Operating manual

TS 606...-i/1006-i

Model TS 606/2-i
Model TS 606-G/2-i
Model TS 606/3-i
Model TS 606/4-i
Model TS 606-G/4-i
Model TS 1006-i

Accuracy when going to press

The use of advanced technology and the high quality standard of our instruments are the result of continuous development. This may result in differences between this operating manual and your instrument. Also, we cannot guarantee that there are absolutely no errors in this manual. Therefore, we are sure you will understand that we cannot accept any legal claims resulting from the data, figures or descriptions.

1 Overview

Applications

The thermostat cabinets serve to continuously temper a variety of applications, e. g.:

- 20 °C BOD_5 determination
- 25 °C Enzymatic activity (TTC test)
- 37 °C Colony count

The instruments manage all tempering tasks in the range of 10 °C to 40 °C maintenance-free and reliably.

Features

- The fully insulated cabinet exactly controls the internal temperature via an integrated temperature sensor. The compressor cooling unit or the heating unit switches on separately.
- Depending on the operating condition, an LED display shows the internal measured temperature or the desired temperature that was set.
- The temperature can be set in the range of 10 °C to 40 °C in steps of 1 °C (via 2 keys, which are protected by a robust foil front).
- The recirculation ventilation is provided by a tangential blower. This guarantees a stable internal temperature in the whole thermostat cabinet.

2 Safety instructions

This operating manual contains basic instructions that have to be observed during the commissioning, operation and maintenance of the instrument. Thus, it is essential for the operator to read this operating manual before carrying out any work with the system. The operating manual must always be available within the vicinity of the measuring system.

General safety instructions

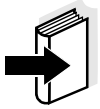
The following safety labels in the individual chapters of this operating manual indicate different levels of danger:

Warning
indicates instructions that must be followed precisely in order to prevent serious dangers to personnel.

Caution
indicates instructions that must be followed precisely in order to avoid slight injuries to personnel or damage to the instrument or the environment.

Other labels

Note
This symbol indicates instructions that describe special features.



Note
indicates cross-references to other documents, e.g. component operating manuals.

2.1 Authorized use

The authorized use of the TS 606...-i/1006-i thermostat cabinets consists exclusively of the use as a tempering instrument in water analysis.
Please keep to the technical specifications according to chapter 7 TECHNICAL DATA. Only operation according to the instructions in this operating manual is authorized.

Any other use is considered to be **unauthorized**. Unauthorized use invalidates any claims with regard to the guarantee.

2.2 General safety instructions

Function and operational safety

The failure-free function and operational safety of the instrument is only guaranteed if the generally applicable safety measures and the special safety instructions in this operating manual are followed during its use.

The failure-free function and operational safety of the TS 606...-i/1006-i is only guaranteed within the operational limits under the environmental conditions that are specified in chapter 7 TECHNICAL DATA.

Safe operation

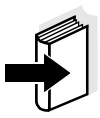
If safe operation is no longer possible, the instrument must be taken out of operation and secured against inadvertent operation.
Safe operation is no longer possible if the instrument

- has been damaged in transport
- has been stored under adverse conditions for a lengthy period of time
- is visibly damaged
- no longer works as prescribed.

If you are in any doubt, please contact the supplier of your instrument.

3 Commissioning

3.1 Unpacking and setting up the instrument



Note
Please also follow the instructions on how to set up the instrument in the enclosed operating manual of the Liebherr company!

Unpacking

When unpacking the instrument pay attention to shipping damages. If you find damages inform the consigner immediately so that you can claim insurance cover.

Check the scope of delivery according to the delivery note.

Positioning at the location

Also observe the environmental conditions according to chapter 7 TECHNICAL DATA.

Caution
Do not expose the instruments with glass doors to direct sunlight, as the interior of the cabinets may be warmed up too much!

3.2 Initial commissioning

Caution
After transporting and setting up the thermostat cabinet, wait at least 60 minutes before switching on.

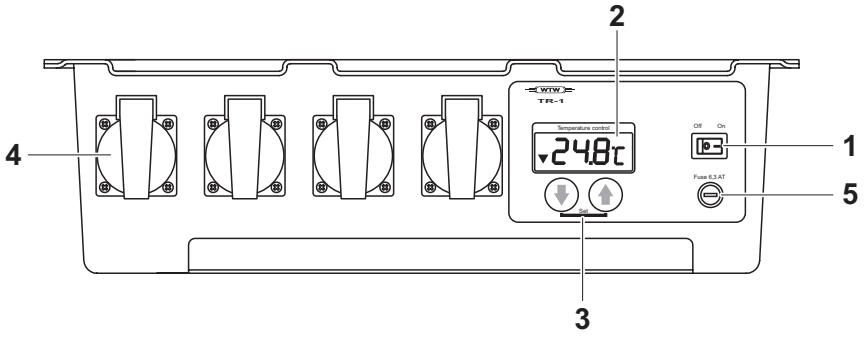
Course of the initial commissioning

1	Connect mains plug to mains socket (230 V / 50 Hz, power see chapter 7 TECHNICAL DATA).
2	Switch on the thermostat cabinet and set the desired temperature (see chapter 4 OPERATION).

4 Operation

4.1 Operating elements

Control unit inside the thermostat cabinet



1	**<On/Off>** switch: switch the instrument on and off
2	LED display: temperature and status display
3	**<Up>** and **<Down>** keys: display desired temperature / set desired temperature
4	4 Schuko sockets: connection of BOD_5 instruments or stirring platforms
5	Electrical fuse for control unit and compressor

4.2 Switching on the thermostat cabinet

To switch on, set the **<On/Off>** switch the control unit to **On**. In the switched on condition, the Schuko sockets are supplied with voltage.

To switch off, set the **<On/Off>** switch to **Off**.

4.3 Connecting the stirring platforms

Caution
Observe the maximum sum load for all 4 sockets (see chapter 7 TECHNICAL DATA). If the sum load is too high, the temperature control may be disturbed.

Connecting the stirring platforms

1	Open the door.
2	Equip the thermostat cabinet with stirring platforms. When doing so, observe the following points: ● Place the stirring platforms and other fillings in the center of the gratings to ensure an optimum air circulation! ● If the cabinet is only partly filled, use the upper levels.
3	Connect the stirring platforms to the sockets of the control unit.
4	Close the door.

4.4 Setting the desired temperature

Note
The adjusted desired temperature remains stored in the case of a power failure or when the instrument is switched off.

Setting the desired temperature

1	Open the door.
2	Press the **<Up>** and **<Down>** keys simultaneously for a short period of time. The LED display flashes and displays the current desired temperature.
3	With the aid of the **<Up>** or **<Down>** key set the desired temperature to the required value (increment of 1 °C): – **<Up>** Increase the desired temperature – **<Down>** Decrease the desired temperature.
4	Take over the adjusted value: After approx. 3 seconds without pressing the **<Up>** or **<Down>** key, the LED display shows the current internal temperature again and stops flashing. The control unit now regulates to the newly adjusted temperature.
5	Close the door.

Operating example: Changing the desired temperature set in the factory

The desired temperature set in the factory is to be changed from 20 °C to 25 °C.

1	Press the **<Up>** and **<Down>** keys simultaneously for a short period of time. The LED display flashes and shows 20.0 °C.
2	Press the **<Up>** key until the LED display shows 25.0 °C.
3	Wait for approx. 3 seconds until the LED display shows the actual inside temperature again. The control unit now regulates the temperature to 25.0 °C.

Status display

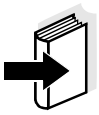
The current operating mode is displayed with the aid of two arrow symbols on the left side of the temperature display:

▲ : Heating

▼ : Cooling

The required sample temperature is achieved after an adjustment time of one to three hours. The necessary duration of the adjustment time depends on the sample quantity.

While the sample temperature is being controlled, the air temperature in the thermostat cabinet (it is displayed as the actual value at the control unit) may fluctuate by up to several degrees centigrade. **The actual temperature of the sample liquid, however, fluctuates by a maximum of ± 0.5 °C**.



Note
To check the actual sample temperature, see chapter 6 WHAT TO DO IF....

5 Maintenance, cleaning, disposal

5.1 General maintenance instructions

Warning
Before any work inside the cabinet disconnect the mains plug of the thermostat cabinet from the socket (do not only switch off the mains switch).

Warning
It is not allowed to perform any maintenance or cleaning work through the protective cover grid of the TR-1 control unit or to remove this grid. Any contamination can be removed through the cover grid using a vacuum cleaner.

Cleaning

Remove any dust inside the instrument every 6 to 8 months. When doing so, also remove the dust from the convection grids on the back of the instrument using a dry brush. Take care not to tear off cables or bend pipes.

For a more thorough cleaning of the cabinet inside (for example if the instrument is to be stored for a longer period of time), use lukewarm water with some washing-up liquid or household cleaner for synthetic material surfaces.

For more detailed instructions on cleaning, see the Liebherr company operating manual.

Defrosting

The instrument has an automatic defroster. Condensation water is collected in the condensation container and evaporates automatically. Take care that the condensation water can flow through the outlet in the back wall without obstructions. If necessary, clean the outlet with an elongated object, e. g. with a bottle brush.

For more detailed instructions on defrosting, see the Liebherr company operating manual.

Transport

Ship the instrument shock-protected (if possible in original packaging). Mark the packing accordingly (Keep dry / Attention, risk of fracture).

5.2 Disposal

Note
Instructions on how to dispose of the packing material and thermostat cabinet can be found in the operating manual of the Liebherr company.

6 What to do if...

6.1 Testing the thermostat cabinet

Test procedure

1	**Prepare the test.** Disconnect all consumers from the sockets of the control unit.
2	**Switch on the instrument**. The actual temperature must be displayed.
3	**Test the ventilator:** The ventilator must blow downwards. Hold your hand closely below the ventilator grating and check the air stream.
4	**Test the cooling.** Set the desired value to 10 °C. Make sure that the actual temperature is higher than the temperature setpoint. The compressor must switch on. Switching on may be delayed by 5 min due to the protection function against too frequent switching. The ▼status display must appear. The temperature in the thermostat cabinet must decrease. For testing use additional thermometer without water-filled BOD bottle.
5	**Test the heating and switching-off of the compressor.** Set the desired value to 40 °C. Close the cabinet door. The compressor of the thermostat cabinet must switch off. The heating must switch on. The ▲ status display must appear. The temperature in the thermostat cabinet must increase. For testing use additional thermometer without water-filled BOD bottle.
6	**Test the control of the thermostat cabinet.** Set the desired value to 20 °C. Close the cabinet door. The actual value of the sample temperature must adjust itself in the range 19.0 °C to 21.0 °C. Test see: Measuring the actual value of the sample temperature.
7	**Test the sockets.** Connect a small consumer (for example WTW stirring platform) to each individual socket of the control unit. The small consumer must work at each socket.

If all test points are OK, the thermostat cabinet is OK. In the case of an error, contact the WTW service department.

6.2 Measuring the actual value of the sample temperature

Test procedure

1	Place a BOD sample bottle filled with approx. 400 ml water on a grating in the center of the thermostat cabinet.
2	Completely immerse the probe of a temperature meter (accuracy at least 0.5 °C, resolution at least 0.1 °C) in the sample bottle. The probe must not touch the bottle wall.
3	After three hours adjustment time read the temperature value.

6.3 Error diagnosis

Control unit is switched on,
- no display indication
- no reaction

Cause	Remedy
Mains power supply failed	Check mains power supply, connect an operable consumer (e.g. lamp) to the power socket
Fuse of the control unit defective	Check the fuse of the control unit. If it is defective, replace it by a new fuse (value, see chapter 7 TECHNICAL DATA). The fuse is available in specialist shops. Warning: Only use the specified type. Do not repair fuses!
Control unit defective	Contact the WTW service department.

Display of the control unit works. Desired temperature is not achieved. The actual temperature value is too *low*

Cause	Remedy
The waiting time was not sufficient for the loading of the thermostat cabinet.	Wait for a longer period of time and observe the development of the actual value.
The ambient temperature is too low.	Check the ambient temperature.
Control unit defective, compressor runs permanently.	Contact the WTW service department.

Display of the control unit works. Desired temperature is not achieved. The actual temperature value is too *high*

Cause	Remedy
The waiting time was not sufficient for the loading of the thermostat cabinet.	Wait for a longer period of time and observe the development of the actual value.
The heat output capacity of the consumers inside the instrument is too high.	Check the power consumption of the consumers inside the thermostat cabinet and reduce it if necessary. Also see chapter 7 TECHNICAL DATA, “Maximum sum load for all four sockets“.
The ambient temperature is too high.	Check the ambient temperature.
The thermostat cabinets with transparent doors are exposed to direct sunlight.	Avoid direct sunlight on transparent doors.
Compressor runs, cooling unit defective.	Contact the Liebherr service department.
The compressor of the cooling unit does not work or the control unit does not switch on the compressor.	Contact the WTW service department.

7 Technical data

7.1 General data

Test certificates

CE

Environmental conditions

Operation	10 °C ... + 32 °C (climatic class SN)
Storage	- 25 °C ... + 65 °C

Guidelines and norms used

EMC	EC guideline 89/336/EEC EN 61326-1 EN 61000-3-2 EN 61000-3-3
Instrument safety	EC guideline 73/23/EEC EN 61010-1

7.2 Electrical data

Mains power supply

Nominal voltage	230 VAC ± 10 %
Supply frequency	50 Hz according to DIN IEC 60038
Protective class	I
Internal instrument safety	6,3 A delay fuse, for TR 1 control unit and compressor. The fuse is on the operating front of the control unit.

Protective class

I

Maximum electrical power consumption [W]

TS 606/2-i (TS 606-G/2-i)	TS 606/3-i	TS 606/4-i (TS 606-G/4-i)	TS 1006-i
160 (170)	180	190 (210)	190

Consumers at the sockets of the control unit are not taken into account for these specifications.

7.3 Temperature control unit TR-1

Control range 10 °C ... 40 °C

Setting increment 1 °C (1 K)

Constancy of the sample temperature ± 0.5 °C (0.5 K)

Recirculation ventilation 120 m^3/h by means of a tangential ventilator

Temperature and status display
- 3-digit LED display for temperature, resolution 0.1 °C (0.1 K)
- Status displays for heating and cooling phases

Connections 4 Schuko sockets,
maximum sum power consumption:

TS 606/2-i TS 606-G/2-i	TS 606/3-i	TS 606/4-i TS 606-G/4-i	TS 1006-i
50 W	75 W	100 W	100 W

7.4 Dimensions and weights

	TS 606/2-i (TS 606-G/2-i)	TS 606/3-i	TS 606/4-i (TS 606-G/4-i)	TS 1006-i
Volume [l]	180	260	360	500
Outer dimensions [mm]				
Height *Width* *Depth*	850 (884) 602 600	1215 602 600	1589 602 600	1515 755 715
Inner dimensions [mm]				
Height *Width* *Depth*	734 513 433	1047 513 433	1418 513 433	1338 646 516
Weight [kg]				
Gross (incl. packing) *Net*	39.5 (50.0) 36.5 (48.0)	47.5 44.5	63.5 (82.0) 50.0 (78.5)	76.5 71.5

8 Service information

This chapter applies to service personnel of both the Liebherr and WTW companies.

Warning
Before working on the current circuits it is essential to disconnect the mains plug of the thermostat cabinet! The following tasks may only be carried out by a specialist electrician authorized by WTW. The customary regulations for building electrical appliances must absolutely be observed.

Check of the cooling unit

Example	Action
1. Control unit works.	● Set the desired temperature to 10 °C. Make sure that the actual temperature is higher than the temperature setpoint. The compressor must switch on. Switching on may be delayed by 5 min due to the protection function against too frequent switching. The temperature in the thermostat cabinet must decrease.
2. Control unit does not work.	● Switch off the control unit! ● Disconnect the mains plug of the thermostat cabinet. ● Bridge the control contact of the control unit in the connection box of the compressor for a test (between the brown and black wire). ● Make sure that nobody is endangered by mains contact, then plug in the mains plug. ● If the cooling unit is operable, the compressor must run and the temperature in the thermostat cabinet must decrease.

Example	Action
2. Control unit does not work.	● Pull off the mains plug. ● If necessary, repair the cooling unit and restore the original state (to be carried out on site by Liebherr service personnel).

Replacing the control unit

1	Disconnect the mains plug of the thermostat cabinet.
2	Unscrew all fixing screws of the control unit.
3	Unplug the mains connection plug. It is located on the right-hand circuit board inside the control unit. Subsequently, take the control unit out of the cabinet.
4	Plug a new control unit onto the mains connection plug and screw it tight using the fixings screws.
5	Connect the mains plug of the thermostat cabinet. Then test the thermostat cabinet according to section 6.1.