

Operating Manual

Universal induction module IN-LWAN



ISO 9001

ISO 27001

ISO 14001

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1. Application

The IN-LWAN is a universal RF (radio frequency) communication module enabling remote reading of water meters made by Apator Powogaz S.A. The IN-LWAN counts the revolutions of a dedicated inductive pointer of the water meter and outputs data via an ISM 868 MHz RF transmitter interface. The dedicated inductive pointer revolutions are detected with an induction scanning module.

Table 1 Product compatibility chart

Water meter type / name	Q ₃ [m ³ /h] or DN [mm]	Rotation weight [dm ³ /rev.]	Temperature class
JS Smart D+	Q ₃ 1,6÷4	1	T50/T90
JS Smart C+	Q ₃ 1,6÷4	1	T50/T90
JS Smart +	Q ₃ 1,6÷4	1	T50/T90
JS Master D+	Q ₃ 6,3÷16	1	T50
JS Master C+	Q ₃ 6,3÷16	1	T50
JS Master +	Q ₃ 6,3÷16	1	T50/T130
JS Impero	Q ₃ 50÷100	10	T50
MWN Nubis	DN 40÷125	10	T50/T130
MWN Nubis	DN 150÷400	100	T50
MWN Nubis	DN 150÷300	100	T130
MK	DN 50÷100	10	T50
MK	DN 150	100	T50
MWN/JS-S	DN50÷150	Use the rotation weight assigned to the component water meters	T30/ T50
WI	DN 40÷250	100	T30 / T50

2. Overview

IN-LWAN is a battery-powered electronic device designed as part of a remote water meter reading system (AMR – Automatic Meter Reading).

The IN-LWAN scans the dedicated inductive pointer of the connected water meter by detecting the revolutions and their sense with an induction circuit. This solution enables remote transmission of the actual water meter register reading and information about events occurring at measurement points via a radio interface in the ISM 868 MHz band, in accordance with LoRaWAN technology and the Wireless M-Bus protocol, which allows for broad analysis and diagnostics of their operation.

The device has been designed to operate in harsh environmental conditions, such as water meter pits, basements, etc. Thanks to the inductive water meter reading interface and the high IP68-rated enclosure, it can also operate in high humidity and in the presence of water in the water meter pit. A version of the IN-LWAN ANT3 device with an extended antenna cable (3 m cable as standard) is also available, designed for installation in locations such as deep and flooded water meter chambers and other particularly challenging sites.

The main component of the IN-LWAN universal radio overlay is the radio module, which consists of electronic components, a battery and an antenna, normally housed inside the casing. Additionally, the device is equipped with an NFC (Near Field Communication) interface compatible with ISO 15693 and ISO 18000-3 mode.

Events detected and recorded by the device:

- minimum flow – detection of the volumetric flow rate of water through the water meter falling below a specified value, occurring for longer than a set time,
- maximum flow – detection of a volumetric water flow rate through the water meter exceeding a specified value, occurring for longer than a set time,
- backflow – detection of backflow exceeding a specified backflow volume threshold,
- leak – detection of continuous water flow through the water meter lasting longer than a set time,
- no change in measurement – detection of a complete lack of flow, or very slight increases in volume, lasting longer than a set time,
- magnetic field detection – detection of a strong external magnetic field,
- device disconnection – detection of the cap being removed from the water meter,
- battery consumption threshold exceeded – detection of the battery charge level falling below a user-defined value,
- exceeding the device's operating temperature range – detection of the device temperature falling below -15°C or rising above 60°C,
- device access error – detection of more than 30 failed attempts to communicate with the cap via the radio interface (resulting from errors such as an incorrect encryption key, or an incorrectly addressed or malformed message),
- reading error – detection of damage to the measuring module.

Note: After re-fitting the overlay onto the water meter, the event must be cleared and the correct value of the current water meter reading must be saved to the overlay's memory (re-installation of the device).

Note: The event may also be generated by incorrect operation of the cover – for example, when the cover, not installed on the water meter, is stored or transported in operating mode instead of storage mode.

3. Key components of the IN-LWAN for installation on water meters with an IP65/IP68 protection ring

- Transmission module – the device's main module responsible for communication
- Intermediate ring – a ring enabling the correct positioning and installation of the cover on various types of water meters manufactured by Apator Powogaz. In the IP68 water meter version, the ring is not used, as its role is taken over by a special counter cover with a #UTIP (Universal TI Plug)
- Locking ring* – a ring included only in the IP65-rated water meter kit with the overlay
- Cover – a protective cover for the water meter counter
- Ring lock – a pin permanently securing the module to the counter cover

Table 2. Key components of the IN-LWAN cover, enabling installation on water meters with an IP65/68 protection rating.

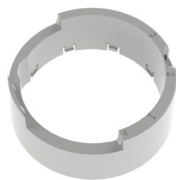
Radio induction module IN-LWAN with INTERNAL antenna	Radio induction module IN-LWAN ANT3 with EXTERNAL antenna L = 3 m
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IN-LWAN and IN-LWAN ANT3 accessories

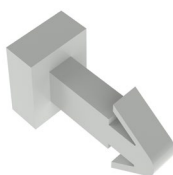
Each set of induction covers includes the accessories listed below, which enable installation on an IP65/IP68 water meter:

IP65

		
Cover 33-3160-000004	Intermediate ring 33-3160-000001	Locking ring* 33-3160-000007

* The locking ring (33-3160-000007) is used in the assembly of domestic water meters (excluding the JS Smart D+) and in the domestic JS Master +/C+/D+ models.

IP68

	
NA-1 cover 33-5003-110016	Ring lock 33-5003-110007

4. Technical data

Table 3. Technical specifications of the IN-LWAN cover.

Module	IN-LWAN	IN-LWAN ANT3
Antenna	Internal (standard version)	External antenna line L = 3m
Installation method	Intermediate ring attached to the water meter	
Pulse counting method	Inductive resonance module	
Power supply	3V DC AA lithium battery	
Battery life	12 years of operation + 1 years in warehouse mode with a temperature profile:	

	10% of operating time at 10°C, 80% of operating time at 20°C, 10% of operating time at 30°C 10% of operating time at 30°C
Operating temperature	-15°C to 60°C
Ingress protection rating	IP68
Transmission type	LoRaWAN frames with confirmation – communication with the LoRa gateway (joining the network, connection quality diagnosis) LoRaWAN frames without confirmation – regular readout transmissions WMBus frames – communication in fallback mode
Transmission interval	LoRaWAN every 7h
	wMBUS every 10s
Protocol	LoRaWAN Standard 1.0.4, Wireless M-Bus C1 mode
Transmission frequency	EU 868 MHz
Transmit power output	<=25 mW
Receiver sensitivity	-130dBm
Outdoor range	LoRaWAN: up to 5000m wMBUS: up to 800m (Depending on the actual surroundings)
Weight	0,138 kg

4.1 Dimensions of the module separated and installed on a water meter

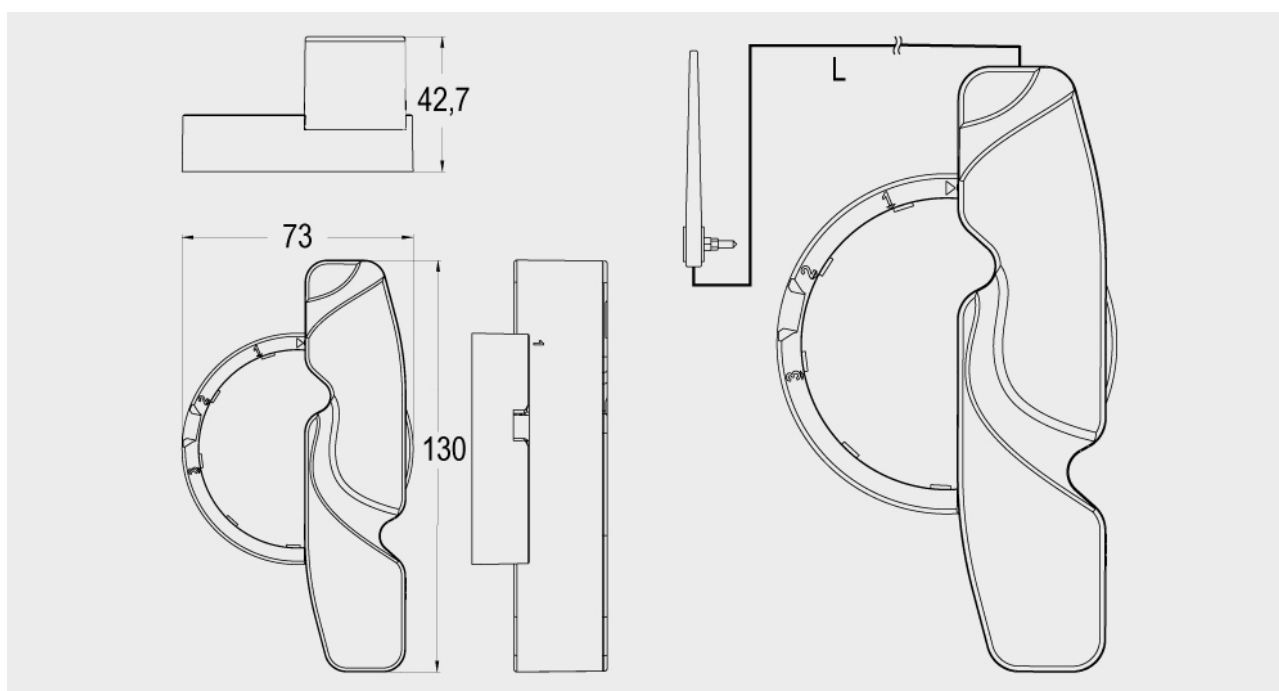


Fig. 1. Module overall dimensions.

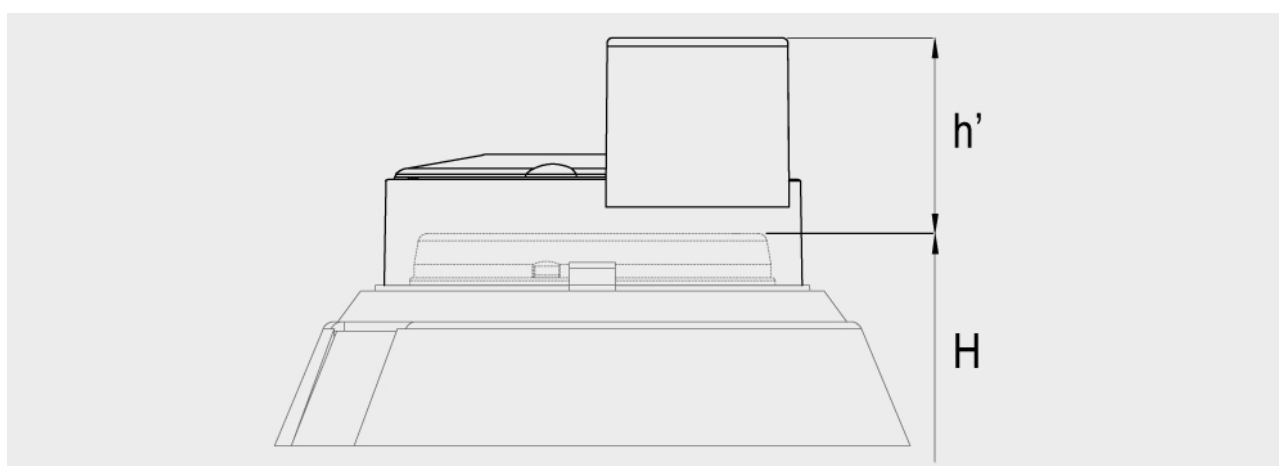


Fig. 1. Water meter height with the module installed.

Table 2. Dimensions of modules installed on water meters.

Water meter type	Water meter + module height $H + h'$ [mm]
Apartment WMs: JS / (T50 or T90; DN15 or DN20)	$H^* + 32,2$
Domestic WMs: JS / (T50 or T130; DN25÷DN40)	$H^* + 35,0$
Industrial WMs: MWN and MP (T50 or T130), JS, MK, WI (T50); (DN per assigned sizes)	$H^* + 34,8$

* The H values are specified in the product data sheets available at www.apator.com.

5. Installation of the IN-LWAN universal cover on Apator Powogaz water meters

5.1 Information required for installation

Before installing the cover, you must:

- Remove the cover from the water meter, if fitted.
- Clean any dirt from the upper surface of the counting mechanism cover (especially the ring recess) and the base of the radio module, which will be located directly above the induction pointer after installation.

Note! Do not use chemical solvents; use only detergents diluted in water.

A water meter with a universal radio attachment should be installed near the water supply system (steel or copper pipes, water meters, transmission devices, etc.) or the electrical system, maintaining the distances specified in Fig. 3.

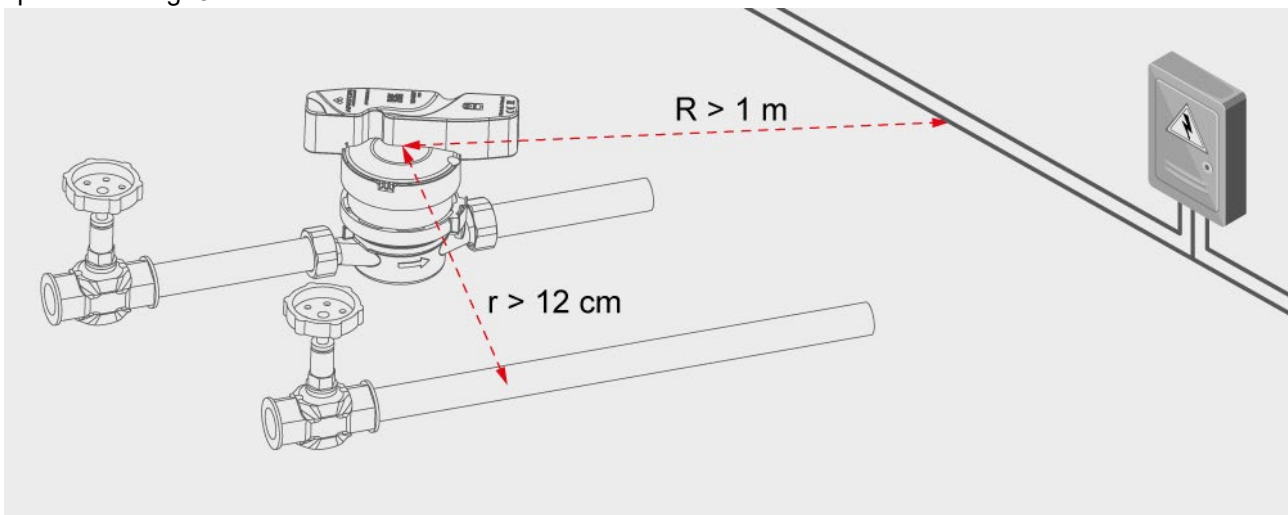


Fig. 3. Recommended installation distances for water meters with a cover from water and electrical installations.

5.2 Installation on JS Smart series domestic water meters (DN15 or DN20; T50 or T90) in IP65/IP68 versions

5.2.1 Positioning and securing the intermediate ring on the counter assembly and checking that it is correctly fitted

1. First, position the intermediate ring against the meter casing as shown in the diagram below, so as to identify which of the intermediate ring's tabs fit into the grooves on the water meter glass.

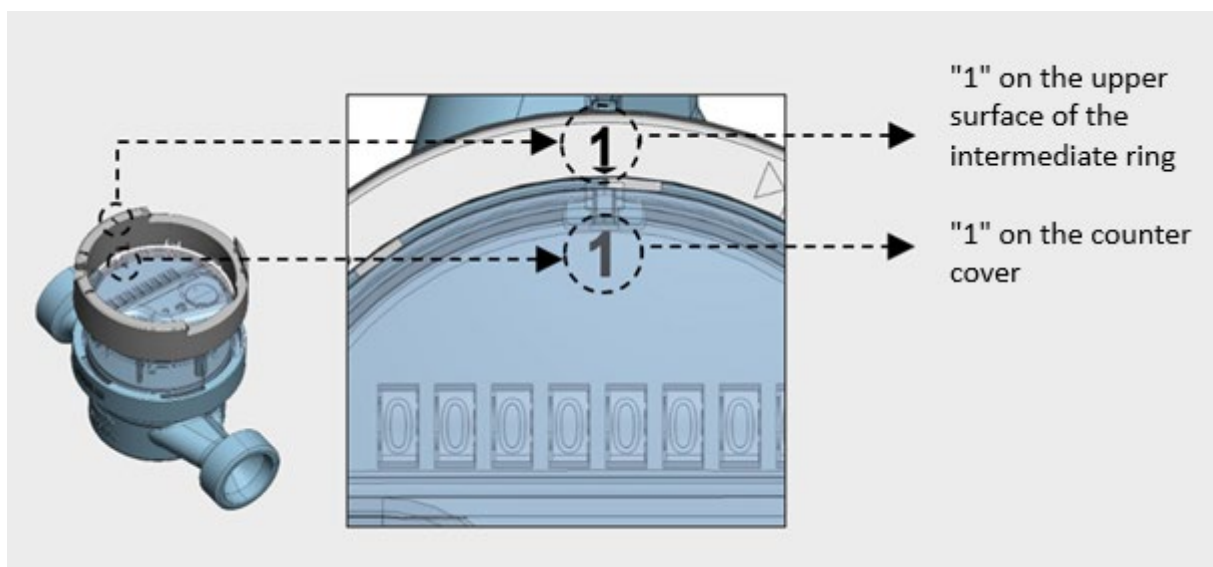


Fig. 4. A view showing the correct positioning of the intermediate ring in relation to the abacus glass.

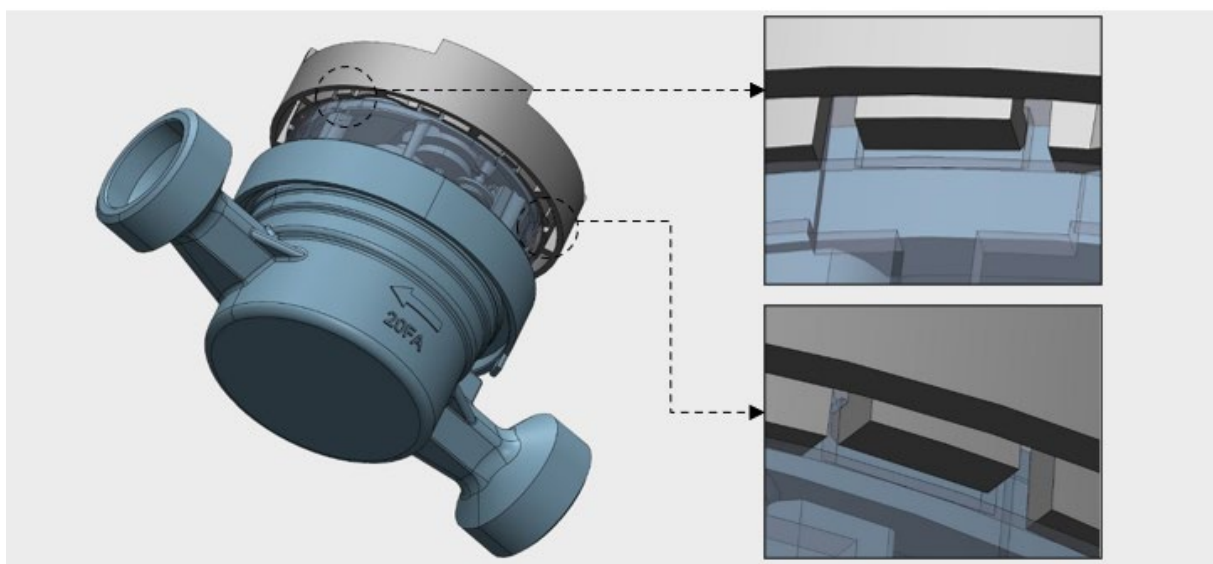


Fig. 5. A view of two of the three active latches on the intermediate ring; these are the points where the raised sections of the locking ring must be inserted.

2. Fitting the locking ring* onto the intermediate ring.

Note! *The locking ring (33-3160-000007) is included in the kit for domestic water meters (excluding the JS Smart D+)

When mounting the locking ring on the intermediate ring, particular attention must be paid to positioning the locking ring so that its visible ridges/protrusions fit into the recesses of the intermediate ring where the ring's locking tabs are located, with their corresponding sockets on the JS Smart water meter counter cover; see Fig. 5.

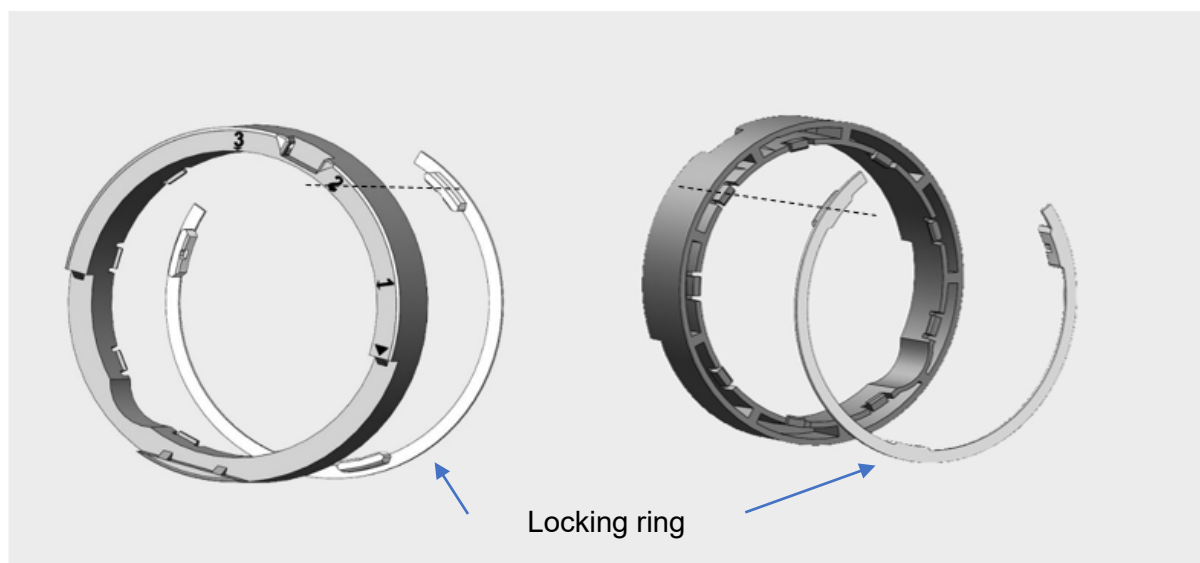


Fig. 6. Positioning of the locking ring relative to the intermediate ring.

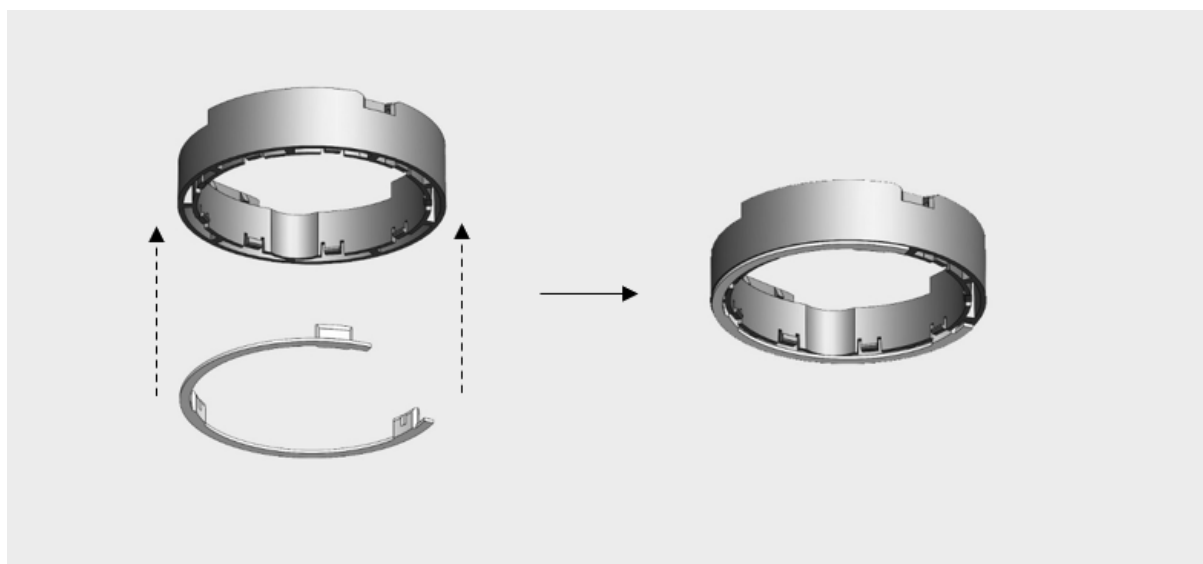


Fig. 7. Fitting the locking ring onto the intermediate ring.

3. When fitting the pre-assembled intermediate ring and locking ring assembly onto the counter cover, start by aligning the '1' on the intermediate ring with the '1' on the counter cover, as shown in Fig. 8.

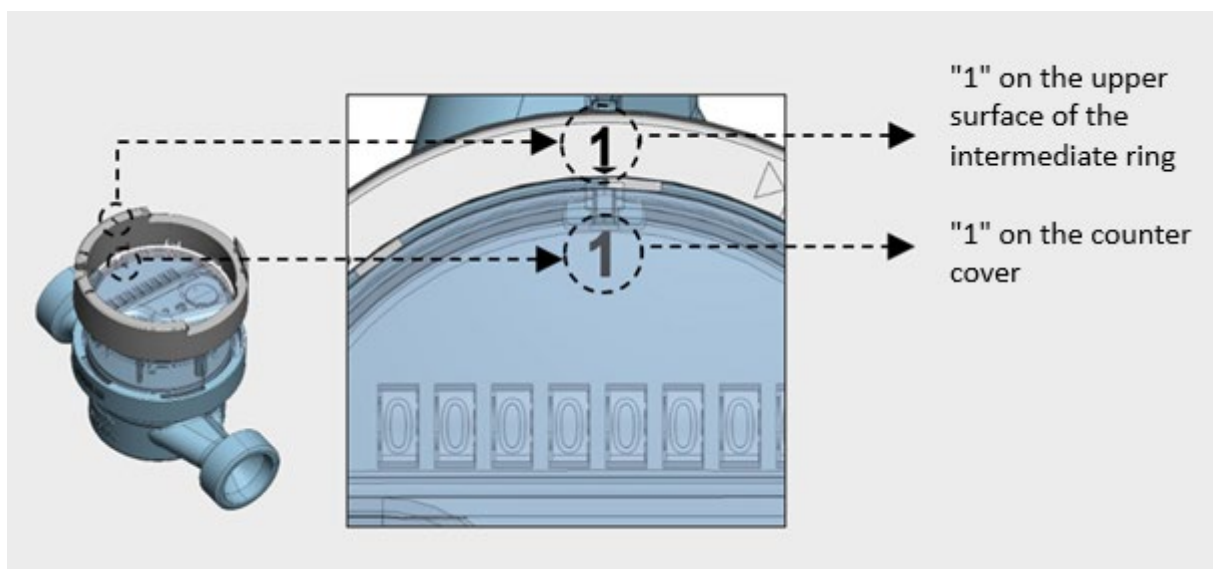


Fig. 8. Fitting the intermediate ring with a cover onto the water meter dial.

4. Align the positioning of the intermediate ring's fasteners with the layout of the snap-fit holes on the cylindrical part of the water meter's counter housing.

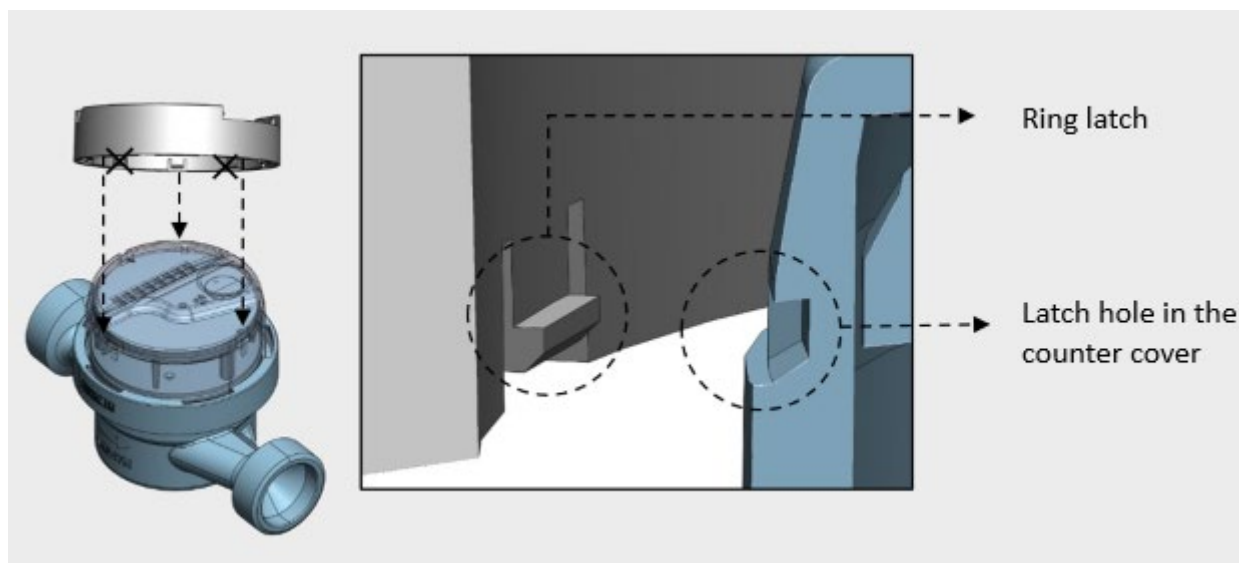


Fig. 9. The positioning of the intermediate ring's lugs on the cylindrical part of the water meter's counter.

5. Press the intermediate ring firmly against the water meter dial cover with both hands until you hear a distinct 'click'.

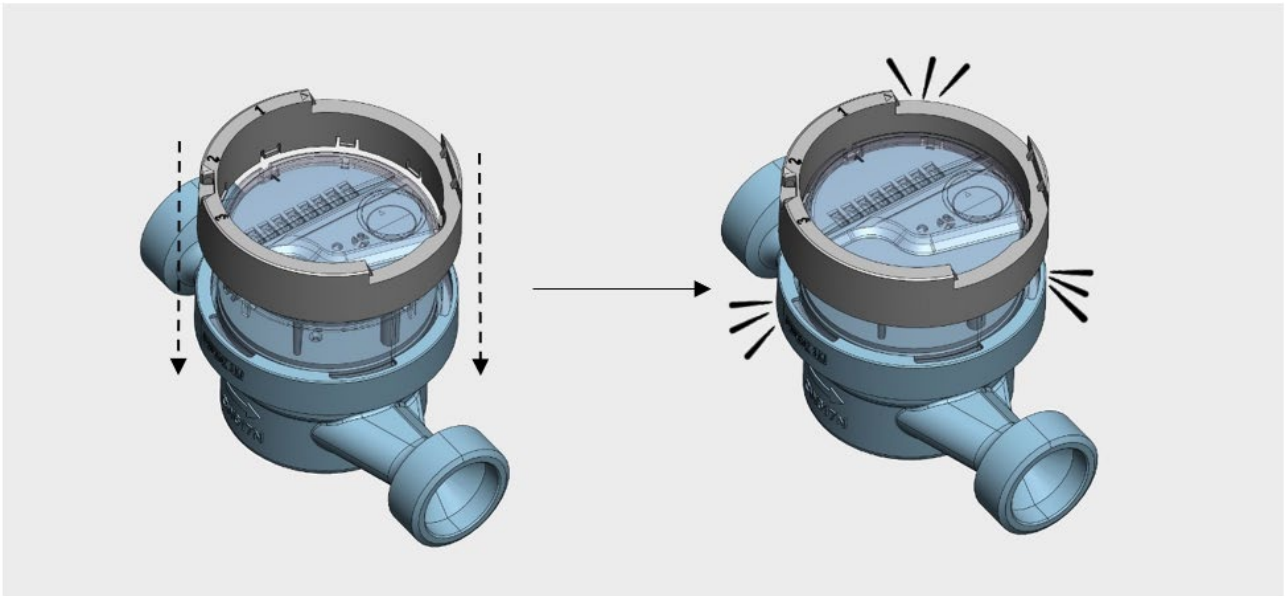


Fig. 10. Pressing the intermediate ring onto the cylindrical part of the water meter's counter.

6. Check that the spacer ring is securely fitted by attempting to remove it without applying force.

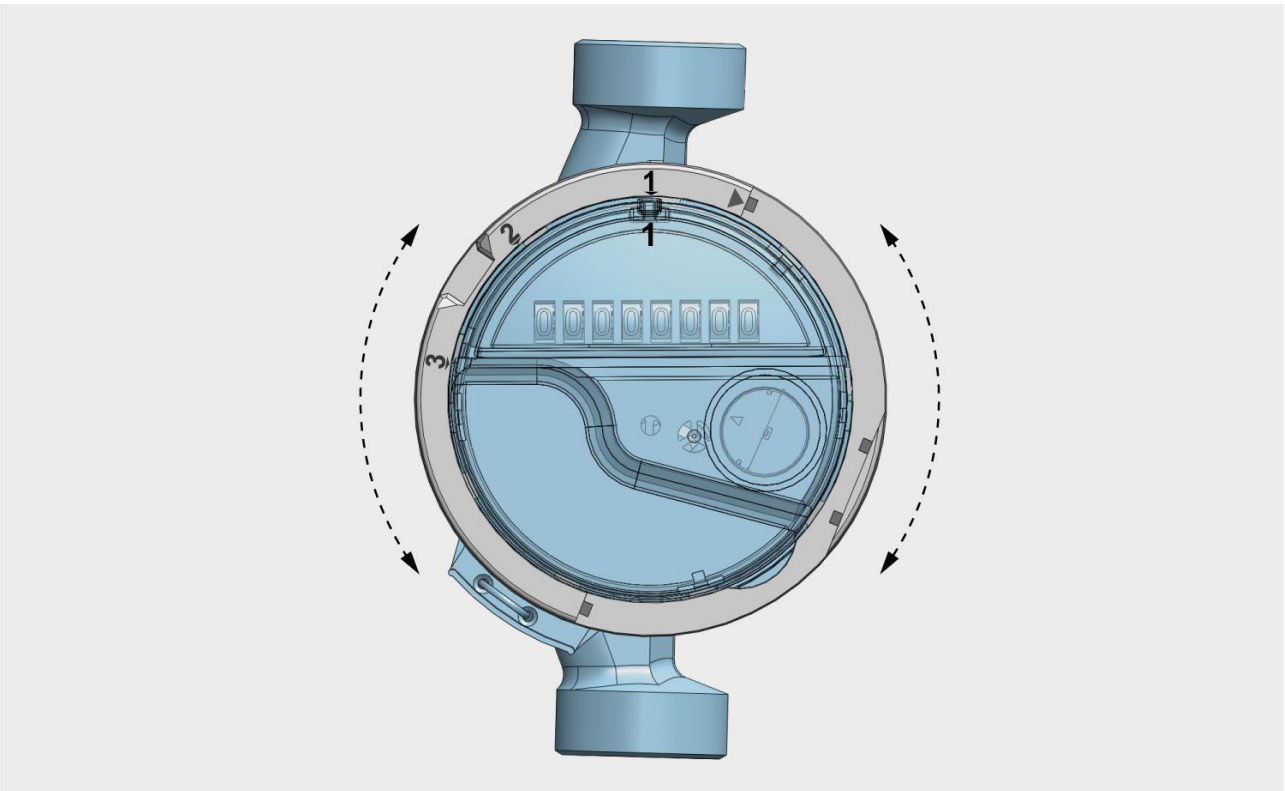


Fig. 11. Attempt to remove the intermediate ring from the cylindrical part of the water meter's counter without using force.

5.2.2 Installation of the radio module

1. Position the radio module above the intermediate ring mounted on the counter cover, so that the '1' mark on the side of the module aligns with the 'Δ' mark on the upper edge of the intermediate ring.

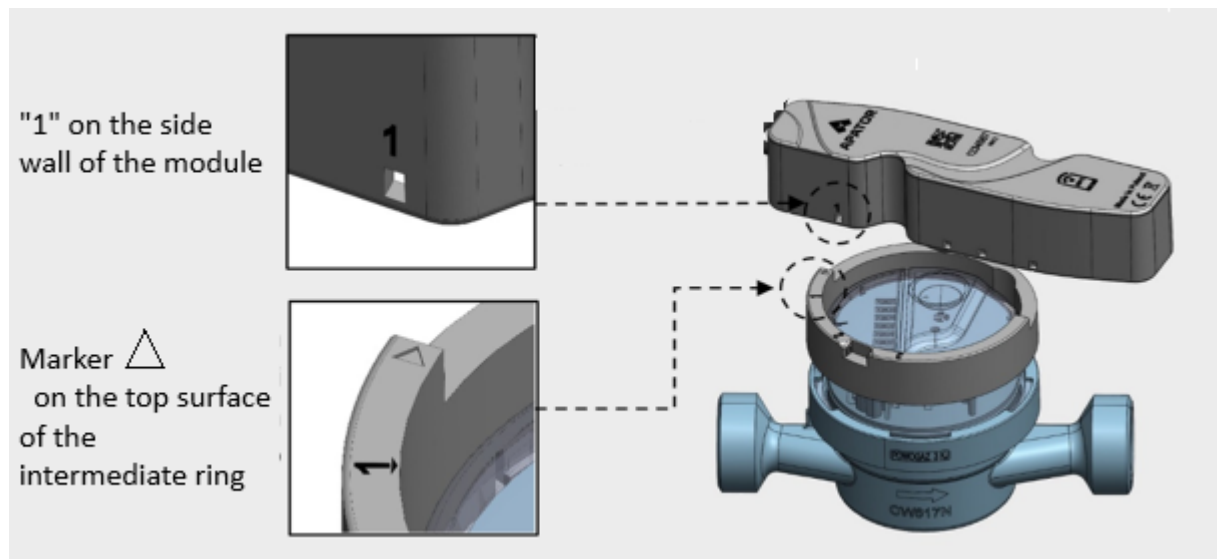


Fig. 12. Installation of the radio module on the JS Smart+ water meter mechanism.

2. Insert the radio module into the recess of the spacer ring on one side, so that the two latching tabs on the spacer ring (A) engage with the two latching holes on the radio module.

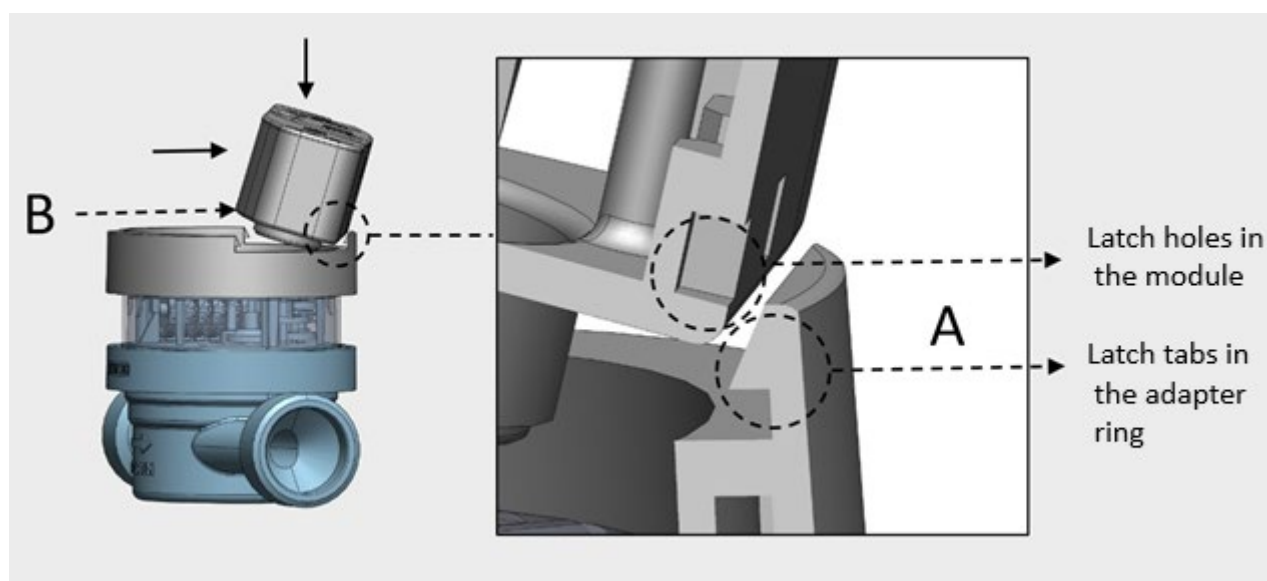


Fig. 13. Snap the radio module into the spacer ring.

3. Press the other side of the radio module firmly against the intermediate ring with both hands so that the two subsequent locking holes on the opposite side of the module (B) snap into place, and you hear a distinct 'click'.
4. Check that the radio module is correctly secured by attempting to remove it without applying force.
5. Installation of the device is complete.

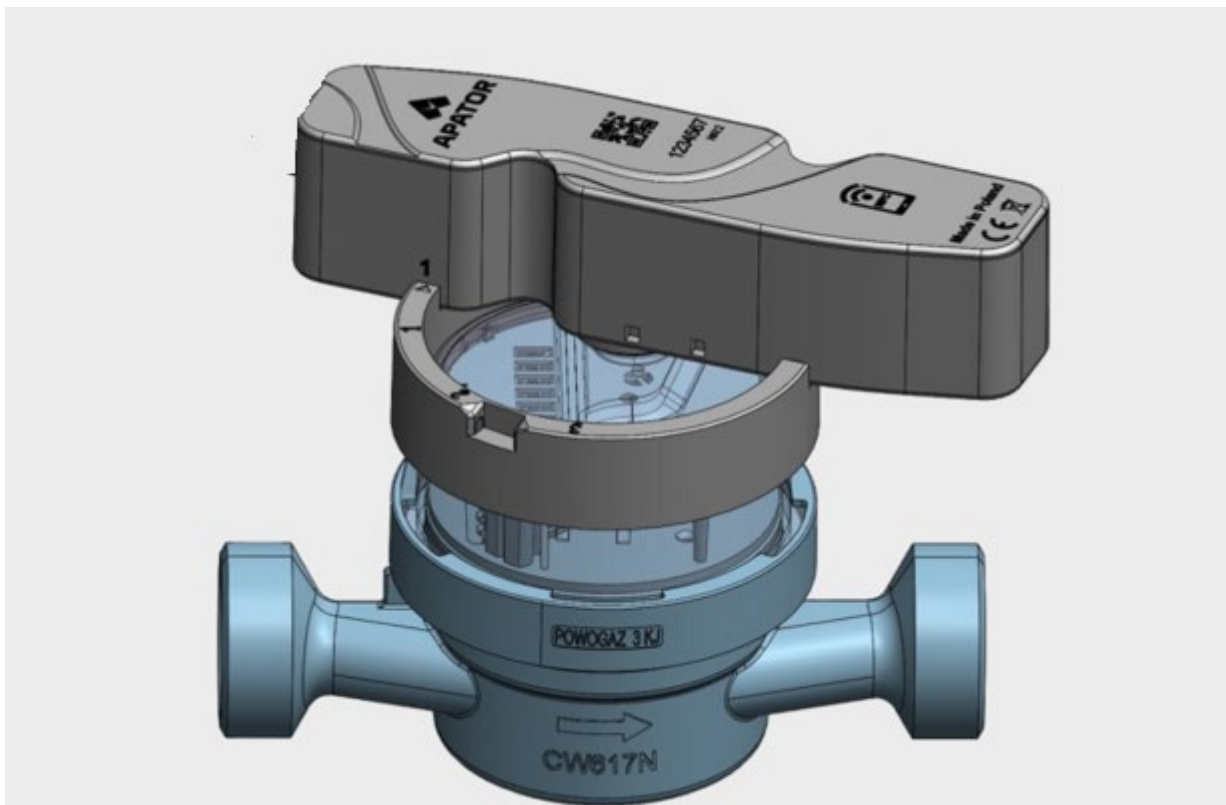


Fig. 14. A view of a correctly installed radio module on a domestic water meter.

Installing the radio module in the order of the steps described above ensures that it operates correctly. The detachable connections between the radio module and the adapter ring allow for the hassle-free replacement of individual components of the metering point as required.

Note! As the stages and sequence of steps for installing the universal radio adapter are the same and independent of the type of water meter on which the installation is carried out, the installation description in sections 6.3 and 6.4 will be presented in a simplified graphical form.

5.3 Installation on JS Master series domestic water meters (DN25-DN40; T50 or T140) in IP65 version

5.3.1 Positioning and securing the intermediate ring on the counting mechanism cover and checking it is correctly fitted

1. First, position the intermediate ring against the counter cover as shown in the diagram below, so as to determine which of the intermediate ring's latches fit into the sockets on the counter cover.

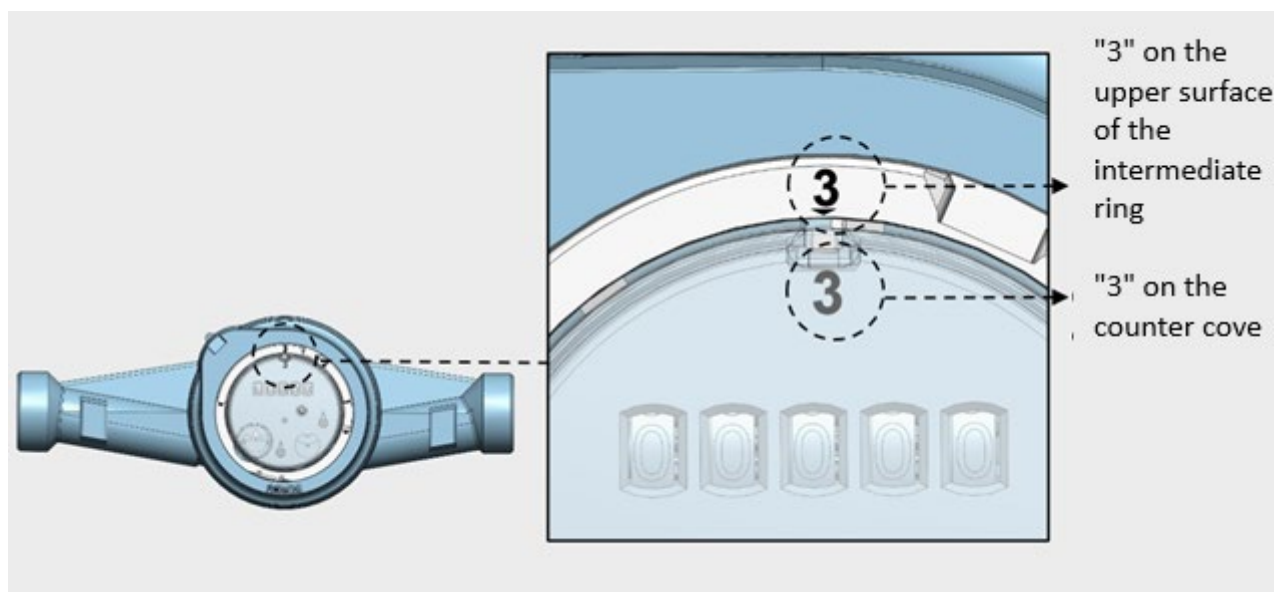


Fig. 15. Fitting the adapter ring to the JS Master+ water meter dial cover.

2. Fitting the locking ring onto the intermediate ring.

Fit the locking ring onto the intermediate ring as shown in Figures 16 and 17 (below). Particular attention should be paid to positioning the locking ring so that its thickened sections/protrusions fit into the recesses of the intermediate ring where the ring-securing latches are located, with their corresponding sockets on the JS Master water meter dial cover. This is visible when the cap is placed on the counter cover as shown in Fig. 16.

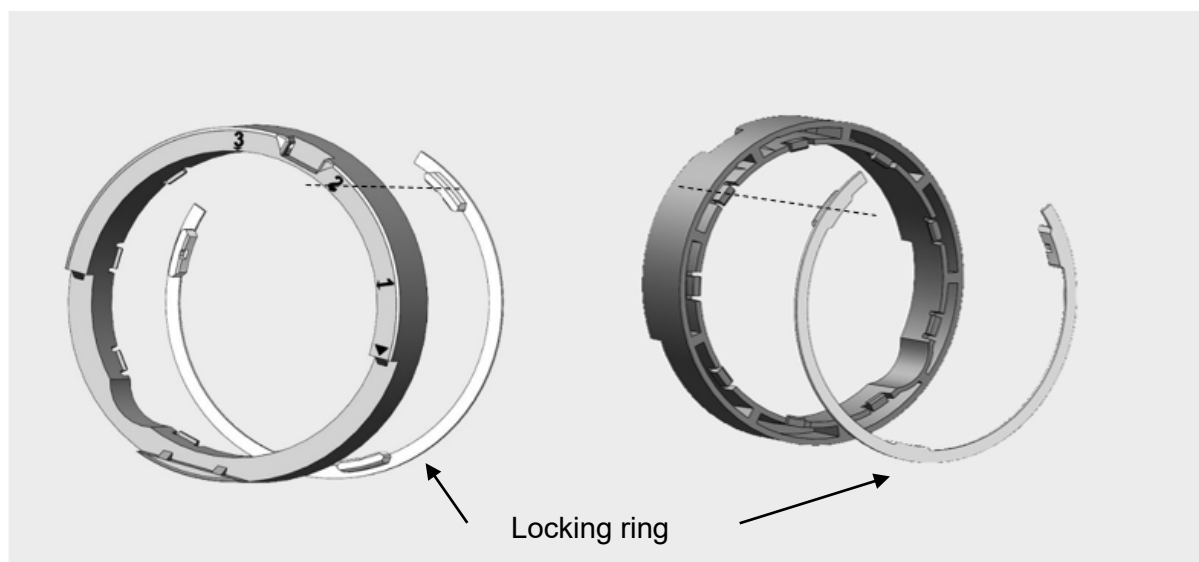


Fig. 16 Position the locking ring before fitting it onto the intermediate ring.

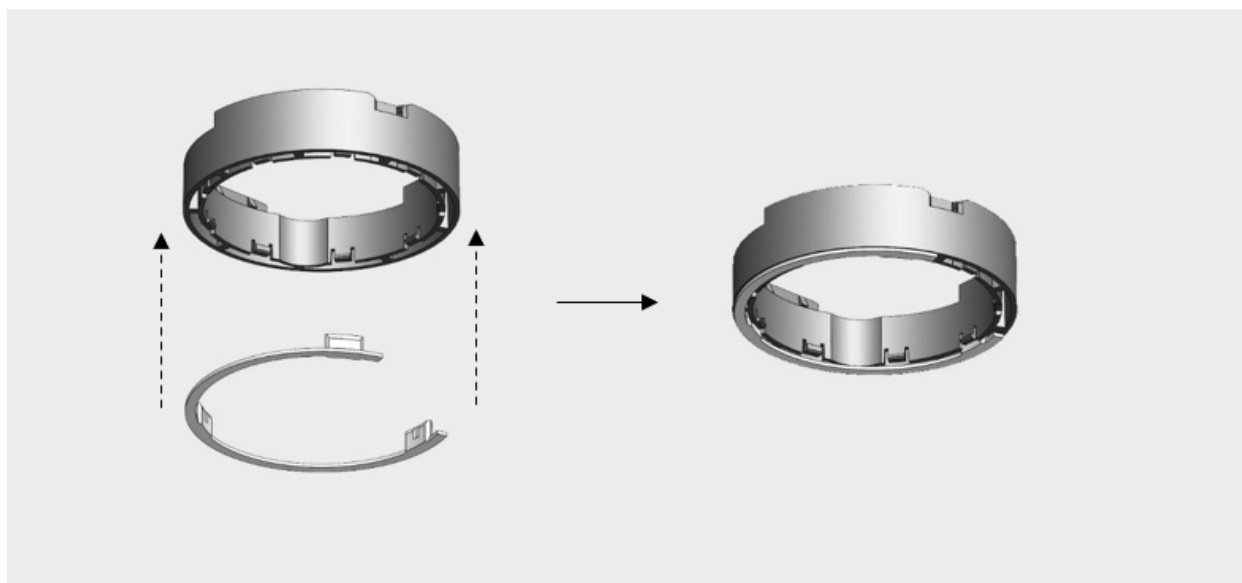


Fig. 17. Fitting the locking ring onto the intermediate ring.

5.3.2 Mounting the radio module

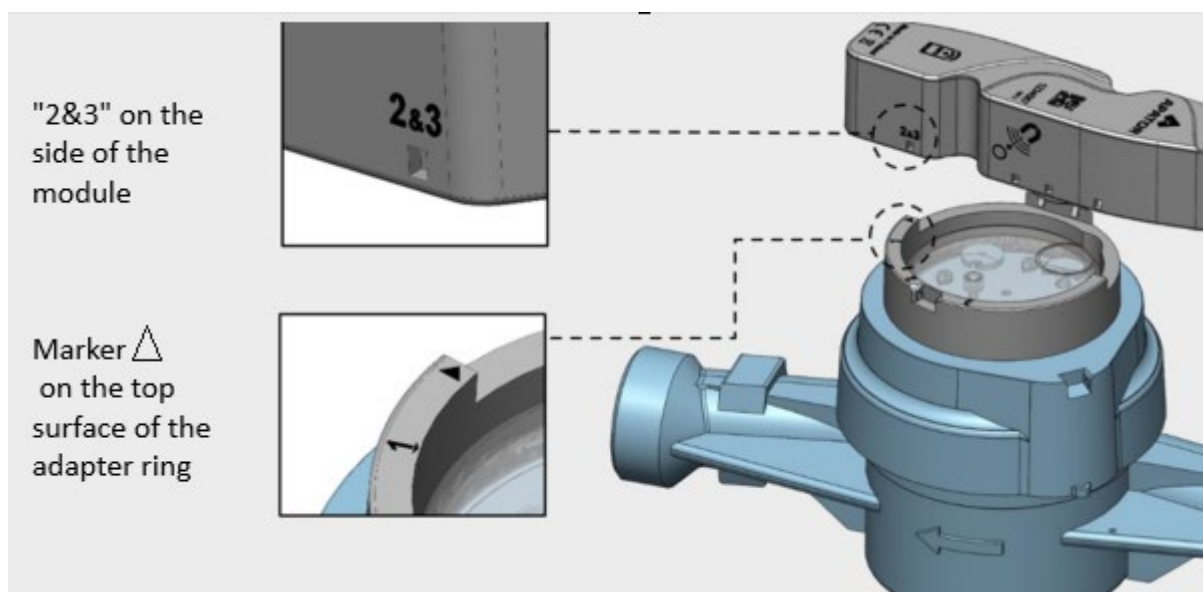


Fig. 18. Positioning the radio module above the intermediate ring.

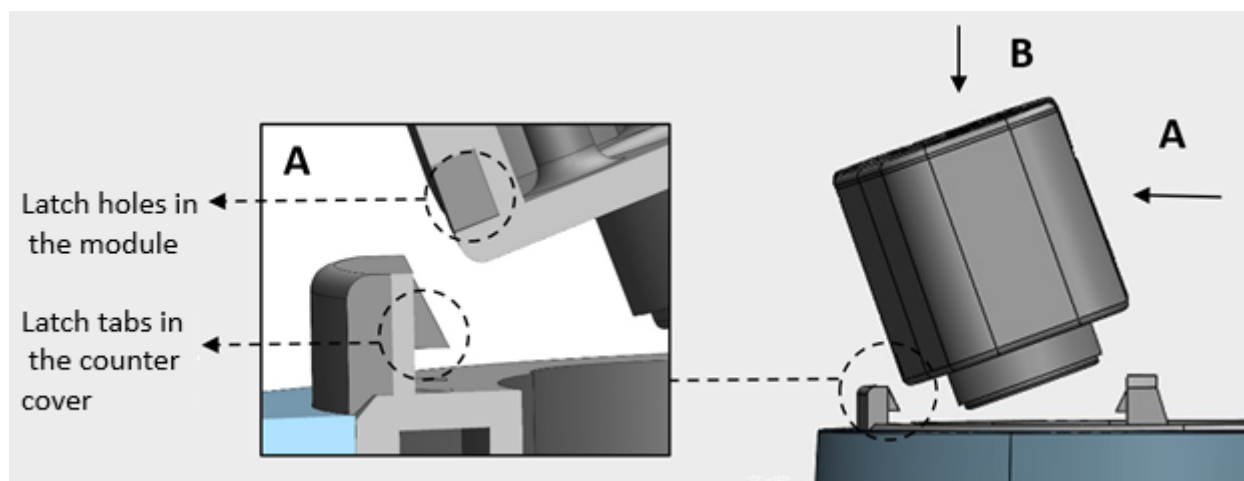


Fig. 19. Fitting the radio module onto the intermediate ring.

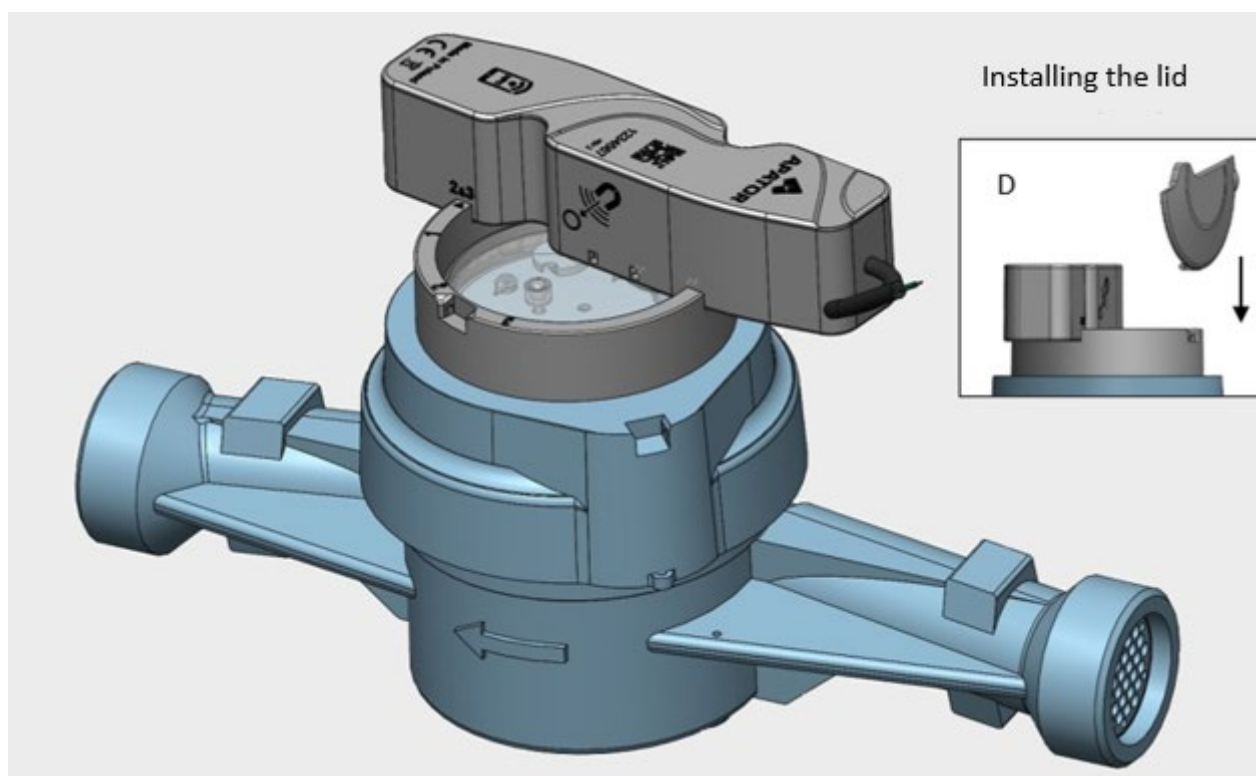


Fig. 20. A view of a universal radio adapter fitted to a domestic water meter.

3. Check that the spacer ring and module are securely fitted by attempting to remove them without applying force. Then fit the protective cap (D) onto the spacer ring

5.4 Installation on JS Master series domestic water meters (DN25–DN40; T50) with IP68 rating

The JS Master+ or JS Master C+ water meter, in the IP68 version, comes as standard with a special counter cover featuring a #UTIP (Universal TI Plug) connector, designed for fitting the communication module. The cover must be removed before fitting the communication module.

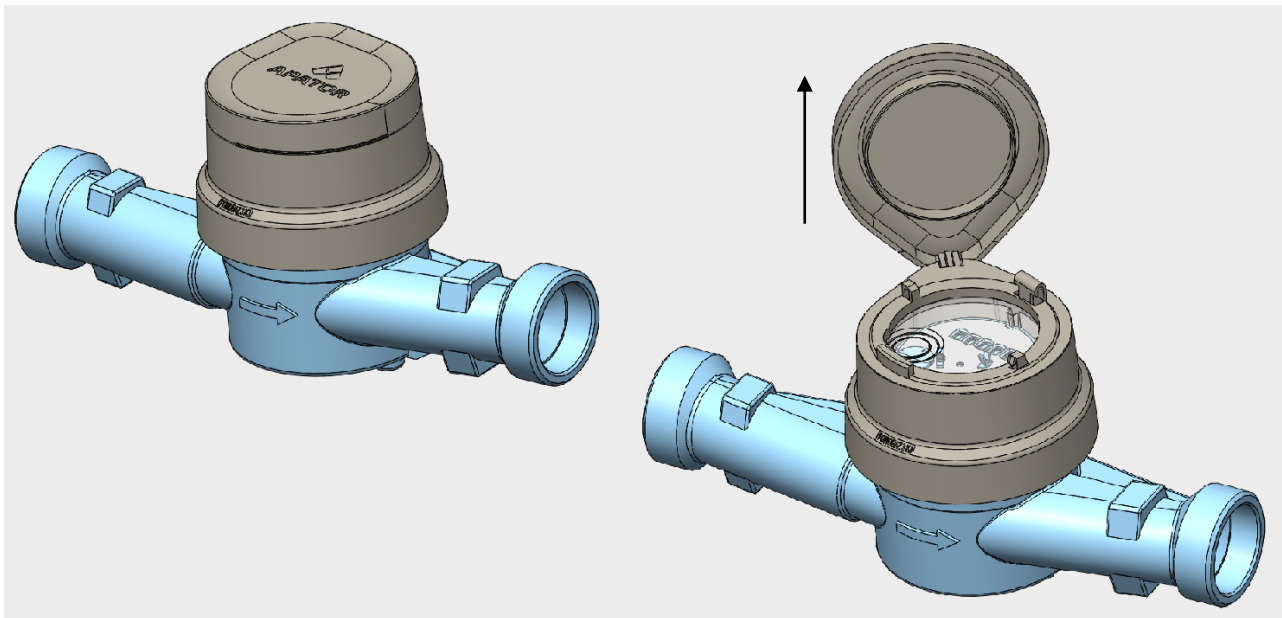


Fig. 21. A view of the JS Master+ water meter in the IP68 version.

5.4.1 Positioning and securing the intermediate ring on the counting mechanism cover and checking that it is correctly fitted

1. Position the IN-LWAN module above the intermediate ring so that the '2&3' mark on the side of the module aligns with the tab shown below in the intermediate ring of the counter cover.

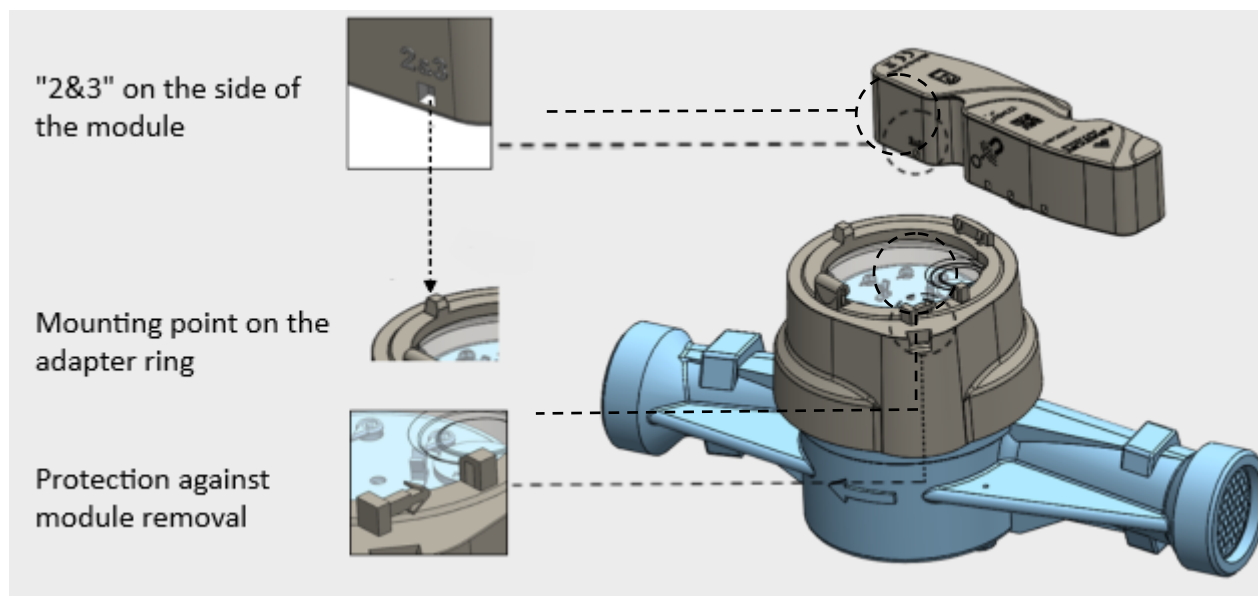


Fig. 22. Positioning the radio module over the intermediate ring.

2. Insert the cover into the recess of the spacer ring from one side so that the two latching tabs on the spacer ring (A) fit into the two latching holes on the module, then press the module down onto the ring from above so that the latches on the opposite side of the ring (B) engage.

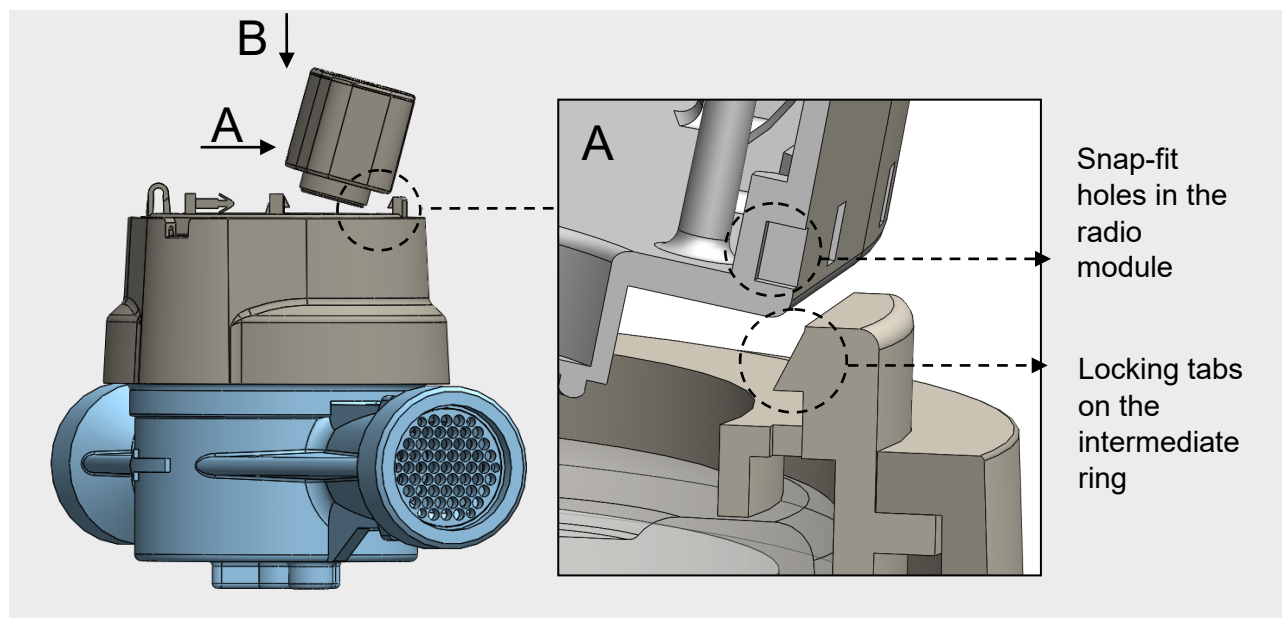
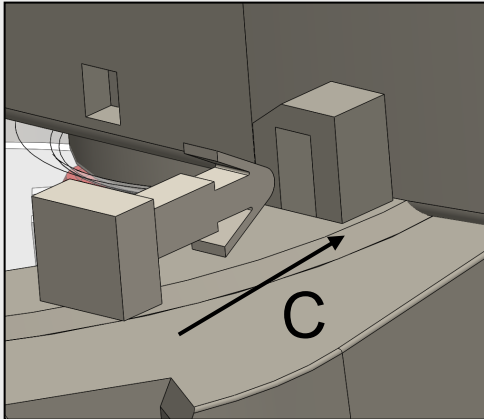


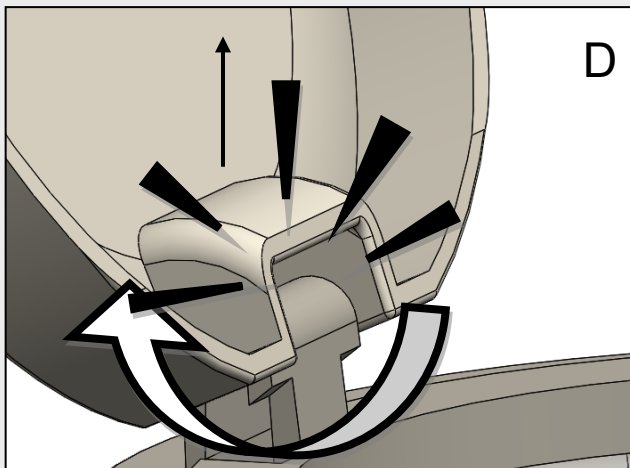
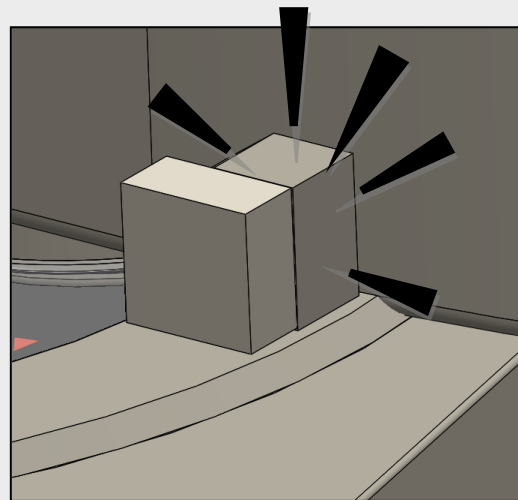
Fig. 23. Fitting the radio module onto the intermediate ring.

3. Fit the ring lock (C) and check that the radio module is securely fastened by attempting to remove it without using force, then fit the cover (D) to conceal the counter drums.



Turn the lock to face the direction shown in the photo and slide it into the hole. One side of the lock is wider, which prevents it from being fitted incorrectly

Push the lock all the way in until you hear a distinct 'click' – at this point, the lock should be impossible to remove without using considerable force



Fit the lid in the direction indicated by the wide black arrow. Then pull it upwards until you hear a distinct 'click'.

Fig. 24. The IN-LWAN radio module fitted to a domestic water meter, complete with a ring lock.

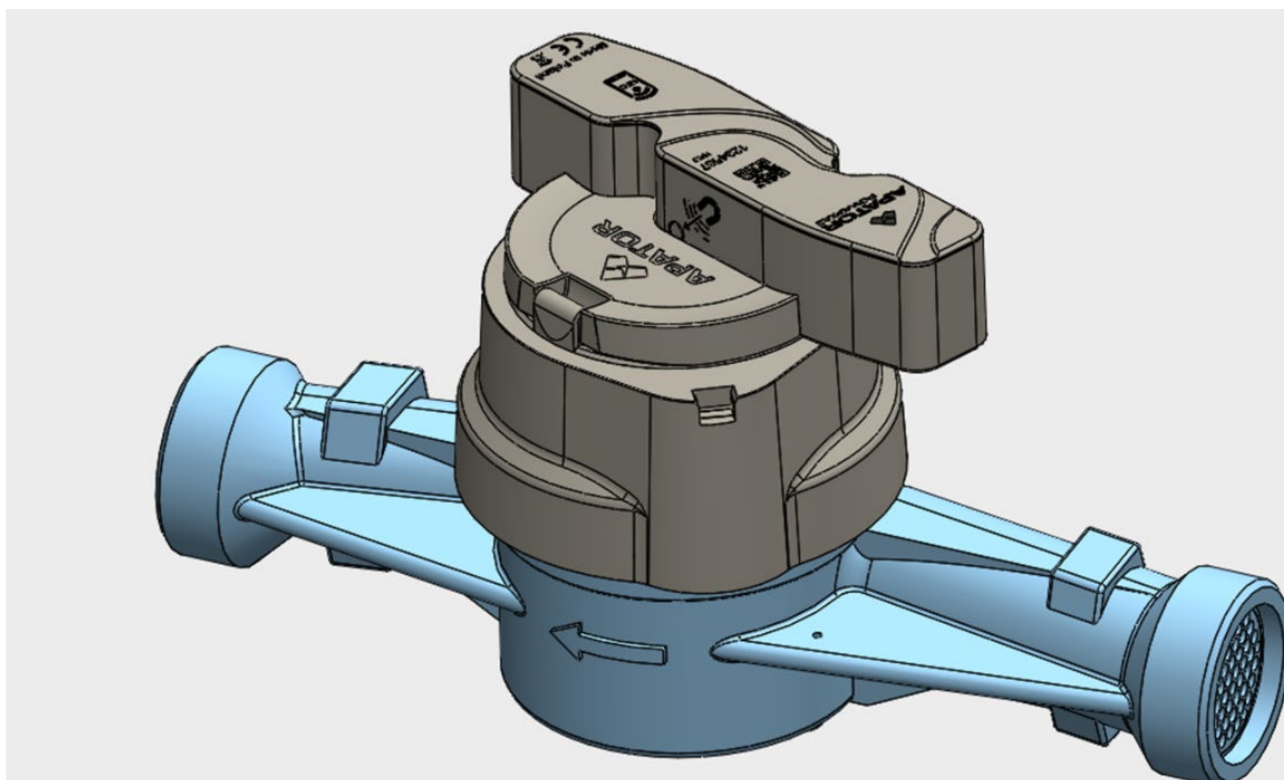


Fig. 25. View of a correctly installed IN-LWAN radio module on a domestic water meter with an IP68 rating.

5.5 Installation on industrial water meters in the IP65 version

1. View of an MWN-type industrial water meter with IP65 rating. The installation of the transmission module in other types of industrial water meters is carried out in the same way. Remove the cover from the intermediate ring. Place the intermediate ring onto the water meter counter cover so that the number '2' on the upper edge of the intermediate ring is directly above the '2' mark visible on the water meter counter cover. Press the intermediate ring firmly against the water meter counter cover with both hands until you hear a distinct 'click'.

5.5.1 Fitting the intermediate ring to the counter cover

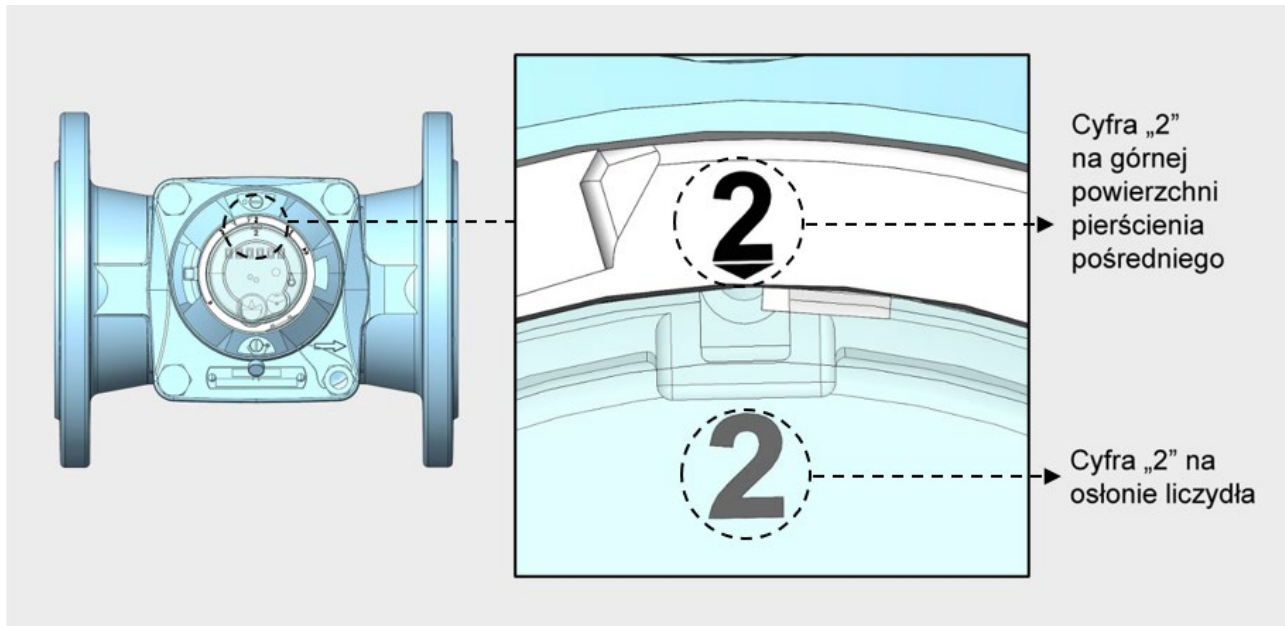


Fig. 26. Fitting the spacer ring onto the counting mechanism cover.

5.5.2 Fitting the radio module

1. Position the transmission module above the intermediate ring mounted on the counter cover, so that the '2&3' mark on the side of the module aligns with the 'Δ' mark on the upper edge of the intermediate ring.

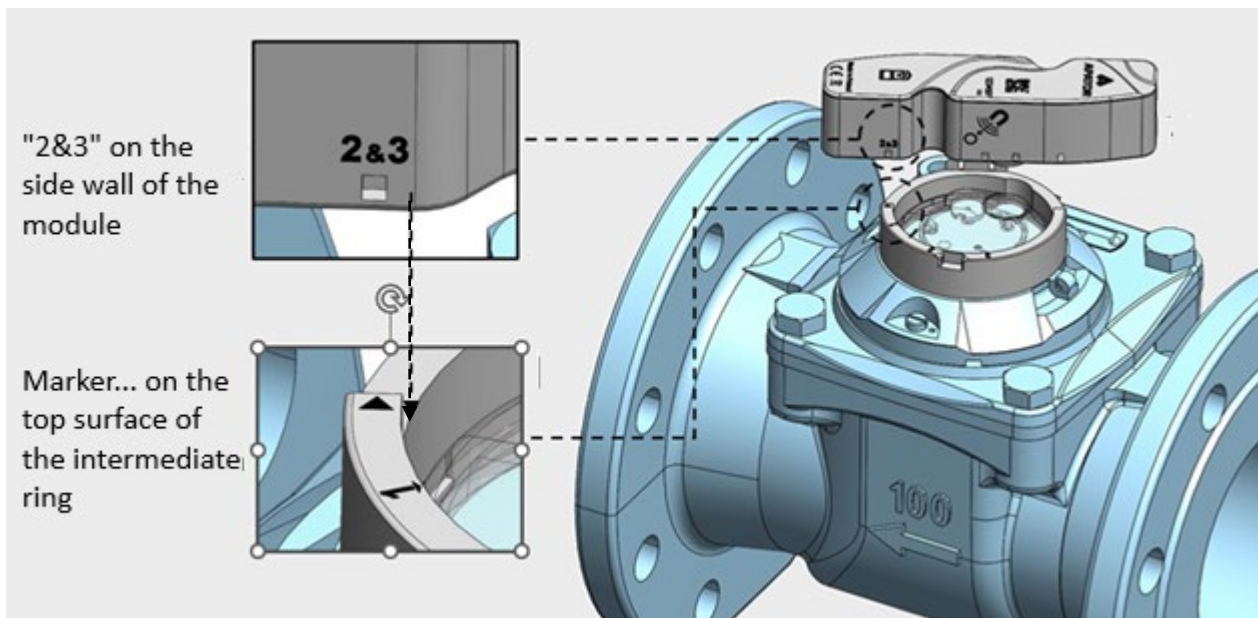


Fig. 27. Positioning the radio module above the intermediate ring.

2. Insert the module into the recess of the spacer ring from one side so that the two latching tabs on the spacer ring (A) fit into the two latching holes on the module, then press the module down onto the ring from above so that the latches on the opposite side of the ring (B) engage.

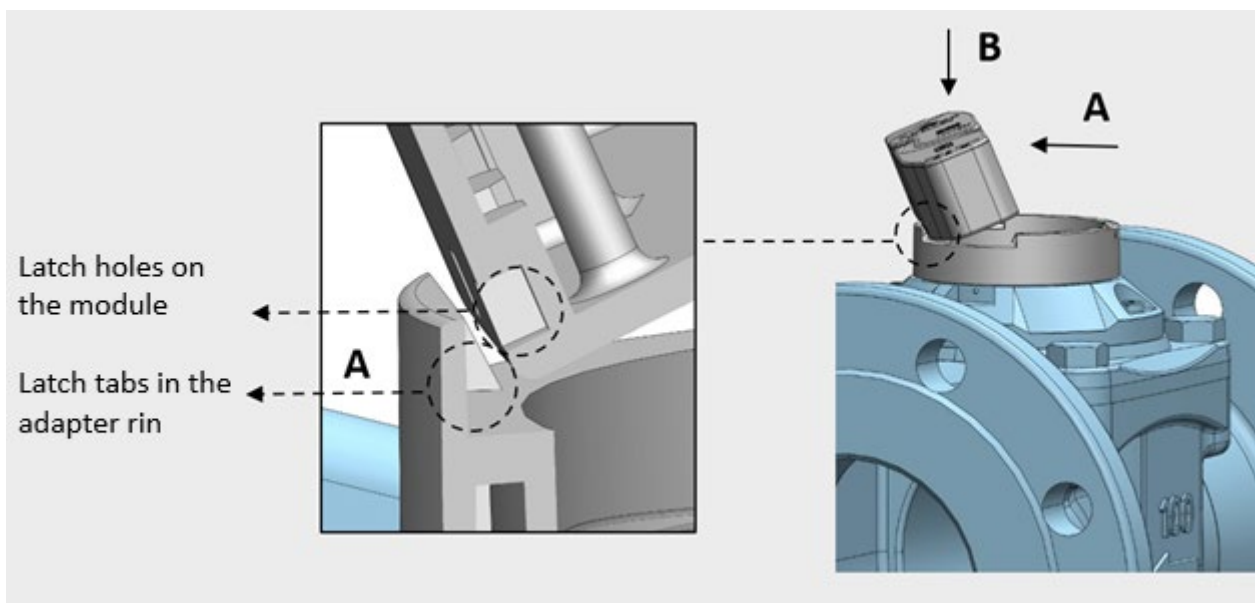


Fig. 28. Positioning the radio module on the intermediate ring.

3. Check that the spacer ring and module are correctly secured by attempting to remove them without applying force.

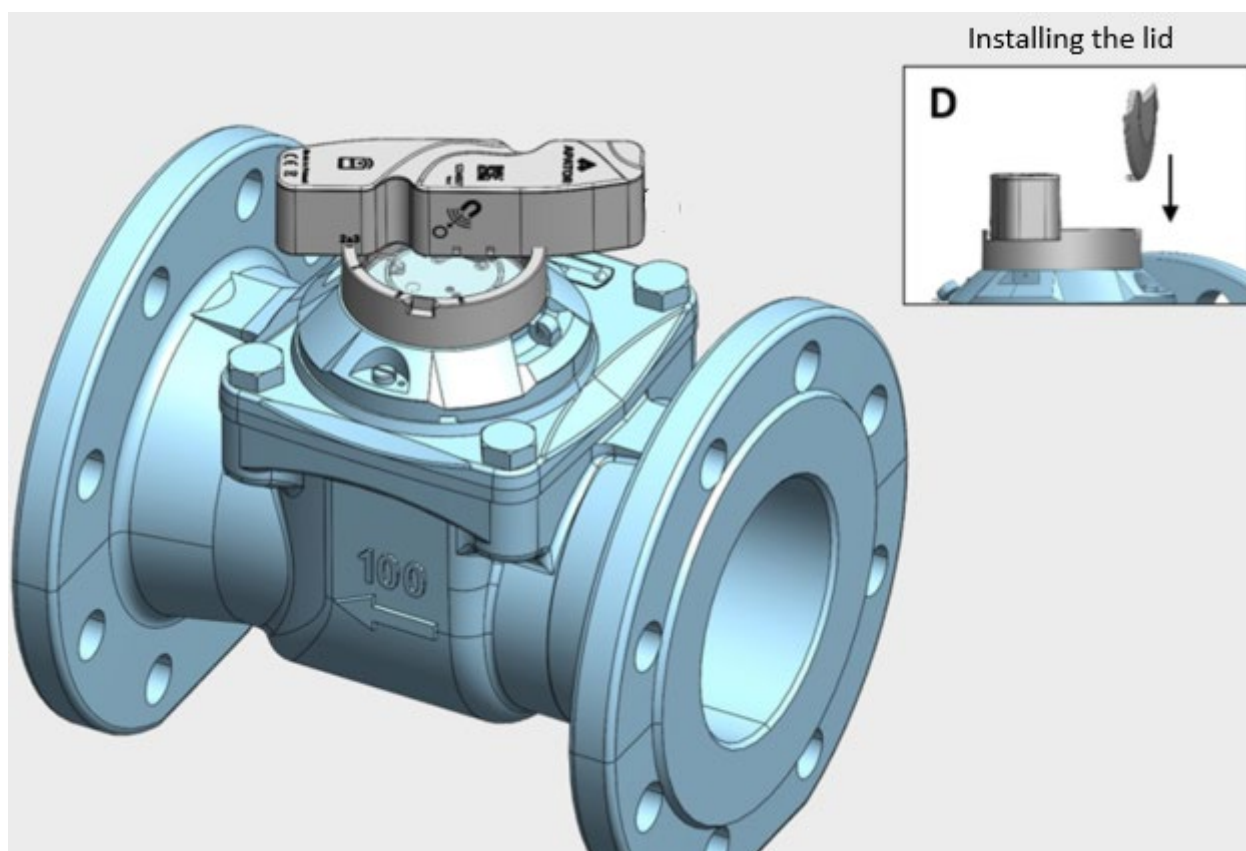


Fig. 29. View of a universal radio adapter fitted to an industrial water meter.

5.6 Installation on industrial water meters in the IP68 version

1. View of an MWN-type industrial water meter in an IP68 version, which comes as standard with a special counter cover featuring a #UTIP (Universal TI Plug) connector, used for mounting the transmission module. The installation of the module in other types of industrial water meters (JS; MK) is carried out in the same way. Before installing the module, remove the cover from the water meter housing.

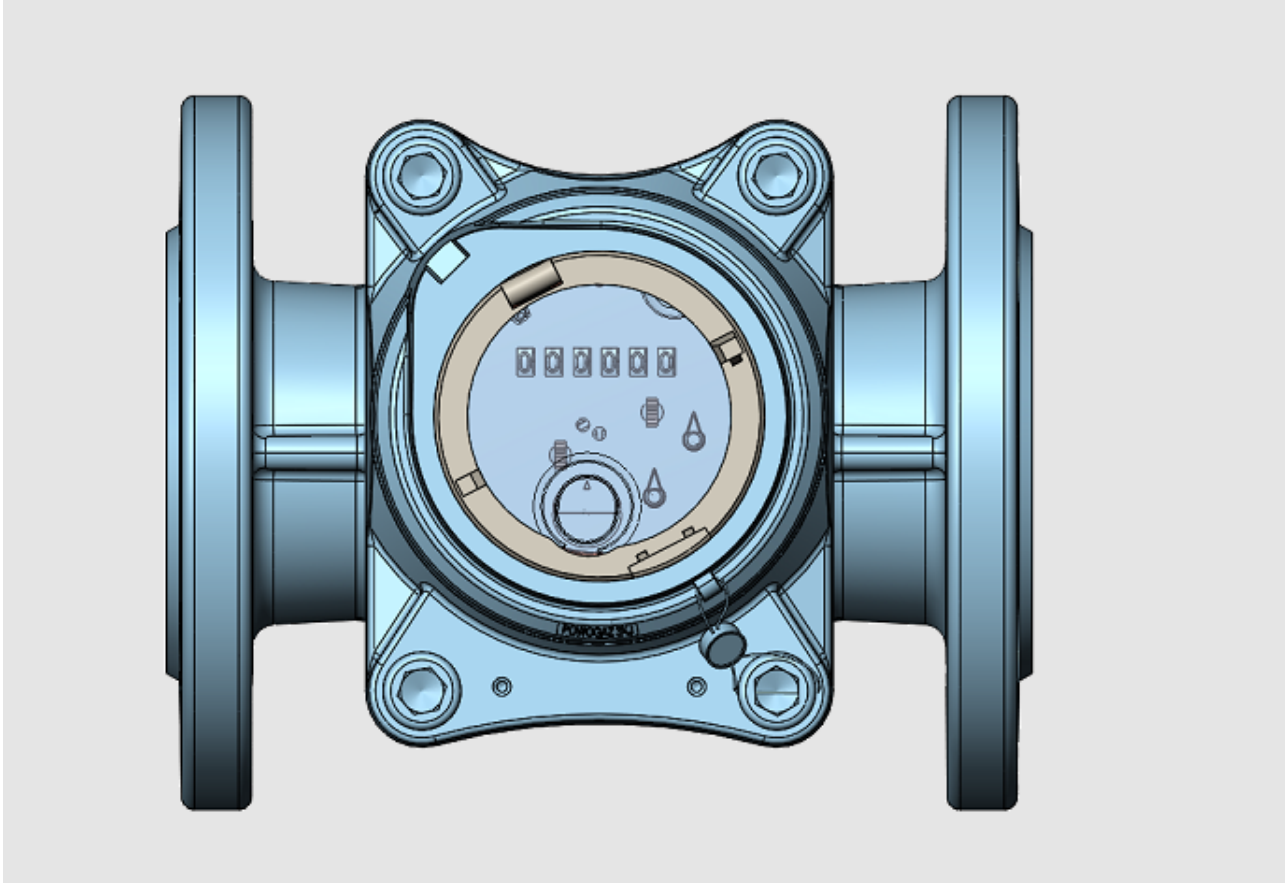


Fig. 30. View of the MWN industrial water meter in the IP68 version.

2. Position the IN-LWAN transmission module above the intermediate ring so that the '2&3' marking on the side of the module aligns with the tab shown below on the intermediate ring.

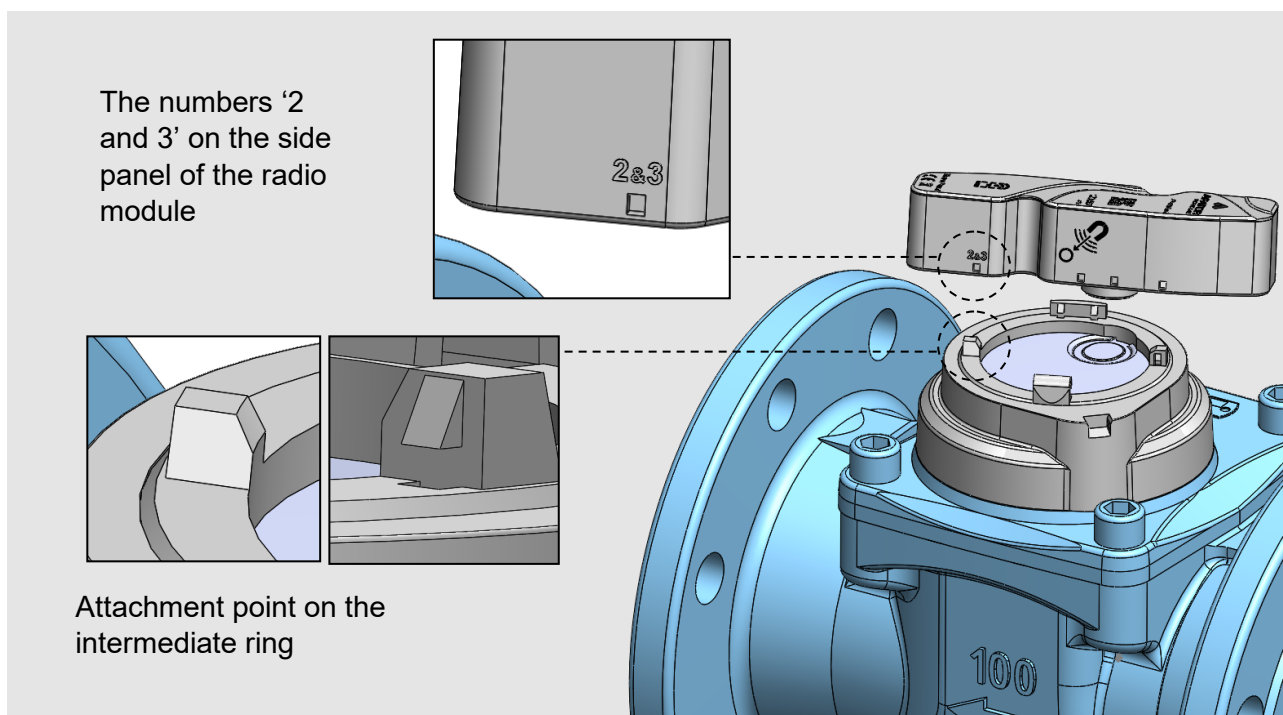


Fig. 31. Positioning the radio module on the counter housing.

3. Insert the transmission module into the recess of the intermediate ring from one side so that the two latching tabs on the intermediate ring (A) fit into the two latching holes on the module; then press the module down onto the ring from above so that the latches on the opposite side of the ring (B) engage.

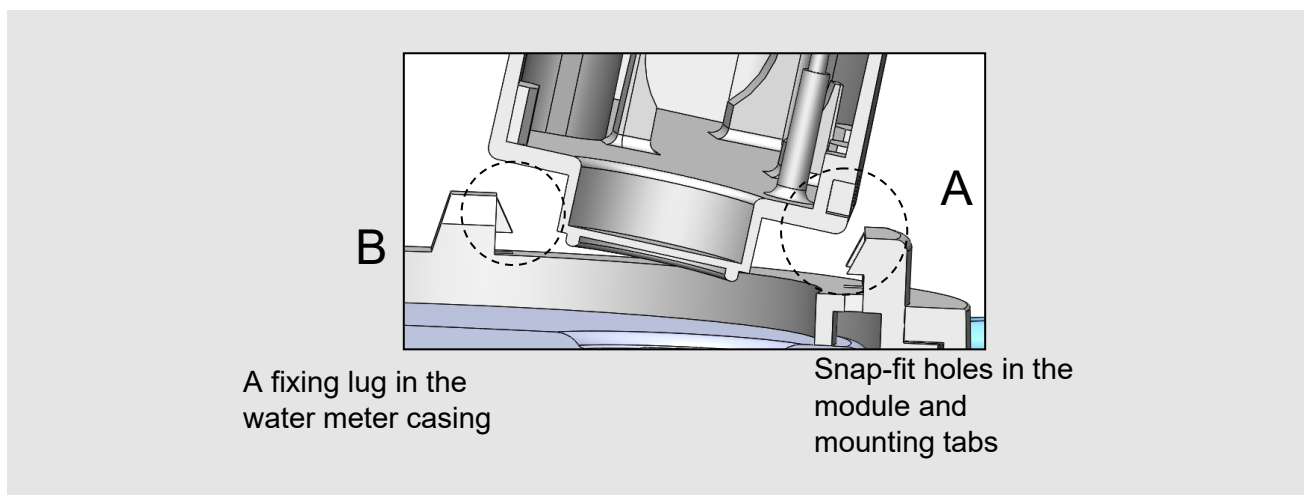
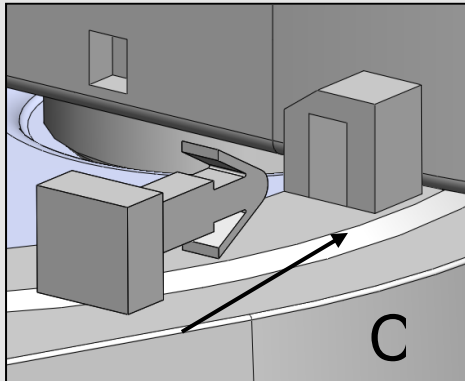


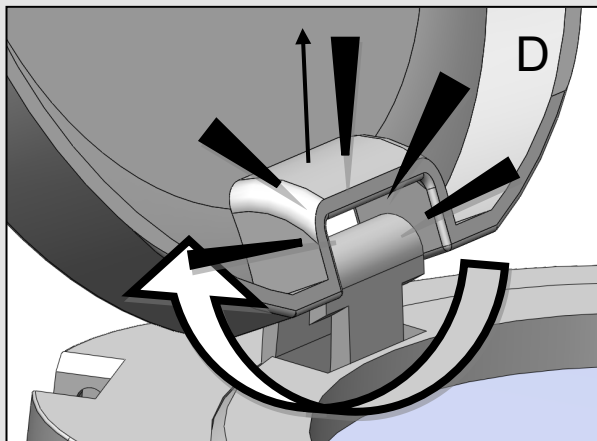
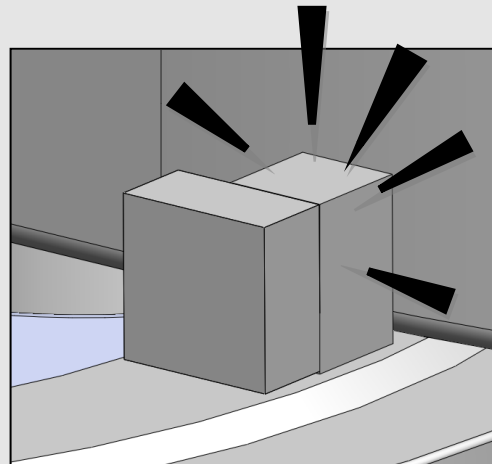
Fig. 32. Fitting the radio module to the cash register housing.

4. Fit the ring lock (C) and check that the IN-LWAN cover is securely fastened by attempting to remove it without applying force; then fit the cover (D) to conceal the counter drums.



Turn the lock to face the direction shown in the photo and slide it into the hole. One side of the lock is wider, which prevents it from being fitted incorrectly

Push the lock all the way in until you hear a distinct 'click' – at this point, the lock should be impossible to remove without using considerable force



Fit the lid in the direction indicated by the wide black arrow. Then pull it upwards until you hear a distinct 'click'

Fig. 33. The IN-LWAN radio module fitted to an IP68 industrial water meter, along with the installation of a ring lock.

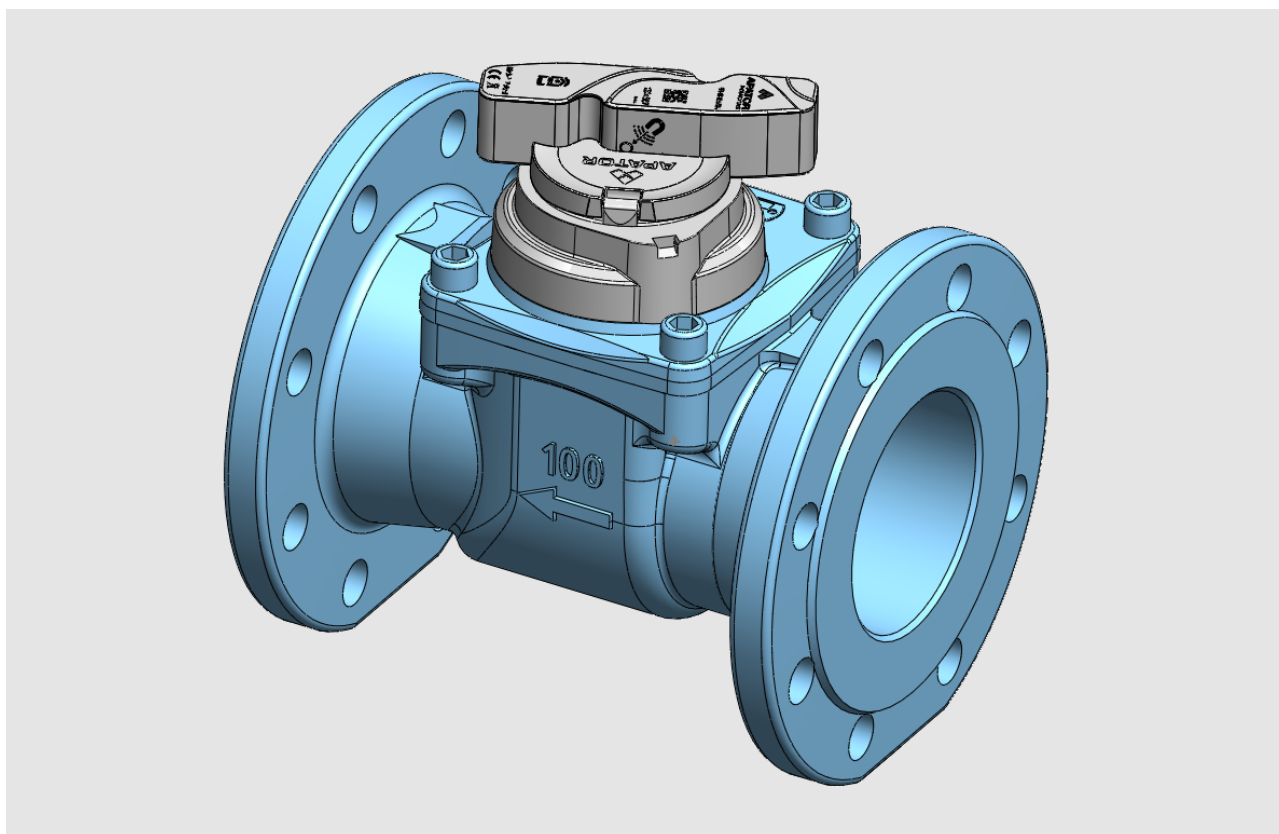


Fig. 34. View of a correctly installed IN-LWAN radio module on an MWN-type industrial water meter with an IP68 rating.

5.7 External antenna installation

1. Install the external antenna as shown in Figure 35.
2. The antenna cable must not be left hanging freely; it must be secured to fixed parts of the chamber (wall, pipes) using standard fastenings (cable ties, plugs, etc.).
3. It is prohibited to mount the antenna or its components (e.g. the cable) to the ladder or steps fitted to water meter chambers, or to use any other similar solutions.
4. Roll any excess cable into a coil with a diameter greater than 15 cm and secure it to a fixed structural element near the cover. Protect the antenna cable from kinking.
5. For horizontal installation, the bending radius of the cable exiting the antenna should be greater than 10 cm.
6. The distance between the antenna and any metal parts should be greater than 15 cm.
7. The mounting bracket must be positioned less than 1 cm from the ends of the antenna.

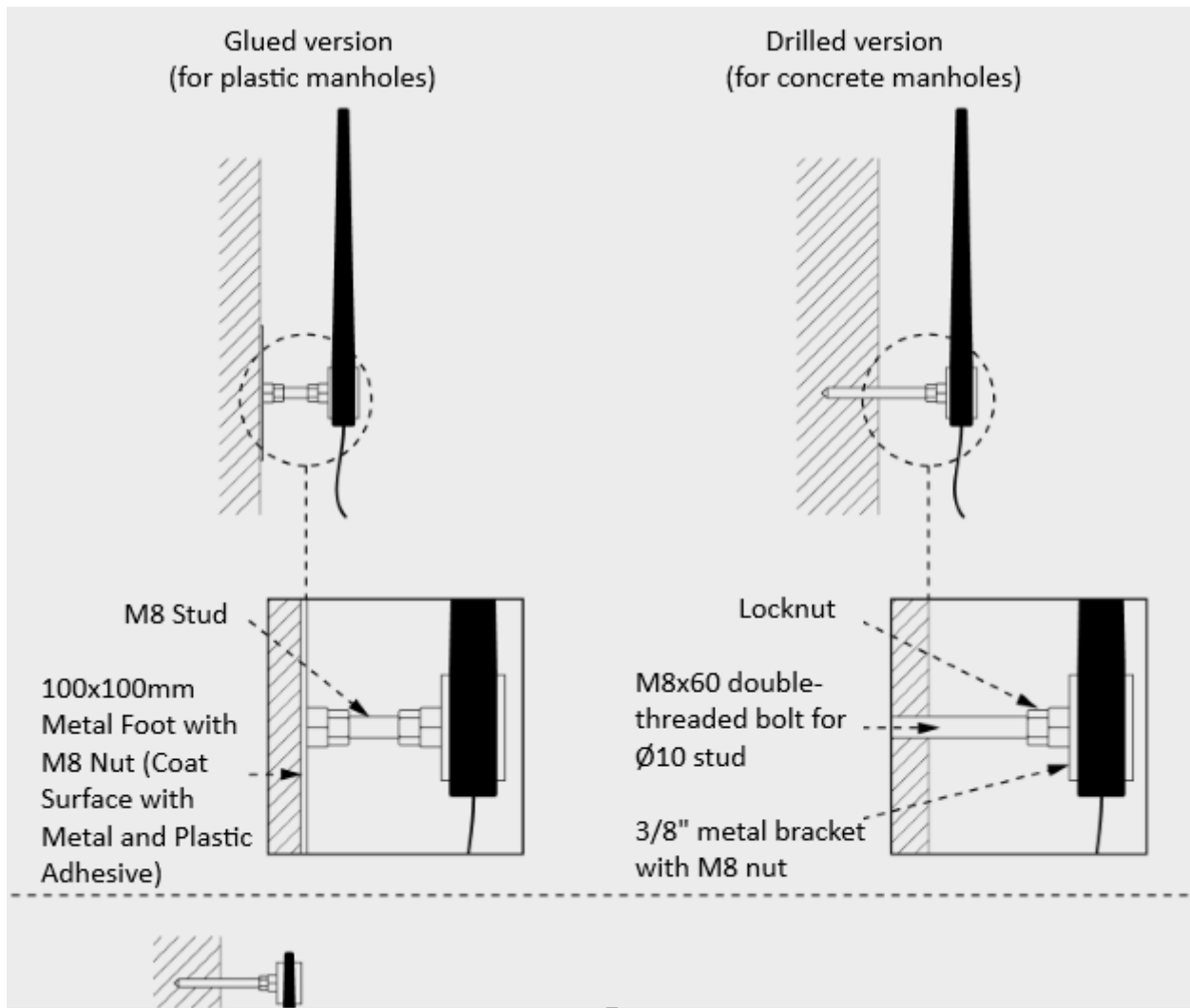


Fig. 35. Options for installing an external antenna.

6. Device configuration

Proper operation of the IN-LWAN in a reading system requires specific configuration settings of the module.

Note: To ensure uncorrupted and valid data, the module must remain properly mounted on the water meter while being configured, and there must be no actual flow through the water meter when saving the actual water meter indication.

6.1 First launch

For proper device operation, the following steps are recommended:

- Before installing the adapter on the water meter, close the valves at the measurement point.
- After installing it on the water meter, proceed to installation in the mobile app.



- Select the device type, then "First Launch" and follow the on-screen instructions.

Type of device
IN-LWAN
Action
First launch
Stages of first launch
1. Hold the phone close to the overlay to wake it up. After this step, wait 30 seconds. 2. Enter the device data. Click "EXECUTE" to save the profile. 3. Save the profile by holding the phone close to the overlay. Force the transmission.
EXECUTE

- In the next step, enter the appropriate parameters (type, serial number, indication) to ensure proper device operation.

Profile JS 4,0-02 Smart+ Number of saved parameters: 9
Water meter S/N 12345678
Meter reading 0
Antenna type ☒ Internal antenna – INLWAN ☐ External antenna – INLWAN ANT 3
Type of device ☒ Cold water meter ☐ Hot water meter

- After correct configuration, open the valves at the measurement point.

NFC installation

Profile has been written

OK

6.2 RTC sync

The module enables syncing its RTC any time with an RF interface command. The RTC is synced by saving the actual date and time in the module with daylight saving time and UTC time zone offset, as applicable.

Note: Daylight saving time is enabled in the default configuration. If no daylight saving time is used at your location, disable it in the module configuration. Before each reading or modifying the configuration settings, check the actual date and time of the mobile device you intend to interface with the module, or enable and acknowledge automatic synchronisation with your GSM provider.

6.3 Initial water meter indication

To properly map the water meter indications, the module configuration must be saved with a properly defined initial indication of the water meter counter. Note the initial counter indication with its maximum resolution. Round the indication to full values of 1, 10, 100 or 1000 litres according to the available pointer rotation weight, see Table 1. (The counter status is saved to the module memory as the number of pointer revolution).

6.4 Metering location event thresholds

Event thresholds are parameters which must be saved in the module configuration according to the product data sheet of the water meter for the module to properly detect the instances of:

- Maximum Flow
- Minimum Flow
- Reverse Flow
- Measurement Unchanged
- Leak

6.5 Storage period for historical indications

Define the duration and interval of indication saving according to user's preferences for saving historical indications:

- Year: set the month, day of month and time of indication save
- Month: set the day of month and time of indication save
- Week: set the day of week and time of indication save

NOTE: It is recommended that 1 month with the day and time of indication save is set as follows: 1st day of month, time 00:01.

6.6 Automatic deletion period of event details

You can set the automatic deletion period for each of the events supported by the functionality:

- Maximum and minimum flow
- Reverse Flow
- Measurement Unchanged
- Leak
- Disconnected, Magnetic Field, and Access Error

6.7 Removing the IN-LWAN transmission module from the water meter

Note! Before removing the module, force a transmission to save the current data from the module.

Removal of the device from the IP65-rated water meter is carried out as follows:

- Press down the intermediate ring with one hand
- With the other hand, tilt the module outwards relative to the centre of the water meter so that the module slides out of the intermediate ring's latches

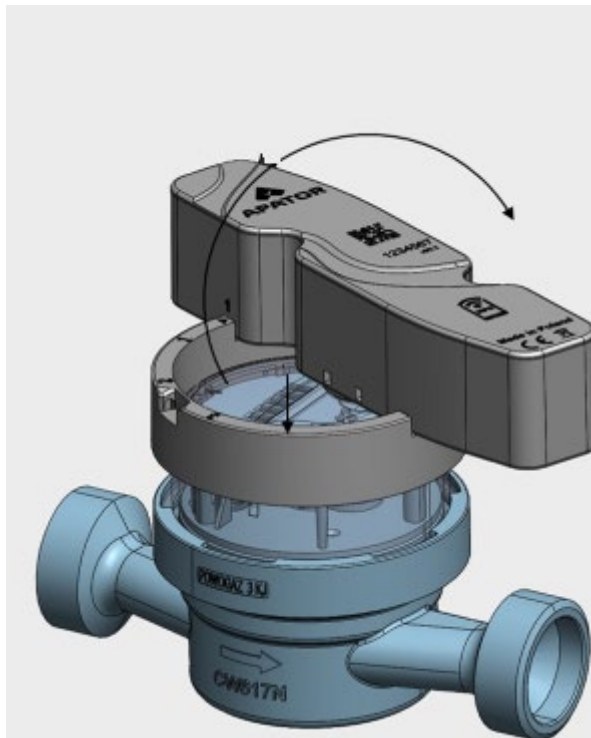


Fig. 36. Removal of the IN-LWAN transmission module from the IP65 water meter.

- Lift the intermediate ring from the top using a small, flat-bladed screwdriver just next to the catch (do not pry directly at the catch! This risks breaking it, which may cause the cover to fall off the water meter)

Note! When refitting the same or a new cover, a new intermediate and locking ring must be used.

Removal of the device from an IP68 water meter is carried out as follows:

- While holding the water meter with one hand, pull the ring lock (Fig. 37) out of the latch on the counter cover and the IN-LWAN module socket.

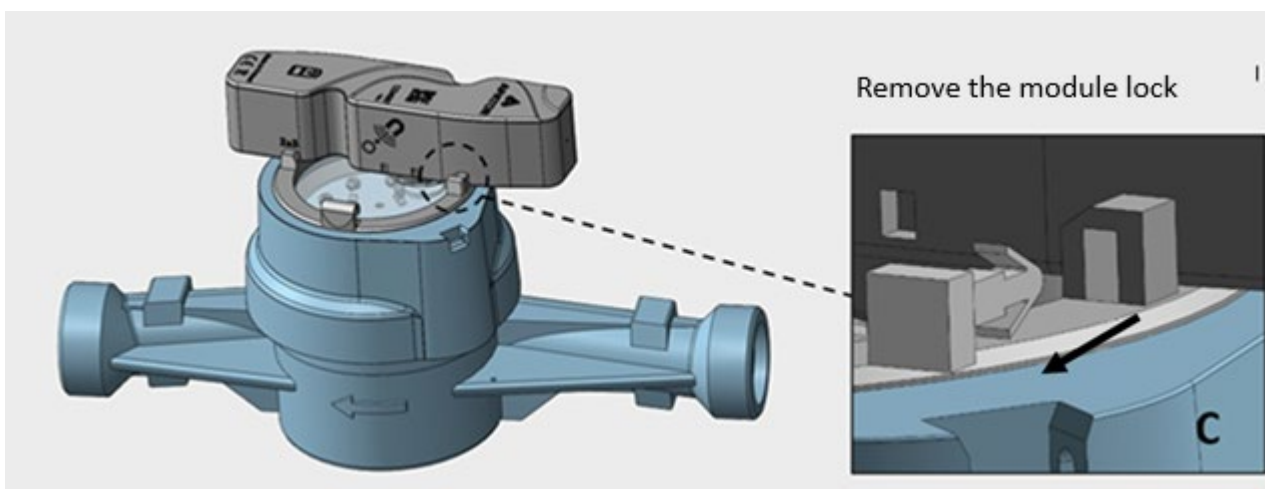


Fig. 37. Removing the ring lock from an IP68 water meter.

- While continuing to hold the water meter, use your other hand to tilt the transmission module outwards from the centre of the water meter so that the module slides out of the intermediate ring latches on the water meter counter housing.

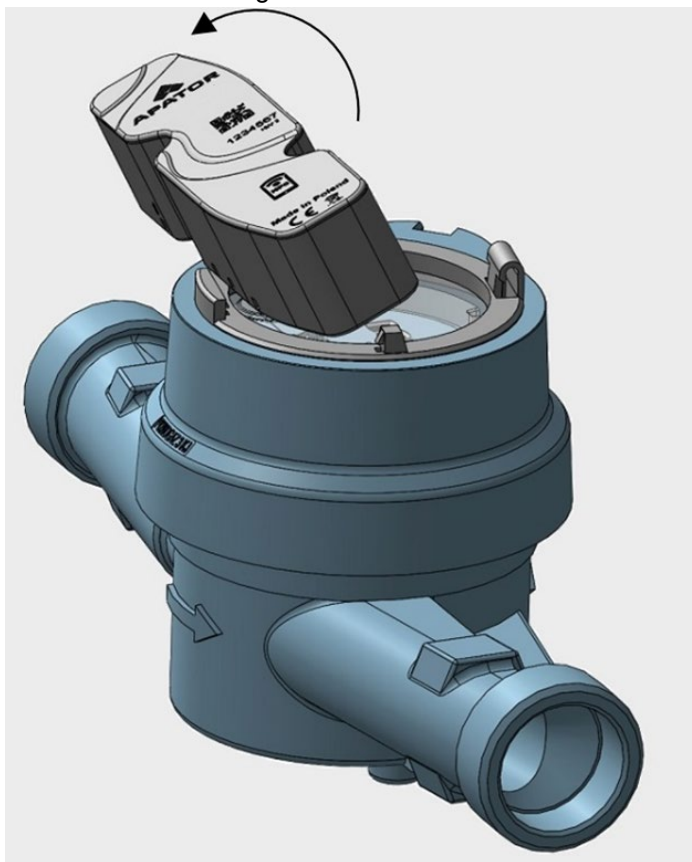


Fig. 38. Removing the IN-LWAN module from an IP68 water meter.

7. Regulatory and standard compliance

Radio Equipment Directive (RED) 2014/53/EU

(Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC)

8. Operating precautions



The product shall be protected against impact and shock during transport and kept at a temperature between -20°C and $+70^{\circ}\text{C}$ (the maximum temperature is allowed for less than 3 days).



Store the product at a temperature between $+5^{\circ}\text{C}$ and 35°C .



Having installed the product on a water meter, exit the warehouse mode and set the configuration as explained in this Manual.



Operate the product at ambient temperatures and the conditions specified in this Manual.

9. Warranty terms and conditions

Apator Powogaz guarantees proper performance of the product for the duration specified in § 2 of the Apator-Powogaz General Warranty Terms & Conditions only if the requirements for transport, storage and operation are followed.

10. Environmental protection

Do not dispose of with regular waste. Return the product to a WEEE collection point for disposal. Help protect the natural environment.



The data presented in the data sheet was correct on the date of publication.
The manufacturer reserves the right to modify and improve its products without notice.
This publication is intended for information purposes only and shall not be construed as a commercial offer under the Polish Civil Code.



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