

PointMaster 200

6-channel Multipoint recorder
Version with LC display
Version with LED
Version with scales

Operating manual

42/41-22 EN

Rev. 01



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Depiction of reference symbols

<Key> Inscription of the keys
{Reading} Readings in the display

The indications "right", "left" or "top", "bottom" imply that the viewer is looking at the front panel of the instrument unless stated otherwise.

Complementary publication

Instructions for parameter setting	42/41-23 (Display versions) 42/41-24 (Scale version)
Interface description	42/41-25

Important instructions! Please read and observe!

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

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

Please take note of the contents of this Operating Manual and the safety regulations affixed to the apparatus.

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

This apparatus has been designed and tested in accordance with EN 61010-1 "Safety requirements for electrical measurement, control and laboratory instruments" and has been supplied in a safe condition. In order to retain this condition and to ensure safe operation, the safety instructions in this Operating Manual bearing the headline "Caution" must be observed. Otherwise persons can be endangered and the apparatus itself as well as other equipment and facilities can be damaged.

If the information in this Operation Manual should prove to be insufficient in any point, the A B B Service Department will be delighted to give you more information.

Short description

The PointMaster 200 is a microcontroller-controlled multipoint recorder.

It is supplied in 3 different versions:

- Scale version with 1 to 6 scale graduations,
- LED display version and
- LC display version.

The recorder is connected to the transmitter and/or directly to thermocouples or resistance thermometers. The measuring channels are galvanically separated and ungrounded.

The recorder is adapted to the measuring task via software using keys of the display and operator control unit or PC and parameter definition program PARAPOINT 200 via RS 485 interface. Standard temperature sensor curves are stored in the unit firmware and are linearized with a high degree of precision. Supplementary functions such as text printout, balance calculation and event markers enlarge information content of the process variables logged. By virtue of the alarm signalling facilities and remote control make the recorder an instrument of versatile application. The Standby function permits a triggered recording mode.

Installation and Commissioning

Scope of delivery

The unit is supplied with the following:

- 1 Operating manual
- 1 Instructions for Parameter Setting document
- 1 Interface Description document
- 2 mounting brackets *Be*
- 1 Ink unit *Fk*
- 1 pack of fanfold chart *Fp* or 1 roll chart *Sr*
- Depending on the order the corresponding number of screw plug terminals *Sk*, 9-pin connector and ruler(s).

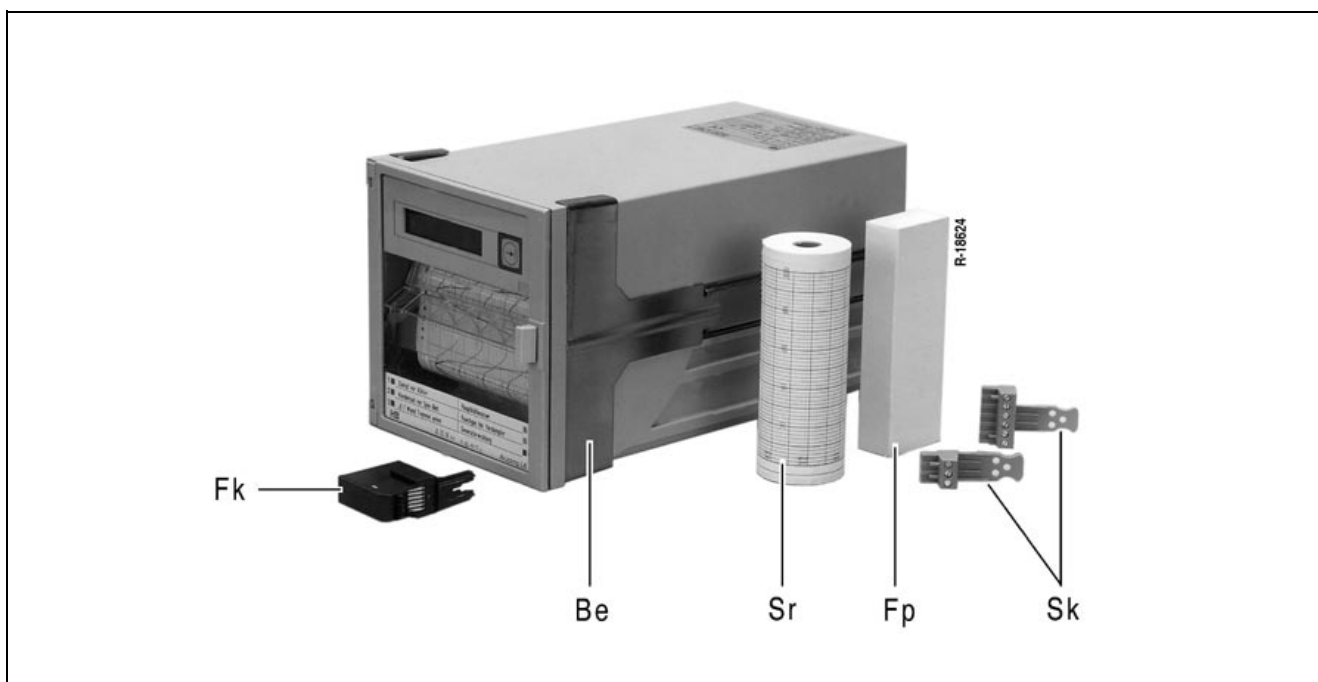


Fig. 1 Scope of delivery (here: LC display version)

<i>Be</i>	Mounting brackets
<i>Fk</i>	Ink unit
<i>Fp</i>	Fanfold chart
<i>Sk</i>	Screw-plug terminals
<i>Sr</i>	Roll chart

1. Mounting location

Mounting orientation

Inclination lateral $-30^{\circ} \dots 0^{\circ} \dots +30^{\circ}$

Inclination backwards 20° , forwards 20°

Ambient temperature

$0 \dots 50^{\circ} \text{C}$

Relative humidity

$\leq 75\%$ annual average,

max. 85%

Avoid condensation!

2. Mounting

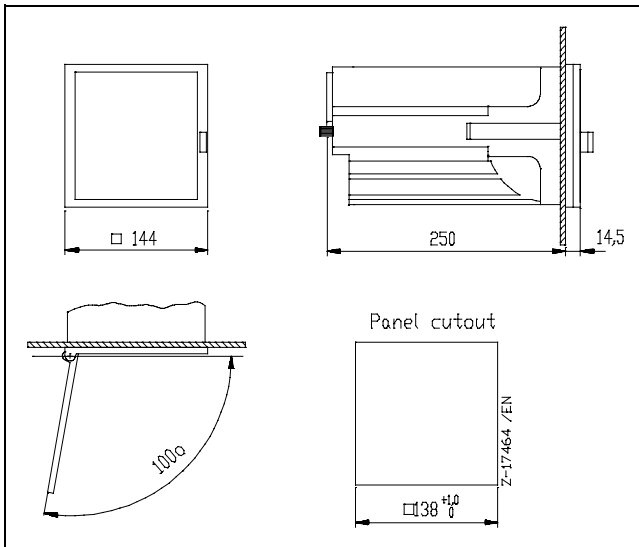


Fig. 2 Dimensional drawing (dimensions in mm)

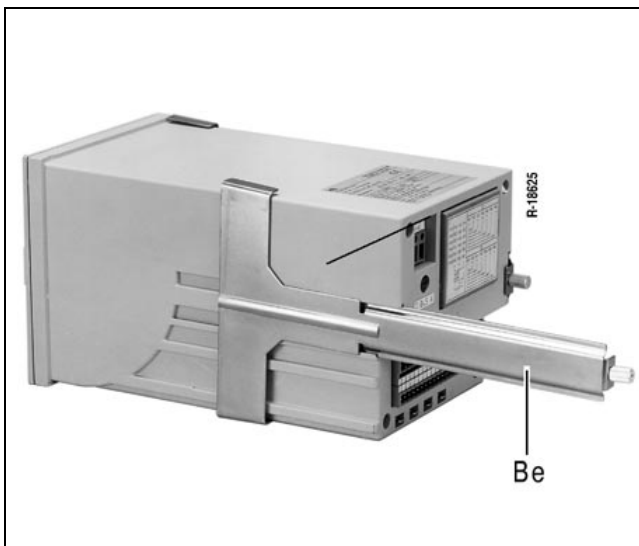


Fig. 3 Mounting the brackets
Be Mounting the brackets

Mounting in panels

1. Fit the unit into the panel from the front.
2. Fit mounting brackets *Be* laterally into the fitting notches on the case (see fig. 3).

Note

The mounting brackets *Be* are designed for close-packed horizontal and vertical mounting.

3. Align the mounting brackets *Be* vertically and tighten them equally.

Mounting in rack

1. Fasten 4 centering brackets (Cat. No. 92204-4-0457301) to the rack.
2. Fit mounting brackets *Be* laterally into the fitting notches on the case (see fig. 3).
3. Align the mounting brackets *Be* vertically and tighten them equally.

3. Connecting the instrument

⚠ Caution

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

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

The unit may only be operated when properly installed.

Install a mains switch, with adequate switching capacity, within the reach of the mounting site so that the unit can be disconnected at all poles from the mains. The protective action of the protective conductor must not be negated.

The nominal current power of the protection equipment on the side of the installation must not be over 16 A.

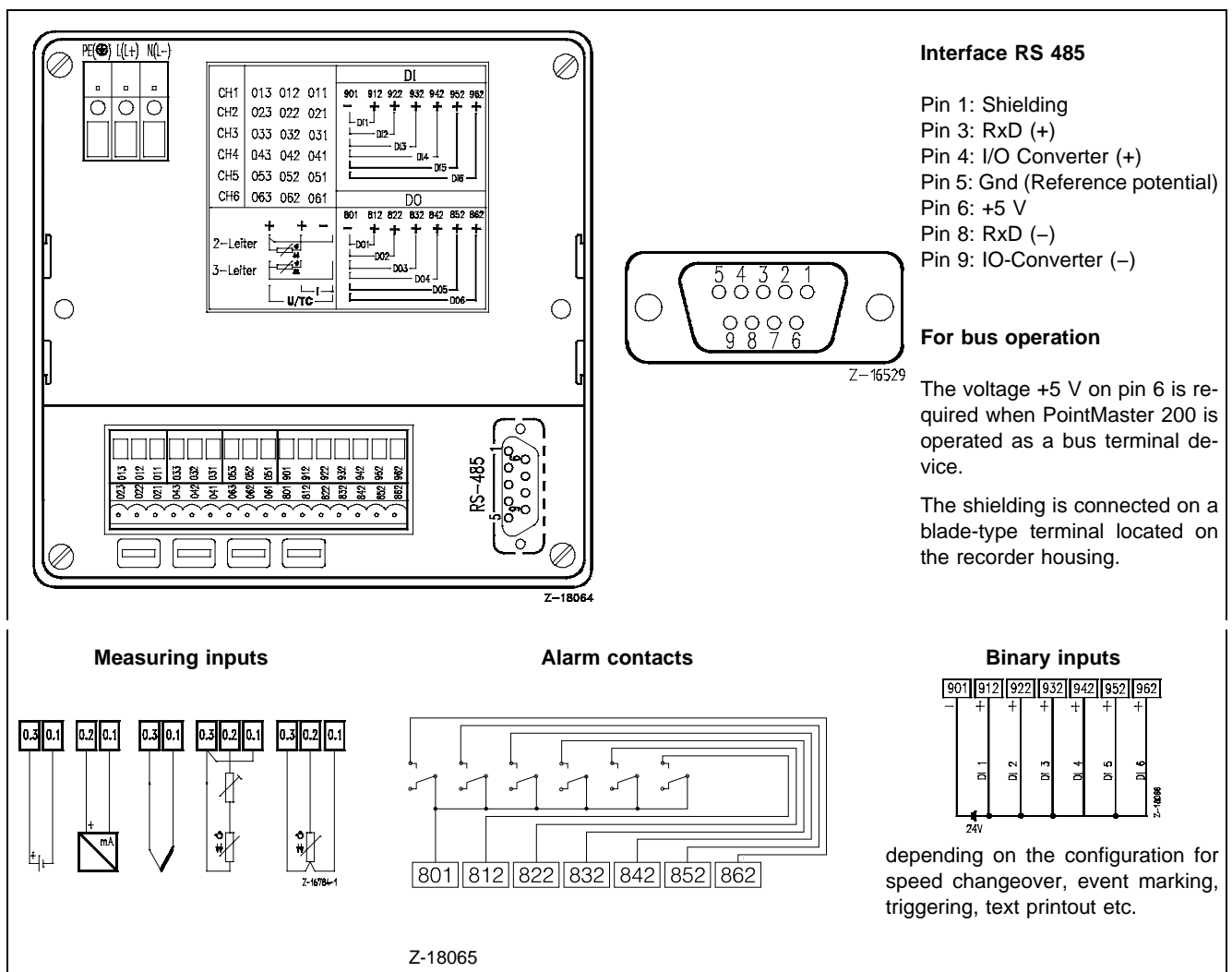


Fig. 4 Rear panel and connection diagrams
 . Δ of the number of the measuring channel 1...6

Connecting the input signal

- Fasten signal lines (max. cross section 2 x 1 mm²) at the screw-plug terminals.

Connecting the power supply

- Fasten power supply lines (max. cross section 1 x 4 mm² or 2 x 1.5 mm²) or at the screw-plug terminals. The cross section of the protective conductor must at least be equal to the cross section of the power supply line.

4. Fitting the chart

Chart unit for roll chart

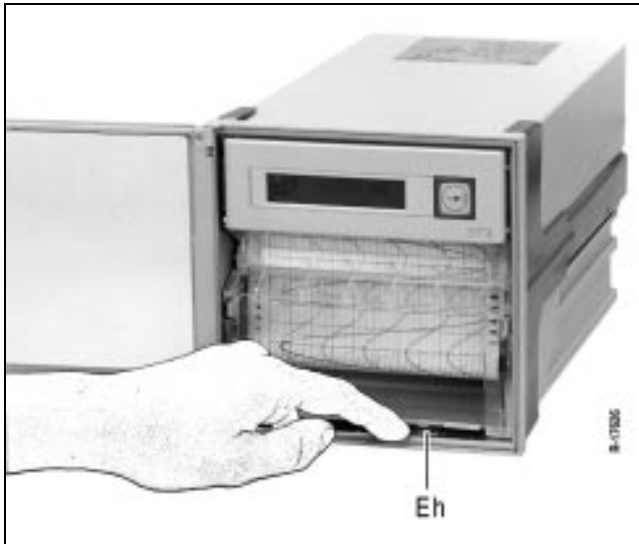


Fig. 5 Unlocking the chart unit (here: LC display version)
Eh Unlocking lever

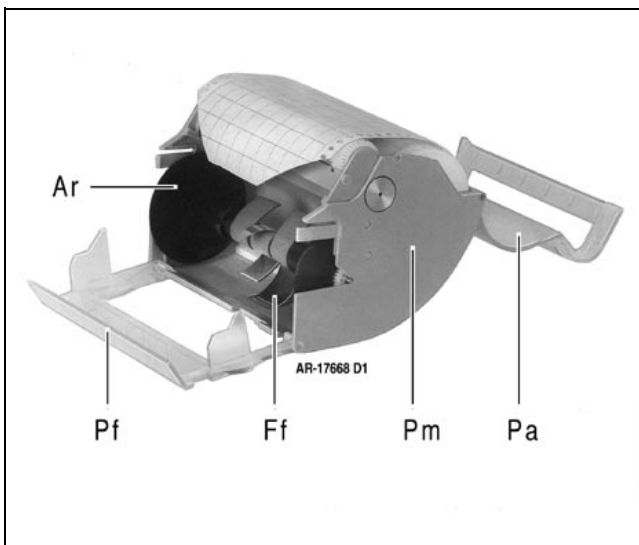


Fig. 6 Chart unit for roll chart
Ar Take-up roll
Ff Guide spring
Pa Pressure plate flap
Pf Chart guide flap
Pm Chart storage recess

1. Unlock chart unit: press unlocking lever *Eh* (see fig. 5). Chart unit swings forwards. Remove chart unit.

2. Open out pressure plate flap *Pa*.
3. Insert roll chart into chart storage recess *Pm*.
4. Pull the chart beginning forwards to the sprocket wheel and engage the perforation with the sprocket wheel making sure that the chart is parallel to the sprocket wheel!
5. Close the pressure plate flap *Pa*.
6. Open out the chart guide flap *Pf*.
7. Fit take-up roll *Ar*.
8. Close the chart guide flap *Pf*.

Note

Having installed the chart unit in the recorder, the chart unit winds itself automatically onto the take-up roll.

9. Fit chart unit in the chassis until it engages.

Chart unit for fanfold chart

(see fig.s 5, 6 and 7)

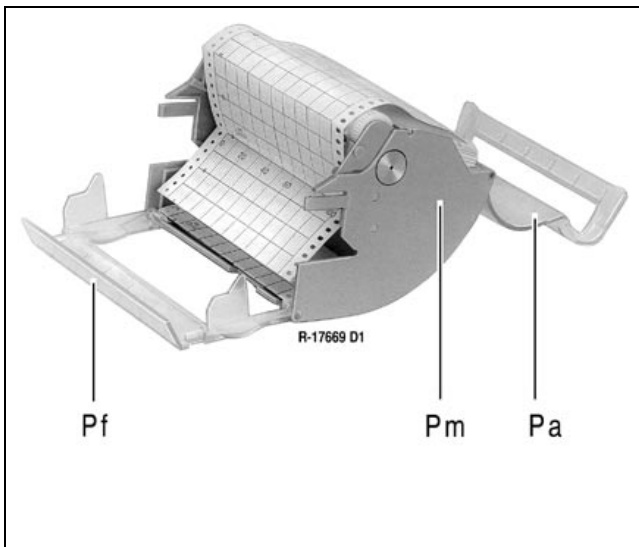


Fig. 7 Chart unit for fanfold chart
Pa Pressure plate flap
Pf Chart guide flap
Pm Chart storage recess

Remove the guide spring *Ff* and take-up roll *Ar* when converting the roll chart unit to the fanfold chart (see fig. 6).

1. Unlock chart unit: press unlocking lever *Eh* (see fig. 5). Chart unit swings forwards. Remove chart unit.
2. Open out pressure plate flap *Pa*.
3. Insert roll chart into chart storage recess *Pm*.
4. Pull the chart beginning forwards to the sprocket wheel and engage the perforation with the sprocket wheel. Two fanfold sheets must lie on the base of tray.
5. Close pressure plate flap *Pa*.
6. Open out the chart guide flap *Pf*.
7. Move the chart forwards by turning at the sprocket wheel until two fanfold sheets lie on the base of tray.
8. Close the chart guide flap *Pf*.
9. Fit chart unit in the chassis until it engages.

5. Fitting ink unit

Scale version

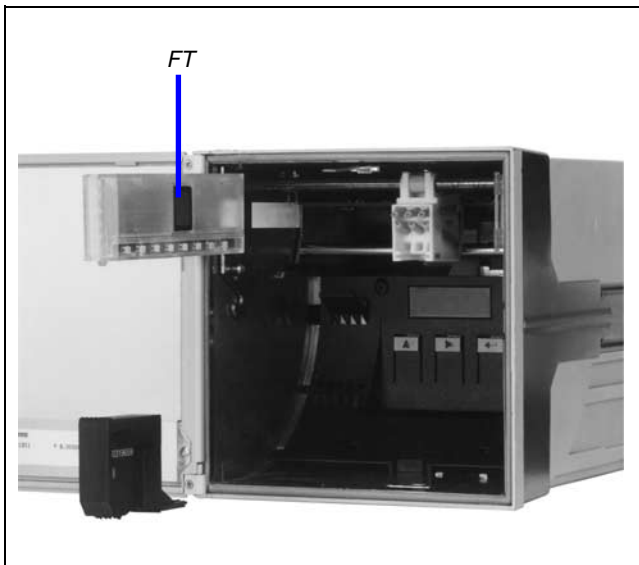


Fig. 8 Fitting ink unit (scale version)

1. Unlock chart unit: press unlocking lever *Eh* (see fig. 5). Chart unit swings forwards. Remove chart unit.
2. Remove chart unit.
3. Push pointer upwards.
4. Open scale.
5. Press the *FT* key for about 2 s. Print head moves to park position.
6. Fit ink unit according to fig. 8.
7. Press *FT* key. The unit begins to record.
8. Close scale.
9. Push pointer downwards.
10. Fit chart unit in the chassis till it engages.

LED display version



Fig. 9 Fitting ink unit (LED display version)

1. Unlock chart unit: press unlocking lever *Eh* (see fig. 5). Chart unit swings forwards.
2. Remove chart unit.
3. Press key <Fnc> for about 2 s. The measuring systems moves to park position.
4. Flap open display to the left.
5. Fit ink unit according to fig. 9.
6. Close display to the right.
7. Press MF <Fnc> for about 2 s. The recorder assumes the recording mode.
8. Fit chart unit in the chassis till it engages.

LC display version



Fig. 10 Fitting ink unit (LC display version)

1. Unlock chart unit: press unlocking lever *Eh* (see fig. 5). Chart unit swings forwards.
2. Remove chart unit.
3. Press key <-> for about 2 s. The measuring systems moves to park position.
4. Flap open display to the left.
5. Fit ink unit according to fig. 9.
6. Close display to the right.
7. Press MF key <-> for about 2 s. The recorder assumes the recording mode.
8. Fit chart unit in the chassis till it engages.

6. Switching on the unit

⚠ Caution

Before switching on, make sure that the operating voltage of the unit (see rating plate) corresponds to the voltage of the power supply.

Install a mains switch, with adequate switching capacity, within the reach of the mounting site so that the unit can be disconnected at all poles from the mains. The protective action of the protective conductor must not be negated.

7. Positioning the chart

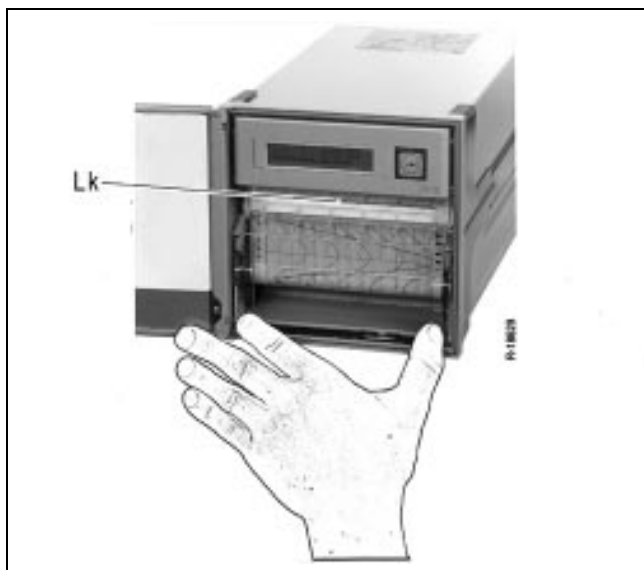


Fig. 11 Positioning the chart (here: LC display version)

The print head records leaving a space of 11.5 mm before the leading edge of the pressure plate flap.

1. Press the lower handle strips of chart unit towards the back. The chart is transported faster downwards.
2. Let go the handle strips once the desired baseline has reached the leading edge.

Note

If the time printout or printout of date time line is activated, the chart is transported on releasing the handle so far as the next time printout or printout of date and time line is performed at the desired position.

Operation

Removing the chart

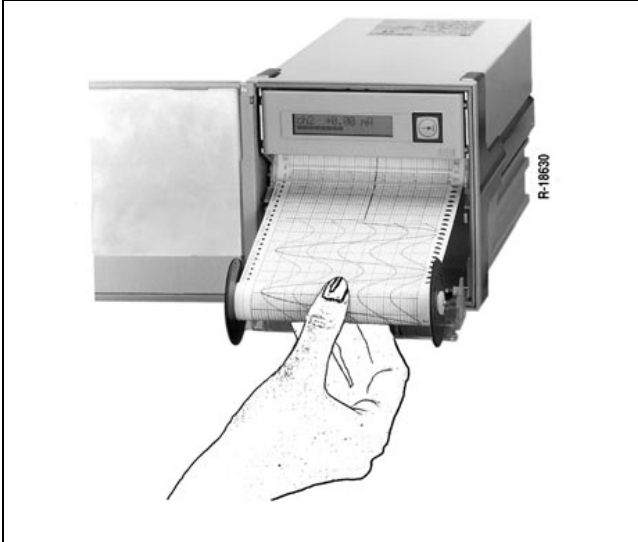


Fig. 12 Removing the chart (here: LC display version)

The chart unit can remain in the unit when removing the chart.

Chart unit for chart

1. Open the chart guide flap downwards.
2. Remove take-up roll.
3. If necessary, tear off the chart at the perforation.

Chart unit for fanfold chart

1. Open the chart guide flap downwards.
2. Remove the fanfold pack.
3. If necessary, tear off the chart at the fold.

Note

Two fanfold sheets must rest in the tray.

Withdrawing chart paper from the take-up roll

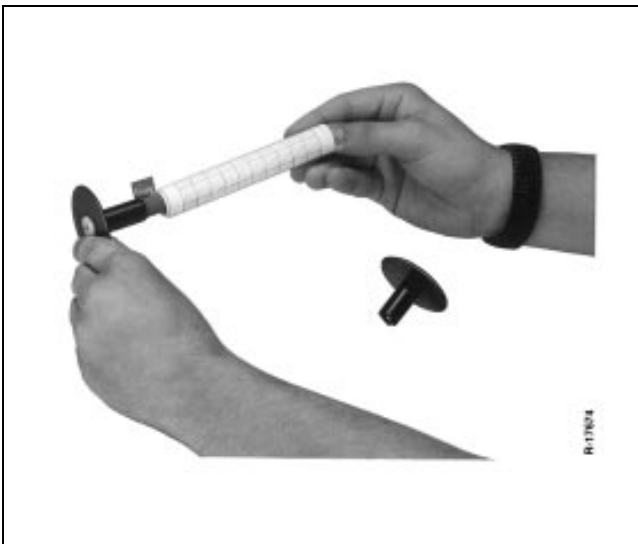


Fig. 13 Withdrawing chart paper from the take-up roll

1. Rotate flange without drive pinion by 45° and pull from take-up roll.
2. Hold chart as shown in fig. 12 and remove from axis.
3. Replace right flange on the take-up roll and secure by rotating by 45°.
4. Fit take-up roll into chart unit. The drive pinion must be on the right hand side.
5. Close chart guide flap.

Key assignment of the LED display version



The LC display version is operated and configured with the 6 keys on the operator panel. In the operation mode the labels on the keys are valid, in the parameter definition mode the labels over the keys are valid.

Key legend

Operation mode

<Para>
Call-up
Parameter definition

<Print>
Printout of the measured
value of active channels

<→>
Channel step enabling
for measured value display

<Fnc>
Enable service mode
Enable standby
Initiate accounting printout

<⌂>
Display date and time

<|=⊗>
Acknowledge alarm value
infringements and error
messages

Parameter definition modes

<Esc>
End the parameter definition
or
return to the higher level
menu

<▲>
Select menu item
Select parameter
Select parameter value

<▼>
Select menu item
Select parameter
Select parameter value

<◀>
Editing function:
Left cursor

<▶>
Editing function:
Right cursor

<↵>
Select menu item
Select parameter
Take over parameter value

Parameters and parameter values are displayed in clear text on the 16-digit LED display.

Measured value display

With the **scale version** the active LED of the left LED column displays in each case the measuring channel displayed by the measuring system. The LED active on the right shows the scale graduation assigned to the measuring channel.

With the **display versions** measuring channel and the measured value are displayed alphanumerically.

The following factory setting is valid for both versions:

During the cycle time all measuring channels are processed and recorded, but only one measuring channel is displayed. On expiry of the cycle the display is switched to the next measured channel. If one measuring point selected is displayed constantly, the setting can be made using the MF key as follows:

Version	Key	
Scales	FT	Lift up pointer, swing open scales, the key is on the reverse side of scale (see fig. 8)
LC-Display	<→>	
LED-Display	<→>	

Cyclic display of all measuring channels enabled for the display

<key>	Static display measuring channel 1
<key>	Static display measuring channel 2
<key>	Static display measuring channel 3
<key>	Static display measuring channel 4
<key>	Static display measuring channel 5
<key>	Static display measuring channel 6
<key>	Display of the residual chart length in m (only with display versions).
<key>	Cyclic display of all measuring channels enabled for the display

For the scale version, the transition from the cyclical measured value display of all channels to the measured value display of one channel is illustrated when the upper three LEDs flash alternately with the lower three LEDs.

Special operating states of the reading with display version

Reading in the display	Operating states
{C H}	statical display of the measuring channels
{c h}	cyclical display of the measuring channels
{C H . ↑...}	Measuring range overshooting (↑ flashes)
{C H . ↓...}	Measuring range undershooting (↓ flashes)
{C H . ?...}	Infringement of the result range limit
{C H . *...}	Line break
{C H . &...}	Result channel of the 2 arithmetically combined channels
{C H . Σ...}	Display of the integrated measured value (sum) in the place of the measured value (only possible if the balance calculation is activated).
{C H . 10...}	Logarithmic display of the measured value (decadic logarithm)

Special numerical formats

The exponential representation is selected for displaying the sum value with the balance calculation function.

Example 1

$$\{7.45 E6\} = 7.45 * 10^6 = 7\,450\,000$$

The exponential presentation is selected also for logarithmic course of the readout range.

Example 2

$$\{7.45_{10} 6\} = 7.45 * 10^6 = 7\,450\,000$$

The difference between the two displays is that the mantissa is linear in example 1 and logarithmic in example 2.

Special operating states of the display when using the standby function

{STANDBY: ACT: DI}	Standby is switched on. It was activated via a binary input (parameter setting).
{STANDBY: DEL: DI}	On elapsing the delay time standby is switched on. It was activated by binary input.
{STANDBY: ACT: AUTO}	Standby switched on. It was activated on switching on the power supply (parameter setting).

Setting the parameters

The parameter definition of the multipoint recorder is performed via the keys of display and the control unit or by means of a PC via the interface RS 485. For setting the parameters for the recorder the Program PARAPPOINT 200 is available (see Data Sheet 10/41-2.15).

If the access to the parameter setting level is protected by assignment of a password parameters values can only be read:

1. Press <↓>. {Password 0000} is displayed. Last digit of the password flashes.
2. Using the keys <▶> und <▲> enter the password "9999".
3. Main menu item and parameter can be selected. All parameter values except the password are displayed.

Balance calculation function

If the <→> key (LC) or <Fnc> (LED) key is activated with balance calculation function switched on, the printout of the lines stipulated at the time of parameterisation can be triggered specifically for each channel with a double click. The balance calculation interval control (internal cyclically or cyclically via binary inputs) is not affected by this action.

Note

The balance calculation and standby functions exclude each other.

Signalling end of paper

- Fit roll or fanfold chart (see Section "Fitting the chart").
- **Entering the chart length** (with display versions)
 1. Press <→> until "Display of the residual chart length" appears.
 2. Remove chart unit (only LC display version).
 3. Press <↵> (LC) or <Para> (LED). {L = ? 0000} is displayed. Last digit of the numerical value flashes.
 4. Enter paper length with keys <▶> and <▲>.
 5. Terminate input with <↵> key.
 6. Insert chart unit (only LC display version).
- **Entering the chart length** (with scale version)

The entry of chart length is made (on fitting a new chart roll or fanfold stack) in the parameter setting mode under the main menu item "S P F n C" in the parameter "P A L E n".

- **Display of residual chart length** (with display versions)

If the chart length was input as described above, the residual chart length can be checked at any time:

Press <→> key several times until "Display of residual chart length" appears.

In addition the time remaining until the chart has to be replaced, depending on the chart speed. The value of length of chart remaining which is continuously ascertained by the recorder is safeguarded against power failure. In case of a power supply failure the value is written into a F-RAM.

In the parameter setting mode the assignment of end-of-paper signal to the contact output is defined in the main menu item under the parameter "End of paper DO x". End-of-paper signal is output depending on the speeds 2 hours before the paper finishes.

- **Display of residual chart length** (with scale version)

If in the parameter setting mode the assignment of end-of-paper signal to the contact output is defined in the main menu item "S Y S" under the parameter "P A O U t", the residual chart length is displayed on removal of the chart unit.

Changing the chart speed

If the unit is of the type with "limit alarm monitoring and binary inputs", it is possible to change between speed 1 and speed 2 externally. The required variables for speed 1 and speed 2 can be selected in the parameter setting mode. Likewise in the parameter setting mode the binary input is to be selected, by which the speed 2 can be activated (see Instructions for Parameter Setting 42/41-23 (display versions) or 42/41-24 (scale version)).

Speed 1 becomes active upon switching on the unit. Speed 2 is activated by applying a voltage of 24 V DC between terminals 901 (-) and terminal (+) which the selected binary input is assigned.

Standby function

If the unit is of the type with "limit alarm monitoring and binary inputs", it can be switched to standby. To switch on the standby function in the parameter mode a binary input must be selected. A voltage of 24 V DC must be applied between the terminal 901 (-) and the terminal (+) which the selected binary input is assigned, for switching on the standby function.

The speed is switched off in the standby mode. The measured value processing and limit alarm monitoring functions are active.

Threshold infringements or switch-off of unit cancel the standby mode. The unit begins to record.

If the <→> key (LC) or <Fnc> key (LED) is activated for standby mode, the standby function also can be switched on and off by doubleclicking.

If the recorder is parameterised such that on applying the voltage it is in the standby mode, it can be switched on and off by means of <→> key (LC) or <Fnc> key (LED).

Retrofitting

Firmware update

(Dismantling electronics unit)

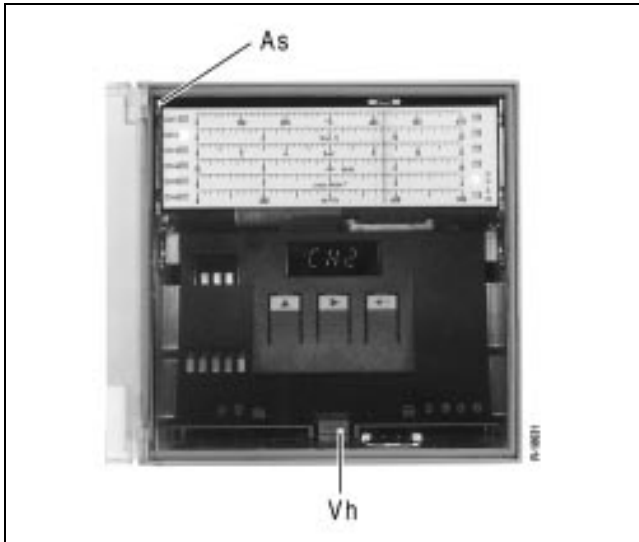


Fig. 14 As Retaining screw
Vh Locking lever

1. Loosen the retaining screws *As* (see fig. 14) and pull forward the measuring element carriage by approx. 2 cm.
2. Lift up the locking lever *Vh* (see fig. 14) whilst pulling forward the module simultaneously.
3. Pull out the plugs to the measuring elements.
4. Remove the electronics unit from the case (see fig. 15).
5. Replace EPROM.
6. Reinstall the unit in the reverse order.

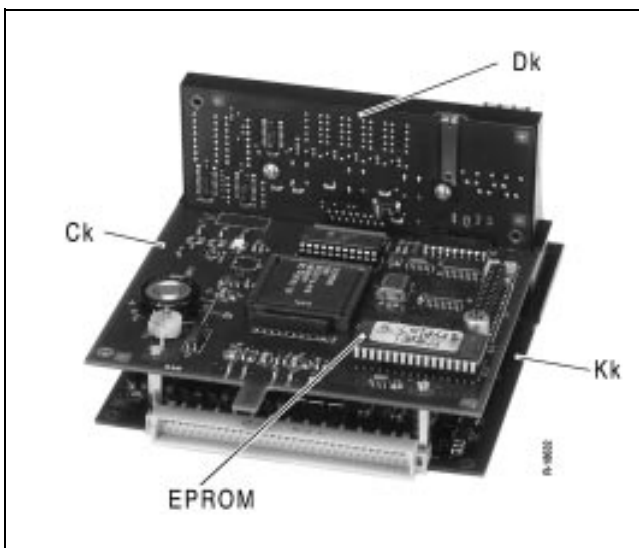


Fig. 15 Dismantled electronics unit (rear view)
Dk Display card
Ck CPU card
Kk Channel card

Replacing scale

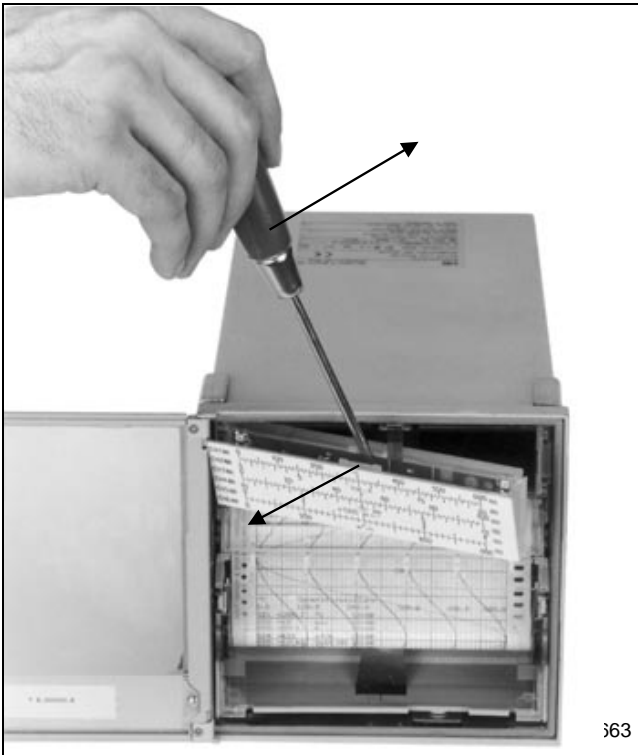
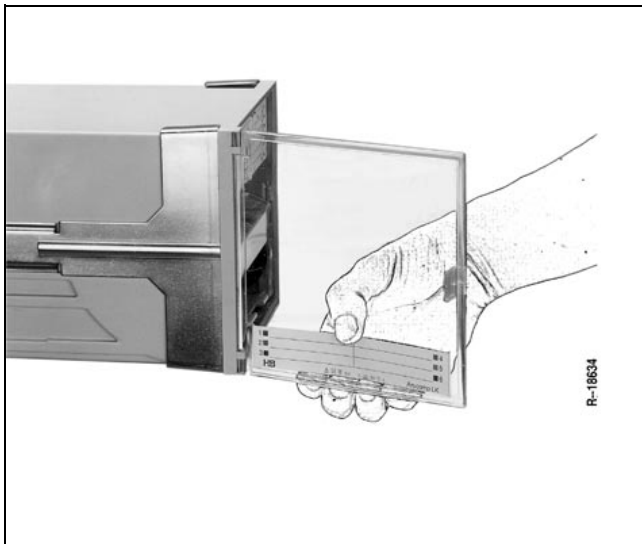


Fig. 16 Replacing scale

1. Push pointer upwards.
2. Swing open the scale
3. Position the screw driver as shown in fig. 16 and lift up the upper flange of the scale plate.
4. Remove the scale plate.
5. Install the new scale plate by following the same method in the inverse direction
6. Draw the scale to close on the right and press down the pointer.
7. Check measuring system zero with the start of scale.
 - a. Remove the chart unit
 - b. Press $\langle \leftarrow \downarrow \rangle$.
 { **S Y S** } is displayed.
 Press $\langle \rightarrow \rangle$ several times until
 { **S P . F n C** } is displayed.
 Press $\langle \leftarrow \downarrow \rangle$.
 { **S i . t Y P** } is displayed.
 Press $\langle \rightarrow \rangle$ several times until
 { **S c . o F S** } is displayed.
 Press $\langle \leftarrow \downarrow \rangle$.
 The print head is driven to the set scale zero point for checking.
 If the zero point setting is correct:
 Press $\langle \rightarrow \rangle$ and leave the setting of the scale zero point.
 If the zero point setting is not correct:
 Press $\langle \leftarrow \downarrow \rangle$.
 The print head (pointer) moves to approx. 3% below the first scale line.
 Press $\langle \rightarrow \rangle$.
 The print head (pointer) moves to the right. As soon as the scale start is reached,
 press $\langle \leftarrow \downarrow \rangle$.
 The setting is stored.
 Press $\langle \rightarrow \rangle$ until the pointer is directed at the initial graduation value.
 Press $\langle \leftarrow \downarrow \rangle$
 { **S c . o F S** } is displayed.
 Press $\langle \rightarrow \rangle$.
 { **S P . F n C** } is displayed.
 Press $\langle \rightarrow \rangle$.
 { **S A v E ?** } is displayed.
 Press $\langle \leftarrow \downarrow \rangle$. The calibration data is stored in the EEPROM.
 - c. Reinstall the chart unit.

Replacing the measuring point name plate

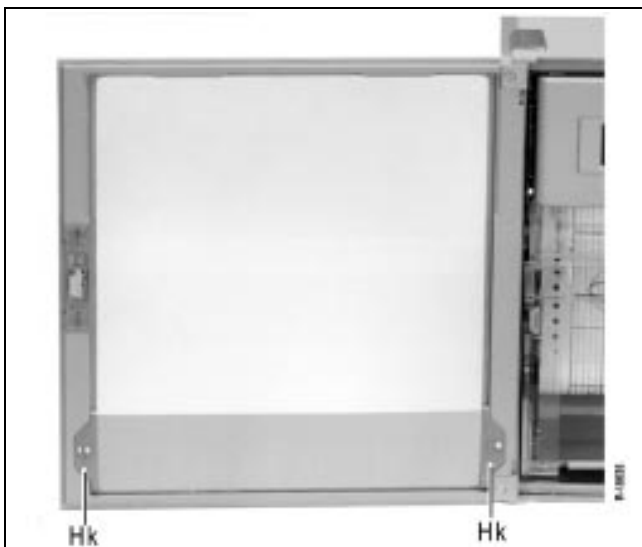
Version with moulded door



1. Pull out the flexible measuring point name plate from its holding device.
2. Fit a new measuring point name plate.

Fig. 17 Replacing measuring point name plate with moulded door

Version with metal frame door



1. Loosen retaining clamps *Hk*.
2. Withdraw measuring point name plate.
3. Fit a new measuring point name plate.
4. Tighten retaining clamps *Hk*.

Fig. 18 Replacing measuring point name plate with metal frame door

Replacing the case door

Moulded door

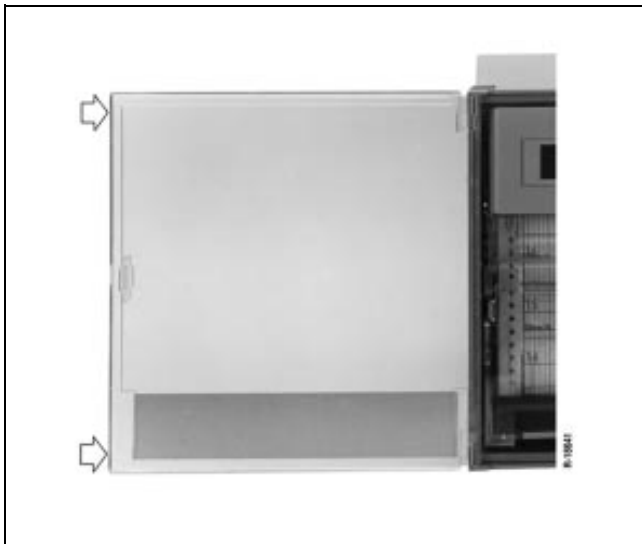


Fig. 19 Replace moulded door

1. Open case door by 180°.
2. Press successively against the top and the bottom of the narrow side of the door (see fig. 19), until the door hinge is out of its engage.
3. Hang on the new door (at 180° opening angle).
4. Press successively at the top and bottom on the front side of the door hinge.

Metal frame door

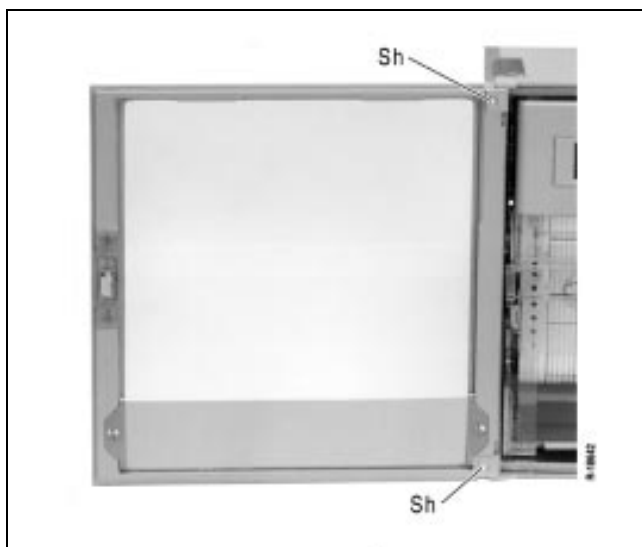


Fig. 20 Replace metal frame door

1. Loosen screws *Sh* at the top and bottom hinge and remove.
2. Remove door.
3. Fit the new door.
4. Turn screws *Sh* at the top and bottom hinge again and tighten.

Maintenance

Replacing fuse



Fig. 21 Replacing fuse *Si*

⚠ Caution

Make sure that only fuses with the required rated current and of the specified type are used for replacement. The use of makeshift fuses and the short-circuiting of fuse-holder are prohibited.

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.

1. Unscrew the fuse holder.
2. Replace fuse *Si*.
3. Screw back the fuse holder.

Fuse values

230 V T 0.5 A
115 V T 0.5 A
24 V M 1.6 E

Technical data

Measuring section

Measuring deviation

Class 0.5 according to IEC 484 referred to the nominal range where lower-range value and/or upper-range value shifted, additionally

$$\pm \left(0,1\% \frac{\text{nominalrange}}{\text{span}} - 0,1 \right)$$

Dead zone

0.25 % of span

Print cycle time for all channels

3...360 s selectable

Measured value damping

with 1st order low-pass filter, time constant 0...60 s per measuring channel, parameterizable

Measurement variable / nominal ranges

Direct current

0...20 mA, 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, ±25 mV, Ri ≥ 2 MΩ

0...100 mV, ±100 mV, Ri ≥ 2 MΩ

0...500 mV, ±500 mV, Ri ≥ 2 MΩ

0...2.5 V, ±2.5 V, Ri ≥ 200 kΩ

0...5 V, ±5 V, Ri ≥ 200 kΩ

±10 V, Ri > 200 kΩ

±20 V, Ri > 200 kΩ

Thermocouples, Ri ≥ 2 MΩ

Type B, E, J, K, L, N, R, S, T, U

the nominal range corresponds to respective definition range of the type selected

Parameters can be set internally or externally for reference point,

sensor monitoring can be activated

Resistance thermometers

Pt 100 in 2- or 3-wire circuits

-50...+150 °C; -50...+500 °C; -200...850 °C

Line resistance

with 2-wire circuitry max. 40 Ω

with 3-wire circuitry max. 80 Ω

Measuring ranges

Lower range

from 0...80 % of each nominal range can be set as a parameter.

Measuring scope

from 20...100 % of each nominal range can be set as a parameter

Root extracting function

can be set as a parameter in direct current and direct voltage nominal ranges

User linearisation

can be set as a parameter in direct current and direct voltage nominal ranges

Effects

Temperature

$$\pm \left(0,2 + \left(0,05 \frac{\text{nominalrange}}{\text{span}} - 0,05 \right) \right) \% / 10K$$

± 1 °C / 10 K for internal reference junction correction

Reference temperature

25 °C

Influence of supply voltage

0.1 % for 24 V DC ±20 %

0.1 % for 24 V AC +10 % / -15 %

0.1 % for 115 V AC +10 % / -15 %

0.1 % for 230 V AC +10 % / -15 %

Influence of AC parasitic voltages

0.5 % of span

Influence of external magnetic field 1 mT

0.5 % of span

Influence at mechanical stress

during and after the effect ±0.5 % of span

Recording section

Measured value display with the scale version

Scale

1 to 6 graduations

Character height for number of graduations

Graduations 1 2 3 4 5 6

Character height (mm) 4 4 4 2 2 2

Channel display

by vertical LED column on left scale sides

Assignment of the scales to the channel

by horizontal LED column on right scale side

Display and operator control unit

(accessible on removal of the chart unit)

Display (only for parameter definition)

5-digit, 7-segment display

Character height 4 x 7 mm.

Operator control

with one function key *FT* on the rear of the scale and with three keys behind the chart unit (see fig. 8)

Measured value display in the display versions

Displays used

- in the operating mode for displaying the measuring point number (1-digit), measured value (5-digit), unit of measuring unit (7-digit), alarm value status.
- in the parameter setting mode for displaying the parameters and parameter values.

LC display (background lit)

Display

16-digit

Character height 3.1 x 5.5 mm

Operator control

with one function key <→> in the display and with three keys behind the chart unit (see fig. 10)

LED display

Display

16-digit

Character height 3 x 5 mm

Operator control

with 6 keys in the display (siehe fig. 9)

Recording

Farben

Colours **Colour assignment according to DIN 43 838**

violet	Channel 1
red	Channel 2
black	Channel 3
green	Channel 4
blue	Channel 5
brown	Channel 6

or can be assigned freely to the channels

last dot can be seen from the front

Ink reserve 1 x 10⁶ dots for each colour

Trend recording

The measured value recording takes place in form of a dot line at the same dotting spacing.

Operating modes

Cyclic mode: process all active channels

Recording

all active channels are updated during the cycle time.

Measured value display

switches forwards continuously or channel by channel from cycle to cycle

Externally initiated (option “in-/outputs” required)

Recording

the externally selected channels are recorded

Recording start of 0...30 s can be delayed

Measured value display

switches forwards or channel by channel from cycle to cycle.

Cyclic mode: Process one channel (option “binary in-/outputs” required)

Recording and measured value display

The displayed channel is updated during cycle time. DI 1...DI 6 signals the measuring channel connected through.

Event recorder for 10 events (I/O converter required)

Recording

Beginning, duration and end of an event are recorded in a form of an open rectangle.

Reading (with display versions)

last event as clear text message

Cycle time

can be selected between 3...360 s

Text print

(only possible with chart speeds ≤ 240 mm/h)

Character height

approx. 1.5 x 2 mm

Scope of the text print

1. Ten text lines. Each line optionally with:
 - max. 32 characters
 - max. 30 characters and time printout
 - max. 24 characters and time and date printoutInitiation cyclic in time intervals or event-dependent by means of internal (limit values) / external actuation (binary inputs).
2. Printout of chart speed, date and time.
Initiation when unit is switched on and on chart switchover.
3. Printout of date and time
Initiation cyclic in time intervals or event-dependent by means of internal (limit values) / external actuation (binary inputs).
4. Printout of time (DIN time)
Initiation cyclic in time intervals
5. Printout of current measured values
Initiation cyclic in time intervals or event-dependent by means of internal or external actuation
6. Printout of 3-fold lines allocated to measuring points
 - 1st line Scaling line with channel identification and printout of unit.
 - 2nd line Measuring point-specific text with max. 54 characters
 - 3rd line Limit value markers
7. Printout of the balance calculation table consisting of:
 - Comment line
 - Times of power failure
 - Start and end time of the balance calculation interval
 - Min./max. value during the balance calculation interval
 - Mean and sum value of balance intervalInitiation: cyclic and external
8. Listing of all active parameters
Initiation manually in the parameter setting mode

Chart speed

Parameters can be set for chart speeds

0 / 2.5 / 5 / 10 / 20 / 30 / 40 / 60 / 120 / 240 / 300 / 600 / 1200 mm/h

For switching chart speed over and off option "binary in-/outputs" required.

Chart length

32 m roll chart or 16 m fanfold chart

Visible diagram length

60 mm

Recording width

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

Chart feed-in (with roll chart)

via automatic catch of fresh paper by take-up reel (tearing off and take up of 32 m is possible daily).

Power supply

UC power supply unit

24 V AC/DC \pm 20 %

Power consumption

approx. 11 W / 14 VA with scale version

approx. 12 W / 15 VA with display versions

AC power supply unit

24 V AC / 110 V AC / 230 V AC, +10 % / -15 %

Frequency range

47.5...63 Hz

Power consumption

approx. 12 W / 16 VA with scale version

approx. 13 W / 18 VA with display versions

RS-485 interface

- for parameter-setting
- Link to higher-order systems for bidirectional data transmission. The data protocol is based on the PROFIBUS standard.

Additional functions

(Option with "binary in-/outputs" required)

External chart speed switchover

Control voltage: 24 V DC / 6 mA external

Standby function

Control voltage: 24 V DC / 6 mA external

Alarm value monitoring

2 alarm values per channel for absolute value monitoring, 6 internal relays can be freely assigned to the alarm values.

Output:

NO contact – the contacts are linked to each other on one side, contact load, 14 additional relays available via external I/O converter

Event marking

4 markers possible

Recording at approx. 2 %, 5 %, 95 % und 98 % recording width

Control voltage: 24 V DC / 6 mA external

External speed changeover

Recording of externally selected channels

Control voltage: 24 V DC / 6 mA external

10 event markers usable (without measured value recording)

via external I/O converter

Balance calculation function

Balance calculation function can be selected for each channel.

The external control of balance calculation interval is performed via a binary input which can be selected.

Control voltage: 24 V DC / 6 mA external

End of paper signalling

with speeds \geq 120 mm/h 2 hours before chart end

with speeds < 120 mm/h at least 8 hours before chart end

Output: via freely selectable relay contact.

General and safety-related data

Environmental capabilities

Climate class

3K3 according to DIN IEC 721-3-3

Ambient temperature

0...25...50 °C

Transport and storage temperature

-40...+70 °C

Relative humidity (during operation)

\leq 75 % annual average, max. 85 %

Avoid condensation!

Note effect of atmospheric humidity on the chart paper according to DIN 16 234.

Mechanical stress

Tested

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

During transport

Impact 30g / 18 ms

Vibration 2g / 5...150 Hz

During operation

Vibration 0.5g / \pm 0.04 mm / 5...150 Hz / 3 x 2 cycles

Electromagnetic compatibility

The protection targets of the EMC directive 89/336/EEC with regard to radio interference suppression to EN 55 011 and to interference resistance according to EN 50 082-2 are met.

Radio interference suppression

Limit class B according to EN 55 011 or

Post Office Ordinance 243/92

Interference immunity
Tested according to IEC 801

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

The NAMUR industrial standard EMC is fulfilled (interface lines are shielded).

Permitted interference voltages

Serial interference peak to peak	≤ 0,3 x span max. 3 V
Normal mode rejection	75 dB
Common-mode parasitic voltage	60 V DC 48 V AC
Common-mode rejection	83 dB for DC 96 dB for AC

Electrical safety

The EEC Directive 73/23/EEC with regard to low voltage is observed.

Tested
according to DIN EN 61 010-1 (Classification VDE 0411)
or IEC 1010-1

Protection class
I

Overvoltage category
III at mains input
II at inputs and outputs

Degree of contamination
2 in unit and at the input terminals

Test voltage
3.75 kV measuring channels to power supply
2.2 kV protective conductor to power supply
0.35 kV measuring and signal lines to protective conductor

Functional extra low-voltage with safe isolation (PELV)
between mains inputs – signal inputs, control inputs, interface lines
according to VDE 0100 part 410 and VDE 0106 part 101

Connection, case and mounting

Electrical connections

Degree of protection
IP 20

Threaded-head terminals for signal inputs, control inputs and alarm value relay outputs
max. wire cross-section 2 x 1 mm²

Screw-plug terminals for mains connection
max. wire cross-section 4 mm² or 2 x 1.5 mm²

RS-485 interface
via 9-pin Sub-D connector

Case

Case
moulded plastic for panel or rack (dimensional drawing see fig. 2)

Degree of case protection according to DIN 40 050
Front side IP 54
Back side IP 20

Case colour
Pebble grey to RAL 7032

Case door
moulded material
Option: Metal frame door with glass pane non-reflecting

Mounting of case
with 2 mounting brackets (optionally for panel or rack), max. width of grid rod = 40 mm
for rack mounting centering brackets required (see Catalogue No. 92204-4-0457301)

Mounting orientation
Inclination lateral –30°...0...+30°
Inclination backwards 20°
Inclination forwards 20°

Mounting distance
horizontally or vertically 0 mm, case door must open at 100°

Weight
approx. 3.5 kg

Factory settings

Scale with a graduation 0...100
will be delivered, if no scale is defined when ordering a scale unit.

Basic parameters

If no individual parameter-setting is requested when a unit is ordered, the unit is supplied with the following parameter setting:

- Measuring range (all measuring channels): 0...20 mA.
- Speed 1: 20 mm/h.
- Speed 2: 120 mm/h.
- Alarm values: set to end positions (0 und 20 mA).
- Measured value damping, zoom, printer and alarm value functions: deactivated.
- No password assigned.

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

Fulfilled norms and standards

International standards

IEC	DIN	
484	43 782	Potentiometric recorders
1010-1	EN 61 010-1	Electric safety (Test voltages)
664	VDE 0110	Insulation groups
68-2-6	68-2-6	Mechanical stress (Vibration)
68-2-27	68-2-27	Mechanical stress (Impact)
529	40 050	Degree of case protection
801	VDE 0843 EN 60 801	Immunity to electromagnetic interference
721-3-3	721-3-3	Ambient climatic conditions
742	EN 60 742	Classification VDE 0551 Safety transformer

German standards

DIN 43 802	Scales
DIN 16 234	Chart paper
DIN 43 831	Cases

Packaging for transport or for return to manufacturer

- Remove the ink unit inserts when transporting.
 - If the original packing is no longer available, the unit must be wrapped in an insulating air foil or corrugated board and packed in a sufficiently large crate lined with shock absorbing material (foamed material or similar) for the transportation. The amount of cushioning must be adapted to the weight of the unit and to the mode of transport. The crate must be labelled "Fragile".
 - For overseas shipment the unit must additionally be sealed airtight in 0.2 mm thick polyethylene together with a desiccant (e.g. silica gel). The quantity of the desiccant must correspond to the packing volume and the probable duration of transportation (at least 3 months). Furthermore, for this type of shipment the crate should be lined with a double layer of kraft paper.
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ABB Automation Products GmbH

Höseler Platz 2
D-42579 Heiligenhaus
Phone +49 (0)20 56) 92 - 51 81
Fax +49 (0)20 56) 92 - 50 81
<http://www.abb.com>

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