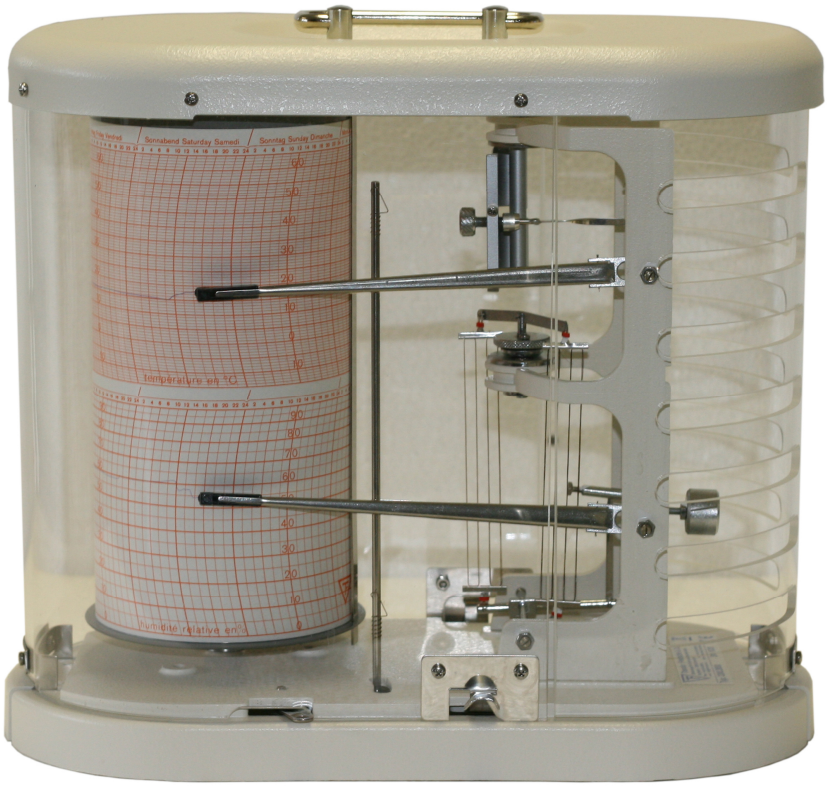
Thermohygrograph
Hygrograph, Thermograph

GROUP 2/3	TEMPERATURE/HUMIDITY
NO.	**3200/3210/2210.0000**
VERSION / DATE / NAME	04 / 05.2017 / Zi



Manual

Thermohygrograph 3200

Hygrograph 3210

Thermograph 2210

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1. GENERAL

This manual contains all important information about the function, start-up and maintenance of the thermal/hygrographs. Before start-up you should read it completely. The use of the thermo/hygrograph must be exclusively with consideration of the instruction, technical data and operating conditions specified in this guidance. Disturbances cannot be excluded at neglect of instructions, inappropriate treatment and not intended use.

2. FUNCTION / TECHNICAL DATA

Thermo/hygrographs serve long period registration of air temperature and relative humidity. The measuring element of the thermograph is a u-shaped bimetal with high specific bending, which reacts with short inertia time to changes of temperature. Humidity-dependent length variation of hair or synthetic fibres are used in the hygrograph's part.

The parts of the instrument movements consist of brass and are brushed chromium plated. All axles are bedded in stone, whereby the instruments have a minimal resting friction. The measuring elements are within the housing and therefore protected from mechanical damages. Despite it, the measuring elements are sufficiently ventilated. The used materials and all surfaces processing lend a very good corrosion resistance of the instruments.

The thermo/hygrographs are equipped with a mechanical or quartz clockwork, the recording drum revolution cycle can be easy set from week to daily or monthly cycle (monthly cycle for quartz clockwork only), with corresponding time 25.6h/176h/783h. The recorders are supplied completely with 2 write fibres as well as chart paper for one year period. Optionally items can be equipped with a safety lockable housing.

2.1. TECHNICAL DATA

MEASURING ELEMENT TEMPERATURE	
Bimetal:	–35…+45 °C; ±0.5 K
Bimetal:	–15…+65 °C; ±0.5 K

MEASURING ELEMENT AIR HUMIDITY	
Hair:	0…100%; ± 3% at 20…100% r.h.
Synthetic fibre:	0…100%; ± 3% at 20…100% r.h.

CLOCKWORK

MECHANIC DRUM CLOCKWORK ACC. TO DIN 58658	
Revolution cycle:	day 25.6 h week 176 h
Autonomic operation:	1 week

ELECTRONIC QUARTZ CLOCKWORK	
Revolution cycle:	day 25.6 h week 176 h month 783 h
Autonomic operation:	12 months (used the battery type Mignon (AA) 1.5 V (R6))

RECORDING DRUM	
Drum material:	Plastic
Chart paper holder material:	brass nickel plates
Diameter:	93.3 mm
High:	93 mm (thermographs, hygrographs)
High:	186 mm (thermohygrographs)
Write range:	80 mm for each measuring element
Chart paper resolution:	1 °C and 5 % rel. humidity

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MATERIAL	
Transmission system:	brass matte-chromium-plates, axles in chrome-plated steel
Movement stand:	aluminium white varnished
Base plate:	aluminium white varnished
Housing cover part:	chrome-plated steel X5CrNi1810, corrosion resistant white varnished
Lateral surface:	plastic transparent, scratch-proof

HOUSING DIMENSIONS	
Thermographs and hygrographs:	length 290 x broad 145 x height of 190 mm
Thermo-hygrographs:	length 290 x broad 145 x height of 260 mm

ACCESSORIES (included in delivery)	
60 sheets of week chart paper	
2 pieces of write fibre (thermograph, hygrograph)	
4 pieces of write fibre (thermohygrographs)	
Battery Mignon (AA) 1,5 V (R6) (for electronic Quartz clockwork)	
optionally:	carrying case ES*55 (thermographs, hygrographs) carrying case DS455 (thermohygrographs)
optionally:	lockable housing by installation of a safety lock

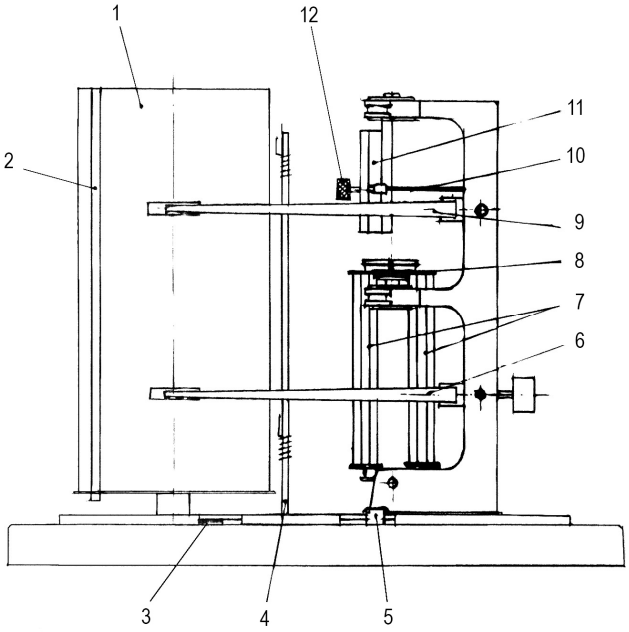
2.2. ORDERING CODE

THERMOHYGROGRAPH	
Measuring range: -35…+45 °C	**3200.1000**
Measuring range: -15…+65 °C	**3200.2000**

HYGROGRAPH	
Measuring range: 0…100 % rel. humidity	**3210.0000**

THERMOGRAPH	
Measuring range: -35…+45 °C	**2210.1000**
Measuring range: -15…+65 °C	**2210.1100**
Measuring range: -15…+65 °C	**2210.2000**

3. MECHANICAL CONSTRUCTION



(1) drum
(2) chart paper clamp
(3) release lever
(4) disengaging link
(5) lock fastener
(6) write arm hygrograph
(7) hair / fibre harps
(8) zero-point correction hygrograph
(9) write arm thermograph
(10) band with needle
(11) Bimetal
(12) zero-point correction thermograph

4. TRANSPORT MODE

After you took the thermo/hygrograph out of the packing, remove please the surrounding paper as well as the sticking ring, which protect the carrying handle.

Note:
Take from the packing as well as the provided accessories (functional paper, write fibre, if necessary battery and clockwork key).

To open a housing of the thermo/hygrograph press the lock fastener (5) to the left and up the left and right plastic hood.

Optionally: In case of safety lockable housing first the safety lock on the frame cover has to be unlocked with the help of the provided keys.

The thermo/hygrographs are supplied in the transport mode, i.e., with locked and relieved mechanics. Before the start-up of the equipment the transport lock is to be loosened

Thermograph: Lift the write arm (9) from the spring clip at the disengaging link (4) and hold in this position. Insert now carefully the band with needle (10) into the opposite case at the bimetal (11). Let you the write arm simultaneous slide slowly downward.

Hygrograph: Lift the write arm (6) from the spring clip at the disengaging link (4) and let you the write arm slide upward.

Thermo-Hygrograph: Follow both of the higher indicated steps above. It is absolutely necessary to protect again exclude damages before each transport the thermo/hygrographs. Hang up the write arm(s) into the arm holder(s) (spring clip) at the disengaging link again.

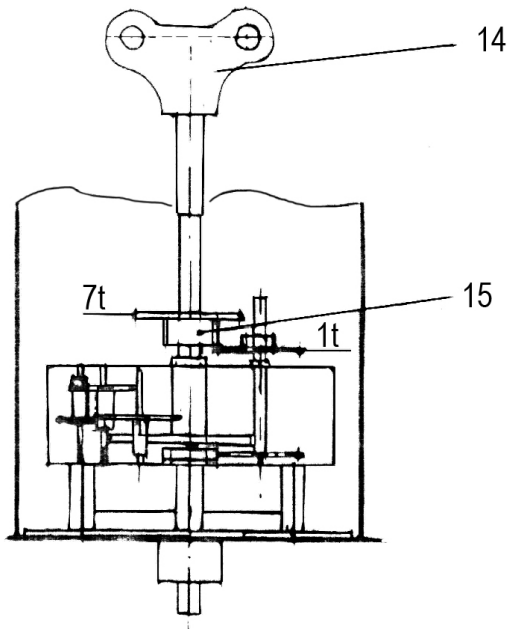
5. START UP

5.1. SETTING THE DRUM REVOLUTION CYCLE

Inside of the recording drum (1) is the clockwork, which revolves the recording drum in the clockwise direction. The clockwork can be set for 7D (week revolution cycle), for 1D (daily revolution cycle), and 31D (monthly revolution cycle).

Note:
The 31D setting (monthly revolution) is possible only with quartz clockwork. The delivered thermo/hygrographs have a week drum revolution cycle, if nothing another was agreed in the order. For a changing of the revolution cycle, the recording drum (1) must be removed upward from the clockwork.

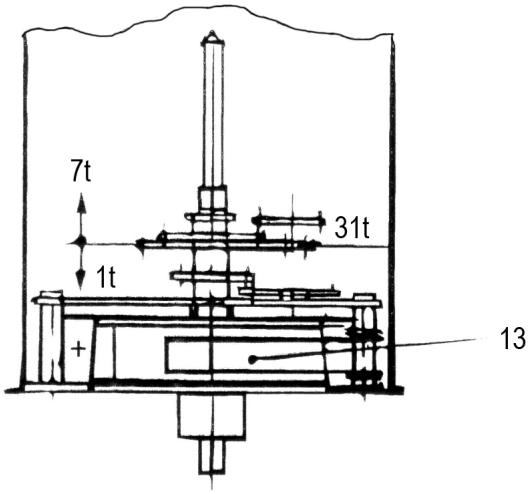
MECHANICAL CLOCKWORK



Unscrew the clockwork key (14) in the clockwise direction, present at the drum. Subsequently, you seize the drum (1) with both hands under the edge and take it off upward from the clockwork.
After taking the drum off the revolution cycle setting can be made, as the gear wheel (15) in the drum is taken off and attached opposite again.
Set the recording drum again onto the clockwork push on it and screw the clockwork key against the clockwise direction.

Electronic quartz clockwork
Keep with both hands under the edge of the recording drum and take off the drum upward from the clockwork. After taking the drum (patch cord off), the revolution cycle setting can be change by pressing downward the red gear wheel disk from the highest position (7D).
The middle position of the clockwork corresponds to a monthly revolution cycle (31D), in the lowest position daily circulation (1D). It is to be made certain that the appropriate gear wheels engage.

Note:
After change of the drum revolution cycle it is necessary to use another corresponding chart paper (see 6.2).



5.2. CLOCKWORK STARTING

Mechanical Clockwork: The clockwork is drawn up with the help of the clockwork key (14) against the clockwise direction and taken thus in enterprise. Draw the clockwork up completely.

Electronic quartz clockwork: By using the provided battery, type Mignon (AA) 1.5 V (R6) into the battery holder (13) the clockwork is ready to operate. It is very important to pay attention to the correct polarity.
After that the recording drum (1) is to be set onto the clockwork again.

5.3. OPERATION START-UP

The delivery set includes 2 (for thermo/hygrograph) or 4 (for thermohygrograph) write fibres. After removing the protective cap write fibre(s) is to be set onto the write arm(s).
Before beginning of the data registration is be set the chart paper corresponding to drum revolution cycle and the recording drum (1) must be turned to the according time position. By manipulation of the lever (3), the disengaging link (4) releases the write arm(s) and write fibre(s) touches the chart paper on the drum.
Close the housing, by folding first the right, afterwards the left part of the plastic hood into the centre, until the plastic hoods lock audibly. After locking the housing the thermo/hygrograph is ready for use.

Optionally: the safety lockable housing of the thermo/hygrograph can be protected against unauthorized access with the help of the safety lock on the frame cover.

6. MAINTENANCE

6.1. CLOCKWORK RUNTIME / CHANGE BATTERY

Mechanic clockwork
The clockwork has an at least one-week operating autonomy, if it was completely drawn up with start-up. The operating autonomy is independent of the drum revolution cycle setting.
At expiration of one operating week the clockwork is to be again completely drawn up with the help of the clockwork key. Always draw the clockwork up against the clockwise direction, otherwise the clockwork spring can be destroyed.

Electronic quartz clockwork
The clockwork has an operating autonomy of approx. 12 months. The operating autonomy depends on the selected drum revolution cycle as well as operating conditions. If the clockwork stops, then you should change the battery, (see 5.1. and 5.2). Always use a battery of the type Mignon (AA) 1.5 V (R6).

6.2. CHART PAPER REPLACEMENT

At the end of drum revolution cycle press the clamp (2) from down to top at the bottom side of the drum (1) and remove the drawn chart paper.
Set a new chart paper under the clamp and press it up to locking. It is necessary to mount the bottom side of the chart paper directly on the border in the lower edge of the recording drum. Afterwards the recording drum can be set again onto clockwork.

Note:
In case mechanical clockwork the clockwork key (14) in the clockwise direction must be unscrewed before taking the recording drum (1) off. Accordingly this is to be screwed on after putting the recording drum on against the clockwise direction again.

6.3. WRITE FIBRE CHANGING

The write fibre has one work cycle from approx. 6 to 8 months depends on operating conditions. If it is not enough write quality, remove the write fibre from write arm and replace by a new one (see 5.3)

6.4. ZERO-POINT CORRECTION

On the basis of reference equipment accomplished comparative measurements deviations, which lie outside of the indicated range of tolerance (see 2. Technical data), the zero-point of the thermo/hygrograph can be corrected.

Thermograph: The zero-point screw (12) is left at the free end next to bimetal (11).

Hygrograph: The zero-point screw (8) is above the measuring elements (7) of the instrument movement.

Thermohygrograph: Make if required the zero-point correction for both instrument movements, as described above.

Note:
The screws for adjustment the amplitude are secured lacquer and may not be adjusted. Any adjustment leads in any case to the measuring error.

6.5. HUMIDITY MEASURING ELEMENT REGENERATION

To save the accuracy hygrograph/hygrothermographs the humidity measuring elements is to be regenerated regularly by high humidity. The instruments with the hair measuring element should be regenerated all two to three weeks. In case hygrographs/hygrothermographs with synthetic fibre as measuring element the regeneration is necessary only once or twice in the year.

A regeneration is recommended, even if the hygrograph/hygrothermograph were not in use. The regeneration requires durable moistening of the measuring elements. The simplest regeneration can be provided by placing the equipment into a humid cloth.
The indicator accuracy can be examined at the same time at high air humidity. After approximately a half hour the item must indicate relative humidity 95 to 98%. If the indication does not lie within this range, then an appropriate correction must be made (see 6.3.zero-point correction).

Note:
The regeneration must take place absolutely in the loaded condition of the instrument movement, i.e., the write arm (6) is from the spring clip at the disengaging link to put out (see 4.Transport mode).

At the regularly high humidity conditions the measuring elements regenerate automatically (for example at the high night humidity). A regeneration is not to be made then additionally.

6.6. CLEANING OF THE HOUSING

The dust cover is made from transparent plastic. For the outside cleaning of the equipment can be used a dampened cloth with help of a mild detergent. Under any circumstances cleaning may not be used agents with solvents and/or scrubbing means.

6.7. IN THE EVENT OF AN ERROR

If the possibilities for the elimination of errors, listed in the following description, should lead behaviour not to success, please contact the manufacturer.

7. CONSUMPTION MATERIAL

Write fibre, black	**2210.0000.02**
Chart paper for Thermograph range: -35…+45 °C weekly cycle, 60 sheets	**2210.1000.01**
Chart paper for Thermograph range: -15…+65 °C weekly cycle, 60 sheets	**2210.2000.01**
Chart paper for Thermograph range: -15…+65 °C Monthly cycle, 13 sheets	**2210.2000.03**
Chart paper for Thermohygrograph range: -35…+45 °C / 0…100 % weekly cycle, 60 sheets	**3200.1000.01**
Chart paper for Thermohygrograph range: -15…+65 °C / 0…100 % weekly cycle, 60 sheets	**3200.2000.01**
Chart paper for Hygrograph range: 0…100 % weekly cycle, 60 sheets	**3210.0000.01**

TABLE OF POSSIBLE ERROR

Error	Possible cause	Elimination
no recording of measured values	write fibres are not on the recording drum	levers (3) press to the right (see 5.3.)
	write fibre protective casing is not taken off	take off the casing (see 5.3.)
	write fibre is dried up	dampen write fibre with a drop vinegar or citric acid
	write fibre is used up	change write fibre
sequential recording of the measured values in the same place (no motion of the registration drum)	**mechanic clockwork:**	
	recording drum is not set right on the clockwork axle on fastens	screw on the recording drum with the help of clockwork key (14)
	clockwork is not drawn up	draw clockwork up (see 5.2)
	electronic clockwork:	
	recording drum mounted not right on the clockwork axle	press recording drum down up to click
	gear wheels do not interlink after changing of drum revolution cycle	set the drum revolution cycle again pay attention to gear connections (see 5.1.)
	battery discharged	change battery (see 6.1.)
sequential record of the same measured value (constant measured value)	write arm remains hanging on spring clip on the disengaging link (4)	press lever (3) completely to the right
time notices on the chart paper are not corresponding to the motion of recording drum	chart paper is not corresponding to drum revolution cycle setting	change the chart paper to corresponding (see. 6.2.) or set corresponding drum revolution cycle (vgl. 5.1.)
	electronic clockwork battery voltage insufficiently	change battery (see 6.1.)

Error	Possible cause	Elimination
displaying wrong measuring value	chart paper is not corresponding to this thermo / hygrographs	change chart paper to corresponding
	chart paper does not lie on the lower edge of the recording drum (1) zero-point drift degeneration of the humidity measuring element	set chart paper again, mount it on the lower edge of drum (see 6.2) correct zero-point (see 6.4) regenerate humidity measuring element (see 6.5)
write arm of thermograph (9) shows down	thermograph movement is unconnected with write arm	insert band with needle (10) into over-lying case of the bimetal (11)
hygrograph write arm (6) shows to up	hygrograph movement is unconnected with write arm	hang up the small band with slotted hole in tap **Note**: Humidity write arm must be free of spring clip at the disengaging link (4)

8. EEC CONFORMITY EXPLANATION

Hereby we explain that

Thermohygrographs

Hygrographs

Thermographs 2210

Correspond to the following regulation:
EEC guideline electromagnetic compatibility 89/336/EWG changed to the guideline 92/31/EWG.
Further EU guidelines are not at present determining for the equipment.

The following harmonized standards are applied:
EN50081-1:92/-2:93
EN50082-1:92/-2:95
for the range private, business and trade as well as small firms.
The equipment carries the CE indication.

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