

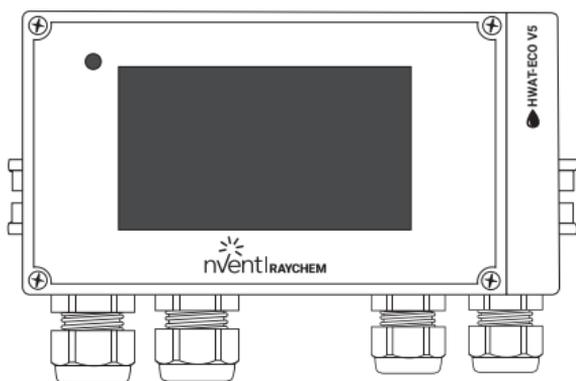


RAYCHEM

HWAT-ECO V5 (EU)

(Firmware version 1.1.3 or higher)

Installation, operation and maintenance manual





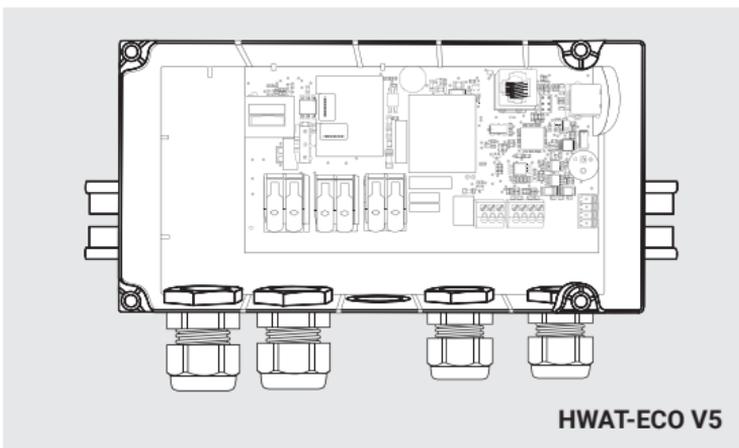
1.	Product overview	3
2.	Installation instructions	4
3.	Installation notes	9
4.	Operation	11
5.	Parameter settings (default)	16
6.	Technical specifications	16
	Appendix	21
	Electrical schemes	22

1. PRODUCT OVERVIEW

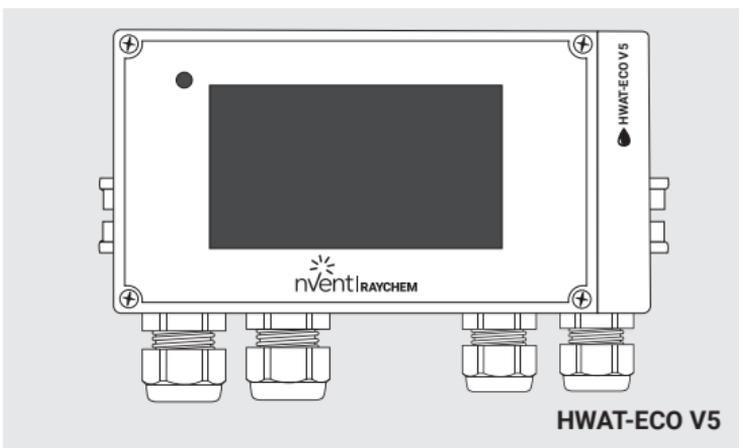


EN

A



B



C

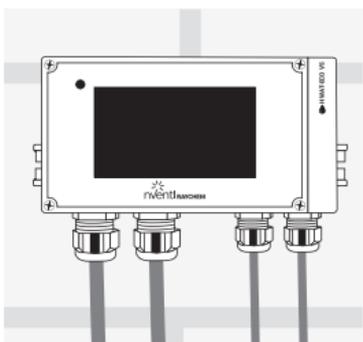
	1x	1x	1x
	2x M25; 2x M20	1x	1x
	1x	2x 2x	1x
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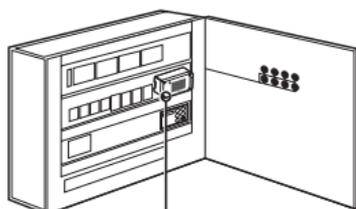
2. INSTALLATION INSTRUCTIONS

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1A

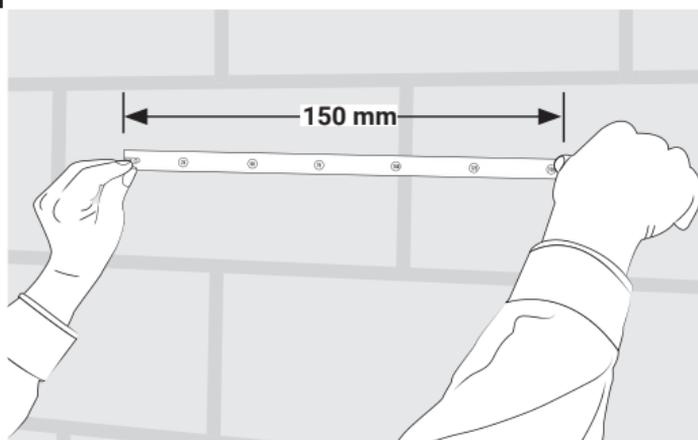


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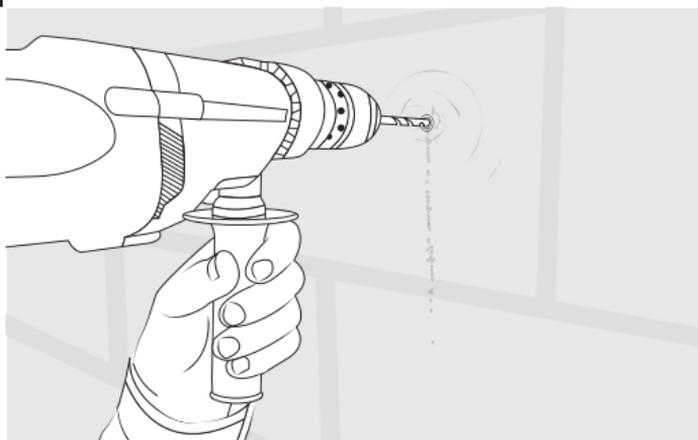


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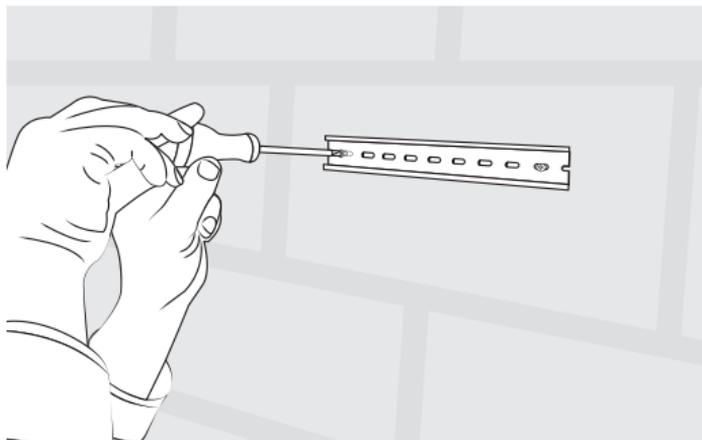
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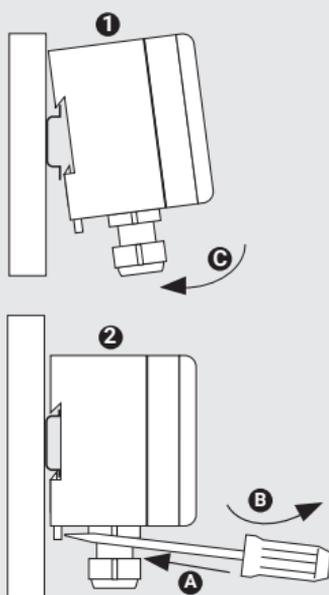


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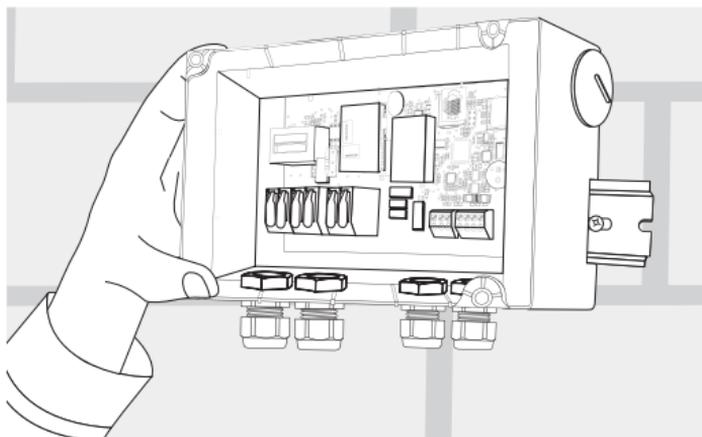


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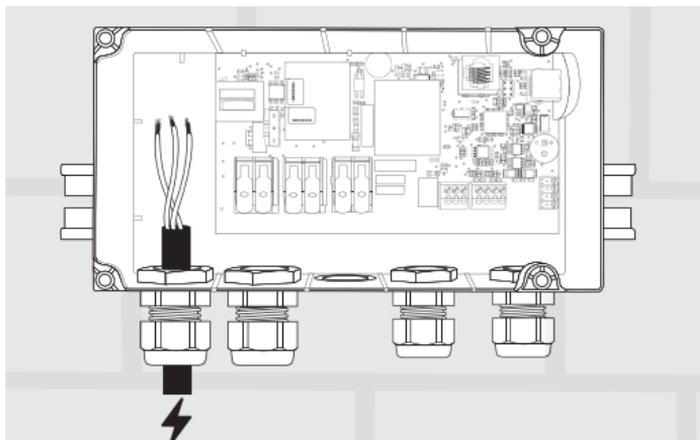


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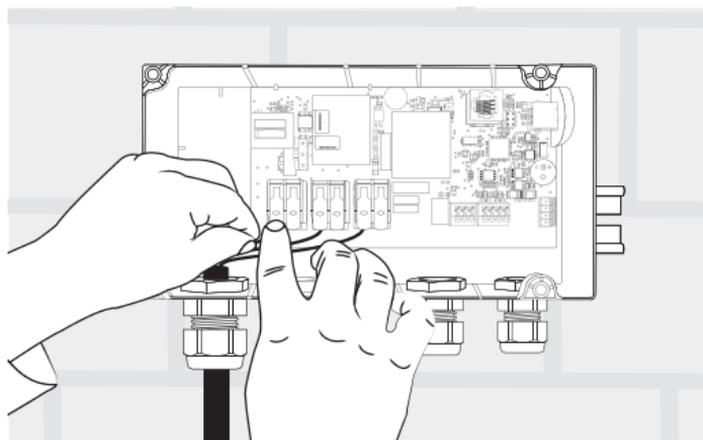




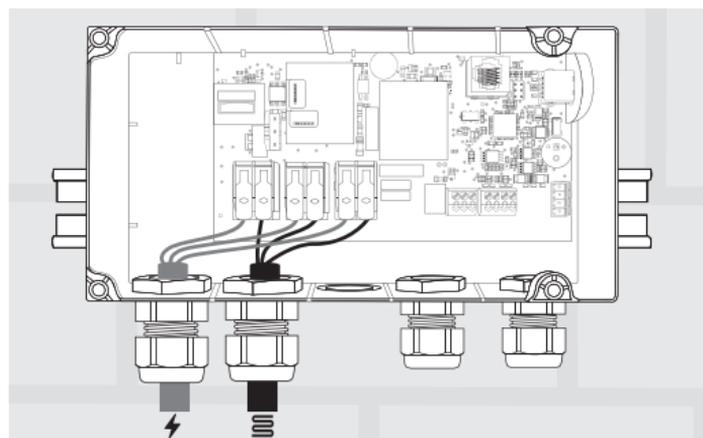
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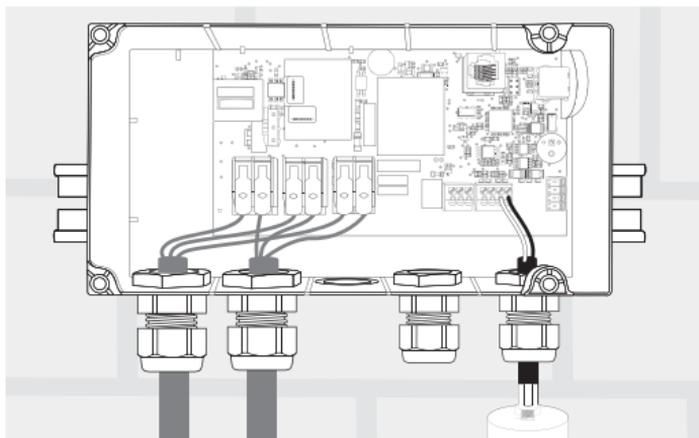
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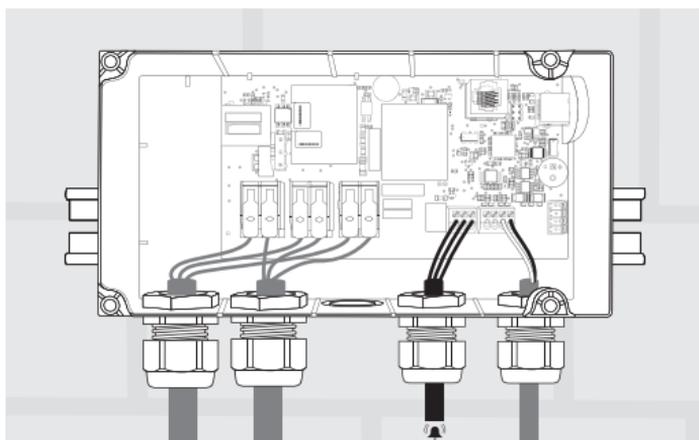


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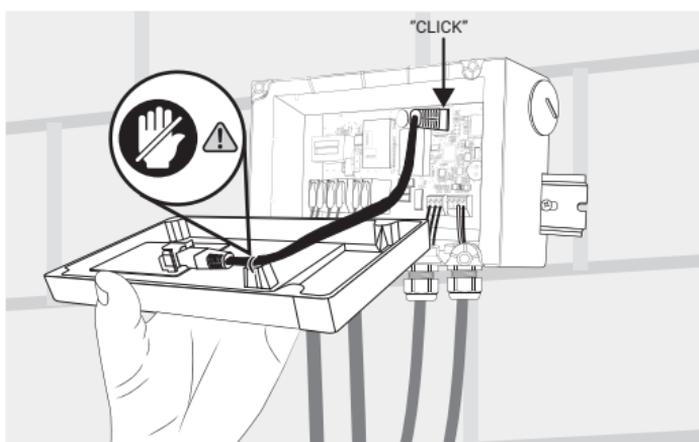


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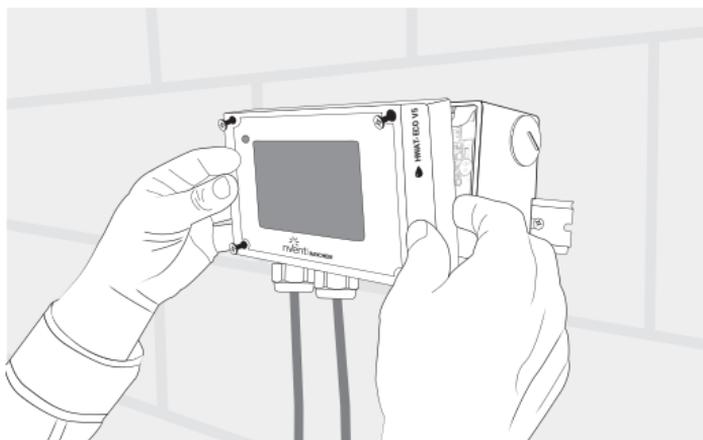
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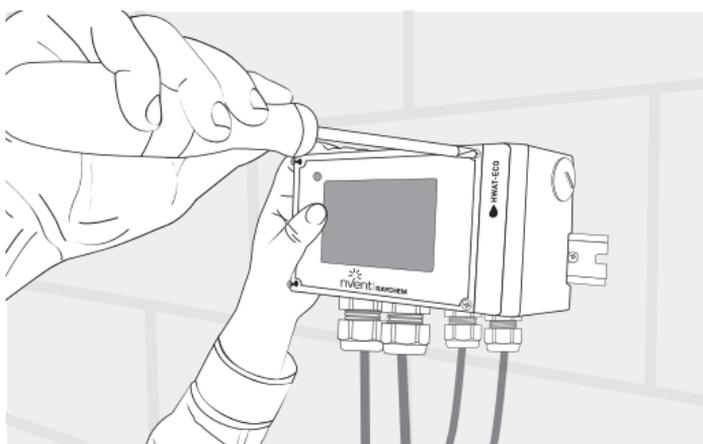
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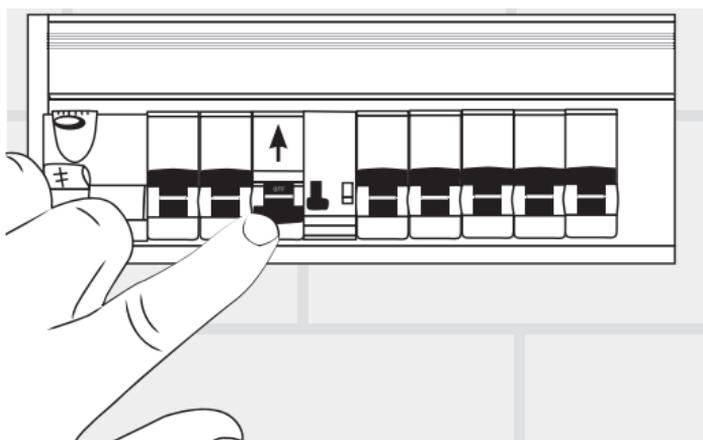
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14



15



30mA RCD & C20A 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 nVent RAYCHEM HWAT-SBS panels to operate 3, 6, 9 or 12 heating circuit

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

The nVent RAYCHEM 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: nVent RAYCHEM 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 nVent 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

Product specification	HWAT-R/-M/-L heating cables only	
	Electrical properties	
Supply voltage	180-253 VAC, 50/60 Hz	
Power consumption	3,5 VA max	
Power output relay (heating cable)	20 A / 230 VAC	
Power supply terminals	3 x 6 mm ² max	
Heating cable terminals	3 x 6 mm ² max	
Alarm terminals	3 x 1,5 mm ² max	
Sensor terminal - Boiler	2 x 1,5 mm ² max	
Sensor terminal - Pipe	2 x 1,5 mm ² max	
Alarm relay	Single pole double throw relay, volt-free, Max. switching capacity (resistive load only) 1 A/30 VDC 0.5 A/125 VAC, Max.: 60 VDC/125 VAC	
Circuit breaker	Max. C 20 A (C-Characteristic)	
Real time clock	Automatic Summer/Winter time and Leap year correction	
Clock backup	10 days	
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	Polycarbonate	
Dimensions	210 mm x 110 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 2,0 KOHM at 25°C, 2 wires	
Sensor tip dimensions	Ø 5 mm; length 20 mm	
Sensor cable length	3 m; extendable up to 100 m, 2 x 1,5 mm ²	
Temperature range	0°C to 90°C	
Sensor data	40°C	1211 Ω
	45°C	1033 Ω
	50°C	884 Ω
	55°C	762 Ω
	60°C	658 Ω
	65°C	571 Ω

	Approval
Approval	CE, UKCA, EMC According to EN 50081-1/2 for emission and EN 50082-1/2 for immunity Temperature for bal pressure +100°C test (DIN EN 60730/VDE 0631-1) Rated impulse voltage: Overvoltage category 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

The screenshot shows the 'HOT WATER MAINTENANCE' screen. At the top left is a menu icon, followed by the title 'HOT WATER MAINTENANCE', a warning triangle icon, and the time '14:14'. The screen is divided into three main sections:

- Red area:** Displays 'NOW 55°C MAINTAIN TEMP'.
- Grey area:** Displays 'NEXT 55°C ECONOMY TEMP AT 17:00'.
- White area:** Displays a boiler icon, 'BOILER 58°C'.

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



EN

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

SYSTEM

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

Info	General info about the unit, name, commissioning date, firmware version, nVent contact info per country.
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.
Reset	Select "Yes" to activate the Quick install menu and return all settings to factory settings. Quick start process restarts automatically.
Service	Access for nVent SERVICE TEAM
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
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".

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	>
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.

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.

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.

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 >

Language	Choose your language from the language menu.
Country	Select a country in this menu. Your selection defines the default values used for time format, pipe diameter and insulation thickness.
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.
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.
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.

WATER TEMP. & PROGRAMMING

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

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.
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 6.1 for the schedule of each programme. The building programme reflects the tapping profiles.



Graphically programme the Timer in 1 hour time blocks. You can set a block to OFF, Economy temp, Maintain temp, or HEAT-UP*



Timer
schedule

(*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.

5. PARAMETER SETTINGS (DEFAULT)

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
Ambient temperature	20°C
Maintain temperature	55°C
Economy temperature	50°C
Low temperature limit	40°C
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

Apartments

←
APARTMENT WEEKDAY
09:31

OFF

ECONOMY

MAINTAIN

HEAT-UP
MON

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

←
HOSPITAL 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

←
HOTEL 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

←
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
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 WEEKEND 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	Water pipe 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) 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
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



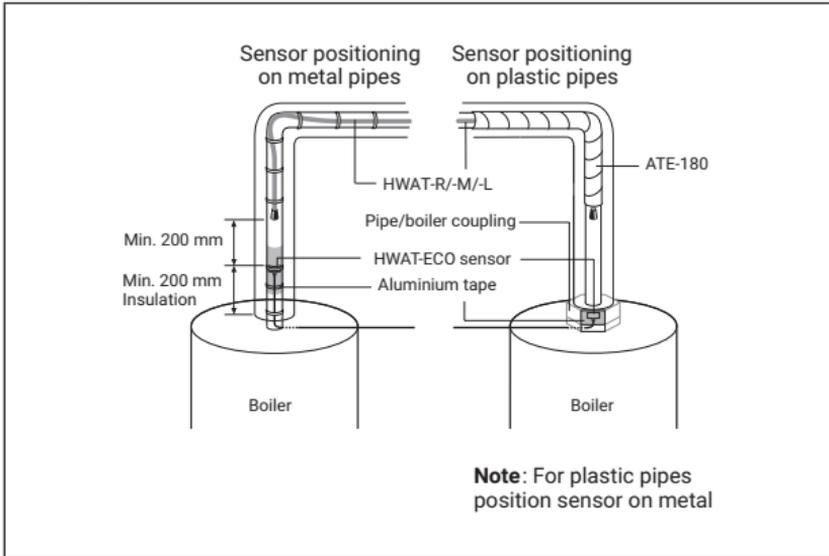


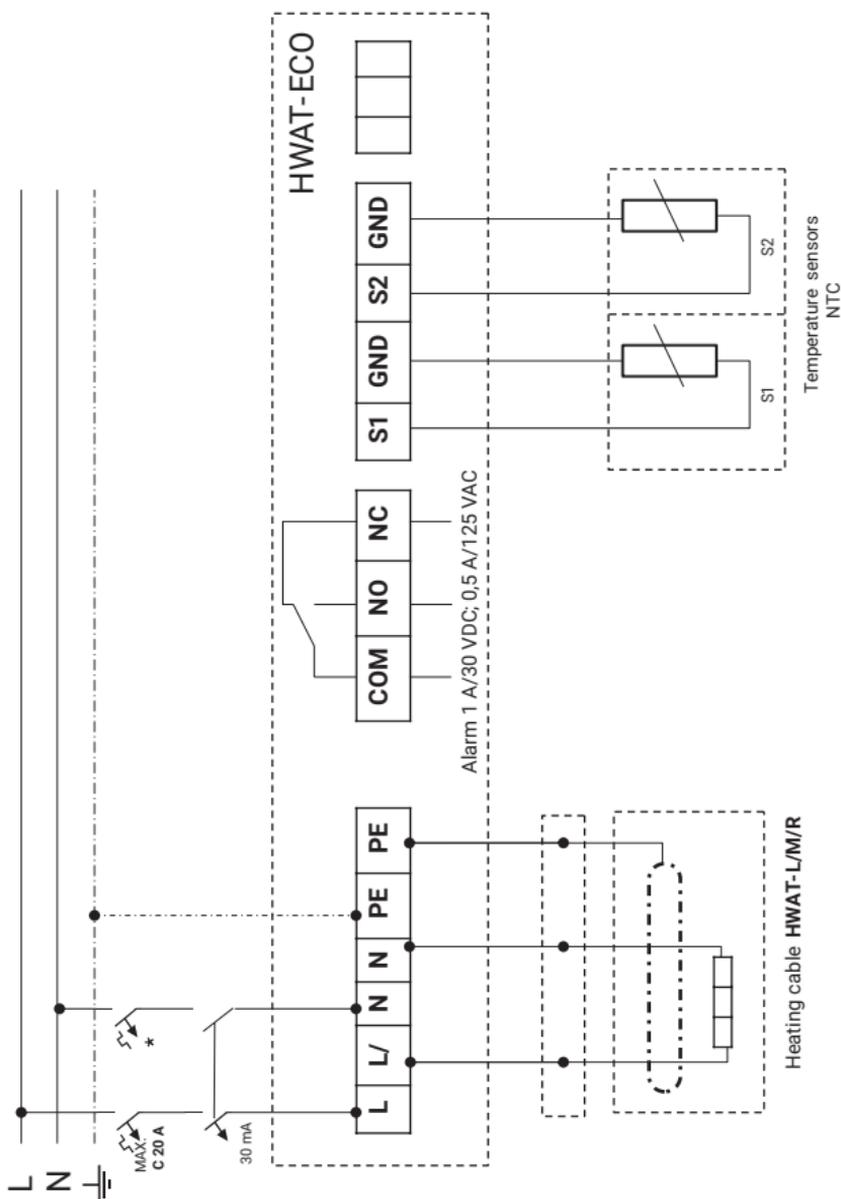
Error No.	Warning message	Problem causes	Corrective actions
E:5	HEATING CABLE DISCONNECT	Low or no current. alarm No current measured when the circuit should be on.	Confirm that heating cable is connected to the controller.
E:6.1	INTERNAL ERROR	Internal error	Disconnect HWAT-ECO controller and replace unit. When reporting this error, provide the exact error number, cable type, cable length and the setpoint temperature.
E:6.2	INTERNAL ERROR	Internal error	Disconnect HWAT-ECO controller and replace unit. When reporting this error, provide the exact error number, cable type, cable length and the setpoint temperature.
E:6.3	INTERNAL ERROR	Internal error	Disconnect HWAT-ECO controller and replace unit. When reporting this error, provide the exact error number, cable type, cable length and the setpoint temperature.
E:6.4	INTERNAL ERROR	Internal error	Disconnect HWAT-ECO controller and replace unit. When reporting this error, provide the exact error number, cable type, cable length and the setpoint temperature.
E:6.5	INTERNAL ERROR	Internal error	Disconnect HWAT-ECO controller and replace unit. When reporting this error, provide the exact error number, cable type, cable length and the setpoint temperature.
E:6.6	INTERNAL ERROR	Internal error	If you are using low noise, humfree contactor, replace it with the non-humfree contactor. If this does not help, then disconnect HWAT-ECO controller and replace unit. When reporting this error, provide the exact error number, cable type, cable length and the setpoint temperature.
E:7	PLAUSIBILITY CHECK		Check parameter settings
	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). Adjust power correction factor. Change value of ambient temperature. See 4.2

Error No.	Warning message	Problem causes	Corrective actions
	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). Adjust power correction factor. Change value of ambient temperature. See 4.2
	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
	Seeing 3 dots, one by one, on the screen	Pushing the screen for 30 seconds causes controller to enter screen calibration mode (it can be triggered also from the service menu)	All 3 dots have to be pressed one by one for calibration before jumping back to the main screen

Appendix

Sensor position





S1=

Pipe Sensor / Rohrleitungsfühler / Rørsensor / Potrubní čidlo / Sonde du tuyau /
 Sensore tubazione / Leidingsensor / Czujnik temperatury rury / 管道传感器

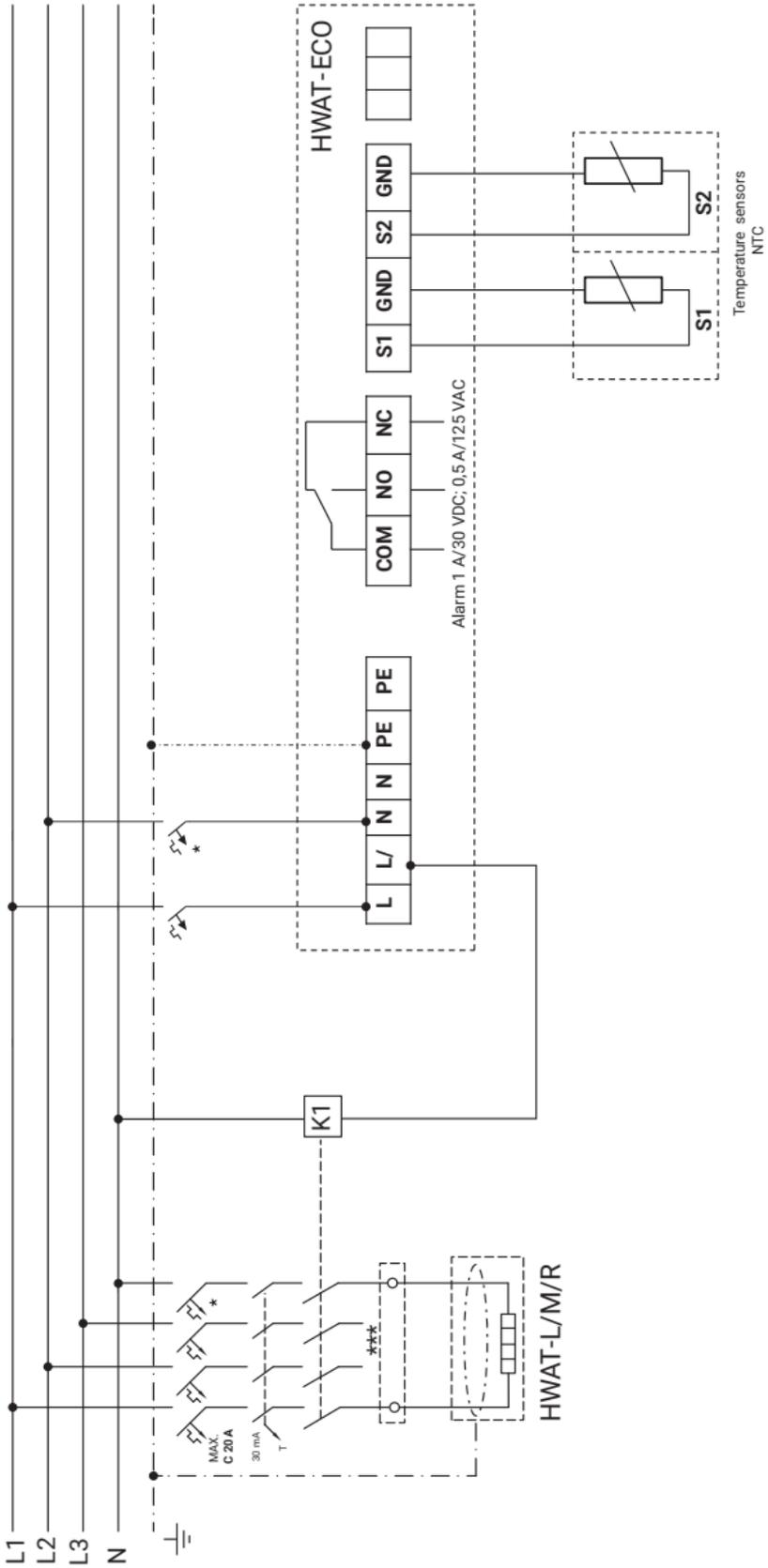
S2 =

Boiler Sensor / Boilerföhler / Kedelsensor / Bojleru čidlo / Sonde de la chaudière /
 Sensore caldaia / Ketelsensor / Czujnik temperatury kotła / 锅炉传感器

ELECTRICAL SCHEME



EN



België / Belgique

Tel. +32 16 21 35 02
Fax +32 16 21 36 04
salesbelux@nVent.com

Bulgaria

Tel. +359 5686 6886
Fax +359 5686 6886
salesee@nVent.com

Česká Republika

Tel. +420 606 069 618
czechinfo@nVent.com

Denmark

Tel. +45 70 11 04 00
salesdk@nVent.com

Deutschland

Tel. 0800 1818205
Fax 0800 1818204
salesde@nVent.com

España

Tel. +34 911 59 30 60
Fax +34 900 98 32 64
ntm-sales-es@nVent.com

France

Tél. 0800 906045
Fax 0800 906003
salesfr@nVent.com

Hrvatska

Tel. +385 1 605 01 88
Fax +385 1 605 01 88
salesee@nVent.com

Italia

Tel. +39 02 577 61 51
Fax +39 02 577 61 55 28
salesit@nVent.com

Lietuva/Latvija/Eesti

Tel. +370 5 2136633
Fax +370 5 2330084
info.baltic@nVent.com

Magyarország

Tel. +36 1 253 7617
Fax +36 1 253 7618
saleshu@nVent.com

Nederland

Tel. 0800 0224978
Fax 0800 0224993
salesnl@nVent.com

Norge

Tel. +47 66 81 79 90
salesno@nVent.com

Österreich

Tel. 0800 29 74 10
Fax 0800 29 74 09
salesat@nVent.com

Polska

Tel. +48 22 331 29 50
Fax +48 22 331 29 51
salesee@nVent.com

Republic of Kazakhstan

Tel. +7 712232 09 68
Fax +7 7122 32 55 54
saleskz@nVent.com

Россия

Тел. +7 495 926 18 85
Факс +97 495 926 18 86
salesru@nVent.com

Serbia and Montenegro

Tel. +381 230 401 770
Fax +381 230 401 770
salesee@nVent.com

Schweiz / Suisse

Tel. +41 (41) 766 30 80
Fax +41 (41) 766 30 81
infoBaar@nVent.com

Suomi

Puh. 0800 11 67 99
salesfi@nVent.com

Sverige

Tel. +46 31 335 58 00
salesse@nVent.com

Türkiye

Tel. +90 545 284 09 05
Fax +32 16 21 36 04
salesee@nVent.com

United Kingdom

Tel. 0800 969 013
Fax 0800 968 624
salesthermalUK@nVent.com



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