

# TRV Engineering Specifications



The TRV based on Z-Wave™ Slave library of V7.16.03. This TRV integrated Z-Wave communication module to connect with Z-Wave gateway.

The TRV can be included and operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers and/or other applications. All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

The TRV is a security Z-Wave device (S0/S2), so a security enabled controller is needed to take full advantage of all functionality for the TRV.

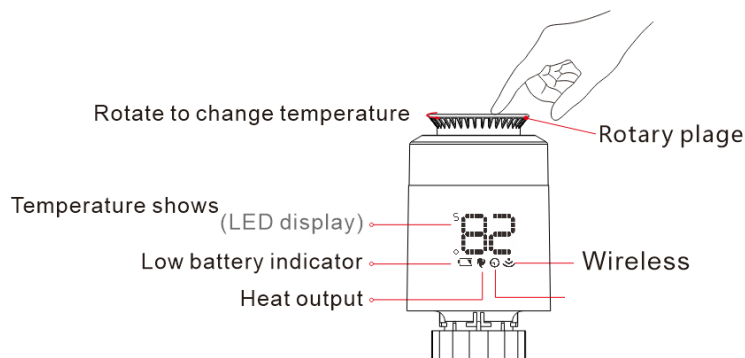
## Features:

- Manual or Z-Wave setpoint set heating control with instant status updates.
- 700 series Z-Wave chip for better range and faster control.
- SmartStart and S2 Security for a safer network.

## 1 Technical Specifications

Communication Protocol	Z-TRV-V01
Radio Frequency	868.42MHz (EU)
Wireless Range	Up to 300 feet line of sight
Power Source	AA*2
Working current	~20mA
Standby current	~30uA
Temperature setting accuracy	0.5° C
Room temperature display range	0-50° C
Operating temperature	5-30° C
Operating humidity	Up to 85% non-condensing

## 2 Familiarize yourself with TRV



## 3 Security and non-Security features of TRV

This device is a security enabled Z-Wave Plus™ product that is able to use encrypted Z-Wave Plus messages to communicate to other security enabled Z-Wave Plus products.

When a node includes into a S2 Z-Wave network, the node supports S2 unauthenticated class, S2 authenticated and so do the supported CCs.

This product can be operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers. All mains operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

### 3.1 Supported Security Levels

- SECURITY\_KEY\_S0\_BIT
- SECURITY\_KEY\_S2\_AUTHENTICATED\_BIT
- SECURITY\_KEY\_S2\_UNAUTHENTICATED\_BIT

### 3.2 Library

Basic Device Class: BASIC\_TYPE\_ROUTING\_SLAVE

Generic Device Class: GENERIC\_TYPE\_THERMOSTAT

Specific Device Class: SPECIFIC\_TYPE\_THERMOSTAT\_GENERAL\_V2

### 3.3 Commands List

Command Classes	Version	Required Security Class
COMMAND_CLASS_ZWAVEPLUS_INFO_V2	2	None
COMMAND_CLASS_TRANSPORT_SERVICE_V2	2	None
COMMAND_CLASS_SECURITY_V1	1	None
COMMAND_CLASS_SECURITY_2_V1	1	None
COMMAND_CLASS_SUPERVISION_V1	1	None
COMMAND_CLASS_APPLICATION_STATUS	1	None
COMMAND_CLASS_VERSION_V3	3	S0 or S2 Authenticated/Unauthenticated
COMMAND_CLASS_ASSOCIATION_V2	2	S0 or S2 Authenticated/Unauthenticated
COMMAND_CLASS_ASSOCIATION_GRP_INFO_V3	3	S0 or S2 Authenticated/Unauthenticated
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3	3	S0 or S2 Authenticated/Unauthenticated
COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2	2	S0 or S2 Authenticated/Unauthenticated
COMMAND_CLASS_DEVICE_RESET_LOCALLY_V1	1	S0 or S2 Authenticated/Unauthenticated
COMMAND_CLASS_BATTERY_V1	1	S0 or S2 Authenticated/Unauthenticated
COMMAND_CLASS_CONFIGURATION_V4	4	S0 or S2 Authenticated/Unauthenticated

COMMAND_CLASS_SENSOR_MULTILEVEL_V11	11	S0 or S2 Authenticated/Unauthenticated
COMMAND_CLASS_THERMOSTAT_MODE	3	S0 or S2 Authenticated/Unauthenticated
COMMAND_CLASS_THERMOSTAT_SETPOINT	3	S0 or S2 Authenticated/Unauthenticated
COMMAND_CLASS_FIRMWARE_UPDATE_MD_V5	5	S0 or S2 Authenticated/Unauthenticated
COMMAND_CLASS_POWERLEVEL_V1	1	S0 or S2 Authenticated/Unauthenticated
COMMAND_CLASS_INDICATOR_V3	3	S0 or S2 Authenticated/Unauthenticated

## 4 All functions of each trigger

### 4.1 SmartStart

SmartStart enabled products can be added into a Z-Wave network by scanning the Z-Wave QR Code present on the product with a controller providing SmartStart inclusion. No further action is required and the SmartStart product will be added automatically within 10 minutes of being switched on in the network vicinity.

#### Add the TRV into the Z-Wave network via SmartStart (SmartStart Inclusion):

- a. Add TRV DSK into the primary controller SmartStart Provisioning List (If you don't know how to do this, refer to its manual, DSK usually print on the main body).
- b. Remove the battery from the TRV. A few seconds later, repowered in the TRV.
- c. The TRV will send "Z-Wave protocol Command Class" frame to start SmartStart Inclusion.

### 4.2 Short press Z-Wave Button three times




#### Add the TRV into the Z-Wave network (Manual Inclusion):

- a. Power on your TRV,
- b. Set your Z-Wave controller into add/inclusion mode.
- c. In "OF" state, short press rotary plate three times until the screen shows " ---".
- d. The screen will show " PA " after few seconds, which meant the inclusion is successful. Otherwise, the inclusion is failed, which you will need to repeat the process from step b.

#### Remove TRV from a Z-Wave network (Manual Exclusion):

- a. Power on your TRV
- b. Set the Z-Wave primary controller into remove/exclusion mode.
- c. In "OF" state, short press rotary plate three times until the screen shows " ---".
- d. The screen will turn back to "OF" after few seconds, which meant the inclusion is successful. Otherwise, the exclusion is failed which you will need to repeat the process from step b.

### 4.3 Reset TRV to factory default

In “” state, press and hold rotary plate for at least 5 seconds and release when the screen will blink “”. When the reset is successful, the screen will show “” in solid for 2 seconds then turn off. And TRV will reset itself to factory default by sending a “Device Reset Locally Notification” to gateway.

Note: Please use this procedure only when the network primary controller is missing or otherwise inoperable.

## 5 Special Rule of Each Command

### 5.1 Z-Wave Plus Info Report Command Class

**Z-Wave Plus Version:** 0x02

**Role Type:** 0x05 (ZWAVEPLUS\_INFO\_REPORT\_ROLE\_TYPE\_SLAVE\_ALWAYS\_ON)

**Node Type:** 0x00 (ZWAVEPLUS\_INFO\_REPORT\_NODE\_TYPE\_ZWAVEPLUS\_NODE)

**Installer Icon Type:** 0x1200 (ICON\_TYPE\_GENERIC\_THERMOSTAT)

**User Icon Type:** 0x1200 (ICON\_TYPE\_GENERIC\_THERMOSTAT)

### 5.2 Multilevel Sensor Command Class

Supported the sensor type for Temperature.

### 5.3 Association Command Class

The Thermostat supports 1 association groups and max 5 nodes for each group.

Grouping Identifier	Max Nodes	Send Commands
Lifeline Group	0x05	<p>1. Battery Report The TRV will send a Battery Report When Battery level change is greater than 5%(configurable) or the report interval is reached.</p> <p>2. Sensor Multilevel Report The TRV will send a Sensor Multilevel Report When Room temperature change is greater than 0.5°C (configurable) or the report interval is reached.</p> <p>3. Thermostat Mode Report The TRV will send a Thermostat Mode Report when the TRV mode changed.</p> <p>4. Thermostat Setpoint Report The TRV will send a Thermostat Setpoint Report when setting temperature changed.</p> <p>5. Indicator Report</p>

## 5.4 Basic Command Class

Value	Description	Function
0x00	OFF	No Heating, Only Frost-protection
0xFF	Heat Mode	TRV into comfort heating mode. The room temperature will be kept at the configured comfortable level.

## 5.5 Thermostat Mode Command Class

Thermostat Mode Value	Supported Thermostat Mode	Defined By
0x01	THERMOSTAT_MODE_REPORT_MODE_HEAT_V3	Z-Wave Standard
0x00	THERMOSTAT_MODE_REPORT_MODE_OFF_V3	Z-Wave Standard

## 5.6 Thermostat Setpoint Command Class

Supported the Setpoint type:

- THERMOSTAT\_MODE\_REPORT\_MODE\_HEAT

## 5.7 Multilevel Sensor Command Class


Sensor Type	Scale	Description
0x01(Air Temperature)	0x00(Celcius)	
	0x01(Fahrenheit)	When Scale is 0x01 of SENSOR_MULTILEVEL_GET.

## 5.8 Indicator Command Class

The Receptacle support the Indicator Command Class, version 3 and support the Indicator ID 0x50 (Identify) and Properties ID 0x03, 0x04 and 0x05

## 5.9 Configuration Command Class

#	Name	Size	Range	Description	Default
1	Open window detect function	1	0~1	When use radiator to heating,the window is opened,when room temperature drop 6°C in 4 minutes,TRV will close valve	0

				<p>automatic, display will show "OFF", When window is closed, meanwhile room temperature increase 2°C, TRV will open valve automatic, back to operation mode.</p> <p>0 = Disable 1 = Enable</p>	
2	Anti-freezing function	1	0~1	<p>The TRV is at "off" state, the screen show  .</p> <p>Anti-freezing function: the valve will be opened when the temperature is below 5°C, when the temperature rises to 8°C, the valve will be closed.</p> <p>0 = Disable 1 = Enable</p>	0
3	Measured temperature offset	1	-6~6	<p>Offsets the measured temperature by -6.0°C – (+)6.0°C.</p> <p>0x0 = 0°C Offset 0xFA~0x06 = -6~(+)6°C Offset</p>	0
4	Set away home mode	1	0~1	<p>Set away home</p> <p>0 = No 1 = Yes</p>	0
5	Anti-scale function	1	0~1	<p>If radiator not open within two weeks or long time not open will let valve clogged as scale, radiator will be damaged. In order to let radiator to use normally, TRV will open valve running 30 seconds every two weeks, display will show "AS", when run finished will recovery running condition.</p> <p>0 = Disable 1 = Enable</p>	0
6	Temperature auto report interval time	4	0~267840 0	<p>The time interval when to send the temperature report. The unit= second</p> <p>1. Valid values: 0-2678400 2.0 = Disable</p>	0
7	Temperature change report threshold	1	0~100	<p>Temperature change threshold.</p> <p>unit 0.1°C 0 = Disable</p>	5

8	Battery auto report interval time	4	0~267840 0	The time interval when to send the battery report. The unit= second 1. Valid values: 0-2678400 2.0 = Disable	0
9	Battery change report threshold	1	0~50	Battery power change threshold. The unit = % 0 = Disable	5
10	Enable open child lock	1	0~1	Enable or disable the child lock function when long press rotary plate. 0 = Disable 1 = Enable	0