



# SERIE CRISTAL

COUNTER  
LCD

## DELTA-H

INSTRUCTIONS MANUAL

Code: 30727178  
Edition: December 2002



**DELTA-H**  
**English**

## General information

Please find below the explanation to the symbols used in the following operating instructions.

- ➡ This symbol induces actions.
- This symbol refers to additional technical information.



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This symbol is placed in front of text passages that have to be particularly observed to ensure the correct use of the DELTA-D.

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This symbol is placed in front of text passages that supply further important information.

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*italic*

Important terms are written in *italics* on the left for quick reference purposes

# DELTA-H

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## 1 SAFETY INDICATIONS

The electronic counter, controller and monitor has been designed to the latest state of the art.

Use the instrument only:

- In an absolutely correct technical state,
- For the intended purpose,
- Being conscious of relevant safety and danger, observe the operating instructions

### *Intended purpose*

The instrument is to be used only indoors as built-in model for industrial processes and controls on production lines of the metal, wood plastic, paper, glass and textile industries and similar; overvoltage exerted on the terminals of the instrument must be limited to the voltages of category II.

Description of the overvoltage category under DIN VDE 0110, part2.

The instrument may only be operated in a correctly mounted state.

The instrument may only be operated as described under chapter "Technical data"



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The instrument may not be used in hazardous areas, for medical apparatus, nor for applications expressly declared under EN 61010. If the instrument is to be used to control machines or processes, where the machine could be damaged or the operator could be injured due to a breakdown of the instrument or to a failure in operation, then relevant safety precautions will need to be taken

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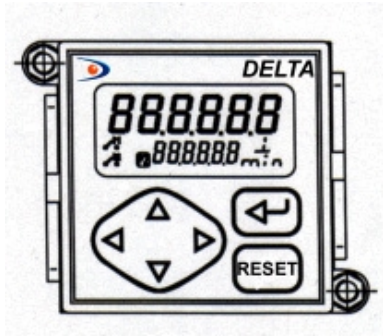
### *Organizational measures*

Make sure that your personel has read and understood the operating instructions, especially the chapter "Safety indications".

In addition to the operating instructions, please make sure that generally applicable legal and other mandatory regulations relevant to accident prevention and enviroment protection are observed.

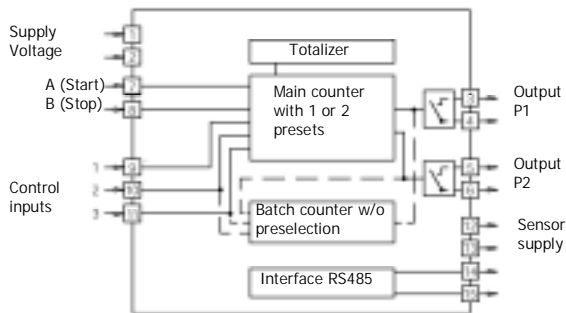
In the event of safety-relevant modifications (including those in the behavior of the instrument during operation), immediately stop operation of the instrument

<i>Installation</i>	<p>installation may only be effected as described under the chapter "Connection".</p> <p>During installation work, take care to cut off the power supply of the instrument.</p> <p>Installations may only be effected by skilled expert</p> <p>Prior to initial operation of the instrument, please control voltage selection. Set the switch to the required AC voltage.</p> <p>During the installation make sure that supply voltage and connection of the output contacts are provided from the same MAINS phase.</p> <p>Max. voltage 250 V Terminal - Terminal, Earth – Terminal.</p>
<i>Initial operation</i>	The instrument is ready for use after it has been correctly mounted and installed.
<i>Maintenance / Servicing</i>	Cut off power supply of all connected machinery.
<i>Trouble shooting</i>	These tasks may only be effected by a skilled expert. In case of unsuccessful trouble shooting, you must absolutely interrupt use of instrument and contact your dealer.
<i>Getting acquainted</i>	After successful initial operation, get acquainted with the handling of your instrument by studying the chapter "Get to know your DELTA-H".



## 2.2 Block diagram of the DELTA-H

The block diagram shows the components of the DELTA-H together with its contacts and connections



## 2 GET TO KNOW YOUR DELTA-H

### 2.1 DELTA-H components

- A 6-digit operating time meter (principal counter) with 1 or 2 settings.
- An 8-digit totalizer (counts in parallel to principal counter)
- An 6-digit batch counter with 1 or without preselection

### LCD-Display

Current count

P1 Preselection 1

P2 Preselection 2

Control state of preselection 1

Control state of preselection 2

tot Totalizer

b Batch counter

Measuring units h, min, s



Shift key for display of functions confirmation key



Reset



Key to select HIGHER decades



Key to select decades to the RIGHT



Key to select decades to the LEFT



Key to select LOWER decades

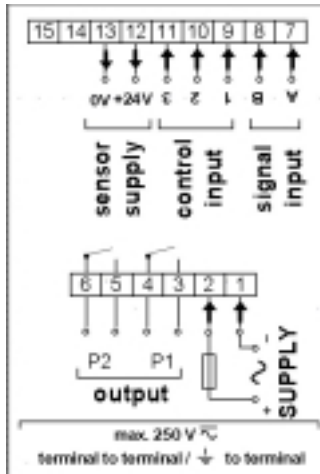
### 3 DELTA-H connection

This chapter will explain how the contacts are assigned and give you some examples of connection.

Under chapters 3.1 to 3.6, you will find actual tips and technical data for the various connections

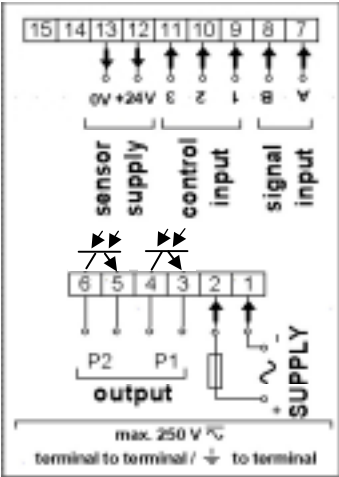
Assignment

#### Model with relay outputs



Contact	Function
1	Supply voltage
2	Supply voltage
3	Relay output P1
4	Relay output P1
5	Relay output P2
6	Relay output P2
7	Signal input A (start)
8	Signal input B
9	Control input 1 (Reset contador principal)
10	Control input 2 (Stop)
11	Control input 3 (Reset Total)
12	Encoder supply + 10... 26 V
13	Encoder supply 0V
14	RS485 output (T,R-)
15	RS485 output (T,R+)

Model with electronic outputs



Contacto	Función
1	Supply voltage
2	Supply voltage
3	Output P1
4	Output P1
5	Output P2
6	Output P2
7	Signal input A (Start)
8	Signal input B
9	Control input 1 (Reset contador principal)
10	Control input 2 (Stop)
11	Control input 3 (Reset Total)
12	Encoder supply + 10... 26 V
13	Encoder supply 0V
14	RS485 output (T,R-)
15	RS485 output (T,R+)

Litz contact only by means of connector sleeves with insulating enclosure for reasons of shock protection according to EN 61010. Do not otherwise assign contacts that have been left unassigned ex factory.

We recommend to screen all encoder terminal leads and to ground the shield on one side. Shields on both sides are recommended in case of RF interference or in case of equipotential bonding.

The encoder leads should not be in the same phase winding as the MAINS supply and the output contact leads.



### 3.1 Supply voltage connection

- AC connection      It is possible to choose two different AC voltages by using the selector on the side. The respectively higher voltage ( 48 V AC ó 230 V AC) is preset at the factory.
- Switch to the required AC voltage using the selector.
  - Connect AC at the contacts 1 and 2 according to the DELTA-D terminal diagram

#### Supply voltage

#### Recommended external protection

24 VAC $\pm 10\%$ 50/60 Hz	M 400 mA
48 VAC $\pm 10\%$ 50/60 Hz	M 200 mA
115 VAC $\pm 10\%$ 50/60 Hz	M 100 mA
230 VAC $\pm 10\%$ 50/60 Hz	M 50 mA

- DC connection      Connect interference-free supply voltage. Therefore, do not use supply voltage for parallel supply drives, contactors, electromagnetic valves, etc.

- Connect DC according to the DELTA-D diagram.

Supply range 12 ... 30 V DC  $\pm 10\%$ , max. 5 % residual ripple.

Recommended external protection M 400 mA

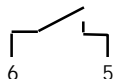


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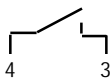
Fire protection: Operate instrument on the MAINS with external fuse recommended on the rating plate. In case of disturbance, make sure that 8A / 150 VA (W) are never exceeded as defined under EN 61010.

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Contact P2



Contact P1



### 3.2 Assignment of signal outputs "Relay contacts"

The signal outputs (contacts 3,4 and 5,6) are floating relay contacts. The signal outputs can be assigned as per the adjacent terminal diagram.

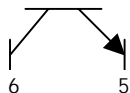
Their function, as normally open or closed, is selected in programming line 40.

max. rating	max. Voltage	max. Current
150 VA / 30 W	250 V	1 A

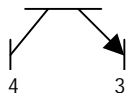
The user must take care that, in case of disturbance, the contact rating of 8 A / 150 VA (W) is not exceeded.

Internal spark suppression by means of zinc-oxide varistor (275V). The output relays of the instrument ( 1 relay or several) may in total switch 5 x per minute at the most. Admissible clicks according to interference suppression standard EN 55011, EN 50081-2 for the industrial sector. In case of higher switching rate, the operator will be responsible to take care of local interference suppression in consideration of the contact rating.

Output P2



Output P1



### 3.3 Assignment of signal outputs "electronic"

The electronic outputs ( contacts 3,4 and 5,6) are optocoupler outputs. The signal outputs can be assigned as per the adjacent terminal diagram.

Their function, as normally open or closed, is selected in programming line 40.

Max. Voltage	max. Current	max. Residual voltage
+ 40 V DC	25 mA	< 1 V @ 25 mA

The electronic outputs are not short-circuit-proof.

### Choice of PNP or NPN

## 3.4 Assignment of signal inputs

The contacts 7 to 11 are comparator signal inputs. They can be triggered either by PNP or NPN encoders. The input logic as well as the operating threshold are correspondingly chosen in programming line 33. The function of the signal inputs A and B (time start and stop signal) are determined in programming line 30.




The contacts 9, 10 and 11 are control inputs for Reset, Stop, Hold, Programming Disabled, Keylock, Batch counter input, etc. The function of these control inputs is selected in the programming lines 34, 36 and 37.

The minimum pulse duration of control input 1 can be switched in programming line 35 from 30 ms to 100  $\mu$ s.

For control inputs 2 and 3, 30 ms are generally valid.

Input resistance	Selectable operating threshold
Ca. 3 kOhm	3 V and 6 V

### 3.4.1 Examples of connection

Encoder	DELTA-H Contact assignment	Programming
<i>Contact</i>		Signal inputs: Line 30 to 0, 1 or 2
<i>Proximity switch</i> <i>PNP or NPN</i>		Input logic: Line 33 to 0 = PNP Line 33 to 1 = NPN
<i>NAMUR</i> <i>Without explosion prttection</i>		Input logic: Line 33 to 1 = NPN

### 3.5 Encoder supply connection



Connect encoder supply for rotary encoder, proximity switch, etc. to the contacts 12 and 13. However, do not use encoder supply for unearthed inductors or capacitive loads.

The encoder supply is not short-circuit-proof.

Contact	Voltage	Máx. admissible current
12	10 ... 26 V DC	60 mA
13	0 V	

### 3.6 Interface connection

The serial interface can perform the following functions:

- Retrieve data
- Program parameters

Interface parameters are:

- Transmission speed (Baud rate),
- Parity bit,
- Number of stop bits,
- Address of controller for master.

The interface parameters can be set on the programming level (Lines 51 to 54).

#### RS485

Half-duplex transmission with the following features:

- Symmetrical
- 2 lines
- Multi-point connection – emitter and receiver (max. 32 units)
- Maximum distance of data transmission: 1500m

➡ Assign contacts 14 (T,R-) and 15 (T,R+) accordingly.

## 4 DELTA-H OPERATION

The following chapter will inform you on the operation of your DELTA-H.

- The DELTA-H is automatically on the operator level after the supply voltage has been turned on.

On the operator level it is possible:

- To read and, if necessary, clear the current count;
  - To read and, if necessary, modify the preselections P1 and P2;
  - To read and, if necessary, clear the totalizer;
  - To read and, if necessary clear the batch counter;
- It is possible to disable all operator parameters on the programming level (Lines 11-16)

### **The keys and their function**

#### *Parameter reading*

Select the enabled parameters via the key ↑ or ↓.

The key ↵ allows to switch to the next operation parameter.

For quick sweep, keep this key depressed.

#### *Resetting of counts*

1. Display count of respective parameter.
2. Push C.

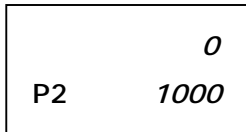
#### *Setting of parameters*

1. Display parameter.
2. Push ← or →; and select required decade; chosen decade position blinks.
3. Push ↑ or ↓ and enter required value.  
To set further decades, repeat steps 2 and 3.
4. Confirm the parameter entered with ↵.  
Should no confirmation be given within 15 s, the previous setting will remain valid.

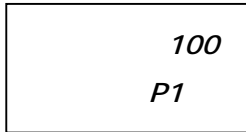
## Current count

The upper display indicates the current count.

The lower display indicates preselection P2 or a parameter of your choice in programming line 27.



*Read* Read count and, for example, preselection P2.



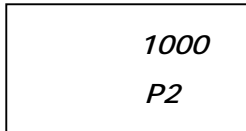
## Preselection P1

*Read* Push ↓ or ↵

The preselection value P1 is displayed.

The lower display indicates "P1"

*Modify* Enter preselection P1 via the keys ← → ↓ ↑  
Push ↵.



## Preselection P2

*Read* Push ↓ or ↵

The preselection value P2 is displayed.

The lower display indicates "P2"

*Modify* Enter preselection P2 via the keys ← → ↓ ↑  
Push ↵.

### Totalizer tot

*Read* Push ↓ or ↵

The totalizer tot is displayed

The lower display indicates "tot"

<i>H</i>	<i>99</i>
	<i>tot</i>

If the value 999999 is exceeded, its display will be shown in two steps:

First step: Display of the first 6 digits

Second step, marked by an H: Display of the seventh and eighth digits.

Display of each value for ca. 3 seconds.

<i>999999</i>
<i>tot</i>

*Clear* Push C

### Batch counter b

*Read* Push ↓ or ↵.

The batch counter b is displayed

The lower display indicates "b"

<i>0</i>
<i>b</i>

*Clear* Push Reset.

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## 5 PROGRAMMING DELTA-H

This chapter will inform you on how to program your DELTA-H.

### *Programming level*

Operation parameters are set on the programming level.  
The programming level consists of 3 programming fields.  
Access is protected by a 4-digit code or via a control input.

### *1<sup>st</sup> programming field*

Here it is possible to select and modify all operation parameters.  
The operation parameters that are disabled for the operator are also displayed.

### *2<sup>nd</sup> programming field*

The individual operation parameters for operator access are disabled or enabled here.

### *3<sup>rd</sup> programming field*

All functions and values as well as interface parameters conditioned by the machinery are programmed here.

## THE KEYS AND THEIR FUNCTION

### *Turn on programming*

Push  $\uparrow$  y  $\downarrow$  simultaneously.  
"Code" appears on the lower display.



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No code number has yet been set at the factory, therefore it is possible to skip the code query by pushing  $\downarrow$ .

The code is set on programming line 50.

**After a code has been set, it will only be possible to switch to the programming level by entering the correct code.**

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<i>Enter code</i>	Enter code via the keys ← → ↓ ↑. Push ↵ to confirm. The instrument switches from the operator level to the programming level.
<i>Wrong code</i>	If a wrong code has been entered, "Error" is displayed as long as ↵ remains pushed . After 15 s the instrument switches automatically back to the operator level.
<i>Correct code unknown</i>	If the correct code is not know, please return the counter to the supplier or Effect reset to factory setting.
<i>Select programming lines</i>	Select the programming line needed via the keys ↓ ↑. This function can also be reached by pushing ↵. The line number is displayed.
<i>Modify operation parameters</i>	Select the decade to be changed via the keys ← →. The selected decade blinks. Enter the value by pushing the keys ↓ ↑. Push ↵ .
<i>Leaving programming</i>	It is possible to shut down the programming at any time by pushing ↑ and ↵ simultaneously.
<i>Reset to factory setting</i>	Turn on instrument and press the keys ← and ↵ simultaneously. All values already programmed are set back to the factory setting. "Clr Pro" briefly appears on the display.

### Programming field 1

Here it is possible to select and modify all operation parameters.  
The operation parameters that are disabled for the operator are also displayed.

<i>Line 1</i>	<i>0</i>
<i>1</i>	<i>Ph</i>

**Ph – Operating time meter** (Principal counter)

<i>Line 2</i>	<i>100</i>
<i>2</i>	<i>P1</i>

**P1 – Preselection 1**

<i>Line 3</i>	<i>1000</i>
<i>3</i>	<i>P2</i>

**P2 – Preselection 2**

<i>Line 5</i>	<i>0</i>
<i>5</i>	<i>tot</i>

**tot – Totalizer**

<i>Line 6</i>	<i>0</i>
<i>6</i>	<i>b</i>

**b –Batch counter**

<i>- - - - -</i>
------------------

The dash line indicates the end of the first programming field.  
Switch to programming field 2 by pushing ↓ or ↵.

**Programming field 2** The individual operation parameters for operator acces are disabled or enabled here.  
**StAt** appears on the upper display. The lower display indicates the line number and the abbreviation for the operation parameter. The status number is entered on the upper display.

### Meaning of the status numbers.

- |          |                     |  |
|----------|---------------------|--|
| <i>0</i> | <i>Free acces</i>   | It is possible to select, read and modify the operation parameter on the operator level.                                 |
| <i>1</i> | <i>Display only</i> | It is possible to select and read the operation parameter on the operator level.   |
| <i>2</i> | <i>Disabled</i>     | It is possible to select the operation parameter on the operator level. Its corresponding function is however sustained. |



---

Each factory setting is marked as such by \*.

---

*Modify status* Enter corresponding status number via the keys ← → ↓ ↑.  
Push ↵.

Line 11

<b>StAt</b>	<b>0</b>
<b>11</b>	<b>Ph</b>

### Ph – Operating time meter

- 0 \* Free access
- 1 Display only
- 2 Disabled

Line 12

<b>StAt</b>	<b>0</b>
<b>12</b>	<b>P1</b>

### P1 – Preselection 1

- 0 \* Free access
- 1 Display only
- 2 Disabled

Line 13

<b>StAt</b>	<b>0</b>
<b>13</b>	<b>P2</b>

### P2 – Preselection 2

- 0 \* Free access
- 1 Display only
- 2 Disabled

Line 15

<b>StAt</b>	<b>2</b>
<b>15</b>	<b>tot</b>

### tot – Totalizer

- 0 Free access
- 1 Display only
- 2 \* Disabled

Line 16

<b>StAt</b>	<b>2</b>
<b>16</b>	<b>b</b>

### b – Batch counter

- 0 Free access
- 1 Display only
- 2 \* Disabled

- - - - -
-----------

The dash line indicates the end of the second programming field.  
Switch to programming field 3 by pushing ↓ or ↵.

### Programming field 3

All functions and values as well as interface parameters conditioned by the machinery  
Are programmed here

---

Each factory setting is marked as such by \*.

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Line 21

21	0
----	---

#### Operating modes Principal counter

- |   |   |   |
|---|---|---|
| 0 | * | Adding, final signal at P2, reset to 0      |
| 1 |   | Subtracting, final signal at 0, reset to P2 |

Line 22

22	0
----	---

#### Preselection modes

- |   |   |   |
|---|---|---|
| 0 | * | Principal counter and batch counter with automatic reset      |
| 1 |   | Principal counter without, batch counter with automatic reset |
| 2 |   | Principal counter with, batch counter without automatic reset |
| 3 |   | Principal counter and batch counter without automatic reset   |

Line 23

23	0
----	---

#### Reset modes

- |   |   |   |
|---|---|---|
| 0 | * | Principal counter and batch counter with automatic reset      |
| 1 |   | Principal counter without, batch counter with automatic reset |
| 2 |   | Principal counter with, batch counter without automatic reset |
| 3 |   | Principal counter and batch counter without automatic reset   |

### Time range and Resolution of Ph – Principal counter

Line 24

24	0
----	---

- 0 \* 9999.99 s
- 1 999.59.9 min
- 2 9999.59 min
- 3 9999.59 h

### Time range and Resolution of tot - Totalizer

Line 25

25	0
----	---

- 0 \* like principal counter
- 1 99999.9 h

### Display of measuring units

Line 26

26	0
----	---

- 0 \* w/o measuring unit
- 1 h
- 2 min
- 3 s

### Assignment of lower display

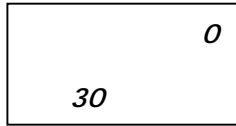
The upper display always indicates the current value

Line 27

27	2
----	---

- 0 Without lower display
- 1 P1 - Preselection
- 2 \* P2 - Preselection
- 3 tot - Totalizer
- 4 b – Batch counter

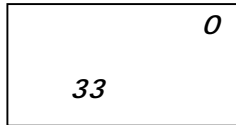
Line 30



### Function of signal inputs A, B

- 0 \* Time measurement while signal A is active. Signal B without function.
- 1 Time start – to signal A. Time stop when preselection P2 is reached  
Intermediate stop – to signal B. Signal A and B edge-triggered.
- 2 Time start and reset – to signal A. Stop and reset when preselection P2 is reached. Intermediate stop – to signal B. Signal A and B edge-triggered.

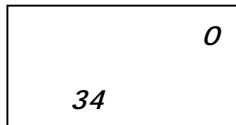
Line 33



### Input logic and Operating thresholds of signal inputs

- 0 \* PNP Operating threshold 6 V
- 1 NPN Operating threshold 6 V, or for NAMUR without explosion protection
- 2 PNP Operating threshold 3 V
- 3 NPN Operating threshold 3 V

Line 34

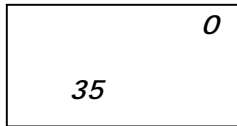


### Fuction Control input 1 (Contact 9)

- 0 \* PC Principal counter – Reset static
- 1 PC Principal counter – Reset edge-triggered
- 2 Stop
- 3 Hold
- 4 Programming disabled
- 5 Keylock
- 6 Print (30 ms minimum pulse duration)



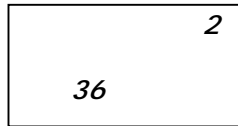
Line 35



### Minimum pulse duration for control input1

0	*	30 ms
1		100 $\mu$ s

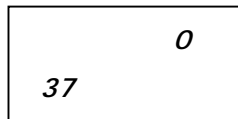
Line 36



### Function control input 2 (Contacto 10)

0		PC Principal counter – Reset static
1		PC Principal counter– Reset edge-triggered
2	*	Stop
3		Hold
4		Programming disable
5		Keylock
6		Print
7		External counting input for batch counter

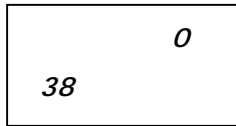
Line 37



### Function control input 3 (Contact 11)

0	*	tot – Totalizer – Reset static
1		tot – Totalizer – Reset edge-triggered
2		b – Batch counter – Reset static
3		b – Batch counter – Reset edge-triggered
4		Programming disabled
5		Keylock
6		Print
7		Counting input for batch counter

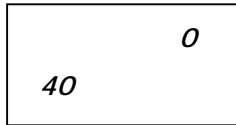
Line 38



#### Take-over of preselections P1, P2

- 0 \* Effective immediately
- 1 When timer reset is effective

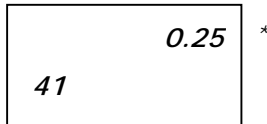
Line 40



#### Output logic

- 0 \* Both outputs as normally open
- 1 P1 normally closed, P2 normally open
- 2 P1 normally open, P2 normally closed
- 3 Both outputs normally closed

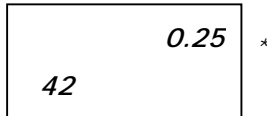
Line 41



#### Output time P1

- 0.01 s Minimum signal duration
- 0.25 s \*
- 99.99 s Maximum signal duration
- Latch = Latched signal ( By pressing the C key)

Line 42



#### Output time P2

- 0.01 s Minimum signal duration
- 0.25 s \*
- 99.99 s Maximum signal duration
- Latch = Latched signal ( By pressing the C key)

Line 50

50	0
----	---

#### Code setting

0 \* Code not active  
max. 9999

Line 51

51	0
----	---

#### Baud rate

0 \* 4800 Baud  
1 2400 Baud  
2 1200 Baud  
3 600 Baud

Line 52

52	0
----	---

#### Parity

0 \* Even parity  
1 Odd parity  
2 No parity

Line 53

53	0
----	---

#### Stop bits

0 \* 1 Stop bit  
1 2 Stop bits

Line 54

54	0
----	---

#### Address

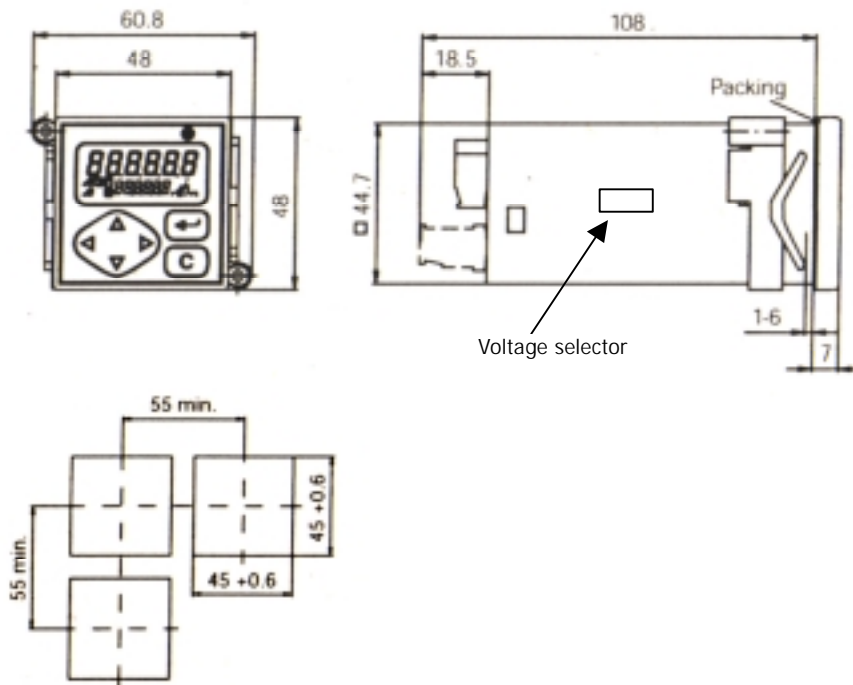
0 \* deactivated  
9999 max

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The dash line indicates the end of the third programming field  
By pushing ↓ or ↵, the instrument switches back to the beginning of the First programming field. Programming can be shut down at any time by Pushing the keys ↑ and ↵ simultaneously

## 6 Technical data

### 6.1 Dimensions and mounting



## 6.2 Technical data

Display .....	7-segment LC-Display (TN) with background illumination
Digit size .....	Display for actual value 7mm, display for preselection 4mm
Time range and resolution .....	9999.99 s, 999.59.9 min, 9999.59 min, 9999.59 h
Measuring unit display.....	" h, min, s "
Display of switching outputs P1,P2 .....	Illustration as normally open or normally closed
Supply voltage .....	Choice of two voltages via selector of device 115 / 230 VAC (50/60Hz) 24 / 48 VAC (50/60Hz) 12...30 VDC 5 % residual ripple
Power consumption .....	5 VA, 4W
Encoder supply.....	10 ... 26 VDC, 60 mA
Counting rate Batch counter .....	15 Hz
Data storage .....	> 10 years (via EEPROM)
Fixing.....	Clamping frame
Front.....	48 x 48 mm
Mounting depth .....	100 mm
Connections .....	2 plug-in screw terminals With 6 poles (grid 5.08 mm) and with 9 poles (grid 3.81 mm)
Core cross-section .....	Max. 1.5 mm <sup>2</sup>
Casing material .....	Makrolon 6485
Keypad.....	Short stroke keys and front membrane
Front membrane.....	Polyester membrane
Weight .....	AC model: aprox. 260 g DC model: aprox. 140 g

Protection category.....	EN 61010 Protection category II
Protection to DIN 40050.....	From the front, in built-in state seal IP65
Operational requirements .....	According to contamination factor 2
Overvoltage category .....	EN 61010 Protection category 2
Interference immunity.....	EN 50081 –2 Severity grade 3
Emitted interference.....	EN 50081 - 2
Ambient temperature .....	0...+50°C
Storage temperature.....	-20...+70°C
Humidity.....	Max. Relative humidity 80 %, non-condensing
General rating .....	EN61010

## 5. WARRANTY

All products are warranted against defective material and workmanship for a period of three years from date of delivery.

If a product appears to have a defect or fails during the normal use within the warranty period, please contact the distributor from whom you purchased the product.

This warranty does not apply to defects resulting from action of the buyer such as mishandling or improper interfacing.

The liability under this warranty shall extend only to the repair of the instrument ; no responsibility is assumed by the manufacturer for any damage which may result from its use.