Polycomp SK

12/24-Channel
Multipoint recorder

Manual

42/41-15 EN

Rev. 06

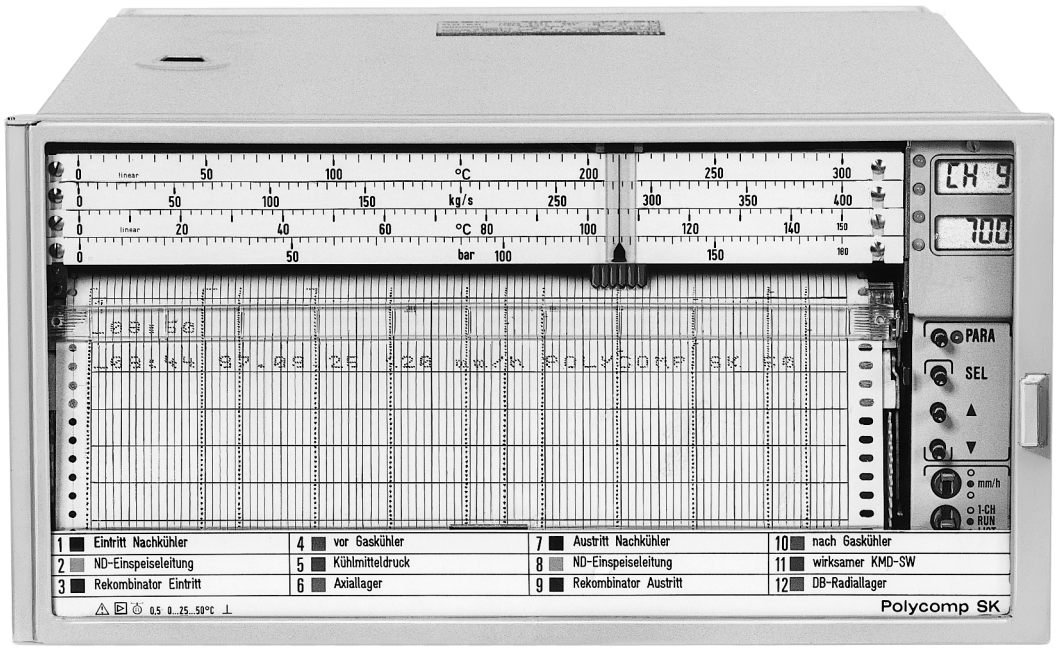

Table of Contents

Important instructions for your safety! Read and observe!

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

Only qualified personnel who are familiar with the installation, commissioning, operation and maintenance of similar instruments are authorized to work on the recorder.

Observe
- the present operating instructions,
- the warnings and cautions attached to the device,
- the relevant safety regulations and standards for the installation and operation of electrical systems
- the regulations and directives pertaining to explosion protection.

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

The recorder has been designed and tested in accordance with DIN VDE 0411 Part 1 "Safety Requirements for Electronic Measuring Apparatus" and has been supplied in a safe condition. The present operating instructions contain warnings marked accordingly which must be followed by the user to retain the device in a safe condition and to ensure safe operation. Otherwise, persons may be injured or the device itself or other devices or installations may be damaged or fail.

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

R-14693

Writing Conventions

<Key>	Key name
Display	Display on the screen
Display	Flashing display

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

Application and Brief Description

The multipoint recorder is to be used for recording measured values (DC voltage, direct current, resistance, thermoelectric voltage).

12 to 24 channels can be recorded, depending on the recorder model.

Additional documentation

Data sheet
Configuration instructions

Installation

Scope of Delivery

The following items are delivered with the recorder:
- 1 operating manual
- 2 fasteners *1*
- 2 roll charts *4* or fan-fold charts *3*
- 1 print insert *2*
- Scale(s), connectors, 4 centering brackets, depending on your order

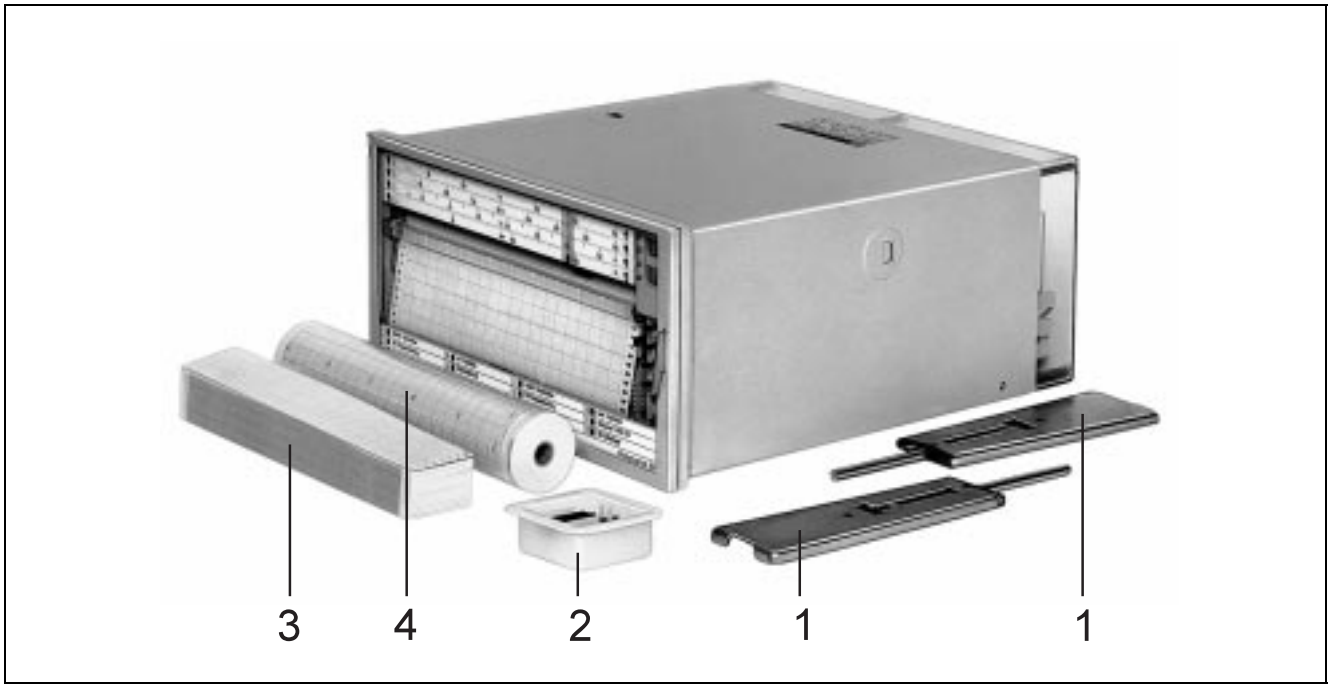

Fig. 1 Scope of delivery
Z-14705
1 Fasteners
2 Print insert
3 Fan-fold chart
4 Roll chart

1. Selecting the Installation Site

Mounting orientation
Lateral inclination −30°...0...+30°
Inclination to rear 90°, to front 30°

Ambient temperature:
0...50 °C

Relative humidity:
≤75 % annual average,
Max. 85 %
Avoid condensation
Observe effect of air humidity on chart paper to DIN 16 234.

Mounting

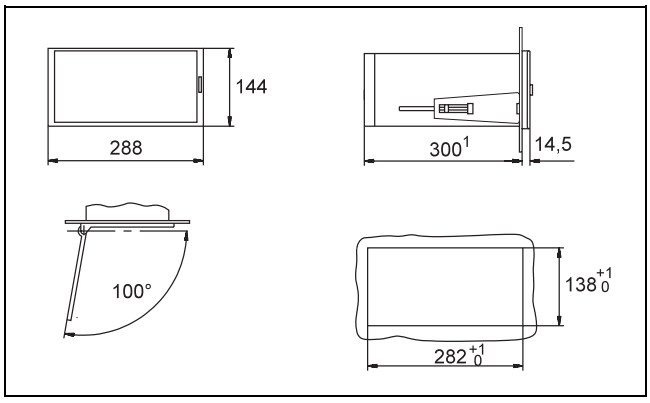

Fig. 2 Dimensional drawing (dimensions in mm)
Z-13795 Panel cutout bottom right
1 With multipoint connector - around 370 mm
2 With integral RS-485-adaptor

Panel mounting

1. Slide the recorder into the panel cutout from the front.
2. Attach the fasteners laterally to the case such that they snap in the cutouts (flat side to the outside).

   Note
   The fasteners are designed for close-packed mounting in both horizontal and vertical direction.

3. Evenly tighten the fasteners upon perpendicular alignment of the recorder in the panel.

Connecting Signal Cables for Measured Values

⚠ Warning

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

The device may become a safety hazard when the protective grounding conductor is interrupted inside or outside the device or is disconnected from the grounding conductor terminal.

Provide a mains connector of sufficient breaking capacity and which can disconnect all power near the installation site. Make sure that the mains switch does not affect the protection through the protective grounding conductor.

When selecting the conductor material and when making the installation observe the directives and regulations for the installation of high-voltage systems with voltages of up to 1000 V (VDE 0100).

When powering the recorder from a mains of overvoltage-category III the recorder must be protected by external fuses for 10 A.

Do not use the device outside a control panel.

Do not touch live parts.

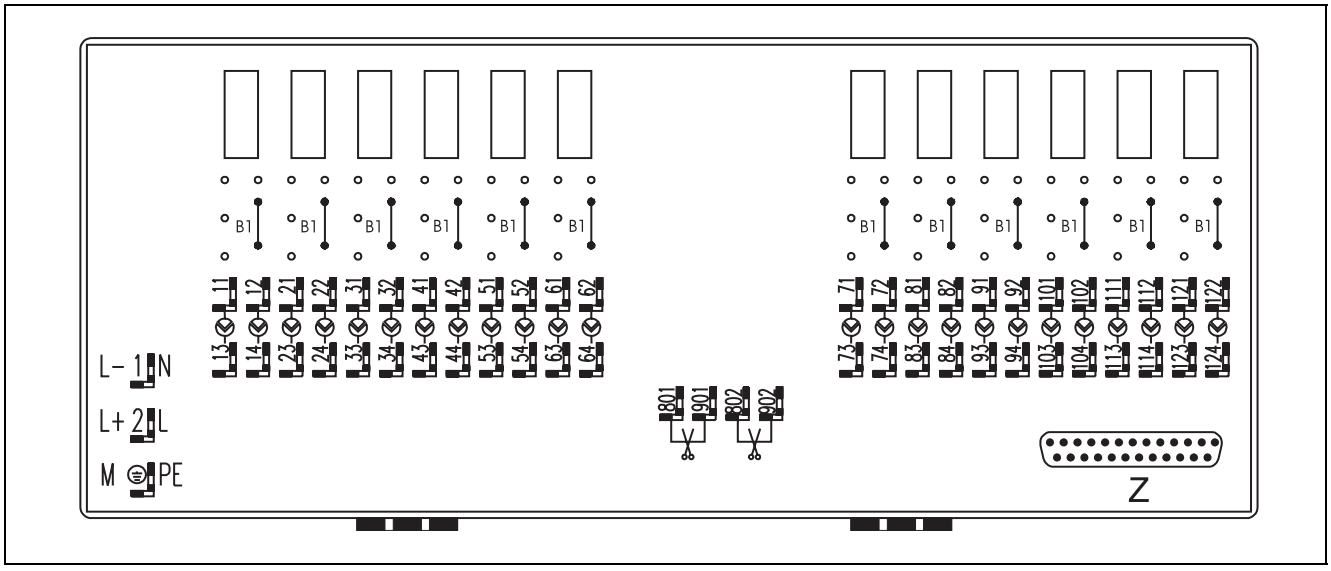

Fig. 3 Backside of the recorder (12-channel) with screw terminals
Z-14319 Bottom Blade-type terminal for putting on cable shields
Z SUB-D socket for additional equipment

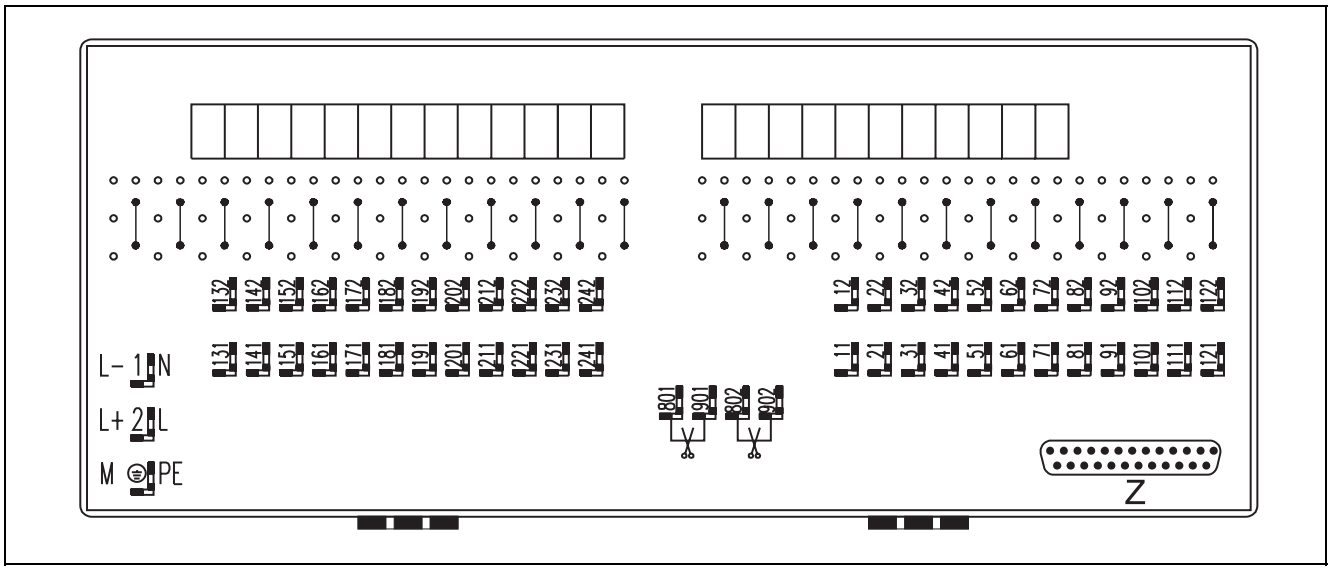

Fig. 4 Backside of the recorder (24-channel) with screw terminals
Z-14320 Bottom Blade-type terminal for putting on cable shields
Z SUB-D socket for additional equipment

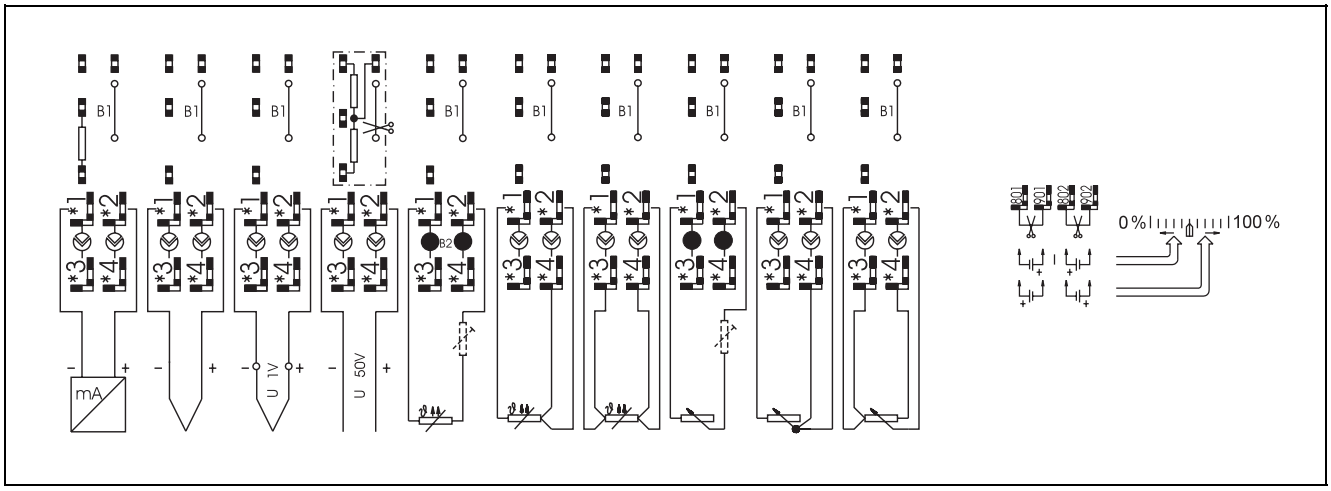

Fig. 5 Connecting sensors
Z-14240 Balanced RTD's can only be connected to 4-wire circuits; therefore, it is not possible to connect balanced
Z-14321 RTD's to the recorder model with 24 measuring points

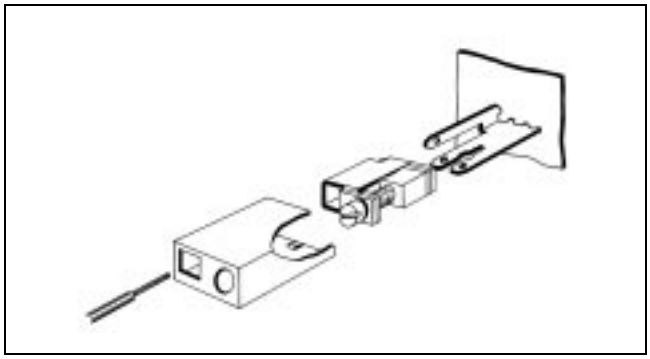

Fig. 6 Connecting screw terminals
Z-12405

Note
The cables must be entered through the cutouts in the (transparent) cover (Protection: IP 20).

Connecting the screw terminals
(see fig. 6)

Always start on the left hand side of a horizontal terminal strip.

Connecting sensors
(see fig.s 3, 4, 5 and 6)

The first digit of terminals with a two-digit terminal number, and the first two digits of a three-digit terminal number are identical with the measuring point number.

Twisted-pair or shielded cables should be used for feed lines. Keep the free ends as short as possible.

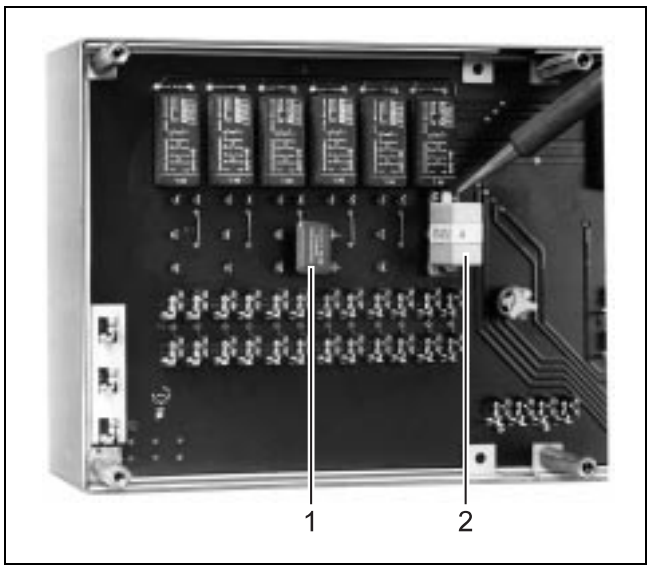

Fig. 7 Installing a shunt resistor / voltage divider
Z-14734 *1* Shunt resistor
2 Voltage divider

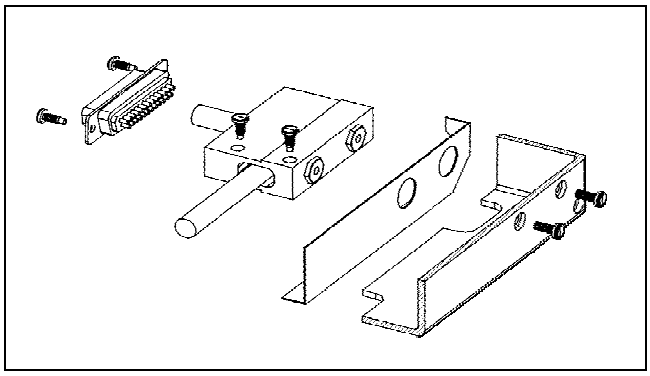

Fig. 8 Fastening the SUB-D connector for additional equipment
Z-14398

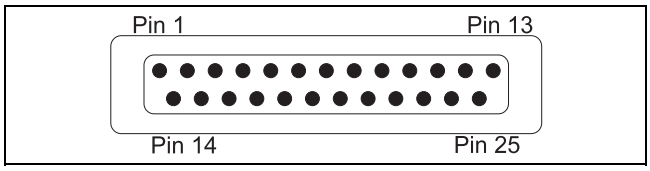

Fig. 9 SUB-D connector
Z-13824

When connecting 2-wire resistance thermometers, connections ..1 and ..3 as well as ..2 and ..4 have to be bridged (see fig. 5).

For measuring ranges of more than 1 V or for DC measuring ranges the respective connections have to be provided with voltage dividers or shunt resistors (see fig.s 5 and 7).

For special applications (e.g. when connecting a gas analyzer with 12 or 24 solenoid valves) the measuring signal for all measuring points can be connected to terminals 901 (+) and 902 (−). When the conductor strips are interrupted between terminals 801 and 901, an offset voltage effective for all measuring points can be fed in (e.g. when connecting a common counter element for thermocouples).

Connecting the SUB-D Connector
(see fig. 8)

Additional equipment can be connected to the SUB-D connector on the recorder's back panel.

The respective functions can be realized by connecting the appropriate pin to pin 1.

Pin	Function (/ = function depends on configuration)
1	Ground
2	RS 232C (RxD)
3	RS 232C (option)
4	End-of-paper signal (+5 V)
5	Alarm values (for measuring point 2^0 + ...)
6	Alarm values (for measuring point 2^2 + ...)
7	Alarm values (for measuring point 2^4 + ...)
8	Alarm values (LL)
9	Display measured values / Standby / Reset / List
10	Select identification line
11	Initiate identification line
12	Chart speed 3 (normal: 60 mm/h)
13	Chart speed 2 or 1 (normal: 20 or 10 mm/h)
14	Pulse-controlled chart speed
15	RS 232C (TxD)
16	RS 232C (5 V) / alarm values
17	Alarm values (for measuring point 2^1 + ...)
18	Alarm values (for measuring point 2^3 + ...)
19	Alarm values (LH)
20	Alarm values (data transfer)
21	Change-over between measuring points is stopped, recorder only works for one measuring point
22	Select identification line
23	Event marker
24	Chart speed 6 (normal: 1200 mm/h) / change dotting rate / dotting rate externally controlled
25	No chart speed / external clock synchronization

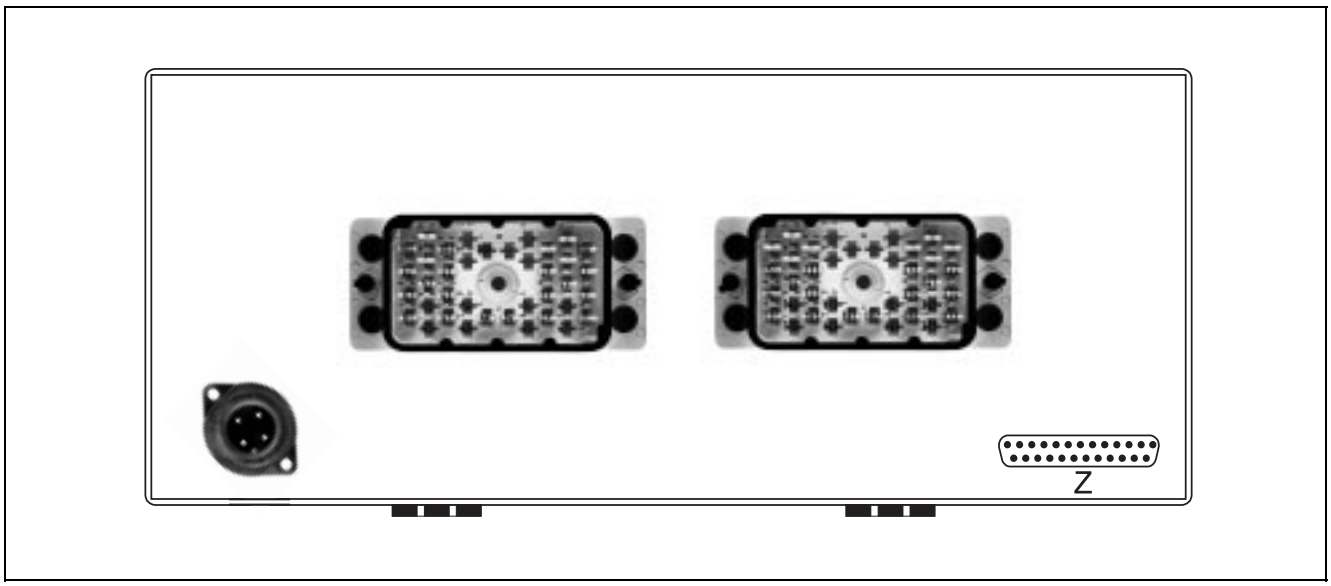

Fig. 10 Recorder back panel with multipoint connector
Z-14318 *Z* SUB-D connector for additional equipment

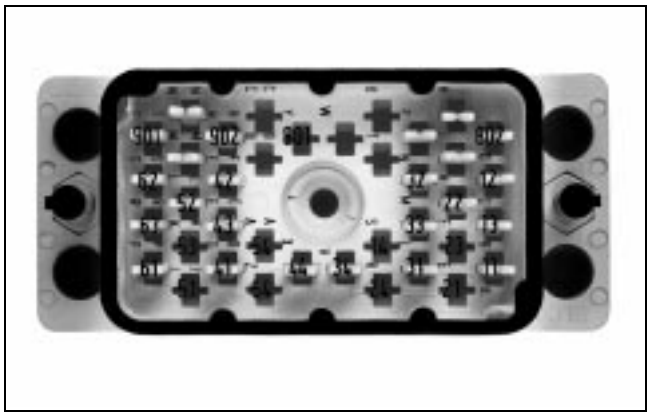

Fig. 11 12-fold: measuring point 1...6
Z-037841

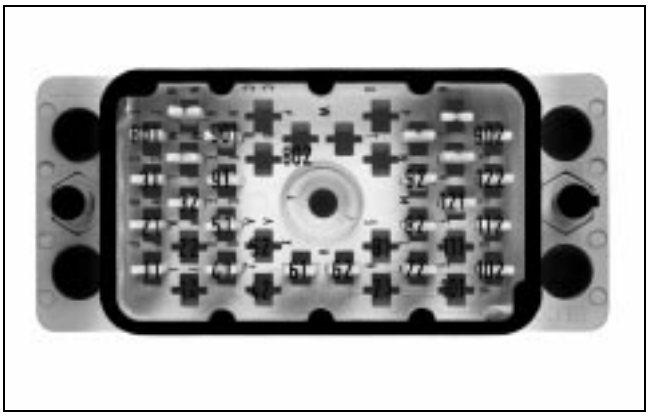

Fig. 13 24-fold: measuring point 1...12
Z-037843

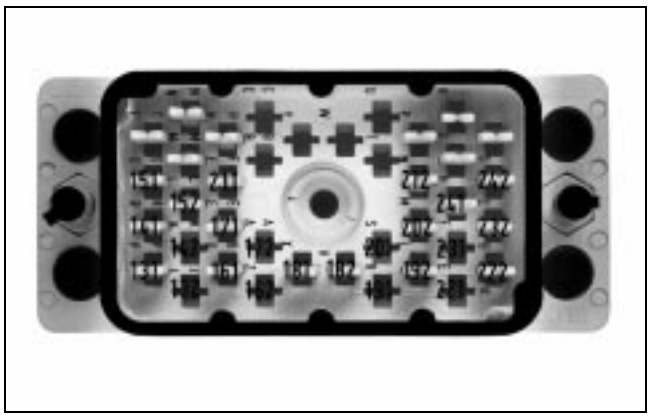

Fig. 12 12-fold: measuring point 7...12
Z-037842

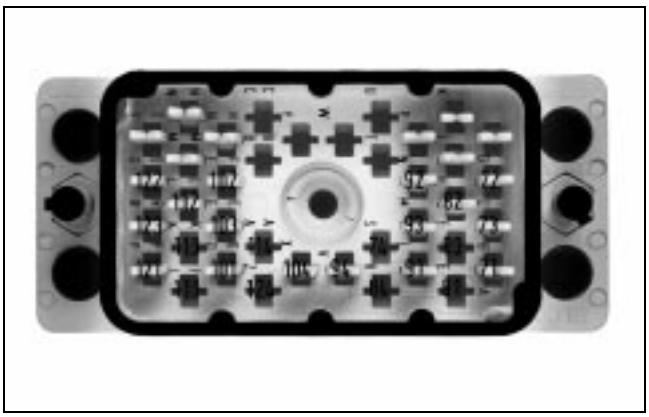

Fig. 14 24-fold: measuring point 13...24
Z-037844

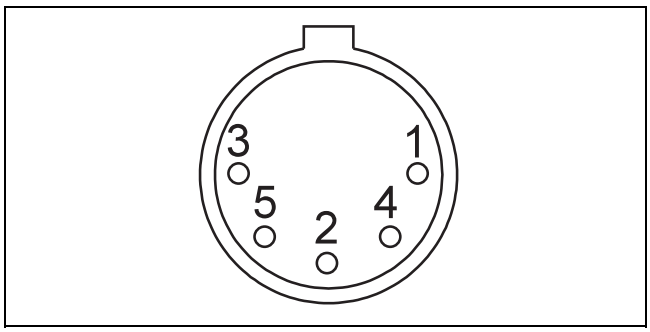

Fig. 15 RS 232C interface
Z-14317
1 +5 V
2 Ground
3 Option
4 RxD
5 TxD

Note
An adapter cable with level converter is needed to configure the recorder via the RS 232C interface.

1. Remove the chart unit (see section „Changing the chart paper“ on page 14).

The RS 232C connection is accessible then.

2. Connect the cable.

Connecting the Power Supply

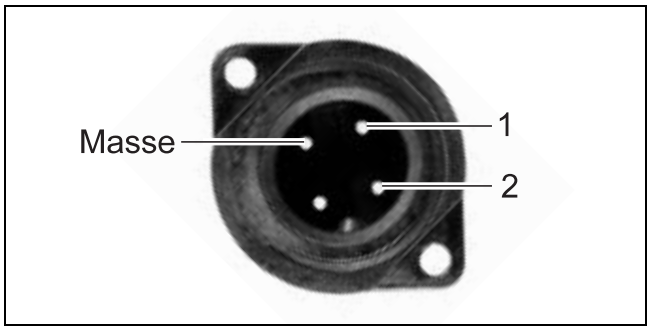

Fig. 16 Power supply with optional “multipoint connector”
Z-09461
1
2
3 Ground

⚠ Warning

Remove the transportation restraint from the print head.

When using stranded wires they must be provided with wire end sleeves.

Connect the power supply for
- AC to N, L and PE (= protective earth)
- DC to L+, L− and PE (= protective earth)

Commissioning

⚠ Warning

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

1. Installing the Print Head

1. Tilt up the pointer and scale.
2. Let the upper end of the print head's guide plate snap in the slot of the holder.
3. Let the lower end of the print head's guide plate snap in the hook of the holder.
4. Pull down the print head and let it snap in.

2. Switching On the Recorder

1. Actuate the external mains switch to power up the device.

Recorders with "alphanumeric chart identification" option first write the identification line with time, date, chart speed, and additional text (if configured).

After around 2 h the recorder has reached its operating temperature.

The built-in clock of the basic version has more than 5 days of reserve power.

3. Positioning the Chart Paper

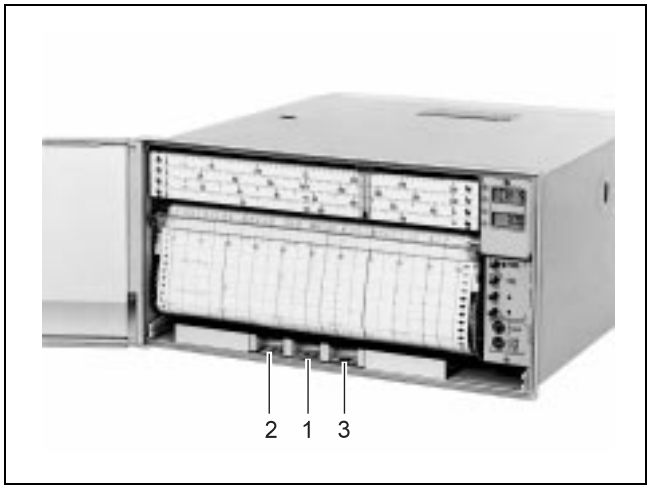

Fig. 17 Positioning the chart paper
Z-14703
1 Chart transport backwards
2 Chart transport forwards
3 Print head arrested

1. Position the chart by actuating keys *1* and *2*.

Note
Do not press key *1* more than once; otherwise, a paper jam may occur.

4. Balancing the Cables

Note
Cable balancing is only necessary when using 2-wire circuits.

Automatic balancing

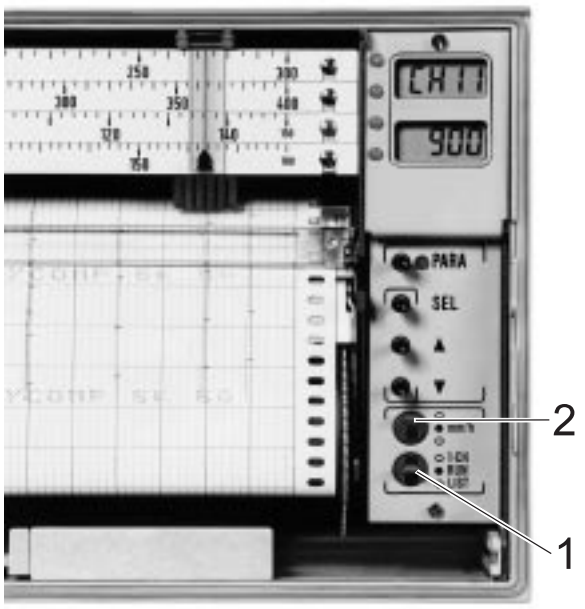

Fig. 18 Switch / display on the operating panel
Z-14700 *1* Mode switch
2 Chart speed switch

1. Set mode switch *1* to “Run” position.

Note
When using a recorder with optional “Connector for external control function” you can connect pin 21 to pin 24 instead of performing steps 2 to 9. Remove the connection prior to making step 10.

2. Press <PARA>. The LED lights up. The upper part of the display shows: PA 0.
3. Press <SEL>. Display: PA 0 (PA flashing)
4. Actuate <▲> until display: FU 0.
5. Press <SEL> until display: FU 0.
6. Actuate <▲> until display: FU 2.
7. Press <SEL> twice. The lower part of the display indicates for example 1234.

If an even number is indicated in the flashing position, the number has to be increased by 1 to activate the automatic cable balancing function:

8. Press <▲>. Display indicates e.g.: 1334.
9. Press <PARA>. The LED goes off. The recorder is returned to normal operation.

Note
If you linked pin 21 with pin 24 instead of performing steps 2 to 9, this connection has to be removed prior to making step 10.

10. Set mode switch *1* to the upper position („1-CH“). Display: ?
11. Shorten the measuring resistance either directly or on the connection head.
12. Set mode switch *1* to the lower position (“LIST”).

The device then measures all line resistances at all measuring points for which automatic cable balancing has been configured, and then saves the measured values. After the measurement has been completed, the display indicates: ?

Upon actuation of mode switch *1* the originally configured function is restarted.

Manual or calculated balancing

Measure the line resistance (R_{Line}) and enter it as a parameter for the respective measuring point.

Standard balancing

Enter 10 Ω as the line resistance parameter and add up the loop resistance to 10 Ω, independent of the device.

Operation

Note

The following priorities are valid for operation:

1. Film keys under the chart unit
2. SUB-D connector on the back panel for additional equipment.
3. Chart speed switch (not in center position) and mode switch (see fig. 18).
4. Operating parameters, depending on configuration.

Positioning the Chart Paper

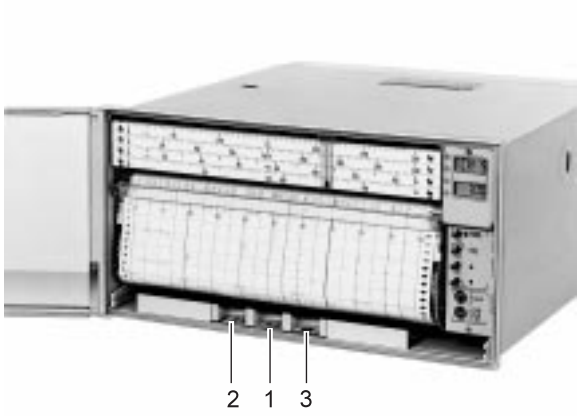

Fig. 19 Positioning the chart paper
Z-14703
1 Chart transport backwards
2 Chart transport forwards
3 Print head arrested

1. Position the chart by actuating keys *1* and *2*.

Note
Do not press key *1* more than once; otherwise, a paper jam may occur.

Viewing Historical Records on the Chart Paper

(see fig.s 20, 21 and 22)

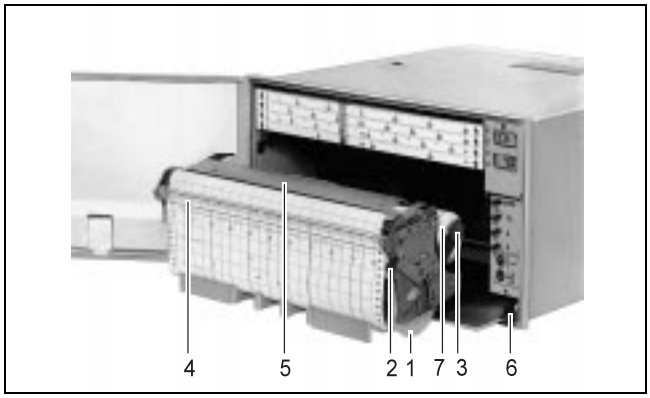

Fig. 20 Chart unit pulled out
Z-14701

1 Take-up reel
2 Lever for unlocking the take-up reel and the unwinding protector
3 Bearing
4 Ruler
5 Paper pressing device
6 Locking spring
7 Chart roll (supply)

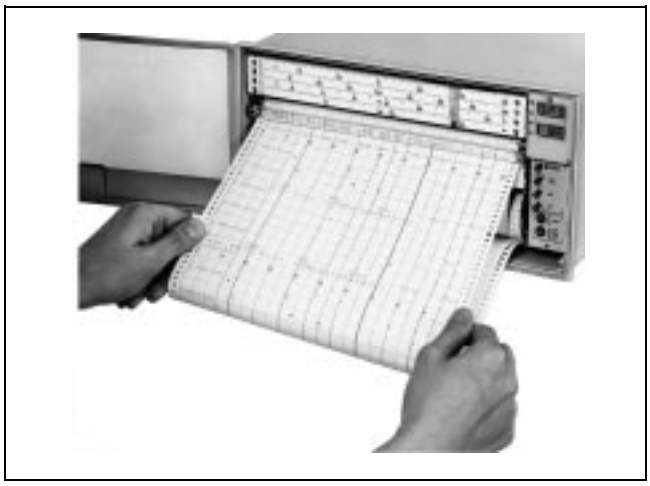

Fig. 21 Viewing historical data
R-14697

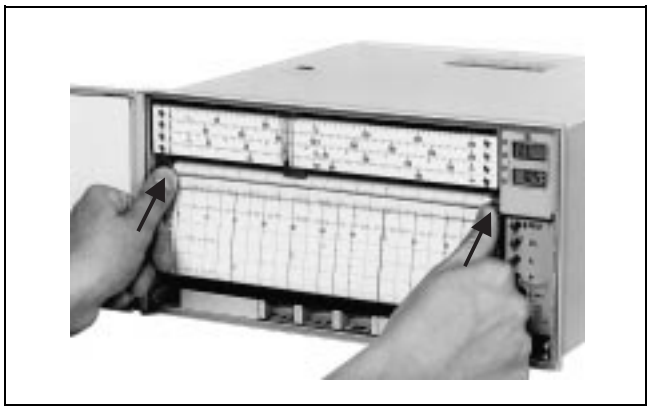

Fig. 22 Locking the chart unit
Z-14698

Note
See section “Changing the chart paper” for details about how to view historical data on fan-fold paper.

1. Press down lever to unlock the take-up reel and the unwinding protector *2* (see fig. 20).
2. Turn back (quarter turn) the left flange of the take-up reel *1* (see fig. 20).
3. Pull out the chart paper until the wanted information is seen (see fig. 21).
4. Wind the chart on again by turning the left flange of the take-up reel *1*.
5. Push up the lever to lock the take-up reel and the unwinding protector *2*.
6. Check the chart position, and correct it if required (see section “Positioning the chart paper”).
7. Let the unwinding protector snap in (see fig. 22).

After this the recorder restarts normal recording operation.

Tearing Off the Chart Paper

Note
For details about how to tear off a part of fan-fold paper please refer to section “Changing the chart”.

1. Press down lever to unlock the take-up reel and the unwinding protector *1* (see fig. 20).
2. Turn back (quarter turn) the left flange of the take-up reel *2* (see fig. 20).
3. Pull out the chart paper to the desired length (see fig. 21) and then tear off.
4. Push up the lever to lock the take-up reel and the unwinding protector *2*.
5. Let the unwinding protector snap in (see fig. 22).
6. Close the device door.

The start of the chart paper is taken up and wound on.

After this the recorder restarts normal recording operation.

7. Check the chart position, and correct it if required (see section “Positioning the chart paper”).

Changing the Chart Paper

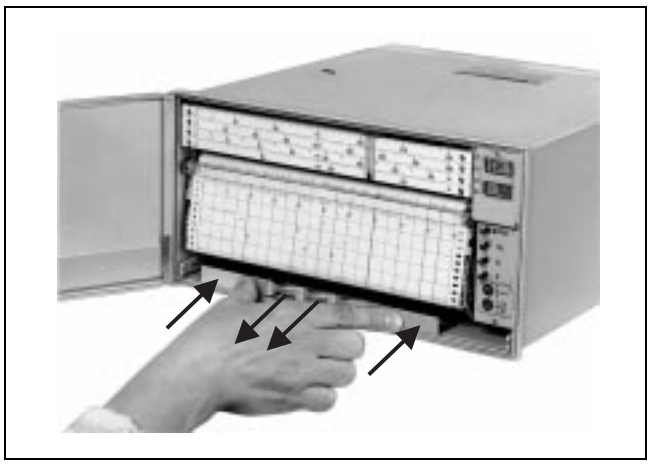

Fig. 23 Unlocking and pulling out the chart unit for the chart roll
Z-14707

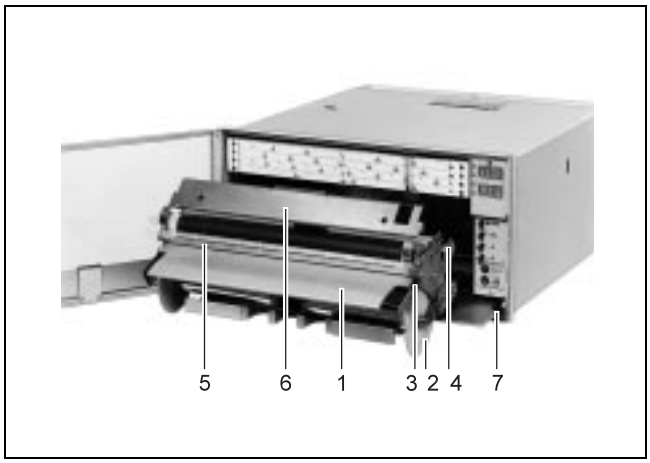

Fig. 24 Chart unit for chart roll
Z-14704

	1	Unwinding protector
	2	Take-up reel
	3	Lever for unlocking the take-up reel and the unwinding protector
	4	Bearing
	5	Ruler
	6	Paper pressing device
	7	Locking spring

The end of the paper roll is indicated by a red line which starts around 1 m before the chart roll actually ends and crosses over the paper. -During normal operation a voltage of +5 V against pin 1 is applied to pin 4 (ground). When the end of the paper roll is reached, a voltage of 0 V against pin 1 (ground) is applied to pin 4.

Chart unit for chart roll
(see fig.s 23 and 24)

1. Unlock the chart unit and pull it out until reaching the stop.
2. Press in the two plastic springs on the left and right side of the chart unit and remove the chart unit.
3 . Press down the lever *3* to unlock the unwinding protector *1* and the take-up reel *2*.
4. Tilt up the unwinding protector *1* until reaching the stop.
5. Remove the take-up reel *2*.
6. Turn the accordingly marked flange and remove it.
7. Remove the chart from the take-up reel.
8. Replace the removed flange and the take-up reel.
9. Push up the lever *3*.
10. Tilt down the unwinding protector and snap it in.
11. Tilt up the paper pressing unit *6*.
12. Push aside the bearing *4* and remove the empty chart roll.
13. Place the new chart roll.
14. Insert the start of the paper roll between the pin roller and the ruler *5*.
15. Fit the chart paper onto the pin roller in such a way that the pins introduce into the perforation of the chart.
16. Tilt down and snap in the paper pressing unit *6*.
17. Push the chart unit back into the housing until it snaps in.
18. Check the chart position, and correct it if required (see section “Positioning the chart paper”).

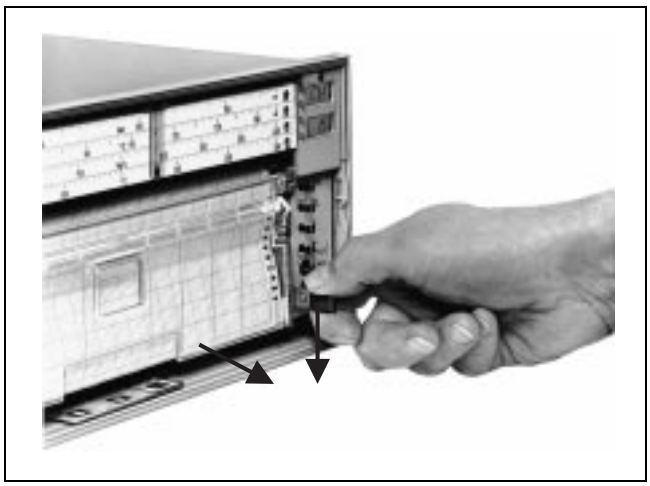

Fig. 25 Unlocking and pulling out the chart unit for fan-fold paper.
Z-14733

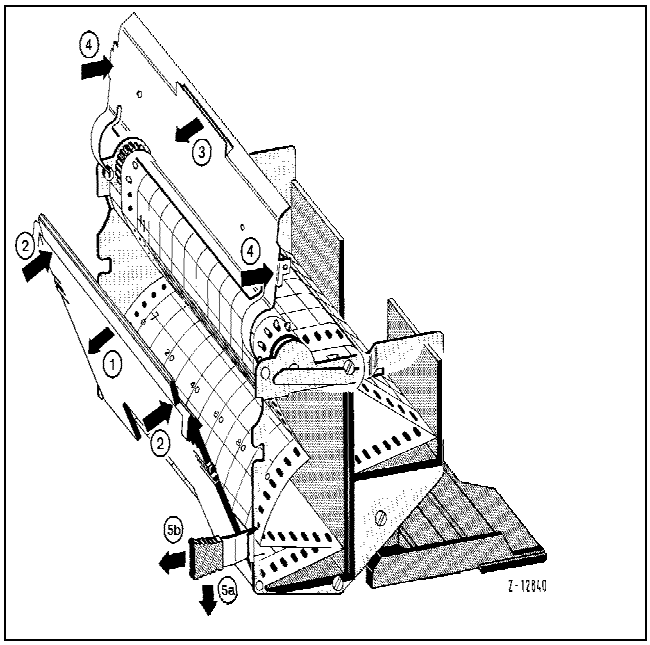

Fig. 26 Chart unit for fan-fold paper
Z-12840

1	Open the flap
2	Close the flap
3	Tilt up the paper pressing unit
4	Tilt down the paper pressing unit
5a	Unlock the chart unit
5b	Pull out the chart unit

Chart unit for fan-fold paper
(see fig.s 25 and 26)
>>Marke<<
Note
The following procedure also includes the steps for viewing historical data and for tearing off individual diagrams.

1. Unlock the chart unit and pull it out until reaching the stop.
2. Press in the two plastic springs on the left and right side of the chart unit and remove the chart unit.
3. Press down the transparent front cover *1*.
4. Tilt up the paper pressing unit *3*.
5. Take out the fan-fold paper to be able to archive it, tear off individual diagrams or view historical data.

   When tearing off diagrams make sure that the paper is conveyed manually, such that two layers of fan-fold paper are available in the stacker.
   When viewing historical data put the paper back into the stacker after viewing.
6. Put in new fan-fold paper.
7. Insert the start of the paper roll between the pin roller and the paper pressing unit.-^Q
8. Fit the chart paper onto the pin roller in such a way that the pins introduce into the perforation of the chart.
9. Further pay out some paper until two layers of fan-fold paper are available in the stacker.
10. Tilt down the paper pressing unit *4*.
11. Close the transparent flap *2*.
12. Push the chart unit back into the housing until it snaps in.
13. Check the chart position, and correct it if required (see section “Positioning the chart paper”).

Changing a Measuring Point Name Plate

1. Untighten the fastening screws of the supporting metal plate in the middle of the housing door.
2. Remove the old measuring point name plate.
3. Place the new measuring point name plate.
4. Tighten the fastening screws of the supporting metal plate in the middle of the housing door.

Changing the Scale Plate

1. Undo the screws on the left and right hand side.
2. Remove the old scale plate.
3. Insert the new scale plate.
4. Loosely tighten the screws.
5. Set the mode switch (see fig. 18) to “CH-1”.
6. Shorten the respective measuring point.
7. Align the start of the scale with the pointer.
8. Tighten the screws.
9. Unshorten the measuring point.
10. Set the mode switch (see fig. 18) to the “RUN” position.

Using the Front Panel Operating Elements

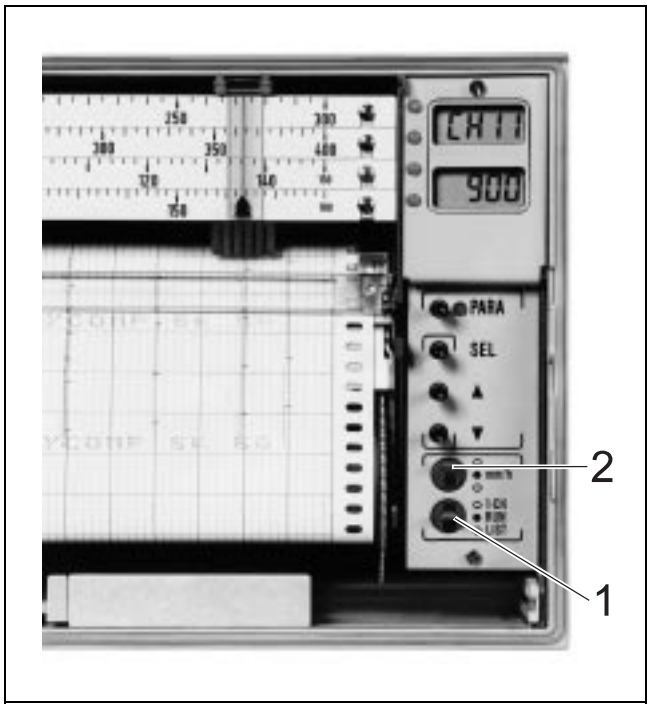

Fig. 27 Operating panel switches
Z-14700 *1* Mode switch
2 Chart speed switch

Key functions

<PARA> changes over between operating mode (LED off) and configuration mode (LED on).

<SEL> Function depends upon the selected parameter group:

with parameters PA (chart speed) and PF (dotting rate) the displayed value is directly taken over.
The display CL (time) is changed to Cd (date) and CA (year).
With parameters CH (measured value), LL (alarm value 1) and LH (alarm value 2) the code number of the respective measuring point starts flashing.

<▲>, <▼> select the parameter which is to be indicated in the display.
change the value of the displayed parameter.

Operating-mode-switch See section “Changing the operating mode”.

Chart-speed-switch See section “Selecting the chart speed”.

Displays

Upper Parameter

Lower Parameter value

LEDs

Signal the graduated scale assigned to the measuring points.

Parameters

The following parameters can be selected by actuating <▲>, <▼>:

CH 2 365	Channel 2 Measured value	see section “Measured value display of channels”
Er	Error message	see section “Error messages”
LL 2 0050	Alarm val. 1 chan. 2 Value	see section “Alarm signaling”
LH 2 1050	Alarm val. 2 chan. 2 Value	see section “Alarm signaling”
PA 120	Chart speed 120 mm/h	see section “Selecting the chart speed”
PF 30	Dotting rate	see section “Selecting the dotting rate”
CL 1420	Time 14:20	see section “Time / date”

... and display switched off.

Special displays:

! Indicates an error message

▲ Contents of RAM will be saved in the non-volatile memory upon termination of configuration.

Measured Value Display of the Channels

Upon switch-on the channel number is shown in the upper display, and the corresponding measured value is seen in the lower display of the recorder.

```
CH 2
 365
```

Displaying only one measuring point

1. Set mode switch to “CH-1” position.
2. Press <▲> or <▼> until CH x (x = channel number) is displayed.
3. Press <SEL> until CH x is displayed (with flashing channel number).
4. Actuate <▲> or <▼> until the desired channel number is indicated.
5. Press <SEL> to exit and set mode switch to “RUN” position.

Assigning a measuring point to a measuring range, and skipping measuring points

1. Press <PARA>. The LED lights up. The upper display shows: PA 0.
2. Press <SEL>. Display PA 0 (PA flashing).
3. Press <▲> until CH 0 is displayed.
4. Press <SEL> until CH00 is displayed.
5. Press <▲> until the desired measuring point (number) is indicated.
6. Press <SEL> until the first digit of the lower display starts flashing.
7. Press <▲> until the first digit equals 1.
8. Assignment of measuring points to measuring ranges 0...1 V and 0.2...1 V with linearization: continue with step 14.
9. Press <SEL> twice. The third digit in the lower display starts flashing.
10. Press <▲> until the third digit equals 0.
11. Press <SEL>. The fourth digit in the lower display starts flashing.
12. Press <▲> until the fourth digit is
    0 (= measuring point skipped)
    1 (= measuring range 1)
    2 (= measuring range 1)
    3 (= measuring range 1)
    4 (= measuring range 1)
    5 (= measuring range 0...1 V)
    6 (= measuring range 0.2...1 V)
13. Continue with step x.
14. Press <SEL> until the third digit of the lower display starts flashing.
15. Press <▲> until the third digit is
    1 (= measuring range 0...1 V linearized)
    2 (= measuring range 0,2...1 V linearized)
16. Press <SEL>. The fourth digit in the lower display starts flashing.
17. Press <▲> until the fourth digit is
    1 (= measuring range 1)
    2 (= measuring range 1)
    3 (= measuring range 1)
    4 (= measuring range 1)
18. Press <PARA> to exit.

Exceeding or falling below the measuring range

Max. pointer overranging/underranging 0.3 % (0.63 mm). If the measured value exceeds/falls below the measuring range by 0.3 to 1 %, this is recorded as 0.3 %. If the measuring range is exceeded by more than 1 % the second measuring value line is written (with reduced (half) density) of 10 or 90 %.

When the measured value falls below the measuring range, this is indicated with uu. When the measuring range is exceeded, nn is indicated.

Measured values greater than 999.9 are indicated with _____.

Displaying actual values (physical values)

The following four measuring ranges can be configured for all recorder versions:
- 0...1 V
- 0...20 mA
- 0.2...1 V
- 4...20 mA

However, these ranges can be used only if the appropriate model is used.

For measuring points within these measuring ranges there are two ways to assign physical values to the display range:

1st way

Parameter rAx1 is used to define the lower range value, parameter rAx2 is used to set the upper range value.

Parameter rAx3 is used to select the type of measurement which includes the desired maximum reading.

Parameters CHxx / 1 1# for 0...1 V or CHxx / 1 2# for 0.2 ...1 V are used to assign the measuring point (xx) to the measuring range (#) and the display range.

Parameter CH / 6 must be set to CH / 6 00.

Note

If there is a linear relation between the measuring range and the display range, the temperature measuring ranges are entered without linearization.

If the the measuring ranges 0...1 V or 0.2...1 V correspond to a non-linearized temperature measuring range, the linearization function can be used.

2nd way

If the device is equipped with the alphanumeric chart identification option, the scaling lines which can be entered under parameter SC can be assigned to the measuring points, which are indicated in the display.

For this purpose, automatic scaling for the wanted graduation has to be configured using parameter AL60 / 7 xx.- If the scalings are to be written simultaneously, no point must be entered. Also, the maximum reading divided by five must not equal a number with a digit to the right of the decimal point. If the scalings are not written, you can also enter numbers with digits to the right of the decimal point. Note that the decimal point of the start and end values of the scale must be in the same position. If the maximum reading is divided by 5, the value resulting from this calculation must not have more digits to the right of the decimal point than the start/end values of the scale.

Parameter CHxx / 6 0# is used to assign the measuring point (xx) to the scaling line (#).

Thermocouple break monitoring

1. Press <PARA>.The LED lights up.
2. Press <▲> until CH is displayed.
3. Enter the number of the measuring point to be monitored in the first two digits on the right side of the upper display.
4. Press <▲> until FU 1 is displayed.
5. Enter C (for pointer travel to the left side when testing, display - ^{c}H 3 / ^{n}u) or E (for pointer travel to the right side when testing, display cH 3 / ^{n}u) in the first two digits on the left side of the upper display.
6. Press <PARA> to exit.

Recording all measuring points, but indicating only one

1. Press <PARA>. The LED lights up.
2. Press <▲> until FU 1 is displayed.
3. Add eight to the second digit on the lift side indicated in the lower display.
4. Press <▲>. Display FU 2.
5. Enter the number of the measuring point to be displayed in the first two digits on the right side of the lower display.
6. Press <PARA> to exit.

Error messages

!

This symbol indicates that an error message exists.

Press <▲> or <▼> to call up the error message for display:

Er
xy

Explanation:

x 1 Invalid alphanumeric input
2 Error of measured value display
4 General hardware error
8 Chart speed not accurate

y 1 General error
2 Thermocouple break
4 Invalid measuring range configuration
8 Serial interface error

Error x + error y

x, y		
	3	1 + 2
	5	4 + 1
	6	4 + 2
	7	4 + 2 and 1
	9	8 + 1
	A	8 + 2
	b	8 + 2 and 1
	c	8 + 4
	d	8 + 4 and 1
	E	8 + 4 and 2
	F	8 + 4 and 2 and 1

Press <SEL> to acknowledge an error message.

Alarm signaling

If the recorder is provided with the optional “Signal output for external alarm converter”, two alarm values can be configured for every measuring point.

If the recorder is provided with the optional “Alphanumeric chart identification”, the alarm values are marked on the chart with
- ◢ (1st alarm value) and
- ◣ (2nd alarm value)

The display indicates

CH 3 for no alarm value violation
0500

Ch 3 for alarm value fallen below (parameter LL)
0800

cH 3 for exceeded alarm value (parameter LH)
0200

Indicating alarm values

1. Press <▲> or <▼> until LL 1 (1st alarm value) is indicated.
2. Press <SEL> until LL 1 is displayed (1 is flashing).
3. Press <▲> or <▼> .

The upper display shows the numbers of all measuring points for which a first alarm value has been configured. The lower display indicates the corresponding value.

4. Press <SEL>. Display LL 1.
5. Press <▲>. Display LH 1 (2nd alarm value).
6. Press <SEL> until LH 1 is displayed (1 flashing).
7. Press <▲> or <▼>.

The upper display shows the numbers of all measuring points for which a second alarm value has been configured. The lower display indicates the corresponding value.

8. Press <SEL> . Display LH 1.
9. Press <▲> or <▼> to exit.

Changing alarm values

1. Press <PARA>. The LED lights up. The upper display shows: PA 0.
2. Press <SEL>. Display PA 0 (PA flashing).
3. Press<▲> until LL 0 (1st alarm value) or LH 0 (2nd alarm value) is displayed.
4. Press <SEL> until Lx00 is displayed.
5. Press <▲> until the wanted measuring point (number) is indicated.

The lower display indicates the corresponding value.

6. Press <SEL> until the appropriate digit of the value to be changed is flashing.
7. Press <▲> until the wanted value is indicated in the digit to be changed.
8. Repeat steps 6 and 7 accordingly for all digits to be changed.
9. Press <SEL> and <PARA> to exit. The LED goes off.

Selecting the Chart Speed

1. Press <▲> or <▼> to change over the display to the chart speed.

PA
120

In the configuration mode, 6 chart speeds are possible, which are generated from two basic speeds and 2 speed factors:

1st chart speed	Basic chart speed 1
2nd chart speed	Basic chart speed 2
3rd chart speed	Basic chart speed 1 × speed factor 1
4th chart speed	Basic chart speed 1 × speed factor 2
5th chart speed	Basic chart speed 2 × speed factor 1
6th chart speed	Basic chart speed 2 × speed factor 2
7th chart speed	off

The following speeds are defined in the standard configuration:
- Basic chart speed 1 = 10 mm/h
- Basic chart speed 2 = 20 mm/h
- Speed factor 1 = 6
- Speed factor 2 = 60

From this results:

1 chart speed	10 mm/h
2nd chart speed	20 mm/h
3rd chart speed	60 mm/h
4th chart speed	600 mm/h
5th chart speed	120 mm/h
6th chart speed	1200 mm/h
7th chart speed	off

Using the chart speed switch to select the chart speed

Three chart speeds can be selected directly by using the chart speed switch:
Switch
- Top position 3rd chart speed
- Center position 2nd chart speed (default setting)
- Bottom position 1st chart speed

Extended chart speed functions

2. Set chart speed switch to mm/h.

3. Press <SEL> and hold it until the appropriate chart speed is displayed. Release <SEL>.

The recorder than works with the newly set chart speed.Also, this chart speed is saved for the center position of the chart speed switch.

Changing the chart speed externally

Note
The optional “Connector for external control functions” is required for this.

The chart speed can be changed externally. Connecting pin 1 (ground) to

pin	changes over to
13	speed factor 1
12	3rd chart speed (normally 60 mm/h)
24	6th chart speed (normally 1200 mm/h)
12 + 13	1st chart speed (normally 10 mm/h)
24 + 13	2nd chart speed (normally 20 mm/h)
25	chart speed off

Controlling the chart speed externally

Note
The optional “Connector for external control functions” is required for this.

The chart speed can be controlled externally (TTL-level):

Pulse input
Pin 14 and pin 1 (ground)

Pulse wave shape
rectangular
Voltage level +5 V DC through passive pulse generator (internal resistance of pulse generator less than 750 Ω).

Pulse width
0.9 ms, max. frequency 512 Hz

From this results a chart speed of

$$= \frac{basic\ chart\ speed \times speed\ factor}{512\ Hz} \times input\ frequency$$

Selecting the Dotting Rate

1. Press <▲> or <▼> to call up the dotting rate display.

```
PF
  30
```

Two recording functions are possible:
- Sequential display and printing of all measuring points (recording function 1). The dotting rate defines the time between the printing of two adjacent measuring points.
- Sequential display of all measuring points, and printout sorted by measured value (recording function 2). The dotting rate is defined as the time between two print cycles.

Function 2 is the default recording function. The default settings for the dotting rate are 30 and 60 seconds. The shortest possible printing time is 2 s for recording function 1, and 18 s for recording function 2 with 12 measuring points (30 s for 24 measuring points).

Changing the dotting rate

2. Press <SEL>.

The second dotting rate configured is displayed and selected.

3. Press <▲> or <▼> to exit.

Changing the dotting rate externally

You can externally change over between the two configured dotting rates by connecting pin 24 to pin 1.

Time / Date

1. Press<▲> or <▼> to call up the time for display.

```
CL
1420
```

Displaying the time and date

2. Press <SEL>. Display `Cd` / `14.10` (day / month).

3. Press <SEL>. Display `CA` / `1999` (year).

4. Press <▲> or <▼> to exit.

Changing time / date

1. Press <PARA>. The LED lights up. The upper display shows: `PA 0`.

2. Press <SEL>. Display `PA 0` (PA flashing).

3. Press <▲> until `CL 0` is displayed.

4. Press <SEL> until `CL 0` is displayed.

5. Press <▲>until `CL x` is displayed.
   x = 1 = enter hours and minutes (hhmm)
   x = 2 = enter day and month (ddmm)
   x = 3 = enter year (yyyy)

6. Press <▲> until x has the desired value.

7. Press <SEL>.

The first digit in the lower display starts flashing

8. Press <▲> until the first digit has the desired value.

9. Press <SEL>.

The second digit in the lower display starts flashing

10. Press <▲> until the second digit has the desired value.

and so on. Proceed accordingly for all four digits.

11. Press <SEL> until `CL x` is displayed.

12. Back to step 5 for further adjustment.
    or
    Press <PARA> to exit: The clock starts running.

Changing the Operating Mode

The following operating modes can be selected with the mode switch (see fig. 27):

- “1-CH” One measuring point is printed.
- “RUN” All measuring points are printed
- “LIST” A list of all configured measuring ranges, alarm values and text lines is printed.

When setting the switch to the “LIST” position you can reconfigure the function:

- display one measuring point,
- display all measuring points,
- reset,
- standby.

Setting the mode switch briefly to the “LIST” position already suffices to start the listing. -After the listing has been completed, the recorder automatically returns to normal recording mode. Listing can be aborted at any time by pressing a key under the chart unit.

When the mode switch is in the “LIST” position, pressing the stop switch under the chart unit will change over the recorder to Standby mode (display: ?). Listing is continued when the mode switch is set to another position.

Externally changing the operating mode

Note
The optional “Connector for external control functions” is required for this.

The recorder will only print a measuring point if pin 21 is connected to pin 1. The recorder will print a list of all measuring ranges, alarm values and text lines configured when pin 9 is connected to pin 1 (also, the other functions configured for switch position “LIST” are started when pin 9 is connected to pin 1).

Event Marker

The configured event marker is recorded outside the chart graduation, between zero line and perforation.

When the connection between pin 1 and pin 23 is opened or closed, the written line is shifted by around 1.5 mm. The line is only written every 30 mm as long as the switching status is not changed. All changes are marked with a small right angle.

Alphanumeric Chart Identification

Note
Cyclic alphanumeric chart identification with scaling lines is only possible with chart speeds between 15 and 200 mm/h.

Three ways are possible:

1. Identification line

_hh:mm YY:MM:DD xxxxx mm/h ZZZZZZZZZZZZZZZ

with time line (_), time (hh:mm), date (YY:MM:DD), chart speed (xxxxx mm/h) and 15 configurable characters (up to four blocks of 15 characters, each, can be configured).

2. Time print

_hh:mm

as short identification line (print cycle according to DIN 16 230).

3. up to 6 double lines

The first line is a scaling line:The amplitude lines for 0 %, 20 %, 40 %, 60 %, 80 % and 100 % are labeled with the numbers of the corresponding measuring range.

The second line is to be used for the dimensions and other texts specific to the measuring point.

The print cycle for the identification line and for the scaling line is seen in the following table:

Chart speed	2..5..9	10...19	20...59	60...119	120...
Identification line	01:00	01:00	01:00	01:00	01:00
Scaling line 1	01:00x	07:00	04:00	02:00	01:30
Scaling line 2	01:00xx	13:00	07:00	03:00	02:00
Scaling line 3	01:00xxx	19:00	10:00	04:00	02:30
Identification line	01:00xxxx	01:00x	13:00	05:00	03:00
Scaling line 4	etc.	07:00x	16:00	06:00	03:30
Scaling line 5		13:00x	19:00	07:00	04:00
Scaling line 6		19:00x	22:00	08:00	04:30
Identification line		01:00xx	01:00x	etc.	etc.

x = Output date + 1 day

The identification line is also written in the commissioning phase and upon a change of the chart speed.

Tiggering the identification line externally

Up to four lines can be configured for external trigger.

They are selected as described below:

Line 1 No external selection required.

Line 2 Selected by connecting pin 10 to pin 1.

Line 3 Selected by connecting pin 22 to pin 1.

Line 4 Selected by connecting pin 10 and pin 22 to pin 1.

The selected line can be printed by connecting pin 11 to pin 1. If the printout is requested before the previously started printout has been terminated, the printing color is changed. The new line is then printed without the time line, with the time of the trigger pulse.

Maintenance

⚠ Warning

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

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

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

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

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

You must assume that the device is no longer safe
- **if the device has visible damages,**
- **if the device does no longer work,**
- **if the device has been stored for a longer time period in a harsh environment,**
- **if the device has been exposed to harsh transportation conditions.**

⚠ Warning

The PCBs contain MOS-components.

Take the necessary ESD protection measures (wear grounding strap, ground working area).

Changing the Print Insert

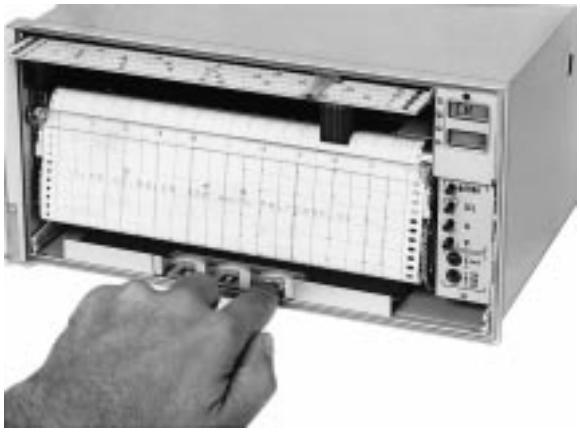

Fig. 28 Pressing the stop key
R-14695

1. Press <Stop> (see fig. 28).

The print head is moved to a scale length of around 80 % and is then arrested.

2. Tilt up the pointer and scale.
3. Push up and unsnap the old print head.
4. Let the lower end of the print head's guide plate unsnap from the hook of the holder.
5. Remove the upper end of the print head's guide plate from the slot of the holder and remove the print head.
6. Let the upper end of the new print head's guide plate snap in the slot of the holder.
7. Let the lower end of the print head's guide plate snap in the hook of the holder.
8. Pull down the new print head and let it snap in.
9. Press <Stop> (see fig. 28).

The print head moves to the start of the scale for zero control and then restarts normal recording operation.

Replacing Fuses

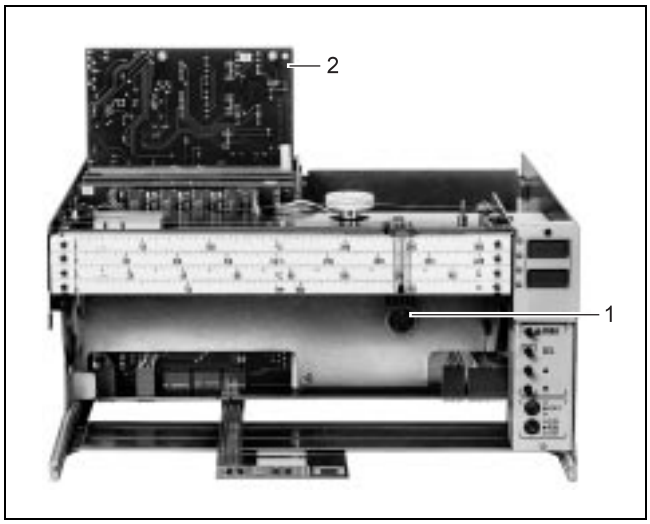

Fig. 29 Power supply board
Z-14694 *1* Connection socket for RS-232C-interface
2 Power supply board moved out

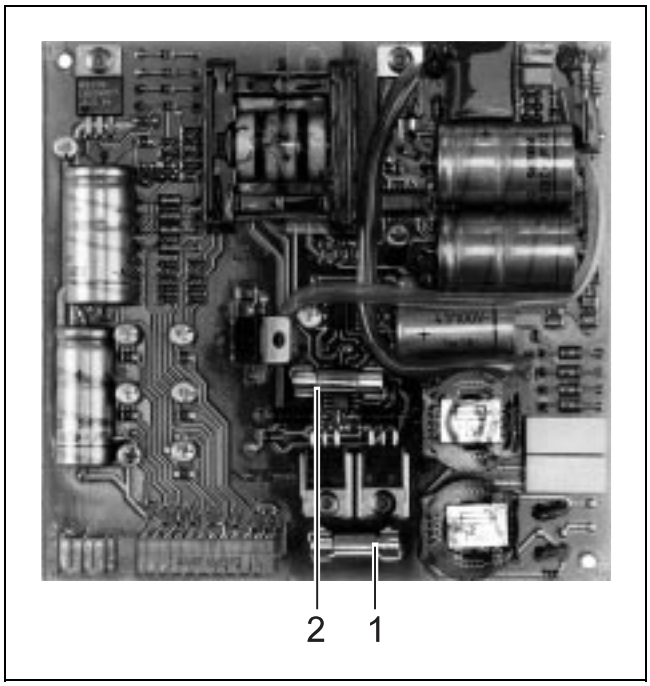

Fig. 30 Fuses
Z-17567 *1* Fuse 1
2 Fuse 2

1. Disconnect the device completely from the mains by using the external mains switch.
2. Unlock the chart unit and pull it out until reaching the stop.
3. Press in the two plastic springs on the left and right side of the chart unit and remove the chart unit.
4. Lift and untighten the plate with the film keypad.
5. Remove the insert from the housing.

Note
When using a recorder with alarm signaling function, this action may release an alarm.

The mains transformer is fastened to the power supply board with four screws.

6. Undo the four screws.
7. Remove the power supply card.
8. Replace the fuses:
   24...60 V:
   Fuse 1: M 1.25 A/C
   Fuse 2: M 1.25 A/C
   110...240 V
   Fuse 1: T 500 mA/C
   Fuse 2: T 250 mA/C
9. Proceed in reverse order to remount.

Cleaning the Recorder

Usually, the device does not require any further cleaning.

⚠ Warning

Do not moisten or wet the cleaning area.

Technical Data

Measuring section

Error limit
Class 0.5 to DIN EN 61 143-1
Additionally
±0.1 % × (lower range value/ span) [mV; mA; Ω]
±0.1 % of span with linearization
±1 °C with internal reference junction compensation

Dead band
0.25 % of span

Response time
1 s

Measuring cycle
The measured value of the indicated measuring point is updated at 1-s intervals

Measuring ranges

Direct current (via shunt resistances)
0...20 mA, 4...20 mA, Ri = 50 Ω

DC voltage
Potential difference: Max. 120 V between measuring points, 60 V DC between measuring points and ground
without voltage divider:
0...1 V, 0.2...1 V, Ri = 5 MΩ
with voltage divider:
0...10 V, Ri = 50 kΩ

Overranging
max. ±10 V

or for recorder models with configurable measuring ranges:

Direct current (via shunt resistances)
Span:
min. 0.1 mA, max. 20 mA (Ri = 50 Ω)
min. 0.5 mA, max. 100 mA (Ri = 50 Ω)
lower range value:
−100...+500 % of span

DC voltage
Potential difference: Max. 120 V between measuring points, 60 V DC between measuring points and ground
Span without voltage divider:
min. 5 mV, max. 1 V (Ri ≥ 5 MΩ)
Span with voltage divider:
min. 0.25 V, max. 50 V (Ri = 250 kΩ)
lower range value:
−100...+500 % of span

Thermocouples
for internal or external reference junction correction
Linearization possible for types T, K, S, B, R, J, L (DIN IEC 584, L according to Fe-CuNi DIN)

Sensor break monitoring
configurable

Resistance thermometer
Linearization possible for Pt100 DIN and Ni100 DIN

Preferred measuring ranges for Pt100 DIN

0...40 °C
0...60 °C
0...100 °C
0...120 °C
0...150 °C
0...200 °C
0...300 °C
0...400 °C
0...500 °C

50...150 °C
100...200 °C
100...400 °C
200...400 °C
300...600 °C

−10...+40 °C
−20...+20 °C
−30...+60 °C
−30...+150 °C
−100...+50 °C

Other measuring ranges on request

Line resistance
2-wire circuit:
≤65 Ω
3-wire and 4-wire circuit:
≤1000 Ω

Span
min. 20 °C

Lower range value
any

Zero suppression
max. 100 % of span

Exact calculation of measuring ranges

R_{TA} Resistance of thermometer with lower range value
R_{TA} Resistance of thermometer with upper range value
ΔR = $R_{TE} - R_{TA}$ = span
R_{Line} Line resistance

2-wire circuit:

Lower range value:
$R_{TA} + R_{TE} \leq 880\ \Omega$

Span
for $R_{TA} + R_{Line} < 140\ \Omega$:
$5\ \Omega \leq \Delta R \geq (R_{TA} + R_{Line}) / 14$
for $R_{TA} + R_{Line} \geq 140\ \Omega$:
$5\ \Omega \leq \Delta R \geq (R_{TA} + R_{Line}) / 8$

Upper range value
$R_{TE} \leq 1000\ \Omega - R_{Line}$

Line resistance
$R_{Line} \leq 65\ \Omega$

4-wire circuit:

Lower range value
$R_{TA} \leq 880\ \Omega$

Span
for $R_{TA} < 140\ \Omega$:
$5\ \Omega \leq \Delta R \geq R_{TA} / 14$
for $R_{TA} \geq 140\ \Omega$:
$5\ \Omega \leq \Delta R \geq R_{TA} / 8$

Upper range value
$R_{TE} \leq 1000\ \Omega$

Line resistance
$R_{Line} \leq 1000\ \Omega$

Effects

of temperature
≤0.2 % / 10 K
additionally
$\pm(\frac{0{,}2\,\%}{10K} \times \frac{measuring\ start}{meassuring\ span} / mV\ [mA,\Omega])$

of supply voltage
≤0.1 % of span with 24 V DC ±25 %
≤0.1 % of span with 220 V ±20 %
≤0.2 % of span with other voltages

of interference voltage
≤0.5 % of span

of external magnetic field 2 mT
≤0.5 % of span

of mechanical stress
during and after the effect ±0.5 % of span

Recording section

Scale
exchangeable

Assignment of scales to measuring points
an LED display shows the graduated scale assigned to each measuring point

LC display
Operating mode:
Display of measuring point number and measured value or of the chart speed, dotting rate or time
Configuration mode
Display of the parameters and the entries made

Recording function
either
Measuring points are displayed sequentially, with selectable dotting rate (2...255 s in 1-second steps)
or
Printing of all measuring points, sorted by magnitude of measured values (shortest printing time for 12 measuring points is 18 s, for 24 measuring points is 30 s.

Operating modes
see section „Changing the Operating Mode“ on page 24

Color sequence according to DIN 43 831
violet, red, black, green, blue, brown
last dot visible from front
Ink supply for 500000 dots per color

Alphanumeric chart identification
Only possible with chart speeds of less than 200 mm/h

Identification line
max. 4
configurable for time, date, chart speed and 15 characters.
Selectable through external contacts

Print release
Cyclically or through external contact

Measuring range lines
max. 6
Double lines, the bottom line can be configured with any 40 characters

Print release
cyclically

Chart drive
Time error $\leq \pm 10^{-4}$ referred to the chart speed

Chart speed
configurable between 1...36000 mm/h
selectable with switch:
10 / 20 / 60 mm/h
selectable wit push-button:
10 / 20 / 60 / 120 / 600 / 1200 mm/h
additionally
drive can be switched off or over externally
or
can be controlled externally: 0...512 Hz (TTL-level)

Recording width to DIN 16 230
210 mm (chart width 230 mm)

Chart length
roll charts 32 m (approx. 66 days at 20 mm/h)
fan-fold charts 16 m

Visible chart length
70 mm on roll chart
20...70 mm on fan-fold chart

Chart feed-in (roll chart)
via automatic take-up device (daily chart tear-off or take up of the entire 32 m possible)

Power supply

Voltage
20...24...53 V AC/DC ...60 V DC
85...230...265 V AC/DC

Frequency:
47.5...63 Hz

Power supply
primary switched-mode power supply for AC/DC operation with electrical isolation of all secondary supply voltages

Power consumption:
around 10 W or around 20 VA

Connection, case, and mounting

Electrical connections

Protection class
IP 20

Connector
Tab connectors in accordance with DIN 46 244
A 6.3 × 0.8; A 2.8 × 0.8 or MTP 2.4 × 0.8 for Maxi-Thermi-Point to DIN 41 611 Part 4 (clamping connection)

or

screw terminals
max. CSA 2 x 1.5 mm^2

or

Multipoint connector

Interface
RS-232C
5-pole socket (accessible after removing the chart unit)

Additional functions / interface at rear
25-pole SUB-D connector (max. cable diameter 10 mm)
Functions
1. RS-232C interface
2. Alarm signaling
3. Chart speed selection and drive disconnection
4. Chart speed and dotting rate controlled externally
5. Event marker
6. End-of-paper signaling
7. Selection and initiation of identification lines

Case

Case (see fig. 2 for dimensions)
Sheet steel for panel or rack mounting

Protection according to IEC 529
IP 54

Color of case
Pebble gray to RAL 7032

Case door
Metal frame with mineral glass

Case fastening
with 2 fasteners (either for rack or panel mounting) according to DIN 43 834 / 11.82

Mounting orientation
Lateral inclination −30°...0...+30°
Inclination to rear 90°
Inclination to front 30°

Mounting distance
horizontal or vertical 0 mm, case door must be open by 100°

Weight
around 7.5 kg

General and safety data

Environmental capabilities

Climate class
complies with climate class 3K3 to DIN EN 60 721-3-3

Ambient temperature:
0...25...50 °C

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

Relative humidity:
≤75 % annual average,
max. 85 %
Avoid condensation!
Pay attention to the influence of air humidity on chart paper as per DIN 16 234.

Mechanical capabilities

Test
according to DIN EN 60 068-2-27 and to DIN IEC 68-2-6

During transportation
Shock 30g / 18 ms / 18 shocks
Vibration 2g / ±0.15 mm / 5...150 Hz / 3 × 5 cycles

In operation
Recorder with alphanumerics
Vibration 0.5g / ± 0.04 mm / 5...150 Hz / 3 x 2 cycles
Recorder without alphanumerics
Vibration 1g / ± 0.08 mm / 5...150 Hz / 3 x 2 cycles

Seismic capabilities

Tested to DIN IEC 68-2-6
Vibration 2g / ±10 mm / 1...35 Hz / 3 × 1 cycles
corresponds to seismic stress class III to IEC 68-3-3

Electromagnetic compatibility

The safety requirements stated in the EMC directive 89/336/EEC are fulfilled in respect of interference suppression to EN 55 011 and in respect of interference immunity to DIN EN 50 082-2

Radio interference suppression
Limit value class B to EN 55 011

Interference immunity
according to IEC 1000-4-x or DIN EN61 000-4-x

Type of test	Severity of test	Effect
Burst (5/50 ns) on power supply circuit signal circuit	 2 kV 1 kV	 ≤0.5 % ≤0.5 %
Surge (1,2/50 µs) on power supply circuit common power supply circuit differential signal circuit (shielded)	 2 kV 1 kV 1 kV	 ≤0.5 % ≤0.5 % ≤0.5 %
HF-field radiation 30 MHz...1 GHz cable conducted 0.15 ...80 MHz	 10 V/m 10 V/m	 ≤0.5 % ≤1 %
ESD (1/30 ns) ESD (5/30 ns)	6 kV 8 kV	≤0.5 % ≤0.5 %

The NAMUR industrial standard for EMC is fulfilled (control and interface cables shielded, cable shields connected to the case shield on both sides.

Tolerated interference voltages

Tolerated interference voltage	1-V basis	mV basis
Series-mode parasitic voltage peak-peak	≥0.1 × span max. 10 V	≥10 × span max. 42 V
Series-mode rejection	26 dB	66 dB
Common-mode interference voltage	60 V DC / 42 V AC	60 V DC / 42 V AC
Common-mode rejection	82 dB	128 dB

Electrical safety

Tested in accordance with DIN EN 61 010-1

Protection class
I

Overvoltage category to VDE 0110 Part 1 and 2
II at mains input
When powering the recorder from a mains of overvoltage category III the recorder must be protected by external fuses for 10 A.

Degree of pollution to VDE 0110 Part 1 and 2
2

Test voltage
2.3 kV measuring channels against power supply
1.35 kV protective ground conductor against power supply

Protective extra low voltage (PELV) with safe isolation from other circuits
between mains input and signal channels, control lines, and interface lines
according to VDE 0100 Part 410 and VDE 0106 Part 101
safety transformer to DIN EN 60 742

Options

Alarm signaling
with two configurable switching points per measuring point. The alarm values can be marked on the chart. For further processing, conversion in the connected alarm unit is required.

Event marker
can be activated with software for the left-hand chart margin (between the perforations and the zero line). Controlled via floating contacts. On or off line recorded with dots in each print cycle. If the switching status does not change, the line is only recorded approximately every 30 mm for around 5 mm to save ink.

End-of-paper signal
approx. 20 mm before chart runs out
Output: +5 V when chart is supplied, 0 V when paper runs out

RS-485 interface
Connection to higher-level systems, for bi-directional data transmission. The data protocol corresponds to a subset of the PROFIBUS-protocol.

Default configuration

Recording
Fixed value

Chart speed
10 / 20 / 60 / 120 / 600 / 1200 mm/h

Recording function
Measuring points are printed, sorted by magnitude of measured values.

Printing sequence
with 12 measuring points 60 s and 30 s
with 24 measuring points 60 s and 30 s

Print head response time
1 s

Measuring range 1
0...100 °C type J, linear, with internal reference junction

Measuring range 2
0...100 °C Pt100 DIN linear 2-wire circuit

Measuring range 3
0...1200 °C type K, linear, with internal reference junction

Measuring range 4
0...5 mV

Adjusted measuring range (fixed value)
Fixed value with

scale length	Measuring point	
6 %	1	13
14 %	2	14
22 %	3	15
30 %	4	16
38 %	5	17
46 %	6	18
54 %	7	19
62 %	8	20
70 %	9	21
78 %	10	22
86 %	11	23
94 %	12	24

Thermocouple break monitoring
all channels are configured for thermocouple break monitoring

Measured value indication in LC display
corresponding to measuring ranges (with fixed value in ‰)

Assignment of measuring points to LED scales (LED counting from bottom to top)

LED	Measuring point					
1	1	5	9	13	17	21
2	2	6	10	14	18	22
3	3	7	11	15	19	23
4	4	8	12	16	20	24

Alarm values
for all measuring points, the first switching point is set to 28 %, the second switching point is set to 72 %, and the hysteresis is set to 2 %

Time / date
set according to the time/date valid in Germany at the time of configuration

Relevant standards

International standards

IEC 61 143-1	Electrical measuring apparatus X-Y-Recorders
IEC 1010-1 DIN EN 61 010-1	Electrical safety
IEC 664 VDE 0110	Isolation coordination
IEC 68-2-6	Mechanical stress (vibration)
IEC 68-2-27 DIN EN 60 068-2-27	Mechanical stress (shock)
IEC 529 DIN VDE 0470 Part 1	Degree of protection of case
IEC 68-3-3	Seismic stress
IEC 721-3-3 DIN EN 60 721-3-3	Climatic ambient conditions

German standards

DIN 43 802	Scales
DIN 16 230	Chart paper
DIN 43 831	Case
DIN 46 834	Case fastening
DIN 46 244	Connection (tab connector)
DIN 41 611 Part 4	Connection (Maxi-Thermi-Point)

Packaging for Transport or for Return to the Manufacturer

- Remove the ink cartridge for transport.
- Secure the print head against lateral displacement.
- If the original packaging material is no longer available, wrap the display unit in a padded plastic film or corrugated paper board. Put the wrapped device in a box laid out with a damping material like foamed plastics. The thickness of the damping material should be in accordance with the device weight and the type of transportation. Label the box with a “handle with care” sticker.
- For overseas shipping always add a desiccant bag (e.g. filled with silica gel) and then weld the device in a 0.2 mm polyethylene foil. Adapt the amount of desiccant to the packing-volume and the approximate transportation time (at least 3 months). Additionally line the box with a layer of union paper.

Subject to technical changes.

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