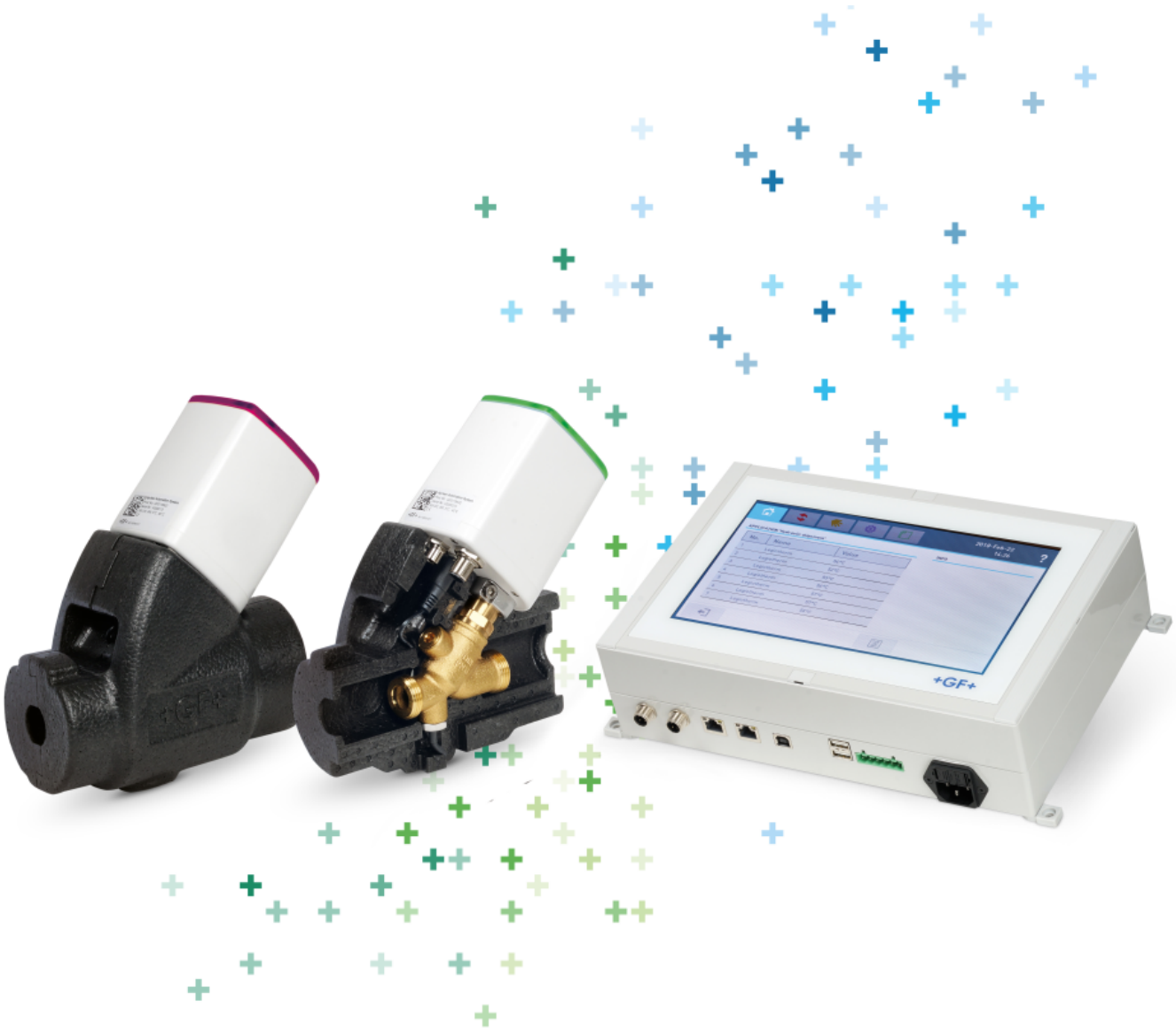
GF Piping Systems

Hycleen Automation System User Guide

Version 3.5



Contents

1 About this document

1.1 Follow the instruction manual

The instruction manual is part of the product and an important element within the safety concept.

- ⇨ Read and observe instruction manual.
- ⇨ Always have instruction manual available by the product.
- ⇨ Give instruction manual to all subsequent users of the product.

1.2 Symbols used in this manual

Safety-relevant information is labeled in this document by the following symbols and signal words:

⚠ CAUTION

Risk of injury!

Non-observance may lead to physical injury!

⇨ Remedy

NOTICE

Risk of material damage!

Non-observance may lead to material damage (loss of time, loss of data, machine defects, etc.)!

⇨ Remedy

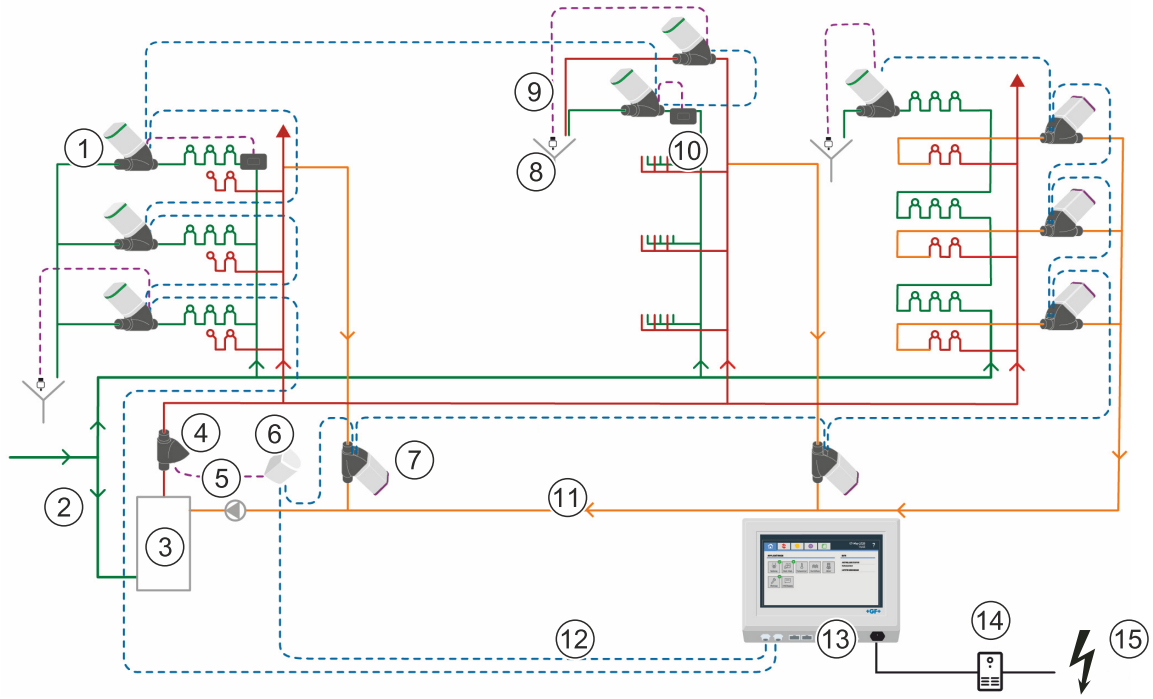
Descriptive text

⇨ Instructions for conduct

⇨ Reaction of the system

2 System Overview

2.1 Sample system



The sample system shows a water supply with 3 cold water pipes and 5 hot water circulations.

1	Valve LegioTherm K	9	Sensor cable
2	Cold water pipe	10	Flow sensor
3	Water heater	11	Return line (hot water)
4	Temperature sensor	12	Power supply and communication cable
5	Feed line (hot water)	13	Master
6	Uni controller	14	Uninterruptible power supply (UPS)
7	Valve LegioTherm 2T	15	External power supply
8	Run off monitoring system		

2.2 Operating principle

The hot water and cold water circulations contain valves of the types **LegioTherm K** and **LegioTherm 2T**. The latter serve hydraulic balancing (circulation system).

Both circulations can be flushed. The flush water runs into a drain.

The LegioTherm valves are equipped with a temperature sensor.

All valves are connected to the **Master** via power supply and communication cables serially (i.e. not radial!), which also supplies them with power. The master controls the opening angle of the valves according to its programming, taking into account the connected sensors, and creates log data in the form of protocols.

If required, the system can be enhanced by Hycleen Automation (Hycleen AS) Uni controllers. This allows the integration of additional sensors (existing Hycleen AS sensors or external 4-20mA sensors) as well as the control of actuators via an output (4-20mA or relay).

The system can control a maximum of 50 LegioTherm valves (**LegioTherm K** and/or **LegioTherm 2T**). If Uni controllers are installed in the system, the following applies:

(Number of LegioTherm valves) + (2 x number of Uni controllers) ≤ 50.

After the valves are installed according to their operating instructions, they only must be connected to **Hycleen Automation power supply and communication cables**. The power is supplied by the master via these connecting cables. For cable lengths of more than 300 m an additional**Hycleen Automation Powerbox** is required. Via its 2 cable connections, a master with 2 power boxes can supply and control up to 1,000 m cable length.

3 Installation

3.1 Changing components in a configured system

NOTICE

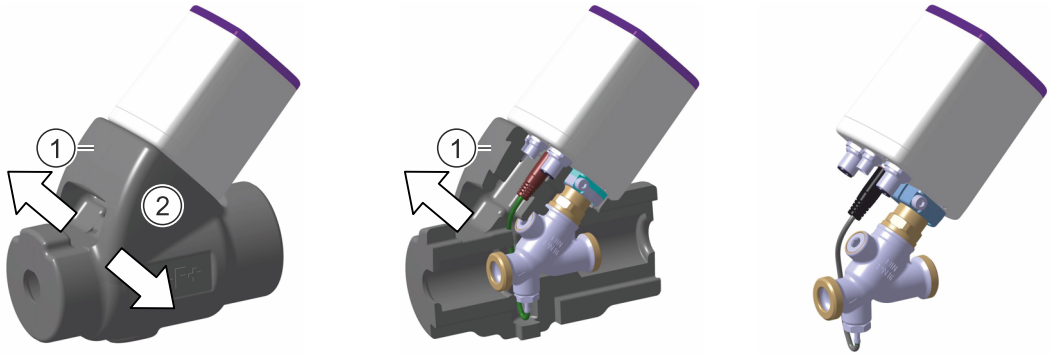
Applications are reset when changing the hardware components!

When changing hardware components in an already configured system (e.g. when installing an additional external sensor), all applications are reset to the factory settings. The valve parameters remain unchanged.

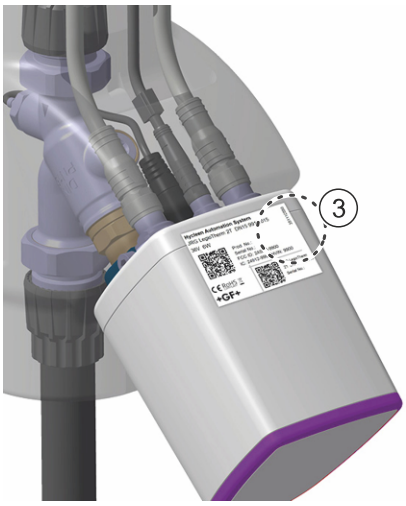
- ⇨ Prior to the installation Export the system configuration as a PDF.
- ⇨ After completion of the installation open the PDF and enter the application parameters into the Hycleen master.

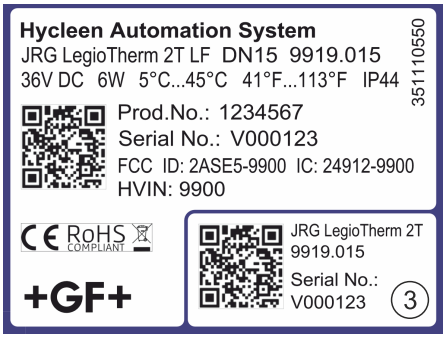
3.2 Valves

The insulation of the valves must be removed for cabling the valves.



- ⇨ To remove the insulation, carefully pull apart both parts (1, 2). Make sure that the temperature sensor cable is not detached or damaged.
- ⇨ Put the insulation aside for later assembly.



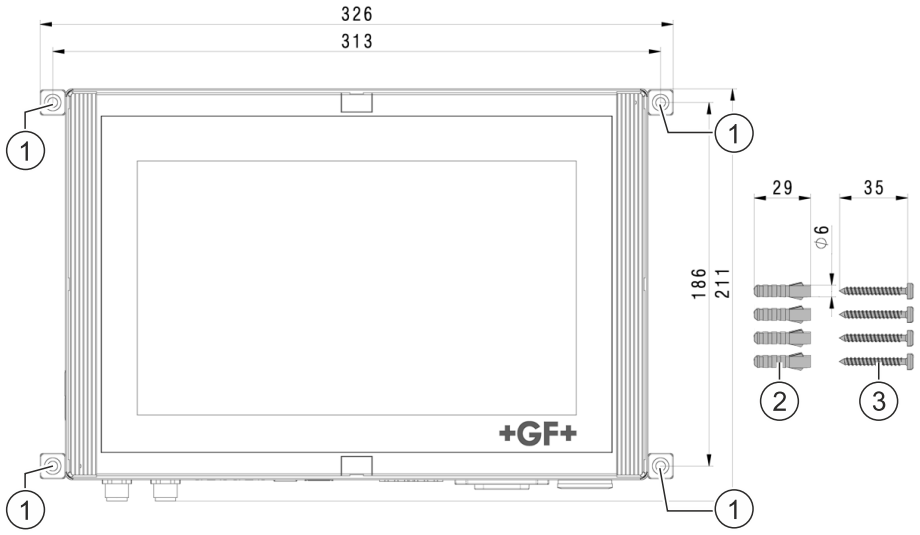


After assembling each valve, remove the detachable part (3) of the label from the valve and stick it in the installation plan. This part contains information about the valve type, serial number and size etc., and serves the subsequent identification of the valve in the installation plan.

3.3 Master

3.3.1 Mounting the master on the wall

The housing of the master is attached to the wall using 4 eyelets (1).



- ⇨ Drill 4 dowel holes with a diameter of 6 mm into the wall according to dimensional drawing and insert the supplied dowels (2).
- ⇨ Use a Phillips screwdriver to screw on the master with the 4 screws provided (3).

3.3.2 Connecting the master to the valves via cables

The **connecting cables** include 2 lines for the voltage supply and 2 signal lines. The two cable ends are equipped with the same female plug-in connectors. They are secured to prevent rotation and their M12 knurled screws ensure a reliable hold, even in harsh environments.

NOTICE

Non-approved components can cause malfunctions!

Components must not be modified and connecting cables or distributors for star topology cabling must not be installed at any time!

⇨ Always connect master, valves and, where required, powerboxes in series, i.e. one behind the other, to the components specified by the manufacturer!

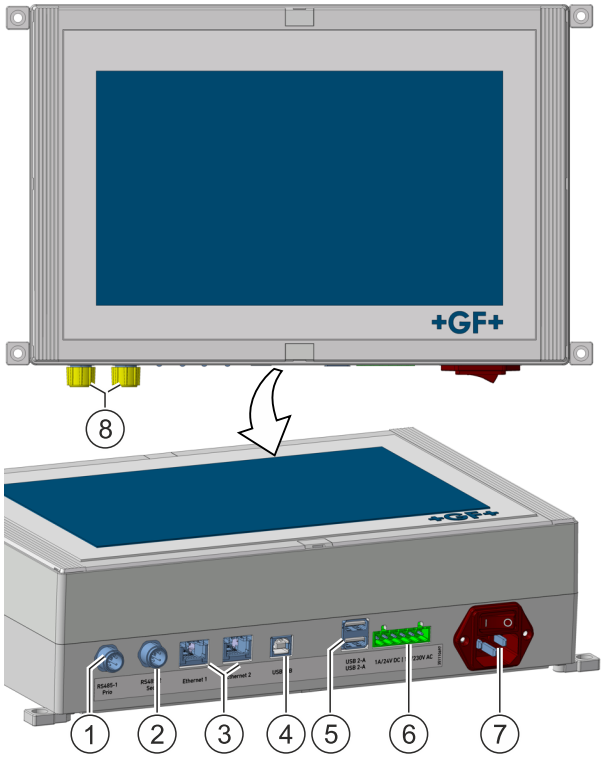
NOTICE

Faulty assembly can cause malfunctions!

Carrying out cabling with the power supply switched on could cause damage to the electronic components!

⇨ Make sure that neither the master nor powerbox(es) are supplied with voltage while cabling!

Connecting the master



⇨ Connect one of the plugs of the connecting cable to the **left** M12 connection (1) of the master and fasten the knurled screw. After that the M12 (2) connection can also be used, for example, (1) for one side of the building, and (2) for the other side.

⇨ Close the open M12 connection on the last valve with a protection cap (8).

When switching on the master, the valves coming from the master are numbered automatically, starting with the left line (1). The components of the right line (2) are then further numbered directly afterwards.

NOTICE

Faulty assembly can cause malfunctions!

If no component is connected to the left connection (1), the master will ignore the right connection (2) during the booting procedure after switching on.

⇨ When connecting the components, start with the left line (1)!

⇨ Connect the power supply cable to the connection (7) of the master.

For the connections Ethernet (3), USB-2B (4), 2 USB-2A (5) and master relay 24V/230V (6) see Additional components.

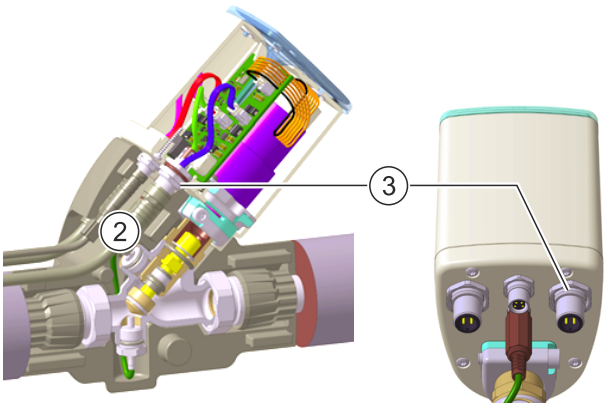
Connecting a valve

NOTICE

Faulty assembly can cause malfunctions!

Carrying out cabling with the power supply switched on could cause damage to the electronic components!

⇨ Make sure that the master is not supplied with power while cabling!



⇨ Connect the other plug (2) of the connecting cable to one of the two M12 plugs (3) of the valve and fasten with a knurled screw. Both M12 plugs (3) of the valves are equivalent.

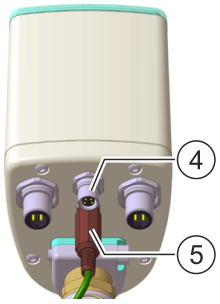
Where required: Connect sensor(s) to the valve

NOTICE

Faulty assembly can cause malfunctions!

Carrying out cabling with the power supply switched on could cause damage to the electronic components!

⇨ Make sure that the master is not supplied with power while cabling!



Connect plug (5) of the sensor to the sensor connection (4). During the switching on process of the master, the sensor is automatically detected.

Connecting additional valves

⇨ Connect one of the plugs of the next connecting cable to the second M12 plug (3) of the valve and fasten with a knurled screw, etc.

NOTICE

Faulty assembly can cause malfunctions!

If the knurled screw is not tightened correctly, the connection can work loose over time. This causes the system to malfunction!

⇨ Make sure that all knurled screws of the connecting cables are tightened!

3.4 Uni Controllers

If Uni controllers are installed in the system, the following applies:

(Number of LegioTherm valves) + (2 x number of Uni controllers) ≤ 50.

Examples:

Installed LegioTherm valves	additional Uni controllers possible
10	20
20	15
30	10
40	5

The Uni controller is fully mapped via the BACnet interface, in the REST API interface only the 4-20mA inputs of the Hycleen AS-sensors are processed.

3.4.1 Mounting Uni controllers

Uni controllers can be mounted flexibly according to the situation. For information beyond the mounting, see the instruction manual of the Uni controller.

Fixing to the pipe or pipe insulation via cable connector

- ⇨ Slightly bend the 2 fins (1) upwards at the rebated joints.
- ⇨ Position the Uni controller on the pipe or pipe insulation and fix it with cable connectors.

Wall mounting

- ⇨ Drill 4 dowel holes with a diameter of 6 mm into the wall according to dimensional drawing and insert the supplied dowels.
- ⇨ Screw the Uni controller to the bracket (2) via 4 screws.

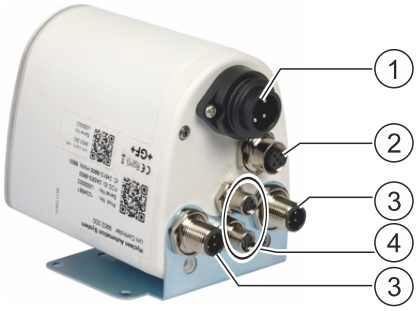
3.4.2 Cabling Uni controllers

NOTICE

Faulty assembly can cause malfunctions!

Carrying out cabling with the power supply switched on could cause damage to the electronic components!

⇨ Make sure that neither the master nor Powerbox(es) are supplied with voltage while cabling!



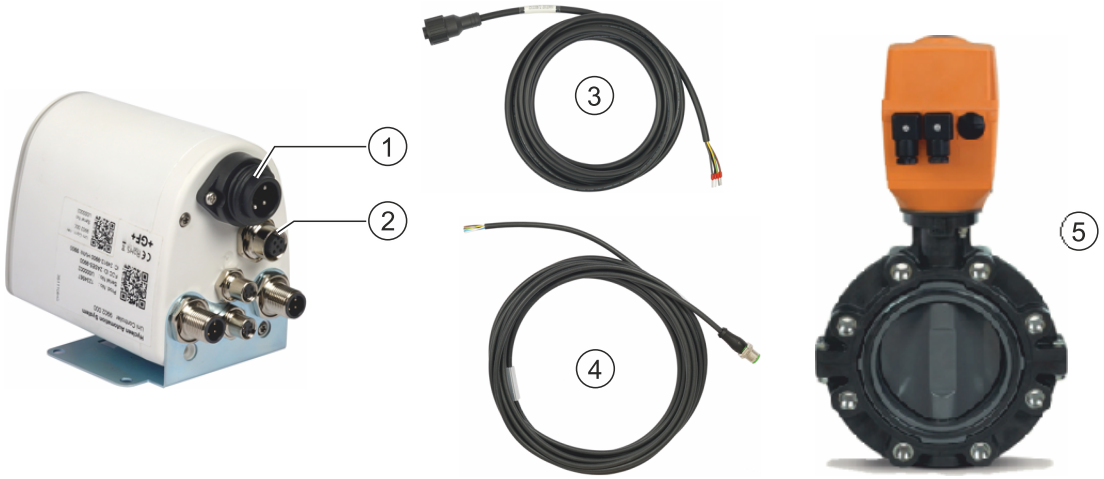
The Uni controller offers the following connections:

- (1) Relay output 24V/230V
- (2) 4-20mA IN/OUT
- (3) 2 M12 plug
- (4) 2 inputs 4-20mA (top: port 1, bottom: port 2) for the connection of two 4-20mA sensors (external Hycleen AS sensors or sensors of other manufacturers).

Uni controllers are cabled via M12 plugs (3) similar to a Valve.

⇨ Connect Uni controllers to the master and the valves in series via cables.

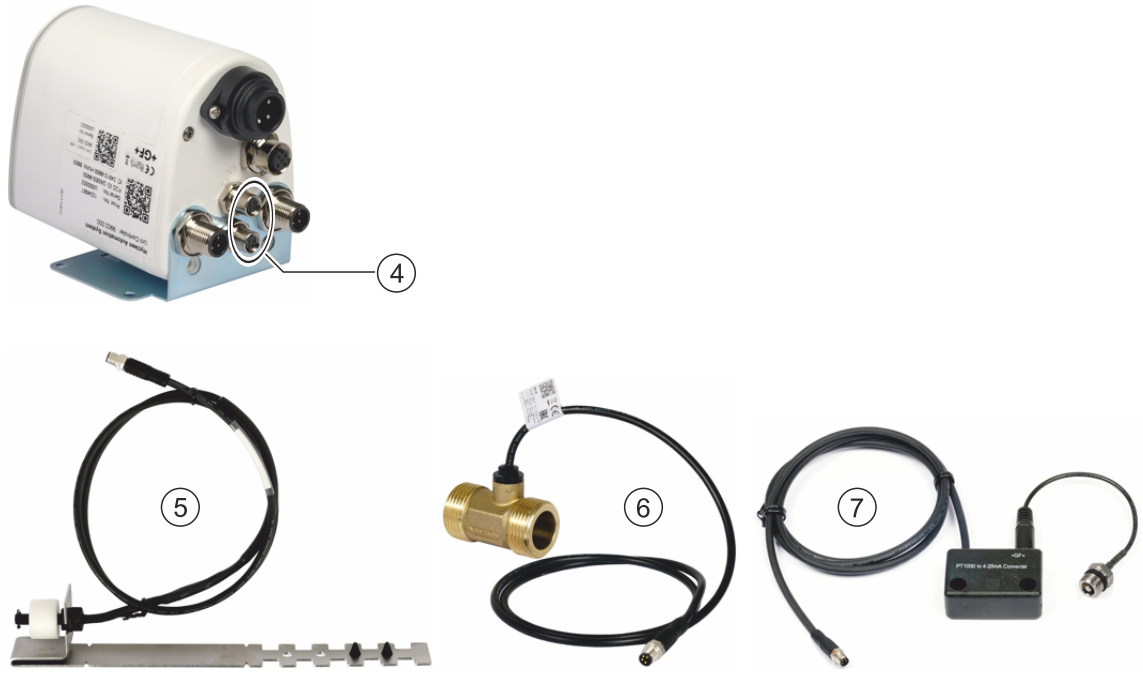
Relay output 24/230V and connection 4-20mA IN/OUT



⇨ These connections allow the control of actuators such as, e.g. electric actuators with or without position feedback (5). Actuators connected here can be controlled via the application Actuator Automation.

⇨ Connect the cable relay 24/230V (3) or 4-20mA IN/OUT (4) of the actuator to the respective connection (1) or (2).

Inputs 4-20 mA

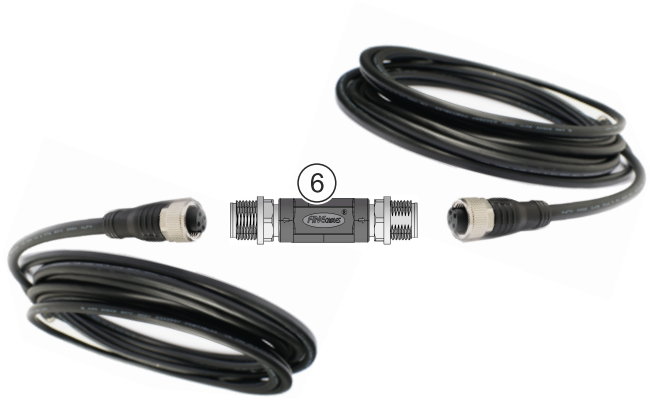


The inputs 4-20mA (4) can be used to connect the Hycleen AS sensors temperature (5), flow (6) and process monitoring (7).

⇨ Connect the cables of the sensor to one of the two inputs (4).

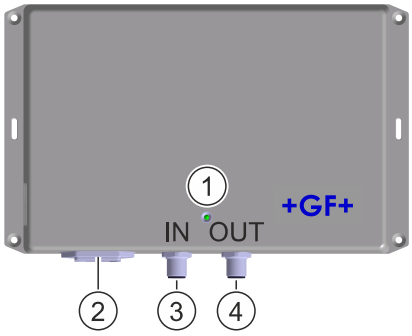
3.5 Additional components

3.5.1 Extending the connecting cable



⇨ Use the **connector** (6) for connecting two connecting cables in series.

3.5.2 Mounting the Powerbox



In the case of cable lengths longer than 300 m, switch a **Powerbox** between two connecting cables. This way, the cable length can be extended by another 200 m to 500 m maximum. For more information see the installation instructions of the Powerbox.

NOTICE

Faulty assembly can cause malfunctions!

Carrying out cabling with the power supply switched on could cause damage to the electronic components!

⇨ Make sure that the Powerbox is not supplied with power while cabling!

⇨ When cabling the Powerbox, observe the IN and OUT marks!

- ⇨ Connect the plug of the first connecting cable from the master to one of the M12 plug IN (3) of the Powerbox and fasten with a knurled screw.
- ⇨ Connect the plug of the second connecting cable to the next controller to the M12 plug OUT (4) of the Powerbox and fasten with a knurled screw.
- ⇨ Only insert the cold-device plug of the power cable into the connection (2) to begin the startup of the system once all components have been correctly cabled.
- ⇨ The LED (1) of the Powerbox lights up green´when the master is switched on and started up.

NOTICE

Faulty assembly can cause malfunctions!

If the knurled screw is not tightened correctly, the connection can work loose over time. This causes the system to malfunction!

- ⇨ Make sure that all knurled screws of the connecting cables are tightened!

NOTICE

Faulty assembly can cause malfunctions!

If powerboxes are installed, these components provide voltage even when the master is switched off.

- ⇨ Make sure that all powerboxes are first switched off before switching off the master!
- ⇨ Make sure that all powerboxes are first switched on again before switching on the master!

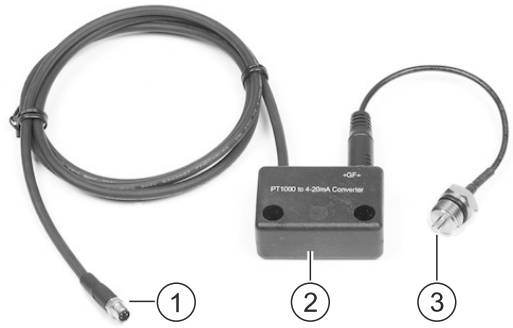
NOTICE

Faulty assembly can cause malfunctions!

The master must be switched off during the connection of new external sensors.

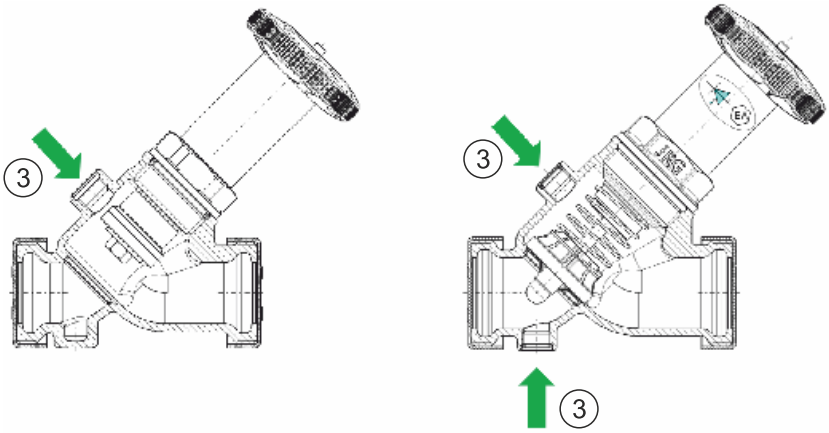
- ⇨ Switching off the master.
- ⇨ Connect the sensors with the master as described below.
- ⇨ Switch on the master again. This first initializes all connected powerboxes and then launches the master software. The newly connected external sensors are now automatically detected by the master.

3.5.3 Mounting external temperature sensors

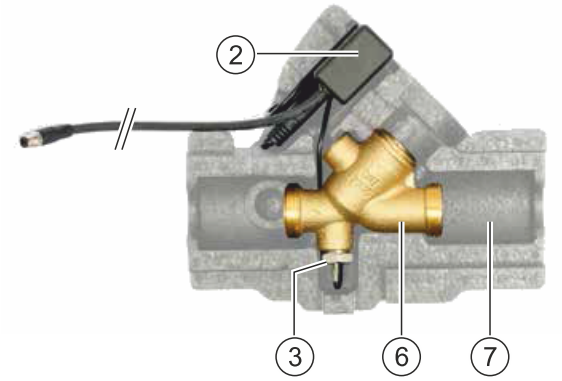


The external temperature sensor (3, 9952.000, PT1000) is delivered with a converter (2, output 4 - 20 mA) and connecting cable (1).

⇨ Screw the temperature sensor (3) with its screw-in thread AG ¼" to the desired point of the installation. **Example:** Installation to a JRG LegioStop inclined seat valve:



Under JRG number 9951.xxx the temperature sensor (3) is delivered fully pre-installed on a red brass pipe section (6, DN 15 or DN 20), complete with matching insulation (7), which also offers room for the converter (2).



With this variation, only the pipe section (6) is installed to an appropriate point of the installation.

- ⇨ Position the converter (2) in the included insulation (7).
- ⇨ The external temperature sensor is connected to the controller of a valve (flush or calibration valve) or Uni controller, for this purpose connect the connection valve (1) to the M8 connection (8).

Using the above-shown extension cables (9, 9943.005) the connection of several extension cables of 5m each in series can bridge a distance of max. 50 m between the temperature sensor and the valve. We recommend to always minimize the distance to the valve.

3.5.4 Installing the run off monitoring system

The run off monitoring system (1) detects whether the water in the run off exceeds the maximum level determined by the installation height of the sensor.

⇨ It is connected to the controller of a valve (flush or calibration valve) or Uni controller, for this purpose connect the connection cable (1) to the M8 connection (8).

The Flush function determines to which flush valves the run off monitoring should apply.

Using the above-shown extension cables (9, 9943.005) the connection of several extension cables of 5m each in series can bridge a distance of max. 50 m between the sensor and the valve. We recommend to always minimize the distance to the valve.

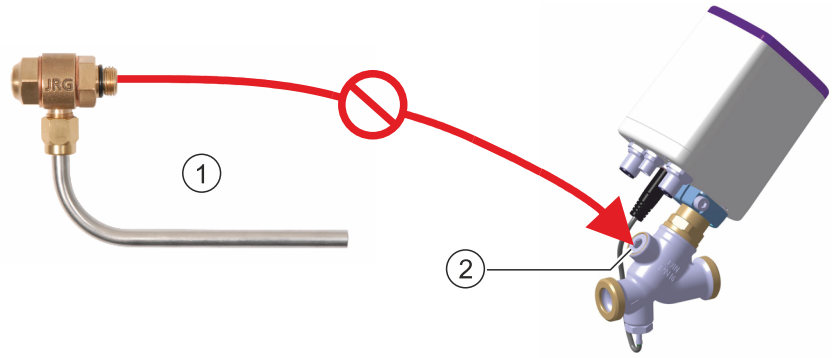
3.5.5 Installing the flow sensor

The external flow sensor (1) measures the flow through the pipe section.

⇨ It is connected to the controller of a valve (flush or calibration valve) or Uni controller, for this purpose connect the connection cable (1) to the M8 connection (8).

Using the above-shown extension cables (9, 9943.005) the connection of several extension cables of 5m each in series can bridge a distance of max. 50 m between the sensor and the valve. We recommend to always minimize the distance to the valve.

3.5.6 Installation of a sampling removal valve

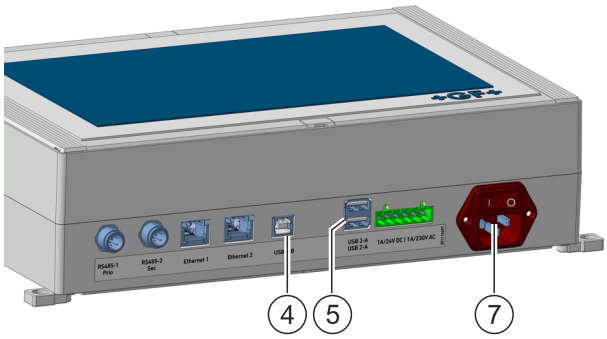


A sampling removal valve (1) can only be installed before or after a Hycleen valve. A connection directly to a Hycleen valve (2) is not permitted, as Hycleen valves may be damaged when the sampling removal valve is flamed before a sample is taken. Please contact your GF Piping Systems contact person or our Technical Customer Service.

3.5.7 Installing an uninterruptible power supply

An uninterruptible power supply (UPS) ensures that the connected valves are put into a secure state in case of power failure. The notification "Power Fail Mode", appears on the master, the flush valves are closed and all hydraulic balancing valves are moved to the set leakage volume.

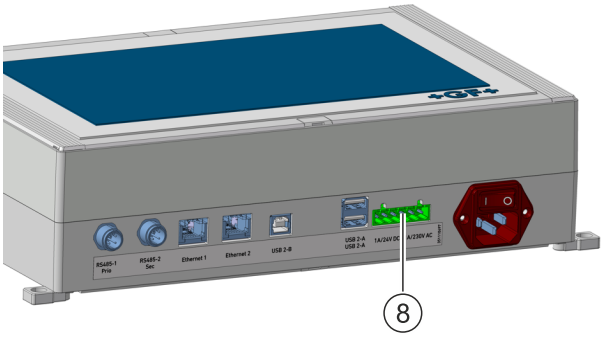
The output performance capacity of the UPS must be at least 195 watt.

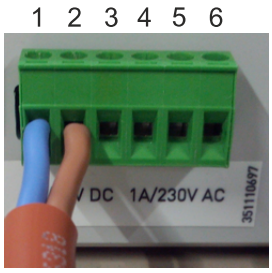


- ⇨ Connect the UPS to the external power supply.
- ⇨ Connect the UPS to the power supply (7) of the master
- ⇨ For communication with the master connect the UPS to the USB 2B input (4) or USB 2A connections (5) of the master.

A UPS connected to the master does not supply actuators with their own power supply. Such actuators become inactive in case of failure of their own power supply.

3.5.8 Connecting the master relay 24/230 V





The plug connection (8) offers 1 relay 24V and 1 relay 230V each with a potential-free switching contact (changeover contact). Observe the following PIN allocation for this:

Relay 24V

1 NO (normal open with relay OFF)
2 C (relay common)
3 NC (normal closed with relay OFF)

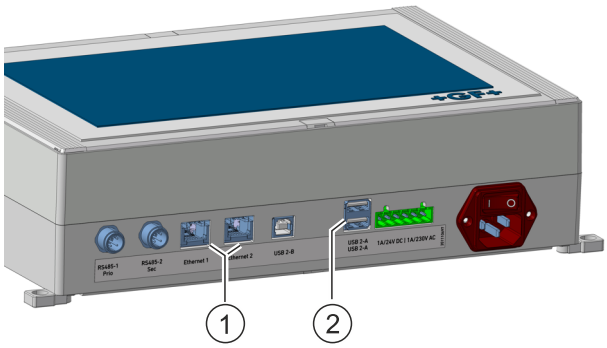
Relay 230V

4 NO (normal open with relay OFF)
5 C (relay common)
6 NC (normal closed with relay OFF)

⇨ Connect the master relay to the plug connection (8) according to the voltage.

Programming of the master relay is carried out in the application Actuator automation.

3.5.9 Establish network and cloud connection (Hycleen Connect)



To establish remote access via the cloud-based Hycleen Connect, the licence must be activated in the Connect Hub. In addition, the Master requires an Internet connection. The following options are available:

- LAN connection or router with SIM card on one of the two Ethernet ports (1)
- Internet dongle to USB port (2)

Routers with SIM card or Internet dongle must be configured on a computer before connecting to the Master.

The status of the connection is displayed in the main menu.

4 Working with the master

The master allows the control and steering of all connected components.

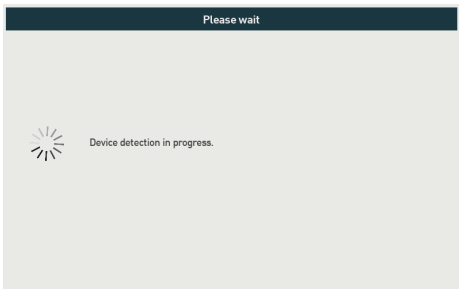
It is protected from unauthorized access by a password: 137.

The available functions depend on the current configuration. A sample configuration is described here.

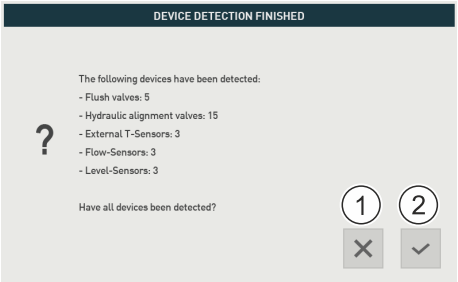
4.1 Commissioning

The Hycleen Master starts automatically as soon as the power supply is switched on. A notice then appears informing you that some settings have to be performed first. In this phase, all valves supplied correctly with power flash blue and green alternately and can communicate with the master.

The master first records and numbers the connected components. It groups each valve, sensor etc. into the relevant function groups. The numbering starts at the left line and is then continued at the right line, see also Installation.
The adjustment path of the valve plug for all valves of type LegioTherm 2T is also checked to adjust the exact position of the valve plug.
It is not possible to enter data during all these initialization processes. The indicator lights of the valves light up yellow and the master checks the firmware version of each component. If an update is necessary, this is performed automatically by the master while a message is displayed.



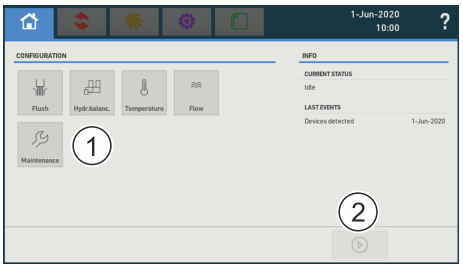
⇨ Afterwards, the recorded components are displayed.



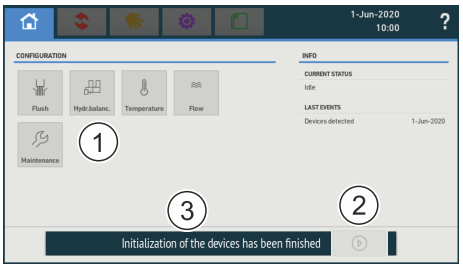
⇨ If some of the components were not recorded correctly, press button (1) to close the dialog, switch the master off, check that all components are connected correctly, and then switch the master on again.

⇨ If all valves were recorded correctly, confirm the dialog positively with button (2).

⇨ The master overview appears. The detected components are initialized.



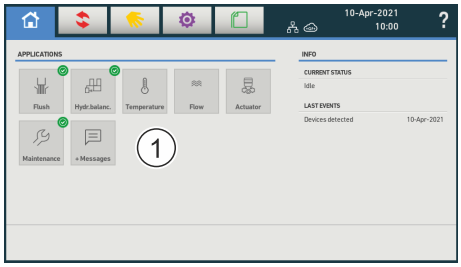
⇨ The pre-configured applications can already be opened and parameterized using the functional elements in (1) without starting them. The **Run** button (2) is still inactive.



⇨ After successful initialization, a message (3) additionally appears. The **Run** button (2) becomes active.

⇨ Press the **Run** (2) button to start normal operation. This button only becomes active if it was positively confirmed that all components were detected, and the initialization of the components was completed afterwards.

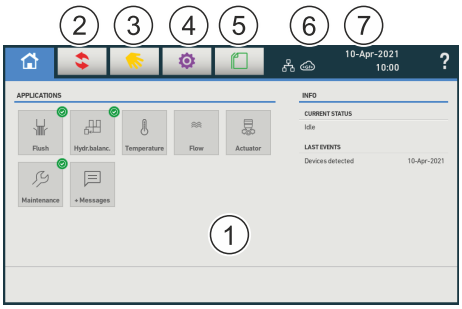
⇨ Thus, the main menu is also displayed completely.



The master is ready.

- The active applications are marked with a green circle.
- The applications currently running are marked with an animated blue circle.
- In area (1), all configured applications can be opened and parameterized.

4.2 Home/main menu

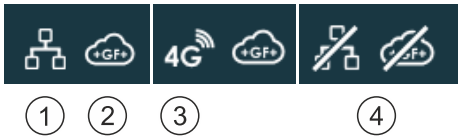


Area (1) includes icons for all active applications.

Furthermore, the main menu displays the additional functions:

- **Applications (2)**
  Switching back and forth between the running applications, e.g. for adjustment of the parameterization.
- **Manual functions (3)**
  Manual operation of the recorded valves.
- **Settings (4)**
  Adjustment of general system settings.
- **Protocols (5)**
  Viewing protocols of processes implemented so far.
- **Network status (6)**
  Display of the connection to the Internet and Hycleen Connect.
- **Help (7)**
  Viewing the help for the current action (operating manual).

4.2.1 Display of the connections



The type of connection and the status are displayed

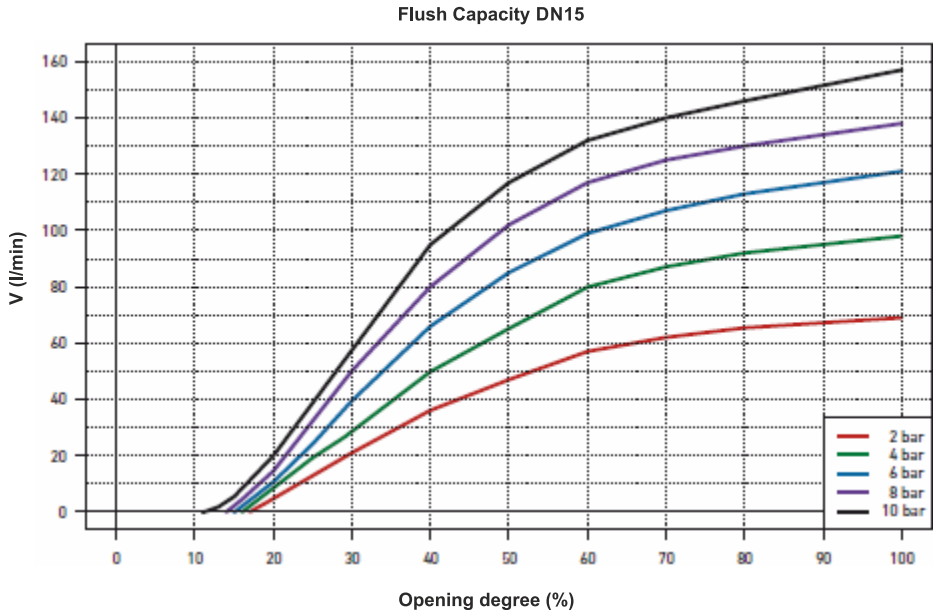
- (1) LAN connected
- (2) Hycleen Connect connected
- (3) SIM connected
- (4) no connection

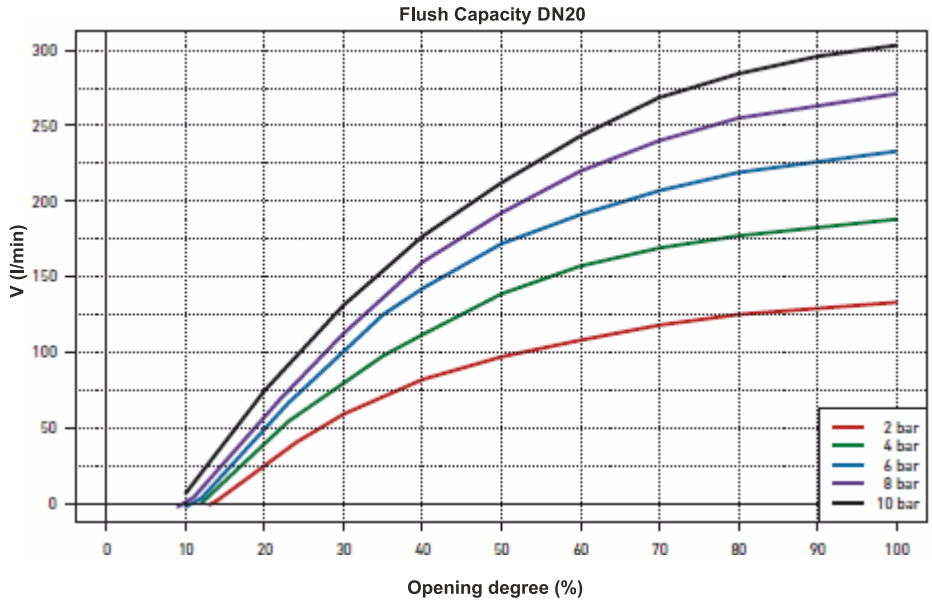
4.3 Flush

The flush of a line requires a valve that flows outwardly into a sufficiently large drain. The corresponding valves close completely.

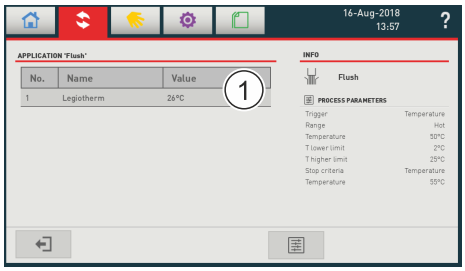
For safety reasons, only 1 flush valve is open during flush processes.

The flush performance depends on the opening angle of the valve and the water pressure:

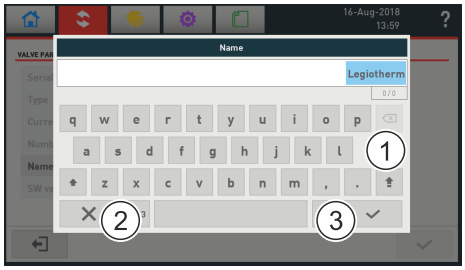




The recorded components are first displayed.

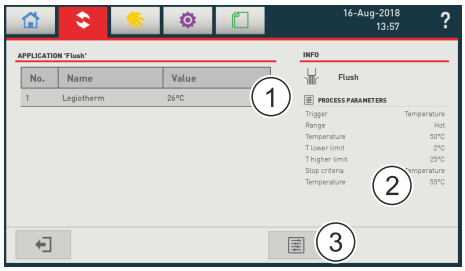


⇨ Select valve entry in area (1) in order to adapt the name of the valve - a virtual keyboard appears for this purpose.



⇨ Enter the required text for the name of the valve via the virtual keyboard (1).

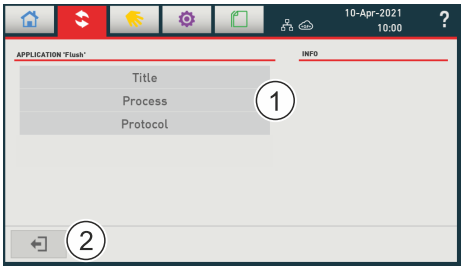
⇨ Abort keyboard dialog with x (2) in order not to make any adaptation or activate the keyboard entry with the checkmark (3).



The current process parameters are displayed in area (2).

Button (3) opens the dialog for defining the parameters after entry of the authorization code.

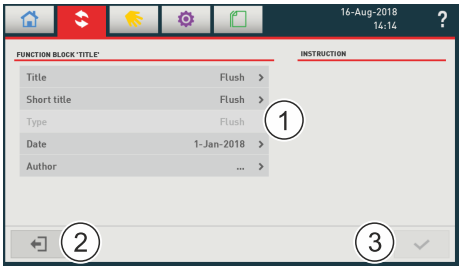
4.3.1 General procedure



⇨ Define title, process and protocol successively: Pressing the fields in area (1) opens the corresponding dialog.

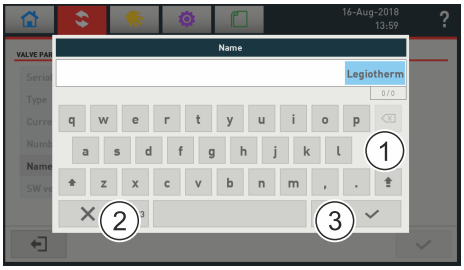
⇨ Activate data using button (2).

4.3.2 Title



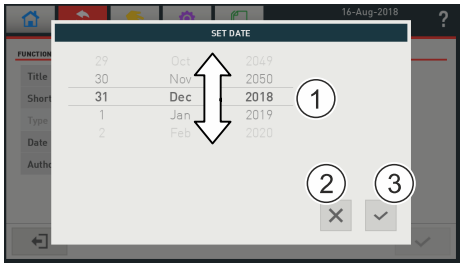
The light-colored fields indicate parameters that cannot be adjusted, such as the type. The number of a component is assigned automatically, for example, beginning with the line at the left socket of the master, see Installation.

⇨ Enter meta data for the protocol in the area (1): title etc.:



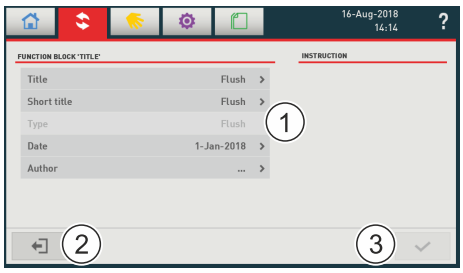
⇨ Enter the required text via the virtual keyboard (1).

⇨ Abort keyboard dialog with x (2) in order not to make any adjustment or activate the entry with the checkmark (3).



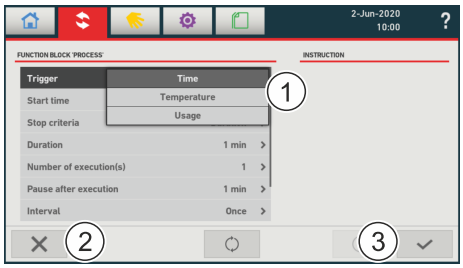
⇨ Adjust the desired date.

⇨ Abort keyboard dialog with x (2) in order not to make any adjustment or activate the adjustment with the checkmark (3).



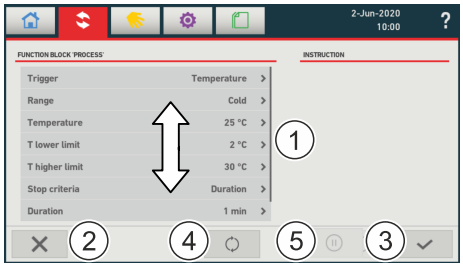
⇨ If the necessary adjustments have been made in the area (1), activate data using button (3) or abort dialog using button (2).

4.3.3 Process



- Select trigger in the area (1): Time, Temperature or Usage.
- Once everything has been defined, activate the data using button (3)
- Abort dialog using button (2) if necessary.

The selection options in the area (1) adapt to the selection of the trigger. Here for temperature:

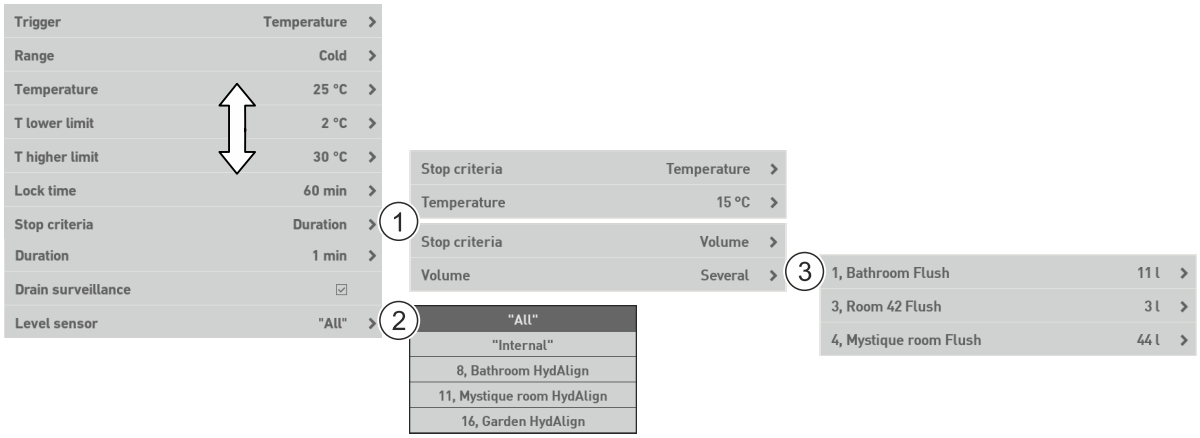


- Define the other parameters in the area (1). For this purpose, move the list in the area up or down as required.
- Activate data using button (3) or abort dialog using button (2).
- Button (5) aborts active flush. This way parameters can be adjusted, e.g. in case of undesired programming. Button (3) restarts the flush.
- Button (4) resets the data to the factory settings.

4.3.3.1 Trigger = Temperature

The process is started for each individual valve depending on the temperature.

Process sequence for cold water (Range = cold)



The process is started if the water temperature exceeds the **Temperature** (default setting: 20 °C).

The lines are now flushed with cold water. The **Stop criterion** (1) for the flush process is either a defined **Duration** (default setting: 1 min), a **Temperature** to be fallen below (default setting: 15 °C), or a specific **Volume**.

If for the stop criterion **Temperature** the target temperature is not reached within 10 min of flush, the flush is aborted and restarted following the lock time. If the flush is aborted three times, an alarm is activated and the process fully aborted. The flush process can be restarted by resetting the flush criteria.

Stop criterion **Volume**: This stop criterion can only be selected if a flow sensor is connected to all flush valves of the sensor. It must be installed in the same pipe as the respective flush valve, see Installing the flow sensor. The **Volume** (3) to be flushed can be individually adjusted for each flush valve with a flow sensor.

If **Run off monitoring** is installed, see Installing the run off monitoring system, it can be activated via the checkmark. Under **Level sensor** you can determine whether actuation of the signal of the float switch closes **all** flush valves in the system (default setting and **recommendation**), only the valve (**internally**), to which the sensor is connected, or a manually selected flush valve. Actuation of a float switch of the run off monitoring stops the flush process. The process is restarted if the water temperature exceeds the **temperature** (default setting: 25 °C).

In normal operation, an error message is displayed if the water temperature falls below the **T lower limit** (risk of frost), and if it exceeds the**T higher limit** (possible growth of legionella).

The valve carries out the next process at the earliest after the **lock time** has elapsed. This can be used to counteract excessive flushing.

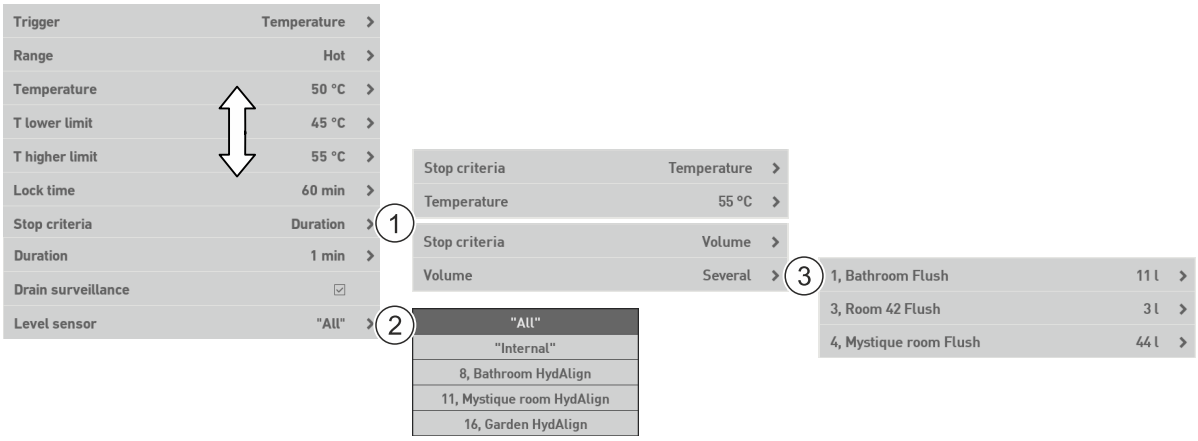
NOTICE

Reduction of the system run time!

A reduced lock time leads to higher wear and thus a possible reduction of the system run time.

- ⇨ The default setting and recommendation is 60 min. Shorten the lock time only if necessary (e.g. while putting into operation) and only temporarily.
- ⇨ If the lock time is set to less than 20 min, the system will change this value to 20 min at the end of the day.

Process sequence for hot water (Range = hot)



The process is started if the water temperature falls below the **Temperature** (default setting: 50 °C).

The lines are now flushed with hot water. The **Stop criterion** (1) for the flush process is selectable: Either a defined **Duration** (default setting: 1 min), a **Temperature** to be exceeded (default setting: 55 °C), or a specific **Volume** for each flush valve. If for the stop criterion **Temperature** the target temperature is not reached within 5 min, the valve closes again and an entry is made in the protocol.

Stop criterion **Volume**: This stop criterion can only be selected if a flow sensor is connected to all flush valves of the sensor. It must be installed in the same pipe as the respective flush valve, see Installing the flow sensor. The **Volume** to be flushed can be individually determined for each flush valve with a flow sensor

If **Run off monitoring** is installed, see Installing the run off monitoring system, it can be activated via the checkmark. Under **Level sensor** you can determine whether actuation of the signal of the float switch closes **all** flush valves in the system (default setting and **recommendation**), only the valve (**internally**), to which the sensor is connected, or a manually selected flush valve.

In normal operation, an error message is displayed if the water temperature falls below the **T lower limit** (risk of frost), and if it exceeds the**T higher limit** (possible growth of legionella).

The valve carries out the next process at the earliest after the **lock time** has elapsed. This can be used to counteract excessive flushing.

NOTICE

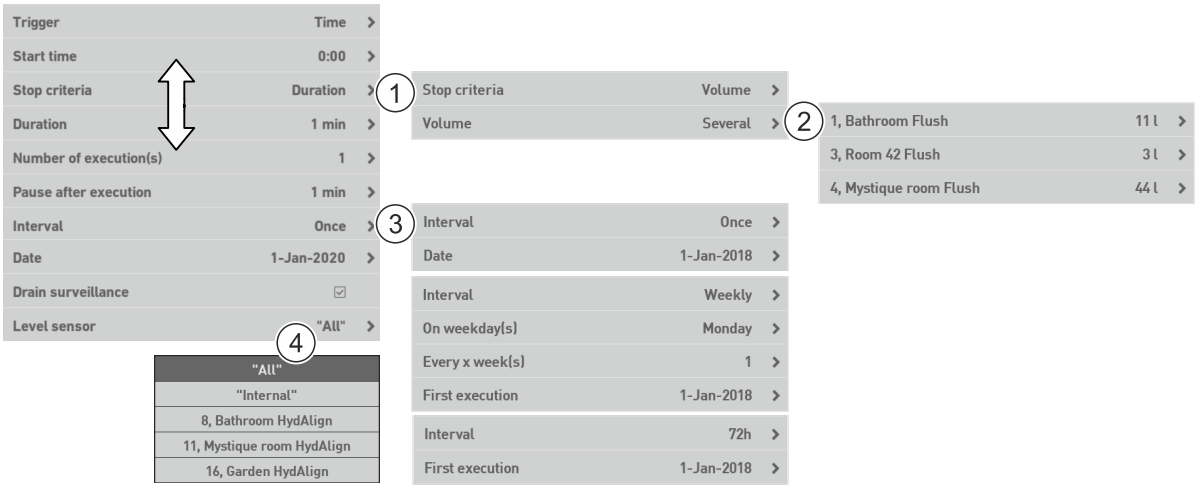
Reduction of the system run time!

A reduced lock time leads to higher wear and thus a possible reduction of the system run time.

- ⇨ The default setting and recommendation is 60 min. Shorten the lock time only if necessary (e.g. while putting into operation) and only temporarily.
- ⇨ If the lock time is set to less than 20 min, the system will change this value to 20 min at the end of the day.

4.3.3.2 Trigger = Time

The flush process is started time-dependent and then implemented for all flush valves in sequence, starting with the first flush valve.



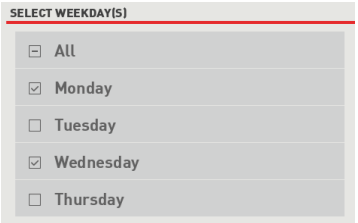
The process is started when the set **Start time** (default setting: 00:00 o'clock) is reached. The **Stop criterion** (1) for the flush process is selectable: Either a defined duration (default setting: 1 min), or a specific volume for each flush valve (2).

The lines are now flushed with water for the **Duration** (default setting: 1 min). The set **Number of execution(s)** follows (default setting: 1). In between, a pause is made according to the set **Pause after execution** (default setting: 1 min). The **Interval** (3) is once, daily, weekly, or every 72 hours (every 3 days).

The flush process ends when the stop criterion **Duration** is reached (default setting: 1 min)

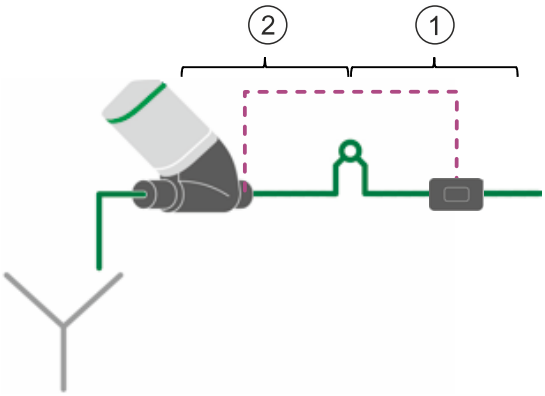
- ⇨ In the case of single execution, set the desired day (date selection).
- ⇨ In the case of daily execution or execution every 72 hours, set the desired day for the **First execution** (date selection).

⇨ In the case of weekly execution, e.g. Mondays and Wednesdays every week, set the desired weekday, in the example here **On weekday** Monday and Wednesday:

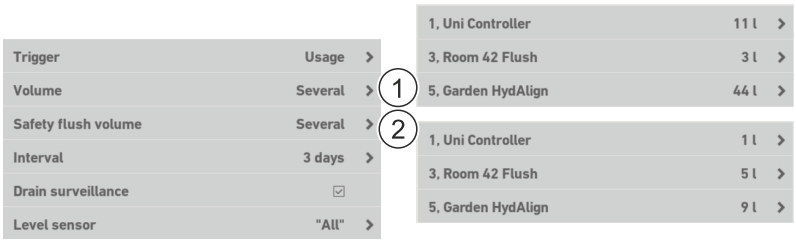


Under **Every x weeks**, set whether execution should take place weekly (x = 1, default settings) or less frequently (x > 1).
If **Run off monitoring** is installed, see Installing the run off monitoring system, it can be activated via the checkmark. Under **Level sensor** you can determine whether actuation of the signal of the float switch closes **all** flush valves in the system (default setting and **recommendation**), only the valve (**internally**), to which the sensor is connected, or a manually selected flush valve – only such a valve is selectable. Actuation of a float switch of the run off monitoring stops the flush process independent of the set **Number of execution(s)**. However, the set **Interval** will be taken into account. In this case the flush process is restarted

4.3.3.3 Trigger = Usage



The prerequisite for this trigger is that each flush valve is connected to the respective flow sensor.

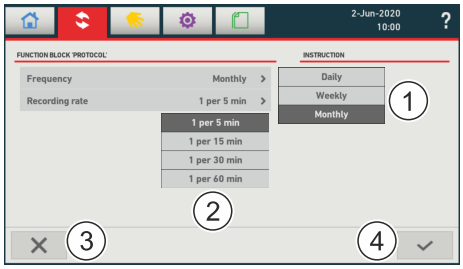


The process is started for each individual valve depending on its usage. After each interval, the difference between the consumed water and the set target replacement **Volume** is flushed.

If the consumed water volume was greater than the set target replacement **Volume**, no flush process is actuated. However, a **Safety Flush Volume** can be flushed (recommended) that is equivalent to the volume between the extraction point(s) and the flush valve.

This way, the entire water content of the pipes is replaced. The **Safety Flush Volume** is flushed when the difference between the target replacement **Volume** and consumed water volume is less than the set safety flush volume.

4.3.4 Protocols



- ⇨ Select frequency (1) of the protocols.
- ⇨ Activate the selection with checkmark (4) or discard with x (3).

The data recording takes place in line with selected recording rate (2). If the temperature difference between the recording points is ≤ 0.5 °C, no value is stored.

During a flush process the temperature data is recorded every 2 seconds.

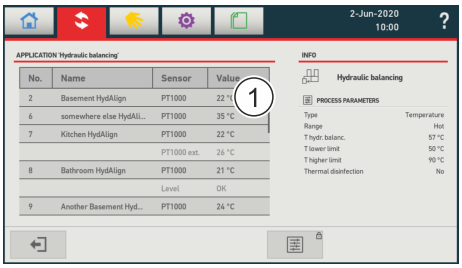
Protocol status

If all flushing processes have been successfully performed during the protocol period, the protocol status is **OK**. If expiration monitoring has been triggered at least once during the protocol period, the protocol status is **NOK**.

4.4 Hydraulic balancing

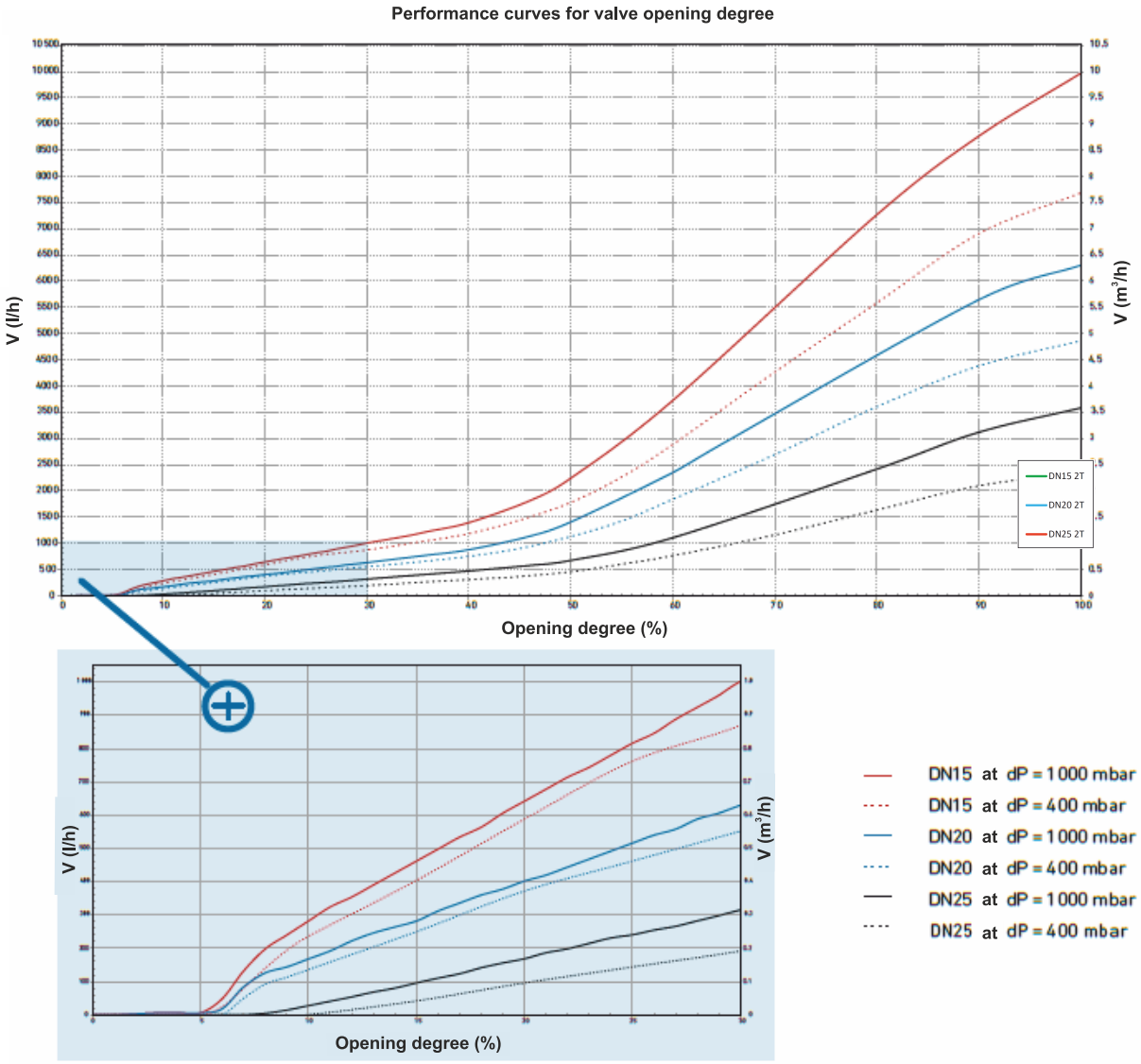
Hydraulic balancing requires a circulation line. The corresponding valves do not close completely but only up to an adjustable leakage rate (minimum flow, Kvmin). The maximum opening angle (maximum flow Kvmax) of each valve can also be adjusted.

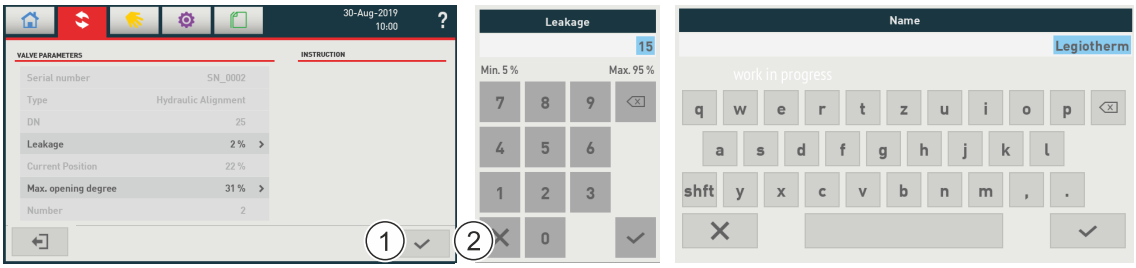
Selecting the application icon for hydraulic balancing opens this dialog, which first displays the recorded components:



⇨ Select valve entry in the area (1) to adapt the name, leakage rate, and maximum opening angle of this valve - a virtual keyboard appears for this purpose.

Allocation of flow (liters/h) to the opening angle (leakage rate):



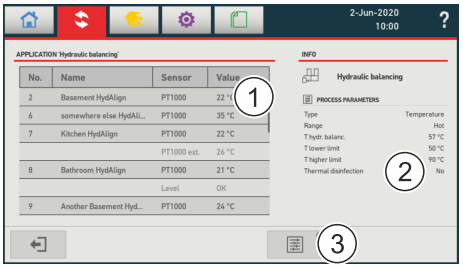


The light-colored fields display parameters, which cannot be adjusted. The number of a component is continuously assigned automatically, beginning with the line at the left socket of the master.

Button x (2) closes the respective dialog without making any changes.

Leakage rate (Kvmin, default setting 15%) and maximum opening angle (Kvmax, default setting 70%) can be adjusted.

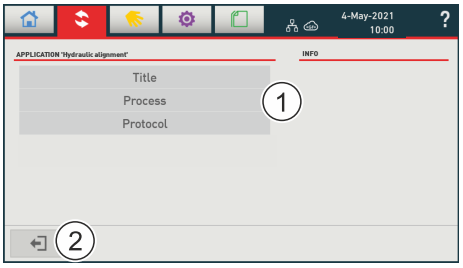
The checkmark button (1) activates the changes and closes the respective dialog.



The current process parameters are displayed in the information area (2).

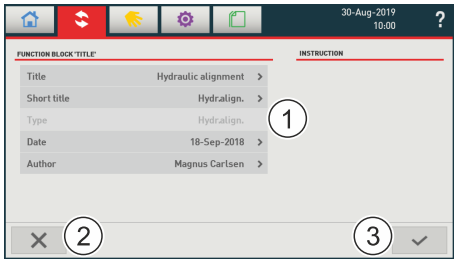
Button (3) opens the dialog for parameterizing the hydraulic balancing process after entry of the authorization code: 42.

4.4.1 General procedure



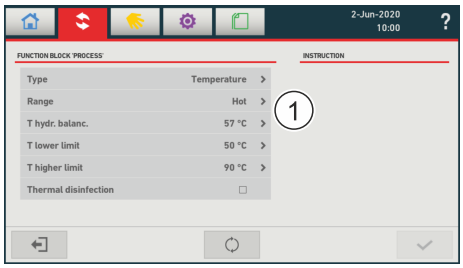
- ⇨ Define title, process and protocol successively: Pressing the fields in area (1) opens the corresponding dialog.
- ⇨ Activate data using button (2).

4.4.2 Title



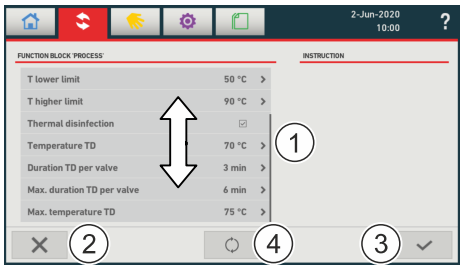
- Enter meta data for the protocol in the area (1) (virtual keyboards): title, short title (labeling of App icon), date, author.
- Activate data using button (3) or abort dialog using button (2).

4.4.3 Process



- Process type in the area (1) is temperature
  - The other fields change depending on this selection.

The selection options in the area (1) adjust to the selected type. Shown for temperature here:



- Define the other parameters in the area (1) (virtual keyboards). For this purpose, move the list in the area up or down as required.
- Activate data using button (3) or abort dialog using button (2).
- Button (4) resets the data to the factory settings.

4.4.3.1 Type = Temperature

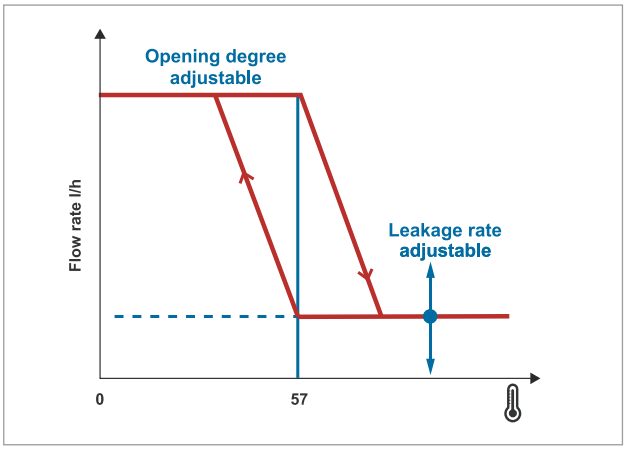
The process is started upon reaching a specific temperature.

Process sequence for hot water (Range = hot)

Type	Temperature
Range	Hot
T hydr. balanc.	57 °C
T lower limit	50 °C
T higher limit	90 °C
Lock time	60 min
Thermal disinfection	☑
Temperature TD	70 °C
Duration TD per valve	3 min
Max. duration TD per valve	6 min
Max. temperature TD	75 °C

- If the hot water becomes colder than **T hydr. balanc.** (here: 57 °C, still thermally safe against legionella), then the process starts and opens the valve. If **T hydr. balanc.** is exceeded again, the valve closes again (leakage rate). The leakage rate can be defined separately for each valve.

Dynamic hydraulic alignment



- If the temperature falls below **T lower limit** (here: 50 °C), an error message appears and an entry is made in the error protocol.
- If the temperature exceeds **T higher limit** (here: 90 °C), an error message appears and an entry is made in the error protocol. These two limits must be defined meaningfully, since they form the basis for an evaluation of the Protocols.

- The valve carries out the next process at the earliest after the **lock time** has elapsed. This can be used to counteract excessive regulation of the valves.

NOTICE

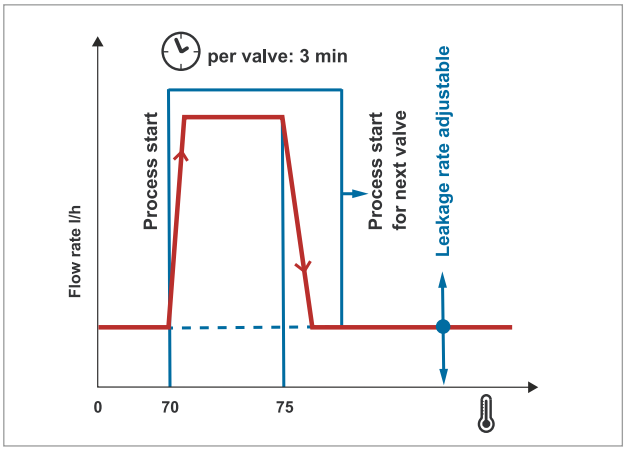
Reduction of the system run time!

A reduced lock time leads to higher wear and thus a possible reduction of the system run time.

- ⇨ The default setting and recommendation is 60 min. Shorten the lock time only if necessary (e.g. while putting into operation) and only temporarily.
- ⇨ If the lock time is set to less than 20 min, the system will change this value to 20 min at the end of the day.
- ⇨ Optimizations should preferably be made by the leakage rate and the maximum opening degree of the valves.

- If the checkmark at **Thermal disinfection** is set, the parameters shown below it are displayed and active.

Thermal disinfection



CAUTION

Risk of injury from hot water and components!

Danger of burning and scalding during thermal disinfection!

- ⇨ Make sure not to touch the components of the hot water circulation and the drain water during thermal disinfection. Please note that the components and the drained water require some time to cool down after the rinsing process.

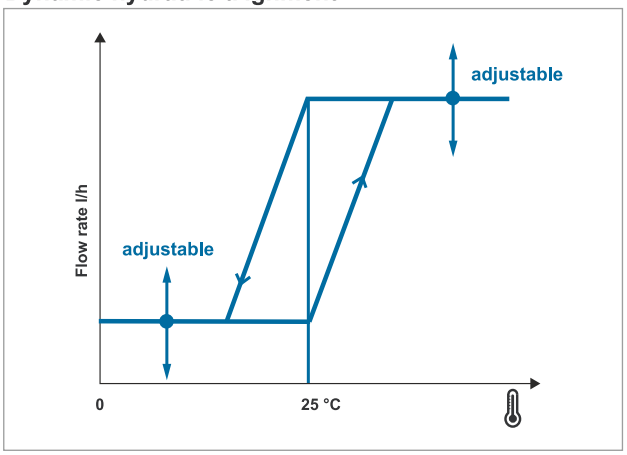
- Thermal disinfection (TD) starts as soon as one of the hydraulic balancing valves reaches the **Temperature TD** set for TD (here: 70 °C, we recommend 70 °C for at least 3 min). The valve with the highest temperature is opened, all others are closed (leakage rate). When reaching the **Duration TD per valve** required for TD (total amount of time when temperature ≥ T start TD) or **Max. temperature TD** (here: 75 °C), the now disinfected valve is closed (leakage rate). Following this, TD is now performed in sequence for the other valves, always starting with the valve with the highest temperature.
- If a valve complies with the **Duration TD per valve** set for the TD or **Max. temperature TD**, then the disinfection is entered as OK in the TD protocol. If the criteria are not fulfilled, the TD is abandoned after the set **Duration TD per valve** for this valve and commences with the next one. The disinfection is entered as NOK for this valve in the TD protocol. The function **Max. duration TD per valve** ensures that are valves are flushed at high temperature, even if the set **Temperature TD** for the set **Duration TD per valve** or **Max. temperature TD** are not reached.
- After thermal disinfection the system remains inactive for 4 hours to allow the components to cool down again. During this time, all valves are set to the "leakage rate" position. The next thermal disinfection can be started at the earliest after an interval of 12 hours.
- TD is always the priority. If another application, e.g. automatic maintenance, is started during the implementation of the TD, the other application is stopped and restarted after an interval of 4 hours.
- TD is performed only in hot water circulation sections where a Hycleen circulation valve is installed.

Process sequence for cold water (Range = cold)

Type	Temperature
Range	Cold
T hydr. balanc.	25 °C
T lower limit	2 °C
T higher limit	27 °C
Lock time	60 min
Thermal disinfection	☐

- If the cold water becomes warmer than **T hydr. balanc.** (here: 25 °C), then the process starts and opens the valve. The resulting cold water circulation lowers the temperature.

Dynamic hydraulic alignment



- If the temperature once again falls below **T hydr. balanc.**, the valve closes again (leakage rate).
- If the temperature falls below **T lower limit** (here: 2 °C), an error message appears and an entry is made in the error protocol.
- If the temperature exceeds **T higher limit** (here: 27 °C), an error message appears and an entry is made in the error protocol.
- Results and error messages are recorded in the protocol.
- The valve carries out the next process at the earliest after the **lock time** has elapsed. This can be used to counteract excessive regulation of the valves.

NOTICE

Reduction of the system run time!

A reduced lock time leads to higher wear and thus a possible reduction of the system run time.

- ⇨ The default setting and recommendation is 60 min. Shorten the lock time only if necessary (e.g. while putting into operation) and only temporarily.
- ⇨ If the lock time is set to less than 20 min, the system will change this value to 20 min at the end of the day.
- ⇨ Optimizations should preferably be made by the leakage rate and the maximum opening degree of the valves.

Thermal disinfection is not necessary for cold water.

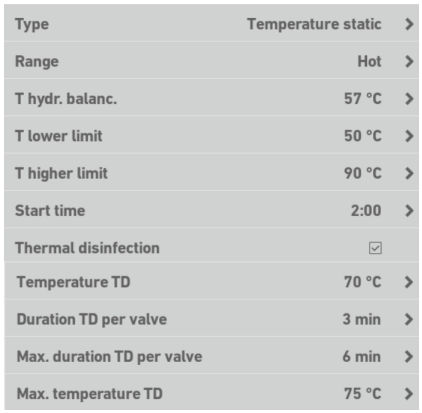
4.4.3.2 Type = Temperature static

The process is started daily at a specific **Start time**. The start time must be selected in such a way that the process of static hydraulic balancing takes place at a time when no water is withdrawn, i.e. typically at night.

Process sequence

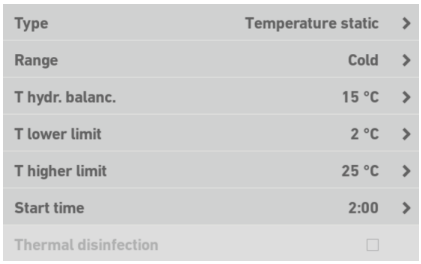
- At the start of the process, the opening angle (leakage rate) of each single valve is set. During this, the valves sequentially adjust to the flexible average temperature of the past 24 hours and the set target **T hydr. balanc.**. The valves maintain this set opening angle for 24 hours until the next regulation phase.
- The first period after activation of the hydraulic balancing of type **Temperature, static** is used to determine the basic data (determination of average values for 3 hours and 24 hours). The first hydraulic balancing is only executed in the 2nd regulation phase (2nd night). With each additional regulation phase, the opening angle of the valves is further optimized. Depending on the complexity of the drinking water installation, optimal hydraulic balancing may require several nights.
- Providing the specific water content of the pipe on which the balancing valve is installed can expedite the process (optional). For this purpose, enter the pipe volume (volume of the entire circulation line), see Pipe volume (> Settings > Valves). The pipe volume is a proportional factor that affects the adjustment steps and thus helps the system to adjust faster.
- If the average temperature of the past 3 hours falls below the **T lower limit** , a new ideal valve position is immediately calculated and the opening degree (leakage rate) is adjusted. This safety correction is carried out no more than 1 time per valve and regulation phase.

Process sequence for hot water (Range = hot)



- At the set **Start time** the first valve regulates its flow to the set **T hydr. balanc.**, in the shown example to 57 °C.
- Then the second valve regulates its flow, followed by the other valves, and finally the process is repeated until all valves reach **T hydr. balanc.** or the 4 hours have passed.
- If the temperature falls below **T lower limit** (here: 50 °C), an error message appears and an entry is made in the error protocol.
- If the temperature exceeds **T higher limit** (here: 90 °C), an error message appears and an entry is made in the error protocol. These two limits must be defined meaningfully, since they form the basis for an evaluation of the Protocols.
- If the checkmark at **Thermal disinfection** (TD) is set, the parameters shown below it are displayed and active. Thermal disinfection process see Thermal disinfection. The difference is that the leakage quantity is set to 8% for all valves in order to increase efficiency and save energy during disinfection.
- The TD process corresponds to the one used by the Type = Temperature. Instead of the set leakage quantity, however, the valves are opened here with 15%.

Process sequence for cold water (Range = cold)



- At the set **Start time** the first valve regulates its flow to the set **T hydr. balanc.**, in the shown example to 15 °C.
- Then the second valve regulates its flow, followed by the other valves, and finally the process is repeated until the 4 hours have passed.
- If the temperature falls below **T lower limit** (here: 2 °C), an error message appears and an entry is made in the error protocol.
- If the temperature exceeds **T higher limit** (here: 25 °C), an error message appears and an entry is made in the error protocol. These two limits must be defined meaningfully, since they form the basis for an evaluation of the Protocols.

Thermal disinfection is not necessary for cold water.

4.4.3.3 Type = Flow

The process is based on the hydraulic balancing related to the flow. For this purpose, a flow sensor is installed in each circulation line with a hydraulic balancing valve and connected to the controller, see Installing the flow sensor.

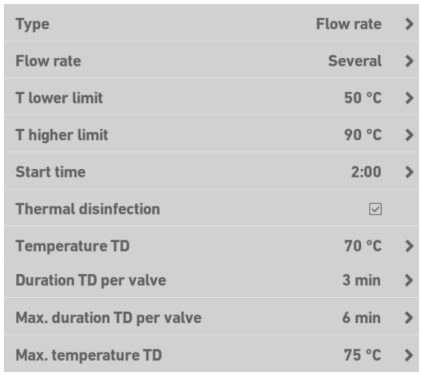
The process is started daily at a specific **Start time**.

The starting time must be selected in such a way that the process takes place at a time when no hot water is withdrawn, i.e. typically at night. The valves sequentially adjust to the flow rate set **individually for each valve** for a maximum period of 4 hours, and then maintain their set opening angle until the next regulation phase.

The first period after activation of the hydraulic balancing of type **Flow** is used to determine the basic data. The first hydraulic balancing is only executed in the 2nd regulation phase (2nd night). With each additional regulation phase, the opening angle of the valves is further optimized. Depending on the complexity of the drinking water installation, optimal hydraulic balancing may require several nights.

Providing the specific water content of the pipe on which the balancing valve is installed can expedite the process. For this purpose, enter the pipe volume (volume of the entire circulation line), see Pipe volume (> Settings > Valves). The pipe volume is a proportional factor that affects the adjustment steps and thus helps the system to adjust faster.

Process sequence



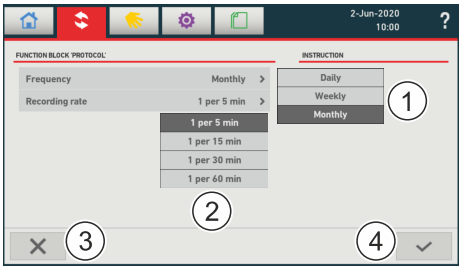
- First the respective valve must be selected under **Flow rate**.
- At the start of the **Start time** process, the opening angle (leakage rate) of each individual valve is set. During this, the valves sequentially adjust based on the flexible average flow of the past 24 hours and the set target valve **Flow rate**. The valves maintain this set opening angle for 24 hours until the next regulation phase.
- The first period after activation of the hydraulic balancing of type **Flow** is used to determine the basic data (determination of average values for 3 hours and 24 hours). The first hydraulic balancing is only executed in the 2nd regulation phase (2nd night). With each additional regulation phase, the opening angle of the valves is further optimized. Depending on the complexity of the drinking water installation, optimal hydraulic balancing may require several nights.
- If the temperature falls below **T lower limit** (here: 50 °C), an error message appears and an entry is made in the error protocol.
- If the temperature exceeds **T higher limit** (here: 90 °C), an error message appears and an entry is made in the error protocol. These two limits must be defined meaningfully, since they form the basis for an evaluation of the Protocols.
- If the checkmark at **Thermal disinfection** (TD) is set, the parameters shown below it are displayed and active. Thermal disinfection process see Thermal disinfection.

4.4.3.4 Type = Fixed

In this type, the opening angle set for the valve (leakage rate) is not changed.

There are also no parameters to be adjusted. The system permanently maintains the opening angel set for each valve, for details of the setting see Leakage rate (>Settings >Valves). Only the weekly maintenance disrupts this state for a short period of time.

4.4.4 Protocol



- ⇨ Select frequency (1) of the protocols and recording rate (2) of the measured values.
- ⇨ Activate selection with checkmark (4) or discard with x (3).

The data recording rate is in line with the selected recording rate. If the temperature difference between the recording points is ≤ 0.5 °C, no value is stored.

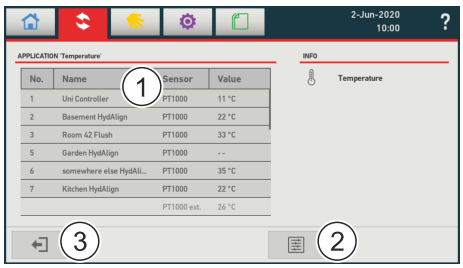
During thermal disinfection the temperature data is recorded every 2 seconds.

Protocol status

During **hydraulic balancing**, if the temperature mean value of all hydraulic system balancing valves is within the limit temperatures during the protocol period, the status is **OK**, otherwise **NOK**.

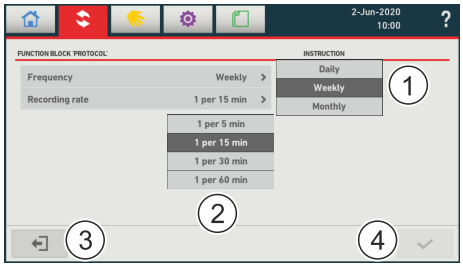
If during **thermal disinfection** each hydraulic system balancing valve has reached the **temperature TD** for the set **duration TD per valve** or **Max. Temperature TD**, the protocol is **OK**. If thermal disinfection is aborted, or the requirements for error-free TD are not met, the protocol is **NOK**.

4.5 Temperature



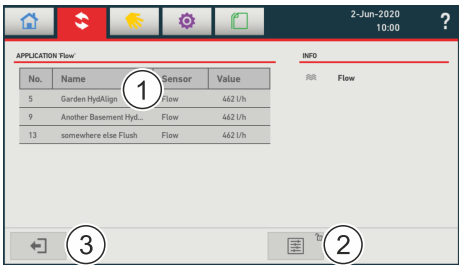
This function provides an overview of the temperatures of all internal and external temperature sensors. Here parameters can also be adjusted.

- ⇨ Select button (1) to adjust valve parameters.
- ⇨ Select button (2) to adjust the logging of temperature data or abort the dialog with button (3).



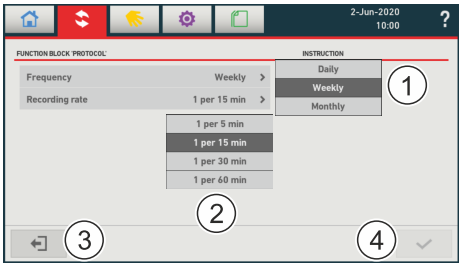
- ⇨ Button (1) opens the frequency, button (2) the measurement values of the logging file.
- ⇨ Activate changes using button (4) or abort the dialog using button (3).

4.6 Flow



This function provides an overview of the flow values of all external flow sensors. Here parameters can also be adjusted.

- ⇨ Select button (1) to adjust valve parameters.
- ⇨ Select button (2) to adjust the logging of flow data or abort the dialog with button (3).



- ⇨ Button (1) opens the frequency, button (2) the measurement values of the logging file.
- ⇨ Activate changes using button (4) or abort the dialog using button (3).

4.7 Actuator Automation

The application **Actuator Automation** offers many possibilities, from increased automation of drinking water installations and process safety up to the optimization of energy and hygiene. The central control via the master makes the automation simple, quick, and easy to monitor.

Actuator automation allows the programming of actuators that are connected to the master relay interface or to Uni controllers, e.g electric actuators, water heaters, or circulation and dosage pumps.

Required inputs/outputs

To use **Actuator automation**, the connected actuators must provide one of the following inputs/outputs.

Master relay:

- 24 V DC
- 230 V AC

Uni controller:

- Relay 24V/230V
- Inputs 4-20 mA
- 4-20 mA IN/OUT

Hycleen AS flush valves or hydraulic balancing valves cannot be controlled via **Actuator automation** as they are integrated in the respective application.

Activation

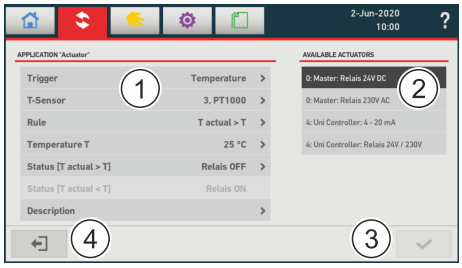
The license for the **Actuator automation** is not automatically activated in the master settings and must be activated separately.

- **Master relay**: free of charge after registering the Hycleen AS
- **Actuator automation**: chargeable

Activation takes place on the Georg Fischer platform.

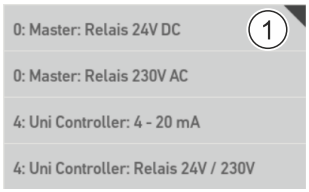
⇨ For this purpose, load the master-specific license file on a USB stick and activate it, see Settings->Modules.

Overview

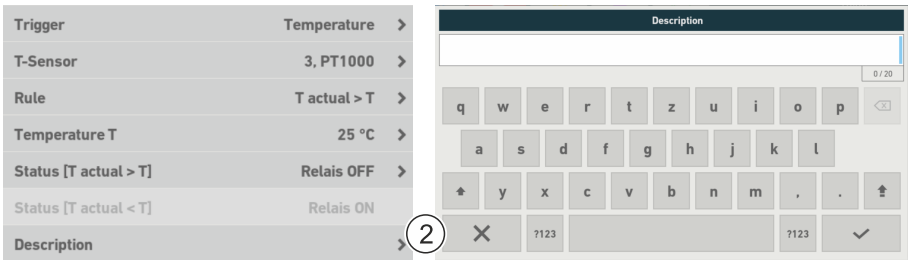


- Area (2) shows the list of connected Uni controllers and master relays.
- Area (1) shows the settings of the selected relay or 4-20mA input/output.
- Button (3) saves the changes.
- Button (4) closes the dialog.

4.7.1 Trigger



Actuators with a selected trigger are marked by a triangle (1).

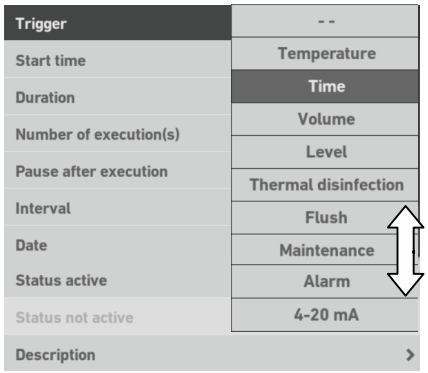


For easy allocation, each trigger can be assigned a name under (2):

⇨ Enter the desired name via the virtual keyboard.

⇨ Abort keyboard dialog with x in order not to make any adjustment or activate the entry with the checkmark.

Selecting triggers



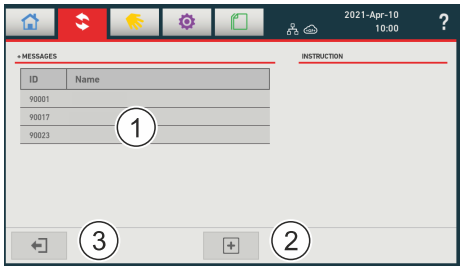
The following triggers can be selected:

- **- -**. Trigger deactivated.
- **Temperature**. The trigger is a temperature sensor (of a flush valve, a hydraulic balancing valve, or an external temperature sensor). This can be used, for example, to set up a temperature-controlled frost protection system that cuts off the water line to the outside and empties it.
- **Time**. The trigger is the start time. This can be used, for example, to trigger time-controlled garden irrigation, flushing, or heating a hot water heater for thermal disinfection.
- **Volume**. The trigger is the measured water volume that is detected by the flow sensor during a specific time period. The trigger can be reset either by a specific time period or by a sensor (signal from a 4-20 mA sensor connected to the system). This can be used, for example, to shut off drinking water installations in case of extended nonuse (e.g. an unused apartment). This protects the drinking water installation from the hygienic risks of stagnating water.
- **Level**. The trigger is the Run off monitoring system. The selected level sensor has a status of OK as long as the float switch is not triggered. If the float switch is triggered, the status switches to NOK, which remains in place as long as the float switch remains in a triggered state. This way, for example in case of water damage or a blocked sewage pipe the water supply can be shut off with the help of an electric actuator.
- **Thermal disinfection**. The trigger is the thermal disinfection (TD) process. If a TD is started, the status switches to active and remains in place until the TD is completed. The status then switches back to not active. This can be used, for example, to set up a signal system (audio or visual), which warns the users of the drinking water installation of increased temperatures during the TD.
- **Flush**. The trigger is the flush process of the Hycleen Automation System. At the start of a flush process the status switches to active and remains in place until the flush process is completed. The status then switches back to not active.

- **Maintenance**. The trigger is the automatic maintenance process. If a maintenance process is started, the status switches to active and remains in place until the maintenance is completed. The status then switches back to not active. This can be used, for example, to trigger a disinfection measure or a flush process during the maintenance process.
- **Alarm**. The triggers are incurred alarms. If one of the selected alarms is triggered, the status switches to active and remains in place until the alarm is acknowledged by the master. This can be used, for example, to trigger a signal (audio or visual) in case of a defect Hycleen AS component or an undesired temperature deviation.
- **4-20 mA**. The trigger is a 4-20 mA signal input. The selected 4-20 mA sensor will affect the actuator status according to the selected rule. With this, for example, a leakage sensor can actuate an electric valve that shuts off the water supply. Another possible application is opening and closing the water supply via a switch.

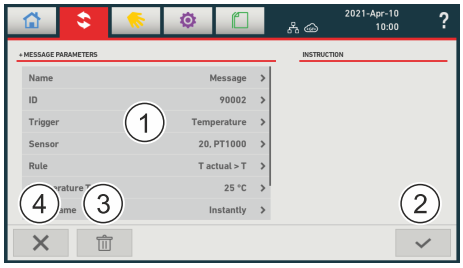
4.8 + Messages

The application **+ Messages** offers the possibility to create up to 30 individual messages and this means to personalize the alarm management. Ex works defined system messages remain unchanged.



- Area (1) displays the list of created individual messages. Select message to change or delete it.
- Button (2) opens the window for creating a new message.
- Button (3) closes the dialog.

4.8.1 Create or change message

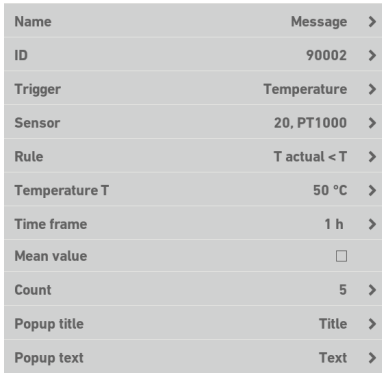


⇨ Configure the designation and parameters of the message (1).
⇨ Save and activate message (2).
⇨ Delete message (3).
⇨ Abort configuration (4).

The following **triggers** can be programmed:

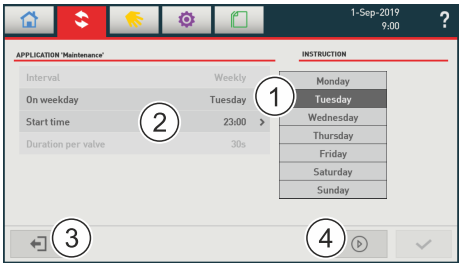
- **Temperature**. Monitoring of one or more Hycleen temperature sensors.
- **Volume**. Monitoring of one or more flow sensors and their cumulative flowed through volume.
- **Level**. Monitoring of one or more Hycleen sequence monitors.
- **4-20 mA**. Monitoring of external signals 4 - 20 mA.
- **Thermal disinfection**. Monitoring the number of thermal disinfections .
- **Flush**. Monitoring the number of flushes.
- **Message**. Monitoring of Hycleen system messages.
- **Data volume**. Monitoring the amount of data for communication with Hycleen Connect (if installed).
- **Actuation cycles**. Monitoring of the number of actuation cycles of the Hycleen valves.

Example with temperature trigger



- **Name**. Freely selectable name of the message in the message list.
- **ID**. Identification number of the message in the message list (possible: 90001 to 90030)
- **Trigger**. Trigger of the message, in this case **Temperature**.
- **Sensor**. Selection of temperature sensors to be monitored. It is possible to select a single sensor, several sensors or all sensors.
- **Rule**. Definition of the rule when the message is displayed. Possible values are T actual > T, T actual < T, T actual lies between the values T1 and T2.
- **Temperature T**. Setting the temperature(s) for the rule.
- **Period**. Definition of the period during which the rule must be fulfilled. Possible are 0 min to 1 week.
- **Mean value**. If the check mark is set, the message will be displayed if the mean value meets the rule in the defined period. In example, a message would be displayed if the temperature mean value of the external sensor at valve no. 20 was below 50° C during the last hour.
  If the check mark is not set, a value must be specified that monitors the fulfillment of the rule during the defined period. Values between 1 and 100 are possible. In the example, a message would be displayed if the temperature falls below 50° C 5 times within 1 h.
- **Popup title**. Name of the message in the popup that is displayed on the Master.
- **Popup text**. Description of the message in the popup that is displayed on the Master.

4.9 Automatic Maintenance Process



Once a week, the **Maintenance** application is actuated.

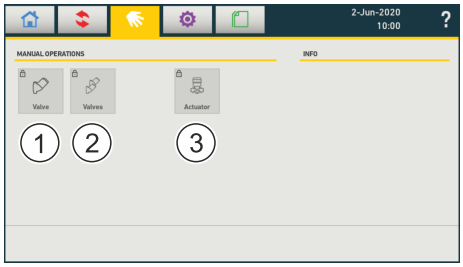
It ensures long-term reliable operation of the valves during hydraulic alignment. A basic problem of hydraulic regulator valves is the fact that during operation they are never shut fully or only during maintenance measures. There are also lines that only have to be regulated very rarely. This leads to the danger of sediments accumulating and obstructing the function of the valves. The automatic maintenance process prevents this problem by moving the valve to the positions 0 and 100% opening degree. Potential sedimentation is also avoided in this way. In addition, the sequential opening of the individual circulation lines at 100% ensures repeated high flow velocity (cleaning effect).

Process sequence

- ⇨ All circulation regulators decrease the flow to the leakage rate.
- ⇨ Each valve opens in sequence for 30 seconds and is rinsed, then the valve assumes the preset position again.
- ⇨ Define the desired day of the week (1) and starting time (2) for the automatic maintenance process. The starting time must be selected so that the process takes place at a time when no warm water is withdrawn, i.e. typically at night.
- ⇨ Save the changes using the confirm key (3).

The play key (4) initiates an immediate maintenance process.

4.10 Manual operation



The following functions are possible here:

- (1) Manual activation of individual valves
- (2) Joint activation (opening/closing) of LegioTherm valves according to type:
  - all hydraulic balancing valves (LegioTherm 2T)
  - all flush valves (LegioTherm K)
- (3) Manual operation of the connected actuators

NOTICE

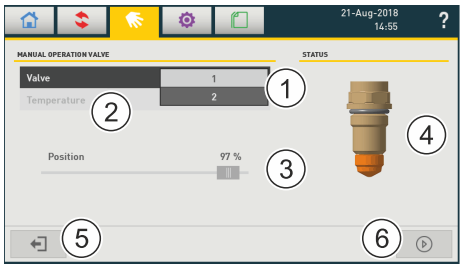
Risk of damage to the flow sensors!

Flow sensors potentially installed to flush valves can be damaged if the flow speed is too high (opening degree = 100%)!

The manual movements are password-protected. After selecting the application, a virtual keyboard appears for entering the password. The password is 42.

4.10.1 Valve

The dialog allows the service technician to adjust the valve position using the slider (3).



Valve number (1), valve position (4) and temperature (2) at the sensor of the valve are displayed.

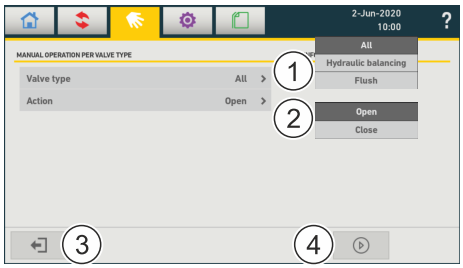
Button (5) closes the dialog. It is inactive during the manual valve movements.

Button (6) starts the manually set valve movement. Its icon changes to a pause icon until the valve status set on the slider (3) has been reached. Afterwards, the play icon appears again as shown here, and button (5) is active again.

Closing the dialog with button (5) or selection of another function terminates manual operation. Afterwards, the application takes over the control of the valve again.

4.10.2 Valves

The dialog allows the service technician to manually open and close the selected valves (max. 5 valves at a time). During this, the valves open and close completely (opening degree 100 %/0 %). In **flush valves** this can lead to a high water output!



- ⇨ Select the desired valve type (all, flush valves or hydraulic balancing valves).
- ⇨ Select the process (opening/closing).

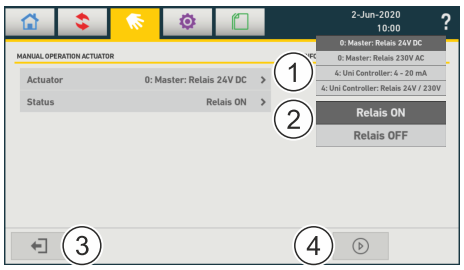
Button (3) closes the dialog. It is inactive during the manual valve movements.

Button (4) starts the selected valve movement. Its icon changes to a pause icon until the selected status has been reached. Afterwards, the play icon appears again as shown here, and button (3) is active again.

Closing the dialog with button (3) or selection of another function terminates manual operation. Afterwards, the application takes over the control of the valves again.

4.10.3 Actuators

The dialog allows the service technician to manually adjust the actuators.



⇨ Select the desired actuator (1). The selection takes place via the cabling to the master relay or Uni controller (relay or 4-20 mA).

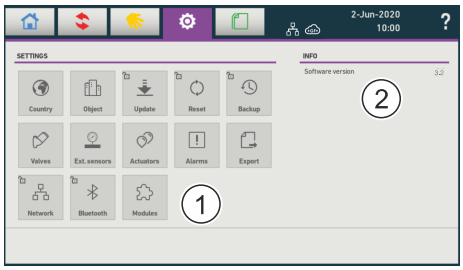
With a relay, the status is displayed in field (2), while the value is shown with an output 4-20 mA.

Button (3) closes the dialog. It is inactive during the manual actuator movements.

Button (4) starts the selected change. Its icon changes to a pause icon until the selected setting has been reached. Afterwards, the play icon appears again as shown here, and button (3) is active again.

Closing the dialog with button (3) or selection of another function terminates manual operation. Afterwards, the application takes over the control of the actuators again.

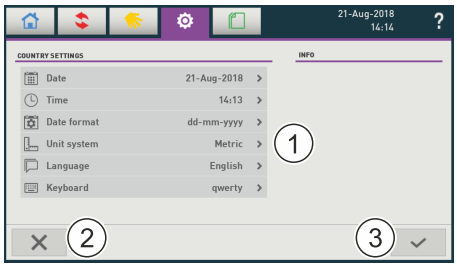
4.11 Settings



Area (1) contains functional elements for all configured adjustment options.

Next to that, the current software version (2) is displayed.

4.11.1 Country



The following settings can be adjusted in area (1):

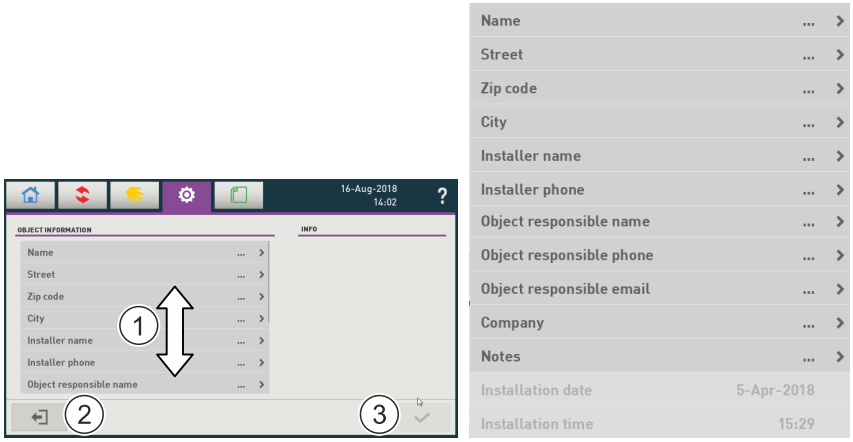
- **Date**: Current date, selection dialog
- **Time**: Current time, selection dialog plus 24h or am/pm
- **Date format**: dd-MM-yyyy or yyyy-MM-dd
- **System of units**: Metric or Imperial
- **Language** depending on configuration
- **Keyboard**: QWERTY, QWERTZ or others, depending on configuration

Button (2) closes the dialog without making any changes.

Button (3) saves the changes and closes the dialog.

The system does not perform automatic adjustment for summer / winter time. The adjustment must be performed manually.

4.11.2 Object



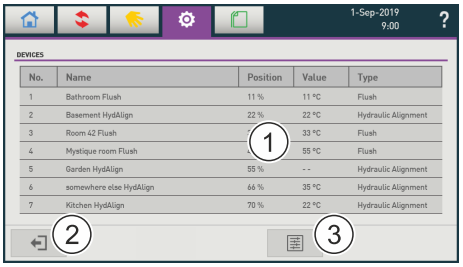
Data regarding the current property or building can be customized in area (1).

⇨ View the entries for the concerned building in area (1) and adjust them if necessary (virtual keyboard). For this purpose, move the list in the area up or down as required.

Button (2) closes the dialog without making any changes.

Button (3) saves the changes and closes the dialog.

4.11.3 Valves



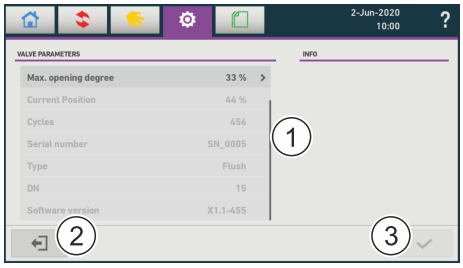
⇨ The list in the area (1) displays one line for each valve that is connected to the master.

⇨ Move the list up or down as required.

⇨ Select a valve entry to change valve data.

⇨ The LED illumination of all valves can be switched on or off via button (3).

⇨ After successful adjustment, close dialog using button (2).



Area (1) normally displays the parameters that can be adjusted.

"Cycles" indicates the movements of the selected valve. 1 cycle consists of 1 x opening and 1 x closing. The expected minimum service life of a valve motor is 100,000 cycles.

- ⇨ Adjust the name of the valve and the pipe volume as required.
- ⇨ In the case of valves for hydraulic balancing, the maximum opening angle and the leakage rate can additionally be adjusted.
- ⇨ Precise setting of the pipe volume controlled by the valve allows the quick adjustment of the leakage rate during hydraulic balancing. The pipe volume consists of the content of the entire circulation line to which the valve is connected.

  The following table shows the pipe volume per pipe length meter for standard pipe diameters.

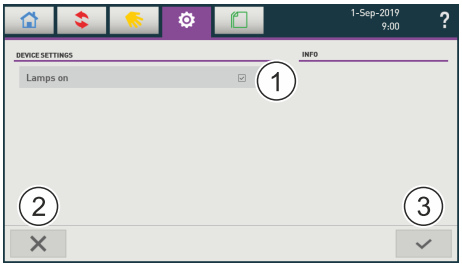
Sanipex MT	Inner diameter / mm	Liter / m
16	12	0.104
20	15	0.177
26	20	0.314
32	25	0.531
40	32	0.855
50	40	1.350
63	63	2.230

Button (2) closes the dialog without making any changes.

Button (3) saves the changes and closes the dialog.

NOTICE

Adjusting the leakage rate to values outside 10 to 15% means that the DVGW standard W554 is not complied with!

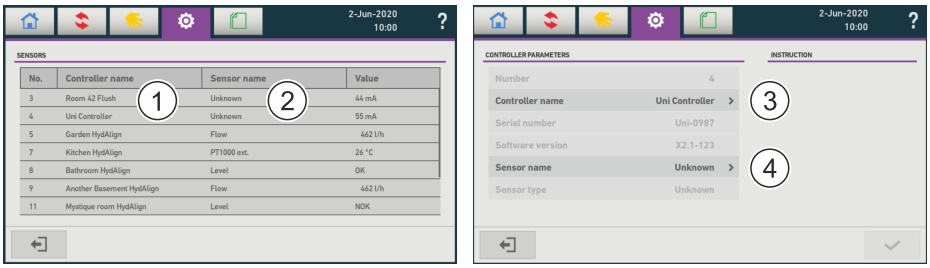


In the default setting, the "lamps on" checkmark is set, i.e. the LED illumination of all attached valves is switched on.

- ⇨ To turn the LED illumination on/off, set/deactivate the checkmark.
- ⇨ Activate changes with button (3).

Button (2) closes the dialog without making any changes.

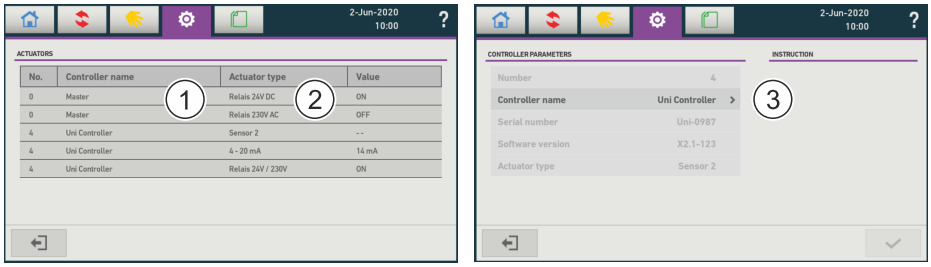
4.11.4 External sensors



The list in the area (2) displays one line for each external sensor that is connected to the master. Area (1) displays the name of the controller to which the external sensor is connected.

- ⇨ Move the list up or down as required.
- ⇨ Select the external sensor to display detailed information. The name of the controller (3) and the external sensor (4) can also be changed here. The changed controller name is adopted for all applications.

4.11.5 Actuators

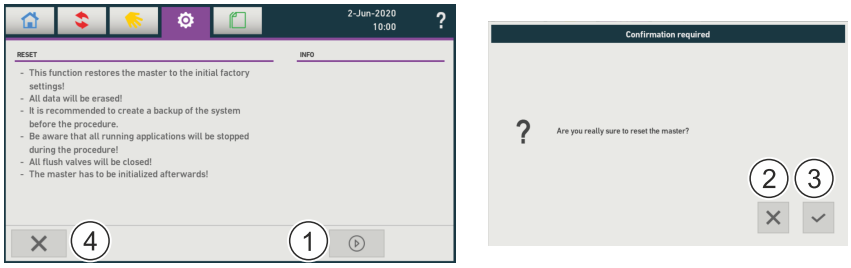


The list in the area (2) displays one line for each actuator that is connected to the master. Area (1) displays the name of the Uni controller that activates the actuator.

⇨ Move the list up or down as required.

⇨ Select the actuator to display detailed information (3) of the Uni controller and actuator.

4.11.6 Reset



NOTICE

This function restores the master to the initial factory settings!

- All running applications are stopped and all flush valves closed.
- All settings and protocol data are erased.

The master is newly initialized afterwards.

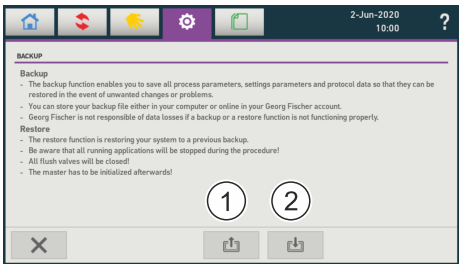
Button (1) opens the confirmation inquiry.

⇨ Abort the process using button (2) or confirm with button (3).

Button (4) closes the dialog without making any changes.

⇨ At the end of the reset, turn the master off and on again to initiate a restart.

4.11.7 Backup

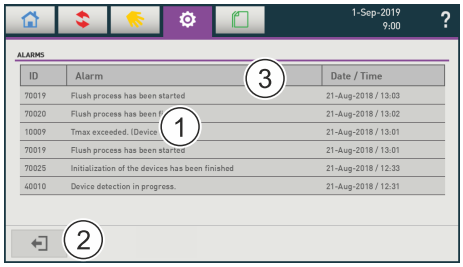


With this function all protocol data and master settings are backed up and restored in case of undesired changes or problems. All running applications are stopped during the restoration process.

The restoration is protected by a password: 42.

- ⇨ Select button (1) to back up all process parameters, setting parameters, and protocol data.
- ⇨ Select button (2) to install a created backup file on the master.
- ⇨ At the end of the restorations, turn the master off and on again to initiate a restart.

4.11.8 Messages



The list in area (1) displays the latest notifications.

Button (2) closes the dialog.

The sorting of the list can be adjusted in the columns of the header (3) : Press once = ascending, press twice = descending.

NOTICE

If the system is not connected to Hycleen Connect, check the master for error messages on a weekly basis. If an error message shows, respond accordingly to ensure smooth operation of the system.

4.11.9 Update

The update of the master with a new firmware is protected by a password: 42.

We provide software updates as a zip archive. These must be copied to a USB stick in their original condition.

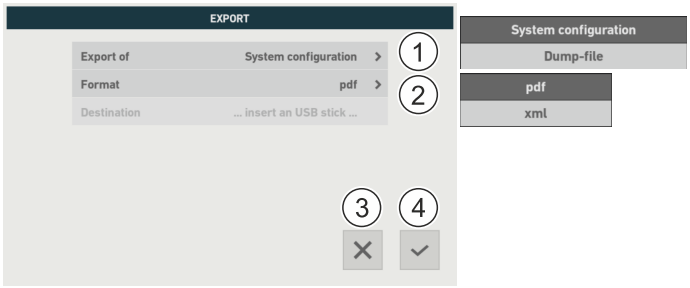
During the update you must agree to the general terms and conditions and our non-liability disclaimer, otherwise the process is abandoned. The software shows step by step instructions.

- ⇨ After the update of the firmware remove the USB stick and restart the master. For this purpose, switch the power to the master and any connected power-boxes off and on again.
- ⇨ The new software is also installed on the controllers of the connected valves. This process takes a few minutes (about 30 seconds per controller).

The update is completed as soon as the following message is shown: "Firmware update of the valves is completed."

If the software update is not successfully completed, the current master software remains active and unimpeded functional.

4.11.10 Export

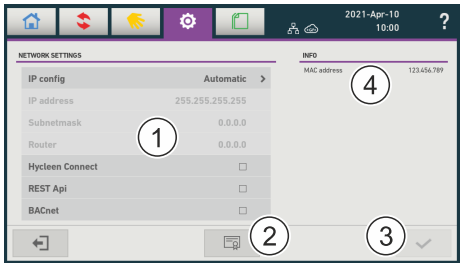


This function allows the export of a system configuration protocol or a dump file. The system configuration protocol (commissioning protocol) includes all components connected to the system as well as the stored application settings. The dump file contains all log data for the system analysis with the commands carried out in the master and can provide information in case of an unexpected event. For this purpose, the dump file can be sent to the technical customer service via e-mail, see Troubleshooting

- ⇨ Select the desired export (1) (system configuration or dump file).
- ⇨ When exporting the system configuration, select the desired export format (2) (PDF or XML).
- ⇨ Start the export with button (3).

Button (4) closes the dialog without making any changes.

4.11.11 Network



In area (1) you can adjust the network parameters of the master: **IP config** on **Automatic** makes sure that the IP address of the master is automatically retrieved.

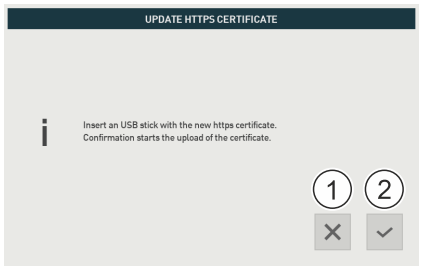
Otherwise (**Manual**) the entered IP address applies.

As information (4), the **MAC address of the master** is displayed. The MAC address is required for the user-specific licenses of the Modules.

With button (2) you can import a new HTTPS certificate.

Button (3) activates the implemented adjustments.

The certificate is expected on a USB stick.



If button (2) is not active, no USB stick is detected. In this case make sure that the USB stick is correctly inserted and, if required, use a USB stick of another make.

Button (2) starts the import.

Button (1) closes the dialog without making any changes.

Notes for HTTPS certificates

- The RSA cryptographic system is supported by the .pem (privacy-enhanced mail) format.
- The certificate must be created according to the X.509 standard for the definition of formats for public key certificates.
- The certificate and the private key must be in the same file.
- Supported byte size: 512 to 3072.
- Password protection of the certificate is supported.
- Example of creating a certificate under Linux:

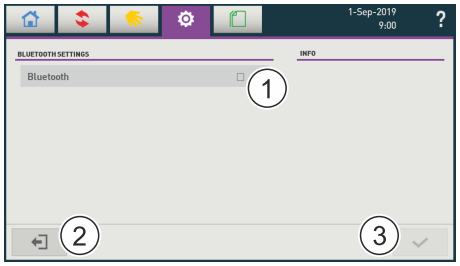
  openssl req -x509 -days 365 -newkey rsa:2048 -keyout any.pem -out any.pem

If a module for **REST Api** or **BACnet** was acquired, for activation see Settings > Modules, the corresponding interface can be activated by setting the checkmark.

Activating the **BACnet**interface expands the list of parameters by the network parameters of **BACnet**:

These are adjusted in line with the network parameters.

4.11.12 Bluetooth



The **Hycleen Automation System** app is available as an Android and Apple version in the respective app stores. It allows status monitoring of valves via a smartphone. The connection is via the Bluetooth access of a valve controller (max. distance 10 m). The valve through which the connection is set up maintains its function and continues to operate normally.

For Uni controllers Bluetooth connection is not possible.

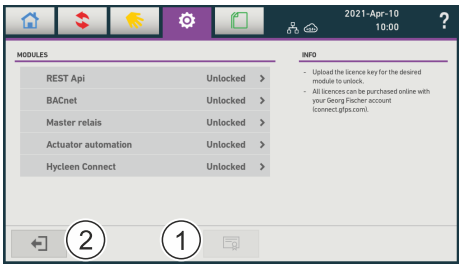
If a valve is connected to the app via Bluetooth, the valve is illuminated in blue (4). Exception: When the LED illumination of the valves is switched off, the valve is not illuminated even when connected to the app.

This Bluetooth access to the master can be activated and deactivated by setting the checkmark (1) in the Bluetooth settings.

Button (3) activates the implemented adjustments.

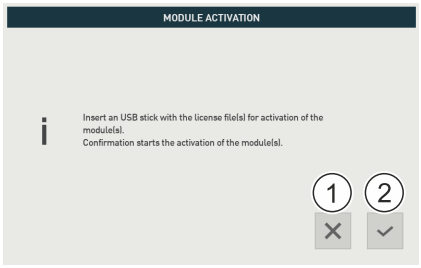
Button (2) closes the dialog without making any changes.

4.11.13 Modules



By importing the associated license file(s) here, chargeable modules can be activated, such as

- **REST API** interface
- **BACnet** interface
- **Master relay** (free of charge after registration)
- **Actuator Automation**
- **Hycleen Connect** (cloud-based remote-access)



The required license file is expected on a USB stick.

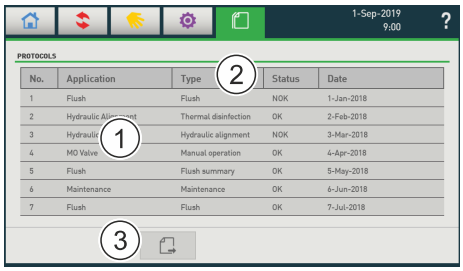
The parameterization of the BACnet interface takes place via Settings > Network

With button (2) you can import a license file. If button (2) is not active, no USB stick is detected. In this case make sure that the USB stick is correctly inserted and, if required, use a USB stick of another make.

Button (1) closes the dialog without making any changes.

The Uni controller is fully mapped via the BACnet interface, in the REST API interface only the 4-20mA inputs of the Hycleen AS-sensors are processed.

4.12 Protocols

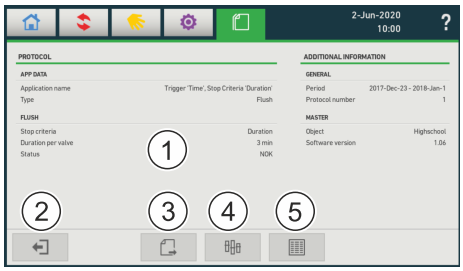


The list of available protocols is displayed in area (1).

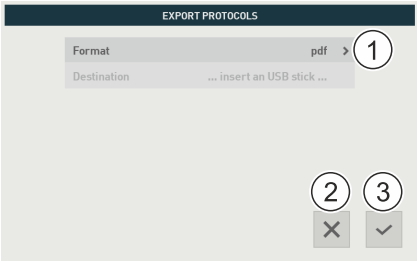
The sorting of the list can be adjusted in the columns of the header (2) : Press once = ascending, press twice = descending.

Button (3) exports all protocols at once via USB (choice of PDF or XML).

Selecting an entry in area (1) displays details of the selected protocol in a new dialog:



- Area (1) displays the meta data of the selected protocol.
- Button (2) takes you back to the list of available protocols.
- Button (3) exports the current protocol via USB.
- Button (4) opens the display of the temperature ranges in the time periods recorded by the protocol.
- Button (5) opens the display of the valves that have exceeded the limit temperatures in the time periods recorded by the protocol.

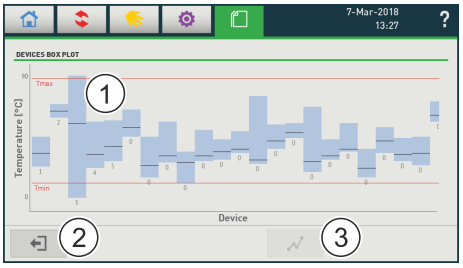


Area (1) allows you to select the output format: PDF or XML.

Button (2) closes the dialog.

Button (3) exports the current protocol via USB. If button (3) is not active, no suitable USB stick is recognized. In this case make sure that the USB stick is correctly inserted and, if required, use a USB stick of another make.

Temperature ranges (4)

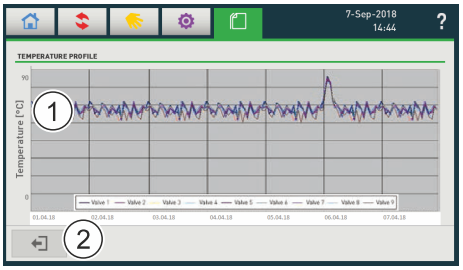


Area (1) displays a bar with the recorded temperature range for each time interval of the selected protocol. You can see immediately if T_{max} was exceeded or T_{min} was not met.

Selecting an interval in area (1) activates button (3), which opens the graph with the corresponding chronological sequence of all recorded temperatures. Up to 5 intervals can be selected simultaneously.

Button (2) takes you back to the protocol.

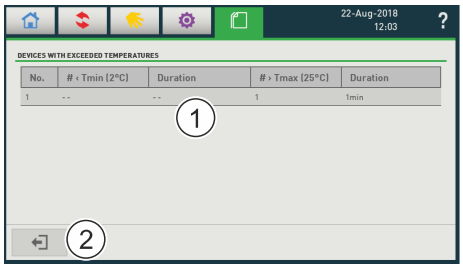
Chronological sequence



Area (1) displays the chronological sequence of all recorded temperatures. You can see immediately when exactly and how often T_{max} was exceeded or T_{min} was not met.

Button (2) takes you back to the display of the temperature ranges.

Exceeded limit temperatures (5)



The table in the area (1) provides a clear summary of the temperature messages. Each time a limit temperature is violated, it is displayed in a separate line with details of the valve concerned. Here, you can quickly find out whether there were any critical conditions during the protocol period.

Button (2) takes you back to the list of available protocols.

5 Troubleshooting

Here, you will find the most important messages and instructions for its removal. In addition, frequently asked questions and problems regarding the Hycleen Automation System are stated together with recommended solutions. Address any additional questions to your contact person at GF Piping Systems or our technical customer service, tel.+ 41 61 975 23 77, e-mail: tkd.jrg.ps@georgfischer.com.

5.1 Messages

10003: Required temperature not reached or max. time period exceeded

Measures:

- ⇨ Check storage temperature.
- ⇨ Check storage volume.
- ⇨ Check output of the circulation pump.

10006: Wrong password

Measures:

- ⇨ Enter the correct password:
  - Monitor: 137
  - Application changes: 42

10045: No applicable data found on the USB flash-drive

Update or backup on the USB flash-drive is not recognized.

Measures:

- ⇨ Use a USB flash-drive with the applicable data.

10047: The license of one of the modules expired

The licence for a Hycleen extension module has expired. Note: Purchased licenses expire after 10 years and can then be renewed free of charge.

Measures:

- ⇨ Renew the license.

20008: Tmin exceeded

The moving average temperature has fallen below the programmed limit temperature of the application over the last 24 hours.

Measures:

- ⇨ Check temperature on water heater.
- ⇨ Check valve and application settings.

20009: Tmax exceeded

The moving average temperature has exceeded the programmed limit temperature of the application over the last 24 hours.

Measures:

- ⇨ Check piping system for excessive temperature.
- ⇨ Check temperature on water heater.
- ⇨ Check valve and application settings.

20053: Motor service life check

The actuator will soon reach the end of its expected service life. The 1st message is sent after 90,000 actuating cycles, the 2nd after 95,000, then every 1,000. The expected service life is approx. 100,000 actuating cycles, but depends on the operating conditions.

Measures:

- ⇨ Order replacement controllers so that an immediate replacement can take place in the event of a failure.

20055: Leakage exceeded

50% of all hydraulic system balancing valves have exceeded the leakage position of 50%

Measures:

- ⇨ Check system parameter.

20062: Reset application after a change of the hardware configuration

After changes to the hardware configuration (e.g. adding another Hycleen valve or an external temperature sensor), the application settings must be reprogrammed. The 1:1 replacement of a defective controller or sensor is not affected.

Measures:

- ⇨ To change the hardware configuration, switch off the master and restart.
- ⇨ Reprogram the application settings. The settings of the valve parameters remain unchanged.

70050: Level sensor actuated (NOK)

The run-off monitoring has been triggered.

Measures:

- ⇨ Identify the concerned flush valve and check the associated process.

5.2 Error messages

10004: Power supply < 28V

Insufficient power supply to controllers or valves.

Measures:

- ⇨ Check: Cable length corresponds to the specification (max. 300 m).
- ⇨ With cable lengths > 300 m: Mount powerbox.

10005: TCP/IP error

Problem with the network connection.

Measures:

- ⇨ Check cable connections.
- ⇨ Check IP addresses.

10013: PT 1000 Temperature sensor defective

Measures:

- ⇨ Replace PT 1000 Temperature sensor.

10014: PT 1000 Temperature sensor not connected.

The temperature sensor is no longer recognized.

Measures:

- ⇨ Check cable connection of the temperature sensor.
- ⇨ Connect temperature sensor according to assembly instructions. Carefully fit the valve insulation.
- ⇨ Replace temperature sensor.

10016: Controller communication error

The Master reports a communication error with a Controller.

Measures:

- ⇨ Check cable connection.
- ⇨ Restart Master.
- ⇨ Contact Technical Customer Service.

10029: Actuator defective

There is an error in the motorized actuator of a valve.

Measures:

- ⇨ Check actuator and controller.
- ⇨ Connect the actuator according to the assembly instructions.
- ⇨ Remove and check valve bonnet and controller.
- ⇨ Replace controller.

10030: Valve blocked

The actuator of a valve is not in the required position, e.g. due to a foreign object, blockage of the valve stroke or a defective controller providing incorrect values.

Measures:

- ⇨ Check valve for blockage.
- ⇨ Remove and check valve bonnet and controller. Replace defective component.

10054: 4 - 20 mA sensor error

A 4 - 20 mA sensor is incorrectly connected or defective.

Measures:

- ⇨ Check the condition and wiring of the sensor. Replace defective sensor.

60038: Unknown error -> Restart Master

An unspecified error has occurred.

Measures:

- ⇨ Restart Master.
- ⇨ Contact Technical Customer Service.

5.3 Error management

5.3.1 Problems

No LegioTherm valves or Uni controllers recognized

- ⇨ Check: Components connected to the left cable output of the master, see Installation.

Not all LegioTherm valves or Uni controllers recognized

Measures:

- ⇨ Check serial cabling.
- ⇨ Check maximum number of system components:
  Number of LegioTherm valves + 2 x number of Uni controllers ≤ 50.
- ⇨ Check cable length of 300 m for each output (500 m with Powerbox).
- ⇨ Localize and replace a potentially defective valve controller. The valve itself does not need to be replaced.

Valve controller or Uni controller not illuminated

- ⇨ Switch on the LED illumination, see Settings > Valves.

The master monitor is black or frozen and cannot be reactivated

- ⇨ Restart the master, export a dump file (see Settings -> Export) and forward it to the technical customer service via e-mail.

The master does not record protocols

- ⇨ Contact the technical customer service to install a full update.

The BACnet interface or the REST API interface is not functioning

- ⇨ Obtain the according license and activate under modules, see Settings -> Modules.

The application Actuator Automation is not selectable

- ⇨ Obtain the according license and activate under modules, see Settings -> Modules.

The hydraulic system balancing is not functioning, the set target temperature is not reached

- ⇨ Check the application settings and adjust the valve settings such as leakage rate and maximum opening angle based on the evaluation of the protocols.
- ⇨ Check the installation system for weak spots with the help of the protocols.

5.3.2 Questions

Are the settings of the master still in place after a power outage?

The master retains all settings in case of a power outage. As soon as the power returns, the master restarts automatically, unless someone intervenes manually, and carries out the respective application according to the settings.

Where is the data of the external sensors (temperature or flow) stored?

The temperature data of the external sensors is stored in the Temperature protocol, the flow values in the Flow protocol.

Can the passwords be changed?

No. The access password for the master user interface is 137, the password for adjusting settings is 42.

NOTICE

If the system is not connected to Hycleen Connect, check the master for error messages on a weekly basis. If an error message shows, respond accordingly to ensure smooth operation of the system.

6 CE Declaration

+GF+

EG / EC / UE
KONFORMITÄTSERKLÄRUNG
DECLARATION OF CONFORMITY
DÉCLARATION DE CONFORMITÉ

Wir	**Georg Fischer JRG AG**
We	***Hauptstrasse 130***
Nous	*CH-4450 Sissach*

erklären in alleiniger Verantwortung, dass das Produkt,
declare under our sole responsibility that the product,
déclarons sous notre seule responsabilité que le produit,

Hycleen Automation System	
Automation Master	**9900.XXX**
Year of Construction	**2018**

konform ist mit den Anforderungen der Richtlinien,
is conform to the provisions of directives,
est conforme aux exigences des directives,

2014/53/EU

gestützt auf die folgenden Normen,
based on the following standards,
basé aux normes suivants,

EN 61000-3-2, EN 61000-3-3, 61000-4-2, EN 61000-4-3, EN 61000-4-4
EN 61000-4-5, EN 61000-4-6, EN 61000-11
EN 55032:2015 Class B, EN 61000 6 3: 2007 + A1:2011
ETSI EN 301 489 17, V3.2.0:2017
ETSI EN 300 328, V2.1.1:2017-01
EN 60730, EN 62479

Sissach, 14.06.2018 Philippe Cachot

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GF Piping Systems

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