PAULWEGENER
MESSTECHNIK SEIT 1921

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Installation and Operating Instructions

for single, double, triple-continuous chart pen recorders,
drum and circular-chart recorders

Types: 230.01; 240.0; 340.0 RNR; 341.0; 361.01; 354 and 355

0 Before start-up!

Remove transportation lock!

For that purpose, please open Installation and Operating Instructions (page 5).

Transportation locks are:

1. one adhesive strip (yellow)

2. one transportation lock roller

3. one write lever lock (pressure recorders only)

The adhesive strip must be entirely removed. The transportation lock roller is inserted instead of the delivery roller 5 (figure 10). It should be kept for future dispatch. At the device with transportation lock, the delivery roller is in the separate cardboard box.

1 Application

Strip-chart and drum-chart recorders are designed for countinuous measurement and recording of temperature or pressure in almost every branch of industry. The rugged construction of these devices guarantees a high degree of operational reliability even under severe operating conditions.

2 Delivery scope

- 1 recording chart roll (0-100%, without feed)
- 1 recording pen with holder per measuring system
- 2 housing keys
- 1 adjusting key for zero point
- 1 wind crank at mechanical drive
- 1 installation and operating instruction

Pressure systems:

- 1 high-pressure seal per pressure system

Temperature systems:

- 2 high-pressure seals at type C and E per temperature system

3 Field of application

Before initial start-up, pay attention to the following fields of application of pressure recorders according to DIN EN 837

- Capsule-type element:	Suitable only for gases, maximum loadability up to full scale value
- High-pressure, diaphragm or Bourdon-tube elements:	Maximum loadability up to full scale value at static load, up to 0,9-fold full scale value at varying load

Notes in terms of pressure equipment directive 2014/68/EU

- The PWB chart recorders are specified as „pressure-retaining equipment“ subject to the current pressure equipment directive (PED).
- The volume of the pressurised measurement system is < 0,1l.
- Chart recorders with maximum allowable operating pressure > 200bar are exclusively designed for use with fluids and gases of the fluid group 2 subject to PED. These pressure devices are manufactured according to „sound engineering practice“ subject to the third paragraph of the Article 4. There will be no CE marking subject to PED.
- Chart recorders with maximum allowable operating pressure > 200bar get marking of the allowable fluid group „PED/G2/L2“ on the reading scale.
- Safeguarding the operational safety requires installation according to regulations by skilled and by facility operator authorised staff. The responsibility shall be borne by the user.

4 Installation

4.1 Flush-mounting

Preparing wall openings according to figure 1 - 4

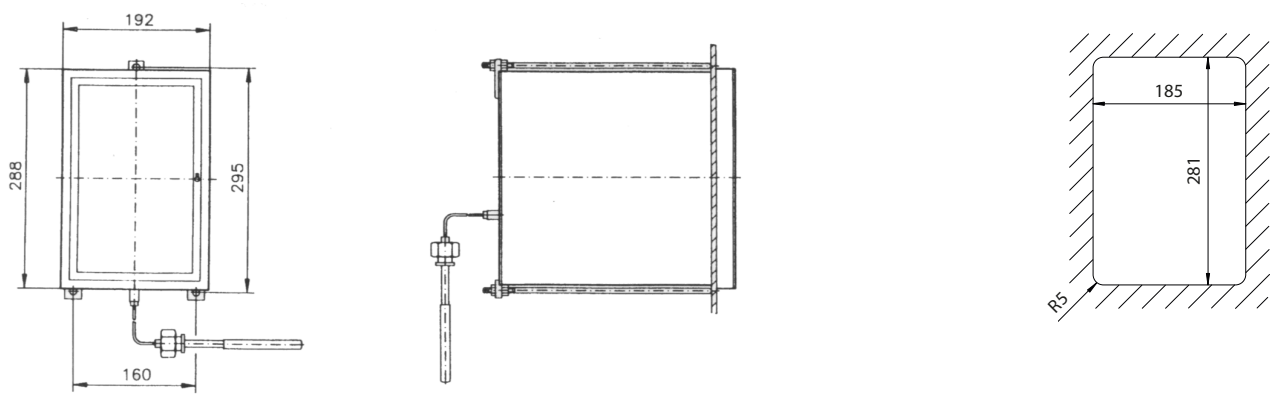


Figure 1 Single-continuous chart pen recorder for temperature measurement, type 230.01

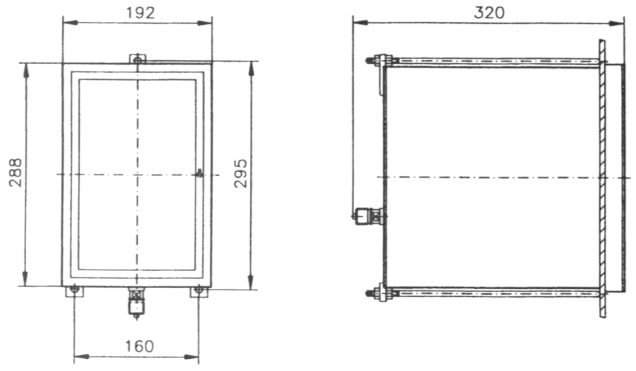
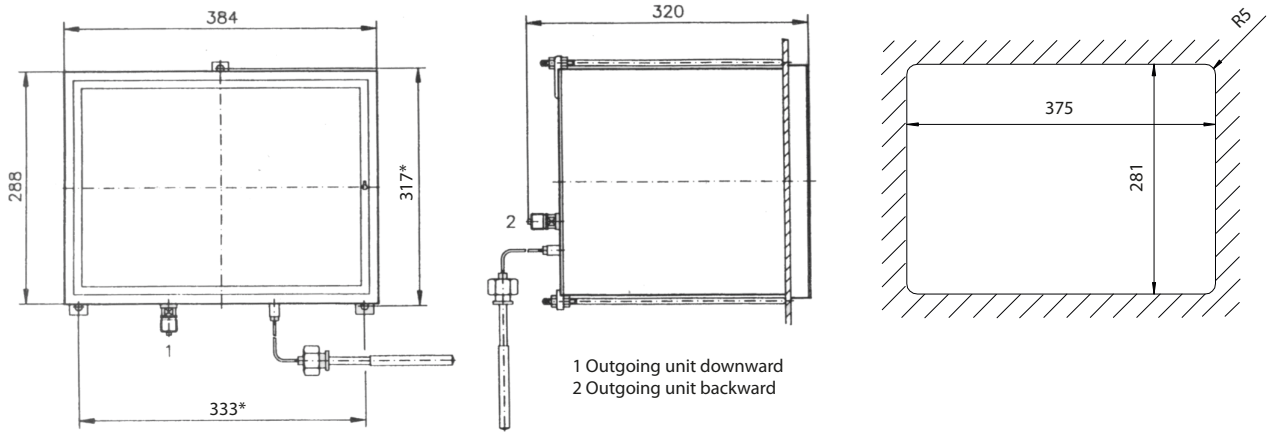


Figure 2 Single-continuous chart pen recorder for pressure measurement, type 361.01



* amended as of 10/2017

Figure 3 Double-continuous chart pen recorder for temperature/temperature measurement, type 240.0; pres-sure/pressure measurement, type 340.0; pressure/temperature measurement, type 341.0

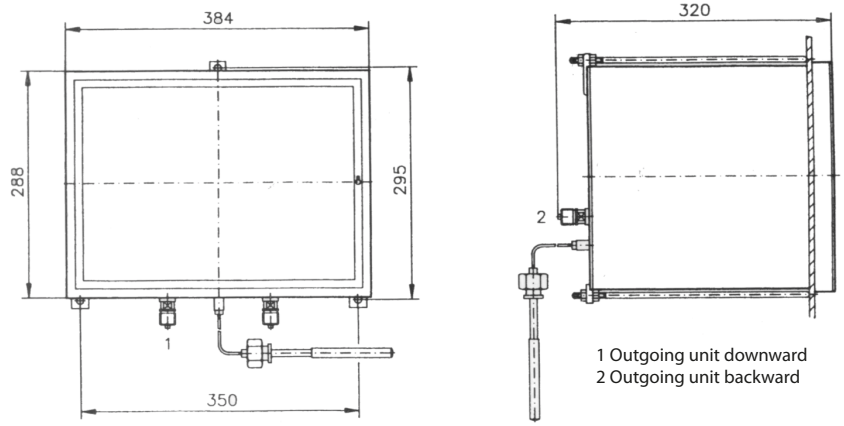


Figure 4 Triple-continuous chart pen recorder, differentiation by specification of measured values, type 340.0 RNR

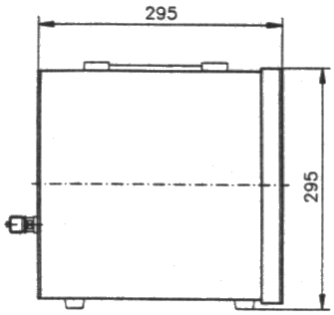


Figure 5 portable type

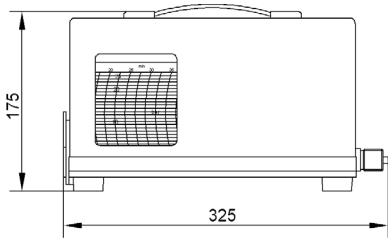


Figure 6 Drum-chart recorder, type 354

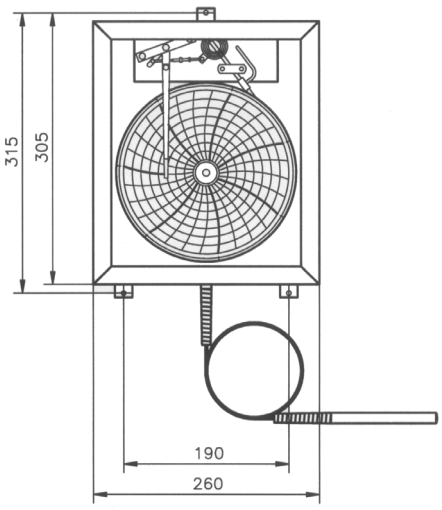


Figure 7 Circular-chart recorder, type 355

- Place the device into the wall opening (at types 230.01, 240.0, 340.0, 340.0 RNR, 341.0, 361.01 - remove the upper fixing lug before).
- types 230.01 and 361.01, 240.0, 340.0, 340.0 RNR, 341.0: Screw nuts M8 on clamping bolt for installation. Lift the rear of the device, insert bottom clamping bolts from inside to outside (with threaded portion forward) into fixing lug and clamp it using nuts M8. Screw fixing lug with upper inserted clamping bolt and tighten it with nut M8.

4.2 Wall mounting (only for types 230.01, 240.0, 340.0, 340.0 RNR, 341.0 and 361.01) with pressure and temperature outgoing lines at bottom

- Place three wall bolts M8 as spacing is specified (according to figures 1 - 4) and install the device.
- Make sure that the measuring instruments are installed at a safe distance from measuring location in a way that there is guaranteed the allowable degree of protection IP 31, the allowable humidity 80%, the allowable ambient temperature from 5° to 55° as well as the attachment or mounting angle of 90°.

4.3 Connecting the temperature sensor

(only for types 230.01, 240.0, 340.0 RNR, 341.0, 354, 355)

After installing the device as described in paragraph 4.1 or 4.2, lay out the loose cable to the measuring point. Make sure not to kink the remote line (stainless steel or steel capillary tube) at the outlet of the casing. The minimum bending radius must be 50 mm. Do not separate the cable from the device. Remove the G ¾ A threaded part or plug-in sleeve from the sensor and screw the threaded part with seal 27 x 36 tight in the tube according to figure 9. Thereafter screw the sensor with seal 17 x 23 in the threaded part or plug it in the sleeve and screw tight with the union nut. A large difference in the height level between indicating- and measuring location can distort the measuring value. Correct as described in paragraph 8.

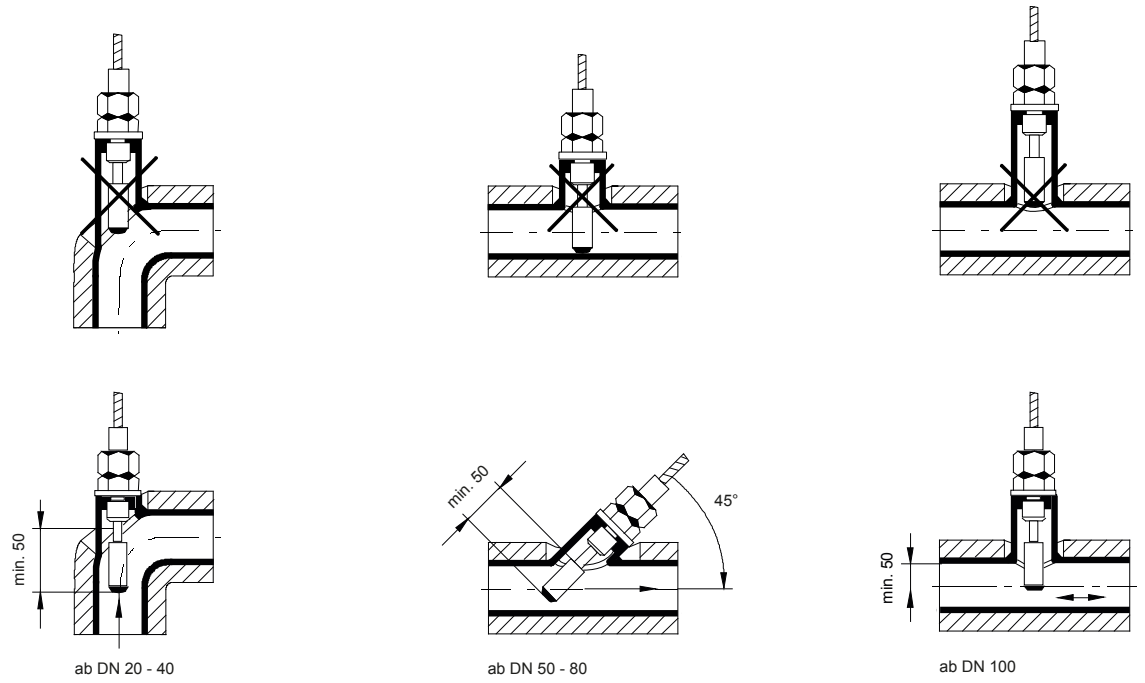


Figure 9 Installing temperature sensor

4.4 Making pressure connection
(for types 340.0, 340.0 RNR, 341.0, 361.01, 354, 355 only)

Before connecting the devices, please note the following range of application:

- Capsule-type element are suitable for gases only
- Loadability according to DIN EN 837
  - K: upper limit of scale
  - H/P/R: Static load up to upper limit of scale, fluctuating load up to 0.9 of upper limit of scale
- If the devices are connected to a steam boiler or steam pipeline, a siphon and a three-way valve must be integrated in the feedline. In case of hot steam pipelines, open the valve to allow the steam to escape from the line. Therafter keep the valve closed for about 30 minutes. Condensate will build up. Then slowly open the line. Never expose the system to the direct impact of the hot steam.
- If pressure surges are likely, install suitable protective devices (e.g. flow regulator). Connect recorders with G½ A - threaded stud and seal 6 x 17 to pressure line.

4.5 Making electrical connection

Connect the recorder to an AC line as specified on the nameplate. Observe the applicable DIN- or VDE standards, e.g. VDE 0100, DIN 57800/VDE 0800.

5 Installing the strip chart

5.1 Paper drive mechanism according to figure 10

Release the middle piece of the holder. Compress the fibre pen holder, remove the holder from the recording lever cradle and take out the pen. Loosen screw 1 figure 10, lift transportation lock 2, turn transportation lock 180° and tighten the screw again. Lift lever 3 and swing the transport mechanism forward as far as it will go. Lift clip 4. Insert the recording chart roll (cardboard tube) on the delivery roller firmly so that the carrier centre enters into the cardboard tube. (The round perforation of the chart paper must contact the left side of the disk). Insert the delivery roller true-sided (mechanical stop left on the roll). Pull the paper forward and insert the perforation on the pin roll. Fold back the clip 4 and swing the recording mechanism in position. Lift the pawls 7 and remove the shaft axle 8. Fold the paper tip into a pointed shape. Insert the paper tip into the wide slot of the shaft axle and wind up some turns of the reel. The form closure of the two-piece shaft axle must be kept! Install shaft axle again.

Make sure that the spur gear on the left meshes. Put down the pawls 7, pull the paper reel straight at the delivery roller, install the pen. Set the time using handwheel F beneath the pen tip. Use lever K to start running. The paper reel is about 15 m long. At a feed of 20mm/h it lasts for about one month. A red line will appear on the recording paper 1 meter before its end.

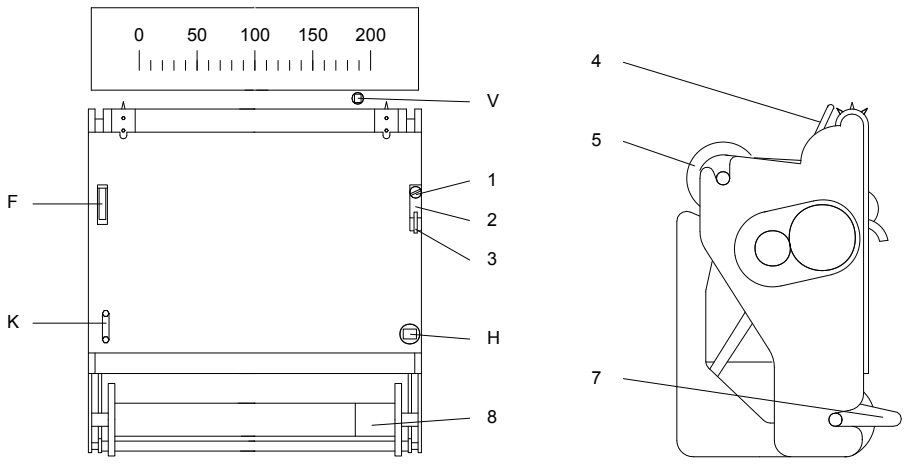
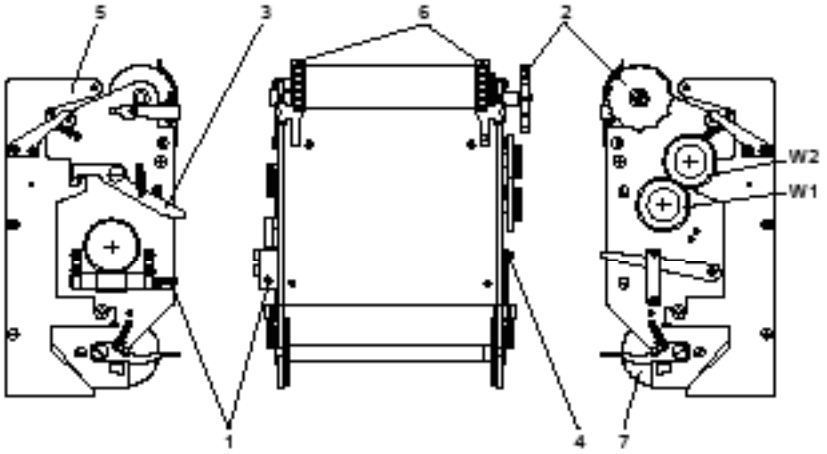


Figure 10 Paper drive mechanism for type 230.01, 240.0, 340.0, 340 RNR, 341.0, 361.01

5.2 Start-up of paper drive mechanisms according to figure 11 (with identification N - 8d and N - 32d or fast runner NH - 120 mm/h and NVH - 1200 mm/h)

From January 2002, continuous-chart pen recorders types 230.01 and 361.01 with chart width of 100 mm are equipped with new chart drive mechanisms which are identifiable by the name above mentioned.

Further changings are:
- male square of winding spindle on left hand side (1)
- manual paper feed facility on right hand side (2)
- lever for swinging the recording mechanism bed on the left hand side (3)
- starting switch for feed on the right hand side (4)



The paper drive mechanisms have to be wound up (using the supplied crank) on male square 1 on the left side of the recording mechanism by clockwise rotation till obviously sensible stop position is reached. After using lever on the right hand side, the paper tape will start in direction to the green marking (see also figure 11, pos. 4).
Wind graph paper (paper drive mechanism according to figure 11.1).

Release the middle piece of the holder. Compress the fibre pen holder, remove the holder from the recording lever cradle and take out the pen. Press lever 3 down. Thereby the recording mechanism bed swings forward. Remove delivery roller 5 and insert the new paper reel. The mechanical stop disk must be on the left hand side and the round perforation of the chart paper as well. Insert delivery roller again and load the top of the paper according to figure 11.1. The paper guide rails 6 are folded back on the placed paper tape. The recording mechanism are folded back to the indexed position. Thereafter, the shaft axle 7 can be removed where the top of the paper is clamped in and winded up some turns of the reel. After inserting the shaft axle 7 in the mounting (pinion gear on the right hand side), adjust the manual feed for the hour time by forward motion of the paper. Install the pen. Set the clock. Start the recording mechanism by using lever 4 (green mark).
Changing chart paper is also possible at the taken out recording mechanism. For this purpose, remove the complete recording mechanism upward by using the left lever and swinging out. Loading chart paper can be carried out easier in this way.

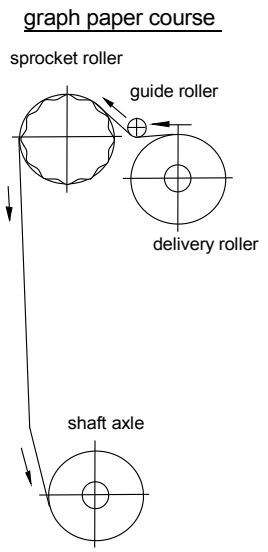


Figure 11.1

5.3 Paper drum for drum-chart recorders according to figure 12

To change the chart, loosen the crank by turning it counterclockwise. Then lift out the drum. Pressing against the chart clamping strip with your hand from below will cause the clamping strip to snap loose, releasing the chart. Install a new chart. Place both chart ends under the clamping strip and install the strip in the slot.

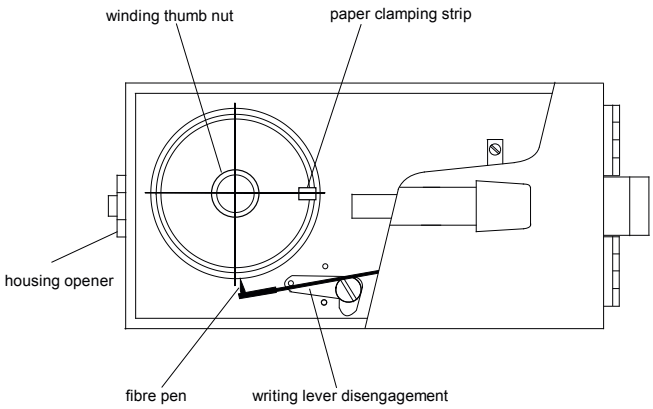


Figure 12

5.4 Paper drive mechanism for circular-chart recorders according to figure 13

Changing the chart can not be carried out until the knurled screw(s) (depending on type) in the middle of the chart mounting has been unscrewed and removed.
When putting a new chart, please make sure that the chart paper is under the sleeve of the pick-up disc, and the knurled screw tightly clamped the chart.

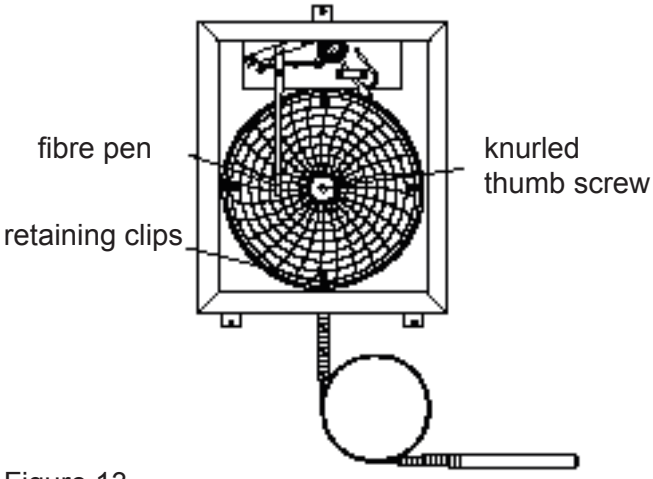
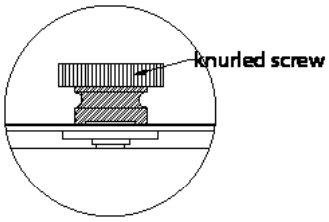
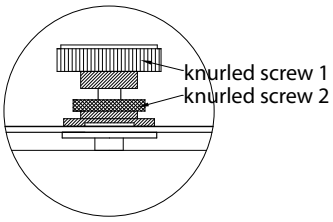


Figure 13



Type 1: Knurled screw is used for fitting the chart and for winding the clock work



Type 2: Knurled screw 2 is used for fitting the chart, knurled screw 1 is used for winding the clock work

6 Recording mechanism

The recorders are equipped with disposable fibre pens.

6.1 Recording mechanism for continuous-chart pen recorders

Pull out the transportation lock at the respective recording lever (pressure recorders only). The disposable fibre pen is delivered including pen holder. The pen tip is protected by a cap against drying. For putting into operation, compress the V-shape holder and install it in the cradle of the recording lever. After releasing the holder, the pivot bearing pins will engage the cradle eyes. Then press the clip back between the bearing pins.
The pen should lightly fall against the chart. To use the pen, remove the cap. When a spent pen is replaced, the holder can be used again. Lightly turn the pen and take it from the holder. Install the new pen in the reverse order of removal. At 20 mm/h feed, the ink supply will last for about 2 months.

6.2 Recording mechanism for drum- and circular-chart recorders

Take the recording lever from the transportation lock (wire spring). Push the fibre pen to the stop position on the recording lever. Remove the cap on the pen and loosen the recording lever release rod (figure 12). The pen can be used now. Replace the recording lever in the transportation lock before every transport (pressure recorders and drum-chart recorders only).

7 Start-up of paper drive mechanisms

7.1 Paper drive mechanisms for continuous-chart pen recorders

Hand-wind paper drive mechanisms are wound up only with the supplied crank at the square (square socket for types 230.01, 240.0, 340.0, 340 RNR, 341.0 and 361.01 according to figure 10; male square for recording mechanisms according to paragraph 5.2). Wind up the recorder by clockwise rotation, not till stop position! Pressing the switch starts chart travel in hand-wind- and synchronuous motor recorders.

7.2 Paper drive mechanisms for drum and circular-chart recorders

The paper drive mechanism is wound by clockwise rotation of the crank on the drum. The circular-chart recorder is wound by clockwise rotation of the knurled thumb screw.

7.3 Changing paper feed rate at continuous-chart pen recorders

7.3.1 Continuous-chart pen recorders according to figure 10

To change the feed rate at the recording mechanism, proceed as follows:

- Swing the recording mechanism forward (lever 3 at the mechanism)
- Remove the knurled nuts at the change gears W1 and W2
- Remove the change gears
- Install the new change gear pair. Ensure that the locating pin engages the recess in the change gear
- Screw on the knurled nuts and install the recording mechanism in place

Drive mechanism	Drive gear		Change gear		Feed
Drive type Hand-wind	A1 teeth	A2 teeth	W1 teeth	W2 teeth	mm/h
8d	30	60	40	80	5
			60	60	10
			80	40	20
	60	30	60	60	40
			72	48	60
			90	30	120
	72	18	90	30	240
≥32d	45	45	40	80	5
			60	60	10
			80	40	20
	72	18	60	60	40
			72	48	60
			80	40	80
			90	30	120

The drive gears A1 and A2 at the windup mechanism should be replaced by manufacturer since both gears make a very tight fit on the axles and the drive system would fail if the axles were bent. (If necessary, use suitable chart paper.)

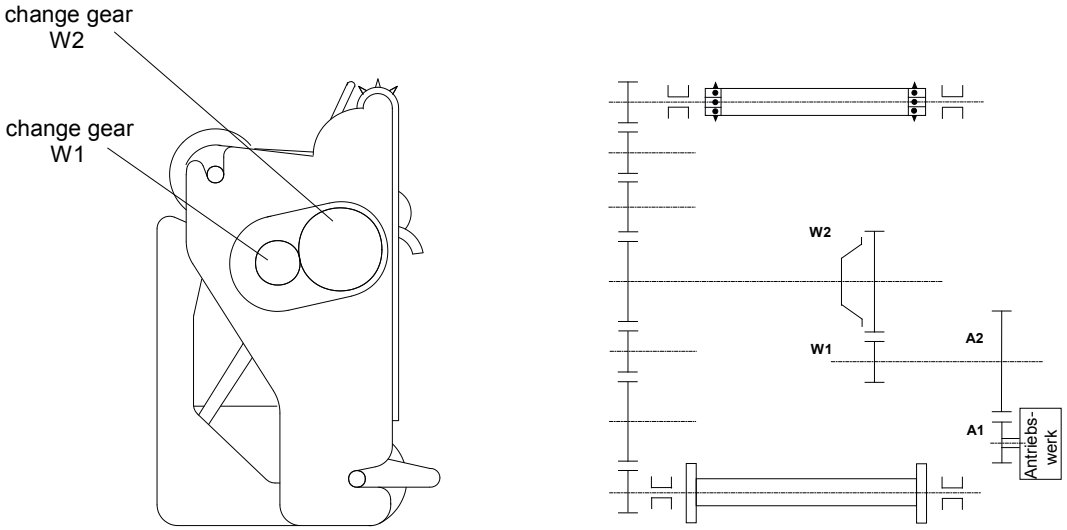


Figure 14

7.3.2 Changing the rev time setting at recording mechanisms according to paragraph 5.2 and figure 11

To change the rev time on recording mechanisms N-8d, N-32d, NH-120 and NVH-1200 proceed as follows:

- Swing the recording mechanism forward and remove the bearing pin according to paragraph 5.2
- Make change gears W1 and W2 available for the desired feed according to following tables
- Loosen hexagon nuts of both change gears - replacement of gear pair
- Fix hexagon nuts again
- Insert recording mechanism in bearing pins and swing back

Switching-over clock work

Settings are made by manufacturer as specified by the customer. Other run time settings are possible by changing drive gears inside the drum and on the drive mechanism.

Change gear tables (see also figure 11)

N-8d

mm/h	W1	W2
5	15	120
10	24	96
20	40	80
30	51	68
40	60	60
60	72	48

N-32d

mm/h	W1	W2
5	24	96
10	40	80
20	60	60

NH-120

mm/h	W1	W2
120	60	60
240	80	40
360	90	30

NVH-1200

mm/h	W1	W2
600	40	80
900	51	68
1200	60	60

8 Function check

The devices are delivered accurately adjusted and reliable in performance. Due to long use or improper transportation it may be necessary to correct the zero point or to make a new adjustment carried out by manufacturer.

8.1 Temperature recorder

Immerse the temperature sensor in liquid and keep it immersed in the bath for at least 5 minutes while continuously stirring or feeding compressed air etc.. Check the bath liquid temperature by using test thermometer. If thermometer reading and recorder value are different, adjust the recorder carefully at the spindle V (figure 10 at types 230.01, 240.0, and 341.0). For this purpose, use the supplied square wrench.

8.2 Pressure recorder

Use a check gauge (class 0,6) for comparison of readings. Make the setting as described for temperature recorders (figure 10 at types 340.0, 341.0, 361.01).

9 Maintenance

The recorders need little maintenance. Only spent fibre pens and charts must be replaced as needed.

10 Troubleshooting

Error:

No recording

possible causes:

- Pen empty - replace pen
- Pen has come off lever cradle - install as required
- Recording table disengaged - engage recording table (continuous-chart pen recorders only)

Error:

No chart transport

possible causes:

- Recording table disengaged - engage recording table (continuous-chart pen recorders only)
- Delivery roller or shaft axle not properly latched in position - install correctly
- Paper perforation not engaged or paper run out of straight - engage perforation, correct paper run
- Drum has come loose - tighten knurled nut

Our customer service is at your disposal at any time. Please call for advice, maintenance, repairs on site or for delivery of spare parts.

Changings as a result of technical measures are possible.

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