



**RAYCHEM**

# HWAT ECO VERSION 5 (EU)

- EN** ELECTRONIC TEMPERATURE CONTROL UNIT FOR ENERGY SAVING OPERATION OF HWAT-R/-M/-L HEATING CABLE
- DE** MIKROPROZESSORGESTEUERTER TEMPERATURSTELLER FÜR DEN ENERGIE-SPARENDEN BETRIEB DER TEMPERATURHALTEBÄNDER HWAT-R/-M/-L
- FR** MODULATEUR DE PUISSANCE ÉLECTRONIQUE POUR UNE UTILISATION ÉCONOMIQUE DES RUBANS HWAT-R/-M/-L
- CZ** ELEKTRONICKÁ JEDNOTKA ŘÍZENÍ TEPLoty PRO ÚSPORNÝ PROVOZ TOPNÉHO KABELU HWAT-R/-M/-L

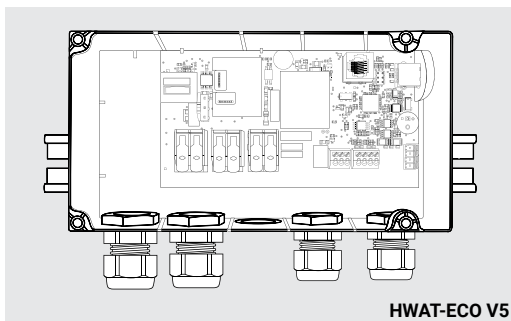


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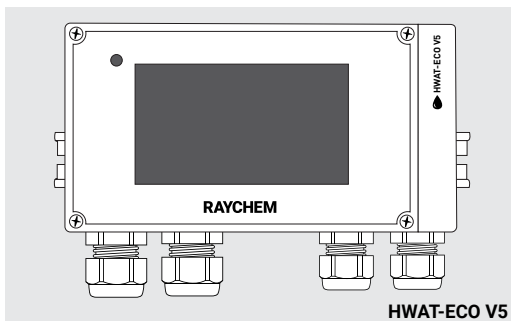
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# 1. PRODUCT OVERVIEW

**A**



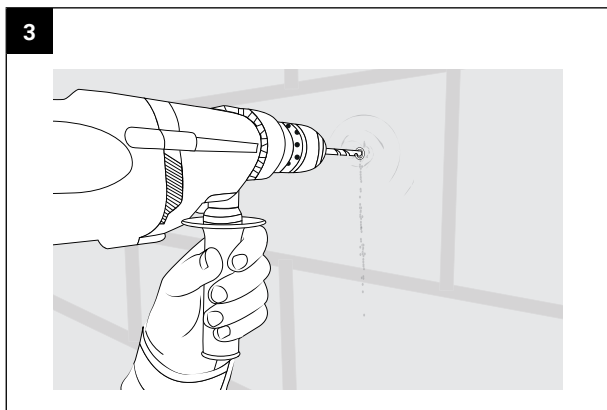
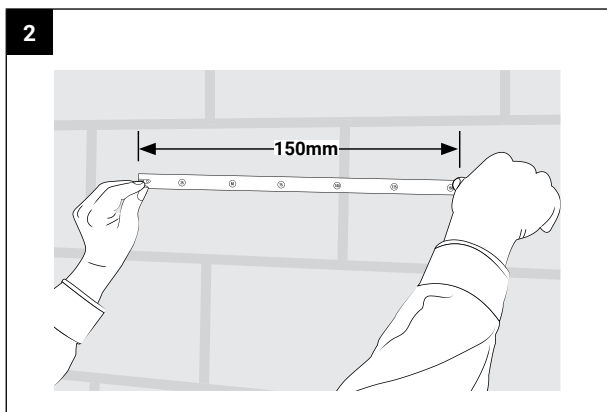
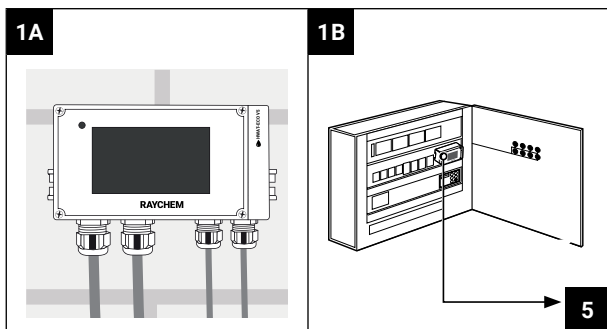
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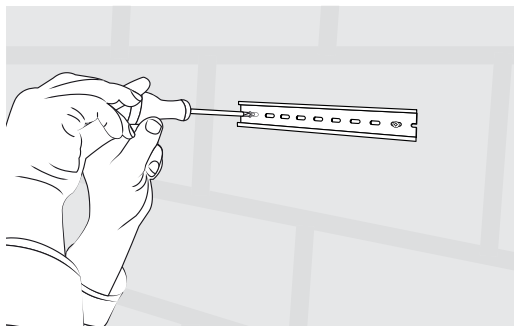
**C**

	 1x	 1x	 1x
	 2x M25; 2x M20	 1x	 1x
	 1x	 2x	 2x
	 PCN: 1244-020365	 PCN: 1244-015847	

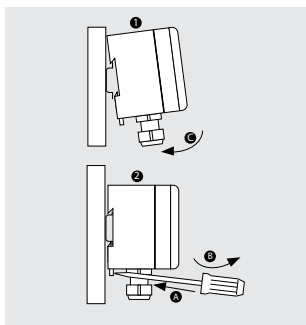
## 2. INSTALLATION INSTRUCTIONS



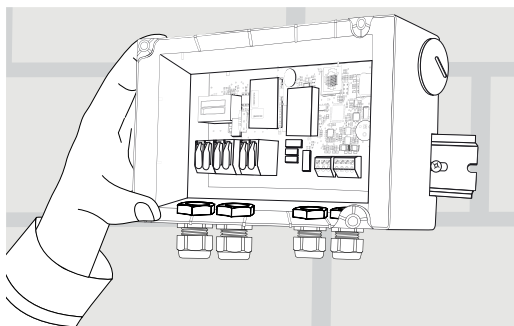
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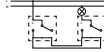
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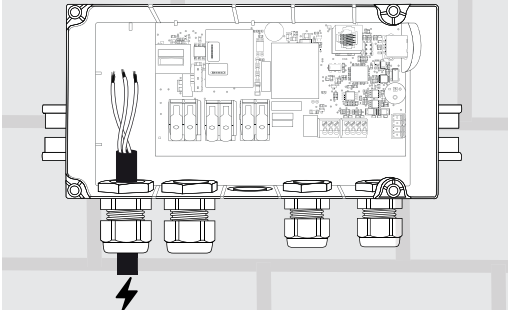
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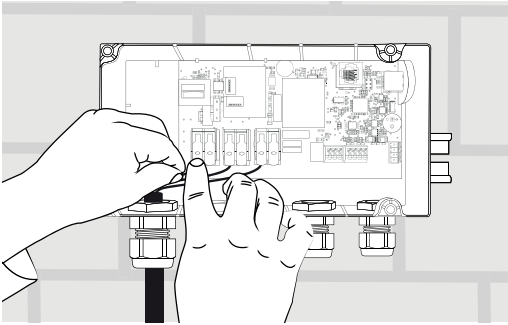
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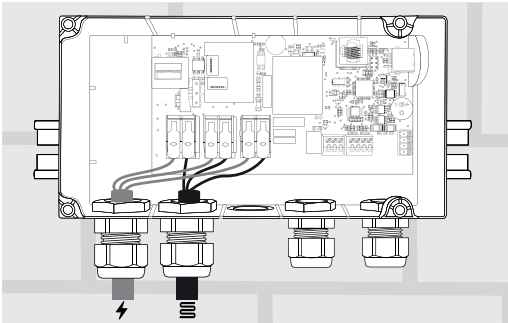
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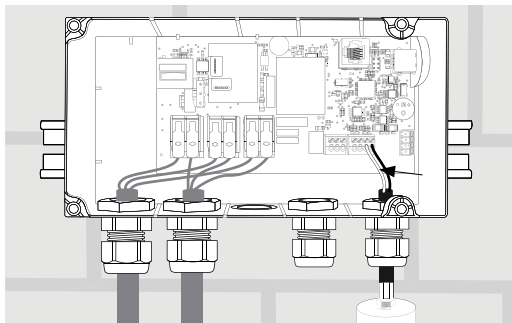
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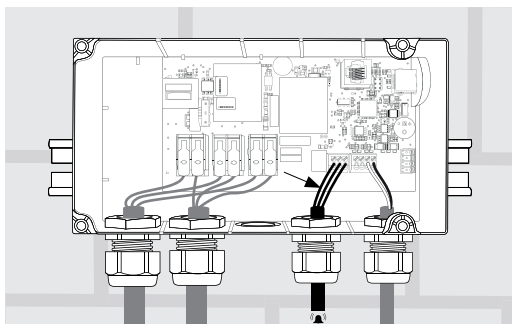
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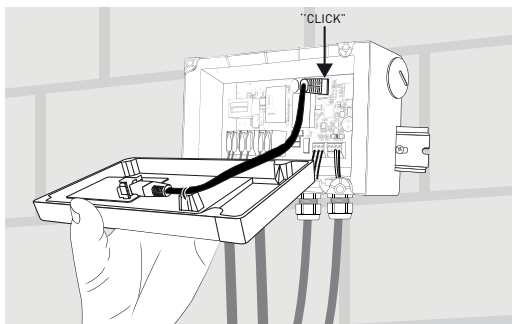
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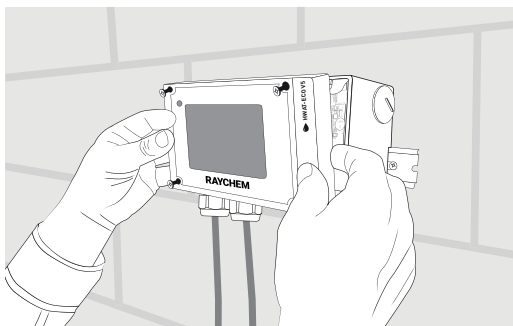


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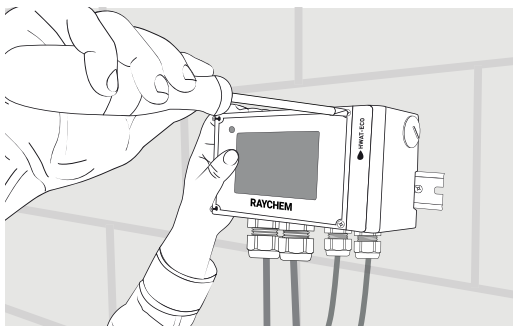




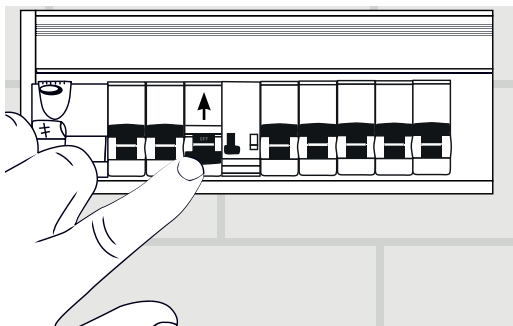
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RCD 20 A : ON

### 3. INSTALLATION NOTES

The installation and, if necessary, the maintenance and the disassembling must be carried out by a qualified electrical installer. The installation must be compatible with local regulations.

Check the maximum circuit length for your circuit breaker in the next table:

#### Maximum circuit length at 230 VAC and for 20°C start-up temperature C-characteristic circuit breaker

Multiple units on multiple power points can be used if longer heating cables are required. We recommend to use Raychem HWAT-SBS panels to operate 3, 6, 9 or 12 heating circuits.

Fig. 1	HWAT-L	HWAT-M	HWAT-R
Circuit breaker	(Yellow)	(Orange)	(Red)
C 10A	80 m	50 m	50 m
C 13A	110 m	65 m	65 m
C 16A	140 m	80 m	80 m
C 20A	180 m	100 m	100 m

The HWAT-ECO has a removable top lid. Both top and bottom of the box have electronic parts and are connected to each other by an Ethernet connector cable. The unit is delivered with top lid and back part dismantled.

**Warning:** For over voltage protection (e.g. in case of thunderstorm) we recommend the use of an external over voltage protection device.

#### Care and maintenance

Clean the HWAT-ECO with a soft damp cloth only, do not use any solvents. Do not pour water directly on the device. Do not use a water hose or a high pressure cleaner.

### 3.1. Description

The HWAT-ECO control unit has been developed for operation with the self-regulating heating cables: HWAT-R, HWAT-M and HWAT-L. The hot water temperature maintenance system is a comfort system providing instant hot water at the tap.

A self-regulating heating cable is positioned on the pipe and compensates for any temperature loss of the warm water.

The HWAT-ECO control unit combines the following features:

- The operating temperature of the heating cable can be limited to a desired temperature. Combined with the integrated "power off" timer function, this offers important energy savings.
- Energy can be saved upon activation of the "trace boiler" function and installation of the boiler sensor. The maintain temperature of the heating cable will automatically be lowered in case the boiler temperature is reduced, preventing the heating cable from using too much energy for heating the water in the pipes.
- On big warm water systems it is sufficient to programme one HWAT-ECO unit in a Raychem SBS panel to manage multiple heating circuits. The HWAT-ECO controller can be delivered in different prefabricated panels, depending on the quantity of heating circuits (3, 6, 9).
- An alarm terminal makes remote reading of errors possible.
- A pipe sensor (to be ordered separately) can be installed as reference point to track and monitor pipe temperature in a large hot water distribution network.
- The unit can be pre-programmed in power-off mode by external power bank (to be ordered separately) connected via A-A-USB cable and USB connection.

## 3.2. Technical data

<b>Product specification</b>	HWAT-R/-M/-L heating cables only															
<b>Electrical properties</b>																
Supply voltage	230 VAC -15 /+10%; 50 Hz															
Power consumption	2,5 VA max															
Power output relay (heating cable)	20 A / 230 VAC															
Power supply terminals	3 x 6 mm <sup>2</sup> max															
Heating cable terminals	3 x 6 mm <sup>2</sup> max															
Alarm terminals	3 x 1,5 mm <sup>2</sup> max															
Sensor terminal - Boiler	2 x 1,5 mm <sup>2</sup> max															
Sensor terminal - Pipe	2 x 1,5 mm <sup>2</sup> max															
Alarm relay	Single pole double throw relay, volt-free, rating 2A / 250 VAC															
Circuit breaker	Max. C 20 A (C-Characteristic)															
Real time clock	Automatic Summer/Winter time and Leap year correction															
Clock backup	15 days with rechargeable battery; after first start battery must be charged for min. 48 hours															
Clock accuracy	A variation of ± 10 minutes per year is possible															
Settings	All settings are stored in non-volatile memory															
Operating temperature	0°C to 40°C ambient															
Selectable temperature	37°C up to 65°C in 24 blocks per day															
Pre-programmes	7 built-in building specific programmes, can be edited															
Enclosure																
Material	ABS															
Dimensions	210 mm x 90 mm x 85 mm															
Ingress protection class	IP 54															
Weight	990 g															
Mounting	DIN-Rail mountable 35 mm															
Entries	2 x M25 and 2 x M20															
Storage temperature	-20°C to +50°C															
Flammability class	D category (DIN EN 60730/VDE 0631-1)															
Sensor																
Temperature sensor type	Standard NTC 10 KOHM, 2 wires															
Sensor tip dimensions	Ø 5 mm; length 20 mm															
Sensor cable length	3 m; extendable up to 100 m , 2 x1,5 mm <sup>2</sup>															
Temperature range	-20°C to 90°C															
Sensor data	<table border="1"> <tr> <td>10°C</td> <td>1772 Ω</td> </tr> <tr> <td>20°C</td> <td>1922 Ω</td> </tr> <tr> <td>30°C</td> <td>2080 Ω</td> </tr> <tr> <td>40°C</td> <td>2245 Ω</td> </tr> <tr> <td>50°C</td> <td>2417 Ω</td> </tr> <tr> <td>60°C</td> <td>2597 Ω</td> </tr> <tr> <td>70°C</td> <td>2785 Ω</td> </tr> </table>		10°C	1772 Ω	20°C	1922 Ω	30°C	2080 Ω	40°C	2245 Ω	50°C	2417 Ω	60°C	2597 Ω	70°C	2785 Ω
10°C	1772 Ω															
20°C	1922 Ω															
30°C	2080 Ω															
40°C	2245 Ω															
50°C	2417 Ω															
60°C	2597 Ω															
70°C	2785 Ω															

Approval	
Approval	VDE according to EN60730 EMC According to EN 50081-1/2 for emission and EN50082 - 1/2 for immunity Temperature for bal pressure +100°C test (DIN EN 60730/VDE 0631-1) Rated impulse voltage: Overvoltage cat- egory III (DIN EN 60730/ VDE 0631-1)

## 4. OPERATION

The HWAT-ECO version 5 has a resistive touchscreen user interface:  
The unit will go in dim mode after 2 minutes with no interaction.  
The unit will switch to the main screen after 2 minutes of no-interaction  
on the parameter input screens.

### 4.1 Quick install

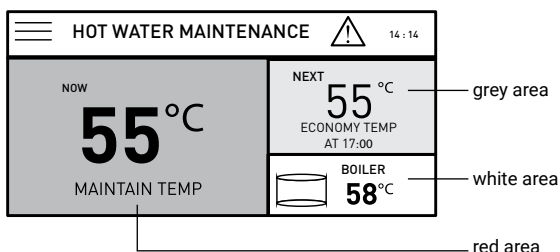
When the unit is powered up for the first time, a quick setup must be  
executed before the unit is ready to start. The Quick start helps to set all  
important settings, the unit will go in main screen mode automatically  
when done. Quick start is sufficient for normal operations. More settings  
are available in the Setup menu for special installation conditions.

### 4.2. Programme start

Quick start	Language selection	Select your language from the language menu.
	Connection check	The unit is automatically executing a connection check. It will check the heating cable connection, boiler sensor and pipe sensor connection. A connection of the unit to an external relay needs to be confirmed by the user. Boiler sensor and pipe sensor are optional connections. If connected, they will automatically switch on. Fine-tune the sensor inputs in the parameter settings. The unit also operates in mode without sensors.
	Country selection	Select a country in this menu. Your selection will define the default values for time format, pipe diameter and insulation thickness.
	Date input	Use the up/down arrow keys to select the year.
	Time input	Use the up/down arrow keys to set the hour and minute.
	Building type programme	The HWAT-ECO has 7 default timer programmes. Select a programme by tapping on the corresponding box (box will turn red).
	Select cable type	Select the installed HWAT heating cable.

Plumbing settings		Default values are set for selected plumbing set values. Change the default values by clicking on the arrow sign for each value and enter a new value.
	Heating cable selection	Select the type of cable used in your installation (HWAT-L,HWAT-M,HWAT-R).
	Pipe diameter	Selection range DN 15 up to DN 125.
	Ambient temperature	The ambient temperature is the temperature inside the room where the heating cable is installed. Use the +/- keys to select a temperature from 10°C to 25°C. Clicking on the "back" icon will store the value and show it in plumbing settings. Range: from 10°C to 30°C.
	Maintain temperature	The maintain temperature is the water temperature that you set for normal use. The minimum temperature is 37°C or the economy temperature, whichever is higher. The maximum temperature depends on cable type, pipe thickness, insulation thickness and ambient temperature.
	Economy temperature	The economy temperature is the water temperature for periods in which the amount of hot water used is low (at night) or high (peak period). Select the temperature using the +/- keys. The minimum temperature is 37°C in the programme Kindergarten and 41°C in the Apartments programme. The maximum temperature is the selected maintain temperature.
Test programme start		The test programme runs for 30 minutes, during which all parameters will be ignored to check heating cable and connection on site. You can stop the test programme at any time.

## MAIN SCREEN







Contains 3 areas:

1. Actual Maintain temperature (red area)
2. Next event temperature (grey area)
3. Hot water storage temperature  
(white area- if boiler sensor is connected and active)

Additional icons for settings, relay (ON/OFF), key lock or warning will be displayed.

When Lock is "on" a password is needed to access the parameter menus. After the correct 4 number password is entered, each parameter in the setup can be changed. The unit locks again after a 10 min. time out (no keys pressed).

## SETTINGS

<b>X</b>	<b>SETTING</b>	14 : 17
	<b>SYSTEM</b> INFO, RESET, SERVICE, TEST,....	>
	<b>HEATING CABLE &amp; PIPE</b> CABLE TYPE, PIPE DAIMETER,....	>
	<b>GENERAL SETTINGS</b> COUNTRY, LANGUAGES, UNITS,....	>
	<b>WATER TEMP. &amp; PROGRAM</b> APPARTMENT, MAINTAIN, ECONOMY,....	>

## SYSTEM

←	<b>SYSTEM</b>	14 : 17
	INFO	>
	TEST PROGRAM	>
	RESET	>
	SERVICE	>
	STATUS	>

Info	General info about the unit, name, commissioning date, firmware version, Raychem contact info per country.
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Test Programme	The test programme runs for 30 minutes, during which all parameters will be ignored to check the heating cable and the connection on site. You can stop the test programme at any time.
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Reset	Select "Yes" to activate the Quick install menu and return all settings to factory settings. Quick start process restarts automatically.
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Service	Access for Raychem SERVICE TEAM
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Status	Info on current status of the control unit: Pipe temperature Boiler temperature Maintain temperature Supply voltage Duty cycle Power output Max power output Load current
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Key lock	When key lock is "On", the setup and timer menus are protected by password. To unlock the unit, enter the predefined password (3000). The unit will automatically lock itself after 10 mins of inactivity or when Lock "on" key is pressed. To deactivate the Key lock, press "OFF".
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## HEATING CABLE & PIPE

←	HEATING CABLE & PIPE		14 : 17
SELECT CABLE TYPE	HWAT-M	>	^
SELECT PIPE DIAMETER	DN 25	>	
SELECT INSULATION THICKNESS	40 MM	>	
SELECT AMBIENT TEMPERATURE	20 °C	>	v
SELECT BOILER SENSOR	ON	>	
SELECT BOILER CUT-OFF TEMPS.	35/85 °C	>	

**Selection of parameters** Every parameter line shows the actual value / attribute for each parameter.

**HWAT cable** Select the type of cable used in your installation (HWAT-L, HWAT-M, HWAT-R).

**Pipe diameter** Set the pipe diameter. You can change the value from DN 15 mm up to DN 125.

**Insulation thickness** Set the insulation thickness. You can change the value from 9 to 130 mm, with the pipe diameter as the limiting value.

**Boiler sensor** Activate/deactivate a connected boiler sensor by clicking on ON/OFF.  
The external temperature sensor measures the boiler temperature. The trace boiler setting is included to ensure that the heating cable temperature does not exceed the boiler temperature. The HWAT-ECO memorizes the highest measured temperature over the last 24 hours. If the boiler temperature is too low, the maximum temperature is lowered to the boiler temperature minus the trace temperature. In this case the green trace boiler LED will be on.

**Boiler low temperature limit** You can determine the low temperature limit. If the boiler temperature reaches this value, the unit will switch off the heating system in order to fulfil hygienic requirements and avoid energy waste.

**Boiler high temperature limit** You can determine the high temperature limit. If this value is reached the unit will switch off the heating system to avoid scalding.

**Pipe sensor** Activate/deactivate a connected pipe sensor by pressing ON/OFF. The pipe sensor monitors the pipe temperature and needs to be installed close to the furthest point in the pipe distribution network.

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Pipe sensor low temperature limit	You can determine the low temperature limit. When the value is reached a warning will appear on the screen but will not interrupt the unit's functioning. The info status screen will show the actual pipe temperature.
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Pipe sensor high temperature limit	You can determine the high temperature limit. A warning will appear on the screen when the value is reached but will not interrupt the unit's functioning.
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## GENERAL SETTINGS

← GENERAL SETTING 14 : 17	
SELECT LANGUAGE	ENGLISH >
SELECT COUNTRY	GERMANY >
SELECT DATE	01.10.2017 >
SELECT TIME	14 : 17 >
SELECT ALARM	OFF >
SELECT SAVING TIME	ON >

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Language	Choose your language from the language menu.
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Country	Select a country in this menu. Your selection defines the default values used for time format, pipe diameter and insulation thickness.
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Date	Use the up/down arrow keys to select the year. After a power break of more than 15 days you need to re-enter the date.
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Time	Use up/down arrow keys to set hour and minute. After a power break of more than 15 days you need to re-enter the time.
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Alarm tone	An alarm will go off inside the unit indicating an error condition. Activate/deactivate the alarm by pressing ON/OFF. Note: Alarm messages and an alarm signal will be created any time in case of a malfunction.
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## Water temp. & Programming

← WATER TEMP. & PROGRAM 14 : 17	
SELECT WATER TEMPRATURE	55 °C / 50°C >
SELECT PROGRAM	HOTEL >
PROGRAM TIMER	>

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Maintain / Economy temperature	The maintain temperature is the water temperature that you set for normal use. The minimum temperature is 37°C or the economy temperature, whichever is higher. The maximum temperature depends on cable type, pipe thickness, insulation thickness and ambient temperature. The economy temperature is the water temperature for periods in which the amount of hot water used is low (at night) or high (peak period). Select the temperature using the + / - keys. The minimum temperature is 37°C in the programme Kindergarten and 41°C in the Apartments programme. The maximum temperature is the selected maintain temperature.
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Building type programme	The HWAT-ECO has 7 default timer programmes. Select by tapping on the programme of choice (box will turn red). See figure xx for the schedule of each programme. The building programme reflects the tapping profiles.
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Timer schedule	Graphically programme the Timer in 1 hour time blocks. You can set a block to OFF, Economy temp, Maintain temp, or HEAT-UP*
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(\*HEAT-UP=100% power, only when using the HWAT-R cable. This is the legionella prevention mode and it is not pre-programmed. **Activate this preferably during night hours to avoid scalding.** Use the modes button to overwrite the timer schedule. Select a temperature mode to assign to the time block of choice.

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## 5. PARAMETER SETTINGS (default)

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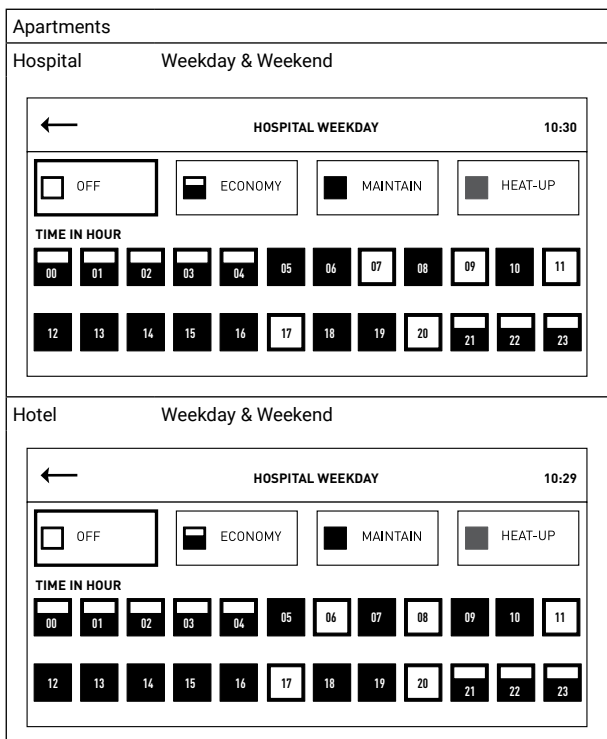
Language	English
Country	Not pre-defined; to be selected
Date	01/01/2017 or last saved date
Time	00:00; or last saved time
Building programme	Not pre-defined; to be selected
Heating cable type	Not pre-defined/ to be selected
Pipe diameter	DN25
Insulation thickness	30 mm

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Ambient temperature	20°C
Maintain temperature	55°C
Economy temperature	50°C
Low temperature limit	40°
High temperature limit	65°C
Low temperature alarm	OFF
High temperature alarm	ON
Alarm sound	ON
Key lock	OFF

## 6. TECHNICAL SPECIFICATIONS

### 6.1. Building programme schedule



Nursing home Weekday & Weekend

← **NURSING HOSPITAL WEEKDAY** 10:31

OFF     ECONOMY     MAINTAIN     HEAT-UP

TIME IN HOUR

00	01	02	03	04	05	06	07	08	09	10	11
12	13	14	15	16	17	18	19	20	21	22	23

Office Weekday

← **OFFICE WEEKDAY** 10:29

OFF     ECONOMY     MAINTAIN     HEAT-UP

TIME IN HOUR

00	01	02	03	04	05	06	07	08	09	10	11
12	13	14	15	16	17	18	19	20	21	22	23

Weekend

← **OFFICE WEEKDAY** 10:29

OFF     ECONOMY     MAINTAIN     HEAT-UP

TIME IN HOUR

00	01	02	03	04	05	06	07	08	09	10	11
12	13	14	15	16	17	18	19	20	21	22	23

## Prison

← **PRISON WEEKDAY** 10:30

OFF     ECONOMY     MAINTAIN     HEAT-UP

**TIME IN HOUR**

00	01	02	03	04	05	06	07	08	09	10	11
12	13	14	15	16	17	18	19	20	21	22	23

## Sport center Weekday & Weekend

← **SPORT CENTER WEEKDAY** 10:29

OFF     ECONOMY     MAINTAIN     HEAT-UP

**TIME IN HOUR**

00	01	02	03	04	05	06	07	08	09	10	11
12	13	14	15	16	17	18	19	20	21	22	23

## Constant mode

← **CONSTANT WEEKDAY** 10:31

OFF     ECONOMY     MAINTAIN     HEAT-UP

**TIME IN HOUR**

00	01	02	03	04	05	06	07	08	09	10	11
12	13	14	15	16	17	18	19	20	21	22	23

## 6.2. Error/Alarms and Troubleshooting

Error No.	Warning message	Problem causes	Corrective actions
E:1	FOLLOW BOILER	Hotwater storage temperature decreases by 5K vs. maintain temperature	Connect sensor to HWAT-ECO or set programme water heater sensor to OFF. Check sensor connections. Replace sensor.
E:2.1	BOILER SENSOR OPEN	Sensor not connected or broken	See E.1.
E:2.2	BOILER SENSOR SHORT	Sensor short	See E.1.
E:2.3	PIPE SENSOR OPEN	Sensor not connected or broken	See E.1.
E:2.4	PIPE SENSOR SHORT	Sensor short	See E.1.
E:3.1	PIPE TEMP HIGH	<b>Water pipe temperature too high</b> Will pop up if Temperature sensor is higher than the maximum exposure temperature of the HWAT cable: HWAT-M (65°C), HWAT-R (85°C) Water heater sensor failure Sensor has not been installed Sensor or sensor cable defect (only when water heater sensor "On" is selected)	Check Sensor and Boiler temperature
E:3.2	BOILER TEMP HIGH	Water heater temperature too high Will pop up if Temperature sensor is higher than the maximum exposure temperature of the HWAT cable: HWAT-M (65°C), HWAT-R (85°C)	Check Sensor and Boiler temperature
E:4.1	BOILER TEMP LOW	Water heater temperature is lower than maintain temperature set point of the HWAT-ECO	Check water heater temperature (also indicated in INFO of HWAT-ECO menu) Check maintain temperature setting at HWAT-ECO. Check temperature sensor mounting

Error No.	Warning message	Problem causes	Corrective actions
E:4.2	PIPE TEMP LOW	Water heater temperature is lower than maintain temperature set point of the HWAT-ECO	Check water heater temperature (also indicated in INFO of HWAT-ECO menu). Check maintain temperature setting at HWAT-ECO. Check temperature sensor mounting
E:5	HEATING CABLE DISCONNECT	Low or no current alarm No current measured when the circuit should be on.	Confirm that heating cable is connected to the controller.
E:6.x	INTERNAL ERROR	Internal Error	Disconnect HWAT-ECO controller and replace unit.
E:7	PLAUSIBILITY CHECK		Check parameter settings
E:8	Time and ANNUAL TIME VERIFICATION	No power supplied during prolonged period of time (~30 days). Clock reset to default "01.01.2001 00:00" displays	Set date and time.
	Water temperature too low	Water heating cable temperature is too low Installed heating cable is different from the programme selected Insulation thickness deviates from the required insulation thickness The ambient temperature value entered is too high	Check water heater temperature and timer programme. Change heating cable type in HWAT-ECO (can only be done in Quick start). See 3.1.3. Adjust power correction factor. See 3.3.1.4. Change value of ambient temperature. See 3.1.5.
	Water temperature too high	Water heating cable temperature is too high Insulation thickness deviates from the required insulation thickness The ambient temperature value entered is too low	Change heating cable type in HWAT-ECO (can only be done in Quick start). See 3.1.3. Adjust power correction factor. See 3.1.4. Change value of ambient temperature. See 3.1.5.
	Cannot access programming Mode and parameter settings	Controller is password protected	Enter your 4-digit password. If you forgot your password, enter the backup password (3000) to unlock the controller. See key lock



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