

Description of the Payload



Wireless Ultrasonic Sensor

WILSEN.sonic.level

WS-UCC*-F406-B15-B41-*-02

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General Information on Operating the WILSEN.sonic.level in a LoRaWAN Environment

Rejoin

The WILSEN.sonic.level 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.

Confirmed Messages

To elevate the data transmission to a level suitable for industrial use, only "confirmed messages" are used to transmit all payloads of the WILSEN.sonic.level. This means the WILSEN requires confirmation from the LNS that each message has been correctly received.

Downlink / Control via LoRa

The WILSEN.sonic.level is a LoRa Class A device. It can process the confirmation messages requested from the LNS, for example.

The device does not support further control via LoRa i.e., no commands can be sent to the device via LoRa. Likewise, no parameters in the device can be changed via LoRa. This is only possible via the WILSEN app.

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
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Application data package 1	ADP2	ADP3	...	ADPn
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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 cm	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
0x0B01	prox_cm	uint16	2	Proximity value in cm
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:

04 0B 01 00 41 03 0B 06 59 06 02 01 41 00 00 00 03 51 01 23



Proximity in cm Fill level in % Temperature in °C Battery status

Note

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

- Proximity value: 0 cm
- 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 cm
- 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 cm	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
0x0B01	proxx_cm	uint16	2	Proximity value in cm
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 01 00 41 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 cm
- 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 cm
- 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 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	uint16	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.