ECH-8-DM

CONTROLLER FOR WATER HEATERS / COOLERS WITH EC FAN

Mounting and operating instructions

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SAFETY AND PRECAUTIONS

Read all the information in this manual, in the datasheet and in the Modbus Register Map before working with the product. For personal and equipment safety and for optimum product performance, make sure you fully understand the content before installing, using or servicing this product.

For safety and licensing (CE) reasons, unauthorised conversions and / or modifications of the product are inadmissible.

The product should not be exposed to abnormal conditions, such as extreme temperatures, direct sunlight or vibrations. Long-term exposure to chemical vapours in high concentration can affect the product performance. Make sure the work environment is as dry as possible and avoid condensation.

All installations must comply with local health and safety regulations and local electrical standards and approved codes. This product should only be installed by an engineer or a technician with expert knowledge of the product and safety precautions.

Avoid contact with energised electrical parts. Always disconnect the power supply before connecting, servicing or repairing the product.

Always check that you are connecting the correct power supply to the product and use wires of the correct characteristics and cross-section. Make sure all screws and nuts are properly tightened and fuses (if any) are in place.

Consideration should be given to recycling the equipment and packaging. These should be disposed of in accordance with local and national laws and regulations.

If there are questions that are not answered, contact your technical support or consult a professional.

PRODUCT DESCRIPTION

ECH-8-DM is a controller for water air coolers or hot water air heaters that are equipped with EC fans. Typically, they are used to cool or heat warehouses and industrial areas.

- Key features:
  - Stepless temperature setpoint adjustment via the potentiometer or via a dedicated holding register through Modbus communication.
  - Unregulated output (ON-OFF) to control a water valve or electric heater.
  - Rotary switch with 7 positions for manual EC fan speed regulation (Automatic, 5 manual steps and OFF).
  - Automatic mode for automatic regulation of the EC fan speed based on the setpoint temperature.
  - Full settings adjustment via Modbus RTU communication.
  - Remote mode, enabling the controller to be overridden by a remote Master device.

ARTICLE CODES

Article code	Supply voltage
ECH-8-DM	85—305 VAC / 50—60 Hz

INTENDED AREA OF USE

- Warehouse air coolers equipped with an EC fan and a water valve
- The ideal controller for hot water air heaters in warehouses, sheds/stables, etc.
- Temperature controlled ventilation systems
- For indoor use, surface wall-mountable

TECHNICAL DATA

- **Supply Voltage**: 85—305 VAC / 50—60 Hz
- **Output Features**:
  - Stepless analogue output in automatic mode:
    - 0—6 (0—10) VDC / max. load 200 Ω
  - Unregulated output for valve / heater control:
    - Supply voltage: (Us) / Imax 10 A
- **Control and Adjustment Options**:
  - Heating/cooling mode with jumper setting
  - Analogue output with:
    - Jumper (0—6 / 0—10 VDC)
    - Modbus setting
  - Input for PT500 temperature sensor
  - Control switch with 7 positions:
    - Off position
    - 5 manual steps (1 to 5)
    - Auto mode
- **Temperature Control**:
  - Temperature setpoint in the range of 5°C—35°C set by:
    - Potentiometer
    - Dedicated holding register
- **Status and Communication**:
  - RGB LED for status indication
  - Modbus RTU communication

- **Enclosure**:
  - Plastic enclosure for wall fixing
  - Protection class: IP54
- **Operating conditions**:
  - Temperature: -10—50 ºC
  - Relative humidity: 5—90% rH, non-condensing

STANDARDS

- Low Voltage Directive 2014/35/EU
- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Commission Delegated Directive (EU) 2015/863 of 31 March 2015 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances

WIRING AND CONNECTIONS

L, N, PE	Supply voltage 85—305 VAC / 50—60 Hz
PE, N, L1	Unregulated output to control an external water valve or electric heater - Imax 10 A
TEMP	Optional temperature sensor PT500 (type FLTSN-P500-010 or similar)
Ao, Gnd	Analogue output to control EC fan speed (0—6 VDC or 0—10 VDC)
A, /B	Modbus RTU communication

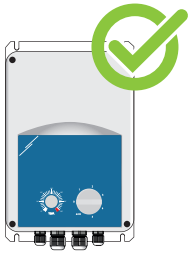
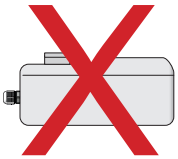
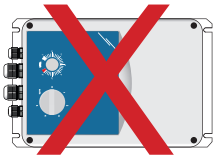
MOUNTING INSTRUCTIONS IN STEPS

Before you start mounting the unit, read carefully **"Safety and Precautions"** and follow these steps:

1. Switch off the mains supply.
2. Unscrew the front cover and open the enclosure.
3. Fix the unit onto the wall or panel using the provided screws and dowels. Mind the correct position and mounting dimensions as shown in **Fig. 1** and **Fig. 2**.

Fig. 1 Mounting dimensions

Fig. 2 Mounting position

Correct	Incorrect
	
	

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4. Insert the cables through the cable glands and do the wiring according to the wiring diagram (see **Fig. 3**), while adhering to the information from section "**Wiring and connections**" above.

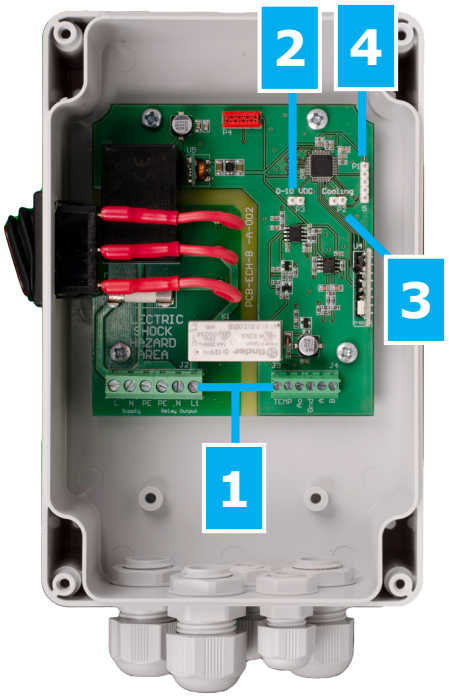
4.1 Connect the power supply cables to the terminals.

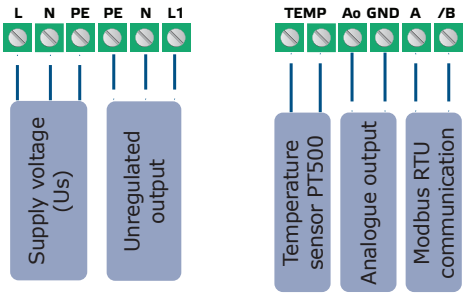
4.2 Connect the cables of the load (fans and valve/heater) to the terminals.

4.3 Connect the power earth cables to the dedicated places.

4.4 Install the temperature probe in such a way that it measures the temperature in the air of the desired area. Cables must be shorter than 4 m.

Fig. 3 Wiring and connections



1 - Terminal block		
2 - Analogue output range selection	Jumper removed (default) - 0—6 VDC Jumper installed - 0—10 VDC	
3 - Temperature mode selection	Jumper removed (default) - heating Jumper installed - cooling	
4 - PROG header		Put a jumper onto pins 1 and 2 and wait for at least 5 seconds to reset the Modbus communication parameters
		Put a jumper onto pins 3 and 4 and restart the supply to enter bootloader mode

5. Tighten the cable glands.

6. Close the cover and secure it with the screws.

⚠ ATTENTION

A safety isolator / disconnect switch should be installed on the mains electricity side of all motor drives.

⚠ ATTENTION

Make sure the connections are correct before you power the unit.

⚠ ATTENTION

Make sure the mains supply voltage is within the admissible rated maximum current of the product.

7. Switch on the mains supply.

OPERATING INSTRUCTIONS

1. Select the requested temperature via the left rotary switch (**Fig. 4**).

Fig. 4 Temperature setpoint selection

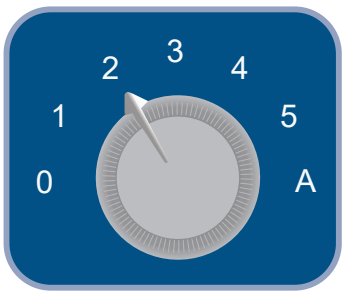
2. Select the operating mode by turning the control switch / knob on the right to the relevant position.

2.1 **Manual mode**
In manual mode, the fan speed can be selected manually via the switch (position 1—5), (**Fig. 5**).

- In heating mode, the motor will be enabled at the selected speed if the measured temperature is lower than the set temperature. Once the measured temperature exceeds the set temperature, the motor will be disabled.
- In cooling mode, the motor will be enabled as long as the measured temperature is higher than the set temperature.

The unregulated output is activated (230 VAC) when the motor is enabled.

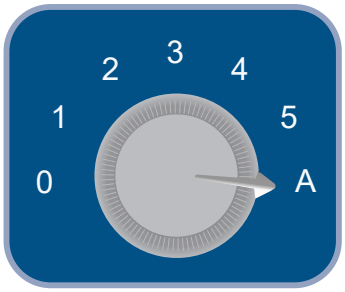
Fig. 5 Manual mode



2.2 Automatic mode

When Auto mode has been selected **(Fig. 6)**, the controller automatically adjusts fan speed based on the difference between the setpoint temperature and the ambient temperature. The higher the difference, the higher the fan speed.

Fig. 6 Automatic mode

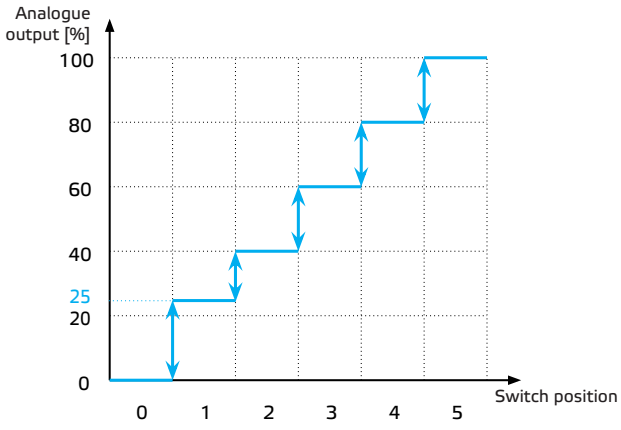


2.3 Control the output value via Modbus RTU communication

Remote mode turns off all user interfaces except Modbus RTU communication. After the remote mode is selected (holding register 20), LED, analogue and unregulated output states are **controlled by a Modbus master device** via holding registers 21—24. The requested fan speed can be specified in holding register 23 — Analogue output overwrite.
If the Modbus safety timeout register (Holding register 8) is not 0, it means the Modbus safety timeout is set. Therefore, when the time runs out due to no Modbus communication, the analogue output value will be “position 1” value (holding register 12). After Modbus communication is recovered, the analogue output value will follow again the value specified in Modbus holding register 23.

OPERATIONAL DIAGRAMS

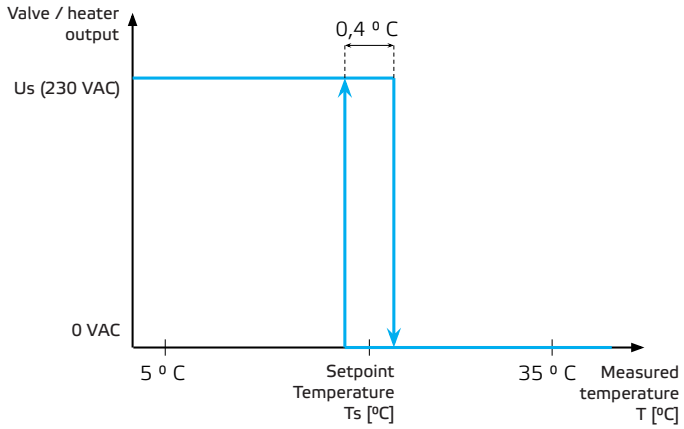
Manual mode



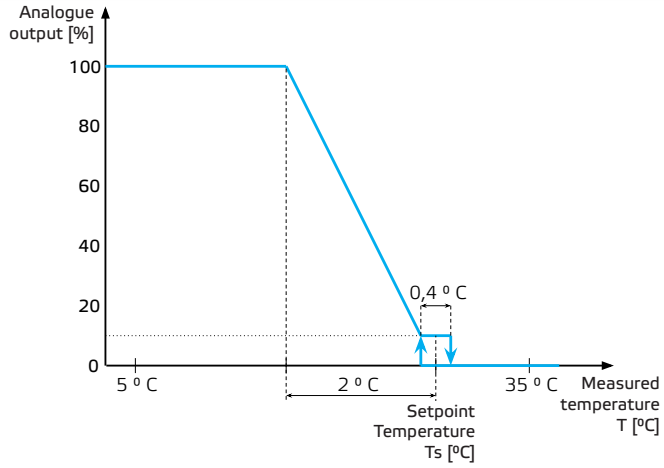
	Heating	Cooling
T > Ts	Valve / heater output: 0 VAC EC fan speed: minimum value	Valve / heater output: 230 VAC EC fan speed: According to rotary switch position
T < Ts	Valve / heater output: 230 VAC EC fan speed: According to rotary switch position	Valve / heater output: 0 VAC EC fan speed: minimum value
T – measured temperature Ts – temperature setpoint		

Automatic mode - heating

Unregulated output - water valve or heater control

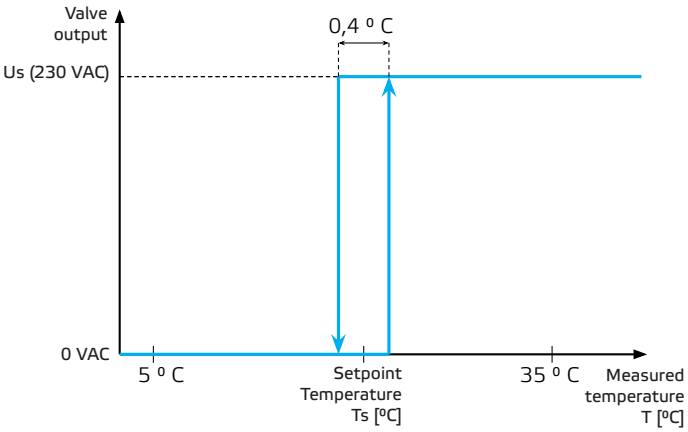


Analogue output - EC fan speed control

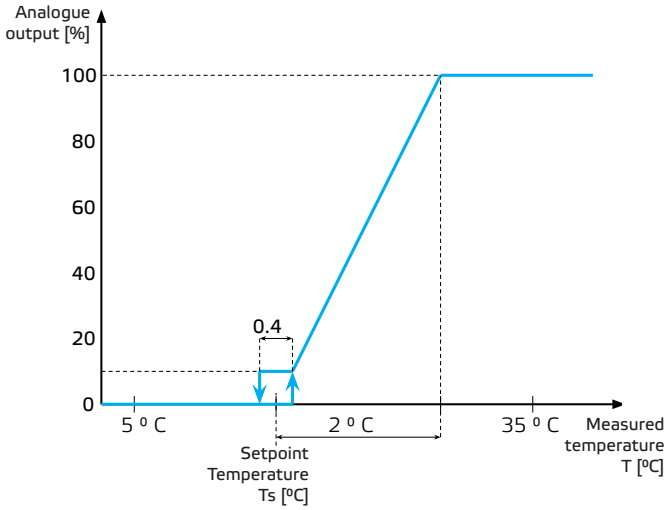


Automatic mode - cooling

Unregulated output - water valve control



Analogue output - EC fan speed control



VERIFICATION OF INSTALLATION

ATTENTION

Use only tools and equipment with non-conducting handles when working on electrical devices.

Safe operation depends on proper installation. Before start up, ensure the following:

- The mains supply is connected correctly.
- The speed regulator must be properly earth protected.
- During operation, the unit must be closed.
- Protection is provided against electrical shocks.
- The cables are the appropriate size and fuse-protected.
- There is sufficient air flow around the unit.

Verification of operation:

- Switch on the mains supply.
- Set the temperature to the minimum position (5 ⁰C).

- The connected fan must stop – (if the ambient temperature is higher than the selected setpoint value).
- The valve/heater must be closed.
- Set the temperature setpoint to the maximum position (35 ºC).
- The connected fans must run at max speed (6 VDC) – (if the measured temperature is below the setpoint value).
- The valve/heater must be open (230 VAC).

If the unit does not work according to the instructions, the wiring connections and settings need to be checked.

⚠ ATTENTION

Applying overvoltage to any of the logical controller parts will cause improper operation or failure to the internal circuit.

⚠ ATTENTION

Disconnect and confirm that there is no live current flowing to the unit before servicing.

⚠ ATTENTION

Avoid exposing the controller to direct sunlight!

TRANSPORT AND STORAGE

Avoid shocks and extreme conditions; stock in original packaging.

WARRANTY AND RESTRICTIONS

The warranty against manufacturing flaws is valid for two years starting from the date of delivery. Any alterations or adjustments to the product absolve the manufacturer of all liability. The manufacturer disclaims all liability for typographical or other errors in this document.

MAINTENANCE

In normal conditions, this product is maintenance-free. If soiled, clean with a dry or damp cloth. In case of heavy pollution, clean with a non-aggressive product. In these circumstances, the unit should be disconnected from the supply. Pay attention that no fluids enter the unit. Only reconnect it to the supply when it is completely dry.