LoRaWAN™ MODULARIS MODULE CM3020

LoRaWAN™ Modularis Module enables the acquisition of water consumption data and transmits it wirelessly to the available LoRaWAN™ network.

LoRaWAN™ Modularis Module is meant to be attached to the Wehrle(compatible) water meter.

OVERVIEW

Efficient

LoRaWAN™ Modularis Module has bidirectional, battery powered, long range transceiver with low power consumption.

Intelligent

Real-time usage data is gathered wirelessly and processed automatically. Data is accessible from your LoRaWAN™ provider.

APPLICATIONS

Water metering

Frequent reporting provides a detailed usage overview.

Usage detection

LoRaWAN™ Modularis Module can be configured to send alerts when usage is detected.

FEATURES

- Long range wireless data transmission
- Pre-installed long-life battery
- Water metering
- Configurable reporting interval

- Maintenance free - install & forget
- Easy installation
- Average life 8 years*
- Secure communication

* Lifetime depends from device location and reporting interval.

SPECIFICATIONS

Diameter:	64.0 mm
Height:	39.2 mm
Weight:	60 g
Operating temperature:	-20°C ... +65°C
Communication range:	up to 15km*
Tx power:	up to +20dBm
Rx Senitivity:	-140dBm
MAC Layer:	LoRaWAN™
Physical Layer:	LoRa®
Body material:	Polycarbonate
IP Rating:	IP68
Communication:	LoRaWAN™

* Communication range is dependent on the location of the sensor and nearest base station.

COMMUNICATION

Bit order:	LSB
Usage reporting:	Unconfirmed messages
Status reporting:	Confirmed messages
Device configuration:	Confirmed messages. Device confirms configuration change by replying with changed configuration values.

PORT LIST

fPort	Usage	Format	Uplink	Unit	Comment
14	Water Usage	uint32	yes	liters	Cumulative
24	Status		yes	-	Defined below
50	Configuration		no	-	Defined below
99	Boot/Debug		yes	-	Defined below

FW version >= 0.6.0

fPort 14 Usage Message

Byte0	Byte 1	Byte 2	Byte 3
Liter count (uint32)			

MESSAGE SAMPLE

Message in base64

```
gAoAAA==
```

Message decoded to hex

```
800A0000
```

HEX message flip for MSB

```
00000A80
```

HEX message converted to decimal

```
2688 (liters)
```

fPort 24 Status Message

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
Usage counter (uint32)				Battery mV/16 (Int8)	Temperature* °C (int8)	RFU	Status	

Bit #	Function	Mode	Status
0	RFU		
1	RFU		
2	Temp. detection	0: off 1: on (default)	0: ok 1: alert
3	RFU		
4	RFU		
5	RFU		
6	User triggered		0: false 1: true
7	is Alert		

* Uncalibrated value +-5 °C

Message sample

Message in base64

EQAAAE4kAARA

Message decoded to hex

11000000 4e 24 00 0440

Usage counter `11000000` HEX message flip for MSB

```
00000011
```

HEX message converted to decimal

```
17 (liters)
```

Battery HEX message

```
4E
```

HEX message converted to decimal

```
78
```

Value multiplied by 16 to get mV value

```
1278 mV (1.284 V)
```

Temperature HEX message

```
24
```

HEX message converted to decimal

```
36°C
```

RFU

```
00
```

Status HEX message

```
0440
```

Status HEX message first byte converted to binary

```
0000 0100
```

Binary converted to statuses (LSB)

```
0 : RFU

1 : RFU

1 : Temperature detection - on

0 : RFU

0 : RFU

0 : RFU

0 : RFU

0 : RFU
```

Status HEX message second byte converted to binary

```
0100 0000
```

Binary converted to alerts (LSB)

```
0 : RFU
0 : RFU
0 : Temperature detection - ok
0 : RFU
0 : RFU
0 : RFU
1 : User triggered - true*
0 : Is Alert - false
```

* Status message can be triggered manually by putting the magnet on the sensor for 1 second. When the message is manually triggered then user triggered bit will be set to true.

fPort 50 Configuration Message

Byte1	Byte ...	Byte n
Header*	Payload	
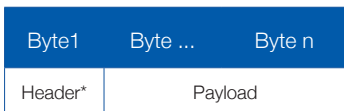
Value	Bit #	Parameter	Payload size	Type	Value	Unit	Comment
0: not sent 1: sent	0	Reporting interval	32bit	uint	3600**	seconds	0 = disabled 600..86400
	1	RFU					
	2	Status Interval	32bit	uint	86400**	seconds	0 = default 900..86400
	3	Counter	32bit	uint		liters	
	4	Temp. threshold	8bit	int	0	°C	
	5	RFU					
	6	RFU					
	7	Functions	8bit				

Bit #	Function	Value
0	RFU	
1	RFU	
2	Temp. detection	0: off 1: on (default)
3	RFU	
4	RFU	
5	RFU	
6	RFU	
7	RFU	

* only 1 parameter can be configured at once.
** Values are rounded down to full minutes

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Message sample

Message goal: Configure reporting interval to 600 sec

Header

Function selection

```
1 : Reporting interval (seconds) - set
0 : RFU
0 : Status interval - not set
0 : Counter - not set
0 : Temperature threshold - not set
0 : RFU
0 : RFU
0 : Functions - not set
```

Selection converted to binary

```
00000001
```

Selection converted to HEX

```
01
```

Reporting interval (seconds)

Converting interval 600 to HEX

```
258
```

Flip interval for LSB

```
58020000
```

Compile message for sending (HEX)

```
01 58020000
```

Control value in base64 to control after sending

```
AVgCAAA=
```

fPort99 Boot/Debug message

Byte 1	Byte 2	Byte n
Header (HEX)	Payload	

Boot message

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10..17
Header	Serial				Firmware			Reset reason	Debug info
00	HEX				HEX			HEX	BCD

Message sample

Message in base64

ABYBEUwABgAQBACDACgBQAAAAA==

Message decoded to hex

00 1601114C 000600 10 04008300280140000000

Header HEX message

00

HEX translated to type

Boot

Serial HEX message

1601114C

Flip HEX message for MSB

4C110116

Firmware version

Major version in HEX

00

HEX value converted to decimal

0

Minor version in HEX

06

HEX value converted to decimal

6

Patch version in HEX

00

HEX value converted to decimal

0

LoRaWAN™ SENSOR CM3020

Reset reason

```
10
```

Convert to reason

```
Calibration timeout
```

Debug info

```
04008300280140000000
```

Shutdown message

Byte 1	Byte 2	Byte 3..11
Header	Reason	Status packet
01	HEX	Standard status message (fPort24)

Value	Reason
10	Calibration timeout
31	Shutdown by user (magnet)

Message sample

Message in base64

```
ATERAAAATiQABEA=
```

Message decoded to hex

```
01|31|110000004e24000440
```

Header HEX message

```
01
```

HEX translated to type

```
Shutdown
```

Reason HEX message

```
31
```

HEX translated to type

```
Shutdown by user (magnet)
```

Status message

```
110000004e24000440
```

Translate according standard (fPort24)

DIMENSIONS / PACKAGING

Dimensions

64.0 mm

39.2 mm

64.0 mm
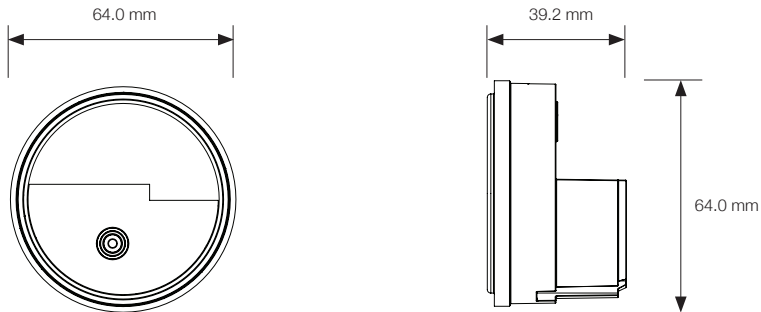
Packaging

1 pcs box

50 mm

100 mm

100 mm
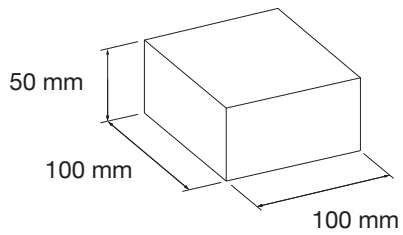
ORDERING INFORMATION

Article / SKU	Package qty	Frequency	Region
CM3020A#0001EU	1	868 MHz	EU
CM3020B#0001AU	1	922 MHz	AU
CM3020C#0001US	1	915 MHz	US
CM3020D#0001AS	1	923 MHz	AS
CM3020E#0001CN	1	780 MHz	CN
CM3020F#0001KR	1	922 MHz	KR
CM3020G#0001EU	1	433 MHz	EU
CM3020H#0001CN	1	470 MHz	CN
CM3020E#0001IN	1	866 MHz	IN

CONTACT INFORMATION

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REVISION HISTORY

0.1 - First draft

0.2 - Status message

1.0 - Updated communication protocol

1.1 - Protocol corrected

1.2 - Usage counter lenghts corrected

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