Operating Instructions

Testomat® PRO CLF

Process Photometer for free chlorine 0 – 2.5 ppm (CL F)

EN

Optionally with SelfClean function



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Original manual

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1 General information

1.1 Use and storage of the instruction manual

The operating instructions form part of the equipment. Therefore, observe the following principles:

Read the operating instructions carefully and in full before working with the device.

Ensure that the operating instructions are accessible at any time for all users. When an SD is used in the device, it can also be stored on the same as a PDF file.

Keep the operating instructions for the equipment's entire service life.

If transferring the device to third parties, ensure these operating instructions are always included.

The device is a system component. Accordingly, you should also observe the Testomat® PRO CLF maintenance manual and the system documentation of the system manufacturer.

We reserve the right to make structural changes with continual improvement in mind!

Our operating instructions are updated at regular intervals. If you are in possession of an older version (see version number of the operating instructions), you can find the current operating instructions on our homepage http://www.heylanalysis.de under Download.

1.2 Symbols

1.2.1 Warnings and safety instructions in this manual

These instructions include warnings against specified actions that involve the risk of injury or property damage. Warnings are structured as follows:



Description of the type or source of danger
Description of the consequences of non-compliance

- Hazard prevention indications

The signal words illustrate the severity of potential injuries if the respective hazard is ignored. The following signal words are used in these instructions:



Danger denotes an imminent danger. If not avoided, death or critical injuries are the result.



Warning denotes a possibly imminent danger. If not avoided, death or critical injuries could be the result.



Caution denotes a possibly imminent danger. If not avoided, slight or minimal injuries could be the result.

NOTE

Note indicates a potentially harmful situation. If not avoided, the equipment itself or something in the vicinity may become damaged.

1.2.2 Pictograms

The following pictograms are used in these operating instructions:



Danger signs for ESD-hazardous components: Electrostatic discharges (ESD) are voltage punctures caused by large potential differences. If this symbol appears in the instructions, ESD protection must be observed.

1.2.3 Typographical highlights

The following typographical highlights are used in these operating instructions:

- Bold text: Name of the keys
  - Manual
  - Alarm
  - Pause
  - OK
  - Arrows **r/l/u/d**
  - M
  - I
  - Manual
- Font Courier New: `Software Text`
- Blue and underlined: Cross reference

1.3 Limitation of liability

1.3.1 Failure to comply with the instructions

The manufacturer accepts no liability for damage resulting from a failure to observe these operating instructions, or from improper use.

1.3.2 Intended use

The process photometer Testomat® PRO CLF is a robust wet-chemical online monitor for monitoring the concentration of free chlorine (CL F) in the measuring range 0 – 2.5 mg/l (ppm) using the photometric analysis principle. The feed water must be clear, colourless and free of undissolved particles.

Applications include, e.g., the monitoring of disinfectant dosing in the drinking water field or in swimming pools.

1. Comply with the output limits specified in the chapter 3 Technical Data on page 6.
2. Observe the areas/limits of application of the reagents and the requirements imposed by the medium to be measured.

The scope of intended use presumes that you have read and under-stood the instructions and particularly the section on chapter 2 Your safety on page 4

Improper use is deemed to occur if you use the device

- outside the applicable scope, as specified in these instructions,
- under operating conditions that deviate from the scope specified in these instructions.

1.3.3 Qualification of personnel

The assembly and commissioning require basic electrical and pro-cess engineering expertise as well as knowledge of the applicable specialist terms. The assembly and commissioning must therefore be performed only by a specialist, or a properly trained person in-structed and supervised by a specialist.

A specialist is a person who can draw on professional training, knowledge and experience as well as knowledge of applicable provisions to assess work assigned to him/her, detect potential hazards and implement suitable safety measures. A specialist must comply with the applicable professional rules.

1.3.4 Use of non-approved spare parts

The equipment's trouble-free operation is only guaranteed when using original Heyl Testomat® PRO reagents and original Heyl spare parts. The use of other reagents or spare parts will invalidate the equipment's guarantee.

1.3.5 Unauthorised conversions

Do not make any changes (or otherwise manipulate the equipment in any way) that go beyond the handling described in these instructions; otherwise, the warranty will be voided. Follow the descriptions in the corresponding chapters of the operating and maintenance instructions when carrying out maintenance and servicing work. In the event of any malfunctions, immediately switch off the Testomat® PRO CLF device and inform the service personnel. Never attempt to repair the Testomat® PRO CLF device yourself. Doing so will invalidate the guarantee. Repairs must be performed by authorized service personnel only.

2 Your safety

The following safety instructions are intended to help you avoid hazards to yourself and bystanders when handling the equipment. They also serve to prevent material damage to the equipment. The measures to avert any and all dangers always apply, irrespective of specific actions.

Warnings to avoid hazards that occur during a specific activity can be found in the respective chapters.

For notes and information on handling the reagents being used, refer to the safety data sheets, which are available for download on our website www.heylanalysis.de..

2.1 Personal injury

DANGER

Danger to life due to electric shock!
The equipment is operated with electric current. The incorrect handling of the equipment, its connections and cables can lead to death or serious injury.

- Only connect the appliance to an earthed socket outlet that is protected by a residual current circuit breaker (RCD).
- Replace any damaged cables immediately.
- Do not use extension cables.
- Fix all cables to prevent damage being caused by other equipment.
- Before mounting the equipment or connecting it to a power supply, disconnect the relevant part of the system from the power supply.
- Only connect the device to the mains voltage as specified on the type plate.
- Route the connections for mains voltage and relay outputs separately.
- Only operate the equipment when the partition walls and terminal compartment cover are installed.

WARNING

Risk of (chemical) burns from reagents!
Contact with the reagents used may cause (chemical) burns.

- Ensure to observe the safety data sheets!
- The safety data sheets are available for download on the homepage www.heylanalysis.de/en.

WARNING

Eye damage due to LED radiation!
If the measuring chamber is removed while the device is running, the eyes may be dazzled by intense LED radiation.

- Always switch off the power supply before working on the device.

CAUTION

Increased risk of accident due to lack of appropriate employee qualification!
The equipment may only be installed and serviced by adequately qualified employees. Insufficient qualification increases the risk of accidents happening.

- Ensure that all activities are conducted by qualified employees only (see chapter 1.3.3 Qualification of personnel on page 3).
- Prevent unauthorised employees from gaining access to the equipment.

2.2 Property damage

NOTE

Avoiding interference voltages!
The Testomat® PRO CLF device requires stable and uninterrupted supply voltage.

- Where applicable, use a mains filter to shield the device from interference voltages.
- Never lay the connecting cables in parallel to mains cables.

NOTE

Handling may cause damage or destruction of electrical components!
If you have to open the equipment's top door, electrical components may be damaged or destroyed by electrostatic discharge.



- Take the necessary safety measures to avoid electrostatic discharge onto the components (ESD safety)
- Make sure you are earthed before opening the casing.

NOTE

Measurement errors when using unapproved reagents!
The use of unapproved reagents can lead to large measurement deviations or measurement errors. Damage due to foreign particles affecting the dosing pumps, measuring chamber or valves is also possible. This can potentially invalidate the warranty!

- Only use original Heyl reagents that are specially adapted to the requirements for the measuring equipment, and thus guarantee perfect measuring results.

NOTE

Tarnishing on VA appliance parts!
Prolonged use may result in tarnishing on VA appliance parts.

- The tarnish colours do not impair the function of the measuring device.

3 Technical Data

	specifications
Power supply:	100 – 240 VAC ± 10%, 50/60 Hz Complete protection T4A including user power supply
Power consumption: max. without external load	 230 V (100-240 V) / 4 A 230 V (100-240 V) / 1 A
Protection class:	I
Protection type:	IP 44
Conformity:	EN 61326-1, EN 61010-1 BS EN IEC 61326-1, BS EN 61010-1+A1
Ambient temperature:	10 – 40 °C
Measuring range:	Free chlorine (CL F) from 0 to 2.5 ppm see chapter 3.1 Available reagents on page 7
User power supply:	Switched power supply with 4A fuse-protected
Durability relay:	DC: 8A at 30V or 0.28A at 250V AC: 8A at 415V
Current interface:	2 x 20 mA Maximum load 500 ohm corresponding to 10V voltage, voltage isolated
SD card interface:	For SD and SDHC cards up to max. 32GByte, FAT/FAT32 formatting
Dimensions:	W x H x D = 480 x 480 x 280 mm
Weight:	Around 12,0 kg
Other:	The device is protected against reverse polarity.

Water connection	
Working pressure*:	1 to 8 bar / 1x10^5 to 8x10^5 Pa or 0.3* to 1 bar / 0.3x105 to 1x105 Pa (after removing the valve body)
Water intake:	Opaque pressure hose with external diameter 6/4x1 mm
Water drain:	Hose with internal diameter 12 mm
Water temperature:	10 – 40 °C

* When using the Testomat® PRO CLF at a pre-pressure of 0.3 bar, it must be ensured that the flow rate through the measuring chamber is at least 400 ml/min.

One option is available for this device:

- Automatic cleaning function (Self Clean retrofit kit, item no. 40248)

3.1 Available reagents

The following reagent kit is available for the determination of the free chlorine (CL F) from 0 to 2.5 ppm:

Reagent type	Quantity
Testomat Chlor reagent set F (contains reagent A and B)	500 ml
Self Clean cleaning solution	500 ml

Table 1

Please note that actually our cleaning solution is only suitable for removing lime deposits. The cleaning solution is only required if the *self-clean* option has been installed in the appliance.

3.2 Other operational requirements

The following conditions must be ensured for a smooth operation:

- Only use Testomat® reagents.
- The pH range must be between 4 and 10.5.
- The water to be measured must be clean and free of bubbles!
- Only operate the device within the scope of parameters specified under chapter 3 Technical Data on page 6.
- Please note that oxidising agents other than chlorine, e.g. ozone, chlorine dioxide or hydrogen peroxide, are also recorded and increase the measuring result. (For details, see EN ISO 7393 Section 9).
- If the measuring water contains more than 20 mg/l CO_2 (carbonic acid), incorrect evaluations cannot be excluded.
- The concentrations of disruptive ingredients can be determined with colorimetric TESTOVAL® test kits from Gebr. Heyl. may lead to erroneous evaluations.

- Careful handling of the device enhances the operational safety and the service life! With this in mind, perform a visual inspection of the device at regular intervals as follows:
  - Has the expiry date of the reagents elapsed?
  - Are the hose connections of the dosing pump leakproof?
  - Is there any air in the dosing hoses?
  - Are all water connections leakproof?
  - Is the door of the device carefully closed?
  - Is the device excessively soiled?
  - Are the measuring chamber and drain channel/drain hose clean?
- Problem-free operation is contingent on regular maintenance! Maintenance and care instructions can be found in the chapter 9 Servicing and maintenance on page 69.
- Indications of problems can be found in the chapter 8.4 Troubleshooting and repair on page 61.

4 Setup and function

4.1 Internal structure of Testomat® PRO CLF

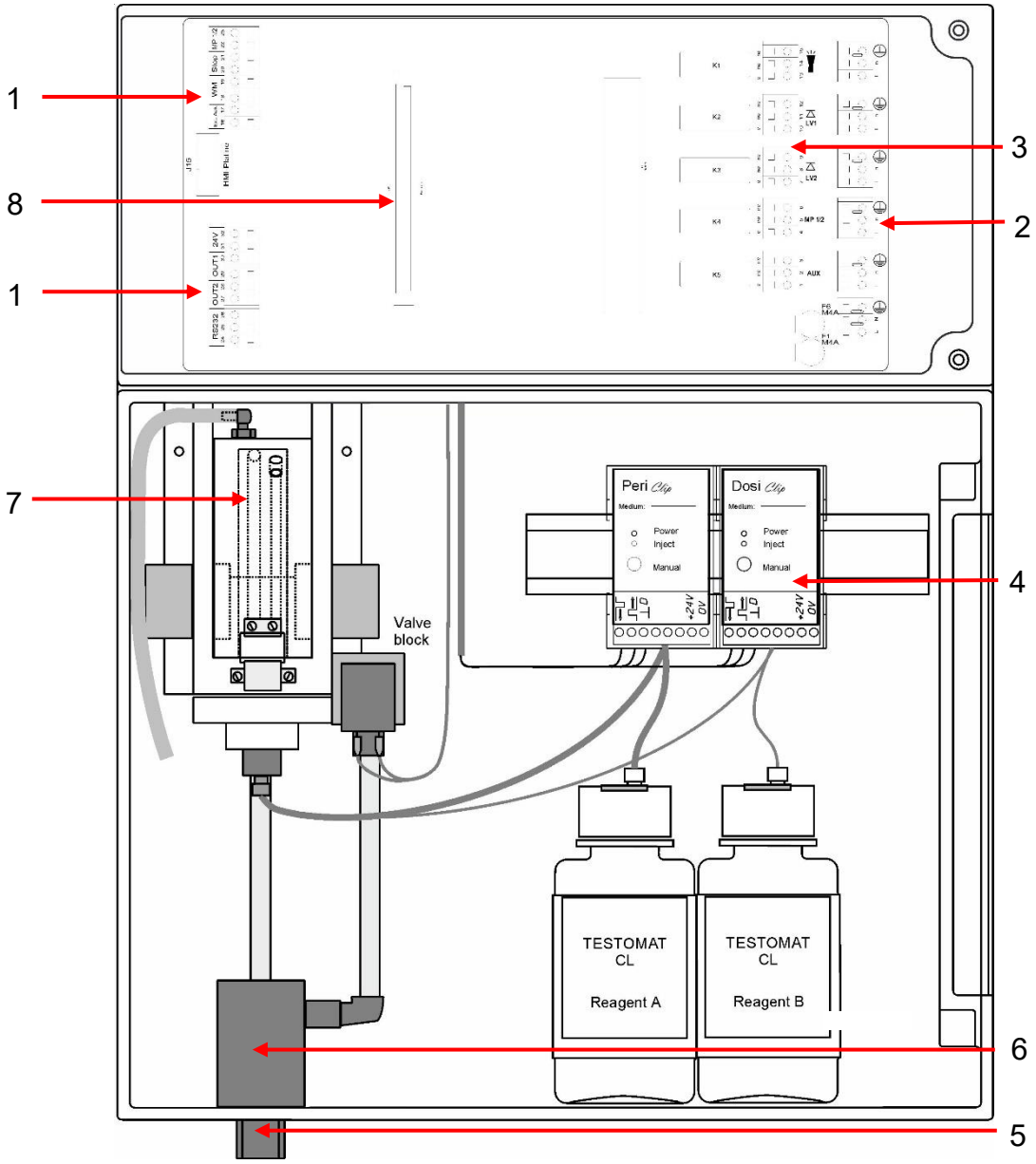


Figure 1

No.	Description
1	Terminal strip for inputs/outputs
2	Terminal strip for mains inlets and outlets
3	Terminal strip relay outputs
4	Dosing pumps
5	Water connections, intake and outlet (funnel)
6	Controller/filter housing
7	Measuring chamber
8	Slot for current interface card

Table 2

4.2 Product description

The process photometer Testomat® PRO CLF is a robust wet-chemical online monitor for monitoring the concentration of free chlorine (CL F) in the measuring range 0 – 2.5 ppm using the photometric analysis principle. Instrument operation is based on the DPD method according to EN ISO 7393-2. The analysis is implemented by adding two reagents, after a reaction time of approx. 1 minute (measuring time without flush time) the analysis result is shown.

- The measuring range is displayed in the range from 0.00 - 0.99 mg/l with two decimal places and in the range from 1.0 - 2.5 mg/l with one decimal place.
- Simplified menu-driven operation and programming via OLED
- Free selection of hardness units in ppm and mgl/l
- Analysis trigger:
  - Automatic interval operation
    (Interval pause can be configured from 0-99 minutes)
  - Depending on quantity, via contact water meter (see page 46)
  - External analysis stop and analysis start through combined start/stop input
- Two independent limit values with adjustable switch functions and switch option after adjustable number of bad analyses (Two neutral change-over contacts)
- Logging on SD card for measurement data and notifications/alarms with interim buffer for 100 measurement values and 50 notifications.
- Import and Export of settings (basic program data) with selectable filenames.
- Error history for 20 notifications
- Firmware update via SD card
- Built-in self-test with ongoing monitoring
- Features for integration into process controllers:
  - Fault signal output (neutral changeover contact) with clear input (External error acknowledgement)
  - 2 current interfaces 0/4 - 20 mA for the analogue transmission of measurement data of both measured values
  - Serial RS232 interface to transfer measurement data and notifications/alarms
  - Ethernet – network connection with web server for graphic display of measured values and messages/alarms. Auto-MDI-X, this means that no crossover cable is required, even during direct connection to a PC network card
  - Notification by e-mail of new measured values, alarms/messages and limit value violations
  - File download by browser or FTP.

  - Password protection for all settings, FTP and web access possible
- A FlowClip pump can be installed as an option. The SelfClean function is then available for cleaning (Self Clean retrofit kit, item no. 40248).

4.3 Functions of the control and display elements

The operating modes and measurement values are shown on the display of the Testomat® PRO CLF. The input keys for the programming (cursor block) and function keys are underneath the display.

4.3.1 Switching the Testomat® PRO CLF on/off

NOTE

Possible malfunction!
If the waiting time after switching off is too short, the equipment will not shut down completely, which may cause a malfunction.

- Wait at least five seconds after switching off before switching back on.

The Testomat® PRO CLF can be switched on or off via an external mains switch. Internal device fuses protect the equipment or the outputs from overload and short circuit. You will find a detailed description of the fuses in chapter 9.5 Replacing fuses on page 72. The article numbers for reordering fuses can be found in chapter 10.1 Spare parts on page 75.

4.3.2 Display functions

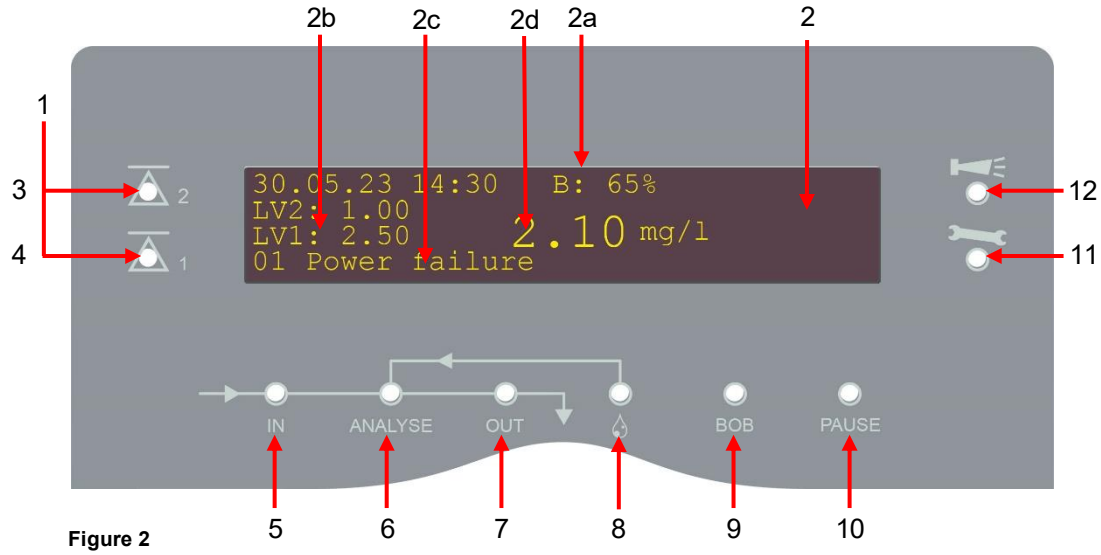


Figure 2

No.	Name	Colour of LED	Description
1	Limit value status indications	red/green	When the limit values 1 are exceeded, indicator LV1 lights up in red. Falling under the limit value results in the indicator LV1 lighting up in green. The same function applies to limit value 2 and indicator LV2.
2	Display		The current analytical result is shown in the display as well as all important states and programming data. The top line shows the date/time and the level of the reagent with the lowest level (2a). The lowest reagent level of one reagent is always displayed. The symbol (2a) flashes when the reagent is low. The level can only be calculated approximately! The configured limit values LV1 and LV2 (2b) appear in lines 2 and 3. If the value falls below the measuring range = "<" e. g.: < 1.0 ppm, If the value exceeds the measuring range = ">" e. g.: > 2.5 ppm. To the right of the limit values is the current measured value (2d). An error message (2c) is displayed in the last line.
3	LV2	red/green	The LED lit up in green indicates that the limit value has been exceeded. The LED lit up in red indicates that the limit value has been exceeded
4	LV1	red/green	The LED lit up in green indicates that the limit value has been exceeded. The LED lit up in red indicates that the limit value has been exceeded
5	In	green	The green LED indicates an opened inlet valve.
6	Analysis message	green	The green LED indicates ongoing analysis.
7	Out	green	The green LED indicates an opened outlet valve.
8	Dosing	yellow	The yellow LED shows that one of the 4 dosing pumps is active.
9	BOB operation	green	Not used
10	Pause	green	The flashing LED indicates the activated pause.
11	Service	yellow	The yellow LED indicates that the maintenance period (pump) has elapsed.
12	Alarm	red	Indicates a functional error/error message or warning message.

Table 3

4.3.3 Control and function keys

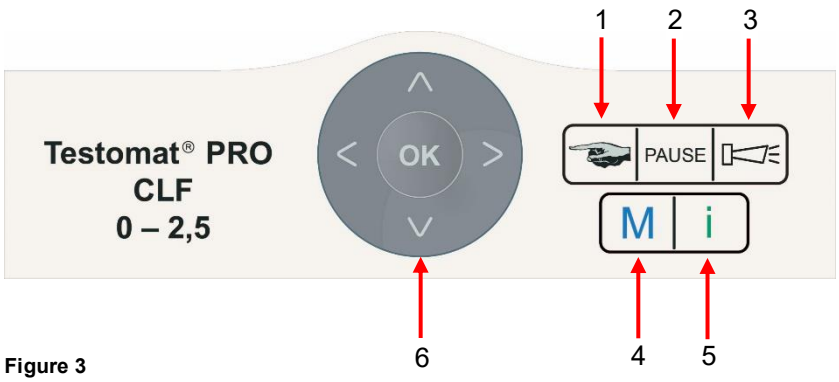


Figure 3

No.	Name	Description
1	**Manual**	The **Manual** button is used to start manual analysis
2	**Pause**	The **Pause** button puts the device into standby mode. There will be no automatic analysis performed: analysis stop. However, an ongoing analysis will not be suspended. The device only reverts to pause mode once the analysis is complete.
3	**Alarm**	Acknowledge error and warning messages with the **Alarm** button.
4	**M**	The **M** button is used to access the programming menu for user- and device-specific settings Pressing this button in the menu brings you to the higher-level menu item or you can leave the programming menu. The programming menu cannot be called up during an active measurement.
5	**i**	The **i** button is used to access all device information and settings
6	arrows **u/d** arrows **r/l** **OK**	The programming keys (cursor block) are used to navigate in the menu, select the desired functions and input the required device- and system-specific data. There are different arrows **up/down** and arrows **right/left**. The **OK** button is used to select the submenu option and allows the selection or data input to be confirmed and adopted.

Table 4

Display of the selected settings

If only one entry from a choice of multiple entries can be selected from within a menu, a * symbol is shown. For all other entries, nothing is shown. If multiple entries from within a menu can be selected, a √ is shown, or –, for each of the active settings.

If inputting numbers is possible, the cursor keys arrow **r/l** are used to change the position and the buttons arrows **u/d** to change the value. In all cases, an input must be confirmed with **OK** to be applied.

4.3.4 Meaning of the symbols in the menu

In the menu, symbols are shown on the first line at the right-hand edge. These represent the function keys, which can be used to facilitate navigation at this point in the menu.

Symbol	Meaning
M / I	**M** button, **I** button: Indicates the current menu (basic program/service or information)
▲ ▼	Down or up arrows indicate that an additional selection option is available over or under the current menu option shown.
◀▶	Right or left arrows mean that settings can be viewed with the cursor keys, for example individual errors in the error list.
+	A plus means that the selected menu option includes an additional submenu.

Table 5

4.4 Control elements on the control board

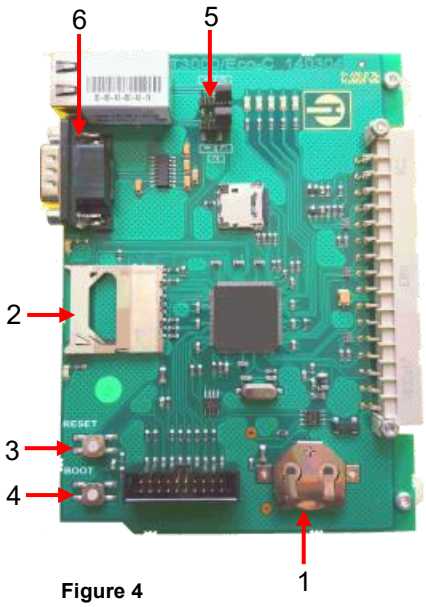


Figure 4

No.	Name	Description
1	Battery holder	The battery holder houses a CR2032 lithium battery to retain the time setting even if the device is switched off.
2	Plug-in slot for SD card	SD or SDHC cards with a maximum capacity of 32GByte are suitable. The card must be FAT or FAT32 formatted.
3	RESET button	To reset the controller, proceed as for switching on and off
4	BOOT button	Only used when a menu-driven firmware update is not possible
5	Jumper field	Both jumpers must be plugged into the marked Position 1. All other positions will render the serial interface unusable.
6	Serial interface	9-pole D-Sub connector for RS232 interface for transmission of measurement data and messages
7	Network connection	100Mbit MDIX Ethernet port for display in the web browser and transfer of measured values and alarms. Green and yellow LED for status display.

Table 6

4.5 Relay outputs

NOTE

Danger of destruction due to excessive load!
The relay outputs are designed for a defined maximum load (see chapter 3 Technical Data on page 6).

- Note the load capacity of the relay outputs.
- Note the total load capacity.

All relay outputs are designed as neutral contacts. This means the full range of connection options is available to you. This facilitates the switching of mains power, external power and direct switching of inputs, e.g., a process control procedure is implemented.

Ensure that the maximum electrical load capacity of the switching outputs is not exceeded, particularly for inductive loads. The power supply for the user inclusive device is secured with a 4A fuse, which means the total of all loads must not reach 4A.

See chapter 5.1.10 Connect inputs and outputs on page 29 for the terminal connection.

Further explanations can be found in chapter 6.11 Set programmable switching output AUX on page 45.

4.6 Signal inputs and signal outputs

NOTE

Damage to the equipment due to external voltage!
Connecting the signal inputs with external voltage will damage the equipment.

- Only connect the signal inputs Stop, WM and ext. Delete with potential-free contacts!

The following signal inputs are available:

- Stop input
- External deletion
- Water meter input
- Measuring point switch-over

These can be activated individually (see chapter 6.16 Set up signal inputs and outputs on page 47).

4.6.1 Stop input

The stop input is intended for short-term suspension of operation, e.g. when performing renewal work on softening plants, reverse osmosis or other water treatment systems. Generally speaking, the system is not offline for more than six hours. The renewal phase of a softening plant, for example, lasts three hours at most.

STOP: Terminals 20, 21

Function	Contact type	Test period	Action
Stop External analysis stop (e.g. via flow controller or process controller)	Programmable: break contact or closing contact (isolated)	none	There are no analyses while the contact at the input is open or closed

Table 7

If stop input is active, an analysis is prevented from starting, due for example to an interval having elapsed. This may be required, if the system lacks water. However, any analysis already started will not be suspended. The analysis is completed, and the device reverts to pause mode.

Manual start has priority over stop input. That means that manual analysis can still be started even when stop input is active. While the stop signal is present, the measurement value is shown on the display and the LED pause flashes. If the stop signal is deleted, a new analysis starts immediately. Accordingly, a short impulse on the stop input can help trigger an analysis remotely.

4.6.2 External delete (external acknowledge)

Extern ack.: Terminals 16, 17

Function	Contact type	Test period	Action
External delete Deleting / acknowledging existing errors / alarms	Programmable: break contact or closing contact (isolated)	none	Operates the same as **Alarm** button

Table 8

Via these terminals, all error messages can be acknowledged remotely. The contact type break contact or closing contact can be set in the menu `=> Basic program => Extern ack.`

4.6.3 Water meter input

WM: Terminals 18, 19

Function	Contact type	Test period	Action
WM Water meter input	Closing contact/ break contact (isolated!)	none	Determining quantity to trigger analysis

Table 9

The pulse rate can be set in the menu under `=> Basic programme => Water meter.`

4.6.4 Measuring point switch-over

M1/2: Terminals 22, 23

The “Measuring point” input is only queried if, under the basic program menu `Measuring points` the function `2 measuring points via input` is activated (see chapter 6.14 Measuring points on page 46). Otherwise, the switching is controlled via the menu.

If the input is active, measuring point 1 is measured, if the input is inactive, measuring point 2 is measured.

4.7 Current interface 0/4 – 20 mA

NOTE

Damage to the equipment due to overloading of the interfaces!
Overloading the interfaces can cause damage to the equipment.

- Do not exceed a load of 500 ohms.
- In the event of faults and very long lines (around 20 m), the use of shielded cable is possible.

Function	Current loop	Action
OUT 1 - Current interface for measuring point 1 OUT 2 - Current interface for measuring point 2	Max. load 500 Ohms	programmable: • 0 - 20 mA or • 4 - 20 mA

Table 10

4.7.1 Calculation of output currents

Depending on the selected function, the current range available is either 0 – 20 mA or 4 – 20 mA. The resulting currents for the various measurement values are shown in the form of the following formulas.

The current for a given measured value is calculated as follows:

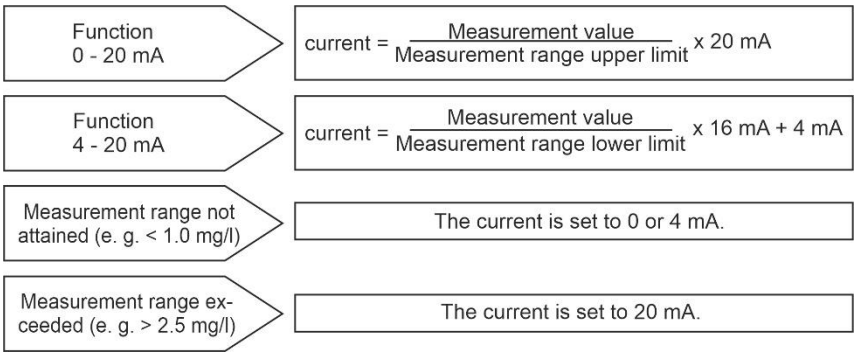


Figure 5

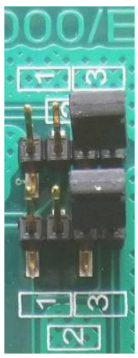
Measurement value = display value in the selected hardness unit

Maximum value = final value 2.5 mg/l

4.8 Serial interface

The serial interface transfers measurement data and alarms/notifications in plain text/ASCII in CSV format. It is always active. It can be switched to RS232 or optional network by means of a jumper (see chapter 7 Connect to network on page 51).

Setting for the jumpers:



No.	Function
1	RS232 to Sub D Connector. Data output of measured values/alarms via RS232
2	Recovery mode for troubleshooting
3	Data output to network

Table 11

The recovery setting is only needed if the Ethernet converter is not accessible via network. In recovery mode, the setting is made via the RS232 connection with the *DeviceInstaller* software from a PC.

The default setting is RS232. The Ethernet converter is inactive.

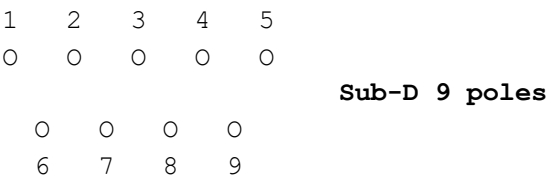
Via the serial interface, data is sent in the format 8 bit, 1 stop bit, no parity.

As soon as a new measured value has been determined, it is transmitted immediately.

The baud rate can be set to 2400, 9600, 19200, 38400 and 115200 baud. For Ethernet, 9600 must be set!

Alarms are transmitted via the serial interface. In the case of alarms that cannot be acknowledged because the device generates them automatically, the end of the alarm is also reported (alarm inactive). These are messages from the SD card or the optics. See chapter 8.4 Troubleshooting and repair on page 61.

Serial interface terminal assignment



Modus RS232

No.	Terminal designation	Function
2	RXD	no function
3	TXD	Output of measured values/alarms
5	GND	Ground

Table 12

Notification format

The notifications are sent in a very similar format as the data placed on the SD card. For connection to a PC a so-called null modem cable is required. The message format is as follows:

- The headings are not transmitted
- Field separator is a comma
- Decimal separator is a full stop
- Each data set is started with the ASCII characters “02” <STX> and terminated with “03” <ETX>.
- Notifications and measured values can be distinguished by evaluating the first characters: If “ME” is read, it is a measured value; with “AL”, it is an alarm/notification.
- This corresponds to the format of the Testomat 2000® data logger.

Examples of measured values:

```
Measuring channel 1:
<STX>ME,Cl,02.01.24,11:48,M1,- ,0.52,mg/l,limit
val.1,0.300,,0.950<ETX>
Measuring channel 2:
<STX>ME,Cl,02.01.24,12:04,- ,M2,3.44,mg/l,,0.300,,
0.950<ETX>
```

Example of notifications:

```
<STX>AL,01 Power failure,31.04.2023,14:24<ETX>
```

4.9 Description of the SD card functions

The SD card can be used to record measurement values and errors as well as for importing and exporting the device settings. Error and measurement value files are separately placed in subfolders arranged by year and month:

In the year folder, files including measurement values and errors are arranged by month.
The format of the file names is:
`ME<Year><Month>.csv` for measurement values and
`AL<Year><Month>.csv` for errors/alarms.

In the year folders, as required, subfolders are placed for the 12 months of the year, within each of which a file for measurement values and errors per day is placed.
The format of the filenames is `ME<Year><Month><Day>.csv` for measurement values and `AL<Year><Month><Day>.csv` for errors/alarms.

Data is stored in the "Comma-Separated-Value" format, to facilitate inclusion in spreadsheet programs and to allow it to be easily imported into databases.

To ensure that the naming of the file and the time and date details in the file are correct, the time function must work properly. If the battery drains, the date is automatically set to 1.1.2011, 12:00 and the data is stored. Data is not lost, since new measurement values and errors are appended to existing files. However, only one file is de-scribed in each case, since the month and day are not subject to change.

Interim storage for a non-inserted SD card

Even if no SD card is currently inserted, no measurement values and errors are lost, since the most recently error and measurement values, which have not yet been written into storage, are saved on internal interim storage (ring memory). The capacity of this interim buffer is 50 error and 100 measurement values. After this point, the oldest values will be overwritten.

As soon as an SD card is inserted, the interim stored data is trans-mitted during next write operation.

Capacity of the SD card

The storage requirement for 10,000 measurement values amounts to around 1 MByte. If error messages occur for one percent of the measurement values, a 2 GB SD card for example may have around 19 million measurement values and errors.

Basic programming data on the SD card

You can save the settings for the equipment in a file on the SD card. This function is recommended for:

- Storing multiple configuration profiles for one device

- Transferring settings onto other devices
- Configuring multiple devices with identical settings
- Remote maintenance / support via transfer of the basic programming data

The filename is preset to "bdata00.ini" (for "Basic Data" / basic programming data). The digits are adjustable, meaning that in total 100 different files from "bdata00.ini" up to "bdata99.ini" can be selected. The files are always stored in the root directory of the SD card.

The settings are in the file in text form and can be displayed or edit-ed, with for example the notepad application on a PC.

If an error message occurs during the import, the format of the data is defective. This may occur if the file has been edited. In this case no settings are changed. Use a simple text editor for editing (e.g. WordPad), not a word processor, since otherwise the formatting may be changed!

All device settings are imported except:

- Language settings
- Operating hours counter
- Reagent fill level
- Password

5 Prepare the product for use

5.1 Installation

5.1.1 Remove the packaging material

Remove the packaging material completely before starting assembly.

Separate packaging materials according to type and size and send for further use or recycling if no other arrangements have been made with your distributor.

5.1.2 Delivery includes

1 Testomat® PRO CLF

1 Screw cap including hole and an insert for the screw cap of the DosiClip reagent bottle

1 Screw cap with suction set for the PeriClip reagent bottle

1 Drain funnel

1 User manual

5.1.3 Requirements for the installation site

Ensure that the following conditions are met at the installation site:

- Use the device in indoor locations only.
- The ambient temperature is between 10 and 40°C.
- The installation site is at altitudes under 2000 m.
- The maximum relative humidity is 80% at temperatures of up to 31°C (linear declining up to 50% relative humidity at 40°C).
- The device must always be protected against wetness and moisture. Under no circumstances may it be exposed to splashed water or condensate.
- Surge category II
- Soiling degree II

5.1.4 Assemble equipment

NOTE

Interrupted operation due to faulty assembly!
In the event of faulty assembly, trouble-free operation is not guaranteed.

- Assemble the device in a location shielded from drips and splashes of water, dust and aggressive substances.
- Assemble the device vertically.
- Assemble the device without mechanical stresses.
- Assemble the device in a location free of vibration.
- Select an installation site at which the length of the water inlet hose can be minimized (max. 5 m)

NOTE

Jamming of the cores with incorrectly selected cross-section!
If cores with the wrong cross-section are used, there is a risk of them becoming jammed when they are released from the terminal strip.

- Our recommendation to prevent jamming is, that you only use wires with cross-sections greater than 0.5 mm².

NOTE

Danger of kinking and abrasion with the cables!
If the wrong cable glands are used, cables may kink or rub.

- Use M16 cable glands.
- Use cable glands with a smooth and rounded opening.
- Ensure that the bend protection is reliably fixed and is five times the maximum cable diameter.
- Use a cable gland with a strain relief that prevents the cable from slipping and cannot be loosened without the aid of tools.
- Use cable glands made of a material with a flammability classification of V1 or better.

You can order cable ducts from us as spare parts (see chapter 10.1 Spare parts on page 75).

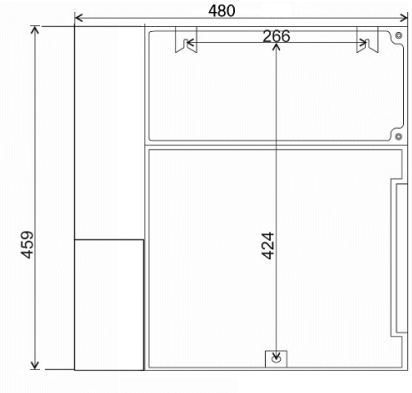


Figure 6

During assembly and commissioning, observe the specific nation-al and local requirements.

Observe the accident prevention and conservation requirements in the country of use and at the installation site.

Proceed as follows when assembling the equipment:

1. Leave sufficient room on the left side of the device to open the door.
2. Drill the mounting holes as specified in figure 6.
3. Secure the device with three screws in a suitable place in the switching cabinet or on the wall.

5.1.5 Connecting the water intake

NOTE

Damage due to measuring water that is too warm!
Water above 40°C can cause burns and damage to the parts of the Testomat® PRO that come into contact with water.

- The measurement water temperature must be between 10 and 40°C.
- Install a cooler in the intake when the water temperature is above 40°C.

NOTE

Interrupted operation if operating conditions are incorrect!

The following conditions must be fulfilled for the equipment's proper operation:

- The water pressure must be within the range 0.3 to 8 bar.
- To operate within a pressure range of 0.3 to 1 bar or when supplying via a booster pump, remove the controller core from the controller and filter housing. The pump should have a capacity of 25 to 35 liters/hour and be correspondingly resistant to the medium being measured.
- For pressures below 0.3 bar or for suction from a tank, use our booster pump MepuClip® (Art. No. 270410).
- Use a pressure reducer when operating above 8 bar.
- Avoid significant pressure fluctuations.
- We recommend short intake lines (under 3m) to the device. For intake lines longer than 3 m, purge periods of longer than 10 s must be configured. For cable lengths exceeding 5 – 10 m, we recommend external flushing via the AUX input.

Use within a pressure range of 0.3 to 1 bar

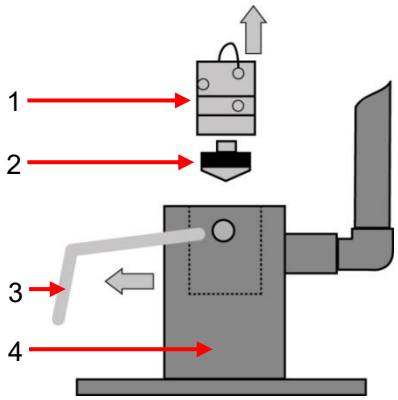


Figure 7

When delivered, the device is equipped for a pressure range of 1 to 8 bar. To operate the device within a pressure range of 0.3 to 1 bar, the flow governor core should be removed. Proceed as follows. Use figure 7 as a guide.

1. Take the locking pin (3) from the controller/filter housing (4).
2. Pull the controller plug (1) on the metal brackets out of the drill hole.
3. Remove the flow governor core (2).
4. Re-insert the controller plug (1).
5. Re-insert the locking pin (3).

The test water is extracted from the sampling pipe and channelled to the supply nozzles of the Testomat® PRO CLF The device comes with a plug connection for plastic hoses 6/4 x 1 as standard (external diameter 6 mm/ internal diameter 4 mm, wall thickness 1 mm).

Connect the water inlet as follows:

1. Connect the linking piece for the intake of the Testomat® PRO CLF directly to the sampling pipe (1) directly behind the water treatment plant.
2. Always establish the connection vertically upwards, to prevent dirt particles from being conveyed from the sampling pipe to the device.
3. Assemble a manual stop valve (2) in the intake to the Testomat® PRO CL.
4. For the water intake (3) use opaque plastic pressure hose 6/4 x 1 (max. length 5 m)
5. Purge the intake to remove dirt particles.

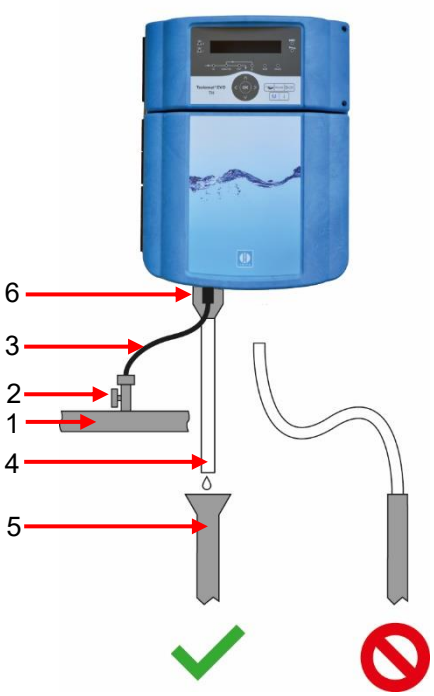


Figure 8

5.1.6 Connecting the water drain

The water is conveyed through the measuring chamber via an open funnel (6) and the drain hose installed on the same and into the duct.

Connect the water outlet as follows:

1. Remove the supplied funnel (6) and accommodate it underneath, in the recess of the housing designated for that purpose.
2. Connect the funnel of the Testomat® PRO CLF with a drain hose (4) (internal diameter 12 mm/14 mm)
3. Lay this hose free of back pressure and without the siphon effect to the drain (5).

5.1.7 Expose cable bushing

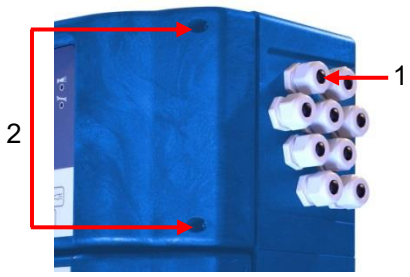


Figure 9

To guarantee IP protection, the device is supplied with cable ductings and blanking plugs. If you wish to use a relay output, you must remove the blanking plug from the cable ducting. Proceed as follows in this instance:

1. Loosen the strain relief of the cable ducting (union nut).
2. Take out the blanking plug (1) and insert the cable.
3. Tighten the union nut of the cable ducting and so establish the strain relief.

5.1.8 Connect mains voltage

DANGER

Danger to life due to missing emergency stop switch!
There is a danger to life in the event of contact with a live component. When delivered, the equipment does not have a mains switch with which you can quickly disconnect it from the mains.

- Fit the Testomat® PRO CLF with a switch as a disconnecting device for the power supply.
- Use an appliance switch or a circuit breaker that meets the requirements of IEC 60947-1 and IEC 60947-3.
- The switch must be within easy reach of the user of the device.
- The switch must be clearly marked as a disconnecting device for the Testomat® PRO CLF
- You can also provide for a socket near the equipment for disconnection, into which a cable (with a suitable plug) is plugged in. Clearly mark the cable as a disconnecting device for the Testomat® PRO CL.
- Water conducts electricity and runs downwards. Therefore, always lay all power lines higher than water lines!

DANGER

Danger to life due to electric shock!
Cables with dangerous voltages are connected in the terminal compartment, which cause a life-threatening electric shock if touched.

- Be sure to replace the terminal compartment cover after connecting the system components and mains voltage.

WARNING

Risk of injury from assembly when voltage present!
You risk injury, unless you disconnect the power supply before commencing assembly.

- Disconnect all power to the relevant system component before assembling the Testomat® PRO CLF.
- Close all taps in the vicinity of the Testomat PRO CLF and secure them against being opened accidentally. It is essential to avoid any and all contact between power lines and water!

NOTE

Damage from assembly when voltage present!
You risk destruction of the product or damage to system components, unless you disconnect the power supply before commencing assembly.

- Disconnect all power to the relevant system component before assembling the Testomat® PRO CLF.

NOTE

Damage possible due to the use of incorrect cables and pipes!
Use only cables and installed lines which meet the following requirements:

- Dielectric strength 30 V … 260 V according to the nominal voltage (see specification plate).
- The cable ducts installed by Gebr. Heyl in the device have a clamping range of 4.5 mm – 10 mm. This means that the external diameter of the laid cable must remain within the range of 4.5 mm – 10 mm.

- If you use other ducts, the cable diameters must correspond to the ducts.
- The terminal strips on the circuit board require core cross-sections of between 0.08 mm^2 and 2.5 mm^2 according to the manufacturer. This applies to single-wire and fine-wire cores with wire end ferrules without plastic collar.
- For fine-wire cores with wire end ferrules and plastic collar, the cross-section may be up to 1.5 mm^2.
- For single-wire cores, AWG28 – AWG12 can also be used.
- Cable and wire lengths must not exceed 30 metres.

NOTE

Danger of damage due to electromagnetic fields!
If you assemble the Testomat® PRO CLF device or connecting cables parallel to mains cables or in the vicinity of strong electromagnetic fields, the device may be damaged or the measurement disrupted.

- Keep the connecting cables as short as possible.
- Lay the connecting cables and mains cables separately.
- Connect the device with the protective conductor (at 230/100-240 VAC).
- Keep interference voltages away from the Testomat® PRO CLF device – e.g., by using a mains filter.
- Shield the device from strong electromagnetic fields.

NOTE

Damage to cables and restricted equipment function!
If the cables are kinked when the terminal cover is replaced, damage to the cable may occur and the equipment's function may be restricted.

- Do not pinch the cables when installing the terminal compartment cover.

Connect the device only to the mains voltage for which it is de-signed. See type plate to confirm the suitable mains voltage.

To connect the cable, proceed as described below. Use Figure 8 as a guide.

1. Remove both fixing screws (2).
2. Open the upper door.
3. Remove the fixing screws of the terminal cover and then remove the terminal cover itself.
4. Lay the cable through the cable ducting (1) provided for that purpose.
5. Tighten the union nut of the cable ducting and so establish the strain relief.
6. Connect the supply voltage to the terminals PE, N, L or, for 24 V devices, to U and V terminals.
7. Ensure that the cores in the terminals are securely in place.
8. Install the terminal compartment cover.

Block diagram of Testomat® PRO CLF

Illustrated position of relays: Device without current, mains: 230 V

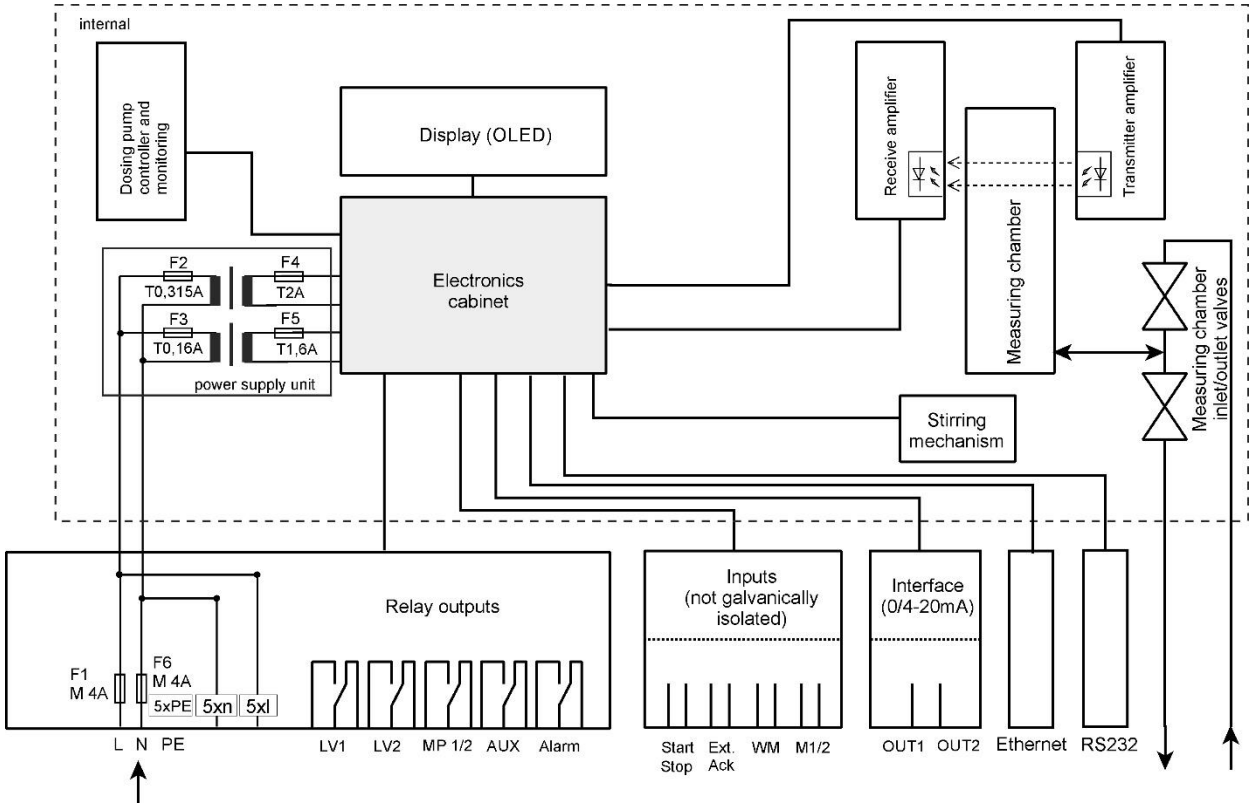


Figure 10

5.1.9 Connect system components



Figure 11

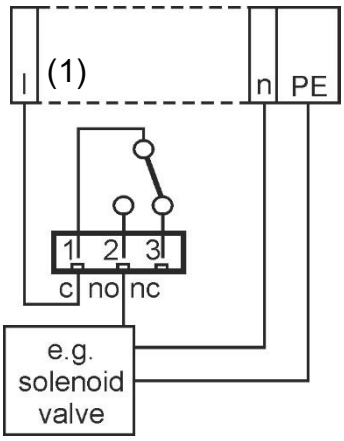


Figure 12

Danger to life due to electric shock!
If you connect system components that do not operate using the device voltage, you can apply external voltages to the relay contacts. This external voltage cannot be switched off via the external mains switch.

- Put a warning sign on the equipment (e. g. a sticker like in Figure 11).

To connect the plant components, proceed as follows: (Illustrated position of relays: Device without current, mains: 230 V)

1. Take out the blanking plugs of the corresponding cable ductings.
2. Push through the cable of the component.
3. Tighten the union nut of the cable ducting.
   ➤ The strain relief is restored.
4. Connect the system components to the output terminals of relays 1 to 4 (e.g. valves).
5. If the system components require mains power, connect the external switched mains voltage (l) to the root contact (1) of the respective relay (see connection example in figure 12.
6. Connect the neutral conductor of the system component with one of the terminals (n).
7. For components with a protective conductor connection, connect them to the PE connection.
8. Ensure that the cores in the terminals are securely in place.

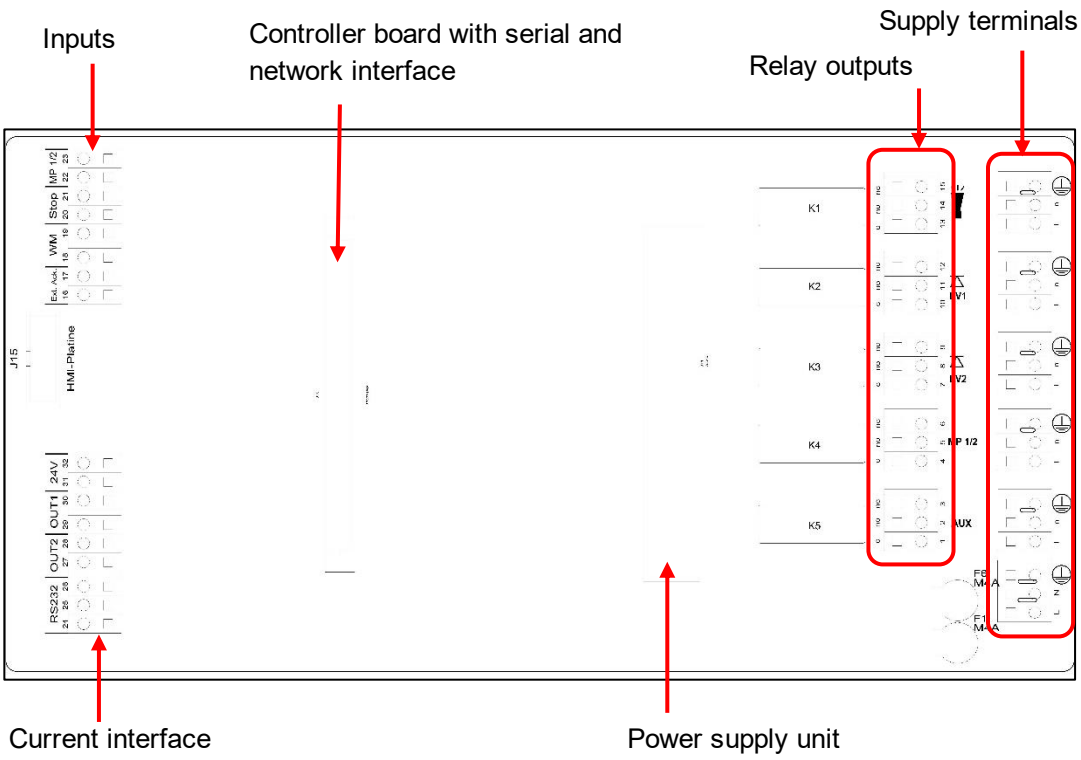


Figure 13

5.1.10 Connect inputs and outputs

NOTE

Possible damage to the equipment due to incorrect connection of the inputs and outputs!

Incorrect connection of inputs and outputs will damage the equipment.

- Do not expose the connections to any external voltage!
- Ensure that the cores in the terminals are securely in place.

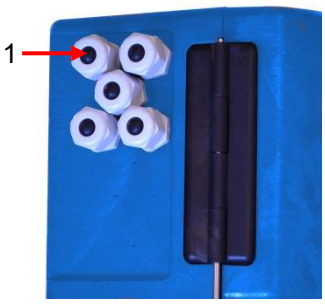


Figure 14

The Testomat® PRO CLF device has the following sockets for control and monitoring functions. Proceed as follows for connection:

1. Take out the blanking plugs of the corresponding cable ductings (see Figure 14).
2. Push through the cable of the component.
3. Tighten the union nut of the cable ducting and so establish the strain relief.
4. Re-secure the upper door after installation with both fixing screws.

Connect supply terminals

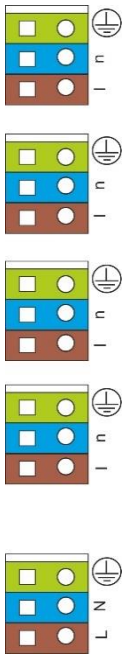


Figure 15

Terminal designation	Type	Function	Note
PE ⏚	IN	Mains protective conductor (5x)	Only for mains supply of 230 V and 100 – 240V!
n **l**	OUT	Neutral conductor, secured with 4A (4x) Phase, secured with 4A (4x)	Grid for consumers, max. 4 A
N (U) **L (V)**	IN	Grid, N=Neutral conductor (U=24V) Grid, L=Phase (V=24V	Power input 50-60 Hz 24 V / 100-240 V / 230 V

Table 13

Connect relay outputs

No.	Terminal designation		Function
			Alarm
15		nc	Fault signal output – root c
14		no	Fault signal output – closing contact no
13		c	Fault signal output – break contact nc
12		nc	Limit value output LV1 – root c
11	LV1	no	Limit value output LV1 – closing contact no
10		c	Limit value output LV1 – break contact nc
9		nc	Limit value output LV2 – root c
8	LV2	no	Limit value output LV2 – closing contact no
7		c	Limit value output LV2 – break contact nc
			Measuring point output
6		nc	Measuring point switch-over – root c
5	MP1/2	no	Measuring point switch-over – closing contact no
4		c	Measuring point switch-over – break contact nc
			Programmable function output / AUX
3		nc	External flushing valve – root c
2	AUX	no	External flushing valve – closing contact no
1		c	External flushing valve – break contact nc (standard configuration)

Table 14

All outputs are potential-free relay outputs with a load capacity of a max. 240VAC, 4A!

Connect inputs

Only connect potential-free NC/NO contacts!

No.	Terminal designation	Function	Standby mode adjustable	Note
23	MS1/2	Measuring point switch-over	X	
22	Ground			
21	Stop	Combined start/stop input	X	
20	Ground			
19	WM (watermeter)	Water meter intake		Observe the technical data of the meter!
18	Ground			
17	Ext. Ack. (external acknowledge)	External reset / acknowledgment input port for error and alarms	X	
16	Ground			

Table 15

Check the wiring with the help of the diagnosis in the Service menu on page 34. Here, all outputs can be switched individually, and the status of the inputs can be queried.

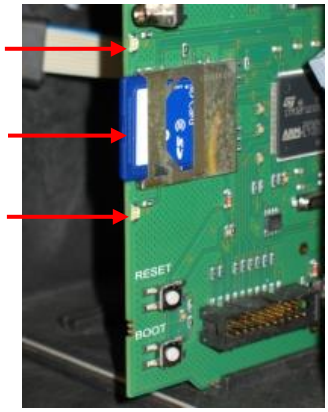
5.1.11 Insert SD card

NOTE

Handling may cause damage or destruction of electrical components!

If you have to open the equipment's top door, electrical components may be damaged or destroyed by electrostatic discharge.

- Take appropriate precautions to avoid electrostatic discharge (ESD protection).
- Make sure you are earthed before opening the casing.



Follow the instructions in the operating instructions enclosed with the SD card. Proceed as follows when mounting the SD card:

Slide the SD card into the plug-in slot provided, as shown in figure 16.

1. Gently press in the SD card until it audibly clicks into place.
   ➤ The process of mounting the SD card is now complete.

Status displays of the SD card (LEDs (2))

LED yellow	LED red	Meaning
On	Off	Read access on the SD card underway
Off	On	Writing process underway
On	On	SD card error has occurred (also shown as text alert in the display)

Table 16

5.2 Commissioning

5.2.1 Insert reagent bottle

Risk of (chemical) burns from reagents!
Contact with the reagents used may cause (chemical) burns.

- Use protective goggles and gloves before handling reagents containing acids and alkalis.

Interrupted operation possible when using unapproved reagents!
Flawless operation of the Testomat® PRO CLF device is only guaranteed when Heyl reagents are used! The use of external reagents may invalidate the guarantee.

- Use only original Heyl reagents.

No error messages for the PeriClip pump!
No error messages are displayed for the PeriClip pump.

- If you encounter measurement issues, check the pump's functionality yourself (e.g. using the diagnostic function in the service menu).

Reagent A should be connected to the PeriClip dosing pump and reagent B to the DosiClip dosing pump.

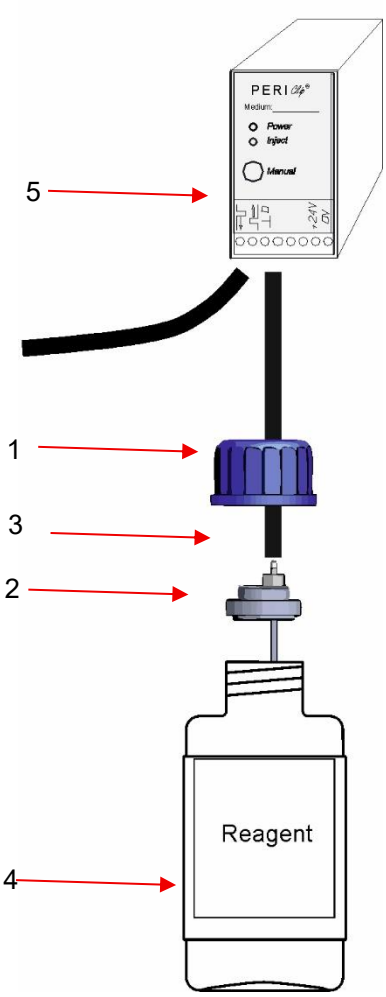


Figure 17

Reagent A to PeriClip

Insert the reagent bottle A as follows. Consider figure 17.

1. Open the lower housing door by pulling on the right side.
2. Remove the caps from the reagent bottle.
3. Take the plastic bag out of the inside of the lower housing door. It contains a screw cap with a hole (1) and the insert for the screw cap (2).
4. Place the insert (2) into the bottle (4).
5. Hand-tighten the screw cap with the hole onto the bottle.
6. Place the bottle under the PeriClip dosing pump (5).
7. Push the intake hose (3) onto the hose connector of the insert (2) by hand.

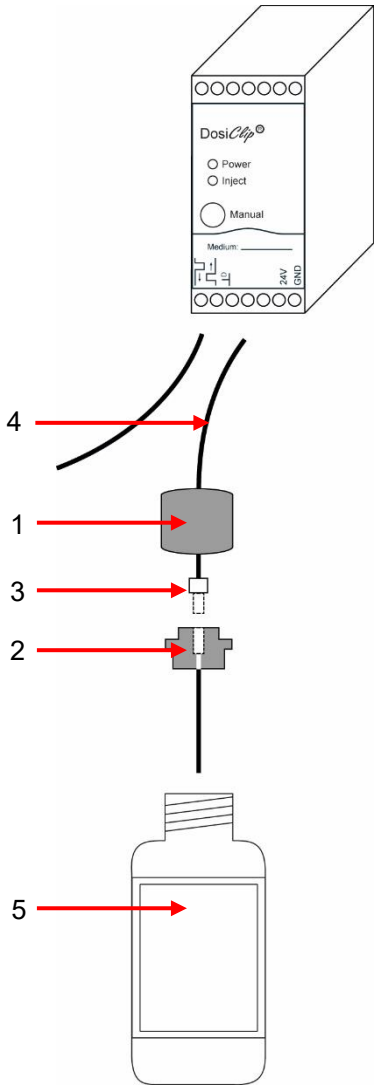


Figure 18

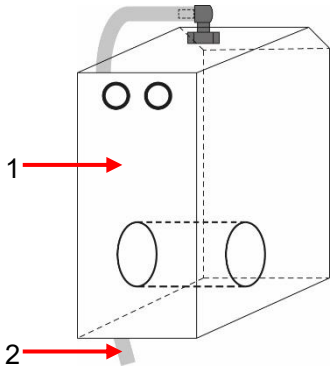


Figure 19

Reagent B to DosiClip

Insert the reagent bottle B as follows. Consider figure 18.

1. Remove the closing cap of the reagent bottle.
2. Remove the plastic bag from the inner side of the lower housing door. It contains the screw cap with hole (1) and the insert (2) for the screw cap.
3. Join the parts together as shown below in figure 18.
4. Screw the hose connector (3) of the suction hose (4) hand-tight into the insert (2).
5. Plug the insert with screwed-in suction hose into the indicator bottle.
6. Now screw the screw cap with hole (1) hand-tight onto the reagent bottle (5).

Drawing in the reagent

1. Switch on the equipment and press **Pause**.
2. Enter the filling levels of all reagent bottles in %:
   Select the menu `>SERVICE => REAGENT => Adjust to 100%`
   (New/full bottle = 100% filling level)
3. Confirm the input with the button **OK**.
4. Enter the other filling levels accordingly.

Watch out for air bubbles in the tubes as they can lead to incorrect measurements. If there is an air bubble in the tube it must be vented.

5. To do this, press the **Manual** button on the pump or select the appropriate pump in the “Service” menu under `SERVICE => DIAGNOSIS => PeriClip/DosiClip` to initiate the pumping process.

5.2.2 Open water intake

To open the water inlet, carry out the following steps. Refer to figure 18.

1. Open the lower housing lid.
2. Slowly open the manual stop valve to prevent the measuring chamber from overflowing. Configuring the flow regulator will take some time during the initial commissioning.
3. Check the leakproof quality of water-conveying parts.
4. If any water sprays out of the hose (2) of the measuring chamber (1), restrict the water intake to some extent with the manual stop valve. The measuring chamber should be filled within two to six seconds!

Before you start with the analysis, enter your desired program data as described in chapter 6 Instrument setting and data entry on page 34.

5.2.3 Operation after idle times

When switching on the device after idle times, check whether all tubes are filled with reagents. If this is not the case, press the **manual** button on the DosiClip pump until the reagent in the tubing reaches the measuring chamber. This avoids measurement errors during the first measurement after switching on.

6 Instrument setting and data entry

In chapter 4.3 Functions of the control and display elements on page 10 the operating elements and displays required for the equipment settings are explained.

6.1 Enter program values

Since no settings in the programming menu can be configured while the analysis is underway, press the **Pause** button once the venting is complete or proceed to the programming menu before the first analysis starts.



1. Access the programming menu with the **M** key.
   Press this key in the menu to go to the superordinate menu item or to exit the program menu.

Make the following settings, since these are imperative for obtaining usable measurement values:

- Checking the date and time. This is important, in order that logged measured values and alarms are displayed at the correct time.
- Select the display unit of the measured values (see chapter 6.8 Select measurement value unit on page 42)
- Select operating mode. As a rule, the measurement is carried out at regular time intervals; therefore, select `time-controlled`

Perform the first measurement by pressing the **Manual** button. Upon completion of the analysis, a measurement value must be shown. If any error occurs, refer to the section on chapter 6.4 Troubleshooting and repair on page 61 and resolve the error.

Once the first analysis has been successfully completed, you can adapt the device to your desired usage. The following sections will set out all the configuration options.

6.1.1 Structure of the Service menu

Use the cursor keys to select the menu option `Service`. The following settings can be determined in the “Service” menu: Reset the reagent fill level, language setting, diagnosis, time, operating time, view/reset error history (see figure 20)

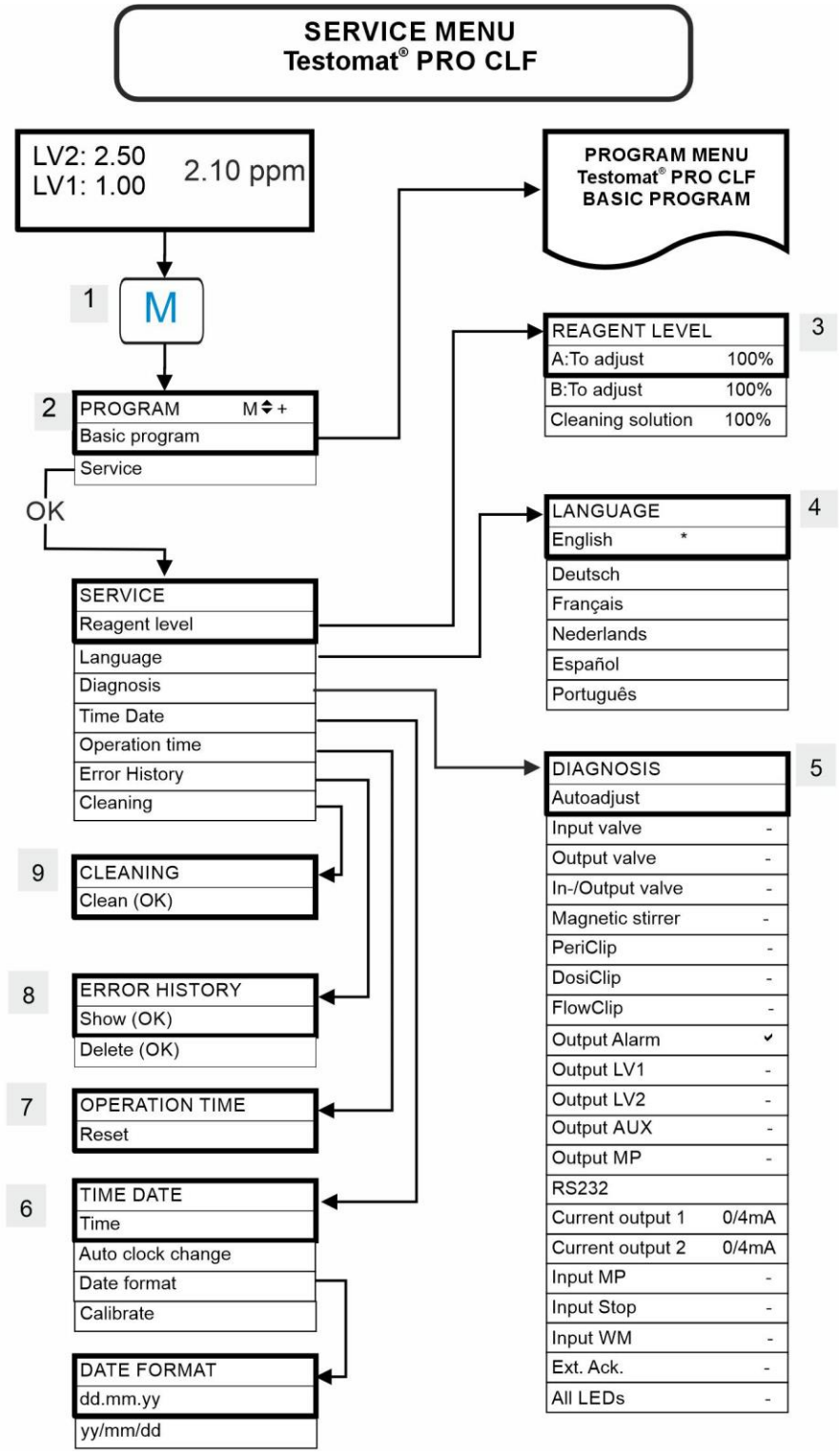


Figure 20

Reagent level (3)

Input the new fill level for each refill or when changing the bottle of the reagent. If you select the menu item for the filling level entry `Reagent level` with **OK**, you can select the reagent that was switched out. If you have connected a full bottle, confirm this value with **OK**. If the bottle filling deviates from this, enter the corresponding value.

Language (4)

Select the desired language for the display.

Diagnosis (5)

The diagnosis menu allows you to perform an automatic comparison for the amplifier of the receiver diode and the LEDs. You can also switch and reset EV, AV and all outputs as well as test the current loop.

Under item `Current output 1/2  4 mA` the current interfaces can be checked. Use the buttons ◀▶ to change the currents from 4-20mA or from 0-20mA in steps.

Under `PeriClip/DosiClip` the pumps can be controlled manually, e.g. for venting the lines. If the optional FlowClip pump for the cleaning function is installed, it can also be tested here.

Time and date (6)

To set the time, date and summertime adjustment (see chapter 6.3 Set Date and Time on page 39).

Operating time (7)

After replacing a dosing pump or mounting the measuring chamber, you can reset the current operating time with `Reset` to 0 hours.

Error history (8)

Faults are recorded in the error history and stored if the incident is programmed as an alarm or message. If for example the lack of reagent is not programmed to trigger an alarm/message, this is also not registered in the error history. Up to 20 error messages are rec-orded. The information stored in each case includes the point in time (day, month, year and time) and the type of error.

Cleaning (9)

By selecting `Clean` the measuring chamber is first rinsed and then the agent is added to the water in the measuring chamber After the set application time, the contents of the measuring chamber are drained. The measuring chamber is then rinsed twice. In order to achieve an optimal cleaning result, we recommend using Testomat® cleaning solution, as described in chapter10.3. Consumables on page 76.

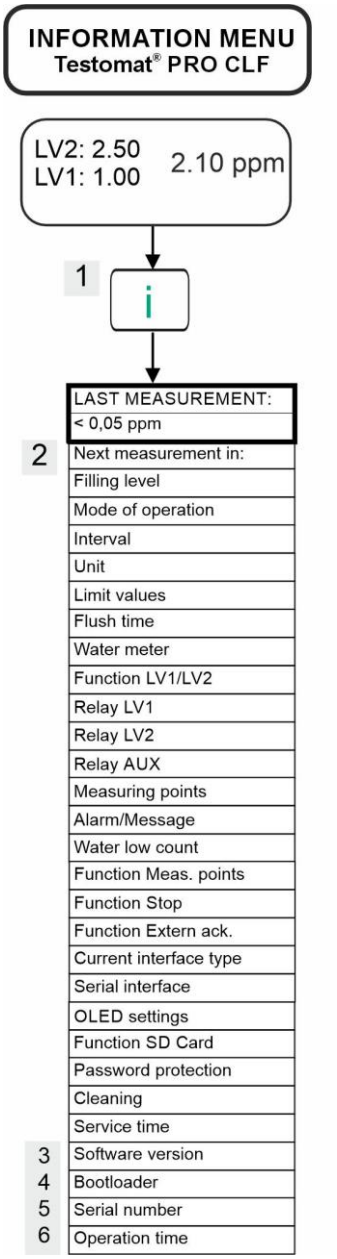


Figure 21

6.1.2 Structure of the Information menu i

Select the information menu by pressing **i**. In this menu, you can query the current settings and states of the equipment. The following query options are available: Operating and program values, such as software status, operating mode, maintenance/operating hours counter (see figure 21).

Call (1)

The button **i** allows you to call up the information menu.

Next measurement (2)

Display showing the time remaining before the next measurement.

Software version (3)

Display showing the installed software version.

Bootloader version (4)

Display showing the in-stalled bootloader version. The bootloader is needed to execute the firmware update

Serial number (5)

Display showing the serial number of the device.

Operating time (6)

Display showing the operating time of the device. Can be reset in the service menu.

6.1.3 Structure of the basic program

Select the menu item `Basic program`. Here you can implement the basic programming of the device (see figure 22).

In basic programming, the following abbreviations are used in the corresponding menu options:

s = seconds; m = minutes; h = hours; T = days; l = liters

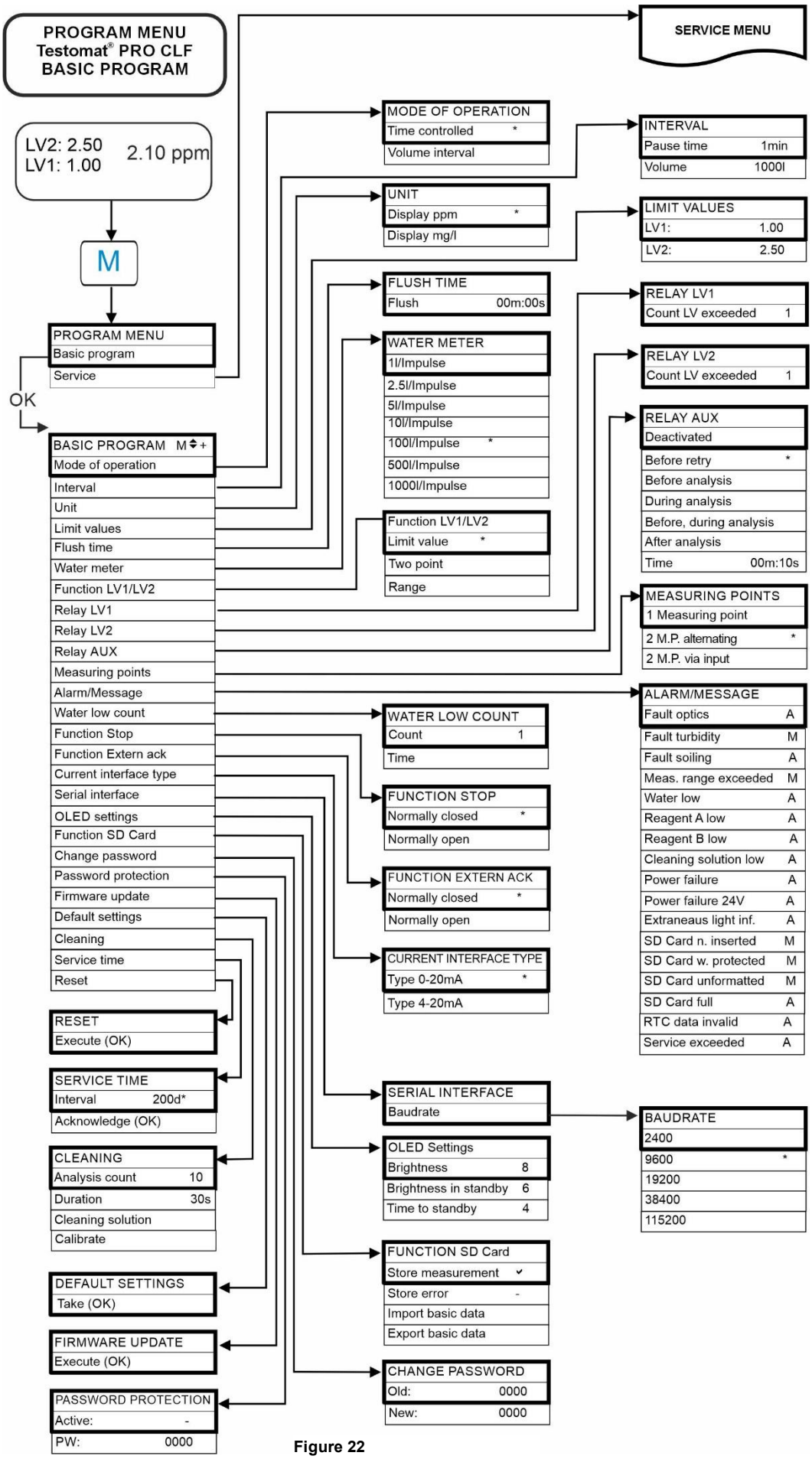

PROGRAM MENU
Testomat® PRO CLF
BASIC PROGRAM
SERVICE MENU
LV2: 2.50
LV1: 1.00
2.10 ppm
M
PROGRAM MENU
Basic program
Service
OK
BASIC PROGRAM M+
Mode of operation
Interval
Unit
Limit values
Flush time
Water meter
Function LV1/LV2
Relay LV1
Relay LV2
Relay AUX
Measuring points
Alarm/Message
Water low count
Function Stop
Function Extern ack
Current interface type
Serial interface
OLED settings
Function SD Card
Change password
Password protection
Firmware update
Default settings
Cleaning
Service time
Reset
MODE OF OPERATION
Time controlled *
Volume interval
INTERVAL
Pause time 1min
Volume 1000l
UNIT
Display ppm *
Display mg/l
LIMIT VALUES
LV1: 1.00
LV2: 2.50
FLUSH TIME
Flush 00m:00s
WATER METER
1l/Impulse
2.5l/Impulse
5l/Impulse
10l/Impulse
100l/Impulse *
500l/Impulse
1000l/Impulse
Function LV1/LV2
Limit value *
Two point
Range
RELAY LV1
Count LV exceeded 1
RELAY LV2
Count LV exceeded 1
RELAY AUX
Deactivated
Before retry *
Before analysis
During analysis
Before, during analysis
After analysis
Time 00m:10s
MEASURING POINTS
1 Measuring point
2 M.P. alternating *
2 M.P. via input
ALARM/MESSAGE
Fault optics A
Fault turbidity M
Fault soiling A
Meas. range exceeded M
Water low A
Reagent A low A
Reagent B low A
Cleaning solution low A
Power failure A
Power failure 24V A
Extraneaus light inf. A
SD Card n. inserted M
SD Card w. protected M
SD Card unformatted M
SD Card full A
RTC data invalid A
Service exceeded A
WATER LOW COUNT
Count 1
Time
FUNCTION STOP
Normally closed *
Normally open
FUNCTION EXTERN ACK
Normally closed *
Normally open
CURRENT INTERFACE TYPE
Type 0-20mA *
Type 4-20mA
RESET
Execute (OK)
SERVICE TIME
Interval 200d*
Acknowledge (OK)
CLEANING
Analysis count 10
Duration 30s
Cleaning solution
Calibrate
DEFAULT SETTINGS
Take (OK)
FIRMWARE UPDATE
Execute (OK)
PASSWORD PROTECTION
Active: -
PW: 0000
SERIAL INTERFACE
Baudrate
BAUDRATE
2400
9600 *
19200
38400
115200
OLED Settings
Brightness 8
Brightness in standby 6
Time to standby 4
FUNCTION SD Card
Store measurement ✔
Store error -
Import basic data
Export basic data
CHANGE PASSWORD
Old: 0000
New: 0000

Figure 22

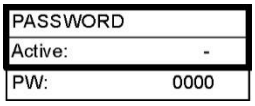
6.2 Set up password protection

NOTE

Danger of changing settings, measurement data and web pages!
When accessing via network: The settings of the equipment cannot be changed remotely. However, changed measured values or websites can be uploaded by unauthorised persons over FTP or the web.

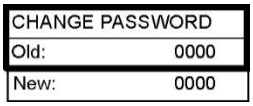
- We recommend that you leave the password protection activated.

No password protection is enabled by default. Independently thereof, a four-digit password can be set in the Basic Program on the equipment for data entry and settings. If you have have forgotten your password, contact your Heyl service partner or water supplier. Note that in exporting settings, the password is not saved. Set your desired password as follows:



1. Press the **M** button.
   ➤ This brings you to the basic menu for `Basic program`.
2. Confirm `Basic program` with **OK**.
   ➤ You then see the selection menu for the basic programming.
3. Use the cursor keys to select `Password protection`.
4. Confirm with **OK**.
   ➤ The password protection is activated.

To change the password, proceed as follows:



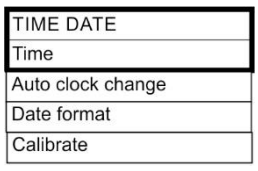
1. Press the **M** button.
   ➤ This brings you to the basic menu for `Basic program`.
2. Confirm `Basic program` with **OK**.
   ➤ The cursor flashes in the `PW: ■000` field.
3. Use the cursor keys to input the sequence of digits.
   The default password on delivery is 0000.
4. Confirm with **OK**.
   ➤ You then see the selection menu for the basic programming.
5. Select `Change Password`.
6. Enter the existing four-digit password.
7. Enter your desired password consisting of four digits.

6.3 Set Date and Time

Adjust the date and time settings before you start the first analysis. The function automatically changes the time to summer/winter time.

You can select the time display format with : Day / month / year `dd.mm.yy`

- Year / month / day `yy/mm/dd`.



Carry out the following steps:

1. Press the **M** button.
   ➤ The following selection appears: `Basic program` or `Service`.
2. Select the menu option `Service` using the **arrow d**.

3. Confirm the selection with **OK**.
4. Select the menu option `Time Date` using the **arrows u/d**.
5. Confirm the selection with **OK**.
6. Move with the **arrows r/l** to the desired position in the time/date field.
7. Select the desired figure by confirming with the **arrows u/d**.
8. Confirm the newly configured values for the time and date with **OK**. If you do not wish to change the values, press no buttons for 30 seconds. The device will then revert back to the values in the operating display.
9. Press the **M** button to leave the levels.
   - ➤ The date and time are now set. The clock continues to run even if the device is switched off.

The function is used to adjust the internal clock offset in the range of a few minutes per month.

10. After you have set the clock for the first time, check the offset after one month.
11. Enter the offset you have determined under . A maximum of 5 minutes per month can be corrected.
    - ➤ The device will correct the offset in future.

6.4 Select Language

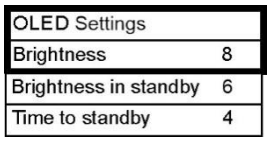


You have the choice between the languages English, German (default setting), French, Dutch, Spanish and Portuguese.

1. Select the desired language for the display in the “Service” menu: `Program menu => Service => Language`
2. Press **OK**, to confirm the settings.

6.5 Setup OLED

The Testomat® PRO CLF is equipped with a large-surface OLED graphic display with a service life of more than 20 years at a setting of 50% luminosity. Set up the display as follows:



1. Adjust brightness in the menu: `Basic program => OLED Settings => Brightness`
   - ➤ While you are changing a setting, it is accepted directly in the display for preview, but is not yet saved
2. Set the brightness in standby mode in the menu: `Basic program => OLED Settings => Brightness in standby`
   This screensaver extends the life of the LEDs many times over.
3. Select the time in minutes until standby: `Basic program => OLED Settings => Time to standby`
4. Press **OK**, to confirm the settings.

6.6 Select operating mode

Under the menu option `Operating mode` you can select the type of analytical control. The Testomat® PRO CLF gives you scope to control timing or quantity via water meter.

- Smallest pause = 0 minutes
- Longest pause = 99 minutes.

The analysis interval (interval between two analyses) is determined by the configured purge cycle, the programmed pause time (interval) and the duration of analysis.

Select timing control

MODE OF OPERATION	
Time controlled	*
Volume interval	

1. Select in the menu `Basic program=> Mode of operation => Time controlled.`
2. Confirm the selection with **OK**.
   ➤ An * appears at the end of the line.
   The factory default is `Time controlled.`
3. Enter the interval.

Select quantity control

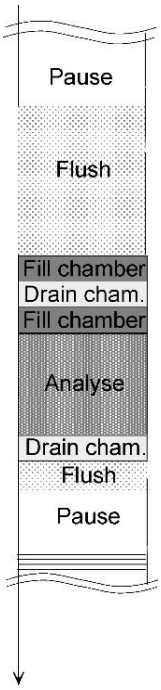


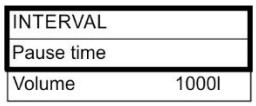
Figure 23

Smallest interval = 1 litre, largest interval = 9999 litres. The analysis is performed once the programmed quantity of water has passed. Before the analysis, the line and measuring chamber are purge. Observe programmed purge cycles.

1. Select in the menu `Basic program => Mode of operation => Volume interval.`
2. Confirm the selection with **OK**.
   ➤ An * appears at the end of the line.
3. Select in the menu `Basic program => Interval => Volume.`
4. Confirm the selection with **OK**.
5. Input the corresponding flow volume in litres.
6. Confirm the input with **OK**.
7. Now select the water meter (see page 46).

6.7 Configure interval pause

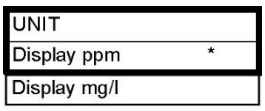
With time-controlled analysis trigger, the interval between two analyses is determined by the interval pause (plus purge cycle). The shortest possible interval pause is 0 minutes. Non-stop analyses are then performed. The largest interval is 99 minutes. The time for the analysis interval comprises the cumulative time taken for the “Analysis interval", “Flush" and the duration of analysis, which depends on the measurement value (see Figure 24). When you perform additional purging via the AUX relay before or after the analysis, the duration of the analysis interval will be extended accordingly.



1. Select in the menu `Basic program => Interval => Pause time`.
2. Select the pause time in minutes with the cursor keys.
   The factory default setting is 10 minutes.
3. Confirm all entries with **OK**.

6.8 Select measurement value unit

You can program the unit of the value shown. Your selection options include mg/l and ppm. All the following inputs and displays will then be shown in the programmed unit.



1. Select in the menu `Basic program=> Unit.`
2. Select the desired unit
   The factory default setting is the mg/l unit.
3. Confirm the selection with **OK**.

6.9 Set limit value monitoring

You can program the limit values to be stepless. The limit value range is specified by the reagent type and programmed unit used. You can monitor two limit values. For this purpose, each limit value output is available. The functions of the assigned delay outputs can be programmed independently of each other. The limit value outputs are permanently assigned to limit values! LV1/2 are available on the LV1/2 terminals. If the limit value LV1 is exceeded, the limit value control indicator lights up in RED and the relay output LV1 responds according to the programmed switching function. If the limit value has not been exceeded, the indicator lights up in GREEN. The same functional approach applies to the limit value LV2.



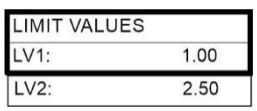
LV1 = limit value 1



LV2 = limit value 2

Figure 24

Entering the limit values



1. Select in the menu `Basic program => limit values.`
2. Input the values for `LV 1` or `LV 2`.
3. Confirm the input with **OK**.

6.10 Input operating mode of LV1 and LV2 limit value outputs

NOTE

Note the setting ranges for LV1 and LV2!
The setting range of LV1 is at most the value of LV2.
LV2 must always be greater than LV1.

- Always change LV2 before setting LV1!

Function LV1/LV2
Limit value *
Two point
Range

1. Activate the operating mode for **both** relays via
   `Basic program => Function LV1/LV2.`

The following operating modes can be configured:

- Limit value: A limit value can be defined for both relays. The relays switch when the limit value is exceeded.
- Two-point: Relay LV1 behaves as with limit value.
  Relay LV2 behaves like a two-point controller: If the upper limit value LV2 is exceeded, output relay LV2 switches. If the value falls below the lower limit value LV1, relay LV2 drops out again. This “dead zone” between LV1 and LV2 is the hysteresis.
- Range: Relays switch when leaving the preset range between LV1 and LV2: If the value *falls below* LV1, relay LV1 switches and the LED “LV1” lights up red. If LV2 *is exceeded*, relay 2 switches and LED LV2 lights up red. Within the range between LV1 and LV2, the LEDs light up green.

The following diagram illustrates the different switching functions. The switching status, which is indicated by the LV LEDs, is shown as a function of the selected switching function and the measured value:

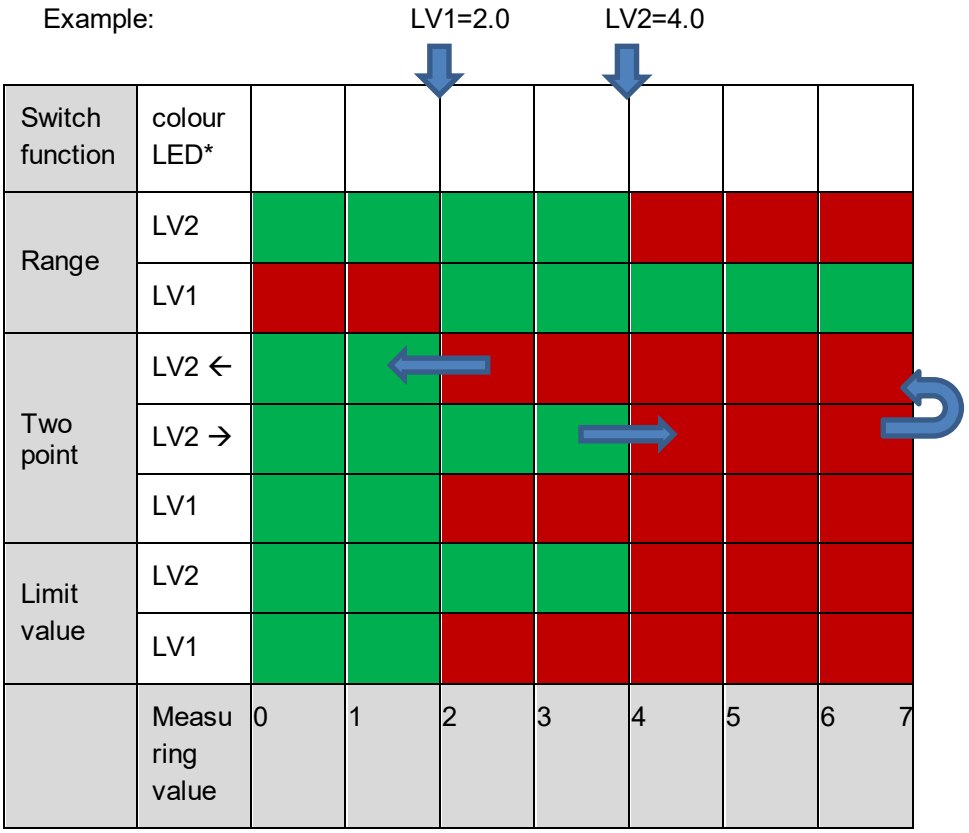


Figure 25

*A red LED indicates the *active switching state* (relay contact c-no connected).

6.10.1 Switching functions, multiple limit value exceedance

You can set after how many limit value breeches the relay should be activated. The setting is determined separately for both relays LV1 and LV2. The default setting is 1:

RELAY LV1	
Count LV exceeded	1

RELAY LV2	
Count LV exceeded	1

1. Select => `Basic program => Relay LV1 or Relay LV2.`
2. Select number of limit value violations (1-3).
3. Confirm the input with **OK**.

This improves the assessment of the analysis e.g. after possibly insufficient purging of the sampling line.

When the number of times the limit value has been exceeded is “2”, the next analysis is performed immediately after the first exceeding of the limit value. Only after the limit value has been exceeded twice is the corresponding output switched.

When the limit value has been exceeded “3” times, the corresponding output only switches after the limit value has been exceeded three times consecutively. This setting is only reactivated once the reading falls under the limit value and the assigned relay is energized or released again.

6.11 Set programmable switching output AUX

NOTE

Relay output AUX must be activated!
The relay is only active if a time interval has been set.

- Set a time interval >0, otherwise, the relay is deactivated!

This isolated relay output lets you set various switching functions set, which depend on the analytical sequence.

1. Make the settings for the relay under
   => `Basic program` => `Relay AUX`.
2. Confirm the entry by pressing "**OK**".

RELAY AUX	
Deactivated	
Before retry	*
Before analysis	
During analysis	
Before, during analysis	
After analysis	
Time	00m:10s

You have the following setting options:

- `Deactivated`: the relay does not switch
- Active `Before retry`: In this case the relay AUX e.g. is used to control an external purge valve. If a limit value has been exceeded, but the number set for the limit value occurrences was >1, the relay switches before each measurement is repeated. The purge procedure is performed for the set time. This can help prevent measurement errors due to insufficient purging.
- Active `Before analysis`: e.g. for external purging switches the relay for the set time before each analysis.
- Active `During analysis`
- Active `Before, during analysis`
- Active `After analysis`

6.12 Input flush time

To guarantee that the sample being analysed is current, the sampling line must be sufficiently flushed over its entire length. When the system is unused for an extended period and when the analysis interval is considerable, a flush time of more than 60 seconds should be selected. The flushing is performed by simultaneously opening the inlet and outlet valves of the Testomat® PRO CLF The analysis interval depends directly on the programmed flush time. If for example a flush time of 90 seconds is set, the analysis interval must be at least 90 seconds as well.

Internally enter the flush time

FLUSH TIME	
Flush	00m:00s

1. Select in the menu `Basic program => Flush time => Flush.`
2. Input in the menu option `Flush` the time in seconds(s).
   The factory default setting is 00 seconds(s).
3. Confirm all entries with **OK**.

6.13 Select water meter

WATER METER	
1l/Impulse	
2.5l/Impulse	
5l/Impulse	
10l/Impulse	
100l/Impulse	*
500l/Impulse	
1000l/Impulse	

For quantity-based analytical trigger, a water meter must be connected to the WM input (WM = water meter).

1. Select in the menu `Basic program => Water meter`.
2. Select the meter constant of the water meter.
3. Confirm the input with **OK**.

6.14 Measuring points

The unit can record 2 measuring points, one after the other. Just how this is done is set in this menu item:

MEASURING POINTS	
1 Measuring point	
2 M.P. alternating	*
2 M.P. via input	

1. Select from menu `Basic program => Measuring points`
   - One measuring point: Only measuring point 1 is measured, the assigned current output is OUT1.
   - Two measuring points alternating: Measuring point 1 and then measuring point 2 are measured alternately.
   - Two measuring points via input. The input MP1 determines the selection of the measuring point: If the input is inactive, measuring point 1 is measured, if the input is active (short-circuited), measuring point 2 is measured.

2nd Confirm the entry by pressing **OK**.

6.15 Program alarm (Fault signal output)

ALARM/MESSAGE	
Fault optics	A
Fault turbidity	M
Fault soiling	A
Meas. range exceeded	M
Water low	A
Reagent A low	A
Reagent B low	A
Cleaning solution low	A
Power failure	A
Power failure 24V	A
Extraneaus light inf.	A
SD Card n. inserted	M
SD Card w. protected	M
SD Card unformatted	M
SD Card full	A
RTC data invalid	A
Service exceeded	A

The device includes a relay Alarm output to notify faults. A error is signalled via the LED alarm and the corresponding error message is shown on the display. You can configure whether and how this indicator should be shown.

1. Select the menu `Basic program => Alarm/Message`.
2. Select the signalling for each type of error.

You can set whether the error alerts

- are not provided at all (by selecting – in the menu).
  Note: selection is not always available!
- Only in the display (by selecting M for notification/message)
- In the display and via the relay output (by selecting A for Alarm)

Functions of the alarm output

The Alarm output is an isolated relay changeover contact. During fault-free operation, the relay is energised, and the contact is closed. In the event of a voltage breakdown, the contact is open.

The device includes a whole range of monitoring functions with following functions/performance of the Alarm output:

In the event of permanent contact, the output remains "Alarm" indefinitely activated (terminals 10 - 12 closed), pending resolution of the error. The prerequisite here is that, in the menu `Basic program =>`

`Alarm/Message` the signalling A indicating the alarm for this error type is activated.

The fault signal at the Alarm output is stopped when you acknowledge the error with the **Alarm** button or by entering EXT. ACK. With the help of these inputs and outputs and the transmission of measurement data (via 20mA current loop or serial RS232 interface), the Testomat can be operated at a master display.

If the limit value is exceeded, there is ***no*** additional Alarm via the Fault signal output!

A description of the possible causes of error is included in the section in chapter 8.4 Troubleshooting and repair on page 61.

6.16 Set up signal inputs and outputs

Set up stop input

FUNCTION STOP	
Normally closed	*
Normally open	

1. Select the menu `Basic program => Function STOP`.
2. Select the contact type.
3. Confirm the selection with **OK**.

Set up external acknowledge

FUNCTION EXTERN ACK	
Normally closed	*
Normally open	

1. Select the menu `Basic program => Function Extern Ack.`.
2. Confirm the selection with **OK**.

6.17 Set up current interfaces 0/4 – 20 mA

Set the desired current interface as follows:

CURRENT INTERFACE	
Type 0-20mA	*
Type 4-20mA	

1. Select in the menu `Basic program => current interface type`.
2. Select the desired current range.
3. Confirm the selection with **OK**.

Example: 1 measuring point, interface 0 - 20 mA

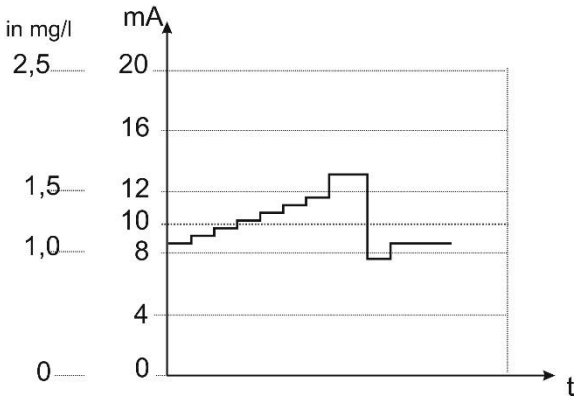
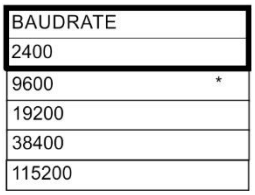


Figure 26



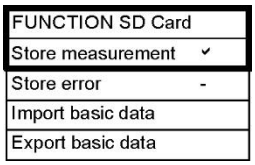


6.18 Set up RS232 interface

Set the baud rate for the interface as follows:

1. Select in the menu `Basic program => Serial interface => Baud rate`.
2. Select the desired baud rate.
3. Confirm the selection with **OK**.

6.19 Set up the SD card functions



Store measurement values

The storing of measurement values on the SD card is activated in the menu:

1. Select the menu `Basic program => Function SD-Card => Store measurement`
2. Confirm with **OK**.

Store errors

The storing of errors on the SD card is activated in the menu:

1. Select the menu `Basic program => Function SD-Card => Store errors`
2. Confirm with **OK**.

Export basic programming data

All settings of the Testomat device can be stored in a file on the SD card.

1. Select the menu `Basic program => Function SD-Card => Export basic data`
2. Export the files with **OK**.

Import basic programming data

1. Select the menu `Basic program => Function SD-Card => Import basic data`
   one of the files in the root directory of the SD card with the ending "ini" using the arrow keys.
2. Import the files with **OK**.

6.20 Restore factory default setting

NOTE

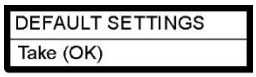
Loss of data and programming!

If you restore the factory default setting, your most recent programming will be lost!

- Back up the data on the SD card before restoring the factory settings.

You can restore the factory default setting by switching on the unit while pressing the **OK** and **Hand** key.

Alternatively, you can restore the factory default setting in the menu.



1. Select the menu `Basic program => Default settings`
2. Confirm `Take` with **OK**

6.21 Cleaning function (optional)

NOTE

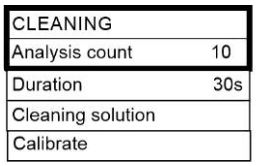
Damage to the components due to incorrect dosing!
Components in the device can be damaged by a wrong dosage or incorrect cleaning solutions!

- Observe the information in the safety data sheet when using the cleaning agent.
- Do not dispense cleaning solution by hand.
- Only use cleaning solution that has been approved by Gebr. Heyl.

If no pump is installed for cleaning, an error message is displayed when a cleaning attempt is made. Set the value under `Analysis count` to 0 to switch off attempts to clean the appliance.

The installation of a FlowClip pump for cleaning is described in the service instructions.

Adjust the settings as follows:

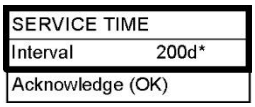


1. In the menu, select `Basic program => Cleaning`.
2. Under , select the quantity after which cleaning should take place. Cleaning the measuring chamber with the Self-Clean solution can be set after 0-999 analyses.
   0 means that no cleaning takes place
3. Under `Duration` select the cleaning duration in minutes.
4. Under `Cleaning solution`, set the amount of cleaning solution to be dispensed (0–15 ml).
5. The function is used to automatically determine the optimum pump running time to completely fill the measuring chamber. This means that the optimum amount of cleaning solution is dispensed.
   The pump runtime is displayed under => => . The value cannot be set but is determined by the device.

6.22 Maintenance

As a reminder for maintenance, an interval in days can be set (0 – 365 days). Once the interval has elapsed, the message `maintenance exceeded` is issued.

Configuring the maintenance interval



1. In the menu, select `Basic program => Service Time => Interval 200d`
2. Change the value with the cursor keys
3. Confirm the input with **OK**.

Acknowledge the maintenance

When maintenance has been performed, you must acknowledge it. This allows the reverse-running day counter to be reset to the configured value, whereupon the maintenance interval restarts afresh. The counter indicates how much time remains until the next maintenance.

1. In the menu, select `Basic program => Service Time => Acknowledge(OK) 200d`
2. Confirm the input with **OK.**
   - ➤ The counter is reset to the value set during the maintenance interval.

6.23 Perform a reset

This function allows you to restart the device.



3. Select the menu => `Basic program` => `Reset`
4. Confirm `Execute` with „**OK**“.

7 Connect to network

NOTE

No network with incorrect setting on the control board
In order for the data of the serial interface to be passed on to the network module, the correct setting of the plug-in field on the control board is necessary.

- Determine the settings as described in chapter Serial interface on page 17.

A network connection is not necessary for the operation of Testomat® PRO CLF. You can only make the settings if a network card is installed in the device.

With a connection, you have the possibility to retrieve your measurement data as well as error and alarm messages via browser or e-mail. The necessary steps for setting up and operating the network can be found in this chapter.

The menu and path information in this chapter (e.g. `Send e-mail`) refers to the DeviceInstaller software and the display in the browser, not to the menu of the Testomat equipment.

Status displays

The two LEDs on the network connector indicate a connection after a network cable has been plugged in:

Yellow LED	Green LED	Action or status
Off	On	Network connection established
Flashing	On	Network activity

Table 17

7.1 Perform network settings

The Lantronix User Manual [1] serves as a reference. The following are described in the settings process:

Password protection

The web interface of the Ethernet converter and the FTP access are password-protected ex works:

- User “admin”
- Password “PASS”.

Some data must be known about the network into which the network logger will be integrated.

7.1.1 Checklist for network configuration:

5. Allocation of IP addresses in the network

a) IP addresses are assigned via DHCP

This corresponds to the state on delivery; no settings are required.

Often the IP address can be linked to a MAC address by the server so that the device is always reachable under the same IP address. The MAC address is printed on the module with the network connection under the barcode.

b) No, a static IP address is used

The network logger must be assigned a fixed IP address, network mask (and possibly gateway). This is done with the DeviceInstaller [2] software. The procedure is explained in detail in Lantronix User's Guide chapter 3 "Using DeviceInstaller".

If the DeviceInstaller does not work over the network, the network logger can also be connected using RS232 (see chapter 4.8 Serial interface on page 17). To do this, proceed as described in the chapter on troubleshooting and problem solving.

2. Which options should be active for data access?

a) FTP for file transfer of measurement/alarm data in CSV format

FTP access is active in the delivery state. It can be switched off in the configuration menu under `FTP → Configuration → State Disabled` and activated with `Enabled` .

Assign usernames and passwords to limit access so that only authorised personnel can log in.

b) E-mail for notifications of new measurements or alarms: Determine the e-mail settings under `Configuration → Email1..3` sowie `Protocol Stack → SMTP`.

Setting the priority to `Very Low` will turn e-mails off, all other priorities will turn it on.

The settings can be checked with `Send Email`. An e-mail is generated as a test.

The setting `Email 4` is not used. It can, for example, be used to send a complete file via e-mail!

c) Web browser for online display and data analysis

Web access is active in the delivery state. It should not be turned off as then there will be no options for settings!

Assign usernames and passwords to limit access so that only authorised personnel can log in.

This data is entered under `HTTP → Authentication → Username, Password`.

d) Web browser for file transfer of measurement/alarm data in CSV format: The measurement/alarm files can be downloaded via the web interface under the menu `Filesystem→ Browse` . All data for one month is stored in the folder http, subfolder for the corresponding year.

Assign usernames and passwords to limit access so that only authorised personnel can log in.

This data is entered under `HTTP → Authentication → Username, Password`.

Should access be limited by using passwords?

Yes: Separate passwords can be configured for FTP and web access, see 2a and 2c below.

No: Delete the passwords for FTP and web access, see 2a and 2c below.

7.2 Web interface configuration menus



Status

Ethernet converter status

Line

The settings relate to the serial interface.
Baud rate, data bits and stop bits must not be changed!

Network

Basic network settings such as DHCP, IP address, gateway, host name.

Protocol Stack

The setting of the SMTP Relay is important if e-mails are to be sent.

SSH

Access via Secure Shell. Not necessary here.

SSL

The encryption of data transfer over the web. Includes certificate production. Is not required for function; relevant as a safety feature for remote access.

Syslog

System log messages. Inactive.

System

For restart. Do not use the firmware update because the Heyl network logger process runs differently!

XML

To export and import settings.

7.2.1 Addresses of the web interface

If 192.168.0.10 is set as the IP address of the Ethernet converter, the web interface can be reached at the following addresses:

http://192.168.0.10	Ethernet converter setting The links below relate to the following pages.
http://192.168.0.10/werte.htm	Monthly data as a graph
http://192.168.0.10/values.htm	Monthly data (English)
http://192.168.0.10/aktuell.htm	Current measured values automatically updated
http://192.168.0.10/online.htm	Current measured values automatically updated in English

The display only works if JavaScript is activated in the browser!

The easiest way to access the files with the measurement data and messages is in the web browser via the setting of the Ethernet converter in the menu `Filesystem`.

7.2.2 Using monthly data display

1. Select the month and year of the measuring data to be displayed.
2. Now press the **OK** button.

According to the CSV file available, their name and path will be generated from the selection.

A help function is available next to the **OK** button.

7.2.3 Using the current measured value display

The display is fully automatic. The number of measuring points is automatically detected based on incoming data after the second measured value.

If an alarm has occurred during device run time, the last alarm is shown. Clicking on the **Acknowledge** button will ensure this error message is no longer shown, only new ones. The display updates automatically.

7.3 Set up e-mail dispatch

NOTE

The Ethernet converter does not send e-mails
The Ethernet converter only supports dispatch via so-called open SMTP servers that do not require a password. Authentication is not used!

- Set up dispatch via an open SMTP server.

You will find the settings in the menu `Email`. The setting for the SMTP server that forwards sent e-mails can be found under `Protocol Stack → SMTP → Relay Address`.

Sending can be turned on and off using the priority setting, separated for

- Measurement data in e-mail 1
- Notifications in e-mail 2
- Limit value exceedances in e-mail 3

Sending is active when the SMTP Relay (see above) is set and the following fields are filled out in the e-mail configuration:

- *To:* Existing destination address
- *From:* Any address for the network logger itself. It need not actually exist (you cannot send e-mails to the Testomat 2000®), but should correspond to the syntax of a correct e-mail address. Example: Testomat2000@firma.de
- *Subject:* Any text must be present.
  Examples: “Measured value” for `Email1`, “Notification” for `Email2`, “Limit value exceedance” for `Email3`.
- Set up *Priority*: `Urgent`, `High`, `Normal` or `Low` .
  With `Very Low` no e-mail is created!

1. Check the settings you have made by triggering a test e-mail with `Send Email` .

The setting `Email 4` is not used. It can be used, for example, to send files by e-mail via the web interface by specifying the file under `Message File` . You must specify the full path with file name.
Example (Measured data from 2014): http/14/ME1407.CSV

Under `Statistics` the e-mail transfer log can be viewed.

7.4 File access with FTP

During operation, all measured values and messages are stored in the flash memory of the Ethernet converter. Measured values and alarms are filed in the root directory, sorted by year. The use of an SD card is, therefore, unnecessary.

Monthly measured values (e.g. 07/2009) are stored in a file “ME0907.CSV”. Errors that occurred are stored in another file “AL0907.CSV”.

Access is possible using Windows Explorer on Windows PCs:

1. Enter the
   ftp://<IP address of the Testomat Pro>.
2. A window `Anmelden als` appears. Enter the username and password for FTP access (Standard: “admin”, “PASS”).
3. Afterwards, the file system of the Ethernet converter with the directory “http” is displayed in the explorer. This contains the measured values and notifications sorted by year.

7.5 File access with web interface

Measured values and notification files can also be downloaded via the menu `Filesystem → Browse` . All data for one month is stored in the folder http (subfolder for the corresponding year).

7.6 Evaluating the CSV files on the PC

NOTE

Data loss in the event of incorrect storage!
Do not save files for further processing in “CSV” format as this causes file formatting information to be lost.

- Always use the original software format for saving!

To analyse data, you can transfer the data to your PC by downloading it with the help of the web interface or via FTP transfer. The CSV files can be read/edited, e.g. using “Microsoft Excel”.

After opening the measured value file (e.g. ME090713.CSV) a picture appears on the monitor with all the daily measured values:

After opening the error file (e.g. AL090713.CSV) the following image appears on the monitor:

1	error message	date	time
2	SPANNUNGSAUSFALL	13.07.09	12:36
3	MESSBER. ÜBERSCHRITTEN	13.07.09	12:40
4	FST. OPTIK	13.07.09	12:57
5	WASSERMANGEL	13.07.09	13:02

Figure 28

7.7 Message forwarding to TCP/IP port

All notifications and measured values can also be forwarded on in CSV raw data format to any TCP/IP port for linking with devices and SPS.

You will find the settings in the menu `Line, Line 1 Configuration`:

- Interface: RS232
- State: Enabled
- Protocol: Tunnel
- Parity: None
- Data Bits: 8
- Stop Bits: 1
- Flow Control: None

- The settings for Gap Timer and Threshold need not be changed.

7.8 Perform network logger maintenance

Check the available storage space **every six months.**

1. In the menu `Filesystem → Statistics` select the menu item `Clean Space`.
   It displays the available storage space for log files.
2. If the storage space is too low (<20%), transfer the log files to a PC and then delete the files from the network logger. This will avoid data loss. The oldest data is automatically deleted if there is no more storage space.
3. In the menu, start the `Filesystem → Statistics` action `"Compact"`. This takes around 30 seconds and causes all files to be refreshed and old files to be removed.

7.9 Further documentation & help

A detailed explanation of the different network module capabilities can be found in the Lantronix User Manual on their website:
http://www.lantronix.com
under
Home » Products&Solutions » Embedded Solutions » Wired Device Servers » Serial To Ethernet » XPort Pro

Under “Downloads” you will find the *XPort Pro - User Guide*.

The program DeviceInstaller can be downloaded via
Home » Products&Solutions » Software Services , Device Installer.

8 Operation

8.1 Normal operation

The device has no power switch.
Use an external power switch to turn the unit on and off. The switch must be installed next to the device and must be marked as power switch for the device - for example with a label.

Delayed reaction:
During analysis, the response to any key presses may be delayed.

Handling of error messages/warning messages:
Eliminate the cause of the error and then acknowledge the message with the **Alarm** button.

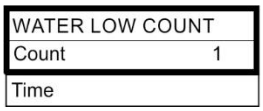
8.2 Operational monitoring: Alarm/Message

Error messages are adapted to the selected language, but can also be identified by an error number, regardless of the language used. All errors are, regardless of the settings made in this menu option:

- stored on SD card if `Storing of error messages` has been activated
- recorded in the error history (the last 20 error messages)
- and sent via the serial RS232 interface.

Detailed information on possible error messages as well as their cause and remedy is found in chapter 8.4 Troubleshooting and repair on page 61.

Water shortage



The water shortage error is a special case, since one further setting can be configured for this error. In the menu, under `Basic program => Water low count` the number of consecutively occurring errors before the alarm is triggered can be set. An error is then generated for each measurement cycle. The function `Water low count` is specially provided for systems subject to intermittent low water pressure errors, which trigger a water shortage error in the device.

1. For instant reporting, set the quantity to 0 or up to 250 measurement attempts until the error is reported.

Normally, the next measurement is started when there is a lack of water. An interval pause until the next measuring cycle can be set under .

8.3 Firmware update

8.3.1 Menu-driven firmware update

In the menu `Basic program => Firmware update` the operating software of the Testomat®- device is updated. For this purpose, you need an SD card. During the firmware update, the red LED lights up next to the SD card plug-in slot (which indicates that the so-called bootloader is active).

NOTE

Handling may cause damage or destruction of electrical components!
If you have to open the equipment's top door, electrical components may be damaged or destroyed by electrostatic discharge.

- Take appropriate precautions to avoid electrostatic discharge (ESD protection).
- Make sure you are earthed before opening the casing.

Implement the firmware update as follows:

FIRMWARE UPDATE
Start

1. Download the firmware update for the Testomat® PRO CLF from the Heyl website.
2. Save the firmware in the root directory of the SD card to be inserted into the Testomat® PRO CL.
3. Insert the SD card into the Testomat® PRO CL.
4. Select the menu `Basic program => Firmware update`.
5. Confirm the selection with **OK**.
6. Select the filename of the update. If only one file exists, only confirmation is required.
7. Confirm the selection with **OK**.
8. The Testomat restarts and implements the update. In this mode, although no text is output, the status is indicated via the LEDs of the SD card (see figure 29) as well as those on the control card (see figure 31 on page 64). The programming progress is indicated as bars with five LEDs on the control card: Initially, only LED1 flashes (in the vicinity of the plug connector to the motherboard) slowly (once every two seconds) and later permanently, whereupon the next LED begins flashing. The process is repeated until all LEDs light up permanently. The firmware update is now complete. The Testomat is started automatically with the new operating software. The complete firmware update takes around 70 seconds.

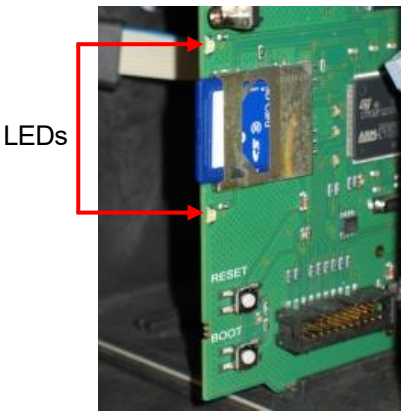


Figure 29

Possible errors:

If both LEDs flash or light up next to the SD card, there is a problem with the SD card itself. The update could not be started. The existing firmware remains unchanged.

If the LEDs next to the SD card are inactive, but the LEDs on the control card flash quickly (10x per second), an error has occurred during the update.

Obtain the settings after the firmware update

After a firmware update, the device may be in an undefined state. After a firmware update, basic programming should therefore always be performed. If the settings have been preserved, it is advisable to export the settings onto the SD card before the firmware update and after the firmware update, to import the saved settings. The set password is preserved even after the firmware update.

During the update a file called "update.txt" is written onto the SD card, which includes a record of the update progress and any errors having occurred in the process. Open these files with your editor of choice (e.g. Notepad), to read the relevant content. The file is not deleted but supplemented. If the same SD card is always used for a device, it will provide an overview of all the firm-ware updates performed for the device in question.

8.3.2 Manual firmware update

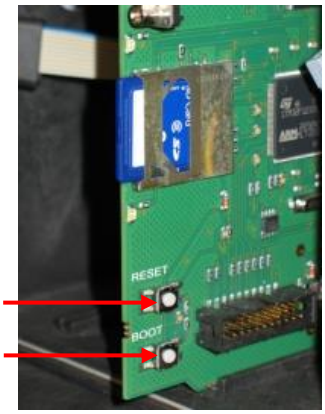
The manual firmware update facilitates the recovery of software after failed firmware updates. The display and device buttons are not used in the process. For the manual firmware update, an SD card with the firmware file must be inserted in the equipment.

NOTE

Handling may cause damage or destruction of electrical components!
If you have to open the equipment's top door, electrical components may be damaged or destroyed by electrostatic discharge.

- Take appropriate precautions to avoid electrostatic discharge (ESD protection).
- Make sure you are earthed before opening the casing.

When performing a manual firmware update, proceed as follows:



1. Press and hold **BOOT** (1) on the control card. Then briefly press the **RESET** button (2).
2. Release **BOOT** when the update starts.
   ➤ The update process progresses automatically. Progress is shown by the LED lights. In case of several software versions on the SD card the newest version is loaded.

Possible errors:

- If both LEDs flash or light up next to the SD card, there is a problem with the SD card itself. The update could not be started. The existing firmware remains unchanged.
- If the LEDs next to the SD card are inactive, but the LEDs on the control card flash quickly (10x per second), an error has occurred during the update.

8.3.3 Firmware update Ethernet converter

The integrated Ethernet converter can be updated to the latest software version via the network. To update, you need a PC with network access to the Testomat and its IP address.

The process is as follows:

1. Download the update in the download section of the Heyl website.
2. Unzip the zip archive on the PC.
3. Start the executable program.
   ➤ Files are extracted and the update process begins after entering the IP address. The process takes about a minute. The program displays the progress.
4. Restart the converter.

8.4 Troubleshooting and repair

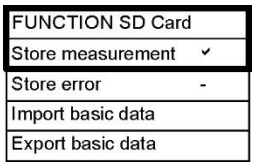
NOTE

No error messages for the PeriClip pump!
No error messages are displayed for the PeriClip pump.

- If you encounter measurement issues, check the pump's functionality yourself (e.g. using the diagnostic function in the service menu).

Once a protective device has been triggered (safety fuse), initially try resolving the cause of error (e.g. by replacing a defective valve), before reactivating the protective device. Frequent triggering always signifies an error, which under certain circumstances may also damage the device.

Errors will be recorded in the error history as far as capacity allows (after which the oldest message will be deleted). In addition, error messages can be stored on the SD card. Process as follows:



1. Select `Basic program => Function SD-Card => Store error`.
2. Activate the function with **OK**.

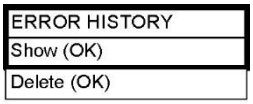
Details of errors are always sent via the serial RS32 interface. Errors are handled differently depending on type:

All errors, for which user access is required to recover the function of the device, are shown as alerts. In addition, an alarm may be triggered. However, it is not possible to completely disable the message, since the selection "–" is locked in the menu. In the event of such error occurring, the device reverts to pause mode. When these errors are acknowledged with the **Alarm** button, they are deleted, and the pause mode can be ended. In the event of any recurrence, the set action (message or alarm) is again triggered. For such errors, the time of occurrence is recorded in a log.

All errors that occur only intermittently, which means they impact only on the analysis process, are cyclically checked by the device and automatically deleted when no longer present. If these error messages are acknowledged, only the alarm is deactivated. The error message is not, however, deleted. It is deleted only when the error no longer occurs

after rechecking (namely, during the following analysis, either automatically or when manually started). These errors can also be ignored when in the menu Alarm/message – is selected.

In the error history the start and end time are logged. Likewise, two notification messages are written via the serial interface and onto the SD card with the start and end times of the error. Regardless of the case, the analyses are continued. Access the error history as follows:



1. Select `Service => Error History` to call up error history.
2. Select `Show(OK)`, to show the list of error messages.
3. Confirm the input with **OK**.
4. Select an error message from the list using the arrow keys.
   ➤ The time and date of the occurrence are shown.
5. Again, press **OK**.
   ➤ Now – depending on the error type – the start and end of the error are shown.
   If the error remains current, no end time is registered.
6. To delete the entire list, select `Delete(OK)  20`.
   ➤ The number indicates the number of stored notifications.
   The error history has room for up to 20 notifications.

The following errors may occur and can be corrected as described. The troubleshooting measures may only be carried out by employees who have the requisite qualifications as described in chapter 1.3.3 Qualification of personnel on page 3. If you have any questions, contact your sales representative. The contact details of the distributor companies can be found at www.heylanalysis.de/en/contact .

Error number/error message	Description, possible causes	Solution, troubleshooting measures
`01 Power failure`	• Prior power failure (also when switching off)	– Check power supply
`02 Power failure 24 V`[1]	• Failure of the internal 24V power supply	– Replace 24V fuse – For all other defects, the device must be repaired
`14 Battery empty`	• Device was switched off and backup battery for clock is empty	– Lithium battery is used up. – Replace battery (see chapter Replacing the backup battery on page 74).
`05 SD Card n. inserted`	• The function to store measurement values and/or error was activated, but no SD card was inserted	– Insert SD card
`06 SD Card w. protected`	• Card is write-protected	– The write-protect tab at the side of the SD card must not be set to "LOCK"
`07 SD Card unformatted`	• Card not formatted or formatted with an invalid file system	– Format the SD card with a FAT or FAT32 file system
`08 SD Card full`	• Error when accessing SD card, because the file is write-protected, or the card is full or defective.	– Remove the write protection of the file – Wipe the card – Insert new card

Error number/error message	Description, possible causes	Solution, troubleshooting measures
12 Meas. range exceeded	• The measurement scope is exceeded	
13 Service exceeded	• The maintenance interval was exceeded	– Perform maintenance
29 Fault Dosing pump 2[1]	• The dosing pump DosiClip is defective • No dosing message from dosing pump	– Check the cable to the dosing pump to ensure a correct connection – Replace dosing pump
33 Fault optics[1]	• Error in the optical unit (light source or receiver defective)	– Swap measuring chamber mounting
34 Fault turbidity	• The water is too cloudy / soiled	– Install an upstream water filter
35 Fault soiling	• Sight glasses are soiled	– Clean sight glasses
36 Fault analysis[1]	• No correct analysis, e.g.: Air in dosing hoses? • Insufficient mixing • reagent expiry date exceeded • Foreign reagent in the device	– Re-tighten dosing pump connections Renew intake insert in bottle – Check suction and pressure hose for damage – Replace stirring bar – Replace reagent, only use Heyl Testomat® reagent
97 Reagent A <10% 99 Reagent B <10%	• Reagent minimum quantity 10 % has not been reached	– Check reagent fill level – Insert new reagent bottle – Reset reagent fill level
38 Water low[1] [2]	• No water intake despite permanent lamp IN • Intake pressure too low • Water remains in the measuring chamber, despite the lamp OUT lighting up	– Check water inflow – Plug at the inlet valve corroded or valve blocked: Replace valve block – Clean filter sieve – Remove the pressure regulator core – Outlet valve blocked or defective. Clean or replace valve – Inflow must be at least 400 ml/min
39 Ext. light influence	• Photo sensor not darkened • Permanently illuminated LED in measuring chamber	– Shut the device door – Avoid sunlight – Hardware problem. Send device for repair.
98 Reagent A empty 100 Reagent B empty	• No more reagent available. Unit stops	– Check reagent fill level – Insert new reagent bottle – Reset reagent fill level

Table 18

[1] Device reverts to pause mode until the error is acknowledged

[2] The error Water shortage is treated as a special case here, as this is the only case in which the number of consecutively occurring errors in the menu `Basic program => Water low count` can be adjusted until the relevant alarm or message is triggered. One error is generated per measurement cycle.

8.4.1 Further possible errors

Error pattern	Possible causes	Solution, troubleshooting measures
Current interface does not function properly	• Incorrect measurement value at the output or no current measurable	– Load too large
The device does not function immediately after being switched on. No display indication. LEDs on control card flash	• Hardware error or error after firmware update, depending on the LED code shown. See chapter 8.4.2 Error messages after self-test on page 65	– If an SD card has been inserted, these notifications are stored in text form in the error log – even when the error recording function is not active.
The device does not function immediately after being switched on. No display indication. Red and yellow LEDs next to the SD card flash alternately.	• Firmware update starts, but no SD card has been inserted	– Insert the SD card with the firmware file and switch on the device.
The device does not function immediately after being switched on. No display indication. Two red LEDs on the control card flash quickly	• Firmware update starts, but no firmware file was found on the inserted SD card	– Download the firmware file from the Heyl website and copy the file onto the SD card.
Device does not function, even though it is switched on. No display indication All three green LEDs on motherboard light up*	• Ribbon cable detached from display board or motherboard • Error on display- or motherboard	– Plug ribbon cable back in – Replace display- or motherboard
Device does not function, although it is switched on No display indication Fewer than three green LEDs on the motherboard light up*	• No power supply • Fuses on the power supply board defective	– There is no power supply. – See chapter Replacing fuses on page 72

Table 19

* For position of the LEDs, see figure 34 of control circuit board.

8.4.2 Error messages after self-test

When switched on, the Testomat® PRO CLF performs a self-test automatically and then monitors its own state continuously. If the LEDs on the **control card** flash quickly after switching on, one of the errors in table 18 has occurred and can be identified by the LED signal.
In addition, the error message is placed on the SD card in the error log, even when the `Store error` function is inactive.

LED1	LED2	LED3	LED4	LED5	Error number/text in alarm log on SD card	Solution, troubleshooting measures
☼	○	○	○	○	500 CTRL-FRAM_IC2	1. Defective component. Repair/exchange required.
○	☼	○	○	○	504 DS1803_FLEX_GAIN_IC6	See 1.
☼	☼	○	○	○	520 PCA8574A_FLEX_MS_IC5	See 1.
○	○	☼	○	○	521 ADS7823_FLEX_ADC_IC11	2. Loose cable between motherboard and display? If not: Defective, repair required.
☼	○	☼	○	○	522 MAX5550_FLEX_D1D2_IC8	See 2.
○	☼	☼	○	○	523 MAX5550_FLEX_D3D4_IC9	See 1.
☼	☼	☼	○	○	508 PCF8574A_MB_IN_IC3	See 1.
○	○	○	☼	○	509 PCF8574A_MB_OUT_IC4	See 1.
☼	○	○	☼	○	507 PCF8574A_MB_OUT_IC5	See 1.
○	☼	○	☼	○	515 MAX6956_HMI_KEYS_IC2	See 1.
☼	☼	○	☼	○	514 MAX6956_HMI_LED_IC1	3. Character set or menu language could not be read. Internal SD card inserted and locked? If yes, perform firmware update again. If the error persists, a repair is required.
○	○	☼	☼	○	524 DAC7750_ADI_IC3	4. Check the seat of the ADI card, replace if necessary Function I1OUT faulty
☼	○	☼	☼	○	525 DAC7750_ADI_IC4	See 4. Function I2OUT faulty
○	☼	☼	☼	○	526 PCA8574A_ADI_IC5	See 4. Function I1OUT and I2OUT faulty
☼	☼	☼	☼	○	510 Font file	See 3.
○	○	○	○	☼	511 Font info	See 3.
☼	○	○	○	☼	512 Font char	See 3.
○	☼	○	○	☼	513 Language file	See 3.
☼	☼	○	○	☼	514 Language header	See 3.
○	○	☼	○	☼	515 Language info	See 3.
☼	○	☼	○	☼	516 Menu entry not found	See 3.
○	☼	○	☼	☼	517 Language magic	See 3.
☼	☼	○	☼	☼	518 FIFO overflow	Buffer of the serial interface overflows. Increase the baud rate.

Table 20

☼: Rapidly flashing LED (around 10 Hz). LED1 is below or next to the plug connector to the motherboard.

8.4.3 Firmware update error list

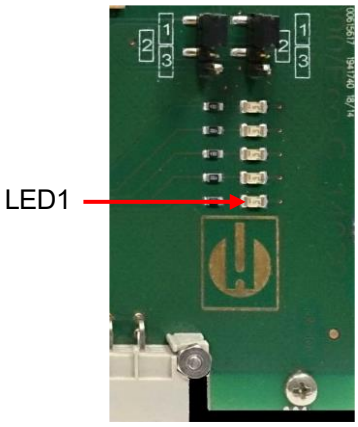


Figure 31

Firmware update error und error after self test can be distinguished using the red LED next to the SD card. If the LED lights up, the bootloader is active, and the error concerned occurred during the firmware update. If the LED is inactive, it is an error after the self-test. The error category is based on the number of simultaneously flashing LEDs on the control card (for the precise error description, refer to the following table). Under normal cases, a firmware update is completed within 70 seconds.

The following options are available:

- **All five LEDs flash quickly**: SD card cannot be read. Replace card. If the attempted replacement fails, there is a defect on the control card. Contact customer support; the device must be repaired.
- **Three or four LEDs flash quickly**: Defect on the control card. Contact customer support; the device must be repaired.
- **Two LEDs flash quickly**: The file for the firmware update was found but is invalid or defective. Re-download the file.
- **One LED flashes quickly**: Problem with SD card (Write protection, formatting).
- For the Testomat® PRO CLF the filename should correspond to the following format: "146M001S00.UPD", where 001 is the version number, which increases incrementally as new versions are released.
- **LED bars not extended:** They revert to the original configuration after some time has elapsed and start from scratch: The means that during the programming, an error was detected and an attempt was made to resolve the error by repeating the update process. The entire programming process is repeated up to five times. For each repeat, the entire programming process is relaunched from the start, whereupon the LED bars "emerge". If, after five attempts, it is still impossible to perform any successful update, the LEDs show an error corresponding to the list on the following page. The device or the control card requires repair. Also send – particularly in this case – the content of the log file on the SD card "update.txt" with the item or enclose the SD card with the device.

LED1	LED2	LED3	LED4	LED5	Error number/text in update.txt on SD card	Solution, troubleshooting measures
☼	○	○	○	○	900 No SD-Card inserted	Insert SD card, restart firmware update
○	☼	○	○	○	901 SD-Card write protect	Confirm write-protect tab on the side of the card, restart firmware update
		☼	○	○	902 SD-Card init. failed	Re-insert SD card, restart firmware update. In the event of multiple failures, a defect is present and repair is required.
○	○		☼	○	903 SD-Card unformatted	Format SD card, restart firmware update
☼	☼	☼	☼	☼	904 SD-Card read error	Inserted SD card defective. Initially replace card. If the defect persists, even after the replacement: Repair
☼	☼	☼		☼	905 PCB SD read error	Internal micro SD card defective: Repair
	☼	☼	☼	☼	906 PCB SD write error	Internal micro SD card defective: Repair
☼	○	☼	☼	☼	907 PCB SD init failed	Internal micro SD card defective: Repair
☼	☼	○	☼	☼	908 FRAM read error	Read error in internal I²C FRAM: Repair
☼	☼	☼	☼		909 FRAM write error	Write error in internal I²C FRAM: Repair
		☼	☼	☼	910 Flash control busy	Initialization error STM32 Flash: Repair
○	○☼	☼	☼		911 Flash program error	Programming error STM32 Flash: Repair
☼	☼	☼			912 Flash write protect	Write protection STM32 Flash: Repair
☼	☼			☼	913 Flash timeout	Timeout STM32 Flash: Repair
☼	☼				914 UPD file invalid	Invalid update file. Re-download
	☼	☼			915 UPD sec invalid type	Section in update file defective: Re-download
		☼	☼		916 UPD sec invalid start	Start info in update file defective: Re-download
			☼	☼	917 UPD sect invalid len	Length info in update file defective: Re-download
☼		☼			918 UPD CRC error	Checksum error in update file: Re-download
☼			☼		919 UPD wrong version	Incorrect version of the update file: Download the correct file for the appropriate device
				☼	920 File not found	Update file on SD card not found: Recopy
	☼		☼		921 App invalid	Application invalid
		☼		☼	922 App address invalid	Application start address invalid
☼				☼	924 No language file	Language file missing: Reprogram with new update file
	☼			☼	925 Language magic wrong	Language file missing: Reprogram with new update file
☼			☼	☼	926 Error mem alloc	Storage error: Repair
	☼		☼	☼	927 Assertion failed	Software error: Repair
☼		☼		☼	928 Unknown error	Unknown error: Contact support department, repair

Table 21

☼: Rapidly flashing LED (around 10 Hz). LED1 is below or next to the plug connector to the motherboard.

8.5 Troubleshooting network connection

Error pattern	Possible causes	Solution, troubleshooting measures
The network connection via web browser works, but it asks for an unknown login:	• Wrong user or wrong password	– The factory set username “admin” has the password “PASS”.
No connection via web browser	• Does the LED on the motherboard light up after the unit is switched on? • Does the LED on the equipment light up green on connection to the network? • Test the connection with “ping <IP address” of the Ethernet converter>.	– If they are not all lit, parts of the equipment are not powered. Check the maintenance manual to see which fuse needs to be changed. – If not, there is no network connection. Check the cable and connection at the switch. – If this fails, try to determine the current IP address. If you cannot determine it, use the DeviceInstaller to search the network logger in the network. If the DeviceInstaller fails to find a network logger and the network has been checked, a null modem cable can be connected to the serial port of the Testomat® in order to use the DeviceInstaller in serial mode. To do this, set the jumper on the circuit board to the middle position. After configuration, set the jumper back to position 3.
C) The Ethernet converter website does not work, no updates occur:	• Check whether JavaScript is activated in the browser. • Check if the jumper on the control board is plugged in position 3	– Activate JavaScript in your browser. – Set the jumper to position 3.
Nothing works any more:	• The settings were changed in error.	– Load the start configuration on the configuration page in the XML menu, `Import Configuration → Configuration from FileSystem → Filename: default.xml`.
The e-mail sending function does not work because there is no setting for user and password.	• The Ethernet converter only supports dispatch via so-called open SMTP servers that do not require a password. Authentication is not used.	– Ask your system administrator whether there is an open gateway available within the company network. Such gateways often exist internally for sending status notifications, e.g. UPS.
The network access works perfectly, the Testomat® also functions, but measured values and messages are never displayed:	• Check if the jumper on the control board is plugged in position 3	– Set the jumper to position 3.

Table 22

9 Servicing and maintenance

WARNING

Risk of (chemical) burns from cleaning agents!
Contact with the cleaning agents used may cause (chemical) burns.

- Ensure to observe the safety instructions when handling the cleaning agents!

NOTE

Danger of soiling!
The surface of the equipment is untreated. Therefore, avoid instances of contamination with reagent, oil or grease.

- If the housing is still dirty, clean the surface with isopropanol.
- Never use other solvents.
- Use only a dry, lint-free cloth.

To ensure problem-free function of the device, regular maintenance is required!

Ensure at least the following specified maintenance work is performed regularly, if

- the device shows the error message `Fault soiling`
- the device shows the error message `Reagent low`
- The most recent maintenance was a maximum of six months earlier

A detailed description of the maintenance work can be found in the maintenance manual. The measures described here only constitute an overview. For all additional maintenance instructions, refer to the Testomat® PRO CLF maintenance manual.

9.1 Leak resistance test

NOTE

Water damage due to leaks!
Water leakage at sealing points can cause damage to the equipment.

- Test the unit regularly for leaks.

The equipment must be checked for leaks before the first analysis and after any maintenance work. Proceed as follows:

1. Switch the device to **Pause**.
2. Fill the measuring chamber during manual operation.
3. Measure out the reagent dose by hand. To do so, press the **Manual** button on the dosing pump.
4. Check the connections and sealing points for leakage.

9.2 Replacing reagents

⚠ WARNING

Risk of (chemical) burns from reagents!
Contact with the reagents used may cause (chemical) burns.

- Use protective goggles and gloves before handling reagents containing acids and alkalis.

With the error message `Reagent low` or if the maximum shelf life of the reagent is exceeded, it must be replaced. Proceed as follows:

1. Open the lower housing door by pulling on the right side.
2. Unscrew the closing cap of the reagent bottle.
3. Remove the empty reagent bottle.
4. Insert the new reagent bottle (see chapter 5.2.1 Insert reagent bottle on page 32).

When refilling or replacing the reagent bottle, the reagent level must be reset. Proceed as follows:

REAGENT LEVEL	
A:To adjust	100%
B:To adjust	100%
Cleaning solution	100%

1. In the menu, select `Service => Reagent level`
   `=> A: To adjust 100%`
   `=> B: To adjust 100%`
   `=> Cleaning solution 100%`
   the reagent that is to be changed.
2. If only the fill level should be reset, confirm the fill level with **OK** or
3. change the value of the fill level with the cursor keys and subsequently confirm with **OK**.

9.3 Cleaning measuring chamber and sight glasses

⚠ WARNING

Risk of (chemical) burns from cleaning agents!
Contact with the cleaning agents used may cause (chemical) burns.

- Ensure to observe the safety instructions when handling the cleaning agents!

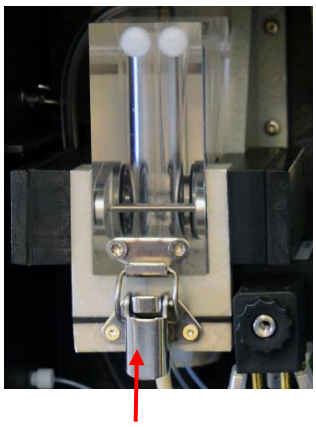


Figure 32

The measuring chamber and the viewing panels must be cleaned every 3 months. If the measurement scope of the device is exceeded for an extended period, this may result in the formation of a coloured film on the viewing window. This firmly adhering film can be easily removed using isopropanol. Perform the cleaning as follows:

1. Switch off the device or press the **Pause** button.
2. Check that the measuring chamber is completely emptied.
3. Connect the manual valve of the secondary line to the Testomat® PRO CLF.
4. Release the spring lock (see figure 32), tilt the measuring chamber upwards and take it out.
5. Remove both the sight glass holders (see figure 33).
6. Remove the sight glasses for cleaning.

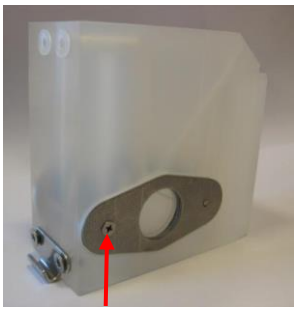


Figure 33

7. Remove the film on the sight glasses with isopropanol.
8. Clean the measuring chamber with 10 percent hydrochloric acid.
9. Rinse the measuring chamber thoroughly.
10. Reinsert the sight glasses after cleaning.
11. Fix the sight glasses in place with the sight glass holders (see figure 33).
12. Do not forget to insert the O-ring seals and be careful to ensure correct fitting in the groove.
13. Put the measuring chamber back in place by tilting the unit.
14. Secure the measuring chamber with the spring lock.

9.4 Cleaning the filter housing

⚠ WARNING

Risk of (chemical) burns from cleaning agents!
Contact with the cleaning agents used may cause (chemical) burns.

- Ensure to observe the safety instructions when handling the cleaning agents!

The filter housing must be cleaned every 6 months. Clean the filter housing as follows:

1. Connect the manual valve of the secondary line to the Testomat® PRO CLF.
2. Press the **Pause** button and wait until the current measurement has finished.
3. Release the piping system of the Testomat® PRO CLF with the function `Internal flush` manually.
4. Switch off the device.
5. Remove the hose connections on the filter housing.
6. Unscrew the inlet connector.
7. Remove the seal, spring and filter.
8. Clean the seal, spring and filter.
9. Remove the retaining pin and extract the flow regulator.
10. Remove the flow governor core.
11. Clean the filter housing with water or isopropanol.
12. Reassemble the filter housing so that the filter screen is inserted with the tip facing downwards.
13. Attach the hose connections to the filter housing.



Figure 34

9.5 Replacing fuses

NOTE

Handling may cause damage or destruction of electrical components!

If you have to open the equipment's top door, electrical components may be damaged or destroyed by electrostatic discharge.

- Take appropriate precautions to avoid electrostatic discharge (ESD protection).
- Make sure you are earthed before opening the casing.

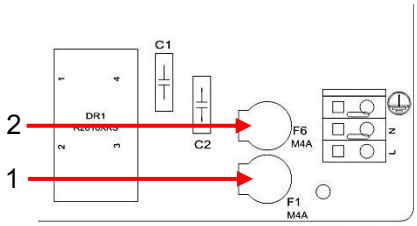


Figure 35

Device fuses (internal)

These fuses protect the Testomat® PRO CLF device or outputs against overload and short circuit. All fuses are pluggable. The main fuses F1 (1) and F6 (2) (4 A MT) for outputs and equipment are located on the motherboard (see figure 36). The power pack includes the four primary and secondary fuses, F2 to F5 for 24V and 12V, 3.3V

Multi-range power supply board 100 – 240 V

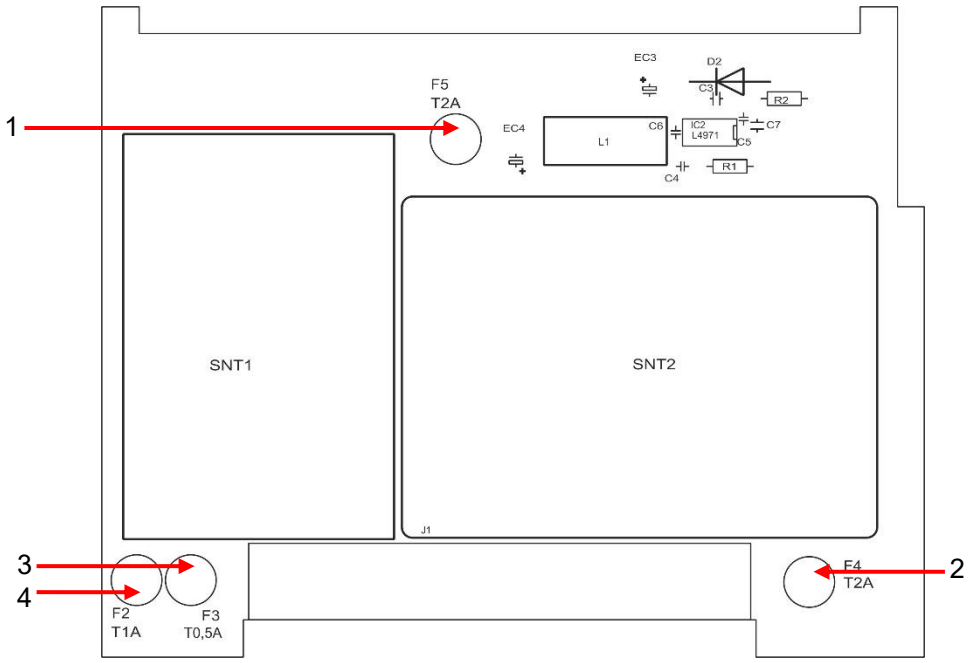


Figure 36

	24 V	12 V / 3,3 V
Primary	(4) F2: 1 A/T	(3) F3: 0,5 A/T
Secundary	(2) F4: 2 A/T	(1) F5: 2 A/T

Table 23

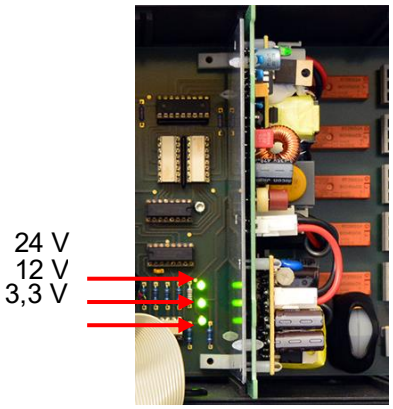


Figure 37

Exchange

If not all three green LEDs on the motherboard light up, at least one fuse is defective (see figure 37). The supply voltage unit is next to the LED, which indicates its status. You will need the following to switch out a fuse:

- A Phillips-tip screwdriver
- Flat-tip screwdriver
- Replacement fuses

To find the defective fuse, proceed in accordance with the trouble-shooting scheme:

Step	LED / lamps	Action
1	Open up the device at the top and switch it on. Does at least one LED light up?	No → Step 2 Yes → Steps 5, 6
2	Does the power supply work and is a permissible voltage measured between N and L?	No → Service Yes → Step 2a
2a	Is the voltage measured in step 2 also measured between n and l?	Yes → Step 4 No → Step 3
3	Primary fuse F1 od F6 on the motherboard defective.	– Disconnect device from the mains! – Remove cable compartment cover (Phillips-tip screwdriv-er). – Use a flat-tip screwdriver to turn and rotate the safety cover. – Replace safety fuse 4A – Put safety cover back in place. – When switching on the Testomat device, check whether all three green LEDs light up. Otherwise, restart from Step 1..
4	Fuses on the power supply board defective.	– Disconnect device from the mains! – Remove both fixing screws of the upper and lower power supply board on the motherboard. – Remove the power supply board. – Change the plug-in fuses F2, F3, F4 and F5. – Re-insert the power supply board. – Assemble both fixing screws – When switching on the Testomat device, check whether all three green LEDs light up. Otherwise, restart from Step 1.
5	3.3V + 12 V do not light up	– Disconnect device from the mains! – Remove both fixing screws of the upper and lower power supply board on the motherboard. – Remove the power supply board. – Change the plug-in fuses F5 (T1,6A) and F3 (T0,16A). – Re-insert the power supply board. – Assemble both fixing screws – When switching on the Testomat device, check whether all three green LEDs light up. Otherwise, restart from Step 1.

Step	LED / lamps	Action
6	24V does not light up	– Disconnect device from the mains! – The fuse F4 is located at the top edge of the power supply board. Change the plug-in fuse F4 (T2A). – When switching on the Testomat device, check whether all three green LEDs now light up. Otherwise, F2 (T0,315A) must also be changed: – Remove both fixing screws of the upper and lower power supply board on the motherboard. – Remove the power supply board. – Change the plug-in fuse F2 (T0,315A). – Re-insert the power supply board. – Assemble both fixing screws – When switching on the Testomat device, check whether all three green LEDs light up. Otherwise, restart from Step 1.

Table 24

9.6 Replacing the backup battery

NOTE

Handling may cause damage or destruction of electrical components!

If you have to open the equipment's top door, electrical components may be damaged or destroyed by electrostatic discharge.

- Take appropriate precautions to avoid electrostatic discharge (ESD protection).
- Make sure you are earthed before opening the casing.

When the device is switched off the internal clock is powered by a lithium backup battery (CR2032 type), which is designed to have a service life of 10 years. After this period, it should be replaced for preventive reasons, and always ensuring a measured voltage <2.3 V.

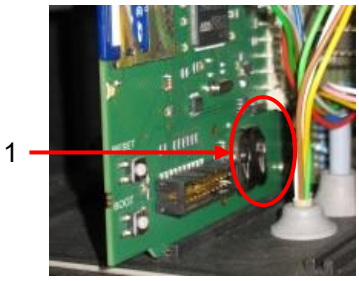


Figure 38

The following is required when replacing the battery:

- A Phillips-tip screwdriver
- A replacement battery CR 2032

Replace the battery (1) as follows:

1. Switch off the device and disconnect it from the power supply.
2. Open the upper housing door.
3. Remove both fixing screws (2) of the upper and lower control card on the motherboard.
4. Remove the control card.
5. Using a non-conductive tool, carefully prise the used battery out of its mounting. Avoid damaging the circuit board with the sharp edge of a screwdriver.
6. Insert a new battery.
7. Reconstruct the circuit board by following the steps for dismantling of the same in reverse.
8. Reset the time after changing the battery.

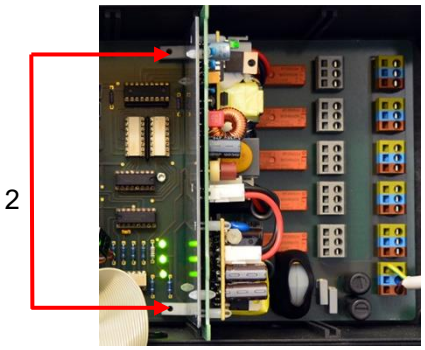


Figure 39

10 Accessories, consumables, spare parts

10.1 Spare parts

Art. no.	Pressure regulator
40125	Controller / filter mounting, complete
40120	Controller / filter mounting
40129	Controller plug, complete
11225	Flow governor core complete
11270	Locking pin 3x50 / 135 degrees
11217	Filter sieve for inflow 19.5dx25
11218	Spring for inflow
40121	Inlet connection
40153	Male connector G 1/4" -6
40157	Angle male connector G 1/8"
	Measuring chamber
40173	Sight glass window with seal,
40170	Sight glass window 30x3
40176	Sight glass holder
33253	Screw M3x40, A2, DIN 965
40032	Latch fastener TL-17-201-52
11210	Plug for measuring chamber
40022	Measuring chamber 4 inlets complete
	Measuring chamber holder
40706	Measuring chamber holder QUAD cone, machined
40050	Magnetic stirrer
40156	Screw-in connector 3/8“ -10
34620	Solenoid valve, media isolated, 2/2-way
	Dosing pump DosiClip®
40001	Dosing pump DosiClip SP
40011	Hose, suction, complete
40016	Hose, pressure, complete
40040	Valve set
32046	Plastic cover CNH 45 N
	Dosing pump FlowClip®
270440	Dosing pump FlowClip, tested
	Dosing pump Peri Clip
270430	Dosing pump PeriClip complete
37542	Seal for hose adapter length 5mm
37643	Hose connector with hose olive diameter 2.4 mm

Art. no.	Bottle connection/suction device
40131	Screw cap with Insert
40130	Screw cap GL32 - hole
40135	Insert with screw cap and suction pipe
	Device spare parts
31582	Fuse GS-M 5x20E 4A MT
31655	Fuse T2A (24V)
12140	Fuse T1.6A (12V/3.3V)
31622	Fuse T0.16A
31585	Fuse T0.315A
32396	Circuit board T-Pro GP kpl.
32406	Circuit board T-Pro HMI kpl.
32398	Circuit board T-Pro ADI kpl.
32345	Circuit board T-Pro_C, kpl.
37734	Cable ducting M16 x 1,5
37735	Nut for cable ducting M16 x 1,5
37736	Blanking plug for cable ducting
37831	Ribbon cable
31656	Jumper/coding link
40060	Cable loom 2V for
40063	Cable loom 4P for
40064	Cable loom power supply 2nd pump
37320	Standard SD card
31999	Lithium backup battery CR2032
32394	Switching power supply board 100V – 240V
32187	Drain funnel
	Spare parts required for 2 - 3 years of operation
40173	Sight glass window with seal,
11217	Inlet filter 19.5dx25
40124	Seal kit

Table 25

10.2 Accessory

Art. No.	Description
040187	Connector set: Cock, hoses, reducers
130010	Aerator type R for Testomat devices
270352	Service set including flow controller
270410	MepuClip booster pump
040123	Conversion kit for water intake *)
270334	Maintenance case Testomat Pro
040248	Self Clean retrofit kit

Table 26

***) Conversion kit for water intake, Art. No. 040123**

When using fabric pressure hoses (e.g. for existing installations), replace the plug connection on the controller and filter housing for a plug for the quick-release coupling (not included in the delivery scope).

A current device overview of the available accessories can be found in details of our delivery scope.

10.3 Consumables

Reagent type		Quantity	Art. No.
Testomat Chlorine reagent set F	Reagent A and B	100 ml	156233
Self Clean cleaning solution	Cleaning solution	500 ml	151105

Table 27

Please note that the cleaning solution is only suitable for removing lime deposits. The cleaning solution is only required if the *self-clean* option has been installed in the appliance.

11 Information on the repair of products and exchange of parts

The repairing of defective equipment is – regardless of the warranty period – only possible in a dismantled state and with a description of the fault. In addition, tell us the type of reagent currently used and the medium measured. Do not carry out any manipulations on the equipment that go beyond the handling described in these operating instructions; otherwise, the warranty will be voided. This applies, in particular, to the measuring chamber holder, the seal of which must not be damaged.

When sending the equipment for repair, proceed as follows:

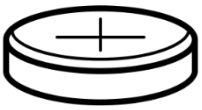
1. Note the type of error (error number, error effect, log file of the SD card).
2. Empty the measuring chamber completely.
3. Remove the reagent bottle.
4. Remove the drain funnel.
5. Flush the pump hoses with water.

If you have any questions, contact your sales representative. The contact details of the distributor companies can be found at www.heylanalysis.de/index.php/de/en/contact.

12 Required information when the product is no longer needed

Dispose of the device in accordance with the regulations of your country.

Batteries



The unit contains a removable lithium battery (CR2032 / 3V) from VARTA or an equivalent.

Batteries must be disposed of separately from the equipment! Dispose of the batteries according to the guidelines of your country.

Check list Testomat® PRO CLF

Dear customers and service technicians,
The following checklist is no substitute for your expertise and experience applied to the process of troubleshooting. It should assist you and facilitate swifter and more systematic detection and logging of errors. No claim of completeness may be inferred from this list. We are grateful to receive supplementary feedback at any time. General operating instructions are included on the rear of this checklist.
Your device manufacturer

Block 1 / System and device data

	Testomat® PRO CLF				
System type	Device type	Device number	Reagent type	Software version	Pump No.

Block 2 / error message and error history — Place a cross as appropriate (X)

What does the error history of the device indicate?			(Text of the error history)
Does an error message appear on the display? e.g. "Water low" etc. (See instruction manual "Error messages / Help dealing with faults")	Yes	No	(Text of the error message)

Block 3 / Visual and functional check	Place a cross as appropriate (X)			where applicable values / comments
Is the mains voltage for the device in accordance with the type plate?	Yes		No	
Does an indication appear on the display?	Yes		No	
Do the three green LEDs light up to indicate the stresses on the motherboard?	Yes		No	
Do LEDs flash on the control card?	Yes		No	Which LED?
Are the measuring chamber and hoses carrying water leakproof?	Yes		No	
Is the measuring chamber clean and free of film?	Yes		No	
Is the water pressure in the stipulated range (400 ml/min)? (See type plate of the device)	Yes		No	System pressure:
Is the outflow over the entire length laid to ensure no back pressure? (No "siphon effect"!!)	Yes		No	
Is the drain hose free? (Micro-organisms due to contamination etc.)	Yes		No	
Is the purge cycle / rinsing water quantity set such that Fresh water can always be measured?	Yes		No	Purge cycle:
Are the hoses to the dosing pumps free of air bubbles? (Operate pump by hand / Perform manual analysis)	Yes		No	
PERFORM A (MANUAL) ANALYSIS				
Does the water level rise uniformly when filling the measuring chamber up to the overflow hole (5 mm under the top edge of the measuring chamber)? (If no: check water pressure, water flow/flow regulator)	Yes		No	
Does the pumps dose when an analysis is triggered? (LED on the pump comes on!)	Yes		No	Number of dosing strokes:
After the dosing process, are the reagents correctly mixed with the water in the measuring chamber? Check the stirrer!	Yes		No	
PROGRAMMING DATA / OPERATING CONDITIONS				
Are the configured limit values correct? (Within the measurement range/corresponding to the performance limit of the system?)	Yes		No	Limit values:
Is the Testomat continually supplied with mains voltage – except during maintenance work/emergency cases? (Intermediate switching off only with "PAUSE" button or "Stop"! input)	Yes		No	

More details of error messages and possible causes of errors can be found in the **operating instructions** under chapter 8.4. Troubleshooting and repair.

After performing these tests, experience supports the assumption that the checked functions (Block 3) work flawlessly if the questions are answered with "Yes". We recommend carrying out these tests systematically during each inspection or any disruptions which arise.

Device settings Testomat® PRO CLF

Caution!
Your settings may be deleted in the event of a repair. There are several ways to save the settings:

- Export your equipment settings to an SD card before sending the equipment to our service team for repair. The settings can be imported again after the repairs have been completed
- Copy or print the menu displays for Service and Basic program and mark the settings that deviate from the standard.

Menu	Settings
MODE OF OPERATION	
Time controlled	
Volume interval	
INTERVAL	
Pause time	
Volume	
UNIT	
Display mg/l	
Display ppm	
LIMIT VALUES	
LV1:	
LV2:	
FLUSH TIME	
Flush	
WATER METER	
1 l/Impulse	
2,5 l/Impulse	
5 l/Impulse	
10 l/Impulse	
100 l/Impulse	
500 l/Impulse	
1000 l/Impulse	
FUNCTION LV1/LV2	
Limit value	
Two point	
Range	
RELAY LV1	
Count LV exceeded	
RELAY LV2	
Count LV exceeded	
RELAY AUX1	
Deactivated	
Before retry	
Before analysis	
During analysis	
Before + during analysis	
After analysis	
Time	
MEASURING POINTS	
1 Measuring point	
2 M.P. alternating	
2 M.P. via input	

WATER LOW COUNT	
Count	
‘Time	
FUNCTION MEAS. POINTS	
Normally closed	
Normally open	
FUNCTION STOP	
Normally closed	
Normally open	
FUNCTION EXTERN ACK.	
Normally closed	
Normally open	
CURRENT INTERFACE	
Type 0-20 mA	
Type 4-20 mA	
SERIAL INTERFACE	
Baudrate	
OLED SETTINGS	
Brightness	
Brightness in standby	
Time to standby	
FUNCTION SD CARD	
Store measurement	
Store error	
Import basic data	
Export basic data	
LANGUAGE	
English	
German	
Français	
Nederlands	
Español	
Português	
CLEANING	
Analysis count	
Duration	
Runtime FlowClip	
CLEANING MODE	
Undiluted	
Diluted	

Conformity Declaration

EC Conformity Declaration

CE UKCA

for the following product

Testomat® PRO CLF
Process Photometer for free chlorine 0 – 2,5 ppm (CL F)

We hereby confirm that the above product confirms to the principal health and safety regulations laid down in the EC Directives 2014/30/EU and 2014/35/EU.
This declaration applies to all units produced in accordance with the attached manufacturing documents which are a constituent part of this declaration.

The product was assessed with reference to the following standards:

CE

EN 61326-1: Electrical equipment for measurement, control and laboratory use - EMC requirements
EN 61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use

UKCA

BS EN IEC 61326-1 Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements
BS EN 61010-1+A1 Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements

This declaration is made on behalf of

GEBRÜDER HEYL
Analysentechnik GmbH & Co. KG
Orleansstraße 75b
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by

Jörg-Tilman Heyl

General Manager

Hildesheim, 08/06/2026



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