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Operation manual

APULSE-W x1F5

IoT data logger for
Smart Water Metering

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LoRa Alliance Member

APULSE-W x1F5
OPERATION MANUAL

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DISCLAIMER

Thank you for choosing APULSE-W x1F5. Please take a few minutes to read and become familiar with the advantages of our device. Failure to follow the instruction or any modifications/alternations in the operations described in this instruction may void the warranty. If the operating and installation instructions describe different models of APULSE-W, any differences will be pointed out at the relevant points in the text.

Before the first use check that there is no visible damage to the device. Do not operate the device if it is damaged. Should you have any problems, please contact customer service. Read and follow the operating and installation instructions and all other information enclosed with this document. Retain the document for subsequent use or for subsequent owners.

SAFETY INSTRUCTIONS

The following safety information and warnings are provided to protect you from injury and to prevent material damage to your surroundings. It is nevertheless important to take the necessary precautions and to proceed with the necessary care when installing, maintaining, cleaning and operating the device.

- Keep the device away from fire, extreme temperatures and chemicals.
- Do not use harsh chemicals, cleaning solvents or strong detergents to clean the device.
- Never rub the enclosure surface of APULSE-W x1F5 using a dry cloth because of the danger of electrostatic discharge.
- The installation of the product should follow the manufacturer's instructions and should use mounting accessory recommended by the manufacturer.
- When replacement parts are required, make sure that only replacement parts specified by the manufacturer are used.
- Every item removed from the multi-pack must be properly secured (e.g. with bubble wrap) for further transport.
- Scraping, rubbing or dropping the device may result in its damage.
- Any abnormal functioning of the device should be reported to the manufacturer.

ENVIRONMENTAL PROTECTION

- Do not throw away the device with the normal household waste at the end of its life, but hand it in at an official collection point for recycling. By doing this you help to preserve the environment (Fig. 1).
- Always remove the battery before you discard or hand in the device at an official collection point. Dispose of the battery at an official collection point for batteries (Fig.2).

Fig. 1   Fig. 2

MANUFACTURER

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GENERAL INFORMATION

APULSE-W x1F5 are autonomous, battery powered IoT data loggers that can be installed on various AMR-ready water meters and register consumption profile as well as magnet and tamper detection. The devices transmit the received data via LoRa low power network. APULSE-W and water meter are inductively coupled what prevents from magnetic fraud. APULSE-W is suitable for fixed and walk-by readout. The systems can operate simultaneously for maximum convenience and gradual implementation of further investments.

FIND THE RIGHT APULSE-W FOR YOUR WATER METER
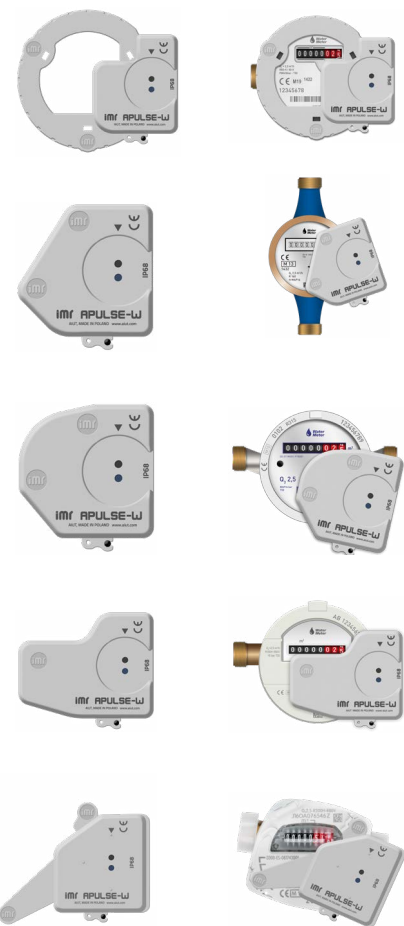
APULSE-W D1F5-xxxx | DIEHL

Supported water meters
- Altair V4, Altair V3, Aquarius V3, Aquila V3, Aquila V4, Wesan WPVG, Wesan WP G

APULSE-W B1F5-1xxx | BAYLAN

Supported water meters
- K K-1, K K-12, K K-13, K K-14, K K-16, KK-17, TK-2, TK-3, TK-26, VK-6, VK-10, VK-11

APULSE-W S1F5-1xxx | SENSUS

Supported water meters
- 120, 120C, 405S, 420, 420PC, 620, 620C, 820

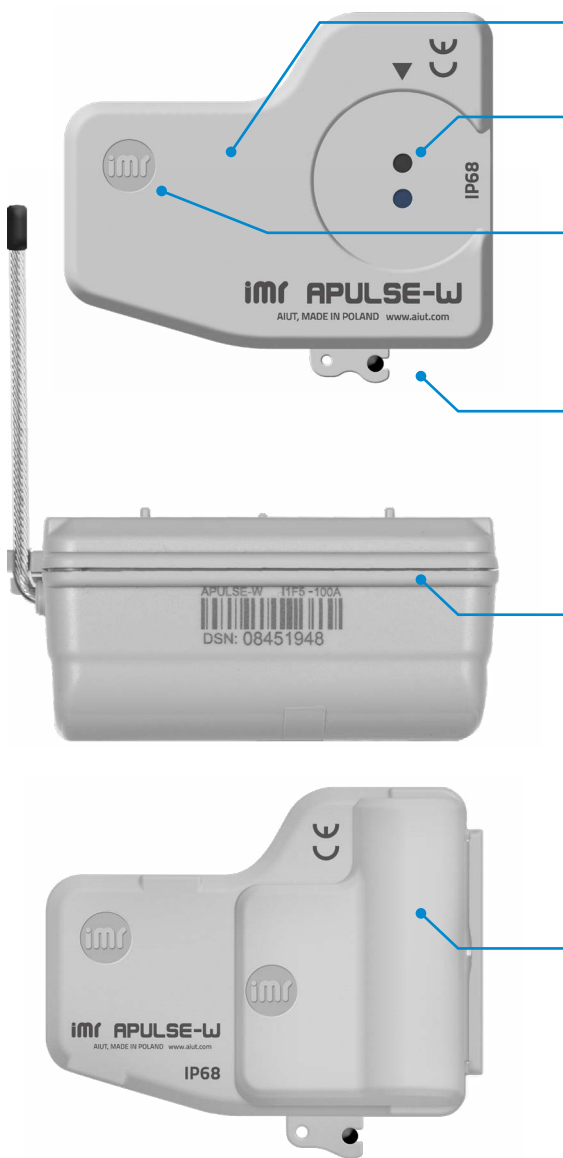### APULSE-W I1F5-xxxx | ITRON

Supported water meters
- Flodis, Aquadis+, Flostar, Woltex M, Unimag Cyble, MSD Cyble

APULSE-W E1F5-1xxx | ELSTER

Supported water meters
- S150, S220, V200, V200P,V210, V210P, C4000

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THE STRUCTURE OF THE DEVICE

SPACE FOR LOGO

Space available for logo allows flexible customization

OPTO PORT

For quick diagnostics and other service operations.

IMR SEAL(s)

Protection against tampering, unauthorized attempts of repairs or parts replacement

ANTENNA

Wired antenna or external SMA antenna

OVERPRINT/LABEL

order number and serial number of APULSE-W barcode (code 128)

BATTERY COMPARTMENT

For versions with replaceable battery

ORDER NUMBER

APULSE-W v1w5-xy**

v - device type

D - dedicated for Diehl water meters

B - dedicated for Baylan water meters

S - dedicated for Sensus water meters

 I - dedicated for Itron water meters

E - dedicated for Honeywell water meters

w - type of communication

F - transceiver 868/915MHz, protocol LoRa WAN/IMR

x - type of battery

1 - single, non-replaceable

2 - single, replaceable

5 - double, non-replaceable

y- hardware modifications

0 - whip antenna
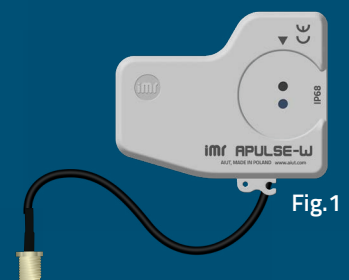
3 - external SMA antenna

   (Fig.1)

Fig.1

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TECHNICAL PARAMETERS

Low power radio communication	LoRa Transmission	unlicensed 868MHz band (EU868), hourly readouts, radio frames - twice a day (by default)
	IMR IoT	868MH, 25mW, range: 1000m (open space), radio frame - twice a day (scheduled) or on request, bidirectional communication after transmission (data archive, diagnostics, configuration)
	Walk-by readout	walk-by frames including 31 daily readouts by default
Events	Event transmission	LoRa and IMR IoT, wireless M-Bus protocol (walk-by readouts)
	Event types	device removal, external magnet, reverse/max/min/no flow, low battery
HMI interface	Opto port	local on-line set-up, configuration & diagnostics
	SITA mobile application	readouts, configuration & device installation, convenient walk-by readouts, current & archive consumption data
Power supply	Type of battery	single/double, non-replaceable/replaceable* LiSOCl$_2$ battery AA Saft LS14500, 3.6 V, 2600 mAh *depending on product specification, see Order number for details
	Battery lifetime	over 10 years (depending on the device's target configuration, environmental conditions, and user interaction with the device.)
Environmental parameters	Operational temperature	-25°C to +55°C
	Ingress protection	IP 68
Dimensions h x w x d	APULSE-W D1F5-1xxx	36mm (109mm with antenna) x 87mm x 98mm
	APULSE-W D1F5-2xxx	60mm (109mm with antenna) x 87mm x 98mm
	APULSE-W B1F5-1xxx	39mm (108mm with antenna) x 65mm x 64mm
	APULSE-W S1F5-1xxx	35mm (108mm with antenna) x 68mm x 62mm
	APULSE-W I1F5-1xxx	35mm (108mm with antenna) x 78mm x 68mm
	APULSE-W I1F5-2xxx	56mm (109mm with antenna) x 78mm x 68mm
	APULSE-W E1F5-1xxx	35mm (108mm with antenna) x 95mm x 75mm

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INSTALLATION

The installation procedure is very intuitive and can be performed in a couple of minutes. You simply **fix APULSE-W to a water meter** with screw(s) and secure it with plastic seal(s). The whole procedure is supported by SITA - a mobile application that guides you step by step throughout the installation process and **registers the APULSE-W in selected location**.

NOTE The individual steps of the installation procedure may vary depending on the type of APULSE -W. Specify the type of your water meter and APULSE-W and follow the steps described on the following pages.

NOTE During the installation please make sure that **mechanical counter of water meter is clearly visible**.

NOTE In order to prevent from accidental removal of the plastic seal, please remember to **place the IMR seal below the rim.**

▬▬ SEALING SMA CONNECTOR WITH SELF-AMALGAMATING TAPE

For devices equipped with an external SMA antenna, the connector should be protected from moisture using self-amalgamating tape.

1. Make sure that the surface for applying is clean and dry (no dust, grease, oil, or petroleum-type solvent).

2. Wrap the tape around the object, stretching it to the point that its width reduces to about 2/3, and make 50% overlap.

3. When insulating the connector, start wrapping the tape approximately 2 cm before the connector and finish approximately 2 cm beyond it.

NOTE Depending on the ambient temperature, the layers will self-amalgamate within a few hours after the tape is applied.

MECHANICAL ASSEMBLY OF APULSE-W B1F5

Supported BAYLAN water meters

- Baylan KK-1*
- Baylan KK-12*
- Baylan KK-13
- Baylan KK-14*
- Baylan KK-16
- Baylan KK-17

- Baylan TK-2*
- Baylan TK-3
- Baylan TK-26*
- Baylan VK-6
- Baylan VK-10
- Baylan VK-11

*Water meters requiring anti-tampering plates

Necessary equipment

- APULSE-W B1F5
- 2 x IMR seal
- 2 x cheese head nylon screw
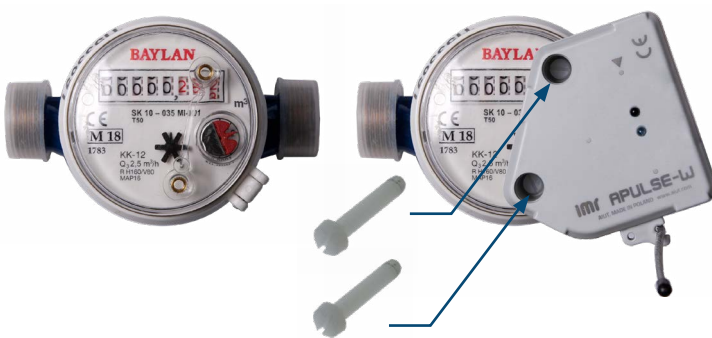- a flat-head screwdriver
- anti-tampering plate (optional)

STEP 1 I ATTACH THE PLATE (OPTIONAL)

If anti-tampering plate is required, mount it to the back of APULSE -W as presented in the picture beside.

STEP 2 I ATTACH APULSE-W TO WATER METER

Install APULSE-W on Baylan water meter with two plastic screws.

STEP 3 I SCREW APULSE-W

Secure APULSE-W with two plastic seals.

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MECHANICAL ASSEMBLY OF APULSE-W I1F5

Supported ITRON water meters

- Flodis DN: 15/20/25/32
- Aquadis+ DN: 15/20/25/32/40
- Flostar DN: 40/50/65/80/100/150
- Woltex M DN: 50-500
- Unimag Cyble – DN: 15/20
- Baylan KK-13
- Baylan VK 11

Necessary equipment

- APULSE-W I1F5
- 1 x IMR seal
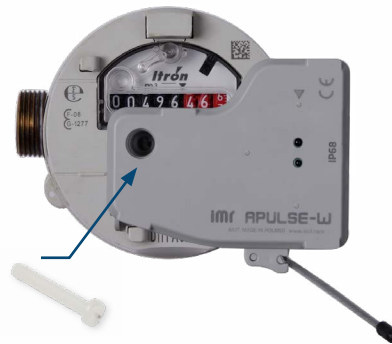- 1 x cheese head nylon screw
- a flat-head screwdriver

STEP 1 I REMOVE PLASTIG PLUG
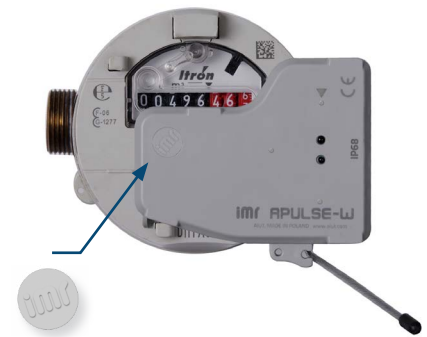
Remove the plastic plug located on the totalizer surface

Plastic plug

Removed plastic plug

Mounting brackets
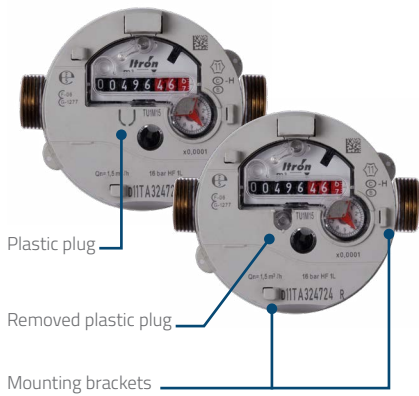
STEP 2 I FIX APULSE-W

Fix APULSE-W to the mounting brackets of water meter with a cheese head nylon screw

STEP 3 I SEAL APULSE-W

Seal APULSE-W with an IMR plastic seal

MECHANICAL ASSEMBLY OF APULSE-W E1F5

Supported ELSTER water meters

- Elster: S150, S220, V200, V200P, V210, V210P, C4000

Necessary equipment

- APULSE-W E1F5
- 2 x IMR seal
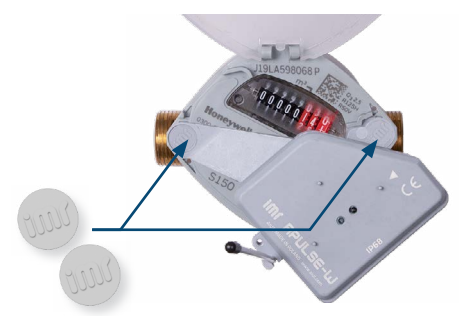- 2 x Philips head screw
- a Philips head screwdriver

STEP 1 I FIX APULSE-W

Attach APULSE-W to the mounting bracket of the water meter and fix it with two Philips head screws
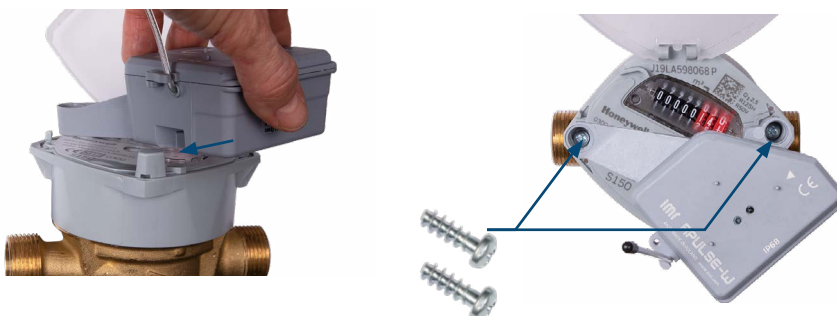
STEP 2 I SEAL APULSE-W

Seal APULSE-W with two IMR plastic seals

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MECHANICAL ASSEMBLY OF APULSE-W S1F5
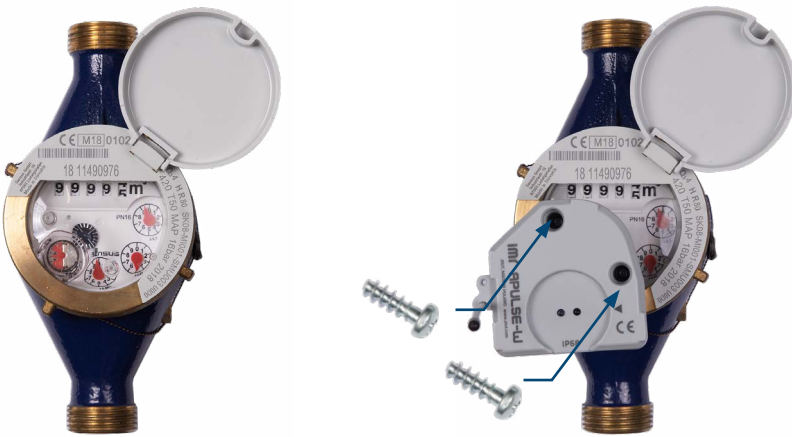
Supported SENSUS water meters

- Sensus: 120, 120C, 405S, 420, 420PC, 620, 620C, 820

Necessary equipment

- APULSE-W S1F5
- 2 x IMR seal
- 2 x Philips head screw
- a Philips head screwdriver

STEP 1 | FIX APULSE-W

Attach APULSE-W to the water meter and fix it with two Philips head screws

STEP 2 | SEAL APULSE-W

Seal APULSE-W with an IMR plastic seal

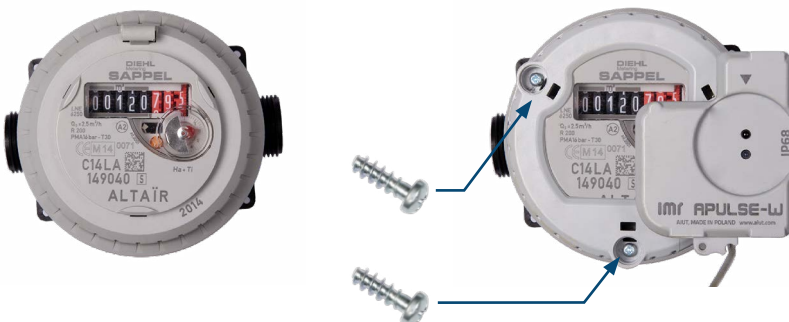## MECHANICAL ASSEMBLY OF APULSE-W D1F5

Supported DIEHL water meters

- Altair: V4, V3,
- Aquarius V3,
- Aquila: V3, V4,
- Wesan: WPVG, WP G

Necessary equipment

- APULSE-W D1F5
- 2 x IMR seal
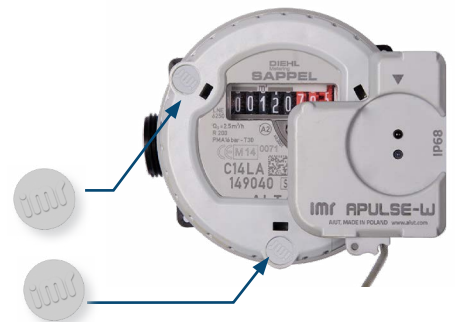- 2 x Philips head screw
- a Philips head screwdriver

STEP 1 | FIX APULSE-W

Attach APULSE-W to the water meter and fix it with two Philips head screws

STEP 2 | SEAL APULSE-W

Seal APULSE-W with two IMR plastic seals

APULSE-W INSTALLATION WITH SITA APPLICATION

Together with mechanical assembly of APULSE-W, the operation of its registration in the system must be performed. Such procedure is performed with SITA application, where the user fills the installation form and the gathered data are sent to the server.

1 | Log in to the application

2 | Press *New task*

If your location is not on the list press *Create new location* and follow the instructions displayed on the screen
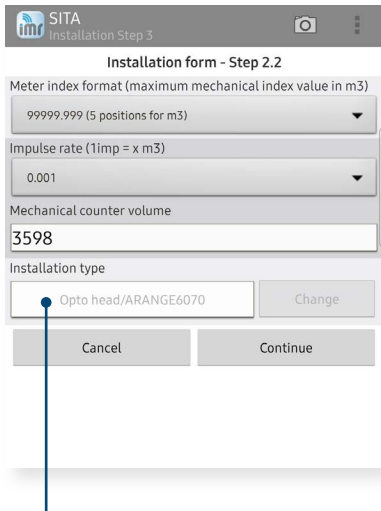
3 | Select the area and location

4 | Press *Installation*

5 | Enter or scan the serial number of APULSE-W

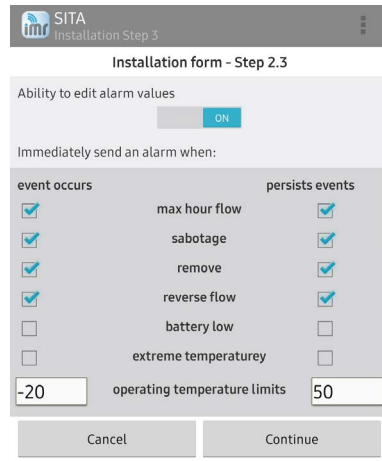### 6 | Enter the required parameters of the water meter

Continued

7 I Rewrite the mechanical volume from water meter

Choose the type of communication between APULSE-W and SITA. In this case it is ARANGE 6070.
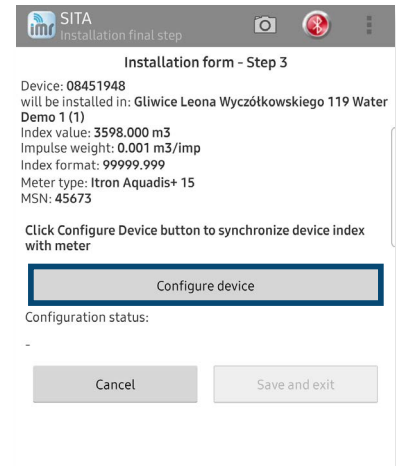
8 I Set alarm parameters

Event occurs - information is sent immediately to the system once the alarm occurs
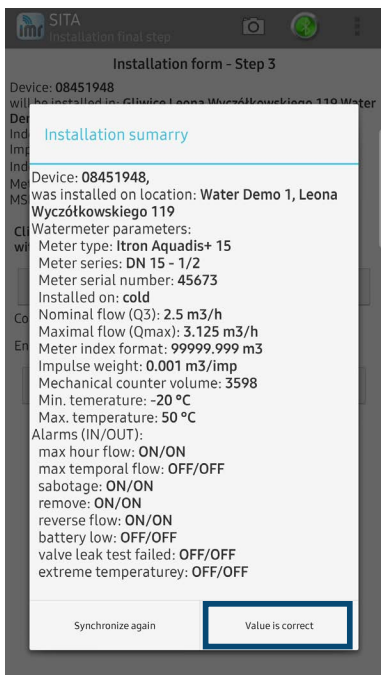**Persists events** - information about occurred alarm is included in data package sent periodically to the system
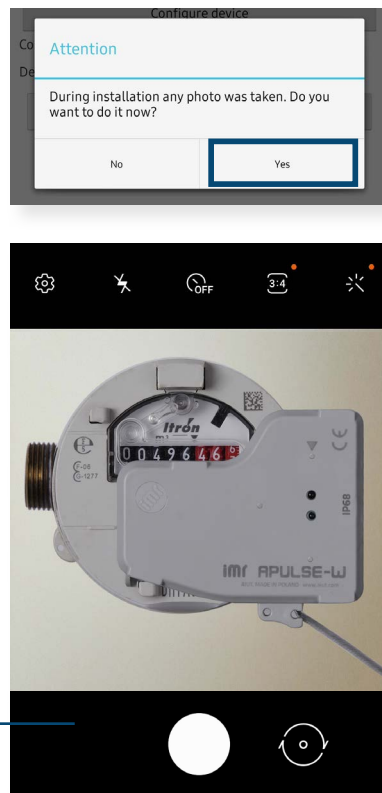
9 I Press *Configure device*

NOTE Please make sure that your ARANGE 6070 is turned on.

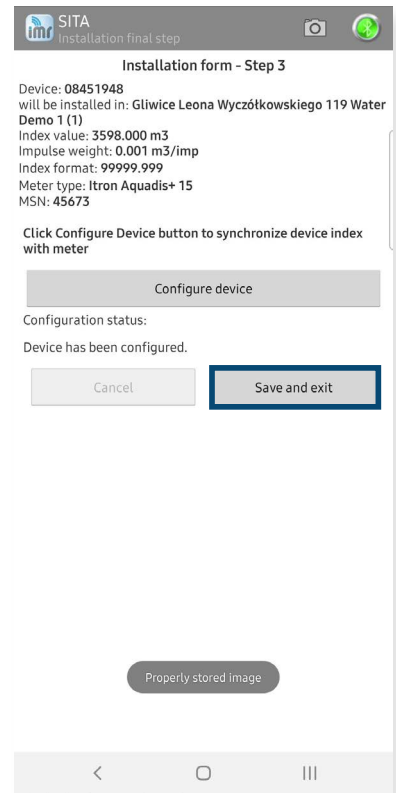## 10 I Check the data and confirm the installation summary

Make sure that the water meter readout is clearly visible

11 I Take a picture of the installed APULSE-W

12 I Press save and exit

FUNCTIONALITY

Congratulations! Your device is already installed and successfully registered in your location. From now on you can enjoy its full functionality. Here you can find information on data types received from your device, possible ways of data access and how to perform the walk-by readouts.

SCOPE OF DATA

The content of data packet sent by APULSE-W depends on configuration, while the frequency of data transfer is set in schedules. The information contained in the data packet sent by APULSE-W is listed below.

Daily readouts packet

- Battery level [%]
- Last registered status of the device [see table below]
- The volume differences between the subsequent periods [e.g. every hour]
- Total volume differences registered in the last period [e.g. last day]
- End timestamp of the period
- Total volume registered in the end of the last period [e.g. last day]
- Water meter pulse rate

Device status from the period

- Exceeded maximum allowed hourly flow
- Exceeded maximum allowed instantaneous flow
- Magnet tamper detection
- Device removal from the meter
- Reverse flow has been detected
- Opto port has been activated
- Physical failure of inductive sensor
- Exceeded maximum/minimum allowed temperature
- Significant change in device clock
- Change in volume counter
- Device has been installed/dismounted
- Error of time module
- Access error to device memory
- Counter error
- Continuous flow registered in the last 24 hours - possibility of leakage

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DATA ACCESS & CONFIGURATION

Data received from APULSE-W can be acquired by IMR Server - a high performance, multiprotocol data collection system that enables data presentation on the web application, supervise on-site installations, device handling and daily system maintenance.

SITA is an application dedicated for mobile devices (smart phone, tablet) with Android and iOS that supports on-site procedures such as installation and configuration of IMR data loggers. The communication between SITA and APULSE-W is performed using ARANGE 6070 that is connected by Bluetooth to collector's terminal (notebook, Android device) where SITA application is installed.

- Remote readout collection from APULSE-W installed on site
- Intuitive installation of APULSE-W, easy data synchronisation and configuration
- User-friendly interface for flawless operation and easy diagnostics
- Highest security standards

SIMAX is a web based comprehensive application designed to visualize the measurement and diagnostic data. It enables to efficiently organize the data and gives you access to a wide variety of management tools such as: management of locations and assigned devices or on-line access to acquired data.

- Visualisation of readout, diagnostic and configuration data in form of graphs and tables
- Locations displayed on the map
- Planning, supporting and assessing on-site operations
- Alarms & configuration management
- Data export to common files
- Reporting including billing reports
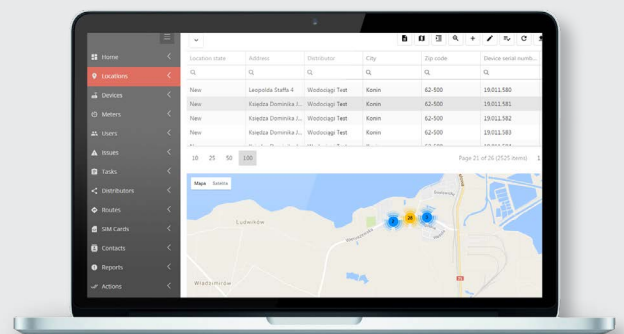
WALK-BY READINGS WITH SITA APPLICATION

Walk-by reading is a highly efficient radio data acquisition system that enables to get exact consumption data without the need of entering consumer's premises. As collector moves around the area with installed APULSE-W devices, acquired readings are streamed on-line to back-office server. The readout progress is presented on a smartphone screen with installed SITA application indicating which sites remain to be covered by the collector. If there is no Internet connection in the area, the data are gathered in the internal database and transferred to the default system once any Internet connection is active.

Necessary equipment:

- APULSE-W installed in location and registered in the system
- SITA application installed on your smartphone
- Turned on ARANGE 6070 paired with your SITA application

Before starting the readouts find the most appropriate reading position and prepare the tools:

1 I Stand at a distance so that you can see the whole object while your head is slightly raised (usually approximately 50-80 meters from the building with up to 12 floors).

2 I Stay in visual contact with uncovered parts of the building where telemetric devices are installed.

3 I Make sure that there are no visible obstacles between you and the building (e.g. trees, bushes, other buildings)

4 I Turn ARANGE 6070 on. Make sure that your ARANGE is paired with SITA.

5 I Start SITA application on your smartphone or tablet.

Click or scan the QR code to see how to perform the walk-by reading with SITA application