# Thermostat Radiator Valve User Manual

## Introduction:

The TRV based on Z-Wave<sup>TM</sup> 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 for take full advantage of all functionally for the TRV.
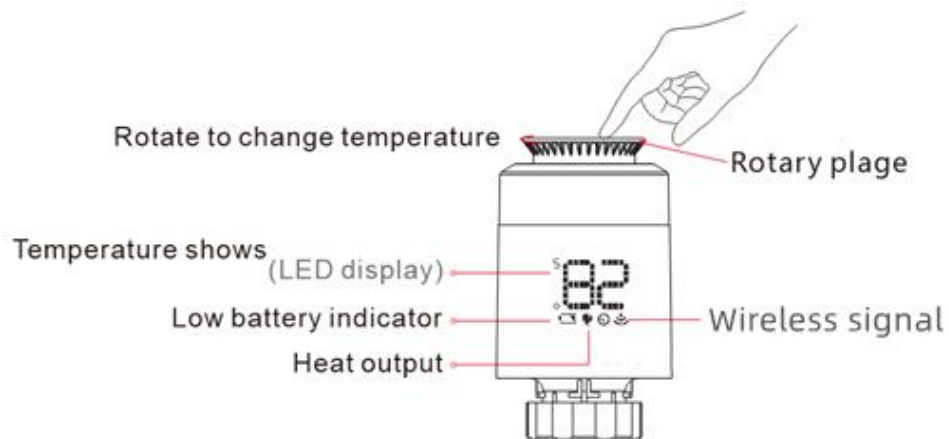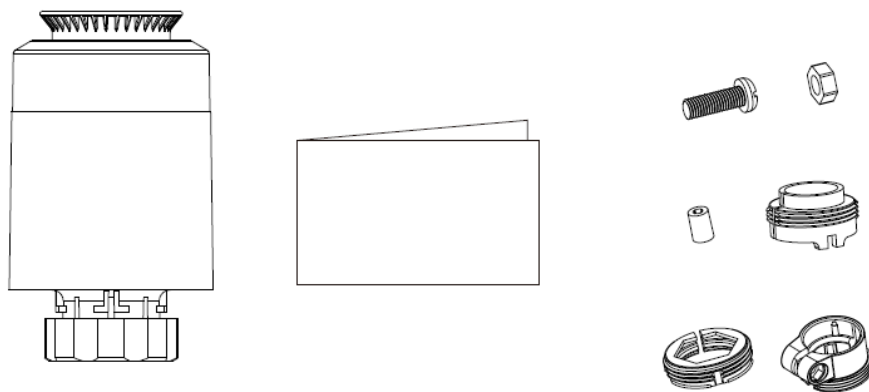
## Features:

- 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 range | 5-30° C |
| Operating humidity | Up to 85% non-condensing |

# 2 Familiarize yourself with your TRV

What is in the box?

Rotate to change temperature — Rotary plage

Temperature shows (LED display)

Low battery indicator — Wireless signal

Heat output

## Notice for use

### ⏻ ON / OFF

The temperature<5°C , display "OF".       The temperature>30°C , display "On"

### ▦ Open window function

When use radiator to heating , the window is opened ,when room temperature drop 6°C in 4 minutes , TRV will close valve automatic,disply will show "OP", When window is closed , meanwhile room temperature increase 2°C , TRV will open valve automatic , back to operation mode .

### 𝕏 Anti-scale function

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 valave running 30 seconds every two weeks , display will show "AS" ,  when run finished will recovery running condition .

### 🔒 Child lock function

In order to prevent TRV setting from children,it could activate child lock functin by long press rotary plate until display show " LC ". Long press rotrary plate again over 10s to unlock.

### ❄ Anti-freezing function

In the power off state, the screen show "♨"
Anti-freezing function: the valve will be opened when the temperature is below 5°C , when the temperature risees to 8°C , the valve will be closed.

### 🔔 Alarm

In the normal operation range:
NTC  sensor damage , display: Er

### 🔋 Low power alarm

When the battery voltage is extremely low , display the alarm symbol 🔋 , which remind that the user shall replace battery.
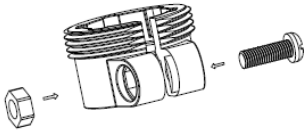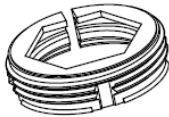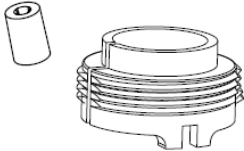
# 3 Installation

IMPORTANT: Please include your TRV to the network (refer to 4.1) before doing the installation. Below is the installation process:

a.        Choose the right adapter and install it to the valve if the TRV can not install to your valve directly.

# Adapter Selection

Pls confirm valve diameter

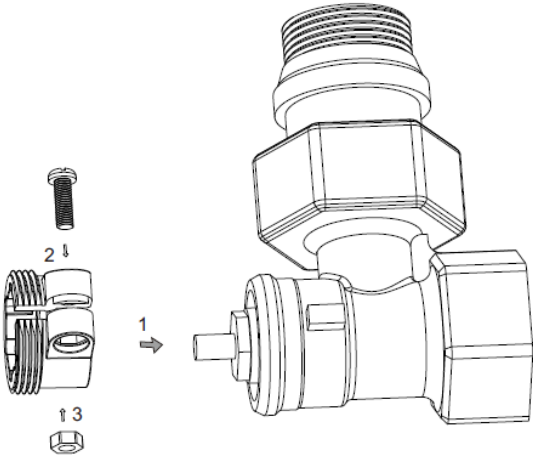| Danfoss | Caleffi | Giacomini |
|---------|---------|-----------|
| 1/2 valve (RA) | 1/2 valve | 1/2 valve + short plunger |
|  |  |  |

# Adapter Installation

**Danfoss**  1/2 valve (RA)

**Please tighten the screws after fixing the valve connector**



5

| Caleffi | **1/2 valve** | Giacomini | **1/2 valve** |
|---|---|---|---|

**Caleffi**  **1/2 valve**

Adapter, please put directly on the valve.



**Giacomini**  **1/2 valve**

Giacomini 1/2 valve need install short plunger at button of TRV .
Accessories, please put directly on the valve.
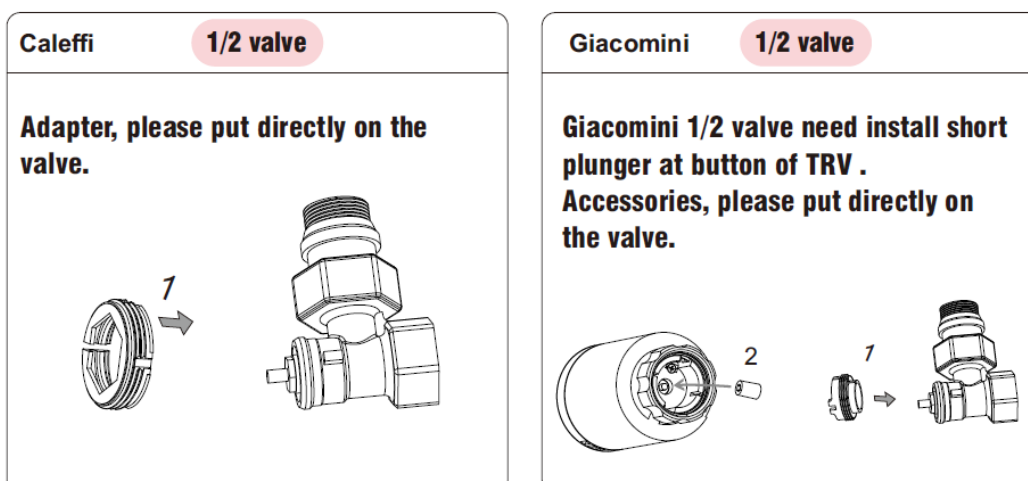


b.     **Take off the batteries and put them on again to REPOWER the TRV;**

c.     **The screen will blink "LA" until it become solid;**

d.      **Install the TRV to the valve;**

e.     **Click the roraty plate once and the "LA" will start blinking again;**

f.     **Installation completed ("LA" disappears and shows the temperature).**

❶ Put battery in battery compartment

Press buckle to take off cover

2AA battery
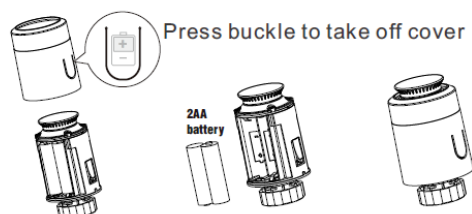
**Attention:**

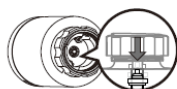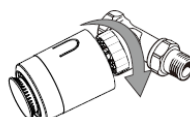* Insert the batteries checking the polarities (+ / -) are correcly aligned.
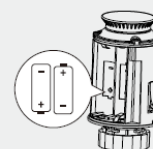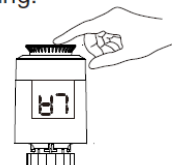


❷ **Display show "LA" flashing.**

❸ Once valve needle is flush with the base.

❹ **Install TRV with M30*1.5 screw thread Interface of valve .Tighten the copper ring.**

❺ Press button on rotary plate lightly, it would flash "LA" TRV will match valve stroke, if match succefully, will active initial setting.

# 4 Inclusion, Exclusion and Reset

## 4.1 Inclusion

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.

**Include the TRV into the Z-Wave network via SmartStart:**

**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.

**Include the TRV into the Z-Wave network manually:**

**a.** Power on your TRV,

**b**. Set your Z-Wave controller into add/inclusion mode.

**c.** In "⎕F " state, short press rotary plate three times until the screen shows " ▬ ▬ ".

**d.** The screen will show " PR " after few seconds, which meant the inclusion is successful. And the " 📶 " will light on. Otherwise, the inclusion is failed, which you will need to repeat the process form step **b.**

## 4.2 Exclusion

**Exclude TRV from a Z-Wave network:**

**a.** Power on your TRV

**b.** Set the Z-Wave primary controller into remove/exclusion mode.

**c.** In "⎕F " state, short press rotary plate three times until the screen shows " ▬ ▬ ".

**d**. The screen will turn back to "⎕F" after few seconds, which meant the inclusion is successful. The " 📶 " light will be off. Otherwise, the exclusion is failed which you will need to repeat the process form step **b.**

## 4.3 Reset TRV to factory default

In " ⎕F" state, press and hold rotary plate for at least 5 seconds and release when the screen will blink "⎕F". When the reset is successful, the screen will show "⎕F" 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 Security and non-Security features of TRV

This device is a security enabled Z-Wave Plus<sup>TM</sup> 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.

## 5.1 Supported Security Levels

- SECURITY_KEY_S0_BIT
- SECURITY_KEY_S2_AUTHENTICATED_BIT
- SECURITY_KEY_S2_UNAUTHENTICATED_BIT

## 5.2 Library

Basic Device Class: BASIC_TYPE_ROUTING_SLAVE
Generic Device Class: GENERIC_TYPE_THERMOSTAT
Specific Device Class: SPECIFIC_TYPE_THERMOSTAT_GENERAL_V2

## 5.3 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_2_V1 | 1 | None |
| COMMAND_CLASS_SUPERVISION_V1 | 1 | None |
| COMMAND_CLASS_APPLICATION_STATUS | 1 | None |
| COMMAND_CLASS_BASIC | 2 | S0 or S2 Authenticated/Unauthenticated |
| COMMAND_CLASS_VERSION_V2 | 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_SWITCH_MULTILEVEL_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 |

# 6 Special Rule of Each Command

## 6.1 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)

## 6.2 Multilevel Sensor Command Class

Supported the sensor type for Temperature.

## 6.3 Association Command Class

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

| Grouping Identifier | Max Nodes | Send Commands |
|---|---|---|
| Group 1 | 0x05 | 1.Battery Report<br>The TRV will send a Battery Report When Battery level change is greater than 5%(configurable) or the report interval is reached.<br>2.Switch Multilevel Report<br>The TRV will send a Switch Multilevel Report when valve opening level changes.<br>3.Sensor Multilevel Report<br>The TRV will send a Sensor Multilevel Report When Room temperature change is greater than 0.5℃ (configurable) or the |

report interval is reached.

4.Thermostat Mode Report

The TRV will send a Thermostat Mode Report when the TRV mode changed.

5.Thermostat Setpoint Report

The TRV will send a Thermostat Setpoint Report when setting temperature changed.

6. Indicator Report

## 6.4 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. |

## 6.5 Switch Multilevel Command Class

Allows to request the valve opening in percent.　0% represents a fully shut valve.　100 % a fully open valve. The valve opening can be reported on change.　If the configuration parameter is set.

## 6.6 Thermostat Mode Command Class

| Thermostat Mode Value | Supported Thermostat Mode | Defined By |
|-----------------------|---------------------------|------------|
| 0x01 | THERMOSTAT_MODE_REPORT_MODE_HEAT_V3 | ZWave Standard |
| 0x00 | THERMOSTAT_MODE_REPORT_MODE_OFF_V3 | ZWave Standard |

## 6.7 Thermostat Setpoint Command Class

Supported the Setpoint type:
● THERMOSTAT_MODE_REPORT_MODE_HEAT

## 6.8 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

## 6.9 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℃ in 4 minutes,TRV will close valve automatic,displiy will show "⊡P" ,When window is closed，meanwhile room temperature increase 2℃,TRV will open valve automatic,back to operation mode.<br>0 = Disable<br>1 = Enable | 0 |
| 2 | Anti-freezing function | 1 | 0~1 | The TRV is at "off" state, the screen show 🔥 .<br>Anti-freezing function: the valve will be opened when the temperature is below 5℃,when the temperature risees to 8℃,the valve will be closed.<br>0 = Disable<br>1 = Enable | 0 |
| 3 | Measured temperature offset | 1 | -6~6 | Offsets the measured temperature by-6.0℃ − (+)6.0℃.<br>0x0 = 0℃ Offset<br>0xFA~0x06 = -6~(+)6℃ Offset | 0 |
| 4 | Set away home mode | 1 | 0~1 | Set away home<br>0 = No<br>1 = Yes | 0 |
| 5 | Anti-scale function | 1 | 0~1 | 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 | 0 |

| | | | | use normally, TRV will open valave running 30 seconds every two weeks, display will show "AS", when run finished will recovery running condition.<br>0 = Disable<br>1 = Enable | |
|---|---|---|---|---|---|
| 6 | Valve opening level report threshold | 1 | 0~100 | Valve opening level change threshold. The unit = %<br>0 = Disable<br>1-99 = Valve opening level | 1 |
| 7 | Temperature auto report interval time | 4 | 0~2678400 | The time interval when to send the temperature report. The unit= second<br>1. Valid values: 0x00-0x28DE80<br>2.0x00 = Disable | 0 |
| 8 | Temperature change report threshold | 1 | 0~100 | Temperature change threshold.<br>unit 0.1℃<br>0 = Disable | 5 |
| 9 | Battery auto report interval time | 4 | 0~2678400 | The time interval when to send the battery report. The unit= second<br>1. Valid values: 0x00-0x28DE80<br>2.0x00 = Disable | 0 |
| 10 | Battery change report threshold | 1 | 0~100 | Battery power change threshold. The unit = %<br>0 = Disable | 5 |
| 11 | Enable child lock | 1 | 0~1 | Enable or disable child lock<br>0 = Disable<br>1 = Enable | 0 |