

# Wireless heating valve actuator **MVA004 EnOcean**

User manual and device specification  
Annex: List of adapters and theft protection



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## 1 Document history

<u>Date</u>	<u>Description</u>	<u>Version</u>	<u>Status</u>
06.04.2017	First release	0817_v2e	Released
01.05.2017	Added section 5.5 Remote Commissioning Added Section 9 and 10	0817_v3e	Released
24.05.2017	Minor changes	0817_v4e	Released
03.06.2017	Added ReCom commands table	0817_v4e	Released
	Added DO example descriptions		
28.08.2017	DB2.4 BCAP bit linked to DB2.5 Energy Storage	0817_v8e	Released
24.11.2017	<ul style="list-style-type: none"> <li>* Safety position: Internal temperature control 21°C instead of 50% valve position, no change to radio communication interval</li> <li>* DB2.7...DB2.0 = If RCU Temp. = 0x00 and SPS = 1 (target temperature) then internal temperature sensor is used</li> <li>* ReCom: Radio interval default = Auto</li> <li>* ReCom: Removed safe mode setting (incl. DO)</li> <li>* ReCom: Removed safe mode com. period (incl. DO)</li> </ul>	0817_v11e	Released

## 2 Use and safety recommendations

- The metallic part of the unit's housing serves as a heat sink. Be sure that the air circulation around it is not obstructed by furniture, curtains, plants, or other objects.
- If the device has been stored in a cold environment, make sure that it resumes close to room temperature before use. This is to prevent condensation from forming.
- The thermostatic radiator valve is designed for indoor use only. Do not allow the thermostatic radiator valve to get wet. Its sensitive electronics can be affected.
- The unit is best cleaned with a dry or slightly damp cloth. Do not use aggressive cleaning agents or solvents.
- Refrain from exposing the unit to environmental stress such as high mechanical forces (do not step on it), strong vibrations, direct sunlight or extreme temperatures.
- The unit must not be disassembled or modified. In case you are unsure how to use the unit, please get in touch with your beta test consultant.
- Be aware that correct operation can be affected by strong electromagnetic fields. Typical sources of such are mobile phones, 2-way radios, RC transmitters, microwave ovens, electric motors.
- The housing contains actuated springs that can lead to injuries if released. For servicing, refer to qualified service personnel.
- The thermostatic radiator valve has been designed and must solely be used for the purpose of controlling a M30 x 1.5 heater valve. Any other use may pose a hazard to the device itself, to the equipment involved, or to the health of the user.
- When operating the device in a workplace environment, be sure to observe the workplace regulations that may apply.
- The self-powered thermostatic radiator valve is suitable solely for controlling water-filled heating radiators. Any other use – including control of floor heating systems - is not permitted and can result in damage. Do not disassemble or modify any part of the product. It is important to comply with the safety notice included in these operating instructions.


Read these instructions carefully and keep them for later reference.  
Thank you.


### 3 System description


This document defines the properties of Micropelt's battery free thermostatic radiator valve MVA004. The unit is directly mounted onto radiator valve bodies (M30x1,5 thread), where it controls the room temperature, based on signals of a central controller. It is radio-controlled and powered by energy harvesting, so it neither requires any cabling work nor does it consume batteries. It is designed for maintenance-free operation. The wireless design makes the unit ideal for retrofit installation and cost-sensitive projects, where cabling cost is prohibitive.


At its heart, the MVA004 contains a thermoelectric harvesting module and integral energy storage. Beyond this, it contains an electromechanical valve actuator, a radio module and a microcontroller that makes all parts of the system work together. The actuator is equipped with a number of hard- and software functions that not only allow remote-management (ReMan) and -commissioning (ReCom) but also features unique status and monitoring capabilities. The device also offers a debug- and deployment-friendly radio communication interval of 10 seconds for the first 10 minutes following its initial activation.


At its user interface, MVA004 has a red and a green LED, which are described in more detail in section 4. Two internal temperature sensors are used with a) its internal temperature controller and freeze protection control (ambient sensor) and b) the automatic radio duty cycle control of 2, 5 or 10 minutes (flow temperature sensor).


 MVA004 is operating with EnOcean standard EEP A5-20-01 (4BS) in either valve position or set temperature mode. According to the standard protocol, the drive reports to the room controller every 2/5 or 10 minutes (auto radio interval based on flow temperature) and transmits the value of its valve position. The room controller responds with either a new control value in the value range 0% (valve closed) to 100% (valve maximum open) or setpoint temperature (0 ... 40 ° C). When the setpoint changes, the actuator motor moves the motor to the new position.


 When operating with the setpoint temperature, it is recommended to use a separate, external room temperature sensor, which transmits the room temperature to the room controller, which then transmits it to the drive (as described in A5-20-01 protocol). Without external room temperature, the internal controller uses the sensor installed in the drive (picture page 5). By heat input from the radiator in the drive, there are deviations between the measured and actual room temperature, which are compensated by means of an integrated correction function.


 The actuator is in the delivery state in mounting position (motor position is fully retracted). The actuator has valve recognition. Unmounted but activated will automatically move the motor back to mounting position and switch-off the actuator.

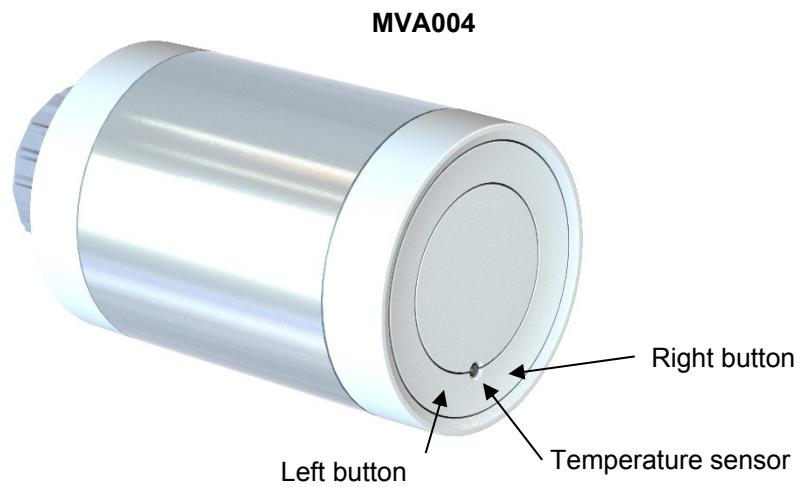
 The internal energy storage of the actuator is fully charged upon delivery, so that sufficient energy is available for installation and up to approximately one year of operation. The drive works 365 days a year. When the heating system is switched on, the actuator then supplies itself independently via the heat of the heating circuit. Due to the surplus of generated energy in winter, the internal storage provides sufficient energy for the year-round operation including transition periods and summer.

 In the event of a radio failure (6 unsuccessful communication attempts), the internal temperature controller is activated and the radiator is regulated to a preset 21 ° C. A change of the radio interval does not take place. The drive goes into normal operation as soon as the radio communication is restored.

 When operating in unheated rooms, the internal memory will eventually be discharged. The drive then moves to the 50% position to recharge the memory. Operation of the drive in unheated rooms is not recommended

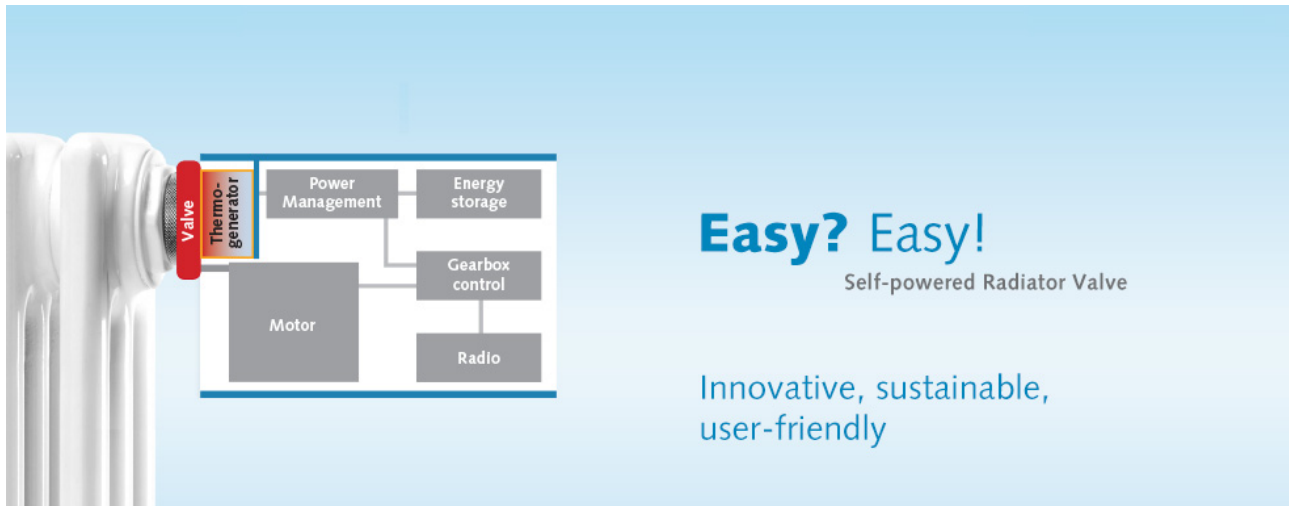
 MVA004 is designed for low power operation. Therefore, all ReMan and ReCom operations are internally time limited and must be executed within less than 5 seconds. It is strongly recommended to use script command sets (contact Micropelt for examples) and execute ReMan only for initial teach over the air (Link Table) and device configuration following its initial deployment.

 MVA004 has a button lock after one hour function integrated that will prevent from unintended use.



## 4 Energy harvesting

The actuator generates the necessary electrical energy for operation by means of a thermoelectric generator (TEG), which gains electrical energy from the temperature difference between radiator flow and room temperature. During the heating season, excess energy is accumulated in the internal storage for operation in transition periods and summer. The energy balance of the actuator is designed to allow operation through 365 days per year when used in typical radiator heating installations.





If, in exceptional cases, the storage voltage drops below a certain limit, the actuator reports this status to the room controller and takes the protection position (50% valve opening or maintains the set value, whichever is the higher). Subsequently, the actuator goes to sleep and waits until the memory is re-charged by the thermoelectric generator back to a sufficient level. As soon as enough energy is available, the actuator resumes normal operation.

The protection position ensures that the heating valve cannot calcify in an end position and freeze protection is ensured. Unexpected room temperatures will occur.

## 5 User Control – Quick overview table

The below tables provide a quick overview of the product functionality and the installation process.  
MORE DETAILED DESCRIPTION IN SECTION 8.



### 5.1 Installation with Manual Pairing

No	Objective	Button No.	Action	LED Activity	Reasons for failure
1	Pairing from mounting position (= shipping condition = OFF) or normal operation (while buttons not locked)	1 <u>OR</u> 2	<u>Press for at least 5 sec</u> Unit does pairing and remains in mounting position = shipping condition = OFF If unit is not in mounting position, it moves to mounting position now.	Success: Single green flash Failure: Triple red flash	Controller or gateway either not present or not in pairing mode, so that pairing fails
2	Mounting 		<u>Mount the actuator</u> before executing run-in sequence and normal operation		
3	Run-in sequence and normal operation from mounting position	1 <u>OR</u> 2	<u>Single-press (&lt; 1 sec)</u> Unit executes run-in sequence; radio communication occurs every 10 seconds for 10 minutes, and then reverts to every 10 minutes.   One hour after this action, the pushbutton switches will lock and can only be unlocked, by performing RESET (5.)	Success: Single green flash Failure: Triple red flash	Motor or gear error
4	Get new target value (while buttons not locked)	1 <u>OR</u> 2	<u>Single-press (&lt; 1 sec)</u> Unit immediately gets target value from controller / gateway, then moves to the new target	Success: Single green flash Failure: Triple red flash	Unit cannot contact the controller or gateway
5	Return to mounting position	1 <u>OR</u> 2	<u>Hold button for 5 seconds until single green flash.</u> Green LED appears, followed a triple red LED. The device will turn the motor back to mounting position and switch off.	Success: Single green flash followed by triple red flash	
6	Deactivate button lock  and  RESET followed by normal operation	1 <u>AND</u> 2	<u>Long-press both buttons simultaneously for at least 10 seconds:</u> The unit enters normal operation, assuming it is paired. For 60 min, the unit will accept a 5-second long-press of any button and for 10 minutes, it will run at a 10-second radio communication interval. It contacts the	After 10 seconds 1x green (RESET activated), then 2x red (new start), after a short break 1x green (normal operation with successful communication) or	Unit cannot contact the controller or gateway it has been paired with or unit has never been paired. Mounting or or



			controller / gateway immediately after RESET.	3x red (communication error, mounting error)	motor problems
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### 5.1 Installation with Remote Commissioning

No	Objective	Button No.	Action	LED Activity	Reasons for failure
1	Mounting 		<u>Mount the actuator</u> before executing run-in sequence and normal operation		
2	Run-in sequence and normal operation from mounting position	1 <u>OR</u> 2	<p><u>Single-press (&lt; 1 sec)</u> Unit executes run-in sequence; radio communication occurs every 10 seconds for 10 minutes, giving opportunity for ReMan/ReCom to configure the unit quickly. Once 10 minutes have elapsed, the radio communication interval defaults to 10 minutes.</p> <p> One hour after this action, the pushbutton switches will lock and can only be unlocked, by performing RESET</p> <p>In case of an empty link table (gateway address), the motor will move after to its safety position (Default value = 50%)</p>	<p>Success: Single green flash</p> <p>Failure: Triple red flash</p>	Motor or gear error
3	Get new target value (while buttons not locked)	1 <u>OR</u> 2	<p><u>Single-press (&lt; 1 sec)</u> Unit immediately gets target value from controller / gateway, then moves to the new target</p>	<p>Success: Single green flash</p> <p>Failure: Triple red flash</p>	Unit cannot contact the controller or gateway
4	Return to mounting position	1 <u>OR</u> 2	<p><u>Hold button for 5 seconds until single green flash.</u> Green LED appears, followed a triple red LED. The device will turn the motor back to mounting position and switch off.</p>	Success: Single green flash followed by triple red flash	
5	Deactivate button lock and RESET followed by normal operation	1 <u>AND</u> 2	<p><u>Long-press both buttons simultaneously for at least 10 seconds:</u> The unit enters normal operation, assuming it is paired. For 60 min, the unit will accept a 5-second long-press of any button and for 10 minutes, it will run at a 10-second radio communication interval. It contacts the controller / gateway immediately after RESET.</p>	After 10 seconds 1x green (RESET activated), then 2x red (new start), after a short break 1x green (normal operation with successful communication) or 3x red (communication error, mounting error)	Unit cannot contact the controller or gateway it has been paired with or unit has never been paired Mounting or motor problems

## 6 Notes on radio operation

### 6.1 Transmission range

The radio transmission range is limited by both the distance between transmitter and receiver, and by interference. Indoors, building materials play an important role. Major reflections and signal losses are due to metallic parts, such as reinforcements in walls and metallized foils, which are used on thermal insulation products.

Penetration of radio signals:

Material	Penetration
Wood, gypsum, uncoated glass	90..100 %
Brick, chipboard	65.. 95 %
Reinforced concrete	10.. 90 %
Metal, aluminum facings	0.. 10 %

For an evaluation of the environment, please see guide values listed below:

Conditions	Range / penetration
Line-of-sight halls	Typ 30 m range in passages, up to 100 m in
Plasterboard and wood walls	Typ 30 m range through max. 5 walls
Brick and foamed concrete walls	Typ 20 m range through max. 3 walls
Reinforced concrete walls & ceilings	Typ 10 m range through max. 1 ceiling

Supply blocks and lift shafts should be treated as shields.

In addition, the angle at which the signal enters the wall has to be considered. A shallow angle increases the effective wall strength as well as the attenuation of the signal. Whenever possible, signals should enter walls perpendicularly. Alcoves should be circumvented.

For additional information, refer to the EnOcean White Paper “EnOcean Wireless Systems – Range Planning Guide”.



### 6.2 Other interference sources

Common sources of interference are devices that generate high-frequency signals. These are typically computers, audio-/video systems, electronic transformers and ballasts. The distance of the actuator to such devices should be more than 0.5 m.

### 6.3 Loss of communication with the room controller

If the actuator cannot establish a dependable radio communication with the room controller, i.e. more than 6 times in sequence the room controller does not receive a radio signal, then the actuator switches to a reduced radio pattern. The typical 10 minute radio period is extended to one transmission every hour, reducing the energy consumption while radio contact is interrupted. In addition, the actuator enters the safe position. Once the radio contact to the room controller recovers, the actuator reverts to requesting instructions from the controller every 10 minutes.

## 7 EEP A5-20-01 description

Bidirectional radio communication occurs periodically according to the EnOcean Equipment Profile “EEP A5-20-01” (Battery Powered Actuator). Communication is triggered by the actuator.

### 7.1 Protocol Data Overview

Transmit mode from MVA to controller/ gateway/ server	
DB3.7...DB3.0	Current valve position 0..100%, linear n=0..100
DB2.7	Not used
DB2.6	Active energy harvesting (valve is hot)
DB2.5	Energy storage sufficiently filled
DB2.4	Storage capacity sufficient (analog DB_2.Bit_5)
DB2.3	Not used
DB2.2	Temperature sensor failure
DB2.1	Not used
DB2.0	Motor failure
DB1.7...DB1.0	Ambient temperature MVA (0...40°C ~ 0x00...0xFF)
DB0.7...DB0.4	Not used
DB0.3	LRN Bit, defined for data telegram
DB0.2...DB0.0	Not used

Receive mode from controller / gateway / server to MVA	
DB3.7...DB3.0	New valve position (0...100% ~ 0x00...0x64) or Target temperature (0...40°C ~ 0x00...0xFF)  Selection with DB1.2
DB2.7...DB2.0	Room temperature from room sensor (0...40°C ~ 0xFF...0x00*) * for operation with the internal MVA ambient sensor must be set to 0x00
DB1.7...DB1.4	Not used (set to “zero”)
DB1.3	Summer mode, transmit / receive time interval 8 hours
DB1.2	Setpoint Selection 0: Valve pos. (0...100%) 1: Target Temp. (0...40°C)
DB1.1...DB1.0	Not used (set to “zero”)
DB0.7...DB0.4	Not used (set to “zero”)
DB0.3	LRN Bit, defined for data telegram
DB0.2...DB0.0	Not used (set to “zero”)

More information are available in the latest release version of the published equipment profiles EEP of the EnOcean Alliance. [www.enocean-alliance.org](http://www.enocean-alliance.org)

## 7.2 Description of individual functions

Based on section 7.2

### 7.2.1 Setpoint Selection (DB1.2, RCU to MVA004)

Selection whether A5-20-01 and the actuator is used with Valve Position (Controller running in the room or building control system) or with its internal temperature control loop.

### 7.2.2 Valve position [%] and Set temperature [°C] in actuator mode (DB3, RCU to MVA004)

The external radio partner transmits the temperature setpoint for the internal controller (0 ... + 40°C, DB3.7 ... DB3.0 = 0 ... 255). The use of a separate, external room temperature sensor is recommended whose room temperature (DB2.7 ... DB2.0) is transmitted to the drive by the room controller as part of the A5-20-01 protocol. The internal controller thus does not use the ambient temperature measured in the near field of the radiator, but the actual room temperature.



When operating with an internal temperature sensor, DB2.7 ... DB2.0 must be set to 0x00. Values not equal to 0x00 are interpreted as sent room temperatures and thus lead to faulty control behavior.

Valve position (%): The external radio partner transmits a 0 ... 100% control signal (DB3.7 ... DB3.0 = 0 ... 100) and converts it into an actuating movement by the actuator (0% = closed valve / 100% = completely open valve).

### 7.2.3 Summer Mode (DB1.3)

When the actuator receives the status message „Summer mode ON“ from the external radio master, then the valve opens and the transmit/receive interval is increased from 2/5/10 minutes to 8 hours. It is possible to wake up the iTRV through 1 x pressing the push button. Then the iTRV receives the new setting from the room controller.

### 7.2.4 Recognition of valve position and reference run

The valve actuator recognizes during the teach-in the closing position of the valve. During operation the valve actuator does a full stroke (self-calibration) after every 30 movements, to avoid malfunction of the valve. It is not intended to trigger the recognition of the valve position via room controller.

## 7.3 Example of a radio protocol

### Radio protocol of valve actuator MVA to server /controller /gateway

Example in HEX "0x32 0x70 0x89 0x08"

- DB3.7...DB3.0 = 0x32 = 50: valve position is 50%
- DB2.7...DB2.0 = 0x70 includes
  - DB2.4 = 1 Energy storage capacity sufficient
  - DB2.5 = 1 Energy storage charged
  - DB2.6 = 1 Harvesting active
- DB1.7...DB1.0 = 0x89 = 137: Internal temperature =  $40 \cdot \text{DB}.1 / 255 = 40 \cdot 137 / 255 = 21,5 \text{ °C}$

- DB0.7...DB0.0 = 0x08: Data telegram

Radio protocol from server /controller /gateway to valve actuator

VALVE\_POS: Example in HEX "0x05 0x77 0x00 0x08"

- DB3.7...DB3.0 = 0x05 = 5: new valve position is 5%
- DB2.7...DB2.0 = 0x77 = 119: room temperature =  $255 - 119 = 136 \Rightarrow 40 * 136 / 255 = 21,3 \text{ } ^\circ\text{C}$
- DB1.7...DB1.0 = 0x00:
  - o DB1.3 = 0: regular default radio cycle (no summer mode)
  - o DB1.2 = 0: DB3.7...DB3.0 is set to valve position %
- DB0.7...DB0.0 = 0x08: Data telegram

SET\_TEMP: Example in HEX "0x80 0x81 0x04 0x08"

- DB3.7...DB3.0 = 0x80 = 128: New target temperature is  $40 * 128 / 255 = 20,1 \text{ } ^\circ\text{C}$
- DB2.7...DB2.0 = 0x81 = 129: room temperature =  $255 - 129 = 126 \Rightarrow 40 * 126 / 255 = 19,8 \text{ } ^\circ\text{C}$
- DB1.7...DB1.0 = 0x04:
  - o DB1.3 = 0: regular default radio cycle (no summer mode)
  - o DB1.2 = 1: DB3.7...DB3.0 is set to internal temp.-controller with default duty cycle (Summer bit not active)
- DB0.7...DB0.0 = 0x08: Data telegram

More information are available in the latest release version of the published equipment profiles EEP of the EnOcean Alliance. [www.enocean-alliance.org](http://www.enocean-alliance.org)

## 8 EnOcean Remote Management (ReMan), Remote Commissioning (ReCom)

### 8.1 EnOcean Link Table

MVA004 supports the following number of tech-in relationships:

- Inbound EnOcean Link Table: 0 Tech-in relationships (not existing)
- Outbound EnOcean Link Table: 3 Tech-in relationships

Comments:

MVA004 uses an outbound link table only, inbound relationships are not supported. Manually erasing the outbound link table is not possible. Manual pairing (tech-in) however overwrites the first entry of the outbound link table, clearing the other two entries.

### 8.2 Outbound Teach-in

Outbound teach-in is supported for EEP A5-20-01 (4BS)

Two options are available to teach-in MVA004 with an external Gateway/Controller:

- Manually via teach-in message (4BS version 3)
- Using Remote commissioning

### 8.3 ReMan supported functions

- PING
- LOCK, UNLOCK (Default Security ID: 0xFFFFFFFF)
- SET CODE
- QUERY ID, QUERY STATUS

For further details, pls. refer to the document "Remote Management" by EnOcean GmbH:  
[https://www.enocean.com/fileadmin/redaktion/pdf/tec\\_docs/RemoteManagement.pdf](https://www.enocean.com/fileadmin/redaktion/pdf/tec_docs/RemoteManagement.pdf)

```

<ReMan>
  <Cmd CmdId="0x0001">
    <Description>
      Unlock - RM_FN_UNLOCK
    </Description>
  </Cmd>
  <Cmd CmdId="0x0002">
    <Description>
      Lock - RM_FN_LOCK
    </Description>
  </Cmd>
  <Cmd CmdId="0x0003">
    <Description>
      Set security - RM_FN_SET_CODE
    </Description>
  </Cmd>
  <Cmd CmdId="0x0004">
    <Description>
      Query ID - RM_FN_QUERY_ID
    </Description>
  </Cmd>
  <Cmd CmdId="0x0006">
    <Description>
      Ping - RM_FN_PING_COMMAND
    </Description>
  </Cmd>
  <Cmd CmdId="0x0007">
    <Description>
      Query supported RPC functions - RM_FN_QUERY_FUNCTION_COMMAND
    </Description>
  </Cmd>
  <Cmd CmdId="0x0008">
    <Description>
      Query last Status - RM_FN_QUERY_STATUS
    </Description>
  </Cmd>

```

#### 8.4 ReCom supported standard functions

Remote Commissioning Mandatory Commands Bundle:

- Remote Commissioning Acknowledge
- Get Product ID Query & Response

EnOcean Link Table Basic Commands Bundle

- Get Link Table Metadata Query & Response
- Get Link Table Query & Response
- Set Link Table Content

Configuration Parameters Bundle

- Get Device Configuration Query & Response
- Set Common Configuration Query
- RESET DEVICE DEFAULTS

RESET DEVICE DEFAULTS: MVA will execute reference run and reset all internal parameter to DEFAULT values (Table 4.5). Link connections and Security Code will not be changed.

```

<ReComm>
  <Cmd CmdId="0x0210">
    <Description>
      Get Link Table Metadata Query
  <Cmd CmdId="0x0211">
    <Description>
      Get Link Table Query
  <Cmd CmdId="0x0212">
    <Description>
      Set Link Table Content
  <Cmd CmdId="0x0227">
    <Description>
      Get Product Id Query
  <Cmd CmdId="0x0230">
    <Description>
      Get Device Configuration Query
  <Cmd CmdId="0x0231">
    <Description>
      Set Device Configuration Query
  <Cmd CmdId="0x0310">
    <Description>
      Get Firmware Version Query
  <Cmd CmdId="0x0224">
    <Description>
      Reset Device Defaults

```



### 8.5 ReCom supported MVA internal parameter

Parameter	INDEX	Description
Ambient to target temp offset [K]	0	<b>(0x00) 0 ... Auto* (DEFAULT)</b> (0x01) 1 ... -3 K (0x02) 2 ... -2 K (0x03) 3 ... -1 (0x04) 4 ... 0 K (0x05) 5 ... +1 K (0x06) 6 ... +2 K (0x07) 7 ... +3 K ... (0x0F) 15 ... +11 K
Radio communication interval [s/min]	1	<b>(0x00) 0...Auto * (DEFAULT)</b> (0x01) 1 ... 10sec (for debugging only) (0x02) 2 ... 2min (0x03) 3 ... 5min (0x04) 4 ... 10 min (0x05) 5 ... 20min (0x06) 6 ... 30min  * Automatic mode: 2/5/10 minutes interval based flow temperature and internal storage
Execute Reference Run	10	0x01  <b>DEFAULT 0x00</b>
Auto ambient to target offset parameter	11	(0x00 ... 0xFF) 0 ... 255  <b>MVA004 DEFAULT* 44 (0x2C)</b> * Micropelt Internal parameter
Temp.-control loop gain parameter	12	(0x00 ... 0xFF) 0 ... 255 = 10x GAIN  <b>DEFAULT 30 = 0x1E</b>
Battery open circuit voltage (V)	13 READ ONLY	(0x00 ... 0xFF) 0 ... 255 = 10x Voltage  Example 0x21 = DEZ 33 : 10 = 3,3Volt

Please contact Micropelt to receive related xml (DDF) file with further technical details.

## 8.6 Dolphin View DO command examples

UNLOCK	SYS_EX: C0 02 7F F0 01 <u>FF FF FF FE</u> Destination ID	Default security-ID: 0xFFFFFFFF
LOCK	SYS_EX: 40 02 7F F0 02 <u>FF FF FF FE</u> Destination ID	Default security-ID: 0xFFFFFFFF
SET_CODE	SYS_EX: 40 02 7F F0 03 <u>FF FF FF FE</u> Destination ID	Default security-ID: 0xFFFFFFFF
PING	SYS_EX: 40 00 7F F0 06 00 00 00 00 Destination ID	
Query_Status	SYS_EX: 40 00 7F F0 08 00 00 00 00 Destination ID	
Get_Link_Table_Metadata	SYS_EX: 40 00 7F F2 10 80 00 02 00 Destination ID	
Get All Link Table Data	SYS_EX: 40 01 FF F2 11 80 00 02 00 Destination ID	
SET_Link_Table_Index 0	SYS_EX: C0 05 7F F2 12 80 <u>00 FF FF</u> Destination ID SYS_EX: C1 <u>AA FF</u> A5 20 01 00 00 00 Destination ID  Default: 0xFFFFFFFF	0 = Outbound Linktable Index 0 0xFFFFAAFF = EURID example
SET_Link_Table_Index 1	SYS_EX: C0 05 7F F2 12 80 <u>01 FF FE</u> Destination ID SYS_EX: C1 <u>AE FC</u> A5 20 01 00 00 00 Destination ID  Default: 0xFFFFFFFF	1 = Outbound Linktable Index 1 0xFFFEAEFC = EURID example
SET_Link_Table_Index 2	SYS_EX: C0 05 7F F2 12 80 <u>02 FF FF</u> Destination ID SYS_EX: C1 <u>AA FF</u> A5 20 01 00 00 00 Destination ID  Default: 0xFFFFFFFF	2 = Outbound Linktable Index 2 0xFFFFAAFF = EURID example
Get_Device_Config	SYS_EX: 40 02 FF F2 30 00 00 00 <u>14</u> Destination ID SYS_EX: 41 00 00 00 00 00 00 00 Destination ID	Index 0 ... 0x14 (20 Parameters)
Set_Device_Config_Index 0 <b>Ambient-to-Target-offset</b>	SYS_EX: 40 02 7F F2 31 00 <u>00 01 06</u> Destination ID  Default: 0x00 (Auto mode)	0 = Index 0 1 = Length 0x06 = Value (+2K)
Set_Device_Config_Index 1 <b>RF-Com-Interval</b>	SYS_EX: 40 02 7F F2 31 00 <u>01 01 04</u> Destination ID  Default: 0x04 = 10 minutes RF interval	1 = Index 1 1 = Length 0x04 = Value (10min)
Set_Device_Config_Index 10 <b>REFERENCE-RUN</b>	SYS_EX: 40 02 7F F2 31 00 <u>0A 01 00</u> Destination ID  Default: 0x00	A = Index 10 1 = Length 0x01 = Value (Exec. Ref.-Run)
Set_Device_Config_Index 11 <b>Offset-a-parameter</b>	SYS_EX: 40 02 7F F2 31 00 <u>0B 01 00</u> Destination ID 0 ... 255  Default = 0x2C (DEZ44) MVA004 Default 44 MVA003 Default 75	B = Index 11 Internal offset compensation parameter (a)
Set_Device_Config_Index 12 <b>Temp.-Cntr.-p-parameter</b>	SYS_EX: 40 02 7F F2 31 00 <u>0C 01 00</u> Destination ID  0 ... 255 Default = 0x1E (DEZ30) => GAIN = 3	C = Index 12 Internal temperature controller gain (p) parameter
RESET_DEVICE_DEFAULT	SYS_EX: 40 00 <u>84 92 24 80</u> 00 00 00 Destination ID <u>84</u> = Length (required)  1000 0000 = 0x80 Reset device parameter 0110 0000 = 0x60 Reset link tables 1110 0000 = 0xE0 Reset parameter and link tables	Reset device to default values and re-start 10sec for 10min radio communication interval

## 9 Extended features and functions

Micropelt's newest generation of wireless heating valve actuators integrate and support a number of features and functions that allow any time and over-the-air status check and monitoring. Internal sensor and performance data have been stored over a longer time period accessible through a serial data dump. Unlike the remote commissioning functions listed under 4.5, the following Data logs are accessible on request only:

- Data log readout of battery open-circuit voltage V
- Data log readout of harvester open-circuit voltage V
- Data log readout ambient temperature °C
- Data log readout of flow pipe temperature °C

The above mentioned data log data's may not be available in the current MVA004 product release. Pls. get in touch with Micropelt to get the latest status.

## 10 Product ID and label

The MVA004 Product ID consists of the Micropelt manufacturer ID as well as the product reference number. All functions and properties are available electronically in the shape of the Device Description File (DDF).

Device	Manufacturer ID	Product Reference
MVA004 Valve Actuator	0x0049	0x00000000

Labeling of each valve actuator is according to the EnOcean alliance QR-Code specification, which does include EURID (EnOcean Unique Radio Identifier) as well as product ID. In addition to such mandatory information, the label also includes the vendor-specific ReMan Security code, which is fixed and internally stored.

The Micropelt MVA004 label does include:

– 30S	EURID_48bit	EnOcean Unique Radio Identifier, 6 Byte Hexadecimal
– 1P	004900000000	ManID = Micropelt, Product Reference = 0x00000000
– 10Z	00	Header Data Structured Free Text
– 11Z	ReMan_SC_32bit	ReMan Security Code, 4 Byte Hexadecimal

30S	0000019145B8	<i>EURID (0x019145B8)</i>
1P	004900000000	<i>Product-ID (ManID = 0x0049; Product Reference = 0x00000000)</i>
10Z	00	<i>Version der nachfolgenden Zeilen (0x00)</i>
11Z	FFFFFFFFE	<i>ReMan Security Code (0xFFFFFFFFE)</i>



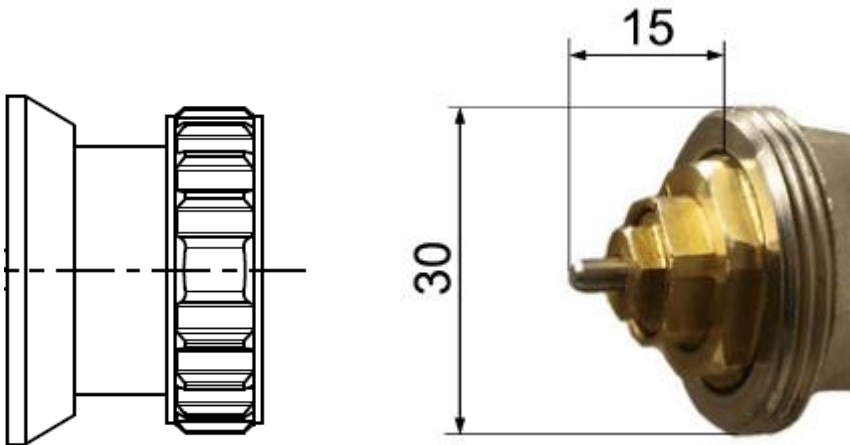
QR-Code: 30S0000019145B8+1P004900000000+10Z00+11ZFFFFFFFFE

## 11 Performance data

Parameter	Range
Valve thread	M 30 x 1,5 (adapter available for other types)
Ambient operating temperature	0 to 40°C, max 70% rH
Flow pipe temperature	75°C max
Transportation & storage temperature range	-10 to +45°C, max 70% rH
Max pin stroke (calibration range)	> 5 mm
Operating pin stroke (0-100 %)	2.5 mm typical
Pin Stroke Resolution (defined by EnOcean Equipment Profile A5-20-01)	Steps of 1% (smallest executable position change has to be 3% from current physical position)
Adjustment speed	0.95 mm/s typical
Stall force	100 N typical
Noise level	< 30 dB(A)
RF communication interval	Default: Automatic 2/5/10 minutes Other settings through Remote Commissioning
Activation and debug RF communication interval	~ 10 sec (will revert to the default 10 minutes after 10 minutes)
Antifreeze	Below 6°C, open valve to 95% (referring to operating stroke)
Safe position (following 6 consecutive communication failures)	Internal temperature controller with 21°C target value Will revert to standard operation as soon as radio communication is online again
EnOcean EEP and operating mode	A5-20-01 (Valve Position and SetTemp)
EnOcean Remote management & Remote commissioning capability	Yes (Section 8)
DDF (Device description file)	Yes (Section 8)
Life cycle status and monitoring capabilities	Yes (Section 9)
Accuracy of internal ambient temperature sensor	+/- 0.5 °C
Offset of internal ambient temperature sensor	Default: Automatic offset correction Fixed offset settings through Remote Commissioning
Energy storage	Construed for full year operation
Energy generation minimum requirement	90 standard heating days with > 45°C flow pipe temperature
Radio carrier frequency	868.3 MHz
Maximum radiated power	+1.4 dBm (EN 300220-2:V3.1.1)
Receiver	Category 2 (EN 300 220-1 V3.1.1)
Conformity	CE

## 12 Mechanical Interface to Radiator Valve

The MVA004 is designed to mount directly onto an M30 x 1.5mm radiator valve body. Several other valve types are supported by metallic adapter pieces.



### 13 Annex 1: List of adapters for commonly used non-M30x1,5 valve bodies

	<b>Danfoss Series 2</b> (M20 x 1.0) Item no. 9703-24.700		<b>Danfoss Series 3</b> (M23.5 x 1.5) Item no. 9704-24.700
	<b>Danfoss RA2000</b> Item no. 9702-24.700		<b>Adapter Oventrop</b> (M30 x 1.0) Item no. 9700-10.700
	<b>Adapter Comap</b> (M28 x 1.5) Item no. 9700-55.700		<b>Danfoss RAV</b> Item no. 9800-24.700
	<b>Danfoss RAV-L</b> (Ø26 mm) Item no. 9700-24.700		<b>Adapter Vaillant</b> (Ø 30 mm) Item no. 9700-27.700
	<b>Adapter TA</b> (M28 x 1.5) Item no. 9701-28.700		<b>Adapter Herz</b> (M28 x 1.5) Item no. 9700-30.700
	<b>Adapter Markaryd</b> (M28 x 1.5) Art-No. 9700-41.700		<b>Adapter Giacomini</b> (ca. 22.6 mm) Item no. 9700-33.700

## 14 Annex 2: Theft protection

Pls. contact Micropelt to receive more information about **MVA-DS01** theft protection solution.

		<p>Stainless steel clamp with distance rings and security screw (requires special tool to open)</p>