

Supplementary information for EU Devices in the LoRaWAN® Showcase catalogue. Version 1.0

Version of Questionnaire form from the Customer/ Device Manufacturer

Version	Date	Author	Update
1.0	30.07.2020	Jon Ortego	Initial release from manufacture

Supplementary Information on certified device

1 Supplementary information	
1.1 Manufacturer or Brand name	IMST GmbH
1.2 Website	https://wireless-solutions.de/
1.3 Sales / Marketing contact person, email:	Jon Ortego, sales@imst.de
1.4 Technical contact person, email:	Heinz Syrzisko, syrzisko@imst.de
1.5 Commercial Product name	Wireless M-Bus Range Extender
1.6 Product code used when ordering / article number	404600
1.7 Product Version : Hardware version: Firmware version:	1.0 C100 0.9
1.8 In what countries is the product available	Europe
1.9 What date was / is the market introduction for this device / product?	03.07.2020
1.10 Is the device already working on a public LoRaWAN network. If yes specify at which public operator, country and number of deployed devices on that network:	<input checked="" type="checkbox"/> Yes: <input type="checkbox"/> No TTN
1.11 What functionality does the device provide and which sensor(s) does it contain?	<p>Use case: Smart Metering</p> <p>Short behavior description: The IMST Wireless M-Bus Range Extender is a compact and cost-effective device that collects wireless M-Bus messages (C1/T1 and S1-mode, telegram format A and B) from utility meters and forwards them to a LoRaWAN® network. It significantly extends the range of wireless M-Bus meters and allows filtering those messages by Manufacturer ID (M-field) and Sender Address (A-field) to select specific groups of measuring instruments. Due to its leading RF performance and ultra low power capability (standby current 3µA with RTC on) it provides a lifetime of up to 10 years and more.</p> <p>The Range Extender supports flexible</p>

	configuration of calendar events for WM-Bus reception intervals and status messages as well as device filtering by Manufacturer ID and Device ID (whitelist).
1.12 Accuracy & resolution for every sensor or measurement made by the device	
Name: sensor accuracy (incl. unit): +/- resolution (incl. unit): measurement parameter: measurement range	
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1.13 Uplinks are: <p style="text-align: right;">Periodic:</p> <p style="text-align: right;">Period:</p> <p style="text-align: right;">Explanation:</p> <p style="text-align: right;">Keep alive message period:</p> <p style="text-align: right;">Event triggered how:</p>	<input checked="" type="checkbox"/> Configurable Events can be triggered by an internal calendar Configurable, via internal calendar
1.14 Parameter configuration of device (e.g. transmission or measurement interval, threshold levels, etc.)	<input type="checkbox"/> Remotely: <input type="checkbox"/> Over-the-air with LoRaWAN data downlinks <input type="checkbox"/> Specify if other: <input checked="" type="checkbox"/> Locally: Serial Interface <input type="checkbox"/> Via CLI: specify type of connector: <input type="checkbox"/> Via NFC: <input type="checkbox"/> Specify if other:
1.15 Does the application server send downlinks to the devices?	<input type="checkbox"/> Yes: (why/how often/typical size) <input checked="" type="checkbox"/> No

1.16 Operating temperature of device - x °C to + x °C	Minimum -10 °C Maximum +55 °C
1.17 Is the payload structure available for decoding?	<input checked="" type="checkbox"/> Yes: <input type="checkbox"/> No Please attach the payload structure (+example of decoded payload) See: https://wireless-solutions.de/products/wireless-m-bus-range-extender-with-lorawan/
1.18 Is there a decode-API available	<input checked="" type="checkbox"/> Yes: <input type="checkbox"/> No Please attach the API documentation
1.19 Is the firmware upgradeable and how?	<input checked="" type="checkbox"/> Yes: (how) Serial interface
1.20 How can the device be reset to factory default settings?	Not available yet
1.21 How can the device be forced to re-initiate the join procedure?	Reset of the device, if OTAA already activated. Otherwise by means of the reed sensor or and application event sent from a PC-Tool via local serial interface
1.22 Product certifications (IP rating, ATEX, ...)	1. IP rating: 2. ATEX compliance: Other:
1.23 Which regulatory certifications are available (RED, CE, EMC)?	<input checked="" type="checkbox"/> RED <input checked="" type="checkbox"/> CE <input checked="" type="checkbox"/> EMC Attach proof of certification to the mail in which this document is sent to a public operator
1.24 Power Supply	<input type="checkbox"/> External power supply: connection: voltage: amperage: <input checked="" type="checkbox"/> Internal battery: battery type: SL-2880/S chemical composition: Lithium-Thionylchlorid Battery self-discharge (%/year): <1% Battery shelf life: 10 years capacity: 19Ah weight: 93gr rechargeable: <input type="checkbox"/> Yes: <input checked="" type="checkbox"/> No
1.25 Powering device on and off How is the device turned ON? How is the device turned OFF?	Connect battery Disconnect battery
1.26 Dimensions of device (Length x width x height)	14.5 x 9.2 x 55 cm

1.27 Weight of full device	335 g
1.28 Mounting of device 1. How to mount? 2. How to mount for best antenna propagation	Housing for wall mounting

2 LoRaWAN Device Information

2.1 DevEUI Range (IEEE Compliance)	From :70-B3-D5-8F-F0-00-00-00 To : 70-B3-D5-8F-FF-FF-FF-FF
2.2 LoRaWAN Class	<input checked="" type="checkbox"/> Class A <input type="checkbox"/> Class B <input type="checkbox"/> Class C
2.3 For Class C Device: Device Under Test restores previous RF settings at boot?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2.4 In what LoRaWAN region/frequency ranges is the product available	<input checked="" type="checkbox"/> EU863-870 <input type="checkbox"/> US902-928 <input type="checkbox"/> AS923 <input type="checkbox"/> IN865-867 <input type="checkbox"/> KR920-923 <input type="checkbox"/> Other
2.5 Is the LoRaWAN test mode supported?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No, why not
2.6 Tested and certified against which LoRaWAN Specification(s)	<input type="checkbox"/> V1.0 <input type="checkbox"/> V1.0.1 <input checked="" type="checkbox"/> V1.0.2 revB <input type="checkbox"/> V1.0.3 <input type="checkbox"/> V1.1.x <input type="checkbox"/> Other :
2.7 Link to document on the LoRa Alliance website	Link: https://lora-alliance.org/showcase/wireless-m-bus-range-extender
2.8 Which TX power is used in production devices by default? - if LW 1.0.2 rev A or older is used: - if LW 1.0.2 rev B or newer is used	<input type="checkbox"/> TXPower 0 (20dBm) <input type="checkbox"/> TXPower 1 (14dBm) <input type="checkbox"/> TXPower 2 (11dBm) <input type="checkbox"/> TXPower 3 (8dBm) <input type="checkbox"/> TXPower 4 (5dBm) <input type="checkbox"/> TXPower 5 (2dBm) <input type="checkbox"/> other TXPower (dBm) <input checked="" type="checkbox"/> TXPower 0 (MaxEIRP) <input type="checkbox"/> TXPower 1 (MaxEIRP-2dB) <input type="checkbox"/> TXPower 2 (MaxEIRP-4dB) <input type="checkbox"/> TXPower 3 (MaxEIRP-6dB) <input type="checkbox"/> TXPower 4 (MaxEIRP-8dB)

	<input type="checkbox"/> TXPower 5 (MaxEIRP-10dB) <input type="checkbox"/> TXPower 6 (MaxEIRP-12dB) <input type="checkbox"/> TXPower 7 (MaxEIRP-14dB) <input type="checkbox"/> other TXPower (Max EIRP : 14 dBm)
<p>2.9 Which TX powers are supported by the device in production</p> <p>- if LW 1.0.2 rev A or older is used:</p> <p>- if LW 1.0.2 rev B or newer is used</p>	<input type="checkbox"/> TXPower 0 (20dBm) <input type="checkbox"/> TXPower 1 (14dBm) <input type="checkbox"/> TXPower 2 (11dBm) <input type="checkbox"/> TXPower 3 (8dBm) <input type="checkbox"/> TXPower 4 (5dBm) <input type="checkbox"/> TXPower 5 (2dBm) <input type="checkbox"/> other TXPower (dBm) <input checked="" type="checkbox"/> TXPower 0 (MaxEIRP) <input checked="" type="checkbox"/> TXPower 1 (MaxEIRP-2dB) <input checked="" type="checkbox"/> TXPower 2 (MaxEIRP-4dB) <input checked="" type="checkbox"/> TXPower 3 (MaxEIRP-6dB) <input checked="" type="checkbox"/> TXPower 4 (MaxEIRP-8dB) <input checked="" type="checkbox"/> TXPower 5 (MaxEIRP-10dB) <input checked="" type="checkbox"/> TXPower 6 (MaxEIRP-12dB) <input checked="" type="checkbox"/> TXPower 7 (MaxEIRP-14dB) (Max EIRP : 14 dBm)
<p>2.9 Which LoRaWAN Specification is currently supported on the production devices?</p>	<input type="checkbox"/> V1.0 <input type="checkbox"/> V1.0.1 <input type="checkbox"/> V1.0.2 revA <input checked="" type="checkbox"/> V1.0.2 revB <input type="checkbox"/> V1.0.4 <input type="checkbox"/> V1.1.x <input type="checkbox"/> Other:
<p>2.10 Will you re-certify your device when a new major LoRaWAN specification version is released</p>	<input checked="" type="checkbox"/> Yes. <input type="checkbox"/> No, why :
<p>2.11 Has Interoperability prequalification testing been done?</p>	<input checked="" type="checkbox"/> Yes. <input type="checkbox"/> No, why : Missing information for this. Which Network Servers <input checked="" type="checkbox"/> Actility <input checked="" type="checkbox"/> Loriot <input checked="" type="checkbox"/> TTI <input checked="" type="checkbox"/> Other: Specify: ChirpStack

	<p>Please attach all the test reports. Manual tested without reports</p>
2.12 Is Activation Type OTAA the default	<input checked="" type="checkbox"/> Yes. Configurable by customer <input checked="" type="checkbox"/> No, why : Configurable by customer
2.13 For OTAA, is AppKey unique for each device?	<input checked="" type="checkbox"/> Yes. Configurable by customer <input type="checkbox"/> No.
2.14 Is ADR implemented? Recommendation: ADR should always be activated. Exceptions can be made for moving devices but will need to be explained.	<input checked="" type="checkbox"/> Activated <input type="checkbox"/> Deactivated, why : <input type="checkbox"/> Configurable by user (recommendation: Activated by default) <input type="checkbox"/> Mixed, explain:
2.15 What values did you implement for: - ADR_ACK_LIMIT: - ADR_ACK_DELAY:	<p>64recommended value: 64 32recommended value: 32</p>
2.16 Do you use unconfirmed and/or confirmed uplinks and what is the data rate, timing and power back off algorithm? Upon reception of a confirmed downlink message, is the next uplink sent immediately after the downlink ?Answers (radio buttons)	<input type="checkbox"/> unconfirmed <input checked="" type="checkbox"/> confirmed, when and why: <input type="checkbox"/> Both, which is used when and why: Data rate, timing and power back-off algorithm (only if you use confirmed uplinks): In the absence of ACK the end-device will try to retransmit the same data again, with a maximum number of 7 retries. Each data rate will be used twice and will be lowered after that till DR0 is achieved. <input checked="" type="checkbox"/> Yes. <input type="checkbox"/> No, why :
2.17 Is the device doing a periodical rejoin? (only for OTAA)	<input type="checkbox"/> Yes (frequency): <input checked="" type="checkbox"/> No. Why? How to trigger a rejoin? See 1.21
2.18 Is the first join request sent on SF12?	<input type="checkbox"/> Yes. <input checked="" type="checkbox"/> No, why: Explain the JoinRequest sequence if no JoinAccept is received - data rate, timing and power back-off algorithm. It will be retransmitted on a new random frequency channel if no join accept is received. The maximum number of retries is fixed to 12. The first transmission happens with SF7. Each data rate will be used twice and will be lowered after that.
2.19 On what SF and power setting is the first uplink (after join procedure) done?	<p>SF: 7 TXPower: +14 dBm</p>
2.20 Are you doing periodically reset of Uplink frame counter?	<input type="checkbox"/> Yes (frequency/why): <input checked="" type="checkbox"/> No.

2.21 If LoRaWAN 1.0.x, DevNonce behaviour :	<input checked="" type="checkbox"/> Based on a random value <input type="checkbox"/> Monotonically increasing never-wrapping counter
2.22 Uplink DataRate (0-7 supported)	Min: 0 Max: 7
2.23 RX1 Data Rate Offset	<input checked="" type="checkbox"/> Default LoRaWAN in regards of ISM band <input type="checkbox"/> Other:
2.24 RX1 Delay	<input checked="" type="checkbox"/> Default LoRaWAN in regards of ISM band <input type="checkbox"/> Other:
2.25 RX2 Data Rate	<input checked="" type="checkbox"/> Default LoRaWAN in regards of ISM band <input type="checkbox"/> Other:
2.26 RX2 Frequency	<input checked="" type="checkbox"/> Default LoRaWAN in regards of ISM band <input type="checkbox"/> Other:
2.27 RX1 Delay on JoinRequest (OTAA devices only)	<input checked="" type="checkbox"/> Default LoRaWAN in regards of ISM band <input type="checkbox"/> Other:
2.28 Mobility Profile (how your device moves)	<input checked="" type="checkbox"/> Near static <input type="checkbox"/> Walking speed <input type="checkbox"/> Vehicle speed <input type="checkbox"/> Random
2.29 Frame Counters Up To 32-bits	<input checked="" type="checkbox"/> Frame counter-up <input checked="" type="checkbox"/> Frame counter-down
2.30 Which MAC commands does the device support	<input checked="" type="checkbox"/> LinkCheckReq / LinkCheckAns <input checked="" type="checkbox"/> TXParamSetupReq / TXParamSetupAns <input checked="" type="checkbox"/> LinkADRRReq / LinkADRAns <input checked="" type="checkbox"/> DutyCycleReq / DutyCycleAns <input checked="" type="checkbox"/> RXParamSetupReq / RXParamSetupAns <input checked="" type="checkbox"/> DevStatusReq / DevStatusAns <input checked="" type="checkbox"/> NewChannelReq / NewChannelAns <input checked="" type="checkbox"/> TXTimingSetupReq / TXTimingSetupAns
2.31 LoRaWAN Stack Type (optional)	<input type="checkbox"/> Semtech/Stackforce <input type="checkbox"/> Semtech/Stackforce with modifications <input type="checkbox"/> IBM <input type="checkbox"/> IBM with modifications <input checked="" type="checkbox"/> Proprietary- Other, name it:
2.32 LoRaWAN Stack Version (optional)	
2.33 LoRa Radio Hardware (optional)	<input type="checkbox"/> Proprietary: <input type="checkbox"/> LoRaWAN Modem/Module:

2.34 Multicast support (optional)	<input type="checkbox"/> Yes: Multicast DevAddr: Multicast AppSKey: Multicast NwkSKey: Payload: Port: <input checked="" type="checkbox"/> No.
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3 Radio Frequency Information

3.1 Type of Antenna	<input type="checkbox"/> Wire <input checked="" type="checkbox"/> PCB <input type="checkbox"/> External <input type="checkbox"/> Other: (which type)
3.2 Antenna gain [dBi or dBd]	1.5 dBi or dBd
3.3 Did you measure and take into account the loss between the modem and the antenna?	<input checked="" type="checkbox"/> Yes, dB loss <input type="checkbox"/> No, why:
3.4 For LW 1.0.2 rev A or older devices: which TXPower setting should be used on the network for your device*:	<input type="checkbox"/> TXPower 0 (20dBm) <input type="checkbox"/> TXPower 1 (14dBm) <input type="checkbox"/> TXPower 2 (11dBm) <input type="checkbox"/> TXPower 3 (8dBm) <input type="checkbox"/> TXPower 4 (5dBm) <input type="checkbox"/> TXPower 5 (2dBm) <input type="checkbox"/> other txpower (dBm)
3.5 Did you calibrate your device with the antenna gain and measured loss in between the chipset and antenna? This so that your device emits with maximal power when using TXPower 1 for LW 1.0.2 rev A or older devices (= 14dBm) and TXPower 0 for LW 1.0.2 rev B or newer devices (= MaxEIRP or 16.15dBm EIRP)*.	<input checked="" type="checkbox"/> Yes, dB loss <input type="checkbox"/> No, why:

4 Battery and TX Power Information

Please indicate if you do not want Section 4 displayed on the LoRa Alliance Website Yes
 If yes please supply contact details for the operators to request the information for Section 4

<p>4.1 Battery consumption of the device (including modem, sensors and all other electronics)</p>	<p>TX current: 35 mA RX current: 13 - 20 mA Idle time current: 3 µA (RTC on)</p>																																				
<p>4.2 Estimated battery life in years based on the number of transmissions (including sensor readings) at SF7, SF10 & SF12 with your battery self-discharge and aging over time taken into account.</p> <p>Assumptions: - Product shelf life before use: Maximum 1 year. - At an environment temperature of 20°C.</p> <p>- LoRaWAN specification used for battery life calculation:</p> <p>- TX power setting (txpower) used for battery life calculation:</p> <p>- Payload size used for battery life calculation (should be average payload size of production device):</p> <p>- Additional assumptions or comments on battery life (Typical usage)</p>	<table border="1"> <thead> <tr> <th colspan="4">Battery life in years</th> </tr> <tr> <th>Transmission Periodicity (transmissions/day)</th> <th>SF7</th> <th>SF10</th> <th>SF12</th> </tr> </thead> <tbody> <tr> <td>144</td> <td></td> <td></td> <td></td> </tr> <tr> <td>96</td> <td></td> <td></td> <td></td> </tr> <tr> <td>48</td> <td></td> <td></td> <td></td> </tr> <tr> <td>24</td> <td></td> <td></td> <td></td> </tr> <tr> <td>12</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><input type="checkbox"/> LW1.0.1 <input type="checkbox"/> LW1.0.2 revA <input checked="" type="checkbox"/> LW1.0.2 revB <input type="checkbox"/> Other :</p> <p><input type="checkbox"/> LW1.0.1 <input type="checkbox"/> LW1.0.2 revA <input checked="" type="checkbox"/> LW1.0.2 revB <input type="checkbox"/> Other :</p> <p>50 bytes</p> <p>WMBus-Range-Extender_AN028_PowerConsumption_V1_0.pdf</p>	Battery life in years				Transmission Periodicity (transmissions/day)	SF7	SF10	SF12	144				96				48				24				12				4				1			
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144																																					
96																																					
48																																					
24																																					
12																																					
4																																					
1																																					

<p>4.3 Which TX power setting (TXPower) was used in the RF test?</p> <p>- If LW 1.0.2 rev A or older device:</p> <p>- If LW 1.0.2 rev B or newer device:</p>	<p><input type="checkbox"/> TXPower 0 (20dBm)</p> <p><input type="checkbox"/> TXPower 1 (14dBm)</p> <p><input type="checkbox"/> TXPower 2 (11dBm)</p> <p><input type="checkbox"/> TXPower 3 (8dBm)</p> <p><input type="checkbox"/> TXPower 4 (5dBm)</p> <p><input type="checkbox"/> TXPower 5 (2dBm)</p> <p><input type="checkbox"/> other TXPower (dBm)</p> <p><input checked="" type="checkbox"/> TXPower 0 (MaxEIRP)</p> <p><input type="checkbox"/> TXPower 1 (MaxEIRP-2dB)</p> <p><input type="checkbox"/> TXPower 2 (MaxEIRP-4dB)</p> <p><input type="checkbox"/> TXPower 3 (MaxEIRP-6dB)</p> <p><input type="checkbox"/> TXPower 4 (MaxEIRP-8dB)</p> <p><input type="checkbox"/> TXPower 5 (MaxEIRP-10dB)</p> <p><input type="checkbox"/> TXPower 6 (MaxEIRP-12dB)</p> <p><input type="checkbox"/> TXPower 7 (MaxEIRP-14dB)</p> <p><input type="checkbox"/> other TXPower (MaxEIRP-14 dBm)</p>
<p>4.4 Is this the same TX power setting (TXPower) used by default in production devices (before network ADR)?</p>	<p><input checked="" type="checkbox"/> Yes,</p> <p><input type="checkbox"/> No, why:</p>
<p>4.5 Maximum ERP measured: (ERP = EIRP - 2.15 dB; LoRaWAN allows 14 dBm ERP)</p>	<p>12 dBm</p>
<p>4.6 TRP measured: (TRP is based on EIRP) This gives an idea about the directivity of the antenna.</p>	<p>11.6 dBm</p>
<p>3.10 TIS measured on RX1:</p>	<p>For RX1-SF12BW125 on 868.3MHz -138.6 dBm</p>
<p>3.11 TIS measured on RX2</p>	<p>For RX2-SF12BW125 on 869.525 MHz: -138.3 dBm</p>