micropelt

Wireless heating valve actuator
MVA003 EnOcean

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

Preliminary

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1 Introduction

This document defines the properties of Micropelt's battery free thermostatic radiator valve MVA003. The unit is directly mounted onto the radiator valves, 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 MVA003 contains a thermoelectric harvesting module and integral energy storage. The internal storage is charged throughout the heating season from surplus energy produced by the harvesting element. This allows the actuator to operate 365 day/year. 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.

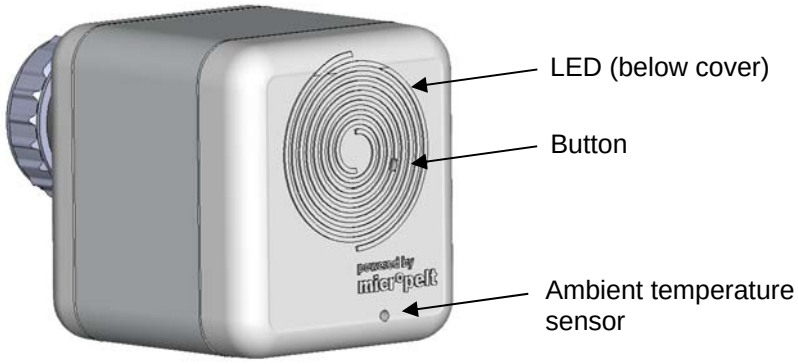
☝ MVA003 is operating with EnOcean standard EEP A5-20-01 (4BS) valve position or set temperature.

☝ MVA003 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.

☝ MVA003 has a button lock after one hour function integrated that will prevent from unintended use.

The unit's user interface consists of one user button and one LED. An ambient temperature sensor serves both the temperature control and the antifreeze function. The actuator fits a standard radiator valve M30 x 1.5 mm.

MVA003



2 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.

2.1 Installation with Manual Pairing

No	Objective	Action	LED Activity	Reasons for failure
1)	Pairing from mounting position (= shipping condition = OFF) or normal operation (while buttons not locked)	Press pushbutton twice within 2 seconds. Unit sends pairing request and remains in mounting position = shipping condition = OFF If unit is not in mounting position, it moves to mounting position now.	Success: Single red flash Failure: 6x red flash	Controller or gateway either not present or not in pairing mode, so that pairing fails
2)	Mounting ☝	Mount the actuator before executing run-in sequence and normal operation		
3)	Run-in sequence and normal operation from mounting position	Press pushbutton once. Unit executes run-in sequence, radio communication occurs once every 10 seconds for the duration of 10 minutes, then relaxes to once every 10 minutes. ☝ One hour after this action, the pushbutton switch will lock and can only be unlocked, by performing RESET	Success: Radio communication Failure: 3x red flash, unit returns to mounting position = OFF	Unit is not attached to an appropriate valve, an inadequate adapter is being used, motor or gear error, unit is not paired, unit cannot contact the controller
4)	Get new target value (while buttons not locked)	Press pushbutton once. Unit requests new settings from controller or gateway	Success: Single red flash Failure: 3x red flash	Unit is not paired, unit cannot contact the controller
5)	Return to mounting positon	Press pushbutton twice within 2 seconds. Unit moves the plunger fully in and sets inner stop reference anew, then turns off, remaining in mounting position	3x red flash, unit returns to mounting position = OFF	
6)	RESET from normal operation	Push and hold the button for at least 10 seconds: Unit moves to 50%, resets, awakes, moves the plunger fully in, does the run-in	After 10 sec have elapsed and RESET is triggered: Single red flash For run-in sequence, see item (3)	User failed to press the pushbutton long enough

		sequence and enters normal operation. It assumes it is paired. For 10 minutes, it runs at a 10 second radio communication interval.		
7)	RESET from mounting position	Push and hold the button for at least 10 seconds: Unit moves the plunger fully in and sets inner stop reference anew, then turns off, remaining in mounting position	After 10 sec have elapsed and RESET is triggered: Single red flash	User failed to press the pushbutton long enough

2.2 Installation with Remote Commissioning

	Objective	Action	LED Activity	Reasons for failure
1)	Mounting 	Pls. mount the actuator before executing run-in sequence and normal operation		
2)	Run-in sequence and normal operation from mounting position	Single-press push-button (< 1 sec) Unit executes run-in sequence, radio communication occurs every 10 seconds for 10 minutes, giving opportunity for Remote Commissioning to configure the unit quickly. Once 10 minutes have elapsed, the radio communication interval defaults to 10 minutes.	Success: Single red flash Failure: 6x red flash	Motor or gear error
3)	Get new target value	Single-press push-button (< 1 sec) Unit immediately gets target value from controller / gateway, then moves to the new target	Success: Single red flash Failure: 3x red flash	Unit cannot contact the controller or gateway
4)	Return to mounting positon	Press pushbutton twice within 2 seconds. Unit moves the plunger fully in and sets inner stop reference anew, then turns off, remaining in mounting position	Success: 3x red flash, unit returns to mounting position = OFF	
5)	RESET followed by normal operation	Long-press push-button for at least 10 seconds: 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.	Success: Single red flash Failure: 3x red flash	Unit cannot contact the controller or gateway it has been paired with or unit has never been paired

3 Notes on radio operation

3.1 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	Typ 30 m range in passages, up to 100 m in halls
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”.

3.2 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.

3.3 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.

4 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.

4.1 Protocol Data Overview

Transmit mode from MVA to controller/ gateway/ server	
DB_3	Current valve position 0..100%, linear n=0..100
DB_2.Bit_7	Not used
DB_2.Bit_6	Active energy harvesting (valve is hot)
DB_2.Bit_5	Energy storage sufficiently charged
DB_2.Bit_4-0	Storage capacity
DB_1	Internal temperature of MVA
DB_0.Bit_7-4	Not used
DB_0.Bit_3	LRN Bit, defined for data telegram
DB_0.Bit_2-0	Not used

Receive mode from controller / gateway / server to MVA	
DB_3	New valve position 0..100% linear or Target temperature (0…40°C) Selection with DB_1.Bit_2-0)
DB_2	Room temperature from room sensor
DB_1.Bit_7-4	Not used
DB_1.Bit_3	Summer mode, transmit / receive time interval 8 hours
DB_1.Bit_2-0	Setpoint Selection 0: Valve position (0…100%) 1: Target Temp. (0…40°C)
DB_0.Bit_7-4	Not used
DB_0.Bit_3	LRN Bit, defined for data telegram
DB_0.Bit_2-0	Not used

4.2 Description of individual functions

Setpoint Selection

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.

Valve position / Set temperature in actuator mode (DB_3)

Based on 4.2.1:

Target temperature (°C): The room control unit transmits a target temperature between 0°C and +40°C which will be used as by the internal control loop to calculate valve positions.

It is recommended to also transmit the RCU temperature used to operate the MVA internal control loop (p-controller with GAIN).

Valve positon (%): From the external radio master a control value of 0..100% is transmitted and the valve actuator executes a valve movement (0% = valve closed / 100% = valve open).

Summer Mode (DB_1.Bit_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 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.

Recognition of valve position
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.

4.3 Example of a radio protocol

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

Example in HEX "0x32 0x60 0x89 0x08"
- DB.3 = 0x32 = 50: valve position is 50%
- DB.2 = 0x60: DB2.Bit_5 = 1 (Energy storage charged) / DB2.Bit_6 = 1 (Harvesting active)
- DB.1 = 0x89 = 137: Internal temperature = 40*DB.1/255 = 40*137/255 = 21,5 °C
- DB.0 = 0x08: Data telegram

Radio protocol from server /controller /gateway **to valve actuator**

VALVE POS: Example in HEX "0x05 0x81 0x00 0x08"
- DB.3 = 0x05 = 5: new valve position is 5%
- DB.2 0x77 = 119: room temperature = 255 - 119 = 136 = 40*136/255 = 21,3 °C
- DB.1 = 0x00: DB_1.Bit_3 = 0: regular radio cycle 10 Minutes (no summer mode)
- DB.0 = 0x08: Data telegram

SET_TEMP: Example in HEX "0x80 0x81 0x04 0x08"
- DB.3 = 0x80 = 128: New target temperature is 20,1°C
- DB.2 0x77 = 119: room temperature = 255 - 119 = 136 = 40*136/255 = 21,3 °C
- DB.1 = 0x04: DB_1.Bit_3 = 0: Internal Temp.-controller with 10min Duty Cycle (Summer bit not active)
- DB.0 = 0x08: Data telegram

5 EnOcean Remote Management (ReMan), Remote Commissioning (ReCom)

5.1 EnOcean Link Table

MVA003 supports the following number of tech-in relationships:

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

Comments:
MVA003 uses an outbound link table only, inbound relationships are not supported. Manually erasing the outbound link table is not possible. Manual pairing (teach-in) however overwrites the first entry of the outbound link table, clearing the other two entries.

5.2 Outbound Teach-in

Outbound tech-in is supported for EEP A5-20-01.

Two options are available to tech-in MVA with an external Gateway/Controller:

- Manual via Teach-in message (4BS version 3)
- Using Remote commissioning

5.3 ReMan supported functions

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

For further details, pls. refer to Remote Management EnOcean GmbH
https://www.enocean.com/fileadmin/redaktion/pdf/tec_docs/RemoteManagement.pdf

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

5.4 ReCom supported standard functions

Remote Commissioning Mandatory Commands Bundle:

- Remote Commissioning Acknowledge
- Get Product ID Query & Response

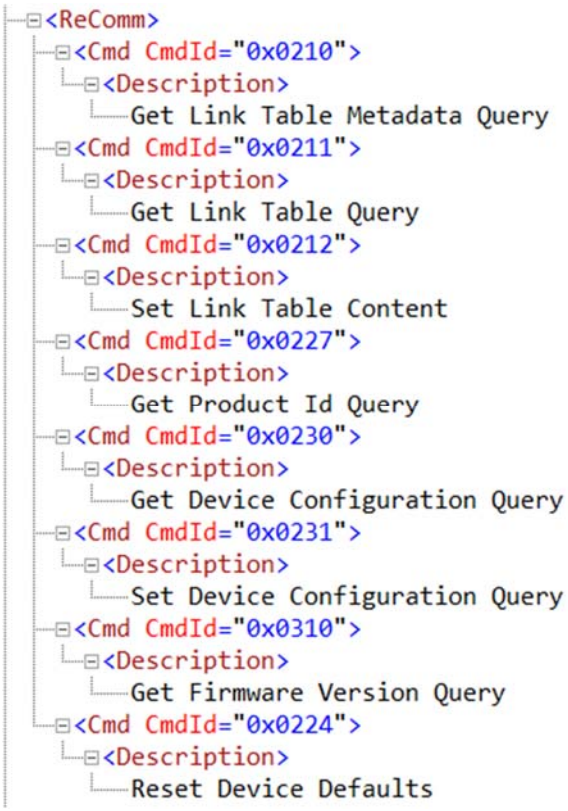
EnOcean Link Table Basic Commands Bundle

- 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.



5.5 ReCom supported MVA internal parameter

Parameter	INDEX	Description
Ambient to target temp offset [K]	0	**(0x00) 0 … Auto* (DEFAULT)** (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	(0x00) 0…Auto * (0x01) 1 … 10sec (for debugging only) (0x02) 2 … 2min (0x03) 3 … 5min **(0x04) 4 … 10 min (DEFAULT)** (0x05) 5 … 20min (0x06) 6 … 30min * Automatic mode: 2/5/10 minutes interval based flow temperature and internal storage
Safe mode setting [%]	2	(0x00 … 0x64) 0 … 100% **DEFAULT 50% (0x32)**
Safe mode communication period [h]	5	(0x00) 0 … 0,5h **(0x01) 1 … 1h (DEFAULT)** (0x02) 2 … 2h (0x03) 3 … 4h (0x04) 4 … 8h (0x05) 5 … 24h (0x06) 6 … 48h (0x07) 7 … 96h
Execute Reference Run	10	0x01 **DEFAULT 0x00**
Auto ambient to target offset parameter	11	(0x00 … 0xFF) 0 … 255 **MVA003 DEFAULT 75* (0x4B)** * Micropelt Internal parameter
Temp.-control loop gain parameter	12	(0x00 … 0xFF) 0 … 255 and multiply with 10 **DEFAULT 3 (0x1E)**
Battery open circuit voltage (V)	13 READ ONLY	(0x00 … 0xFF) 0 … 255 and divide by 10 Example 0x21 = DEZ 33 : 10 = 3,3Volt

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

5.6 Dolphin View DO command examples

UNLOCK	SYS_EX: C0 02 7F F0 01 FF FF FF FE Destination ID	Default security-ID: 0xFFFFFFFE
LOCK	SYS_EX: 40 02 7F F0 02 FF FF FF FE Destination ID	Default security-ID: 0xFFFFFFFE
SET_CODE	SYS_EX: 40 02 7F F0 03 FF FF FF FE Destination ID	Default security-ID: 0xFFFFFFFE
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 00 FF FF Destination ID SYS_EX: C1 AA FF A5 20 01 00 00 00 Destination ID Default: 0xFFFFFFF	0 = Outbound Linktable Index 0 0xFFFFAAFF = EURID example
SET_Link_Table_Index 1	SYS_EX: C0 05 7F F2 12 80 01 FF FE Destination ID SYS_EX: C1 AE FC A5 20 01 00 00 00 Destination ID Default: 0xFFFFFFF	1 = Outbound Linktable Index 1 0xFFFEAEFC = EURID example
SET_Link_Table_Index 2	SYS_EX: C0 05 7F F2 12 80 02 FF FF Destination ID SYS_EX: C1 AA FF A5 20 01 00 00 00 Destination ID Default: 0xFFFFFFF	2 = Outbound Linktable Index 2 0xFFFFAAFF = EURID example
Get_Device_Config	SYS_EX: 40 02 FF F2 30 00 00 00 14 Destination ID SYS_EX: 41 00 00 00 00 00 00 00 00 Destination ID	Index 0 … 0x14 (20 Parameters)
Set_Device_Config_Index 0 **Ambient-to-Target-offset**	SYS_EX: 40 02 7F F2 31 00 00 01 06 Destination ID Default: 0x00 (Auto mode)	0 = Index 0 1 = Length 0x06 = Value (+2K)
Set_Device_Config_Index 1 **RF-Com-Interval**	SYS_EX: 40 02 7F F2 31 00 01 01 04 Destination ID Default: 0x04 = 10 minutes RF interval	1 = Index 1 1 = Length 0x04 = Value (10min)
Set_Device_Config_Index 2 **Safe-mode-setting-%**	SYS_EX: 40 02 7F F2 31 00 02 01 32 Destination ID Default: 0x32 (50%)	2 = Index 2 1 = Length 0x32 = Value (50%)
Set_Device_Config_Index 5 **Safe-mode-communication-period**	SYS_EX: 40 02 7F F2 31 00 02 01 01 Destination ID Default: 0x01 (1 hour RF interval)	2 = Index 2 1 = Length 0x01 = Value (1h)
Set_Device_Config_Index 10 **REFERENCE-RUN**	SYS_EX: 40 02 7F F2 31 00 0A 01 00 Destination ID Default: 0x00	A = Index 10 1 = Length 0x01 = Value (Exec. Ref.-Run)
Set_Device_Config_Index 11 **Offset-a-parameter**	SYS_EX: 40 02 7F F2 31 00 0B 01 00 Destination ID 0 … 255 Default = 0x4B (DEZ75) MVA004 Default 91 MVA003 Default 75	B = Index 11 Internal offset compensation parameter (a)
Set_Device_Config_Index 12 **Temp.-Cntr.-p-parameter**	SYS_EX: 40 02 7F F2 31 00 0C 01 00 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 84 92 24 80 00 00 00 Destination ID 84 = 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 RF interval

6 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 MVA003 product release.
Pls. get in touch with Micropelt to get the latest status.

7 User Control description

7.1 Installation with Manual Pairing

Pairing / Teach-In, Mounting position and OFF

Set the EnOcean controller or gateway to pairing mode. Then take the MVA003 from its packing and press the button at least twice within 2 seconds. MVA003 confirms successful pairing by a single flash of the red LED. An unsuccessful pairing attempt is indicated by a 6x flash of the red LED. In this case, check the setting of the EnOcean gateway and repeat the pairing procedure. In case the MVA003 is not in mounting position already, it now moves to mounting position (= shipping condition = OFF). It does so, even if the pairing attempt failed.

Attaching the unit to the radiator valve

After pairing, the MVA003 is always in mounting position, e.g. the plunger is moved fully inwards so that the unit can be attached to a radiator valve without force. Remove any existing thermostatic head that may be affixed to the radiator valve. Assure that the valve seat and the valve thread are clean, then place the MVA003 against the valve seat and tighten the connecting nut. If appropriate, secure the connecting nut through a theft-protection bracket.

Activating the unit

Press the MVA003 button once for < 1 sec, in order to initiate the run-in sequence. This calibrates the unit against the particular valve, determining closed-valve and open-valve positions. A single red flash indicates success and a triple red flash indicates failure. In the event of failure, the MVA003 will return to mounting position and power down. In this case, verify that the unit is correctly and firmly attached to the valve. In case of an adapter piece being used, verify that it's the correct adapter for the valve and that it is installed according to the instructions. Once everything is checked and any errors are corrected, repeat this paragraph.

Start using MVA003

After activation, MVA003 powers up its radio and contacts the EnOcean controller / gateway, requesting new settings. It does so every 10 minutes; however, for the first 10 minutes after activation, the radio communication period is 10 seconds as to speed up installation and test of a freshly installed unit.

Return to mounting position

Double press the button. The device will turn the motor back to mounting position and switch off.

RESET

The MVA003 RESET function is useful if the unit exhibits inexplicable behavior. It is being triggered by pressing the pushbutton for at least 10 seconds. A single red flash confirms that the 10 sec have elapsed and the reset-sequence starts. Now it depends if the unit was in normal operation or in mounting position (=off).
If MVA003 was in normal operation, the valve is opened 50%, then the actual reset is applied to the unit. The motor moves fully inward, then goes through the run-in sequence and finally enters normal operation. At first, the radio communicates every 10 seconds. After 10 minutes have elapsed, it switches to the user-set radio communication period (default is 10 minutes)
If MVA003 was in mounting position (=off), the motor moves against the inner end stop, thereby recalibrating. There is no further motor movement. The unit remains in mounting position and switches off.

Removal of MVA003 from the Valve

Press the pushbutton twice. If the motor starts moving, wait for it to stop. Loosen the connecting nut, remove the unit and place it into its original packing.

7.2 Installation with Remote Commissioning

Attaching the unit to the radiator valve

Take the MVA003 from its packing. It should be in mounting position, e.g. the plunger is moved fully inwards so that the unit can be attached to a radiator valve without force. Remove any existing thermostatic head that may be affixed to the radiator valve. Assure that the valve seat and the valve thread are clean, then place the MVA003 against the valve seat and tighten the connecting nut. If appropriate, secure the connecting nut through a theft-protection bracket.

Activating the unit

Press the push-button of the MVA003 buttons once for < 1 sec, in order to initiate the run-in sequence. This calibrates the unit against the particular valve, determining closed-valve and open-valve positions. A single red flash indicates success and a triple red flash indicates failure. In the unlikely event of failure, start over from mounting position. Section 0 explains how to get there.

Start using MVA003

After activation, MVA003 powers up its radio and contacts the EnOcean controller / gateway, requesting new settings.

The controller / gateway then switches the MVA003 into Remote Commissioning mode by responding using Remote Management command UNLOCK instead of 4BS (refer to section 4).

In order to accomplish the configuration of a freshly installed unit as fast as possible, the radio first communicates every 10 seconds. After 10 minutes have elapsed, the communication period relaxes to the default 10 minutes.

Return to mounting position

Double press the button. The device will turn the motor back to mounting position and switch off.

RESET

The MVA003 RESET function is useful if the unit exhibits inexplicable behavior. It is being triggered by pressing the pushbutton for at least 10 seconds. A single red flash confirms that the 10 sec have elapsed and the reset-sequence starts. Now it depends if the unit was in normal operation or in mounting position (=off).
If MVA003 was in normal operation, the valve is opened 50%, then the actual reset is applied to the unit. The motor moves fully inward, then goes through the run-in sequence and finally enters normal operation. At first, the radio communicates every 10 seconds. After 10 minutes have elapsed, it switches to the user-set radio communication period (default is 10 minutes)
If MVA003 was in mounting position (=off), the motor moves against the inner end stop, thereby recalibrating. There is no further motor movement. The unit remains in mounting position and switches off.

Removal of MVA003 from Valve

Press the pushbutton twice. If the motor starts moving, wait for it to stop. Loosen the connecting nut, remove the unit and place it into its original packing.

8 Product ID and label

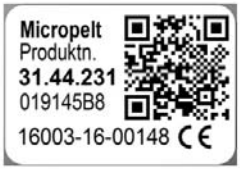
The MVA003 Product ID consists of the Micropelt manufacturer ID as well as the product reference number. All functions and properties are available as electronic Device Description File (DDF).

Device	**Manufacturer ID**	**Product Reference**
MVA003 Valve Actuator	0x0049	0x00000000

Labeling of each valve actuator is according the EnOcean alliance QR-Code specification, which does include EURID (EnOcean Unique Radio Identifier) as well as device product ID. In addition to such mandatory information does the label also include vendor specific ReMan Security code, which is fix and internally stored. The Micropelt MVA003 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	***EURID** (0x019145B8))*
1P	004900000000	***Product-ID** (ManID = 0x0049; Product Reference = 0x00000000)*
10Z	00	***Version** der nachfolgenden Zeilen (0x00)*
11Z	FFFFFFFE	***ReMan Security Code** (0xFFFFFFFE)*



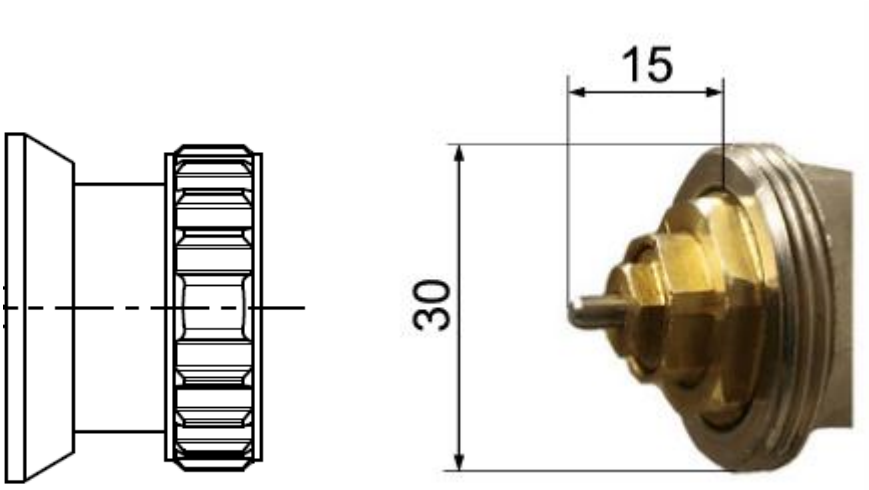
QR-Code: **30S0000019145B8+1P004900000000+10Z00+11ZFFFFFFFE**

9 Performance data

Parameter	Range
Ambient operating temperature	0 to 40°C, max 70% rH
Flow pipe temperature	75°C max
Transportation & storage temperature range	-20 to +65°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%(0.025mm) (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
RF communication interval	10 minutes
Activation and debug RF communication interval	~ 10 sec (will revert to the default 10 minutes after 10 minutes)
RF duty cycle, after 6 consecutive RF communications failed	~ 60 minutes
Valve protection	If valve immobile for > 2 weeks, execute reference-run and return to previous position
Antifreeze	Below 6ºC, open valve to 50% (referring to operating stroke)
Safe position (on loss of radio contact)	Open valve to 50% (referring to operating pin stroke)
EnOcean EEP and operating mode	A5-20-01 Valve Pos. (%) A5-20-01 Set Temperature (°C)
EnOcean Remote management & Remote commissioning capability	Yes (Section 4)
DDF (Device description file/xml)	Yes (Section 4)
Life cycle status and monitoring capabilities	Yes (Section 5)
Accuracy of internal ambient temperature sensor	+/- 0.5 ºC
Offset of internal ambient temperature sensor	Auto Mode (ReCom parameter section 4.5)
Energy storage	Yes
Energy generation minimum requirement	90 standard heating days per year @ 40ºC flow pipe temperature and 8h heating @ 10minutes duty cycle and steps of 10% per cycle without summer bit (365days operation)
Battery voltage flag	When battery voltage drops below 3.1 V (prefer more margin as this level is also used to reset communication interval): 1) Set battery-low flag 2) Reset RF communication interval to default 10 min
Product life expectancy	10 years
Conformity	CE

10 Mechanical Interface to Radiator Valve

The MVA003UCL is designed to mount onto an M30 x 1.5mm radiator valve bodies.
Several other valve types are supported by metallic adapter pieces.

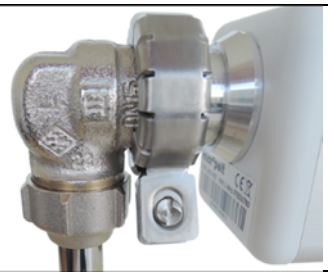


11 Annex 1: List of adapters for commonly used non-M30x1,5 valve bodies

	**Danfoss Series 2** (M20 x 1.0) Item no. 9703-24.700		**Danfoss Series 3** (M23.5 x 1.5) Item no. 9704-24.700
	**Danfoss RA2000** Item no. 9702-24.700		**Adapter Oventrop** (M30 x 1.0) Item no. 9700-10.700
	**Adapter Comap** (M28 x 1.5) Item no. 9700-55.700		**Danfoss RAV** Item no. 9800-24.700
	**Danfoss RAV-L** (∅26 mm) Item no. 9700-24.700		**Adapter Vaillant** (∅ 30 mm) Item no. 9700-27.700
	**Adapter TA** (M28 x 1.5) Item no. 9701-28.700		**Adapter Herz** (M28 x 1.5) Item no. 9700-30.700
	**Adapter Markaryd** (M28 x 1.5) Art-No. 9700-41.700		**Adapter Giacomini** (ca. 22.6 mm) Item no. 9700-33.700

12 Annex 2: Theft protection

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

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