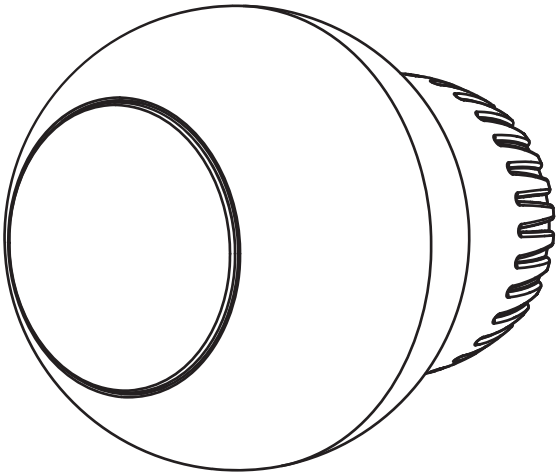
OPERATING MANUAL

EN



RADIATOR THERMOSTAT

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Important safety information

Read this manual before attempting to install the device!

Failure to observe recommendations included in this manual may be dangerous or cause a violation of the law. The manufacturer, will not be held responsible for any loss or damage resulting from not following the instructions of operating manual.

This product is not a toy. Keep away from children and animals! CR2032 coin cell battery is harmful if swallowed!

Battery pack warning!

Device contains lithium-ion polymer battery pack, heed all following warnings:

- If an unusual odor or malfunction is detected, avoid sources of open flame and remove the device from the radiator.
- In the event of damage from crashes, etc., carefully remove to a safe place for at least a half hour to observe.
- Do not leave the device unattended while charging.
- Do not attempt to replace the battery!

General information about the System

System is a wireless smart home automation system, based on the Z-Wave™ protocol. All of available devices can be controlled through a computer (PC or Mac), smartphone or tablet. Z-Wave devices are not only receivers, but can also repeat the signal, increasing the Z-Wave network's range. It gives advantage over traditional wireless systems that require direct link between transmitter and receiver, as a result the construction of the building could affect network's range negatively.

Every Z-Wave network has its unique identification number (home ID). Multiple independent networks can exist in the building without interfering. Transmission security of System is comparable to wired systems.

Z-Wave technology is the leading solution in smart home automation. There is a wide range of Z-Wave devices that are mutually compatible, independently of manufacturer. It gives the system the ability to evolve and expand over time.

#1: Description and features

Device is a remotely controlled thermostatic head to control temperature in your room. It measures the temperature and automatically adjust the heat level.

It can be mounted without tools on three types of thermostatic radiator valves.

You can create schedules via app to easily manage temperature throughout the week.

Main features of Device:

- to be installed on three types of valves: M30 x 1.5, Danfoss RTD-N and Danfoss RA-N,
- compatible with any certified Z-Wave™ Controller,
- supports Z-Wave network Security Modes: S0 with AES-128 encryption and S2 with PRNG-based encryption,
- built-in battery recharged through standard micro-USB port,
- easy installation - no tools required,
- can use a dedicated temperature sensor,
- supports heating schedules,
- automatic calibration,
- anti-freeze function,
- descaling function,
- unconstrained rotation spherical knob to set desired temperature.

Device is a fully compatible Z-Wave Plus™ device.

NOTE

This device may be used with all devices certified with Z-Wave Plus certificate and should be compatible with such devices produced by other manufacturers.

NOTE

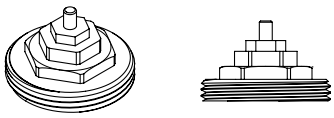
Z-Wave Controller must support Z-Wave Security Mode in order to fully utilize the product.

#2: Basic activation

1. Connect the charger to the micro-USB port to charge the device. The LED ring will pulse red if it's not fully charged; otherwise, it will pulse green.

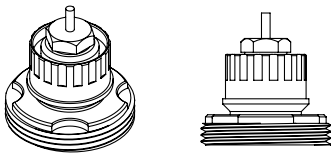
   If you have the temperature sensor:
   a. Use a coin to open the battery cover by turning it counter-clockwise.
   b. Remove the sticker underneath the battery.
   c. Use a coin to close the battery cover by turning it clockwise.

2. Disconnect the charger when the LED ring pulses green (device fully charged).
3. Dismount your current thermostatic head.

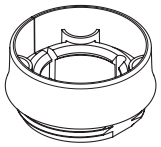


Proceed normally

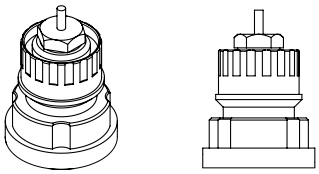
M30 x 1.5



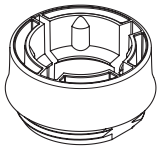
Use adapter:



Danfoss RTD-N



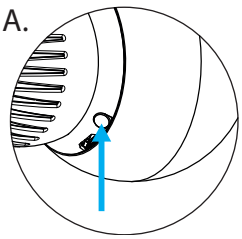
Use adapter:



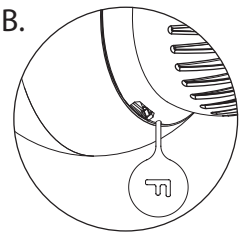
Danfoss RA-N

4. Depending on type of your thermostatic valve:
5. Mount the device on the valve and tighten it by turning the cap clockwise.
6. Press and hold the button for at least one second (A) or use the included key to quickly triple click the button (B).

A.

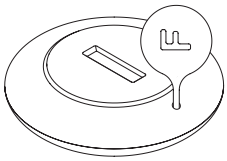


B.



7. The LED ring will start blinking blue.

   If you have the temperature sensor:
   a. Click the button on the temperature sensor now.
   b. The LED ring on the thermostatic valve will blink green 5 times if the connection was successful.



NOTE

First charging may take up to 3 hours.

CAUTION

If you use one of the adapters, double check that it is mounted properly. It should click when putting on the valve, hold tight after installing and not rotate!

CAUTION

If the device is installed in vertical position, set bit 5 in parameter 2.

CAUTION

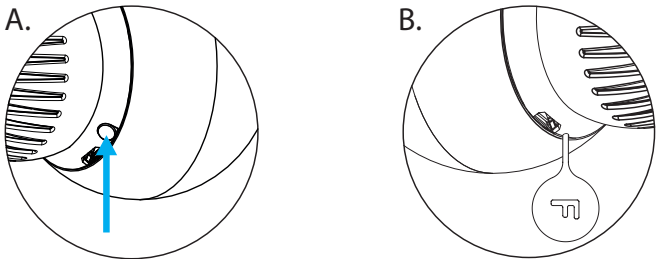
Do not cover or veil the thermostatic head.

#3: Adding to Z-Wave network

Adding (Inclusion) - Z-Wave device learning mode, allowing to add the device to existing Z-Wave network.

To add the device to the Z-Wave network:

1. Make sure the device is within the direct range of your Z-Wave controller.
2. Set the main controller in (security/non-security) add mode (see the controller's manual)
3. Quickly triple click the button on the thermostatic head (A) or use the included key (B).



4. The LED ring will start blinking white.
5. If you are adding in S2 authenticated mode, type in the device pin code (underlined part of the public key on the label).
6. Wait for the adding process to end.
7. Successful adding will be confirmed by the Z-Wave controller and green LED colour.

#4: Removing the device

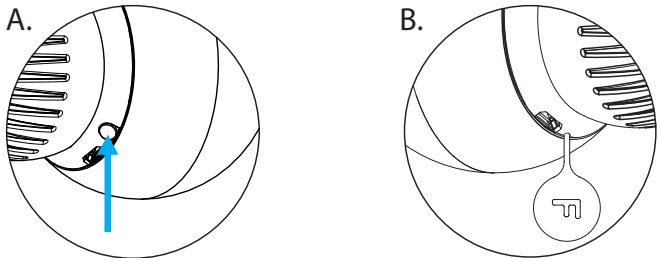
NOTE

Removing the device from the Z-Wave network restores all the default parameters of the device.

Removing (Exclusion) - Z-Wave device learning mode, allowing to remove the device from existing Z-Wave network.

To remove the device from the Z-Wave network:

1. Make sure the device is within the direct range of your Z-Wave controller.
2. Set the main controller into remove mode (see the controller's manual).
3. Quickly triple click the button on the thermostatic head (A) or use the included key (B).



4. The LED ring will start blinking white.
5. Wait for the removing process to end.
6. Successful removing will be confirmed by the Z-Wave controller and red LED colour.

#5: Controlling the temperature

You can set temperature using app (10-30°C) or directly on the device (16-24°C).

During manual temperature change LED ring colour corresponds to the temperature set-point.

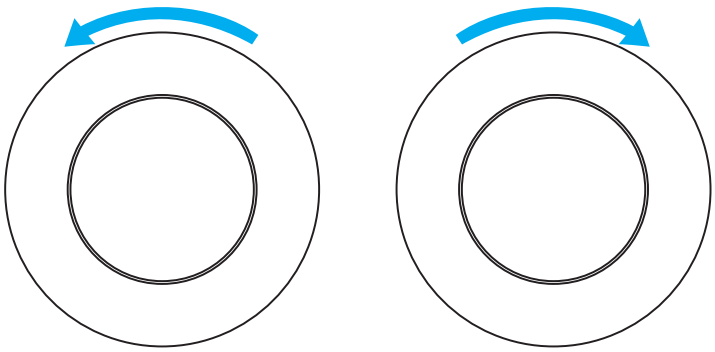
To check and change the temperature on the device:

1. Bring your hand close to the sphere.
2. LED ring will:
   - Glow if temperature was set manually,
   - Pulse slowly if device is in schedule mode,
   - Pulse quickly if device is in override schedule mode.

   With colour depending on set temperature:

Z-Wave Mode	Temperature [°C]	Colour
OFF	Valve closed (anti-freeze)	White
HEAT	16°C or lower	Blue
	17°C	Azure
	18°C	Cyan
	19°C	Spring green
	20°C	Green
	21°C	Chartreuse
	22°C	Yellow
	23°C	Orange
	24°C or higher	Red
MANUFACTURER SPECIFIC	Valve fully opened	Magenta

3. Turn the sphere counter-clockwise to lower temperature or turn clockwise to raise the temperature.



Lower temperature Raise temperature

4. Remove the hand from the sphere, after 5 seconds LED will fade and new temperature will be set.

NOTE

If device is currently during normal schedule, setting temperature manually will set Override Schedule (see "Override Schedule" on page 18).

#6: Extra temperature sensor

CAUTION

This product is not a toy. Keep away from children and animals!

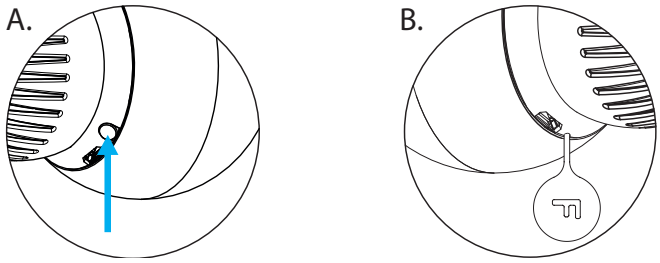
The device can be used with an additional, dedicated temperature sensor to provide the best temperature regulation.

It should be placed in the same room or heating zone as the thermostatic head which will use it as a reference point for the room temperature.

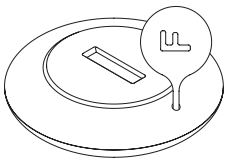
Before using, the sensor must be paired with the thermostatic head. One thermostatic head can be paired with only one sensor, but one sensor can be paired with up to three thermostatic heads.

To **pair** the sensor with the device:

1. Press and hold the button on the thermostatic head (A) or use the included key (B).



2. Release the button when you see **blue** LED colour.
3. Click the button to confirm the selection, the LED ring will start blinking blue.



4. Within 1 minute click the button on the sensor.
5. The LED ring on thermostatic head will glow green to confirm successful pairing.
6. Place the sensor in same room as head, no further than 5 meters from it.

To **remove** all **paired heads** from the sensor's memory:

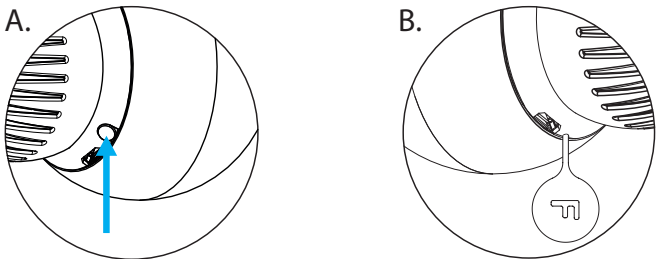
1. Press and hold the button on the sensor for 2 seconds.
2. The LED on the sensor will blink 3 times to confirm unpairing.

#7: Dismounting the device

Before dismounting, the device must be put in Standby Mode to ensure safe removal. See chapter „Standby Mode" on page 13 for more information.

To dismount the device:

1. Press and hold the button (A) or use the included key (B).

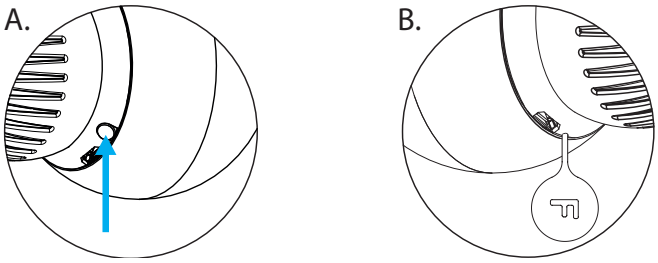


2. Release the button when you see cyan LED colour.
3. Click the button to confirm the selection.
4. Turn the cap counter-clockwise and remove adapter if used.
5. Store the device in temperature: -10°C to 25°C.

#8: Menu

Menu allows to perform important configuration and maintenance actions. In order to use the menu:

1. Press and hold the button (A) or use the included key (B).



2. Release the button when you see desired LED colour:

Colour	Action
Blue	pair dedicated temperature sensor
Red	enable/disable local control protec-tion
White	perform head calibration
Green	adding/removing to/from Z-Wave network
Magenta	Z-Wave network's range test
Cyan	put device in Standby Mode
Yellow	factory reset

3. Click the button to confirm the selection.

#9: Local protection

After enabling the local protection changing temperature directly on the device (by turning it) will not be possible.

Enabling local protection is recommended if you want to prevent accidental temperature change, e.g. by children.

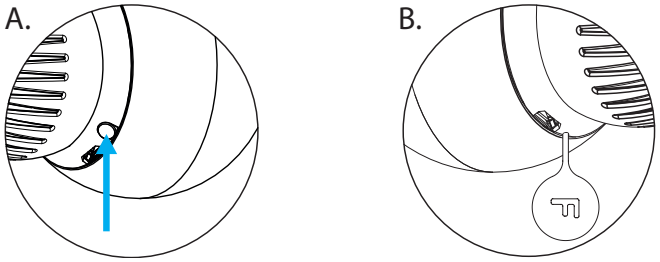
When attempting to change temperature if local protection is enabled:

- The device will not set new target temperature,
- The LED ring will blink red 3 times.

To change the temperature use the app or disable the local protection.

To enable/disable local protection using the menu:

1. Press and hold the button (A) or use the included key (B).



2. Release the button when you see **red** LED colour.
3. Click the button to confirm the selection.

NOTE

Local protection can also be enabled/disabled remotely through Z-Wave controller.

#10: Head calibration

NOTE

Calibration cannot be performed while the device is being charged.

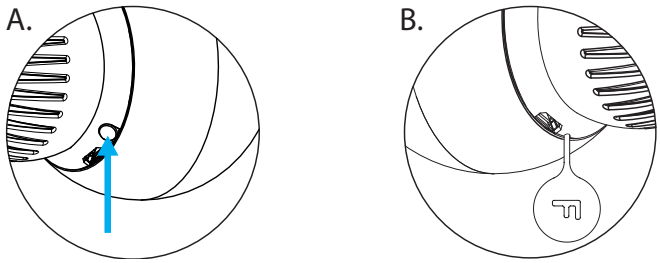
Calibrating the device to your radiator valve is required for proper controlling the temperature.

Calibration is performed:

- Automatically, after 10 minutes from turning on if no operation on the device has been made (only at first installation),
- Automatically, after 10 minutes from last state change (only at first installation),
- Manually, using the menu (see below).

To perform calibration using the menu:

1. Press and hold the button (A) or use the included key (B).



2. Release the button when you see white LED colour.
3. Click the button to confirm the selection.

#11: Standby Mode

In Standby Mode the device is in deep sleep state allowing safe dismounting, transporting and low as possible battery consumption.

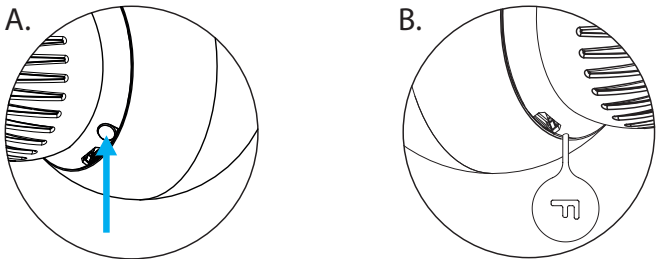
The device is shipped in Standby Mode. It should be fully charged before first use.

Entering the device in Standby Mode **will not** factory reset the device **nor** will result in loosing any data, but calibration and sensor pairing (after long Standby) is lost.

We recommend unpairing temperature sensor before putting the device into Standby Mode.

To enter Standby Mode:

1. Press and hold the button (A) or use the included key (B).



2. Release the button when you see cyan LED colour.
3. Click the button to confirm the selection.

To exit Standby Mode click the button once, the device will enter first installation procedure.

#12: Factory reset

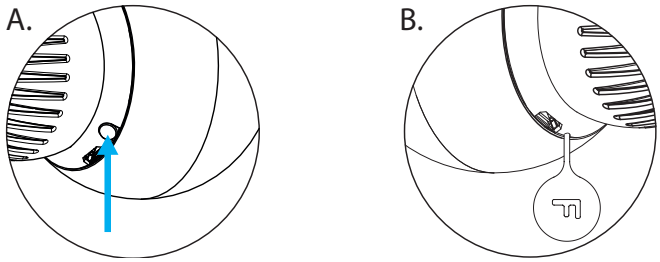
NOTE

Resetting the device is not the recommended way of removing the device from the Z-Wave network. Use the reset procedure only if the primary controller is missing or inoperable.

Reset procedure allows to restore the device back to its factory settings, which means all information about the network and user configuration will be deleted.

To perform factory reset:

1. Press and hold the button (A) or use the included key (B).



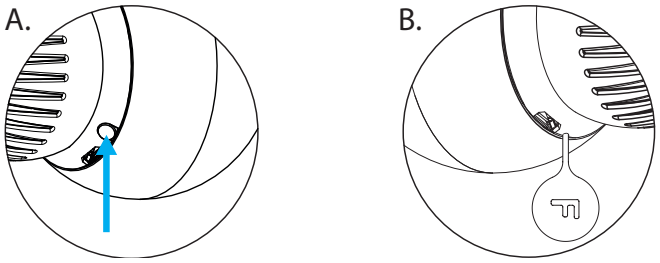
2. Release the button when you see yellow LED colour.
3. Click the button to confirm the selection.
4. After finishing resetting the device will be put in Standby Mode. Click the button to activate it again.

#13: Z-Wave range test

The device has a built in Z-Wave network main controller's range tester.

To perform range test:

1. Press and hold the button (A) or use the included key (B).



2. Release the button when you see **magenta** LED colour.
3. Click the button to confirm the selection.
4. LED ring will indicate the Z-Wave network's range:
   - **Pulsing green** - the device attempts to establish a direct communication with the main controller. If a direct communication attempt fails, the device will try to establish a routed communication, through other modules, which will be signaled by visual indicator pulsing yellow.
   - **Glowing green** - the device communicates with the main controller directly.
   - **Pulsing yellow** - the device tries to establish a routed communication with the main controller through other modules (repeaters).
   - **Glowing yellow** - the device communicates with the main controller through the other modules. After 2 seconds the device will retry to establish a direct communication with the main controller, which will be signaled with visual indicator pulsing green.
   - **Pulsing magenta** - the device does communicate at the maximum distance of the Z-Wave network. If connection proves successful it will be confirmed with a yellow glow. It's not recommended to use the device at the range limit.
   - **Glowing red** - the device is not able to connect to the main controller directly or through another Z-Wave network device (repeater).
5. To exit Z-Wave range test, press the button briefly.

#14: Battery and charging

CAUTION

Make sure you are using certified charger Class II, marked ⧈ which complies with parameters specified in the manual.

CAUTION

Do not leave the device unattended while charging.

CAUTION

Set the device to OFF (white) before charging or dismount the thermostatic head if not possible.

NOTE

Do not use cables longer than 3 meters for charging the device.

CAUTION

Make sure the device won't discharge during the heating season or it may cause high temperatures!

The device is equipped with a rechargeable lithium-polymer battery pack that can be charged via micro-USB port using standard 5V charger (not included).

When battery is low the LED ring will start to blink red. The device will also report low battery status of itself and dedicated temperature sensor (if paired) to the controller.

The device does not operate the valve during the charging and maintains the last valve position.

If the battery is discharged the device will open valve completely to allow easy dismounting.

To charge the battery:

1. Connect charger to the micro-USB port.
2. During charging the LED ring will pulse red and valve control will be disabled.
3. When LED starts pulsing green, disconnect the charger.
4. The device will restore its previous operation.

#15: Normal Schedules

The device allows to create multiple heating schedules to manage temperature in the room throughout the week. Schedules are created via controller interface or app.

- Up to 253 normal schedules can be created.
- The lower the schedule ID number, the higher the priority.
- Schedules with higher priority override those with lower priority in case of overlapping schedules.
- Schedules can be disabled without deleting it.
- Schedules allow to set target temperature for HEAT mode (using Thermostat Setpoint CC) and one of operating modes: HEAT, OFF or MANUFACTURER SPECIFIC (using Thermostat Mode CC)
- Only SET commands are permitted.

To create normal schedules user must specify:

- Day of the week,
- Starting time (hour and minute),
- Duration,
- Temperature Setpoint for HEAT mode in range 10-30°C (using Thermostat Setpoint CC)
- One of the operating modes (using Thermostat Mode CC):
  - » HEAT for setting temperature,
  - » OFF for valve fully closed,
  - » MANUFACTURER SPECIFIC for valve fully opened.

NOTE

Schedule CC Set command payload must not be greater than 22 bytes limit or it would be rejected.

#16: Override Schedule

Override Schedule is a special type schedule with highest priority; thus it overrides other schedules.

The Override Schedule starts right after setting and lasts for specified time, then it is removed and current schedule or normal operation is restored.

To create Override Schedule user must specify:

- Starting time (START NOW),
- Duration,
- Temperature Setpoint for HEAT mode in range 10-30°C (using Thermostat Setpoint CC)
- One of the operating modes (using Thermostat Mode CC):
  - » HEAT for setting temperature,
  - » OFF for valve fully closed,
  - » MANUFACTURER SPECIFIC for valve fully opened.

Override Mode can be **enabled** in two ways:

- By turning the knob, while normal schedule is active. The LED ring will pulse with selected adjustment.
- Via controller, by creating schedule with ID set 255, start time set to NOW and duration (in minutes/hours/days).

To **exit** Override Mode grab knob with your hand for 5 seconds.

#17: Z-Wave specification

Endpoint 1:

Generic Device Class: GENERIC_TYPE_THERMOSTAT

Specific Device Class: SPECIFIC_TYPE_THERMOSTAT_GENERAL_V2

Description: represents **thermostatic head**, allows to set temperature, schedules and check its battery level.

Endpoint 2:

Generic Device Class: GENERIC_TYPE_SENSOR_MULTILEVEL

Specific Device Class: SPECIFIC_TYPE_ROUTING_SENSOR_MULTILEVEL

Description: represents **temperature sensor**:

- Extra temperature sensor paired – reports temperature measured by the extra sensor and its battery level,
- No extra temperature sensor paired – reports temperature measured by the built-in sensor and head battery level.

Response to Basic Command Class:

Value	Action
0	Set OFF mode (unfreeze function)
99	Set HEAT mode (last set temperature)
255	Set MANUFACTURER SPECIFIC mode (valve fully opened)

Association Command Class:

The device supports only **"Lifeline"** association group that reports the device status and allows for assigning single device only (main controller by default).

Supported Command Classes:

Command Class	Version	Secure
ZWAVEPLUS_INFO [0x5E]	V2	
ASSOCIATION [0x85]	V2	YES
MULTI_CHANNEL_ASSOCIATION [0x8E]	V3	YES
BASIC [0x20]	V1	YES
APPLICATION_STATUS [0x22]	V1	
THERMOSTAT_MODE [0x40]	V3	YES
THERMOSTAT_SETPOINT [0x43]	V3	YES
SCHEDULE [0x53]	V1	YES
TRANSPORT_SERVICE [0x55]	V2	
ASSOCIATION_GRP_INFO [0x59]	V2	YES
DEVICE_RESET_LOCALLY [0x5A]	V1	YES
MULTI_CHANNEL [0x60]	V4	YES
SUPERVISION [0x6C]	V1	YES
NOTIFICATION [0x71]	V8	YES
MANUFACTURER_SPECIFIC [0x72]	V2	YES
POWERLEVEL [0x73]	V1	YES
PROTECTION [0x75]	V1	YES
FIRMWARE_UPDATE_MD [0x7A]	V4	
BATTERY [0x80]	V1	YES
CLOCK [0x81]	V1	YES
VERSION [0x86]	V2	YES
SECURITY [0x98]	V1	
SECURITY_2 [0x9F]	V1	
CONFIGURATION [0x70]	V1	YES
CRC_16_ENCAP [0x56]	V1	
SENSOR_MULTILEVEL [0x31]	V5	YES

Multichannel Command Class:

Command Class	Version	Secure
Endpoint 1		
ZWAVEPLUS_INFO [0x5E]	V2	
ASSOCIATION [0x85]	V2	YES
MULTI_CHANNEL_ASSOCIATION [0x8E]	V3	YES
BASIC [0x20]	V1	YES
THERMOSTAT_MODE [0x40]	V3	YES
THERMOSTAT_SETPOINT [0x43]	V3	YES
SCHEDULE [0x53]	V1	YES
ASSOCIATION_GRP_INFO [0x59]	V2	YES
SUPERVISION [0x6C]	V1	YES
NOTIFICATION [0x71]	V8	YES
BATTERY [0x80]	V1	YES
CLOCK [0x81]	V1	YES
PROTECTION [0x75]	V1	YES
SECURITY [0x98]	V1	
SECURITY_2 [0x9F]	V1	
Endpoint 2		
ZWAVEPLUS_INFO [0x5E]	V2	
ASSOCIATION [0x85]	V2	YES
MULTI_CHANNEL_ASSOCIATION [0x8E]	V3	YES
SENSOR_MULTILEVEL [0x31]	V5	YES
ASSOCIATION_GRP_INFO [0x59]	V2	YES
SUPERVISION [0x6C]	V1	YES
NOTIFICATION [0x71]	V8	YES
BATTERY [0x80]	V1	YES
SECURITY [0x98]	V1	
SECURITY_2 [0x9F]	V1	

Notification Command Class:

The device uses Notification Command Class to report different events to the controller ("Lifeline" group).

Endpoint 1:

Notification Type	Event	Event Parameters
Power Management [0x08]	Charge battery soon [0x0E]	
	Charge battery now! [0x0F]	
	Battery is charging [0x0C]	
	Battery is fully charged [0x0D]	
System [0x09]	System Hardware Failure [0x03]	External sensor remove [0x02]
		Motor error [0x03]
		Calibration error [0x04]

Endpoint 2:

Notification Type	Event	Event Parameters
Power Management [0x08]	Replace battery soon [0x0A]	
	Replace battery now! [0x0B]	

#18: Advanced parameters

The device allows to customize its operation to user's needs. The settings are available in the interface as simple options that may be chosen by selecting the appropriate box.

In order to configure the device:

1. Go to the device options by clicking the icon:
2. Select the „Advanced" tab.
3. Modify values of chosen parameters.
4. Save the changes.

GENERAL SETTINGS

1. Override Schedule duration

This parameter determines duration of Override Schedule after turning the knob while normal schedule is active (set by Schedule CC).

Available settings:	**10-10 000** (in minutes)		
Default setting:	**240** (4h)	Parameter size:	**4** [bytes]

2. Additional functions

This parameter allows to enable different additional functions of the device.

Available settings:	**1** (bit 0) - open window detection (normal) **2** (bit 1) - open window detection (rapid) **4** (bit 2) - increase receiver sensitivity (shortens battery life) **8** (bit 3) - LED indications when controlling remotely **16** (bit 4) - protect from setting Full ON and Full OFF mode by turning the knob manually **32** (bit 5) - device mounted in vertical position **64** (bit 6) - Moderate regulator behaviour (instead of Rapid) **128** (bit 7) - inverted knob operation **256** (bit 8) - heating medium demand reports **512** (bit 9) - detecting heating system failures		
Default setting:	**1**	Parameter size:	**4** [bytes]

3. Additional functions status (READ-ONLY)

This parameter allows to check statuses of different additional functions.

Available settings:	**1** (bit 0) - optional temperature sensor connected and operational **2** (bit 1) - open window detected **4** (bit 2) - provide heat in order to maintain set temperature **8** (bit 3) - malfunctioning heating system (cannot reach set temperature)		
Default setting:	**0**	Parameter size:	**4** [bytes]

NOTE

Entering invalid value of parameter will result in not setting the value and response with Application Rejected or Supervision CC frame (depending on the controller).

NOTE

Parameter 2 values may be combined, e.g. 1+8=9 means that Open Window Detector and LED indications when controlling remotely are enabled.

NOTE

Parameter 3 values may be combined, e.g. 1+2=3 means optional sensor works properly and open window detection was triggered.

#19: Specifications

NOTE

Charger type: Unit shall be supplied by a source certified as Limited Power Source (LPS) as defined in clause 2.5 of IEC60950-1 2nd edition + Amd. 1 + Amd. 2.

CAUTION

SELV power supply (USB supply) is used only for battery charging. The device does not operate the valve during the charging.

Power supply:	3.7V Li-Poly battery pack (non-replaceable)
Charging port:	micro-USB
Charger voltage (not included):	5V DC (±5%)
Minimum charger current (not included):	0.5A
Operating temperature:	0–40°C
Storage temperature (standby mode)	-10–25°C
Maximum water temperature:	90°C
Temperature measuring accuracy:	0.5°C (within 0–40°C range)
Regulator class:	Type 1 class
Device Firmware Class:	A-grade
Motor protection:	Impedance Protected
Actuator action:	Linear variable position actuator
Actuator stroke:	5mm
Purpose of control:	Operating control
Construction of control:	Integrated control
Degree of protection by enclosure:	IP20
Classification of control according to protection against electric shock:	Class III
Action type:	type 1
Control pollution degree:	pollution degree 2
Rated impulse voltage:	330V (when connected to the USB power supply)
Dimensions (Diameter x Length):	56 x 74 mm (without the adapter) 56 x 87 mm (with the adapter)
EU Directive compliance:	RoHS 2011/65/EU, RoHS 2015/863, RED 2014/53/EU

For communication with the controller:

Radio protocol:	Z-Wave (500 series chip)
Radio frequency bands:	868.0-868.6 MHz 869.7-870.0 MHz
Maximum transmit power:	6dBm

For communication with the extra sensor:

Radio frequency band:	2402-2480 MHz
Maximum transmit power:	7dBm

#20: Accessory specification

CAUTION

Using batteries other than specified may result in explosion. Dispose of properly, observing environmental protection rules.

CAUTION

CR2032 coin cell battery is harmful if swallowed!

Power supply:	CR2032, 3.0V battery (included)
Operating temperature:	0–40°C
Storage temperature:	-10–40°C
Temperature measuring accuracy:	0.5°C (within 0–40°C range)
Dimensions (Diameter x Height):	38 x 12 mm
Radio frequency band:	2402-2480 MHz
Maximum transmit power:	1dBm
EU Directive compliance:	RoHS 2011/65/EU RoHS 2015/863 RED 2014/53/EU

#21: Regulations

Warning

This product is not a toy. Keep away from children and animals! CR2032 coin cells are harmful if swallowed!

Declaration of conformity

Hereby, manufacturer declares that the device is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the manufacturer's website.

WEEE Directive Compliance

Device labelled with this symbol should not be disposed with other household wastes. It shall be handed over to the applicable collection point for the recycling of waste electrical and electronic equipment.