Users guide for PC units
Counter
4- or 6-digit

Contents

1. Brief description

The **PC** display is driven by impulses or a programmable time base, and shows a value proportionate to this on the 7-segment display. The display has two setpoints that can be set to freely parametrizable limit values. *Chapter 7.1* contains an overview of the functions.

2. Safety instructions

Please read the users guide before installation and keep it for future references.

2.1. **Proper use**

The **PC** is determined for recording of impulses and its display.

⚠️ **Danger!** Careless use or improper operation can result in personal injury and/or damage to the equipment.

2.2. **Control of the device**

The devices are checked before dispatch and sent out in perfect condition. Should there be any visible damage, we recommend close examination of the packaging. Please inform the supplier immediately of any damage.

2.3. **Installation**

The **PC** must be installed by a suitably qualified specialist (e.g. with a qualification in industrial electronics) or somebody with comparable qualifications.

2.4. **Notes on installation**

❑ There must be no magnetic or electric fields in the vicinity of the device, e.g. due to transformers, mobile phones or electrostatic discharge.[1]

❑ The fuse rating of the supply voltage should not exceed a value of 6A N.B. fuse.

❑ Do not install inductive consumers (relays, solenoid valves etc.) near the device and suppress any interference with the aid of RC spark extinguishing combinations or free-wheeling diodes.

❑ Keep input, output and supply lines separate from one another and do not lay them parallel with each other. Position go and return lines next to one another. Where possible use twisted pair.

❑ The device is not suitable for installation in areas where there is a risk of explosion.

❑ Any electrical connection deviating from the connection diagram can endanger human life and/or can destroy the equipment.

❑ The unit must not be mounted in the vicinity of direct sunlight.

❑ Do not install several devices immediately above one another (see ambient temperature).[1]

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1 see technical data

3. Assembly

On front of the **PC** are the operating and display elements.
On the sides are the fixing elements to mount the device in the panel.
On the back are the terminals for all the electrical connections.
A sealing strip is inserted between the contact surface of the front collar and the control panel.
The **PC** is intended for installation in a control panel. Before assembly, a cut-out must be made to accommodate the device. The sizes and tolerances are given in the technical data.
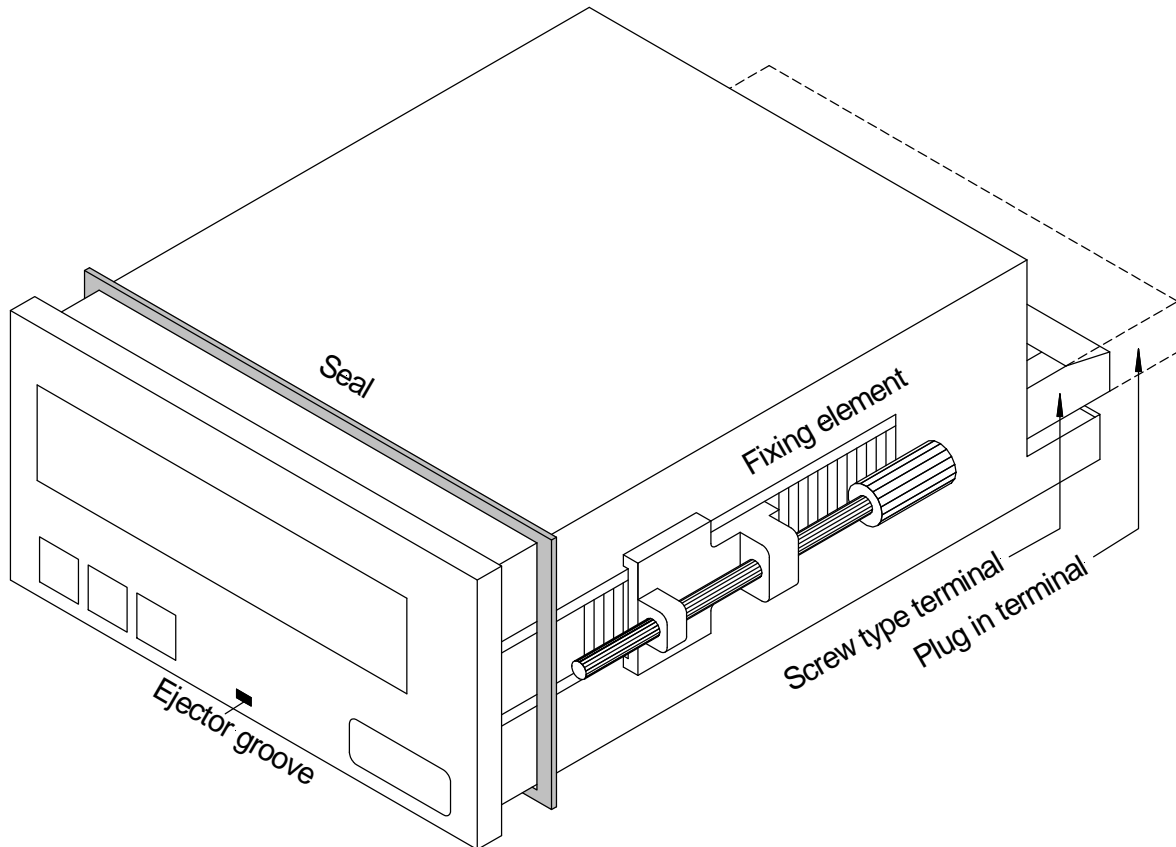
View of the **PC** (model 96 x 48)

3.1. **Installation in the panel cut-out**

I.   Before inserting the unit, the side fixing elements must be pulled off from the rail. Therefor, slightly raise the screw head of the fixing element and pull the fixing element backwards at the same time.

II. Lay the sealing strip around the unit and push it up against the front collar. Then push the unit from the front through the cut-out.

III. Then place the fixing elements into the guide rails from the rear. While doing this, hold the unit from the front securely in the cut-out. Then, using a slotted screw driver, push the fixing elements as far as possible towards the front panel from the rear. Check that the sealing strip is properly positioned between the front collar and the control panel and correct it if necessary.

IV.   Finally secure the device by tightening the screws on the fixing elements until they turn freely. The fixing elements have a slip coupling to prevent any over tightening of the thread; they hold the unit tight with the optimum amount of force.

3.2. **Dismantling**

To remove the unit, follow the same steps as described for assembly in reverse order.

For the version featuring the protective system IP65, a new sealing strip must be used when the unit is replaced.

4. Electrical connection

The electrical connection is made on the back of the unit and depends on the type of unit. All connections for the **PC** are listed below. To determine the correct position for the connecting terminal, compare the interface indicated on the unit with the following table and select the right terminal position for your unit.

4.1. **Connection terminals**

The following table lists terminal positions for the various models.

Terminal	Function	72x24 and 72x36 mm	96x24 and 96x48 mm
1	Input	Impulse	Impulse
2	Reset	State or edge	State or edge
3	NAMUR	Current source for NAMUR	Current source for NAMUR
4	GV	Sensor- / contact supply (12 VDC for 72x36) (externally for 72x24**)	Sensor- / contact supply (24 VDC) (12 VDC for 96x24)
5	Setpoints	Setpoint S1	Setpoint S1
6	Setpoints	Setpoint S1	Setpoint S1
7	Setpoints	Setpoint S2	Setpoint S2
8	Setpoints	Setpoint S2	Setpoint S2
9	Reference	GND	GND
10	Power supply	L− (24 VDC)	
11		L+ (24 VDC)	
10	Sensor supply		0 V (GND)
11			GV
12	NC*		
13	NC*		
14	Power supply		L+ (24 VDC) L (115 VAC) L (230 VAC)
15			L− (24 VDC) N (115 VAC) N (230 VAC)

* = not connected; this terminal must not be connected to any potential
**= housing size 72x24 mm without own sensor supply

The following sections describe the terminal positions based on various examples.

4.1.1. **Input**

The signal to be recorded is connected to this input.

4.1.2. **Reset**

The present counter status can be reset to zero via this input.

4.1.3. **Sensor supply**

The sensor supply is only available for devices in housing sizes of 96x48 mm.
For devices in housing sizes 72x24 see diagrams in the connection examples.

4.1.4. **Power supply**

Depending on the size of the housing, the auxiliary voltage and power supply are connected to different terminals. The 72 mm wide units are connected to terminals 10 and 11, while the units with a width of 96 mm are connected to terminals 14 and 15. It should be pointed out that the 72 mm units are intended only for operation with DC voltage.

4.2. **Connection examples**

Several connection examples are given below as representative of the most common applications.
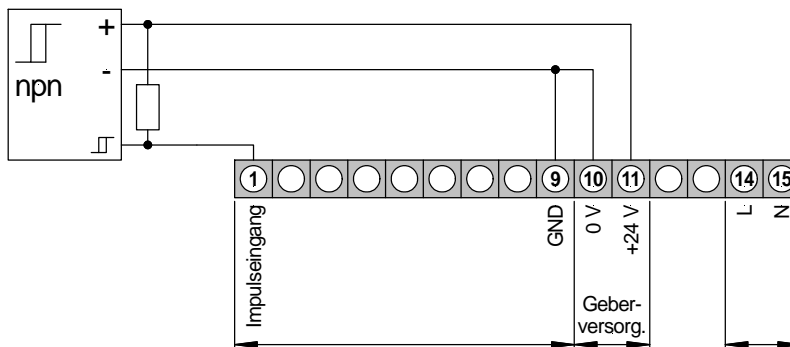
4.2.1. **Connection examples 96x48 mm**

Connection of a mechanical switch
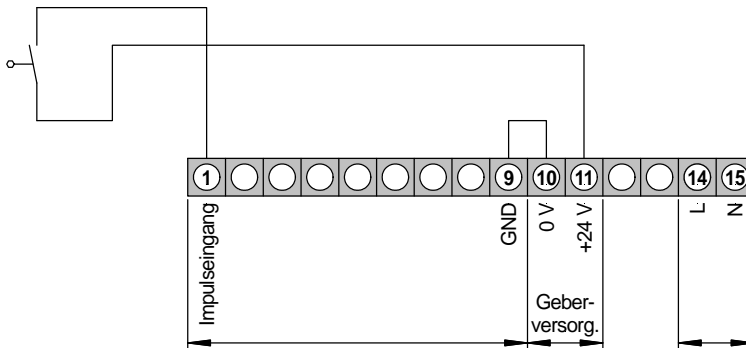
With 115 or 230 VAC supply, the optional sensor supply can be used to feed the sensor.

Connection of an initiator (npn) with external pull-up resistance

Connection of an initiator (pnp) with external pull-down resistance

pnp

| 1 | | | | | | | | 9 | 10 | 11 | | | 14 | 15 |

Impulseingang — GND — 0 V — +24 V — Geber-versorg. — L — N
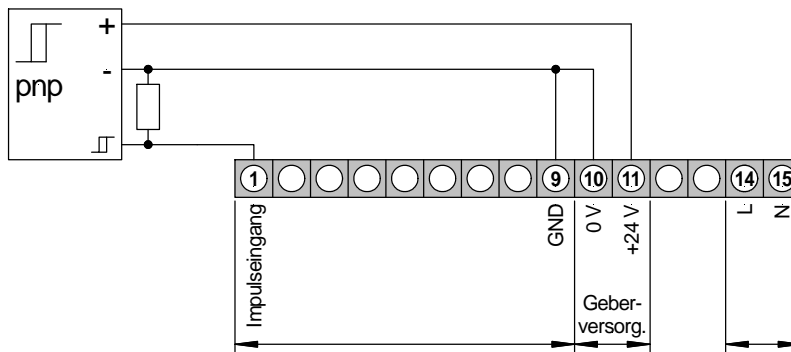
Connection of a NAMUR-sensor

| 1 | | 3 | | | | | | 9 | 10 | 11 | | | 14 | 15 |

Impulse input — Namur — GND — 0 V — +24 V — Sensor supply — L — N
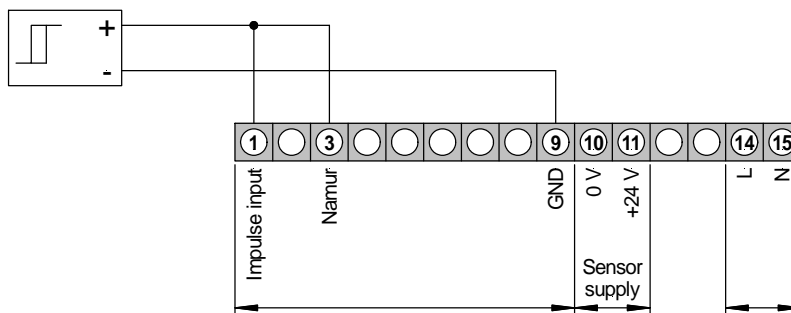
Connection of a reset-button

| 1 | 2 | | | | | | | 9 | 10 | 11 | | | 14 | 15 |
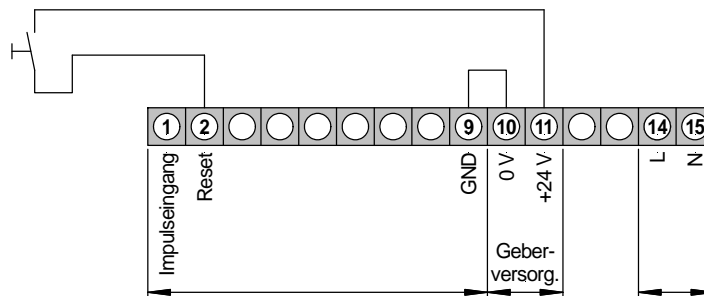
Impulseingang — Reset — GND — 0 V — +24 V — Geber-versorg. — L — N

4.2.2. Connection examples 72x24 mm

Connection of a mechanically switch
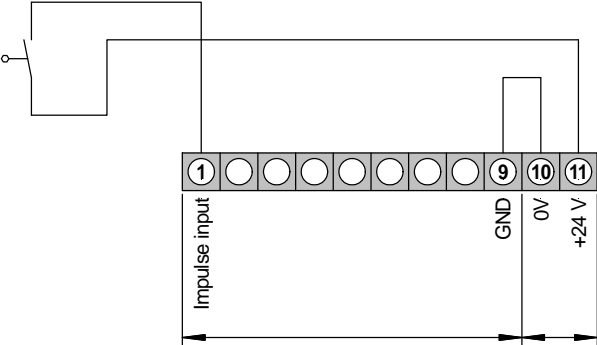
Connection of an initiator (npn) with external pull-up resistor

Connection of namur-sensor

5. Operation

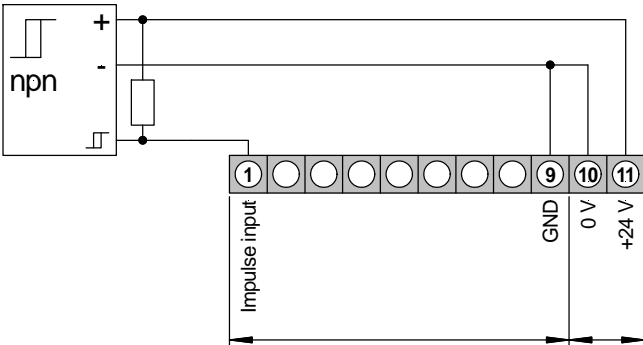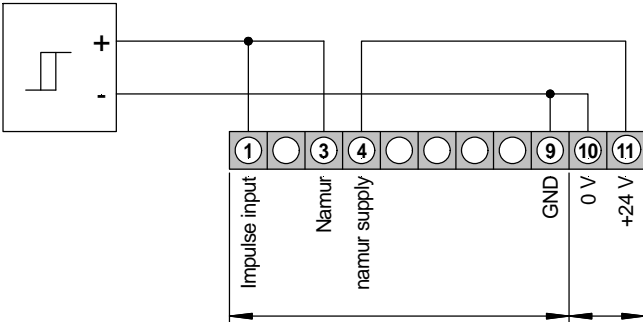The units are configured with two or three keys. Depending on the size of the housing, the unit has a 4- or 6-digit 7-segment display.

5.1. Operating and display elements

Housing size 96x48
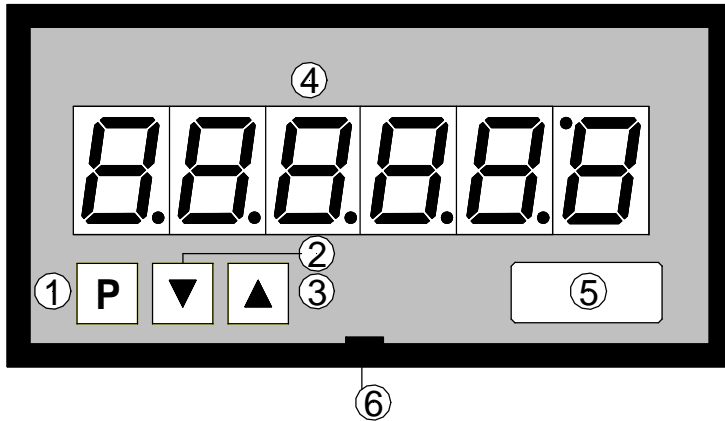
Housing size 72x36
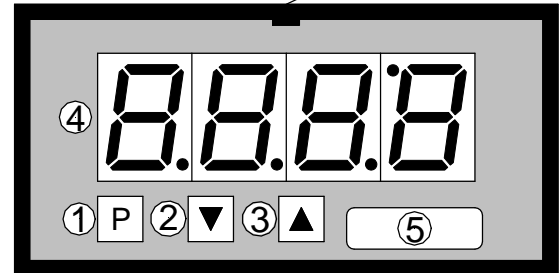
Housing size 96x24
Operation behind the front
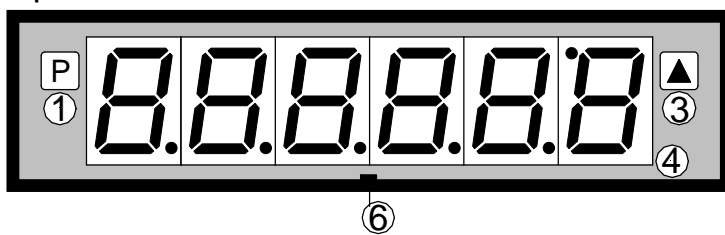
Housing size 72x24
Operation behind the front
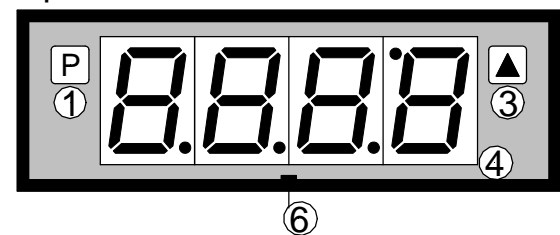
Operating and display elements

1	Program key [P]	With the program key, you can call up the programming mode or perform various functions in the programming mode.
2	Minus key [DOWN]	The minus key is used exclusively in programming mode for setting parameters.
3	Plus key [UP]	The plus key is used in programming mode for setting parameters and also for resetting the counter.
4	7-segment display	The 7-segment display shows either the count status during a counting process or the program numbers or parameters during programming.
5	Dimension window	Here, a physical unit can be inserted. A dimension window can be inserted ex works, but subsequent installation by the user is also possible.
6	Ejector groove	Point for inserting a screw driver

5.2. Levering out the front panel and inserting again

It may be necessary to remove the front of the unit for a short time to make adjustments or insert a dimension window.

I.   To remove the front, use a slotted screwdriver of size 00 or 0.

II.   Insert the screwdriver in the recessed groove as indicated and lever the front out of the front collar of the unit.

III.   To replace it, lay the front flat up against the front cover and press the bottom first, and then the top into the front collar until it audibly clicks into place.

Caution! With units having an IP65 protective system, the front must not be removed. Removing the front will permanently damage the seal.

5.3. Inserting a dimension window

A dimension window can only be inserted with models having front dimensions 72x36 and 96x48 mm.

I.   Remove the front panel from the housing as described above.

II.   On the back of the front panel is a slit near to the outer edge in which the dimension window must be inserted.

6. Programming

This section deals with the programming and parameterisation of the **PC**. It also describes the special features and effects of the individual parameters of the program numbers.

The diagrams are always depicted here with 4 characters. The relevant keys are shown below the display, although they are positioned differently on the actual device. You can check the position and function of the keys in *Chapter 5*.

In the display, the program numbers (PN) are shown, right-justified, as a 3-digit number with a **P** in front of them.
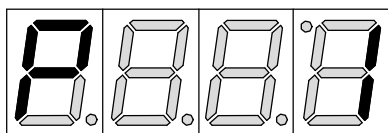
Display of e.g. program number 1

6.1. **Programming procedure**

The entire programming of the **PC** is done by the steps described below.

Change to programming mode

Pushing the [P] key changes to programming mode. The unit goes to the lowest available program number. If the programming lock is activated, the key must be pushed for at least 1 second.
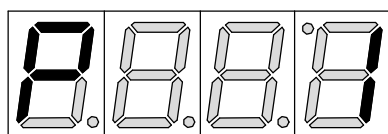
Example:
Change to programming mode by pushing key [P]. The first released program number (PN) appears, in this case PN1.

Change to other program numbers

To change between individual program numbers, hold the [P] key down and push the [UP] key for changing to a higher program number or the [DOWN] key for changing to a lower number. By keeping the keys pushed, e.g. [P] & [UP], the display will begin, after approx. 1 second, to automatically run through the program numbers.
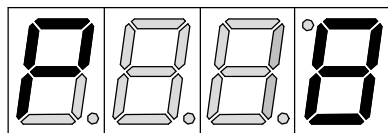
Example:
A 0 is parameterised under PN8.
Keep the [P] key pushed and push the [UP] key several times. PN8 appears in the display. Under this parameter, the starting value of the counter can be set.

Change to the parameters set

Once the program number appears in the display, you can push the [DOWN] or [UP] key to get to the parameters set for this program number. The currently stored parameters are displayed.
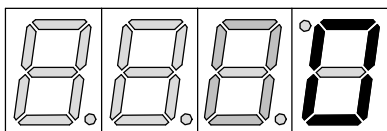
Example:
By pushing the [DOWN] or [UP] key, the currently stored value for PN8 appears in the display. In this case, it is 0.

Changing a parameter

After changing to the parameter, the lowest digit of the respective parameter flashes on the display. The value can be changed with the [UP] or [DOWN] key. To move to the next digit, the [P] key must be briefly pushed. Once the highest digit has been set and confirmed with [P], the lowest digit will begin to flash again.
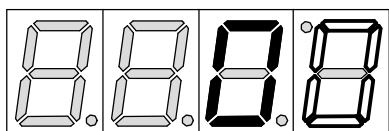
Example:
The 0 is flashing this is the lowest digit and asks if you want to change it. Let us assume the figure is to be changed from 0 to 60.
Briefly push the [P] key to move to the next digit.
The 0 begins to flash. Change the figure by pushing [UP] or [DOWN] to change the digit from 0 to 6. Briefly push the [P] key to move on to the next digit. The 0 does not need to be changed. If the maximum value for the particular position has been reached, it will jump back to zero.

Saving parameters

All parameters must be acknowledged by the user by pushing the [P] key for one second. The changed parameters are then taken over as the current operating parameters and saved in the EEPROM.
This is confirmed by horizontal bars lighting up in the display.
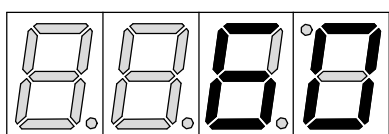
Example:
Save the parameters by pushing [P] for 1 second. All the newly entered data are confirmed by the unit. If no confirmation is received, the relevant parameters have not been saved.
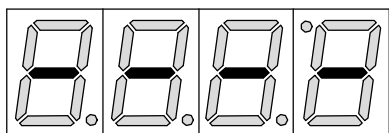
Example:
You receive confirmation from the unit that the changes have been saved through the appearance of horizontal bars in the middle segments.

Changing from programming to operating mode

If no key is pushed in the programming mode for about 7 seconds, the unit will return automatically into the operating mode.

7. Software

7.1. Range of functions

♦ one chanel counter
♦ operating hour counter via 10 ms-, 100 ms-, 1 s- time base
♦ selectable slope (forward / backward)
♦ The count is saved cyclically and also in the event of a power failure
♦ factorisation (multiplicator / divisor / floating point)
♦ forward- / backward counting with definable start value
♦ 2 setpoints on display values
♦ parametrizable drop-out delay after a breach of the limit value
♦ frequency division via switch outputs
♦ decimal point can be freely positioned
♦ static or dynamic counter reset on keyboard stroke and / or reset input
♦ adjustable reset source (keystroke, reset input, limit value)
♦ debouncing for mechanical contacts (connectable 30 Hz-filter)
♦ connectable basic devider for impulse recording (1/100 impulse devider)
♦ programming lock
♦ upper counter frequency limit 10 kHz
♦ optionally 4/6 digits

7.2. Switching on

After switching on, a segment test "8.8.8.8" is carried out and then the name of the software version is displayed.

7.3. Help

On switching on, the content of the EEPROMS is checked on the basis of the stored test sum and, if there is an error, HELP is shown in the display. This error can only be overcome by making a reset to the factory parameters, for which the program key must be held down during start-up of the unit.

7.4. Overflow

For the counter to 'overflow' (forward counting), all segments with a "9" must be triggered, whereby the parameterised decimal point is retained. During an overflow, the display flashes. The error can be erased via a counter reset, which can be initiated by the parameterisable input or a configuration change.

7.5. Underflow

If a backward counter is being made and the value on the counter falls below zero, all the display segments will flash with a "0". This is an underflow. It must be assumed that no negative values should occur. For the set points, a zero must be parameterisable as the switch limit value.

7.6. Forward / backward counter

The counter can be parameterised as a forward or backward counter. A starting value can also be defined. When counting forwards, the display value will go up by the increment parameterised under PN3/4, and when counting backwards, subtracted as the decrement.

7.7. **Prescaler function 1/1000**

If program number 3 is programmed to "multiply by 1/1000", a floating point value can be added via the impulse number. The value relates to the digits in the display without any reference to the decimal point setting PN5. With this process, carry-overs can occur. When this happens, the display will always round them up. The calculated display value then also serves as the reference for the thresholds!

This function only has only has a limited amount of number space. This means that premature overflow can occur. The limit value (G) for the number of impulses can be derived from the following formula:

$$G = 2^{32 - \frac{\log(PN4)}{\log 2}}$$

8. Program table

The program table lists all the program numbers (PN) with their function, range of values, default values and user level.

PN	Description	Range of settings	Default
1	Polarity of the inputs (0 = rising / npn ; 1 = falling / pnp)	0 / 1	0
2	Mode of operation of the counter 0 = normal pulse counter without filter 1 = damping to 30 Hz 2 = 1/100 – pre-divider 3 = counter increment every 10 ms 4 = counter increment every 100 ms 5 = counter increment every 1 second	0 / 1 / 2 / 3 / 4 / 5	0
3	Prescaler function 0 = multiplying 1 = dividing 2 = 1/1000 multiplying (rounded)	0 / 1 / 2	0
4	Prescaler factor	1...9999 (99)	1
5	Decimal point setting	000000...0.00000	none
6	Reset mode to starting value 0 = none; 1 = key reset ([UP]-key) 2 = input reset 3 = key or input reset 4 = reset via limit value 5 = limit value or key reset 6 = limit value or input reset 7 = all possible reset sources	0 / 1 / 2 / 3 / 4 / 5 / 6 / 7	3
7	Reset treatment 0 = static 1 = slope-triggered 2 = Debouncing (Push reset signal at least 0.5s)	0 / 1	0
8	Starting value of the counter (scaled)	0000...max.	0
9	Count direction of 0 = forward counter 1 = backward counter	0 / 1	0
10	Limit value for the counter reset	0000...max.	1000
50	Authorisation code	0000...9999	0000
51	Preset authorisation code	0000...9999	0000
60	Limit value function setpoint 1 0 = no limit value monitoring 1 = simple limit value monitoring 2 = cyclical limit value switch	0 / 1 / 2	0
61	Limit value threshold or cycle value (given as scaled value)	0000...max.	0
62	Drop-out time in ms (depending on mode of operation)	0...100	0
63	Mode of operation (0 = closed circuit; 1 = open circuit)	0 / 1	1

PN	Description	Range of settings	Default
70	Limit value function setpoint 2 0 = no limit value monitoring 1 = simple limit value monitoring 2 = cyclical limit value switching	0 / 1 / 2	0
71	Limit value threshold or cycle value (indicated as calculated value)	0000...max.	0
72	Drop-out time in ms (depending on mode of operation)	0...100	0
73	Mode of operation (0 = closed circuit; 1 = open circuit)	0 / 1	1

8.1. pnp/npn logics PN1

With this parameter, the slope is defined on which the device classifies a level as logical 1 at the inputs. This setting is valid globally for all inputs.
pnp: classifies a logical 1 for a switch from 0 to 24 V
npn: classifies a logical 0 for a switch from 24 to 0 V

8.2. Mode of operation of the counter PN2

The counter supports a number of operating modes. With PN2 = 0, a simple impulse count is made. The counter responds with its maximum reaction speed. When PN2 = 1 is chosen, an input filter of 30 Hz is put in place, i.e. frequencies above 30 Hz are not counted. This makes it possible to debounce mechanical contacts, because, in the bouncing phase, a higher frequency than 30 Hz occurs. Where PN2 = 2, a 1/100 pre-divider can be switched on. This divides the counting signal by 100 before processing. This must be taken into account in particular with prescaler function PM3/4! When PN 2 = 3 is selected, the counter can be used as a time counter, moving on one place every 10 ms. This can be processed like an impulse counter value via PN3/4. The actual counting input serves as a gate element. Depending on the preset logics PN1, the counter is stopped on the counting input at a logical 1 (PN 1 = 0) or logical 0 (PN 1 = 1). Where PN2 = 4 or 5, only the time basis for the counter increment is changed.

8.3. Prescaler function PN3

This function is used to stipulate how the value set under PN4 is considered in the calculation of the displayed result. It can either be used as a multiplier, which results, for example, in 5 display units being added to the display for each impulse, or it can be used as a divisor, in which case, e.g. after every 5 impulses, the display moves on 1.
With the function "multiply by 1/1000", the set value is added on with each impulse. The result is always related to the last digit (unit position) of the display, i.e. if PN4 is set at 20, the units position moves up one digit after 50 impulses. With scaling, the figure is always rounded up, so that, on counting forwards, the first impulse after the counter reset always triggers one display increment even if a 1 is programmed under PN4.

8.4. Prescaler factor PN4

The prescaler factor is a number with which every input impulse or time unit is weighted before being included in the displayed value. The range of settings is restricted 1...9999.

8.5. Decimal point PN5

The decimal point can be freely parameterised, depending on the number of digits in the display, from 0 to 7 places after the decimal point.

8.6. Reset mode PN6

With the reset mode, the parameter for the event that is to return the counter to the starting value can be entered. Possible sources are the reset input, the UP key or the limit value PN10.

8.7. Reset treatment PN7

With this program number, the treatment of the reset signal is fixed. With a static evaluation, the counter is kept at 0 for the duration of the event. With an evaluation of the slope, the unit responds to the relevant slope change by returning the counter to 0 and the count is immediately continued. By debouncing, the reset signal needs to be pushed for at least 0.5s, so the counter value will change to the starting value.

8.8. Starting value PN8

Here, the value is defined at which the counter springs back in the case of a reset.

8.9. Counting direction PN9

The counting direction defines whether the counter counts up from the starting value (forward counter) or down (backward counter).

8.10. Limit value for counter reset PN10

Under this program number, the limit value is entered at which, with forward counting, the counter is set at the starting value on exceeding the respective limit value or, with backward counting, on falling below the given value. Parameterisation must also be carried out under PN6 or 7.

8.11. Authorisation code PN50

Here, the authorisation code for programming is entered. The value of PN50 must correspond to the value of PN51.

8.12. Preset authorisation code PN51

Here, the code must be entered that is needed under PN50 to gain authorisation for programming.

8.13. **Limit value function of the setpoints PN60/70**

The setpoints have 3 types of functions. Firstly, the setpoints can be deactivated via PN60/70 = 0. Secondly, with PN60/70 = 1, a simple limit value function can be performed in which the digital output is switched on or off when the limit value PN61/71 is exceeded (depending on the set mode of operation in PN63/73). Thirdly, with the cyclical limit value switching (PN60/70=2), the limit value is raised by the value set under PN61/71 when it is reached. This enables an impulse division to be attained.

8.14. **Limit value threshold of the setpoints PN61/71**

This indicates the threshold for the simple limit value monitoring (PN60/70 = 1), which brings about a switching of the respective output. In the case of cyclical limit value switching (PN60/70 = 2), when the current limit value is reached, it is raised by the threshold value set here. As a result of this, the breaching of the limit value is annulled, the setpoint for the drop out time (PN62/72) is activated. If PN62/72 is set to 100, an impulse is emitted every time the display shows a value that can be divided exactly by 100, in other words, an output impulse is generated whenever the display shows 100, 200, 300...1300, 1400...

8.15. **Drop out time of the setpoints PN62/72**

The drop out time defines the earliest time that the breach of the limit value should be withdrawn. Should the breach of the limit value last longer than the drop out time given here, the output will be reset as soon as the value falls below the threshold value. With the open-circuit principle, it should be borne in mind that the output is switched off with a delay and, with the closed-circuit principle, switched on with a delay.

8.16. **Mode of operation of the setpoints PN63/73**

The mode of operation governs whether the output is switched on (open-circuit principle = operating current) or off (closed-circuit principle = idle current) when the limit value is exceeded.

9. Technical Data

Housing

Dimensions	72 x 24 x 103 mm (WxHxD) including screw terminal
	72 x 24 x 115 mm (WxHxD) including plug in terminal
	$68.0\ ^{+0.7}$ x $22.0^{+0.6}$ mm / assembly cut out
	72 x 36 x 103 mm (WxHxD) including screw terminal
	72 x 36 x 115 mm (WxHxD) including plug in terminal
	$68.0^{+0.7}$ x $33.0^{+0.6}$ mm / assembly cut out
	96 x 24 x 134 mm (WxHxD) including screw terminal
	96 x 24 x 148 mm (WxHxD) including plug in terminal
	$92.0\ ^{+0.8}$ x $22.0^{+0.6}$ mm / assembly cut out
	96 x 48 x 134 mm (WxHxD) including screw terminal
	96 x 48 x 148 mm (WxHxD) including plug in terminal
	$92.0\ ^{+0.8}$ x $45.0^{+0.6}$ mm / assembly cut out

Weight (72x24)	approx. 120 g
Weight (72x36)	approx. 140 g
Weight (96x24)	approx. 250 g
Weight (96x48)	approx. 390 g

Wall thickness	0...50 mm
Fixing	snap in screw element
Material	PC/ABS-plastics blend, black, UL94V-0
Protective system	standard IP54, optional IP65 (front), IP00 (back)
	protection IP65 only with 72x36 and 96x48 mm
Connection	screw-/plug-in terminal; line cross section up to 2.5 mm^2

Display

Digit height	14 mm
Segment colour	red
No. of digits	4 or 6

Input

Impulse rate	10000 impulses/s max.
	30 impulses/s with active damping
Input resistance	approx. 10 kOhm
Input voltage	$\pm5...24$ V
HIGH- / LOW-level	> 6 V / < 4 V
NAMUR supply	1,5 mA

Output

Sensor supply (galvanic insulated)	24 VDC 15 mA (housing size 96x48 mm)
(not galvanic insulated)	12 VDC 15 mA (housing size 96x24 mm and 72x36)

Setpoints

| | 30 VAC / 0.4 A – 30 VDC / 0.4 A |
| PhotoMos | input/output dielectric strength 100 VAC |

Power supply

Supply voltage	230 VAC / 50/60 Hz / $\pm$10 %
(galvanic insulated)	115 VAC / 50/60 Hz / $\pm$10 %
	24 VDC / $\pm$10 %
Power consumption	max. 5 VA

Memory   Parameter memory EEPROM
Data life   >30 years

Ambient conditions

Working temperature	0...60 °C
Storing temperature	-20...80 °C
Climate resistance	rel. humidity $\leq$75 % on year average without dew
EMV	EN61326-1 (1997) A1, A2
CE-sign	conformity to 89/336/EWG

Safety standard   EN61010-1 (1998) A1, A2

10. Memo

Memos

Memos

Memos