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Important instructions for your safety! Read and observe!

Safe and proper operation of the trend display unit requires proper transportation and storage, installation and commissioning by qualified personnel, proper use and careful maintenance.

Only qualified personnel who are familiar with the installation, commissioning, operation and maintenance of this trend display unit or similar devices are authorized to work on trend display unit.

Observe

- the present operating instructions,
- the safety instructions attached to the device,
- the relevant safety regulations and standards for the installation and operation of electrical systems.

The regulations, standards and directives referred to in these operating instructions are applicable in Germany. When using this trend display unit outside the German jurisdiction, the relevant regulations, standards and directives applicable in the country where the device is used must be observed.

The trend display unit has been designed and tested in accordance with DIN EN 61 010 Part 1 "Safety Requirements for Electrical Measuring, Control and Laboratory Apparatus" and has been supplied in a safe condition. The present operating instructions contain warnings marked accordingly which must be followed by the user to retain the device in a safe condition and to ensure safe operation. Otherwise, persons may be injured or the device itself or other devices or installations may be damaged or fail.

If you should need any information which is not contained in the present operating instructions please contact our service department.

Writing Conventions

<Control button>	specifies the control button on the front panel which must be actuated to perform the desired step (<Control button>, <Control button> ...: press buttons one after the other <Control button> + <Control button> + ...: press buttons at the same time).
Text	stands for a text in the digital display.
"Text"	represents a label on the device.

If not otherwise specified, the information "right", "left" or "top", "bottom" refers to the device seen from the front.

Application and Brief Description

The trend display unit is to be used for measurement, display and storage of process signals.

The measured process signals can be applied to the four inputs as voltages

- $0 \dots \pm 1$ V or
- $0 \dots \pm 10$ V

or as currents

- $0 \dots \pm 1$ mA
- $0 \dots \pm 20$ mA

The measured values are indicated through bargraph, trend or digital displays.

Optionally, alarm signalling is possible.

Installation and Commissioning

Scope of Delivery

- Datasheet
- Panel mounting clamps

Additional documentation

- Data sheet
- Interface description

1. Selecting the Installation Site

1. Mounting:
in control panels or mosaic panel fields
2. Ambient temperature:
0...40 °C
3. Relative humidity:
up to 75 % (annual average)
non-condensing
in accordance with climate class 3K3 to DIN EN 60 721-3-3
4. To ensure a good reading, the device should be mounted at eye level and at a maximum lateral angle of vision of 20°.
5. A dark background should be used for devices with an "active" (i.e. illuminated) display to improve the contrast effect. A bright environment will improve the contrast effect for devices without illumination.

2. Mounting

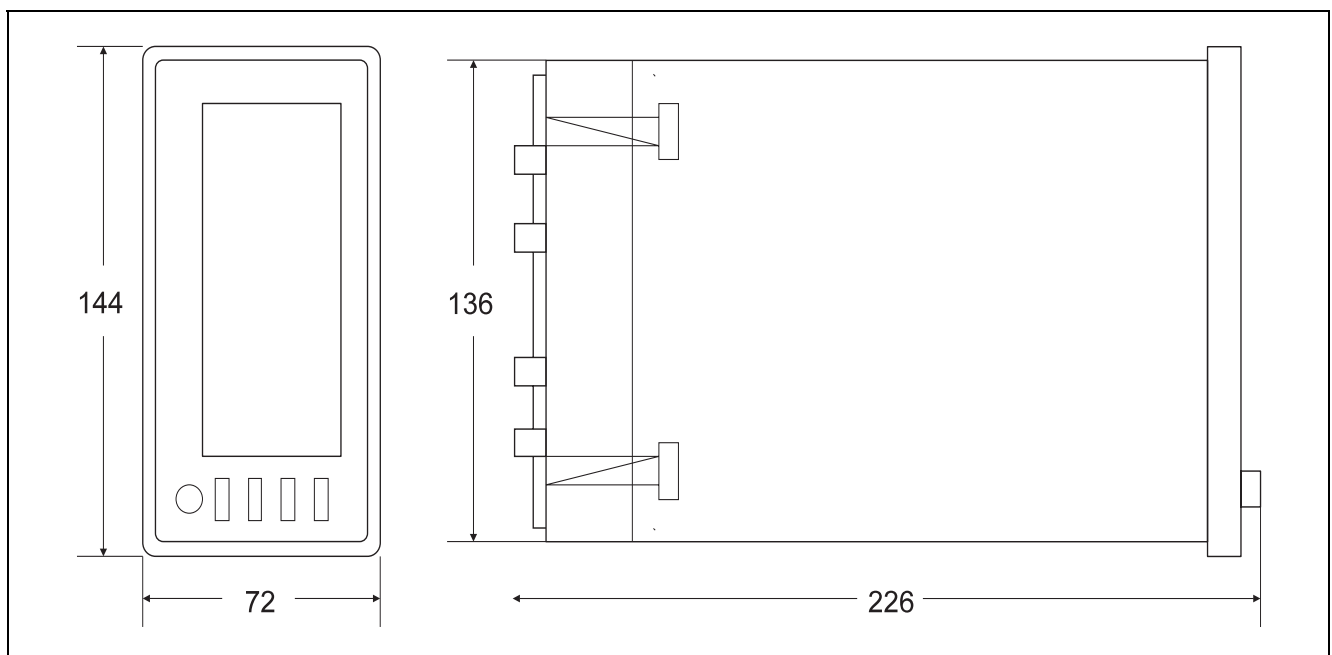


Fig. 1 Dimensional drawing (dimensions in mm)
Z-16365

Panel Cutout

to DIN 43 700 68^{+0.7} mm x 138⁺¹ mm.

See also dimensional drawing, Figure 1.

Mounting

1. Slide the device into the panel cutout or mosaic panel field from the front.
2. Insert the mounting clamps from the back into the rivets on the housing wall.
3. Fasten to the control panel or mosaic panel field by turning the lead screw with a screw driver.

3. Connecting the Signal Cables



Warning

Observe the national regulations and directives for the setup of high voltage power systems of up to 1000 V when selecting the cable material and making the installation.

Prior to making any other connections, connect the grounding conductor to the grounding conductor terminal.

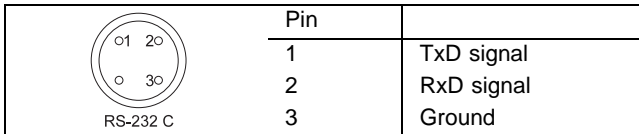
Only connect current circuits with safe isolation from current circuits with hazardous voltages to the inputs and outputs (DIN VDE 0106 Part 1).

Note

Do not lay measuring and signal cables close to high-voltage power cables.

Use shielded cables to ensure EMI/RFI shielding and RFI suppression.

RS-232C serial interface (front)

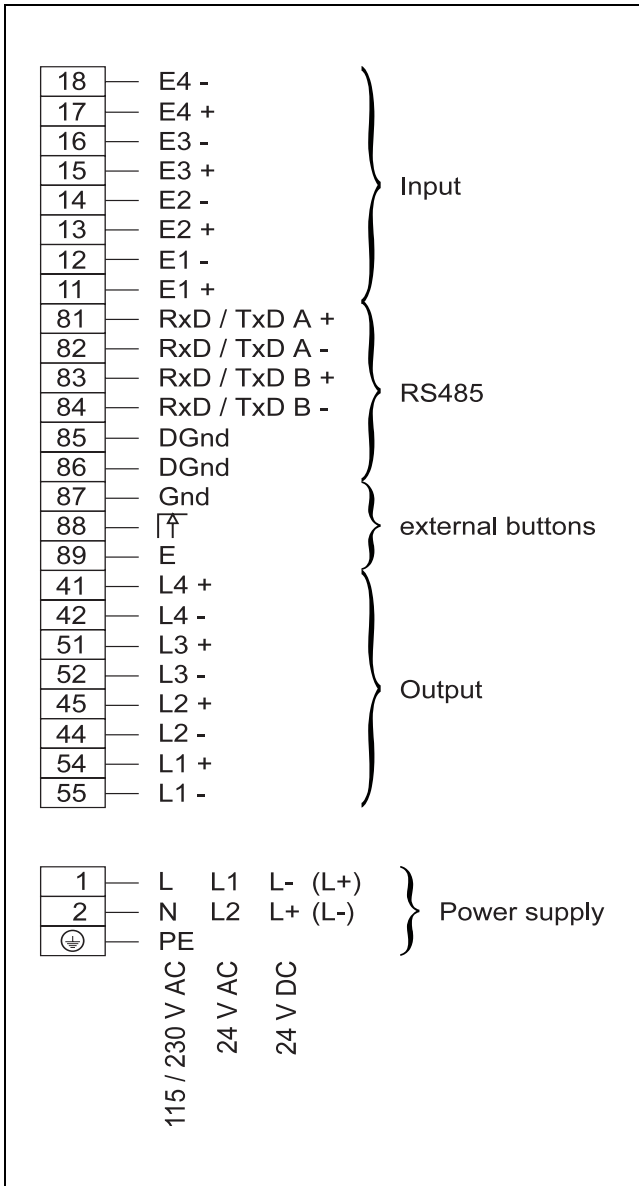


Note

Do not connect the RS-232C interface cable when the device is switched off.

Fig. 2 RS-232C serial interface (front)
Z-18972

Connectors on the Back



1. Connect to special pluggable connectors with screw-terminals for wires with a cross-sectional area of 2.5 mm².
2. Bind all cables on the extended connector unit to ensure strain relief.

Note

Reversal of the pluggable connectors is not possible.

Fig. 3 Connectors
Z-16366

RS-485 Serial Interface (Rear)

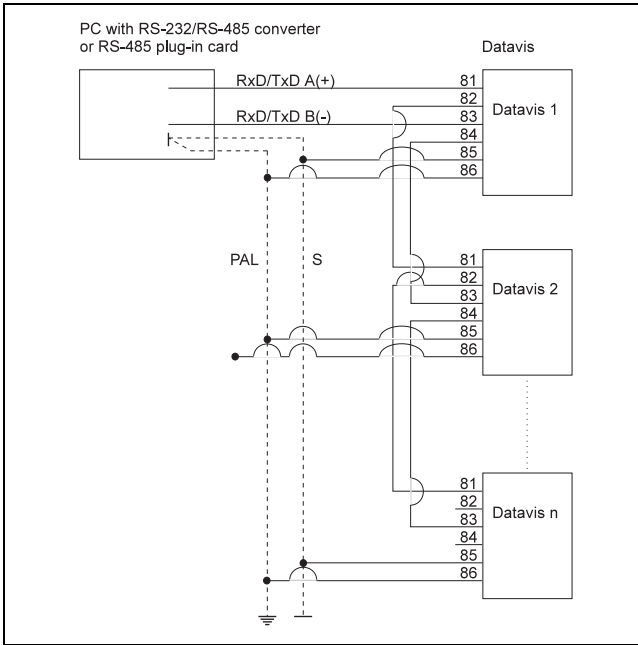


Fig. 4 Connecting the serial RS-485 interface
 Z-15280 PAL Potential Equalization Cable
 S Shield

1. Use a shielded two-wire cable as the bus cable.
2. Connect the cable shield on both the computer side and the device side to the enclosure ground and ground in a central place (e.g. the control panel or protective ground conductor).
3. Connect the *reference cables* of the individual devices to a sufficiently dimensioned potential equalization cable.

Note

Double connection terminals are used to allow for connection of the bus cable into the circuit.

The transmission protocols are described in the interface description.

Measuring Circuits

1. The measuring circuits should have *nearly* the same potential.
2. The common mode voltage between the inputs and ground should be less than 6.5 V.
3. Lay feed and return cables close to each other.
4. Shorten unused input channels.

Signal Outputs

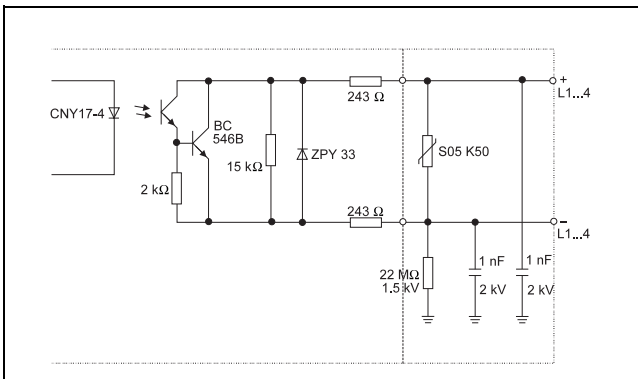


Fig. 5 Connecting the signal outputs
 Z-16368

A signal output is only active if the respective device variant exists or if the limits card has been mounted.

The signal outputs are open collector transistor outputs. They are electrically isolated from each other through optocouplers and have the following limits:

- $V_{\max} = 30 \text{ V}$
- $I_{\max} = 40 \text{ mA}$

The switching principle (NC or NO contacts), the switching function (minimum or maximum signal), the response delay and the hysteresis are determined by configuration (see section "Configuring").

- **NC Contact Operation**
If a limit is exceeded or underscored, the transistor is blocked.
- **NO Contact Operation**
If a limit is exceeded or underscored, the transistor becomes conductive.
- **Power Failure**
In the case of a power failure the transistor is blocked.

4. Connecting the Power Supply

(see also fig. 2)

Warning

Observe the national regulations and directives for the setup of high voltage power systems of up to 1000 V when selecting the cable material and making the installation.

Prior to making any other connections, connect the grounding conductor to the grounding conductor terminal.

When powered with 24 V UC the device must be supplied with an electrically isolated extra low voltage to DIN VDE 0100 Part 410 to comply with DIN VDE 0106 Part 101.

The power supply must be externally protected with the following fuses to DIN 41 662:

- 24 V AC/DC voltage: T 600 mA
- 115 V AC voltage: T 125 mA
- 230 V AC voltage: T 62 mA

Only fuses in accordance with the UL list are permissible.

The feed cable of the power supply must not be live when the power-supply is connected to the pluggable 3-pole (mains)-connector. This is also valid when the power supply is disconnected.

When using stranded wires for connecting the power supply, they must be provided with wire end sleeves.

Note

It is recommended to provide an external mains switch for the power supply. The switch must not be installed in the feed cable and should be placed as close to the device as possible. The switch position (on or off state) must be clearly visible.

-
1. Connect to special pluggable connectors with screws terminals for wires with a cross-sectional area of up to 2.5 mm².
 2. Bind all cables on the extended connector unit to ensure strain relief.

Note

Reversal of the pluggable connectors is not possible.

5. Commissioning

Warning

Do not use the device outside a control panel or mosaic panel.

Prior to switching the device on, make sure that the mains voltage is identical with the operating voltage selected on the device.

1. When using devices with range selector switches make sure that the switches have been set to the appropriate ranges.

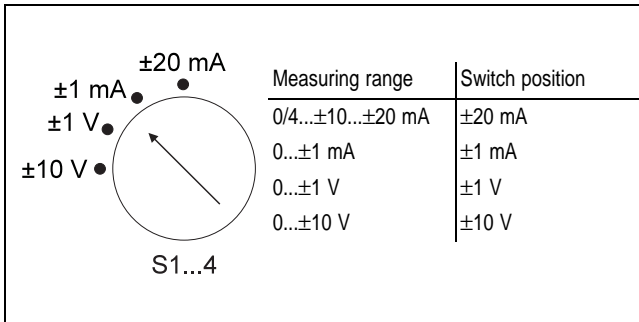


Fig. 6 Range selector switch S 1...4
Z-16367

2. Actuate the external mains switch to power up the device.
3. The following error message is output if the range selector switches should not be set to the correct measuring ranges:

```
Caution: Measuring range has been modified!
Invalid input configuration.
Please reconfigure inputs.
```

See Section "Configuration".

Note

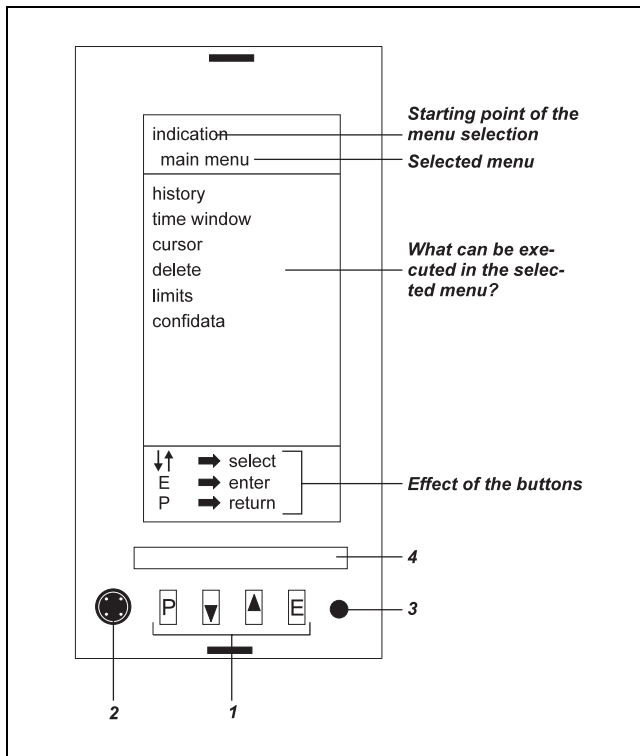
A short-time power failure is indicated by the respective error message. Press <E> to acknowledge the error message.

The duration of the power failure is then indicated.

When using a device without buffer battery for the first time after a longer power failure, it is recommended to readjust the time and date (see Section "Time/Date").

Operation

Control Buttons



- <P> calls up or exits a menu
- <▼> indicate data from the past or select the next menu level or modify a parameter.
- <▲>
- <E> completes an entry or acknowledges a limit violation.

Fig. 7 Front view with operating principle
R-16374 1 Control buttons
D5 (referred to as <P>, <▼>, <▲> and <E> in the text)
2 RS-232C serial interface (front)
3 Contrast adjustment
4 Label

Adjusting the Contrast

(see also fig. 7)

Note

The contrast can only be adjusted if the device is provided with an illuminated display.

1. Slightly turn potentiometer 3 with a thin screwdriver to adjust the contrast.

User-Guidance

(see also fig. 7)

- The trend display unit supports the user as far as possible through operating instructions and notes shown on the display.
- Selected or already set parameters are inverted.
- All entries must be confirmed with <E>.
- Error messages indicating invalid entries are displayed in a special window and must be acknowledged with <E>.
- A clock symbol is shown while parameters are being saved or submitted to a plausibility check.

Displays

When the trend display unit is switched on for the first time, a bargraph display is used by default.

1. Call up the pict. select. menu:
<P>

A list of the selectable displays will be indicated.

- pic. A,
- pic. B,
- bars,
- digits,
- listing (of the most important configuration data) and
- main menu.

2. Select a display:
<▼/<▲>

3. Confirm:
<E>

Note

If the display selecting procedure is changes as described in Section "History", the display can be changed directly with <▼> or <▲>. <P> will then directly call up the main menu.

Display Description

Trend Display

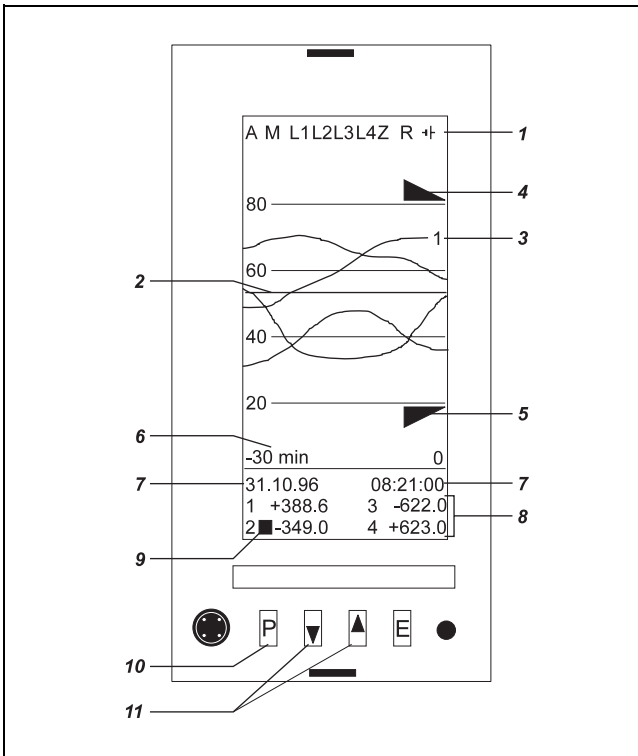


Fig. 8 Trend display

R-16374	1	Alarm line
D4	A	Trend display A is shown
	M	Indicates start of residual storage time
	L1...L4	Alarm signalling
		Empty battery warning (Warning time: around 7 days)
	Z	Zoomed display
	R	History mode is being active
	2	Reference line
	3	Curve marking for input 1
	4	High limit indicator
	5	Low limit indicator
	6	Time window (right side of window: t = 0)
	7	Date/Time
	8	Momentary value of input 3
	9	Alarm signalling
	10	Menu call
	11	Back into the past

Notes

As the digital display shows the momentary values and the refreshing rate of the curves depends upon the selected time window, there may be differences between the digital display and the trend display.

If stored values are displayed, for which "minimum -maximum-value" has been selected during signal processing, the maximum value will be displayed in the digital display.

Exceeding or underscoring a measuring range

Digital display underscore or overrange

Trends can be derived from the curve.

Power Failure

When the device is switched on for the first time after a power failure has occurred, the duration of the power failure is indicated. When data is read from the memory, a break in the curve (around 5 pixels are missing) and the information `no data available` indicate the power failure.

Past

- Go back into the past:
<v> (pressing and holding the button will change over to fast action to return faster to the desired point back in time)
- Return to the present:
<v> (pressing and holding the button will change over to fast action to return faster)
or
Jumping back into the present:
<P>, <E>

Note

If there are no further user actions for more than three minutes, the device will automatically return to the present.

Zooming

Note

Zooming always refers to the range around the reference line. A zooming factor of three is always used.

- Activate the zooming function:
Press and hold <E> and <^>
- Deactivate the zooming function:
Press and hold <E> and <^>

Bargraph Display

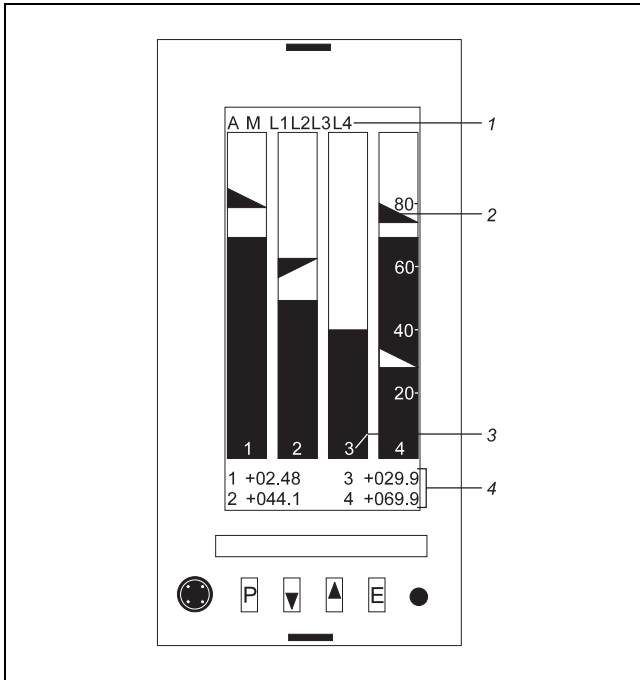


Fig. 9 Bargraph display
R-16374 1 Alarm line
D2 2 High limit mark
3 Marking for input 3
4 Momentary value input 3

The bargraphs and digits represent the currently measured value.

When the measuring range is exceeded or underscored, "9999" or "W..." and a triangle/arrow appear at the top and bottom of the bargraph.

Status Indicator

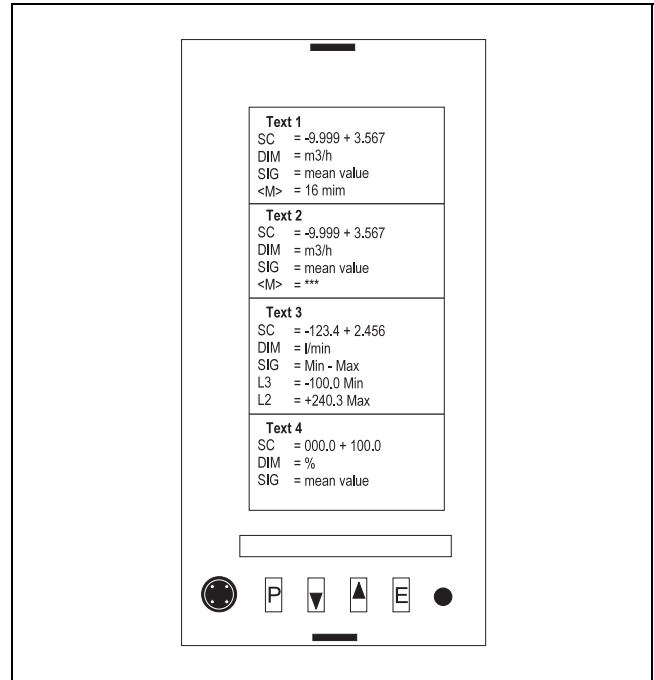


Fig. 10 Status indicator
R-16374 *** Not configured
D1 DIM Unit of measured variable
L1 Limit setting (high limit/low limit)
<M> Time spacing between two saved measuring values
SC Start and end of scale
SIG Type of trend display (average/minimum-maximum value)
Text Tag name (max. 15 characters) (only applicable when configuring the trend display unit via a PC, using the PROG1 configuration program)

The relevant input is indicated by a flashing number in the four sections of the display.

Digital Display

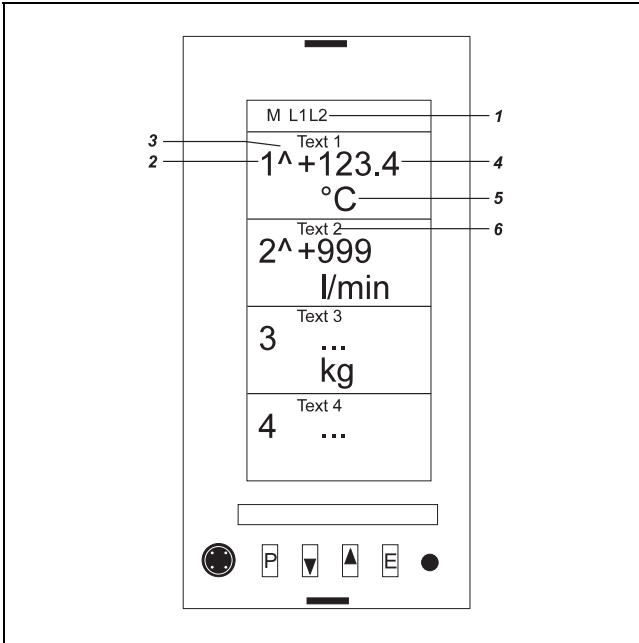


Fig. 11 Digital display

R-16374	1	Alarm line	4	Measured value
D4	2	Channel number	5	Unit
	3	Indicates a limit violation	6	Tag
		▲ High limit		
		▼ Low limit		

Main menu

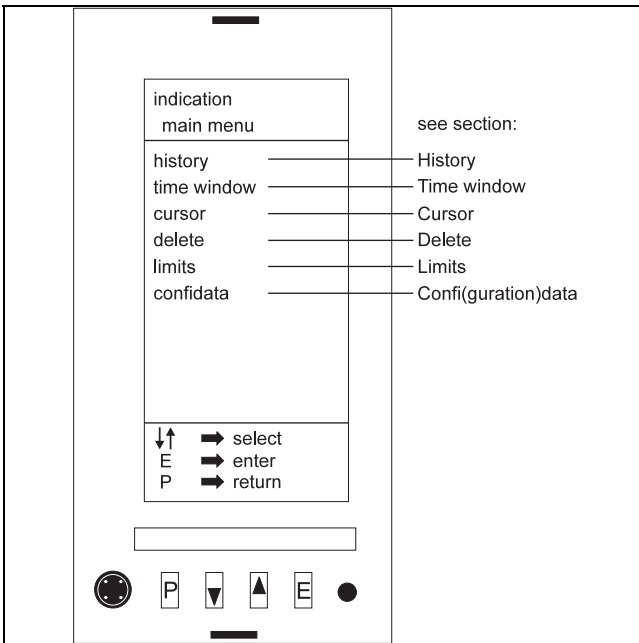


Fig. 12 Main menu

R-16374 D6

1. Call up the display selection menu:
<P>
2. Select main menu :
<▼>/<▲>
3. Confirm:
<E>

The submenus

- history
 - time window
 - cursor
 - delete
 - limits
 - confi(guration)data
- are available.

History

4. Select the History menu:
<▼>/<▲>
5. Confirm:
<E>
6. Select "Scroll" (to go back in time continuously with <▼>, <▲>) or "Enter time" (to jump to a defined point in time):
<▼>/<▲>
7. Confirm:
<E>
8. Select time and date to "Enter time":
<▼>/<▲>
9. Confirm:
<E>
10. Select value:
<▼>/<▲>
11. Confirm:
<E>
12. Return to display:
<P>

Time window

4. Select the time window menu:
<▼>/<▲>
5. Confirm:
<E>
6. Select appropriate time window from displayed values:
<▼>/<▲>

The time axis is 92 pixels wide. The following minimum resolutions for the individual time windows result from this:

Time window	Minimum resolution
90 s	1 s
3 min = 180 s	2 s
6 min = 360 s	4 s
18 min = 1080 s	12 s
30 min = 1800 s	20 s
1 h = 3600 s	40 s
3 h = 10800 s	2 min = 120 s
9 h = 32400 s	6 min = 360 s
15 h = 54000 s	10 min = 600 s
24 h = 86400 s	16 min = 960 s

7. Confirm:
<E>
8. Return to display:
<P>

Cursor

for a better reading of the measuring values

4. Select the cursor menu:
<▼>/<▲>
5. Confirm:
<E>

The current value of the reference line is shown (in the center of the display, directly above the digital display).

6. Move the reference line to the desired value:
<▼>/<▲>
7. Confirm:
<E>

Note

If the reference line is placed on a grid line when the window is called up, the grid line will be erased when the reference line is moved.

If the time window is small, several reference lines may be visible temporarily.

When the device is switched off, the reference line is frozen in the last selected position, provided that this has been confirmed before by pressing <E>.

The reference line will also stay in its last previous position after a jump back into the present.

Delete

4. Select the delete menu:
<▼>/<▲>
5. Confirm:
<E>
6. Select the input channel:
<▼>/<▲>
7. Confirm:
<E>
8. Select either on or off :
<▼>/<▲>
9. Confirm:
<E>
10. Return to display:
<P>

Limits

4. Select the limits menu:
<▼>/<▲>
5. Confirm:
<E>
6. Select limits (▲ = high, ▼ = low limit):
<E>, <E>, ...
7. Edit limit:
<▼>/<▲>

If a limit is exceeded or underscored, L1, L2 ... is displayed in the alarm line. In the trend displays, arrows to the left of the digits indicate if a high -(↑) or low limit value has been exceeded/underscored.

8. Confirm/select next limit:
<E>
- ...
9. Return to display:
<P>

Note

Exceeding/underscoring of limits must be acknowledged with <E>. The acknowledgement has no effect on the signal output. When the alarm has been acknowledged and the limit value is no longer exceeded/underscored, the alarm displays are cleared.

Note that with falling characteristic curves the display of the low limit is above the display of the high limit.

All relevant alarm limit data can be called up:

1. Call up the pict. select. menu:
<P>
2. Select the listing menu:
<▼>/<▲>
3. Confirm:
<E>

Conf(iguration)data

4. Select the confidata menu:
<▼>/<▲>
5. Confirm:
<E>
6. See Section "Configuration".

Configuration

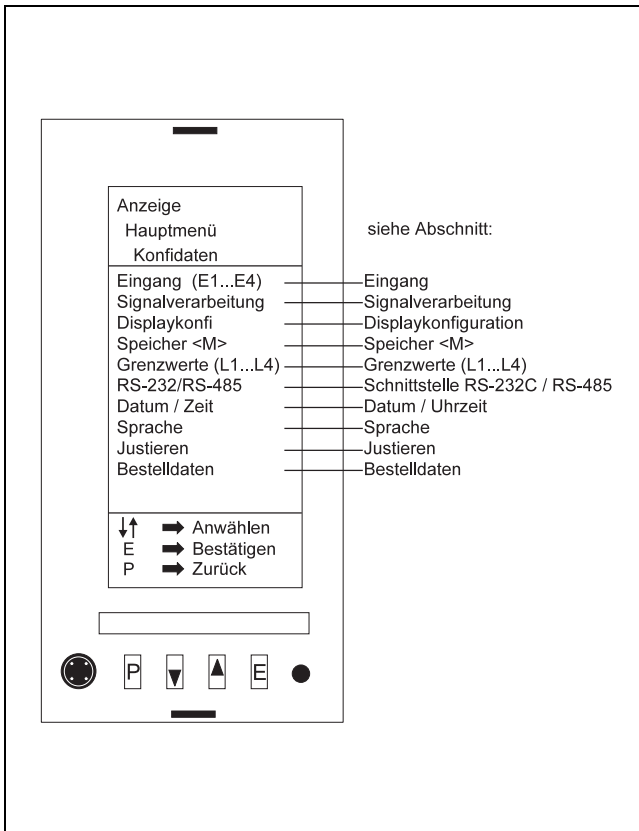


Fig. 13 "Confi(guration)data" submenu
R-16374 D7

A lock protects the configuration data against unauthorized access and unwanted changes. The lock can be disabled by a special button combination. The button combination has to be entered in the display mode. Make sure that no other buttons are actuated in the display mode prior to entering this button combination.

1. Call up the Select display menu:
<P>
2. Return to display:
<P>

This ensures that no other buttons have been actuated in the display mode. Now you can enter the button combination to disable the access protection lock.

3. Disable lock:
Hold <E> and press <P>, <▼>, <▲>, <▲>, <▼>, <P>
4. Call up the pict. select. menu:
<P>
5. Select the main menu :
<▼>/<▲>
6. Confirm:
<E>
7. Select the configuration data:
<▼>/<▲>
8. Confirm:
<E>

The configuration data can be edited then.

The (modified) configuration data are saved in the non-volatile memory (EEPROM).

The lock will automatically be re-enabled after around five minutes.

Input

The measuring range, scaling and engineering units can be configured individually for every input.

If required, perform steps 1 to 8 described in Section "Configuration" (Page 18) to call up the `confidata` menu.

1. Select input I1 ... I4.
<▼>/<▲>
2. Confirm:
<E>

Measuring range

3. Confirm the meas. range menu:
<E>
4. Select range (0...20 mA, 4...20 mA, user-defined):
<▼>/<▲>

For a user-defined measuring range it is required to define the limits (<▼>/<▲>) and confirm the setting (<E>).

5. Confirm:
<E>
6. Return to input menu:
<P>

Linear scale

7. Select the scale linear menu:
<▼>
8. Confirm:
<E>
9. Select point (position):
<E>, <▼>/<▲>
10. Confirm:
<E>
11. Select start of scale:
<E>, <▼>/<▲>
12. Confirm:
<E>
13. Select end of scale:
<E>, <▼>/<▲>
14. Confirm:
<E>
15. Select bargraph with scale (yes/no):
<E>, <▼>/<▲>
16. Confirm:
<E>
17. Return to input menu:
<P>

Non-linear scale

18. Select the scale nonlinear menu:
<▼>, <▼>
19. Confirm:
<E>
20. Select point (position):
<E>, <▼>/<▲>
21. Confirm:
<E>
22. Select characteristic line menu:
<P>
23. Return to input menu:
<P>

Units

24. Select the units menu:
<▼>
25. Confirm:
<E>
26. Select units:
<▼>/<▲>

Note

The following engineering units can be selected:

t / N / K
Ω / V / A / W / % / ‰ / m / g
Pa
°C / °F / Hz / mΩ / kΩ
MΩ / mV / kV / μA / mA
mW / kW / MW / mm / cm
m³ / kg / MN / pH / kn
ppm / kPa / MPa / l/h
t/h / mm/min
m/min
rad/s / 1/min
m³/h

If you should not find the desired unit in the selection list, you can define it by using the configuration program. "***PC**" will then be indicated as the parameter in the list.

27. Confirm:
<E>
28. Return to the input menu:
<P>
29. Select next input:
<▼>/<▲> and continue with step 2.
30. Return to the `confidata` menu:
<P>

Signal processing

If required, perform steps 1 to 8 described in Section "Configuring" (Page 18) to call up the `confidata` menu.

1. Select signal processing:
<▼>/<▲>

As every input is scanned once per second, but may be indicated in other intervals, depending on the selected time window, the measured values must be processed prior to being displayed.- There are two ways to calculate a point on the trend curve:

- Average value (in time window)
- Minimum or maximum value (in time window)

Except for the 90 s time window the minimum and maximum values are united by filling the pixel gap between the values, such that a more or less wide band is produced.

Trends that cross over this band are inverted.

When restoring values from the past, the maximum value is displayed in the digital display.

2. Select input I1 ... I4.
<▼>/<▲>
3. Confirm:
<E>
4. Select either average value or minimum/maximum values:
<▼>/<▲>
5. Confirm:
<E>
6. Select next input:
<▼>/<▲> and return to step 3.
7. Return to the `confidata` menu:
<P>

Configuring the Display

If required, perform steps 1 to 8 described in Section "Configuration" (Page 18) to call up the `confidata` menu.

1. Select the `displayconfi` menu:
<▼>/<▲>
2. Confirm:
<E>
3. Select input I1 ... I4 in display A:
<▼>/<▲>
4. Confirm:
<E>
5. Select curve width (1 (= thin) / 2 (= thick)):
<▼>/<▲>
6. Confirm:
<E>
7. Select display (yes/no):
<▼>/<▲>

Note

An input which has been disabled for display in the configuration menu cannot be enabled in the "Skip" menu.

8. Confirm:
<E>
 9. Select filling with color (yes/no):
<▼>/<▲>
 10. Confirm:
<E>
 11. Select next input:
<▼>/<▲> and return to step 6.
 12. Select grid (on/off):
<E>, <▼>/<▲>
 13. Confirm:
<E>
 14. Select input I1 ... I4 in display B:
<▼>/<▲> and return to step 6.
 15. Select "positive" (dark line on light background) or "negative" (light line on a dark background) display:
<E>, <▼>/<▲>
 16. Return to the `confidata` menu:
<P>
-

Memory <M>

If required, perform steps 1 to 8 described in Section "Configuration" (Page 18) to call up the `confidata` menu.

Continue with Section "Time per value".

1. Select the `memory<M>` menu:
<▼>/<▲>
 2. Confirm:
<E>
-

Time per value

Defines the time spacing between two measured value storages.

Note

With an average time spacing of 2 minutes per value for all channels and a measured value memory of 192 kbytes the storage capacity is sufficient for 30 days.

A skipped input is not saved.

3. Select time per value:
<E>
 4. Select time for I1 (1 / 4 / 12 / 20 / 40 s 2 / 6 / 10 / 16 min):
<▼>/<▲>
 5. Confirm:
<E>
-

6. Select time for I2:
<▼>/<▲>

... for all inputs (skip input with <E>).

7. Select Delete (memory) (yes/no):
<E>, <▼>/<▲>
8. Confirm:
<E>

Continue with Section "Alarm signal <M> ..." or return to the `confidata` menu with <P>.

Alarm signal "M" indicating full memory

When continuing, the storage time remaining with the selected configuration is indicated.

If the memory is either erased or empty this is equivalent to the total storage time.

The memory uses the „FIFO“ (= first in, first out) principle, i.e. if the memory is full the measured values saved first in the memory are deleted first to free enough space for the new values. To avoid measured data loss and to be able to read out the memory in due time by using the readout and data conversion program, a warning time and an alarm signal can be configured.

9. Select time unit (day/hour/minute):
<▼>/<▲>
 10. Confirm:
<E>
 11. Modify value:
<▼>/<▲>
 12. Confirm:
<E>
 13. Return to the `confidata` menu:
<P>
-

Limits (L1...L4)

If required, perform steps 1 to 8 described in Section "Configuration" (Page 18) to call up the `confidata` menu.

1. Select input I1 ... I4.
<▼>/<▲>
2. Confirm:
<E>
3. Select type for limit L1:
<▼>/<▲>

LH = Low limit
HL = High limit
LH = Limit not active

4. Confirm/select next limit:
<E>

6. Select type for limit L2:
<▼>/<▲>

... for all limits and all inputs (press <▼>/<▲> to skip an input).

Continue with Section "Operating principle ..." or return to the `confidata` menu with <P>.

Operating principle

7. Select operating principle (NO contact operation, NC contact operation):
<E>, <▼>/<▲>
8. Confirm:
<E>

Continue with Section "Hysteresis ..." or return to the `confidata` menu with <P>.

Hysteresis

9. Select hysteresis (0.5 / 1 / 2 / 5 / 10 %):
<E>, <▼>/<▲>
10. Confirm:
<E>

Continue with Section "Lock ..." or return to the `confidata` menu with <P>.

Locking

11. Select lock (on/off):
<E>, <▼>/<▲>
12. Confirm:
<E>

13. Return to the `confidata` menu:
<P>
-

RS-232C / RS-485 Serial Interface

Note

Configuring this interface is only necessary if the RS 485 interface is to be used as well.

If required, perform steps 1 to 8 described in Section "Configuration" (Page 18) to call up the `confidata` menu.

1. Select RS 232 / RS 485:
<▼>/<▲>
2. Confirm:
<E>
3. Select the interface:
RS 232 on the front panel, for configuration via a PC
Even parity
1 stop bit
Transmission rate 9600 bauds
RS 485 (on the rear side, for connecting the device as a slave to a device bus)
<E>, <▼>/<▲>
4. Confirm:
<E>
5. Select switching option (yes/no):
<E>, <▼>/<▲>
6. Confirm:
<E>

When using the RS485 interface, the address and baud rate (= transmission rate) must be configured (otherwise return to the `confidata` menu with <P>):

7. Select the address:
<E>, <▼>/<▲>
8. Confirm:
<E>
9. Select the baud rate (300 / 600 / 1200 / 2400 / 4800 / 9600 / 19200):
<E>, <▼>/<▲>
10. Confirm:
<E>
11. Return to the `confidata` menu:
<P>

Note

Only if the interfaces have been configured as switchable, the "interface" parameter is displayed in the main menu, allowing the user to switch over.

Date / Time

Note

Daylight saving time/normal time and leap years must be set manually.

When the minute value is changed, the second value is reset to zero to allow for exact starting.

If the device has no buffer battery, the time setting will be lost around 2 hours after the power has been switched off and must be entered again.

When the time is set back, two measured values are assigned to each point in time. When data is restored from the past, the next available value is displayed. If several data are assigned to the same point in time, they can be scrolled.

If required, perform steps 1 to 8 described in Section "Configuration" (Page 18) to call up the `confidata` menu.

1. Select time/date:
<▼>/<▲>
2. Confirm:
<E>
3. Select the time data that is to be set (year, ..., minute):
<▼>/<▲>
4. Confirm:
<E>
5. Adjust:
<▼>/<▲>
6. Confirm:
<E>
7. Select next data:
<▼>/<▲>
or
Return to the `confidata` menu:
<P>

Language

If required, perform steps 1 to 8 described in Section “Configuration” (Page 18) to call up the `confidata` menu.

1. Select the `language` menu:
<▼>/<▲>
 2. Confirm:
<E>
 4. Select the language (German, English ...):
<▼>/<▲>
 5. Confirm:
<E>
 6. Return to the `confidata` menu:
<P>
-

Calibration

If required, perform steps 1 to 8 described in Section “Configuration” (Page 18) to call up the `confidata` menu.

1. Select the `calibrate` menu:
<▼>/<▲>
 2. Confirm:
<E>
 3. Select input:
<▼>/<▲>
 4. Confirm:
<E>
 5. Follow instructions 1) and 2).
 6. Start:
<E>
 7. Perform step 3)
 8. Start:
<E>
 9. Follow instruction 4)
 10. Return to the `input` menu
<P>
 11. Adjust the next input
continue with step 3
or return to the `confidata` menu:
<P>
-

Order Data

If required, perform steps 1 to 8 described in Section “Configuration” (Page 18) to call up the `confidata` menu.

1. Select the `order data` menu:
<▼>/<▲>
2. Confirm:
<E>

The following information is displayed:

- device type,
- catalog number,
- device number and
- software revision.

3. Return to the `confidata` menu:
<P>
-

Standard Configuration

Inputs	0...20 mA
Numerical values	0...100 %
Signal processing	Average value
Display configuration	All displays Display A: Displays I1, I3, curve width 1 Display B: Displays I1, I3, curve width 2 No filling with color
Memory I1...I4	2 min
Alarm signal	12 h
Limits	L1 → I1, L2 → I2, etc. Maximum signal 100 % NO contact operation Hysteresis 0.5 % Locking off
Time window	3 h
Interface	RS-232C Not switchable Address: hex 22
Calling up memory	directly with <▼>/<▲>

Configuring by using a PC

Note

During configuration the device is "off line", i.e. no data is being registered.

1. Switch on the device .
2. Connect PC to the RS-232C- interface on the front side (see figure on title page and figure 2 on page 6).
3. Start the PROG1 program.
4. If required, switch the device over to the RS232C interface.
5. Follow the program instructions displayed on the screen.

Retrofitting/Extension

Warning

When opening covers or removing parts, live parts may be exposed, even if no tool is required to do this work. Also, connecting points may be live.

Prior to any work requiring that the device is opened, disconnect the device from the power source. Only qualified personnel who are familiar with the potential danger are allowed to work on an open device under power.

Note that capacitors in the device still may be charged, even if the device has been disconnected from all power sources.

Do not replace fuses with fuses of different type or nominal current. Do not use “repaired” fuses. Do not shorten the fuse holder.

Immediately stop operation and take measures to prevent accidental switch-on of the device if you must assume that the device is no longer safe.

You must assume that the device is no longer safe

- if the device has visible damages,
- if the device does no longer work,
- if the device has been stored for a longer time period in a harsh environment,
- if the device has been exposed to harsh transportation conditions.

Warning

The cards contain MOS components.

When working on the open device, take the appropriate ESD precautions (wear grounding strap, ground working area).

Preparation

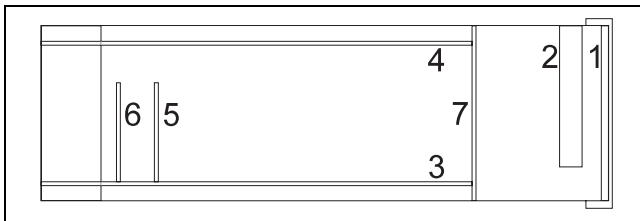


Fig. 14 Card slot assignment
Z-16376

1	Display unit
2	Illumination unit
3	Motherboard
4	Power supply card
5	Limit card
6	Measuring range card
7	Distributor card

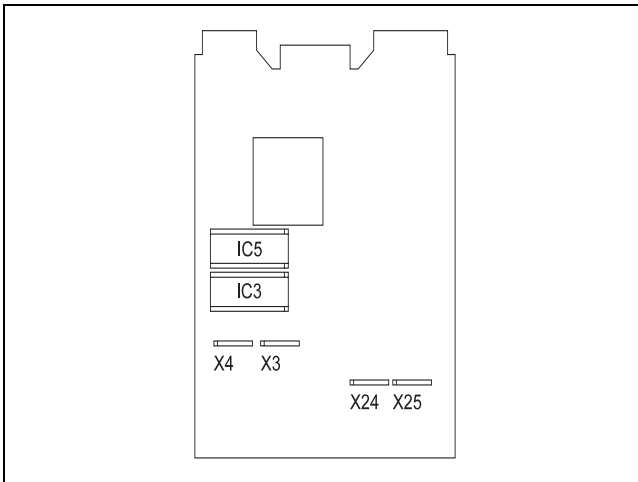
Note

If a voltage test to DIN EN 61 010-1 is required after retrofitting or conversion, follow the test instruction 4-9848 (1). The test instruction can be ordered from the manufacturer.

Follow the instructions below:

1. Dismount the device.
2. Remove all pluggable screw terminals from the back of the device.
3. Loosen three retaining springs on the edges of the housing back.
4. Remove the rear wall of the housing.
5. Remove the motherboard 3.
6. Disconnect the grounding conductor.
7. Remove the power supply card 4.
8. Repeat all steps in reverse order to re-assemble and replace the device (Warning: Make sure that the grounding conductor is reconnected!)

Mounting the Measuring Range Card



1. Unplug (old) measuring range card 6 from connector X24X25 and remove.
2. Plug (new) measuring range card 6 into connector X24X25.

Fig. 15 Motherboard
Z-16375 Terminal blocks X4X3, X24X25
Socket for memory extension IC3

Mounting the Limit Card

(see fig. 15)

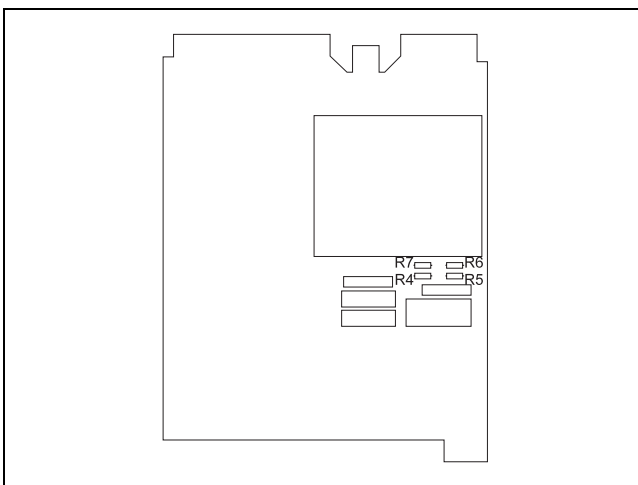
1. Plug limit card 5 into connector X3X4.

Extending the Memory

(see fig. 15)

1. Connect the CMOS-RAM IC3 to the appropriate socket IC3.

Changing the Power Supply



- 230 V model: bridge R5 and R6
- 115 V model: bridge R4 and R7
- 24 V model: replace power supply card 4

Fig. 16 Power supply card (4 in fig. 14)
Z-16369 115 V: R4, R7
230 V: R5, R6

Maintenance

Warning

When opening covers or removing parts, live parts may be exposed, even if no tool is required to do this work. Also, connecting points may be live.

Prior to any work requiring that the device is opened, disconnect the device from the power source. Only qualified personnel who are familiar with the potential danger are allowed to work on an open device under power.

Note that capacitors in the device still may be charged, even if the device has been disconnected from all power sources.

Do not replace fuses with fuses of different type or nominal current. Do not use “repaired” fuses. Do not shorten the fuse holder.

Immediately stop operation and take measures to prevent accidental switch-on of the device if you must assume that the device is no longer safe.

You must assume that the device is no longer safe

- if the device has visible damages,
- if the device does no longer work,
- if the device has been stored for a longer time period in a harsh environment,
- if the device has been exposed to harsh transportation conditions.

Warning

The cards contain MOS components.

When working on the open device, take the appropriate ESD precautions (wear grounding strap, ground working area).

Cleaning

Warning

Do not use aggressive substances for cleaning.

Clean the display with a cloth that is either dry or moistened with a mild detergent.

Replacing the Display Light

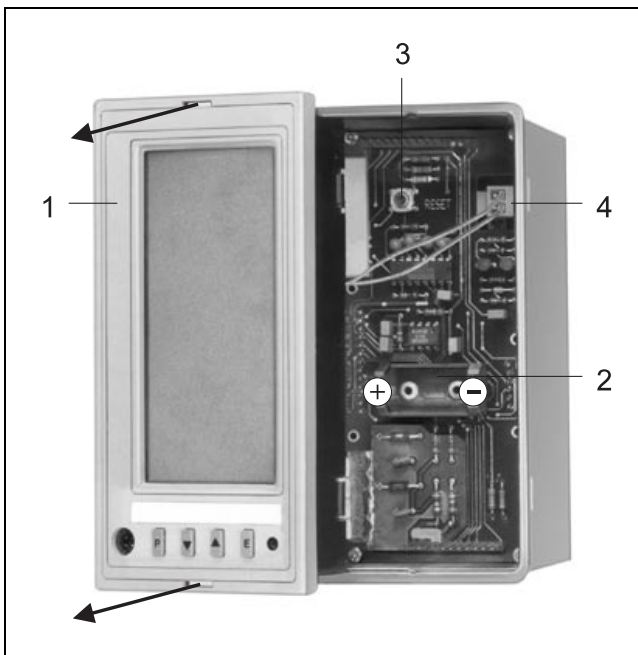


Fig. 17 Display unit removed

Z-16422	1	Display unit
D1	2	Battery space
	3	Reset
	4	Plug connector for illumination unit

1. Insert the plastic keys delivered with the device into the slots on the front.
2. Carefully remove the display unit 1 towards the front.
3. Disconnect the illumination unit 4.
4. Loosen the three Philips screws on the bottom side of the illumination unit 1.
5. Remove the side part from the illumination unit 1.
6. Remove the lighting gear.
7. Carefully pull the tube out of the lighting gear.
8. Insert the new tube.
9. Re-install the illumination unit 1. Follow the instructions 1 to 6 in reverse order. Make sure that the binding posts of the two card connectors (top and bottom) are not bent. - Lay the connection cable around the cutout to achieve strain relief (as before).

Replacing the Battery

(see fig. 17)

Note

The battery has a total service life of around two years.

While the battery is being replaced, a capacitor provides for power supply in order to maintain the measuring values and time.

1. Insert the plastic keys delivered with the device into the slots on the front.
2. Carefully remove the display unit 1 towards the front.
3. Disconnect the illumination unit 4.
4. Remove the battery from the battery holder.
5. Replace the new battery in the battery holder (Warning: Do not re-verse polarity (see fig. 17)).
6. Re-install the illumination unit 1. Follow the instructions 1 to 6 in reverse order. Make sure that the binding posts of the two card connectors (top and bottom) are not bent. - Lay the connection cable around the cutout to achieve strain relief (as before).

Malfunctions

Some device functions are monitored by the device itself. If a malfunction is reported, (display: „#...“) either

1. Acknowledge with <E>

or (if acknowledgment is not possible)

1. Remove the display unit (see fig. 17, page 22).

2. Press the Reset button (3 in fig. 17), with the power supply being switched on.
3. After successful reset, check the configuration.
4. If the error should occur again, contact the manufacturer.

Technical Data

Inputs

Total of 4
Permissible common mode voltage $\leq \pm 6.5$ V between the inputs and against ground

Measuring ranges

0... $\pm 1/20$ mA, $\Delta U < 1$ V
0... ± 10 V, $R_i > 100$ k Ω
0... ± 1 V, $R_i > 100$ k Ω

Measured value error

> 0.1 % of measuring range ± 1 digit

Display

Trends: Average value or minimum/maximum values:
Bargraphs/digits: Momentary value

Resolution

Graphics display: 92 x 200 pixels
Digital display: ± 9999 digits

Scanning rate

All inputs once per second

Time window

Visible time range
90 s
3 / 6 / 18 / 30 min
1 / 3 / 9 / 15 / 24 h

Scaling

Linear and non-linear

Units

Freely selectable

Reference conditions

Temperature 23 °C ± 2 °C

Storage cycle

Time spacing between two storage values:
off
1 / 4 / 12 / 20 / 40 s
2 / 6 / 10 / 16 min

Data storage

Configuration data unlimited (EEPROM)
Measured value storage:
without battery > 2 h
with battery approx. 2 years

Storage capacity

64 Kbytes or 192 Kbytes
(approx. 32000 or 96000 measured values)

Limits

Total of 4 (optional)
Transistor output: open collector
 $V_{\max} = 30$ V, $I_{\max} = 40$ mA
Optical signal acknowledgeable
High/low alarm limits
NO/NC current operation
Hysteresis 0.5 % / 1 % / 2 % / 5 % / 10 %, selectable

Interface

RS-232C (front)
Even parity
1 stop bit
Transmission rate 9600 bauds
RS-485 (rear)
Transmission rate 300...19200 bauds
Address 00..FF (hex.)

Power supply

AC voltage: 115 V
AC voltage: 230 V
AC/DC voltage: 24 V
Permissible deviation:
AC voltage $-10...+15$ %
DC voltage ± 25 %
Frequency: 48...62 Hz
Power consumption: around 6.5 W or 10 VA
Battery (optional): Type CR 1/2 AA, 3 V, Li

Protection class

I

Overvoltage category

III (power supply 115 / 230 V)
II (all other current circuits)

Pollution level

2

Test voltage

Power supply 115 / 230 V against inputs/outputs: 3.7 kV

Environmental capabilities

Complies with climate class 3K3 to DIN EN 60 721-3-3
Ambient temperature 0...40 °C
Transport and storage temperature $-20...60$ °C (2K2)
Relative humidity ≤ 75 % (annual average)
Avoid condensation

Mechanical capabilities

According to DIN IEC 68-2-6 and DIN EN 60 068-2-27
Shock 30g / 18 ms
Vibration 2g / 0.15 mm / 5...150 Hz

Protection class

According to DIN VDE 0470 Part 1 / EN 60 529 / IEC 529
Front side IP 40
Housing IP 30
Terminals IP 20

Electromagnetic compatibility

EMI/RFI shielding to DIN EN 50 082-2 or DIN EN 61 000-4-x
RFI suppression DIN EN 55 011, Class B
NAMUR NE21: standard requirements

Mass

1.5 kg

Standard configuration

Inputs	0...20 mA
Numerical values	0...100 %
Signal processing	Average value
Display configuration	All displays Display A: Displays I1, I3, curve width 1 Display B: Displays I1, I3, curve width 2 No filling with color
Memory I1...I4	2 min
Alarm signal	12 h
Limits	L1 → I1, L2 → I2, etc. Maximum signal 100 % NO contact operation Hyteresis 0.5 % Locking off
Time window	3 h
Interface	RS-232C Not switchable Address: hex 22
Calling up memory	Directly with <▼>/<▲>

Software

Configuration: PROG1

- creates a configuration data set and transmits it to the device
- reads the configuration of a device and prints it out

Data readout and conversion: PROG2

- reads the memory of a device and creates a binary file
- converts a binary file into an ASCII file (completely or in selectable time intervals)

Trend evaluation: PROG3

- displays a binary file as a (coloured) curve
 - analyzes the curves by zooming the amplitude and/or the time axis/axes
 - creates print files in .dxf or .hpg(l) format
 - prints trend displays on a postscript printer
-

Packaging for Transport or Return to Manufacturer

If the original packaging material is no longer available, wrap the display unit in a padded plastic film or corrugated paper board.-- Put the wrapped device in a box laid out with a damping material like foamed plastics. The thickness of the damping material should be in accordance with the device weight and the type of transportation. Label the box with a "handle with care" sticker.

For overseas shipping always add a dessiccant bag and then weld the device in a polyethylene foil of 0.2 mm. Adapt the amount of desiccant to the packing- volume and the approximate transportation time (at least 3 months). Additionally line the box with a layer of union paper.

Spare Parts, Retrofit Parts, Software

The spare parts for the trend display unit are compiled in the following spare parts list. When ordering spare parts please notify the de-signation and the catalog number of the spare part. Also notify the serial and order number specified on the type label.

Note that the designations in the spare parts list, the order confirmation, the delivery note and the invoice may be different from the designations used in the present operating instructions, which are rather related to the parts' functions.

The catalog number is decisive.

Designation	Catalog number
Panel mounting clamps	30805-4-0861753
Tag plate, grey	30805-4-09626468
Tag plate, white	30805-4-0626438
Memory extension to 192 Kbytes (IC 3)	30805-4-0761782
Measuring range card (selectable measuring ranges)	30805-4-0761779
Limit card	30805-4-0761780
Battery type CR 1/2 AA, 3 V	30805-4-0742896
Power supply 24 V UC	30805-4-0761776
Power supply 115 / 230 V AC	30805-4-0761775
Display unit without illumination, grey RAL 7032	30805-4-0761777
Display unit without illumination, black RAL 9005	30805-4-0761778
Illumination unit (including tube and cable)	30805-4-0783296
Tube for illumination unit	30805-4-0783297
Link cable between PC and display unit	30804-4-0761798
PROG1 3.5" diskette	30895-5-3100391
5.25" diskette	30895-5-3100392
PROG2 3.5" diskette	30895-5-3100393
5.25" diskette	30895-5-3100394
PROG3 3.5" diskette	30895-5-3100408
5.25" diskette	30895-5-3100409
Interface description	30895-5-3100210

Subject to technical changes.

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