inputs



Menu 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

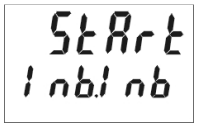
for electronic control of the signal inputs

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

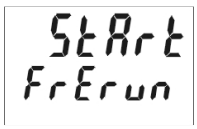
Input mode Time measurement

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 when subtracting) and then starts timing again.

Timing is stopped with adding operations when preset 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

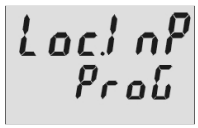
User input

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.

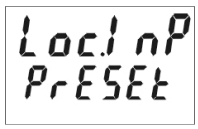
When the MPI input is activated the current time value will be adopted as the new preset value.
See also 7.9

When the MPI input is activated the 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.



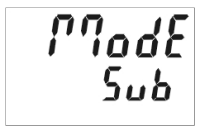
When the Lock input is activated the setting of the preset values is inhibited.

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

7.8.6.2 Submenu for the output operations

Submenu for determining the operation of the output

Count mode ADD
Output active when count status ≥ preset value
Reset to zero



Count mode SUBTRACT
Output active when count status ≤ 0
Reset to preset value

Count mode ADDING with automatic reset
Output (timed signal) active when count status = preset value

Automatic reset to zero when count status = preset value
Reset to zero

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

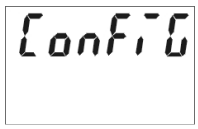
Count mode ADDING with automatic reset and Batch counter

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

Count mode SUBTRACTING with automatic reset and Batch counter
Output (timed signal) active when main counter = 0
Automatic reset to preset when main counter = 0
Batch counter counts the number of automatic repetitions of the preset
Manual reset sets main counter to preset value and batch counter to zero
Electrical reset sets only the main counter to preset value

Count mode ADDING with automatic reset and Total counter
Output (timed signal) active when main counter = preset value
Automatic reset to zero when main counter = preset value
Total counter counts all the count pulses from the main counter
Manual Reset sets both counters to zero
Electrical reset sets only the main counter to zero

7.8.6.3 Submenu for configuration



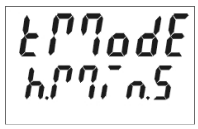
Submenu for matching the time ranges and display

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)

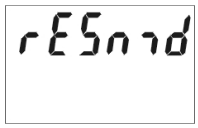
Decimal place
(determines the resolution)

0	no decimal place
0.0	1 decimal place
0.00	2 decimal places
0.000	3 decimal places

Set value

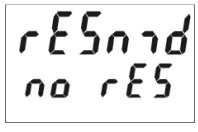
Set value can be programmed from 000000 to 999999
A previously programmed decimal point will be displayed

7.8.6.4 Submenu for reset mode

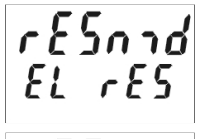


Setting the reset mode

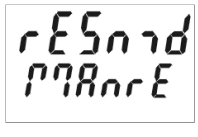
Manual reset (with red key) and electrical reset (reset input)



No reset possible (red key and reset input inhibited)



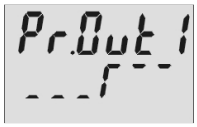
Only electrical reset possible (reset input)



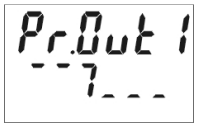
Only manual reset possible (red key)

7.8.6.5 Submenu for Preset

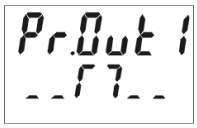
Submenu for the preset



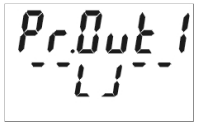
ADD mode output operations: permanent signal at the output, becomes active when count ≥ preset
SUB mode output operations: permanent signal at the output, becomes active when count ≤ 0



ADD mode output operations: permanent signal at the output, becomes passive when count ≥ preset
SUB mode output operations: permanent signal at the output, becomes passive when count ≤ 0



ADD mode output operations: timed signal at the output, becomes active when count ≥ preset. (Activation only in positive direction)
SUB mode output operations: timed signal at the output, becomes active when count ≤ 0. (Activation only in negative direction)



ADD mode output operations: timed signal at the output, becomes passive when count ≥ preset. (Deactivation only in positive direction)
SUB mode output operations: timed signal at the output, becomes passive when count ≤ 0. (Deactivation only in negative direction).

ADD mode output operations: timed signal at the output, becomes active with positive direction and when count ≥ preset and subsequently active with negative direction and when count ≤ preset
SUB mode output operations: timed signal at output, becomes active with negative direction and when count ≤ 0 and subsequently active with positive direction and when count ≥ 0

ADD mode output operations: timed signal at the output, becomes passive with positive direction and when count ≥ preset and subsequently passive with negative direction and when count ≤ preset
SUB mode output operations: timed signal at the output, becomes passive with negative direction and when count ≤ 0 and subsequently passive with positive direction and when count ≥ 0

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

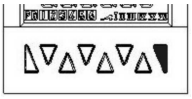
Active:
Relay is activated when the preset value is reached.

Passive:
Relay is de-energized when the preset value is reached.

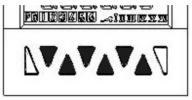
7.9 Setting the preset

7.9.1 Setting via Decade Keys

In the operating mode, the preset value will always be displayed in the lower line. This is except for the output operations AddBat, SubBat and AddTot.

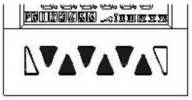


Press the Prog/Mode key until the preset to be changed is displayed - PR 1

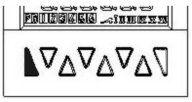


Press any decade key

⇨ Display switches to the editor mode



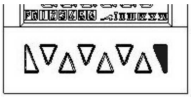
Set the desired preset value using the decade keys



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 ***tEAch***



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

Briefly activate the MPI (NPN or PNP input logic)

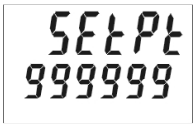
⇨ The current count value will be adopted as the new preset value

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

7.10 Set Function

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

Program the MPI input to ***SEt***



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

Briefly activate the MPI (NPN or PNP input logic)

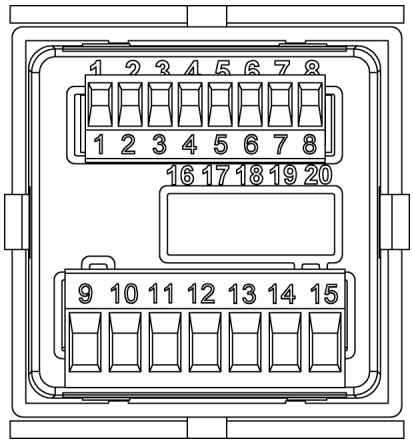
⇨ For add. output operations the pulse counter or timer will be set to the ***SEtPt*** default value

⇨ For sub. output operations the pulse counter or timer will be set to the difference between 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: 24 VDC/80 mA DC: UB connected	Sensor supply voltage
	through	
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	n.c.	-
10	n.c.	
11	Relay contact C	Output
12	Relay contact N.O.	
13	Relay contact N.C.	
14	AC: 90..260 VAC N~ DC: 10..30 VDC	Supply voltage
15	AC: 90..260 VAC L~ DC: GND (0 VDC)	Supply voltage

10 Technical Data

10.1 General Data

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

10.2 Pulse counter

Count frequency: max. 55 kHz (see section 13. frequencies typ.)

Response time of the output:

Add/Sub	< 7 ms
With automatic repeat	< 7 ms
A/B ; (A-B)/A	< 29 ms

10.3 Tacho/Frequency meter

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

10.4 Timer

Seconds	0.001 s ... 999 999 s
Minutes	0.001 min ... 999 999 min
Hours	0.001 h .. 999 999 h
h.min.s	00h.00min.01s ... 99h.59min.59s
Min. time measurable	500µs
Measuring error	< 50 ppm
Response time of the output:	< 7 ms

10.5 Signal and Control inputs

Polarity:	programmable NPN/PNP for all inputs in common	
Input resistance	5 kΩ	
Pulse shape	any	
Switching level with AC supply:		
HTL level	Low:	0 ... 4 VDC
	High:	12 ... 30 VDC
5V level	Low:	0 ... 2VDC
	High:	3,5 … 30 VDC
Switching level with DC supply:		
HTL level	Low:	0 ... 0,2 x UB
	High:	0,6 x UB ... 30 VDC
5V level	Low:	0 ... 2 VDC
	High:	3,5 ... 30 VDC

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

10.6 Output

Relay with changeover contact

Switching voltage	max. 250 VAC/ 150 VDC
Switching current	max. 3 A AC/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 ... 260 V AC / max. 8 VA 50/ 60 Hz ext. fuse protection: T 0.1 A
DC supply:	10 ... 30 V DC/ max. 1.5 W reverse polarity protection ext. fuse protection T 0.2 A

10.8 Sensor supply voltage

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

10.9 Climatic Conditions

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

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 91 mm
Panel cut-out:	$45^{+0,6}$ x $45^{+0,6}$ mm
Installation depth:	ca. 107 mm incl. terminals
Weight:	ca. 125 g
Protection:	IP 65 (front)
Housing material:	Polycarbonate UL94 V-2
Vibration resistance: (EN60068-2-6):	10 - 55 Hz / 1 mm / XYZ 30 min in each direction
Shock resistance (EN60068-2-27):	100G / XYZ 3 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 output:
Plug-in screw terminal, 7-pin, RM5.08
Core cross section, max. 2.5 mm²

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

CXQ312M4L

- Display
  - N = Standard LCD display
  - L = with backlight
- Supply voltage
  - V3 = 90 .. 260 VAC
  - M4 = 10 .. 30 VDC
- Relay output
  - 312 = 1 Relay output
  - 322 = 2 Relay output

13 Frequencies (typical)

13.1 Pulse counter

HTL level

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

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

5V level

typ. Low	1,0 V
typ. High	4,0 V

	Add Sub	**AddAr SubAr AddBat SubBat**	**AddTot**
Cnt.Dir	9 kHz	2,7 kHz	2,4 kHz
Up.Dn Up.Up	9 kHz	2,7 kHz	2,4 kHz
Quad Quad 2	9 kHz	1,2 kHz	1,2 kHz
Quad 4	9 kHz	1,2 kHz	0,9 kHz
A/B (A-B)/A	9 kHz		

13.2 Frequency meter

HTL level

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

5V level

typ. Low	1,0 V
typ. High	4,0 V

	HTL	**5V**
A	65 kHz	9 kHz
A – B A + B A / B (A-B)/A	65 kHz	9 kHz
Quad	30 kHz	9 kHz

NOTE: Switching levels of the input

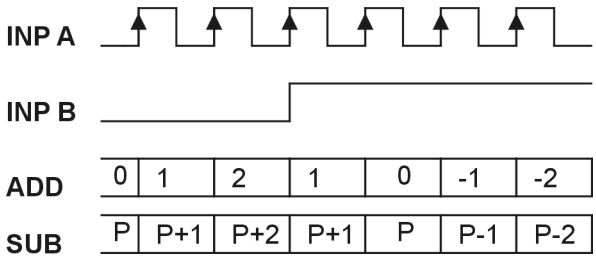
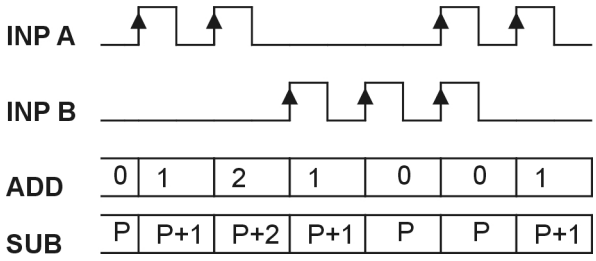
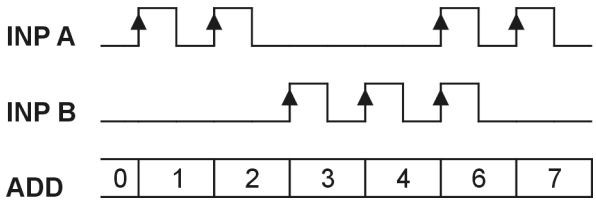
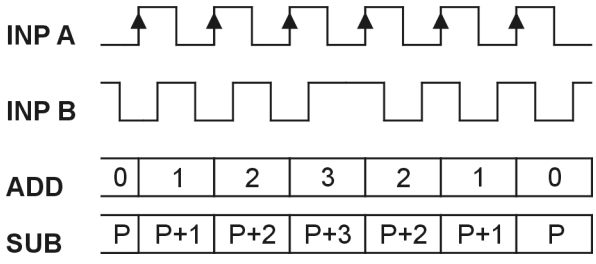
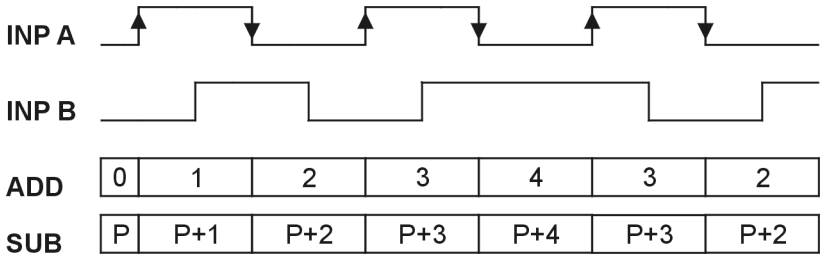
Switching levels with AC supply:

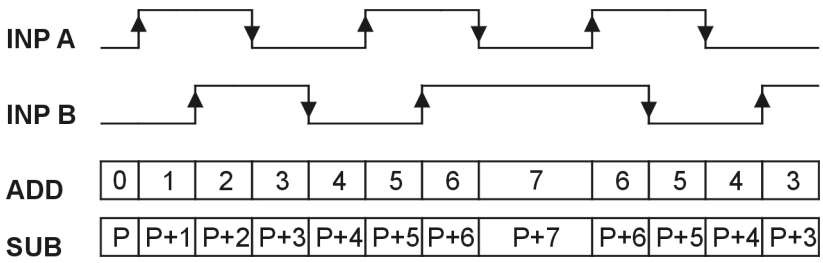
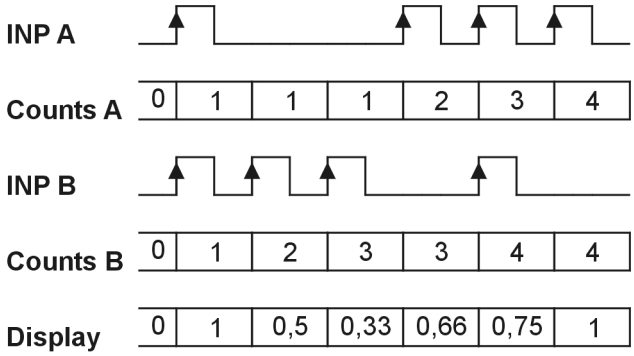
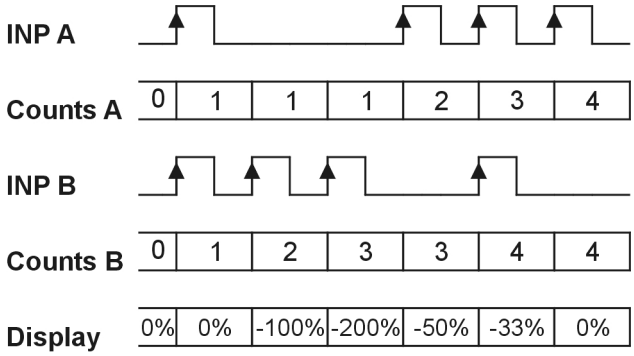
HTL level	Low:	0 .. 4 VDC
	High:	12 .. 30 VDC
5V level	Low:	0 .. 2VDC
	High:	3,5 .. 30 VDC

Switching levels with DC supply:

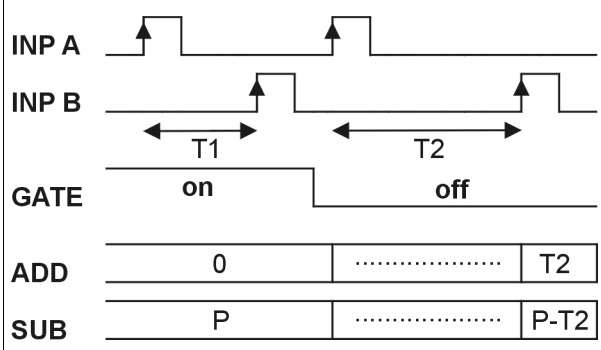
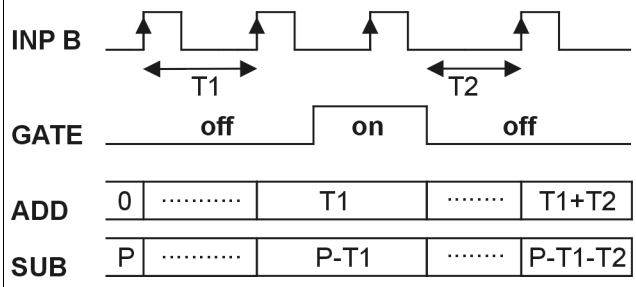
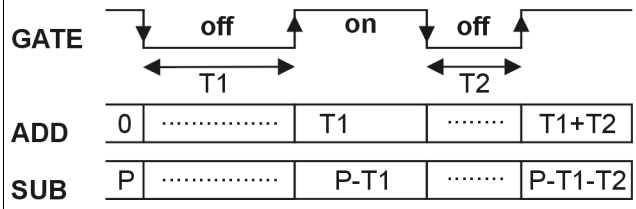
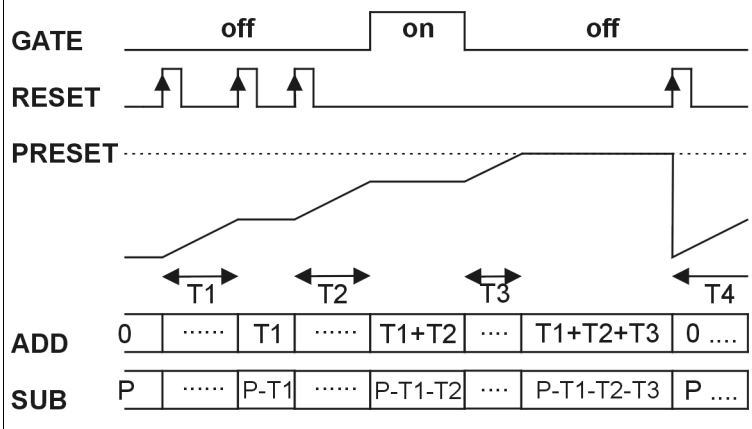
HTL level	Low:	0 .. 0,2 x UB
	High:	0,6 x UB .. 30 VDC
5V level	Low:	0 .. 2 VDC
	High:	3,5 .. 30 VDC

14 Input modes: Pulse counting

Function	Diagram Note: No counting when GATE input is active P = Preset	PNP: Count on rising edge NPN: Count on falling edge
Cnt.Dir		Inp A: Count input Inp B: Count direction Add: Display 0 --> Preset Sub: Display Preset -> 0
Up.Dn		Inp A: Count input add Inp B: Count input sub Add: Display 0 --> Preset Sub: Display Preset -> 0
Up.Up		Inp A: Count input 1 add Inp B: Count input 2 add Add: Display 0 --> Preset
Quad		A 90°B Inp A: Count input Count on one edge Inp B: Reverse direction Add: Display 0 --> Preset Sub: Display Preset -> 0
Quad 2		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

Function	Diagram Note: No counting when GATE input is active	PNP: Count on rising edge NPN: Count on falling edge
Quad 4		A 90°B Inp A: Count input Count on rising and on falling edges Inp B: Count input Count on rising and on falling edges, Reverse direction Add: Display 0 --> Preset Sub: Display Preset -> 0
A / B		Inp A: Count input 1 Inp B: Count input 2 Formula: A / B
(A-B)/A		Inp A: Count input 1 Inp B: Count input 2 Formula: (A – B)/A x100

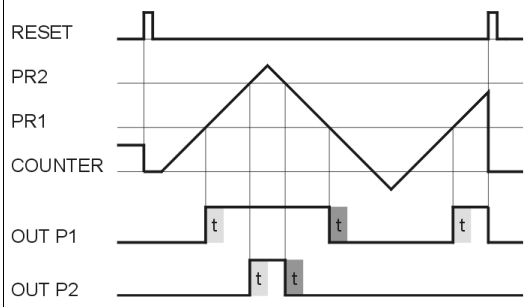
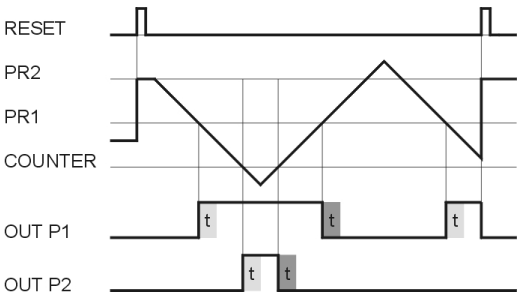
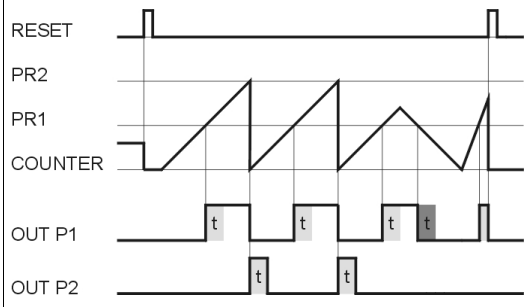
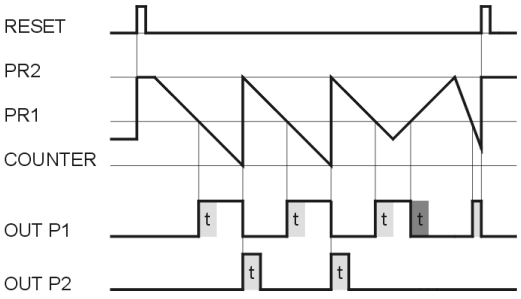
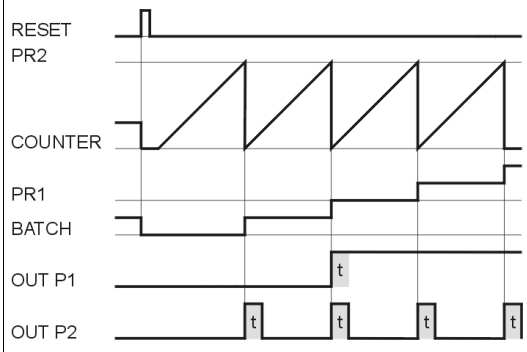
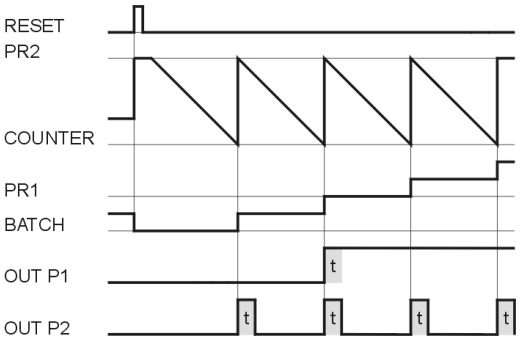
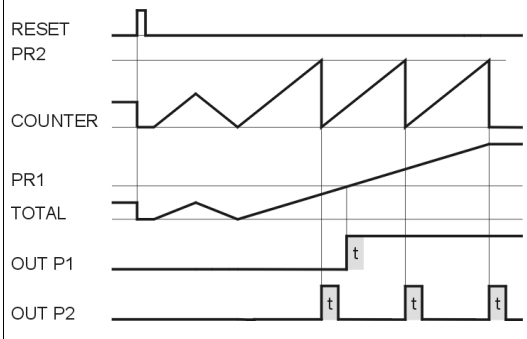
15 Input modes: Timing

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

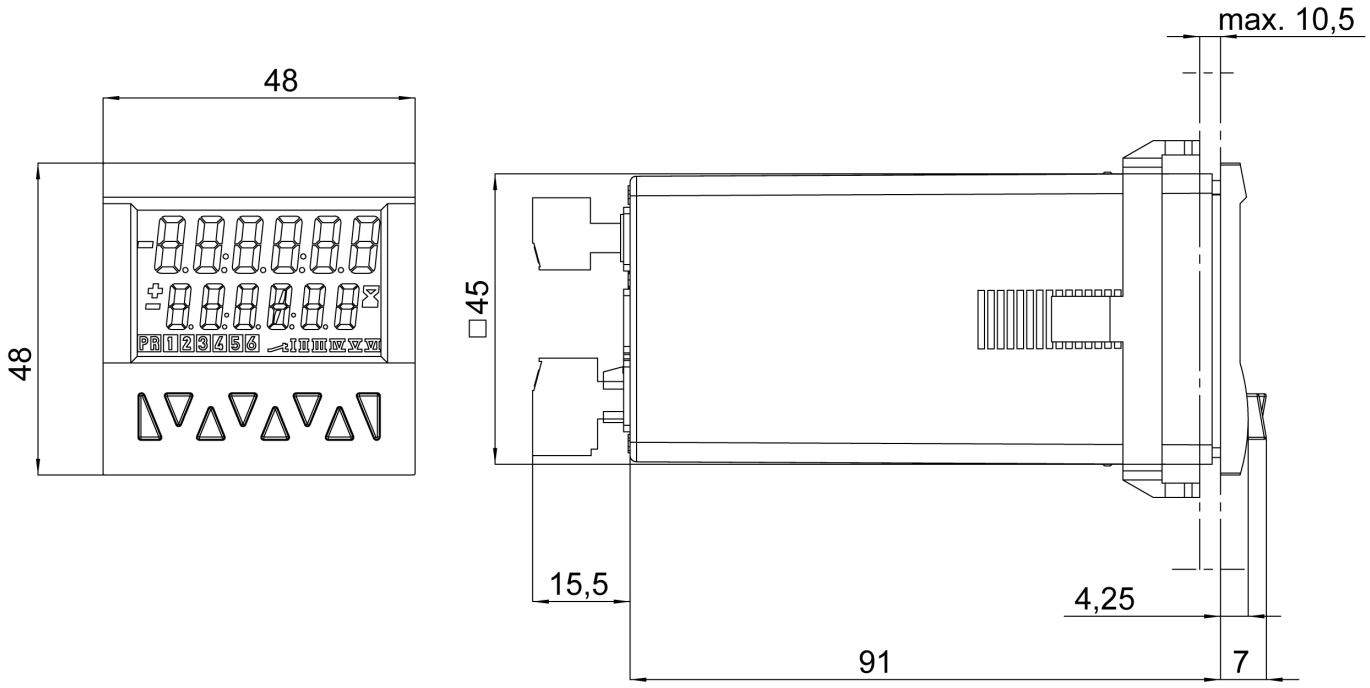
16 Input modes: Frequency meter

Function	Diagram	PNP: Count on rising edge NPN: Count on falling edge
A	**INP A**: 0 | F_{A0} | F_{A1} | F_{A2} | 0 | x **Display**: 0 | 0 | F_{A0} | F_{A1} | F_{A2} | 0	Inp A: Frequency input Inp B: no function
AsubB	**INP A**: 0 | F_{A0} | F_{A1} | F_{A2} | 0 | x **INP B**: 0 | 0 | F_{B0} | F_{B1} | F_{B2} | x **Display**: 0 | 0 | F_{A0} | $F_{A0} - F_{B0}$ | $F_{A1} - F_{B1}$ | $- F_{B2}$	Inp A: Frequency input 1 Inp B: Frequency input 2 Formula: A - B
AaddB	**INP A**: 0 | F_{A0} | F_{A1} | F_{A2} | 0 | x **INP B**: 0 | 0 | F_{B0} | F_{B1} | F_{B2} | x **Display**: 0 | 0 | F_{A0} | $F_{A0} + F_{B0}$ | $F_{A1} + F_{B1}$ | F_{B2}	Inp A: Frequency input 1 Inp B: Frequency input 2 Formula: A + B
Quad	**Inp A** **Inp B** f_{A0} f_{A1} f_{A2} f_{A3} f_{A4} f_{A5} **Display**: 0 | 0 | F_{A0} | F_{A1} | F_{A2} | $- F_{A3}$ | $- F_{A4}$	A 90°B Inp A: Frequency input 1 Inp B: Reverse direction
A / B	**INP A**: 0 | F_{A0} | F_{A1} | 0 | 0 | x **INP B**: 0 | 0 | F_{B0} | F_{B1} | F_{B2} | x **Display**: 0 | 0 | 0 | F_{A0}/F_{B0} | F_{A1}/F_{B1} | 0	Inp A: Frequency input 1 Inp B: Frequency input 2 Formula: A / B
(A-B)/A	**INP A**: 0 | F_{A0} | F_{A1} | 0 | 0 | x **INP B**: 0 | 0 | F_{B0} | F_{B1} | F_{B2} | x **Display**: 0 | 0 | 100% | $F_{A0}\%F_{B0}$ | $F_{A1}\%F_{B1}$ | 0	Inp A: Frequency input 1 Inp B: Frequency input 2 Formula: (A – B)/A x100

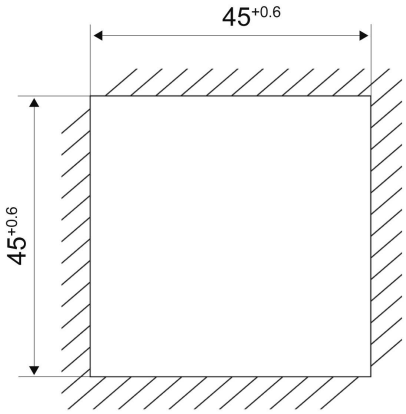
17 Output operations

Mode	Diagram	Mode	Diagram
	t Only in the mode ⎍ and ⎍		t Additionally in the mode ⎍ and ⎍
Add		Sub	
AddAr		SubAr	
AddBat		SubBat	
AddTot			

18 Dimensional Drawings



Panel cut-out



Saia-Burgess Controls AG
Bahnhofstrasse 18 I 3280 Murten I Switzerland
T +41 26 672 72 72 I F +41 26 672 74 99
www.saia-pcd.com I www.sbc-support.com