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Comments on displays within text
Text inputs are illustrated by < >, displays by { } and text
printouts by [ ].
The statements “right”, “left” or “up”, “down” – if not stated
otherwise, mean when viewed from the front.

Supplementary technical literature
Parameter-definition instructions, Description of interfac

Application and short description
The recorder is a microcontroller-controlled Multiline Recorder
with 1...4 line channels or 1...3 line channels and 1 printer
channel.
The recorder is connected to a transmitter and detecting ele-
ments such as thermocouples. Standard temperature sensor
curves are stored in the firmware of the recorder and linearised
with a high accuracy rate.
The recorder is adapted to the measuring task per software
using an internal operator keyboard or adapted through the inter-
faces RS 232C and RS 485.
Installation and commissioning

Scope of supply and delivery

Supplied with the recorder are the following spare parts:

2 Fasteners B
1 Fibre-pen insert F per line channel
1 Print insert D (for versions with printer channel)
1 Roll chart S

Depending on the order, the corresponding number of screw terminals K; one Zener-diode combination for each measuring element and rulers.

Fig. 1 With accessories
2-17070 B fasteners
D print insert
F fibre-pen inserts
K screw terminals
S roll chart

1. Installation site

Mounting position
- with lateral inclination −30°...0...+30°
- inclination to the back 20°
- inclination to the front 20°

Ambient temperature
0...50 °C

Relative humidity
≤75 % annual average
maximum relative humidity ≤85 %

Avoid condensation!
2. Mounting

The recorder is suitable for mounting in panels and mosaic panel fields.

Mounting in panels
1. Insert unit into the panel from the front.
2. Attach by hanging fasteners onto the cutouts on case.
In case of close-density mounting in horizontal direction, hang the fasteners onto the cutouts in the upper and lower sides of panel.
3. Clamp and tighten the fasteners uniformly in vertical direction.

Mounting in a mosaic grid framework
1. Attach 4 centering brackets to the grid framework.
2. Attach by hanging fasteners onto the cutouts on case.
3. Clamp and tighten the fasteners uniformly in vertical direction.

3. Connection

(see fig. 3)

⚠️ Attention

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

The apparatus can be dangerous if the protective conductor is interrupted inside or outside the apparatus or if the protective ground terminal is disconnected.

Signal connection

- Attach wire (maximum cross-section $2 \times 1 \text{ mm}^2$) onto the screw terminal.

⚠️ Attention

In the version “without flat-ribbon cable” install a zener diode combination for each current circuit at the terminals of the current measuring points in order to prevent internal circuit interruptions. The zener diode combination (for catalog no. see data sheet) is part of the recorder accessories supplied on first delivery.

No zener diode combination should be installed for such input variables like voltage or resistance.

Power supply connection

Provide an on/off switch within reach powerful enough to disconnect the apparatus completely from the power supply. This should not nullify the protective function of the grounding conductor.

- Attach wire (maximum cross-section $2 \times 1 \text{ mm}^2$) to the screw terminals. The cross-section of the protective conductor must correspond at least to the cross-section of the power supply cable.
4. Opening the case door

1. Press the handle a bit to the right.
2. Pull case door open.
5. **Inserting the roll chart**

1. Unlocking the slide-in unit.

2. Pulling forward the slide-in unit.

3. Unlocking the measuring element carrier.

4. Open the measuring element carrier to the limit.
5. Inserting the roll chart from the side.

6. Pull the start of paper up to the sprocket wheel and position the perforations on the sprockets.
7. Push the measuring element carrier downwards.
8. Push the slide-in unit into the case.

6. **Switching on the unit**

Switch on unit with external on/off switch.

7. **Inserting the fibre-pen insert**

1. Press and hold <Stop> for more than 2 s.

   The measuring elements move into the parking position (only when the stop key function is enabled).

2. Swing up the scales.

3. Install the fibre-tip insert into the chart carriage.
8. Inserting the print unit

1. Press and hold <Stop> for more than 2 s.
   
The measuring elements move into the parking position (only when the stop key function is enabled).

2. Swing up the scales.

3. Install the print insert into the chart carriage.

9. Adjusting the starting point of recording

Press <↓> and release when the right baseline has been adjusted under the fibre-pen insert or print unit.

Notice
If the time imprint or date/time baseline is enabled, the handle strips upon releasing it, will transport the chart paper so far that the next time or date will be imprinted at the correct position.
Operation

Operator front panel

After opening the case door, the eight keys of the operator keyboard will become accessible. In the operating mode, the characters on the keyboard are valid; in the parameter-definition mode, the characters over the keys are valid.

Key legend

<table>
<thead>
<tr>
<th>Operating mode</th>
<th>Parameter-definition mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;Para&gt;</td>
<td>&lt;Esc&gt;</td>
</tr>
<tr>
<td>Call up the parameter definition mode</td>
<td>End parameter-definition or return to the higher-level menu</td>
</tr>
<tr>
<td>&lt;Print&gt;</td>
<td>&lt;Help&gt;</td>
</tr>
<tr>
<td>Print channel name, measured value time, ...</td>
<td>Context-related help texts on the parameters</td>
</tr>
<tr>
<td>&lt;←</td>
<td>&gt;</td>
</tr>
<tr>
<td>Switch the measured value to a further channel</td>
<td>Shift the decimal point to one further place on the right</td>
</tr>
<tr>
<td>&lt;Stop&gt;</td>
<td>&lt;-&gt;</td>
</tr>
<tr>
<td>Stop the recording or Standby (can be activated or deactivated in the parameter-definition mode)</td>
<td>Select the menu item Adjust the figure</td>
</tr>
<tr>
<td>&lt; opener &gt;</td>
<td>&lt; opener &gt;</td>
</tr>
<tr>
<td>Stop der unwind function</td>
<td>Select the menu item Adjust the figure</td>
</tr>
<tr>
<td>&lt;↑&gt;</td>
<td>&lt;↑&gt;</td>
</tr>
<tr>
<td>Adjust the baseline (quicker chart speed)</td>
<td>Edit function: left cursor</td>
</tr>
<tr>
<td>&lt;θ&gt;</td>
<td>&lt;θ&gt;</td>
</tr>
<tr>
<td>Display date and time</td>
<td>Edit function: right cursor</td>
</tr>
<tr>
<td>&lt;</td>
<td>=θ&gt;</td>
</tr>
<tr>
<td>Acknowledge error message</td>
<td>Select menu item Select parameter Accept parameter value</td>
</tr>
</tbody>
</table>

Display

The display is a green 16-digit dot matrix.

The parameter-definition mode and the validity of the second key assignment is signalled by a red LED positioned on the left beside the <Para> key.
Display in the operating mode

In the operation mode the measured values of the enabled channels are displayed cyclically, e.g.:

\{ c1 253.5 °C \}
\{ c2 22.34 l/min \}
\{ m1 19.02 mA \}
\{ i1 521 MWh \}
\{ s1 250 MWh \}
\{ bl 225 V \}
\{ rd 75 mm \}
\{ gn 76.02 bar \}

This means:

c1...c4 Channel 1...4 
m1...m4 Mathematic channel 1...4 
i1...i4 Pulse channel 1...4 
s1...s4 Accounting channel 1...4 
bl, rd, gr, vt Output channels blue, red, green, violet 
pr Printer channel

On overshooting the measuring range, e.g. \{ bl↑ \} is displayed in flashing mode.

On undershooting the measuring range, e.g. \{ bl↓ \} is displayed in flashing mode.

In case of sensor break, e.g. \{ bl* \} is displayed in flashing mode.

The channel code is displayed in lowercase characters in case of cyclical display of the measured values, e.g. \{ c1 253.5 °C \}

The channel code is displayed in uppercase characters in case of static display of the measured values, e.g. \{ C1 253.5 °C \}.

Special character formats

For display sections whose readout range exceeds 9999, the exponential display mode (semi-logarithmic) can be selected (see parameter-definition instructions):

Example:
\{ 7.452E6 \} = 7452000

The exponential display mode can also be selected for a logarithmic readout range (see parameter-definition instructions):

Example:
\{ 7.452 \times 10^6 \} = 7452000

Special display operating states when using the history function

Standby with memory:

(Standby: MEM/MAN)
Standby is switched on; is activated with <Stop>.

(Standby: MEM/DI)
Standby is switched on; is activated through the binary input.

(Standby: MEM/AUTO)
Standby is switched on; is activated upon switching on the unit.

(Standby: PRT/DI)
Standby is switched off; the activation criteria are printed out.

(Standby: OUT/DI)
Standby is switched off; the buffer is printed out till empty.

Standby without memory:

(Standby: MAN)
Standby is switched on; is activated with <Stop>.

(Standby: DI)
Standby is switched on; is activated through the binary input.

(Standby: AUTO)
Standby is switched on; is activated upon switching on the unit.
Key functions in the operating mode

The <Print> key

If a printer channel exists, the active and enabled channels will be printed out in ascending order:

For about 2 s the message {printout active} will be displayed. If no printer channel exists, the message {no print system} will be displayed for about 1 s.

On completion, the display reverts to normal operation.

Die Taste <->

The active channels for display are enabled with the <-> key.

In the standby mode, {Standby: ...} is displayed. If <-> is pressed, the current measured value of channel C1 is displayed. If <-> is pressed again, the current measured value of channel C2 is displayed etc. If <-> 5 s is not pressed for a long time, the display reverts to {Standby: ...}.

The <Stop> key

If the <Stop> key is pressed 2 s long, the recorder shifts to the “stop recording” mode (if this function was enabled during parameter-definition). As a result, the take-up and chart speed motor stops and the servomechanisms revert to the parking position:

As an alternative to the stop function, the <Stop> key can also be assigned with the standby function. Precondition is that the {Systemdaten}/(History)/(Taste) is adjusted to “on”. The standby can be switched on and off with <Stop>.

{Standby: MEM/MAN} (for standby with memory time) or {Standby: MAN} (for standby without memory time) is displayed.

System up to 100 %
System middle up to 80 %
System middle down to 0 %
System down to 20 %
Printer channel to 50 %

The active print mode is terminated when the on-going dot sequence has been completed.

Registrier-Stop

is displayed. Upon pressing <Stop> again, the unit returns to the normal operation mode.

If this function is inhibited,

{Taste gesperrt}

is displayed.
The <\> key

On pressing the <\> key, the take-up motor stops. It is then that the unrolled paper can be manually handled and viewed. If <\> is pressed again, the paper is rewound at an approximate speed of 20000 mm/h.

The <↓> key

Pressing <↓> positions the paper. If the key is kept pressed, the chart speed increases in approx. 5 s from 2.5 to about 5000 mm/h. On releasing and repressing the key, the chart speed starts again with 2.5 mm/h.

Notice
If the time imprint or date/time baseline is enabled, the handle strips upon releasing it, will transport the chart paper so far that the next time or date will be imprinted at the correct position.

The <⊙> key

On pressing <⊙>, date and time will be displayed in European format

{08.09.1997 13:38}
or in American format

{09/08/1997 1:38pm}.

The < |=⊙> key

In case of an error or alarm signal, acknowledge this with < |=⊙>. If there are several signals, all of them must be acknowledged before other inputs can be made with the keyboard.

Action in case of measuring range under or overshooting

Display and recording are within the −0.25 % to 100.25 % range, as a proportional function of the selected measuring range. Over or undershooting of the measured value of the stated proportional range is signalled as follows:

Illustrated displays

Should the measured value be short of or exceed the selected measuring range by more than 0.25 %, the channel in question will display after approx. 2 s e.g.

{BL↑} for measuring range overshooting

{BL↓} for measuring range undershooting

in the flashing mode. Upon returning to the permissible range, the measured value is redisplayed after approx. 2 s.

Display on paper

If the measured value under or overshoots the selected measuring range by more than 0.25 %, the measuring element will be controlled in steps with a delay of approx. 2 s to approximately −1 % or +101 % of the recording width.
Changing the chart speed

The chart speed is set to a standard of 20 mm/h. The chart speed can be modified in the parameter-definition mode:

1. Press <Para>.

(Systemdaten) is displayed, if no password has been allocated.

Notice
In the parameter-definition mode the red LED lights up beside <Para>.

2. Press <↵>.

(Vorschübe) is displayed.

3. Press <↵>.

(Vorschub 1) is displayed.

4. Press <↵>.

The chart speed value 0000 flashes.

5. Press <△> or <▼>. Select the required chart speed 1.

Adjustable speeds in mm/h:
0 / 1 / 2,5 / 5 / 10 / 20 / 30 / 40 / 60 / 120 / 240 / 300 / 600 / 1200 / 1800 / 3600 / 7200

6. Acknowledge selected chart speed 1 with <↵>.

7. Press <Esc>.

(Vorschübe) is displayed.

8. Press <Esc>.

(Systemdaten) is displayed.


(Param. Ende ?) is displayed.

10. Press <↵>.

(Daten Sichern ?) is displayed.

11. Press <↵>.

The selected chart speed is stored in the EEPROM and is active.

Chart speed changeover

If the recorder features the option “Alarm value monitoring and binary inputs”, it can be externally switched between chart speed 1 and chart speed 2. The desired values for chart speed 1 and chart speed 2 are selected in the parameter-definition mode.

Chart speed 1 becomes active after switching on the recorder. On applying a voltage of 24 V DC between terminals 901 (−) and 902 (+) the chart speed 2 becomes active. On applying a voltage of 24 V DC between terminals 903 (−) and 904 (+) the chart speed is switched off.
Standby

If the recorder features the option “Alarm value monitoring and binary inputs”, it can be switched to the standby mode. In the parameter-definition mode, select a binary input for switching on the standby function. In order to switch on the standby function, apply a voltage of 24 V DC between terminals 701/703 (−) and the terminals (+) assigned to the selected binary input.

In the standby, standby chart speed, measured value processing and alarm value monitoring modes are active.

The measuring elements are at the start of scale or are located at the last position prior to the triggering of the standby mode.

The standby mode is cancelled by alarm value infringements or by switching the applied voltage to the binary input. The recorder begins recording.

If the <Stop> key for the standby control is switched on, the it can also be used to switch the standby function on and off.

If the recorder is so defined, that the recorder switches to standby when the power supply is applied, the standby operation can be switched on and off with the <Stop> key.

Making history become visible

1. Press <→>.

{Aufwickel-Stop} is displayed.

2. Push lever H on the right side of the slide-in module to the up position.

3. Pull out chart paper to the front.

4. Push lever H to the down position.

Notice

Lever must snap in.

5. Press <→> again.

Recording paper is automatically taken up.
Removing the chart paper

1. Unlock slide-in unit and pull forward (see Figs. 4 and 5).
2. Unlock the measuring element carrier and swing open to the limit (see Figs. 6 and 7).
3. Swing open the chart roll holder to the limit (see Fig. 15).
4. Remove the take-up reel with recording paper (see Fig. 16).
5. Take off the flange without “handling instructions”
6. Remove the recording chart.
7. Fit back the removed flange.
8. Insert the take-up reel.
9. Close the chart roll holder.
10. Insert the new roll chart (see Fig. 8).
11. Pull the start-of-paper up to the sprocket wheel and position the perforations on the sprockets.
12. Swing down the measuring element carrier
13. Push the slide-in unit into the apparatus.

Fig. 15  Opening the chart roll holder
R-17081

Fig. 16  Removing the take-up reel
R-17082
Paper-end signal

Insert the roll chart (see Chapter 5.) and state the length of the roll chart.

1. Press < = ⊗ >.
2. Press < PARA >.

The parameter \{L\} is displayed. The parameter value flashes.

3. State the length of the inserted roll chart with < = > or < = > and < = > or < = > in meters. When doing this take account of the negative paper tolerance.

4. Acknowledge the value with < ↵ >.

The input value is stored. The recorder returns to the operating mode. The length of the remaining paper is written in an EEPROM at time intervals determined by the speed.

Displaying length of rest of paper

In the parameter mode, the end-of paper signal is assigned to the contact output in the main menu \{(System) \ under \{(Pap.Ende DO1)\}. The end-of-paper signal is output 2 hours prior to paper-end, depending on the speed.

If < = ⊗ > is pressed, the rest of paper is displayed. In addition, the time remaining for paper change is also displayed in accordance with the active chart speed.

Accounting function

If during the accounting function the <Print> key is enabled, the printout of the lines defined in the parameter-definition can be initiated. The control of the accounting interval (internally cyclical or cyclically via binary inputs) is not affected by this.

Notice

The accounting and standby functions are mutually exclusive.

Parameter definitions

(see parameter-definition instructions)

The recorder is defined with the operating keys or with a parameter-definition software from a PC via the RS 485 interface.

Should access to the parametering level be blocked due to a password allocation, the parameter values can only be read.

Press < PARA >. \{(Passwort ?)\} is displayed. The parameter value “0000” flashes.

Input the password “9999” with the keys < = > or < = > and < = > or < = >.

The main menu items and parameters are selected. The parameter values are only displayed.
Conversion

Exchanging the scales

1. Remove the fibre-tip insert from the chart carriage (fig. 9).
2. Pull forward the slide-in unit.
3. Unloosen the left scale screws.
4. Push the scales to the right and remove by untightening the scale screw.
5. Take out the scales from the left side (see fig. 17).
6. Install scales in the opposite order.
7. Adjust the measuring element to zero:
   Press <Para>.  {Systemadten} is displayed.
   Press <↑> (Service) is displayed.
   Press <↓>.  {Kanal BLAU} is displayed.
   Press <→>.  Select required channel.
   Press <→>.  {Papier} ← x x x i is displayed.
   Press <↓>.  Pointer moves to zero. “x x x” flashes.
   Check agreement between electrical zero and paper zero. If balancing is necessary, press <↓>, until the recording pen reaches field. Press <↓> and make a zero correction.
8. Align scale to pointer.
9. Tighten scale screws.
10. Changeover to the parameter-definition mode.

Press <Esc>.  {Kanal blau} is displayed.
Press <Esc>.  (Service) is displayed.
Press <Esc>.  (Param. Ende ?) is displayed.
Press <Esc>.  (Daten Sichern ?) is displayed.
Press <Esc>.  Recorder is switched to the operating mode.
Exchanging the tag name plate

**Moulded door**

Pull off the flexible tag name plate from the retainer.

**Metal frame door**

1. Unloosen the screws of the retainer.
2. Take out the tag name plate.
3. Shorten the new tag name plate at the rupture joints (see fig. 18) and insert into the retainer.
4. Tighten the screws of the retainer.

---

Exchanging door

1. Open door.
2. Unloosen the four mounting studs 1 and unhinge door.
3. Replace with new door and fasten with the four studs 1.

---

Fig. 18  Exchanging the tag name plate
Z-18806

Fig. 19  Exchanging the tag name plate
Z-18810
Firmware update

1. Unlock the slide-in unit with <Open> and pull forward to the limit (see fig. 20).

2. Move pull-to-unlock lever 1 (accessible from underneath) in direction of arrow (1.) and remove the chart unit completely from the case (2.) (see fig. 21).

3. Carefully pull up the electronic card 2 and loosen cables 3, 4, 5 and 6 (see fig. 22).

4. Completely pull out the electronic card 2 and exchange EEPROM 7.

5. Mount in the opposite order.


Maintenance

⚠️ Attention

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

The apparatus shall be disconnected from all voltage sources before it is opened for any operations. Operations on the opened apparatus under voltage must 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.

Replacing fuse

⚠️ Attention

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

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.

1. Unscrew and take out the fuse holder.
2. Replace fuse Si.
3. Rescrew the fuse holder.

Fuse ratings

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>110...300 V</td>
<td>T 1 A</td>
</tr>
<tr>
<td>24...60 V</td>
<td>T 2 A</td>
</tr>
</tbody>
</table>

Fig. 24 Replacing fuse 1

Z-18809
Technical Data

Measurement section

Deviation
to IEC 1143-1 as a function of the nominal range
Class 0.5 for line channels
Class 1 with printer channel
in case of shift of lower-range and/or upper range, optional

\[ \pm \left( 0.1 \% \frac{\text{nominal range}}{\text{measuring range}} - 0.1 \right) \]

± 0.1 % of scale span during linearisation
± 1 K during internal reference junction correction

Dead zone
0.25 % of scale span

Response time
1 s

Measured value damping
with low-pass 1st grade
time constant 0…60 s definable per channel

Measured variables / Nominal ranges

Standard version

Direct current
0…20 mA Ri = 50 Ω
4…20 mA Ri = 50 Ω

Direct voltage
0…10 V Ri ≥ 1 MΩ

Universal version

Direct current
0…20 mA Ri = 50 Ω
4…20 mA Ri = 50 Ω
± 2.5 mA Ri = 50 Ω
± 5 mA Ri = 50 Ω
± 20 mA Ri = 50 Ω

Direct voltage
0…25 mV Ri ≥ 2 MΩ
± 25 mV Ri ≥ 2 MΩ
0…100 mV Ri ≥ 2 MΩ
± 100 mV Ri ≥ 2 MΩ
0…2.5 V Ri ≥ 200 kΩ
± 2.5 V Ri ≥ 200 kΩ
0…5 V Ri ≥ 200 kΩ
± 5 V Ri ≥ 200 kΩ
± 10 V Ri ≥ 200 kΩ
± 20 V Ri ≥ 200 kΩ

Thermocouples Ri ≥ 2 MΩ
Type B 100…+1820 °C
Type E -270…+1000 °C
Type J -210…+1200 °C
Type K -270…+1372 °C
Type L -200…+900 °C
Type N -270…+1300 °C
Type R -50…+1769 °C
Type S -50…+1769 °C
Type T -270…+400 °C
Type U -200…+600 °C

Internal or external reference junction
Sensor break monitoring can be defined

Resistance thermometer
Pt 100 in 2- or 3-wire circuitry
-50…+150 °C; -200…+850 °C;

Line resistance for
2-wire circuitry max. 40 Ω
3-wire circuitry max. 80 Ω

Measuring ranges

Start of measuring range
0…80 % of the respective nominal range, definable

End of measuring range
20…100 % of the respective nominal range, definable,

Start of measuring range
≥ 20 % of the respective nominal range

Square-rooting function
nominal ranges for direct current and direct voltage definable

Linearisation of user-specific curves
nominal ranges for direct current and direct voltage definable

Mathematic channels

Number
4, freely assignable to the recording systems

Purpose
interconnection of input channels

Term length
maximum 32 characters

Arithmetic
+; -; x; /

Functions
x^n; a^x; log; cos; sgn; int
Pulse inputs

Number
4

Pulse frequency
maximum 10 Hz

Control voltage
24 V DC / 6 mA external

Option “Binary inputs/outputs” required

Effects

Temperature
\[ \pm \left( 0.2 \times \frac{\text{nominal range}}{\text{measuring range}} - 0.05 \right) \% / 10 K \]

Reference temperature
25 °C

Supply voltage
\leq 0.1 \% for 24 V DC ±20 \%
\leq 0.1 \% for 24 V AC +10/-15 \%
\leq 0.1 \% for 230 V AC +10/-15 \%
\leq 0.2 \% for other voltages

Interfering parasitic voltages
\leq 0.5 \% of the measuring span

External magnetic field 1 mT
\leq 0.5 \% of the measuring span

Mechanical stress
during and after activation \pm 0.5 \% of the measuring span

Recording section / Measured value display

Scales
one graduation per measuring element

<table>
<thead>
<tr>
<th>Type</th>
<th>Scale plate width</th>
<th>Character size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 mm</td>
<td>2 mm</td>
</tr>
<tr>
<td>2</td>
<td>7.5 mm</td>
<td>3 mm</td>
</tr>
<tr>
<td>3</td>
<td>13.4 mm</td>
<td>5 mm</td>
</tr>
</tbody>
</table>

Operator and display panel

Display
16-digit point-matrix-display

Character size
3 mm × 5 mm

Operation
8 keys, double assignment
First level: operation
Second level: parameter-definition

Recording

Arrangement of the measuring elements and colour assignments

Version with 1..4 line channels

<table>
<thead>
<tr>
<th>Type</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>green</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>red</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>blue</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>violet</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

Version with 1..3 line channels and printer channel

<table>
<thead>
<tr>
<th>Type</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Printer Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>green</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>red</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>violet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Trend recording with line channels

Fibre-pen with ink reservoir, containing approximately 1.4 ml, trace length approx. 1300 m, spacing between the tips of the fibre-pens 2 mm.

Trend recording with printer channel

Instead of the violet line channel, a printer channel for text printouts has been incorporated. The measured values are recorded as dotted lines with equidistant dot spacings. Ink head reservoir approx. 1.5 \times 10^6 dots. Spacing between the blue fibre-pens and ink head 6 mm.
Text printout
only for chart speeds of $\leq 300$ mm/h

Character size
approx. $1.5 \times 2$ mm

Scope of text printouts:
1. Ten text lines: optional per text line
   maximum 32 characters
   maximum 30 characters and time imprint
   maximum 24 characters and time/date imprint
   Cyclically triggering at time intervals or
   event-dependent through internal (alarm value) / external
   excitation (binary inputs)
2. Printout of chart speed, date and time
   Triggering off upon switch-on of recorder and during chart
   speed changeover
3. Printout of the current measured values
   Triggering at cyclical time intervals or
   event-dependent through internal/external excitation
4. Printout of double lines assigned to measuring points
   First line: scaling line with channel coding and printout of the
   measured unit
   Second line: measuring point-related text with a maximum of
   32 characters
5. Printout of the accounting table consisting of:
   comment line
   start and end time of the accounting interval
   minimum / maximum value during the accounting interval
   average and summation value through accounting interval
   initiation: cyclical and external.

Chart speed

Speeds (definable)
0 / 1 / 2.5 / 5 / 10 / 20 / 30 / 40 / 60 / 120 / 240 / 300 / 600
/ 1200 / 1800 / 3600 / 7200 mm/h
Option: external chart speed changeover and switch-off
required (Option “Alarm value monitoring and binary inputs”)

Charts
64 m roll chart

Visible diagram length
65 mm

Recording width
100 mm (chart width 120 mm, DIN 16 230)

Chart feed-in
automatic capture of start-of-paper by the take-up reel (daily
chart tear off or complete unwinding is possible)

Power supply

Power supply unit
18...53 V UC / ...75 V DC
85...265 V UC / ...300 V DC

Holding time in case of mains interruption in the range 85...
120 V DC
$\geq 2$ ms

Frequency range for AC operation
47.5...63 Hz

Power intake
at maximum complement approx. 18 W, 25 VA

Interface RS 485

– for parameter definitions
– for coupling to higher-level systems for bidirectional data
  transmission

Option “Alarm value monitoring and binary inputs”

External chart speed changeover
Signal voltage 24 V DC / 6 mA external

Standby
Signal voltage 24 V DC / 6 mA external

Alarm value monitoring
2 Alarm values per channel for absolute value monitoring
2 Alarm values per channel for gradient monitoring
6 internal relays can be freely assigned to the alarm values
Output: NO contact
Contact load: $U_{\text{max.}} = 30$ V, $I_{\text{max.}} = 100$ mA, $\cos \phi = 1$
14 additional relays available with external I/O converters

Event marking
4 markings possible
Recording for 2 %, 5 %, 95 %, 98 % recording width
Signal voltage 24 V DC / 6 mA external

External measuring range changeover
Signal voltage 24 V DC / 6 mA external

Accounting
4 accounting channels can be used
one freely selectable binary input controls the accounting
interval
Control voltage 24 V DC / 6 mA external

End-of-paper signal
for speeds $\leq 120$ mm/h, 2 hours before paper-end
for speeds $>120$ mm/h, at least 8 hours before paper-end
Output: freely selectable relay contact
General and safety data

Environmental capabilities

Climatic category
3K3 to DIN IEC 721-3-3

Ambient temperature
0...25 °C

Transportation and storage temperature
−40...+70 °C

Relative humidity
≤ 75 % annual average
maximum relative humidity ≤ 85 %, avoid condensation
Pay attention to effect of humidity on chart paper according to DIN 16 234

Mechanical capabilities

Tested to DIN IEC 68-2-27 and DIN IEC 68-2-6

During transportation
Shock 30g / 18 ms
Vibrations 2g / 5...150 Hz

In function
vibrations 0.5g / ± 0.04 mm / 5...150 Hz / 3 × 2 cycles

Electromagnetic compatibility

The protection targets of the EMC directive 89/336/EWG on radio interference suppression to EN 55011 and on interference immunity to EN 50 082-2 are met.

Radio interference suppression
Alarm value class B to EN 55 011 or Postal Ordinance 243/92

Interference immunity
Tested to IEC 801 / EN 60 801

Permissible parasitic voltages

<table>
<thead>
<tr>
<th>Type of test</th>
<th>Test severity</th>
<th>Effect</th>
<th>Severity degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burst (5/50 ns) on main lead</td>
<td>2 kV</td>
<td>≤ 1 %</td>
<td>3</td>
</tr>
<tr>
<td>measuring lead</td>
<td>2 kV</td>
<td>≤ 1 %</td>
<td>3</td>
</tr>
<tr>
<td>Surge (1.2/50 µs) on main lead</td>
<td>2 kV</td>
<td>≤ 1 %</td>
<td>3</td>
</tr>
<tr>
<td>common differential</td>
<td>1 kV</td>
<td>≤ 1 %</td>
<td>2</td>
</tr>
<tr>
<td>HF field radiated 80 MHz...1 GHz</td>
<td>10 V/m</td>
<td>≤ 1 %</td>
<td>3</td>
</tr>
<tr>
<td>lead routing 0.15 ...80 MHz</td>
<td>10 V</td>
<td>≤ 1 %</td>
<td>3</td>
</tr>
<tr>
<td>1-MHz pulse on main lead</td>
<td>2 kV</td>
<td>≤ 1 %</td>
<td>3</td>
</tr>
<tr>
<td>common differential</td>
<td>1 kV</td>
<td>≤ 1 %</td>
<td>3</td>
</tr>
<tr>
<td>ESD (1/30 ns)</td>
<td>6 kV</td>
<td>≤ 1 %</td>
<td>3</td>
</tr>
</tbody>
</table>

The NAMUR industrial standard is met (interface leads shielded).

Electrical safety

Tested to DIN EN 61 010-1 (classification: VDE 0411) or IEC 1001-1

Protection class
I

Overvoltage category
III at mains input
II at inputs and outputs

Pollution severity
2 in unit and on the terminals

Test voltage
3.75 kV measuring channels to power supply
2.20 kV protective conductor to power supply

Functional extra-low voltage with intrinscal isolation (PELV) to VDE 0100 Part 410 and VDE 0106 Part 101 between mains input – channels, signal leads, interface leads

Connection, Case and Mounting

Electrical connections
Type of protection IP 20
Screw terminals for signal inputs,
Control inputs and alarm value relay outputs
Maximum wire cross-section 2 × 1 mm²
Screw terminals for mains connection
Maximum wire cross-section 1 × 4 mm² or 2 × 1.5 mm²
RS 485 interface with 9-pin Sub-D connector
Case
Sheet steel for panel or rack mounting
(see dimensional diagram)

Case type of protection to DIN 40 050
Front panel including door IP 54
Rear panel IP 20

Case colour
Pebble grey to RAL 7032

Case door
Moulded material
Option: Metal frames with glass

Case fastening
with 2 fasteners (optionally for panel or rack mounting). Maximum grid rod thickness 40 mm, centering bracket is required for installation in rack

Mounting orientation
side inclination −30°...0°...+30°
back inclination 20°
front inclination 20°

Mounting spacing
horizontal or vertical 0 mm, case door must be opened to 100°

Mass
approx. 5 kg

Default settings
Scales with graduation 0...100 per measuring element will be supplied if no scale is defined when ordering.

Basic parameter-definition
If no specific parameter-definition is stated when ordering, the recorder will be supplied with the following parameter-definition:

All channels with measuring range 0...20 mA
Chart speed 1 20 mm/h
Chart speed 2 120 mm/h
Alarm values are set to the end positions (0 and 20 mA)
Measured value damping, zoom-, printer- and alarm-value functions are switched off
No password allocation

These parameter presets can be initialised at any time in the service mode of the recorder.

Basic Standards

International Norms
IEC 68-2-6 Mechanical capabilities (vibrations)
IEC 68-2-27 Mechanical capabilities (shock)
IEC 225-4 1 MHz pulse on mains leads
IEC 529 IP types of protection
IEC 721-3-3 Environmental capabilities
IEC 742 Safety transmitters
IEC 880 Software development
IEC 1000-4 Electromagnetic immunity (measuring method)
IEC 1010-1 Safety of process instruments
IEC 1143-1 Class accuracy
EN 50 081-1 Electromagnetic parasitic emissions in living areas
EN 50 081-2 Electromagnetic parasitic emissions in industrial areas
EN 50 082-1 Electromagnetic parasitic immunity in living areas
EN 50 082-2 Electromagnetic parasitic immunity in industrial areas
EN 50 011 Radio interference suppression for ISM units
EN 60 873 Process recorders
EN 132 400 Solid capacitors (Y-capacitors)

German norms
DIN 16 230 Recording paper
DIN 24 420 Spare parts list for mounting
DIN 43 802 Scales
DIN 46 834 Unit fastening
DIN VDE 0100-410 Protection against shock currents
DIN VDE 0106-101 Basic requirements for intrinsic isolation
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 air-tight in 0.2 mm thick polyethylene together with a dessicant (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.