

DEOS TEO Configuration w/ *LoRa Toolkit*

User manual (Last updated 2023-01-30 – V1.1)

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» CONTENT

» Content	1
» Function Description	2
» <i>Provided Consumables & Accessories</i>	2
» <i>Software applications</i>	2
» <i>Compatible LoRaWAN sensors</i>	3
» <i>Compatible valve adapters</i>	3
» General Regulations	4
» <i>Technical data</i>	4
» Safety Regulations	4
» Installation	5
» <i>Installation materials and auxiliary aids</i>	5
» <i>Mounting the device</i>	5
» <i>Activating the device</i>	5
» <i>Deactivating the device</i>	6
» Commissioning and Configuration with LoRa Toolkit	6
» <i>Setting up LoRaWan devices</i>	7
» <i>Importing LoRa devices via Excel (Excel import)</i>	9
» <i>Setting up rooms</i>	10
» <i>Adjusting room control parameter settings</i>	12
» <i>Setting up access to pro.Building Suite</i>	12
» <i>Uploading the configuration file</i>	14
» <i>Importing the license file</i>	15
» <i>Calling up the log file</i>	16
» <i>Setting up a user-specific UI</i>	17
» Data exchange	18
» <i>Reading data – input register</i>	18
» <i>Writing data – holding register</i>	19
» Disposal	20
» <i>Device Disposal</i>	20

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» FUNCTION DESCRIPTION

DEOS TEO is a system used to control the room temperature via radiators. The motor-driven actuator on the radiator is equipped with LoRaWAN radio technology. Communication takes place using a central gateway. A thermoelectric generator ensures maintenance-free operation. With the help of energy harvesting technology, electricity can be generated from the heat of the flow to charge the integrated battery.

Device settings can be made using a configuration software that is tailored to the specific application. Time programs and setpoint temperatures can be specified on a room level based on calendar functions using DEOS TEO.

Highlights at a glance

- Wireless solution for saving energy – reduction in energy consumption of up to 40%
- Self-charging thanks to the integrated thermoelectric generator
- Digitization of existing buildings with an intelligent wireless solution
- Robust design
- Conversion during operation
- Easy installation
- Made in Germany

» PROVIDED CONSUMABLES & ACCESSORIES

Art. no.	Description
DS-360498	DEOS TEO, thermostat for energy optimization
DS-360521	Magnetic tool for activating/deactivating DEOS TEO
DS-360517	Operation license via pro.Building Suite (optional)
	Quick Start Guide with mounting kit
	Excel spreadsheet with Dev EUIs and AppKeys (file name: LoRAConfig LS 12345678.xls)
	License file for activating the connection to the LoRaWAN gateway (file name: Lizenz.dltk, type DS-L-GWLIC-1)
	IP address of the gateway (standard: 192.168.23.150)
	User name for access to the gateway (standard: admin)
	Password for access to the gateway (standard: DEOS-AG)
optional	Login data for pro.Building Suite

» SOFTWARE APPLICATIONS

Art. no.	Type	Download link
	LoRa Toolkit	https://portal.deos-ag.com/

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» COMPATIBLE LORAWAN SENSORS

Art. no.	Type	Function
DS-360447	DEOS SAM	CO ₂ indoor air quality indicator
DS-360450	DS-L-EM300-TH	LoRaWAN sensor for °C and rH for outdoor applications
DS-360464	DS-L-EM500-CO ₂	LoRaWAN sensor for °C, rH, CO ₂ and ppm for outdoor applications
DS-360473	DS-L-ERS-Lite	LoRaWAN sensor for °C and rH for indoor applications
DS-360474	DS-L-EMS	LoRaWAN magnetic window and door contact for indoor applications
DS-360475	DS-L-ERS15CO ₂	LoRaWAN sensor for °C, rH., CO ₂ , light and motion detection for indoor applications
DS-360477	DS-L-WS301-868M	LoRaWAN magnetic contact switch
DS-360497	DS-L-ERS15	LoRaWAN sensor for °C, rH., light and motion detection for indoor applications
DS-360512	DS-L-WS101-868M-SOS	LoRaWAN Smart Button SOS
DS-360513	DS-L-WS101-868M-Scene	LoRaWAN Smart Button Scene

» COMPATIBLE VALVE ADAPTERS

Excerpt from DEOS TEO overview of metal valve adapters, see DEOS portal.

Make	DEOS Art. No.	Type	Metal adapter for ...
Danfoss	DS-360522	DS-MVA-RA2000	Thermostatic valve bodies RA (2000), connection: Ø (inner) 23 mm, with 2 Allen screws
Markaryd	DS-360524	DS-MVA-MARKARYD	Thermostatic valve bodies M28 x 1,5
Danfoss	DS-360525	DS-MVA-RAVL	Thermostatic valve bodies Danfoss RAV-L (Ø 26 mm), connection: 25.5 mm with 4 Allen screws
Danfoss	DS-360528	DS-MVA-RAV	Thermostatic valve bodies Danfoss RAV, connection: Ø (inner) 34 mm, with 4 Allen screws
Oventrop	DS-360529	DS-MVA-OV	Thermostatic valves M30 x 1,0
Coman	Upon request	M28 x 1.5	Thermostatic valve bodies
Danfoss	Upon request	Series 2 (M20 x 1.0)	Installation on radiator valve body with thermostatic insert
Danfoss	Upon request	Series 3 (M23.5 x 1.5)	Installation on radiator valve body with thermostatic insert
Giacomini	Upon request	approx. 22.6 mm	Thermostatic valves from Giacomini with a plastic seal
Herz	Upon request	M28 x 1.5	Thermostatic valve bodies
ISTA	Upon request	M32 x 1.0	Thermostatic valve bodies
TA	Upon request	M28 x 1.5	Thermostatic valve bodies
Vaillant	Upon request	Ø 30 mm	Thermostatic valve bodies

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» GENERAL REGULATIONS

» TECHNICAL DATA

Excerpt from data sheet v1d dated 05/15/2022 from the company **EH 4 GmbH, 79224 Umkirch, Germany. Subject to change. The information products from EH4 should be given preference in consideration.**

Wireless specifications	868.0 ... 868.6 MHz, 14 dBm; SF7BW125 CLASS A		
Interval of wireless communication	during installation cycle 10 seconds (for 5 minutes)	after communication errors interval 1 ... 3: 10 seconds interval 4: 120 seconds as of interval 5: every 60 minutes	
Measured variable	Temperature		
Energy storage LTO	500mAh (nominal)		
Assembly	on valve M30 x 1.5 TIP: For other valves, use a valve adapter in addition.		
Dimensions (WxDxH)	with valve connection 83 x 60 x 64 mm	without valve connection 63 x 60 x 64 mm	
Operating modes	with external room temperature sensor valve position %	without external room temperature sensor target room temperature °C	
Transport/Storage temperature	-20 ... 65°C		
Ambient temperature	0 ... 40°C		
Supply temperature	Max. 75°C		
Request for energy generation	Min. 90 days / year @ 45°C supply temperature		
Transport/Storage humidity	Max. 70% rH		
Ambient humidity	Max. 70% rH		
Accuracy of temperature sensors (internal)	valve side ±0.5°C	ambient side ±0.5°C	
Frost protection of sensor (valve connection)	6°C		
Operation at high altitudes	Max. 2000 m.a. s.l.		
Motor stroke	Calibration range up to 5.5 mm	Working range (0-100%) 2.56 mm (typically)	Resolution increments of 1%
Motor power	100N (typically)		
Motor driving speed	0.727 mm/s (typically)		
Noise level	< 35 dB(A) @ 70 N load		
Conformity with CE requirements	see EU declaration of conformity		
Weight	280 g		

» SAFETY REGULATIONS

See data sheet v1d, dated 05/15/2022, from the company **EH 4 GmbH, 79224 Umkirch, Germany. Subject to change. The information products from EH4 should be given preference in consideration.**

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» INSTALLATION

Excerpt from data sheet v1d, dated 05/15/2022, from the company **EH 4 GmbH, 79224 Umkirch, Germany. Subject to change. The information products from EH4 should be given preference in consideration.**

» INSTALLATION MATERIALS AND AUXILIARY AIDS

- » Magnetic tool (DS-MLR003-KEY)
- » Valve adapter, if required
- » Pipe wrench
- » Lubricant
- » License file for activating the connection to the LoRaWAN gateway (file name: Lizenz.dltk, type DS-L-GWLIC-1)
- » IP address of the gateway (standard: 192.168.23.150)
- » User name for access to the gateway (standard: admin)
- » Password for access to the gateway (standard: DEOS-AG)

» MOUNTING THE DEVICE

Procedure:

1. Remove the old thermostat head, if present.
2. Screw a valve adapter on the valve, if required.

TIP: Determine a suitable valve adapter based on the overview (see section *Compatible valve adapters, page 3*).

3. Screw the device on the valve (M30 x 1.5).

TIP: To improve ease of movement of the valve, ...

- spray a lubricant on the valve pin;
- using a monkey wrench, push in the valve pin and have it come back out; repeat this several times.

» ACTIVATING THE DEVICE

Procedure:

1. Use the magnetic tool to make contact with the logo at the front of the device for approx. 1 second. (see Fig. 1)



Fig. 1

2. Based on the acoustic and optical signals, determine the device status during activation as follows:

Number of acoustic/optical signals	Status	TIP
1x (briefly) / 1x	Successfully activated	Ongoing acoustic signals indicate a failed operation.
2x (briefly) / 2x	Successfully connected to gateway (join)	
3x (briefly) / 3x	Successfully homed	

3. After being successfully homed (reference run), the device is operating in normal operation.

TIP: During the first 5 minutes, the device is exchanging communication signals every 10 seconds. As of the sixth minute, the device is exchanging communication signals as specified (downlink).

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» DEACTIVATING THE DEVICE

Procedure:

1. Disassemble the device.
2. In order to reset the device to factory settings, hold the magnetic pin in front of the logo for approx. 5 seconds until an acoustic signal sounds and the LED flashes once.
 - The device is restarting.
3. After restarting, the device is homed automatically.
 - The device is deactivated after homing is finished. (installation position)

» COMMISSIONING AND CONFIGURATION WITH LORA TOOLKIT

Before fitting the device: Device configuration is carried out with the aid of the in-house DEOS application, the LoRa Toolkit, and in conjunction with the LoRaWAN gateway UG65 (type: DS-LoRaGateway, item DS-360448).

The configuration in brief:

1. Download LoRa Toolkit.

TIP: The installation file (file extension: .msi) is available for download at the BetaTools section of the DEOS portal.

2. Install the LoRa Toolkit.

ATTENTION: This software is an untested version without support or warranty. Use at your own risk.

TIP: Provide the following components:

- » .NET-Framework as the basis for software functionality (if necessary this is available as a download at Microsoft).
- » DEOS LoRa Gateway ("gateway", type DS-L-LoRaGateway), connected in the network

TIP: Have the following information on hand:

- » EUI(s) (Extended Unique Identifier(s)) of the device(s)
- » AppKey(s) of the device(s)
- » License file for the gateway for connecting the devices (file name: Lizenz.dltk, type DS-L-GWLIC-1)
- » IP address of the gateway (standard: 192.168.23.150)
- » User name for access to the gateway (standard: admin)
- » Password for access to the gateway (standard: DEOS-AG)

3. Set up LoRaWAN device.
4. Set up rooms.
5. Make parameter settings for room control system.
6. Create the interface to pro.Building Suite.
7. Create configuration file.
8. Have the license file for the LoRaWAN gateway on hand (see supplied accessories).
9. Connect LoRa Toolkit with LoRaWAN gateway.
10. Upload the configuration file to the LoRaWAN gateway.

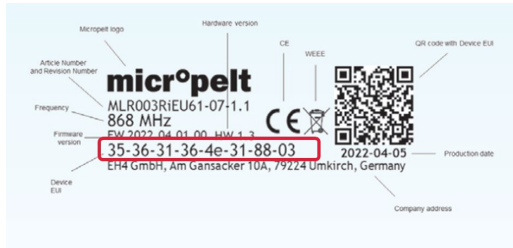
DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» SETTING UP LORAWAN DEVICES

Have the following information on hand:

- » The Dev EUI(s) (**Device Extended Unique Identifier**) of the device(s) (see rear of device and lists of Device EUIs and AppKeys)



- » AppKey(s) of the device(s)

TIP: Obtain the data from the documentation provided by the sensor manufacturer.

Procedure:

1. Open the section “Devices”.
2. Click the button “+” (→ bottom right).
 - The list with all the devices opens that can be integrated into the LoRaWAN system.

TIP: See overview in section *Compatible sensors, page 3*.

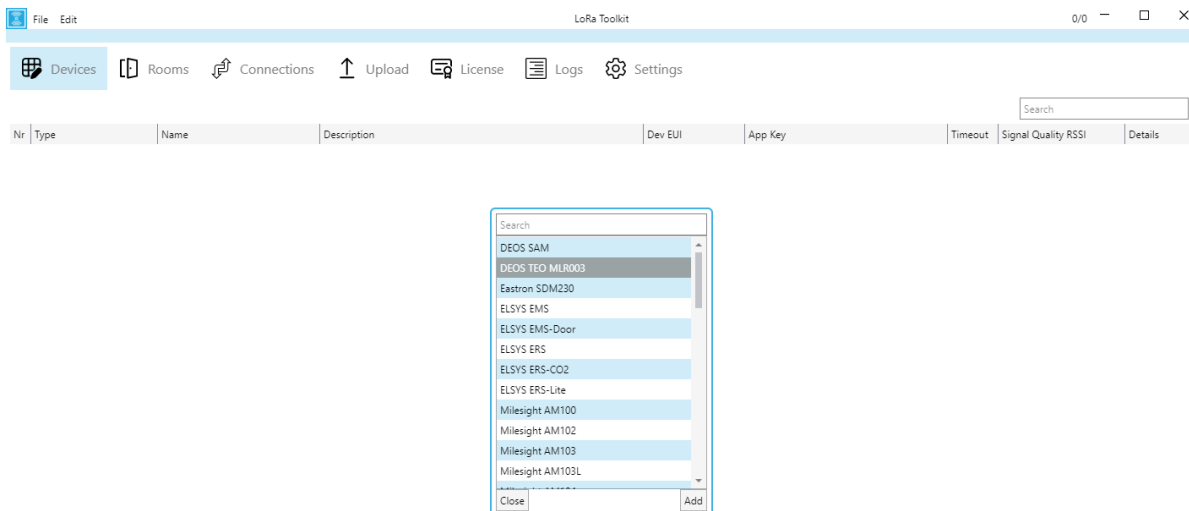


Fig. 2: Section “Devices”

3. Select the device and confirm with “Add”.
 - The device is added to the list.

TIP: The *number* and *type* are assigned automatically.

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

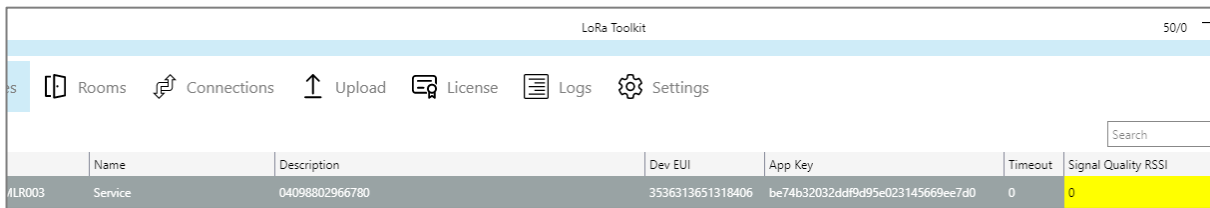


Fig. 3: Section “Devices”

4. Enter the *name* and *description* of the device.

TIP: Use the serial number of the device as *device description*.

TIP: Enter the *name* without any spaces or special characters.

5. Enter the *Dev EUI* and the *AppKey* to set up communication between the LoRaWAN gateway and the device.

TIP: Import Excel data with the aid of the Dev EUI and AppKey lists. For details see section xx, page xx.

6. Enter *timeout* value if required.

TIP: This value is used to indicate the time span when communication does not take place correctly.

7. Enter the *RSSI* (Received Signal Strength Indicator) value.

TIP: This value [entered as a negative integer value] indicates the received signal strength of a LoRaWAN telegram. To this end, the following applies: The closer the value is to 0 the better the signal strength.

Signal strength	Meaning	Color coding
0	No signal	Yellow
-100 dB ... 0	Very good	Light Green
-100 dB ... -120 dB	Average	Orange
≤ -120 dB	Signal strength reception limit	Grey

8. Click More under the column Details to open the table with the itemized information on device data points based on the Modbus addresses.

TIP: The information listed in the table is required for integration into a building automation system. Including a time stamp of the most recently received package, the table provides the following information on each data point:

- » Name
- » Data type
- » Size
- » Unit
- » Calculation formula for decoding the value for the Modbus register to the MQTT value
- » Register type (here: Modbus)
- » Modbus register value (real-time value)
- » MQTT value (real-time value)

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

Modbus Address (0-based)	Name	Datatype	Size	Unit	Calculation formula	Register Type	Modbus Register Value	Last MQTT value
0	Current Valve Position	short	1	%	value	INPUT		
1	Flow Sensor RAW Value	short	1	C	value*0.5	INPUT		
2	Flow TEMPERATURE Value	short	1	C	value*0.5	INPUT		
3	Ambient Sensor RAW Value	short	1	C	value*0.25	INPUT		
4	Ambient TEMPERATURE Val	short	1	C	value*0.25	INPUT		
5	Energy Storage is low	bit	1	1 = Battery is low	value	INPUT		
6	Harvesting	bit	1	1 = Harvesting is active	value	INPUT		
7	Ambient Sensor Failure	bit	1	1 = Sensor Failure	value	INPUT		
8	Flow Sensor Failure	bit	1	1 = Sensor Failure	value	INPUT		
9	Radio Communication Error	bit	1	1 = Radio Loss	value	INPUT		
10	Radio Signal Strength	bit	1	1 = Weak Radio	value	INPUT		
11	Motor	bit	1	1 = Motor Error	value	INPUT		
12	Storage Voltage V	short	1	V	value*0.02	INPUT		
13	Average Current Consumed	short	1	uA	value*10	INPUT		
14	Average Current Generated	short	1	uA	value*10	INPUT		
15	Operating Condition	bit	1	0 = Device is in Normal Op	value	INPUT		
16	Storage Fully Charged	bit	1	1 = Fully Charged	value	INPUT		
17	Reference Run Completed	bit	1	1 = Successfully Completed	value	INPUT		
18	Operating Mode	short	1	0=Valve Position, 1=Flow Te	value	INPUT		
19	Set Valve Position / Set Amt	short	1	%/C/C	value	INPUT		
0	Set Valve Position / Set Amt	short	1	%/C/C	value	HOLDING		
1	Room TMP from RCU	short	1	C	value	HOLDING		
2	Save Position / Set Save An	short	1	% / C / C	value	HOLDING		
3	Radio Communication Inter	short	1	1=5min, 0=10min, 2=60min	value	HOLDING		
4	Selected User Mode	short	1	0=Valve Position, 1=Flow Te	value	HOLDING		
5	Selected Safety Mode	short	1	0=SP Ambient Temperature	value	HOLDING		
6	Offset Comp. Flow Sensor	short	1	0=Default(S), 1=1C, 2=2C	value	HOLDING		
7	Do Reference Run Now	bit	1	1=Do Reference Run Now, 0	value	HOLDING		
8	Proportional Controller Gain	short	1	0=3', 1=4', 2=1', 3=2'	value	HOLDING		
9	Send Packet	short	1	Any	value	HOLDING		

Fig. 4: Example of a table with data points of a device with Modbus registers

» IMPORTING LORA DEVICES VIA EXCEL (EXCEL IMPORT)

In order to reduce the work associated with setting up communication between the LoRa gateway and several devices, it is possible to import the Dev EUIs and AppKeys using the supplied Excel spreadsheet (file name: LoRAConfig LS 12345678.xls) (so-called Excel import).

TIP: The Dev EUIs and AppKeys listed in the Excel spreadsheet depend on the relevant delivery contents.

Procedure:

1. Open the Excel spreadsheet (file name: LoRAConfig LS 12345678.xls).

	A	B	C	D	E
1	Type	Name	Description	Eui	AppKey
2	DEOS TEO MLR003	Kantine1	04098802966780	3536313651318406	be74b32032ddf9d95e023145669ee7d0
3	DEOS TEO MLR003	Kantine1	0411A402966781	353631366c318503	abec2dd726ee3e1c00dfdc9c0eac9590
4	DEOS TEO MLR003	Fuhrpark	041E79F2956781	313932335c318309	65cdf7a935a5c0d3668189bcee520fb9
5	DEOS TEO MLR003	Fuhrpark	04258702966780	313932336a31880b	56eebb9435100f6a64c6f2beca8addaf
6	DEOS TEO MLR003	Umkleide	042677F2956781	323531396d306f04	e3081336a4e8dc56046d4afe8ba2f1cd
7	DEOS TEO MLR003	Abwasserhebeanlage	0429CA02966780	313932335b31860b	22fd9f75a6c3f7f5ddc4a5d82b31ac4d
8	DEOS TEO MLR003	Fahrschule	0439A302966781	323531396c30690c	87ea5543c0b718e3f962b2faf290e674
9	DEOS TEO MLR003	Fahrschule	04407AF2956780	323531395e307004	eb419e5f146c77ae87223ff2bd940d22
10	DEOS TEO MLR003	Fahrschule	0440D602966781	323531396a30690c	ad5bed25386e9131d0420bd5c6b2ea7b
11	DEOS TEO MLR003	IT	044577F2956781	313932335e318f0c	188c5962d28990781e37766d6e8b7f64
12	DEOS TEO MLR003	TreppenhausKG	04478902966781	323531395b306e0b	c58cd6ac31a9e4b9e0c595a41e785828
13	DEOS TEO MLR003	FlurKG	0447CA02966780	3235313962306e04	fd2476353df803d7e8711ac86456b746
14	DEOS TEO MLR003	Speditionsleitung	04498702966780	3235313964306f04	c0b746cd9a76877b4aa01e3c1451d08f

Fig. 5: Table of Dev EUIs and AppKeys for configuration

2. Enter the name and description (column Description).

TIP: Ensure that the entries made under the column *Type* are correct so that the correct device is set up in the LoRa Toolkit.

TIP: Use transparent names so that the devices can be easily matched with the rooms, or assign the names at a later date.

3. Save the Excel spreadsheet.

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

4. Go to the LoRa Toolkit.
5. Select the menu item “File → Excel Import”.
6. Select the Excel spreadsheet and confirm with “Open”.
 - The data from the Excel spreadsheet is imported into the LoRa Toolkit.

» SETTING UP ROOMS

The rooms are set up with the project parameters in the section “Rooms”.

Procedure:

1. Open the section “Rooms”.

TIP: A default “Room 0” is set up with the setpoints for the programs *Comfort Temp.* (default: 21°C) and *Eco Temp.* (default: 16°C).

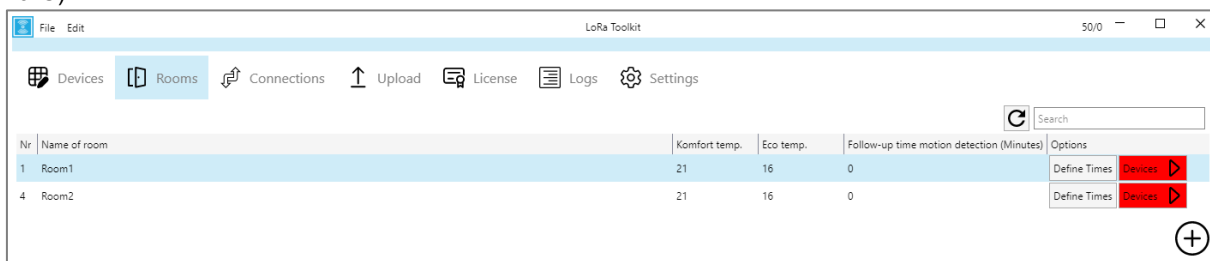


Fig. 6: Section “Rooms”

2. Add a room by clicking the button “+” (→ bottom right).
3. Assign a name to the room.
4. Enter the setpoints for a room (continue with item 7) or specify the setpoints for several rooms (continue with item 5).

Program	Function
Comfort Temp	Setpoint during times of use
Eco Temp	Setpoint outside of times of use

5. In order to specify the setpoints for several rooms, select the rooms and from the context menu (→ right mouse click), select the menu item “Edit selected”.
 - The dialog window opens for specifying the setpoints and the backup temperature.

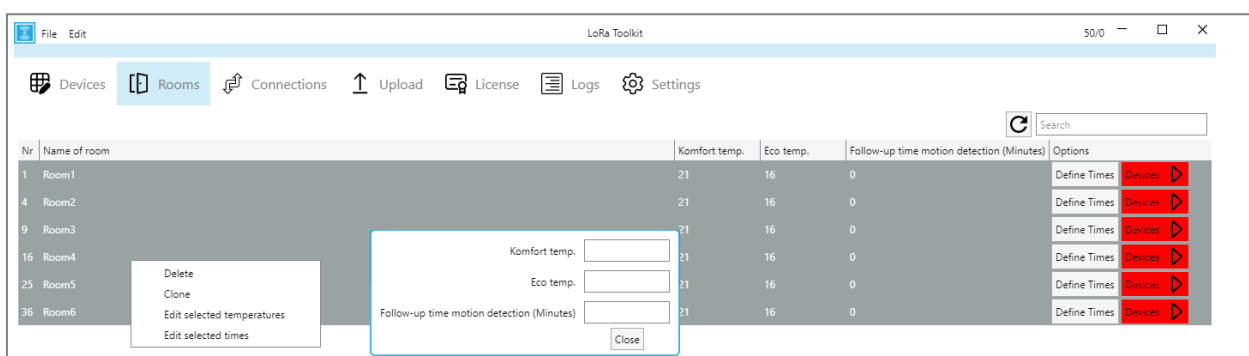


Fig. 7: Specifying setpoints for several rooms

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

6. Enter the setpoints and backup temperature and confirm with “Close”.

TIP: The backup temperature is used for safety reasons: If the device is not connected to the LoRa gateway, the valve will control the temperature.

7. Rooms with a motion sensor

Enter the time for the run-on timer for the motion sensor (in minutes). The run-on timer value refers to the waiting period of the motion sensor until the signal is emitted that motion is no longer taking place and that the program is changed as a consequence.

8. Specify the times of use for a room in a weekly program.

9. Click the button “Specify times” to specify the times of room use in a weekly program.

- The dialog box opens for specifying the weekly program.

TIP: In order to specify the times of use for several rooms, select the rooms and click the button “Specify times”.

TIP: The times of use of one weekday can be transferred to other weekdays (continue with item 11).

10. Enter the beginning and end of the time of use for the weekdays and confirm with “Close”.

TIP: Whenever no times of use are intended for a given weekday, a Saturday and/or a Sunday, for example, set the time from 00:00 to 00:00.

TIP: The times of use of one weekday can be transferred to other weekdays (continue with item 11).

11. Enter the times of use in the uppermost row to transfer the times of use of one weekday to the other weekdays.

	In use, Start	In use, End
	00:00 o'clock	00:00 o'clock
	Copy to marked	
Monday	<input type="checkbox"/> 06:00 o'clock	<input type="checkbox"/> 22:00 o'clock
Tuesday	<input type="checkbox"/> 06:00 o'clock	<input type="checkbox"/> 22:00 o'clock
Wednesday	<input type="checkbox"/> 06:00 o'clock	<input type="checkbox"/> 22:00 o'clock
Thursday	<input type="checkbox"/> 06:00 o'clock	<input type="checkbox"/> 22:00 o'clock
Friday	<input type="checkbox"/> 06:00 o'clock	<input type="checkbox"/> 22:00 o'clock
Saturday	<input type="checkbox"/> 06:00 o'clock	<input type="checkbox"/> 22:00 o'clock
Sunday	<input type="checkbox"/> 06:00 o'clock	<input type="checkbox"/> 22:00 o'clock
	Close	

	In use, Start	In use, End
	06:00 o'clock	17:00 o'clock
	Copy to marked	
Monday	<input checked="" type="checkbox"/> 06:00 o'clock	<input type="checkbox"/> 17:00 o'clock
Tuesday	<input checked="" type="checkbox"/> 06:00 o'clock	<input type="checkbox"/> 17:00 o'clock
Wednesday	<input checked="" type="checkbox"/> 06:00 o'clock	<input type="checkbox"/> 17:00 o'clock
Thursday	<input checked="" type="checkbox"/> 06:00 o'clock	<input type="checkbox"/> 17:00 o'clock
Friday	<input type="checkbox"/> 06:00 o'clock	<input type="checkbox"/> 15:00 o'clock
Saturday	<input type="checkbox"/> 00:00 o'clock	<input type="checkbox"/> 00:00 o'clock
Sunday	<input type="checkbox"/> 00:00 o'clock	<input type="checkbox"/> 00:00 o'clock
	Close	

Fig. 8: View of specifying times for rooms

12. Activate the check boxes for the weekday to which the time of use is to be transferred and click the button “Copy to selected”.

- The times of use are transferred to the selected weekdays.

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» ADJUSTING ROOM CONTROL PARAMETER SETTINGS

Various room control setpoint values can be set (programs). The table below provides an overview of the various programs:

Program	Setpoint (default)	Function
Comfort Temp	21°C (adjustable)	Setpoint during times of use
Pre-comfort	20°C (non-adjustable)	Is active in conjunction with a presence detector. To this end, the room is controlled 1 K below the setpoint. This program is activated whenever a presence is detected in the room.
Eco Temp	16°C (adjustable)	Setpoint outside of times of use
Protection	6°C (non-adjustable)	In conjunction with a window contact
Backup Temp.		This program is activated if communication between the LoRa gateway and the device is interrupted.

» SETTING UP ACCESS TO PRO.BUILDING SUITE

The device data can be processed using pro.Building Suite.

Note: Use of the pro.Building Suite is subject to a charge. Please email any questions to bit@deos-ag.com.

Note: The following ports (outgoing) must be enabled on the gateway:

Function	Port
MQTT (M2M communication)	8883
Domain Name System (DNS)	53
Network Time Protocol (NTP)	123

Have the following information on hand:

- » Port
- » Device ID of the gateway
- » Access data (user name, password) for access to the gateway

TIP: The data is provided by pro.Building Suite.

Procedure:

1. In order to set up access to pro.Building Suite, open the section “Connections”.
2. Activate the option “Activate pro.Building Suite”.
3. Enter the access data for the pro.Building Suite.

TIP: Email any questions to it@deos-ag.com.

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

Parameter	Meaning
Address	Address of the DEOS Cloud (standard: mqttt-bit.deos-ag.com)
Port	Port of the DEOS Cloud (standard 8883)
Device ID	Device ID of the gateway
User	User name for access to the gateway
Password	Password for access to the gateway

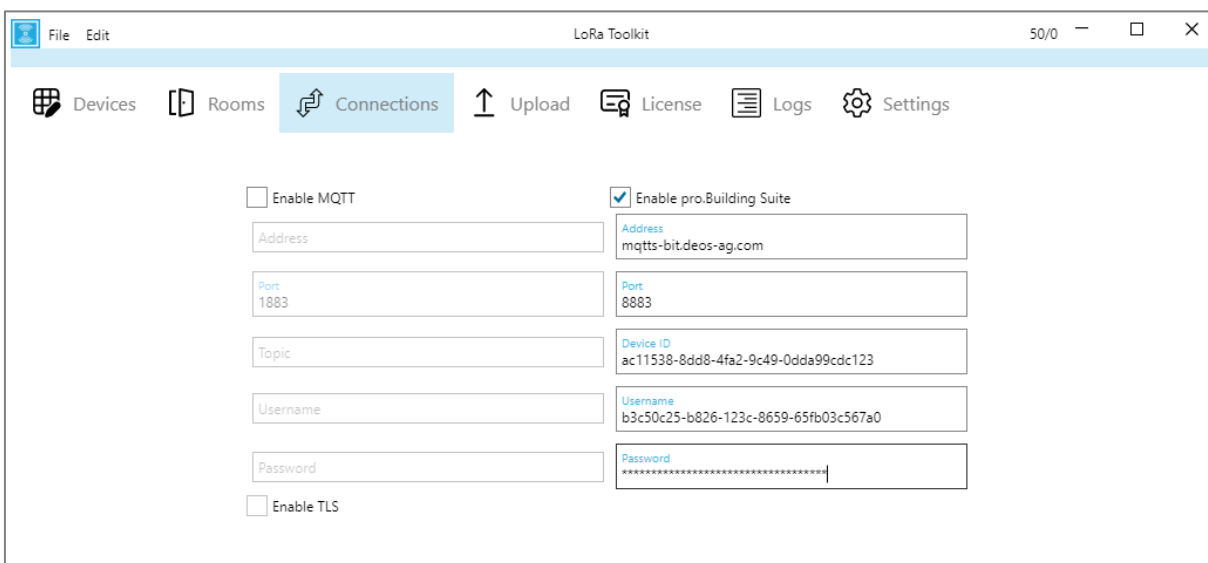


Fig. 9: Section “Connections”

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» UPLOADING THE CONFIGURATION FILE

As soon as you have made the settings in the LoRa Toolkit, you can upload the configuration file to the LoRa Gateway (art. no. 360448, type DS-LoRaGateway).

TIP: The IP address of the LoRa Gateway is pre-configured (standard: 192.168.23.150).

Have the following information on hand (see delivery contents of LoRa Gateway):

- » User name
- » Password

Procedure:

1. Open the section “Upload”.

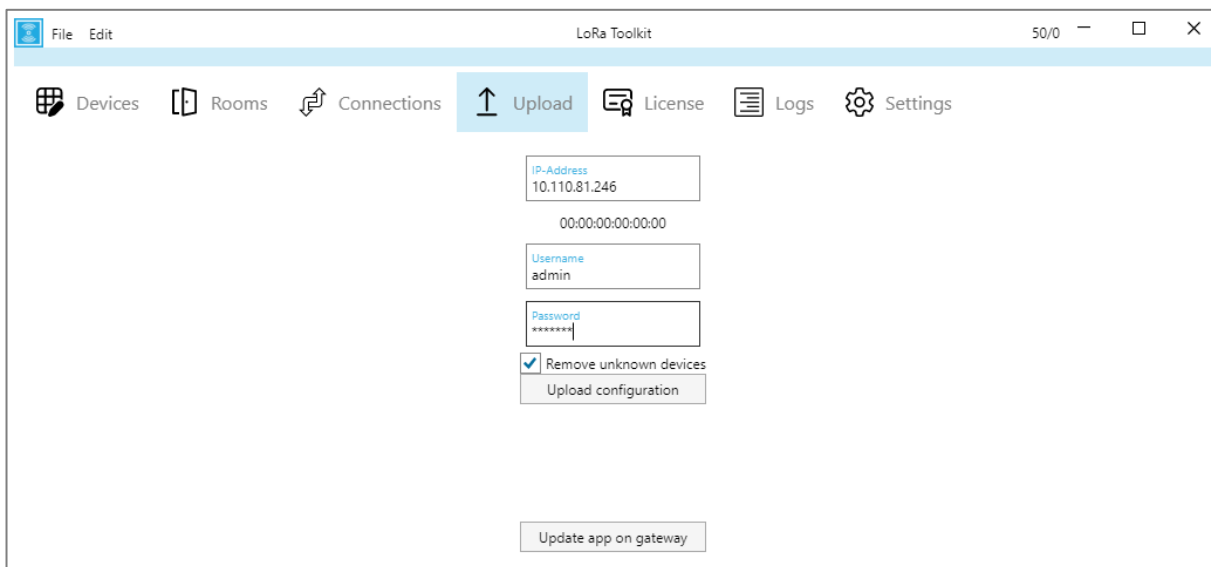


Fig. 10: Section “Upload”

2. Enter the user names and password for the LoRa Gateway.
3. Activate the option “Delete unknown devices” so that only the set up devices are taken into account when uploading the configuration file to the LoRa Gateway.

Note: Devices that are not included in the configuration file are deleted from the LoRa Gateway and cannot be added later.
4. Confirm the security prompt to have the devices deleted from the LoRa Gateway that are not included in the configuration file.
5. Click the button “Upload configuration” to upload the configuration file to the LoRa Gateway. The configuration is uploading to the LoRa Gateway.

TIP: The progress made in the process is indicated at the bottom right section.

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» IMPORTING THE LICENSE FILE

Activation with the aid of the license files is required to be able to connect the device to the LoRaWAN Gateway.

Note: The license is bound to the gateway and the MAC address of the gateway, and it cannot be transferred to another gateway.

Note: The **license** is limited to the number of devices stated in the order. Please email any questions to bit@deos-ag.com.

Have the following information on hand:

- » License file for activating the connection to the LoRaWAN gateway (file name: Lizenz.dltk, type DS-L-GWLIC-1)

Procedure:

1. Open the section “Licenses”.

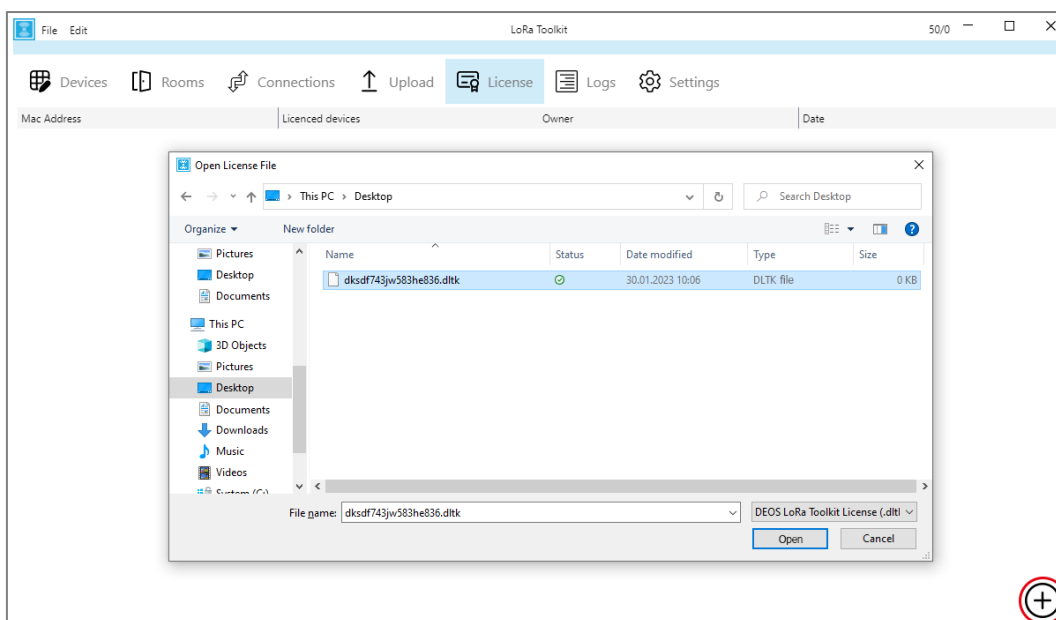


Fig. 11: Section “Licenses”

2. Click the button “+” (→ bottom right).
3. Select the license file (file extension .dltk). Confirm with “Open”.
4. The license file will be imported and entered in the list.

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» CALLING UP THE LOG FILE

All actions recorded (logs) by the system on the device are listed in the section “Logs”. The logs are saved in a log file, located on the PC (see Fig. 12):

`C:\Users**Username**\AppData\Roaming\DEOS\LoRaToolkit\log.log`

TIP: In the case of questions, have the log file on hand for the DEOS Professional Support team.

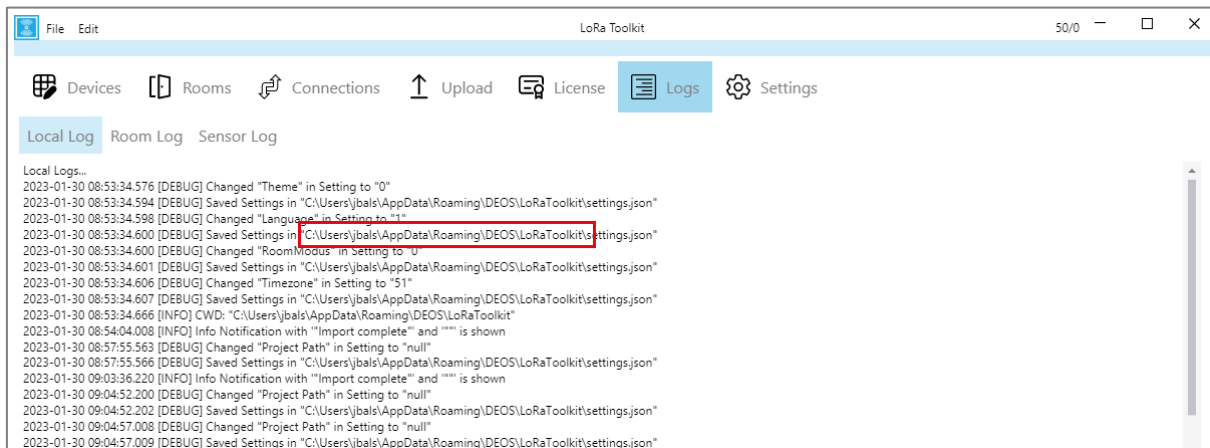


Fig. 12: Section “Logs”

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» SETTING UP A USER-SPECIFIC UI

The following settings can be made in the section “Settings”:

- » Selecting a language
- » Selecting a UI design
- » Selecting workflow options for naming the devices whenever a device is added to a room:
 - Do not edit device names:
There is no change to the description.
 - Rename devices:
There is a change to the description.
 - Display dialog box for renaming devices:
The dialog box for renaming the device is displayed.
- » Setting the time zone

In addition, the version of the installed software is listed. Click the button *Look for updates* to install possible updates.

Recommendation: Activate the function *Pre release updates* only after prior consultation with the DEOS Professional Support team! DEOS AG is not liable for and does not provide Support services for untested beta versions.

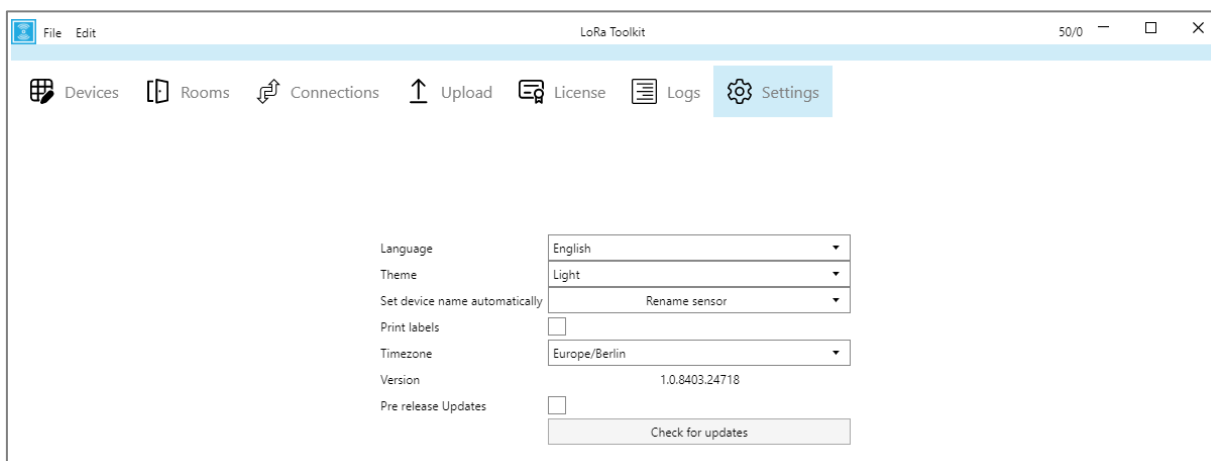


Fig. 13: Section “Settings”

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» DATA EXCHANGE

» READING DATA – INPUT REGISTER

Device data is received in the input register. The device sends values to the LoRa Gateway at a prescribed interval. During communication, the device sends a so-called *Uplink* with the values of the shown *Input Register*. During the same communication interval, the device is provided with a so-called *Downlink* with the *Holding Register*.

No.	Name	Data type	Unit	
1	Current Valve Position	short	%	Value of current valve position 0% = closed 100% = open
2	Flow Sensor RAW Value	short	°C	Raw value of current supply temperature sensor
3	Flow Sensor Temperature	short	°C	Value of the current supply temperature (raw value plus offset)
4	Ambient Sensor RAW Value	short	°C	Raw value of current room temperature
5	Ambient Sensor Temperature Value	short	°C	Value of the current room temperature (raw value minus offset)
6	Energy Storage is Low	bit	1 = Battery is low	Error message: Battery depleted (< 25% battery status)
7	Harvesting	bit	1 = Harvesting is active	Status message: Active charging process (energy harvesting)
8	Ambient Sensor Failure	bit	1 = Sensor Failure	Error message: Internal temperature sensor
9	Flow Sensor Failure	bit	1 = Sensor Failure	Error message: Internal supply temperature sensor
10	Radio Communication Error	bit	1 = Radio Loss	Error message: Communication failed
11	Radio Signal Strength	bit	Weak Radio	Error message: Signal strength 0 = Normal radio signal (RSSI > -100 dBm) 1 = Weak radio signal (RSSI < -100 dBm)
12	Motor Error	bit	1 = Motor Error	Error message: Motor
13	Storage Voltage V	short	V	Battery charge: 2.00 V = 0% 3.67 V = 100%
14	Average Current Consumed	short	uA	Current average electricity consumed
15	Average Current Generated	short	uA	Current average generated electricity
16	Operating Condition	bit	Operating Condition	Operation signal: 0 = Device is in normal operation and is active 1 = Device is in installation position (delivery state) and is inactive
17	Storage Fully Charged	bit	1= Fully Charged	Status message: Battery is charged to 100%
18	Reference Run Completed	bit	1 = Successfully Completed	Status message: Successfully homed
19	Operating Mode	short	Operating Mode	0 = Valve position 1 = Supply temperature 2 = Room temperature
20	Set Valve Position Set Ambient Temperature Set Flow Temperature	short	% °C °C	Information on the setpoint that was sent to the device via the downlink (no. 21). This value is communicated with a time lag, dependent on the communication interval.

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» WRITING DATA – HOLDING REGISTER

Data points written to the device can be found in the holding register.

No.	Name	Data type	Unit	
21	Set Valve Position Set Ambient Temperature Set Flow Temperature	short	% °C °C	This data point determines the current actuator position, the set room temperature, or the set supply temperature on the device.
22	Room TMP from RCU	short	°C	The room temperature from an external temperature sensor (Room-Control-Unit) that is specified as the set room temperature.
23	Save Valve Position Set Save Ambient Temperature Set Save Flow Temperature	short	% °C (default 20°C) °C	After 6 failed communication attempts between the gateway and the device, the device switches to safety mode. This data point is used to set the safety position.
24	Radio Communication Interval	short	1 = 5 min 0 = 10 min 2 = 60 min 3 = 120 min 4 = 240 min	The device can communicate in various communication intervals.
25	Selected User Mode	short	0 = Valve Position 1 = Flow Temperature 2 = Ambient Temperature	This data point is used to determine the operating mode. The selection includes the actuator positions, the room temperature (internal sensor), and the applied supply temperature.
26	Selected Safety Mode	short	0 = SP Ambient Temperature 1 = Flow Temperature 2 = Valve Position	The device will regulate based on the preset value specified under no. 23 and dependent on the safety mode. The selection includes the actuator positions, the room temperature (internal sensor), and the applied supply temperature.
27	Offset Comp. Flow Sensor	short	0 = 3°C (default) 1 = 1°C 2 = 2°C 3 = 3°C 4 = 4°C 5 = 5°C 6 = 6°C 7 = 7°C 8 = -8°C 9 = -7°C 10 = -6°C 11 = -5°C 12 = -4°C 13 = -3°C 14 = -2°C 15 = -1°C	The offset value to compensate for the supply temperature sensor value can be adjusted using the selected difference because the applied sensor cannot measure the exact heating pipe temperature.
28	Do Reference Run Now	bit	1 = Do Reference Run Now 0 = Don't Reference Run Now	If the value of the data point is 1, the device is homed automatically.
29	Proportional Controller Gain	short	0 = '3' (default) 1 = '4' 2 = '1' 3 = '2'	The device compares the current room temperature with the desired setpoint temperature (using the internal or external temperature sensor, dependent on the operating mode). In the case of a temperature difference (Δ), the device will regulate in accordance with the formula $(P \times \Delta \times 4) \%$, whereby the P value can be altered using this data point.
30	Send Packet	short	From 0 to 1: Packet will be sent once	All the information of the holding register is included in this packet and sent to the device. The register should be left at 1 for about 5 seconds and then set back to 0.

DEOS TEO – Configuration with LoRa Toolkit

User Manual – Version: 2023/01/30, V1.1

» DISPOSAL

» DEVICE DISPOSAL

NOTE**Electrical and electronic components impact the environment**

- » In addition to recyclable materials, the device also contains a battery.
 - » Dispose of the device without the battery.
 - » Do not dispose of the device with household waste.
 - » Take the device to an appropriate waste collection center for disposal.
-

Technology for intelligent buildings

DEOS.AG

DEOS AG
Birkenallee 76
48432 Rheine
Germany

+49 5971 91133-20
+49 5971 91133-2995
info@deos-ag.com
www.deos-ag.com

© Copyright 2023 DEOS AG

This manual was prepared with the utmost care. DEOS AG, however, is not liable for damage or losses resulting from or in connection with errors, ambiguities or other circumstances. Errors and changes excepted.

Note:

We are pointing out that the software and hardware names and brand names of the respective companies used in this manual are generally protected by brand, trademark or patent laws.