



# 924K

## **Electronic Preset Counter with two presets**

Installation and Operating Instructions



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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 924 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. Overvoltages 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 mm<sup>2</sup>.

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.

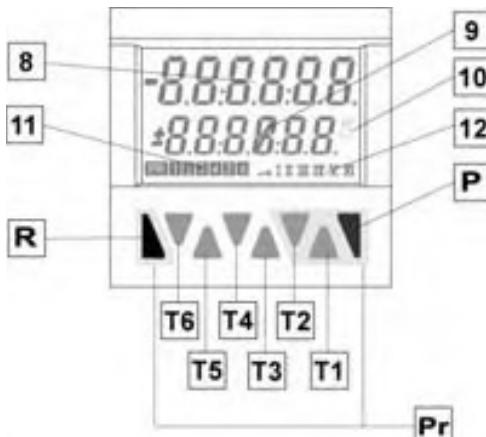
Avoid routing signal or control cables parallel to power lines.

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 annunciations 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 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

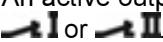
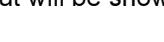
### 6.1 Output 1

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.

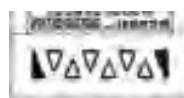
### 6.3 Active Outputs

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).

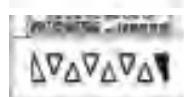
## 7 Programming

### 7.1 Entering the programming



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

⇒ The security prompt appears in the display

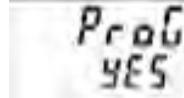


Programming can be exited again using the Prog/Mode key.



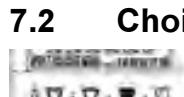
Press key T2 to continue with the programming

⇒ The security prompt appears in the display



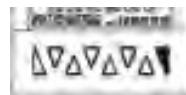
Enter the main menu by pressing the Prog/Mode key

### 7.2 Choice of main menus



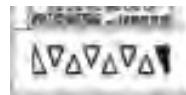
The menus are selected using the keys T2 (next) and T1 (back)

### 7.3 Entering a sub-menu



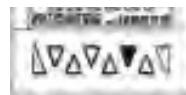
The sub-menu is opened with the Prog/Mode key and the first menu item is displayed.

### 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

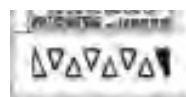


The T2 key is used to select the individual settings for the menu items



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

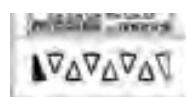
### 7.6 Accepting the setting



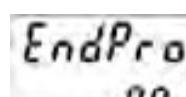
Pressing the Prog/Mode key causes the current setting to be accepted. Programming then switches to the next menu item.

### 7.7 Ending the programming

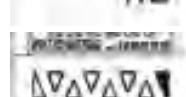
During programming, it is possible to exit the programming at each menu item by pressing the reset key.



Press the Reset key



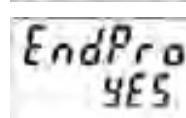
⇒ The security prompt appears in the display



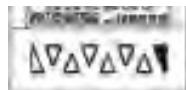
Pressing the Prog/Mode key acknowledges this prompt and causes the programming menu to start again from the beginning. The previously-programmed values are preserved. These can now be changed or checked again.



Pressing the decade key T2 selects the termination of the programming

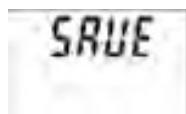


⇒ The security prompt appears in the display



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

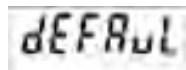
### 7.8.1 Default parameters



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

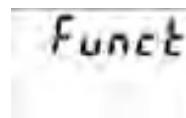


Factory settings are highlighted in grey

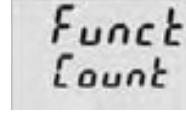
### 7.8.2 Table: Parameter Sets

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

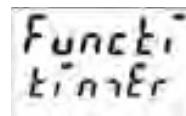
### 7.8.3 Setting the Basic Function



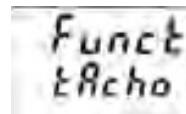
Basic function menu



Programming menu  
Pulse counter (7.8.4)



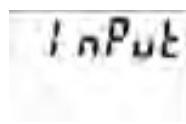
Programming menu  
Timer/Hour meter (7.8.6)



Programming menu  
Tacho/Frequency meter (7.8.5)

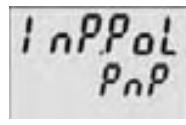
## 7.8.4 Pulse Counter

### 7.8.4.1 Submenu for the Signal and Control inputs

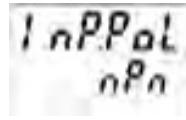


Menu for programming the signal and control inputs

#### Input polarity

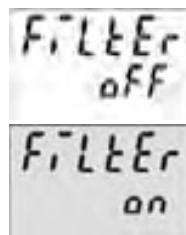


PNP: switching to Plus for all inputs in common

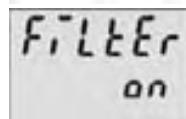


NPN: switching to 0 V for all inputs in common

#### Filter for the signal inputs InpA and InpB

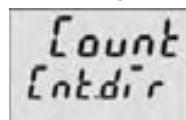


Maximum count frequency



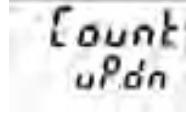
Damped to approx. 30 Hz (for control with mechanical contacts)

#### Count Input mode



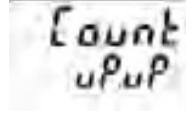
##### Count/Direction

INP A: count input  
INP B: count direction input



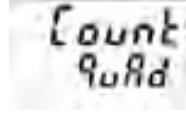
##### Differential counting [A – B]

INP A: count input add  
INP B: count input sub



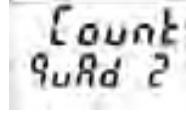
##### Totalising [A + B]

INP A: count input add  
INP B: count input add



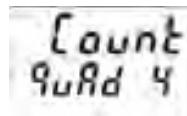
##### Quadrature input

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



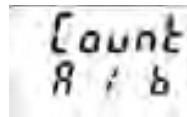
##### Quadrature with pulse doubling

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



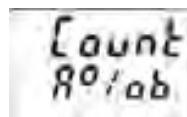
#### Quadrature x4

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]

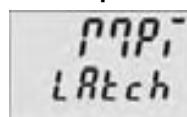
Inp A: count input A  
Inp B: count input B



#### Percentage differential counting

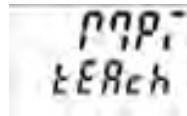
$[(A - B) / A] \text{ in \%}$   
Inp A: count input A  
Inp B: count input B

#### 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.



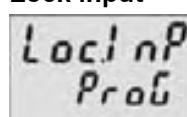
When the MPI input is activated the current count value for the preset that has just been selected will be adopted as the new preset value.

See also 7.9

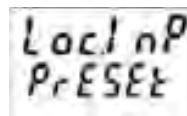


When the MPI input is activated the preset counter will be set to the value specified in the parameter *SEtPt*. See also 7.10

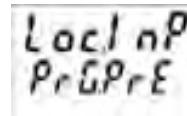
#### Lock input



When the Lock input is activated the programming is inhibited.

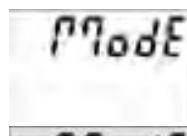


When the Lock input is activated the setting of the preset values is inhibited.

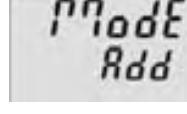


When the Lock input is activated the setting of the preset values and the programming are both inhibited.

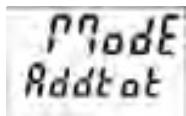
### 7.8.4.2 Submenu for Output operations



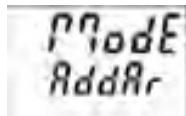
Submenu for determining the operation of the outputs



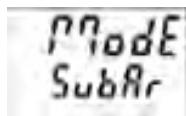
**Count mode ADD**  
Outputs active when count status  $\geq$  preset value  
Reset to zero



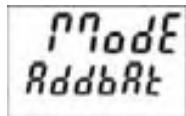
**Count mode SUBTRACT**  
 Output 1 active when  
 count status  $\leq$  preset value 1  
 Output 2 active when  
 count status  $\leq 0$   
 Reset to preset 2



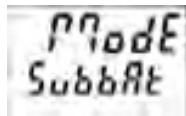
**Count mode ADDING with  
 automatic reset**  
 Output 1 active when count  
 status  $\geq$  preset value 1  
 Output 2 (timed signal) active  
 when count status = preset value  
 2  
 Automatic reset to zero when  
 count status = preset value 2  
 Reset to zero



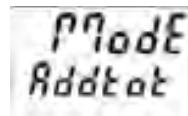
**Count mode SUBTRACTING  
 with automatic reset**  
 Output 1 active when count  
 status  $\leq$  preset value 1  
 Output 2 (timed signal) active  
 when count status = 0  
 Automatic reset to preset 2 when  
 count status = 0  
 Reset to preset 2



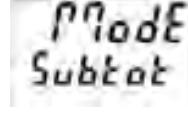
**Count mode ADDING with  
 automatic reset and Batch  
 counter**  
 Output 2 (timed signal) active  
 when main counter = preset  
 value 2  
 Automatic reset to zero when  
 main counter = preset 2  
 Batch counter counts the number  
 of automatic repetitions of preset  
 2  
 Output 1 active when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



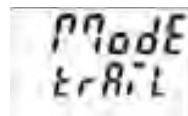
**Count mode SUBTRACTING  
 with automatic reset and Batch  
 counter**  
 Output 2 (timed signal) active  
 when main counter = zero  
 Automatic reset to preset 2 when  
 main counter = zero  
 Batch counter counts the number  
 of automatic repetitions of preset  
 2  
 Output 1 active when Batch  
 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



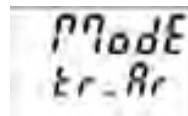
**Count mode ADDING with  
 automatic reset and Total  
 counter**  
 Output 2 (timed signal) active  
 when main counter = preset  
 value 2  
 Automatic reset to zero when  
 main counter = preset value 2  
 Total counter counts all the count  
 pulses from the main counter  
 Output 1 active when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

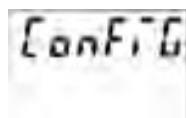


**Tracking Preset mode**  
 When preset 2 is changed then  
 preset 1 automatically tracks it.  
 Reset to zero  
 Preset 1 relative to preset 2 (see  
 also section 17. Output  
 operations)



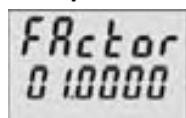
**Tracking Preset mode with  
 automatic reset**  
 When preset 2 is changed then  
 preset 1 automatically tracks it.  
 Reset to zero.  
 Automatic reset to zero when  
 main counter = preset value 2.  
 Preset 1 relative to Preset 2  
 (see also section 17. Output  
 operations)

#### 7.8.4.3 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

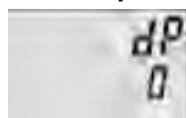
##### Division factor



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

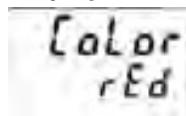
##### Set value



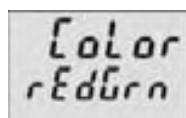
Set value can be programmed from -999999 to 999999

A previously programmed decimal point will be displayed

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

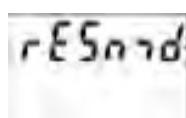


Display colour	
upper line	red
lower line	red

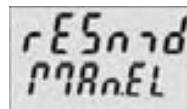


Display colour	
upper line	red
lower line	green

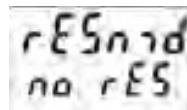
#### 7.8.4.4 Submenu for reset mode



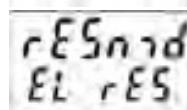
Setting the reset mode



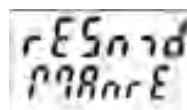
Manual reset (with red key) and electrical reset (reset input)



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 1

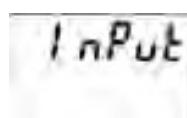
See below 7.8.6.5

#### 7.8.4.6 Preset 2

See below 7.8.6.8

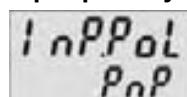
#### 7.8.5 Tacho/Frequency meter

##### 7.8.5.1 Submenu for the Signal and Control inputs

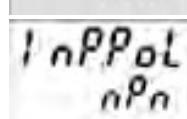


Submenu for programming the signal and control inputs

##### Input polarity

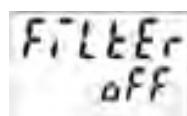


PNP: switching to Plus for all inputs in common

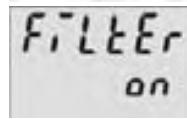


NPN: switching to 0 V for all inputs in common

##### Filter for the signal inputs Inp A and Inp B

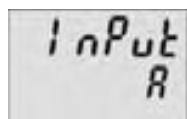


maximum count frequency



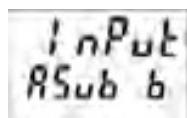
damped to approx. 30 Hz (for control with mechanical contacts)

#### Input mode Frequency Measurement



#### Simple frequency measurement

Inp A: Frequency input  
Inp B: no function



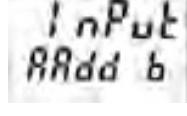
#### Differential measurement

##### [A - B]

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

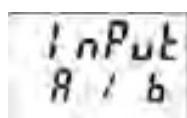
##### Total measurement [A + B]

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



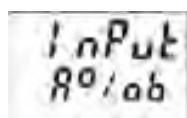
#### Frequency measurement with direction recognition [Quad]

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



#### Ratio measurement [A / B]

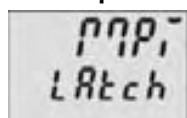
Inp A: Frequency input A  
Inp B: Frequency input B



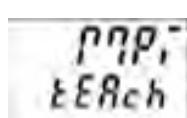
#### Percentage differential measurement [(A-B) / A in %]

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

#### User input

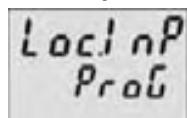


When the MPI input is activated the display is “frozen” and remains “frozen” until the MPI input is deactivated.  
Internally the frequency meter continues running.

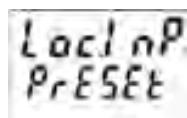


When the MPI input is activated the current frequency for the preset that has just been selected will be adopted as the new preset value.  
See also 7.9

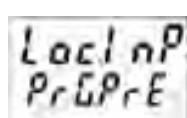
#### Lock input



When the Lock input is activated the programming is inhibited.

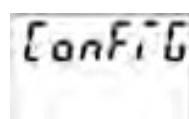


When the Lock input is activated the setting of the preset values is inhibited.



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

#### 7.8.5.2 Submenu for configuration



Submenu for matching the input pulses and display

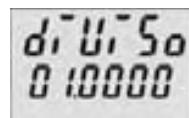
#### Multiplication factor



Multiplication factor can be programmed from 00.0001 to 99.9999.

The setting 00.0000 will not be accepted

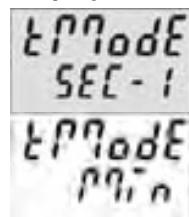
#### Division factor



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

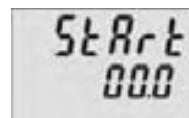
AVG 2 over 2 measurements

AVG 5 over 5 measurements

AVG 10 over 10 measurements

AVG 20 over 20 measurements

#### Start delay



#### 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

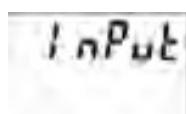
See below 7.8.6.5

#### 7.8.5.4 Preset 2

See below 7.8.6.6

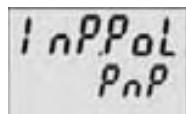
### 7.8.6 Timer

#### 7.8.6.1 Submenu for the Signal and Control inputs

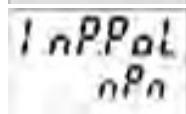


Menu for programming the signal and control inputs

##### Input polarity

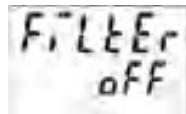


PNP: switching to Plus for all inputs in common

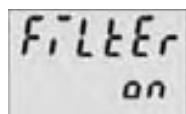


nPN: switching to 0 V for all inputs in common

##### Filter for the signal inputs Inp A and Inp B

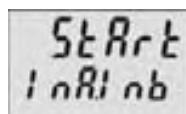


for electronic control of the signal inputs



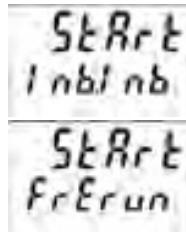
for mechanical control of the signal inputs (for control with mechanical contacts)

##### Input mode Time measurement



Start: Edge to Inp A

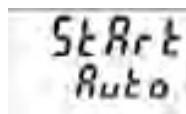
Stop: Edge to Inp B



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 2 when subtracting) and then starts timing again.

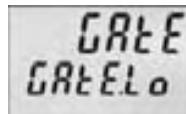
Timing is stopped with adding operations when preset 2 is reached.

Timing is stopped with subtracting operations when zero is reached.

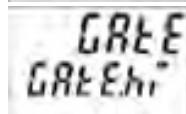
A RESET during the timing process also causes this to stop.

Inp A and Inp B: no function.

##### Gate control for Timing

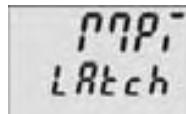


Timing takes place when the Gate input is not active.



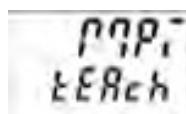
Timing takes place when the Gate input is active

##### 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.



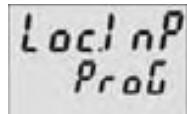
When the MPI input is activated the current count value for the preset that has just been selected will be adopted as the new preset value.

See also 7.9

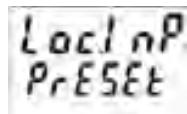


When the MPI input is activated the preset timer will be set to the value specified in the parameter *SEtPt*. See also 7.10

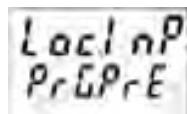
## Lock input



When the Lock input is activated the programming is inhibited.

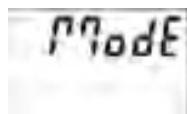


When the Lock input is activated the setting of the preset values is inhibited.

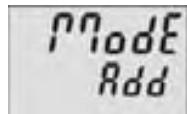


When the Lock input is activated the setting of the preset values and the programming are both inhibited.

## 7.8.6.2 Submenu for the output operations

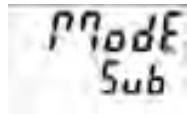


Submenu for determining the operation of the outputs



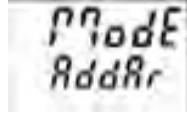
### Count mode ADD

Outputs active when count status  $\geq$  preset value  
Reset to zero



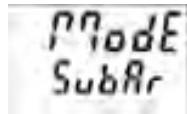
### Count mode SUBTRACT

Output 1 active when count status  $\leq$  preset value 1  
Output 2 active when count status  $\leq 0$   
Reset to preset 2



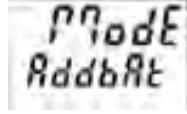
### Count mode ADDING with automatic reset

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

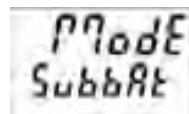
main counter = preset value 2

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



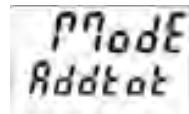
### Count mode SUBTRACTING with automatic reset and Batch counter

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

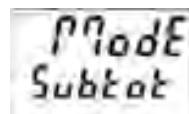
Automatic reset to zero when main counter = preset value 2

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

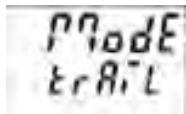
Total counter counts (sub from preset value 1) all count pulses from main counter

Output 1 active when Total counter  $\leq$  zero

Manual reset sets both counters to the preset values

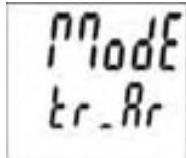
Electronic reset sets only main counter to preset value 2

### 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)

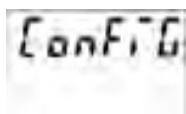


#### Tracking Preset mode with automatic reset

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 Submenu for configuration

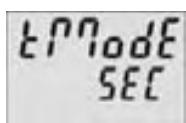


Submenu for matching the time ranges and display

#### Unit of time

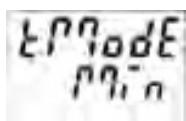
Unit of time: seconds

Decimal point setting determines the resolution



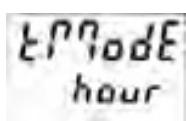
Unit of time: minutes

Decimal point setting determines the resolution

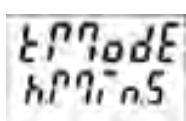


Unit of time: hours

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

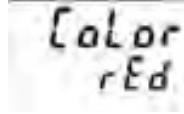
#### Set value



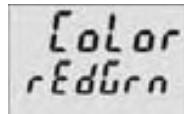
Set value can be programmed from 000000 to 999999

A previously programmed decimal point will be displayed

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

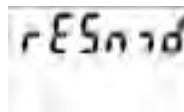


Display colour  
upper line red  
lower line red

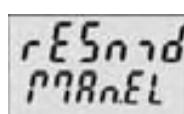


Display colour  
upper line red  
lower line green

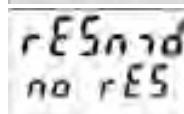
### 7.8.6.4 Submenu for reset mode



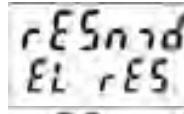
Setting the reset mode



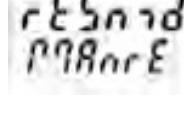
Manual reset (with red key) and electrical reset (reset input)



No reset possible (red key and reset input inhibited)

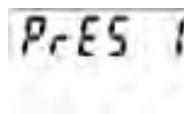


Only electrical reset possible (reset input)

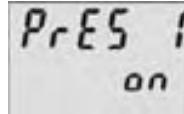


Only manual reset possible (red key)

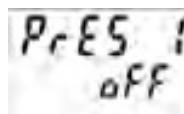
### 7.8.6.5 Submenu for Preset 1



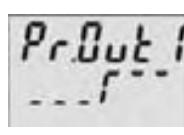
Submenu for turning preset 1 ON/OFF



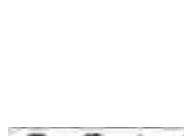
Preset 1 ON



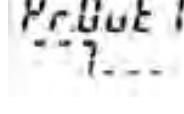
Preset 1 OFF and no function



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

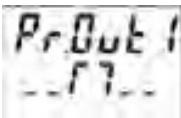


SUB mode output operations: permanent signal at Output 1, becomes active when count  $\leq$  Preset 1



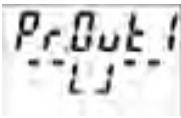
ADD mode output operations: permanent signal at Output 1, becomes passive when count  $>$  Preset 1

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



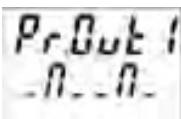
ADD mode output operations:  
timed signal at Output 1,  
becomes active when count  $\geq$   
Preset 1. (Activation only in  
positive direction)

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



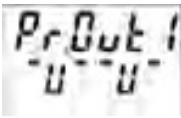
ADD mode output operations:  
timed signal at Output 1,  
becomes passive when count  $\geq$   
Preset 1. (Deactivation only in  
positive direction)

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

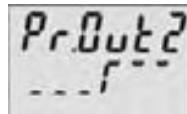
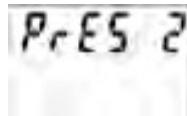


Duration of timed signal of  
Output 1, programmable from  
00.01 to 99.99 s.

Timed signal is post-triggered

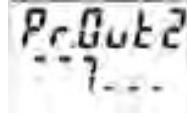
#### 7.8.6.6 Submenu for Preset 2

Submenu for Preset 2



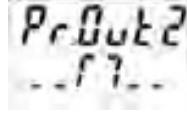
ADD mode output operations:  
permanent signal at Output 2,  
becomes active when count  $\geq$   
Preset 2

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



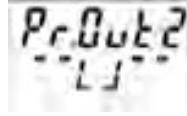
ADD mode output operations:  
permanent signal at Output 2,  
becomes passive when count  $\geq$   
Preset 2

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



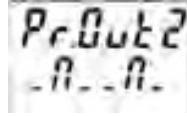
ADD mode output operations:  
timed signal at Output 2,  
becomes active when count  $\geq$   
Preset 2 (Activation only in  
positive direction).

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



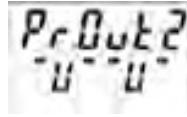
ADD mode output operations:  
timed signal at Output 2,  
becomes passive when count  $\geq$   
Preset 2 (Deactivation only in  
positive direction)

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 0.01 to 99.99 s.  
Timed output is post-triggered.



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

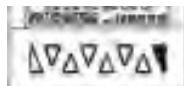
**Passive:**  
Relay becomes de-energized or the optocoupler disabled when the preset value is reached.



## 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

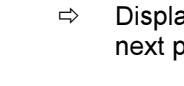


⇒ Display switches to the editor mode

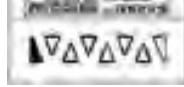
Set the desired preset value using the decade keys



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

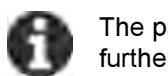
Program the MPI input to **tEACH**



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.

### 7.9.3 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)

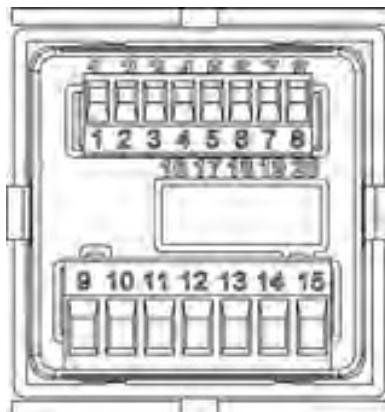
⇒ For add. output operations the pulse counter or timer will be set to the **SETPt** default value

⇒ For sub. output operations the pulse counter or timer will be set to the 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



N°	Designation	Function
9	Collector 1	Output 1
10	Emitter	
11	Emitter 2	
12	Not connected	Output 2
13	Collector 2	
14	AC: 90..260 VAC N~ DC: 10..30 VDC	Supply voltage
15	AC: 90..260 VAC L~ DC: GND (0 VDC)	Supply voltage

### 9.1 Signal and Control Inputs

N°	Designation	Function
1	AC: 24 VDC/80 mA 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	
10	Relay contact N.O.1	Output 1
11	Relay contact C.2	
12	Relay contact N.O.2	Output 2
13	Relay contact N.C.2	
14	AC: 90..260 VAC N~ DC: 10..30 VDC	Supply voltage
15	AC: 90..260 VAC L~ DC: GND (0 VDC)	Supply voltage

#### 9.2.2 Version with Optocouplers

N°	Designation	Function

## 10 Technical Data

### 10.1 General Data

Display	LCD positive or negative, backlit
Digit height	2 x 6-digit upper line 9 mm lower line 7 mm special characters 2 mm
Overload/ Underload	Blinking, 1 s Counter loses up to 1 decade no pulses
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 outputs:

Relays	Add/Sub/Trail With automatic repeat A/B ; (A-B)/A	< 7 ms < 7 ms < 29 ms
Optocouplers	Add/Sub/Trail With automatic repeat A/B ; (A-B)/A	< 1 ms < 1 ms < 23 ms

### 10.3 Tacho/Frequency meter

Frequency range 0,01 Hz to 65 kHz (see section 13. frequencies typ.)

Measuring principle  $\leq 76.3$  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 outputs:

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 outputs:	
Relays	< 7 ms
Optocoupler	< 1 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 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)	$2 \times 10^7$
N° of switching cycles at 3 A/ 250 V AC	$1 \times 10^5$
N° of switching cycles at 3 A/ 30 V DC	$1 \times 10^5$
or NPN optocoupler	
Switching capacity	30 VDC/10 mA
U <sub>CESAT</sub> for IC = 10 mA:	max. 2.0 V
U <sub>CESAT</sub> for IC = 5 mA:	max. 0.4 V

### 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)	$20 \times 10^6$
N° of switching cycles at 3 A/ 250 V AC	$5 \times 10^4$
N° of switching cycles at 3 A/ 30 V DC	$5 \times 10^4$

or NPN optocoupler

Switching capacity	30 V DC/10 mA
U <sub>CESAT</sub> for IC = 10 mA:	max. 2.0 V
U <sub>CESAT</sub> for IC = 5 mA:	max. 0.4 V

## 10.7 Supply voltage

AC supply:	90 ... 260 V AC / max. 8 VA 50/ 60 Hz
DC supply:	ext. fuse protection: T 0.1 A 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 $\pm 15\%$ , 80 mA
DC supply:	max. 80 mA, 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
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:	$45^{\pm 0,6}$ x $45^{\pm 0,6}$ mm
Installation depth:	ca. 107 mm incl. terminals
Weight:	ca. 125 g
Protection:	IP 65 (front)
Housing material:	Polycarbonate UL94 V-2
Vibration resistance:	10 - 55 Hz / 1 mm / XYZ (EN60068-2-6): 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 outputs:  
Plug-in screw terminal, 7-pin, RM5.08

Core cross section, max. 2.5 mm<sup>2</sup>

Signal and control inputs:

Plug-in screw terminal, 8-pin, RM 3.81

Core cross-section, max. 1.5 mm<sup>2</sup>

## 11 Scope of Delivery

**Delivery includes:**

Preset counter

Mounting clip

Instruction manual

## 12 Ordering codes

### Ordering information:

EXAMPLE	924K	A	0
Series	_____		
Operating Voltage	_____		
	A = 90 to 260 VAC		
	B = 10 to 30 VDC		
Outputs	_____		
	0 = Relay(s)		
	1 = Opto Coupler(s)		

## 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 Trail	AddAr SubAr	AddTot SubTot
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 Trail	AddAr SubAr	AddTot SubTot
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	65 kHz	9 kHz
A / B (A-B)/A		
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

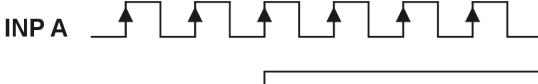
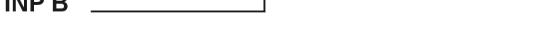
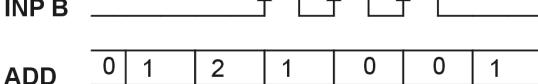
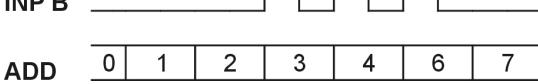
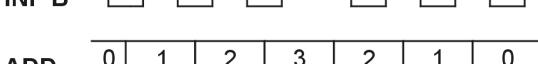
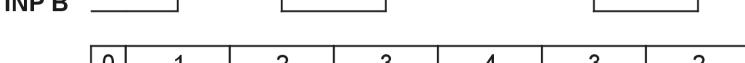
5V level	Low: 0 .. 2VDC
	High: 3,5 .. 30 VDC

##### Switching levels with DC supply:

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

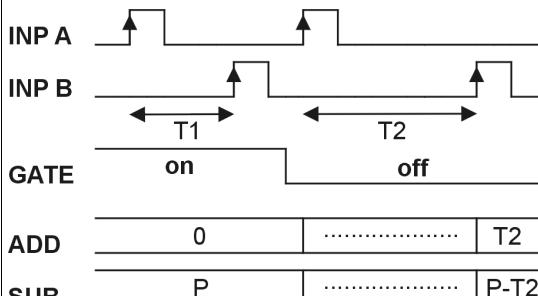
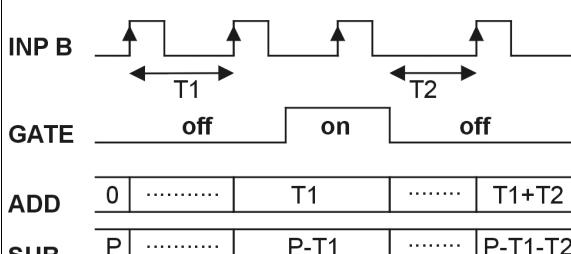
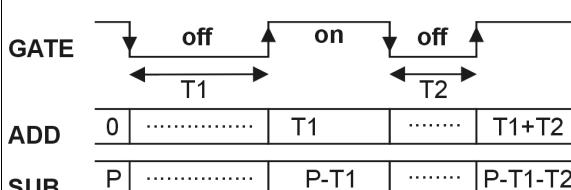
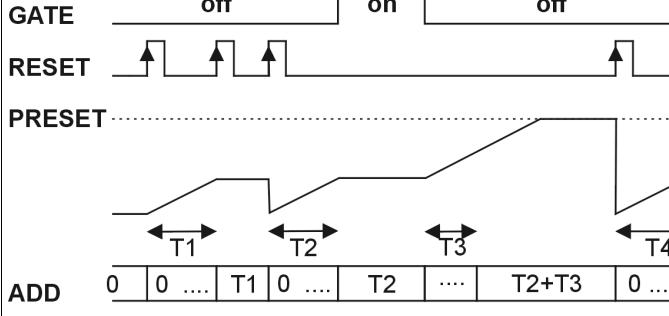
5V level	Low: 0 .. 2 VDC
	High: 3,5 .. 30 VDC

## 14 Input modes: Pulse counting

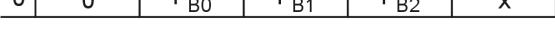
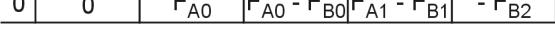
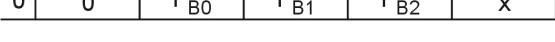
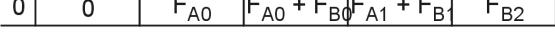
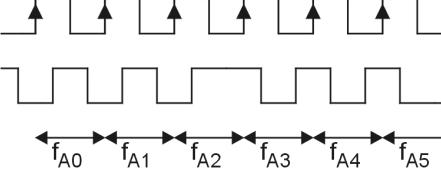
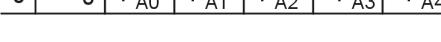
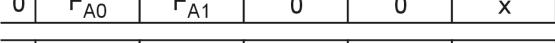
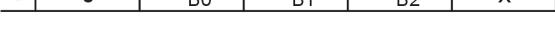
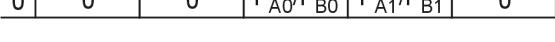
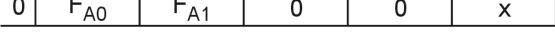
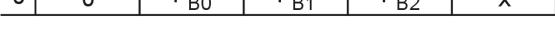
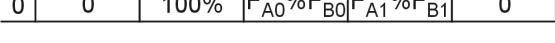
Function	Diagram																						
	<p>Note: No counting when GATE input is active P = Preset</p>	PNP: Count on rising edge NPN: Count on falling edge																					
Cnt.Dir	<p>INP A</p>  <p>INP B</p>  <p>ADD</p> <table border="1"> <tr> <td>0</td><td>1</td><td>2</td><td>1</td><td>0</td><td>-1</td><td>-2</td> </tr> <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>SUB</p> <table border="1"> <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>	0	1	2	1	0	-1	-2	P	P+1	P+2	P+1	P	P-1	P-2	P	P+1	P+2	P+1	P	P-1	P-2	Inp A: Count input Inp B: Count direction Add: Display 0 --> Preset Sub: Display Preset -> 0
0	1	2	1	0	-1	-2																	
P	P+1	P+2	P+1	P	P-1	P-2																	
P	P+1	P+2	P+1	P	P-1	P-2																	
Up.Dn	<p>INP A</p>  <p>INP B</p>  <p>ADD</p> <table border="1"> <tr> <td>0</td><td>1</td><td>2</td><td>1</td><td>0</td><td>0</td><td>1</td> </tr> <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>SUB</p> <table border="1"> <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>	0	1	2	1	0	0	1	P	P+1	P+2	P+1	P	P	P+1	P	P+1	P+2	P+1	P	P	P+1	Inp A: Count input add Inp B: Count input sub Add: Display 0 --> Preset Sub: Display Preset -> 0
0	1	2	1	0	0	1																	
P	P+1	P+2	P+1	P	P	P+1																	
P	P+1	P+2	P+1	P	P	P+1																	
Up.Up	<p>INP A</p>  <p>INP B</p>  <p>ADD</p> <table border="1"> <tr> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>6</td><td>7</td> </tr> </table>	0	1	2	3	4	6	7	Inp A: Count input 1 add Inp B: Count input 2 add Add: Display 0 --> Preset														
0	1	2	3	4	6	7																	
Quad	<p>INP A</p>  <p>INP B</p>  <p>ADD</p> <table border="1"> <tr> <td>0</td><td>1</td><td>2</td><td>3</td><td>2</td><td>1</td><td>0</td> </tr> <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>SUB</p> <table border="1"> <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>	0	1	2	3	2	1	0	P	P+1	P+2	P+3	P+2	P+1	P	P	P+1	P+2	P+3	P+2	P+1	P	A 90° B Inp A: Count input Count on one edge Inp B: Reverse direction Add: Display 0 --> Preset Sub: Display Preset -> 0
0	1	2	3	2	1	0																	
P	P+1	P+2	P+3	P+2	P+1	P																	
P	P+1	P+2	P+3	P+2	P+1	P																	
Quad 2	<p>INP A</p>  <p>INP B</p>  <p>ADD</p> <table border="1"> <tr> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>3</td><td>2</td> </tr> <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>SUB</p> <table border="1"> <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>	0	1	2	3	4	3	2	P	P+1	P+2	P+3	P+4	P+3	P+2	P	P+1	P+2	P+3	P+4	P+3	P+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
0	1	2	3	4	3	2																	
P	P+1	P+2	P+3	P+4	P+3	P+2																	
P	P+1	P+2	P+3	P+4	P+3	P+2																	

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</p> <table border="1"> <tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td></tr> </table> <p>SUB</p> <table border="1"> <tr><td>P</td><td>P+1</td><td>P+2</td><td>P+3</td><td>P+4</td><td>P+5</td><td>P+6</td><td>P+7</td><td>P+6</td><td>P+5</td><td>P+4</td><td>P+3</td></tr> </table>	0	1	2	3	4	5	6	7	6	5	4	3	P	P+1	P+2	P+3	P+4	P+5	P+6	P+7	P+6	P+5	P+4	P+3	<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, Reverse direction</p> <p>Add: Display 0 --&gt; Preset</p> <p>Sub: Display Preset -&gt; 0</p>
0	1	2	3	4	5	6	7	6	5	4	3															
P	P+1	P+2	P+3	P+4	P+5	P+6	P+7	P+6	P+5	P+4	P+3															
A / B	<p>INP A</p> <p>Counts A</p> <table border="1"> <tr><td>0</td><td>1</td><td>1</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> </table> <p>INP B</p> <p>Counts B</p> <table border="1"> <tr><td>0</td><td>1</td><td>2</td><td>3</td><td>3</td><td>4</td><td>4</td></tr> </table> <p>Display</p> <table border="1"> <tr><td>0</td><td>1</td><td>0,5</td><td>0,33</td><td>0,66</td><td>0,75</td><td>1</td></tr> </table>	0	1	1	1	2	3	4	0	1	2	3	3	4	4	0	1	0,5	0,33	0,66	0,75	1	<p>Inp A: Count input 1 Inp B: Count input 2</p> <p>Formula: A / B</p>			
0	1	1	1	2	3	4																				
0	1	2	3	3	4	4																				
0	1	0,5	0,33	0,66	0,75	1																				
(A-B)/A	<p>INP A</p> <p>Counts A</p> <table border="1"> <tr><td>0</td><td>1</td><td>1</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> </table> <p>INP B</p> <p>Counts B</p> <table border="1"> <tr><td>0</td><td>1</td><td>2</td><td>3</td><td>3</td><td>4</td><td>4</td></tr> </table> <p>Display</p> <table border="1"> <tr><td>0%</td><td>0%</td><td>-100%</td><td>-200%</td><td>-50%</td><td>-33%</td><td>0%</td></tr> </table>	0	1	1	1	2	3	4	0	1	2	3	3	4	4	0%	0%	-100%	-200%	-50%	-33%	0%	<p>Inp A: Count input 1 Inp B: Count input 2</p> <p>Formula: (A - B)/A x100</p>			
0	1	1	1	2	3	4																				
0	1	2	3	3	4	4																				
0%	0%	-100%	-200%	-50%	-33%	0%																				

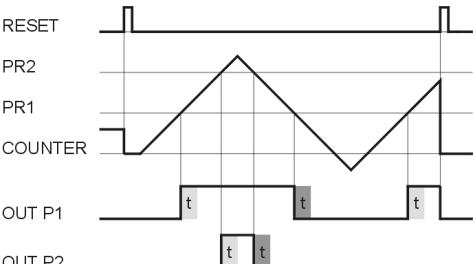
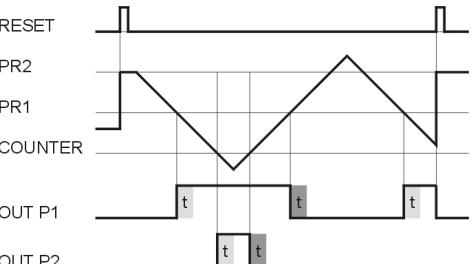
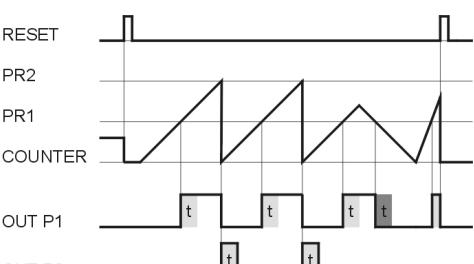
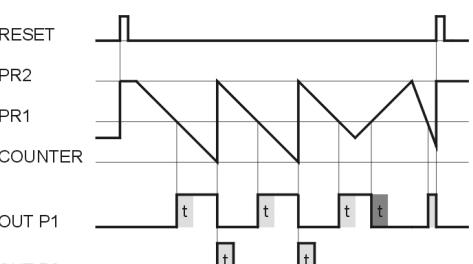
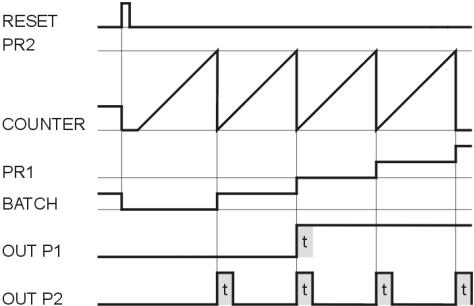
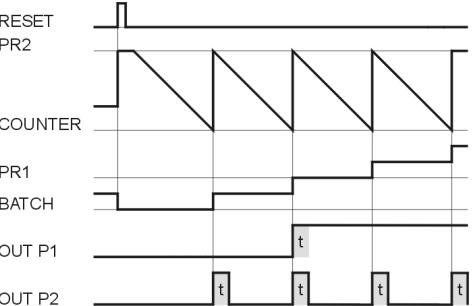
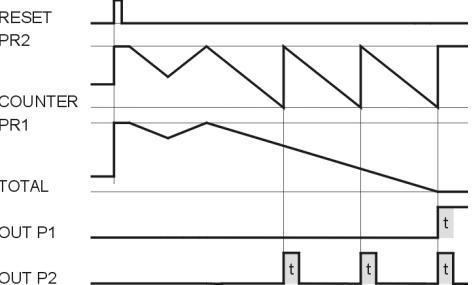
## 15 Input modes: Timing

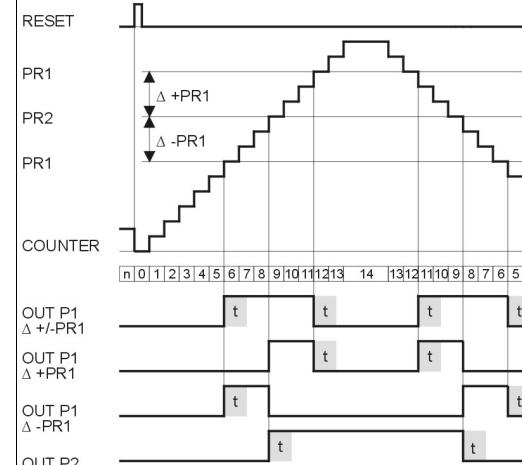
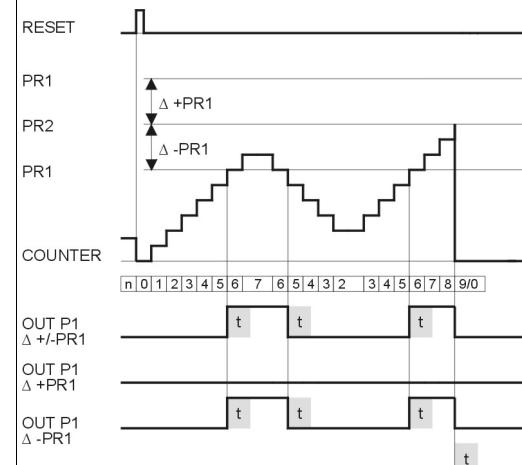
Function	Diagram	PNP: Count on rising edge NPN: Count on falling edge
InA.InB	 <p>INP A</p> <p>INP B</p> <p>GATE</p> <p>ADD</p> <p>SUB</p> <p>Time markers: T1, T2</p>	<p>Inp A: Start Inp B: Stop Add: Display 0 --&gt; Preset Sub: Display Preset -&gt; 0</p>
InB.InB	 <p>INP B</p> <p>GATE</p> <p>ADD</p> <p>SUB</p> <p>Time markers: T1, T2</p>	<p>Inp A: no function Inp B: Start/Stop Add: Display 0 --&gt; Preset Sub: Display Preset -&gt; 0</p>
FrRrun	 <p>GATE</p> <p>ADD</p> <p>SUB</p> <p>Time markers: T1, T2</p>	<p>Inp A: no function Inp B: no function Control of the timing only via the GATE input Add: Display 0 --&gt; Preset Sub: Display Preset -&gt; 0</p>
Auto	 <p>GATE</p> <p>RESET</p> <p>PRESET</p> <p>ADD</p> <p>SUB</p> <p>Time markers: T1, T2, T3, T4</p>	<p>Inp A: no function Inp B: no function Control of the timing via RESET (manual or electrical) Add: Display 0 --&gt; Preset Sub: Display Preset -&gt; 0</p>

## 16 Input modes: Frequency meter

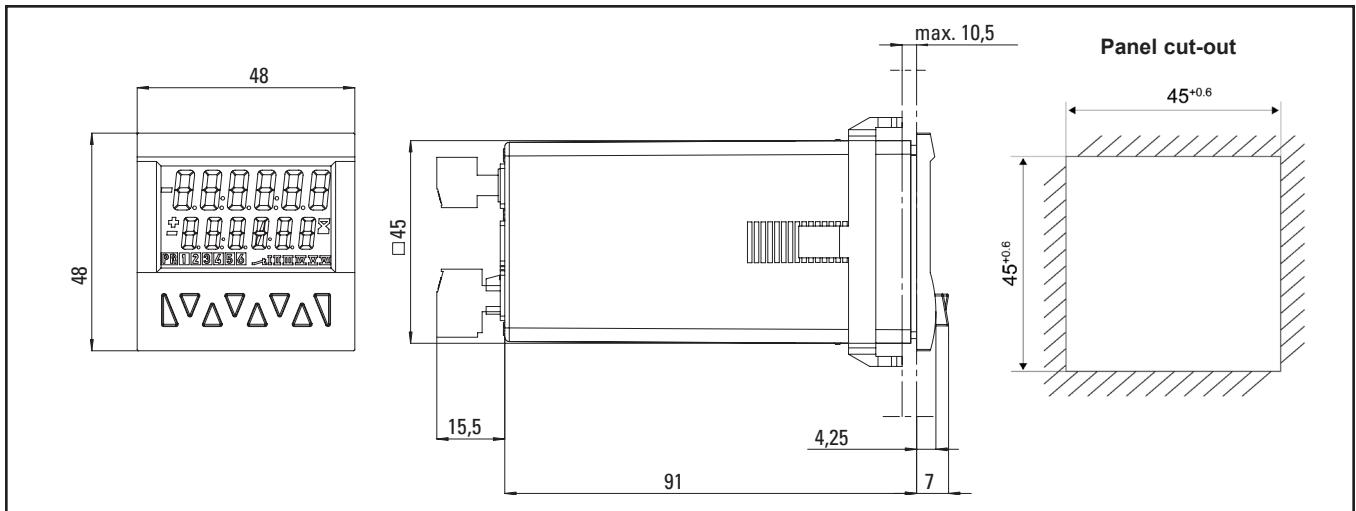
Function	Diagram	PNP: Count on rising edge NPN: Count on falling edge
A	<p>INP A</p>  <p>Display</p> 	Inp A: Frequency input Inp B: no function
AsubB	<p>INP A</p>  <p>INP B</p>  <p>Display</p> 	Inp A: Frequency input 1 Inp B: Frequency input 2  Formula: A - B
AaddB	<p>INP A</p>  <p>INP B</p>  <p>Display</p> 	Inp A: Frequency input 1 Inp B: Frequency input 2  Formula: A + B
Quad	<p>Inp A</p>  <p>Inp B</p>  <p>Display</p> 	A 90° B Inp A: Frequency input 1 Inp B: Reverse direction
A / B	<p>INP A</p>  <p>INP B</p>  <p>Display</p> 	Inp A: Frequency input 1 Inp B: Frequency input 2  Formula: A / B
(A-B)/A	<p>INP A</p>  <p>INP B</p>  <p>Display</p> 	Inp A: Frequency input 1 Inp B: Frequency input 2  Formula: (A - B)/A x100

## 17 Output operations

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

Mode	Diagram
Trail	 <p>Timing diagram for Trail mode:</p> <ul style="list-style-type: none"> <li>RESET: Initial pulse.</li> <li>PR1: Increasing step function. <math>\Delta +PR1</math> is the rising edge, <math>\Delta -PR1</math> is the falling edge.</li> <li>PR2: Increasing step function.</li> <li>COUNTER: Sequence of values: n 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 13 12 11 10 9 8 7 6 5.</li> <li>OUT P1 <math>\Delta +/-PR1</math>: Pulse train with period <math>t</math>.</li> <li>OUT P1 <math>\Delta +PR1</math>: Pulse train with period <math>t</math>.</li> <li>OUT P1 <math>\Delta -PR1</math>: Pulse train with period <math>t</math>.</li> <li>OUT P2: Pulse train with period <math>t</math>.</li> </ul>
TrailAr	 <p>Timing diagram for TrailAr mode:</p> <ul style="list-style-type: none"> <li>RESET: Initial pulse.</li> <li>PR1: Increasing step function. <math>\Delta +PR1</math> is the rising edge, <math>\Delta -PR1</math> is the falling edge.</li> <li>PR2: Increasing step function.</li> <li>COUNTER: Sequence of values: n 0 1 2 3 4 5 6 7 6 5 4 3 2 3 4 5 6 7 8 9/0.</li> <li>OUT P1 <math>\Delta +/-PR1</math>: Pulse train with period <math>t</math>.</li> <li>OUT P1 <math>\Delta +PR1</math>: Pulse train with period <math>t</math>.</li> <li>OUT P1 <math>\Delta -PR1</math>: Pulse train with period <math>t</math>.</li> <li>OUT P2: Pulse train with period <math>t</math>.</li> </ul>

## 18 Dimensional Drawings



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email: sales.usa@trumeter.com

[www.trumeter.com](http://www.trumeter.com)