

Integration into a LoRa Network

 **PEPPERL+FUCHS**



Wireless Ultrasonic Sensor
WILSEN.sonic.level

WS-UCC*-F406-B15-B41*

Support: fa-info@pepperl-fuchs.com
Website: www.pepperl-fuchs.com

Purpose of the Documentation

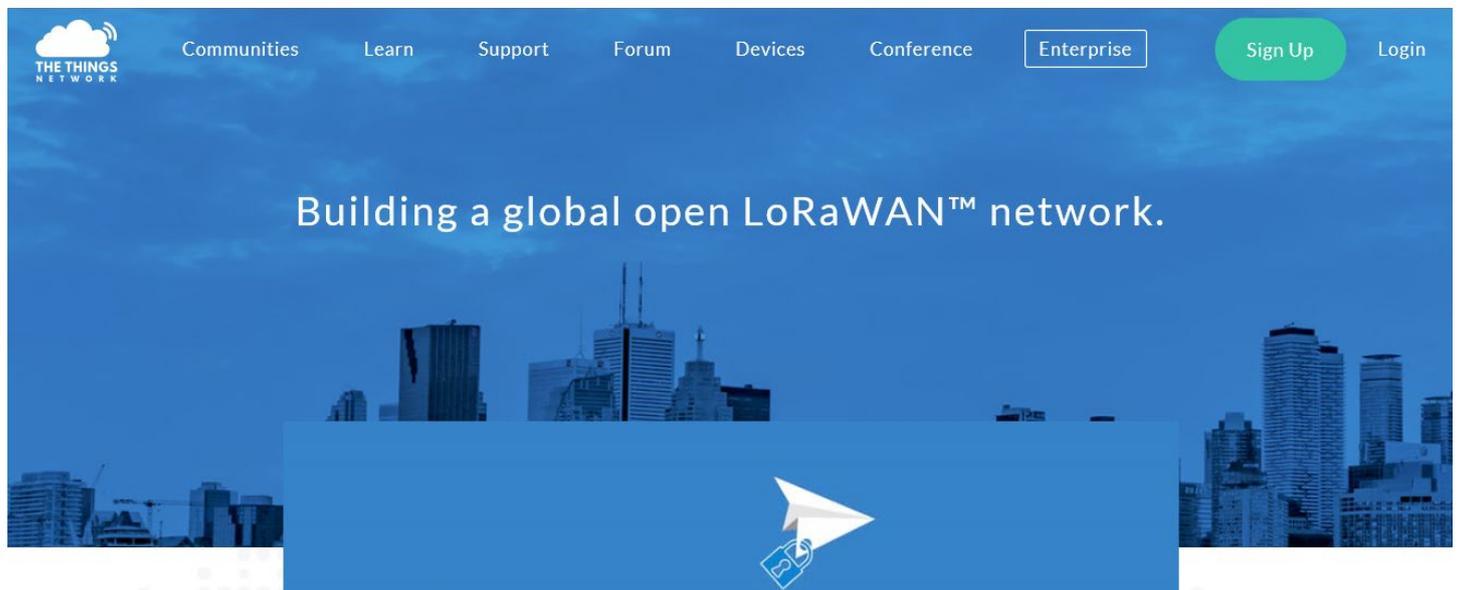
These instructions describe the procedure for integrating a WILSEN.sonic.level wireless ultrasonic sensor into a LoRa network using the example of the onboarding process for "The Things Network" (TTN).

The example integration process comprises the following steps:

1. Creating a customer account with TTN
2. Creating a new application
3. Creating a new device
4. Transmitting sensor data
5. Payload decoder
6. Software application for processing sensor data

1. Creating a Customer Account with TTN

1. Enter "The Things Network" into the search window of your web browser or follow the link:
<https://www.thethingsnetwork.org/>



2. Click *Sign Up* to create your own customer account.
3. Follow the further instructions in the dialog menu.
4. Once a customer account has been created, select the *CONSOLE* area.
 - This area can be used to register a new application—such as a WILSEN sensor—or a new LoRa gateway with the network.

Note

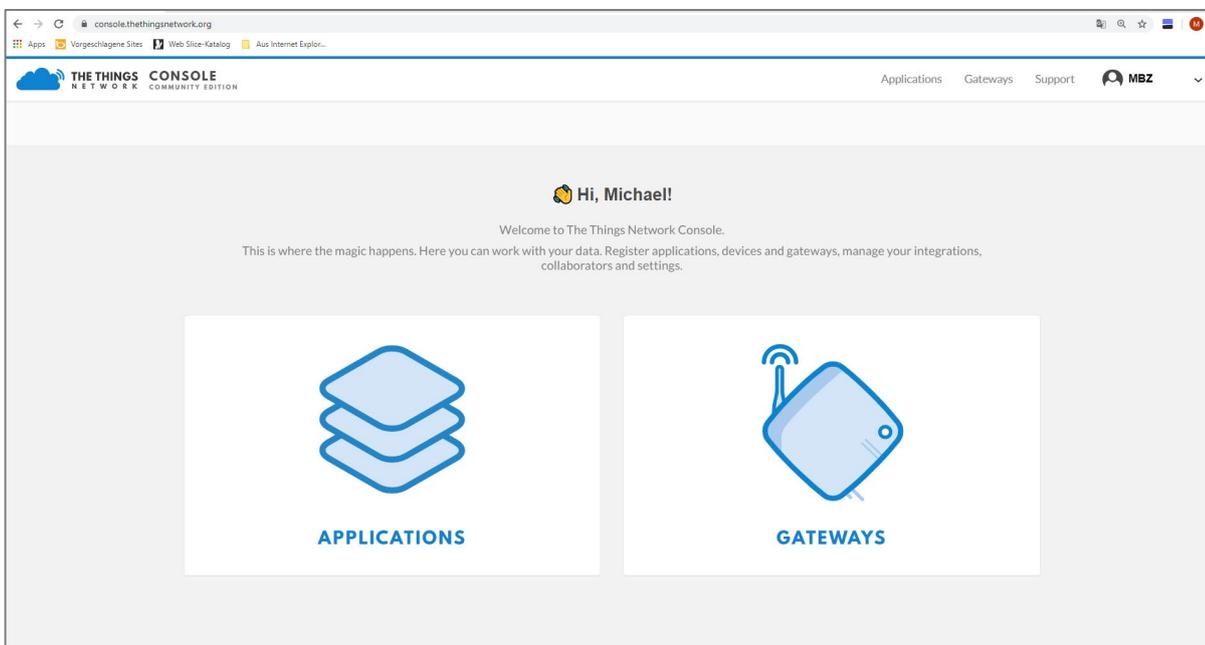
Make sure that the sensor is located in the radio range of at least one LoRa gateway in its future operating location. If you have not yet installed your own gateway, you can use a LoRa network tester to determine whether the respective location already has TTN network coverage. For this purpose, register a network tester to your TTN account as a new device. Instructions on how to do this can be found in the documentation provided with the respective network test device.

If there is still no TTN coverage, you can install your own LoRa gateway. To do this, follow the instructions in the documentation provided by the gateway manufacturer.

If an active TTN network is already available at the operating location of the sensor, you can log in and operate the WILSEN.sonic.level at the respective location.

2. Creating a New Application

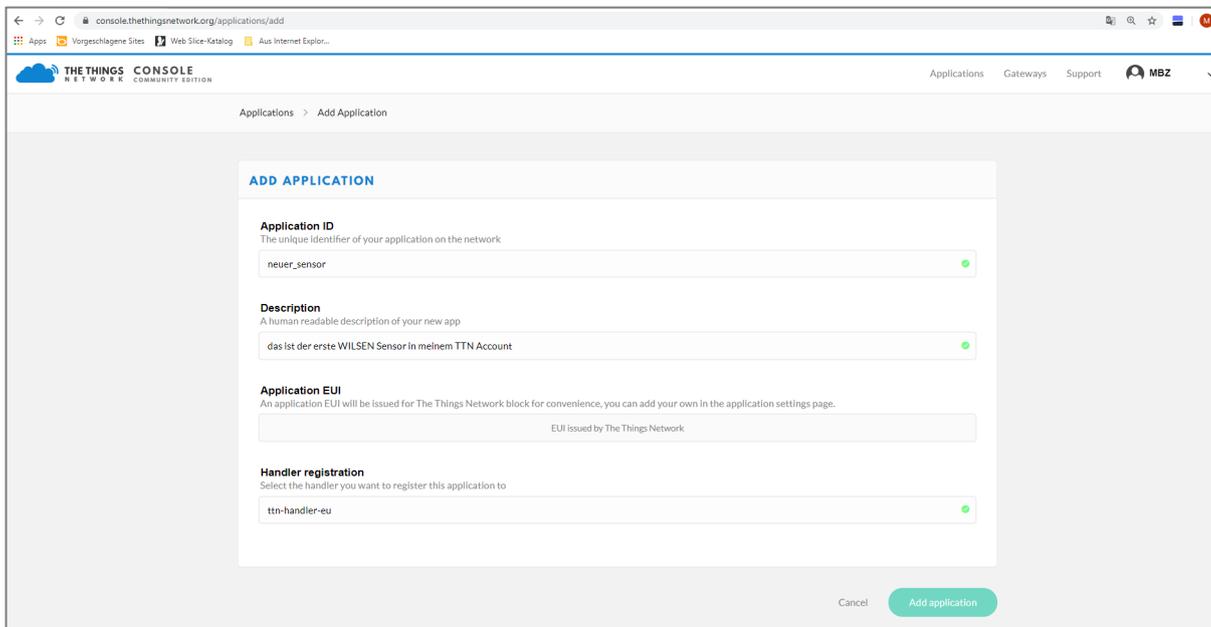
1. Open the *CONSOLE* area in your TTN account and select *APPLICATIONS*.



2. Next, select *add application* in the upper right-hand corner of the dialog box.
3. Enter the required information in the *Application ID* and *Description* fields.
 - The software system will automatically assign you an *Application EUI*. Make sure that you connect to the nearest TTN server in the region. In Europe, this is the server called *ttn-handler-eu*.

Note

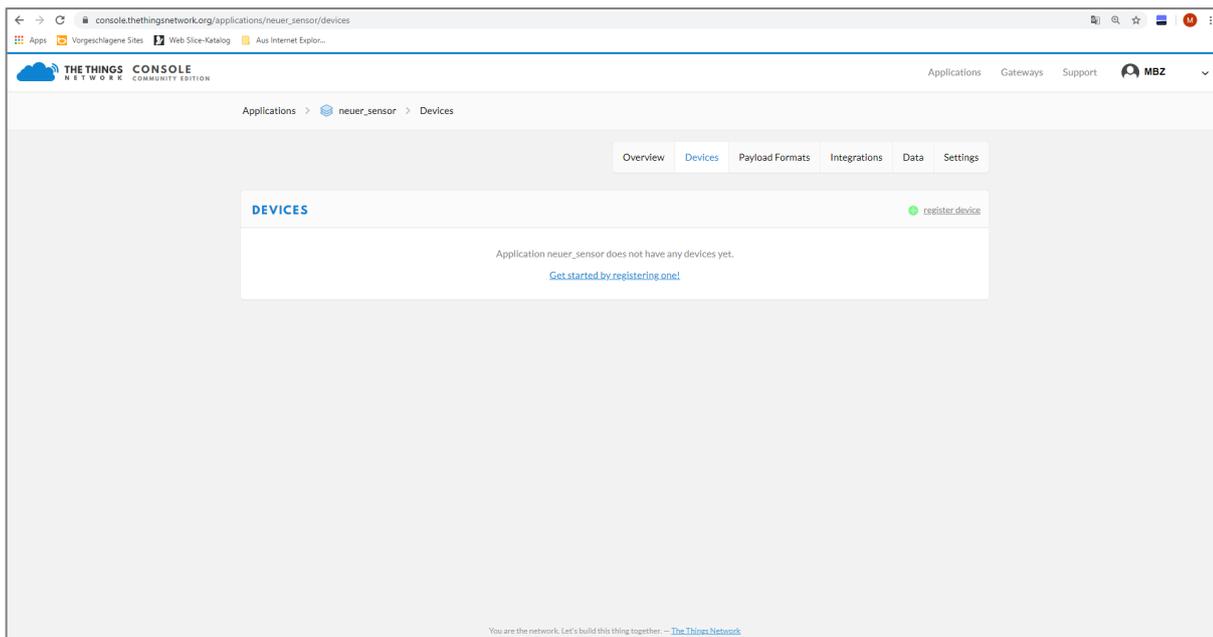
For details on the information to be entered into the TTN console, see the relevant documentation in the portal.



4. Confirm the entered information by clicking the green *Add application* button at the bottom right.

3. Creating a New Device

1. Select the *Devices* tab to register a new device and then click the *register devices* field.



2. Follow the dialog for creating a new device and assign a *Device ID* as the device name. Note that the form editor only accepts lower case letters and no spaces.

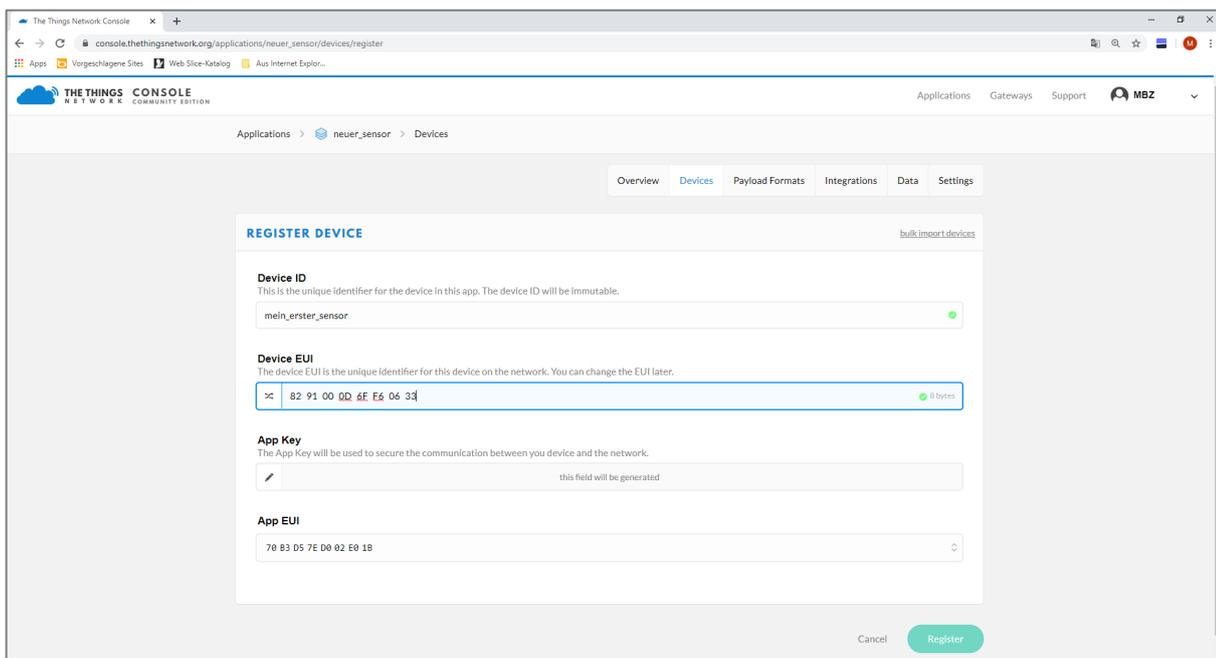
Note

The second input window requests the *Device EUI*. The *Device EUI* is a unique identification number for each LoRa device.

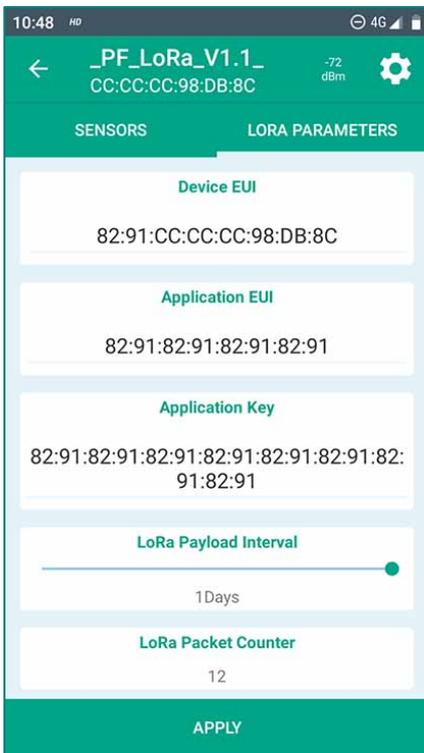
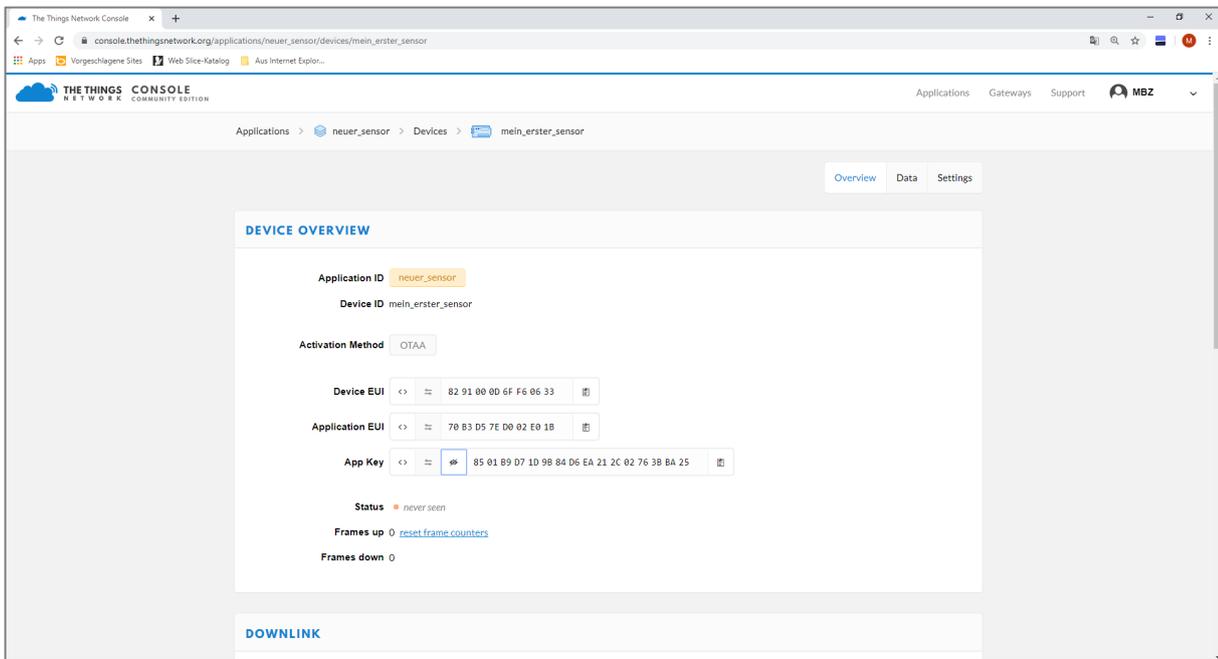


With WILSEN.sonic.level, you can access this 16-digit Device EUI in hexadecimal format by connecting to the device via the WILSENcontrol app (see brief commissioning instructions). The device-specific *Device EUI* is displayed under the *LORA PARAMETERS* tab in the app.

3. Enter the displayed *Device EUI* in the corresponding dialog box of the TTN tab.



4. In TTN, click the green *Register* button at the bottom right.
 - The new device is now created and the individual registration information of the sensor is displayed in the *DEVICE OVERVIEW*.
5. Make sure that the *Activation Method* field displays "OTAA."
 - In addition to the Device EUI that you entered, this overview displays a 16-digit *Application EUI* and a 32-digit *App Key* generated by the system. The *App Key* is initially invisible to the viewer and can be made visible using the eye symbol to the left of the form field.



6. Now enter both the *Application EUI* and the *App Key* in the corresponding *Application EUI* and *Application Key* fields of the WILSENcontrol app. To do this, overwrite the pre-filled fields in the app.

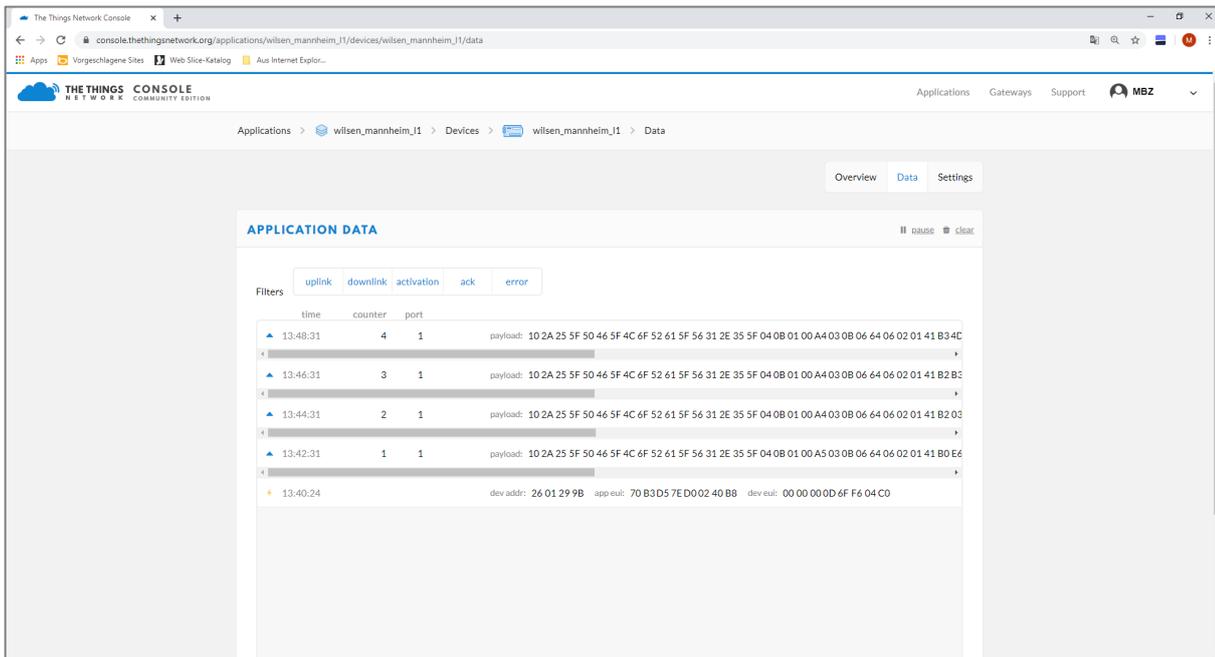
7. Save your entry by clicking *APPLY* in the sensor menu.

8. Once the registration information has been successfully applied, close the WILSENcontrol app.

➤ If the sensor is in the sensing range of a LoRa gateway that is also registered with TTN, the sensor starts as soon as the connection is established. The status indicator in the *DEVICE OVERVIEW* area below the *App Key* field changes from yellow to green to indicate a successful connection.

4. Transmitting Sensor Data

1. Select the *Data* tab to display the telemetry data exchanged between the LoRa network and the sensor in the *APPLICATION DATA* area.



The first time a connection is established between the sensor and the network, the *device address* (assigned automatically by the network), the *Application EUI* and the *Device EUI* are exchanged.

This initial connection to the LoRa network is indicated by a small lightning bolt symbol in the status window.

Once the sensor is connected to the network, telemetry data starts to be transferred between the sensor and network. Data uploads from the sensor to the network are indicated by a small blue arrow pointing upward. Downloads from the network to the sensor are indicated by a small blue arrow pointing downward.

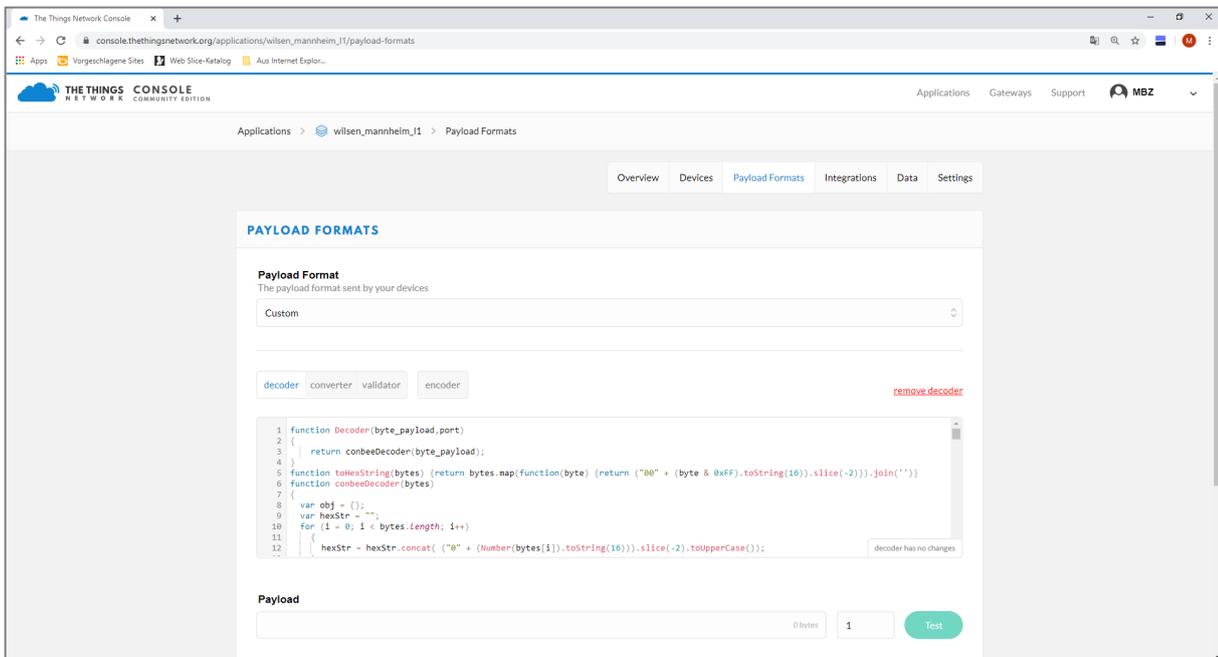
5. Payload Decoder

A payload decoder is used to interpret the payload string.

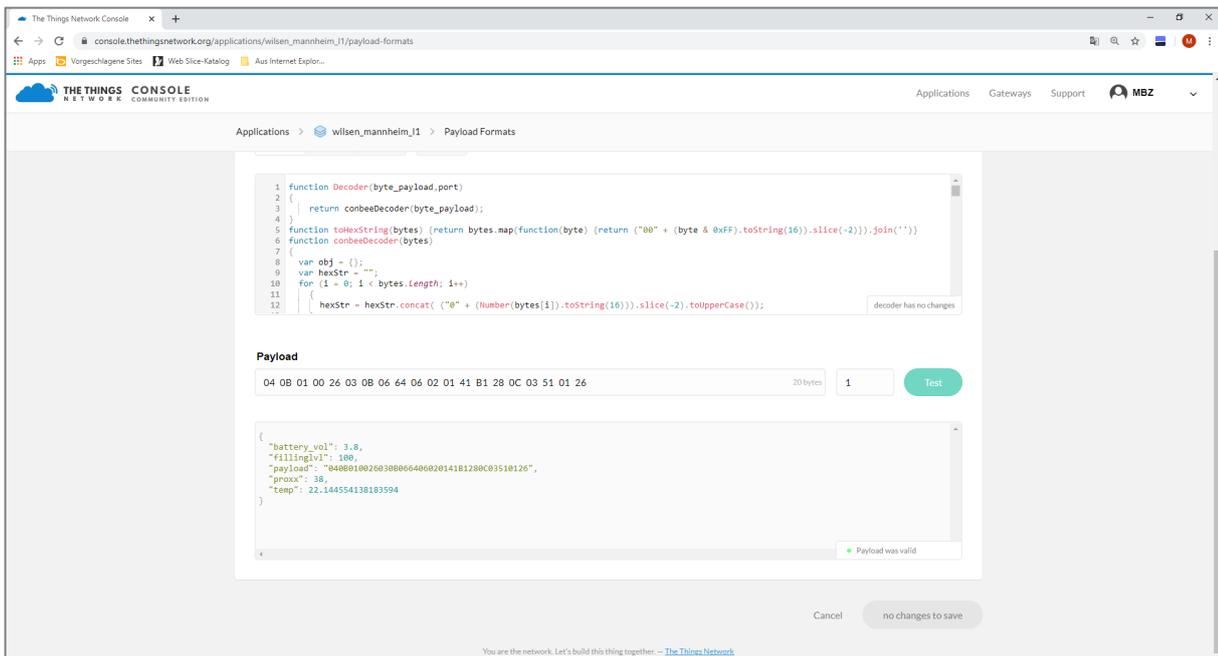
1. To add a payload decoder, go back one level—from the device level to the application level.
2. Select your *new_sensor* application and click the *Payload Formats* register card in the upper-right navigation menu.
 - In the *PAYLOAD FORMATS* area, you can add the payload decoder as a JavaScript program.

Note

The payload description and the payload decoder for your WILSEN.sonic.level can be downloaded online from the product detail page for the respective WS-UCC*-F406-B15-B41-* wireless ultrasonic sensor at www.pepperl-fuchs.com. See the *Documents* and *Software* areas.



3. Copy the program code of the payload decoder from the text file and paste it into the *Payload Formats* register card.
 4. After pasting the source code, you must save it to the application. To do this, click the green *save payload functions* button at the bottom right of the *PAYLOAD FORMATS* page.
 5. To test whether the payload decoder functions correctly, copy a test payload into the *Payload* field.
 6. Click the green *Test* button.
- The interpretation result of the payload string above appears in the bottom window of this area.



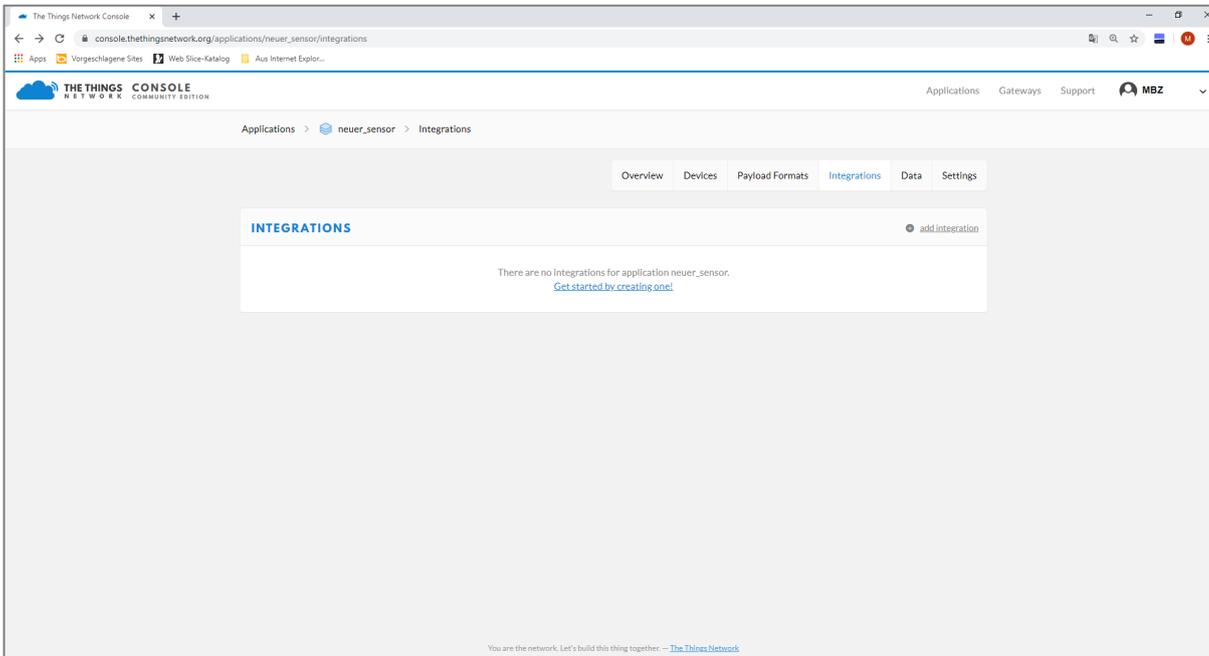
Once the payload decoder has been successfully implemented, the interpreted sensor data will also be displayed in the *APPLICATION DATA* area.

6. Software Applications for Processing Sensor Data

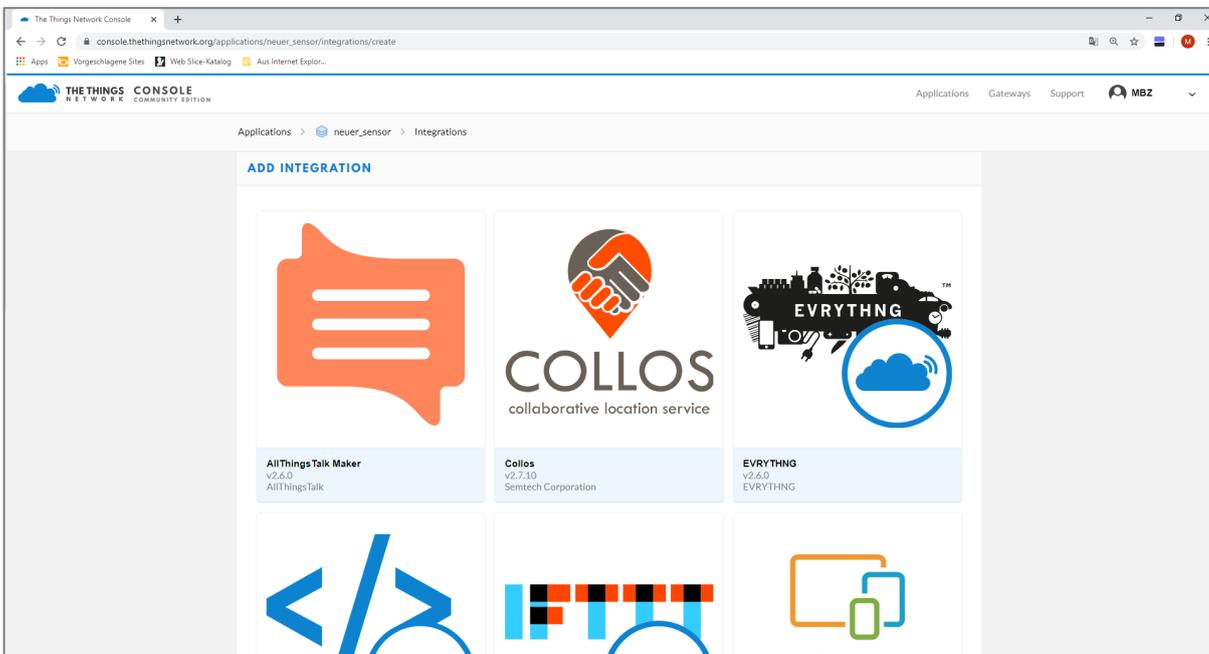
The incoming telemetry data from the LoRa sensors is stored in TTN only while the browser window is active. This means that the data will be lost if the browser window is closed.

However, if the sensor data must be saved for graphic representation or subsequent evaluation, it must be transferred from TTN to a further software application.

The TTN displays some example integration options as standard. To display the options, select the *INTEGRATIONS* area within your *new_sensor* application and select *add integration* in the upper right of the window.



A window displaying some software applications in which the sensor data can be integrated appears.



Below the integrations, you can find:

- Databases for longer-term storage of sensor data
- IoT platforms for graphic representation of sensor data
- Applications such as IFTTT ("If This Then That") that enable logical processing of the data, e.g., with certain sensor values triggering further actions.

For information on choosing the appropriate integration, read the respective product description. Each integration offers specific documentation on integrating sensor data from TTN.