KC-LCDL…
KC-LCDC…

Electronic Preset Counter

with two presets

Operating instructions

Models
KC-LCDL-48-2R-230VAC
KC-LCDL-48-2R-24VDC
KC-LCDC-48-2T-230VAC
KC-LCDC-48-2T-24VDC
KC-LCDC-48-2R-230VAC
KC-LCDC-48-2R-24VDC

CE

Your automation, our passion

PEPPERL+FUCHS

Table of Contents

1 Preface

Please read this instruction manual entirely and 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.
Defective or damaged devices should be disconnected from the mains immediately and taken out of operation.
The device shall not be opened. Use the repair service of the manufacturer.
Only connect the device to the electricity networks provided to that purpose.
The safety of the system in which the device is integrated is the responsibility of the installer.
Disconnect all electricity networks prior to any installation or maintenance work.
Use exclusively cables approved in your country and designed for your temperature and power ranges.
Installation and service work shall be carried out exclusively by qualified personnel.
The device must compulsorily be protected with approved external fuses. The value of these fuses can be found in the technical information.

⚠	This symbol is used on the device to remind of the existence of dangers, which are referred to in this manual.

2.1 Use according to the intended purpose

The preset counter 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”.

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, it is your responsibility to take the appropriate safety measures.

The device has been designed for indoor operation. It may nevertheless be used outdoors, provided the technical data is adhered to. In this case, take care to provide suitable UV protection.

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.

Provide a free space of 10 mm all around the device for its ventilation.

The device should be mounted so that the terminals are out of the reach of the operator and cannot be touched by him. When mounting the device, consider the fact that only the front side is classified as accessible for the operator.

Mounting instructions

1. Remove the 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.

Note: *In case of proper installation, IP65 can be reached on the front side.*

2.3 Electrical Installation

DANGER

The device must be disconnected from any power supply prior to any installation or maintenance work. Make sure that no more voltages LIABLE TO CAUSE AN ELECTROCUTION are present.

AC-powered devices must only be connected to the low-voltage network via a switch or circuit breaker installed close to the device and marked as their disconnecting device.

Installation or maintenance work must only be carried out by qualified personnel and in compliance with the applicable national and international standards.

Take care to separate all extra-low voltages entering or exiting the device from hazardous electrical conductors by means of a double or reinforced insulation (SELV circuits).

DANGER

The device must be protected externally for its proper operation. Information about the prescribed fuses can be found in the technical information.

The relay outputs are not protected internally in the device. Without suitable protection of the relay outputs, undesired heat development or even fire may occur. The relay outputs must be protected externally by the manufacturer of the plant. It must also be made sure that, even in case of a malfunction, the values stated in the technical data are under no circumstances exceeded.

- During installation, make sure that the supply voltage and the wiring of the output contacts are both fed from the same mains phase, in order not to exceed the maximum permitted voltage of 250V.
- The cables and their insulation must be designed for the planned temperature and voltage ranges. Regarding the type of the cables, adhere to the applicable standards of the country and of the plant. The cross sections allowed for the screw terminals can be found in the technical data.
- Before starting the device, check the cables for proper wiring and tightening. The screws of unused screw terminals must be screwed to the stop, so that they cannot loosen and get lost.
- The device has been designed for overvoltage category II. If higher transient voltages cannot be excluded, additional protection measures must be taken in order to limit the overvoltage to the values of CAT II.

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 and control lines. Connect shield at both ends. The conductor cross-section of the cables should be a minimum of 0.14 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.

2.4 Cleaning and maintenance

The front side of the unit should only be cleaned using a soft damp (water!) cloth. Cleaning of the embedded rear side is not planned and is the responsibility of the service personnel or of the installer.

In normal operation, this device is maintenance-free. Should the device nevertheless not operate properly, it must be sent back to the manufacturer or to the supplier. Opening and repairing the device by the user is not allowed and can adversely affect the original protection level.

english

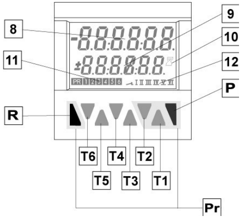
3 Description

6-digit multifunction LCD display
Easy-to-read 2-line LCD-display with annunciators for both the displayed preset and the status of the two outputs
Simultaneous display of the actual value and of the presets or auxiliary counters
Versions with/without backlit display
Add./Sub. Preset counter with two presets
Relay or optocoupler outputs
Easy-to-program
Simple preset entry via the front keys or via the Teach-In function
Step or tracking preset
Pulse, frequency, time or batch counter
Preset counter, Batch counter or Total Counter (cumulative count)
Set function for pulse and time counter
Multiplication and division factor (00.0001 .. 99.9999) for pulse counter and frequency meter
Averaging and Start Delay for frequency meter

Input modes:
Pulse counter: cnt.dir , up.dn , up.up , quad , quad2 , quad4 , A/B , (A-B)/Ax100%
Frequency meter: A , A – B , A + B , quad , A/B , (A-B)/Ax100%
Timer: FrErun , Auto , InpA.InpB , InpB.InpB

Output operations:
Add , Sub , AddAr, SubAr , AddBat , SubBat , AddTot , SubTot , Trail , TrailAr
4-stage RESET-Mode
3-stage keypad locking (Lock)
MPI input for Display Latch, Teach-In function or Set function
Supply voltage 100 … 240 V AC ± 10% 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:	time measurement while active(Gate.hi) 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

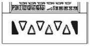
Relay with potential-free make (NO) contact or optocoupler with open emitter and collector.

6.3 Active Outputs

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

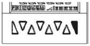
7 Programming

7.1 Entering the programming



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

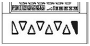
⇨ The security prompt appears in the display



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

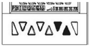
Press key T2 to continue with the programming

⇨ The security prompt appears in the display



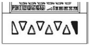
Enter the main menu by pressing the Prog/Mode key

7.2 Choice of main menus



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

7.3 Entering a sub-menu



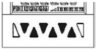
The sub-menu is opened with the Prog/Mode key and the first menu item is displayed.

7.4 Selecting the menu items

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

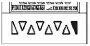
7.5 Setting the menu items

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

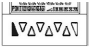
7.6 Accepting the setting



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

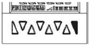
7.7 Ending the programming

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



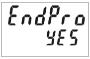
Press the Reset key

⇨ The security prompt appears in the display

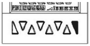


Pressing the Prog/Mode key acknowledges this prompt and causes the programming menu to start again from the beginning. The previously-programmed values are preserved. These can now be changed or checked again.

Pressing the decade key T2 selects the termination of the programming



⇨ The security prompt appears in the display



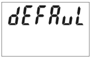
Pressing the Prog/Mode key acknowledges this prompt and terminates the programming; the modified settings are saved in the EEPROM.

⇨ 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

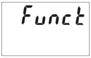
Freely programmable
User settings

Factory settings are highlighted in grey

7.8.2 Table: Parameter Sets

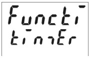
	P.SEt 1	P.SEt 2	P.SET 3
Func	Count	Count	Count
InP.PoL	PnP	PnP	PnP
FiLtEr	on	oFF	oFF
Count	Cnt.dir	uP.dn	Quad
MPi	LAtch	LAtch	Set
Loc.InP	ProG	ProG	ProG
ModE	Add	Sub	TrAiL
FActor	01.0000	01.0000	01.0000
diViSo	01.0000	01.0000	01.0000
dP	0	0	0.00
SEtPt	000000	000000	0000.00
CoLor	red.Grn	red.Grn	red.Grn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

7.8.3 Setting the Basic Function

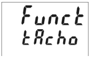


Basic function menu

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

InPut	Menu for programming the signal and control inputs

Input polarity

InPPol PnP	PNP: switching to Plus for all inputs in common
InPPol nPn	NPN: switching to 0 V for all inputs in common

Filter for the signal inputs InpA and InpB

FiLtEr oFF	Maximum count frequency
FiLtEr on	Damped to approx. 30 Hz (for control with mechanical contacts)

Count Input mode

Count Cntdir	**Count/Direction** INP A: count input INP B: count direction input
Count uPdn	**Differential counting [A – B]** INP A: count input add INP B: count input sub
Count uPuP	**Totalising [A + B]** INP A: count input add INP B: count input add
Count QuAd	**Quadrature input** INP A: count input 0° INP B: count input 90°
Count QuAd 2	**Quadrature with pulse doubling** INP A: count input 0° INP B: count input 90° Each pulse edge of INP A will be counted
Count QuAd 4	**Quadrature x4** INP A: count input 0° INP B: count input 90° Each pulse edge of INP A and INP B will be counted.
Count A / b	**Ratio measurement [A / B]** Inp A: count input A Inp B: count input B
Count A%/ob	**Percentage differential counting** **[(A – B) / A in %]** Inp A: count input A Inp B: count input B

User input

MPI LAtch	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.
MPI tEAch	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
MPI SEt	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

Loc.InP ProG	When the Lock input is activated the programming is inhibited.
Loc.InP PrESEt	When the Lock input is activated the setting of the preset values is inhibited.
Loc.InP PrG.PrE	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

ModE	Submenu for determining the operation of the outputs
ModE Add	**Count mode ADD** Outputs active when count status $\geq$ preset value Reset to zero

english

MOdE
Sub

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

MOdE
AddAr

Count mode ADDING with automatic reset
Output 1 active when count status ≥ 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

MOdE
SubAr

Count mode SUBTRACTING with automatic reset
Output 1 active when count status ≤ 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

MOdE
AddbAt

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 ≥ preset 1
Manual reset sets both counters to zero.
Electrical reset only sets the main counter to zero.

MOdE
SubbAt

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 ≥ 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

MOdE
Addtot

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 ≥ preset value 1
Manual Reset sets both counters to zero
Electrical reset only sets the main counter to zero

MOdE
Subtot

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 ≤ zero
Manual reset sets both counters to the preset values
Electrical reset sets only main counter to preset value 2

MOdE
trAiL

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)

MOdE
tr_Ar

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

`ConFiG`

Submenu for matching the input pulses and display

Multiplication factor

`FActor`
`01.0000`

Multiplication factor can be programmed from 00.0001 to 99.9999.

The setting 00.0000 will not be accepted

Division factor

`diViSo`
`01.0000`

Division factor can be programmed from 01.0000 to 99.9999.
The setting <01.0000 will not be accepted

Decimal point setting

`dP`
`0`

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

`SEtPt`
`000000`

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

Display colour (for device KC-LCDC…)

`CoLor`
`rEd`

Display colour
upper line red
lower line red

`CoLor`
`rEdGrn`

Display colour
upper line red
lower line green

7.8.4.4 Submenu for reset mode

`rESmod`

Setting the reset mode

`rESmod`
`mAn.EL`

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

`rESmod`
`no rES`

No reset possible (red key and reset input inhibited)

`rESmod`
`EL rES`

Only electrical reset possible (reset input)

`rESmod`
`mAnrE`

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

`InPut`

Submenu for programming the signal and control inputs

Input polarity

`InPPoL`
`PnP`

PNP: switching to Plus for all inputs in common

`InPPoL`
`nPn`

NPN: switching to 0 V for all inputs in common

Filter for the signal inputs Inp A and Inp B

`FiLtEr`
`oFF`

maximum count frequency

`FiLtEr`
`on`

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

Input mode Frequency Measurement

`InPut`
`A`

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

`InPut`
`ASub b`

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

english

InPut
AAdd b

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

InPut
QuAd

Frequency measurement with direction recognition [Quad]
Inp A: Frequency input 0°
Inp B: Frequency input 90°

InPut
A / b

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

InPut
A%ob

Percentage differential measurement [(A-B) / A in %]
Inp A: Frequency input A
Inp B: Frequency input B

User input

MPI
LAtch

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.

MPI
tEAch

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

LocInP
ProG

When the Lock input is activated the programming is inhibited.

LocInP
PrESEt

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

LocInP
PrG.PrE

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

ConFiG

Submenu for matching the input pulses and display

Multiplication factor

FActor
01.0000

Multiplication factor can be programmed from 00.0001 to 99.9999.
The setting 00.0000 will not be accepted

Division factor

diUiSo
01.0000

Division factor can be programmed from 01.0000 to 99.9999.
The setting <01.0000 will not be accepted

Display mode

tMode
SEC-1

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

tMode
Min-1

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

Decimal point setting

dP
0

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

AUG
oFF

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
00.0

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

WAitO
00.1

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

Display colour (for device KC-LCDC…)

Color
rEd

Display colour

Upper line	red
Lower line	red

Color
rEdGrn

Display colour

Upper line	red
Lower line	green

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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

InPut

Menu for programming the signal and control inputs

Input polarity

InPPoL PnP

PNP: switching to Plus for all inputs in common

InPPoL nPn

nPn: switching to 0 V for all inputs in common

Filter for the signal inputs Inp A and Inp B

FiLtEr oFF

for electronic control of the signal inputs

FiLtEr on

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

Input mode Time measurement

StArt InA.Inb

Start: Edge to Inp A

Stop: Edge to Inp B

StArt Inb.Inb

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

StArt FrErun

Timing can only be controlled via the Gate input

Inp A and Inp B: no function

StArt Auto

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

GAtE GAtE.Lo

Timing takes place when the Gate input is not active.

GAtE GAtE.hi

Timing takes place when the Gate input is active

User input

MPI LAtch

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.

MPI tEAch

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

MPI SEt

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

Loc.InP ProG

When the Lock input is activated the programming is inhibited.

Loc.InP PrESEt

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

Loc.InP PrGPrE

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

MOdE

Submenu for determining the operation of the outputs

MOdE Add

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

MOdE Sub

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

MOdE AddAr

Count mode ADDING with automatic reset
Output 1 active when count status ≥ 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

MOdE SubAr

Count mode SUBTRACTING with automatic reset
Output 1 active when count status ≤ 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

MOdE AddbAt

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 ≥ preset 1
manual reset sets both counters to zero
electrical reset sets only main counter to zero

MOdE SubbAt

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 ≥ 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

MOdE Addtot

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 ≥ preset value 1
Manual Reset sets both counters to zero
Electronic reset only sets the main counter to zero

MOdE Subtot

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 ≤ zero
Manual reset sets both counters to the preset values
Electronic reset sets only main counter to preset value 2

Tracking preset mode

MOdE trAiL

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)

MOdE tr_Ar

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

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main counter = preset value 2. Preset 1 relative to Preset 2

(see also section 17. Output operations)

7.8.6.3 Submenu for configuration

ConFiG	Submenu for matching the time ranges and display

Unit of time

tMode SEC	Unit of time: seconds Decimal point setting determines the resolution
tMode Min	Unit of time: minutes Decimal point setting determines the resolution
tMode hour	Unit of time: hours Decimal point setting determines the resolution
tMode h.Mi n.S	Unit of time: Hrs. Min. Sec.

Decimal point setting (Resolution)

dP 0	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

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

Display colour (for device KC-LCDC…)

CoLor rEd	Display colour upper line red lower line red
CoLor rEdGrn	Display colour upper line red lower line green

7.8.6.4 Submenu for reset mode

rESMod	Setting the reset mode
rESMod MAn.EL	Manual reset (with red key) and electrical reset (reset input)
rESMod no rES	No reset possible (red key and reset input inhibited)
rESMod EL rES	Only electrical reset possible (reset input)
rESMod MAnrE	Only manual reset possible (red key)

7.8.6.5 Submenu for Preset 1

PrES 1	Submenu for turning preset 1 ON/OFF
PrES 1 on	Preset 1 ON
PrES 1 oFF	Preset 1 OFF and no function
Pr.Out 1	ADD mode output operations: permanent signal at Output 1, becomes active when count ≥ Preset 1 SUB mode output operations: permanent signal at Output 1, becomes active when count ≤ Preset 1
Pr.Out 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 ≤ Preset 1
Pr.Out 1	ADD mode output operations: timed signal at Output 1, becomes active when count ≥ Preset 1. (Activation only in positive direction) SUB mode output operations: timed output at Output 1, becomes active when count ≤ Preset 1 (Activation only in negative direction)
Pr.Out 1	ADD mode output operations: timed signal at Output 1, becomes passive when count ≥ Preset 1. (Deactivation only in

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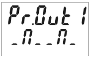
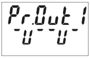
positive direction)
SUB mode output operations: timed output at Output 1, becomes passive when count < Preset 1. (Deactivation only in negative direction).



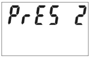
ADD mode output operations: timed signal at Output1, becomes active with positive direction and when count > Preset 1 and subsequently active with negative direction and when count < Preset 1
SUB mode output operations: timed signal at Output 1, becomes active with negative direction and when count < Preset 1 and subsequently active with positive direction and when count > Preset 1



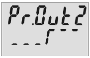
ADD mode output operations: timed signal at Output1, becomes passive with positive direction and when count > Preset 1 and subsequently passive with negative direction and when count < Preset 1
SUB mode output operations: timed output at Output 1, becomes passive with negative direction and when count < Preset 1 and subsequently passive with positive direction and when count > Preset 1

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

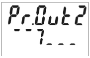
7.8.6.6 Submenu for Preset 2



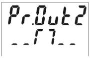
Submenu for Preset 2



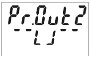
ADD mode output operations: permanent signal at Output 2, becomes active when count > Preset 2
SUB mode output operations: permanent signal at Output 2, becomes active when count < zero



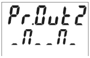
ADD mode output operations: permanent signal at Output 2, becomes passive when count > Preset 2
SUB mode output operations: permanent signal at Output 2, becomes passive when count < zero



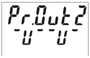
ADD mode output operations: timed signal at Output 2, becomes active when count > Preset 2 (Activation only in positive direction).
SUB mode output operations: permanent signal at Output 2, becomes active when count < zero (Activation only in negative direction)



ADD mode output operations: timed signal at Output 2, becomes passive when count > Preset 2 (Deactivation only in positive direction)
SUB mode output operations: permanent signal at Output 2, becomes passive when count < zero (Deactivation only in negative direction).



ADD mode output operations: timed signal at Output 2, becomes active with positive direction and when count > Preset 2 and subsequently with negative direction and when count < Preset 2
SUB mode output operations: timed signal at Output 2, becomes active with negative direction and when count < zero and subsequently with positive direction and when count > zero



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

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

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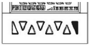
Active:
Relay or optocoupler are activated when the preset value is reached.

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

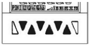
In programming mode Preset 2 will always be displayed in the lower line. This is except for the output operations AddBat, SubBat,AddTot and SubTot.



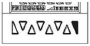
Press the Prog/Mode key until the preset to be changed is displayed - PR1 or PR2 .

Press any decade key

⇨ Display switches to the editor mode

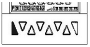


Set the desired preset value using the decade keys



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

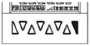
⇨ Display switches to the editor mode of the next preset PR2 or PR1



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.

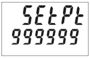
7.9.3 Setting the tracking presets (trail)

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)

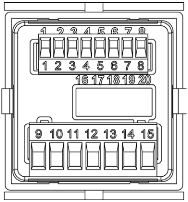
⇨ For add. output operations the pulse counter or timer will be set to the ***SEtPt*** default value

⇨ 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



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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	Output 1
10	Relay contact N.O.1	
11	Relay contact C.2	Output 2
12	Relay contact N.O.2	
13	Relay contact N.C.2	
14	AC: 100 … 240 VAC ± 10% N~ DC: 10..30 VDC	Supply voltage
15	AC: 100 ... 240 VAC ± 10% L~ DC: GND (0 VDC)	Supply voltage

9.2.2 Version with Optocouplers

N°	Designation	Function
9	Collector 1	Output 1
10	Emitter	
11	Emitter 2	Output 2
12	Not connected	
13	Collector 2	
14	AC: 100 … 240 VAC ± 10% N~ DC: 10..30 VDC	Supply voltage
15	AC: 100 … 240 VAC ± 10% 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 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	< 13 ms
With automatic repeat	< 13 ms
A/B ; (A-B)/A	< 34 ms
Optocouplers	
Add/Sub/Trail	< 1 ms
With automatic repeat	< 1 ms
A/B ; (A-B)/A	< 23 ms

10.3 Tacho/Frequency meter

Frequency range	0,01 Hz to 65 kHz (see section 13. frequencies typ.) In case of frequencies < 10 Hz, the waiting time must be increased accordingly to obtain the display of a value.
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 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

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Response time of the outputs:

Relays	< 13 ms
Optocoupler	< 1 ms

10.5 Signal and Control inputs

SELV circuits, reinforced / double insulation

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
4-30 V 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
4-30 V 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

Prescribed fuse:	3A

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

⚠ The maximum values shall in no case be exceeded!

Mechanical service life (switching cycles)	$2x10^7$
N° of switching cycles at 3 A/ 250 V AC	$1x10^5$
N° of switching cycles at 3 A/ 30 V DC	$1x10^5$

or NPN optocoupler

Switching capacity	30 VDC/10 mA
U_{CESAT} for IC = 10 mA:	max. 2.0 V
U_{CESAT} for IC = 5 mA:	max. 0.4 V

Output 2

Relay with changeover contact

Prescribed fuse:	3A
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

⚠ The maximum values shall in no case be exceeded!

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	$5x10^4$

or NPN optocoupler

Switching capacity	30 V DC/10 mA
U_{CESAT} for IC = 10 mA:	max. 2.0 V
U_{CESAT} for IC = 5 mA:	max. 0.4 V

10.7 Supply voltage

AC supply:	100...240 V AC / max. 15 VA 50/ 60 Hz, Tolerance ± 10% ext. fuse protection: T 0.1 A
DC supply:	10 ... 30 V DC/ max. 5 W reverse polarity protection SELV, CLASS II (Limited Power Source) ext. fuse protection T 0.2 A

10.8 Sensor supply voltage

(Voltage output for external sensors)
SELV circuits, reinforced / double insulation

for AC supply:	24 V DC ±15%, 80 mA
for 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:	with shielded signal and control cables

10.11 Device safety

Protection Class:	Protection Class 2 (front side)

⚠ Only the front side is classified as accessible for the operator.

Application area:	Pollution level 2 over-voltage Category II
Insulation:	Front: double insulation, Rear side: basic insulation,

Signal inputs and und sensor power supply: SELV

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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:	IP65 (front, device only)
Housing material:	Polycarbonate UL94 V-2
Vibration resistance: (EN 60068-2-6):	10 - 55 Hz / 1 mm / XYZ 30 min in each direction

Shock resistance:

EN 60068-2-27	100G / 2 ms / XYZ 3 times in each direction 10G / 6 ms / XYZ 2000 times in each direction

10.13 Connections

Supply voltage and outputs:
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

230 V AC backlighting, Relay:
KC-LCDL-48-2R-230VAC

24 V DC backlighting, Relay:
KC-LCDL-48-2R-24VDC

230 V AC Multicolour, Optocoupler:
KC-LCDC-48-2T-230VAC

24 V DC Multicolour, Optocoupler:
KC-LCDC-48-2T-24VAC

230 V AC Multicolour, Relay:
KC-LCDC-48-2R-230VAC

24 V DC Multicolour, Relay:
KC-LCDC-48-2R-24VDC

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 AddBat SubBat TrailAr**	**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		

4-30 V level

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

	Add Sub Trail	**AddAr SubAr AddBat SubBat TrailAr**	**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

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

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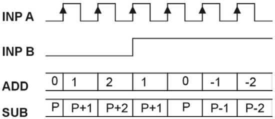
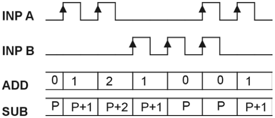
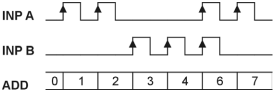
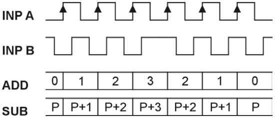
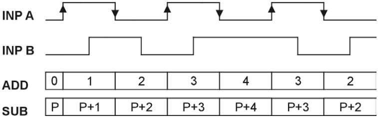
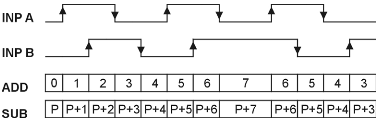
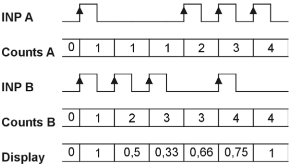
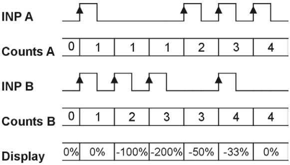
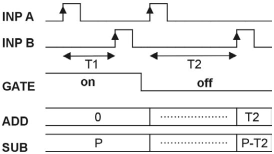
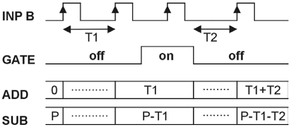
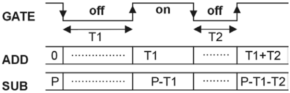
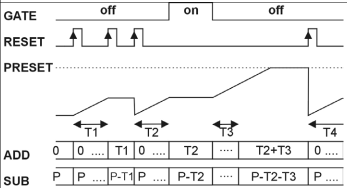
14 Input modes: Pulse counting

Function	Diagram	PNP: Count on rising edge NPN: Count on falling edge
	Note: No counting when GATE input is active P = Preset	
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

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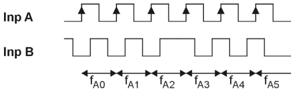
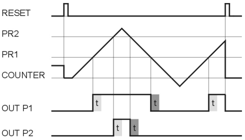
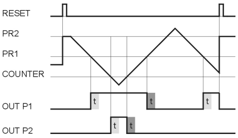
16 Input modes: Frequency meter

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	 **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

<table>
<tr><th>Mode</th><th>Diagram</th><th>Mode</th><th>Diagram</th></tr>
<tr><td></td><td>t Only in the mode and</td><td>↔</td><td>t + t in the mode and</td></tr>
<tr><td>Add</td><td>
</td><td>Sub</td><td>
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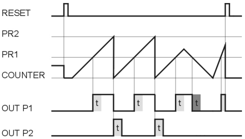
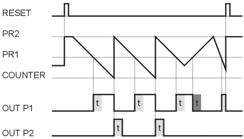
<tr><td>AddAr</td><td>
</td><td>SubAr</td><td>
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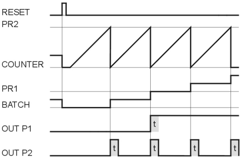
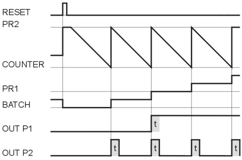
<tr><td>AddBat</td><td>
</td><td>SubBat</td><td>
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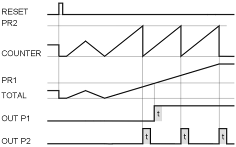
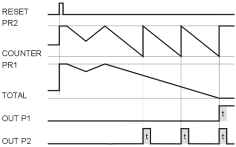
<tr><td>AddTot</td><td>
</td><td>SubTot</td><td>
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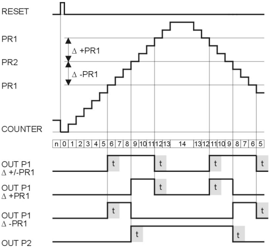

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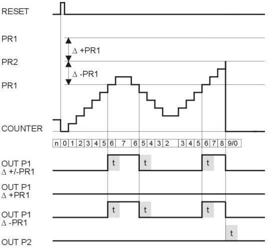
<tr><td>TrailAr</td><td>


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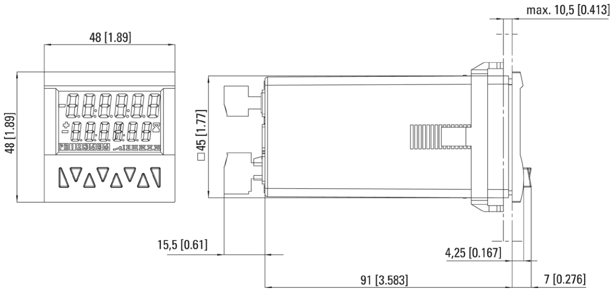
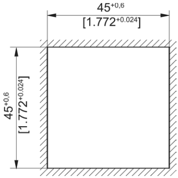
18 Dimensional Drawings

Dimensions in mm [inch]



Panel cut-out



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- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
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