

# Operating Instructions Testomat<sup>®</sup> 808

Online Analysis Instrument  
for Water Hardness



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## Important safety information

- Please read these operating instructions carefully and completely prior to working with the instrument.
- Ensure that these operating instructions are always available for all users.
- These operating instructions must always be passed on to the new owner should Testomat® 808 change hands.
- Always adhere to hazard warnings and safety information when using reagents, chemicals and cleaning agents. Please adhere to the respective safety data sheet! Download the safety data sheets for the supplied reagents at <http://www.heyhl.de>.

## Intended use

Testomat® 808 has been designed for use in the field of water treatment (e.g. osmosis plants, electroplating, large boiler plants, laundries, canteen kitchens). The feed water must be clear, colourless and free of undissolved particles. The instrument is a limit value measuring instrument which automatically monitors the residual total hardness (water hardness) in water.

- Always adhere to the performance limits stated in the section entitled “[Technical data](#)” on page 42.
- Always observe the application areas/application limits of the indicators and the requirements of the medium being measured.

To ensure correct and intended usage, always read and understand these instructions, especially the section entitled “Important safety information”, prior to use.

The instrument is not used as intended if

- it is used in areas not specified in these instructions.
- it is used in areas which do not correspond to the ones described in these instructions.

## Qualification of the staff

Assembly and commissioning require fundamental electrical and process engineering knowledge as well as knowledge of the respective technical terms. Assembly and commissioning should therefore only be carried out by a specialist or by an authorised individual supervised by a specialist.

A specialist is someone who due to his/her technical training, know-how and experience as well as knowledge of relevant regulations can assess assigned tasks, recognise potential hazards and ensure appropriate safety measures. A specialist should always adhere to the relevant technical regulations.

## Warning notices in these instructions

The warning notices in these instructions warn the user about potential dangers to individuals and property resulting from incorrect handling of the instrument. The warning notices are structured as follows:



### SIGNAL WORD!

#### Description of the type or source of danger

Description of the consequences resulting from non-observance

- Preventive measures. Always adhere to these preventive measures.



**DANGER**

“**DANGER**” indicates an immediate hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING**

“**WARNING**” indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



**CAUTION**

“**CAUTION**” indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injuries or property damage.

**NOTE**

“**NOTE**” indicates important information. If this information is not observed, it may result in an undesirable result or state.

## Notes and instructions to be observed

### General instructions



**WARNING**

- Adhere to health and safety regulations, electrical equipment safety regulations, and environmental protection regulations valid in the country of use and at the installation site.
- Adhere to national and local regulations during installation and commissioning.
- Always protect the instrument against moisture and humidity. It should never come into contact with condensation or splash water.
- Do not carry out any changes or modifications at the instrument which are not described in these instructions; failure to adhere to these instructions will negatively affect any warranty claims that you make thereafter.



#### NOTE

## Installation

- Always completely disconnect the relevant plant part before installing the instrument or connecting/disconnecting it to/from the power supply. Secure the plant against reconnection.
- Only connect the instrument to the mains voltage specified on the rating plate.
- Always observe technical data and ambient parameters.
- Testomat<sup>®</sup> 808 requires an interference free and stable power supply. If necessary, use a mains filter to protect Testomat<sup>®</sup> against interference voltages caused, e.g., by solenoid valves or large motors. Never lay connecting cables parallel to power cables.

## Operation

- Ensure that the maximum electrical load capacity of the relay outputs is never exceeded.
- Immediately switch off Testomat<sup>®</sup> 808 and contact service staff if malfunctioning occurs. The warranty will be void if you tamper with or attempt to repair Testomat<sup>®</sup> 808. Repairs must be carried out by authorised service staff.

## Cleaning

- Only use a dry, lint-free cloth for cleaning.

## De-installation

- Prior to de-installing a defective instrument, always write down a description of the error (failure effect). It is only possible to repair a defective instrument (irrespective of the warranty period) if it has been de-installed and returned to us with a description of the error. Use to the enclosed error log to describe the error and return it to us together with the instrument. If the error log is no longer available, download it at [www.heyl.de](http://www.heyl.de).

## Disposal

- Dispose of the instrument in accordance with national regulations.

**CAUTION****Operating requirements**

- In order for Testomat® 808 to operate reliably, use Heyl Testomat® indicators in the pH-range 4 – 10.5!
- Only operate the instrument with the parameters specified under “Technical data”.
- With Testomat® instruments for water hardness monitoring, larger quantities of heavy metal ions in the softened water might influence the colour reaction, especially iron above 0.5 mg/l, copper above 0.1 mg/l and aluminium above 0.1 mg/l (brownish-red colour display).
- If the measuring water contains more than 20 mg/l CO<sub>2</sub> (carbonic acid), incorrect evaluations cannot be excluded. In this case, use an aerator (e.g. special Heyl accessories).
- The concentration of influencing contents can be determined by using our colorimetric TESTOVAL® test kit
- **Important! Excessive carbonate hardness and also the existence of disinfectants in the water can result in erroneous evaluations.**
- Careful handling of the instrument increases both its operational reliability and service life! Therefore, carry out a visual inspection at regular intervals as described below:
  - Has the use-by-date of the indicator expired?
  - Are the hose connections of the dosing pump free of leaks?
  - Is there any air inside the dosing hoses?
  - Are all the water connections free of leaks?
  - Are the doors of the instrument closed properly?
  - Is the instrument heavily soiled?
  - Are the measuring chamber and the drain duct/drain hose clean?
- Trouble-free operation is only possible when maintenance is carried out on a regular basis! For more information, please refer to the section entitled “[Maintenance](#)” on page 35.
- If problems occur, please refer to the section entitled “[Error messages/Troubleshooting](#)” on page 31.

**NOTE****Scope of delivery**

1x Testomat® 808

1x plastic bag containing a screw cap with a hole and an insert for the screw cap of the indicator bottle

2x fuse

1x operating instructions

Special accessories (available separately): Filter inlet, candle filter as well as pressure regulator

Required hose connections and supply lines for Testomat® 808 are available from Heyl.

## Performance specifications

Testomat® 808 is used for the automatic monitoring of residual total hardness (water hardness) in water. The limit value to be monitored is determined by the indicator selection.

- Limit values for residual hardness of 0.02 – 10.0 °dH\* determinable by indicator selection
- Analysis start:
  - Automatic interval mode  
(interval pause can be set from 0 – 60 minutes)
  - External control
  - Manual start
- Extended operating periods due to 500 ml indicator storage bottle
- RS232 interface for optional firmware update

## Indicators for Testomat® 808 instruments

Indicators with various limit values are available for the application of Testomat® 808 instruments according to operational requirements.

Indicator type*	Monitoring range	Limit value LEDs (good/poor display)	Measuring result (information on water quality)
300 – 3100	Residual hardness 0.02 – 10 °dH	“GOOD” green	Residual hardness < indicator limit value
		“POOR” red	Residual hardness > indicator limit value

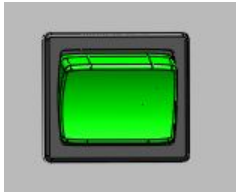
\* The indicator types 350 (5 °dH) and 3100 (10 °dH) will be available in the second half of 2012.

All indicator types are available in two bottle sizes (100 ml and 500 ml). Please refer to the section entitled “[Testomat® 808 spare parts and accessories](#)” on page 40 for a detailed list of the individual indicator types with the respective article numbers.



## Functions of the operating and display elements

Operating statuses and measuring results are displayed at Testomat<sup>®</sup> 808 via LEDs. The input keys for operating the instrument are positioned below the LEDs.



### Switching Testomat<sup>®</sup> 808 on/off

(1) Power switch

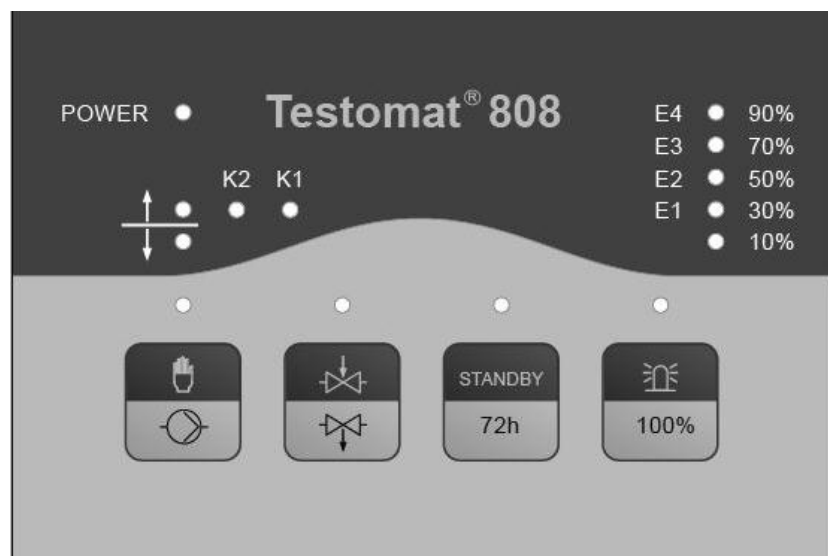
Switch the instrument on/off using the green power switch (after opening the housing cover on the front of the instrument).

(2) Instrument fuse (internal)

These fuses protect Testomat<sup>®</sup> 808 and the outputs against overloads and short circuits.





Please refer to the sections entitled “[Fuses](#)” on page 19 and “[Error messages/Troubleshooting](#)” on page 31 for descriptions of the fuses.

### Front view Testomat<sup>®</sup> 808



## Operating elements/Function keys

All operating elements/function keys are assigned twice. The respective function is triggered by a short or long (min. 2 seconds) key press.

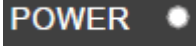
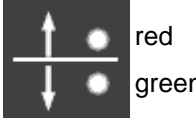

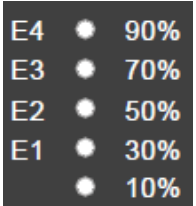
<p>Key 1 (manual)</p> 	<p><u>Short key press:</u> Starts an analysis (manual start), the respective LED flashes.</p> <p><u>Long key press:</u> Switches the dosing pump for bleeding the pipes on/off. The LED illuminates while the pump is running.</p>
<p>Key 2 (flushing)</p> 	<p><u>Short key press*:</u> Switches the internal flush valve on/off, the respective LED flashes as long as the valve is open.</p> <p><u>Long key press*:</u> Activates an external flush valve via relay K1 (on/off). The LED above key 2 and LED K1 illuminate as long as the external valve is activated.</p>
<p>Key 3 (standby)</p> 	<p><u>Short key press:</u> Switches the standby function on/off. The respective LED flashes if standby is active.</p> <p><u>Long key press:</u> The respective LED displays whether operation is possible for longer than 72 h (operation without supervision).</p>
<p>Key 4 (horn)</p> 	<p><u>Short key press:</u> Acknowledges current errors/alarms.</p> <p><u>Long key press:</u> Sets the indicator display from 0% to 100% (the LEDs 10% to 90% illuminate).</p> <p><b>Note:</b> It is not possible to enter any indicator level.</p>

\* only in standby mode

## Display elements/LEDs

All measuring results as well as activated functions are displayed at Testomat® 808 via LEDs.

The LEDs above the function keys illuminate/flash when the respective function is activated.

	<p>The LED illuminates if the instrument is switched on via the power switch on the front of the instrument and is operating.</p>
	<p>Limit value LEDs (red/green) for displaying the measuring result:          Limit value not achieved =&gt; green LED illuminates          Limit value exceeded =&gt; red LED illuminates          When a new measuring is running, the result of the previous measurement flashes.</p>
	<p>The LEDs K1 and K2 display the status of the relays. They illuminate if the respective relay has been switched (also see the section entitled <a href="#">“Switching functions of the relays K1 and K2”</a> on page 23)!</p>
	<p>10% – 90%: These LEDs display the calculated filling level of the indicator bottle (also see the section entitled <a href="#">“Low indicator level”</a> on page 34).          E4 – E1: These LEDs display current errors after simultaneously pressing key 3 and key 4 for approx. 2 seconds (also see the section entitled <a href="#">“Error messages/Troubleshooting”</a> on page 31).          E4 flashes: The pump head has been in operation for 150 hours and must be replaced (also see the section entitled <a href="#">“Pump head maintenance message”</a> on page 38)</p>

### NOTE

#### Cancelling error messages/warning messages

- Press key 4 to acknowledge the messages and, if necessary, eliminate the cause of the fault.



## Installation



### WARNING

#### Risks resulting from incorrect installation!

- Install Testomat<sup>®</sup> 808 at a location where it is protected against dripping or splash water, dust and aggressive substances – e.g. in a control cabinet or on a suitable wall.

### NOTE

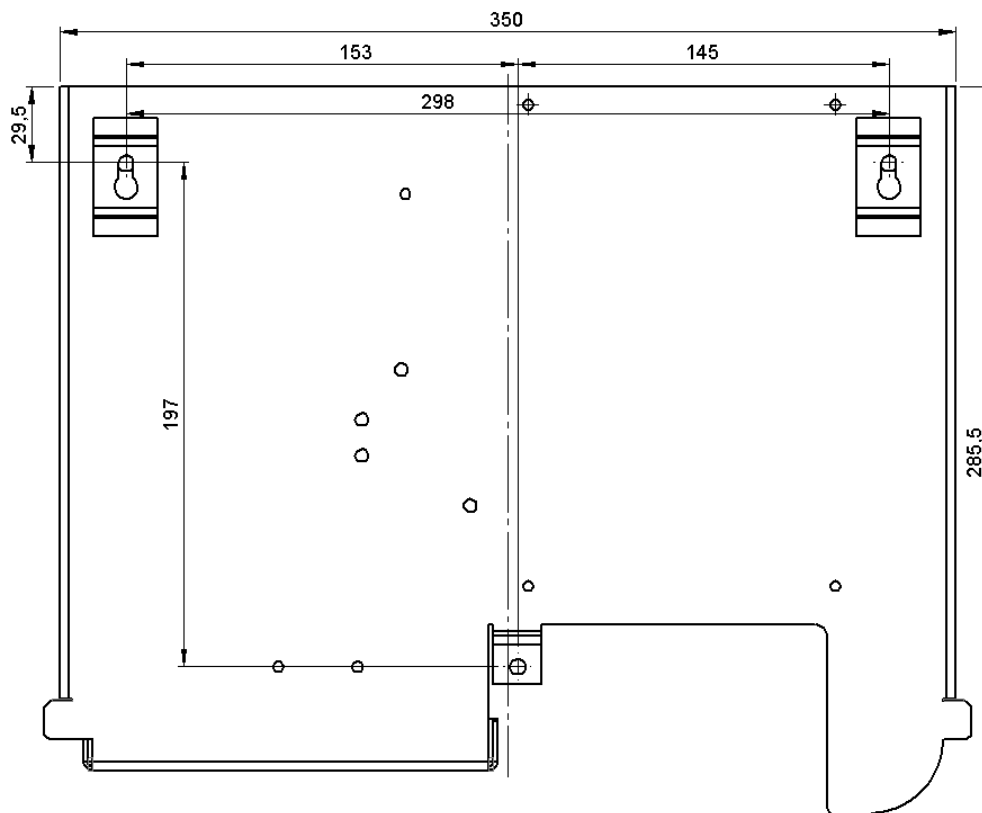
#### Information for trouble-free operation

- Install Testomat<sup>®</sup> 808 vertically and without mechanical stress.
- Install Testomat<sup>®</sup> 808 at a vibration-free site.

## Installing Testomat<sup>®</sup> 808

Select an installation site where the water inlet hose can be kept as short as possible (max. 5 m).

- Drill the mounting holes as shown in the drawing below.
- Use three screws to attach the instrument at a suitable position on the wall.





## Operating Testomat® 808 in the pressure range 4 to 8 bar

Prior to installation, please check whether a higher operating pressure (between 4 and 8 bar) is required. Use a pressure controller (art. no. 37602) for ranges between 4 and 8 bar. Optimum operation of Testomat® 808 is achieved with operating pressure of between 2 and 4 bar.

### NOTE



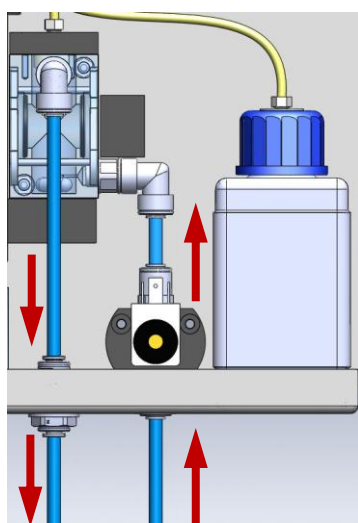
### Information for trouble-free operation

- The water pressure must be between 1 and 8 bar; a pressure reducer should be used for the 4 to 8 bar range (special accessories). This pressure regulator must be set under flow pressure!
- Avoid strong pressure fluctuations.

## Connecting the water inlet and outlet

### Information for trouble-free operation

- Ensure there are no foreign particles smaller than 150 µm which caused blocking. Use our candle filter (Art. No. 37583) at the front end of the device if you have problems with blocking.
- The measuring water temperature must be between 10°C and 40°C.
- For water temperatures above 40°C, install the KCN type cooler in the supply line of Testomat® 808.



Outlet

Inlet



### Water inlet

The measuring water is taken from the main water line of the water treatment plant and fed to the inlet connection of Testomat® 808. The instrument is equipped with a plug connector for plastic hoses 6/4 x 1 (external diameter 6 mm/ internal diameter 4 mm, wall thickness 1 mm) as standard).

- Install the connection for the branch line of Testomat® 808 directly at the main water line directly after the water treatment plant.
- Always lay the branch line connection vertically upwards in order to prevent dirt particles from entering the instrument from the main water line.
- We recommend you to install a manually operated stop valve (see figure "Plant example Testomat® 808" on page 15) in the branch line to Testomat® 808.
- Use an opaque plastic hose 6/4 x 1 (max. length 5 m) for the water inlet ①.
- Flush the supply line to remove any dirt particles.



### CAUTION

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#### When using a cooler

- The hot water can cause burns and damage wetted parts of Testomat® 808.
- 

#### Water outlet

The feed water flows through the measuring chamber to the drain via the outlet hose.

- Remove the red plug from the outlet connection.
  - Connect the outlet connection of Testomat® 808 to an outlet hose ② (internal diameter 4 mm).
  - Feed the hose to an outlet.
- 

### NOTE

#### Transportation plug!

The outlet is sealed with a plug to prevent leakage during transportation. Keep and store the plug for possible transportation at a later date.

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## Connecting the power supply and devices

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### WARNING

#### Risk of electric shocks during installation!

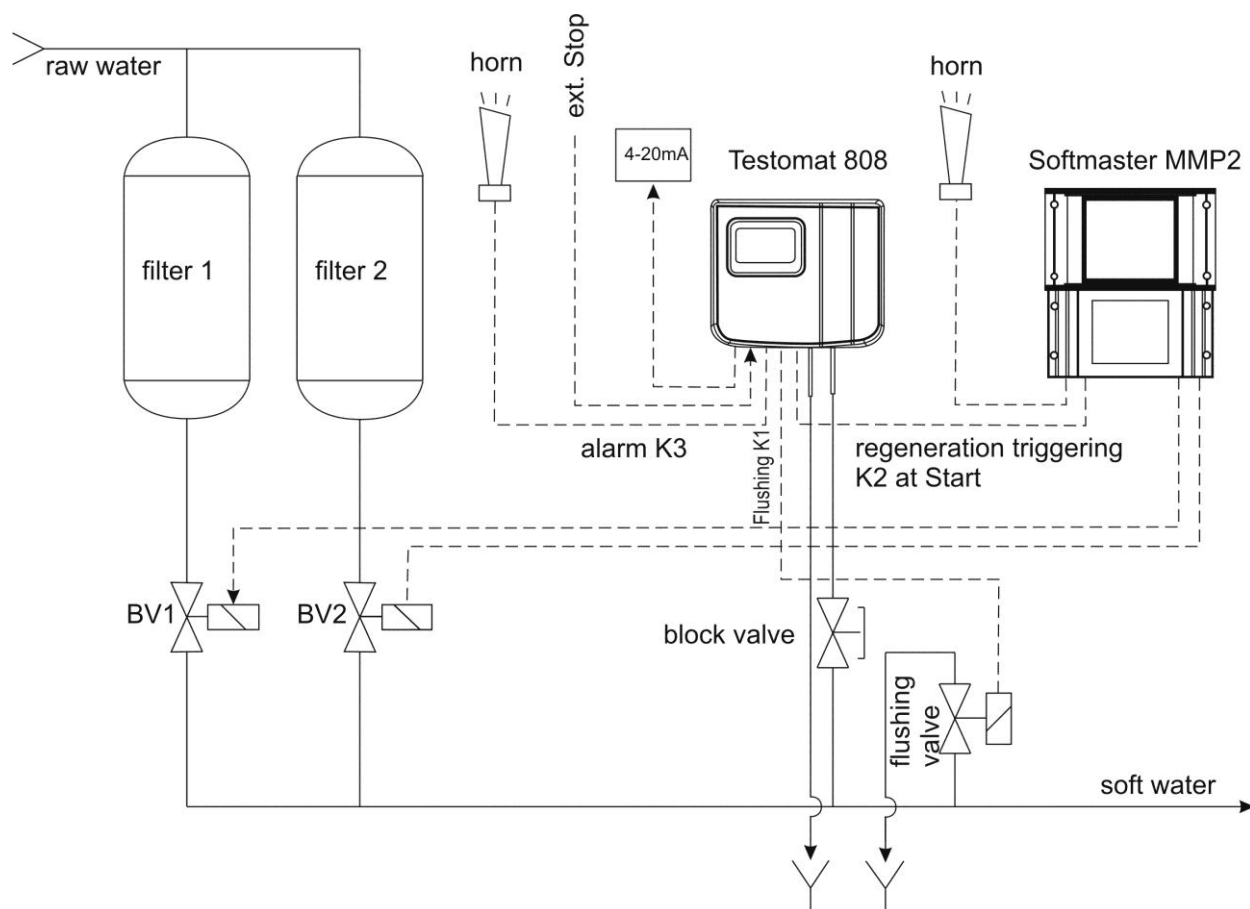
If the power supply is not disconnected prior to installation, it may result in personal injuries, destruction of the product or damage to plant parts.

- Always disconnect the relevant plant parts before installing Testomat® 808.
  - Only use tested cables with sufficient cross-sections for the connections.
- 

### NOTE

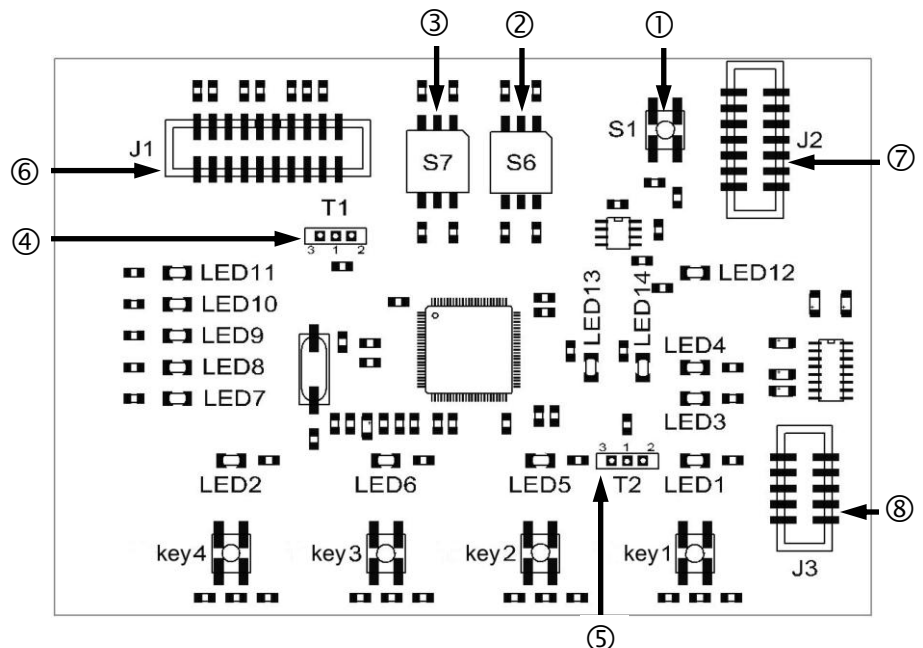
#### Risk of damages caused by electromagnetic fields!

- If Testomat® 808 or the connecting cables are installed parallel to power cables or in close proximity to strong electromagnetic fields, the instrument may be damaged or measurements incorrect.
  - Ensure that connecting cables are as short as possible.
  - Always install connecting cables and power cables separately.
  - Connect the instrument to the protective earth conductor (for 230/115 VAC).
  - Shield the instrument against strong electromagnetic fields.
-

**Plant example Testomat® 808**

## Internal design Testomat® 808

### Rear of the controller board

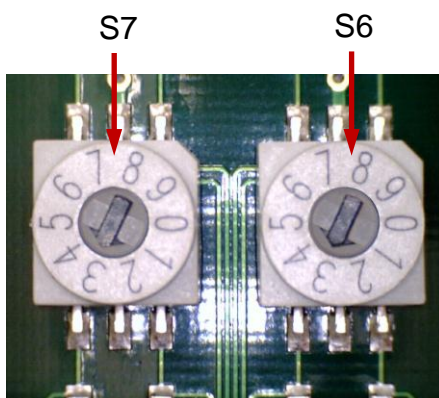


Keys 1 to 4 are located at the front of the board. Please refer to the section entitled “[Functions of the operating and display elements](#)” on page 9 for a detailed description of its operating system and the display elements.

The following function keys and slide switches as well as plug connectors are also provided:

#### Reset key S1

Use reset key S1 ① to execute a reset, i.e. to reset the firmware of Testomat® 808 after an update.



#### Function key S6

Use function key S6 ② to set the interval pause between measurements. Please refer to the section entitled “[Interval pause](#)” on page 30 for an overview of possible switching positions and interval pauses. (The standard setting is 3.)

#### Function key S7

Use function key S7 ③ to set the switching behaviour of the relays K1 and K2. Please refer to the section entitled “[Switching functions of the relays K1 and K2](#)” on page 23 for an overview of possible switching positions. (The standard setting is 3.)



**NOTE****Switch position**

- The respective switch position is read after evaluating a measuring result and after a reset.



Switch position left  
(delivery status)

**Slide switch T1**

**Switch position LEFT:** If the slide switch ④ is in the left position and the instrument is switched on or the reset key pressed while the instrument is switched on, the microcontroller executes the operating program (firmware).

**Switch position RIGHT:** If the slide switch ④ is in the right position and the instrument is switched on or the reset key pressed while the instrument is switched on, the instrument is set to a mode which enables a firmware update via the serial interface.

If your instrument requires a firmware update, Heyl will provide you with further detailed information.

**NOTE****Switch position**

- The switch position is only read immediately after a reset.



Switch position right  
(delivery status)

**Slide switch T2**

Use the slide switch T2 ⑤ to determine the size of the indicator bottle. The following indicator bottle sizes are possible:

Indicator	Switch position
100 ml bottle	Left
500 ml bottle	Right

**NOTE****Switch position**

- The status of the slide switch T2 is read after resetting the indicator display to 100% and after a reset.

**Plug connector J1**

The plug connector J1 ⑥ is a programming interface. It is not important for instrument operation.

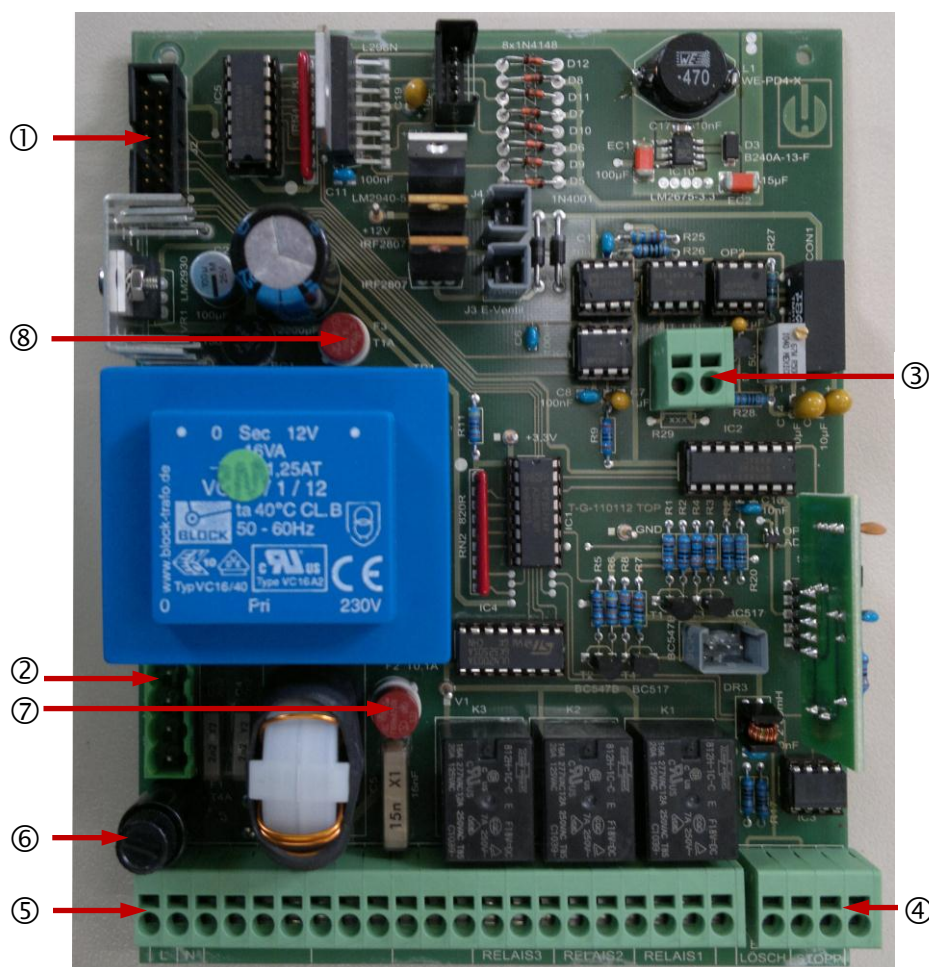
**Plug connector J2**

The connection to the base circuit board is established via the plug connector J2 ⑦ using a ribbon cable.

**Plug connector J3**

The connection to the RS232 interface is established via the plug connector J3 ⑧ using a ribbon cable. Please refer to the section entitled “[Serial interface RS232](#)” on page 23 for a detailed description.

## Base circuit board Testomat® 808



The illustration above provides an overview of the design of the base circuit board.

### Plug connector J2

The connection to the controller board is established via the plug connector J2 ① using a ribbon cable.

### Plug connector J8

The power switch is connected at plug connector J8 ②.

### Current interface

Please refer to the section entitled “[Interfaces](#)” on page 22 for a description of the current interface ③.

## Inputs DEL. EXT. and STOP

Please refer to the section entitled “[Description of the signal inputs](#)” on page 22 for a description of the inputs “Delete externally” and “Stop” ④.

## Terminal block

Please refer to the sections entitled “[Connecting the mains voltage](#)” on page 20 and “[Connecting the inputs and outputs](#)” on page 21 for a description of the terminal block ⑤.

## Fuses

The following fuses can be found on the base circuit board.

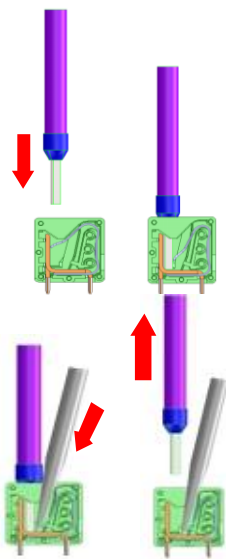
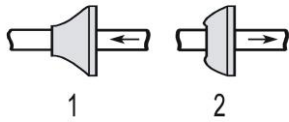


No.	Designation	Function	Comment
⑥	F1	Relay protection fuse	4 A
⑦	F2	Primary fuse	230 V / 0.1 A 115 V / 0.2 A 24 V / 1 A
⑧	F3	Secondary fuse	1 A

Please refer to the section entitled “[Testomat® 808 spare parts and accessories](#)” on page 40 for the article numbers when reordering fuses.

## Connecting the mains voltage

Only connect the instrument to the specified mains voltage. Refer to the rating plate for the appropriate mains voltage. Connect the cables as follows:



- Open the housing cover and subsequently loosen the two fastening screws at the top and bottom of the door to the interior of Testomat® 808. The door can now be opened and the terminal box accessed.
- Feed the cable through one of the cable glands underneath the housing into the terminal box.
- Feed the cable through one of the cable glands underneath the housing into the terminal box.
- Subsequently pull back the cable until the bush has been turned over (2).
- Connect the power supply to the terminals PE, N, L.
- To do so, insert the conductors into the round cable input at the terminal block. Ensure that the strands are held securely in the terminals.
- To loosen the connection, insert a screwdriver into the square opening without force in order to open the terminal. Once the terminal has been opened, remove the conductor.

Terminal description	Type	Function	Comment
PE	IN	Mains protective earth (4x)	Only with mains 115/230 V !
N (U) L (V)	IN	Mains, N=neutral (U=24 V) Mains, L=live (V=24 V)	Mains input 50-60 Hz 24 V / 115 V / 230 V
n I	OUT	Neutral, switched (3x) Live, switched (3x)	Mains for consumers, max. 4 A

L	I	N	PE	PE	PE	PE	I	I	I	n	n	n	S	M	Ö	S	M	Ö	S	M	Ö	EXT. LÖSCH.	STOPP
													RELAIS3			RELAIS2			RELAIS1				

## Connecting the inputs and outputs



### CAUTION

#### Connecting the inputs

- Do not connect external voltage to these connections!

Testomat® 808 has the following connections for control and monitoring functions.

- Ensure that the strands are held securely in the terminals.
- Use the two fastening screws to close the door once installation has been completed.

Terminal description	Type	Function	Comment
RELAY 3	OUT	Fault message output – change-over contact	Volt-free relay output*
RELAY 2	OUT	Control for external application	Volt-free relay output*
RELAY 1	OUT	Control for external flush valve	Volt-free relay output*
EXT. DEL.	IN	Acknowledgment message input – normally open	Volt-free input
STOP	IN	Flow controller/Switch input – normally open	Volt-free input

\* Please refer to the section entitled “[Technical data](#)” on page 42 for the maximum contact load of the relays.

Please refer to the section entitled “[Description of the signal inputs](#)” on page 22 or “[Description of the relay outputs](#)” on page 23 for a detailed description.

## Description of the signal inputs



**EXT. LÖSCH.**  
terminals

**STOPP**  
terminals

### Connecting the signal inputs

- Only connect the signal inputs “Delete externally” and “Stop” to *volt-free* contacts!

The connection of external voltages would damage the instrument!

### DEL. EXT. (EXT. LÖSCH.) of relay K3

The input “Delete externally” is used for the external deletion/acknowledgment of current errors/alarms. It reacts the same as key 4 (horn) after a short press, i.e. all fault messages can also be acknowledged via a remote control (normally open).

### STOP

The input “Stop” is the input for an external flow controller or switch (volt-free, normally open). It reacts the same as key 3 (standby) after a short press. The LED above key 3 flashes and the instrument no longer executes analyses. However, an analysis currently in progress will be completed.

### NOTE

#### ➤ Priority of input STOP

- The external stop function has priority over key 3 (standby)!
- Even if the instrument has been stopped via external, an analysis can be started with key 1 (manual).
- If the standby function (key 3) has been activated and subsequently deactivated during an analysis pause, the interval pause time is reset. However, if the standby function is terminated via the “Stop” input, the analysis starts immediately.

## Interfaces

### Current interface

The results of the analyses or statuses can be registered via the output of the current interface (I-OUT (+) / I-IN (-)). The following defined values for status and error messages are output for this:

- 5 mA = Pause
- 8 mA = Good measurement
- 11 mA = Poor measurement
- 14 mA = Low indicator level (< 10%)
- 17 mA = Low water level
- 20 mA = Indicator is empty or  
optical fault or no or  
insufficient indicator in the measuring chamber

**NOTE****Current interface load**

- The current interface is galvanically decoupled. A maximum load of 500 Ohms should not be exceeded!

For faults and when using very long cables (approx. 20 m), a screened cable should be used if possible.

**Serial interface RS232**

The serial interface RS232 is located at the front of Testomat® 808 (after opening the housing cover). Use a ribbon cable with a 9-pole Sub-D connector to connect the plug J3 on the controller board to RS232. Use this RS232 interface to connect a computer/notebook to the controller board of Testomat® 808 via a null modem cable and update the instrument's firmware.

**Description of the relay outputs**

All relay outputs are neutral contacts. This ensures that all connection options are available. The switching of mains voltage and external voltage, and the direct switching of inputs, e.g. a process controller, can thus be realised. Please refer to the chapter entitled "[Technical data](#)" on page 42 for the maximum load of the relays.

**Relay K3 – fault message**

Relay K3 is designed as a change-over contact and used for fault messages indicating low water level, low indicator level, power failure and measuring faults.

**NOTE**

After several consecutive faulty measurements the relay K3 deactivates and an error message is issued via the current interface.



Function key S7

**Relays K1 and K2**

Two volt-free relay contacts are available to signal that a limit value has been exceeded. Set the function of the relays via the switch position of function key S7.

**Switching functions of the relays K1 and K2****Switch position****NOTE**

- The respective switch position is read after evaluating a measuring result and after a reset.

The following switch positions are possible:

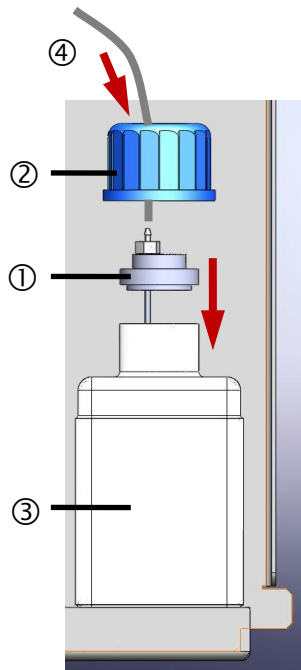
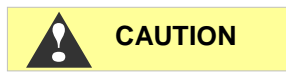
<b>Switch position</b>	<b>Relay K2</b> (message poor analysis)	<b>Relay K1</b> (external flush)	<b>Comment</b> for relay K2
<b>0</b>	Normally open – closes in case of 1 poor analysis, remains closed until the next good analysis	Normally open – closes after a poor analysis for 1 minute	Continuous contact can be deleted via key 4 (horn) or “Delete externally”.
<b>1</b>	Normally open – closes in case of 1 poor analysis, remains closed until the next good analysis	Normally open – closes after a poor analysis for 3 minutes	Continuous contact can be deleted via key 4 (horn) or “Delete externally”.
<b>2</b>	Normally open – closes after 2 poor analyses, remains closed until the next good analysis	Normally open – closes after the first poor analysis for 1 minute and after the second poor analysis for 2 minutes	Continuous contact can be deleted via key 4 (horn) or “Delete externally”. The instrument skips the interval pause after the first poor analysis.
<b>3*</b>	Normally open – closes after 3 poor analyses, remains closed until the next good analysis	Normally open – closes after the first poor analysis for 1 minute, after the second poor analysis for 2 minutes and after the third poor analysis for 3 minutes	Continuous contact can be deleted via key 4 (horn) or “Delete externally”. The instrument skips the interval pause after the first and second poor analysis.
<b>4</b>	Normally open – closes in case of 1 poor analysis and remains closed. Opens again once the alarm has been deleted		Instrument goes into standby. Continuous contact can be deleted via key 4 (horn) or “Delete externally”.
<b>5</b>	Normally open – closes after 2 poor analyses and remains closed. Opens again once the alarm has been deleted	Normally open – closes after the first poor analysis for 1 minute	Instrument goes into standby. Continuous contact can be deleted via key 4 (horn) or “Delete externally”. The instrument skips the interval pause after the first poor analysis.
<b>6</b>	Normally open – closes after 3 poor analyses and remains closed. Opens again once the alarm has been deleted	Normally open – closes after the first poor analysis for 1 minute and after the second poor analysis for 2 minutes	Instrument goes into standby. Continuous contact can be deleted via key 4 (horn) or “Delete externally”. The instrument skips the interval pause after the first and second poor analysis.
<b>7</b>	Normally open – closes in case of 1 poor analysis, remains closed until the next good analysis	Normally open – closes for 90 s before the analysis	Continuous contact can be deleted via key 4 (horn) or “Delete externally”
<b>8</b>	Normally open – closes after the 2 poor analyses for 1 minute	Normally open – closes after the first poor analysis for 1 minute and after the second poor analysis for 2 minutes	The instrument skips the interval pause after the first poor analysis.
<b>9</b>	Normally open – closes after the 3 poor analyses for 1 minute	Normally open – closes after the first poor analysis for 1 minute, after the second poor analysis for 2 minutes and after the third poor analysis for 3 minutes	The instrument skips the interval pause after the first and second poor analysis.

\* Delivery status

Updated: March 2012



# Commissioning



## Handling reagents/indicators

- Please adhere to the respective safety data sheet!
- Trouble-free operation of Testomat® 808 is only guaranteed when using Heyl Testomat® indicators!

## Inserting the indicator bottle

- Open the housing cover to access the housing.
- Remove the cap from the indicator bottle.
- The supplied plastic bag contains the blue screw cap with a hole and the respective insert for the indicator bottle.  
**Caution!** There are two inserts. One is for the 100 ml indicator bottle and the other one is for the 500 ml indicator bottle. The length of the suction tube indicates which insert is for which bottle. Select the insert that matches your indicator bottle. When inserted, the suction tube should almost reach the bottom of the indicator bottle.
- Place the insert ① into the indicator bottle.
- Screw the blue screw cap with hole ② hand-tight onto the indicator bottle.
- Place the indicator bottle ③ next to the water inlet in the housing.
- Push the intake hose ④ hand-tight onto the hose connector of the insert.

## Bleeding the indicator lines

To ensure that indicator is available for the initial analyses, the intake hose and the transport hose must be filled with indicator from the pump up to the measuring chamber.

- Switch on the instrument and press key 3 (standby). The standby function is switched on or off via a short key press. The LED above the key flashes if the function is active.
- Press key 1 (manual) for longer (approx. 2 seconds) to bleed the lines. The dosing pump starts to run.
- Let the pump run until no more bubbles escape from the dosing needle. Then press key 1 (manual) again for approx. 2 seconds to switch off the pump.

During operation, the pump automatically extracts the indicator.

## Opening the water inlet

- Slowly open the manual stop valve in the water line to open the water inlet.

## Instrument settings and analysis

Please read the following information before carrying out the required settings at the instrument.

### Instrument settings

The required instrument settings for executing analyses, e.g. measuring interval pause, indicator bottle size and behaviour of relays K1 and K2, are carried out on the controller board using the function keys and slide switches. Please refer to the section “[Internal design Testomat® 808](#)” on page 16 for a detailed description.

#### NOTE

##### Double assignment of the function keys

- The four function keys at Testomat® 808 for instrument operation basically have two functions.
- A short or long key press (at least 2 seconds) is required for operation.

A short key press activates the top functional level (displayed in black on the key). A long key press is required to activate the bottom key function (displayed in white). Please refer to the section entitled “[Operating elements/Function keys](#)” on page 10 for a description of the individual functions.

#### NOTE

##### Displaying operating statuses and measuring results

- Only LEDs are used to display operating statuses and measuring results at Testomat® 808.
- Depending on the status or measuring result, the LEDs can either flash or illuminate continuously (see the section entitled “[Display elements/LEDs](#)” on page 11).

#### NOTE

##### Limit value display

- Testomat® 808 is a pure limit value measuring instrument which uses two limit value LEDs to display the measuring result.



- The green LED illuminates when the limit value specified by the selected indicator is not achieved during the analysis.
- The red LED illuminates if the limit value is exceeded.
- If a new measurement is running after completion of another measurement, the result of the previous measurement flashes in the display. The respective LED displaying the result of the previous measurement illuminates continuously during the interval pause.

**Both LEDs are switched off if an error occurred during the previous measurement.**

## Selecting the indicator type and bottle size

### NOTE

#### Specifying the measuring/monitoring range of Testomat® 808

- The measuring/monitoring range of Testomat® 808 is specified by the selected indicator type only.
- Please refer to the section entitled “[Testomat® 808 spare parts and accessories](#)” on page 40 for a list of available indicators.

All listed indicator types are available in two bottle sizes. To specify the size of the indicator bottle, move slide switch T2 on the rear of the controller board to the respective switch position (see the section entitled “[Internal design Testomat® 808](#)” on page 16):

Indicator	Switch position
100 ml bottle	Left
500 ml bottle	Right

### NOTE



#### Switch position

- The status of slide switch T2 is read after resetting the indicator display to 100% and after a reset.

### NOTE

#### Set indicator quantity to 100%

- After selecting the bottle size and inserting the bottle, press key 4 (horn) to set the display for the indicator quantity to 100%.

## Carrying out an analysis

After switching it on, the instrument commences automatic interval mode. The first analysis starts after 15 seconds. The following analyses start automatically according to the set interval pause.

### NOTE

#### Duration of the interval pause

- The duration of the interval pause between two measurements can be set between 0 and 60 minutes, also see the section entitled “[Interval pause](#)” on page 30.
- **Attention!** After a poor analysis, the interval pause is ignored in some switching positions of function key **S6** (2/3/5/6/8 and 9) and **another** analysis is carried out immediately.

Automatic interval mode can be interrupted via standby and analyses started manually.

Operating mode	Function/Process
<b>Standby</b>	<p>The instrument is switched on and in standby.</p> <p>Short press key 3 (standby) to switch standby on/off.</p> <p>Note: During an interval pause, the instrument immediately switches to standby; a started analysis is always completed.</p>
<b>Manual</b>	<p>Precondition: The instrument is in standby or in an interval pause.</p> <p>Short press key 1 (manual) to switch on manual mode.</p> <p>An analysis is started immediately, irrespective of the set interval pause.</p>

## Analysis process

The analysis takes approx. 2 minutes. The water analysis process for determining the residual total hardness is as follows:

### Analysis start

- ⇒ The solenoid valve for water inlet opens
- ⇒ The measuring chamber is flushed
- ⇒ The solenoid valve closes after the flush time
- ⇒ The optical transmitter is switched on to measure possible turbidity in the water
- ⇒ The measurement continues until the turbidity clears (the water has been fully outgassed)
- ⇒ The measurement starts when the measured value is constant
- ⇒ The dosing pump and stirring bar are activated
- ⇒ The current measured value is read
- ⇒ The colour change in the measuring chamber is evaluated
- ⇒ If necessary, switch relay, result is displayed
- ⇒ The measuring chamber is flushed

### Analysis end

## Further basic functions and settings

### Internal flushing

To ensure that the analysed sample represents the current value, the sampling line must be sufficiently flushed.

#### NOTE

#### Duration of the internal flush time

- The duration of the internal flush time is preset (10 s before and after a measurement) and cannot be influenced by the operator.

The quantity of flush water for internal flushing depends on the pressure:

Pressure	Max. water quantity per analysis
1 bar	80 ml
2 bar	120 ml
3 bar	160 ml

### External flushing

If a very long (approx. 3 – 10 metres) sampling line or a line with a large diameter is used, install an external flush valve upstream of Testomat® 808. Connect the external flush valve to the "Relay 1" outlet.

### Flush process – internal/external in manual mode

Proceed as follows to additionally flush the instrument:

- At first switch the instrument into standby mode for flushing. Short press key 3 (standby) to achieve this.
- If a measurement is running, wait until the measurement has been completed.

#### Internal flush process:

- Short press key 2 (Flush) to open the internal flush valve.

The valve opens and the measuring chamber is flushed.

The LED above key 2 (Flush) flashes as long as the internal flush valve is activated.

- Short press key 2 (Flush) again to terminate the flush process.

**External flush process:**

- Long press (approx. 2 seconds) key 2 (Flush) to activate the external flush valve.

The external valve is activated via relay K1 and the line is flushed.

- Long key press (approx. 2 seconds) key 2 (Flush) again to terminate the external flush process.

The LED above key 2 (Flush) and LED K1 illuminate as long as the external flush valve is activated.

**Interval pause**

If the analysis is started via a timer, the interval between two analyses (plus flush time) is determined by the interval pause. The shortest interval can be 0 minutes. In this case, analyses are carried out continuously. The longest interval is 60 minutes.

Set the desired measuring interval pause via function key S6 on the controller board (see the section entitled "[Rear of the controller board](#)" on page 16). The following switching positions and interval pauses are possible:

Position	Interval pause
0	0 min.
1	5 min.
2	10 min.
3*	15 min.
4	20 min.
5	25 min.
6	30 min.
7	40 min.
8	50 min.
9	60 min.

\* Delivery status

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**Switch position****NOTE**

- The current switch position is read after evaluating a measuring result and after a reset.
- 

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**Resetting the interval pause time****NOTE**

- However, if the standby function has been activated and subsequently deactivated during an analysis pause, the interval pause time is reset.
-

## 72 h operation (operation without permanent supervision)

If the instrument should run for a longer period of time without supervision (e.g. at the weekend), use this function to check whether sufficient indicator is available for a continuous measurement.

On the basis of the still available indicator, the set indicator pause and indicator quantity consumed per measurement, the instrument calculates whether the residual indicator quantity is sufficient for the next 72 operating hours.



- Press key 3 (standby) for approx. 2 seconds to check whether 72 h operation is possible.

72 h operation possible	72 h operation not possible
The LED above key 3 (standby) illuminates for 4 seconds.	The LED above key 3 (standby) flashes quickly for 4 seconds.

## Error messages/Troubleshooting

### Alarm/Error message/Relay K3

Testomat® 808 uses LEDs which either illuminate continuously or flash to display alarm/error messages.

#### NOTE

#### Error messages

- All status/error messages are lost after a power failure!
- Current error messages can be confirmed by pressing key 4 (horn) briefly or via input DELETE EXT. (page 22).
- We recommend you to carry out a manual analysis after an error message to determine whether the error has been eliminated or not. Further steps as described below.
- If several consecutive faulty measurements have occurred, the LED "POWER" lights and the LED above key 4 (horn) is blinking. In this case press the reset key S1 or switch off/on the instrument to acknowledge the alarm.

Activate the red alarm LED above key 4 (horn) as follows:

LED	Cause
Flashes	<ul style="list-style-type: none"> <li>• Calculation shows that the indicator filling level is zero</li> <li>• No or insufficient indicator in the measuring chamber after dosing</li> <li>• Optical fault</li> <li>• The instrument is operated outside of the specification (e.g. low temperature or with expired indicator)</li> </ul>
Illuminates	<ul style="list-style-type: none"> <li>• Indicator filling level is between &gt;0 and 10%</li> <li>• All other errors</li> </ul>

Error messages are output via the current interface. The following status/error messages are possible:

Pause	5 mA
Good measurement	8 mA
Poor measurement	11 mA
Low indicator level < 10% (acknowledgeable by pressing key 4)	14 mA
Low water level	17 mA
Indicator is empty (not acknowledgeable) or optical fault or no or insufficient indicator in the measuring chamber or the instrument is operated outside of the specification (e.g. low temperature or with expired indicator)	20 mA



The individual errors can be displayed via the LEDs E1 to E4.

- To do so, simultaneously press key 3 (standby) and key 4 (horn) for approx. 2 seconds.

The following errors are displayed for 4 seconds:

E4	●	90%
E3	●	70%
E2	●	50%
E1	●	30%
	●	10%

LED	Cause	Remedy
<b>E4</b>	Insufficient LED power, insufficient light (or hardware error)	<ul style="list-style-type: none"> <li>➤ Check whether the water is turbid. Strong turbidity can negatively influence the measurement.</li> <li>➤ Check whether the measuring chamber is soiled.</li> <li>➤ The sensor or LED might be damaged.</li> <li>➤ Check whether the water level is too low.</li> </ul>
<b>E3</b>	Excessive LED power, excessive light (or hardware error)	<ul style="list-style-type: none"> <li>➤ Close the housing cover. The environment is too bright (sunlight), thus negatively influencing the measurement.</li> <li>➤ The sensor or LED might be damaged.</li> </ul>
<b>E2</b>	Low indicator level	<ul style="list-style-type: none"> <li>➤ Check whether the indicator bottle is empty.</li> <li>➤ Does the indicator display match the indicator quantity in the bottle?</li> </ul>
<b>E1</b>	Low water level	<ul style="list-style-type: none"> <li>➤ Make sure the water lines are not leaky.</li> <li>➤ Are the water lines connected properly?</li> <li>➤ Are all stop valves in the inlet open?</li> <li>➤ Ensure there are no foreign particles which caused blocking.</li> </ul>

## Low water level

The LED above key 4 (horn) illuminates if the water level is low. The low water level is also registered via relay K3. Contacts M and Ö are connected for this purpose.

- Press key 4 (horn) or close the contacts of the “Delete externally” input to confirm the alarm.

After confirmation, the LED extinguishes via key 4 and relay K3 is reactivated (contacts M and S are connected).

### NOTE

The alarm is also deleted without it being acknowledged once the low water level has been eliminated after the following analysis.

## Low indicator level

- The red alarm LED above key 4 (horn) illuminates if the calculated indicator quantity is between >0 and 10%. This message is only output once and can be acknowledged by short pressing key 4 (horn) at the instrument or a contact via “Delete externally”.
- Both the red alarm LED and the standby LED (via key 3) flash when the calculated indicator quantity is zero. The external inputs “Stop” and “Delete externally” are ignored. You now have to replace the indicator bottle (see the section entitled [“Replacing the indicator bottle”](#) on page 36).
- The LED above key 4 (horn) flashes and the instrument goes into standby mode if the calculated indicator level is low. Damaged or bent lines can cause this error. The indicator bottle may also be empty if the indicator level has been set incorrectly.

## Further possible instrument errors

Error	Possible causes	Remedies
Instrument not functioning, even though it is switched on	<ul style="list-style-type: none"> <li>– Fuses F1, F2 or F3 defective</li> <li>– Power switch defective</li> <li>– Ribbon cable to controller board or</li> <li>– base circuit board is loose</li> <li>– Error at controller board or base circuit board</li> </ul>	<ul style="list-style-type: none"> <li>➤ Replace fuses</li> <li>➤ Replace power switch</li> <li>➤ Reconnect ribbon cable</li> <li>➤ Replace controller or base circuit board</li> </ul>

## Response of a protective circuit

After a protective circuit (fuse) has been tripped, attempt to eliminate the cause of malfunctioning (e.g. replace a defective valve) before reactivating the protective circuit. Frequent tripping is always due to an error which, in certain circumstances, may also cause damage to the instrument.

### Malfunctioning/Repairing a defective instrument

The repair of a defective instrument – irrespective of the warranty period - is only possible when the instrument is dismantled and re-turned to us with a description of the error. Please also inform us about the currently used indicator.

- Before you return the instrument for repair work, remove the bottle and ensure that the measuring chamber has been flushed out and is empty.
- Insert a transportation plug into the outlet pipe to prevent leakage.
- Use to the enclosed error log to describe the error and return it to us together with the instrument. If the error log is no longer available, download it at [www.heyl.de](http://www.heyl.de).

## Maintenance

### NOTE



Scan the code to download the latest service manuals!

### Required maintenance measures

- Regular maintenance is necessary to ensure trouble-free operation of the instrument (every six to twelve months)!

At least carry out the maintenance work described in the following section on a regular basis when

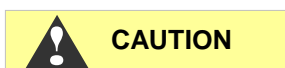
- the instrument displays the following error messages:  
“Insufficient/Excessive light”, “Low water level” or “Low indicator level”
- the last maintenance was carried out no more than six months ago.

### Cleaning measures

- Never use organic solvents to clean the measuring chamber or other plastic parts! Use, e.g., cleaning spirit.
- Always observe the safety regulations when handling cleaning agents!
- As a result of continuous operation, a coloured film may form on the sight-glass windows. Use cleaning spirit to remove this sticky film.

Replace the following components at the respective interval:

Component	Replacement interval
Pump head	<ul style="list-style-type: none"> <li>• if LED E4 flashes with “pump head maintenance”</li> <li>• Check the system every 2 years with the pump head maintenance set and change the head in case of failure of calibration</li> </ul>



**CAUTION**

## Service instructions

The surface of the instrument has not been treated. Therefore, avoid any soiling caused by indicators, oil or grease. However, if the housing becomes soiled, please clean the surface with a commercial plastics cleaner (never use other solvents).

## Description of maintenance work

Carry out the maintenance work described below on a regular basis.

	3 months	Semi-annually	Annually
Measuring chamber for cleanliness and tightness (see page 37)	check	check	check

### Bleeding the lines

#### NOTE

- Bleed the lines after each mechanical step to ensure trouble-free operation of the instrument. To achieve this, proceed as described in the section entitled [“Replacing the indicator bottle”](#) on page 36!

## Replacing the indicator bottle

If Testomat® 808 displays the error message “Low indicator level”, replace the indicator bottle (refer to the section entitled [“Error messages/Troubleshooting”](#) on page 31) for information about error messages). Proceed as follows:

- Put the instrument into standby mode. If a measuring process is currently running, wait until it has been completed.
- Proceed as follows to remove the empty indicator bottle: disconnect the intake hose from the hose connector at the top of the indicator bottle and remove the empty bottle.
- Insert the new indicator bottle as described in the section entitled [“Inserting the indicator bottle”](#) on page 25.
- Bleed the lines after inserting a new indicator bottle. To achieve this, press key 1 (manual) for approx. 2 seconds. The dosing pump starts to run.
- Let the pump run until no more bubbles escape from the dosing needle. Then press key 1 (manual) again for approx. 2 seconds to switch off the pump.

**NOTE****Correct bottle size**

- Make sure that the correct indicator bottle size is set via slide switch T2 (see the section entitled “[Slide switch T2](#)” on page 17)!

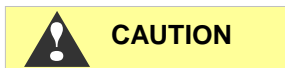
- After bleeding the lines, press key 4 (horn) for approx. 2 seconds to reset the internal analysis counter to 100%.

**Resetting the analysis counter**

Testomat® 808 automatically calculates the number of analyses depending on the set bottle size.

The instrument cannot measure the actual filling level of the indicator bottle!

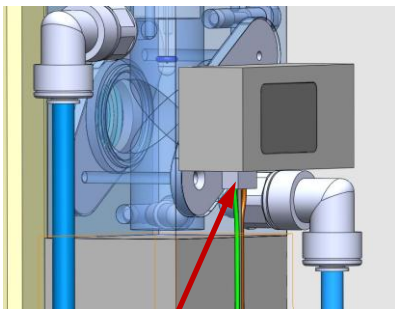
- Only reset the analysis counter to 100% after inserting a new indicator bottle!

**Cleaning the measuring chamber and the sight-glass windows**

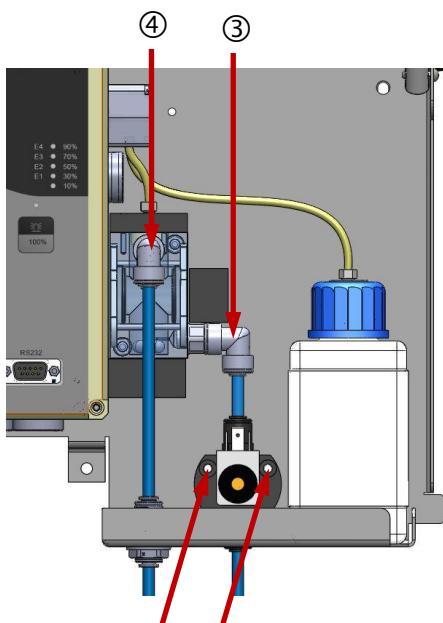
- Switch off the instrument.
- Close the stop valve in the branch line to Testomat® 808.
- Prior to disassembling the measuring chamber, disconnect the cable ① from the LED holder and loosen the pump hose at the hose connector of the measuring chamber.
- You can also remove the indicator bottle to facilitate access.
- Loosen the two screws ② fixing the solenoid valve to the rear panel. Press down the top locking ring of the solenoid valve to allow the valve to be pushed down onto the support.
- Turn the angled hose connector ③ upwards. Press the locking ring of the top angled hose connector ④ upwards and remove the outlet hose.
- Turn this angled hose connector ④ upwards to ensure that any residual water cannot escape from the measuring chamber. Now simply pull the measuring chamber off the retaining bolts towards the front.
- To drain the measuring chamber, turn the bottom angled hose connector ③ downwards and let the residual water drain off.

Disassemble the measuring chamber as follows for cleaning:

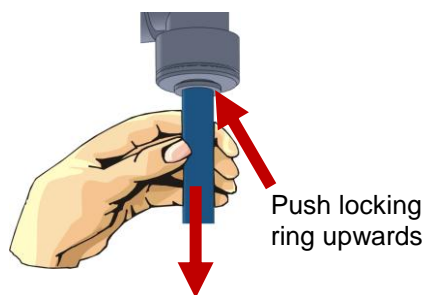
- Loosen the 4 screws (7) of the measuring chamber cover (4) and remove the cover and the flat seal (8).
- Remove the dosing needle (5) from the measuring chamber.
- Loosen 1 screw (6) on each side to remove the sight-glass window holders (2) at the sides of the measuring chamber.



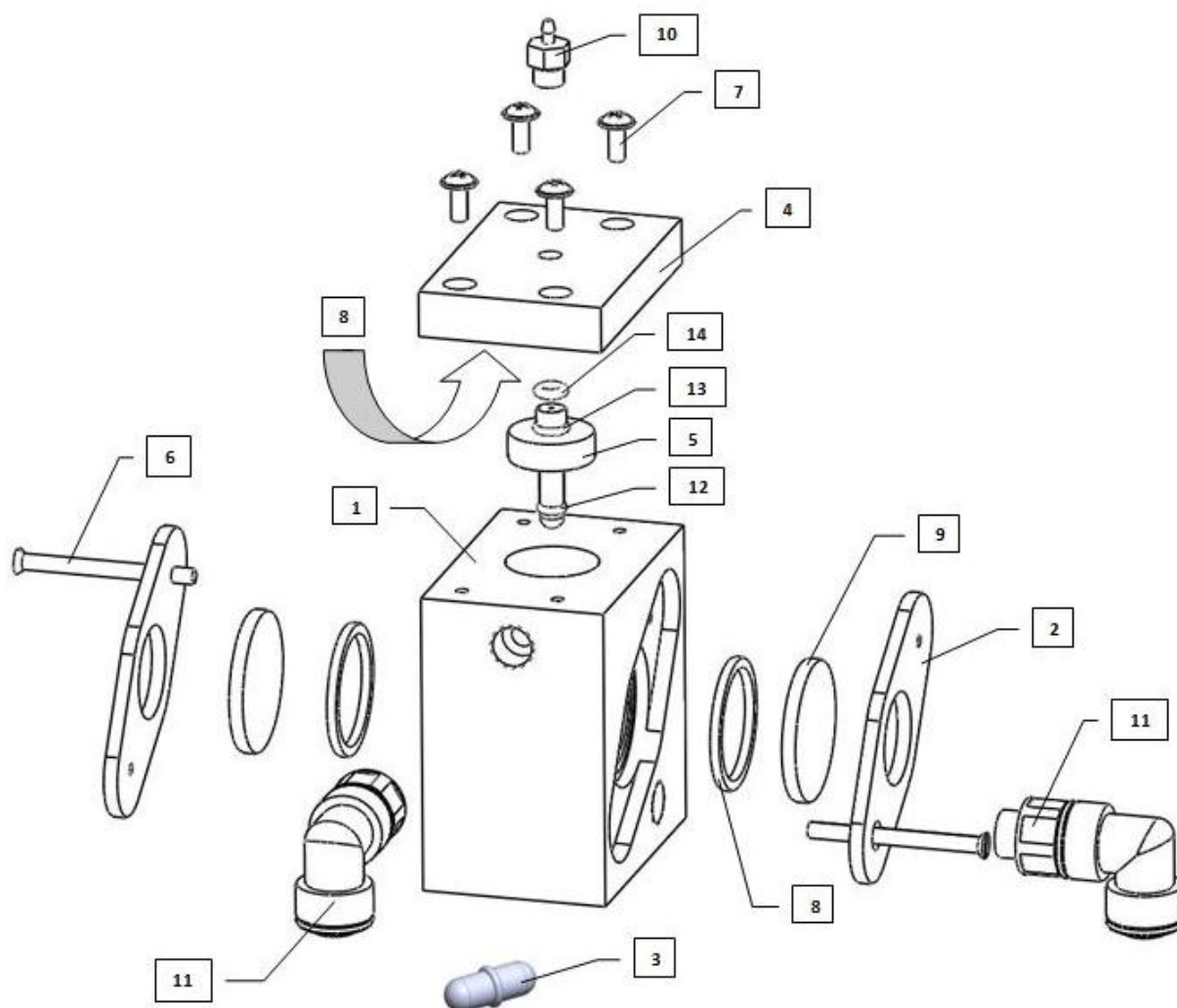
①



②



- Remove the sight-glass windows (9) and the respective flat seals (8).
- Use cleaning spirit to clean the film off the sight-glass windows. If the instrument has been used to measure hard water for a longer period of time, a hard-to-remove film may have formed on the sight-glass windows. In this case, clean the sight-glass windows and the measuring chamber as described below.
- Clean the measuring chamber with a cleaning agent suitable for decalcification and rust removal (max. 5 – 10% solution). Flush the measuring chamber thoroughly after cleaning.
- Once the measuring chamber has been fully cleaned, it can be reinstalled. Reassemble in reverse order to disassembly.
- Once all assembly work has been completed, bleed the lines before restarting the instrument (see the section entitled “[Inserting the indicator bottle](#)” on page 25).



## Pump head maintenance message

The effective runtime of the pump head is counted during operation. After 150 hours of operation, the LED E4 flashes with the maintenance message for the pump head. This runtime for the pump will be reached during normal operation (analysis interval every 10 minutes) after approx. 2 years or 54000 analyses.

- Switch off the instrument to acknowledge the message.
- Press and hold key 4 (horn) when switching on the instrument.  
The operating time of the pump head is then reset to 0.

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### Replacing the pump head

#### NOTE

We recommend you to replace the pump head when the maintenance message for the pump head is displayed.

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1	Measuring chamber	(Article no. 35767)
2	Sight-glass window holder	(Article no. 40176)
3	Magnetic stirrer	(Article no. 40050)
4	Measuring chamber cover	(Article no. 37534)
5	Dosing needle	(Article no. 37536)
6	Screw M3x40	(Article no. 33253)
7	Screw M3x12	(Article no. 33246)
8	Flat seal 24x2	(Article no. 33777)
9	Sight-glass window 30x3	(Article no. 40170)
10	Hose adapter	(Article no. 37538)
11	Angled plug in connector	(Article no. 40157)
12	O-ring 3.8x1.78	(Article no. 33797)
13	O-ring 4.5x1.5	(Article no. 11264)
14	O-ring 1.78x1.78	(Article no. 11245)

## Testomat® 808 spare parts and accessories

Art. no.	Spare parts – measuring chamber
33777	Flat seal 24x2
40170	Sight-glass window 30x3
40176	Sight-glass window holder
33253	Screw M3x40, A2, DIN 965
33246	Screw M3x12
37615	Measuring chamber Testomat 808, complete (1 – 4 bar)
37616	Measuring chamber Testomat 808, complete (0.3 – 1 bar)
37534	Measuring chamber cover
37536	Dosing needle
40050	Magnetic stirrer, processed
40157	Angled plug-in connector G1/8"-6
33797	O-ring 2.8x1.78
11264	O-ring 4.5x1.5
11245	O-ring 1.78x1.78
Art. no.	Spare parts - instrument
32375	Optical board Testomat 808, complete
37322	Controller board Testomat 808, complete
37324	Base circuit board Testomat 808, complete
37568	LED holder Testomat 808, complete
37570	Solenoid valve Testomat 808
37578	Pump head Testomat 808
31592	Fuse, soldered T1.0A
31593	Fuse, soldered T0.8A
31584	Fuse, soldered T0.2A
31595	Fuse, soldered T0.1A
31666	Fuse GS-T, 5x20, T A4
40190	Cable gland 5-7, grey
40191	Cable gland 7-10, grey
40200	Cable loom compl. with power switch and cover
Art. no.	Bottle connection/Suction device
37579	Bottle insert for screw cap and push-fit suction tube, 500 ml bottle
37580	Bottle insert for screw cap and push-fit suction tube, 100 ml bottle
37538	Hose adapter Testomat 808



Art. no.	Special accessories
37583	Candle filter Testomat 808 complete
37584	Filter insert
37593	Plug D = 6
37576	Conversion set for water inlet and water outlet from Testomat BOB to Testomat 808
37602	Pressure regulator, complete for Testomat

## Accessories - indicators

Indica- tor type*	Colour change at a limit value of	Art. no. 100 ml bottle	Art. no. 500 ml bottle
300	0.02°dH = 0.4ppm CaCO <sub>3</sub> = 0.04°f residual hardness	140001	141001
300 S	0.05°dH = 0.9ppm CaCO <sub>3</sub> = 0.09°f residual hardness	140002	141002
301	0.1°dH = 1.8ppm CaCO <sub>3</sub> = 0.18°f residual hardness	140003	141003
302	0.2°dH = 3.6ppm CaCO <sub>3</sub> = 0.36°f residual hardness	140004	141004
303	0.3°dH = 5.4ppm CaCO <sub>3</sub> = 0.54°f residual hardness	140005	141005
305	0.5°dH = 9ppm CaCO <sub>3</sub> = 0.9°f residual hardness	140006	141006
310	1°dH = 18ppm CaCO <sub>3</sub> = 1.8°f residual hardness	140007	141007
320	2°dH = 36ppm CaCO <sub>3</sub> = 3.6°f residual hardness	140008	141008
330	3°dH = 54ppm CaCO <sub>3</sub> = 5.4°f residual hardness	140009	141009

\* The indicator types 350 (5 °dH) and 3100 (10 °dH) will be available in the second half of 2012.


Please refer to our delivery programme for an up-to-date overview of available accessories at [www.heyhl.de](http://www.heyhl.de).

### Bottle connection

#### NOTE

Testomat® 808 is delivered with a bottle connection for a 500 ml bottle. Please order a bottle connection for a 100 ml bottle upon request.

## Technical data

Power supply:	(24 / 115)* 230V, 50 – 60 Hz
	Instrument protection 230 – 240 V: T0.1 A Instrument protection: 115 V: T0.2 A Instrument protection: 24 V: T0.8 A
Mains protection for consumers:	max. 4 A (n , l)
Power consumption:	max. 16 VA, without external load
Protection class:	I
Degree of protection:	IP 54
Conformity:	EN 61000-6-2, EN 61000-6-4, EN 61010-1 
Ambient temperature:	10 - 40°C
Measuring range:	See the section entitled "Performance specifications"
Current interface:	Output of defined values (5, 8, 11, 14, 17, 20 mA) for displaying status and error messages, max. load 500 Ohms
Contact load Relay	230V / 4A AC ohm resistive load
Dimensions:	W x H x D = 364 x 314 x 138 mm
Weight:	4,350 g

\* The power connections for 24 and 115 V will be available in the second half of 2012.

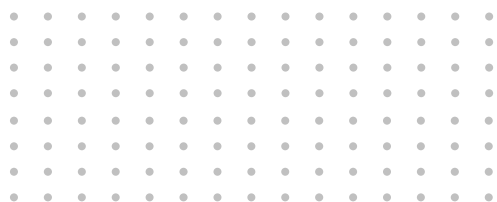
Mains water supply	
Operating pressure:	1 - 4 bar / $1 \times 10^5$ to $4 \times 10^5$ Pa depending on design (a pressure reducer (special accessories) should be used from 4 to 8 bar range)
Water inlet:	Opaque hose with 6 mm external diameter/4 mm internal diameter
Water outlet:	Opaque hose with 6 mm external diameter/4 mm internal diameter
Water temperature:	10 to 40°C

**We reserve the right to make technical changes without notice in the interest of constantly improving our products!**

## Product overview Testomat 2000®-Instruments



Model/Type	Measuring Parameter	Measuring Range	Applications/Functions
<b>Testomat 2000®</b>	<ul style="list-style-type: none"> <li>• Water hardness</li> <li>• Carbonate hardness</li> <li>• p-value</li> <li>• minus-m-valuet</li> </ul>	0.05-25 °dH 0,5-20 °dH 1-15 mmol/l 0.05-0.5 mmol/l	<ul style="list-style-type: none"> <li>• Universal for water treatment plants</li> <li>• allowed for boiler houses</li> </ul>
<b>Testomat 2000® Antox</b>	as Testomat 2000®	as Testomat 2000®	<ul style="list-style-type: none"> <li>• dosing a reducing agent</li> </ul>
<b>Testomat 2000® CAL</b>	as Testomat 2000®	as Testomat 2000®	<ul style="list-style-type: none"> <li>• Automatic calibration function</li> </ul>
<b>Testomat 2000® CLF</b>	<ul style="list-style-type: none"> <li>• Free Chlorine</li> </ul>	0-2.5 mg/l	<ul style="list-style-type: none"> <li>• DPD-method for swimming pool and drinking water control</li> </ul>
<b>Testomat 2000® CLT</b>	<ul style="list-style-type: none"> <li>• Total Chlorine</li> </ul>	0-2.5 mg/l	<ul style="list-style-type: none"> <li>• DPD-method for swimming pool and drinking water control</li> </ul>
<b>Testomat 2000® CrVI</b>	<ul style="list-style-type: none"> <li>• Chromate</li> <li>• Chrome-VI</li> </ul>	0-2.0 mg/l 0-1.0 mg/l	<ul style="list-style-type: none"> <li>• process control of waste water in galvanic industry</li> </ul>
<b>Testomat 2000® Duo</b>	as Testomat 2000®	as Testomat 2000®	<ul style="list-style-type: none"> <li>• Controlling of two measuring points</li> </ul>
<b>Testomat 2000® Fe</b>	<ul style="list-style-type: none"> <li>• Iron-II and Iron-III</li> </ul>	0-1.0 mg/l	<ul style="list-style-type: none"> <li>• De-Ironing plants</li> </ul>
<b>Testomat 2000® SO<sub>3</sub></b>	<ul style="list-style-type: none"> <li>• Sulphite</li> </ul>	0-20 mg/l	<ul style="list-style-type: none"> <li>• Controll oft he Oxygen-binding by Sulphite in boiler feed water</li> </ul>
<b>Testomat 2000® self clean</b>	as Testomat 2000®	as Testomat 2000®	<ul style="list-style-type: none"> <li>• Automatic cleaning oft he measuring chamber</li> </ul>
<b>Testomat 2000 THCL®</b>	<ul style="list-style-type: none"> <li>• Total Chlorine</li> <li>• Water hardness</li> </ul>	0-2.5 mg/l 0.25-2.5 °dH	<ul style="list-style-type: none"> <li>• DPD-method for swimming pool and drinking water control</li> <li>• combination system for hardness and chlorine</li> </ul>
<b>Testomat 2000® V</b>	<ul style="list-style-type: none"> <li>• Water hardness</li> <li>• Carbonate hardness</li> </ul>	1.0-25.0 °dH 1.0-20.0 °dH	<ul style="list-style-type: none"> <li>• blending water</li> </ul>



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