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Important instructions for your safety! Please read and observe!

Correct and safe operation of the Indicomp 4 calls for appropriate transportation and storage, expert installation and commissioning as well as correct operation and meticulous maintenance.

Only those persons conversant with the installation, commissioning, operation and maintenance of similar apparatus and who possess the necessary qualifications are allowed to work on the Indicomp 4.

Please take note of

- the contents of this Operating Manual,
- the safety regulations affixed to the Indicomp 4
- the safety regulations pertaining to the installation and operation of electrical systems.

The directives, norms and guidelines mentioned in this Operating Manual are applicable in the Federal Republic of Germany. When using the Indicomp 4 in other countries, please observe the national regulations prevailing in the respective country.

The Indicomp 4 has been designed and tested in accordance with DIN VDE 0411 Part 1 "Safety requirements for electronic measuring apparatuses" and has been supplied in a safe condition. In order to retain this condition and to ensure safe operation, the safety instructions in this Operating Manual bearing the headline "Attention" must be observed! Otherwise, persons can be endangered and the Indicomp 4 itself as well as other equipment and facilities can be damaged.

If the information in this Operating Manual should prove to be insufficient in any point, the Hartmann & Braun Service Department will be delighted to give you more information.

Remarks on terminology

<Key> describes the operator keys on the front panel for carrying out specific operating steps (<Key> <Key> ...: repeated use of keys, <Key> + <Key> + ...: simultaneous use of keys)

Text describes a text in the digital part of the display.

"Text" Inscription on the unit.

The statement "right", "left" or "up", "down" are – if not stated otherwise – should be understood to mean when viewed from the front.

Application and description

The bar-type unit is designed for the display of process signals.

The values are illustrated as figures and bar-type displays. In order to adapt to local lighting conditions, an "active" or "passive" display can be used optionally.

A maximum number of four signals can be monitored. Alarm value infringements are signalled by a relay or transistor output.

The parameters can be modified on the unit itself or by using a software installed on PC.

Installation

Scope of supply and delivery

- 1 bar-type display 4
- 2 screw-on brackets
- 2 plastic keys
- this operating manual

Supplementary documents

Data Sheet
Interface description

1. Selecting the mounting location

1. Installation:
in panels or mosaic panel fields
2. Ambient temperature:
0...50 °C
3. Relative humidity:
up to 75 % in annual average; max. 95 %
no condensation
corresponds to the climatic category KWF to DIN 40 040
corresponds to the climatic category 3K3 to DIN IEC 721 Part 3-3
4. Construction:
“Close-density design” only permissible in contiguous arrangement
5. For good readability, mount the unit at about 10° above eye level and at a sideview of maximally 20°.
6. For units with an “active”, i.e. illuminated display a black background increases the contrast. For units with a “passive”, i.e. unilluminated display, a brightly lit background increases the contrast.

2. Mounting

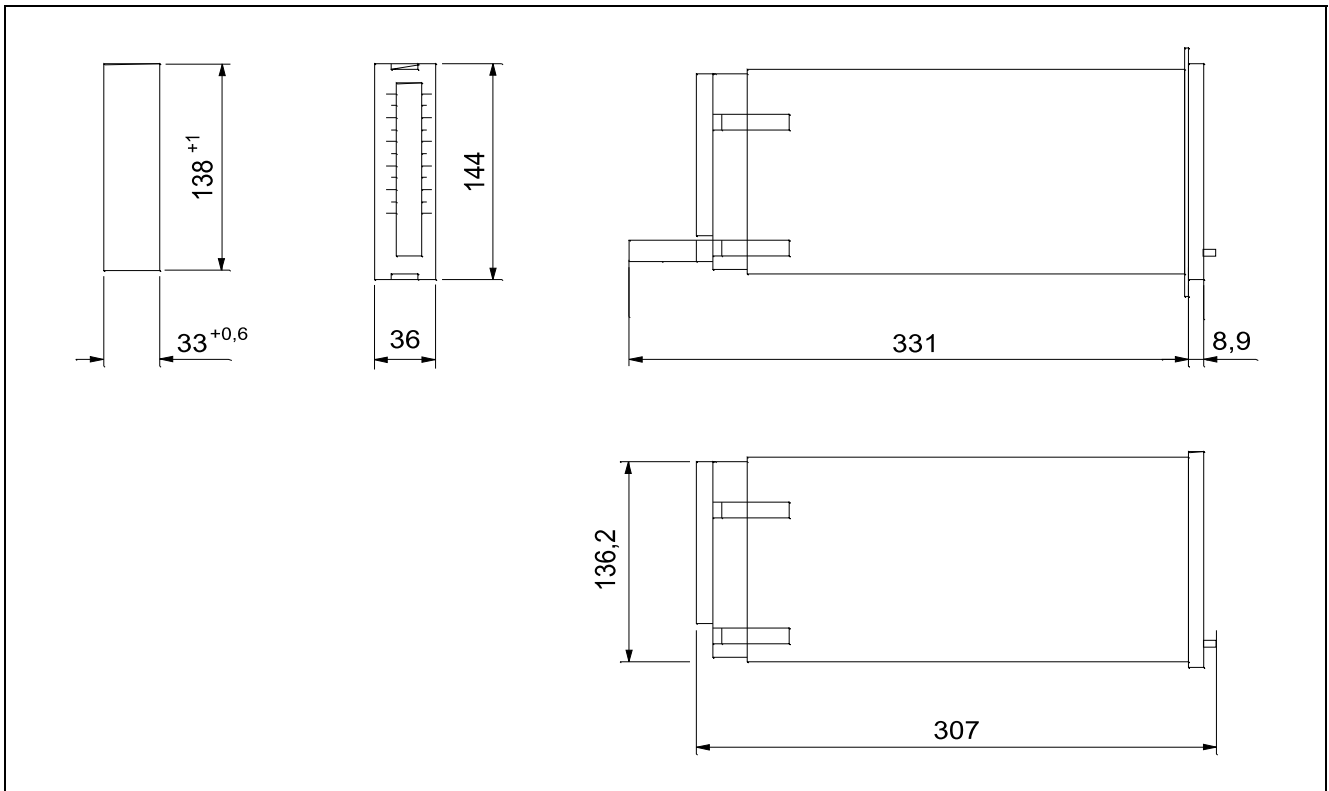


Fig. 1 Dimensional drawing (in mm) (left: panel cutout)
Z-16781

Panel cutout

see dimensional drawing fig. 1.

Installation

1. Push the unit into the panel cutout or mosaic panel field from the front.

2. Fit the screw terminals on the back panel into the rivets on the case wall.
3. Use a screw driver to tighten the threaded spindles against the panel or the mosaic panel.

3. Connecting signal leads

(see figs. 2 ... 9)

Attention

Please observe the prevailing national regulations on the erection of power plants up to 1000 V when selecting cables and during installation.

Before all other connections are made, the protective ground terminal must be connected to a protective conductor.

Only current circuits should be connected to the inputs and outputs which are intrinsically isolated from circuits hazardous to the touch (DIN VDE 0106)

Notice

Measuring and signalling leads must be laid separately from power current cables.

To ensure trouble-free operation use shielded cables.

Terminal diagrams

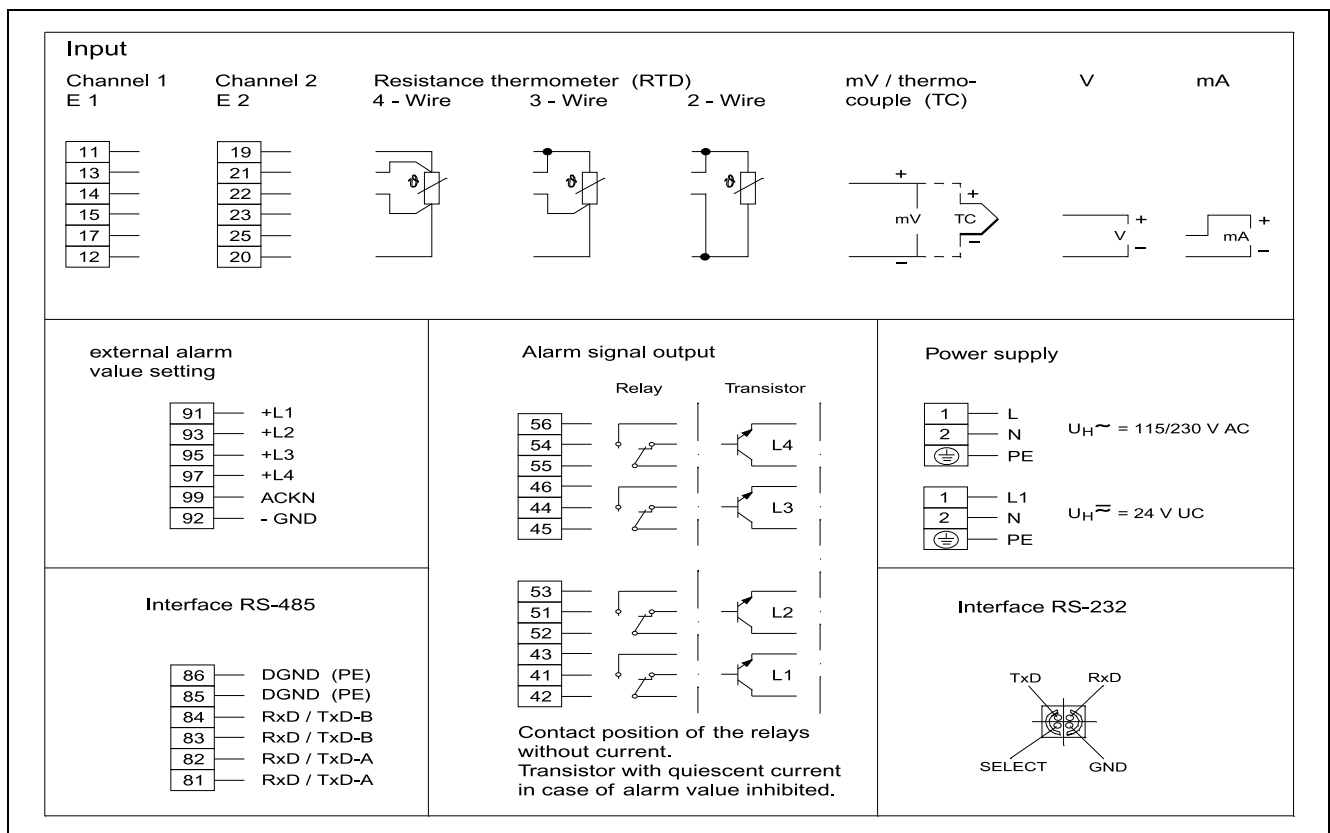


Fig. 2 Terminal diagrams
Z-17507

Interface RS-232C (front panel)

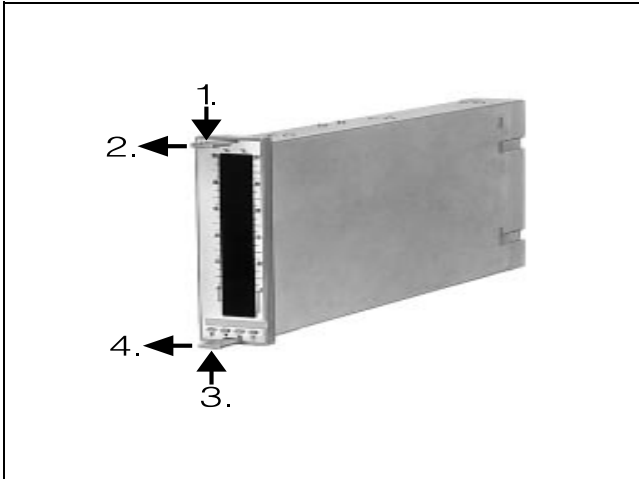


Fig. 3 Removing the display module
Z-16980

1. Hook the supplied plastic keys into the upper and lower slots on the front panel.
2. Alternatingly pull carefully on the plastic keys.
3. Remove the loosened display module.

The RS 232C interface is now accessible.

The cable of the RS-232C interface may only be connected when the apparatus is switched on.

Notice

If the apparatus is configured with a configuration software and a PC, the transmission speed must be set to 9600 bauds (see Chapter on "Configuring with PC").

If using the RS-232C interface, the RS-485 will be automatically inhibited.



Fig. 4 Interface RS-232C on front panel with socket connector
Z-16962

Interface RS-485 (with electrical isolation) (back panel)

(see figs. 5, 6, 7)

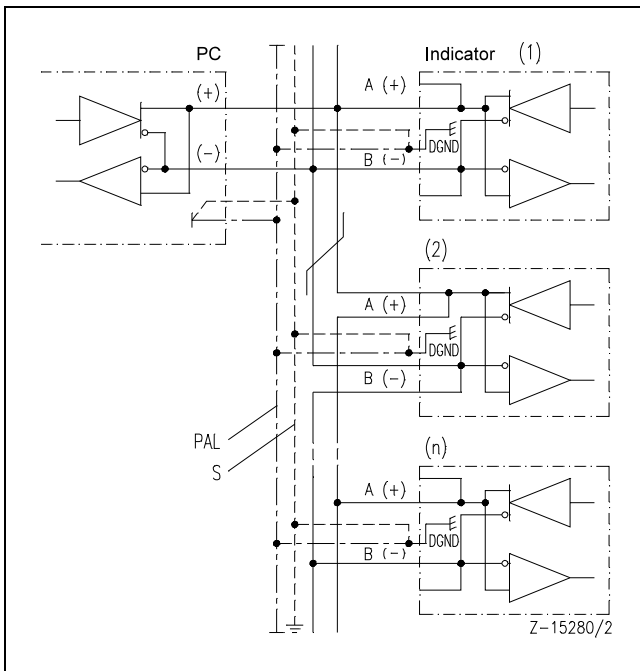


Fig. 5 Wiring diagram of interface RS-485
Z-15280/2 PAL Potential compensating lead
S Protecting conductor

Notice

Units which are not equipped with the option "Serial interface RS-485", may not be connected to the bus.

The maximum permissible common-mode voltage of the measuring section (measuring circuit/protective conductor ≤ 25 V) can only be guaranteed if the interface is electrically isolated (see below). If the electrical isolation is used, it will not be possible to externally activate the alarm control for L3 and L4.

1. Connection with screw terminals for wires up to 1.5 mm². Incorrect interchanging of the plug-in connectors is not possible.
2. Use a shielded pair cable for the bus.
3. Connect the cable shielding to both unit (terminals 85 or/and 86 ("DGND")) and computer with the chassis.
4. Ground the cable shielding to a central spot (e.g. panel or protective conductor) with low impedance.
5. Connect the reference leads of the respective units to an appropriately sized potential compensating lead.

Remarks

The transmission logs are described in a separate Operating Manual.

Electrical isolation

If several units are to be coupled to interfaces in a network environment, such interfaces should be electrically separated from the units.

1. Remove the interface module (see Chapter on "Conversion/Retrofitting").
2. Position the plug-in jumpers on the module as shown in fig. 6.
3. Connect the external floating direct voltage 10...25 V as shown in fig. 7.

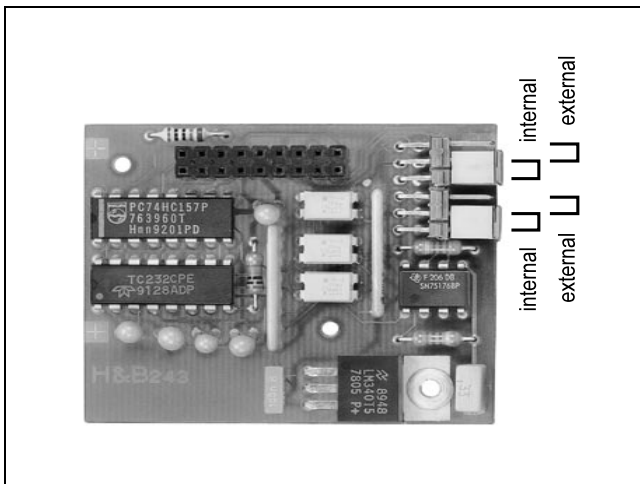


Fig. 6 Position of plug-in jumpers on the interface module 7 for internal or external power supply or for external voltage supply of electrically isolated interface RS-485
Z-16964

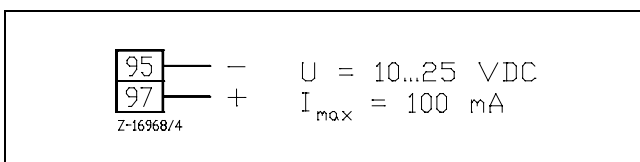


Fig. 7 Connection of power supply to the electrically isolated interface RS-485 with external voltage supply
Z-16968/4

Measuring circuits (back panel)

1. Connection using screw terminals for wires up to 1.5 mm². Wrongful interchanging of the plug-in connectors is not possible.
2. The measuring circuits must be more or less on the same potential, since a separation of the measuring circuits can only be effected to a maximum of 3 V (effective).
3. The maximum separation voltage between measuring circuit and protective conductor is 25 V (effective).
4. Lay feed and return conductors together within the same area.
5. Short-circuit input channels which are not required.

In the following measuring ranges any part or subparts thereof can be possible through configuration. If only parts of the range are selected, the resolution capacity of the bar-type display must be taken into account.

Direct current (mA)

-24...+24 mA, Ri = 100 Ω
Overload rating: 100 mA continuous

Direct voltage

-12...+12 V, Ri > 100 kΩ
Overload rating: 50 V continuous

Optional if the option "Sensor input" exists:

Direct voltage (mV)

-75...+75 mV, Ri > 100 kΩ
Overload rating: 50 V continuous

Thermocouple (TC)

Type	Range thresholds	max. deviation
J	-200 ... +800 °C	±0,13 % of final value
K	-100 ... +1300 °C	±0,16 % of final value
S	0 ... +1750 °C	±0,20 % of final value
R	0 ... +1750 °C	±0,20 % of final value
B	+400 ... +1800 °C	±0,20 % of final value
T	+100 ... +400 °C	±0,16 % of final value
E	0 ... +800 °C	±0,13 % of final value
N	-100 ... +1300 °C	±0,15 % of final value

Temperature coefficient
< 0,1 % / 10 K in range 0...50 °C

Overload rating: 50 V continuous

Additionally de/enable by parameterization:
internal or external reference junction, break monitoring, display in °F

Resistance thermometer (RTD)

Type	Range threshold	max. deviation
Pt 100 IEC	-200 ... +850 °C	±0,15 % of final value
Ni 100 DIN	-60 ... +180 °C	±0,22 % of final value

Temperature coefficient
< 0,1 % / 10 °C in range 0...50 °C

Overload rating: 50 V continuous

Additionally definable by parameterization:
2-, 3- or 4-wire connection, break monitoring, display in °F

Signal outputs (back panel)

The signal outputs can only be utilized, when the corresponding unit version exists or when the respective alarm cards have been retrofitted.

Transistor output

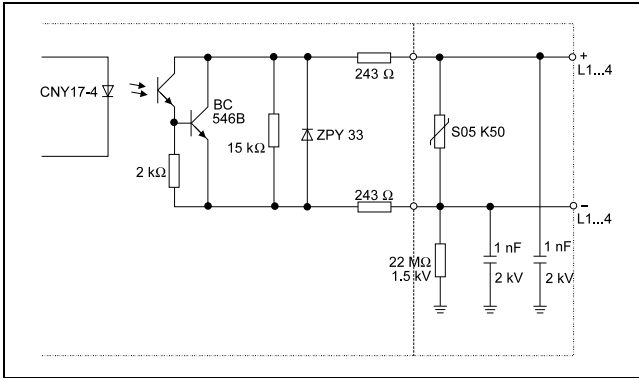


Fig. 8 Transistor output
Z-16368

The transistor outputs are electrically isolated and are open collectors.

The outputs have the following alarm values:

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

The switching principle (quiescent current or operating current), the switching function (min. or max. signal), response delay and the hysteresis are fixed by the configuration (see Chapter on "Configuration").

- **Quiescent current**
The transistor is inhibited in case of alarm value infringement.
- **Operating current**
The transistor conducts in case of alarm value infringement.
- **Power failure**
The transistor is inhibited in case of power failure.

Connection with screw terminals for wires up to 2.5 mm². Wrongful interchanging of the plug-in connectors is not possible.

Relay outputs

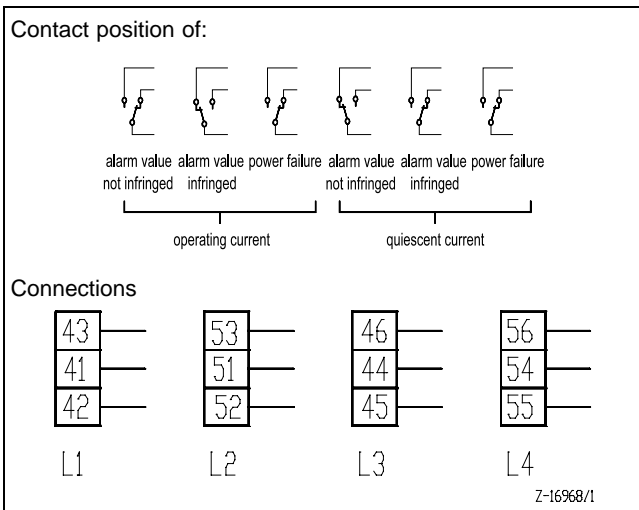


Fig. 9 Relay outputs
Z-16967
Z-16968/1

⚠ Attention

The supply leads of the relay outputs must be voltage-free, if connected to the 6-pin blade-type terminals. The same thing applies, when separating the relay outputs.

All four relay outputs may only be simultaneously connected to either

- "Functional extra-low voltage with intrinsically safe electrical isolation" or to
- "Circuits without safe electrical isolation".

In the case of operation with relay outputs, all relays may only be operated on the same mains network.

The relay outputs are floating changeover contacts.

The outputs have the following operating values:

- Minimum = 18 V, 10 mA DC
- Maximum = 250 V, 1 A AC

A basic isolation exists between the relay outputs for 250 V.

The switching principle (quiescent current or operating current), the switching function (minimum or maximum signal), the response delay and the hysteresis are fixed by the configuration (see Chapter on "Configuration").

Connection with screw terminals for wires up to 2.5 mm². Wrongful interchanging of the plug-in connectors is not possible.

External alarm value setting (back panel)

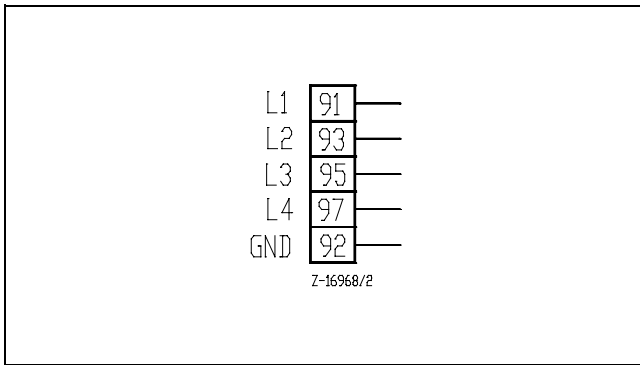


Fig. 10 Connections for external alarm value setting
Z-16968/2

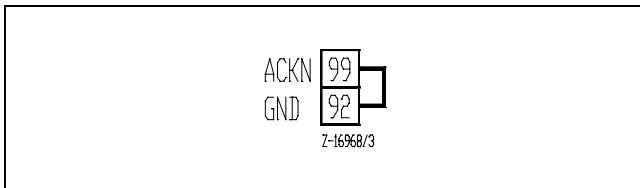


Fig. 11 Suppression of flashing
Z-16968/3

During the external alarm signal setting, state the alarms in default with a floating analog signal 0... 20 mA or 0...10 V to be connected. The four control inputs have a common reference potential.

1. Configure the apparatus (see Chapter on "Configuration")
2. Shield all extension leads.
3. Connect the shields to each other.
4. Connect shields on the apparatus to the protective conductor.
5. Connect wires up to 1.5 mm² with screw terminals. Wrongful interchanging of the plug-in terminals is not possible.

Suppression of flashing

In order to suppress the flashing of the bar-type display if an alarm value is infringed, terminals 92 and 99 located at the rear must be bridged.

4. Connecting the power supply

(see fig. 4)

⚠ Attention

Please observe the prevailing national regulations on the erection of power plants up to 1000 V when selecting cables and during installation.

Before all other connections are made, the protective ground terminal must be connected to a protective conductor.

Please provide a mains switch with enough switching capacity to fully disconnect the apparatus in the immediate vicinity of the installation site. It may not nullify the protective function of the protecting conductor.

The apparatus may only be supplied with an intrinsically isolated safety-low voltage (DIN VDE 0106) when applying a power supply of 24 V UC.

The rated strength of current of the overcurrent protective device on the installation side may not exceed 16 A.

The power supply must be externally secured with the following fuses in accordance with DIN 41 662:

- Alternating/direct voltage 24 V: T 0.8 A
- Alternating voltage 115 / 230 V: T 0.25 A

The supply cable of the power supply must be voltage-free, when connecting the power supply to the 3-pin (mains) connecting terminal. The same applies when disconnecting the power supply.

Wire end ferrules must be used to connect stranded wires to the 115/230 V power supply.

Notice

Connect wires up to 1.5 mm² with screw terminals. Wrongful interchanging of the plug-in terminals is not possible.

Commissioning and operation

Commissioning

Attention

Operate apparatus only when properly installed.

Before switching on the apparatus make sure it is set to the voltage of the power supply.

1. Switch on the unit with the external mains switch.
-

Operation

Operator keyboard

<P>	calls up a menu.
<▲> <▼>	switch on a further menu or change the selected parameters or change the contrast.
<E>	closes an input or acknowledges an alarm infringement.

Setting the contrast

in normal operation with the keys <▲> or <▼>.

User guidance

(see also fig. 12)

The user is guided, as far as possible, with information in the numerical part of the display.

All inputs must be terminated with <E>.

If, upon calling up a menu or an address, a key is not pressed within 60 s, the apparatus will spring automatically back to normal operation.

Wrong inputs or error functions of the apparatus are displayed with an error code bearing the code ERR in the numerical part of the display.

1. Call up the main menu:
<P>

LIM	Disregard alarm values or change them
CONF	Configure the apparatus with addresses
LIST	List the configuration data
END	Spring back to normal operation

2. Select the submenu:
<▲> or <▼>
 3. Call up the submenu:
<E>
-

Alarm values / Alarm value settings

The alarm values are displayed as pointers in the bar-type display. If the alarm values are within the bars, they are displayed inversely.

If an alarm value is infringed (alarm value is smaller or identical, bigger or identical with the measured value), the corresponding bar flashes. The signal is acknowledged with <E>.

(Configurable) Alarm value functions

- Mode of operation:
Set alarm on measured value \geq Maximum alarm
or \leq Minimum alarm
Reset alarm on
Measured value \geq Maximum alarm – hysteresis
or \leq Minimum alarm + hysteresis
- Response delay:
0 s (= 0,3 s) ... 20 s in 1 s steps
- Hysteresis
0...20 % in 0,5 % steps, in relation to the set span

Viewing and shifting alarm values

1. Call up the alarm value menu:
<P>

The alarm value adjustment is not inhibited:
LIM is displayed

Notice

If the alarm value adjustment is not inhibited, no alarm infringements will be displayed. The contact points are frozen upon accessing the menu.

2. Continue with 4.

Alarm value adjustment is inhibited:
LIM and VAL are displayed.

3. Cancelling the inhibition:
see Chapter on "Configuring" and continue with 4.
or
only view alarm values (keys <▼> and <▲> are blocked):
continue with 4.

4. Call up alarm value 1:
<E>

Displayed are LIM1 and the alarm value 1.

5. Shift alarm value 1 adjustment:
<▼> or <▲>

6. Acknowledge (new) alarm value 1 and call up alarm value 2:
<E>

7. Shift alarm value 1:
<▼> or <▲>

etc.

If the alarm value 4 is acknowledged with <E>, the unit jumps back to normal operation.

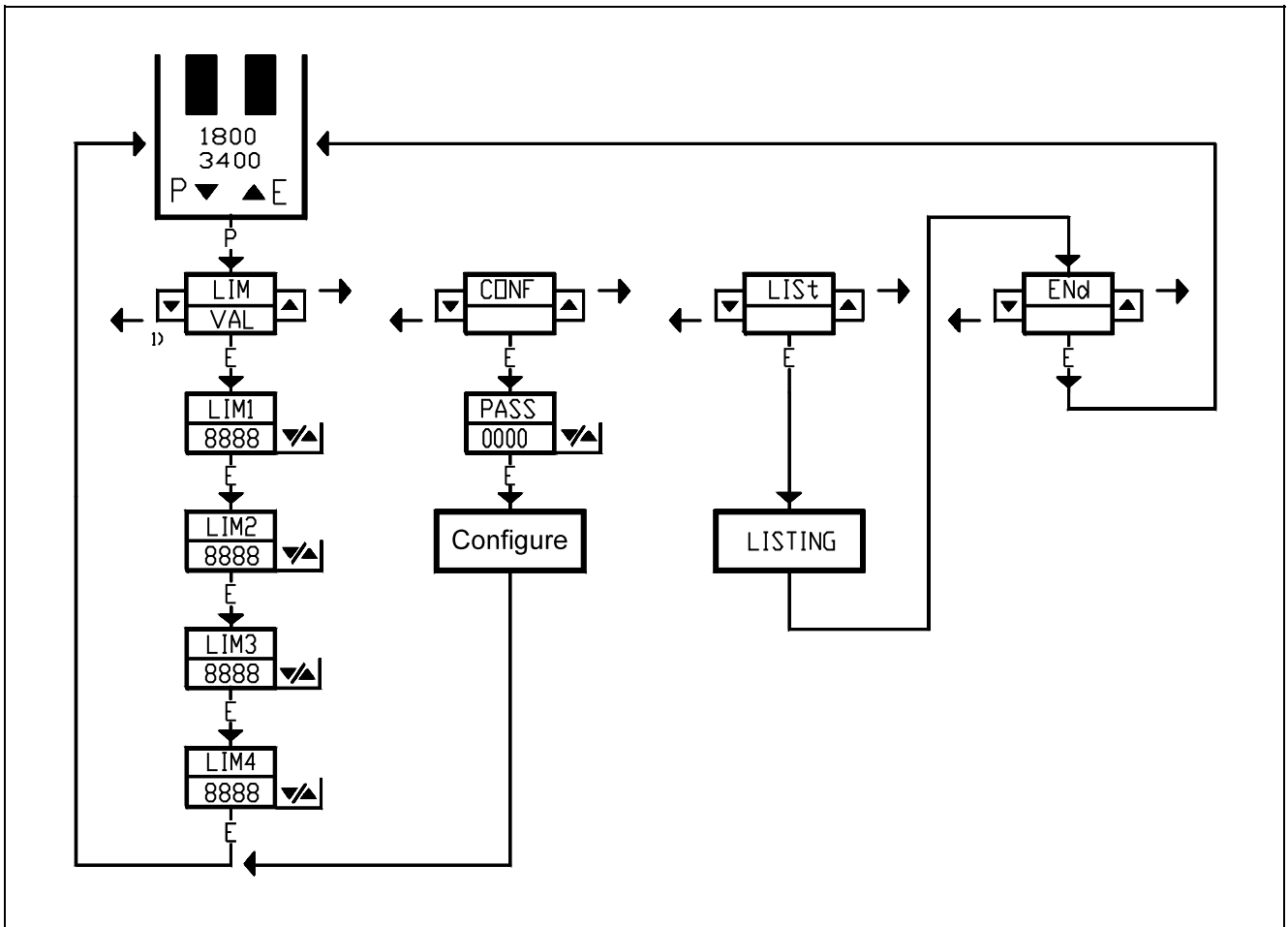


Fig. 12 1) If the definition of the alarm signal parameters by address is inhibited, the text VAL will be displayed under LIM on the second line of the digital display and the keys <▼> and <▲> are without function. The alarm values can only be viewed but not shifted.

Z-16970

Listing

The most important configuration data can be viewed with the menu "Listing".

1. Call up the main menu:
<P>

LIM View alarm values or modify them
 CONF Configure the unit with addresses
LIST List the configuration data
 ENd Jump back to normal operation

2. Select the submenu:
<▲> or <▼>

3. Call up submenu:
<E>

4. Continue with switch-on of parameters:
<E>
or
abort:
<P>

5. At the end acknowledge display ENd:
<E> <E>

The unit jumps back to normal operation.

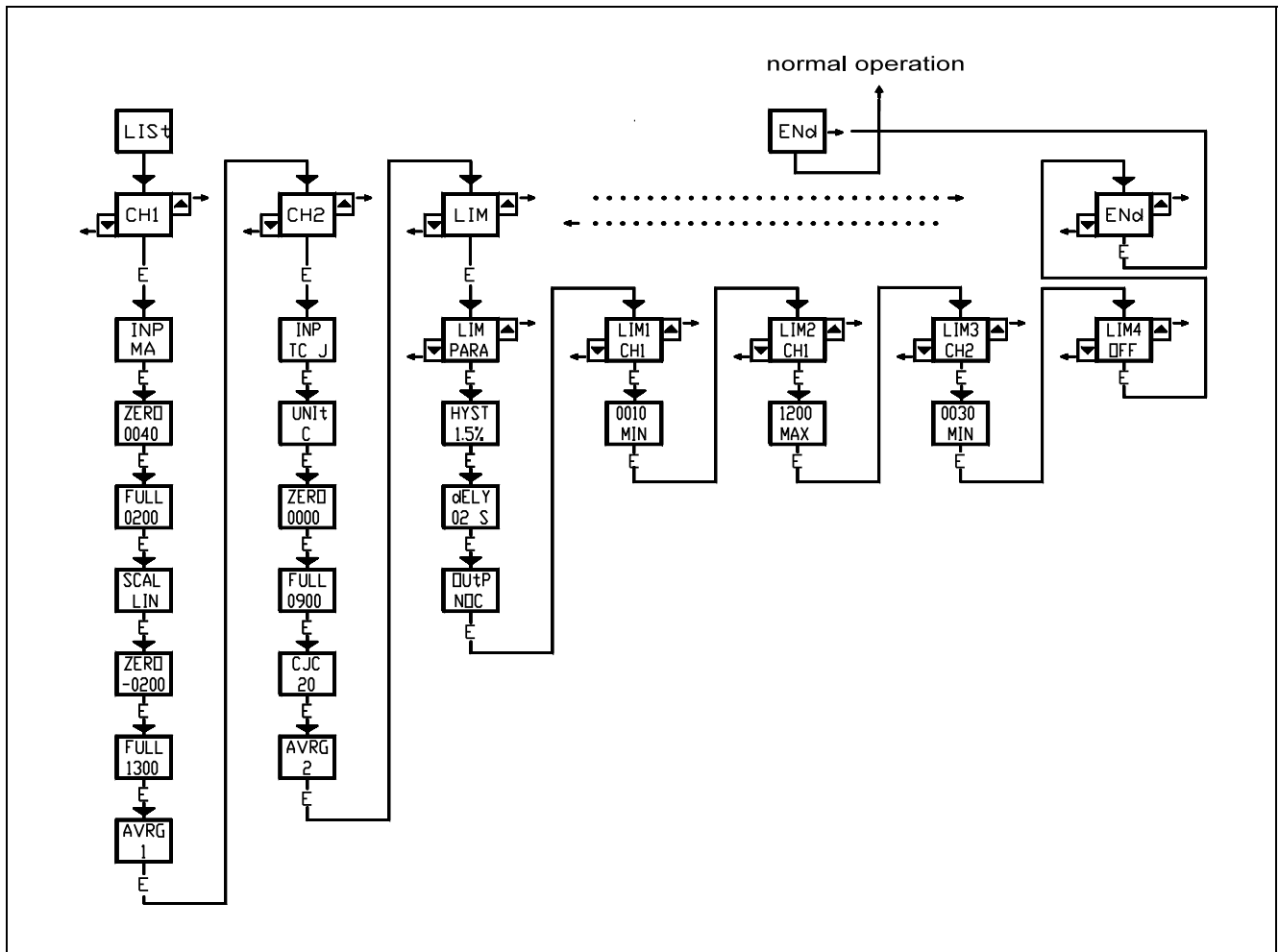


Fig. 13 The menu "Listing" with operator guidance and a configuration example
 Z-16971

Description of the Display

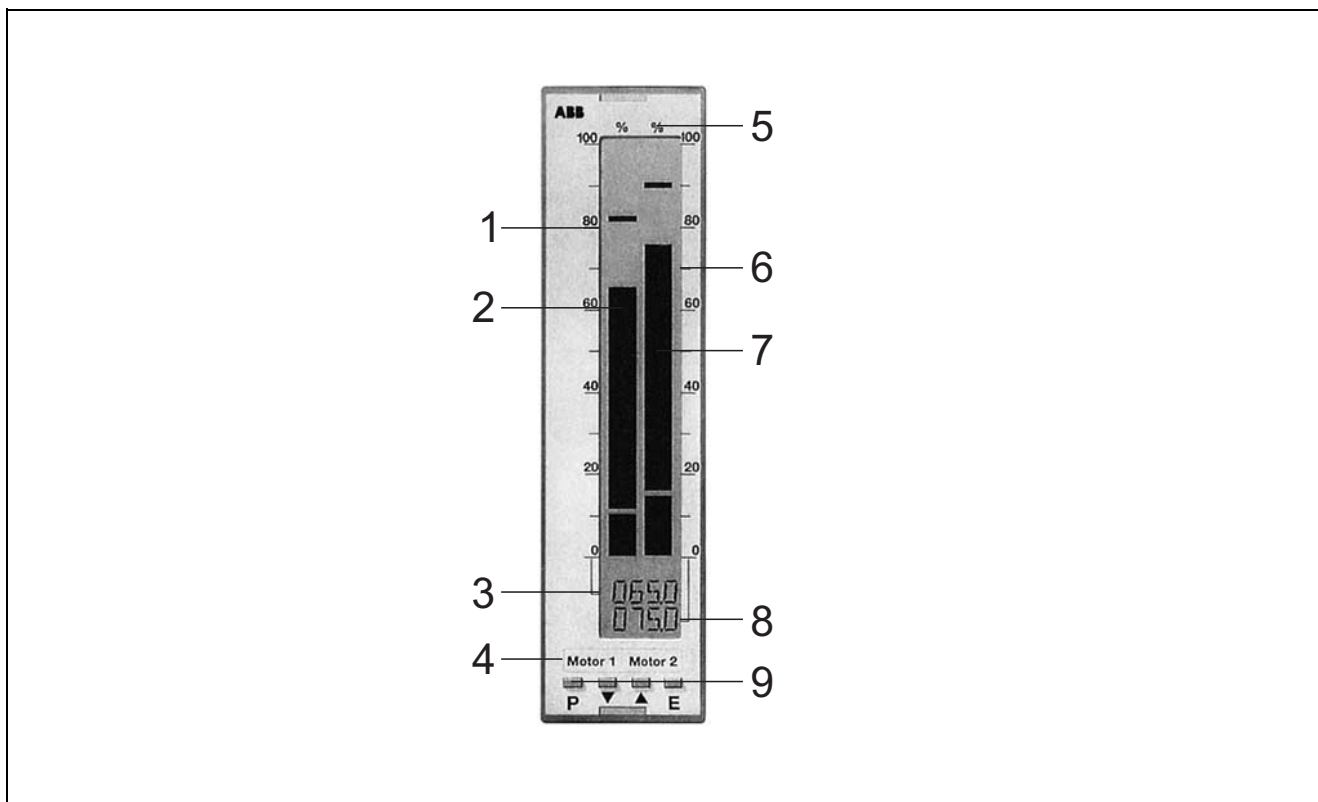


Fig. 14 General display

Z-16770

- 1 Scaling channel 1
- 2 Bar-type display channel 1
- 3 Digital display channel 1
- 4 Exchangeable tag plate
- 5 Legend on dimensions

- 6 Scaling for channel 2
- 7 Bar-type display for channel 1
- 8 Digital display for channel 1
- 9 Operator keyboard

Display of measured and alarm values

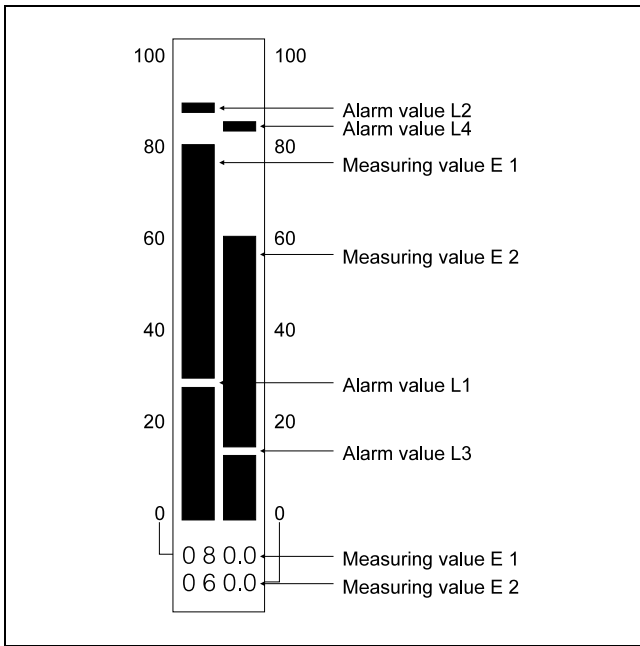


Fig. 15 Example: two-channel unit as display and alarm signalling unit
Z-16973

Measuring range overshooting

- H H H H is displayed in digital display
- the bar is fully modulated

Measuring range undershooting

- L L L L is shown in the digital display
- the lowest segment of the bar remains unchanged

Summation/Differential display

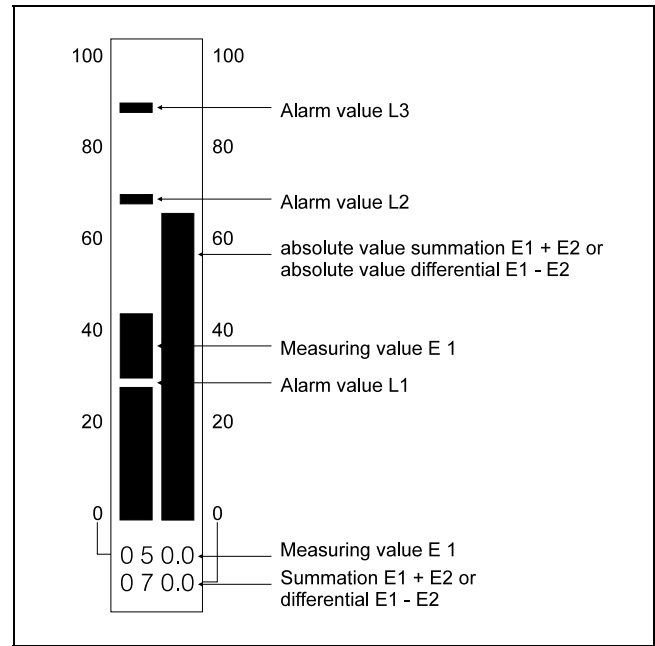


Fig. 16 Example: Summation/differential display "absolute"
on channel 2
Z-16974

Notice

This display is only possible for two-channel units, since the summation/differential variables are shown on the right bar.

For this display, both channels should have the same scaling (see Chapter on "Address lists").

Summation display: $E1 + E2$

- the sum is displayed as a magnitude in the right bar
- the sum $E1 + E2$ is shown in the digital display
- the function "start of bar Middle" is not possible
- alarm value cannot be stated on channel 2

Differential display: $E1 - E2$

- the difference is displayed in the right bar as a sum
- the difference is shown in the digital display $E1 - E2$ "with correct sign" (with minus symbol, if $E2$ is greater than $E1$)
- the function "start of bar Middle" is not possible
- alarm values cannot be stated on channel 2

Differential (deviation) display (“floating”)

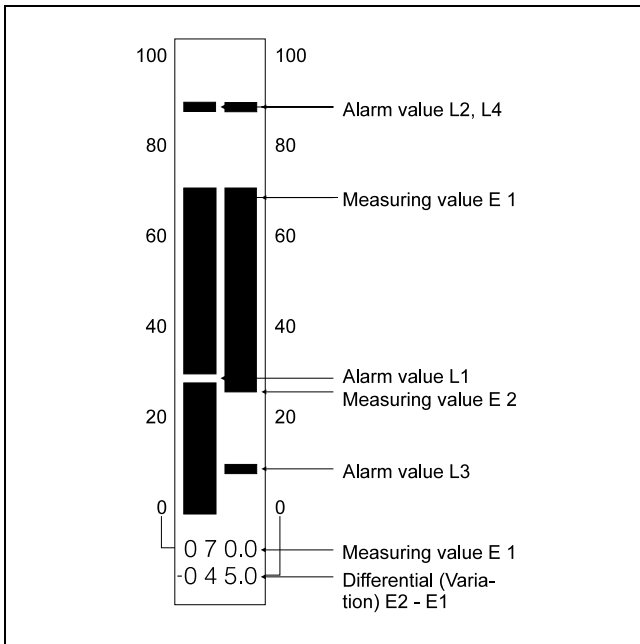


Fig. 17 Example: Differential (deviation) display E2 – E1 “floating” on channel 2
Z-16975

Notice

This display is only possible for two-channel units, since the difference (deviation) is illustrated on the right bargraph.

For such displays, both channels should have the same scaling (see Chapter on “Address lists”).

- the difference is shown in (deviation) E2 – E1 in the bar-type display as a band, whereby the start of band of the measured value E1 is the end of band of the measured value E2
- if E2 is greater than E1, the band rises up and the deviation is positive
- if E2 is less than E1, the band dips down and the deviation is negative (see fig. 17)
- deviation E1 is shown in digital display “with correct sign” (with minus sign, if deviation is negative)

Alarm values on Channel 2 have the same scaling like the measured value E2 and react only if E2 is modified.

Differential (deviation) display (“Fixed value”)

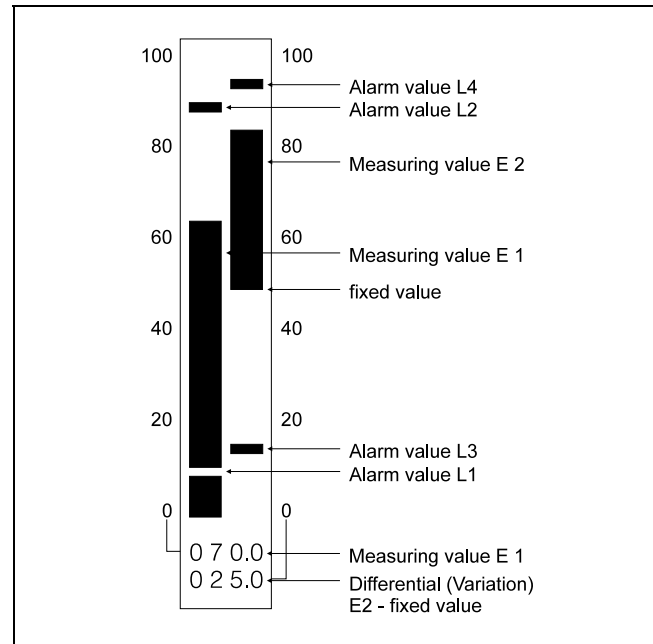


Fig. 18 Example: differential (deviation) display E2 – “fixed value” on channel 2
Z-16976

Notice

This display is only possible for two-channel units, since the difference (deviation) is displayed on the right bargraph.

For this display both channels ought to have the same scaling (see Chapter on “Address lists”).

- in the bar-type display the difference (deviation) E2 – fixed value is illustrated as a bargraph, whereby the start of the bar is an arbitrary fixed value to be expressed in % (see Chapter on “Configuration” and the end of bar is the measured value E2
- if E2 is greater than the fixed value, the bar rises up and the deviation is positive (see fig. 18)
- if E2 is less than the fixed value, the bar dips down and the deviation is negative (see fig. 17)
- in the digital display the deviation from the fixed value is displayed “with correct sign” (with minus sign, if the deviation is negative)

Alarm values on channel 2 have the same scaling as the measured value E2 and react only if E2 is modified.

Malfunctions

Malfunctions are signalled in the digital display with an error code.

There are three types of error signals:

- Message from the monitoring of the input terminals for TC and RTD connections.
- Message in case of operator or hardware error.
- Message in case of error in listing menu.

Message from the input terminal monitoring (for TC and RTD connections)

The error is displayed with ERR . 1 on any one of the lines for digital displays assigned to the channel. The measured value of the intact channel continues to be displayed.

ERR . 1 One or several connections on the input terminals 12 ... 20 is/are open.

Acknowledge with <E> after remedying error.

Message in case of operational or hardware error

The error is displayed in both lines for numeral entries.

ERR . 1 EEPROM checksum error.
ERR . 2 Software version number error.
ERR . 3 Adjustment of the inputs L3 and L4 for the external alarm adjustment (terminals 95 and 97) not possible because of the external power supply for the electrically isolated interface RS-485.

ERR . 4
ERR . 5
ERR . 6 Gauging the capacity in liters is only possible under U/W012.
ERR . 7 ADU does not function.

Acknowledge any operational errors with <E>.

Message in case of error in the listing menu

The error is displayed on a single line within the LIST mode.

ERR . A Invalid value in the configuration variables.
ERR . d Error in the Listing function of the apparatus.

Configuration

Hardlock

To prevent unintentional change of configuration, a switch has been provided on the rear of the apparatus.

Switching position “ON”

The configuration can be altered (see below).

Switching position “OFF”

If an attempt is made to change the configuration, the numerical field will display under the menu CONF on the second line LOCK. The menu CONF cannot be accessed and the configuration cannot be altered (not even via the serial interface).

1. Back to normal operation:
<E>

Default values

The unit has been configured as follows ex-factory:

Measuring range channel 1

0...20 mA, start below, average 1

Measuring range channel 2

0...20 mA, start below, average 1

Scale channel 1

0...100.0 linear

Scale channel 2

0...100.0 linear

Alarm value L1

Minimum on channel 1; 10.0 %

Alarm value L2

Maximum on channel 1; 90.0 %

Alarm value L3

Minimum on channel 2; 10.0 % (not for single-channel unit)

Alarm value L4

Maximum on channel 2; 90.0 % (not for single-channel unit)

Alarm value setting

internal activation, quiescent current, hysteresis 1.0 %, response time 0 s (= 0.3 s)

Password

none (= “0000”)

Notice

If a password is allocated, the password must be archived in non-volatile mode.

Address RS-485

0FH

Data transmission rate

9600 Baud

These default values can be activated at any time (see below).

Notice

The interface data set by user remains unchanged (unit addresses, data transmission rate).

Reset

Resetting the unit

1. Reset the unit:
<P> + <▼> + <▲> + <E>

Resetting the configuration

See the chapter on “Configuring with the operator keyboard” for information on how to operate and the chapter on “Address lists” tab. 6 for addresses.

Resetting the password

See chapter on “Configuring with operator keyboard” for instructions on how to operate and the chapter on “Address lists” tab. 6 for addresses.

Configuring with operation keys

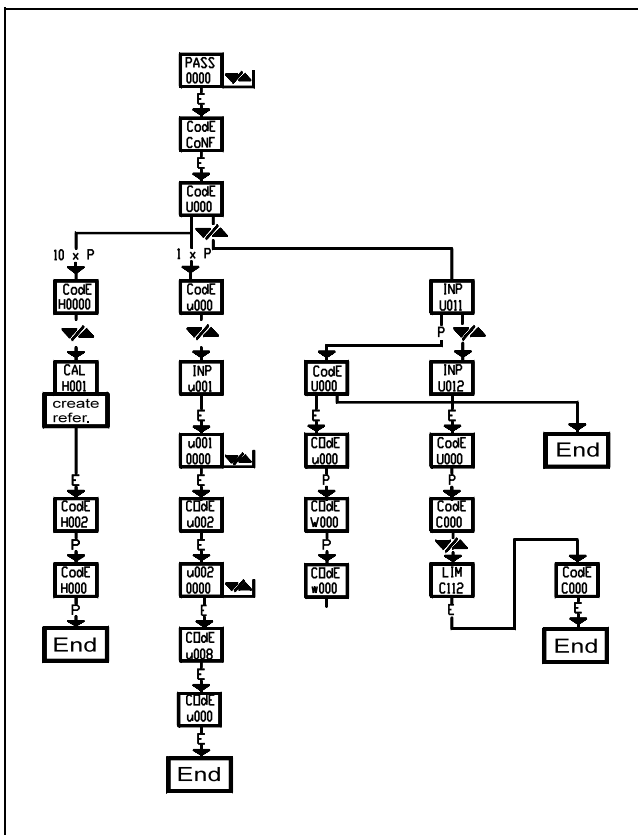


Fig. 19 Example of operation sequence in the configuration mode
Z-16977

Changing the configuration

1. Select the main menu:
<P>
Display: LIM
2. Select the configuration menu:
<▼> <▼>
Display: CONF
3. Acknowledge configuration menu:
<E>
Display if password is allocated: PASS and 0000
4. Input password (4-digit figure):
<▲> (digit), <▼> (position)
5. Acknowledge password:
<E>
Display: CONF and CODE
6. Call up first address:
<E>
Display: CODE and U000
7. Select address range (first position):
<P> (possibly several times)
Display: Address and mnemo code (see tab. 1)
8. Input address:
<▲> (digit), <▼> (position)
9. Acknowledge address:
<E>

If no parameters have to be input, the next possible address is displayed. Continue with step 12.

Display: selected address and parameter default setting

10. Change parameter:
<▲> (digit), <▼> (position)
or
set parameter to 0000:
<P>
11. Acknowledge parameter:
<E>
12. Edit the next address (and the next parameter):
as above
or
go back to the first address in the range (000):
<P>

Notice

An address field can only be quit from the first address with <P>.

13. Select the next address field:
<P> (possibly several times)
Display: Address and mnemo code (see tab. 1)
or
terminate the configuration:
<E>
Display: CODE and WAIT

The addresses and parameters are written in the EEPROM.

Custom scaling (non-linear characteristics)

Preconditions:

monotonous direct action characteristic

Ranges and support values:

- 0...20 mA, all 1 mA
- 4...20 mA, all 1 mA
- 0...10 V, all 0,5 V
- 0...75 mV, all 5 mV

1. Select measuring range with custom scaling.
 2. Input initial address of the custom scaling.
 3. Acknowledge:
<E>
Display: electrical area and scale variable
 4. Adjust the scale variable:
<▲> (digit), <▼> (position)
 5. Acknowledge scale variable:
<E>
 6. Adjust the next scale variable.
<▲> (digit), <▼> (position)
- etc.
7. Quit the last scale variable after adjusting and acknowledging the scale variable:
<E>

Address lists

Functional block	Mnemo-code	Address range	Table
INPUT Channel 1 Confi	INP	U...	2
INPUT Channel 1 Parameter	INP	u...	3
INPUT Channel 2 Confi	INP	W...	2
INPUT Channel 2 Parameter	INP	w...	3
LIMIT Confi	LIM	C...	4
DISPLAY Confi	dISP	d...	5
PASSWORD/AV-inhibition	PASS	E...	6
LINE COMPENSATION RTD 2-wire	WCAL	F...	7
INTERFACE RS 485	I-FA	G...	8
UNIT-adjustment	CAL	H...	11
Unit data	VERS	K...	9
LINEARISATION (dialog)	SCAL	L...	10
END Confi		.000	-

Tab. 1 Grouping of configuration addresses

The apparatus provides only the addresses which are possible, depending on how it has been equipped. Addresses which are no longer of significance because of the existing configuration, are faded out at this phase.

U	• • •	Channel 1
W	• • •	Channel 2
▼	▲ ▲ ▲	
▼	▲ ▲ ▲	DC Measuring ranges
•	0 1 •	mA
•	0 2 •	V
•	0 3 •	mV
•	• • 0	without scaling (scales like INPUT)
•	• • 1	linear scaling
•	• • 2	<i>Custom scaling</i>
▼	▲ ▲ ▲	RTD M measuring ranges
•	0 4 •	Pt100 IEC
•	0 5 •	Ni100 DIN
•	• • 2	2-wire connection
•	• • 3	3-wire connection
•	• • 4	4-wire connection
▼	▲ ▲ ▲	TC Measuring ranges
•	0 6 •	Type J
•	0 7 •	Type K
•	0 8 •	Type T
•	0 9 •	Type S
•	1 0 •	Type B
•	1 1 •	Type E
•	1 2 •	Type N
•	1 3 •	Type R
•	• • 1	internal reference junction
•	• • 2	external reference junction
▼	▲ ▲ ▲	general RTD/TC
•	4 0 0	Display in °C
•	4 0 1	Display in °F
•	5 0 0	without break monitoring
•	5 0 1	with break monitoring up
•	5 0 2	with break monitoring down

Tab. 2 Addresses of the functional block INPUT Channel 1 / Channel 2 Confi

Notice

- The addresses x400 to x502 are faded out when the addresses x01x to x03 x are selected.
- The addresses Wxxx are not offered, if no second input channel exists.
- The addresses x03x to x502 are not offered, if no corresponding sensor module exists.

u	•	•	•	Channel 1
w	•	•	•	Channel 2
▼	▲	▲	▲	
▼	▲	▲	▲	
•	0	0	1	Measuring range initial value
•	0	0	2	Measuring range final value
▼	▲	▲	▲	
•	0	0	8	Decimal point for scaling
•	1	0	0	Start of linear scaling
•	1	0	1	End of linear scaling
•	2	0	1	Start <i>custom scale</i>
•	2	0	2	2. Decimal point <i>custom scale</i>
•	2	0	3	3. Decimal point <i>custom scale</i>
•	2	0	4	4. Decimal point <i>custom scale</i>
•	2	0	5	5. Decimal point <i>custom scale</i>
•	2	0	6	6. Decimal point <i>Custom scale</i>
•	2	0	7	7. Decimal point <i>custom scale</i>
•	2	0	8	8. Decimal point <i>custom scale</i>
•	2	0	9	9. Decimal point <i>custom scale</i>
•	2	1	0	10. Decimal point <i>custom scale</i>
•	2	1	1	11. Decimal point <i>custom scale</i>
•	2	1	2	12. Decimal point <i>custom scale</i>
•	2	1	3	13. Decimal point <i>custom scale</i>
•	2	1	4	14. Decimal point <i>custom scale</i>
•	2	1	5	15. Decimal point <i>custom scale</i>
•	2	1	6	16. Decimal point <i>custom scale</i>
•	2	1	7	17. Decimal point <i>custom scale</i>
•	2	1	8	18. Decimal point <i>custom scale</i>
•	2	1	9	19. Decimal point <i>custom scale</i>
•	2	2	0	20. Decimal point <i>custom scale</i>
•	2	2	1	End <i>custom scale</i>
▼	▲	▲	▲	
•	3	0	0	Average value (of 1, 2, 4, 8, 16, 32 measurements)
▼	▲	▲	▲	
•	4	0	0	external reference junction for TC (variable)
▼	▲	▲	▲	
•	5	0	0	Line resistance for RTD 2-wire (variable)
▼	▲	▲	▲	
•	9	9	9	Fixed value (0...100 %)

Tab. 3 Addresses of the functional block INPUT
Channel 1 / Channel 2 parameters

Notice

- The addresses x400 and x500 are faded out in accordance with the selected input.
- Custom-scale (non-linear scale) is only possible for the measuring ranges 0...20 mA, 4...20 mA, 0...10 V and 0...75 mV.
- The average value is a floating one; i.e. the arithmetically averaged value of the last measurements conducted by the apparatus is displayed.
- The line resistance for the RTD 2-wire is input as value with a resolution of 100 mΩ.

C	•	•	•	
▼	▲	▲	▲	
▼	▲	▲	▲	
•	0	0	1	LIMIT 1
•	1	1	•	OFF
•	1	2	•	on channel 1
•	•	•	1	on channel 2
•	•	•	2	Limit high
•	•	•	2	Limit low
▼	▲	▲	▲	
•	0	0	2	LIMIT 2
•	2	1	•	OFF
•	2	2	•	on channel 1
•	•	•	1	on channel 2
•	•	•	1	Limit high
•	•	•	2	Limit low
▼	▲	▲	▲	
•	0	0	3	LIMIT 3
•	3	1	•	OFF
•	3	2	•	on channel 1
•	•	•	1	on channel 2
•	•	•	1	Limit high
•	•	•	2	Limit low
▼	▲	▲	▲	
•	0	0	4	LIMIT 4
•	4	1	•	OFF
•	4	2	•	on channel 1
•	•	•	1	on channel 2
•	•	•	1	Limit high
•	•	•	2	Limit low
▼	▲	▲	▲	
•	5	1	0	General
•	5	1	1	internal alarm signal control
•	5	2	0	Alarm signal control
•	5	2	0	External alarm signal control
•	5	2	1	Operating current (NOC)
•	5	3	0	Quiescent current (NCC)
•	5	4	0	Hysteresis
•	5	4	0	Value (0.5 % steps to 20 %)
•	5	4	0	Response delay
•	5	4	0	Value (1 s-steps to 20 s)

Tab. 4 Addresses of the function block LIMIT Confi

d	•	•	•	
▼	▲	▲	▲	
▼	▲	▲	▲	Channel 1
•	1	0	1	OFF Bar-type display
•	1	0	2	ON Bar-type display
•	1	0	3	OFF Digital display
•	1	0	4	ON Digital display
•	1	1	0	E1 Bar start below
•	1	2	0	E1 Bar start up
•	1	3	0	E1 Bar start middle
▼	▲	▲	▲	Channel 2
•	2	0	1	OFF Bar-type display
•	2	0	2	ON Bar-type display
•	2	0	3	OFF Digital display
•	2	0	4	ON Digital display
•	2	•	0	E2 absolute
•	3	•	0	Total E1 + E2
•	4	•	0	Difference E1 – E2
•	•	1	0	Bar start below
•	•	2	0	Bar start up
•	•	3	0	Bar start middle
•	5	0	0	Difference E2 – fixed value
•	6	0	0	Difference E2 – E1 floating

Tab. 5 Address functional block DISPLAY confi

Notice

- For the addresses d3x0 and d4x0 bargraph starting in the middle is not possible.
- The input signal of the addresses d130 and d230 must be symmetrical to the zero point (e.g. –5 mA...0...+5 mA)

E	•	•	•	
▼	▲	▲	▲	
▼	▲	▲	▲	
•	0	0	9	new password (4-digit figure)
•	0	1	0	AV parameter inhibition
•	0	1	1	AV parameter enabling
RSEt	CONF			Configuration reset (see Chapter on „Reset“)

Tab. 6 Addresses of the functional block PASSWORD/AV Inhibition

Notice

The configuration reset is offered after the address E003, if continued switching is done with <▲>. After acknowledging with <E> the configuration is reset and the unit returns to the operating mode.

F	•	•	•	
▼	▲	▲	▲	
▼	▲	▲	▲	Effect line compensation
•	0	0	1	on channel 1
•	0	0	2	on channel 2

Tab. 7 Addresses of the functional block LEAD COMPENSATION are automatic for RTD 2-wire

Notice

- The addresses are only offered if, at INPUT Confi sensor input RTD is selected.
- Automatic lead compensation:
 1. Bridge resistance thermometer at point of installation.
 2. Select the above-named address.
 3. Acknowledge: <E>

The unit measures the resistance of the supply lead and writes the measured value into the EEPROM when quitting the configuration menu.

4. Remove jumper on the resistance thermometer.

G	• • •	
▼	▲ ▲ ▲	
▼	▲ ▲ ▲	
•	1 0 0	Unit address (HEX-Code: 00H...FFH)
•	2 0 0	Data transmission speed (1200, 2400, 4800, 9600, 19.2 K (= 19200) bauds)

Tab. 8 Address of functional block INTERFACE RS-485

Notice

- The unit addresses are displayed in HEX-Code.
- The global address is 82H, so that all units can be jointly addressed via the interface RS-485 (see also separate Operating Instructions).

K	• • •	
▼	▲ ▲ ▲	
▼	▲ ▲ ▲	
•	1 0 0	Software status Predecimal ----.xxxx
•	1 1 0	Post decimal xxxx.----
		F number
•	2 0 0	Position 1 - 4 ----.xxxx
•	2 1 0	Position 5 - 8 xxxx.----

Tab. 9 Addresses of functional block Unit data (read only)

L	• • •	Activate linearisation in dialog mode
▼	▲ ▲ ▲	
▼	▲ ▲ ▲	
•	1 0 0	on channel 1
•	2 0 0	on channel 2

Tab. 10 Addresses of the functional block LINEARIZATION in dialog mode

Linearizing in dialog

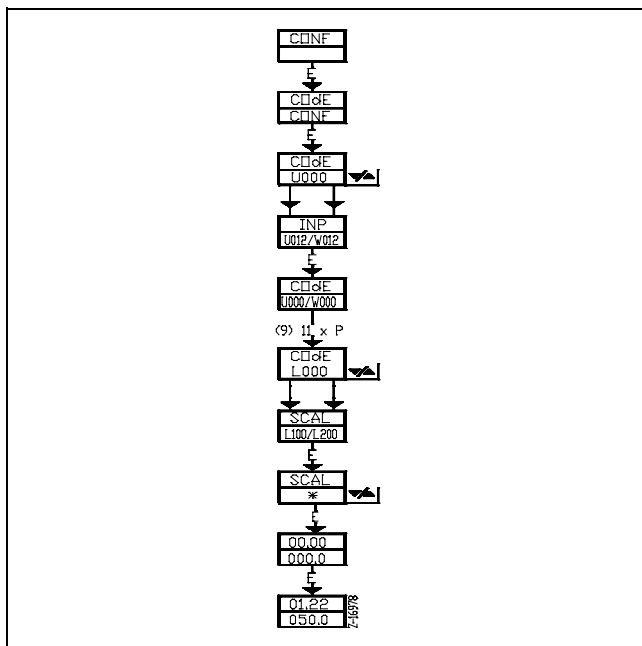


Fig. 20 Operating mode "Linearizing in dialog"
Z-16978

Preconditions

Input variable: mA
Characteristic: exact, monotonous, direct-action

Linearization

1. Select the main menu:
<P>
Display: LIM
2. Select the configuration menu:
<▼> <▼>
Display: CONF
3. Acknowledge configuration menu:
<E>
Display if password is allocated: PASS and 0000
4. Input password (4-digit figure):
<▲> (digit), <▼> (position)
5. Acknowledge password:
<E>
Display: CONF and CODE
6. Call up first address:
<E>
Display: CODE and U000
7. Select the address range INPUT (first position):
<P> (possibly several times)
Display: u001 (Channel 1) or w001 (Channel 2) and INP
8. Input address u201 (channel 1) or w201 (channel 2) (Start of custom scale):
<▲> (digit), <▼> (position)
9. Acknowledge address:
<E>
10. Return to first address in field (000):
<P>
11. Select the address field LINEARIZATION:
<P> (possibly several times)
Display: SCAL and L100
12. Input address L100 (Channel 1) or L200 (Channel 2):
<▲> (digit), <▼> (position)
13. Acknowledge address:
<E>
14. Set the decimal point of the scaling:
<▲> or <▼>
15. Acknowledge the decimal point:
<E>
Display: electrical range and scale value
16. Accept "Container empty" variable as 0 % variable:
<E>
17. Fill container to the first level.
18. Keep the measured value:
<E>
19. Set the corresponding scaling value:
<▲> (digit), <▼> (position)
20. Acknowledge the scaling value:
<E>
21. Return to step 17. for the second level etc.
22. After setting and acknowledging the last scaling value (container full = 100 %), quit the scaling mode:
<E>

Configuring with PC

The apparatus is configured with the help of a configuration program and a PC. The configuration is transferred to the apparatus via the rear-position RS-485 interface or the front-positioned RS-232 interface (Attention: data transmission rate 9600 bauds) (see also Chapter on "Interface RS-232C (front panel)" and "Interface RS-485 (with electrical isolation) (rear panel)"). The apparatus starts again after completing transmission of the configuration.

Conversion / Retrofitting

⚠ Attention

When the apparatus is connected to its supply, terminals may be live, and the opening of covers or the removal of parts except those to which access can be gained by hand is likely to expose live parts. Connected parts may also be live.

The unit shall be disconnected from all voltage sources before it is opened for any operations. Operations on the opened apparatus under voltage may only be performed by an expert who is aware of the hazard involved.

Capacitors inside the apparatus may still be charged even if the apparatus has been disconnected from all voltage sources.

Only fuses with the specified type and rated current may be used as replacements. Makeshift fuses may not be used. The fuse holder may not be short-circuited.

Whenever it is likely that protection has been impaired, the apparatus shall be made inoperative and be secured against any unintended operation.

It must be assumed that the protection has been impaired when,

- the apparatus has visible signs of damage,
- the apparatus no longer functions,
- the apparatus has been stored in unfavourable conditions for a long time,
- the apparatus has been subjected to adverse transport conditions.

⚠ Attention

The cards contain MOS components.

When working on opened units please ground working surfaces and persons.

Exchanging / upgrading Modules

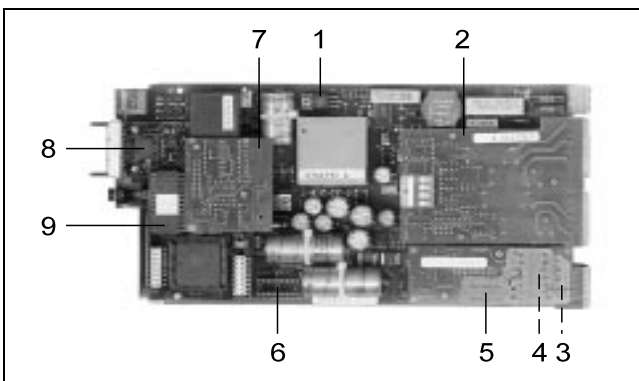


Fig. 21 Modules and components on the main card
 Z-16979

1 Main card	6 Connecting socket for external alarm control module
2 Alarm value module	7 Interface module
3 Second input channel	8 Processor board
4 Sensor module channel 1	9 EPROM
5 Sensor module channel 2	

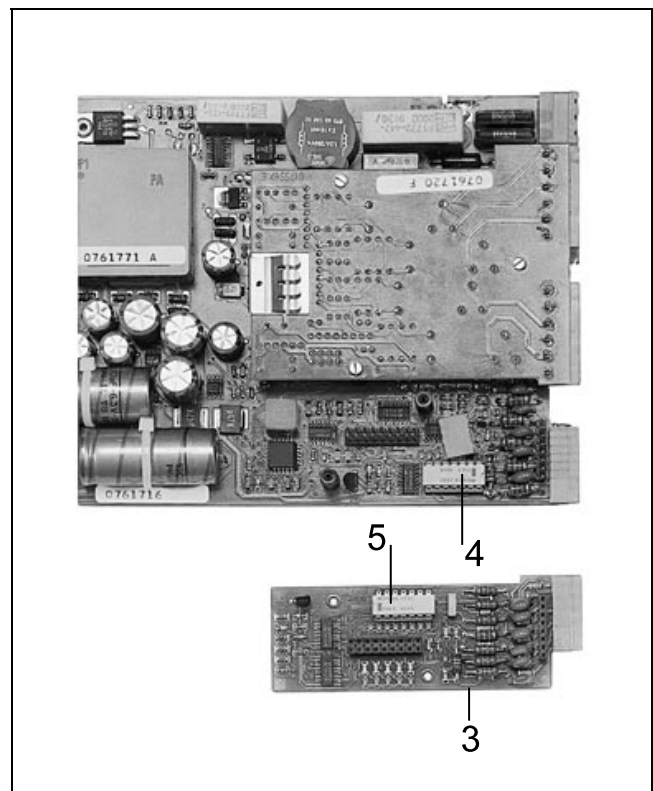


Fig. 22 Sensor modules Channels 1 and 2
 Z-17015

1. Disconnect apparatus from the voltage source with the external mains isolator.
2. Remove the mains blade-type terminal from the apparatus.
3. Remove apparatus (see Chapter "2 Mounting").
4. Remove screw terminals.
5. Loosen the retaining springs and case rear wall.
6. Pull out the main card through the rear (see fig. 21).
7. Retrofit (see next page).
8. Put unit into ready-to-operate state by following steps 6 to 1.

Retrofitting alarm module

(see fig. 21)

1. Position spacers on the main card 1.
2. Plug alarm module 2 into the corresponding plug receptacle.
3. Fasten alarm module 2 with three screws.
4. Remove the pasted cover of the terminal cutouts on the rear wall of apparatus.

Retrofitting input channel

(see fig. 21)

1. Position spacers on the main card 1.
2. Plug channel card 3 into the corresponding plug receptacle.
3. Fasten channel card 3 with two screws.
4. Remove pasted cover on the rear wall of apparatus.
5. After getting ready for operation, readjust the second input channel (see Chapter on "Adjustment").

Retrofitting sensor module for channel 1

(see fig. 22)

1. Plug the sensor module 4 into the 14-pin connecting socket.
2. After getting ready for operation, readjust the first input channel for mV and Ω (see Chapter on "Adjustment").

Retrofitting sensor module for channel 2

(see fig. 22)

1. Unloosen the screws of the card for the input channel 2 3.
2. Pull out the card 3.
3. Plug the sensor module 4 into the 14-pin connecting socket
4. Plug in the card of the second input channel 3.
5. Fasten card 3 with two screws.
6. After getting ready for operation, reajust the second input channel for mV and Ω (see Chapter on "Adjustment").

Retrofitting the interface module

(see fig. 21)

Notice

The interface module contains both RS 232C and RS 485 interfaces.

1. Remove plug-in jumper on the plug receptacle.
2. Place spacers on the main card.
3. Plug the interface module 7 into the right plug receptacle.
4. Fasten the interface module 7 with two screws.

Retrofitting the external alarm adjustment

(see fig. 21)

1. Plug in the module for external alarm adjustment 6 into the corresponding 18-pin plug receptacle (please pay attention to the colouring!).
2. After getting ready for operation, readjust the external alarm setting (see Chapter on "Adjustment").

Exchanging the EPROM

(see Fig. 21)

1. Lift EPROM 9 with appropriate tool from its base.
2. Stick a new EPROM into the base.

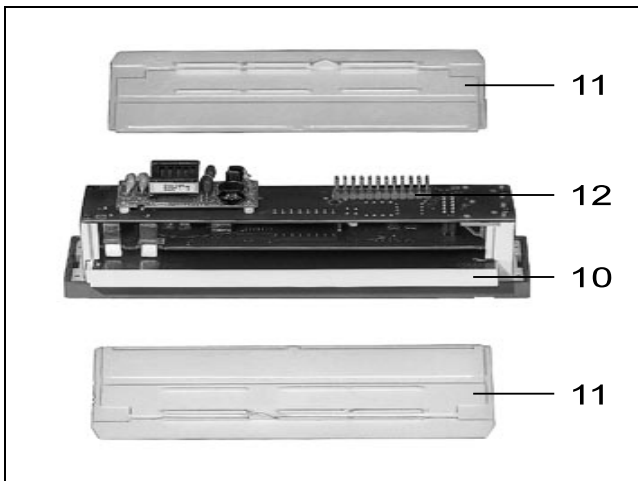
Exchanging the rating plate

Pull out and replace the rating plate beneath the display (with the aid of e.g. tweezers) with a new one.

Exchanging the front foil

1. Pull out the display module (see Chapter on "Interface RS-232C (front panel)", steps 1. to 3.).
 2. Carefully pull off foil (starting from one corner).
 3. Remove any eventual glue deposits without leaving oil-based smudges behind.
 4. Remove protective foil on back of the new front foil.
 5. Place the front foil with the four cutouts in the dead centre of the four operator keys.
 6. Carefully press the front foil to fit.
 7. Again press firmly against the rightly positioned front foil.
-

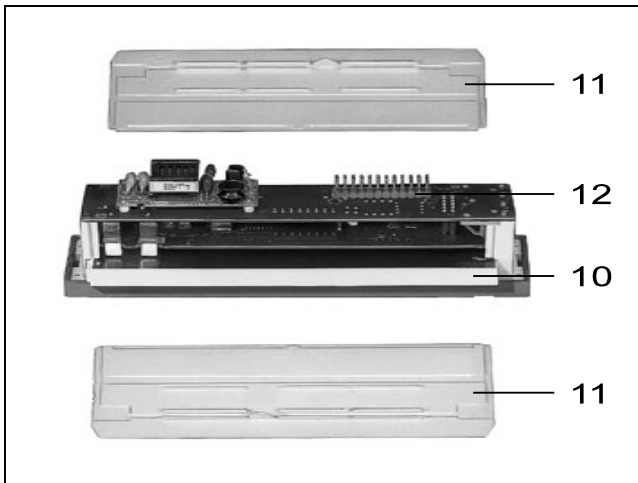
Exchanging the display lighting



1. Pull out display module (see Chapter on "Interface RS-232C (front panel)", steps 1. to 3.).
2. Remove the right (viewed from the front) lateral plastic cover.
3. Pull out the lighting module from the side.
4. Insert a new lighting module:
 - the pipes of the lighting module must be on the display side
 - the contact springs must touch the contact surface of the lighting module
5. Insert the display module (with laterally inserted plastic covers!).

Fig. 23 Display module
Z-16963 10 Lighting module (cold cathode ray tube) (partly withdrawn)
11 Plastic covers
12 Plug connection to apparatus

Exchanging the display module



1. Pull out display module (see Chapter on "Interface RS-232C (front panel)", steps 1. to 3.).
2. Insert new display module (with laterally inserted plastic covers!).

Fig. 24 Display module
 Z-16963 10 Lighting module (cold cathode ray tube) (partly withdrawn)
 11 Plastic covers
 12 Plug connection to apparatus

Adjustment

H	• • •	
▼	▲ ▲ ▲	
▼	▲ ▲ ▲	Channel 1
•	0 0 1	V
•	0 0 2	mA
•	0 0 3	mV
•	0 0 4	Ω
▼	▲ ▲ ▲	Channel 2
•	0 0 5	V
•	0 0 6	mA
•	0 0 7	mV
•	0 0 8	Ω
▼	▲ ▲ ▲	External alarm value adjustment
•	0 0 9	Limit 1
•	0 1 0	Limit 2
•	0 1 1	Limit 3
•	0 1 2	Limit 4

Tab. 11 Addresses of functional block UNIT-adjustment

See also Chapter on "User guidance", "Configuring with keys" and "Address lists".

Notice

Recommended accuracy of the (current, voltage or resistance) sensor for adjustment: 0.01 %.

1. Call up the configuration menu
2. Couple the sensor to the appropriate input (Resistance thermometer: 4-wire input).
3. Select the address to be adjusted.

Calibration values:

V	12 V
mA	20 mA
mV	75 mV
Ω	200 Ω

external alarm value setting 10 V or 20 mA depending on module

4. Acknowledge:
<E>
5. Quit the configuration menu:
6. The adjusted value is written into the EPROM and the measuring range is set.

Maintenance

Attention

When the apparatus is connected to its supply, terminals may be live, and the opening of covers or the removal of parts except those to which access can be gained by hand is likely to expose live parts. Connected parts may also be live.

The apparatus shall be disconnected from all voltage sources before it is opened for any operations. Operations on the opened apparatus under voltage may only be performed by an expert who is aware of the hazard involved.

Capacitors inside the apparatus may still be charged even if the apparatus has been disconnected from all voltage sources.

Only fuses of the specified type and rated current may be used as replacements. Makeshift fuses must not be used. The fuse holder may not be short-circuited.

Whenever it is likely that protection has been impaired, the apparatus shall be made inoperative and be secured against any unintended operation.

It must be assumed that the protection has been impaired when,

- the apparatus has visible signs of damage,
- the apparatus no longer functions,
- the apparatus has been stored in unfavourable conditions for a long time,
- the apparatus has been subjected to adverse transport conditions.

Attention

The cards contain MOS components.

When working on opened units please ground working surfaces and persons.

Cleaning

Attention

Please do not use strong detergents aids to clean the apparatus.

The display can be cleaned with a dry cloth or with a cloth which has been wetted with a mild detergent.

Technical Data

Display

Technology

optionally
active: self-illuminating LCD green on black
active: self-illuminating LCD green on blue
or
passive: LCD black on light grey

Analog section

2 bars each with 101 segments, 93 mm long

Digital section

2 x 4-digit, 12 segments, 5 mm high
Extent: -9999...+9999 digits

Measuring section

Deviation (at 23 °C ± 2 °C)

for mV, V, mA: < ±0.1 % of measured value ±0.025 % from final value ± 1 digit
optionally at the internal reference junction: ±2 °C

Interference immunity

CMR > 120 dB for DC
CMR > 100 dB for 50 / 60 Hz
SMR > 60 dB for 50 / 60 Hz (≤ 1/10 of range final value)

Permissible common-mode voltage

Measuring circuit / measuring circuit:
isolating voltage (effective) ≤ 3 V
Measuring circuit / protective conductor:
isolating voltage ≤ 25 V

Scanning time

approximately 3 s / channel, measuring time 100 ms

Average value determination

parameterizable through 1...32 measurements

Measuring ranges

DC inputs

Direct current

-24...+24 mA, Ri = 100 Ω
Overload rating: 100 mA continuous

Direct voltage

-12...+12 V, Ri ≥ 100 kΩ
Overload rating: 50 V continuous

Any initial or final values can be selected within the limits.

Sensor inputs

Direct voltage

-75...+75 mV, Ri > 100 kΩ
Overload rating: 50 V continuous

Thermocouple (TC)

Type	Range thresholds	maximum deviation
J	-200 ... +800 °C	±0.13 % of final value
K	-100 ... +1300 °C	±0.16 % of final value
S	0 ... +1750 °C	±0.20 % of final value
R	0 ... +1750 °C	±0.20 % of final value
B	+400 ... +1800 °C	±0.20 % of final value
T	+100 ... +400 °C	±0.16 % of final value
E	0 ... +800 °C	±0.13 % of final value
N	-100 ... +1300 °C	±0.15 % of final value

Temperature coefficient

< 0.1 % / 10 K in the range 0...50 °C

Resistance thermometer (RTD)

Type	Range threshold	maximum deviation
Pt 100 IEC	-200 ... +850 °C	±0.15 % of final val.
Ni 100 DIN	-60 ... +180 °C	±0.2 % of final val.

Temperature coefficient

< 0.1 % / 10 K in the range 0...50 °C

2-, 3- or 4-wire connection (parameterizable)
with or without break monitoring (parameterizable)
display in °C or °F (parameterizable)

Any start and final range values can be selected within the thresholds.

The resolution of the digital display amounts to ±999.9 Digit
0.1 °C for span.

Alarm section

Number of alarms

4, freely assignable to the input channels

Alarm value setting

internal with keys
external with 0...20 mA or 0...10 V (without internal electrical isolation)

Switching function

separated MIN or MAX, parameterizable

Hysteresis

joint, parameterizable in the range 0...20 %

Response time

joint, parameterizable in the range 0...20 s

Switching action

joint, operating current or NC contact operation can be defined by parameter

Output

Relay output

4 floating AC contacts

Operating variables

minimum 18 V / 10 mA DC, maximum 250 V / 1 A AC

Transistor output

4 × electrically isolated through optocouplers
compatible with switch amplifier according to DIN 19 234

Operating variables
maximum 30 V / 40 mA DC

Interface

RS-232C
front panel, accessible by removing the display

RS-485
on terminals at the rear

Power supply

24 V direct / alternating current (DC/AC)
AC -15 %...+10 %
DC 18...32 V
0 / 48...62 Hz
10 W / 15 VA

115 / 230 V alternating current (AC)
extended range -20 %...+10 %
48...62 HZ
10...16 VA

External fusing according to DIN 41 662
T 0.8 A for 24 V (DC/AC), T 0.15 A for 115/230 V AC

General and safety data

The guidelines on low voltage 73/23/EWG are met.

Tested to DIN EN 61 010-1 (VDE 0411 classification) / IEC 10101-1

Protection class
I with protective conductor terminal

Overvoltage category
III on mains input
II all others

Pollution severity
2 within unit and on the connecting terminals

High voltage tests

Mains to PE	3.1 kV DC
Mains to measuring circuit	4 kV AC
Secondary circuits to PE	0.5 kV AC

Functional extra-low voltage with intrinsic separation
At the inputs and outputs as well as at the interfaces only current circuits may be connected whose circuits have been separated from shock currents (DIN VDE 0106 Teil 1).

Type of protection
Front panel IP 50
Terminals IP 20

Connection

plug-in screw terminals
for conductors up to 1.5 mm² (measuring / control inputs)
for conductors up to 2.5 mm² (power supply / alarm signal outputs)

Colour

Front panel	Front foil
grey RAL 7032	grey RAL 7032
grey RAL 7037	grey RAL 7032

Mounting

with screw terminals in panel or mosaic panel field
"close-density design" permissible in contiguous fashion

Mass

approximately 1,4 kg

Electromagnetic compatibility (EMC)

Immunity against electromagnetic interferences

	Test severity	Effect	Severit	Norm
Surge on mains lines com	2 kV	without	3	IEC 1000-4-5
Surge on mains lines diff	2 kV	without	3	IEC 1000-4-5
Burst on mains lines com	2 kV	without	3	IEC 1000-4-4
Burst on mains lines diff	1 kV	without	3	IEC 1000-4-4
Burst on signal and data lines com	1 kV	≤1 %	3	IEC 1000-4-4
Discharge of static electricity				
Air discharge	6 kV	without	3	IEC 1000-4-2
Contact discharge	8 kV	without	3	IEC 1000-4-2
radiated HF field 80...1000 MHz	10 V/m	≤0.6 %	3	IEC 1000-4-3
routed through line	10 V	≤0.5 %	3	IEC 1000-4-6

Tab. 12

Die EMC directive 89/336/EWG on interference suppression to EN 50 011 and on interference immunity to EN 50 082-2 are fulfilled. The standard requirements of the NAMUR recommendation 12/90 are met. (Interface lines are shielded).

Environmental capability

Ambient temperature
0...50 °C

Transportation and storage temperature
-25...+65 °C

Relative humidity
up to 75 % annual average; max. 95 %
no condensation
corresponds to climatic category KWF to DIN 40 040
corresponds to climatic category 3K3 to DIN IEC 721 Part 3-3

Mechanical capability

Tested according to DIN IEC 68-2-27 and 68-2-6
Shock 30g / 18 ms
Vibrations 2g / 5...150 Hz

Parameterization capability

parameterizeable (with keys / via interface) are:

Input

Input variable
Measuring range (start and end)
Graduation (linear or arbitrary)
Additional functions

Alarm values

Assignment to the inputs
Function (MIN, MAX)
Activation (internal or external)
Operating principle (operating current or quiescent current)
Hysteresis
Response time

Display

Start of bars (up, middle, down)
Display on channel 2 (normal, summation, differential)

Password

Locks up the parameter variables

Linearization

in dialog during level measurements (only per keyboard)

Unit balancing

with software support (with keys only)

Packaging for transport or for return to manufacturer

If the original packing is no longer available, the apparatus must be wrapped in an insulating air foil or corrugated board and packed in a sufficiently large crate lined with shock absorbing material (foamed material or similar) for the transportation. The amount of cushioning must be adapted to the weight of the unit and to the mode of transport.

The crate must be labelled "Fragile".

For overseas shipment the unit must additionally be sealed airtight in 0.2 mm thick polyethylene together with a desiccant (e.g. silica gel). The quantity of the desiccant must correspond to the packing volume and the probable duration of transportation (at least 3 months). Furthermore, for this type of shipment the crate should be lined with a double layer of kraft paper.

Spare Parts

The spare parts for the apparatus are listed on the Data Sheet.

Subject to technical changes.

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