

HYDRODIGIT

Digital Single Jet water meter

OPERATING INSTRUCTIONS



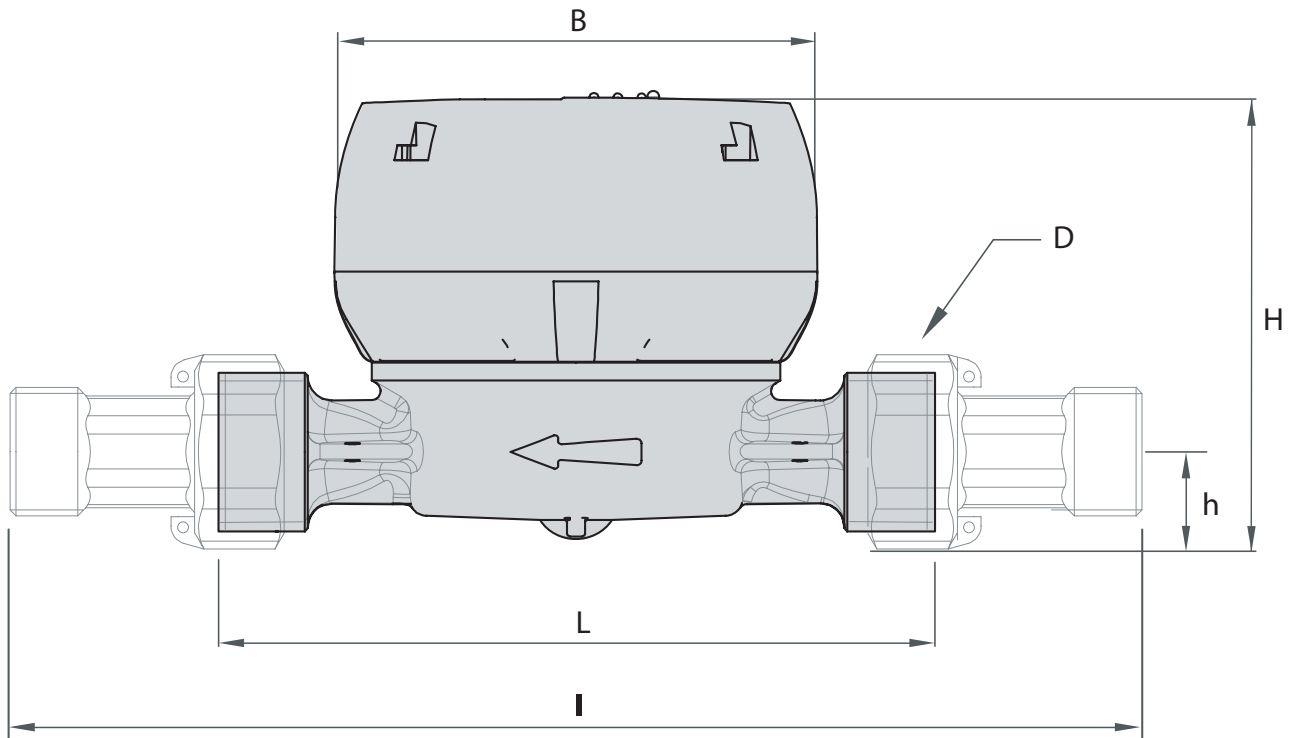
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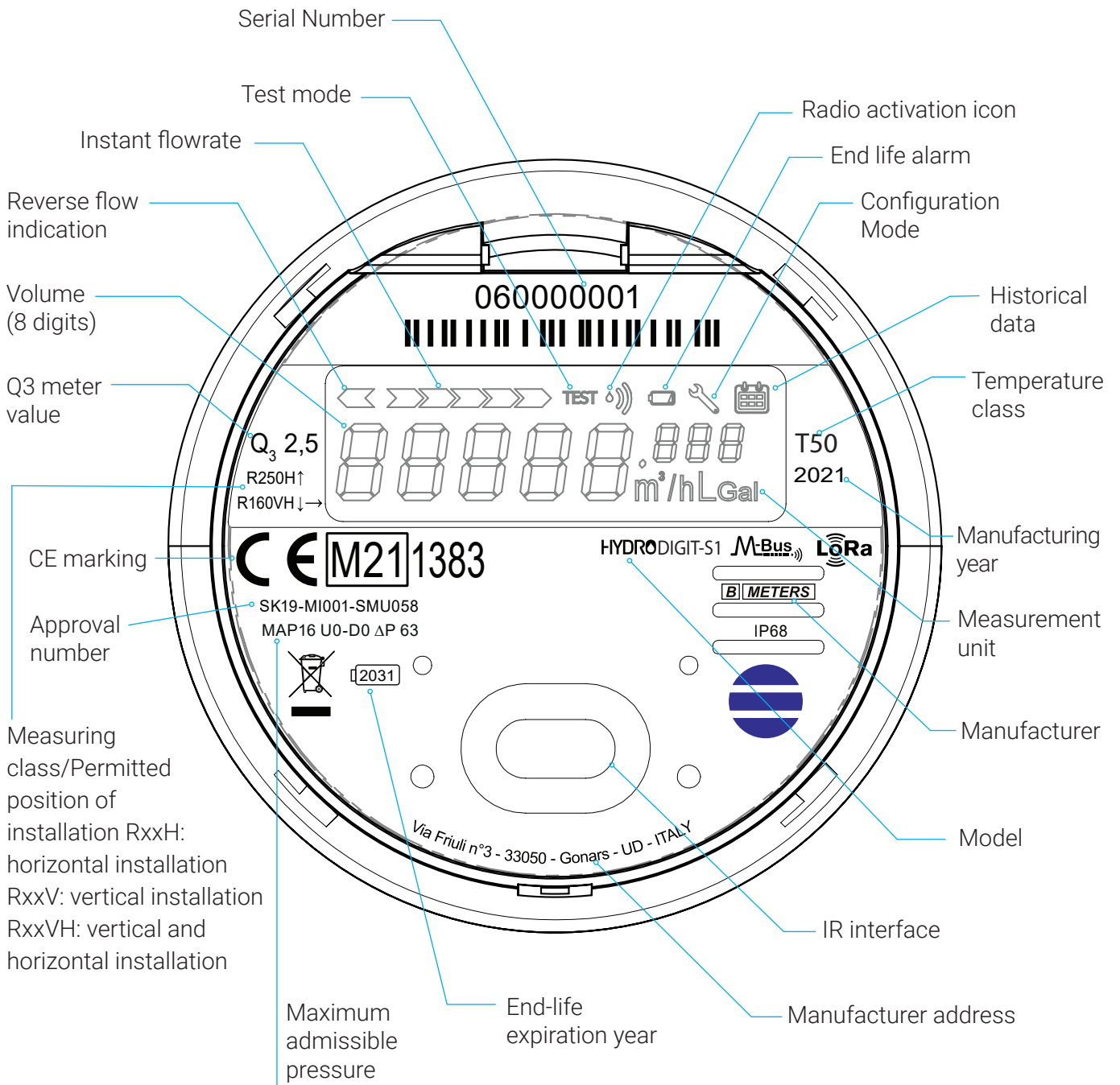
DESIGN

According ISO4064



Size	mm in	15 (1/2")	15 (1/2")	20 (3/4")
L	mm	80	110	130
B	mm	85	85	85
I	mm	160	190	228
D Threading	in	3/4"	3/4"	1"
H	mm	73	73	73
h	mm	18	18	18

DEVICE DIAL



FUNCTIONALITY

The water meter **HYDRODIGIT** is a single jet water meter with digital display and inductive rotation detection, anti-magnetic.

It is available for both cold and hot water.

VERSIONS

The device is available in four versions:

- Wireless MBUS OMS compatible
- Wireless MBUS OMS v4 (COMBO, output configuration Wireless MBUS OMS v4 only)
- LoRaWAN (COMBO, output configuration LoRaWAN only)
- LoRaWAN + Wireless MBUS OMS v4 (COMBO, output configuration LoraWAN + Wireless MBUS OMS v4)

PACKING CONTENT

- Hydrodigit water meter
- Connection gaskets*
- Connectors*
- Seal*

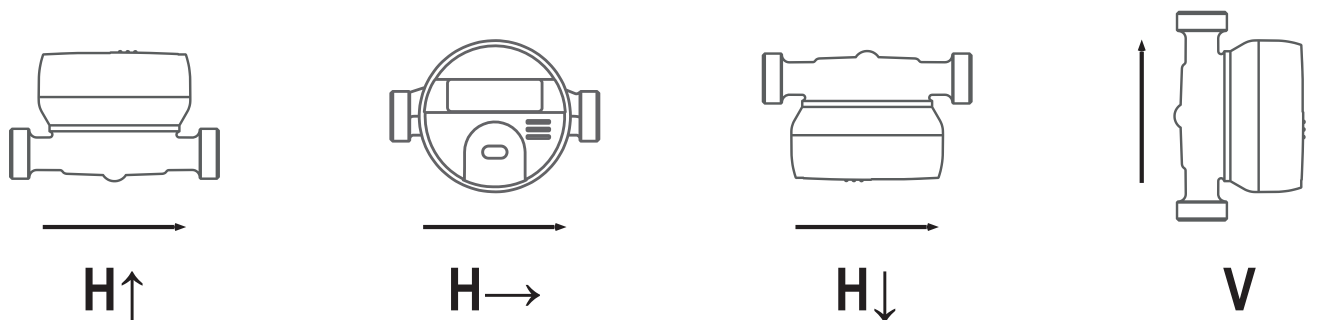
*depending if ordered with the meter

ENVIRONMENTAL CONDITIONS

- Storage: 1°C – 55°C
- Operating: 1°C – 55°C

INSTALLATION REQUIREMENTS

All the versions of the water meter can be installed both horizontally and vertically. For a better performance it is preferable, however, the horizontal installation, with the turbine axis perpendicular to the ground and the reading mechanism facing upwards.



OPERATION

Note: the following display pictures are given as example.

DISPLAY



DELIVERY STATUS

The factory setting is the energy saving mode. In this mode the radio transmission function is not yet activated, in order to save battery power during shipping and stock. However, the device can account the consumption and send, if any, errors (e.g. reverse flow for incorrect installation).

OPERATING MODE – RADIO ACTIVATION

Once the water meter is installed, the radio transmission activates automatically after +/- 5 liters of water passed through the device (LoRaWAN: starts sending Join requests – wM-BUS: radio is activated). The display changes and the flow direction/level appear if the flow rate is detected.

RADIO PARAMETERS

Wireless MBUS compatible

As soon as radio operation mode is activated, the meter sends a radio telegram according to Wireless MBUS OMS (Open Metering Standard) T1 mode (unidirectional transmission).

Preconfigured Radio parameters (AMR Mode):

- Transmission frequency: every 200 seconds (current values).
- Transmission span: Every day, from 0 to 24 h.
- Encryption: disabled (default).
- No historical data.
- Transmitted data: Volume, actual date and hour, reverse flow, alarms.

It is possible to change the configuration parameters into Walk-By mode with an USB to IR interface (B METERS mod. UC-Cable) and the B Metering software.

Walk by mode parameters:

- Transmission frequency: every 60 seconds (current values).
- Transmission span: Every day from 6 to 20.
- Encryption: enabled/disabled.
- Historical Data (12 months).
- Transmitted data: Volume, actual date and hour, reverse flow, alarms, leakage date, fraud date (Qmax overflow or Backward flow detection).

Wireless MBUS OMS v4 (COMBO, output configuration Wireless MBUS OMS v4 only)

As soon as radio operation mode is activated, the meter sends a radio telegram according to Wireless MBUS OMS v4, T1 mode (unidirectional transmission).

Preconfigured Radio parameters (AMR Mode):

- Transmission frequency: every 200 seconds (current values).
- Transmission span: Every day, from 0 to 24 h.
- Encryption: disabled (default).
- No historical data.
- Transmitted data: Volume, actual date and hour, reverse flow, alarms.

It is possible to change the configuration parameters into Walk-By mode with an USB to IR interface (B METERS mod. UC-Cable) and the B Metering software

- Transmission frequency: configurable (minimum 60 seconds).
- Transmission interval: from Monday to Sunday, maximum 12 hours per day (time slot can be selected freely).
Possibility to select a 24-hours time slot with the following mandatory conditions:
 - Transmission frequency: > 300 seconds
 - Historical data disabled.
- Encryption: enabled/disabled.
- Historical data (12 months).
- Transmitted data (depends on the selected parameters): volume, date time, reverse flow, alarms, leakage alarm, fraud alarm (Qmax overflow or backward flow detection).

LoRaWAN (COMBO, output configuration LoraWAN only)

As soon as radio operation mode is activated, the meter sends join requests to the Network Server where it has been provisioned, according to LoRaWAN transmission standard.

During this process, the radio icon on the display will blink every second. If the procedure ends well, the icon will remain on and stable, otherwise it will turn off.

Preconfigured radio parameters:

- Transmission frequency: every 12 hours (current values).
- Transmission interval: 7/7d, 0/24h.
- Transmitted data: volume, reverse flow, diameter, medium, alarms

It is possible to change the configuration parameters into Walk-By mode with an USB to IR interface (B METERS mod. UC-Cable) and the B Metering software:

- Transmission frequency: every 6 hours (current values)
- Temperature data sending
- Transmitted data: volume, reverse flow, diameter, medium, alarms, temperature (if enabled)
- ABP mode and relative keys

LoRaWAN + Wireless MBUS OMS v4 (COMBO, output configuration LoraWAN + Wireless MBUS OMS v4)

As soon as radio operation mode is activated, the meter sends join requests to the Network Server where it has been provisioned, according to LoRaWAN transmission standard. Moreover, it turns on the Wireless M-BUS OMS v4 mode T1 (unidirectional transmission) interface.

During this process, the radio icon on the display will blink every second. If the procedure ends well, the icon will remain on and stable, otherwise it will turn off.

Preconfigured radio parameters (**LoRaWAN**):

- Transmission frequency: every 12 hours (current values).
- Transmission interval: 7/7d, 0/24h.
- Transmitted data: volume, reverse flow, diameter, medium, alarms

Preconfigured radio parameters (**wM-Bus**):

- Transmission frequency: every 60 seconds.
- Transmission interval: from Monday to Friday, from 8 to 18 h.
- Encryption: disabled
- Historical data (12 months)
- Transmitted data volume, date time, reverse flow, alarms, leakage alarm, fraud alarm (Qmax overflow or backward flow detection).

It is possible to change the configuration parameters into Walk-By mode with an USB to IR interface (B METERS mod. UC-Cable) and the B Metering software:

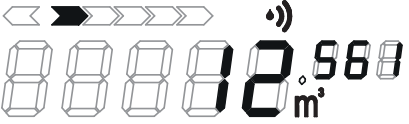
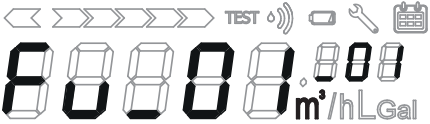

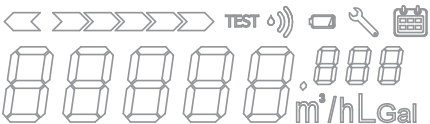
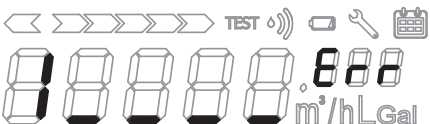
LoRaWAN:

- Transmission frequency: every 6 hours (current data)
- Temperature data sending
- Transmitted data: volume, backward flow, diameter, medium, alarms, temperature (if enabled)
- ABP mode and relative keys

wM-Bus:

- Transmission frequency: configurable (minimum 60 seconds).
- Transmission interval: from Monday to Sunday, maximum 12 hours per day (time slot can be selected freely).
Possibility to select a 24-hours time slot with the following mandatory conditions:
 - Transmission frequency: > 300 seconds
 - Historical data disabled.
- Encryption: enabled/disabled.
- Historical data (12 months).
- Transmitted data (depends on the selected parameters): volume, date time, reverse flow, alarms, leakage alarm, fraud alarm (Qmax overflow or backward flow detection).

DEVICE DISPLAY LOOP


Device display	Display time	Example description
	10 seconds	Consumption: 12,561 m ³ Flow: present Radio: activated
	2 seconds	Firmware version Fu_01_01 (In the "COMBO" version, "Combo 001" will be displayed)
	2 seconds	Display test "ALL ON"
	2 seconds	Display test "ALL OFF"
	2 seconds	Error message

ERROR MESSAGE

If an error occurs, an error message is displayed. The error message will be integrated into the device display loop for 2 seconds.



Error	Type	Descrizione	Activation	Troubleshooting	Reset	Radio telegram
I____Err	Backflow	Reverse flow detected, a flow in opposite direction is detected.	The error activates after continuous reverse flow higher than 20 liters.	Check water network and the meter installation.	Reset the alarm via LoRa downlink (if in LoRa version) or directly on field with IR interface and B Metering software.	The payload contains the status of the alarm and the date of the alarm activation. After resetting it the status is updated and the date will be removed from the radio payload.
_O___Err	Overflow	Water meters was used in an improper condition, flow rate exceeded the operating conditions. Manufacturer warranty expires.	The error activates after the meter operates at a flow rate higher than Q4 for 10 minutes continuously.	Check water network parameters.	Reset the alarm via LoRa downlink (if in LoRa version) or directly on field with IR interface and B Metering software.	The payload contains the status of the alarm and the date of the alarm activation. After resetting it the status is updated and the date will be removed from the radio payload.
__B__Err	Burst	High consumption in a short term is detected. This is probably linked to a pipeline failure/break.	If the flow rate of the meter stays continuously over Q3 for 30 minutes the alarm is set.	Check water network.	The alarm automatically resets when the flow rate decreases below $0,5 \cdot Q3$	The payload contains the status of the alarm and the date of the alarm activation. After the alarm resets, the date changes to the date of deactivation.
___R_Err	Reverse installation	The meter starts flowing in the opposite direction. This is probably due to a wrong installation.	During first installation only, if the absolute counter (forward counter - reverse counter) is equal to 0 and a reverse flow (>8 Liters) is detected, the alarm turns on.	Check water meter installation.	Automatically resets when flow is on the correct direction.	The payload contains the status of the alarm and when flow direction turns to the correct one the status updates.
___L_Err	Leakage	A continuous flow for a long time is detected. This is probably linked to a leakage in the water network.	The meter detects a continuous flow of $>0,5 \cdot Q1$ for 12 hours.	Check water network\system\taps against leakages.	Resets automatically when a flow interruption happens.	The payload contains the status of the alarm and the date of the alarm activation. After the alarm reset the date changes to the date of deactivation.

Device end-life – the icon  is shown one year prior the complete battery discharge or one year prior to the device end life cycle. Contact the manufacturer for a replacement.

Warning: the meter is equipped with non-rechargeable batteries, that can be dangerous when used improperly. To reduce the risks, it is necessary to respect the following precautions:

- Don't recharge the battery;
- Don't put the battery in short circuit;
- Don't expose the battery at temperatures higher than 85° C;
- Don't put inside ovens, crush or cut: these actions could cause an explosion or a leakage of flammable gas or liquids;
- Don't use open flames near the meter;
- Don't expose the battery to extremely low-pressure environment which could cause an explosion or a loss of flammable gas or liquids;
- Always dispose the batteries in compliance with current regulations
- Always use original spare parts authorized by the manufacturer.

PROTOCOL SPECIFICATION

Wireless MBUS OMS compatible

This section describes the management of the communication standard Wireless MBUS OMS compatible.

			Telegram reading (direction: meter → other)		
Code Field	No. Bytes	Value (hex)	Total Length	Description	Notes
L field	1	xx	1	Message length	
C field	1	44	2	Control Field: indicates one-direction al-direction of a slave-to-master reading	
M field	2	B409	4	Constructor Code Encoding: BMT	
A field	4	xx xx xx xx	8	8-digit serial number of the device	
Generation, In	1	17	9	WMBus generation used	
Medium	1	07/06	10	Measured medium (water / hot water)	
CI field	1	7A	11	Control Information: indicates the encoding of the following data	
Count, Inc.	1	xx	12	Progressive count	
Status	1	xx	13	<p>Contains the alarm flags (if bits with value 1 are present, the alarm is active):</p> <ul style="list-style-type: none"> bit 7: reverse installation bit 6: continuous reverse flow greater than the threshold bit 5: overflow bit 4: burst (probable tube break) bit 3: don't care bit 2: battery removal or battery life less than 1 year <p>bit 1-0:</p> <ul style="list-style-type: none"> 0: no error 1: application busy (currently unused) 2: application error (currently unused) 3: water leak age in the plant (continuous water flow detected) 	
Configuration field (Signature)	2	xx xx xx	15	<p>Encryption code used:</p> <ul style="list-style-type: none"> 00 00: no encryption x0 05: CBC AES 128 bit (Pre-Shared Key with Cipher Block Chaining) 	

			Telegram reading (direction: meter → other)		
Code Field	No. Bytes	Value (hex)	Total Length	Description	Notes
AES verify	2	2F 2F		If AES is enabled	
Dif	1	0C		Data Information Field: indicates the format of the read (8 BCD digits)	
Vif	1	13/14/15/16		Value Information Field: indicates the unit of measurement (13-liter, 14-decaliters, 15-hectoliters, 16-m3)	
Data	4	xx xx xx xx		Instant counter value	
Dif	1	04		Date and time	
Vif	1	6d		Date and time – Type F	
Data	4	xx xx xx xx xx		Data and hour value	
Dif	1	0F		Data Information Field: start of manufacture	Optional
MS Code	1	xx		Bit encoding of subsequent fields: bit0: if set, the battery voltage field is present bit1: if set, the reverse stream field is present bit2: if set, fraud date is present bit3: if set, the date in which the water leakage was detected or has been finished is present bit4: if set, the date in which the burst was detected is present bit5: if set, value at memory day 1 is present bit6: if set, value at memory day 2 is present bit7: if set, the historic is present	
Fraud date	3	dd mm yy		Day month year of the first fraud detected (00 00 00 if it did not happen). In the H nibble of the month there is the type of fraud: bit 7: - bit 6: Reverse stream bit 5: overflow	Optional
Water loss date	3	dd mm yy		Day month year in which it was detected that there is a water leak (00 00 00 if it did not happen)	Optional
Date burst	3	dd mm yy		Day month year when it was detected that there is burst (00 00 00 if it did not happen)	Optional

			Telegram reading (direction: meter → other)		
Code Field	No. Bytes	Value (hex)	Total Length	Description	Notes
Mem day 1	5	xx xx xx xx dd mm		Litres (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF -15, 10xm3 if VIF-16) – day and mese Memory day 1	Optional
Mem day 2	5	xx xx xx xx dd mm		Litres (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF -15, 10xm3 if VIF-16) – day and mese Memory day 2	Optional
Data	3	xx xx xx xx		January-relative reading (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF-15, 10xm3 if VIF-16)	Optional
Data	3	xx xx xx xx		February-relative reading (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF-15, 10xm3 if VIF-16)	Optional
Data	3	xx xx xx xx		March-relative reading (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF-15, 10xm3 if VIF-16)	Optional
Data	3	xx xx xx xx		April-relative reading (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF-15, 10xm3 if VIF-16)	Optional
Data	3	xx xx xx xx		May-relative reading (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF-15, 10xm3 if VIF-16)	Optional
Data	3	xx xx xx xx		June-relative reading (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF-15, 10xm3 if VIF-16)	Optional
Data	3	xx xx xx xx		July-relative reading (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF-15, 10xm3 if VIF-16)	Optional
Data	3	xx xx xx xx		August-relative reading (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF-15, 10xm3 if VIF-16)	Optional
Data	3	xx xx xx xx		September-relative reading (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF-15, 10xm3 if VIF-16)	Optional
Data	3	xx xx xx xx		October-relative reading (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF-15, 10xm3 if VIF-16)	Optional

			Telegram reading (direction: meter → other)		
Code Field	No. Bytes	Value (hex)	Total Length	Description	Notes
Data	3	xx xx xx xx		November-relative reading (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF-15, 10xm3 if VIF-16)	Optional
Data	3	xx xx xx xx		December-relative reading (HEX, decalitres if VIF is 13, hectolitres if VIF is 14, m3 if VIF-15, 10xm3 if VIF-16)	Optional
Data	1	xx		Reading Acquisition Day (1-28 BCD) with note at 0.00. Value 0 indicates the last day of the month with note at h23.59.	Optional
AES fill	N	2F (-n)		If AES is enabled	cript

Wireless MBUS OMS v4 (COMBO, output configuration Wireless MBUS OMS v4 only)

This section describes the management of the communication standard Wireless MBUS OMS v4.

Code field	No. bytes	Value (hex)	Total Length	Description
Header	2	AA36	2	Header
L field	1	xx	3	Message lenght
C field	1	44	4	Control field. Shows the direction.
M field	2	B409	5	Manufacturer code: BMT
A field	4	xxxxxxxx	8	8-digit serial number of the device
Generation	1	17	12	WMBUS generation
Medium	1	07/06	13	Medium (water/hot water)
ELL data	1	8C	14	ELL header
ELL data	1	00	15	CC field
ELL data	1	xx	16	ACC field
CI field	1	7A	17	Control info: shows the next data code
Frame counter	1	xx	18	Progressive count of the frame

Campo codice	No. bytes	Valore (hex)	Lungh. Tot.	Descrizione
Status	1	xx	19	Contains the alarm flags. See parameter Alarm Flags.
Configuration field	2	xxxx	20	Encryption code used: 00 00 : no encryption 50 05 : AES CBC
Dif	1	0C		Data Info Field: shows the readng format (8 digits BCD)
Vif	1	13/14/15		Value Info Field: shows the measurement unit (13 liters, 14 liters, 15 hectoliters).
Data	4	xxxxxxxx		Current meter value
Dif	1	04		Date and time type
Vif	1	6D		Date and time type – Typo F
Data	4	xxxxxxxx		Date and time value
Dif	1	0F		Data Info Field: beginning of manufacturer-custom data – optional.
MS Code	1	xx		Bit coding of the next fields: Bit 0: if set to 1, the battery voltage field is present. Bit 1: if set to 1, the backward flow field is present. Bit 2: if set to 1, the fraud date is present Bit 3: if set to 1, the date in which the water leak was detected or when it stopped, is present. Bit 4: if set to 1, the date in which the burst was detected is present. Bit 5: if set to 1, the value Memory day 1 is present. Bit 6: if set to 1, the value Memory day 2 is present. Bit 7: if set to 1, the historical data is present.
Battery data	1	00		Battery value (percentage) – unscheduled
Reverse flow data	4	xxxxxxxx		Current reverse flow data (HEX) - LITERS - optional
Fraud date		ddmmyy		Day month years in which the first fraud was detected (00 00 00 if it never occurred). The nibble H contains the fraud type: Bit 7: - Bit 6: reverse flow Bit 5: overflow
Water leak date	3	ddmmyy		Day month years in which a water leak was detected (00 00 00 if it never occurred)
Burst date	3	ddmmyy		Day month years in which a burst was detected (00 00 00 if it never occurred)

Campo codice	No. bytes	Valore (hex)	Lungh. Tot.	Descrizione
Memory day 1	5	XXXXXXXX ddmm		Liters – day month year of the memory day 1 – optional
Memory day 2	5	XXXXXXXX ddmm		Liters – day month year of the memory day 2 – optional
Data	3	xxxxxx		Historical data referring to January (HEX, decaliters if VIF is 13, hectoliters if VIF is 14, m3 if VIF is 15) – optional
Data	3	xxxxxx		Historical data referring to February (HEX, decaliters if VIF is 13, hectoliters if VIF is 14, m3 if VIF is 15) – optional
Data	3	xxxxxx		Historical data referring to March (HEX, decaliters if VIF is 13, hectoliters if VIF is 14, m3 if VIF is 15) – optional
Data	3	xxxxxx		Historical data referring to April (HEX, decaliters if VIF is 13, hectoliters if VIF is 14, m3 if VIF is 15) – optional
Data	3	xxxxxx		Historical data referring to May (HEX, decaliters if VIF is 13, hectoliters if VIF is 14, m3 if VIF is 15) – optional
Data	3	xxxxxx		Historical data referring to June (HEX, decaliters if VIF is 13, hectoliters if VIF is 14, m3 if VIF is 15) – optional
Data	3	xxxxxx		Historical data referring to July (HEX, decaliters if VIF is 13, hectoliters if VIF is 14, m3 if VIF is 15) – optional
Data	3	xxxxxx		Historical data referring to August (HEX, decaliters if VIF is 13, hectoliters if VIF is 14, m3 if VIF is 15) – optional
Data	3	xxxxxx		Historical data referring to September (HEX, decaliters if VIF is 13, hectoliters if VIF is 14, m3 if VIF is 15) – optional
Data	3	xxxxxx		Historical data referring to October (HEX, decaliters if VIF is 13, hectoliters if VIF is 14, m3 if VIF is 15) – optional
Data	3	xxxxxx		Historical data referring to November (HEX, decaliters if VIF is 13, hectoliters if VIF is 14, m3 if VIF is 15) – optional
Data	3	xxxxxx		Historical data referring to December (HEX, decaliters if VIF is 13, hectoliters if VIF is 14, m3 if VIF is 15) – optional
Data	3	xxxxxx		Historical acquisition day (1 – 28 BCD) with a note at 0.00. The value 0 indicates the last day of the month with a note at h23.59
CRC	1	xx		CRC

LoRaWAN (COMBO, output configuration LoraWAN only)

This section describes the management of the communication standard LoRaWAN interfaced with LoRaWAN 1.0.3 specification.

Join LoRaWAN

The join procedure starts after the digital meter has accounted ± 5 liters (5 liters positive or negative flow) which will last 8 minutes at maximum. When the joining procedure is finished, the first LoRaWAN packet is sent after 5 seconds.

If the Join procedure fails, the meter will attempt again after 12 hours. If this attempt fails again, the meter will try again for after 36 hours.

After 36 hours have passed and the Join has failed, the next join request will be attempted after one week. In case it fails again, it will attempt once a week for 5 weeks. After 5 weeks, if the meter still hasn't joined, it will retry once a month for 10 months.

In the event all these attempts fail, the user is forced to send a Join command via IR interface. The Join command via IR can be sent anytime via B METERING software.

Link Check

After the Join procedure is completed successfully, the meter will enable the Link Check function, sending a message to the Network Server (no distinction on the transmission frequency set – every 12 or 6 hours for ordinary uplinks).

The Link Check will be sent with a SF12 message.

This will cover two main issue cases:

1. NetworkServer-related issues: e.g. LoRaWAN or session keys elimination, crash of the network server etc.
2. Meter installation at a different location (greater distance) with respect to where the JOIN was performed (e.g JOIN completed in the office near the Gateway with SF7 and installation on site few km away where SF12 is required).

Payload LoRaWAN

The payload is composed by a total of 9 bytes (11 bytes if the temperature data sending is enabled):

Field	Byte
Application code	45
Absolute meter counting (size 1 byte LSB)	XX
Absolute meter counting (size 1 byte)	XX
Absolute meter counting (size 1 byte)	XX
Absolute meter counting / reverse flow (size 1 byte MS-nibble for X/Y)	XY
Reverse flow (size 1 byte LSB)	YY
Reverse flow (size 1 byte)	YY
Reverse flow (size 1 byte)	YY
Alarms (bit 0...5)	
Diameter (bit 6)	KK
Medium (bit 7)	
Temperature (size 1 byte MSB)	TT
Temperature (size 1 byte LSB)	TT

Absolute meter counting means: ABS [Positive flow counting (X) – Negative flow counting (Y)].

The temperature must be defined up to the tenth part of a degree (°C).

The VIF is defined as a constant (liters) for absolute counting and reverse flow.

The temperature is handled with a 2-complement. Negative temperature, for example, will be FF 33 to represent -20.5 °C.

Alarms:

Bit 0: Water leak

Bit 1: wrong installation

Bit 2: Overflow

Bit 3: Burst

Bit 4: Reverse flow

Bit 5: Low battery

LORAWAN PAYLOAD EXAMPLE

Here below you can see an example of payload decoding:

45	2A 2F 00	00	86 00 00	0A	00	CD
----	----------	----	----------	----	----	----

Field	Format	Byte	Example byte
Application code	DEC	45	45
Absolute meter counter (size 1 byte LSB)	HEX	XX	2A
Absolute meter counter (size 1 byte)	HEX	XX	2F
Absolute meter counter (size 1 byte)	HEX	XX	00
Absolute meter counter / reverse flow (size 1 byte MSB-nibble for X/Y)	HEX	XY	00
Reverse flow (size 1 byte LSB)	HEX	YY	86
Reverse flow (size 1 byte)	HEX	YY	00
Reverse flow (size 1 byte)	HEX	YY	00
Alarms (bit 0...5)	HEX	KK	0A
Diameter (bit 6)			
Medium (bit 7)			
Temperature (size 1 byte MSB)	HEX	TT	00
Temperature (size 1 byte LSB)	HEX	TT	CD

Description of the payload:

Application code	45
Absolute meter counter	002F2A -> 12074 liters
Reverse flow	000086 -> 134 liters
Absolute meter counter / reverse flow	00
Alarms	0A è 0000 1010 so Burst alarm and wrong installation alarm
Diameter	0 (DN15);
Medium	0 (Water);
Temperature	0x00CD = 205, so +20,5°C

LoRaWAN Downlink commands

In the table below you can find the LoRaWAN downlink commands available:

Code	Command	Description
0x07	<i>GET_FW_VERSION</i>	Command used to read FW version
0x13	<i>GET_METER_SN</i>	Command used to read meter Serial Number
0x0A	<i>RESET</i>	Command used to read reset the meter and to re-initialize the LoRaWAN parameters in order to start a new join procedure (+/-5 liters)
0x14	<i>SET_DATE_AND_TIME</i>	Command used to set date and time
0x15	<i>GET_DATE_AND_TIME</i>	Command used to read date and time
0x24	<i>SET_TX_PAR</i>	Command used to set the transmission parameters only (21600 or 43200 seconds).
0x26	<i>SET_ALARM_PAR</i>	Command used to set the temperature byte data sending or not.
0x27	<i>GET_ALARM_PAR</i>	Command used to read the alarms detection parameters.
0x28	<i>GET_ALARM_DATA</i>	Command used to read the alarms data and flags.
0x29	<i>SET_ALARM_DATA</i>	Command used to set the alarm flags

Command description

This section describes the payload sent from/to the Application server. All the downlink communications are sent over **port 1**.

GET_FW_VERSION (0x07)

This command gets the firmware version of the meter. From Application server to meter:

HEADER property					Data
Fct	C/R/A	Err	Chain	Len	Device type
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x07	0	0	0	0x00	0x05

Answer:

HEADER property					Data				
Fct	C/R/A	Err	Chain	Len	Device type	Reserved	Reserved	FW measure	FW Radio
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x07	0x01	0x00	0x00	0x05	0x05	0x00	0x00	0x01	0x01

The Err field can have the following meanings:

0x00 – No error

0x02 – Error on the device type

0x04 – Error on the command length.

Example

GET FW VERSION (0x07)

R2H: 0x07, 0x00, 0x00, 0x00, 0x00 0x05

H2R: 0x07, 0x01, 0x00, 0x00, 0x05, 0x01, FW1, FW2

GET FW VERSION (0x07) with incorrect length

R2H: 0x07, 0x00, 0x00, 0x00, 0x01, 0x00

H2R: 0x07, 0x01, 0x04, 0x00, 0x00

GET_METER_SN (0x13)

This command gets the serial number of the meter.

From Application server to meter:

HEADER property					Data
Fct	C/R/A	Err	Chain	Len	Device type
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x13	0x00	0x00	0x00	0x01	0x05

Answer:

HEADER property					Data				
Fct	C/R/A	Err	Chain	Len	Device type	SN MSB	SN	SN	SN LSB
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x13	0x01	0x00	0x00	0x05	0x05	0x03	0x00	0x00	0x40

The Err field can have the following meanings:

0x00 – No error

0x02 – Error on the device type

0x04 – Error on the command length.

RESET (0x0A)

This command sets the reboot/restart of the radio application.

From Application server to meter:

HEADER property					Data
Fct	C/R/A	Err	Chain	Len	Device type
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x0A	0x00	0x00	0x00	0x01	0x05

Risposta:

HEADER property					Data
Fct	C/R/A	Err	Chain	Len	Device type
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x0A	0x01	0x00	0x00	0x01	0x05

The Err field can have the following meanings:

0x00 – No error

0x02 – Error on the device type

0x04 – Error on the command length.

Example

RESET (0x0a)

R2H: 0x0a 0x00 0x00 0x00 0x01 0x05

H2R: 0x0a 0x01 0x00 0x00 0x01 0x05

SET_DATE_AND_TIME (0x14)

From Application server to meter:

HEADER property					Data							
Fct	C/R/A	Err	Chain	Len	Device type	Day	Week day	Month	Year	Hour	Minutes	Seconds
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x14	0	0	0	0x08	0x05	1	1	1	18	10	23	0

Answer:

HEADER property				
Fct	C/R/A	Err	Chain	Len
1 byte	1 byte	1 byte	1 byte	1 byte
0x14	1	0	0	0x00

The Date field is described as follows (BCD format):

Name	Type	Default	Minimum	Maximum	Index
Day	UInt8_t	1	1	31	1
Day of the week (0: Sunday, 1: Monday..)	UInt8_t	0	0	6	2
Month (1: January, 2: February..)	UInt8_t	1	1	12	3
Year	UInt8_t	18	18	100	4
Hour	UInt8_t	0	0	23	5
Minutes	UInt8_t	0	0	59	6
Seconds	UInt8_t	0	0	59	7

The Err field can have the following meanings:

0x00 – No error

0x01 – Error data field not valid.

0x02 – Error on the device type

0x04 – Error on the command length

GET_DATE_AND_TIME (0x15)

From meter to Application Server:

HEADER property					Data
Fct	C/R/A	Err	Chain	Len	Device type
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x15	0	0	0	0x01	0x05

Answer:

HEADER property					Data							
Fct	C/R/A	Err	Chain	Len	Device type	Day	Week day	Month	Year	Hour	Minutes	Seconds
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x15	1	0	0	0x08	0x05	1	1	1	18	10	23	0

The Date field is described as follows (BCD format):

Name	Type	Default	Minimum	Maximum	Index
Day	Uint8_t	1	1	31	1
Day of the week (0: Sunday, 1: Monday..)	Uint8_t	0	0	6	2
Month (1: January, 2: February..)	Uint8_t	1	1	12	3
Year	Uint8_t	18	18	100	4
Hour	Uint8_t	0	0	23	5
Minutes	Uint8_t	0	0	59	6
Seconds	Uint8_t	0	0	59	7

The Err field can have the following meanings:

- 0x00 – No error
- 0x01 – Error data field not valid.
- 0x02 – Error on the device type
- 0x04 – Error on the command length.

SET_TX_PAR (0x24)

This command sets the meter to 2 or 4 transmissions per day in LoRaWAN mode.

From Application server to meter:

HEADER property					Data	
Fct	C/R/A	Err	Chain	Len	Device type	Interval between tx
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	2 byte
0x24	0x00	0x00	0x00	0x03	0x05	0x5460

Answer:

HEADER property					Data
Fct	C/R/A	Err	Chain	Len	Device type
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x24	0x01	0x00	0x00	0x01	0x05

Interval:

0x5460 = 21600 = every 6 hours

0xA8C0 = 43200 = every 12 hours

The Err field can have the following meanings:

0x00 – No error

0x01 – Error data field not valid.

0x02 – Error on the device type

0x04 – Error on the command length.

SET_ALARM_PAR (0x26)

This command is used to set the alarm parameters. The data fields bigger than one byte will be represented in Big Endian. From Application server to meter:

HEADER property					Data	
Fct	C/R/A	Err	Chain	Len	Device type	AlarmPar
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	8 bytes
0x26	0x00	0x00	0x00	0x09	0x05	

Answer:

HEADER property					Data
Fct	C/R/A	Err	Chain	Len	Device type
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x26	0x01	0x00	0x00	0x00	0x05

The alarm field is the following:

Name	Type	Default	Minumum	Maximum	Description	Index
Backward flow threshold	UInt8_t	0x00	0x00	0x00	Fixed setting	1
Water leakage alarm	UInt8_t	0x00	0x00	0x00	Fixed setting	2
VIF Transmission	UInt8_t	0x00	0x00	0x00	Fixed setting	3
Temperature	UInt8_t	0x00	0x00	0x01	0: Disabled 1: Enabled	
Low battery threshold	UInt32_t	0x00000992	0x00000992	0x00000992	Fixed setting	5 – 8

The Err field can have the following meanings:

0x00 – No error

0x01 – Error data field not valid.

0x02 – Error on the device type

0x04 – Error on the command length.

Example

SET_ALARM_PAR (0x26) → Temperature bytes enabled

R2H: 0x26 0x00 0x00 0x00 0x09 0x05 0x00 0x00 0x00 0x01 0x00 0x00 0x00 0x00

H2R: 0x26 0x01 0x00 0x00 0x00 0x05

GET_ALARM_PAR (0x27)

This command is used to read the alarm parameters.

The data fields bigger than one byte will be represented in Big Endian.

From Application server to meter:

HEADER property					Data
Fct	C/R/A	Err	Chain	Len	Device type
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x27	0x00	0x00	0x00	0x01	0x05

Answer:

HEADER property					Data	
Fct	C/R/A	Err	Chain	Len	Device type	AlarmPar
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	8 bytes
0x27	0x01	0x00	0x00	0x09	0x05	

The Err field can have the following meanings:

0x00 – No error

0x02 – Error on the device type

0x04 – Error on the command length.

The AlarmPar field is defined as follows

Name	Type	Default	Minimum	Maximum	Description
Reverse flow threshold	Uint8_t	0x00	0x00	0x00	0x00 = 20 liters (fixed)
Water leak time threshold	Uint8_t	0x00	0x00	0x00	0x00 = 6 hours (fixed)
VIF Transmission	Uint8_t	0x00	0x00	0x00	0x00 = liters (fixed)
Temperature data enabled/ disabled	Uint8_t	0x00	0x00	0x01	0x00 = disabled 0x01 = enabled
Low battery threshold	Uint32_t	0x00000992	0x00000992	0x00000992	mV resolution (2450mV)

GET_ALARM_DATA (0x28)

This command is used to read the date of the alarms and flags.

From Application server to meter:

HEADER property					Data
Fct	C/R/A	Err	Chain	Len	Device type
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte
0x28	0x00	0x00	0x00	0x01	0x05

Answer:

HEADER property					Data	
Fct	C/R/A	Err	Chain	Len	Device type	AlarmData
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	18 bytes
0x28	0x01	0x00	0x00	0x13	0x05	

The field AlarmData is defined as follows:

Name	Type	Default	Minimum	Maximum	Description	Index
Alarm Flags 1	Uint8_t	0x00	0x00	0x3F	Bit 0: Water leak Bit 1: wrong installation Bit 2: Overflow Bit 3: Burst Bit 4: Reverse flow Bit 5: Low battery	1
Alarm Flags 2	Uint8_t	0x00	0x00	0xC0	Bit 0: Reserved Bit 1: Reserved Bit 2: Reserved Bit 3: Reserved Bit 4: Reserved Bit 5: Reserved Bit 6: EEPROM Error Bit 7: Coil Error	2
QMax Alarm Date	Uint32_t	0x00	0x00	0xFFFFFFFF	yy/mm/dd	3 – 6
Wrong installation alarm date	Uint32_t	0x00	0x00	0xFFFFFFFF	yy/mm/dd	7 – 10
Burst alarm date	Uint32_t	0x00	0x00	0xFFFFFFFF	yy/mm/dd	11 – 14
Reverse flow alarm date	Uint32_t	0x00	0x00	0xFFFFFFFF	yy/mm/dd	15 – 18

The Err field can have the following meanings:

0x00 – No error

0x02 – Error on the device type

0x04 – Error on the command length.

SET_ALARM_DATA (0x29)

This command is used to set the alarm flags

From meter to Application Server:

HEADER property					Data	
Fct	C/R/A	Err	Chain	Len	Device type	Alarm Flags
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	2 byte
0x29	0x00	0x00	0x00	0x03	0x05	

Answer:

HEADER property				
Fct	C/R/A	Err	Chain	Len
1 byte	1 byte	1 byte	1 byte	1 byte
0x29	0x01	0x00	0x00	0x00

The field Alarm Flags is defined as follows:

Name	Type	Default	Minimum	Maximum	Description	Byte MSB
Alarm Flags 1	Uin8_t	0x00	0x00	0x3F	Bit 0: Water leak Bit 1: wrong installation Bit 2: Overflow Bit 3: Burst Bit 4: Reverse flow Bit 5: Low battery Bit 6: Reserved Bit 7: Reserved	

Name	Type	Default	Minimum	Maximum	Description	Byte LSB
Alarm Flags 2	Uin8_t	0x00	0x00	0x3F	Bit 0: Reserved Bit 1: Reserved Bit 2: Reserved Bit 3: Reserved Bit 4: Reserved Bit 5: Reserved Bit 6: EEPROM Error Bit 7: Coil Error	

The Err field can have the following meanings:

- 0x00 – No error
- 0x01 – Error data field not valid.
- 0x02 – Error on the device type
- 0x04 – Error on the command length.

Example

SET_ALARM_DATA (0X29) reset all alarms

R2H: 0x29 0x00 0x00 0x00 0x03 0x05 0x00 0x00

H2R: 0x29, 0x01, 0x00, 0x00, 0x00

LoRaWAN + Wireless MBUS OMS v4 (COMBO, output configuration LoraWAN + Wireless MBUS OMS v4)

The “COMBO” version contains both communication interfaces: LoRaWAN and Wireless MBUS OMS v4. Both of the outputs are configured and active simultaneously. Check the previous chapters for each standard specifications.

INFORMATION FOR CORRECT DISPOSAL OF THE PRODUCT



This product falls into the scope of the Directive 2012/19/EU concerning the management of Waste Electrical and Electronic Equipment (WEEE). This product shall not be disposing into the domestic waste as it is made of different materials that must be recycled at the appropriate facilities. Inquire through the municipal authority regarding the location of the ecological platforms to receive the product for disposal and its subsequent correct recycling.

The product is not potentially dangerous for human health and the environment, but if abandoned in the environment can have negative impact on the environment.

The crossed-out wheeled dustbin symbol, on the label on the product, indicates the compliance of this product with the regulations regarding Waste Electrical and Electronic Equipment.

Abandonment in the environment or illegal disposal of the product is punishable by law.

TRANSLATION

For deliveries to countries in the European Economic Area, the operating instructions are to be translated into the appropriate language of user country.

Should there be any inconsistencies in the translated text, the original operating instructions (Italian) are to be consulted or the manufacturer should be contacted.

TECHNICAL DATA

Model	HYDRODIGIT
Measuring class/Permitted installation	R400H, R160V↓→ R250H, R160V↓→ R160H, R160V↓→ Depending on the order
Flow detection technology	Turbine reading by inductive system
Temperature class	T50, cold water, T30-90 hot water
Display	LCD, 8 digits + icons
Protection class	IP68*
Local Interface	Optical interface IR IEC 62056-21
Radio standard	Depending on the version: - Wireless MBUS EN 13757-4 OMS compatible; - COMBO - output configuration: Wireless MBUS EN 13757-4 OMS v4; - COMBO - output configuration: LoRaWAN; - COMBO - output configuration: LoRaWAN + Wireless MBUS EN 13757-4 OMS v4;
Radio Frequency	868 MHz
Radio range / radio power	Wireless MBUS: 300 meters** LoRaWAN: 5 Km**
Battery life	max 10 years***

*IP68: maximum 24 hours of continuous submersion at 1 m depth.

Note: in case of damage caused by involuntary impact, the meter must be replaced with a new one, to restore the protection class.

**Under optimal propagation conditions, the radio range depends on physical conditions (building constructions, climatic conditions, ...) where propagation of the radio signal can therefore vary.

*** The battery life strongly depends on the working time window, set during the configuration process, and on the environmental conditions. Estimation of the battery life is given by the configuration software.

DECLARATION OF CONFORMITY

EU DECLARATION OF CONFORMIT

1. **Product type/model:** Water Meter – HYDRODIGIT
2. **Name and address of the manufacturer:**
B METERS SRL Via del Friuli, 3 – 33050 GONARS (UDINE) ITALY
3. **This declaration of conformity is issued under the sole responsibility of the manufacturer.**
4. **Object of declaration:** **HYDRODIGIT**
Vane-wheel single jet with electronic indicating device and radio transmitter
5. **Above mentioned object is in conformity with relevant EU harmonization legislation:**
Directive No. 2014/32/EU
6. **Relevant harmonized standards or normative documents and references or other technical specifications or instructions used for the declaration:**

OIML R 49-1:2006	EN 14154-1:2005+A2:2011	EN ISO 4064-1:2017
OIML R 49-2:2004	EN 14154-2:2005+A2:2011	EN ISO 4064-2:2017
OIML R 49-1:2013	EN 14154-3:2005+A2:2011	
OIML R 49-2:2013		

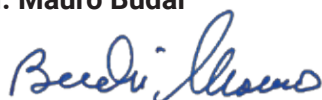
7. Notified body

Name and number of NB	Performed	Issue the Certificate No.
Slovensky mtrologicky ustav, NB 178 Karloveska 63 84255 Bratislava 4 Slovenska Republika	EU type certification in accordance with Module B of Directive No. 2014/32/EU	SK 19-MI001-SMU058 (rev. 1)
Czech Metrology Institute, NB 1383 Okruzni 31 638 00 Brno Czech Republic	Certification of production, final product inspection and testing in accordance with Module D of Directive No. 2014/32/EU	0119-SJ-A011-08

8. Another Information

Signed by the General Manager:

Mr. Mauro Budai



On behalf of:

B Meters Srl

Place and date of declaration issue:

Gonars, Italy, 7th July 2020

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