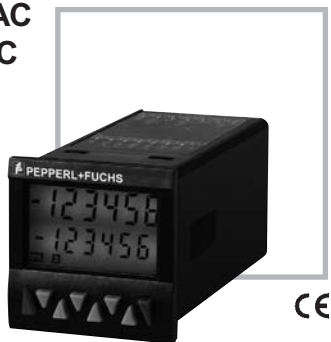


## Operating instructions

**KC-LCDC-48-6T-230VAC**  
**KC-LCDC-48-6T-24VDC**

**Electronic Preset Counter**  
with six presets (optocouplers)



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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 detects and measures pulses, times and frequencies up to max. 50 kHz and offers a wide variety of different operating modes. At the same time, the preset counter processes programmed presets. Use for any purpose over and beyond this will be deemed as not in accordance with its intended purpose and thus not complying with the requirements.

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

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

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

The device is not suitable for use in hazardous areas and for areas excluded in EN 61010 Part 1. If the device is used to monitor machines or processes in which, in the event of a failure of the device or an error made by the operator, there might be the risk of damaging the machine or causing an accident to the operators, then it is your responsibility to take the appropriate safety measures.

### 2.2 Mounting in a control panel



CAUTION

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

#### Mounting instructions

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

### 2.3 Electrical Installation



DANGER

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

#### Advice on noise immunity

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

#### Measures to be taken:

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

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

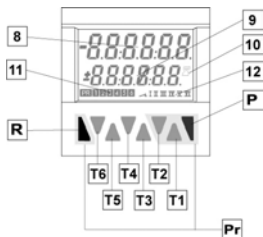
Avoid routing signal or control cables parallel to power lines.

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 annunciators for the displayed preset and the status of the outputs
- Simultaneous display of the actual value and of the presets or auxiliary counters
- Versions with/without backlit display
- Add./Sub. Preset counter with six presets
- Optocoupler outputs
- Easy-to-program
- Simple preset entry via the front keys or via the Teach-In function
- Step preset
- Pulse, frequency, time or batch counter
- Preset counter, Batch counter or Total Counter (cumulative count)
- Set function for pulse and time counter
- Multiplication (00.0001 .. 99.9999) and division factor (01.0000 .. 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 , AddTot
- 4-stage RESET-Mode
- 3-stage keypad locking (Lock)
- MPI input for Display Latch, Teach-In function or Set function
- Supply voltage 90 .. 260 VAC or 10 .. 30 VDC

### 4 Display/Operating elements



T1-6	Decade key T1 ... T6
P	Prog/Mode key
R	Reset key
8	Current count value / main counter
9	Preset value/ Total count/ Batch counter
10	Run display for Timer
11	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 55 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 and output 2


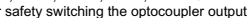


Optocoupler with open emitter and collector

### 6.2 Output 3 to output 6

Optocoupler with open collector and common emite.


### 6.3 Active Outputs

An active output will be shown on the display as


 or   
 For safety switching the optocoupler outputs can be inverted, i.e. the optocoupler is disabled when the presets are reached. To do this, the parameters Pr.OUT1 to Pr.OUT6 must be set to  (for permanent signal) 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	LAch	LAch	Set
Loc.InP	ProG	ProG	ProG
ModE	Add	Sub	AddAr
FActor	01.0000	01.0000	01.0000
diViSo	01.0000	01.0000	01.0000
dP	0	0	0.00
SEtPt	000000	000000	0000.00
CoLor	red.Grn	red.Grn	red.Grn
rESmd	Man.EL	Man.EL	Man.EL
Pr.Out 1			
t.Out 1		00.10	
Pr.Out 2			
t.Out 2		00.10	00.10
Pr.Out 3			
t.Out 3		00.10	
Pr.Out 4			
t.Out 4		00.10	
Pr.Out 5			
t.Out 5		00.10	
Pr.Out 6			
t.Out 6		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**  
Outputs 1, 3, 4, 5 and 6 active when count status  $\leq$  preset value 1, 3, 4, 5 and 6  
Output 2 active when count status  $\leq$  0  
Reset to preset 2

Output 1 resp. 4 active when total counter  $\geq$  preset value 1 resp. 4  
Manual Reset sets both counters to zero  
Electrical reset only sets the main counter to zero

**Count mode ADDING with automatic reset**  
Outputs 1, 3, 4, 5 and 6 active when count status  $\geq$  preset value 1, 3, 4, 5 and 6  
Output 2 (timed signal) active when count status = preset value 2  
Automatic reset to zero when count status = preset value 2  
Reset to zero

#### 7.8.4.3 Submenu for configuration

Submenu for matching the input pulses and display

**Count mode SUBTRACTING with automatic reset**  
Output 1, 3, 4, 5 and 6 active when count status  $\leq$  preset value 1, 3, 4, 5 and 6  
Output 2 (timed signal) active when count status = 0  
Automatic reset to preset 2 when count status = 0  
Reset to preset 2

#### 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

**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  
Output 3, 5 and 6 active when main counter  $\geq$  preset value 3, 5 and 6  
Batch counter counts the number of automatic repetitions of preset 2  
Output 1 resp. 4 active when Batch counter  $\geq$  preset 1 resp. 4  
Manual reset sets both counters to zero.  
Electrical reset only sets the main counter to zero.

#### Set value

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

#### Display colour (for device 6.924.x113.xxB)

Display colour  
upper line red  
lower line red

**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  
Output 3, 5 and 6 active when main counter  $\geq$  preset value 3, 5 and 6  
Total counter counts all the count pulses from the main counter

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 7.8.6.6

#### 7.8.4.7 Preset 3, 4, 5 and 6

See below 7.8.6.7

### 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.

### Display colour (for device 6.924.x113.xxB)

Display colour  
 Upper line red  
 Lower line red

Display colour  
 Upper line red  
 Lower line green

### 7.8.5.3 Preset 1

See below 7.8.6.5

### 7.8.5.4 Preset 2

See below 7.8.6.6

### 7.8.5.5 Preset 3, 4, 5 and 6

See below 7.8.6.7

### 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, 3, 4, 5 and 6 active when count status  $\leq$  preset value  
 1, 3, 4, 5 and 6  
 Output 2 active when count status  $\leq 0$   
 Reset to preset 2



**Count mode ADDING with automatic reset**  
 Output 1, 3, 4, 5 and 6 active when count status  $\geq$  preset value  
 1, 3, 4, 5 and 6  
 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, 3, 4, 5 and 6 active when count status  $\leq$  preset value  
 1, 3, 4, 5 and 6  
 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  
 Outputs 3, 5 and 6 active when main counter  $\geq$  preset value 3, 5 and 6  
 Batch counter counts the number of automatic repetitions of preset 2  
 Output 1 resp. 4 active when batch counter  $\geq$  preset 1 resp. 4  
 Manual reset sets both counters to zero  
 Electrical reset sets only main counter to zero



**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  
 Outputs 3, 5 and 6 active when main counter  $\geq$  preset value 3, 5 and 6

Total counter counts all the count pulses from the main counter  
 Output 1 resp. 4 active when total counter  $\geq$  preset value 1 resp. 4

Manual Reset sets both counters to zero

Electronic reset only sets the main counter to zero

**7.8.6.3 Submenu for configuration**



Submenu for matching the time ranges and display

**Unit of time**



Unit of time: seconds  
 Decimal point setting determines the resolution



Unit of time: minutes  
 Decimal point setting determines the resolution



Unit of time: hours  
 Decimal point setting determines the resolution



Unit of time: Hrs. Min. Sec.

**Decimal point setting (Resolution)**



Decimal place (determines the resolution)

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

**Set value**



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

**Display colour (6.924.x113.xx[B])**



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



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

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



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

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



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

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

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

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

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

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

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

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

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

Timed signal is post-triggered

#### 7.8.6.6 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 00.01 to 99.99 s.  
 Timed output is post-triggered.

### 7.8.6.7 Submenu for Preset 3, 4, 5 and 6

Only preset 3 is represented here.



Submenu for Preset 3 [to 6]



ADD mode output operations:  
 permanent signal at Output 3 [to 6], becomes active when count  $\geq$  preset 3 [to 6]  
 SUB mode output operations:

permanent signal at Output 3 [to 6], becomes active when count  $\leq$  preset 3 [to 6]



ADD mode output operations:  
 permanent signal at Output 3 [to 6], becomes passive when count  $\geq$  preset 3 [to 6]  
 SUB mode output operations:

permanent signal at Output 3 [to 6], becomes passive when count  $\leq$  preset 3 [to 6]



ADD mode output operations:  
 timed signal at Output 3 [to 6], becomes active when count  $\geq$  preset 3 [to 6]. (Activation only in positive direction)  
 SUB mode output operations:

timed signal at Output 3 [to 6], becomes active when count  $\leq$  preset 3 [to 6]. (Activation only in negative direction)



ADD mode output operations:  
 timed signal at Output 3 [to 6], becomes passive when count  $\geq$  preset 3 [to 6]. (Deactivation only in positive direction)  
 SUB mode output operations:

timed signal at Output 3 [to 6], becomes passive when count  $\leq$  preset 3 [to 6]. (Deactivation only in negative direction).



ADD mode output operations:  
 timed signal at Output 3 [to 6], becomes active with positive direction and when count  $\geq$  preset 3 [to 6] and subsequently with negative direction and when count  $\leq$  preset 3 [to 6]  
 SUB mode output operations:

timed signal at Output 3 [to 6], becomes active with negative

direction and when count  $\leq$  preset 3 [to 6] and subsequently with positive direction and when count  $\geq$  preset 3 [to 6]



ADD mode output operations:  
 timed signal at Output 3 [to 6], becomes passive with positive direction and when count  $\geq$  preset 3 [to 6] and subsequently with negative direction and when count  $\leq$  preset 3 [to 6]

SUB mode output operations:  
 timed signal at Output 3 [to 6], becomes passive with negative direction and when count  $\leq$  preset 3 [to 6] and subsequently with positive direction and when count  $\geq$  preset 3 [to 6]



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



Active:  
 Optocouplers are activated when the preset value is reached.

Passive:  
 Optocoupler disabled when the preset value is reached.

## 7.9 Setting the presets

### 7.9.1 Setting via Decade Keys

In operating mode Preset 2 will be displayed in the lower line, excepted for the output operations AddBat and AddTot.



Press the Prog/Mode key until the preset to be changed is displayed - **PR1, PR2, PR3, PR4, PR5** or **PR6**



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.



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

### 7.9.2 Setting with Teach-In Function



Program the MPI input to **tEAch**



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

Briefly activate the MPI (NPN or PNP input logic)

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



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

### 7.10 Set Function

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



Programme the MPI input to **SEt**



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

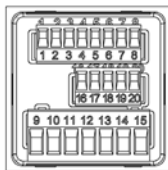
Briefly activate the MPI (NPN or PNP input logic)

- ⇒ 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



### 9.1 Signal and Control Inputs

N°	Designation	Function
1	AC: 24 VDC/80 mA DC: U <sub>B</sub> 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

N°	Designation	Function
9	Collector 1	Output 1
10	Emitter 1	
11	Emitter 2	Output 2
12	Not connected	
13	Collector 2	Supply voltage
14	AC: 90..260 VAC N-DC: 10..30 VDC	
15	AC: 90..260 VAC L-DC: GND (0 VDC)	Supply voltage
16	Common-Emitter	Output 3 to 6
17	Collector 6	Output 6
18	Collector 5	Output 5
19	Collector 4	Output 4
20	Collector 3	Output 3



## 10 Technical Data

### 10.1 General Data

Display	LCD positive or negative, backlight	
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 Operation	> 10 years, EEPROM 8 keys	

### 10.2 Pulse counter

Count frequency max. 50 kHz (see section 13. frequencies typ.)

Response time of the outputs:

Optocouplers	
Add/Sub	< 4 ms
With automatic repeat	< 1 ms
A/B ; (A-B)/A	< 28 ms

### 10.3 Tacho/Frequency meter

Frequency range 0.01 Hz to 50 kHz (see section 13. frequencies typ.)

Measuring principle  
 ≤ 76.3 Hz Time interval (period measurement)  
 > 76.3 Hz Gate time  
 Gate time approx. 13.1 ms

Measuring error < 0.1% per channel

Response time of the outputs:

1-channel operation	< 100 ms @ 40 kHz < 160 ms @ 50 kHz
2-channel operation	< 190 ms @ 40 kHz < 290 ms @ 50 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:

Optocoupler	< 4 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

#### Outputs 1 to 6

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

Outputs 3, 4, 5 and 6 have a common emitter

### 10.7 Supply voltage

AC supply:	90 ... 260 V AC / max. 8 VA 50/ 60 Hz ext. fuse protection: T 0.1 A
DC supply:	10 ... 30 V DC/ max. 1.5 W reverse polarity protection ext. fuse protection T 0.2 A

### 10.8 Sensor supply voltage

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

### 10.9 Climatic Conditions

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

### 10.10 EMC

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

### 10.11 Device safety

Design to:	EN61010 Part 1
Protection Class:	Class 2
Application area:	Souling 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 <sup>+0,6</sup> x 45 <sup>+0,6</sup> mm
Installation depth:	ca. 107 mm incl. terminals
Weight:	ca. 125 g
Protection:	IP 65 (front)
Housing material:	Polycarbonate UL94 V-2
Vibration resistance: (EN60068-2-6):	10 - 55 Hz / 1 mm / XYZ 30 min in each direction
Shock resistance (EN60068-2-27):	100G / XYZ 3 times in each direction
Cleaning:	The front of the unit should only be cleaned using a soft damp (water!) cloth.

## 10.13 Connections

Supply voltage and outputs:

Plug-in screw terminal, 7-pin, RM5.08
Core cross section, max. 2.5 mm <sup>2</sup>
Plug-in screw terminal, 5-pin, RM 3.81
Core cross-section, max. 1.5 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

Preset counter  
Mounting clip  
Instruction manual

## 12 Ordering codes

230 V AC Multicolour, Optocouplers:  
KC-LCDC-48-6T-230VAC

24 V DC Multicolour, Optocouplers:  
KC-LCDC-48-6T-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	AddAr SubAr AddBat	AddTot
Cnt.Dir	55 kHz	1,5 kHz	1,5 kHz
Up.Dn Up.Up	20 kHz	1,5 kHz	1,5 kHz
Quad Quad 2	28 kHz	0,7 kHz	0,7 kHz
Quad 4	10 kHz	0,7 kHz	0,7 kHz
A/B (A-B)/A	29 kHz		

#### 5V level

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

	Add Sub	AddAr SubAr AddBat	AddTot
Cnt.Dir	9 kHz	1,3 kHz	1,6 kHz
Up.Dn Up.Up	9 kHz	1,3 kHz	1,6 kHz
Quad Quad 2	9 kHz	0,5 kHz	0,7 kHz
Quad 4	9 kHz	0,5 kHz	0,7 kHz
A/B (A-B)/A	9 kHz		

### 13.2 Frequency meter

#### HTL level

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

#### 5V level

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

	HTL	5V
A	65 kHz	9 kHz
A - B A + B A / B (A-B)/A	59 kHz	9 kHz
Quad	30 kHz	9 kHz

#### NOTE: Switching levels of the input

Switching levels with AC supply:

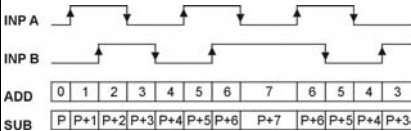
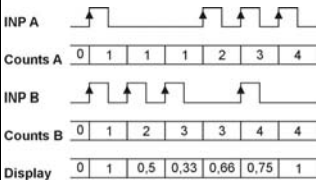
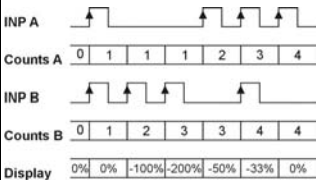
HTL level	Low: 0 .. 4 VDC
	High: 12 .. 30 VDC
5V level	Low: 0 .. 2VDC
	High: 3,5 .. 30 VDC

Switching levels with DC supply:

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

## 14 Input modes: Pulse counting

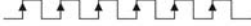

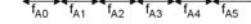
Function	Diagram	PNP: Count on rising edge NPN: Count on falling edge														
Cnt.Dir	<p>Note: No counting when GATE input is active P = Preset</p> <p>INP A </p> <p>INP B </p> <p>ADD <table border="1"><tr><td>0</td><td>1</td><td>2</td><td>1</td><td>0</td><td>-1</td><td>-2</td></tr></table></p>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

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: <table border="1" data-bbox="239 339 712 365"><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> <p>SUB: <table border="1" data-bbox="239 375 712 401"><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></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 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
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: <table border="1" data-bbox="267 564 588 591"><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> <p>INP B: </p> <p>Counts B: <table border="1" data-bbox="267 666 588 693"><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> <p>Display: <table border="1" data-bbox="267 710 588 736"><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></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	Inp A: Count input 1 Inp B: Count input 2  Formula: A / B			
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: <table border="1" data-bbox="267 841 588 867"><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> <p>INP B: </p> <p>Counts B: <table border="1" data-bbox="267 943 588 969"><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> <p>Display: <table border="1" data-bbox="267 987 588 1013"><tr><td>0%</td><td>0%</td><td>-100%</td><td>-200%</td><td>-50%</td><td>-33%</td><td>0%</td></tr></table></p>	0	1	1	1	2	3	4	0	1	2	3	3	4	4	0%	0%	-100%	-200%	-50%	-33%	0%	Inp A: Count input 1 Inp B: Count input 2  Formula: (A - B)/A x100			
0	1	1	1	2	3	4																				
0	1	2	3	3	4	4																				
0%	0%	-100%	-200%	-50%	-33%	0%																				





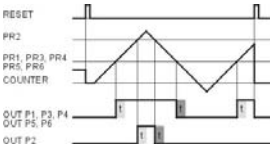
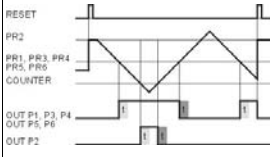
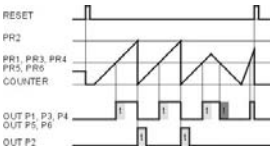
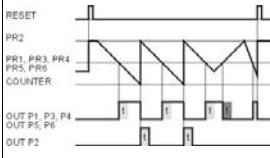
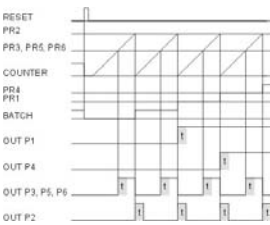
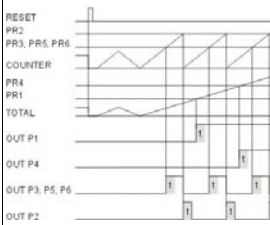
## 15 Input modes: Timing

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>	Inp A: Start Inp B: Stop Add: Display 0 --> Preset Sub: Display Preset -> 0
InB.InB	<p>INP B</p> <p>GATE</p> <p>ADD</p> <p>SUB</p>	Inp A: no function Inp B: Start/Stop Add: Display 0 --> Preset Sub: Display Preset -> 0
FrRun	<p>GATE</p> <p>ADD</p> <p>SUB</p>	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	<p>GATE</p> <p>RESET</p> <p>PRESET</p> <p>ADD</p> <p>SUB</p>	Inp A: no function Inp B: no function Control of the timing via RESET (manual or electrical) Add: Display 0 --> Preset Sub: Display Preset -> 0

## 16 Input modes: Frequency meter

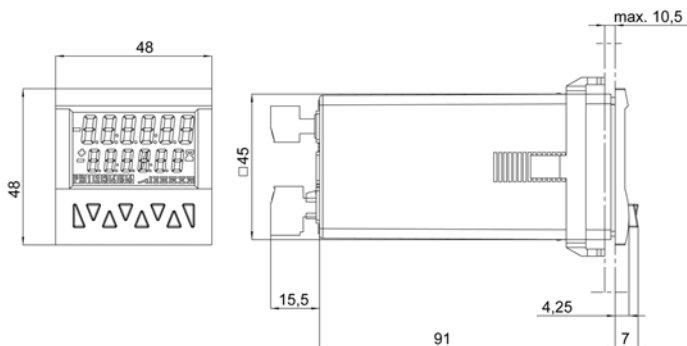
Function	Diagram	PNP: Count on rising edge NPN: Count on falling edge																		
A	<p>INP A <table border="1"><tr><td>0</td><td>F<sub>A0</sub></td><td>F<sub>A1</sub></td><td>F<sub>A2</sub></td><td>0</td><td>x</td></tr></table></p> <p>Display <table border="1"><tr><td>0</td><td>0</td><td>F<sub>A0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

## 17 Output operations

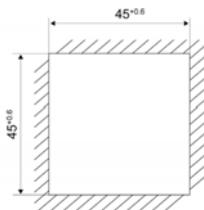
Mode	Diagram	Mode	Diagram
	<p><b>t</b> Only in the mode  and </p>		<p><b>t</b> Additionally in the mode  and </p>
Add		Sub	
AddAr		SubAr	
AddBat		AddTot	



## 18 Dimensional Drawings



Panel cut-out





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