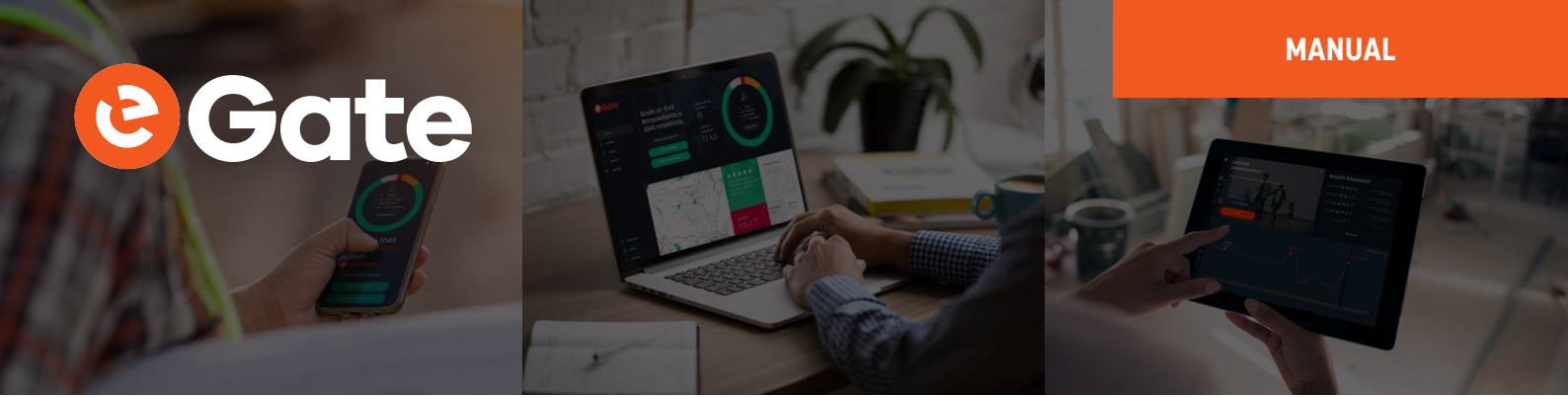




# MANUAL

## eGate-Termo-LWEU-2TCK

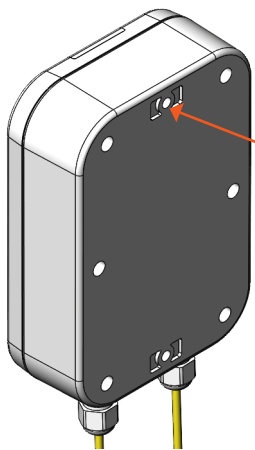


## Installation

### Mounting

Mount device to wall or another suitable vertical surface. Mounting position, cables down

- Open at least one of the lids with flat screwdriver.
- Mount device with pan head screw,  $\varnothing 4.2\text{mm}$  max., length 10mm min.
- Close the lid.



Alternative method:

- Put nail or screw, head dimension  $\varnothing 4.2\text{mm}$  max. to vertical surface .
- Hang device from middle top hole.

### Power supplies

The eGate-Thermo-LWEU-2TCK is powered with a 3.6V Lithium Thionyl battery pack.

The device is supplied with batteries already installed, so it is ready to be used.

## Operation

After the Deep-LoRaWAN is successfully installed, it operates on its own. However, there are some considerations that are good to know when using the Deep-LoRaWAN.

## Maintenance

This device does not need any regular maintenance.



## Settings

The eGate-Thermo-LWEU-2TCK works with its default settings and no parameter configuration is normally required. However, if it is necessary to change the settings of the device, it can be done with Nokeval's MekuWin software (available for free at [www.nokeval.com](http://www.nokeval.com)). Following procedure should be followed in order to get access to the settings:

- Open the enclosure by removing the 6 screws.
- Connect a micro-USB cable to the connector, and the other end of the cable to a computer.
- If Windows requests for a driver, download it at [www.nokeval.com](http://www.nokeval.com) > Support, unzip it to a temporary folder, and show that directory as the location for the driver. If there are problems during the installation, try pushing the button every 5–15 seconds or keeping it pressed so that the eGate-Thermo-LWEU-2TCK will not shut down its USB port.
- Launch the MekuWin program.
- In MekuWin, choose the right COM-port from the Ports-menu. If the port is not visible, try pushing the button on the eGate-Thermo-LWEU-2TCK to wake up the port.
- From the Port settings -menu, choose Protocol = ModbusRTU, Address = 1.
- Click Direct.
- A new window will open for the settings.

The configuration menu includes the following settings:

- Protection
  - » Describes password protection status “None”, “Locked”, “Unlocked”.
- Password input/setup
  - » Unlock protection or change password. See “Protecting the settings” section below for details.
- Transmission Period
  - » Time between transmissions with options from ranging 5 minutes to 6 hours. Default is 30 min.
- LoRaWAN
  - » If the eGate-Thermo-LWEU-2TCK is used with the Nokeval cloud platform, the default settings are ok. If you wish to manually set the LoRaWAN credentials and/or integrate it with your cloud platform, see “LoRaWAN settings” and “Uplink payload structure” chapters.

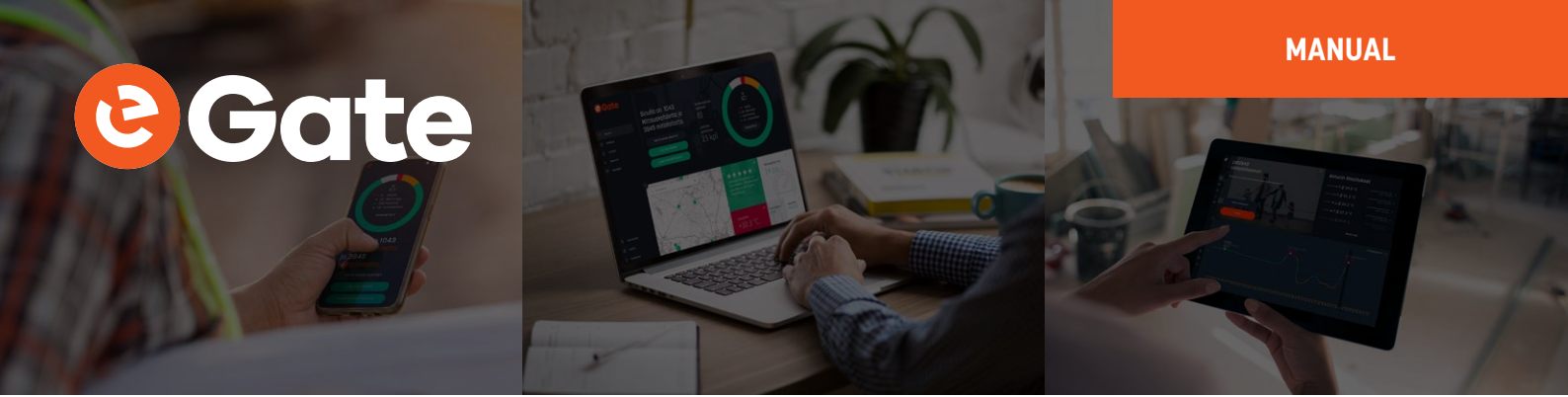
## Protecting the settings

To protect the settings from being easily adjusted, the configuration menu provides a password box. The password can be formed using up to 16 characters. From the next MekuWin session, the settings can't be adjusted without knowing the password.

If the displayed status is “Locked”, changes will not be saved to the device. Write the correct password in the “Password input” field and press enter to unlock.

If displayed status is “Unlocked”, the settings and password can be changed and the menu will become locked again after menu is closed.

Note that the password cannot be reset by the user. If the password is forgotten, the password reset can only be made by the manufacturer. Please make sure that the password is remembered if changed.



## Operation

After the eGate-Thermo-LWEU-2TCK is successfully installed, it operates on its own. However, there are some considerations that are good to know when using the eGate-Thermo-LWEU-2TCK.

### Temperature measurement

Temperature is given in °C.

### Monitor menu

In MekuWin Mon-menu, you can monitor the measurement readings. The sensors are kept continuously on while MekuWin is open. The values update at the rate the sensor can produce new readings.

Information about LoRaWAN is also displayed to help with potential connection issues.

### Cal menu

The calibration menu settings are only for the manufacturer use. They are not explained in this manual.

## LoRaWAN settings

### Conf menu

Quality

- Unidirectional – uplinks are sent as unconfirmed data with 1 attempt. Acknowledgement is not requested.
- Bidirectional – uplinks are sent as confirmed data. Acknowledgement is requested, and up to 3 attempts are used if acknowledgement is not received.

DevEUI (readonly) – shows the DevEUI of the device. Note that DevEUI can't be modified.

### LoRaWAN credentials

These should be only changed if manually provisioning the device to your own system.

AppKey, AppSKey, NwkSKey: If set, these are displayed as “\*\*\*\*” when the menu is re-opened. They can't be read from the device afterwards.

The keys and EUI:s are written as hex symbols 0-9/A-F, 4 bits per symbol.

- OTAA - Activation mode. If toggled on, Over-the-air-activation is used, else Activation by personalization is used.
- (OTAA mode only) AppEUI – 16 hex symbols
- (OTAA mode only) AppKey – 32 hex symbols
- (ABP mode only) DevAddr – 8 hex symbols
- (ABP mode only) AppSKey - 32 hex symbols
- (ABP mode only) NwkSKey - 32 hex symbols



## Other LoRaWAN details

The device always uses Adaptive Data Rate. If it receives no messages from server for 2 subsequent messages, it will lower data rate by 1 step. Then it will lower the data rate by 1 step after every 2 messages until a message is received or data rate 0 is reached. When the device is connected to server, the MAC layer controls the data rate.

## Uplink payload structure

This information is only relevant for integrating the eGate-Thermo-LWEU-2TCK with customer's own cloud platform.

The payload data format consists of a protocol version field and 1 or more messages in length-type-data format. Example payloads are presented at the end of this section for reference.

Size	Name	Meaning
1B	Protocol version	Version=1
XB	1 or more messages	Messages in format presented below.

### Message format:

Size	Name	Meaning
1B	Message length	Bits 0:6 - Message length in bytes, excluding length field and optional age field. Bit 7: If 1, age field is included.
2B	Optional age field	Age, uint16 * 60 seconds
1B	Message type	Type, e.g. 11 = Flagged utility
XB	Message data	Data based on message type

## Message types

Message types:

- 10 Measurement data
- 11 Utility
- 12 Debug

The device may send other message types but those should be ignored. Start of next record can be found based on the length field at start of every message.

Values use LSBF byte order unless otherwise noted.





## Type 10: Measurement data

Measurement data using bit-flags to describe which measurement fields are included. If the device failed to measure a value, that field will be missing. The format additionally contains status information bitflags field and related to measurements after the measurement data section.

After measurement data, has status bitflags field describing which status fields are included, similarly to the measurement bitflags. Generally if the device failed to produce a measurement, it will have a status code to help identify the issue.

Size	Name	Value/Meaning
<b>2B</b>	Measurement format	Always 4.
<b>1B</b>	Measurement flags	Tells which of the measurement fields are included. E.g. 0000 1111 = All 4 fields 0000 0101 = Temperature 1, internal temperature
<b>3B</b>	0 – Temperature TC1	Conversion: int24/100 (°C)
<b>3B</b>	1 – Temperature TC2	int24/100 (°C)
<b>2B</b>	2 – Internal temperature	int16/100 (°C)
<b>1B</b>	3 – Reserved	-
<b>1B</b>	Status flags	Tells which of the measurement status fields are included. Same logic as Measurement flags field
<b>1B</b>	0 – Temperature TC1 status	0: Reserved for future use 1+: error number
<b>1B</b>	1 – Temperature TC2 status	-    -
<b>1B</b>	2 – Internal temperature status	-    -
<b>1B</b>	3 – Reserved	-



### Type 11: Utility

Contains utility information about the device. Uses bit flags to describe which fields are included in the message, similar to message type 10.

Size	Name	Meaning
<b>1B</b>	Bit flags	If 0x00: Request to send utility. Otherwise describes which fields are included in the message. E.g. 0100 0001 = device type + serial number
<b>3B</b>	0 – Device type	<0-16777215>, the product number of the device.
<b>2B</b>	1 – Firmware ver	<major 0-255> <minor 0-255>
<b>3B</b>	2 – Firmware build	<0-16777215> Build number to identify FW version more precisely.
<b>3B</b>	3 – Firmware ID	<0-16777215> Firmware identifier, for use with firmware update.
<b>1B</b>	4 – Battery info	<number 0-255>, highest bit describes whether the device has auxiliary power. Other bits: 0-100 = main battery empty/full (1% resolution), 101-121 = reserve battery empty/full (5% resolution), 126 = battery can't be measured, 127 = no battery attached
<b>2B</b>	5 – Calibration date	<0-65535> as days after 1.1.2000; 65535 means unknown
<b>XB</b>	6 – Serial number	<symbol> *[1-20], 32-126: Ascii-symbols, 128-227: 2 numbers encoded: "00", "01", "02"... "99"

### Type 12: Debug information

Debug information message. These should be skipped when reading.

## Example uplinks

### Example 1: measurement and utility message

01 0D 0A 04 00 07 24 09 00 D2 09 00 95 09 00 09 0B 41 52 4F 00 50 AD CE E3

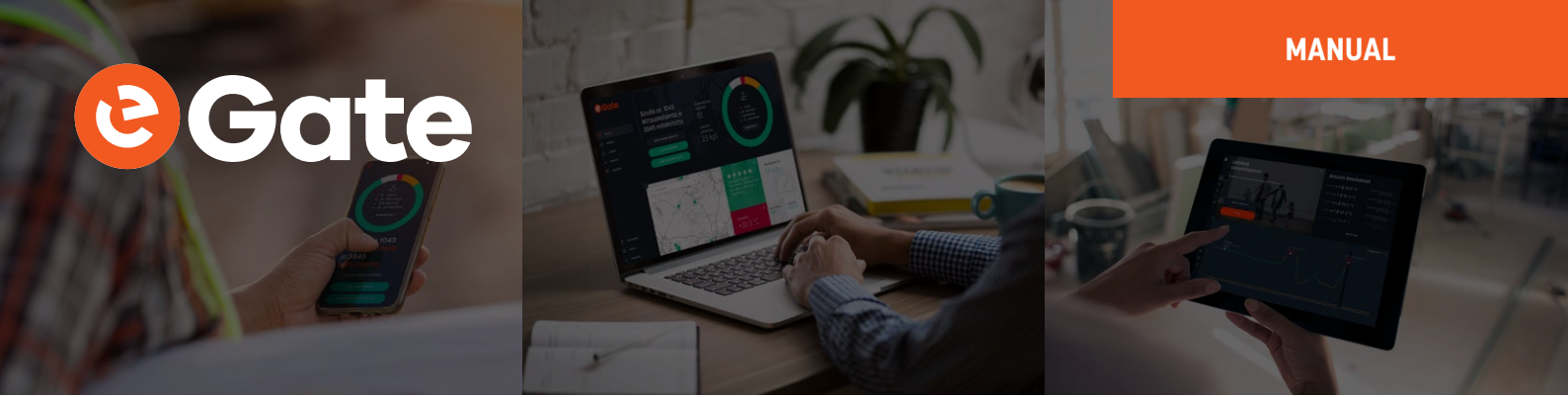
Bytes (hex)	Name	Meaning
01	Protocol version	01 – Version
0D	Message length	Message length 13, excluding length field.
0A	Message	Type 10 = measurement data
04 00	Measurement format	Always 4
07	Measurement flags	Which of the measurement fields are included. 0x07 = 0000 0111, meaning first 3 fields
24 09 00	0 – Temperature 1	2340 -> 23.40C
D2 09 00	1 – Temperature 2	2514 -> 25.14C
95 09	2 – Internal temperature	2453 -> 24.53C
00	Status flags	00 = No errors
09	Message length	Message length 9, excluding length field
0B	Message type	Type 11 = utility
41	Utility bitflags	0x41 = 0100 0001, so fields 0 and 6 are included
52 4F 00	0 - Device type	Dev type 20306
50 AD CE E3	6 – Serial number	Serial number P457899

### Example 2: measurement with active statuses

01 09 0A 04 00 04 95 09 03 02 04

Bytes (hex)	Name	Meaning
01	Protocol version	01 – Version
09	Message length	Message length 9, excluding length field.
0A	Message	Type 10 = measurement data
04 00	Measurement format	Always 4
04	Measurement flags	Which of the measurement fields are included. 0x04 = 0000 0100, meaning Internal Temperature only
95 09	2 – Internal temperature	2453 -> 24.53C
03	Status flags	03 = Temperature 1 and 2 statuses
02	0 – Temperature 1 status	Status = 2
04	1 – Temperature 2 status	Status = 4





## Maintenance

### Checking the status

Press the button to check the status of the eGate-Thermo-LWEU-2TCK. The leds located on the front will indicate the status for 30 seconds:

- Connection:
  - » Green: Connected.
  - » Red blinking: No connection.
  - » Unlit: Unknown, or connection test in progress. Connection test may take >10 seconds.
- Sensor 1 and Sensor 2:
  - » Green: the thermocouple is recognized.
  - » Unlit: the thermocouple is not attached or not recognized.
- Battery:
  - » Green: Ok battery
  - » Red blinking: low battery (<20%)

### Replacing the batteries

- The eGate-Thermo-LWEU-2TCK is powered with a 3.6V Lithium Thionyl battery pack. The batteries should not be replaced by the users.