

## ULTRASONIC WATER METER Configuration: W8 – INTG01

### DETAIL SPECIFICATIONS



Products list	TSMR-015-AXT-W8-INTG01
	TSMR-015-BXT-W8-INTG01
	TSMR-015-CXT-W8-INTG01
	TSMR-020-AXT-W8-INTG01
	TSMR-025-AXT-W8-INTG01
	TSMR-032-AXT-W8-INTG01
	TSMR-040-AXT-W8-INTG01
	TSMR-050-AXT-W8-INTG01

Project Manager	CTO approval	Business Manager	Quality
Florian HOUTTEMANE	Alain RAMOND	Alain RAMOND	Delphine LE GALL
Date : 9/12/2021	Date :	Date :	Date :
Visa :	Visa :	Visa :	Visa :

<b>DOCUMENT RELEASE INDEX</b>				
<b>Version</b>	<b>Date</b>	<b>Modification(s)</b>	<b>Author</b>	<b>§</b>
0.01	19/01/2021	First draft	FHO	All
1.0	29/09/2021	Check and clean	MMO	
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# 1 Product general information

## 1.1 Functional description

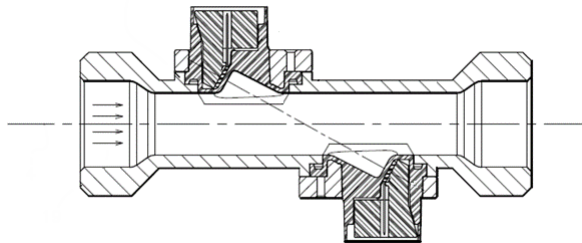
### 1.1.1.1 Application

The INTEGRA METERING water meter are based on the ultrasonic technology. It allows an accurate reading of the water consumption.

Because of the free pipe mechanical design, the accuracy of the measure is not affected by any suspended solids in water like sand or other sediments all along the product lifetime.

The water meter can be installed in any environment. For a walk by drive by reading the Wireless M-BUS versions exist in Open Metering Standard V4 compliant. For more drastic environment the Wired M-BUS version Open Metering Standard V4 compliant allows the device to be installed in industrial environment.

### 1.1.1.2 Measure principle



The measurement principle is based on the difference of time of flight between the two transducers. A transducer is a sensing element which convert the physical dimension (acoustic wave) into an analog signal. The transducer contains a piezoelectric element. This element behaves like a microphone: with an electrical excitation, an acoustic wave is produced across the pipe through the water at the sound velocity plus the water speed (downstream). The other transducer behaves like a speaker. It will generate afterward the same signal which will have the sound velocity reduced by the water speed (upstream). The flow rate is calculated from these raw quantities using several parameters which are to be adjusted during the calibration.

## 1.2 Technical data

### 1.2.1 Technical measurement data and dimensions

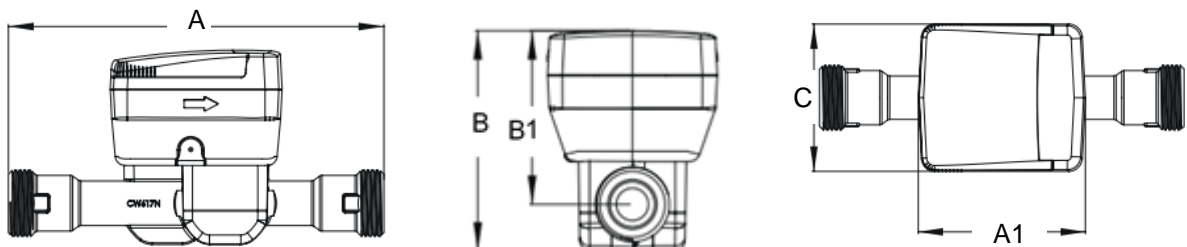


Table of dimensions in next page.

	Unit of measure	Diameter DN (mm)						
		15	15	20	25	32	40	50
Nominal flow Q3	m <sup>3</sup> /h	2.5	2.5	4	6.3/10	10	16	25
Maximum flow Q4	m <sup>3</sup> /h	3.125	3.125	5	7.9/12.5	12.5	20	31.25
Transition flow Q2	L/h	8	8	12.8	21/32	32	51.2	80
Minimum flow Q1	L/h	5	5	8	13/20	20	32	50
Starting Flow	L/h	2.5	2.5	4	6/10	10	16	25
Ratio Q3/Q1	-	500	500	500	500	500	500	500
Total length (A)	mm	110	165	190	260	260	300	300
Height (B1)	mm	77	77	77	77	77	77	77
Total Height (B)	mm	98	98	98	98	101	107	115
Width (C)	mm	76	76	76	76	76	76	76
Housing Length (A1) (mm)	mm	87	87	87	87	87	87	87
Weight (kg)	kg	0.8	0.9	1	1.4	1.5	1.9	2.4
Thread	-	G3/4"B	G3/4"B	G1"B	G1 ¼"B	G1 ½"B	G2"B	G2 ½"B

## 1.2.2 Power supply

Battery powered	Standard: 3.6 VDC lithium batterie, not replaceable
Lifetime	16 years minimum

## 1.2.3 Storage conditions

Storage temperature	from -20°C to +70°C (max. 4 weeks with T>35°C)
	from -13°F to +158°F (max. 4 weeks with T>95°F)

## 1.2.4 Operating conditions

Nominal pressure	PN 16	
Protection class	IP 68	
Medium	potable water	
Metrological class	Class 2	
Medium temperature	from 0.1°C to +50°C	from 32°F to +122°F
Environment temperature	from 1°C to +70°C	from 34°F to +158°F
Environment class	B (Indoor installation) / O (Outdoor installation)	
Mechanical class	M1	
Electromagnetic class	E2	
Sensitivity	U0D0	
Flow Measurement	bi-directional	

## 1.2.5 Technical data display

Display indication	LCD 10 digits
Units	m3, L, hour, min, sec
Value display	Volume, Flow, Reverse flow, Display test, Events and alarms status, F/W version
Events codes and alarms	Reverse flow, Low battery, Leakage, Air bubbles, Burst, Frost, Heat, Dry, Over temperature, No consumption

## 1.2.6 Communication interfaces

Wireless communication	NFC (configuration) Wireless M-BUS 868MHz
------------------------	--

### 1.3 Mechanical design

The meter is composed of:

- The hydraulic part: the free pipe housing in brass material with the two ultrasonic transducers
- The electronics: two electrical circuit boards:
  - The measurement PCBA which make the interface between the transducers and the meter microcontroller.
  - The user PCBA: It is the interface between the hydraulic part and the user. It collects all the information of the measurement PCBA, manage the storage in a datalogger, displays them on the LCD display. The user PCBA manages all the communication protocols like the NFC (Near Field Communication), the wired-MBUS, the wireless-MBUS or the pulse output.
- The housing: The device is IP68 compliant. It is fully potted to protect from humidity, moisture and dust and tampering. It makes the product reliable all along the lifetime.



## 1.4 Materials

### 1.4.1 TOPAS components in contact with the medium

Coupling housing	Lead free brass, material CW617N, compliant to ISO 228-1 for screw thread.
Transducers	Ultem resin, 2300 PW (drinking water compliant)
O-RING	EPDM

### 1.4.2 Other components

Plastic parts	Polycarbonate, UV resistant
---------------	-----------------------------



## 1.5 Certifications and regulations

### 1.5.1 MID



**Slovenský metrologický ústav**  
Karloveská 63, 842 55 Bratislava 4, Slovenská republika

# CERTIFIKÁT

## Certificate

systému kvality podľa prílohy č. 2, Modul D: Zhoda s typom založená na zabezpečení kvality výrobného procesu, nariadenia vlády Slovenskej republiky č. 145/2016 Z. z. o sprístupňovaní meradiel na trhu

*of a system of quality according to Annex II, Module D: Conformity to type based on quality assurance of the production process, Government Ordinance of the Slovak Republic No. 145/2016 Coll. relating to the making available on the market of measuring instruments*

Číslo dokumentu:  
*Document number:*

**SK 19-QD-SMU020**

**Revízia 0**  
*Revision 0*

V súlade s:  
*In accordance with:*

nariadením vlády Slovenskej republiky č. 145/2016 Z. z. o sprístupňovaní meradiel na trhu, ktorým sa preberá smernica Európskeho parlamentu a rady 2014/32/EÚ o harmonizácii právnych predpisov členských štátov týkajúcich sa sprístupnenia meradiel na trhu  
*Government Ordinance of the Slovak Republic No. 145/2016 Coll. relating to the making available on the market of measuring instruments which implemented the Directive 2014/32/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments*

Žiadateľ / Výrobca:  
*Applicant / Manufacturer:*

**INTEGRA METERING**  
12 Rue Fontgrasse, 31700 Blagnac, France

Kategória meradla:  
*Measuring instrument categories:*

**Vodomery (MI-001)**  
*Water meters (MI-001)*

Spôsobilosť pre:  
*Eligible for:*

vyhlásenie o zhode na základe zabezpečenia kvality výrobného procesu v súlade s požiadavkami ustanovenými nariadením vlády Slovenskej republiky č. 145/2016 Z. z. o sprístupňovaní meradiel na trhu, príloha č.2, Modul D  
*declaration of conformity based on quality assurance of the production process in accordance with Directive 2014/32/EU of the European Parliament and Council, Annex II, Module D*

Platnosť do:  
*Valid until:*

**20. august 2022**  
*August 20, 2022*

Počet strán:  
*Number of pages:*

**2**


Notifikovaná osoba:  
*Notified body:*

**Slovenský metrologický ústav 1781**  
*Slovak Institute of Metrology 1781*

Dátum vydania:  
*Date of issue:*

**20. august 2019**  
*August 20, 2019*



  
**Emanuel Godál**  
zástupca notifikovanej osoby  
*representative of notified body*

Tento dokument môže byť rozmnožovaný len celý a nezmenený. Bez podpisu a odtlačku pečiatky je neplatný.  
*This certificate shall not be reproduced except in full. Certificates without signature and stamp are not valid.*



Certifikát č. SK 19-QD-SMU020, Revízia 0 zo dňa 20. august 2019  
*The Certificate No. SK 19-QD-SMU020, Revision 0 dated August 20, 2019*

*strana 2 z 2 strán*  
*page 2 of 2 pages*

Rozsah platnosti  
*Scope*

Pracovisko: **INTEGRA METERING**  
Site: 12 Rue Fontgrasse, 31700 Blagnac, France

Druh meradla: Vodometry (MI-001)  
*Measuring instrument types: Water meters (MI-001)*

No.	Type	Certificate No.	Issued by NB	Valid until
1	RSO	SK 16-MI001-SMU046	SMÚ	3.7.2026
2	TSO	SK 17-MI001-SMU052	SMÚ	28.9.2027
3	Y-RIG	SK 17-MI001-SMU050	SMÚ	15.3.2027

Skúšobné zariadenia/ označenie typu: **1) R0, R1 for RSO, Y-FLOW, Y-RIG**  
*Testing equipment/ Type designation: 2) B1, B2 for TSO*

Grafická podoba zabezpečovacej značky:  
*Graphical shape of security mark:*



Y-FLOW, RSO, Y-RIG

*Poznámka:*  
*Remarks:*

Podkladom na vystavenie tohto certifikátu boli výsledky posúdenia a zistení vykonaných v súlade s postupom stanoveným v prílohe č. 2, Modul D, nariadenia vlády Slovenskej republiky č. 145/2016 Z. z. o sprístupňovaní meradiel na trhu, uvedené v správe č. NO-320/19/D/R.

System kvality výrobcu je periodicky preverovaný v súlade s prílohou č. 2, Modul D, nariadenia vlády Slovenskej republiky č. 145/2016 Z. z. o sprístupňovaní meradiel na trhu.

Výrobca je oprávnený umiestniť na meradlá vyrábané v súlade so schváleným systémom kvality identifikačný kód notifikovanej osoby 1781. Zásady používania certifikátu sú stanovené v dohode č. NO-320/19/D/A.

*The results of appraisal and findings carried out in accordance with Annex II, Module D, Directive 2014/32/EU of the European Parliament and Council, are recorded in Report No. NO-320/19/D/R, with represent the base of issuing of this certificate.*

*The quality system of manufacturer is under permanent surveillance according to Annex II, Module D, of the Directive 2014/32/EU of the European Parliament and Council.*

*The manufacturer is entitled to provide for the measuring instruments produced within the scope of this approved quality system the notified body identification number 1781. The principle of the use of certificate is given in agreement No. NO-320/19/D/A.*

\*\*\*



## CERTIFIKÁT EÚ SKÚŠKY TYPU

### *EU – type examination certificate*

Číslo dokumentu: <i>Document number:</i>	<b>SK 17-MI001-SMU052</b> Revízia 4 nahrádza certifikát zo dňa 8. novembra 2019 <i>Revision 4 replaces the certificate issued by November 8, 2019</i>	<b>Revízia 4</b> <i>Revision 4</i>
V súlade s: <i>In accordance with:</i>	nariadením vlády Slovenskej republiky č. 145/2016 Z. z. o sprístupňovaní meradiel na trhu, ktorým sa preberá smernica Európskeho parlamentu a Rady 2014/32/EU o harmonizácii právnych predpisov členských štátov týkajúcich sa sprístupnenia meradiel na trhu <i>Government Ordinance of the Slovak Republic No. 145/2016 Coll. relating to the making available on the market of measuring instruments, which implemented the Directive 2014/32/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments</i>	
Žiadateľ/Výrobca: <i>Issued to (Manufacturer):</i>	<b>INTEGRA METERING SAS</b> <b>12 Rue Fontgrasse, 31700 Blagnac, France</b>	
Druh meradla: <i>Type of instrument:</i>	<b>Vodomer (MI-001)</b> <i>Water meter (MI-001)</i>	
Označenie typu: <i>Type designation:</i>	<b>TSO</b>	
Základné požiadavky: <i>Essential requirements:</i>	príloha č. 1 a príloha č. 3 Vodomery (MI-001) k nariadeniu vlády SR č. 145/2016 Z. z. <i>Annex No. I and Annex No. III Water meters (MI-001) to Government Ordinance of SR No. 145/2016 Coll.</i>	
Platnosť do: <i>Valid until:</i>	<b>28. septembra 2027</b> <i>September 28, 2027</i>	
Notifikovaná osoba: <i>Notified body:</i>	<b>Slovenský metrologický ústav</b> 1781 <i>Slovak Institute of Metrology</i> 1781	
Dátum vydania: <i>Date of issue:</i>	<b>11. február 2021</b> <i>February 11, 2021</i>	

Základné charakteristiky, popis meradla a podmienky schválenia sú uvedené v prílohe, ktorá je súčasťou tohto certifikátu. Certifikát vrátane prílohy má spolu 13 strán.  
*Essential characteristics, instrument description and approval conditions are set out in the appendix hereto, which forms the part of the certificate. The certificate including the appendix contains 13 pages.*



  
**Viliam Mazúr**  
zástupca notifikovanej osoby  
*representative of notified body*

Poznámka: Tento certifikát EÚ skúšky typu môže byť rozmnožovaný len celý a nezmenený. Bez podpisu a odlačky pečiatky je neplatný.  
*Note: This EU-type examination certificate shall not be reproduced except in full. Certificates without signature and stamp are not valid.*



*This certifies that*

**INTEGRA METERING**

*has had the undermentioned product examined, tested and found, when correctly installed, to comply with the requirements of the United Kingdom Water Supply (Water Fittings) Regulations and Scottish Water Byelaws.*

**TOPAS SONIC (TSO) RANGE OF WATER METERS**

*The certificate by itself is not evidence of a valid WRAS Approval. Confirmation of the current status of an approval must be obtained from the WRAS Directory ([www.wras.co.uk/directory](http://www.wras.co.uk/directory))*

*The product so mentioned will be valid until the end of:*

**April 2023**

**1804043**

*Certificate No.*

A handwritten signature in black ink, appearing to read 'J Furnal'.

*Secretary*

A handwritten signature in black ink, consisting of several vertical strokes followed by a horizontal line.

*Chairman, Product Assessment Group*



## ATTESTATION DE CONFORMITE SANITAIRE

### Certificate of sanitary conformity

Conformément à l'arrêté du 29 mai 1997 modifié et à la circulaire du Ministère de la Santé  
Direction Générale de la Santé DGS/SD7A N° 571 du 25 Novembre 2002

**Coordonnées du demandeur d'ACS /  
Contact details of the ACS owner :**

**INTEGRA METERING SAS  
12 rue Font Grasse  
31700 BLAGNAC  
France**

**Nom de l'accessoire représentatif / Reference of the representative accessory :**

**Compteur d'eau ultrasonique - TOPAS SONIC - DN15**

N° de dossier attribué par le laboratoire habilité / File reference : **17 ACC NY 307**

Date de réalisation des essais d'inertie selon la norme XP P41-280 / Tests date (according to the standard XP P 41-280) : /

Commentaires / Comments : Aucun essai n'est nécessaire à l'émission de cette ACS / No testing is required to issue this ACS.

**Famille d'accessoires couverte par l'ACS / Accessories' family covered by this certificate :**

**COMPTEURS D'EAU ULTRASONIQUES - TOPAS SONIC**

**Références / References :** (1 article et ses variantes)

TOPAS SONIC - DN15

TOPAS SONIC - DN32

TOPAS SONIC - DN20

TOPAS SONIC - DN40

TOPAS SONIC - DN25

TOPAS SONIC - DN50

Attestation délivrée par / Certificate issued by :

Clémence Tafforeau  
Chef de Service / Materials Department Manager

Signature :

Date de délivrance / Date of issue : 21 septembre 2017

Date d'expiration / Expiry date : 21 septembre 2022

Commentaires / Comments : /

Eurofins Expertises Environnementales

SAS au capital de 71676 € RCS Nancy 751 056 102 TVA FR 35 751 056 102

Siège social : Rue Lucien Cuenot site Saint Jacques II BP 51005 54521 MAXEVILLE cedex - T 03 83 50 36 17 F 03 83 50 23 70

Référence : T-AM-FO26360

1/1

Version : 15.2  
Date publication :19.11.2015

**EU DECLARATION OF CONFORMITY**

Model: **TOPAS Sonic water meter**

Type designation: **TSO**



We,

**INTEGRA METERING**  
12 rue FontGrasse  
31700 Blagnac, France

declare under our sole responsibility the product listed above consistent with the type described in the certificate No. **SK17-MI001-SMU052-rev 3** (issued November 8th, 2019 valid until September 28th, 2027 approved by the Notified body 1781 Slovak Institute of Metrology in accordance with **Directive 2014/32/EU Annex II, Module B**).

The quality system for production, final product inspection and testing of the **water meters (MI-001)** was approved by the Notified body 1781 Slovak Institute of Metrology in accordance with **Directive 2014/32/EU Annex II, Module D**, under Certificate No. **SK 19-QD-SMU020** (issued August 20th, 2019 and valid until August 20th, 2022).

The object of the declaration described above is in conformity with the essential requirements of:

- **Directive 2014/32/EU** on Measuring instrument
- **Directive 2014/30/EU** on Electromagnetic compatibility
- **Directive 2014/53/EU** on Radio equipment
- **Directive 2014/35/EU** on Low voltage electrical equipment.
- **Directive (EU) 2015/863 of 31 March 2015 amending Annex II to Directive 2011/65/EU** on restriction of use of certain hazardous substances in electrical and electronic equipment (RoHS III)
- **Directive 1907/2006** on Registration, Evaluation, Authorization and Restriction of Chemical (REACH)

and harmonized standards and normative documents

- **ISO4064-1:2014** : Water meters for cold potable and hot water – Part 1: Metrological and technical requirements.
- **ISO4064-2:2014** : Water meters for cold potable and hot water – Part 2: Tests method
- **OIML R49-1:2013**: Water meters intended for the metering of cold potable water and hot water. Part1: Metrological and technical requirements
- **OIML R49-2:2013**: Water meters intended for the metering of cold potable water and hot water. Part 2: Test methods.

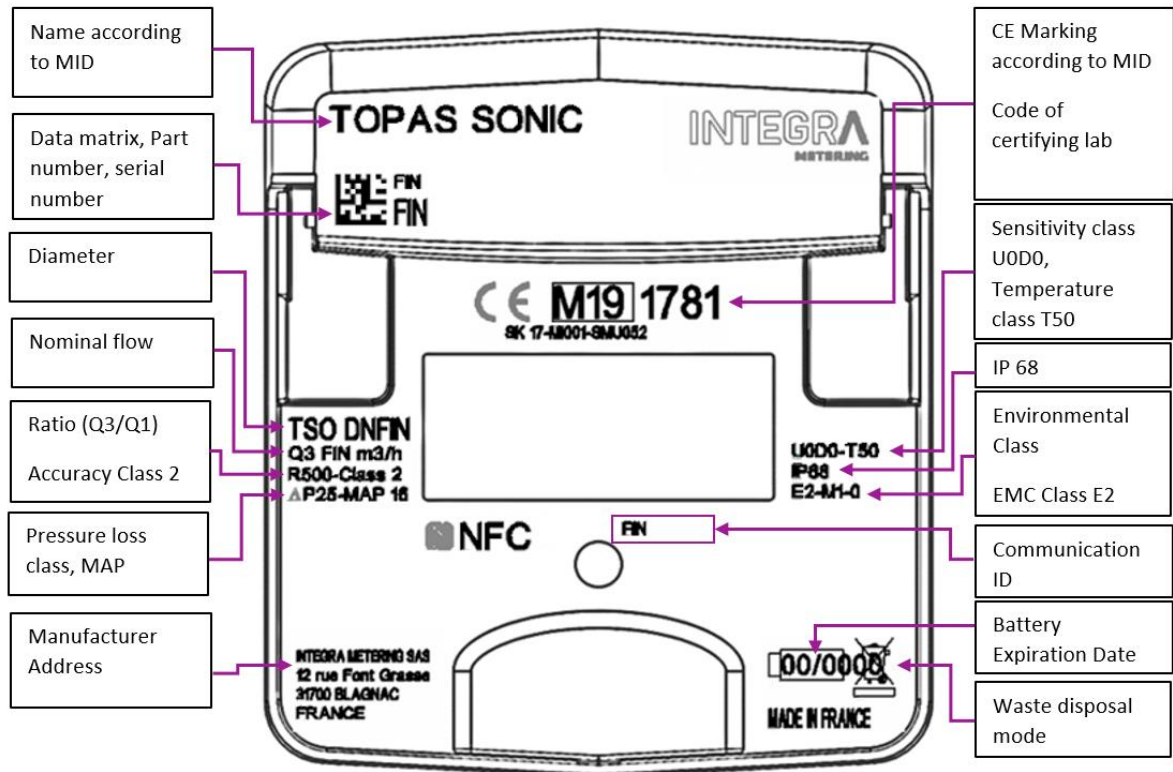
Blagnac, 04/01/2021

.....  
Rémi MERLE  
Head of Quality Management

.....  
Alain RAMOND  
Chief Technical Officer

## 2 Product Design

### 2.1 Product Marking



### 2.2 Datamatrix

Marking includes a datamatrix that contains the serial number in text format.

Integra Metering uses a serial number based on the SPDE standard (ANFAGUA document). It is constructed as follows:

Y	1	8	T	A	1	2	3	4	5	6
L1	F1	F2	L2	L3	F3	F4	F5	F6	F7	F8
1	2		3	4	5					

1	Manufacturer ID	INTEGRA METERING	Y		
2	Year of manufacture	Last 2 digits of the year			
3	Product family	RUBIN SONIC	R		
		TOPAS SONIC	T		
4	Diameter	15 mm	A	65 mm	G
		20 mm	B	80 mm	H
		25 mm	C	100 mm	Y
		30/32 mm	D	125 mm	J
		40 mm	E	150 mm	K
		50 mm	F	200 mm	L
5	Incremental number	Based on 6 digits - Numbering range / product			
		000000 -> 299999	SD Water meters		

## 3 Communication protocol

---

### 3.1 Near Field Communication

The near field communication (NFC) interface is used to communicate with the device. During the assembly, it is used for pushing data from the meter to the database, programming and calibrate the device. When installed, the user can get some data from NFC using the ParamApp application. Due to the self-powering of this interface, when meter has no more power, last information can be read through this interface.

### 3.1 Wireless M-BUS

The following Wireless M-Bus functionality which are part of the Wireless M-Bus specification or OMS V4 are stated to emphasize the requirement for M-Bus compatibility in typical TOPAS environments.

The meter built-in radio is compliant with OMS v4 (OMS v3 compatibility and uses the strictly synchronous transmission scheme.

#### 3.1.1 Wireless emission modes

The meter built-in radio supports wireless M-Bus T1 mode :

- Unidirectional
- Short telegram
- Emission interval

#### 3.1.2 Telegram emission interval

Mode	Default time interval (s)	Estimated lifetime (years)
T1	16 s	16 years

#### 3.1.3 Supported frequencies

Band	868Mhz	
Mode	T	Unit
Frequency (uplink)	868,95	MHz
Frequency accuracy (uplink)	60	± ppm
Chip rate (uplink)	100	kchip/s
Chip rate tolerance (TX)	10 %	
FSK deviation for uplink (min/typ/max)	40/50/80	± kHz

#### 3.1.4 Meter wireless MBUS address

The wireless MBUS address is the com-uid of the device.



### 3.1.5 Wireless MBUS security implementation

#### 3.1.5.1 Encryption mode

The meter being compliant to both OMS v4 and v3 uses encryption mode 5 based on AES encoding (Cipher Block Chaining / 128 bits key / 16 bytes block size) and a 16 bytes dynamic initialization vector. This is equivalent to profile A. The key will be delivered separately.

#### 3.1.5.2 AES Key

All meters share the same AES key.

#### 3.1.5.3 Initialization vector for encryption mode

The initialization vector 5 is written in low to high order according to the AES standard FIPS 197:

LSB	1	2	3	4	5	6	7	8	9	10	11	12	13	14	MSB	
Manuf. ID		Meter ID				Version	Dev. type	Acc #	...	...	...	...	...	...	...	Acc #
LSB	MSB	LSB	...	...	MSB			Acc# is repeated 8 times								

e.g.: Water meter (device type: 07h) with ID 12345678 (BCD) / Manufacturer IMT (25B4h)

Header abstract is :

Manuf. ID		Meter ID				Version	Dev.type		Acc. #				
B4	25	78	56	34	12	10	07	7A	02	00	30	05	

Initialization vector is :

LSB	1	2	3	4	5	6	7	8	9	10	11	12	13	14	MSB
B4	25	78	56	34	12	10	07	02	02	02	02	02	02	02	02

### 3.1.6 Wireless telegram

#### 3.1.6.1 Telegram definition

Following explanation shows the build of the wireless telegram (T1) with AES encryption (128 bit key). The format is defined by the EN13757-4.

The frame is splited in three parts: the datalink layer, the transport layer and the application layer:



##### 3.1.6.1.1 Datalink layer

Field name	Data	Value(hex)	Description															
L-Field	Length	0x3E	Indicates the length of the frame: 62 bytes															
C-Field	Send/No reply	0x44	0x44															
			<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Bit</td><td>[7]</td><td>[6]</td><td>[5]</td><td>[4]</td><td>[3-0]</td></tr> <tr> <td>Value</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0100</td></tr> <tr> <td>Description</td><td>DIR: Not set</td><td>PRM: Set</td><td>FCB: Not set</td><td>FCV: Not set</td><td>Send, no reply expected</td></tr> </table>	Bit	[7]	[6]	[5]	[4]	[3-0]	Value	0	1	0	0	0100	Description	DIR: Not set	PRM: Set
Bit	[7]	[6]	[5]	[4]	[3-0]													
Value	0	1	0	0	0100													
Description	DIR: Not set	PRM: Set	FCB: Not set	FCV: Not set	Send, no reply expected													
			Send spontaneous/periodical application data without request (Send /No Reply)															
M-Field	IMT	0xB4 25	Manufacturer's ID															
A-Field	Meter ID	0x11 11 11 11	M-BUS Interface Identification Number (11111111 in BCD)															
	Version	0x10	Version Number of M-BUS Interface Firmware (from 0x00 to 0xFF)															
	Meter type	0x07	Medium: water meter															

### 3.1.6.1.2 Transport layer

Field name	Data	Value(hex)	Description																																								
CI-Field	Response from device	0x7A	Response from device short header																																								
AccessNR	Access Number	0XF8	Number incremented at each communication																																								
Status	Error	0x00	<table border="1"> <thead> <tr> <th colspan="8">0x00</th> </tr> <tr> <th>Bit</th> <th>[7]</th> <th>[6]</th> <th>[5]</th> <th>[4]</th> <th>[3]</th> <th>[2]</th> <th>[1-0]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>00</td> </tr> <tr> <td>Description</td> <td>Specific to Manufacturer: Not set</td> <td>Specific to Manufacturer: Not set</td> <td>Specific to Manufacturer: Not set</td> <td>Temporary error: Not set</td> <td>Permanent error: Not set</td> <td>Power low: Not set</td> <td>Application status: No error</td> </tr> </tbody> </table> <p>                     Bit0: Meter in busy state                      Bit1: Not defined                      Bit2: Battery low error: (lifetime below 18 month)                      Bit3: Software error                      Bit4: Defective device alarm                      Bit5: Leak alarm                      Bit6: Burst alarm                      Bit7: Reverse flow alarm                 </p>	0x00								Bit	[7]	[6]	[5]	[4]	[3]	[2]	[1-0]	Value	0	0	0	0	0	0	00	Description	Specific to Manufacturer: Not set	Specific to Manufacturer: Not set	Specific to Manufacturer: Not set	Temporary error: Not set	Permanent error: Not set	Power low: Not set	Application status: No error								
0x00																																											
Bit	[7]	[6]	[5]	[4]	[3]	[2]	[1-0]																																				
Value	0	0	0	0	0	0	00																																				
Description	Specific to Manufacturer: Not set	Specific to Manufacturer: Not set	Specific to Manufacturer: Not set	Temporary error: Not set	Permanent error: Not set	Power low: Not set	Application status: No error																																				
OMS Configuration		0x30 25	<table border="1"> <thead> <tr> <th colspan="5">0x30 25</th> </tr> <tr> <th>Bit</th> <th>[15]</th> <th>[14]</th> <th>[13]</th> <th>[12-8]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0</td> <td>0</td> <td>1</td> <td>0b00101</td> </tr> <tr> <td>Description</td> <td>DIR: Not set</td> <td>PRM: Set</td> <td>FCB: Not set</td> <td>FCV: Not set</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="5">0x30 25</th> </tr> <tr> <th>Bit</th> <th>[7-4]</th> <th>[3-2]</th> <th>[1]</th> <th>[0]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0b0011</td> <td>0b00</td> <td>0</td> <td>0</td> </tr> <tr> <td>Description</td> <td>DIR: Not set</td> <td>PRM: Set</td> <td>FCB: Not set</td> <td>FCV: Not set</td> </tr> </tbody> </table> <p>OMS Profil A, Unidirectional, Synchronized, Standard data message</p>	0x30 25					Bit	[15]	[14]	[13]	[12-8]	Value	0	0	1	0b00101	Description	DIR: Not set	PRM: Set	FCB: Not set	FCV: Not set	0x30 25					Bit	[7-4]	[3-2]	[1]	[0]	Value	0b0011	0b00	0	0	Description	DIR: Not set	PRM: Set	FCB: Not set	FCV: Not set
0x30 25																																											
Bit	[15]	[14]	[13]	[12-8]																																							
Value	0	0	1	0b00101																																							
Description	DIR: Not set	PRM: Set	FCB: Not set	FCV: Not set																																							
0x30 25																																											
Bit	[7-4]	[3-2]	[1]	[0]																																							
Value	0b0011	0b00	0	0																																							
Description	DIR: Not set	PRM: Set	FCB: Not set	FCV: Not set																																							

### 3.1.6.1.3 Application layer

The application layer part is encrypted with the key of INTEGRA METERING OMS V.IV.

Field name	Data	Value(hex)	Description																								
RECORD 1 (forward volume)	DIB	0x04	<table border="1"> <thead> <tr> <th colspan="5">0x04</th> </tr> <tr> <th>Bit</th> <th>[7]</th> <th>[6]</th> <th>[5-4]</th> <th>[3-0]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0</td> <td>0</td> <td>0b00</td> <td>0b0100</td> </tr> <tr> <td>Description</td> <td>Subunit: 0 Tarif: 0</td> <td>Storage Number: Not set</td> <td>Function field: Instantaneous value</td> <td>DataField: 0x04 : 32 Bit integer/Binary</td> </tr> </tbody> </table>	0x04					Bit	[7]	[6]	[5-4]	[3-0]	Value	0	0	0b00	0b0100	Description	Subunit: 0 Tarif: 0	Storage Number: Not set	Function field: Instantaneous value	DataField: 0x04 : 32 Bit integer/Binary				
	0x04																										
	Bit	[7]	[6]	[5-4]	[3-0]																						
Value	0	0	0b00	0b0100																							
Description	Subunit: 0 Tarif: 0	Storage Number: Not set	Function field: Instantaneous value	DataField: 0x04 : 32 Bit integer/Binary																							
VIB	0x13	Volume (L)																									
Data	0xB7 0B 00 00	2999																									
RECORD 2 (reverse volume)	DIB	0x84 10	<table border="1"> <thead> <tr> <th colspan="6">0x84 10</th> </tr> <tr> <th>Bit</th> <th>[15-14]</th> <th>[13-12]</th> <th>[11-6]</th> <th>[5-4]</th> <th>[3-0]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0</td> <td>0b01</td> <td>0</td> <td>0b00</td> <td>0b0100</td> </tr> <tr> <td>Description</td> <td>Subunit: Not set</td> <td>Tariff: 1</td> <td>Storage Number: 0x00</td> <td>Function field: Instantaneous value</td> <td>DataField: 0x04 : 32 Bit integer/Binary</td> </tr> </tbody> </table>	0x84 10						Bit	[15-14]	[13-12]	[11-6]	[5-4]	[3-0]	Value	0	0b01	0	0b00	0b0100	Description	Subunit: Not set	Tariff: 1	Storage Number: 0x00	Function field: Instantaneous value	DataField: 0x04 : 32 Bit integer/Binary
	0x84 10																										
	Bit	[15-14]	[13-12]	[11-6]	[5-4]	[3-0]																					
Value	0	0b01	0	0b00	0b0100																						
Description	Subunit: Not set	Tariff: 1	Storage Number: 0x00	Function field: Instantaneous value	DataField: 0x04 : 32 Bit integer/Binary																						
VIB	0x13	Volume (L)																									
Data	0x00 00 00 00	0																									
RECORD 3 (flow rate)	DIB	0x04	<table border="1"> <thead> <tr> <th colspan="5">0x04</th> </tr> <tr> <th>Bit</th> <th>[7]</th> <th>[6]</th> <th>[5-4]</th> <th>[3-0]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0</td> <td>0</td> <td>0b00</td> <td>0b0100</td> </tr> <tr> <td>Description</td> <td>Subunit: 0 Tarif: 0</td> <td>Storage Number: Not set</td> <td>Function field: Instantaneous value</td> <td>DataField: 0x04 : 32 Bit integer/Binary</td> </tr> </tbody> </table>	0x04					Bit	[7]	[6]	[5-4]	[3-0]	Value	0	0	0b00	0b0100	Description	Subunit: 0 Tarif: 0	Storage Number: Not set	Function field: Instantaneous value	DataField: 0x04 : 32 Bit integer/Binary				
	0x04																										
	Bit	[7]	[6]	[5-4]	[3-0]																						
Value	0	0	0b00	0b0100																							
Description	Subunit: 0 Tarif: 0	Storage Number: Not set	Function field: Instantaneous value	DataField: 0x04 : 32 Bit integer/Binary																							
VIB	0x3B	Flowrate (L/h)																									

	Data	0x00 00 00 00	0																																							
RECORD 4 (Send only when water in pipe) (module temperature)	DIB	0x02	<table border="1"> <thead> <tr> <th colspan="5">0x02</th> </tr> <tr> <th>Bit</th> <th>[7]</th> <th>[6]</th> <th>[5-4]</th> <th>[3-0]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0</td> <td>0</td> <td>0b00</td> <td>0b0020</td> </tr> <tr> <td>Description</td> <td>Subunit :0 Tarif : 0</td> <td>Storage Number: Not set</td> <td>Function field: Instantaneous value</td> <td>DataField: 0x04 : 16 Bit integer/Binary</td> </tr> </tbody> </table>	0x02					Bit	[7]	[6]	[5-4]	[3-0]	Value	0	0	0b00	0b0020	Description	Subunit :0 Tarif : 0	Storage Number: Not set	Function field: Instantaneous value	DataField: 0x04 : 16 Bit integer/Binary																			
	0x02																																									
	Bit	[7]	[6]	[5-4]	[3-0]																																					
Value	0	0	0b00	0b0020																																						
Description	Subunit :0 Tarif : 0	Storage Number: Not set	Function field: Instantaneous value	DataField: 0x04 : 16 Bit integer/Binary																																						
VIB	0x5A	Temperature (°C)																																								
Data	0x00 00	Data																																								
RECORD 5 (instant (Date+UTC time))	DIB	0x04	<table border="1"> <thead> <tr> <th colspan="5">0x04</th> </tr> <tr> <th>Bit</th> <th>[7]</th> <th>[6]</th> <th>[5-4]</th> <th>[3-0]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0</td> <td>0</td> <td>0b00</td> <td>0b0100</td> </tr> <tr> <td>Description</td> <td>Subunit :0 Tarif : 0</td> <td>Storage Number: Not set</td> <td>Function field: Instantaneous value</td> <td>DataField: 0x04 : 32 Bit integer/Binary</td> </tr> </tbody> </table>	0x04					Bit	[7]	[6]	[5-4]	[3-0]	Value	0	0	0b00	0b0100	Description	Subunit :0 Tarif : 0	Storage Number: Not set	Function field: Instantaneous value	DataField: 0x04 : 32 Bit integer/Binary																			
	0x04																																									
	Bit	[7]	[6]	[5-4]	[3-0]																																					
Value	0	0	0b00	0b0100																																						
Description	Subunit :0 Tarif : 0	Storage Number: Not set	Function field: Instantaneous value	DataField: 0x04 : 32 Bit integer/Binary																																						
VIB	0x6D	Instant [date+Time]																																								
Data	0x24 29 67 2B	07.11.2019 09:36																																								
		<table border="1"> <thead> <tr> <th colspan="2">Data</th> <th colspan="2">07.11.2019 09:36</th> </tr> </thead> <tbody> <tr> <td>Day</td> <td>.....0 0111 .....</td> <td>Day:</td> <td>0x07 (7)</td> </tr> <tr> <td>Month</td> <td>.... 1011 .....</td> <td>Month:</td> <td>0x0B (11)</td> </tr> <tr> <td>HundredYear</td> <td>.....01 .....</td> <td>HundredYear:</td> <td>0x01 (1)</td> </tr> <tr> <td>Year</td> <td>0010 .... 011. ....</td> <td>Year:</td> <td>0x13 (19) = 19</td> </tr> <tr> <td>Hour</td> <td>.....0 1001 .....</td> <td>Hour:</td> <td>0x09 (9)</td> </tr> <tr> <td>Minute</td> <td>.....10 0100 .....</td> <td>Minute:</td> <td>0x24 (36)</td> </tr> <tr> <td>Invalid</td> <td>..... 0 .....</td> <td>IV:</td> <td>Not Set</td> </tr> <tr> <td>Summertime</td> <td>..... 0 .....</td> <td>SU:</td> <td>Not Set</td> </tr> <tr> <td>Reserved</td> <td>..... .0 .....</td> <td>RES1:</td> <td>Not Set</td> </tr> </tbody> </table>	Data		07.11.2019 09:36		Day	.....0 0111 .....	Day:	0x07 (7)	Month	.... 1011 .....	Month:	0x0B (11)	HundredYear	.....01 .....	HundredYear:	0x01 (1)	Year	0010 .... 011. ....	Year:	0x13 (19) = 19	Hour	.....0 1001 .....	Hour:	0x09 (9)	Minute	.....10 0100 .....	Minute:	0x24 (36)	Invalid	..... 0 .....	IV:	Not Set	Summertime	..... 0 .....	SU:	Not Set	Reserved	..... .0 .....	RES1:	Not Set
Data		07.11.2019 09:36																																								
Day	.....0 0111 .....	Day:	0x07 (7)																																							
Month	.... 1011 .....	Month:	0x0B (11)																																							
HundredYear	.....01 .....	HundredYear:	0x01 (1)																																							
Year	0010 .... 011. ....	Year:	0x13 (19) = 19																																							
Hour	.....0 1001 .....	Hour:	0x09 (9)																																							
Minute	.....10 0100 .....	Minute:	0x24 (36)																																							
Invalid	..... 0 .....	IV:	Not Set																																							
Summertime	..... 0 .....	SU:	Not Set																																							
Reserved	..... .0 .....	RES1:	Not Set																																							
RECORD 6 (target monthly value)	DIB	0x7C (in case of no initialization of the storage value)	<table border="1"> <thead> <tr> <th colspan="5">0x7C</th> </tr> <tr> <th>Bit</th> <th>[7]</th> <th>[6]</th> <th>[5-4]</th> <th>[3-0]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0</td> <td>0b1</td> <td>0b11</td> <td>0b1100</td> </tr> <tr> <td>Description</td> <td>Subunit :0 Tarif : 0</td> <td>Storage Number: Set</td> <td>Function field: ValueDuringErrorState</td> <td>DataField: 0x0C: 8 digit BCD</td> </tr> </tbody> </table>	0x7C					Bit	[7]	[6]	[5-4]	[3-0]	Value	0	0b1	0b11	0b1100	Description	Subunit :0 Tarif : 0	Storage Number: Set	Function field: ValueDuringErrorState	DataField: 0x0C: 8 digit BCD																			
	0x7C																																									
	Bit	[7]	[6]	[5-4]	[3-0]																																					
	Value	0	0b1	0b11	0b1100																																					
Description	Subunit :0 Tarif : 0	Storage Number: Set	Function field: ValueDuringErrorState	DataField: 0x0C: 8 digit BCD																																						
DIB	0x44 (in case of initialization of the storage value)	<table border="1"> <thead> <tr> <th colspan="5">0x44</th> </tr> <tr> <th>Bit</th> <th>[7]</th> <th>[6]</th> <th>[5-4]</th> <th>[3-0]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0</td> <td>0b1</td> <td>0b00</td> <td>0b0100</td> </tr> <tr> <td>Description</td> <td>Subunit :0 Tarif : 0</td> <td>Storage Number: Set</td> <td>Function field: ValueDuringNoErrorState</td> <td>DataField: 0x0C: 8 digit BCD</td> </tr> </tbody> </table>	0x44					Bit	[7]	[6]	[5-4]	[3-0]	Value	0	0b1	0b00	0b0100	Description	Subunit :0 Tarif : 0	Storage Number: Set	Function field: ValueDuringNoErrorState	DataField: 0x0C: 8 digit BCD																				
0x44																																										
Bit	[7]	[6]	[5-4]	[3-0]																																						
Value	0	0b1	0b00	0b0100																																						
Description	Subunit :0 Tarif : 0	Storage Number: Set	Function field: ValueDuringNoErrorState	DataField: 0x0C: 8 digit BCD																																						
VIB	0x13	Volume (L)																																								
Data	0x00 00 00 00	0																																								
RECORD 7 (target date)	DIB	0x42	<table border="1"> <thead> <tr> <th colspan="5">0x42</th> </tr> <tr> <th>Bit</th> <th>[7]</th> <th>[6]</th> <th>[5-4]</th> <th>[3-0]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0</td> <td>1</td> <td>0b00</td> <td>0b0010</td> </tr> <tr> <td>Description</td> <td>Subunit :0 Tarif : 0</td> <td>Storage Number: Set</td> <td>Function field: Instantaneous value</td> <td>DataField: 0x02: 16 bit Integer/Binary</td> </tr> </tbody> </table>	0x42					Bit	[7]	[6]	[5-4]	[3-0]	Value	0	1	0b00	0b0010	Description	Subunit :0 Tarif : 0	Storage Number: Set	Function field: Instantaneous value	DataField: 0x02: 16 bit Integer/Binary																			
	0x42																																									
	Bit	[7]	[6]	[5-4]	[3-0]																																					
Value	0	1	0b00	0b0010																																						
Description	Subunit :0 Tarif : 0	Storage Number: Set	Function field: Instantaneous value	DataField: 0x02: 16 bit Integer/Binary																																						
VIB	0x6C	Instant [date]																																								
Data	0x07 2A	<table border="1"> <thead> <tr> <th colspan="2">Data</th> <th colspan="2">31.10.2019</th> </tr> </thead> <tbody> <tr> <td>Day</td> <td>.... 1111 .....</td> <td>Day:</td> <td>0x1F (31)</td> </tr> <tr> <td>Month</td> <td>.... 1010 .....</td> <td>Month:</td> <td>0x0A (10)</td> </tr> <tr> <td>Year</td> <td>0010 .... 011. ....</td> <td>Year:</td> <td>0x13 (19) = 2019</td> </tr> </tbody> </table>	Data		31.10.2019		Day	.... 1111 .....	Day:	0x1F (31)	Month	.... 1010 .....	Month:	0x0A (10)	Year	0010 .... 011. ....	Year:	0x13 (19) = 2019																								
Data		31.10.2019																																								
Day	.... 1111 .....	Day:	0x1F (31)																																							
Month	.... 1010 .....	Month:	0x0A (10)																																							
Year	0010 .... 011. ....	Year:	0x13 (19) = 2019																																							
RECORD 8 (error indicator)	DIB	0x02	<table border="1"> <thead> <tr> <th colspan="5">0x02</th> </tr> <tr> <th>Bit</th> <th>[7]</th> <th>[6]</th> <th>[5-4]</th> <th>[3-0]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0</td> <td>0b1</td> <td>0b00</td> <td>0b0010</td> </tr> <tr> <td>Description</td> <td>Subunit :0 Tarif : 0</td> <td>Storage Number: Set</td> <td>Function field: Instantaneous value</td> <td>DataField: 0x02: 16 bit Integer/Binary</td> </tr> </tbody> </table>	0x02					Bit	[7]	[6]	[5-4]	[3-0]	Value	0	0b1	0b00	0b0010	Description	Subunit :0 Tarif : 0	Storage Number: Set	Function field: Instantaneous value	DataField: 0x02: 16 bit Integer/Binary																			
	0x02																																									
	Bit	[7]	[6]	[5-4]	[3-0]																																					
Value	0	0b1	0b00	0b0010																																						
Description	Subunit :0 Tarif : 0	Storage Number: Set	Function field: Instantaneous value	DataField: 0x02: 16 bit Integer/Binary																																						
VIB	0xFD 17	Info status (binary), cf 3.1.6.2																																								
Data	0x00 08	0b0000100000000000																																								
RECORD 9 (remaining battery lifetime)	DIB	0x02	<table border="1"> <thead> <tr> <th colspan="5">0x02</th> </tr> <tr> <th>Bit</th> <th>[7]</th> <th>[6]</th> <th>[5-4]</th> <th>[3-0]</th> </tr> </thead> <tbody> <tr> <td>Value</td> <td>0</td> <td>0</td> <td>0b00</td> <td>0b0010</td> </tr> <tr> <td>Description</td> <td>Subunit :0 Tarif : 0</td> <td>Storage Number: Not set</td> <td>Function field: Instantaneous value</td> <td>DataField: 0x02: 16 bit Integer/Binary</td> </tr> </tbody> </table>	0x02					Bit	[7]	[6]	[5-4]	[3-0]	Value	0	0	0b00	0b0010	Description	Subunit :0 Tarif : 0	Storage Number: Not set	Function field: Instantaneous value	DataField: 0x02: 16 bit Integer/Binary																			
	0x02																																									
	Bit	[7]	[6]	[5-4]	[3-0]																																					
Value	0	0	0b00	0b0010																																						
Description	Subunit :0 Tarif : 0	Storage Number: Not set	Function field: Instantaneous value	DataField: 0x02: 16 bit Integer/Binary																																						
VIB	0xFD 74	Remaining battery lifetime (Day)																																								
Data	0xD0 16	5840																																								

### 3.1.6.2 Info status/Events

Status								Events							
Bit 16	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
Not used	Not used	Limit Max. Water temp. (current status)	Limit Min. Water temp. (current status)	Dry	Overflow	Reverse flow	Battery Low	No consumption	Over temperature	Heat	Frost	Leak	Burst	Air Bubbles	Reserved

Info status description			
Alarms	Decimal	Hexadecimal	Binary
Reserved	1	0x0001	0000 0000 0000 0001
Air bubbles	2	0x0002	0000 0000 0000 0010
Burst	4	0x0004	0000 0000 0000 0100
Leak	8	0x0008	0000 0000 0000 1000
Frost	16	0x0010	0000 0000 0001 0000
Heat	32	0x0020	0000 0000 0010 0000
Over temperature	64	0x0040	0000 0000 0100 0000
No consumption	128	0x0080	0000 0000 1000 0000
Low Battery	256	0x0100	0000 0001 0000 0000
Reverse flow	512	0x0200	0000 0010 0000 0000
Overflow	1024	0x0400	0000 0100 0000 0000
Dry	2048	0x0800	0000 1000 0000 0000
Limit minimum water temperature	4096	0x1000	0001 0000 0000 0000
Limit maximum water temperature	8192	0x2000	0010 0000 0000 0000

Overflow alarm: The alarm is triggered immediately when the flow is over 125% of Q3. The alarm is rest immediately after flow goes back below 125% of Q3 threshold.

## 4 Operation

### 4.1 LCD display




To show the meter's data, various windows have been created as functions that can display the assigned system information.



### 4.2 Display symbols

The symbols are defined as follows:

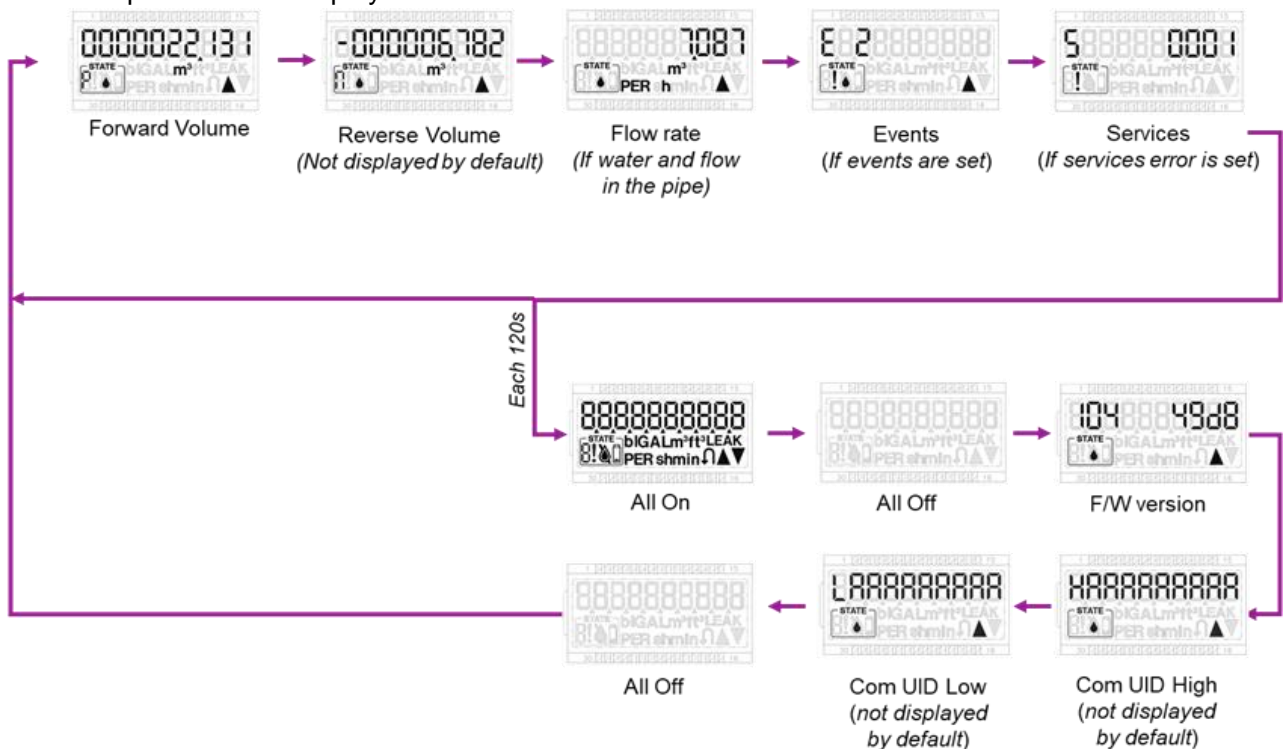
Flow direction		Positive flow	Set when: <ul style="list-style-type: none"> <li>There is water in the pipe</li> <li>The flow is over <math>Q_{start}</math></li> </ul>
		Reverse flow	Set when: <ul style="list-style-type: none"> <li>There is water in the pipe</li> <li>The flow is below <math>-Q_{start}</math></li> </ul>
Index indicator		Positive Index	Set when the window displays the positive index (forward volume)
		Negative Index	Set when the window displays the negative index
Water detection		Wet	The wet symbol indicates that water is present in the pipe.
		Dry	The dry symbol is set when air is detected after 10 consecutive measurement timeouts. It is reset as soon as water is detected in the pipe.
Reverse flow		ON	The reverse flow indicator is set when the average flow rate over 15 min is below -2.5% of $Q_3$
		OFF	The reverse flow indicator is reset when no reverse flow is detected for 30 days
Leakage	<b>LEAK</b>	ON	The leak indicator is set when the flow is greater than the threshold (1% of $Q_3$ ) during 24 consecutive hours
		OFF	The leak indicator is reset when the flow goes below the threshold.
Exclamation mark		ON	The exclamation mark is set when following events occur: <ul style="list-style-type: none"> <li>Air bubbles</li> </ul>

			<ul style="list-style-type: none"> <li>Burst</li> <li>Over temperature</li> <li>No consumption</li> </ul> <p>In case of service error, the exclamation mark is also set.</p>
		OFF	The exclamation mark is cleared when the concerned event is reset every round hour.
Low battery		ON	The low battery symbol is set when the expected remaining battery life is below 18 months. The symbol is off otherwise.
Test mode		ON	The test mode symbol is set to indicate that the flowmeter is in test mode operation. It is reset as soon as the verification mode is over. Please contact the service for further information.
Sleep Mode		ON	Before the first installation, the display is blank. Normal display operation starts when water is detected in the pipe or NFC communication is initiated.

### 4.3 Display loop

The LCD window changes automatically to display the following information: forward volume, reverse volume, flow rate, events, firmware version, flow direction, meter state.

The basic sequence of the display is defined as follows:



## 4.4 Events (visual indication on the LCD)

This summary shows all possible events which require attention by the user.

Display code	Events	Conditions	
E1	RESERVED		
E2	Air bubbles	ON	If air is detected in the pipe
		OFF	Alarm is reset after 1 hour without air detected in the pipe
E3	Burst	ON	Actual flow rate over 25% of $Q_3$ value for more than 30 minutes
		OFF	Actual flow rate is below 25% of $Q_3$
E4	RESERVED		
E7	Over temperature	ON	If ambient temperature > threshold (60 °C)
		OFF	Reset after 1 hour if ambient temperature < threshold (60 °C)
E8	No consumption	ON	If average flow rate is below 0.1% of $Q_3$ for more than 3 days
		OFF	If flow rate greater than 0.1% of $Q_3$
S	Service	Please contact the service	

## 4.5 Services errors description

Display code	Events	Conditions
S 0001	Service	The metrology unit is not working permanently.
S 0002	Service	Temporary communication error between metrology unit and microcontroller.

Service errors register description			
S	Decimal	Hexadecimal	Binary
Defective meter	1	0x 0001	0000 0000 0000 0001
Temporary communication error	2	0x 0002	0000 0000 0000 0010

**Note:** In case of software error, the service error S0002 is displayed after 30s and the bit 3 of the Status register of the transport layer is set. After 9 minutes, the service error S0001 is displayed.

## 4.6 Run modes

### 4.6.1 User mode

This is the default run mode of the meter.

Function	Default
----------	---------

Displayed values		Forward volume (10 sec)
		Flow rate (2sec)
		Events, Status (2 sec)
Led		OFF
Radio		ON if any
Radio emission interval		16s
Unit	Volume	m3
	Flow	m3/h
Resolution	Volume	3 digits after comma
	Flow	2 digits after comma
Mode time out		n/a

#### 4.6.2 Test mode

This mode is set by authorized person for specific test on verification bench at Partners / Customers using ParamAPP Android application.

This mode is active for a defined period of time after this period the meter switches automatically to the “user mode”.

Function		Default
Displayed values		Forward volume (10 sec)
		Flow rate (2 sec)
		Events/status (2 sec)
Led		On (pulse)
		Pulse weight: 10mL/pulse
Radio		On if any
Radio emission interval		16s
Unit	Volume	m3
	Flow	L/h
Resolution	Volume	3 digits after comma
	Flow	3 digits after comma
Mode time out		8 hours

#### 4.6.3 Sleep mode

This mode is used when the device is in storage.

The water meter switches back to “user mode” instantaneously when seing water or using ParamAPP android application.

Function		Default
Displayed values		Empty
Led		OFF
Radio		OFF
Radio emission interval		OFF
Unit	Volume	N.A.
	Flow	N.A.
Resolution	Volume	N.A.
	Flow	N.A.
Mode time out		N.A.



## 4.7 Data

### 4.7.1 Volume

The forward volume and the reverse volume are computed and available for users (display, storage, digital output).

- The volume is incremented when the measured flow rate exceeds  $Q_{start}$ .
- The volume is computed normally even if the flow rate exceeds  $Q_4$  (limited by cavitation)

Both volumes can be displayed :

- Default unit is cubic meters ( $m^3$ )
- The resolution is 3 decimals after point by default

### 4.7.2 Flow rate

The instant flow rate is computed through the 1Hz sampling measurement (when in user mode)  
The flow rate is available for users in a signed format (display, storage, digital output).

- The flow rate is computed for both forward and reverse flow
- When flow  $< Q_{start}$  : no flow rate value is displayed
- The Min flow is computed every round hour
- The Max flow is computed every round hour

The flow rate can be displayed :

- Default unit is cubic meters per hour ( $m^3/h$ )
- The resolution is 3 decimals after point by default

### 4.7.3 Operating hours

The cumulated Operating hours are computed and available for users (storage, digital output)  
The cumulated time during which an or multiple errors are raised are logged in the Error hours counter.

### 4.7.4 Water temperature ( $<50^\circ C$ )

The instant water temperature is computed on 1Hz sampling base.  
The water temperature is available :

- In the following units :  $1/10^\circ C$

## 5 Shipping information

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### 5.1 Unit shipment and ordering information

#### 5.1.1 Unit cardboard box

##### 5.1.1.1 Dimensions

Reference	Unit Weight	Cardboard dimensions
TSMR-015-AXT-W8-INTG01	0.96 Kg	155 x 160 x 100 mm
TSMR-015-BXT-W8-INTG01	1.1 Kg	202 x 150 x 99 mm
TSMR-015-CXT-W8-INTG01	1.1 Kg	202 x 150 x 99 mm
TSMR-020-AXT-W8-INTG01	1.1 Kg	202 x 150 x 99 mm
TSMR-025-AXT-W8-INTG01	1.5 Kg	338 x 140 x 114 mm
TSMR-032-AXT-W8-INTG01	1.6 Kg	338 x 140 x 114 mm
TSMR-040-AXT-W8-INTG01	2.1 Kg	338 x 140 x 114 mm
TSMR-050-AXT-W8-INTG01	2.7 Kg	338 x 140 x 114 mm

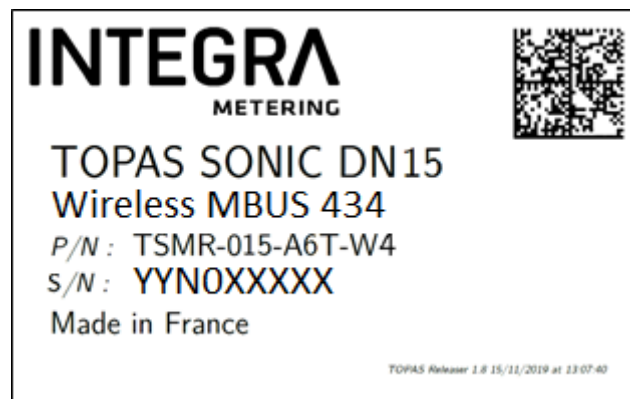
##### 5.1.1.2 Contents

The box contains:

- A water meter

##### 5.1.1.3 Unit cardboard box identification label

Unit identification will be placed on the unitary cardboard with SN. The cardboard is labeled as follows:



The label will be stuck in a way that when the unit handling is open, the unitary label is visible.

### 5.2 Palletization

#### 5.2.1.1 Pallet details

The pallet "Europe Format" will be used. The wood used for the pallet will be compliant with NIMP 15 /ISMP 15. The cargo is maintained by cardboard brackets.

Pallet max weight (including pallet): 1000 Kg

### 5.2.1.2 Handling unit description

The handling unit dimensions are: 120(L)x80x90(H)cm.

The pallet is labelled with the following sticker:



### 5.2.1.3 Dangerous goods specifics

The meter containing Lithium-Ion battery with a power over 20Wh falls into Class 9 (Miscellaneous) hazardous materials category.

This requires to:

- Fill a “Shipper’s declaration for dangerous goods”
  - o This declaration form is filled and signed by authorized personnel from Integra Metering
  - o Lists exact description of shipment conditioning

SHIPPER'S DECLARATION FOR DANGEROUS GOODS	
Shipper INTEGRA METERING SAS 12 RUE FONT-GRASSE 31700 BLAGNAC FRANCE	Air Waybill No. Page 1 of 1 pages Shipper's Reference number
Consignee	
Two completed and signed copies of this Declaration must be handed to the operator.	
<b>TRANSPORT DETAILS</b> This shipment is within the limitations prescribed for: (delete non-applicable) <b>PASSENGER AND CARGO AIRCRAFT</b> Airport of Departure :  Airport of Destination :	<b>WARNING</b> Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties.  Shipment type: (delete non-applicable) <input checked="" type="checkbox"/> NON-RADIOACTIVE <input type="checkbox"/> <b>#####</b>
<b>NATURE AND QUANTITY OF DANGEROUS GOODS</b> UN Number or Identification Number, proper shipping name, Class or Division (subsidiary risk), packing group (if required) and all over required information.  UN 3091, Lithium metal batteries contained in equipment, 9 // 2 FIBREBOARD BOXES x 0.60 kg // 970 UN 3091, Lithium metal batteries contained in equipment, 9 // 1 FIBREBOARD BOX x 0.30 kg // 970  Overpack used	
Additional Handling Information Emergency contact ( 24 - hour number ) : +33 (0)5 67 76 81 09	
I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. I declare that all of the applicable air transport requirements have been met.	Name/Title of Signatory  Place and Date  Signature (see warning above)

- Apply a label identifying the company and address from where the goods are shipped and the address of delivery. It identifies in addition the quantity of lithium present on the pallet.

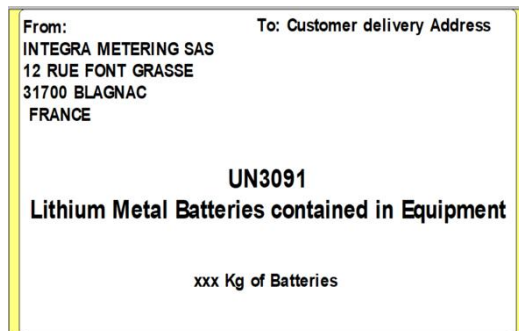
The label is designed as follows:



This label is applied on the film protecting the pallet.

- Apply a label identifying the company and address from where the goods are shipped and the address of delivery. It identifies in addition the quantity of lithium present on the pallet.

The label is designed as follows:



This label is applied on the handling unit.

- Apply a label identifying the hazardous materials category. The label is designed as follows:



This label is applied on the handling unit.

The transporter has to be compliant with dangerous goods.

