Wisely payload

> ⚠ **Warning**
>
> This documentation is subject to change without prior notice.

Analog channels

The Wisely device series offers different analog channels, according to the model.

Analog Channel	Data Channel	Byte Length	Wisely Standard	Wisely CarbonSense	Wisely AllSense
Atmospheric pressure	0x01	2	✓	✓	✓ *
Temperature	0x02	2	✓	✓	✓
Humidity	0x03	1	✓	✓	✓
VOC	0x04	2			✓
Light Density	0x05	2			✓ *
CO_2	0x06	2		✓	✓
PIR/presence elapsed active time	0x07	2			✓ *

* Due to limitations in payload length, these channels are not activated by default.

Standard uplink payload

> ⓘ **Note**

The payload should be read from left to right. The measurement at the beginning of the payload is the oldest one.

Wisely Standard

Data port

Port: 5

Payload length

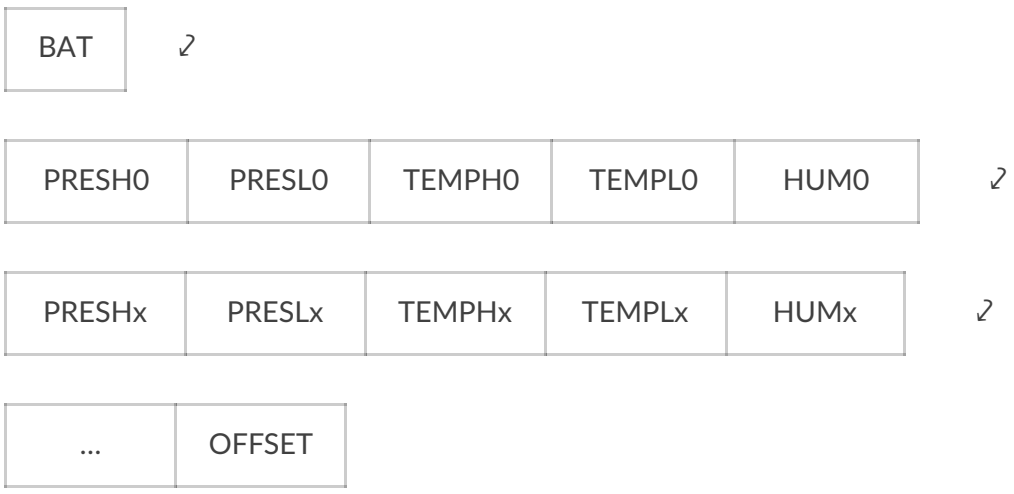
The payload has an individual length, determined by:

- individual sampling settings
- cyclic transmission interval
- spreading factor

Payload format

The payload consists of

- a leading byte, indicating the remaining battery capacity
- a sequence of measurement data sets



Battery

Field	Description	Data Type	Decoding
BAT	Battery capacity, value between 0 and 255	UInt8	(Battery in %) = 100.0 * BAT / 254.0

Special values for the battery are:

- BAT = 254: battery at maximum voltage
- BAT = 1: no further battery capacity available
- BAT = 255: device could not acquire the voltage
- BAT = 0: No battery inserted (external power supply)

Measurement data set and conversion

Field	Data Channel	Description	Data Type	Decoding
PRESHx PRESLx	0x01	Atmospheric pressure (in hPa)	UInt16	((PRESHx << 8) | PRESLx) / 10.0
TEMPHx TEMPLx	0x02	Temperature (in °C)	Int16	((TEMPHx << 8) | TEMPLx) / 10.0
HUMx	0x03	Humidity (in %rH)	UInt8	HUMx / 2.0

Offset

The system assumes that the time of the last measurement in the payload coincides with the transmission time of the package.

If the amount of measurements exceeds the allowed payload size, a full data package will be sent prior to the next scheduled package, and the exceeding measurements will be sent with the next scheduled payload.

To mitigate the fact that the time of the last measurement in the first payload is different from its actual transmission time, an offset > 0 is provided, indicating the number of intervals of **CyclicTransmissionCounter × SensorSampleTime** between these two timestamps.

Wisely CarbonSense

Data port

Port: 5

Payload length

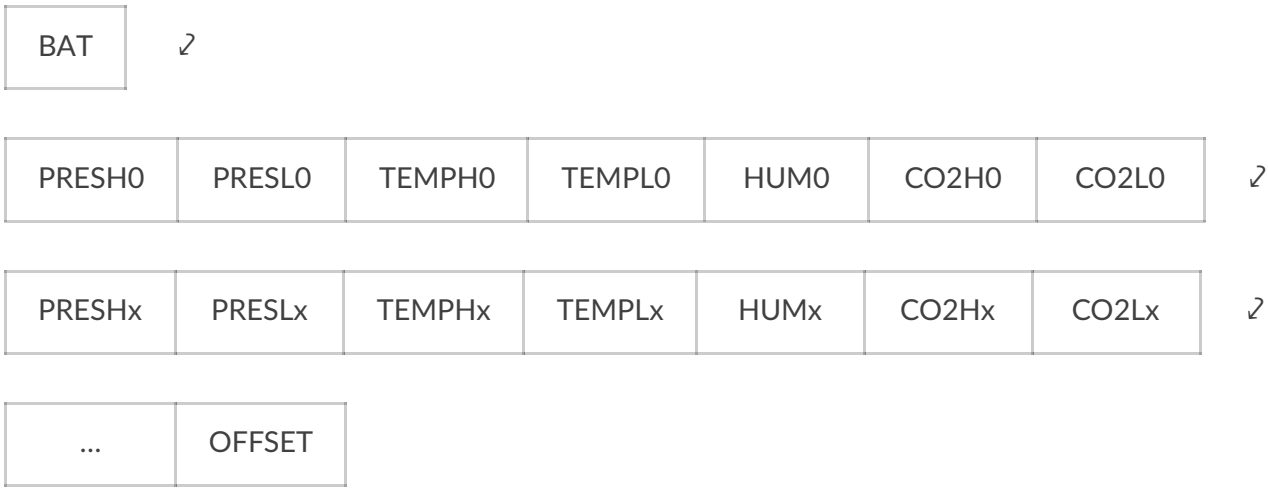
The payload has an individual length, determined by:

- individual sampling settings
- cyclic transmission interval
- spreading factor

Payload format

The payload consists of

- a leading byte, indicating the remaining battery capacity
- a sequence of measurement data sets



Battery

Field	Description	Data Type	Decoding
BAT	Battery capacity, value between 0 and 255	UInt8	(Battery in %) = 100.0 * BAT / 254.0

Special values for the battery are:

- BAT = 254: battery at maximum voltage
- BAT = 1: no further battery capacity available
- BAT = 255: device could not acquire the voltage
- BAT = 0: No battery inserted (external power supply)

Measurement data set and conversion

Field	Data Channel	Description	Data Type	Decoding
PRESHx PRESLx	0x01	Atmospheric pressure (in hPa)	UInt16	((PRESHx << 8) | PRESLx) / 10.0
TEMPHx TEMPLx	0x02	Temperature (in °C)	Int16	((TEMPHx << 8) | TEMPLx) / 10.0
HUMx	0x03	Humidity (in %rH)	UInt8	HUMx / 2.0

Field	Data Channel	Description	Data Type	Decoding
CO2Hx CO2Lx	0x06	CO_2 concentration (in ppm)	UInt16	((CO2Hx << 8) | CO2Lx)

Offset

The system assumes that the time of the last measurement in the payload coincides with the transmission time of the package.

If the amount of measurements exceeds the allowed payload size, a full data package will be sent prior to the next scheduled package, and the exceeding measurements will be sent with the next scheduled payload.

To mitigate the fact that the time of the last measurement in the first payload is different from its actual transmission time, an offset > 0 is provided, indicating the number of intervals of **CyclicTransmissionCounter × SensorSampleTime** between these two timestamps.

Wisely AllSense

Data port

Port: 5

Payload length

The payload has an individual length, determined by:

- individual sampling settings
- cyclic transmission interval
- spreading factor

Payload format

The payload consists of

- a leading byte, indicating the remaining battery capacity
- a sequence of measurement data sets

BAT	⤶

TEMPH0	TEMPL0	HUM0	VOCH0	VOCL0	CO2H0	CO2L0	⤶

TEMPHx	TEMPLx	HUMx	VOCHx	VOCLx	CO2Hx	CO2Lx

...	OFFSET

Battery

Field	Description	Data Type	Decoding
BAT	Battery capacity, value between 0 and 255	UInt8	(Battery in %) = 100.0 * BAT / 254.0

Special values for the battery are:

- BAT = 254: battery at maximum voltage
- BAT = 1: no further battery capacity available
- BAT = 255: device could not acquire the voltage
- BAT = 0: No battery inserted (external power supply)

Measurement data set and conversion

Field	Data Channel	Description	Data Type	Decoding
TEMPHx TEMPLx	0x02	Temperature (in °C)	UInt16	((TEMPHx << 8) | TEMPLx) / 10.(
HUMx	0x03	Humidity (in %rH)	UInt8	HUMx / 2.0
VOCHx VOCLx	0x04	Volatile Organic Compounds (in IAQ)	UInt16	((VOCHx << 8) | VOCLx)
CO2Hx CO2Lx	0x06	CO_2 concentration (in ppm)	UInt16	((CO2Hx << 8) | CO2Lx)

Offset

The system assumes that the time of the last measurement in the payload coincides with the transmission time of the package.

If the amount of measurements exceeds the allowed payload size, a full data package will be sent prior to the next scheduled package, and the exceeding measurements will be sent with the next scheduled payload.

To mitigate the fact that the time of the last measurement in the first payload is different from its actual transmission time, an offset > 0 is provided, indicating the number of intervals of **CyclicTransmissionCounter × SensorSampleTime** between these two timestamps.

Extended uplink payload (Wisely AllSense only)

> ⓘ **Note**
>
> See section Sensor selection below to learn how to enable the extended uplink payload.

Wisely AllSense

Data port

Port: 6

Payload length

The payload has an individual length, determined by:

- individual sampling settings
- cyclic transmission interval
- spreading factor

Payload format

The payload consists of

- a leading byte, indicating the remaining battery capacity
- a sequence of measurement data sets

BAT

PRESH0	PRESL0	TEMPH0	TEMPL0	HUM0	VOCH0	VOCL0

LDH0	LDL0	CO2H0	CO2L0	PIRH0	PIRL0

PRESHx	PRESLx	TEMPHx	TEMPLx	HUMx	VOCHx	VOCLx

LDHx	LDLx	CO2Hx	CO2Lx	PIRHx	PIRLx

...	OFFSET

Battery

Field	Description	Data Type	Decoding
BAT	Battery capacity, value between 0 and 255	UInt8	(Battery in %) = 100.0 * BAT / 254.0

Special values for the battery are:

- BAT = 254: battery at maximum voltage
- BAT = 1: no further battery capacity available
- BAT = 255: device could not acquire the voltage
- BAT = 0: No battery inserted (external power supply)

Measurement data set and conversion

Field	Data Channel	Description	Data Type	Decoding
PRESHx PRESLx	0x01	Atmospheric pressure (in hPa)	UInt16	((PRESHx << 8) | PRESLx) / 10.0
TEMPHx TEMPLx	0x02	Temperature (in °C)	Int16	((TEMPHxx << 8) | TEMPLx) / 10
HUMx	0x03	Humidity (in %rH)	UInt8	HUMx / 2.0
VOCHx VOCLx	0x04	Volatile Organic Compounds (in IAQ)	UInt16	((VOCHx << 8) | VOCLx)

Field	Data Channel	Description	Data Type	Decoding
LDHx LDLx	0x05	Light density (in lux)	UInt16	((LDHx << 8) | LDLx)
CO2Hx CO2Lx	0x06	CO_2 concentration (in ppm)	UInt16	((CO2Hx << 8) | CO2Lx)
PIRHx PIRLx	0x07	Room usage (in minutes)	UInt16	((PIRHx << 8) | PIRLx)

Offset

The system assumes that the time of the last measurement in the payload coincides with the transmission time of the package.

If the amount of measurements exceeds the allowed payload size, a full data package will be sent prior to the next scheduled package, and the exceeding measurements will be sent with the next scheduled payload.

To mitigate the fact that the time of the last measurement in the first payload is different from its actual transmission time, an offset > 0 is provided, indicating the number of intervals of CyclicTransmissionCounter × SensorSampleTime between these two timestamps.

Downlink payload

Sensor sampling time

The sampling period is the time difference between two measurements. The sampling period is adjustable at configuration time and at runtime and is set in minutes. The parameter is relevant for all measurement channels.

Data port

Port: 10

Downlink message

ID	FUNC	SAMPT

Field	Description	Value
ID	Identifier	0xFF

Field	Description	Value
FUNC	Sensor sample time	0x01
SAMPT	Sensor sample time in minutes	0x01 - 0xFF

Default setting

The default value for the sensor sample time is 0x01 (1 minute).

Cyclic transmission counter

The device transmits its data after **CyclicTransmissionCounter × SensorSampleTimestarting** from the last transmission.

Data port

Port: 10

Downlink message

ID	FUNC	CTC

Field	Description	Value
ID	Identifier	0xFF
FUNC	Function code	0xF0
CTC	Cyclic transmission counter	0x01 - 0xFF

Default setting

The default value for the cyclic transmission counter is 0x3C (= 60).

Front LED indicator

This feature is only available for Wisely CarbonSense and Wisely AllSense.

If a configurable CO_2 limit is exceeded, the LED on the front side of the device will blink every 60 seconds (250 ms on, 500 ms off, repeating 4 times).

Data port

Port: 10

Downlink message

ID	FUNC	LIMT	LIMH	LIML	R	G	B	ENBL

Field	Description	Value
ID	Identifier	0x06
FUNC	Function code	0x06
LIMT	Type of limit when the statement will become active	0x08: below 0x09: below or equal 0x0A: equal 0x0B: above or equal 0x0C: above
LIMH LIML	CO_2 limit for the LED to flash	0 - 10000
R	Enable red LED	0x00 (off) 0xFF (on)
G	Enable green LED	0x00 (off) 0xFF (on)
B	Enable blue LED	0x00 (off) 0xFF (on)
ENBL	Enable or disable configuration	0x00 (disable) 0x01 (enable)

ⓘ **Note**

Multiple conditions can be configured, but the device can only store one condition per color.

If two conditions are true at a given time, the one with the higher priority will take precedence.

Color and condition priority

If two conditions become active, the condition with the highest priority (lowest priority identifier) is applied.

Priority	Color
1	red
2	magenta
3	yellow
4	green
5	cyan
6	blue
7	white

Default settings

The LED flashes

- blue, above 800 ppm
- red, above 1400 ppm

Payload for the LED to flash blue above 800 ppm CO_2 and below 1400 ppm:

ID	FUNC	LIMT	LIMH	LIML	R	G	B	ENBL
0x06	0x06	0x0B	0x03	0x20	0x00	0x00	0xFF	0x01

Payload for the LED to flash red above 1400 ppm CO_2:

ID	FUNC	LIMT	LIMH	LIML	R	G	B	ENBL
0x06	0x06	0x0B	0x05	0x78	0xFF	0x00	0x00	0x01

PIR sensitivity threshold (Wisely AllSense only)

This command sets the PIR sensitivity. Smaller values mean a higher sensitivity. The sensitivity is used for calculating the room usage. Two events within a time window of 10 minutes are considered as usage.

Data port

Port: 10

Downlink message

ID	FUNC	PIRT

Field	Description	Value
ID	Identifier	0x07
FUNC	Function code	0xA1
PIRT	PIR threshold; lower values lead to higher sensitivity	0x01 - 0x28

Sensor selection (Wisely AllSense only)

This command lets you choose between two different types of sensor measurements. Only available for Wisely AllSense.

Data port

Port: 10

Downlink message

ID	FUNC	PLT

Field	Description	Value
ID	Identifier	0xFF
FUNC	Function code	0xFE
PLT	Set the payload format	0x01: Simple payload 0x02: Extended payload

A confirmation message `0xF100` will be sent from the device on port 11.

> ⚠ **Warning**
>
> Enabling the extended payload almost doubles the payload that needs to be transmitted. An increased number of packets will lead to a reduced battery life.

	Simple Payload	Extended Payload
Atmospheric pressure		✓

	Simple Payload	Extended Payload
Temperature	✓	✓
Humidity	✓	✓
VOC	✓	✓
Light Density		✓
CO_2	✓	✓
PIR		✓