GELO TECHNOLOGIES GTT-010 Mesh Network Thermostat and Gateway Instruction Manual

Contents

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Product Information

Specifications

- **Models:** GTT-010 (Thermostat), GTG-010 (Gateway)
- **Manual Version:** 0.2
- **Date:** 2024/02/22

Product Usage Instructions

- The Heating Management System (HMS) consists of two modules: Gateway and Thermostat.

FAQ

- **Q:** How often should the air humidity be measured?
- **A:** The air humidity is measured at least 5 times per minute, with an average calculated every 12 seconds.
- **Q:** What are the FCC regulatory requirements for the device?
- **A:** The device complies with FCC Part 15 Rules, ensuring it does not cause harmful interference and accepts any received interference.

Revision history
Table 1 – Manual Revision History

Version Number	Date	Author/Owner	Description of Change

Table 2 – Record of Changes

Version Number	Date	Author/Owner	Description of Change
0.2	*2024/02/22*	*O.Bukin, Gelo Technologies Inc*	*FCC addition*

Introduction

- Heating Management System (HMS) system consists of two independent modules. The first one is Gateway, and the second one is Thermostat.
- A gateway is installed beside the main control panel or inside the main control panel room.
- A thermostat is installed inside each apartment or room depending on customer configuration.

System Manual Identification

Component	Title/Name	Number
	Gateway	1
	Thermostat	1

Notes

ESD protection
Electrostatic discharge (ESD) can damage electronic circuits. GELO products are adequately protected against ESD for their intended use. However, it is possible to damage the product by delivering electrostatic discharges when touching, removing, or inserting any objects in the equipment housing.
To avoid delivering high static voltages to the product:

- Handle ESD-sensitive components on a properly grounded and protected ESD workbench or by grounding yourself to the equipment chassis with a wrist strap and a resistive connection cord.
- If you are unable to take either precaution, touch a conductive part of the equipment chassis with your other hand before touching ESD-sensitive components.
- Hold component boards by the edges and avoid touching component contacts.

FCC STATEMENT

FCC Regulatory Statements
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, according to part 15 of the Federal Communication Commission (FCC) rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used under the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by doing one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

NOTE: THE GRANTEE IS NOT RESPONSIBLE FOR ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

RF Exposure Warning
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. To avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20 cm during normal operation and must not be co-located or operating in conjunction with any other antenna or transmitter.

ISED Regulatory Statements
This device complies with ISED Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. this device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

CAN ICES-003 (B)/NMB-003(B)

RF Exposure Information
This equipment complies with ISED RSS-102 radiation exposure limits set forth for an uncontrolled environment. This transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

System Overview

Functional System Overview

Application/System Dependency
Table 3 – Application/System Dependency

Dependent Application/System	Function	Impact (If Application is Down)

Physical System Overview

The thermostat works from the power source: 18 – 30V AC and 18 – 28 VDC.
The thermostat has four digital inputs compatible with 18 – 30 VAC and 18 – 28 VDC. And two analog inputs 0 – 20 mA.
The thermostat has five buttons: “Mode”, “Fan”, “Fan Speed”, “Temperature Up”, and “Temperature Down”. The thermostat has an LCD. The thermostat contains an internal locking mechanism to secure the front cover to the rear cover.

Settings of the terminals
The thermostat has the standard set of terminals: “RH”, “RC”, “W”, “W2”, “Y”, “Y2”, “O/B”, “B”, “G”, “G2”, “G3”, “AUX”, “C”.

- “RH” – power: “hot” (AC) or “+” (DC) from the heating circuit.
- “RC” – power: “hot” (AC) or “+” (DC) from the cooling circuit.
- “W” – heating or first-stage heating.
- “W2” – second stage heating.
- “Y” – cooling or first stage cooling.
- “Y2” – second stage cooling.
- “O/B” – reversing valve for cooling.
- “G” – fan or fan first speed.
- “G2” – fan second speed.
- “G3” – fan third speed.
- “AUX” – auxiliary output.
- “C” – power: “neutral” (AC) or “-“ (DC) for inside thermostat circuits.

Functions of the buttons
“Mode” – switch between “Off”, “Heating”, “Cooling”, and “Auto” settings. The display shows the current setting. If the “Mode” button is pressed for more than 10 seconds, the temperature measurement units should be changed.
“Fan” – switch between “On”, and “Auto” settings. The display should show the current setting.
“Fan Speed” – switch between “Speed 1”, “Speed 2”, and “Speed 3” settings. The display should show the current setting.
“Temperature Up” – increase the temperature by 0.5 °C or 1 °F per push. The display should show the current setting. The temperature should not be settings above the “maximum available temperature” value.
“Temperature Down” – decrease the temperature by 0.5 °C or 1 °F per push. The display should show the current setting. The temperature should not be settings below 10 °C or 50 °F.
New settings save to non-volatile memory after 10 seconds after the last press of any buttons.

The air temperature measurement
The thermostat makes the air temperature measurement at least 5 times per minute and uses at least 10 last measurements for temperature averaging, i.e., every 12 seconds a new averaged temperature is calculated. The average temperature saves as the “current temperature”.
The accuracy of the temperature measurement is 0.25 °C.

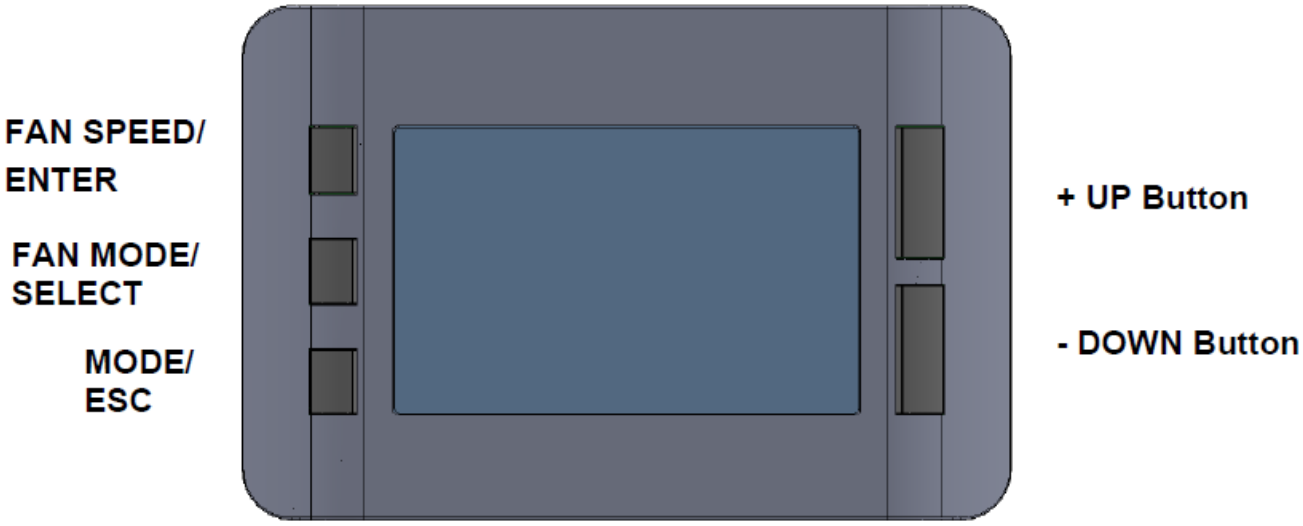
The air humidity measurement
The thermostat makes the air humidity measurement at least 5 times per minute and uses at least 10 last measurements for humidity averaging, i.e., every 12 seconds a new averaged humidity should be calculated. The average humidity should be saved as the “current humidity”.
The accuracy of the humidity measurement is 5%.

The CO^2 concentration measurement
The thermostat makes the CO2 concentration in the air measurement at least 5 times per minute and uses at least 10 last measurements for CO2 concentration in the air averaging, i.e., every 12 seconds a new averaged CO2 concentration in the air is calculated. The averaged CO2 concentration in the air should be saved as the “current

CO2 concentration”.
The accuracy of the CO2 concentration in the air measurement is 50 ppm.

Operation Procedures

Thermostat Overview



User Control

- Tenant can change desired temperature settings by pressing the “UP” and “DOWN” buttons.
- Input value is limited by customer requirements. It can be adjustable for each apartment/room.
- All controls and settings are done through the HMI terminal or remotely.

Thermostat – FAN

Fan control can work in two modes: Manual fan mode and Automatic fan mode.
Manual fan mode:

- Press the “FAN MODE” button until the manual fan mode is turned on.
- FAN speed can be set up in three levels 1 2 3
- Press the FAN button until speed 1 is activated.

Automatic fan mode:

- Press the “FAN MODE” button until the manual fan mode is turned on.
- Press the FAN button until speed 1 is activated.

Thermostat – Control outputs

- When any of the “W”, “W2”, or “AUX” outputs are on the PWM control, the output should be switched to ON state at the start of the PWM period and should be switched to OFF state at the end of the PWM duty cycle or when the “current temperature” is great than or equal to the “setpoint temperature”.
- If the “current temperature” is greater than or equal to the “setpoint temperature” at the start of the PWM period, the PWM duty cycle length should be equal to 0 seconds, i.e., the output should not be switched to ON state during this PWM period. The real PWM duty cycle length should be stored in the “Last actual PWM duty cycle length” parameter.
- “When any of the “Y”, and “Y2” outputs are on the PWM control, the output should be switched to ON state at the start of the PWM period and should be switched to OFF state at the end of the PWM duty cycle or when the “current temperature” is less than or equal or equal to the “setpoint temperature”.
- If the “current temperature” is less than or equal to the “setpoint temperature” at the start of the PWM period, the PWM duty cycle length should be equal to 0 seconds, i.e., the output should not be switched to ON state during this PWM period. The real PWM duty cycle length should be stored in the “Last actual PWM duty cycle length” parameter.
- In the “System” state each output is controlled by two bits in the control word. Two bits in the control word: 0 – output is in OFF state. 1 – output is in ON state.

Thermostat – State list

Table 5 – State list

State	**Function**	**Impact**
Control O/B	Heat Pump – NO Heat Pump – YES	
Control W	Heating stage 1 ON	
Control W2	Heating stage 2 ON	
Control AUX	Heating stage 3 ON	
Control Y	Cooling stage 1 ON	
Control Y2	Cooling stage 2 ON	

Thermostat – UI operations

Table 6 – UI operations

State	**Function**

The main screen state machine	Monitoring – Current temperature – Target temperature – Temperature unit – Humidity – Time – Room number – Fan mode – Fan speed – Mode
Increment target temperature	The main screen is displayed 1. Pressed button “UP”
Decrement target temperature	Precondition: The thermostat on the main screen is displayed 1. Pressed button “DOWN”
Change temperature unit:	Precondition: The thermostat on the main screen is displayed 1. Press and hold button “MODE” 10 sec
Changing the operating mode	Precondition: The thermostat on the main screen is displayed 1. Press button “MODE”
Changing the fan mode	Precondition: The thermostat on the main screen is displayed 1. Press the button “Fan Mode”
Changing fan speed	Precondition: The thermostat on the main screen is displayed 1. Press the button “Fan Speed “
The password screen state machine	Press together “ESC” + “UP” Precondition: Displayed password screen 1. Press the button “UP” or “DOWN” for the 1st Number 2. Press the button “Select” for the next number Repeat until completed. 3. Press the button “Enter ” when done

State	Function
Configuration menu state machine	Precondition: Displayed password screen 1. Keep a password (default password for configuration menu: 1234) 2. Press the button “Enter”
Configuration menu parameter selection	Precondition: open the configuration menu 1. Press button “Down” 2. Press the button “Up” 3. Press the button “Select”
Changing configuration menu values	Precondition: option selected to change values 1. Press button “Up” 2. Press the button “Select” 3. Press the button “Enter”
Engineering menu state machine	Precondition: Displayed password screen 1. Keep a password (default password for configuration menu: 0000) 2. Press the button “Enter”
Engineering menu parameter selection	Precondition: open engineering menu 1. Press button “Down” 2. Press the button “Up” 3. Press the button “Select”
Changing engineering menu values	Precondition: option selected to change values 1. Press button “Up” 2. Press the button “Select” 3. Press the button “Enter”

Reboot the devices	Precondition: open engineering menu 1. Press the button “Down” 5 times (Before placing the cursor on “Reboot the device”) 2. Press the button “Select”
Restore default setting	Precondition: open engineering menu 1. Press the button “Down” 6 times (Before placing the cursor on ” Restore default settings”) 2. Press the button “Select”

Restart/Recovery Procedures
PLC controls and monitors communication with Gateway. If PLC detects a loss of communication for > 2min (adjustable) then it triggers a power cycle on the Gateway.
The thermostat doesn’t require restart or recovery procedures.

Maintenance Procedures

- Keep the Gateway enclosure closed all the time. Avoid any water/moisture/dust contamination for the Thermostats and Gateway.
- It is recommended to blow through the Thermostat case ventilation holes with dry compressed air once per two years to clean internal PCB from dust.
- In case of room/apartment renovation wrap the Thermostat with plastic or fabric materials.

Approvals
The undersigned acknowledge that they have reviewed the Manual and agree with the information presented within this document. Changes to this Manual will be coordinated with, and approved by the undersigned, or their designated representatives.

Table 4 – Approvals

Document Approved By	Date Approved
Name: <Name>, <Job Title> – <Company>	Date
Name: <Name>, <Job Title> – <Company>	Date
Name: <Name>, <Job Title> – <Company>	Date
Name: <Name>, <Job Title> – <Company>	Date

Documents / Resources

	GELO TECHNOLOGIES GTT-010 Mesh Network Thermostat and Gateway [pdf] Instruction Manual GTT-010, GTT-010 Mesh Network Thermostat and Gateway, Mesh Network Thermostat and Gateway, Network Thermostat and Gateway, Thermostat and Gateway, Gateway

References

- User Manual