ThermoFloor
Heating systems

FUNCTIONALITY SPECIFICATION

Multireg® Z-Wave thermostat TF 016

Heatit® Z-Wave thermostat TF 021

Employing Z-Wave functionality

Thermo-Floor AS I Østre Totenvei 24
N-2816 Gjøvik, NORWAY I T: +47 61 18 77 77

post@thermo-floor.no I www.thermo-floor.no

Table of contents

Thermo-Floor AS I Østre Totenvei 24
N-2816 Gjøvik, NORWAY I T: +47 61 18 77 77

post@thermo-floor.no I www.thermo-floor.no

1. TERMINOLOGY

Abbreviations used in the lists and their meanings

- TBD To-Be-Defined, these will be defined later on
- TBU To-Be-Updated, these will be updated later on

2. INTRODUCTION

This document describes how to access the features of the themostat using Z-Wave protocol. Not all thermostat functions are accessible from Z-Wave, due to lack of support in the protocol.

2.1 Thermostat overview

The device is an electronic thermostat for electrical floor heating. It is mains powered (230V/50Hz), and controls the floor heating element directly. Maximum current is 16A, and max. power is 3600W.

Temperature setpoints and setpoint limits can be freely selected between 5°C and 40°C.

The device can control up to 8 Z-Wave on/off switches. The control replicates the control of the internal relay. Thus the external switch units can operate as auxiliary heaters.

Devices by different manufacturers may be used in the same system.

2.1 Thermostat regulation modes

The device implements the following thermostat regulation modes:

1. A - Room temperature mode: Regulation is based on the measured room temperature using the internal sensor.
2. A2 - Room temperature mode: Regulation is based on the measured room temperature using the external sensor (not included in the package).
3. AF - Room mode w/floor limitations: Regulation is based on internal room sensor but limited by the floor temperature sensor (included) ensuring that the floor temperature stays within the given limits (FLo/FHi)
4. F - Floor mode: Regulation is based on the floor temperature sensor reading.

(cont. next page)

Thermo-Floor AS I Østre Totenvei 24
N-2816 Gjøvik, NORWAY I T: +47 61 18 77 77

post@thermo-floor.no I www.thermo-floor.no

Thermostat regulation modes (cont.)

5. Power regulator: Constant heating power is supplied to the floor. Power rating is selectable in 10% increments (0% - 100%)
6. FP - Floor mode with minimum power limitation: Regulation is based on the floor temperature sensor reading, but will always heat with a minimum power setting (PLo)

Note: In a special device model where cooling option is enabled:

1. Any mode other than A2: Cooling is based on internal room sensor.
2. A2: Cooling is regulated based on external sensor.

2.3 Thermostat operating modes

The thermostat implements the following operating modes:

1. Comfort mode: This is the normal operating mode
2. Economy mode: This is the energy saving mode
3. Off mode: In this mode the thermostat is disabled and heating is turned off
4. Cooling: (Special device model only) TBD

Comfort and Economy (CO and ECO) modes have their own separate temperature setpoints. Switching between these modes can be done by:

- Selecting the desired mode from UI
- Using the pilot wire input for selecting the desired mode. The change in pilot wire state triggers the selection, not the static state
- Using Z-Wave protocol for selecting the mode

Off-mode can be toggled by:

- Turning the device ON/OFF from UI
- Using Z-Wave protocol for selecting the mode

Thermo-Floor AS I Østre Totenvei 24
N-2816 Gjøvik, NORWAY I T: +47 61 18 77 77

post@thermo-floor.no I www.thermo-floor.no

2.4 System parameters

Table 1

#	Parameter	Description	Notes	Z-Wave access
1	CO	Temperature setpoint used when in Comfort mode	Used in room and floor regulating modes (A/AF/A2/F/FP)	Y
2	ECO	Temperature setpoint used when in Economy mode	This is the "energy saving heating" mode that must be mentioned in documentation. Used in room and floor regulating modes (A/AF/A2/F/FP)	Y
3	PWR	Power level in Power regulator mode	Level indicated in 10% steps. P04 = 40%, P10 = 100%	N
4	AHi	Room temperature high limit. Limits the setpoint (CO/ECO) max. setting when in Room regulating mode (A/AF/A2)	5°C - 40°C	Y (read only)
5	ALo	Room temperature low limit. Limits the setpoint (CO/ECO) min. setting when in Room regulating mode (A/AF/A2)	5°C - 40°C	Y (read only)
6	FHi	Floor temperature high limit. Limits the highest allowed floor temperature to this value. Operational in modes AF/F/FP. In F or FP mode, setpoint is also limited.	5°C - 40°C	Y (read only)
7	FLo	Floor temperature low limit. Limits the lowest allowed floor temperature to this value. Operational in modes AF/F/FP. In F or FP mode, setpoint is also limited.	5°C - 40°C	Y (read only)
8	PLo	Minimum power level for FP mode	0% - 100%	N
9	Sens	Sensor type selection. Selects the type of floor/external sensor	Options: 10k, 12k, 15k, 22k, 33k, 47k	N
10	Regulation mode	Temperature regulation mode	A/A2/AF/F/FP/P	N
11	Operation mode	Thermostat operation mode	CO/ECO/OFF(COOL)	Y

Thermo-Floor AS I Østre Totenvei 24
N-2816 Gjøvik, NORWAY I T: +47 61 18 77 77

post@thermo-floor.no I www.thermo-floor.no

NOTE: Limiting values (AHi/ALo/FHi/FLo) have a dual functionality: They act as an internal limiter for thermostat logic, but also prevent the user from setting the setpoints out of range.

For example:

- In A mode, AHi is set to 28°C. User cannot set setpoint higher than AHi.
- In AF mode, AHi is set to 35°C and FHi is set to 28°C. User can set the setpoint up to 35°C, but the floor will only heat to 28°C.
- In AF mode, FLo is set to 23°C and FHi is set to 28°C. User sets the setpoint to 19°C. Even though the room temperature is above the setpoint, the floor temperature is always kept within the limiter values.
- In F mode, FHi is set to 28°C and FLo to 20°C. User can only set the setpoint between these two values.

3. Z-WAVE FUNCTIONS

3.1 Network operations

Inclusion and exclusion are operations that add and remove units from a system controlled by a main controller or gateway.

Inclusion = Add
Exclusion = Remove

Inclusion and exclusion are started by selecting "Con" from the UI menu.

3.1.1 Inclusion

In order to join an existing system, an inclusion process must be performed.

1. Start inclusion mode from the gateway
2. Select "Con" from the UI menu
3. If successful, "Inc" will be displayed
4. If not successful, "Err" will be displayed

Note: In case the device has been part of a system before and not excluded since, inclusion is not possible. In this case, exclusion must be performed before inclusion.

Thermo-Floor AS I Østre Totenvei 24
N-2816 Gjøvik, NORWAY I T: +47 61 18 77 77

post@thermo-floor.no I www.thermo-floor.no

3.1.2 Exclusion

In order to remove a unit from a system, an exclusion process must be performed.

1. Start exclusion mode from the gateway
2. Select "Con" from the UI menu
3. If successful, "Ecl" will be displayed
4. If not successful, "Err" will be displayed

3.1.3 Device reset

By resetting the thermostat to default settings, the Z-Wave interface is also reset and the gateway/ controller is informed about the reset.

3.2 Association

Association is used for informing the device about the nodes it should co-operate with. The device can control the associated nodes or report to them depending on the association group.

The device implements two association groups:

- Association group 1: Lifeline
- Association group 2: On/Off control

3.2.1 Association group 1: Lifeline

This is the "Lifeline" group that all reporting is sent to. Generally gateway address is assigned to this group. Maximum number of nodes in this group: 1

3.2.2 Association group 2: On/Off control

This group defines the group of Z-Wave units that the thermostat controls. Control is performed through BASIC_SET commands, enabling all switching units to be used as auxiliary heating controllers. Maximum number of nodes in this group: 8

Thermo-Floor AS I Østre Totenvei 24
N-2816 Gjøvik, NORWAY I T: +47 61 18 77 77

post@thermo-floor.no I www.thermo-floor.no

3.3 Z-Wave data access

This chapter describes how to access device parameters using Z-Wave.

#	Parameter	Description	How to access from Z-wave R: How to read W: How to write
1	CO	Temperature setpoint used when in Comfort mode	R: Thermostat_Setpoint_Get, setpoint type=heating (0x01) Report is returned. W: Thermostat_Setpoint_Set, setpoint type=heating (0x01)
2	ECO	Temperature setpoint used when in Economy mode	R: Thermostat_Setpoint_Get, setpoint type= energy save heating (0x0B) Report is returned. W: Thermostat_Setpoint_Set, setpoint type=energy save heating (0x0B)
4	AHi	Room temperature high limit. Limits the setpoint (CO/ECO) max. setting when in Room regulating mode (A/AF/A2)	R: Thermostat_Setpoint_Capabilities_Get, value is same for all setpoint types. Report is returned, this value is **MaxValue**. W: n/a Note: This value can be read only if the device is in Room regulating mode (A/AF/A2) Otherwise FHi value is reported.
5	ALo	Room temperature low limit. Limits the setpoint (CO/ECO) min. setting when in Room regulating mode (A/AF/A2)	R: Thermostat_Setpoint_Capabilities_Get, value is same for all setpoint types. Report is returned, this value is **MinValue**. W: n/a Note: This value can be read only if the device is in Room regulating mode (A/AF/A2) Otherwise FLo value is reported.
6	FHi	Floor temperature high limit. Limits the highest allowed floor temperature to this value. Operational in modes AF/F/FP. In F or FP mode, setpoint is also limited.	R: Thermostat_Setpoint_Capabilities_Get, value is same for all setpoint types. Report is returned, this value is **MaxValue**. W: n/a Note: This value can be read only if the device is in Floor regulating mode (F/FP) Otherwise AHi value is reported.
7	FLo	Floor temperature low limit. Limits the lowest allowed floor temperature to this value. Operational in modes AF/F/FP. In F or FP mode, setpoint is also limited.	R: Thermostat_Setpoint_Capabilities_Get, value is same for all setpoint types. Report is returned, this value is **MinValue**. W: n/a Note: This value can be read only if the device is in Floor regulating mode (F/FP) Otherwise ALo value is reported.

Thermo-Floor AS I Østre Totenvei 24
N-2816 Gjøvik, NORWAY I T: +47 61 18 77 77

post@thermo-floor.no I www.thermo-floor.no

#	Parameter	Description	How to access from Z-wave R: How to read W: How to write
11	Operation mode	Thermostat operation mode	R: Thermostat_Mode_Get, value is reported as Mode. W: Thermostat_Mode_Set. Supported modes: Off (0x00), heating (0x01), energy save heating (0x0B). Cool (0x02) in special model only.

3.4 Lifeline reporting

The following reports are sent periodically to the node in association group 1: "Lifeline"

- Room temperature
- Current operation mode (CO/ECO/OFF) (+Cooling in special model)
- Current setpoint
- Basic report (0x00/0xFF) depending on operation mode

3.5 Configuration command class

See document "Multireg Z-Wave/Heatit Z-Wave engineering note.pdf"

Thermo-Floor AS I Østre Totenvei 24
N-2816 Gjøvik, NORWAY I T: +47 61 18 77 77

post@thermo-floor.no I www.thermo-floor.no