SERIE CRISTAL

TACHOMETER
TOTALIZER
LCD

DELTA-F

CE

INSTRUCTIONS MANUAL

Code: 30727177
Edition: December 2002

100% RECYCLED PAPER

DELTA-F
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.

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

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

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

DIGITAL PANEL METER **SERIE CRISTAL**

DELTA-F

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Page.

1 SAFETY INDICATIONS

The tachometer 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, and observe the operating instructions.

Intended purpose

The isntrument is to be used only indoors as built-in model for industrial porcesses and controls on production lines of the meatel, wood, plastic, paper, glass and textile industries and similar; the 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, Section 2. The instrument may only be operated in a correctly mounted state. The instrument may only be operated as described under chapter "Technical data".

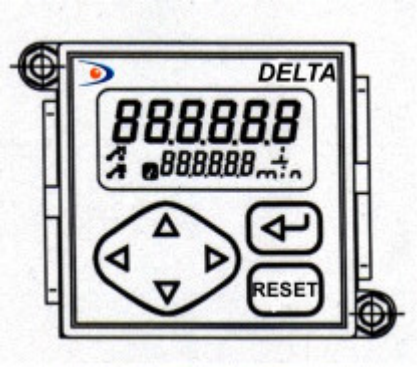
The instrument may not be used in hazardous areas, for medical apparatus, nor for applications expressly declared under EN 61 010.
If the instrument is to be used to control machines or processes, where the machine could be damaged or the operator could be injured due to a breakdown of the instrument or to a failure in operation, then relevant safety precautions will need to be taken.

Organizational measures

Make sure that your personnel 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.

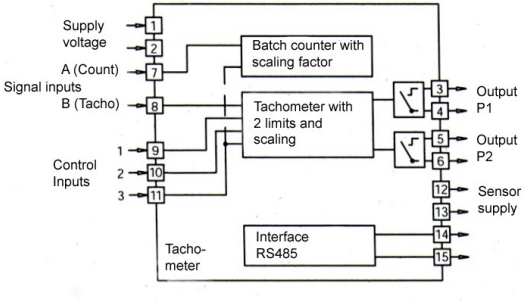
In the event of safety-relevant modifications (including those in the behavior of instrument during operation), immediately stop operation of instrument.

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



2.2 Block diagram of the DELTA-F

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



2 GET TO KNOW YOUR DELTA-F

2.1 DELTA-F components

- a 6-digit tachometer with 2 limit values
- a 6-digit batch counter with scaling factor.

LCD-Display

Current tachometer display
P1 Limit value 1
P2 Limit value 2
Control state of limit value 1
Control state of limit value 2
B Batch counter
Measuring units 1/h, 1/min, 1/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

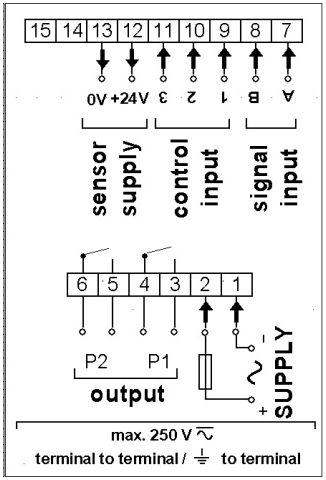

Key to select LOWER decades

3 CONNECTION

This chapter will explain how the contacts are assigned and given you some examples of connection.
Under chapters 3.1 to 3.6, you will find actual tips and technical data for the various connections

Assignement

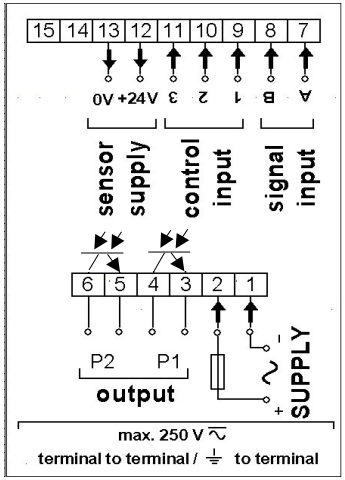
Model with relay outputs



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 (Count)
8	Signal input B (Tacho)
9	Control input 1 (Tacho Hold)
10	Control input 2 (Programming disabled)
11	Control input 3 (Batch counter reset)
12	Encoder supply + 10... 26 V
13	Encoder supply 0V
14	RS485 output (T,R-)
15	RS485 output (T,R+)

Assignement

Model with electronic outputs



Contact	Function
1	Supply voltage
2	Supply voltage
3	Output P1
4	Output P1
5	Output P2
6	Output P2
7	Input signal A (Count)
8	Input signall B (Tacho)
9	Control input 1 (Tacho Hold)
10	Control inpul 2 (Programming disabled)
11	Control input 3 (Batch counter reset)
12	Encoder supply + 10... 26 V
13	Encoder supply 0V
14	RS485 output(T,R-)
15	RS485 output(T,R+)

Do not otherwise assign contacts that have been left unassigned ex factory. We recomend to screen all encoder termial leads and to ground the shield on one side. Shields on both sides are recommended in case of RF interference of in case of equipotential bonding.

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

3.1 Supply voltage connection

AC connection

It is posible to choose two diferent AC voltages by using the selector on the side.
The respectively higher voltage (48 VAC or 230 VAC) 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-F terminal diagram.

Supply voltage	**Recommended external protection**
24 VAC ±10 % 50/60 Hz	M 400 mA
48 VAC ±10 % 50/60 Hz	M 200 mA
115 VAC ± 10 % 50/60 Hz	M 100 mA
230 VAC ± 10 % 50/60 Hz	M 50 mA

DC connection

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

Connect DC according to the DELTA-F terminal diagram.

Supply range 12 ... 30 V DC ± 10 %, max. 5 % residual ripple.
Recommended external protection : M 400 mA

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

3.2 Assignement of signal outputs " Relay contacts"

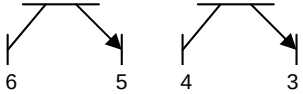
Contact P2 Contact P1

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.
The switching function, as momentary or latched signal, can be choosen in the programming line 40.
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 8A / 150 VA (W) is not exceeded.
Internal spark suppresion 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 responsable to take care of local interference suppression in consideration of contact rating

3.3 Assignement 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.
The switching function, as momentary or latched signal, can be choosen in the programming line 40. Their function, as normally open or closed, is selected in programming line 40.

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

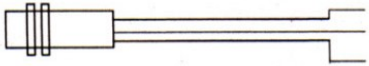
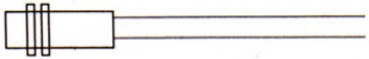
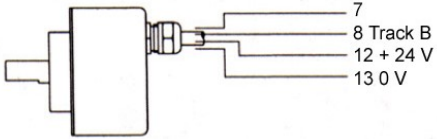
The electronic outputs are not short-circuit-proof.

3.4 Asignación de las señales de entrada

Choice of the PNP or NPN

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.
Contact 7 triggers the batch counter. The counting rate (3Hz, 25 Hz or 10 kHz) is chosen in programming line 32. Contact 8 triggers the tachometer. The frequency range of 25 Hz or 40 kHz is determined on programming line 31.
The contacts 9,10 and 11 are control inputs for Hold, programming disabled, Batch counter reset, etc. The function of this 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 µs. For control inputs 2 and 3, 30 ms are generally valid.

3.4.1 Examples of connection

ENCODER	DELTA-F contact assignement	Programming
Contact	 8 Track B 12 +24 V	Counting rate: Line 31 to 1 = 25 Hz
Proximity switch NPN or PNP	 8 Track B 12 + 24 V 13 0 V	Input logic: Line 33 to 0 =PNP Line 33 to 1 =NPN
NAMUR Without explosion protection	 8 Track B 13 0 V	Input logic: Line 33 to 1 = NPN
Incremental encode	 7 8 Track B 12 + 24 V 13 0 V	Counting rate: Line 31 to 0 = 40 kHz

3.5 Encoder supply connection

Connect encoder supply for rotatory encoder, proximity switch, etc. To the contacts 12 and 13. However, do not use encoder supply for unearthed inductors or captative loads.

The encoder supply is not short-circuit-proof.

Contact	Voltage	Max. 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 parametres

Interface parametres are:

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

The interface parametres can be set on the programming level (lines 51 to 54).

RS485

Half-duplex transmission with the following features:

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

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

4 DELTA-F Operation

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

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

On the operator level it is possible:

- To read the tachometer display;
- To read and, if necessary, modify the limit values P1 and P2;
- To read and, if necessary, modify the evaluation of the tachometer;
- To read and, if necessary, clear de batch counter;
- To read and, if necessary, modify the scaling factor (batch counter)

- It is possible to disable all operator parametres on the programming level (lines 11-17)

The keys and their function

Parameter reading

Select the enable parametres via the key ↑ or ↓.
The key ↵ allows to switch to next operation parameter.
For quick sweep, keep this key depressed.

Resetting of batch counter

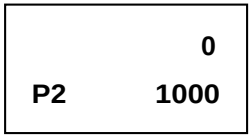
1. Display count
2. Push C.

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.

Tachometer display

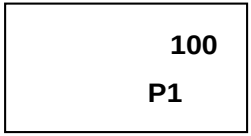
The upper display indicates the current tachometer value
The lower display indicates limit value P2 or parameter of your choice in programming line 27.



Read Read tachometer display F and, for axample, limit value P2.

Limit value P1

Read Push ↓ or ↵

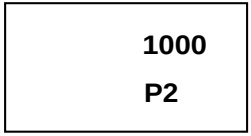


The limit value P1 is displayed
The lower display indicates "P1"

Modify Enter limit value P1 via the keys ← → ↓ ↑
Push ↵.

Limit value P2

Read Push ↓ or ↵



The limit value P2 is displayed
The lower display indicates "P2"

Modify Enter limit value P2 via the keys ← → ↓ ↑
Push ↵.

Evaluation bF

1.0000
bF

The evaluation digit (divisor) will help to adapt the display of the tachometer to the number of pulses per measuring unit.

Example for calculating the evaluation bF

Measure rotational speed

50 pulses per revolution are supplied when measuring rotational speed.
The evaluation is then set to 50.

Evaluation = Pulses / rev = 50

Measure speed

When measuring speed with encoder and cyclometer, the circumferencec of the cyclometer measures 0.5 m the encoder has a resolution of 50 pulses per revolution. The measurement is to be presented in m/min.

$$\text{Evaluation} = \frac{\text{Pulses/ rev}}{\text{Circumference}} = \frac{50}{0{,}5} = 100$$

1.0000
bF

Read

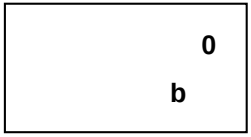
Push ↓ or ↵

The evaluation bF is displayed
The lower display indicates "bF"

Modify

Enter the evaluation bF via the keys ← → ↓ ↑
Push ↵.

Batch counter b



Read Push ↓ or ↵.

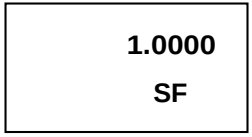
The vbatch counter b is displayed
The lower display indicates "b"

Reset Push Reset.

Scaling factor SF

The scaling factor (multiplier) allows the display of fractions or multiples of the impulse on the batch counter.
Setting range: 0.0001 to 9999.99. Setting ex factory to 1.0000.

Example While the tachometer is displaying the rotational speed, the number of revolutions is to be Counted by the batch counter. An encoder with 2 pulses per revolution is used for this Aplication.
The scaling factor is calculated as follows



$$\text{Scaling factor} = \frac{1 \text{ rev}}{\text{Pulses}} = \frac{1}{2} = 0.5$$

Read Push ↓ or ↵.
The scaling factor SF is displayed.
The lower display indicates "SF".

Modify Enter the scaling factor via the keys ← → ↓ ↑.

The setting range from 0.0001 to 9999.99
Select the decimal point via ← and shift using ↑.
Push ↵.

By pushing ↓ or ↵ again, the current count is re-displayed.

5 DELTA-F PROGRAMMING

5 DELTA-F PROGRAMMING

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

Programming level

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

1st programming field

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

2nd programming field

The individual operation parametres for the operator acces are disabled or enabled here

3rd programming field

All functions and values as well as interface parametres conditioned by the machinery are porogrammed here.

THE KEYS AND THEIR FUNCTIONS

Turn on programming

Push ↑ and ↵ simultaneously
"**Code**" appears on the lower display

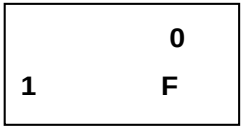
No code number has yet been set at the factory, therefore it is possible to skip the code query by pushing ↵
After a code has been set, it will only be possible to switch to the programming level by entering the correct code

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

Programming field 1

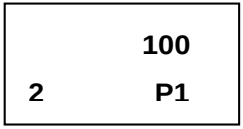
Here it is posible to select and modify all operation parametres.
The operation parameters that are disabled for the operator are also displayed.

Line 1



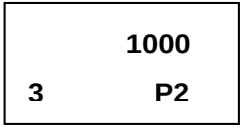
F – Tachometer display

Line 2



P1 – Limit value 1

Line 3

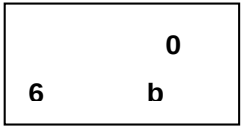


P2 – Limit value 2

Line 4

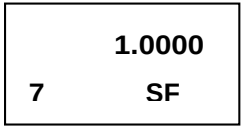
bF – Evaluation of tachometer

Line 5

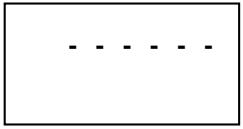


b – Batch counter

Line 7



SF – Scaling factor



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 access 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

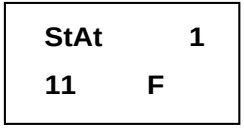
Meaning of the status numbers.

0	Free access	It is possible to select, read and modify the operation parameter on the operator level.
1	Display only	It is possible to select and read the operation parameter on the operator level.
2	Disabled	It is impossible to select the operation parameter on the operator level. Its corresponding function is however sustainde

Each factory setting is marked as such by *.

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

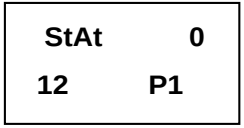
Line 11



F – Tachometer display

0 Free access
1 * Display only
2 Disabled

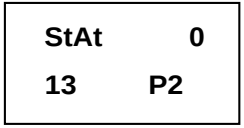
Line 12



P1 – Limit value 1

0 * Free access
1 Display only
2 Disabled

Line 13



P2 – Limit value 2

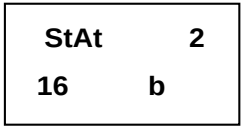
0 * Free access
1 Display only
2 Disabled

Line 14

bF – Evaluation of tachometer

0 Free access
1 Display only
2 * Disabled

Line 16



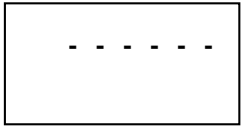
b – Batch counter

0 Free access
1 Display only
2 * Disabled

Line 17

SF – Scaling factor for batch counter

0 Free access
1 Display only
2 * Disabled



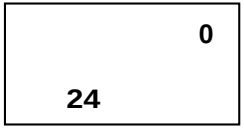
The dash line indicates the end of the second programming field.
Switch to programming field 3 by pushing ↓ or ↵.

Programming field 3

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

Each factory setting is marked as such by *.

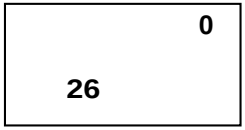
Line 24



Decimal point for F, P1, P2

0	*	No decimal point
1		00000.0
2		0000.00
3		000.000

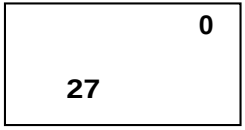
Line 26



Indication of measuring unit on display

0	*	without measuring unit
1		1/h
2		1/min
3		1/s

Line 27



Assignement of lower display

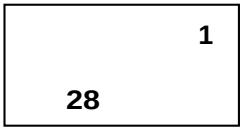
The upper display always indicates the current value

0		without lower display
1		P1 – Limit value 1
2	*	P2 – Limit value 2
3		bF – Evaluation of tachometer
4		b – Batch counter
5		SF – Scaling factor

Uptdate time (Repetition of display)

0		0.5 s
1	*	1 s
2		2 s
3		3 s
4		5 s
5		10 s
6		20 s
7		30 s
8		60 s

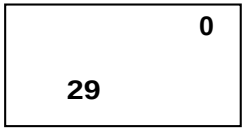
Line 28



Timeout (Tachometer)

0	*	1 s
1		2 s
2		3 s
3		5 s
4		10 s
5		20 s
6		30 s
7		60 s
8		Timeout not operating
9		Timeout not operating, last display value memorized after breakdown of current.

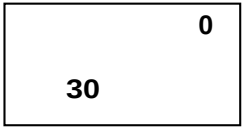
Line 29



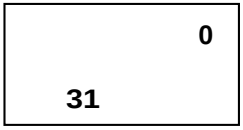
Time unit of tachometer

0	*	1 /min
1		1/s
2		1/h

Line 30



Line 31

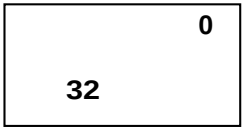


Frequency Track B for tachometer

0	*	40 kHz
1		25 Hz

Frequency Track A for batch counter

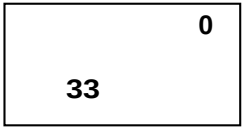
Line 32



0	*	10 kHz
1		25 Hz
2		3 Hz

Input logic and Operating thresholds of signal inputs

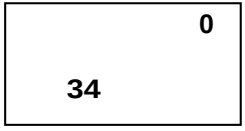
Line 33



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	Opertaing threshold 3 V

Funtion Control input 1 (Contact 9)

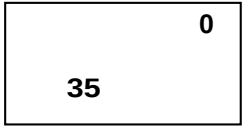
Line 34



0	*	Hold for a tachometer and batch counter
1		Programming disabled
2		Keylock
3		Print (Principally, 30 ms minimum pulse duration)

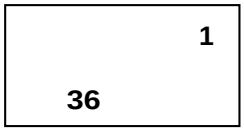
Minimum pulse duration for control input 1

Line 35



0	*	30 ms
1		100 µs

Line 36

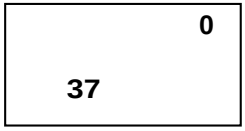


Funcion Control input 2 (Contact 10)

0		Hold for tachometer and batch counter
1	*	Programming disabled
2		Keylock
3		Print

Funtion Control input 3 (Contact 10)

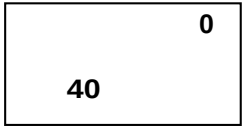
Line 37



0	*	b – Batch counter – Reset static
1		b – Batch counter – Reset edge-triggered
2		Programming disabled
3		Keylock
4		Print

Output logic

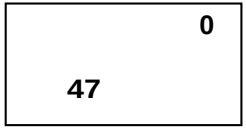
Line 40



0	*	Bouth outputs as normally open
1		P1 normally closed, P2 normally open
2		P1 normally open, P2 normally closed
3		Bouth outputs as normally closed

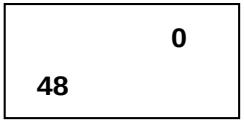
Assignment of limit value P1

Line 47



0	*	Upper limit value
1		Lower limit value

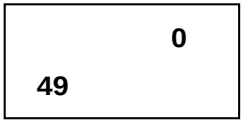
Line 48



Assignement of limit value P2

0 * Upper limit value
1 Lower limit value

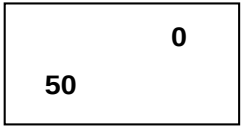
Line 49



Output behavior of lower limit value

0 * With starting lockout (switches only when falling below value)
1 Without starting lockout

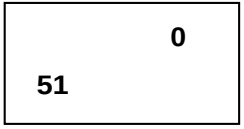
Line 50



Code setting

0 * Code not active
max. 9999

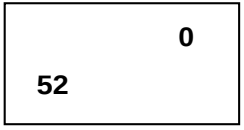
Line 51



Baud rate

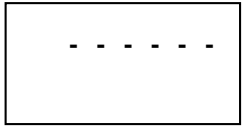
0 * 4800 Baud
1 2400 Baud
2 1200 Baud
3 600 Baud

Line 52

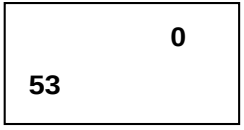


Parity

0 * Even Parity
1 Odd Parity
2 No Parity



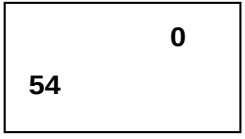
Line 53



Bits stop

0 * 1 Stop bit
1 2 Stop bits

Line 54



Adress

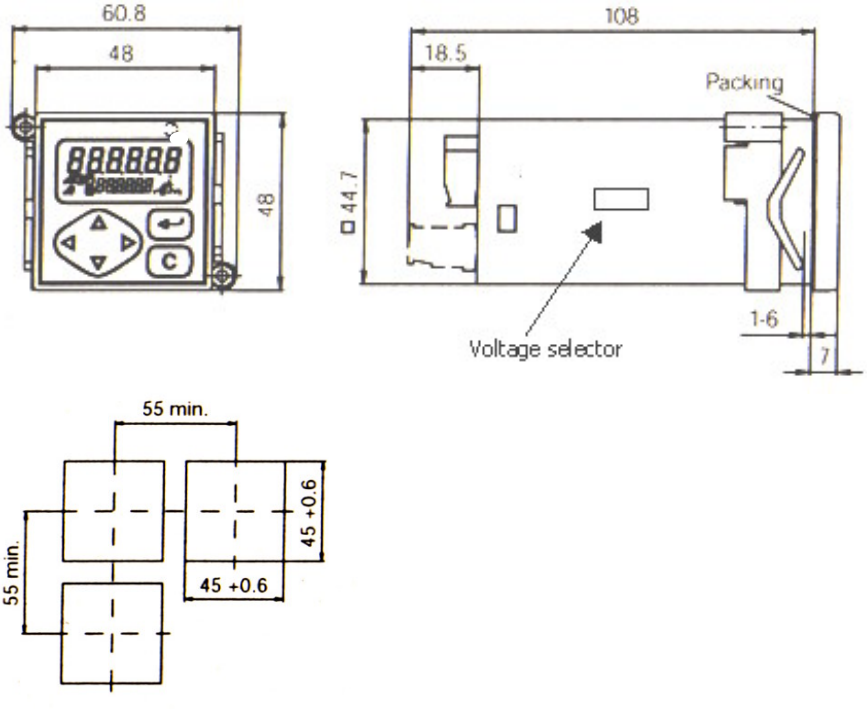
0 * from
99 to

The dash line inducates 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 rime by pushing the keys ↑ and ↵ simultaneously.

6 TECHNICAL DATA

6.1 Dimensions and mounting

measures in mm



6.2 Technical characteristiques

Display	7 segments LCD-display with background light
Digit size	Display of tachometer display: 7 mm, Display of limit value 4 mm
Display of measuring unit	" 1/min, 1/s, 1/h "
Display of switching outputs P1, P2	Illustration as normally open or normally closed
Supply voltage	as ordered
Power consumption	5 VA, 4W
Encoder supply	10 ... 26 VDC, 60 mA
Counting rate Tachometer	25 Hz or 40 kHz
Counting rate Batch counter	3 Hz, 25 Hz or 10 kHz
Data storage	> 10 years via EEPROM
Fixing	Clamping frame
Frontal	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^2
Casing material	Makrolon 6485
Keypad	6 Short-stroke keys and front membrane
Front membrane	Polyester membrane
Weight	Model AC: aprox. 260 g Model DC: aprox. 140 g

Protection category	According to EN 61010 Protection category II
Protection s/ DIN 40050	Frontal: IP65
Operational requirements	According to contamination factor 2
Overvoltage category	According to EN 61010 Protection category II
Interference immunity	According to EN 50082 - 2 Severity grade 2-3
Emitted interference	According to EN 50081 – 2
Ambient temperature	0 ... +50 ºC
Storage tempereture	-20 ... + 70 ºC
Humidity	80 % max. relative humidity, non-condensing
General rating	EN 61010

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.