

Description of the Payload

Wireless Ultrasonic Sensor
WILSEN.sonic.level

WS-UC*-F406-B41-*-02

PEPPERL+FUCHS

LoRaWAN

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

General Information on Operating WILSEN devices in a LoRaWAN Environment

Rejoin

A WILSEN device rejoins (= logs in to the LoRa network server [LNS] again) during operation "only if required." Corresponding detection mechanisms are active in the device to detect whether it is still connected to the LNS. If the device is not connected, the WILSEN rejoins the network automatically.

Unconfirmed/Confirmed Messages

By default, the WILSEN devices are set to "unconfirmed messaging". This type of transmission ensures the lowest possible load on the LoRa network. If your application requires a confirmed messaging, you can change the type of messaging in the WILSEN device to "confirmed". For details, refer to the WILSEN.sonic.level manual.

Downlink / Remote Control via LoRa

The WILSEN devices are LoRa class A devices.
Besides the typical transmission of uplink messages, the device is able to accept and process downlink messages coming from the LNS. The commands supported by the device can be found in the separate documentation "WILSEN Downlink Description". You can download this from the product details page at www.pepperl-fuchs.com.

General Structure of a LoRaWAN Payload

The general structure of a LoRaWAN payload is as follows:

Commands of physical layer	Commands of MAC layer	Application payload	MIC of MAC layer	CRC of physical layer

Application data package 1	ADP2	ADP3	…	ADPn

Structure of the application payload data

Length	Universal Unique identifier (UUID)	Data
0x06	0x0201	0x41C567C9

Content of an application data package

The WILSEN.sonic.level provides its data and information via three different payloads.

Payload 1

Payload 1 contains the sensor data (excluding GPS position data) and is typically used in all applications in which GPS position data is not required.
The transmission of payload 1 and its frequency are determined by the settings in the "LoRaWAN configuration submenu" of the WILSEN app (see the WILSEN.sonic.level manual).

Payload length: 20 bytes

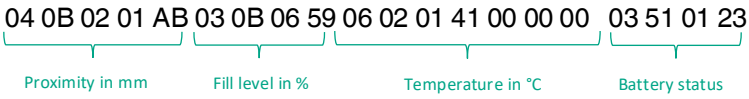
Structure of the application data payload:

ADP1	ADP2	ADP3	ADP4
Proximity in mm	Fill level in %	Temperature in °C	Battery status

The table below provides details on the individual data packages:

Universally Unique Identifier UUID (16 bit)	Data Package Description	Data Type	Data Length (Bytes)	Additional Information
0x0B02	proxx_mm	uint16	2	Proximity value in mm
0x0B06	fillinglvl_percent	uint8	1	Fill level in %
0x0201	temp_celcius	float	4	Temperature in °C
0x5101	battery_vol	uint8	1	Battery status: value is provided in volts/10

Below is an example of this payload:



Note

If an object is within the dead band of the ultrasonic sensor, the following values are transmitted in the payload:

- Proximity value: 0 mm
- Fill level value: 100 %

If there is no object within the sensing range of the ultrasonic sensor, the following values are transmitted in the payload:

- Proximity value: 65535 mm
- Fill level value: maintains its last value

Payload 2

Payload 2 contains the sensor data including GPS position data and is typically used in all applications in which GPS position data is required in addition to the sensor data. Payload 2 can be used in addition to or in place of payload 1.

The transmission of payload 2 and its frequency are determined by the settings in the "GPS configuration submenu" of the WILSEN app (see the WILSEN.sonic.level manual).

ADP1	ADP2	ADP3	ADP4	ADP5	ADP6
Proximity in mm	Fill level in %	Temperature in °C	Battery status	Geographic latitude	Geographic longitude

Payload length: 34 bytes

Structure of the application data packages:

Universally Unique Identifier UUID (16 bit)	Data Package Description	Data Type	Data Length (Bytes)	Additional Information
0x0B02	Proxx mm	uint16	2	Proximity value in mm
0x0B06	fillinglvl_percent	uint8	1	Fill level in %
0x0201	temp_celcius	float	4	Temperature in °C
0x5101	battery_vol	uint8	1	Battery status: value is provided in volts/10
0x5001	latitude	int32	4	Geographic latitude: provided as a decimal value by calculating the degree of latitude/1000000
0x5002	longitude	int32	4	Geographic longitude: provided as a decimal value by calculating the degree of longitude/1000000

Below is an example of this payload:

04 0B 02 01 AB 03 0B 06 59 06 02 01 41 01 99 9A 03 51 01 22 06 50 02 00 7D 21 78 06 50 01 02 F1 C3 DF

Note

If an object is within the dead band of the ultrasonic sensor, the following values are transmitted in the payload:

- Proximity value: 0 mm
- Fill level value: 100 %

If there is no object within the sensing range of the ultrasonic sensor, the following values are transmitted in the payload:

- Proximity value: 65535 mm
- Fill level value: maintains its last value

If the device was unable to determine a valid GPS position, the following values are transmitted in the payload:

- Longitude: 0.000000
- Latitude: 0.000000

Payload 3

The sensor transmits payload 3 ("heartbeat") every 24 hours, regardless of payload 1 and payload 2. Payload 3 contains information about the sensor in the form of counter readings for the frequency of ultrasonic measurements, the number of LoRa transmissions, the number of times the GPS position was determined, and the battery status.

The payload is structured is as follows:

ADP1	ADP2	ADP3	ADP4	ADP5
P+F serial number	Counter reading for LoRa transmissions	Counter reading for GPS position determination	Counter reading for ultrasonic measurements	Battery status

Payload length: 38 bytes

Structure of the application data packages:

Universally Unique Identifier UUID (16 bit)	Data Package Description	Data Type	Data Length (Bytes)	Additional Information
0x2A25	SerialNr	uint8(14)	14	P+F serial number, ASCII-coded
0x3101	lora_count	uint16	2	Counter reading for LoRa transmissions: number of LoRa transmissions
0x3102	gps_count	unit16	2	Counter reading for GPS position determination: number of times the GPS position was determined
0x3103	us_sensor_count	uint32	4	Counter reading for ultrasonic measurements: number of ultrasonic measurements carried out
0x5101	battery_vol	uint8	1	Battery status: value is provided in volts/10

Below is an example of this payload:

10 2A 25 34 38 30 30 30 30 30 30 36 32 38 37 38 33 04 31 01 07 01 04 31 02 03 22 06 31 03 00 00 0F 1C 03 51 01 23

Note

This payload transmission cannot be modified. This payload is transmitted as a sign of life (=heartbeat) for the sensor even when the LoRa and GPS transmission intervals are switched off. The same message type and, if set, the same number of transmissions are used for the transmission of Payload 3 as these two parameters are configured in the WILSEN for the transmission of Payload 1.