

Thermostatic Radiator Valve

User Manual



Introduction:

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 for take full advantage of all functionality for the TRV.

Features:

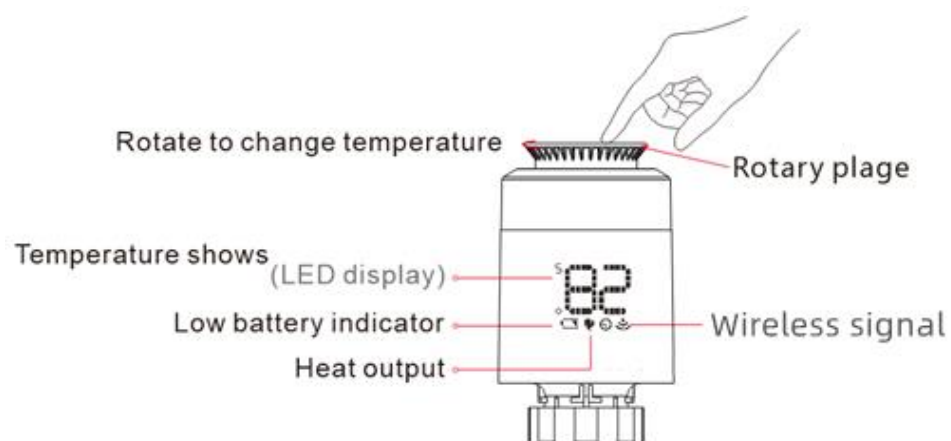
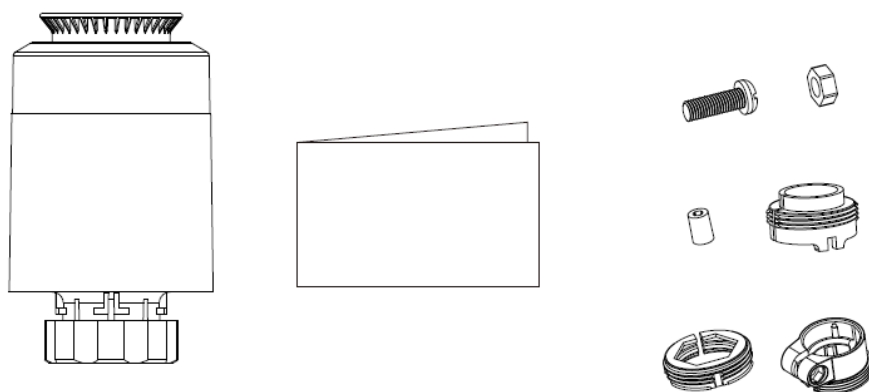
- Manual or Z-Wave setpoint set heating control with instant status updates.
- 700 series Z-Wave chip for better range and faster control.
- SmartStart and S2 Security for a safer network.

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

2 Familiarize yourself with your TRV

What is in the box?



Notice for use

ON / OFF

The temperature < 5°C , display "0F". The temperature > 30°C , display "0n"

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, display will show "0P". When window is closed , meanwhile room temperature increase 2°C , TRV will open valve automatic , back to operation mode .

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 valve 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 function by long press rotary plate until display show "LC". Long press rotary plate again over 10s to unlock.


Anti-freezing function

In the power off state, the screen show "fl".
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.

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.

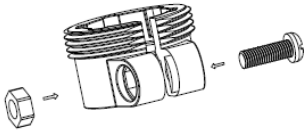
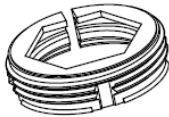
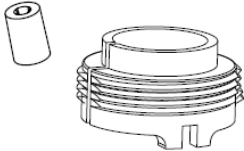
3 Installation

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

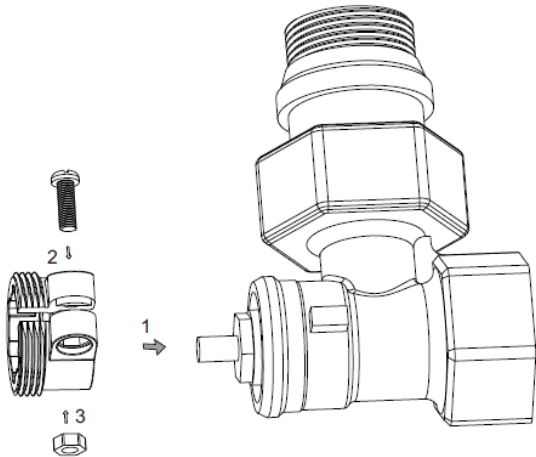
Danfoss	Caleffi	Giacomini
1/2 valve (RA)	1/2 valve	1/2 valve + short plunger
		

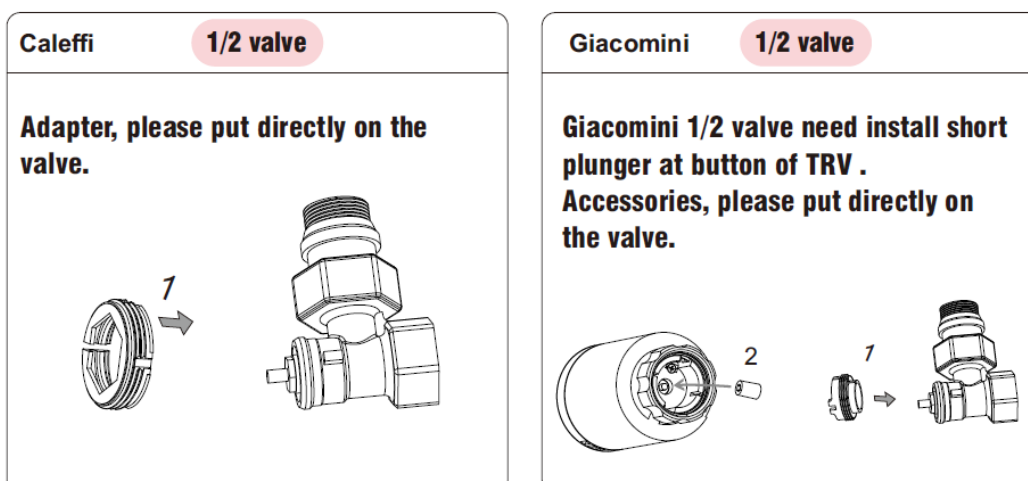
Adapter Installation

Danfoss

1/2 valve (RA)

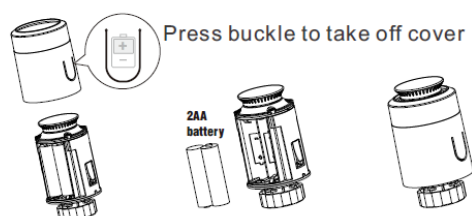
Please tighten the screws after fixing the valve connector





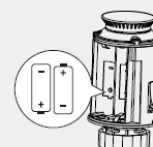
- b. **Take off the batteries and put them on again to REPOWER the TRV;**
- c. **The screen will blink "LA" until it become solid;**
- d. **Install the TRV to the valve;**
- e. **Click the rotary plate once and the "LA" will start blinking again;**
- f. **Installation completed ("LA" disappears and shows the temperature).**

- 1 Put battery in battery compartment



Attention:

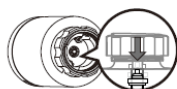
* Insert the batteries checking the polarities (+ / -) are correctly aligned.



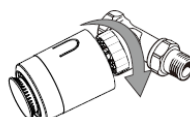
- 2 Display show "LA" flashing.



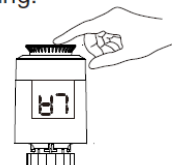
- 3 Once valve needle is flush with the base.



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



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



NOTE: For commercial buildings installations, suggest to replace the two batteries every season or until battery low indication.

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 "OF" 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 from 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 "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. The "📶" light will be off. Otherwise, the exclusion is failed which you will need to repeat the process from step b.

4.3 Reset TRV to factory default

In "OF" state, press and hold rotary plate for at least 5 seconds and release when the screen will blink "OF". When the reset is successful, the screen will show "OF" 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™ 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 Security Levels Supported

- 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

The Command is used to advertise room temperature.

- 1, Support Sensor Type: Air Temperature(0x01)
- 2, Support Temperature scale: 0x03(Celcius & Fahrenheit)

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	<p>1.Battery Report</p> <p>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.Switch Multilevel Report</p> <p>The TRV will send a Switch Multilevel Report when valve opening level changes.</p>

		<p>3.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>4.Thermostat Mode Report The TRV will send a Thermostat Mode Report when the TRV mode changed.</p> <p>5.Thermostat Setpoint Report The TRV will send a Thermostat Setpoint Report when setting temperature changed.</p> <p>6. Indicator Report</p>
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6.4 Basic Command Class

Basic Command maps to Thermostat Mode Command Class, as shown below.

Commands	Value	Mapped	Value	Function
Basic Set	0x00	Thermostat Mode Set	0x00	No Heating, Only Frost-protection
	0xFF		0x01	TRV into comfort heating mode
	0x1F		0x1F	TRV into direct Valve control mode
Basic Report	0x00	Thermostat Mode Report	0x00	off
	0xFF		0x01	Heat Mode
	0x1F		0x1F	Manufacturer Specific
Basic Get		Thermostat Mode Get		

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.

Controlling the valve directly via multilevel switch command class is only possible if the TRV is in **Manufacturer Specific** mode.

6.6 Thermostat Mode Command Class

Thermostat Mode Value	Supported Thermostat Mode	Descriptions
0x01	THERMOSTAT_MODE_REPORT_MODE_HEAT_V3	TRV into heating mode.

0x00	THERMOSTAT_MODE_REPORT_MODE_OFF_V3	Heating off
0x1F	Manufacturer Specific	TRV into direct valve control mode. The valve opening percentage can be controlled using the Switch Multilevel Command Class.

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,disply will show "❄️",When window is closed, meanwhile room temperature increase 2℃,TRV will open valve automatic,back to operation mode. 0 = Disable 1 = Enable	0
2	Anti-freezing function	1	0~1	The TRV is at "off" state, the screen show 🔥. Anti-freezing function: the valve will be opened when the temperature is below 5℃,when the temperature rises to 8℃,the valve will be closed. 0 = Disable 1 = Enable	0

3	Measured temperature offset	1	-6~6	Offsets the measured temperature by- 6.0℃ – (+)6.0℃. 0x0 = 0℃ Offset 0xFA~0x06 = -6~(+)6℃ Offset	0
4	Set away home mode	1	0~1	Set away home 0 = No 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 use normally, TRV will open valve running 30 seconds every two weeks, display will show “AS”, when run finished will recovery running condition. 0 = Disable 1 = Enable	0
6	Valve opening level report threshold	1	0~100	Valve opening level change threshold. The unit = % 0 = Disable 1-99 = Valve opening level	1
7	Temperature auto report interval time	4	0~267840 0	The time interval when to send the temperature report. The unit= second 1. Valid values: 0x00-0x28DE80 2.0x00 = Disable	0
8	Temperature change report threshold	1	0~100	Temperature change threshold. unit 0.1℃ 0 = Disable	5
9	Battery auto report interval time	4	0~267840 0	The time interval when to send the battery report. The unit= second 1. Valid values: 0x00-0x28DE80 2.0x00 = Disable	0
10	Battery change report threshold	1	0~100	Battery power change threshold. The unit = % 0 = Disable	5
11	Enable child lock	1	0~1	Enable or disable child lock 0 = Disable	0

				1 = Enable	
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