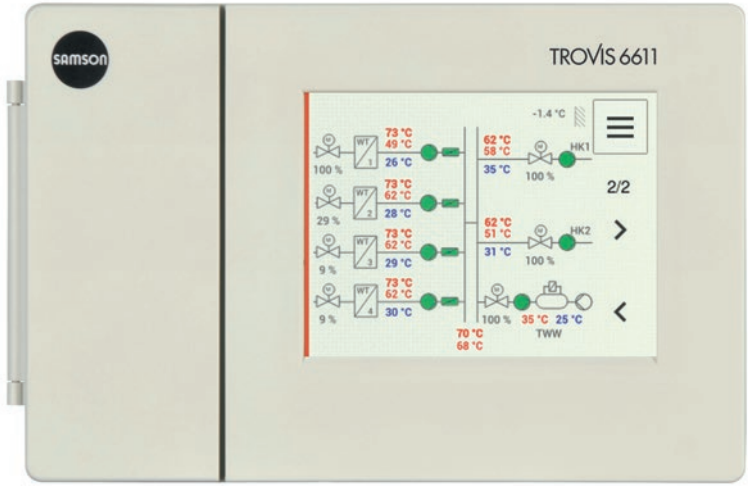
MOUNTING AND
OPERATING INSTRUCTIONS

EB 6611-2 WT EN

Translation of original instructions



Heat Exchanger Sequence Application for TROVIS 6611-2

Firmware version 3.91

Edition January 2022

Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices.

➔ For the safe and proper use of these instructions, read them carefully and keep them for later reference.

➔ If you have any questions about these instructions, contact SAMSON's After-sales Service (aftersalesservice@samsongroup.com).

The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website at ***www.samsongroup.com > Service & Support > Downloads > Documentation***.

Definition of signal words

⚠ DANGER

Hazardous situations which, if not avoided, will result in death or serious injury

⚠ WARNING

Hazardous situations which, if not avoided, could result in death or serious injury

NOTICE

Property damage message or malfunction

Note

Additional information

Tip

Recommended action

1 Safety instructions and measures

Intended use

The heat exchanger sequence application is a ready-to-use software for SAMSON's TROVIS 6611-2 Control and Automation Unit. The **heat exchanger sequence** application allows the control of up to four heat exchangers that share the same flow pipe.

To allow the control and automation unit to access the I/O modules in the required manner, the I/O modules must be mapped logically as a project in the unit.

The control and automation unit as well as the I/O modules are designed to operate under exactly defined conditions (e.g. power supply, ambient conditions). Therefore, operators must ensure that the unit is only used in applications where the operating conditions correspond to the technical data. In case operators intend to use the control and automation unit in applications or conditions other than those specified, contact SAMSON.

SAMSON does not assume any liability for damage resulting from the failure to use the device for its intended purpose or for damage caused by external forces or any other external factors.

➔ Refer to the technical data for limits and fields of application as well as possible uses (▶ EB 6611-2)

The operator is responsible for the physical and logical project management, if not agreed otherwise.

Reasonably foreseeable misuse

The control and automation unit is not suitable for the following applications:

– Use outside the limits defined during sizing and by the technical data

Furthermore, the following activities do not comply with the intended use:

– Use of non-original spare parts
– Performing service and repair work not described

Qualifications of operating personnel

The heat exchanger sequence application must be configured by trained and experienced personnel only. According to these operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible hazards due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.

Personal protective equipment

No personal protective equipment is required.

Revisions and other modifications

Revisions or other modifications of the product are not authorized by SAMSON. They are performed at the user's own risk and may lead to safety hazards, for example. Furthermore, the product may no longer meet the requirements for its intended use.

Safety features

By setting a restore point after setting parameters and module assignment, the settings are saved in a non-volatile memory and can be restored later, if necessary.

Warning against residual hazards

The application directly influences the operation of the heat exchanger. To avoid personal injury or property damage, operators and operating personnel must prevent hazards that could arise in the heat exchanger by taking appropriate precautions. Plant operators and operating personnel must observe all hazard statements, warnings and caution notes in the referenced documents.

Responsibilities of the operator

Operators are responsible for proper use and compliance with the safety regulations. Operators are obliged to provide these mounting and operating instructions as well as the referenced documents to the operating personnel and to instruct them in proper operation. Furthermore, operators must ensure that operating personnel or third parties are not exposed to any danger.

Responsibilities of operating personnel

Operating personnel must read and understand these operating instructions as well as the referenced documents and observe the specified hazard statements, warnings and caution notes. Furthermore, operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

Referenced documentation

The following documents apply in addition to these mounting and operating instructions:

- ▶ AB 6600: System integration guidelines for electrical technicians
- ▶ T 6620-1 for TROVIS 6620-1 I/O Module
- ▶ T 6625 for TROVIS 6625 Input Module
- ▶ T 6630 for TROVIS 6630 AO Module
- ▶ T 6640 for TROVIS 6640 AI Module
- – Mounting and Operating Instructions for TROVIS 6611-2 Control and Automation Unit: ▶ EB 6611-2
- – Documentation of shut-off butterfly valves, control valves, pumps and heat exchangers

1.1 Notes on possible severe personal injury

⚠ DANGER

Risk of fatal injury due to electric shock.

The control and automation unit has been designed for use in low voltage installations. Before starting up the control and automation unit, electrical installation work must be performed. An electric shock due to incorrect work practices may cause fatal injuries.

➔ Before connecting wiring, performing any work on the device or opening the device, disconnect the supply voltage and protect it against unintentional reconnection.

➔ For electrical installation, observe the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use.

➔ In Germany, observe the VDE regulations and the accident prevention regulations of the employers' liability insurance.

1.2 Notes on possible property damage

NOTICE

Damage due to water entering the device.

The front pane of the control and automation unit is protected against vertically falling drops of water (IP41).

➔ Avoid drops, sprays and jets of water.

Manipulation of settings due to unauthorized access.

The TROVIS 6611-2 Control and Automation Unit supports various communications protocol (e.g. a web server). This allows remote access. To protect it from unauthorized access, the onsite and remote operation of the unit is password-protected:

➔ Change the initial administrator password after first start-up.

➔ Regularly change all user passwords.

➔ Do not pass login data on to unauthorized persons. Keep them in a safe place inaccessible to unauthorized persons.

Risk of damage due to failure to comply with the associated Mounting and Operating Instructions EB 6611-2.

These Mounting and Operating Instructions EB 6611-2 WT only describe the **heat exchanger sequence** application. This application must be loaded into TROVIS 6611-2 Control and Automation Unit before it can be used. Installation, start-up and operation of the TROVIS 6611-2 Control and Automation Unit are described in a separate mounting and operating instructions document.

➔ Read the Mounting and Operating Instructions for TROVIS 6611-2 Control and Automation Unit (▶ EB 6611-2).

2 Application start-up

After installing and wiring the TROVIS 6611-2 Control and Automation Unit, the **heat exchanger sequence** application can be started.

➔ Installation and wiring as described in ▶ EB 6611-2.

➔ Continue as described below.

1. User login:
   - ➔ Click ≡ to go to the login window.
   - ➔ Enter your user name and password ("admin").

   NOTICE

   Insufficient security due to generally accessible password.
   Change the administrator password (username: "admin", password: "admin") after first login.

2. Load firmware:
   - ➔ Insert the USB flash drive containing the project into the front USB port.
   - ➔ Go to the main menu (≡ button).
   - ➔ Select "Update firmware" in "USB".

3. Load project:
   - ➔ Insert the USB flash drive containing the project into the front USB port.
   - ➔ Go to the main menu (≡ button).
   - ➔ Select "Load project" in "USB" and select the required project.

4. Assign modules:
   - ➔ Go to the main menu (≡ button).
   - ➔ Select "Module assignment" in "Settings". The modules available for the software are listed.
   - ➔ Assign one physical module for each listed module one after the other.
   - ➔ The LEDs of a selected module blink one after the other after it has been selected. Confirm selection by checking the box (top right) or repeat selection procedure until the correct physical module has been selected.
   - ➔ Select "Apply" in the menu (≡ button) to save changes.

5. Setting parameters:
   See section 4 for details.
   - ➔ Go to menu folder containing the parameters you want to change (section 4) or read them from the parameter list (section 5).
   - ➔ Go to the main menu (≡ button).
   - ➔ Select the corresponding menu folder in 'System'.
   - ➔ Select parameter.
   - ➔ Set parameter (❮ or ❯, gently tap the value).
   - ➔ Confirm (✔) or discard (✖) parameter value.

6. Create new user:
   ▶ EB 6611-2 for details.
   User administration is performed over the TROVIS MOBILE web server. This server can be simply accessed by entering the IP address in a browser (we recommend Mozilla Firefox) over the web (▶ EB 6611-2 for details).

7. Set the time and date:
   - ➔ Go to the main menu (≡ button).
   - ➔ Select "Date and time" in "Settings".
   - ➔ Change the time and date.
   - ➔ Select "Apply" in the menu (≡ button) to save changes.

8. Change network settings (optional):

   ▶ EB 6611-2 for details.

The network settings must be changed if the automation unit is to be connected over a network.

➔ Go to the main menu (≡ button).

➔ Select "Network settings" in "Settings".

➔ Set the "LAN port" to ON in "Ports".

➔ Select "Back one level" in the menu (≡ button) to exit the level.

➔ Set all other parameters in "LAN settings":
- DHCP: ON (= default)
- IP address: 172.30.66.11 (= default)
- Subnet mask: 255.255.0.0 (= default)
- Gateway (essential for e-mail communication; configuration depends on IT structure)
- Host name: TROVIS-6111-2-xxx (xxx = device-specific MAC address)
- DNS server
- NTP server

➔ If necessary, select "Services" in "Network" and set the user options:
- SSH for console access using the "root" user role
- Activate FTPS for use with graphical project management (default = OFF)
- Activate HTTPS for the use of the integrated TROVIS MOBILE web server (default = OFF)
- Activate AVAHI to use Zeroconf (default = OFF)

NOTICE

Impaired device function and loss of warranty through the improper use of the "root" user role.

– Only activate SSH for troubleshooting and administration activities performed by trained personnel.

– Do not leave the SSH constantly activated.

– Assign a "root" password to protect its access.

➔ Select "Apply" in the menu (≡ button) to save changes.

Note

We recommend SAMSON entering a restore point ("Restore system" command in "Settings") after assigning the module. This ensures the settings are saved and can be restored later.

3 Operation

After starting up the **heat exchanger sequence** application, the heat exchangers are controlled based on the parameter settings.

The current set points and actual values can be read in the 'System' folder:

➔ Go to the main menu (≡ button).

➔ Select and gently tap the menu item 'Heat exchanger > 'Set points/actual values' in 'System'.

3.1 Manual operation

NOTICE

Activating the manual operation mode causes the controlled operation to be stopped.
– Only allow trained staff to activate manual operation mode.
– Do not leave the manual operation mode constantly activated.

Required user (👤): Service or Admin

➔ Go to the main menu (≡ button).

➔ Select and switch the required outputs manually in "I/O test" (the open and close signals of three-step valves must be prevented from being activated simultaneously).

4 Functions

The functions are set based on parameters in various menu items.

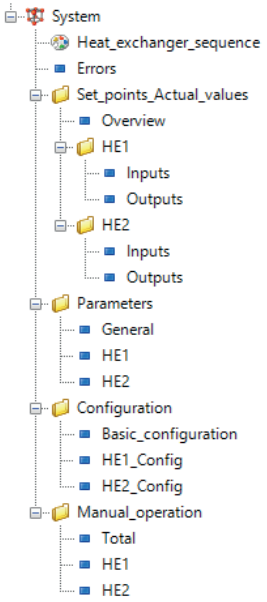


Fig. 1: *Menu structure*

indicates the menu items where the functions described below are set. Not all functions can be set. It depends on the user role (▶ EB 6611-2). indicates the user roles required to set a function.

Note

The parameters listed in the parameter table are default settings. The parameters shown may vary for a different configuration.

Heat exchanger sequence control

The heat exchanger sequence control is designed for the control of up to four heat exchangers that share the same flow pipe. The control of primary valves is based on the sensors of individual heat exchangers. The set point used for control is based on the common flow pipe (VF_{total}) that the heat exchangers share.

4.1 Lag/lead sequence

To control the flow based on the set point (VF_{total}), the required heat exchangers are operated in parallel (section 4.1.3) or based on the outdoor temperature (section 4.1.1), output capacity (section 4.1.2) or lag delay time (section 4.2).

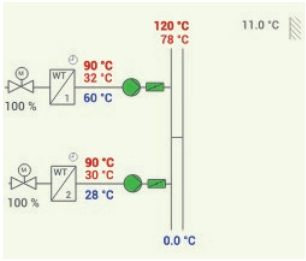


Fig. 2: *System example with two heat exchangers;*
red: flow (set point in bold print)
blue: return

Activation of additional heat exchangers:

1. Demand at the common flow (VF_{total}) determined
2. Shut-off butterfly valves opened
3. Pump enabled after transit time of shut-off butterfly valves elapsed
4. Valve and temperature control enabled
5. Demand for further heat exchangers in sequence

Deactivation of heat exchangers:

1. Deactivation of individual heat exchangers in sequence
2. Closing the valve
3. Pump deactivated after pump lag time elapsed
4. Butterfly valves closed

4.1.1 Sequence based on the outdoor temperature

The heat exchangers are enabled based on the outdoor temperature. Only the lead heat exchanger is enabled above the 'OT limit to enable control'. The 'OT limit to enable control' must be configured taking the energy demand and output capacity of the lead heat exchanger into account. It must be possible to meet a higher energy demand by longer operating times of the lead heat exchanger without loss of comfort.

This configuration prevents the start-up of the lag heat exchanger when it is foreseeable that the output of the lead heat exchanger is sufficient.

Service or Admin

System > Heat exchanger sequence > Configuration > Basic configuration > Sequence parameters

Parameters	Default	Adjustment range
Condition for lag/lead sequence = Outdoor temperature	Outdoor temperature	Outdoor temperature, Unrestricted, Parallel operation
OT limit to enable control	+12 °C	–40 to +50 °C

4.1.2 Unrestricted sequence

The lead heat exchanger is activated if the flow temperature does not reach the required set point. The lag heat exchanger is activated if the output capacity set in 'Activate lag' is insufficient to increase the flow temperature to the required set point It supplies the remaining energy required to heat the flow temperature.

The lag heat exchanger is not deactivated until the total of the modulation of all heat exchangers is smaller than the limit 'Heat exchanger capacity limit'.

Service or Admin

System > Heat exchanger sequence > Configuration > Basic configuration > Sequence parameters

Parameters	Default	Adjustment range
Condition for lag/lead sequence = Unrestricted	Outdoor temperature	Outdoor temperature, Unrestricted, Parallel operation
Activate lag/lead sequence	90 %	0 to 100 %
Heat exchanger capacity limit	40 %	0 to 100 %

4.1.3 Parallel operation

This function leads to all heat exchangers working constantly in parallel (no lag/lead sequence). The heat exchangers start to operate one after the other depending on the entered 'Lag delay time'.

Administrator

System > Heat exchanger sequence > Configuration > Basic configuration > Sequence parameters

Parameters	Default	Adjustment range
Condition for lag/lead sequence = Parallel operation	Outdoor temperature	Outdoor temperature, Unrestricted, Parallel operation
Lag delay time	2 min	0 to 90 min

4.2 Lag delay

If the energy of one heat exchanger is not enough to heat the flow temperature to the required set point, the next heat exchanger is not switched on until the time in 'Lag delay time' has elapsed. This prevents the brief operation of a heat exchanger.

Service or Admin

System > Heat exchanger sequence > Configuration > Basic configuration > Sequence parameters

Parameters	Default	Adjustment range
Lag delay time	2 min	0 to 90 min

4.3 Lead change

The lag/lead sequence can be changed depending on the outdoor temperature, operating hours or output capacity. The type of lead change can be determined or deactivated with the 'Lead change' parameter (see sections 4.3.1 to 4.3.4).

4.3.1 Permanent lead of a heat exchanger

The 'Lead change' parameter setting = OFF causes a lead heat exchanger to be permanently the lead heat exchanger.

Service or Admin

System > Heat exchanger sequence > Configuration > Basic configuration > Sequence parameters

Parameters	Default	Adjustment range
Lead change = OFF	Off	OFF, Outdoor temperature, Output capacity, Operating hours
Lead heat exchanger	1	1 to 4

4.3.2 Lead change based on the outdoor temperature

The lead change based on the outdoor temperature is only appropriate when heat exchangers with varying ratings are used. The rating of each heat exchanger is determined in the 'Rated output of heat generator' parameter. At outdoor temperatures above 'OT limit for lead change', the smaller heat exchanger is the lead heat exchanger. At outdoor temperatures below this limit, the larger heat exchanger is the lead heat exchanger.

To prevent a lead change after brief fluctuations in outdoor temperature, the average outdoor temperature over the past three days is used as the basis.

Example:

	$Rating_{HE1}$ = 20 kW	**$Rating_{HE2}$ = 50 kW**	**$Rating_{HE3}$ = 55 kW**	**$Rating_{HE4}$ = 60 kW**
Outdoor temperature > OT limit for lead change	Lead			
Outdoor temperature < OT limit for lead change				Lead

Service or Admin

System > Heat exchanger sequence > Configuration > Basic configuration > Sequence parameters

Parameters	**Default**	**Adjustment range**
Lead change = Outdoor temperature	Off	OFF, Outdoor temperature, Output capacity, Operating hours
OT limit for lead change	+15 °C	–40 to +50 °C

Service or Admin

System > Heat exchanger sequence > Configuration > HE1 to 4 config. > HE1 to 4 capacity

Parameters	**Default**	**Adjustment range**
Rated output of heat generator	70 kW	5 to 5000 kW

4.3.3 Lead change based on output capacity

The lead heat exchanger is the heat exchanger which had the lowest average output capacity over the past three days.

Service or Admin

System > Heat exchanger sequence > Configuration > Basic configuration > Sequence parameters

Parameters	Default	Adjustment range
Lead change = Output capacity	Off	Outdoor temperature, Output capacity, Operating hours, OFF
Cap. limit for lead change	70 kW	5 to 5000 kW

4.3.4 Lead change based on operating hours

The 'Op. hr limit for lead change' parameter is used to determine after how many operating hours a lead change is to take place.

Service or Admin

System > Heat exchanger sequence > Configuration > Basic configuration > Sequence parameters

Parameters	Default	Adjustment range
Lead change = Operating hours	Off	Outdoor temperature, Output capacity, Operating hours, OFF
Op. hr limit for lead change	168 h	1 to 999 h

4.4 Smooth start-up

The **Smooth start-up** function prevents the lead heat exchanger from overheating in problematic systems by reducing the lead heat exchanger to 50 % (control output) before activating the lag heat exchanger.

Service or Admin

System > Heat exchanger sequence > Configuration > Basic configuration > Sequence parameters

Parameters	Default	Adjustment range
Smooth start-up of the heat generator	Not active	Active, Not active

4.5 Enabling function

The 'HE enabling function' parameter determines whether heat exchangers are to be enabled automatically as part of the control loop or by the binary input.

Service or Admin

System > Heat exchanger sequence > Configuration > Basic configuration > Sequence parameters

Parameters	Default	Adjustment range
HE enabling function	Auto	Auto, Binary input

4.6 Outdoor-temperature-compensated control

When outdoor-temperature-compensated control is used, the flow temperature is controlled based on the outdoor temperature. The heating characteristic in the controller defines the flow temperature set point as a function of the outdoor temperature. The following characteristics are available: gradient characteristic (see Fig. 3), four-point characteristic and fixed set point control.

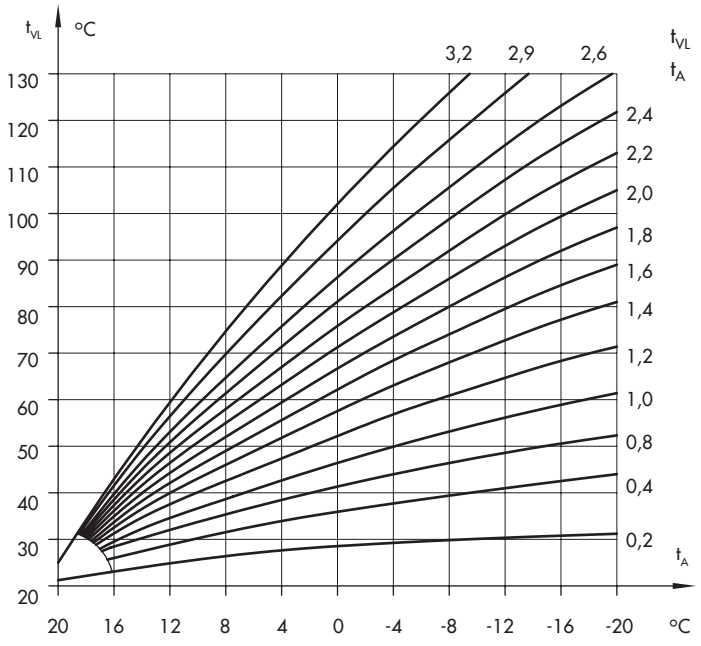


Fig. 3: *Gradient characteristics*

4.6.1 Gradient characteristic

Basically, the following rule applies: a decrease in the outdoor temperature causes the flow temperature to increase. By varying the 'Flow gradient' and 'Flow level' parameters, you can adapt the characteristic to your individual requirements: An increased gradient causes a higher flow temperature. A lower gradient causes a lower flow temperature. The 'Flow level' parameter shifts the heating characteristic parallel upwards or downwards. Outside the times-of-use, reduced flow set points are used for control.

$$RV = t_{VL} - (((RST - RSN) \times Stg)$$

RV = Reduced flow set point
TSL = Flow temperature
RST = Room temperature set point (day)
RSN = Room temperature set point (night)
Stg = Flow gradient

The 'Max. flow temperature' and 'Min. flow temperature' parameters mark the upper and lower limits of the flow temperature.

Examples for characteristics
- Old building, radiator design 90/70: Gradient approx. 1.8
- New building, radiator design 70/55: Gradient approx. 1.4
- New building, radiator design 55/45: Gradient approx. 1.0
- Underfloor heating depending on arrangement: Gradient smaller than 0.5

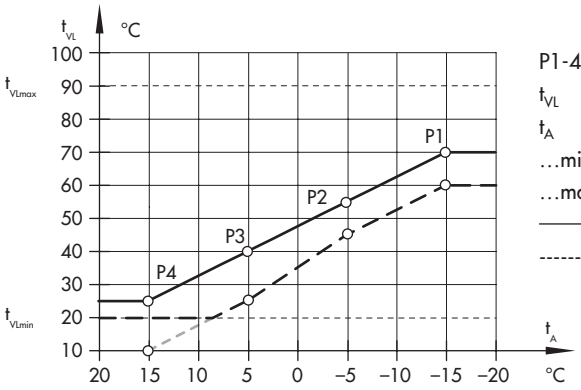
User, Service or Admin

System > Heat exchanger sequence > Parameters > General > Outdoor-temperature-compensated control

Parameters	Default	Adjustment range
Heating characteristic = Gradient	Fixed set point	Gradient, Four-point, Fixed set point
Flow gradient	1.3	0.2 to 3.2
Flow level	+10 °C	–30 to +30 °C
Min. flow temperature	20 °C	5 to 130 °C
Max. flow temperature	90 °C	5 to 130 °C
Room temperature set point (day)	20 °C	5 to 40 °C
Room temperature set point (night)	15 °C	5 to 40 °C

4.6.2 Four-point characteristic

The four-point characteristic allows you to define your own heating characteristic. It is defined by four points for the outdoor temperature, flow temperature and reduced flow temperature. This results in the characteristic represented by the broken line (Fig. 4). The 'Max. flow temperature' and 'Min. flow temperature' parameters mark the upper and lower limits of the flow temperature.



P1-4	Items 1 to 4
t_{VL}	Flow temperature
t_A	Outdoor temperature
…min	Min. t_{VL}
…max	Max. t_{VL}
———	Four-point characteristic
-------	Reduced four-point characteristic

Fig. 4: *Four-point characteristic*

User, Service or Admin

System > Heat exchanger sequence > Parameters > General > Outdoor-temperature-compensated control

Parameters	Default	Adjustment range
Heating characteristic = 4-point	Fixed set point	Gradient, Four-point, Fixed set point
Outdoor temperature 1	–15 °C	–30 to +50 °C
Outdoor temperature 2	–5 °C	–30 to +50 °C
Outdoor temperature 3	5 °C	–30 to +50 °C
Outdoor temperature 4	15 °C	–30 to +50 °C
Flow temperature 1	70 °C	5 to 130 °C
Flow temperature 2	55 °C	5 to 130 °C
Flow temperature 3	40 °C	5 to 130 °C
Flow temperature 4	25 °C	5 to 130 °C

Reduced flow temperature 1	60 °C	5 to 130 °C
Reduced flow temperature 2	40 °C	5 to 130 °C
Reduced flow temperature 3	20 °C	5 to 130 °C
Reduced flow temperature 4	20 °C	5 to 130 °C
Min. flow temperature	20 °C	5 to 130 °C
Max. flow temperature	90 °C	5 to 130 °C

4.6.3 Fixed set point

The flow temperature can be controlled during and outside the times-of-use according to the corresponding fixed set point.

As a result, the outdoor temperature has no effect on the closed-loop control.

User, Service or Admin

System > Heat exchanger sequence > Parameters > General > Outdoor-temperature-compensated control

Parameters	Default	Adjustment range
Heating characteristic = Fixed set point	Fixed set point	Gradient, Four-point, Fixed set point
Flow temperature set point (day)	70 °C	20 to 90 °C
Flow temperature set point (night)	30 °C	20 to 90 °C

4.7 Deactivation depending on outdoor temperature

Outdoor temperature for continuous day mode

A heating circuit is automatically switched to day mode whenever the outdoor temperature falls below 'Outdoor temperature for continuous day mode'. The night mode restarts after the outdoor temperature rises above the limit.

User, Service or Admin

System > Heat exchanger sequence > Parameters > General > Outdoor-temperature-compensated control

Parameters	Default	Adjustment range
Outdoor temperature for continuous day mode	−15 °C	−20 to +5 °C

OT deactivation value (day)

The heating circuit is switched off when the outdoor temperature exceeds the limit 'OT deactivation value (day)'. The heating is immediately switched on again when the outdoor temperature falls below the limit.

User, Service or Admin

System > Heat exchanger sequence > Parameters > General > Outdoor-temperature-compensated control

Parameters	Default	Adjustment range
OT deactivation value (day)	22 °C	0 to 50 °C

OT deactivation value (night)

The heating circuit is immediately switched off when the outdoor temperature during night mode exceeds the limit 'OT deactivation value (night)'. The heating is immediately switched on again when the outdoor temperature falls below the limit.

User, Service or Admin

System > Heat exchanger sequence > Parameters > General > Outdoor-temperature-compensated control

Parameters	Default	Adjustment range
OT deactivation value (night)	+15 °C	–20 to +50 °C

4.8 Return flow temperature limitation

The return flow temperature limitation is performed separately for each heat exchanger.

If the temperature at the return flow sensor RüF1, RüF2, RüF3 or RüF4 exceeds the maximum permissible temperature, the output of the corresponding heat exchanger 1, 2, 3 or 4 is reduced while the other heat exchangers continue to work normally.

The lower limit is restricted when the **Cooling mode** function is activated.

User, Service or Admin

System > Heat exchanger sequence > Parameters > HE1 to HE4 > Return flow temperature limitation

Parameters	Default	Adjustment range
Return flow temperature limitation = Active	Active	Active, Not active
Max. return flow temperature	65 °C	5 to 90 °C
Gain for return flow temperature limitation	1.0	0.1 to 10.0

4.9 Three-step control

The control algorithm is set separately for the control valves Rk1 to Rk4 of the heat exchangers and for the heating circuit mixing valves HK1, HK2 and DHW. The flow temperature can be controlled using a PI algorithm. The control valve reacts to pulses that the controller sends when a system deviation occurs. The length of the first pulse, in particular, depends on the extent of the system deviation and the selected 'Gain K_P' (the pulse length increases as K_P increases). The pulse and pause lengths change continuously until the system deviation has been eliminated. The pause length between the single pulses is greatly influenced by the 'Reset time T_N' (the pause length increases as T_N increases). The 'Valve transit time T_Y' specifies the time required by the valve to travel through the range of 0 to 100 %.

Service or Admin

System > Heat exchanger sequence > Configuration > HE 1 to 4 configuration > Control parameters

Parameters	Default	Adjustment range
Gain K_P	2.0	0.1 to 50.0
Reset time T_N	120 s	0 to 999 s
Valve transit time T_Y	45 s	5 to 600 s
Derivative-action time T_V	0 s	0 to 999 s
Pulse length XSD	0.5 s	0.0 to 100.0 s

4.10 External demand

The external demand is transmitted as a 0 to 10 V signal to the control unit in the default setting. The highest set point is always used for control, regardless whether the set point is internal or external. The external set point can also activate closed-loop control when the unit is in automatic stand-by mode.

i ***Note***

*The **External demand** function is only active when there are no errors in the system.*

The default setting with the 0 to 10 V signal is converted into 0 to 120 °C. The conversion can be adapted using the '1' and '2' parameters.

Service or Admin

System > Heat exchanger sequence > Configuration > Basic configuration > Scaling of external set point demand

Parameters	Default	Adjustment range
1	0 °C	0 to 130 °C
2	120 °C	0 to 130 °C

4.11 Restrict OPEN signal for steam systems

To start up condensate accumulation plants, in particular to avoid problematic excess temperature, the OPEN signal can be activated by setting an attenuation intensity (between 2 and 10 K). The response of the control loop to set point deviations which cause the primary control valve to open is attenuated. The response of the control loop to set point deviations which cause the control valve to close remains unaffected.

The function is deactivated when the value is set to 0 K.

Service or Admin

System > Heat exchanger sequence > Configuration > Basic configuration

Parameters	Default	Adjustment range
OPEN signal damping	0 K (not active)	0 to 10 K

4.12 Cooling

If the heat exchangers are to be used for cooling instead of heating, the **Cooling mode** function can be used to reverse the direction of action. The heat exchangers are enabled when the temperature exceeds the set point. The return flow temperature limitation also functions in the opposite direction.

The **Cooling mode** function only refers to the heat exchangers and not to the heating circuit or DHW heating.

Service or Admin

System > Heat exchanger sequence > Configuration > Basic configuration > Cooling mode

Parameters	Default	Adjustment range
Cooling mode	Heating	Heating, Cooling

4.13 Split-range operation

Note

The split-range operation can only be used for actuators controlled by a continuous signal.

The split-range operation divides a medium line into two for better control accuracy and to distribute the load. Two valves with two actuators are installed for a single heat exchanger. This reduces the size and travel of the valve.

The split-range operation can be set in the TROVIS 6611-2 Control and Automation Unit for actuators controlled by a continuous signal (depending on the version). The control signal is split into two analog outputs per heat exchanger.

The signals for heat exchanger HE1 are issued to Y1 control signal and Y2 control signal (split-range). The signals for heat exchanger HE2 are issued to Y3 control signal and Y4 control signal (split-range). The Y5 control signal and Y6 control signal (split range) are assigned to HE3 and Y7 control signal and Y8 control signal (split range) to HE4.

The split-range operation can only be activated for the 0 to 10 V output. It cannot be used for a three-step signal. It is deactivated in the default setting.

Administrator

System > Heat exchanger sequence > Configuration > HE1 config.

Parameters	Default	Adjustment range
HE1 split-range end Y1/start Y2	0.0 %	0.0 to 100.0 %

System > Heat exchanger sequence > Configuration > HE2 config.

Parameters	Default	Adjustment range
HE1 split-range end Y3/start Y4	0.0 %	0.0 to 100.0 %

System > Heat exchanger sequence > Configuration > HE3 config.

Parameters	Default	Adjustment range
HE1 split-range end Y5/start Y6	0.0 %	0.0 to 100.0 %

System > Heat exchanger sequence > Configuration > HE4 config.

Parameters	Default	Adjustment range
HE1 split-range end Y7/start Y8	0.0 %	0.0 to 100.0 %

5 Parameter list and user settings

Parameters	Adjustment range	Default setting	User setting	See
🗁 System > Heat exchanger sequence > Parameters > General > Outdoor-temperature-compensated control				
Heating characteristic	Gradient, Four-point, Fixed set point	Fixed set point		Section 4.6
Flow gradient	0.2 to 3.2	1.3		Section 4.6.1
Flow level	–30 to +30 °C	+10 °C		Section 4.6.1
Outdoor temperature 1	–30 to +50 °C	–15 °C		Section 4.6.2
Outdoor temperature 2	–30 to +50 °C	–5 °C		Section 4.6.2
Outdoor temperature 3	–30 to +50 °C	+5 °C		Section 4.6.2
Outdoor temperature 4	–30 to +50 °C	+15 °C		Section 4.6.2
Flow temperature 1	5 to 130 °C	70 °C		Section 4.6.2
Flow temperature 2	5 to 130 °C	55 °C		Section 4.6.2
Flow temperature 3	5 to 130 °C	40 °C		Section 4.6.2
Flow temperature 4	5 to 130 °C	25 °C		Section 4.6.2
Reduced flow temperature 1	5 to 130 °C	60 °C		Section 4.6.2
Reduced flow temperature 2	5 to 130 °C	40 °C		Section 4.6.2
Reduced flow temperature 3	5 to 130 °C	20 °C		Section 4.6.2
Reduced flow temperature 4	5 to 130 °C	20 °C		Section 4.6.2
Flow temperature set point (day)	20 to 90 °C	70 °C		Section 4.6.3
Flow temperature set point (night)	20 to 90 °C	30 °C		Section 4.6.3
Min. flow temperature	5 to 130 °C	20 °C		Section 4.6.1 Section 4.6.2
Max. flow temperature	5 to 130 °C	90 °C		Section 4.6.1 Section 4.6.2
Outdoor temperature for continuous day mode	–20 to +5 °C	–15 °C		Section 4.7
OT deactivation value (day)	0 to 50 °C	22 °C		Section 4.7
OT deactivation value (night)	–20 to +50 °C	+15 °C		Section 4.7

Parameters	Adjustment range	Default setting	User setting	See
Room temperature set point (day)	0 to 40 °C	20 °C		Section 4.6.1
Room temperature set point (night)	0 to 40 °C	15 °C		Section 4.6.1
🗁 System > Heat exchanger sequence > Parameters > HE1 to HE4				
Rated output of heat generator	5 to 5000 kW	70 kW		Section 4.3.2
🗁 System > Heat exchanger sequence > Parameters > HE1 to HE4 > Return flow temperature limitation				
Return flow temperature limitation	Active, Not active	Active		Section
Max. return flow temperature	5 to 90 °C	65 °C		Section
Gain for return flow temperature limitation	0.1 to 10.0	1.0		Section
Gain K_p	0.1 to 50	2.0		Section 4.9
Reset time T_N in s	0 to 999 s	120 s		Section 4.9
Valve transit time T_Y in s	5 to 600 s	45 s		Section 4.9
Derivative-action time T_V in s	0 to 999 s	0 s		Section 4.9
Pulse length XSD in s	0.0 to 100.0	0.5		Section 4.9
🗁 System > Heat exchanger sequence > Configuration > Basic configuration				
Number of HEs				
OPEN signal damping	0 to 10 K	0 K (not active)		Section 4.11
🗁 System > Heat exchanger sequence > Configuration > Basic configuration > Sequence parameters				
Condition for lag/lead sequence	Outdoor temperature, Unrestricted, Parallel operation	Outdoor temperature		Section 4.1
Activate lag/lead sequence	0 to 100 %	90 %		Section 4.1.2
Heat exchanger capacity limit	0 to 100 %	40 %		Section 4.1.2
OT limit to enable control	–40 to +50 °C	+12 °C		Section 4.1.1
Lag delay time	0 to 90 min	2 min		Section 4.2
Lead change	OFF, Outdoor temperature, Output capacity, Operating hours	Off		Section 4.3
Lead heat exchanger	1 to 4	1		Section 4.3.1

Parameters	Adjustment range	Default setting	User setting	See
OT limit for lead change	–40 to +50 °C	+15 °C		Section 4.3.2
Cap. limit for lead change	5 to 5000 kW	70 kW		Section 4.3.3
Op. hr limit for lead change	1 to 999 h	168 h		Section 4.3.4
Smooth start-up of the heat generator	Not active, Active	Not active		Section 4.4
HE enabling function	Auto, Binary input	Auto		Section 4.5
🗁 System > Heat exchanger sequence > Configuration > Basic configuration > Scaling of external set point demand				
1	0 to 130 °C	0 °C		Section 4.10
2	0 to 130 °C	120 °C		Section 4.10
🗁 System > Heat exchanger sequence > Configuration > HE1 config.				
HE1 split-range end Y1/start Y2	0.0 to 100.0 %	0.0 %		Section 4.13
🗁 System > Heat exchanger sequence > Configuration > HE2 config.				
HE2 split-range end Y3/start Y4	0.0 to 100.0 %	0.0 %		Section 4.13
🗁 System > Heat exchanger sequence > Configuration > HE3 config.				
HE3 split-range end Y5/start Y6	0.0 to 100.0 %	0.0 %		Section 4.13
🗁 System > Heat exchanger sequence > Configuration > HE4 config.				
HE4 split-range end Y7/start Y8	0.0 to 100.0 %	0.0 %		Section 4.13

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