



**reventon**  
INDUSTRIAL SOLUTIONS

# Technical documentation

AIR WATER HEATERS IN STEEL CASING FARMER MC-3S

REVENTON GROUP FARMER MC-3S



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## 1. INTRODUCTION

Thank you very much for purchasing Reventon Group device. We would like to congratulate you on excellent choice. Please read and keep this manual.

### 1.1 PRECAUTIONS

The buyer and the user of the air water heater Reventon Group brand should read carefully the following instructions and proceed to the content recommendations. Proceeding due to the following instruction guarantees the correct usage and safety. In case of any doubts please contact directly the producer Reventon Group sp. z o.o. The producer reserves the rights to make changes to the technical documentation without previous notice. Reventon Group sp. z o.o. is not responsible for the damages which occur due to improper installation, not keeping the device in repair or using the device out of line. The installation should be carried out by the professional installers, who possess the qualifications to install these types of devices. The installers are responsible for making the installation as instructed in the technical data. In case of unserviceable please plug out the device and contact with the authorized for repair person or the supplier. During the installation, use, service and periodical inspections all regulations and safety rules must be followed.

### 1.2 TRANSPORT

During the acceptance of goods, it is needed to check the device to exclude any damages. During the transport, it is needed to use the proper equipment, it is necessary to carry the device by two people. In case of any damages please fill in the damage report in presence of the supplier.

### 1.3 PACKAGE CONTENT

- Heater
- Operation and maintenance manual and warranty card

### 1.4 USE

Reventon Group Farmer MC-3S heating device is designed for heating surfaces in which aggressive conditions prevail, i.e. high content of acids, ammonia and high concentration of dust. However, heaters should not be used in highly corrosive environments for aluminum, copper and steel. The device should also not be installed in rooms where they would be exposed to the high humidity or direct water action, exceeding the fan's resistance to water penetration (see IP protection degree).

## 2. DEVICE CHARACTERISTICS

### 2.1 INTERNATIONAL PROTECTION DEGREE IP

Determines the tightness of the electrical device (fan motor), which is defined by two digits:

- **first characteristic digit** - specifies protection of the device against access to dangerous parts as well as against penetration of solids
- **second characteristic digit** - determines the resistance of the engine to the water ingress, its waterproofness

Fan motor of the Farmer MC has IP54:

- 5 - protection against access to hazardous parts by wire with a diameter of 1 mm or more and against dust in quantities which might impair the proper functioning of the equipment;
- 4 - protection against splashes of the water from any direction

## 2.2 CONSTRUCTION AND PRINCIPLE OF OPERATION

**Casing:** made of galvanized steel casing, powder painted in RAL 9005 color. Additionally covered by LCE coating.

**Air stators:** made of galvanized steel casing, powder painted in RAL 7048 color. It is possible to adjust manually the air stators to achieve the needed direction of the air flow.

**Heating coil:** made of copper and aluminum. It is covered by LCE coating. Supplied by distribution working fluid, which circulates through the coil and releases heat to the air. The coil has the following technical parameters: the maximum temperature of the heating factor is 120°C; maximum pressure 1,6 MPa; headers diameter ¾". Farmer MC-3S have a double row heat exchanger.

**Axial blowing fan:** made of galvanized steel. Fan has to ensure air flow through the exchanger. It has a single- and three phase motor with the following parameters: protection degree IP54, rate current 0,54-0,84 A (depending on the operating mode). Diameter of the fan is 400 mm.

**Rotating mounting bracket (optional equipment):** enables the device to be installed in several configurations (depending on the requirements) and the unit to be rotated in a horizontal plane.

**Fixed holders (optional equipment):** made of steel, element for mounting the device on a wall or ceiling. Solid and durable construction, possible to assemble device in parallel on the angle 60° and 45°.

### 2.3 LCE COATING

The coating technology is based on immersion of the exchanger in the liquid LCE, which allows protection of the whole surface of the exchanger. The LCE coating is waterproof and protects the heater exchanger from corrosion, mould and bacteria without compromising heat transfer efficiency. It is flexible enough not to be teared during thermal expansion of metal parts.

Periodic maintenance guarantees the resistance of the LCE coating to the following concentrations of chemical factors:

Agent	Concentration
Hydrochloric Acid	30%
Sulphuric Acid	30%
Phosphoric Acid	50%
Acetic Acid	10%
Sodium Hydroxide	10%
Ammonia in the air	30 ppm
Urea in the air	30 ppm
Trichloroethylene	30 ppm
Toluene	25 ppm
Methylated Spirits	30 ppm
Mineral Turps	30 ppm
MEK	25 ppm
Acetone	25 ppm
Hydrogen Sulphide	30 ppm

In addition the above LCE COATING demonstrates high resistance to fumes of the following: Lactic Acid, Oxalic Acid, Humic Acid, Saltwater and NOx.

### TECHNOLOGY HAS THE FOLLOWING CERTIFICATES:

**ASTM B117** salt spray test 10000 hours in heating/cooling cycles changing temperatures between 60°C and 5°C.

**ASTM G 85 A1** Acetic Acid-Salt spray test to prove positive impact on coils used in food industry.

**ASTM G 87** Same as G85 utilizing acidic SO<sub>2</sub> electrolyte.

**ASTM D 552** Flexibility test, which investigates flexibility of coating to bond to the substrate surface of coil.

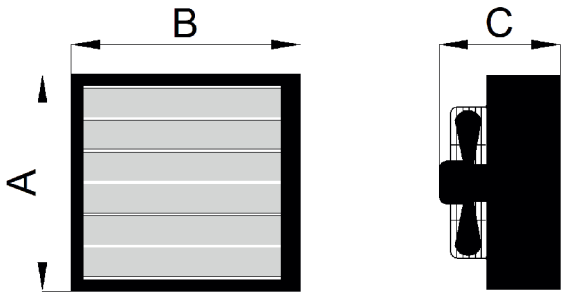
**ASTM G 85 A5** Indirect spraying of dilute salt and ammonium sulphate at 23°C and followed by 1 hour exposure of dry air at 35°C. Test proving resistance in salt containing environment and industrial applications.

**ASTM G 21** that examines resistance to fungi. Important aspect for evaporators.

2.4 DEVICE DIMENSIONS

- MC-3S

height (A): 660 mm  
width (B): 696 mm  
depth (C): 384 mm



2.5 DEVICE TECHNICAL DATA

TECHNICAL DATA		FARMER MC-3S
Product code		WHFARMERMC-3S-1788
Nominal heating capacity [kW] *	III STAGE	40,6
	II STAGE	32,5
	I STAGE	23,8
Heating capacity range [kW] **		3,57 – 53,6
Maximum airflow [m³/h]	III STAGE	3450
	II STAGE	2400
	I STAGE	1500
Maximum horizontal range [m]		19
Number of rows [pcs.]		2
Capacity of water [dm³]		2
Maximum temperature of working fluid [°C]		120
Maximum working pressure [MPa]		1,6
Connection diameter ["]		3/4
Power supply [V] / Frequency [Hz]		230/50
Rated motor current [A]	III STAGE	0,84
	II STAGE	0,65
	I STAGE	0,54
Motor speed [rpm]	III STAGE	1400
	II STAGE	1050
	I STAGE	750
Motor power [W]	III STAGE	190
	II STAGE	150
	I STAGE	120
Protection degree IP [-]		54
Net weight [kg]		27
Noise [dB]***	III STAGE	56
	II STAGE	50
	I STAGE	48

\* for parameters 90/70°C and 0°C inlet

\*\* max. 120/90°C, 0°C inlet, III stage // min. 40/30°C, 20°C inlet, I stage

\*\*\* measurement at the distance 5 m

Parameters	FARMER MC-3S- 3 stage 3450 m³/h				
Supply/return water temperature [°C]	120/90				
Dry bulb air inlet temperature [°C]	0	5	10	15	20
Heating capacity [kW]	53,6	50,3	47,1	44,1	41,0
Dry bulb air outlet temperature [°C]	43,2	46,3	49,4	52,5	55,5
Water flow [m³/h]	1,58	1,49	1,39	1,3	1,21
Pressure drop in the heat exchanger [kPa]	11	10	9	8	7

Parameters	FARMER MC-3S- 3 stage 3450 m³/h				
Supply/return water temperature [°C]	90/70				
Dry bulb air inlet temperature [°C]	0	5	10	15	20
Heating capacity [kW]	40,6	37,5	34,5	31,5	28,6
Dry bulb air outlet temperature [°C]	32,7	35,8	38,8	41,8	44,8
Water flow [m³/h]	1,79	1,65	1,52	1,39	1,26
Pressure drop in the heat exchanger [kPa]	15	13	11	9	8

Parameters	FARMER MC-3S- 3 stage 3450 m³/h				
Supply/return water temperature [°C]	80/60				
Dry bulb air inlet temperature [°C]	0	5	10	15	20
Heating capacity [kW]	35,0	31,9	29,0	26,0	23,2
Dry bulb air outlet temperature [°C]	28,2	31,2	34,2	37,1	40,1
Water flow [m³/h]	1,54	1,4	1,27	1,14	1,02
Pressure drop in the heat exchanger [kPa]	11	10	8	6	5

Parameters	FARMER MC-3S- 3 stage 3450 m³/h				
Supply/return water temperature [°C]	70/50				
Dry bulb air inlet temperature [°C]	0	5	10	15	20
Heating capacity [kW]	29,3	26,3	23,4	20,6	17,8
Dry bulb air outlet temperature [°C]	23,6	26,6	29,6	32,5	35,4
Water flow [m³/h]	1,28	1,15	1,02	0,9	0,78
Pressure drop in the heat exchanger [kPa]	8	7	5	4	3

Parameters	FARMER MC-3S- 3 stage 3450 m³/h				
Supply/return water temperature [°C]	50/30				
Dry bulb air inlet temperature [°C]	0	5	10	15	20
Heating capacity [kW]	17,8	15,0	12,2	9,41	6,63
Dry bulb air outlet temperature [°C]	14,4	17,3	20,2	23,0	25,7
Water flow [m³/h]	0,77	0,65	0,53	0,41	0,29
Pressure drop in the heat exchanger [kPa]	3	2	2	1	1

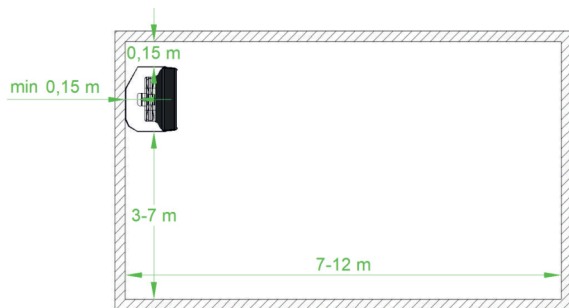
Parameters	FARMER MC-3S- 3 stage 3450 m³/h				
Supply/return water temperature [°C]	40/30				
Dry bulb air inlet temperature [°C]	0	5	10	15	20
Heating capacity [kW]	16,8	14,0	11,2	8,53	5,87
Dry bulb air outlet temperature [°C]	13,6	16,5	19,4	22,3	25,1
Water flow [m³/h]	1,46	1,21	0,97	0,74	0,51
Pressure drop in the heat exchanger [kPa]	11	8	5	3	2

### 3. ASSEMBLY

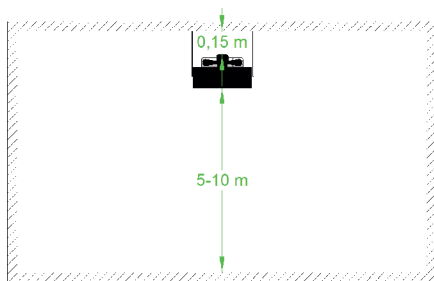
#### 3.1. GENERAL PRINCIPLES

During installation, ensure a free air flow to the device and do not restrict the air stream supply. The figures below show the recommended distances between the heater and building partitions:

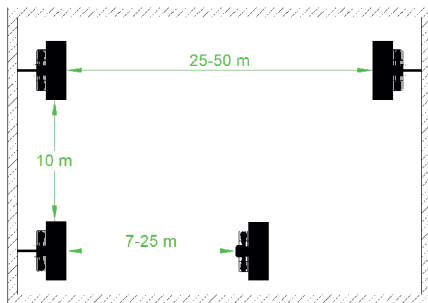
a) in case of wall mounting



b) in case of ceiling mounting

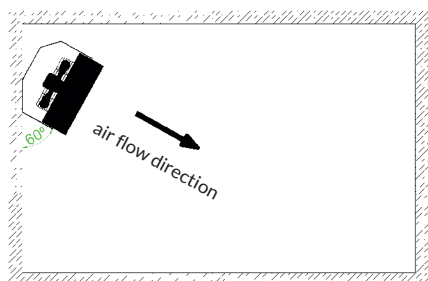


In case of higher heat demand, more units can be installed in the room. In order to ensure proper air flow, it is necessary to maintain the recommended distances between the heaters, as shown in the following figure.



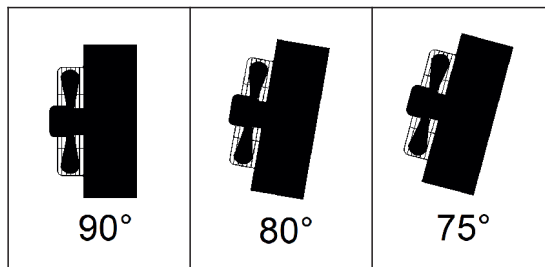
#### 3.2. ROTATING MOUNTING BRACKET

The Reventon Group MC-3S device can be assembled using a rotating mounting bracket. It enables the heaters installation on the wall or ceiling, depending on the required optimal direction of airflow.



#### 3.3 FIXED HOLDERS

The heater can be mounted on a wall or ceiling with fixed holders. They enable to regulate degree slope in range 15°.



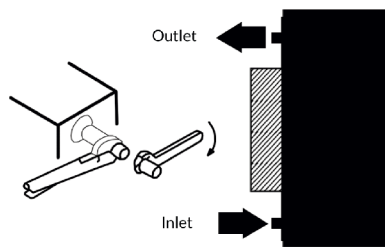
### 4. INSTALLATION INSTRUCTIONS

#### 4.1. CONNECTION OF THE DEVICE TO THE HYDAULIC SYSTEM

- the wires should be connected as indicated on the heater (supply from below, return from above)

- while plugging the device to the water installation do remember to hold its stub pipes by pipes spanner

**Not keeping to the recommendation may cause the damages of the heating coil.**



- it is recommended to use filter on the hydraulic supply of the heater

- it is recommended to use the following valves:

- vent valve in the highest place on the hydraulic installation,
- cut off valve on the supply and return of the device.

- installation has to be secured against excessive increase of pressure

- it is recommended to check the leak tightness of the hydraulic system before plugging the electric supply

#### 4.2. CONNECTION OF THE DEVICE TO THE ELECTRICAL SYSTEM

- all works concerning electrical installation should be made by the qualified personnel (who possess required authorizations to install electrical equipment), based on wiring schematic diagrams (see 7)

- the electrical installation of the building shall have a residual current device

- it is recommended to check the electric installation and controls before the first start

### 5. PRECAUTIONS & WARNINGS

The precautions mentioned below must be strictly followed during operation of the device:

- all works concerning electrical installation (disassembly, repair etc.) should be made by the qualified staff, who possess the qualifications due to the domestic and local norms, regarding electrical installations

- before service or exchange of the device it is obligatory to cut off the current supply

- do not limit or cover the inlet and outlet of the device

- do not install, service the device with wet hands or barefoot

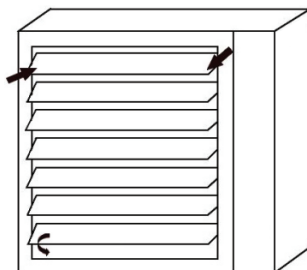
- the device should be kept out of reach of children and animals

- the device does not consist of the anti-frost protection; the temperature in the room, where device is installed, should not go below 0°C; if such situation could take place empty the device out of water

- after the turn off, the elements of device may be warm

- after operating time of the device, please utilize it concerning the local norms and regulations

- it is recommended to clean the device periodically (at least once per month):
  - heating coil blow with compressed air
  - fan casing and blades clean from dirt
- for installation of the device in a room where is high dust concentration, the periodic cleaning should be performed much more often, not allowing the heat exchanger to 'clog'
- failure to comply with cleaning obligations may have a negative effect on technical parameters of the device
- if the device is not used for a longer time disconnect the voltage supply
- the device is transported with the closed air stators. It is essential to open them in at least for 30% before first start
- opening the air stators must be done by two hands in parallel.



## 6.CONTROLS

Usage of automatic control dedicated to the air water heaters of Reventon Group gives great possibilities of adjusting the efficiency of the heater in different, depending on needs, degree of automation of its operation. We also offer additional controls:

### Programmable controller HMI

controller is used to regulate devices equipped with 3-stage fans. It controls them according to set program (required air temperature). There is also opportunity to connect the external air temperature sensor (in the set). The controller automatically controls the actuator of two-way valve. It has MODBUS communication too.



Voltage/ Frequency: 230 V AC / 50 – 60 Hz  
Maximum current: 5 A  
Operating temperature range: 0 - 45°C  
Regulation range: 5°C - 35°C  
Regulation accuracy: ±0,5°C  
External temperature sensor: NTC 10K  
Communication: RS485  
Dimensions: 86 x 86 x 13,3 mm

### 3-stage speed controller with thermostat HC-3S

controller is used to regulate devices equipped with 3-stage fans. It has a 3-stage speed control and built-in thermostat switches the device of automatically when the preset temperature is reached. In addition, the unit controls the operation of the actuators installed on the control valve.



Voltage/ Frequency: 230 V AC / 50 – 60 Hz  
Maximum current: 3 A  
Regulation range: 10°C - 30°C  
Operating mode: continuous or thermostatic  
Regulation accuracy: <1°C  
Dimensions: 130 x 85 x 40 mm  
Weight: 210 g  
Degree of casing's protection: IP 30

### Fan speed controller HC

designed to change the single-phase fan's speed voltage controlled in industrial supply and heating systems. It is available in several versions. The selection of the appropriate model depends on the number of the devices that have to be connected to the to one regulator – the total intensity of the connected devices cannot exceed the maximum current flow of the regulator.



5 control levels: 80-105-135-170-230 V \*  
Voltage/ Frequency: 230 V AC / 50 – 60 Hz  
Maximum current output (depending on model):  
3 A, 5 A, 7 A lub 14 A  
Protection: thermal switch  
Weight (depending on model):  
2,5 kg, 4,5 kg, 5,5 kg or 10,5 kg  
Degree of protection: IP 54

\* regulation for 3 A regulator: 115-135-155-180-230 V

### Two-way valve with actuator 3/4" (installation on the return from exchanger)

the two-way valve with actuator is used to automatically regulate the flow of the heating medium.



Voltage/ Frequency: 230 V AC / 50 – 60 Hz  
Total current: <0,25 A  
Maximum operating temperature: 60°C  
Closing time: 5 - 6 min  
Adjustment stroke: 3,6 mm  
Degree of protection: IP 40

### Relay Module RM-16A

relay module RM-16A opens and closes the circuit to affect the work of other devices. It can be used to connect a receiver with higher power than the relay in the controller allows. Maximum rated current is 16A.



Voltage/ Frequency: 230 V AC / 50 – 60 Hz  
Maximum current: 16 A  
Input: NO/COM  
Input: SL Connection of a regulator with the voltage relay 230 V  
Dimensions: 47 x 47 x 20 mm

### Manual thermostat HC

controls operation of the heater. Switches the unit off automatically when the set temperature is reached.



Voltage/Frequency: 230 V AC / 50 – 60 Hz  
Maximum current: 3 A  
Zakres pracy: 0 - 40°C  
Regulation range: 10 - 30°C  
Regulation accuracy: <1°C

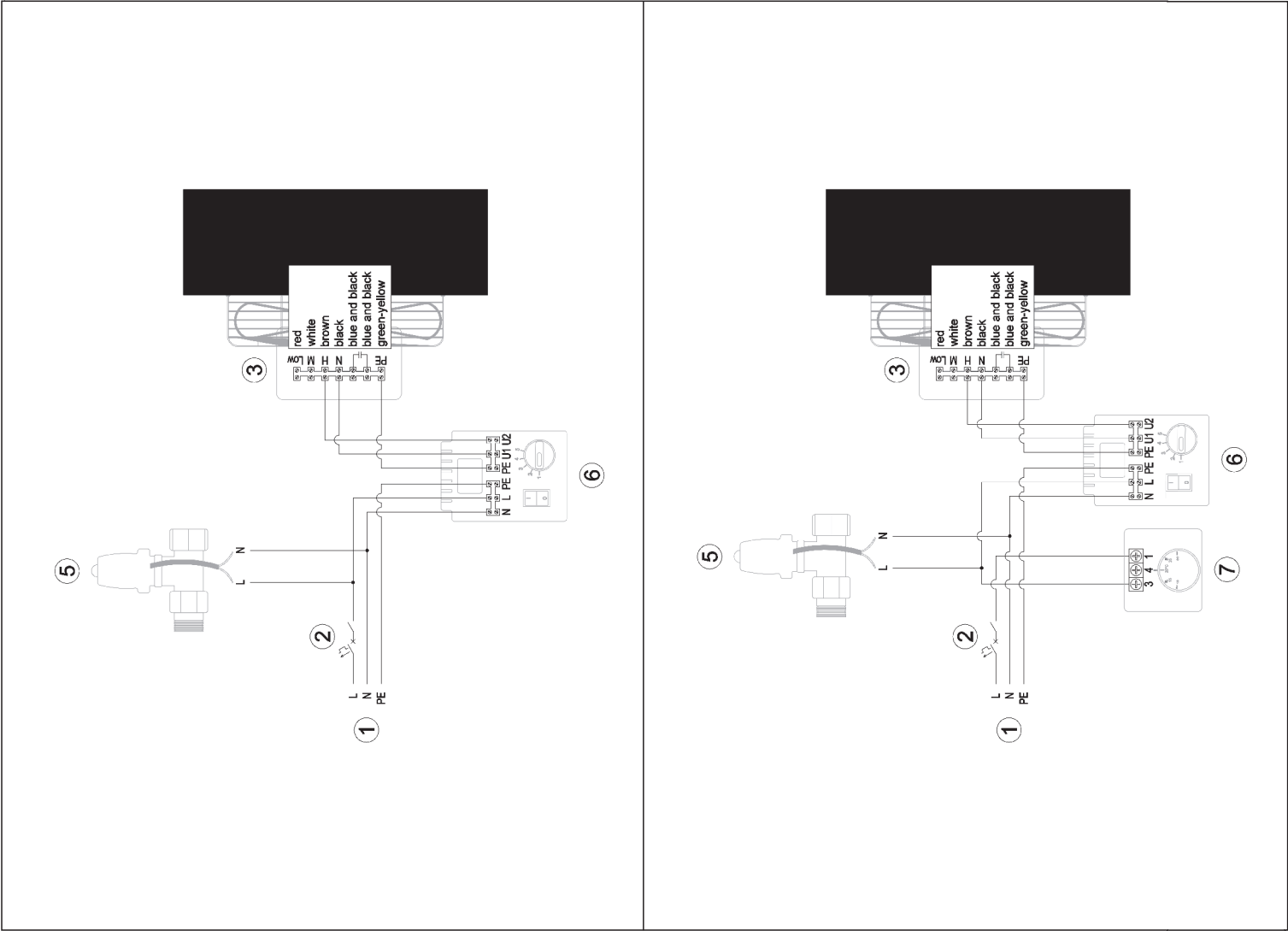
## COOPERATION OF CONTROLLERS WITH EQUIPEMENT

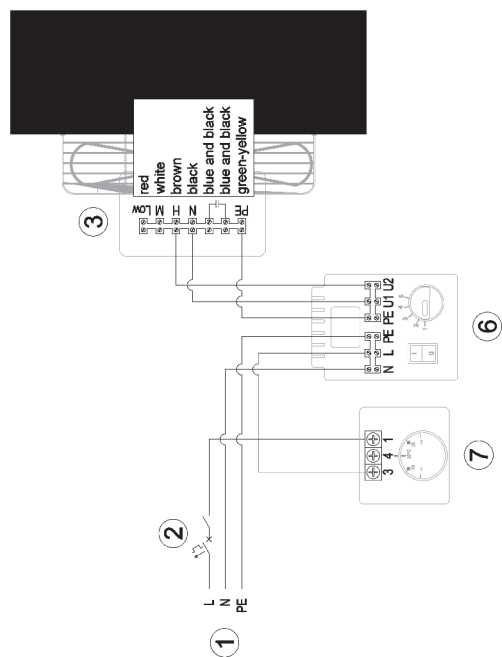
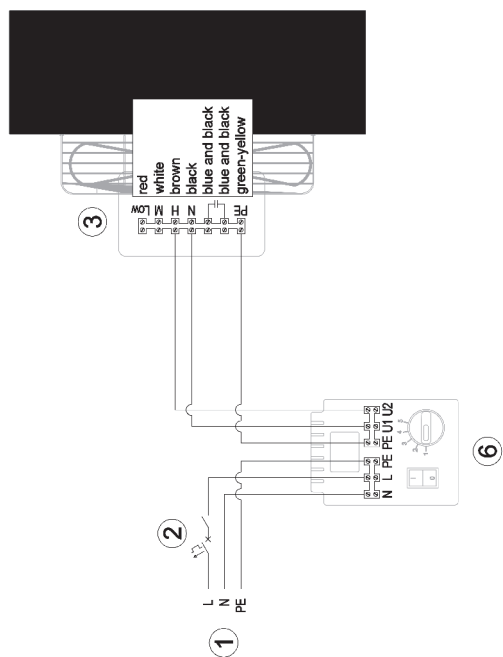
Model	HC3S	HMI	HC 3,0 A	HC 5,0 A	HC 7,0 A	HC 14 A	RM- 16 A
MC IP54-3S	3	5	3	5	8	16	19

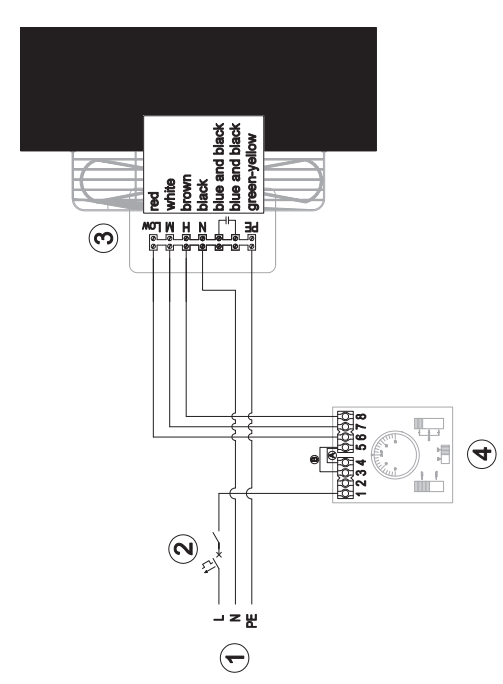
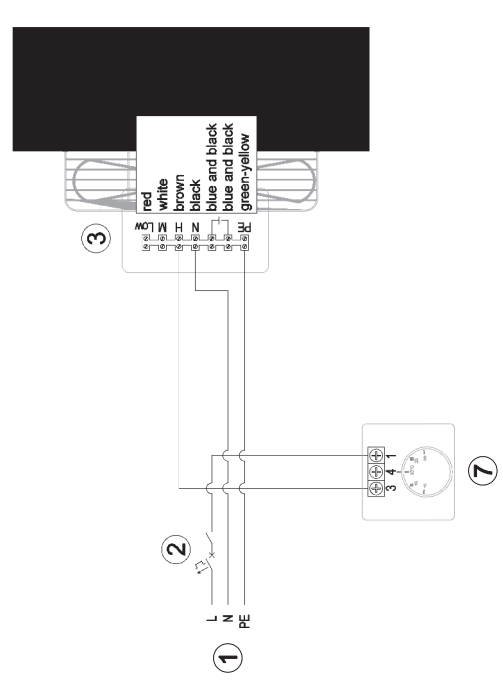
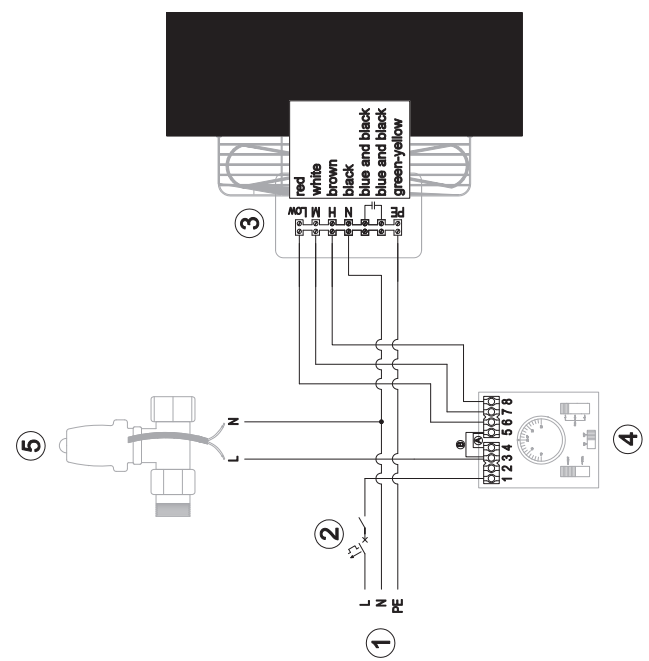
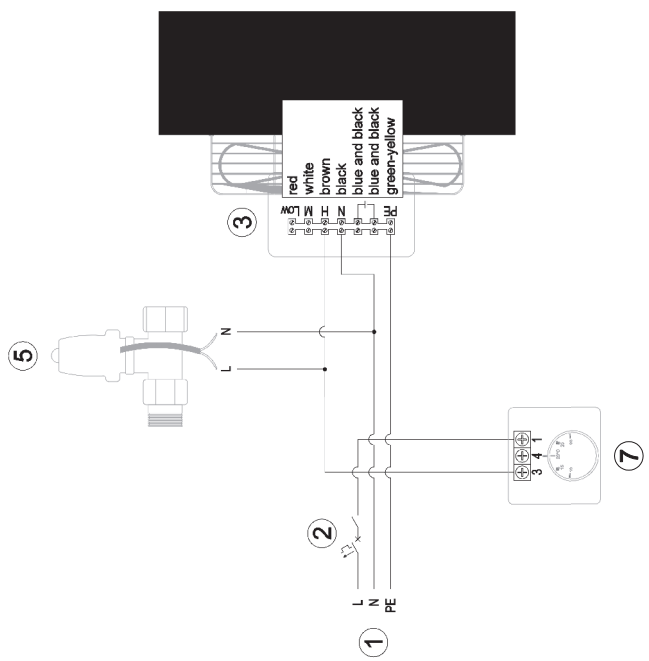
7. CONNECTION SCHEMES

- LEGEND:
- 1. Power
  - 2. Main switch, overcurrent circuit breaker \*
  - 3. Air water heater Farmer MC-3S
  - 4. 3-stage speed controllers with thermostat
  - A-work in continuous mode
  - B-operation in thermostatic mode
  - 5. Two-way valve with actuator HC ¾ "
  - 6. Fan speed controller HC
  - 7. Manual thermostat HC
  - 8. Programmable controller HMI
  - 9. Relay module RM-16A
  - 10. External temperature sensor

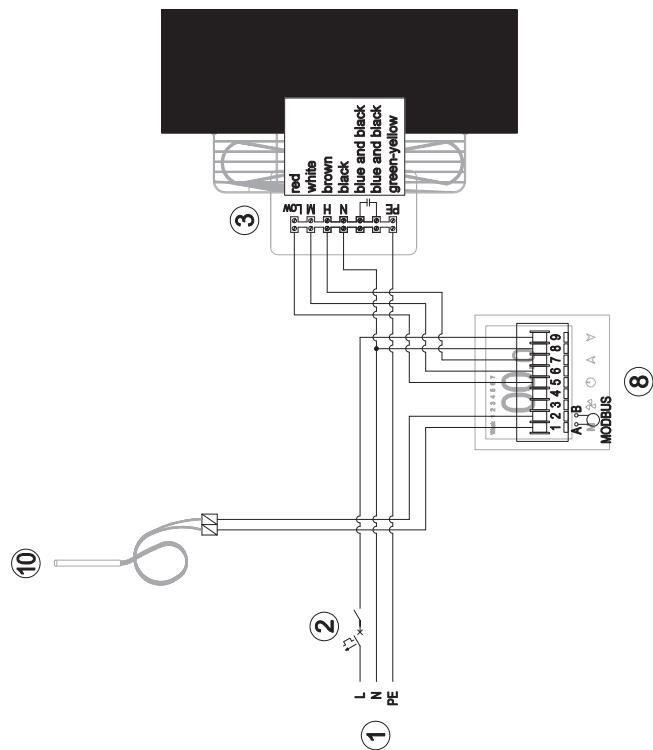
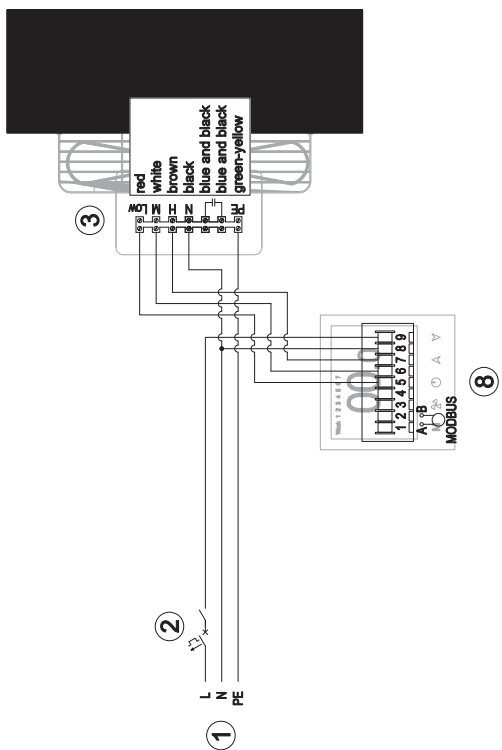
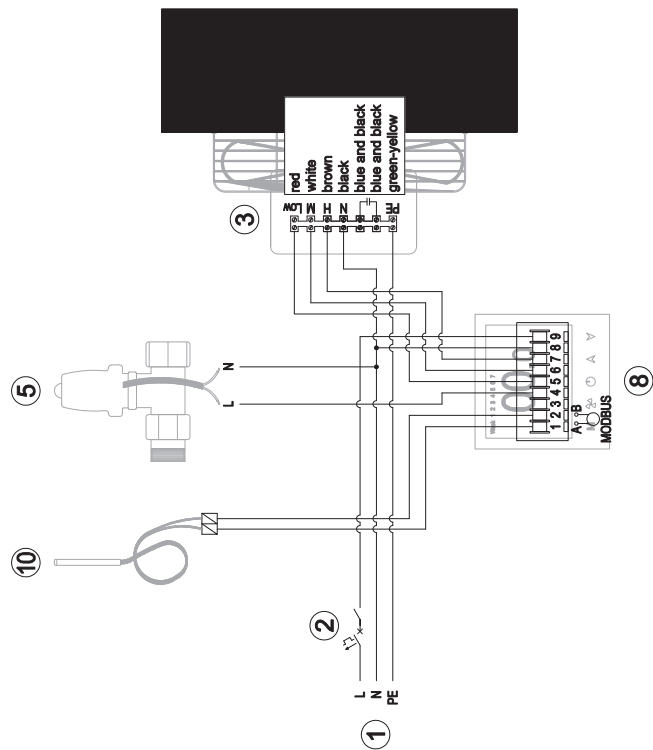
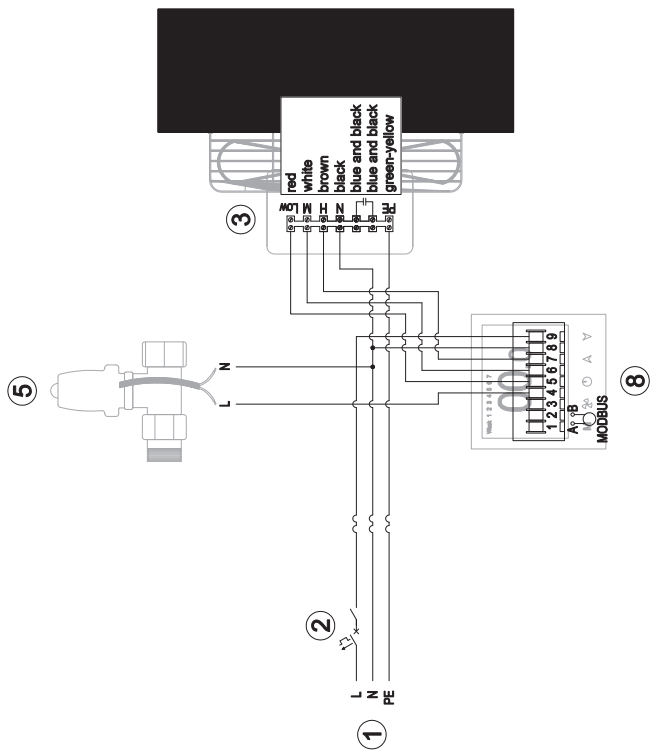
\* main switch and safety fuses are not included in the set

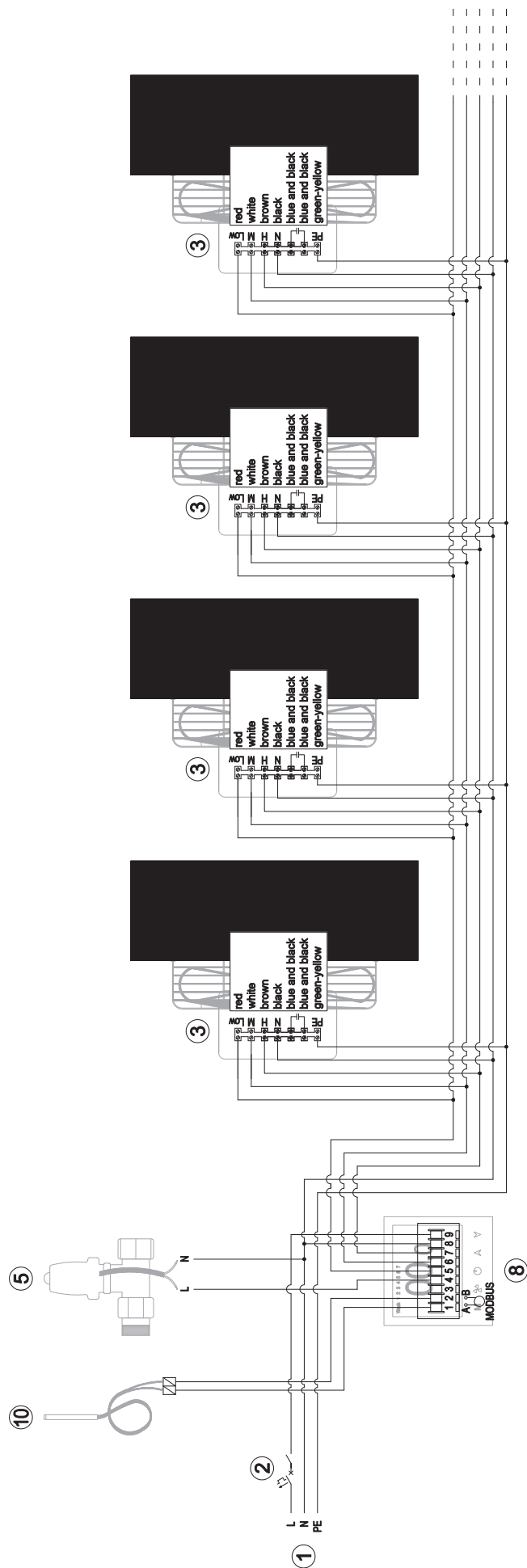
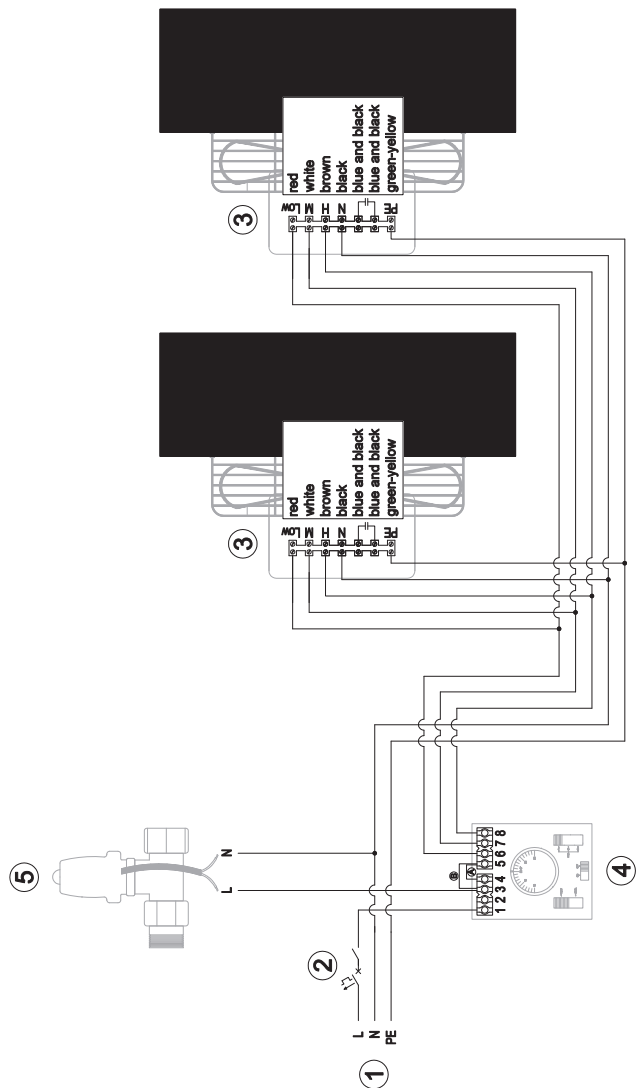


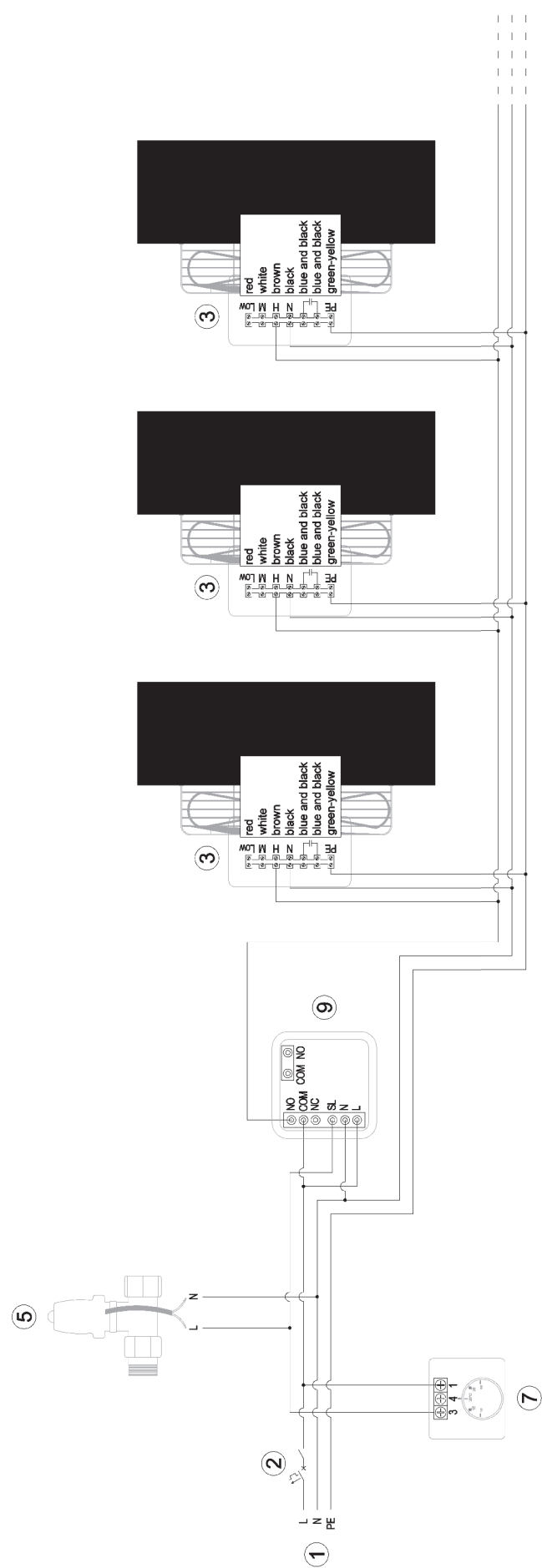
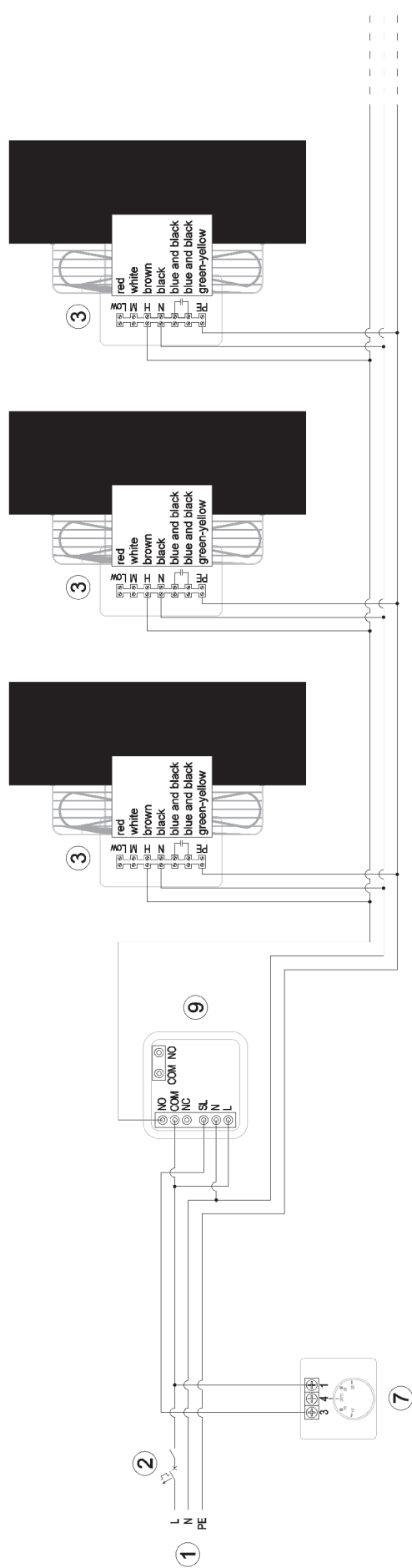


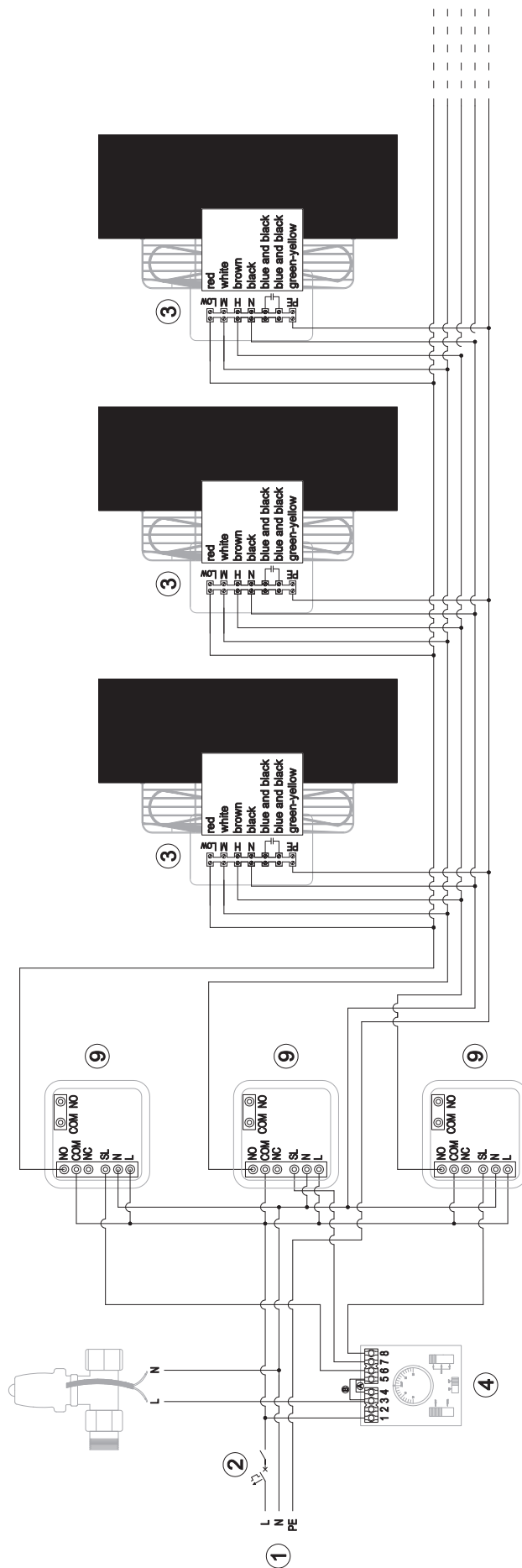
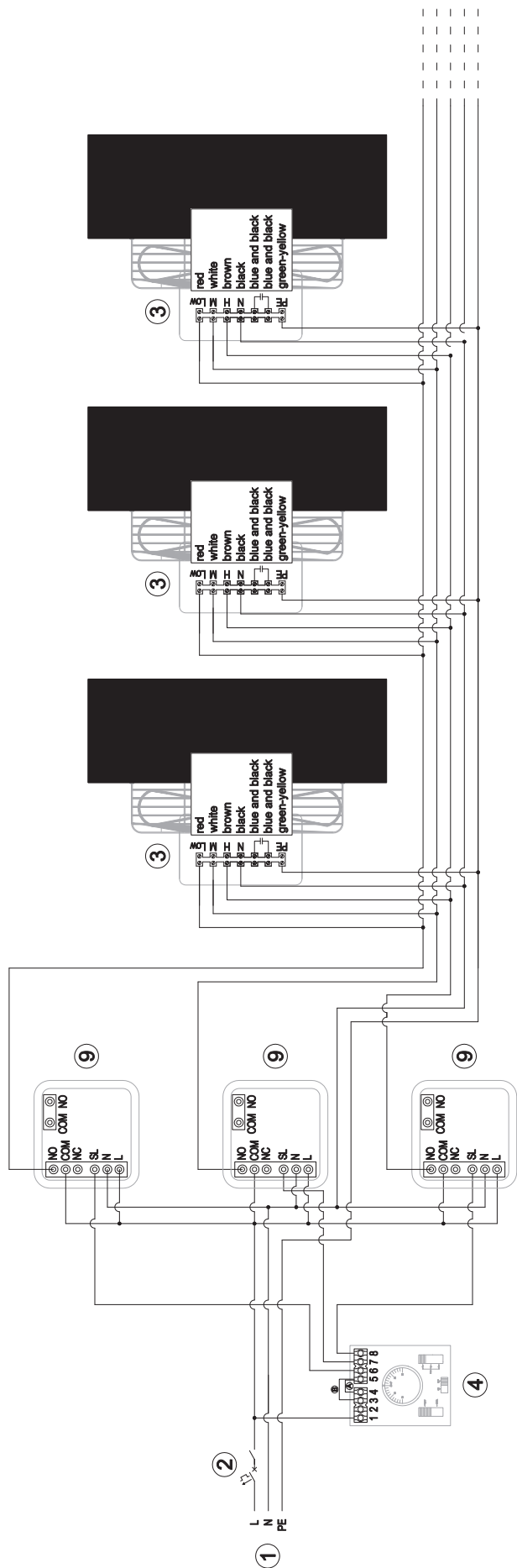












## 8. TERMS OF WARRANTY

I. Reventon Group Sp. z o.o. [Ltd.] 3B Montazowa Street , 43-300 Bielsko-Biała, Poland, is the producer of the Reventon Group brand. The warranty concerns the following devices and it is valid for 2 (two) years:

- air water heater Reventon Group MC-3S

II. Warranty is valid in the European Union.

III. The terms of warranty are valid from purchasing the device (the date issuing a document confirming the purchase of the device) but not further than 30 (thirty) months from leaving the producer's warehouse.

IV. Reventon receives the inoperative device or its components, and then sends back the repaired or replaced product (component) free of charge with in 14 working days.

V. In the exceptional cases, the manufacturer reserves the right to extend the time limit for examination of warranty, especially if the defect is not permanent and its determination requires a longer period of time. Any such extension must be notified by the manufacturer before the end of the 14th day (working).

VI. Warranty does not cover the parts of the device subject to normal maintenance and the cases as below:

a) mechanical damage of the product

b) defects and damages through

- improper storage or transportation

- improper use or maintenance not in accordance with the instructions

- using the device in the improper conditions (too high humidity, too high or too low temperature, impact of the surrounding, sun etc.)

- modified equipment that has been modified or repaired without written agreement of the producer

◀ - connecting additional equipment, which is not recommended by the producer or inconsistent with the technical documentation

- improper power supply

c) elements which wear and tear such as discolor or using

If there is any of the above, you will be charged for transport and / or repairs.

VII. Any changes in the Warranty Terms, improper use of the product (careless handling, exposure to liquids, moisture, corrosion), as well as traces of self-repairing (except for the Reventon Group manufacturer's service), alterations or attempts to make structural changes to the product, (revealed during the performance of warranty service), makes warranty not valid.

VIII. To obtain the service it is needed to send to the producer warranty card with the signature, document confirming the purchase, (copy of the invoice) and correctly filled the warranty form.

IX. Not following to any of warranty regulations makes the warranty not valid.

X. All correspondence, returns, complains should be send to the following address: Reventon Group Sp. z o.o. 3B Montazowa Street, 43-300 Bielsko-Biała, Poland or e-mail: [serwis@reventongroup.eu](mailto:serwis@reventongroup.eu)

The producer reserves the rights to make changes to the technical documentation without previous notice.

## Warranty card

Factory number of the device:	Address and place of assembly :
Stamp and signature of the installation company:	

## Warranty form

The company reporting the complaint:	Date of assembly:	Address and place of assembly the device:
The company installing the device:	Date and circumstances of noticing the defect:	
	Factory number of the device:	
Description of the defect:		
Contact Name and Surname, telephone number/ e-mail address:		

## Service card

Date of declaration the complaint:	Description of the repair:	Service stamp:
Date of repair:		



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INDUSTRIAL SOLUTIONS

Reventon Group [Ltd.] 3B Montazowa Street, 43-300 Bielsko-Biała, Poland, [www.reventongroup.eu](http://www.reventongroup.eu)