



QALCOSONIC W1

ULTRASONIC WATER METER QALCOSONIC W1

TECHNICAL DESCRIPTION,
INSTALLATION MANUAL AND
USER GUIDE

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EU DECLARATION OF CONFORMITY

AXIOMA Metering UAB, Veterinarių str. 52, Biruliškių k., Kaunas district, Lithuania, hereby declares that the water meter QALCOSONIC W1 conforms to the essential requirements of the following Directives:

2014/32/EU Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of measuring instruments (recast).
2014/30/EU Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility (recast).
2014/35/EU Directive 2014/35/EU of the European

Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.
2014/53/EU Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment.
2011/65/EU Directive 2011/65/EU of the European Parliament and of the council of 8 June

2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
2006/66/EC Directive 2006/66/EC of the European Parliament and of the council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC.
2012/19/EU Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE).

Kaunas, 18-04-2023

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The Notified Body:

Laboratory of Heat Equipment Research and Testing of the Lithuanian Energy Institute, Lithuania, Notified Body Number 1621.

For EU Customers only - WEEE Marking



Marking of electrical and electronic equipment in accordance with Article 14 (2) of Directive 2012/19/EU

It is prohibited to dispose a meter marked with this sign

into an unsorted municipal waste container together with other waste!

This symbol on the product indicates that it will not be treated as household waste. It must be handed over to the applicable take-back scheme for the recycling of electrical

and electronic equipment. For more detailed information about the recycling of this product, please contact your local municipal office.

SAFETY INFORMATION

Before beginning of installation works you must read this document and follow its instructions.

The meter is battery-powered (3.6 V), risk factors during the meter installation and service fluid flowing within flow sensor with inner pressure up to 1,6 MPa and temperature up to 90°C.

- Only qualified technical personnel may install and maintain water meters. Personnel must be familiar with appropriate technical documentation and general safety instructions. It is necessary to follow general safety requirements during installation and maintenance process.

- Safety guarantees at installation and service of meter is:

- Hermetic fitting of primary flow sensor into the pipeline.
- Reliable fastening of water meter at installation

WARNING!

Mounting of the sub-assemblies of water meter is permissible only after ensuring of absence of fluid and pressure in the pipeline.

CAUTION:

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

- The meter can be used at ambient temperature: -15°C ... +70°C
- Storage and transportation temperature: -25°C ... +70°C (drained flow part)

1 APPLICATION FIELD

Ultrasonic water meter QALCOSONIC W1 is designed for measurement of cold and hot water consumption.

The meter corresponds to essential requirements of the Technical Regulation

Annexes I and MI 001. The meter complies with the requirements

of European Standards EN ISO 4064, requirements of OIML R49-1 and WELMEC 7.2.

CLIMATIC ENVIRONMENTAL CONDITIONS:

Temperature range: from -15°C to +70°C
Humidity: condensing

Mechanical environment class: M1
Electromagnetic environment class: E2

BASIC SPECIFICATIONS ORDERING CODE COMBINATION OF THE METER:

Meter **QALCOSONIC W1** **QW1** - 

Type

| THE RATIO R (Q ₃ /Q ₁): | CODE |
|--|------|
| 80 | 5 |
| 160 | 6 |
| 250 | 1 |
| 315 | 2 |
| 400 | 3 |
| 500 | 9 |
| 800 | 4 |
| 1000 | 7 |

| PERMANENT FLOW RATE Q, M ³ /h | OVERALL LENGTH L, MM | END CONNECTIONS | CODE |
|--|----------------------|-----------------|------|
| 1,6 | 80 | G ¾ | 11 |
| 1,6 | 105, 105n* | G ¾ | 12 |
| 1,6 | 110, 110n* | G ¾ | 13 |
| 1,6 | 115 | G ¾ | 50 |
| 1,6 | 165, 165n* | G ¾ | 14 |
| 1,6 | 170, 170n* | G ¾ | 15 |
| 2,5 | 80 | G ¾ | 21 |
| 2,5 | 105, 105n* | G ¾ | 22 |
| 2,5 | 110, 110n* | G ¾ | 23 |
| 2,5 | 115 | G ¾ | 51 |
| 2,5 | 165, 165n* | G ¾ | 24 |
| 2,5 | 170, 170n* | G ¾ | 25 |
| 2,5 | 105, 105n* | G1 | 31 |
| 2,5 | 110, 110n* | G1 | 32 |
| 2,5 | 130, 130n* | G1 | 33 |
| 2,5 | 165, 165n* | G1 | 34 |
| 2,5 | 190, 190n* | G1 | 35 |
| 4,0 | 105, 105n* | G1 | 41 |
| 4,0 | 110, 110n* | G1 | 42 |
| 4,0 | 130, 130n* | G1 | 43 |
| 4,0 | 165, 165n* | G1 | 44 |
| 4,0 | 190, 190n* | G1 | 45 |
| 6,3 | 260 | G1 ¼ | 46 |
| 10 | 260 | G1 ¼ | 47 |
| 6,3 | 260 | G1 ½ | 48 |
| 10 | 260 | G1 ½ | 49 |
| 10 | 300 | G2 | 52 |
| 16 | 300 | G2 | 53 |
| 25 | 300 | G2 | 54 |
| 16 | 200 | DN50 | 55 |
| 25 | 200 | DN50 | 56 |
| 40 | 200 | DN50 | 57 |

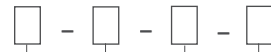
* - B design version (Annex B)

| COMMUNICATION INTERFACE TYPE: | CODE |
|-------------------------------|------|
| RF 868 MHz | 0 |
| RF 433 MHz | 1 |
| RF 915 MHz | 2 |
| RF 920,5 MHz | 3 |
| NB - IoT | 6 |
| 865-867 MHz (IN) | 8 |

| COMMUNICATION PROTOCOL: | CODE |
|-------------------------|------|
| wMbus S1 | 1x |
| wMbus T1 | 2x |
| wMbus C1 | 3x |
| wMbus T2 | 4x |
| LoRa WAN | x1 |
| NB - IoT | 00 |

| EXTRA COMMUNICATION INTERFACE: | CODE |
|--------------------------------|------|
| NONE | 0 |
| Mbus** | 1 |
| Wired pulse output ** | 2 |
| Mbus + Wired pulse output ** | 3 |

** - only for meters with connection type G2 and G2 ½



| TEMPERATURE CLASS: | CODE |
|--------------------------|------|
| Temperature class T30 | 1 |
| Temperature class T30/90 | 2 |
| Temperature class T90 | 3 |
| Temperature class T50 | 4 |

| Connection type | METER DESIGN: | CODE |
|----------------------|--------------------------------|------|
| G $\frac{3}{4}$, G1 | In accordance with the Annex A | 0 |
| G $\frac{3}{4}$, G1 | In accordance with the Annex B | 1 |

| Complete set | CODE |
|----------------------------------|------|
| The water filter is not included | 0 |
| The water filter is included | 1 |

| Backflow measuring function: | CODE |
|--|------|
| Without backflow measurement function | 0 |
| With reverse flow measurement function, when the reverse flow is subtracted from the direct flow | 1 |
| When the reverse direct and reverse flows are registered in different registers | 2 |

2 TECHNICAL DATA

Ratio of the permanent flow rate to the lower limit of the flow-rate (selectable by the user):

$Q_3/Q_1 = 80$, $Q_3/Q_1 = 160$, $Q_3/Q_1 = 250$, $Q_3/Q_1 = 315$, $Q_3/Q_1 = 400$, $Q_3/Q_1 = 800$, $Q_3/Q_1 = 1000$

The technical data of the meter are provided in Table 1.

1.1. Table

| PERMANENT FLOW RATE Q_3 , m ³ /h | RATIO R Q_3/Q_1 | OVERLOAD FLOW RATE Q_4 , m ³ /h | MINIMUM FLOW RATE Q_1 , m ³ /h | TRANSITIONAL FLOW RATE Q_2 , m ³ /h | THRESHOLD VALUE, m ³ /h | CONNECTION TO THE PIPELINE (THREAD – G) | OVERALL LENGTH L, mm | PRESSURE LOSS CLASS ΔP (BAR X 100): without filter / with filter strainer |
|--|----------------------|---|--|---|------------------------------------|---|---|--|
| 1,6 | 80 | 2,00 | 0,020 | 0,032 | 0,001 | G $\frac{3}{4}$ | 80 ¹ , 105, 110, 115 ¹ , 165, 170 | For forward and reverse flow: Δp 16 / Δp 16 |
| 1,6 | 160 | 2,00 | 0,010 | 0,016 | 0,001 | | | |
| 1,6 | 250 | 2,00 | 0,0064 | 0,010 | 0,001 | | | |
| 1,6 | 315 | 2,00 | 0,005 | 0,008 | 0,001 | | | |
| 1,6 | 400 | 2,00 | 0,004 | 0,0064 | 0,001 | | | |
| 2,5 | 80 | 3,125 | 0,031 | 0,050 | 0,001 | G $\frac{3}{4}$ | 80 ¹ , 105, 110, 115 ¹ , 165, 170 | For forward flow: Δp 25 / Δp 25 For reverse flow: Δp 25 / Δp 40 |
| 2,5 | 160 | 3,125 | 0,0156 | 0,025 | 0,001 | | | |
| 2,5 | 250 | 3,125 | 0,010 | 0,016 | 0,001 | | | |
| 2,5 | 400 | 3,125 | 0,0062 | 0,010 | 0,001 | | | |
| 2,5 | 500 | 3,125 | 0,005 | 0,008 | 0,001 | | | |
| 2,5 | 800 | 3,125 | 0,0031 | 0,005 | 0,001 | G1 | 105, 110, 130, 165, 190 | For forward and reverse flow: Δp 16 / Δp 16 |
| 2,5 | 80 | 3,125 | 0,031 | 0,05 | 0,002 | | | |
| 2,5 | 160 | 3,125 | 0,0156 | 0,025 | 0,002 | | | |
| 2,5 | 250 | 3,125 | 0,010 | 0,016 | 0,002 | | | |
| 2,5 | 400 | 3,125 | 0,0062 | 0,010 | 0,002 | | | |
| 4,0 | 80 | 5,00 | 0,050 | 0,080 | 0,002 | G1 | 105, 110, 130, 165, 190 | For forward flow: Δp 25/ Δp 40 ² For reverse flow: Δp 25 / Δp 40 |
| 4,0 | 160 | 5,00 | 0,025 | 0,040 | 0,002 | | | |
| 4,0 | 250 | 5,00 | 0,016 | 0,026 | 0,002 | | | |
| 4,0 | 400 | 5,00 | 0,010 | 0,016 | 0,002 | | | |
| 4,0 | 500 | 5,0 | 0,008 | 0,0128 | 0,002 | | | |
| 4,0 | 800 | 5,00 | 0,005 | 0,008 | 0,002 | G1 $\frac{1}{2}$ | 260 | For forward and |
| 6,3 | 80 | 7,875 | 0,079 | 0,126 | 0,003 | | | |

| | | | | | | | | |
|-----|-------------------|-------|--------|--------|-------|------|-----|--|
| 6,3 | 160 | 7,875 | 0,040 | 0,063 | 0,003 | | | reverse flow: $\Delta p 25 / \Delta p 25$ |
| 6,3 | 250 | 7,875 | 0,0252 | 0,040 | 0,003 | | | |
| 6,3 | 400 | 7,875 | 0,016 | 0,0252 | 0,003 | | | |
| 6,3 | 500 | 7,875 | 0,0126 | 0,0202 | 0,003 | | | |
| 6,3 | 800 ³ | 7,875 | 0,008 | 0,013 | 0,003 | | | |
| 10 | 80 | 12,50 | 0,125 | 0,200 | 0,003 | G1 ¼ | 260 | For forward flow: $\Delta p 63 / \Delta p 63$ For reverse flow: $\Delta p 63 / -^4$ |
| 10 | 160 | 12,50 | 0,0625 | 0,100 | 0,003 | | | |
| 10 | 250 | 12,50 | 0,040 | 0,064 | 0,003 | | | |
| 10 | 400 | 12,50 | 0,025 | 0,040 | 0,003 | | | |
| 10 | 500 | 12,50 | 0,020 | 0,032 | 0,003 | | | |
| 10 | 800 ³ | 12,50 | 0,0125 | 0,020 | 0,003 | | | |
| 10 | 1000 ³ | 12,50 | 0,010 | 0,016 | 0,003 | | | |
| 6,3 | 80 | 7,785 | 0,079 | 0,126 | 0,005 | G1 ½ | 260 | For forward and reverse flow: $\Delta p 16 / \Delta p 16$ |
| 6,3 | 160 | 7,785 | 0,040 | 0,063 | 0,005 | | | |
| 6,3 | 250 | 7,785 | 0,0252 | 0,040 | 0,005 | | | |
| 6,3 | 400 | 7,785 | 0,016 | 0,0252 | 0,005 | | | |
| 10 | 80 | 12,50 | 0,125 | 0,200 | 0,005 | G1 ½ | 260 | For forward and reverse flow: $\Delta p 25 / \Delta p 25$ |
| 10 | 160 | 12,50 | 0,0625 | 0,100 | 0,005 | | | |
| 10 | 400 | 12,50 | 0,025 | 0,040 | 0,005 | | | |
| 10 | 500 | 12,50 | 0,020 | 0,032 | 0,005 | | | |
| 10 | 800 ³ | 12,50 | 0,0125 | 0,020 | 0,005 | | | |
| 10 | 80 | 12,50 | 0,125 | 0,200 | 0,010 | G2 | 300 | For forward and reverse flow: $\Delta p 16 / \Delta p 16$ |
| 10 | 160 | 12,50 | 0,0625 | 0,100 | 0,010 | | | |
| 10 | 250 | 12,50 | 0,040 | 0,064 | 0,010 | | | |
| 16 | 80 | 20,00 | 0,200 | 0,320 | 0,010 | G2 | 300 | For forward and reverse flow: $\Delta p 16 / \Delta p 16$ |
| 16 | 160 | 20,00 | 0,100 | 0,160 | 0,010 | | | |
| 16 | 250 | 20,00 | 0,064 | 0,102 | 0,010 | | | |
| 16 | 400 | 20,00 | 0,040 | 0,064 | 0,010 | | | |
| 16 | 500 | 20,0 | 0,032 | 0,0512 | 0,010 | | | |
| 16 | 800 ³ | 20,00 | 0,020 | 0,032 | 0,010 | | | |
| 25 | 80 | 31,25 | 0,3125 | 0,500 | 0,010 | G2 | 300 | For forward and reverse flow: $\Delta p 16 / \Delta p 16$ |
| 25 | 160 | 31,25 | 0,156 | 0,250 | 0,010 | | | |
| 25 | 250 | 31,25 | 0,100 | 0,160 | 0,010 | | | |
| 25 | 400 | 31,25 | 0,0625 | 0,100 | 0,010 | | | |
| 25 | 500 | 31,25 | 0,0500 | 0,080 | 0,010 | | | |
| 25 | 800 ³ | 31,25 | 0,0312 | 0,050 | 0,010 | | | |
| 16 | 80 | 20,00 | 0,200 | 0,320 | 0,016 | DN50 | 200 | For forward and reverse flow: $\Delta p 16 / \Delta p 16$ |
| 16 | 160 | 20,00 | 0,100 | 0,160 | 0,016 | | | |
| 16 | 250 | 20,0 | 0,064 | 0,102 | 0,016 | | | |
| 16 | 400 ³ | 20,00 | 0,040 | 0,064 | 0,016 | | | |
| 25 | 80 | 31,25 | 0,3125 | 0,500 | 0,016 | DN50 | 200 | For forward flow: $\Delta p 16 / \Delta p 16$ For reverse flow: $\Delta p 16 / -^4$ |
| 25 | 160 | 31,25 | 0,156 | 0,250 | 0,016 | | | |
| 25 | 250 | 31,25 | 0,100 | 0,160 | 0,016 | | | |
| 25 | 400 | 31,25 | 0,0625 | 0,100 | 0,016 | | | |
| 25 | 500 | 31,25 | 0,080 | 0,050 | 0,016 | | | |
| 25 | 800 ³ | 31,25 | 0,0312 | 0,050 | 0,016 | | | |

| | | | | | | | | |
|----|------------------|-------|-------|-------|-------|------|-----|--|
| 40 | 80 | 50,00 | 0,500 | 0,800 | 0,016 | DN50 | 200 | For forward flow: $\Delta p 16 / \Delta p 16$ For reverse flow: $\Delta p 16 / -^4$ |
| 40 | 160 | 50,00 | 0,250 | 0,400 | 0,016 | | | |
| 40 | 250 | 50,00 | 0,160 | 0,256 | 0,016 | | | |
| 40 | 400 | 50,00 | 0,100 | 0,160 | 0,016 | | | |
| 40 | 500 | 50,00 | 0,080 | 0,128 | 0,016 | | | |
| 40 | 800 ³ | 50,00 | 0,050 | 0,080 | 0,016 | | | |

NOTE: ¹ meters with a length $l = 80$ mm and $l = 115$ mm are produced only in the A design version.

² for meters $Q_3 = 4$ m³/h, threaded end connection G1, $l = 190$ mm, when installed the filter strainer, the pressure loss class $\Delta p 40$ is valid. For all other lengths of meter $Q_3 = 4$ m³/h with filter, the pressure loss class $\Delta p 25$ applies.

³ this flow ratio is only valid for meters with temperature class T30.

⁴ meters with reverse flow measurement function are installed only with filter strainer.

| METER TEMPERATURE CLASS | WATER TEMPERATURE RANGE: |
|---------------------------------|--------------------------|
| Meter temperature class T 30 | (0,1°C ... 30°C) |
| Meter temperature class T 50 | (0,1°C ... 50°C) |
| Meter temperature class T 30/90 | (30°C ... 90°C) |
| Meter temperature class T 90 | (0,1°C ... 90°C) |

- Maximum admissible working pressure (pressure class) 16 bar (MAP16)
- Flow profile sensitivity class U0 D0
- Unit of volume measurement: m³ (on LCD display)
- Resolution of a displaying device 0,001 m³
- Displaying range 999999,999 m³

The maximum permissible error (MPE) on volumes delivered at flow rate between the transitional flow rate Q_2 (included) and the overload flow rate Q_4 (included) is:

- When water temperature $\leq +30$ °C ± 2 %
- When water temperature $> +30$ °C ± 3 %

The maximum permissible error (MPE) on volumes delivered at flow rate between the minimum flow rate Q_1 (included) and the transitional flow rate Q_2 (excluded) for water having any temperature is 5%.

If the flow rate exceeds the maximum value Q_4 , error (status) code „Overflow“ is present and calculations are:

- When the flow rate $Q \leq 1.2 \times Q_4$, the flow rate measurement and calculations are continued.
- When the flow rate $Q > 1.2 \times Q_4$, calculations are performed using $1.2 \times Q_4$ flow rate value.

2.1 DISPLAY (LCD)

THE DEVICE IS EQUIPPED WITH 2-LINES LCD (LIQUID CRYSTAL DISPLAY):

Upper line with 9-digits for displaying measured volume of water:

- Readings in normal mode: m³ (three digits after decimal point).
- Readings in test (verification) mode: m³ (six digits after decimal point).

Lower line with 5-digits for displaying current flow rate in m³/h and special symbols for displaying operation modes.

In the case of battery discharge, all integral readings and archive data shall be saved for up to 16 years and can be accessed at the meter manufacture's base by connecting a power battery in the operating condition.

2.2 DATA RECORDING AND STORAGE

In its memory, meter accumulates an archive of hourly, daily, and monthly - measured parameters. Archive values, specified in Paragraph 6.3, can be shown on the display.

HOURLY, DAILY AND MONTHLY OF THE FOLLOWING PARAMETERS VALUES ARE STORED IN THE METER:

| | |
|---|--|
| 1 | Integral of water consumption |
| 2 | Integral of water consumption in the forward direction |
| 3 | Integral of water consumption in the reverse direction |
| 4 | Minimum and Maximum flow rate value and date |
| 5 | Error (Status) code |
| 6 | Total operating time |
| 7 | Operating time without error |
| 8 | Minimum, Maximum and Average temperature |

DATA LOGGER CAPACITY:

- Up to 1480 hours for hourly records.
- Up to 1130 days for daily records.
- Up to 36 last months for monthly records.

Archive data storage time not less than 36 months. Storage time of measured integrated parameters in not less than 16 years, even if device is disconnected from power supply.

2.3 ALARMS

Qalcosonic W1 meter has integrated system that informs about certain alarms, which are indicated as an error code on LCD and transmitted as a status byte within data telegrams. Some of them are critical and could be sent immediately over LoRa or NB - IoT.

LIST OF ALARMS:

- **Leakage** (occurs when constant flow rate within 24 hours is more than 0.25/0.5/1% of Q3).
Disappears after 1 hour, if constant flow rate within that hour is less than configured value.
- **Burst** (occurs when constant flow rate within 60 minutes is more than 5/10/20% of Q3).
Disappears after 32 seconds, if constant flow rate within that period of time is less than configured value.
- **Freeze** (occurs when water temperature is lower than 2/3/4/5°C for 5 minutes).
Disappears after 5 minutes, if water temperature is higher than configured value)
- **Reverse flow** (occurs when meter detects negative flow that is equal to 2 x starting flow).
Disappears immediately if reverse flow is stopped).
- **Empty pipe** (occurs approx. 30 seconds after the absence of water.)
Disappears immediately (up to 30 seconds) if meter detects water without air or air bubbles.
- **Tamper** (occurs when meter is opened or damaged).
- **Hardware or software failure.**
- **Low battery** (occurs when approx. battery lifetime is less than 12 months).
- **Communication temporarily blocked** (only on meter's LCD).
- **Overflow** (occurs when flow rate is higher than Q4).
- **No consumption** (occurs when there was no water usage for the last 3/7/30 days).

| NOMINAL FLOW RATE Q ₃ , m ³ /h | Leakage threshold, m ³ /h | | | Burst threshold, m ³ /h | | |
|--|--------------------------------------|--------|-------|------------------------------------|------|------|
| | 0,25 % | 0,5 % | 1 % | 5 % | 10 % | 20 % |
| 1,6 | 0,004 | 0,008 | 0,016 | 0,08 | 0,16 | 0,32 |
| 2,5 | 0,00625 | 0,0125 | 0,025 | 0,125 | 0,25 | 0,50 |
| 4,0 | 0,010 | 0,020 | 0,040 | 0,20 | 0,40 | 0,80 |
| 6,3 | 0,01575 | 0,0315 | 0,063 | 0,315 | 0,63 | 1,26 |
| 10 | 0,025 | 0,050 | 0,100 | 0,50 | 1,00 | 2,00 |
| 16 | 0,040 | 0,080 | 0,160 | 0,80 | 1,60 | 3,20 |
| 25 | 0,0625 | 0,125 | 0,250 | 1,25 | 2,50 | 5,00 |
| 40 | 0,100 | 0,200 | 0,400 | 2,00 | 4,00 | 8,00 |

| Communication type | Display | | wMBus | | LoRa WAN | | | | NB - IoT | | | |
|-----------------------------------|------------|----------|-------------|----------|-------------|----------|------------------------|----------|-------------|----------|------------------------|----------|
| | Error code | | Status byte | | Status byte | | Critical alarm message | | Status byte | | Critical alarm message | |
| Type of alarm | Default | Optional | Default | Optional | Default | Optional | Default | Optional | Default | Optional | Default | Optional |
| Leakage | X | | X | | X | | X | | X | | X | |
| Burst | X | | X | | X | | X | | X | | X | |
| Freeze | X | | X | | X | | X | | X | | X | |
| Negative flow | X | | X | | X | | | X | X | | | X |
| Empty pipe | X | | X | | X | | | | X | | | |
| Tamper | X | | X | | X | | X | | X | | X | |
| Calculator's hardware error | X | | X | | X | | | | X | | | |
| Hardware error | X | | X | | X | | | | X | | | |
| Software error | X | | X | | X | | | | X | | | |
| Low battery (< 12 months) | X | | X | | X | | | | X | | | |
| Communication temporarily blocked | X | | | | | | | | | | | |
| Overflow | X | | | | | | | | | | | |
| No consumption | | X | | | | | | X | | | | X |

2.4 EXTERNAL COMMUNICATION MODULES AND INTERFACES

Optical interface is integrated in Qalcosonic W1 meter by default. It is intended for data reading, changing parameters of meter and for outputting optical pulses

in the test (verification) mode. It is activated by sending 1 second pulse sequence (5 minutes after the end of communication it is automatically deactivated).

There is also NFC (Near Field Communication) interface integrated by default. It is intended for data reading only.

AVAILABLE COMMUNICATION MODULES FOR DATA TRANSMISSION (ONLY ONE OPTION MIGHT BE SELECTED WHEN PLACING THE ORDER):

- RF 868 MHz
- RF 433 MHz
- RF 915 MHz
- RF 920,5 MHz
- NB - IoT (frequency bands B1, B3, B5, B8, B20, B28)

DATA IN QALCOSONIC W1 METER CAN BE TRANSMITTED USING THE FOLLOWING PROTOCOLS:

- wMBus T1
- wMBus T2
- wMBus S1
- wMBus C1
- LoRaWAN
- CoAP

INTERNAL CREDIT SYSTEM

All external communication interfaces are intended for data reading and meter parametrization. The meter is produced for being powered only from the internal battery. To save the battery, communication credit system is implemented into the meter. Time of communication through additional interfaces (optical connection) is automatically limited to save the battery (up to 20 minutes per month). Unused communication limit is summed up. If the limit is expired, the interface is blocked, and the new time limit of communications will start only after the change of the hour (16 seconds for each next hour). If the device configuration has never been changed, the credit system will never be used up.

Alarm credits: when a particular error occurs, the device sends an alarm telegram, which consumes 1 credit. The meter has a maximum reserve of 30 credits, which means that it can send up to 30 alarm telegrams in one day. Alarm credits automatically refill by 1 credit in 24 hours. Credits above 30 units are not summed up.

Radio credits: every data telegram consumes a different amount of credits, depending on many factors: payload type, spreading factor (LoRa WAN/T1), communication type, amount of stored archive values, etc. Radio credits are refilled every minute by a certain amount. Telegrams could not be sent (communication is temporarily blocked) if the remaining amount of credits is less than necessary for sending one telegram.

Under normal circumstances, if the configuration after manufacturing has not been changed from the customer's side, the credits should not be depleted at all, except NB-IoT devices which also depend on telco provider's radio coverage conditions.

2.5 METER PULSE OUTPUT

2.5.1 Pulse output in test mode via optical interface

Pulse values through optical interface are available only in Test Mode and it depends on the nominal flow rate Q3. It might be used during verification for automatic metrology reading. Available values are specified in the table below:

| Nominal flow rate Q3, m ³ /h | 1,6 | 2,5 | 4,0 | 6,3 | 10 | 16 | 25 | 40 |
|---|-------|---------|-------|------------|----------------|----------|----------|----------|
| Pulse value, l/pulse | 0,001 | 0,002 | 0,004 | 0,005 | 0,010 | 0,015 | 0,020 | 0,025 |
| Connection thread | G ¾ | G ¾; G1 | G1 | G1 ¼; G1 ½ | G1 ¼; G1 ½; G2 | G2; DN50 | G2; DN50 | G2; DN50 |

2.6 POWER SUPPLY

The meter is powered by one or more internal non-replaceable batteries with a service life up to 16 years. Accurate battery lifetime depends also on data transmission frequency. You can choose one of several power battery options when ordering:

For G ¾ or G1 connection type meters (A design version):

- Two internal "AA" connection type 3.6 V lithium (Li-SOCl₂) batteries
- Two internal "AA" size + one "A23" size 3.6 V nominal voltage lithium (Li-SOCl₂) batteries

For G ¾ or G1 connection type meters (B design version):

- One internal "C" size + one "A23" size 3.6 V nominal voltage lithium (Li-SOCl₂) batteries
- Two internal "AA" size + one "A23" size 3.6 V nominal voltage lithium (Li-SOCl₂) batteries

For G1 ¼ or G1 ½ connection type meters:

- Two internal "AA" size + one "A23" size 3.6 V nominal voltage lithium (Li-SOCl₂) batteries
- One internal "C" size + one "A23" size 3.6 V nominal voltage lithium (Li-SOCl₂) batteries

For G2 or DN50 connection type meters:

- One internal "D" size + one "A23" size 3.6 V nominal voltage lithium (Li-SOCl₂) batteries

2.7 MECHANICAL DATA

Maximum dimensions of the biggest Qalcosonic W1 water meter are 170 mm x 139 mm x 200 mm. This applies to DN50 meter with 200 mm length.

WEIGHT OF DIFFERENT SIZES OF QALCOSONIC W1 WATER METERS (WITHOUT ACCESSORIES) ARE SHOWN IN THE TABLE

| END CONNECTIONS (OVERALL LENGTH) | WEIGHT OF METER, NOT MORE THAN, KG |
|---|------------------------------------|
| G ¾ (80, 105, 110, 115, 165, 170 mm) G ¾ (105n, 110n, 165n, 170n mm) | 0,30 |
| G1 (105, 110, 130, 165, 190 mm) G1 (105n, 110n, 130n, 165n, 190n mm) | 0,40 |
| G1 1/4" (260 mm) | 0,82 |
| G1 1/2" (260 mm) | 0,95 |
| G2" (300 mm) | 1,00 |
| DN50 (200 mm) | 1.78 |

2.8 OPERATION CONDITIONS

OPERATING CONDITIONS:

- ambient temperature from -15°C to 70°C
- relative humidity up to 100%, condensing
- atmospheric pressure 86 kPa to 106.7 kPa

Installation: Indoor or outdoor

Mechanical environment class: M1

Electromagnetic environment class: E2

Enclosure protection class: IP68

3 OPERATING PRINCIPLE

Flow measuring principle is based on ultrasonic measurement method. Flow rate is calculated using time difference results many times, and time of flight upstream and downstream is used for these calculations. Calculated flow rate is indicated in meter's LCD.

WATER METER PERFORMS ALL NECESSARY MEASUREMENT AND DATA STORAGE FUNCTIONS. BELOW ARE THE MOST IMPORTANT:

- Static flow measurement - no moving parts, no wear and tear
- Very high metering accuracy
- Eliminates measuring deviations caused by sand, suspended particles or air pockets
- Long-term measurement stability and reliability
- 9 digits, multi-line LCD. Total volume and instantaneous flow rate indication at the same time
- No straight pipe run needed
- Bi-directional flow measurement
- Installation in any position

4 MARKING AND SEALING

4.1 MARKING

The following information is engraved on the meter cover: EU-type examination certificate number, manufacturer's trademark, distributor logo (if applicable), type designation of meter, year of manufacture and

serial number, permanent flow rate Q3 and ratio (Q3/Q1) preceded "R", temperature class, maximum admissible working pressure (MAP), pressure loss class, installation sensitivity class of the meter, latest date by

which the meter shall be replaced, software version number, IP code, QR code or barcode communication interface NB-IoT (if present on the meter).

THE FOLLOWING IS INDICATED ON THE HOUSING OF WATER METER:

- Type of connection (thread size)
- Flow direction

4.2 SEALING

The meter casing is imperceptibly closed. Any unauthorized opening of the housing is impossible without damaging. Additional manufacturer protection is not applied. The manufacturer's warranty does not apply if the upper cover is opened or connection between

upper cover and the housing is damaged. When the upper sealed cover is opened, the safety button that is installed in the meter body is activated and error code appears on the meter display. For sealing of meter after installation, the

holes in the meter's body should be used (See Annex D). Holes for sealing the meter with a threaded connection after installation are provided in the housing of the meter. For the meter with flanges DN50, one mounting screw is sealed after installation.

5 INSTALLATION

5.1 GENERAL REQUIREMENTS

PRIOR TO INSTALLING THE METER, IT IS NECESSARY:

- to check the complete set of the meter with that specified in the technical documentation.
- to check for any visible mechanical defects.
- to check the configuration of the meter and to change it if necessary.

The meters may only be installed by qualified specialists in accordance with the requirements of this document and the meter installation design.

5.2 CHECKING CONFIGURATION OF THE METER

Prior to installing the meter, it must be verified whether its configuration complies with the requirements for the specific facility, and it must be changed if necessary.

THE FOLLOWING PARAMETERS ARE VERIFIED (THE FACTORY SETTINGS FOR THE METER ARE THEIR STANDARD ONES):

- volume measurement units
- displayed volume resolution (point position)
- additional customer serial number (if applied)
- internal clock time (with optical head and special tools)

NOTE. The transportation mode will turn off and radio will be activated automatically when the meter starts operation, and the volume totalizer has accumulated more than 10 liters.

5.3 CHECKING OF INSTALLATION AND PARAMETER SETTING

If meter is installed correctly, when there is water flow, the display of the meter should display flow readings.

It is necessary to check whether the meter is installed in the correct direction, also - whether there is no air in the system.

5.4 MOUNTING

Temperature of the working environment should not be higher than 70°C.

No special requirements are established for the free space around the meter. It is important that nearby installations or structures do not rest against the housing of the meter and do not interfere with reading the data from the display. The meter should be installed at a safe distance from other devices emitting heat or strong electromagnetic field (to prevent disturbance of its working environment conditions).

Sizes and mounting dimensions of meter are provided in Annex A and B.

Straight pipelines in upstream and downstream from the meter are not required (flow profile sensitivity class is U0 D0).

Water meters may be installed in all positions (either horizontally, vertically, or inclined). Mandatory condition: pipe must be pressurized to not less than 30 kPa. For proper preparation the pipe must be filled with water.

Direction of the arrow on the meter must match flow direction in pipeline. Lateral tension force should be avoided, pipe ends must be aligned together.

To avoid stresses in the pipelines, the distance between the meter connection points in the meter installation place shall correspond to the total length of meter regarding the thickness of gaskets.

It is recommended to select meter installation place as far as possible from potential sources of vibration (for example, pumps).

The gaskets must match the pipe diameter. During the installation, gasket must be exactly centered with the center of the pipe cross-section to avoid sticking out gaskets inside the pipe.

Tightening torque should not exceed the value below:

| END CONNECTIONS (overall length) | TIGHTENING TORQUE, Nm (rubber EPDM) |
|-------------------------------------|--|
| DN15 | 25 |
| DN20 | 30 |
| DN25 | 35 |
| DN32 | 35 |
| DN40 | 35 |
| DN50 | 40 |

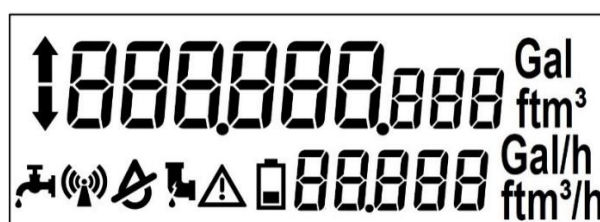
6 OPERATION

6.1 DISPLAY FUNCTIONS



THE METER IS EQUIPPED WITH 2-LINE LCD (LIQUID CRYSTAL DISPLAY):

Upper line with 9-digits for displaying measured volume of water.

Lower line with 5-digits for displaying current flow rate and special symbols for displaying various events.










FLOW ARROW MEANINGS:

| | |
|---|---------------|
|  | Direct flow |
|  | Reverse flow* |
| Arrow is not displayed | No flow |

REMARK (*): for reverse flow case, the meter shows reverse flow rate and error code.

SPECIAL SYMBOLS ON LCD:

| Symbol | Description |
|---|--------------------------------|
|  | Leakage |
|  | Radio transmitter is activated |
|  | Empty pipe |
|  | Pipe is cracked (Burst) |
|  | Error (Status) |
|  | Low battery |

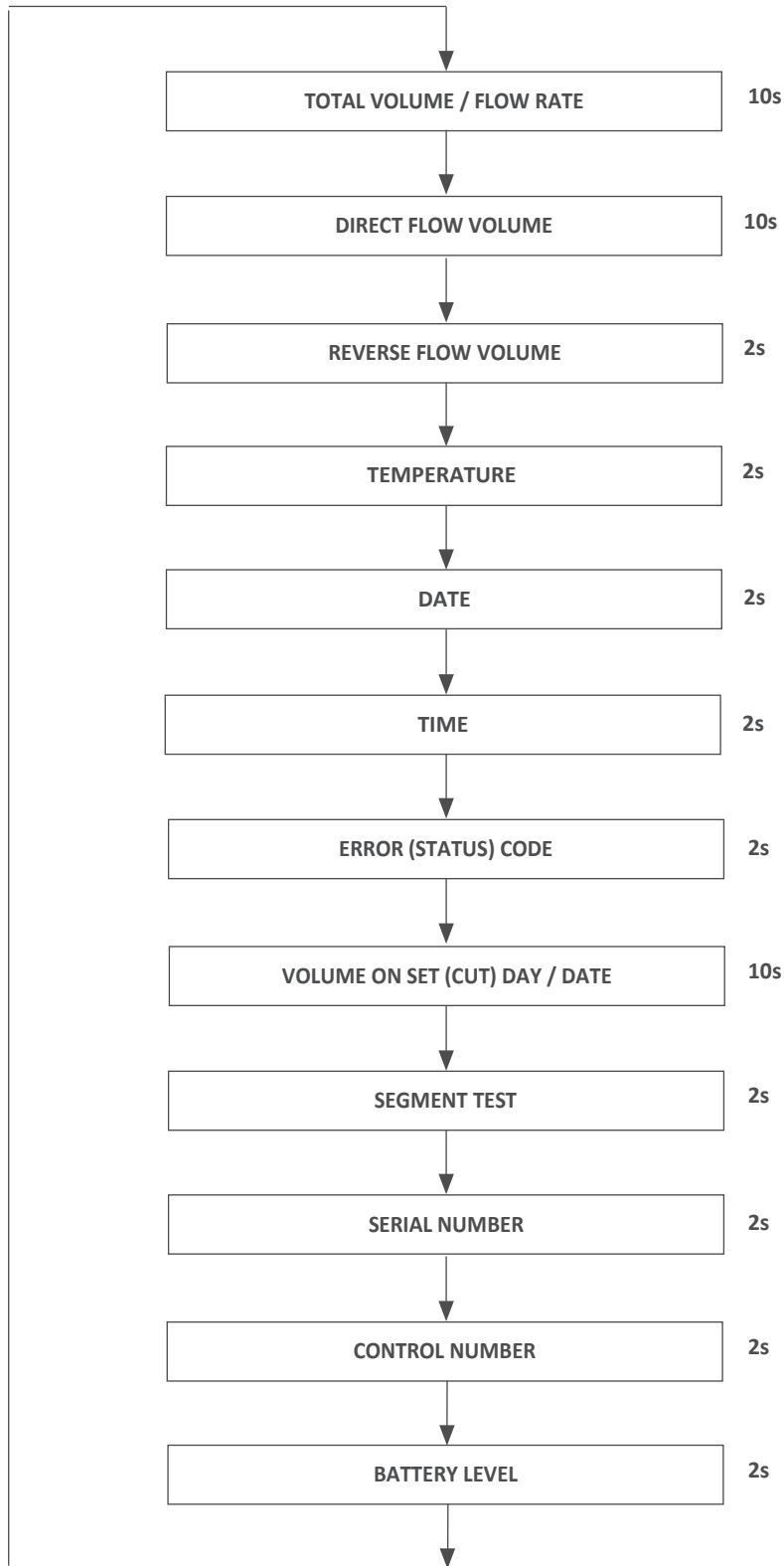
Error symbol  is shown when there is a significant operation error. For the Info code, see the LCD menu (Paragraph „ Menu structure “).

6.2 MENU STRUCTURE

Menu structure in complete mode is presented in Fig. 6.1.

Meter menu stages switch automatically. Individual stages, except of total volume and error (status) code, could be disabled during installation. Error code is displayed only when error occurs. If there are no errors detected by the meter, then error code is not displayed. By default, meter LCD shows error code and total volume / flow rate stages.

Fig. 6.1 Menu structure in normal mode



6.3 VIEWING THE READINGS IN COMPLETE MODE (USER MENU)

REMARK: here the full list of parameters is presented. By default, only error (status) code and total volume / low-rate stages are enabled.

| ID | Parameter | Value (example) | Remarks |
|------|---------------------------------------|-----------------|-----------------------|
| 1.1 | Total volume, Flow rate | | |
| 1.2 | Direct flow volume | | |
| 1.3 | Reverse flow volume* | | |
| 1.4 | Water temperature | | |
| 1.5 | Date | | |
| 1.6 | Real - time | | |
| 1.7 | Status code and error occurrence date | | Changes each 1 second |
| 1.8 | Accumulated volume on set day /date | | |
| 1.9 | Segment test | | Changes each 1 second |
| 1.10 | User identification number | | |
| 1.11 | Control number | | |

| | | | |
|------|---------------------------------------|----------------|--|
| 1.12 | Calculated battery level, percentages | bAtteR-y 97 | |
|------|---------------------------------------|----------------|--|

NOTE: * Reverse flow volume can be calculated with metrological verification.

* Meters with reverse flow measurement function are installed only without filter strainer.

Total volume can be calculated in 2 following ways:

- The volume passed during reverse flow is subtracted from the indicated direct volume.
- The reverse flow measurement option is disabled. In this case, the forward flow volume remains unchanged during reverse flow.

Display of irrelevant parameters can be turned off. Also, parameters that are not relevant to the specific meter configuration will not be indicated.

Indication of specific parameters can be turned on or off by means of meter configuration tools.

6.4 VIEWING THE READINGS IN VERIFICATION (TEST) MODE

Menu structure in verification (test) mode is presented in the Fig 6.2.

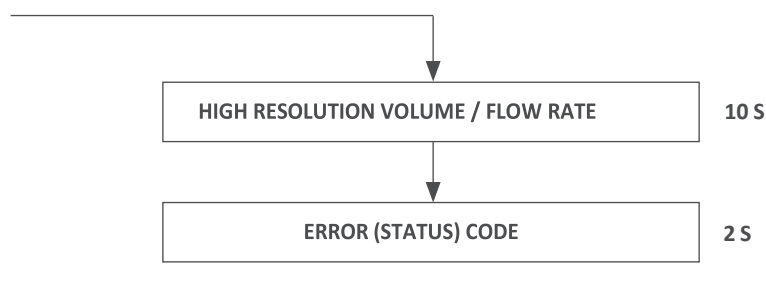


Fig. 6.2 Menu structure in verification (test) mode

High resolution has 6 decimal digits. Flow rate resolution remains the same.







6.5 VOLUME READINGS IN TEST (VERIFICATION) MODE

| PARAMETER | VALUE (EXAMPLE) | REMARKS |
|-----------------------------------|-----------------|--|
| High resolution integrated volume | | <p>Updated every 10 seconds.</p> <p>Resolution increased to 6 decimal numbers.</p> |

6.6 ERROR (STATUS) CODES

Operating status is encoded by a 4-digit code on LCD:

| CODE NUMBER | DESCRIPTION | |
|-------------|---|--|
| nXXX | 0 - Normal operation | |
| | 2 - No consumption | |
| | 4 - Damage to meter housing (tamper) | |
| | 8 - Calculator's hardware failure detected | |
| XnXX | 0 - Normal operation | |
| | 1 - Leakage | |
| | 2 - Burst (pipe is cracked) | |
| | 4 - Communication is temporarily blocked* | |
| | 8 - Low battery (less than 12 months of lifetime is left) | |

| | | |
|-------------|---|---|
| XXnX | 0 - Normal operation | |
| | 4 - Software failure detected |  |
| | 8 - Hardware failure detected |  |
| XXXn | 0 - Normal operation | |
| | 1 - Empty pipe (pipe is not filled with water or air is detected) |  |
| | 2 - Reverse flow |  |
| | 4 - Overflow (flow rate is greater than Q4) |  |
| | 8 - Freeze alert |  |

Active info codes are added if there is detected more than one error. Then the summary indicated info code will be as follows:

| | | |
|--------------------------------------|--------------------------------------|--|
| 3 - corresponds error code 2 + 1 | 9 - corresponds error code 8 + 1 | D - corresponds error code 8 + 4 + 1 |
| 5 - corresponds error code 4 + 1 | A – corresponds error code 8 + 2 | E - corresponds error code 8 + 4 + 2 |
| 6 - corresponds error code 4 + 2 | B - corresponds error code 8 + 2 + 1 | F - corresponds error code 8 + 4 + 2 + 1 |
| 7 - corresponds error code 4 + 2 + 1 | C - corresponds error code 8 + 4 | |

*Note - Error is displayed only for meters with LoRa WAN communication type.

6.7 TEST (VERIFICATION) MODE CONTROL

Test Mode is used for verification process as it allows to achieve precise test results within short measuring time. In this mode, total volume is indicated in increased resolution, also optical pulses are generated through optical interface. Exact pulse values are described in 2.5 paragraph.

Test mode can be activated by using optical head and PC with W1 TOOL software. Optical head should be connected to the computer USB's interface. The optical head must be placed in a special holder and placed on the meter. It is necessary to run the program and specify the correct COM port number to which the USB cable is connected. Then press the "Wake up meter" button and the "Enter test mode" button.

In TEST mode, the total volume value is displayed with a resolution of 0.xxxxxx (six decimal places).

After verification process, the meter can be returned to the User mode in the same way - after opening the program startup window, click „Wake up meter“ then click „Enter User mode“. The meter returns to the normal mode.

Also, the meter will return to its normal mode automatically in 24 hours after activation of Test Mode.

7 VERIFICATION

Metrological control of meter parameters is performed according to requirements defined in EN ISO 4064-1.

8 TRANSPORTATION AND STORAGE REQUIREMENTS

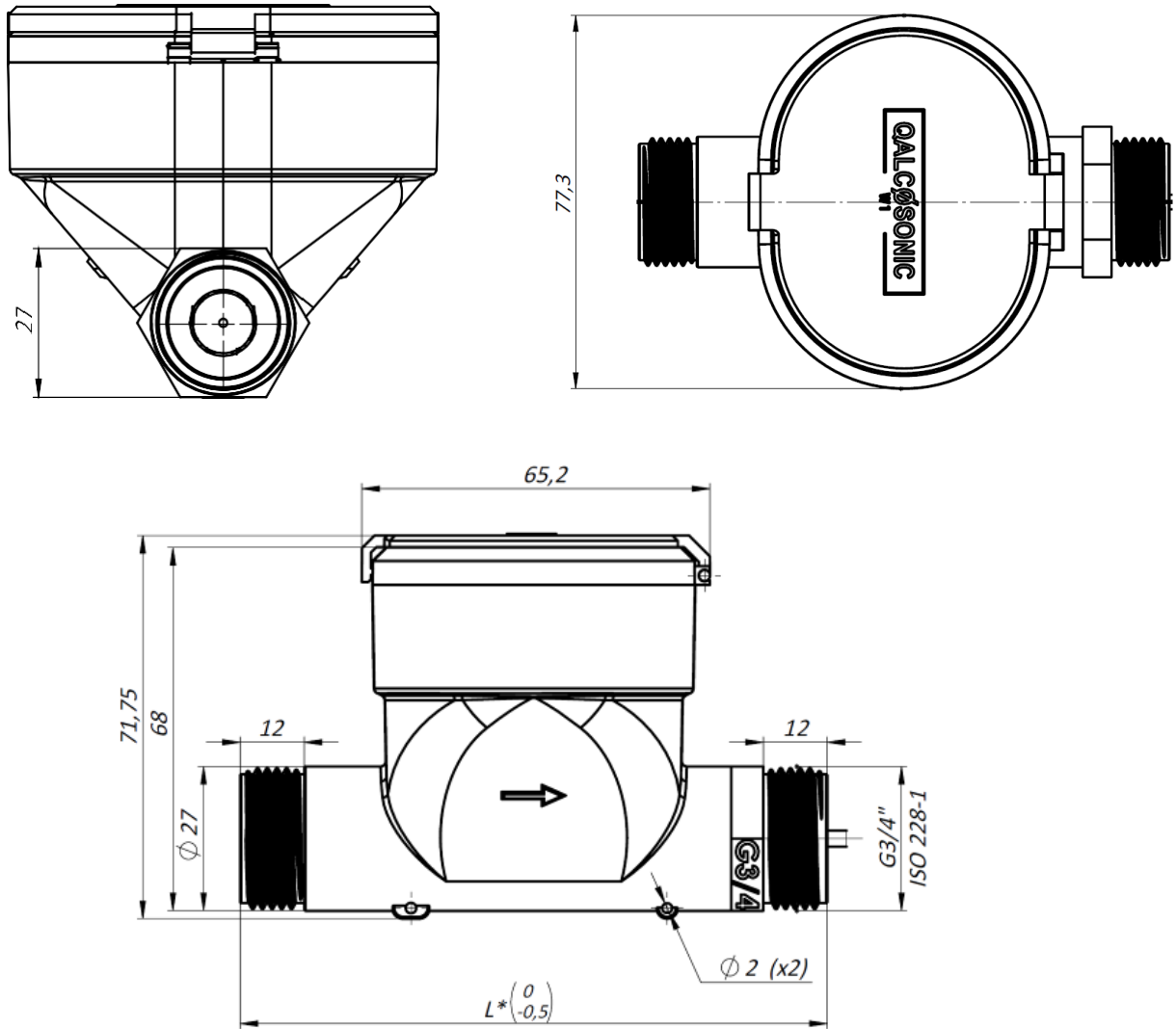
Packed meters may be transported in any type of covered vehicle. Equipment should be anchored reliably to avoid shock and possibility to shift inside vehicle. Meters should be protected against mechanical damage and shock. No aggressive chemical substances should be stored together because of corrosion hazard.

- Storage and transportation temperature: from -25°C to 70°C (drained flow part)
- Humidity: not more than 93%

ANNEX A.1 G ¾ :

Sizes and dimensions of water meter QALCASONIC W1

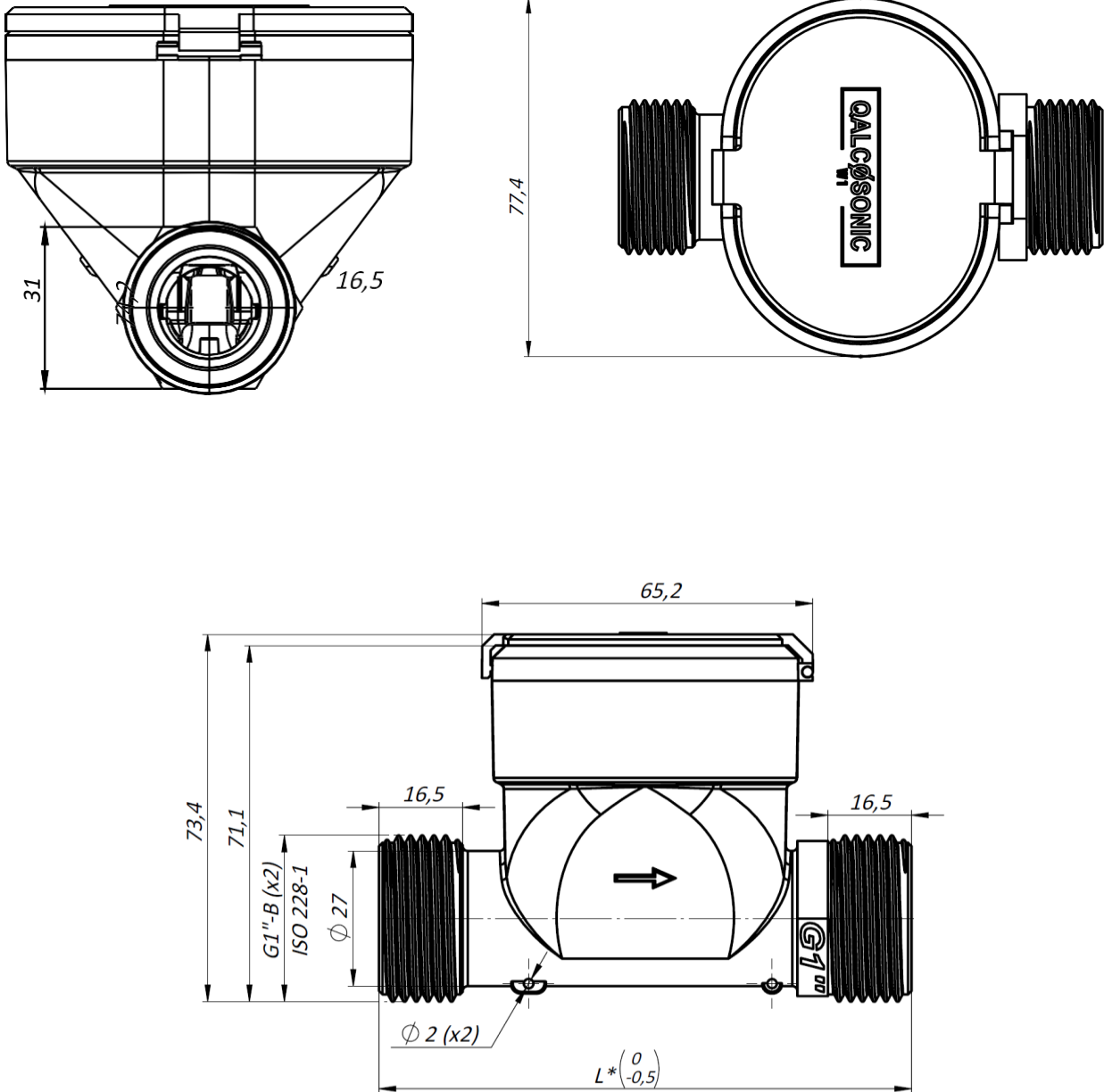
A.1 G ¾ :



| MODEL | L, MM |
|----------|-------|
| G ¾ L80 | 80 |
| G ¾ L105 | 105 |
| G ¾ L110 | 110 |
| G ¾ L115 | 115 |
| G ¾ L165 | 165 |
| G ¾ L170 | 170 |

ANNEX A.2 G1

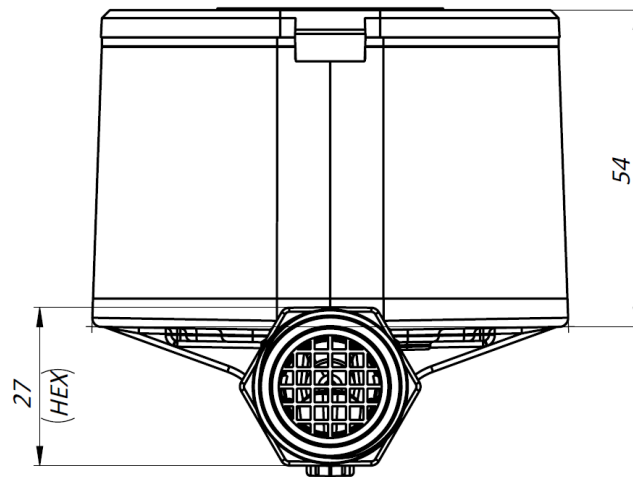
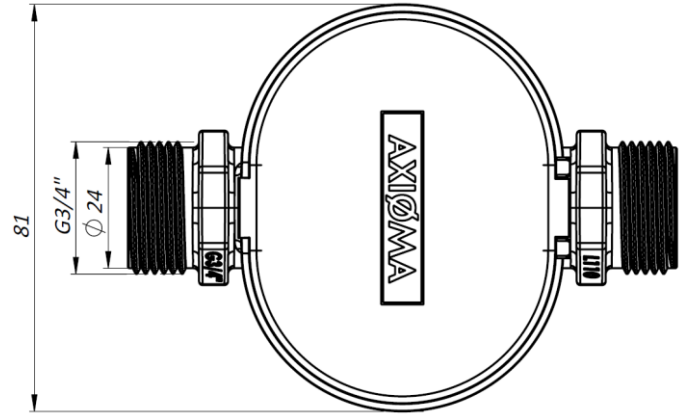
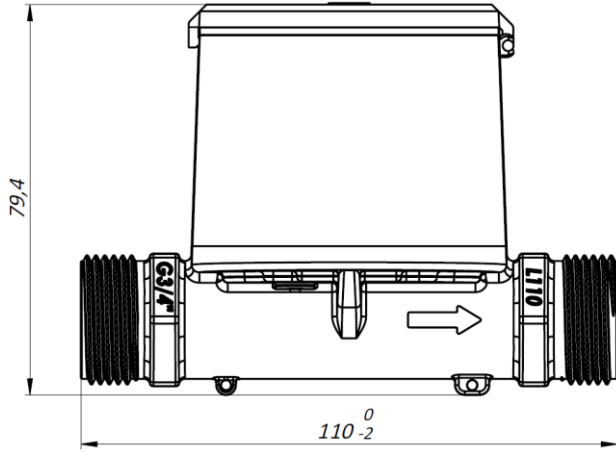
A.2 G1:



| MODEL | L, MM |
|-----------|-------|
| DN20 L105 | 105 |
| DN20 L110 | 110 |
| DN20 L130 | 130 |
| DN20 L165 | 165 |
| DN20 L190 | 190 |

ANNEX B.1 G 3/4

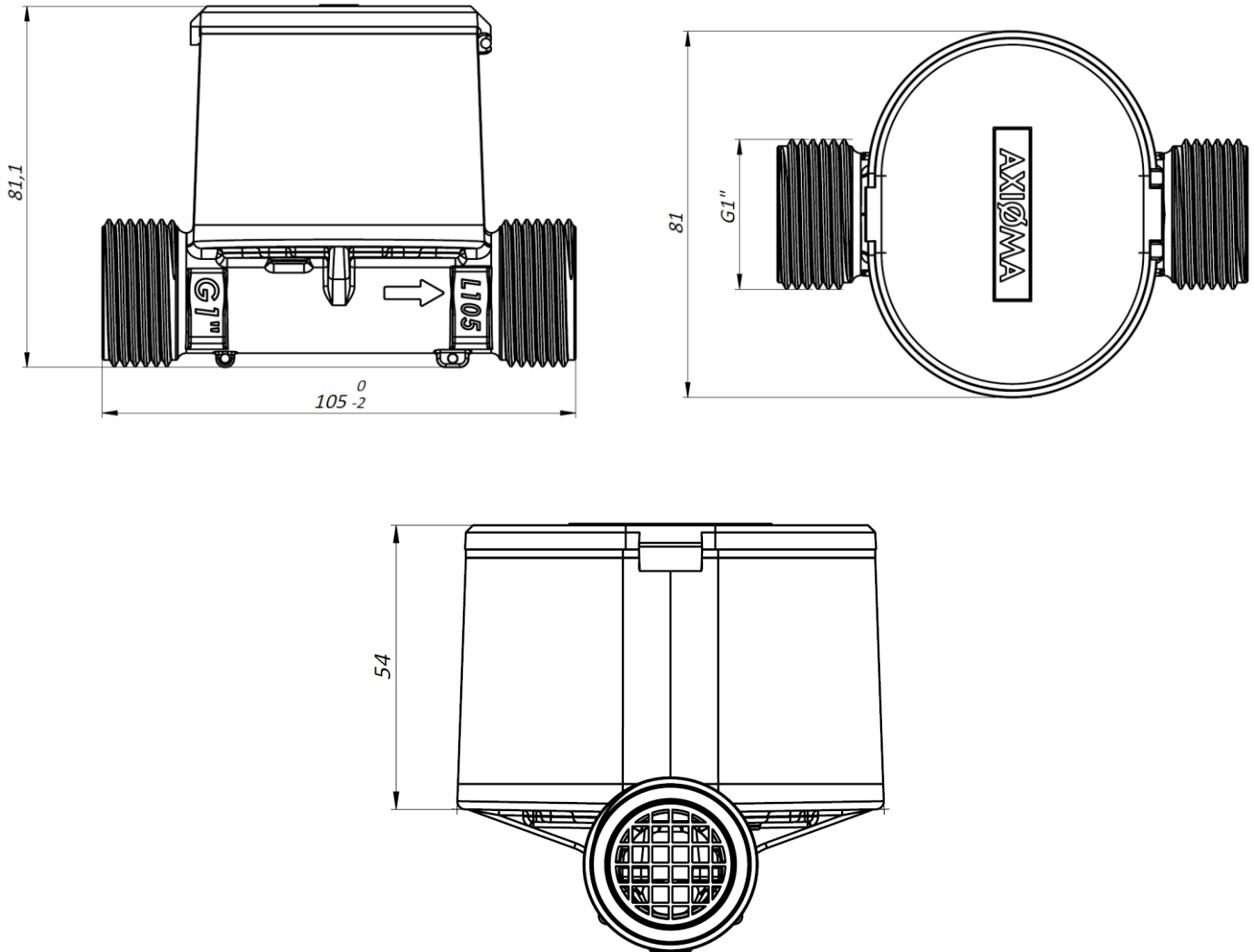
B.1 G 3/4



| MODEL | L, MM |
|-------------|-------|
| G 3/4 L105n | 105 |
| G 3/4 L110n | 110 |
| G 3/4 L165n | 165 |
| G 3/4 L170n | 170 |

ANNEX B.2 G1

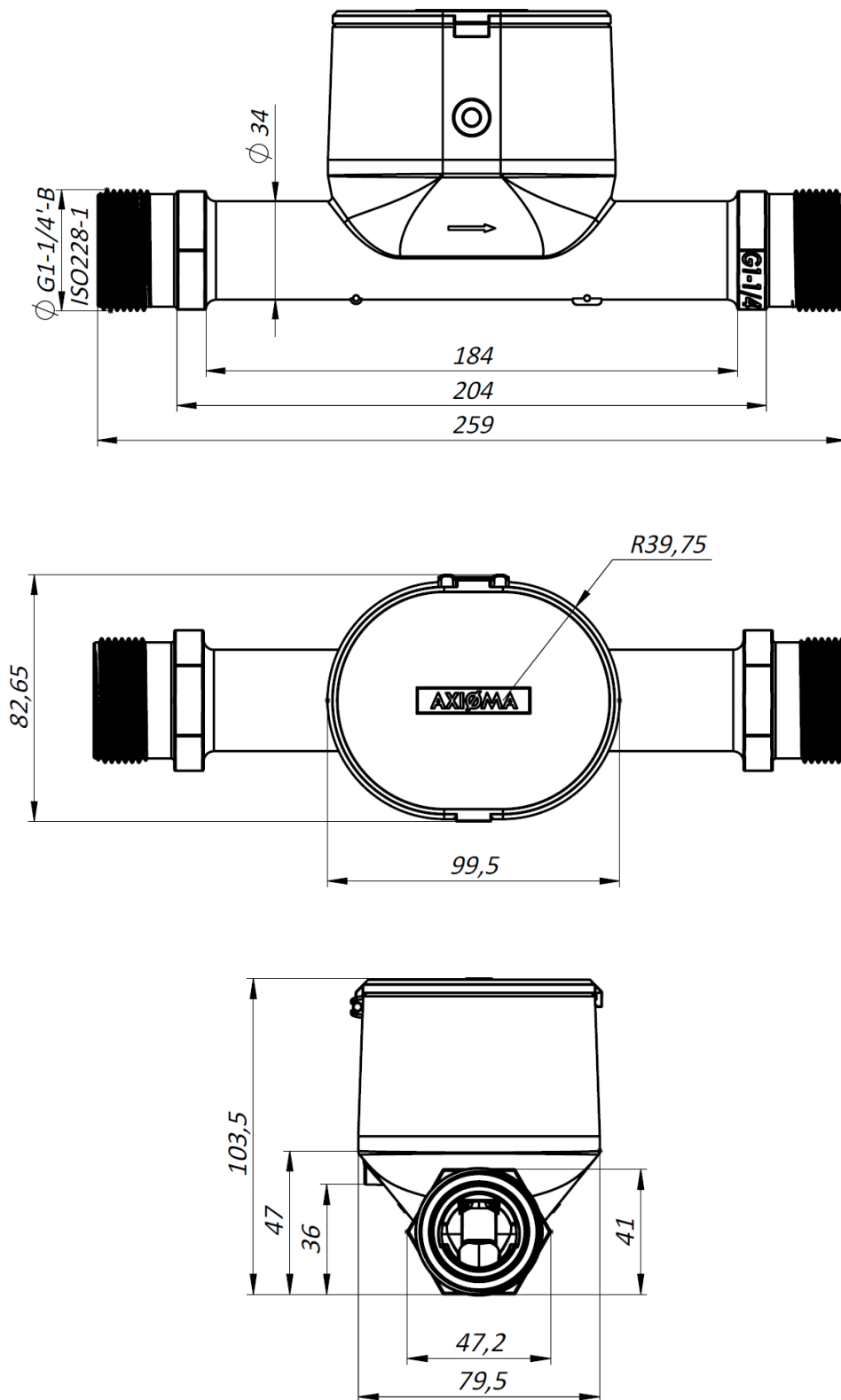
B.2 G1



| MODEL | L, MM |
|----------|-------|
| G1 L105n | 105 |
| G1 L110n | 110 |
| G1 L130n | 130 |
| G1 L165n | 165 |
| G1 L190n | 190 |

ANNEX C.1 G1 ¼

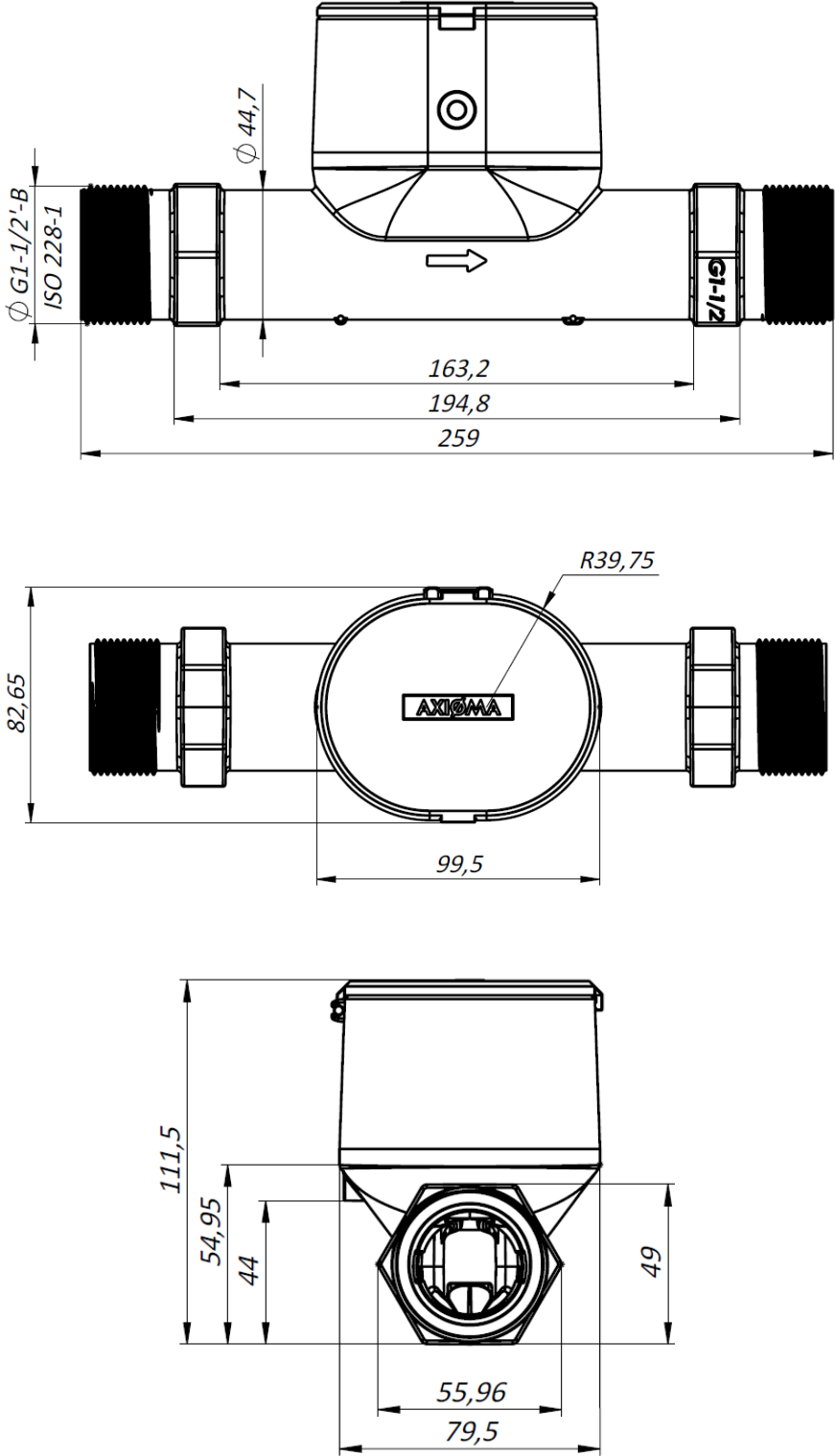
C.1 G1 ¼



| MODEL | L, MM |
|-----------|-------|
| G1 ¼ L260 | 260 |

ANNEX C.2 G1 ½

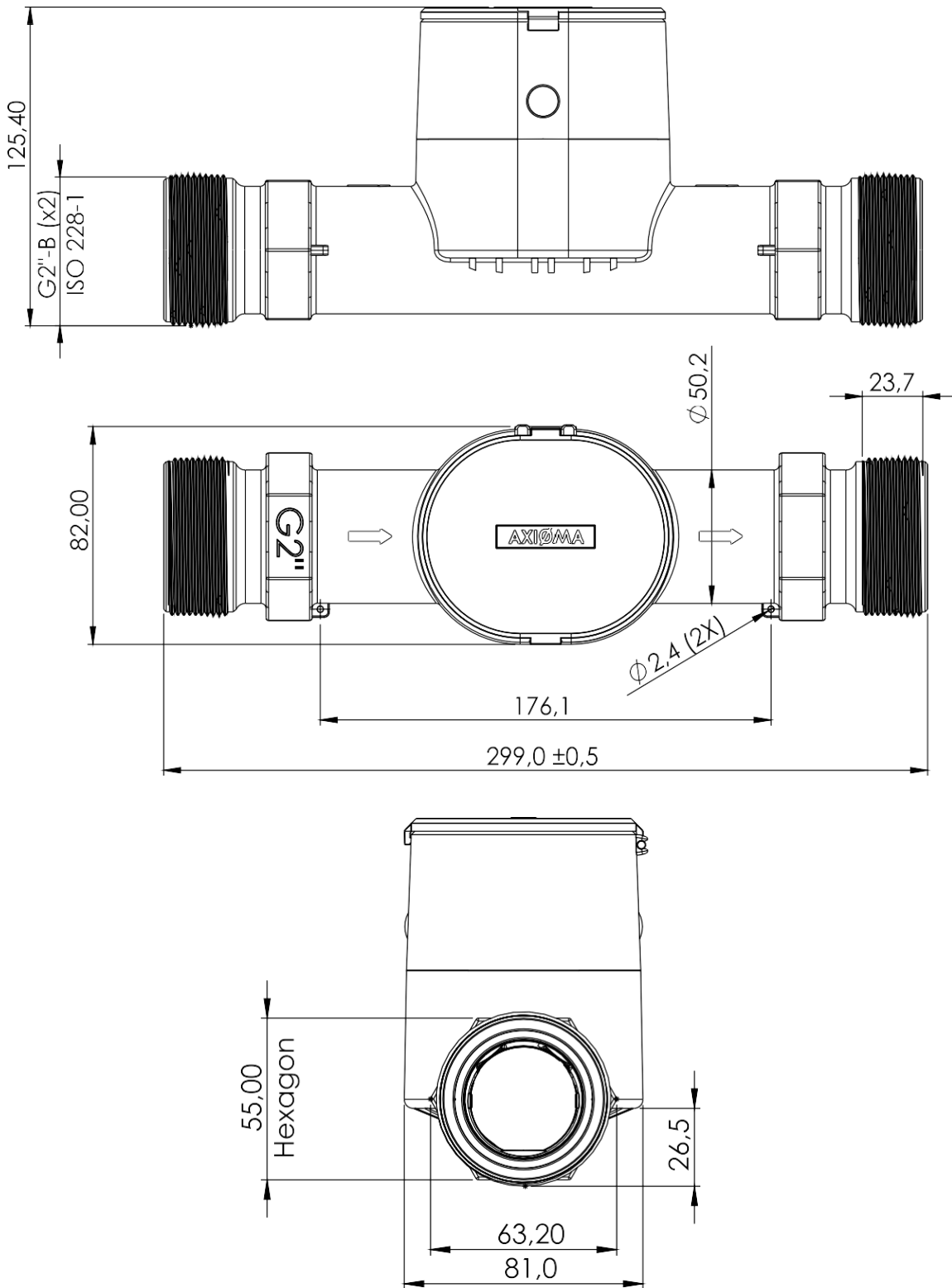
C.2 G1 ½



| MODEL | L, MM |
|-----------|-------|
| G1 ½ L260 | 260 |

ANNEX C.3 G2

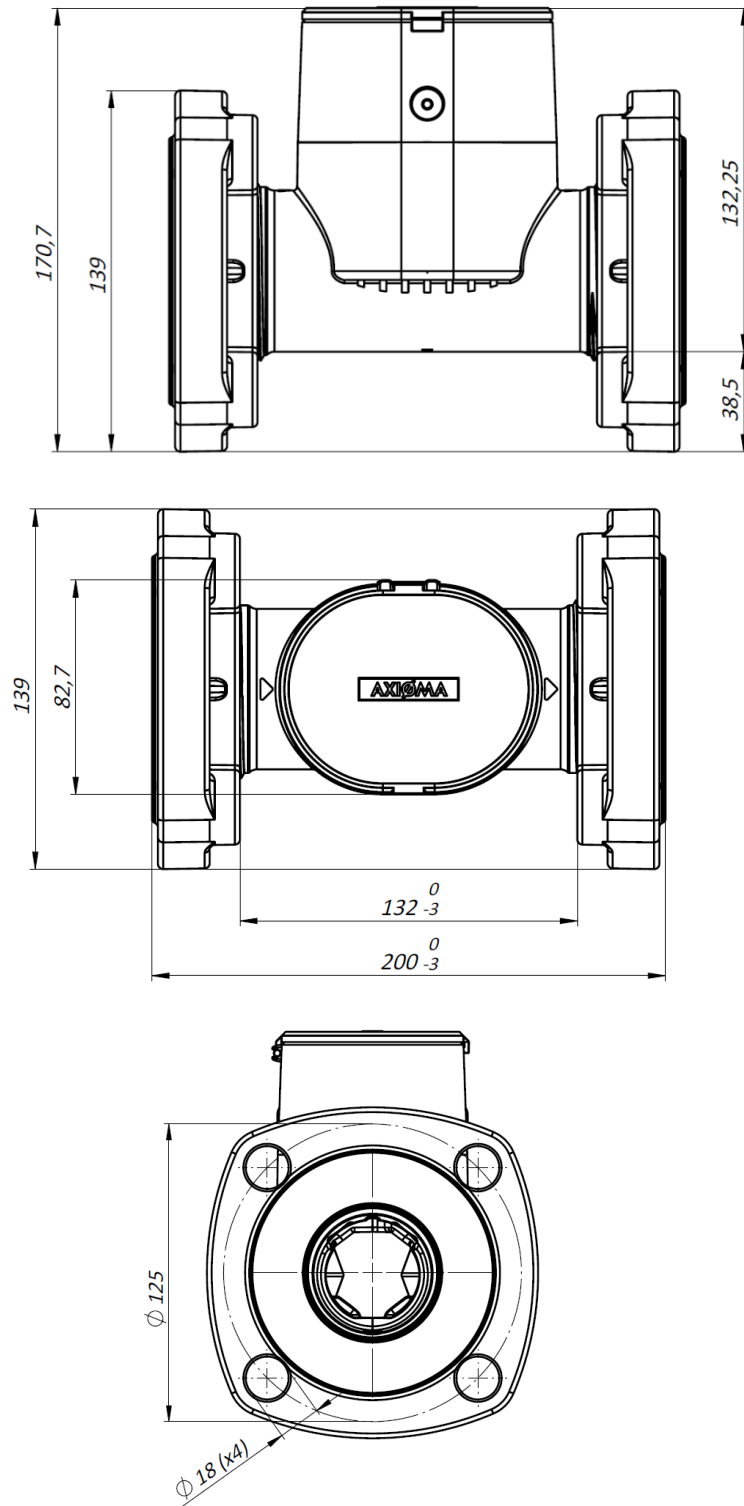
C.3 G2:



| MODEL | L, MM |
|---------|-------|
| G2 L300 | 300 |

ANNEX C.4 DN50

C.4 DN50

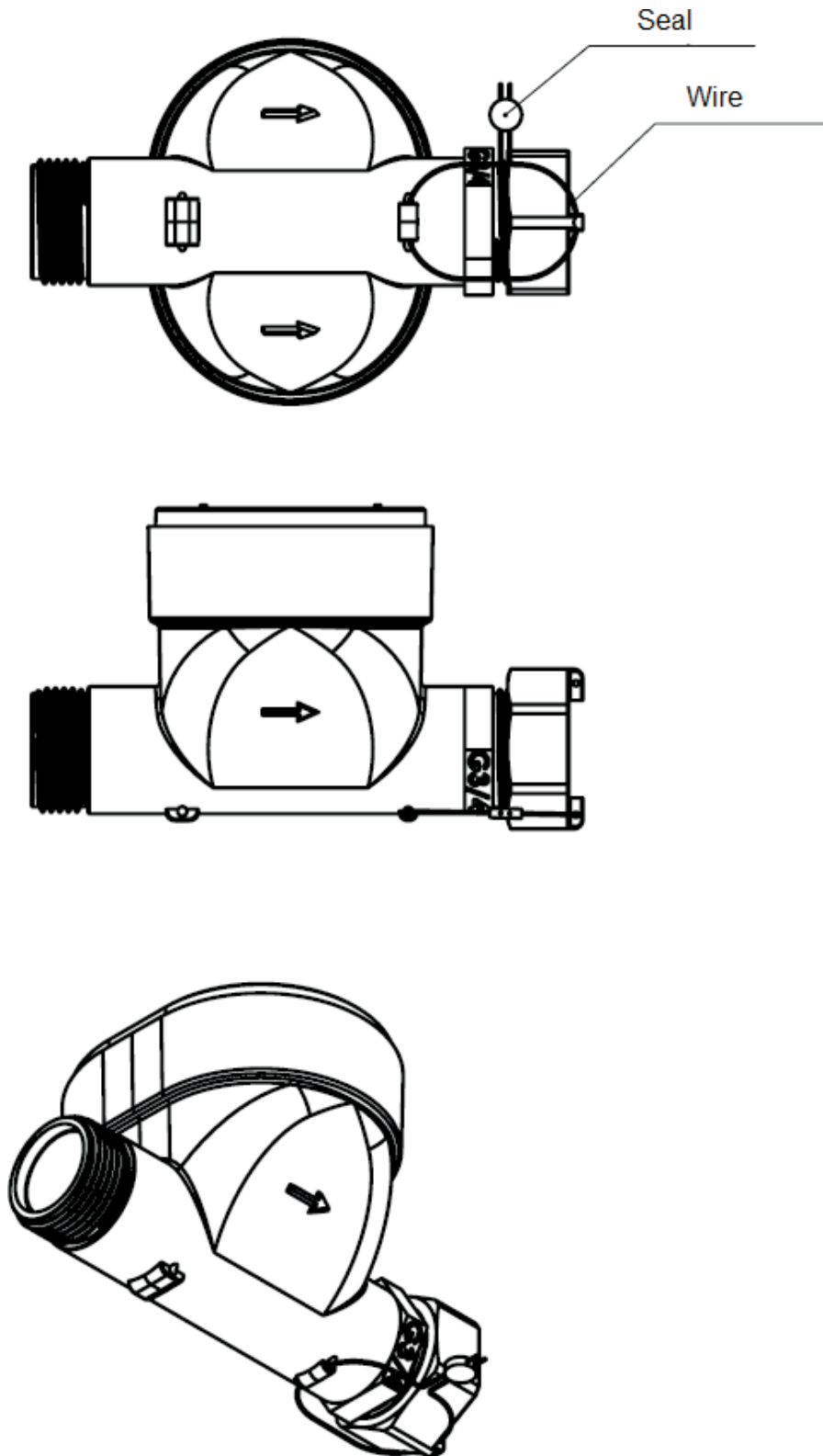


| MODEL | L, MM |
|-----------|-------|
| G2 ½ L200 | 200 |

ANNEX D.1 G ¾

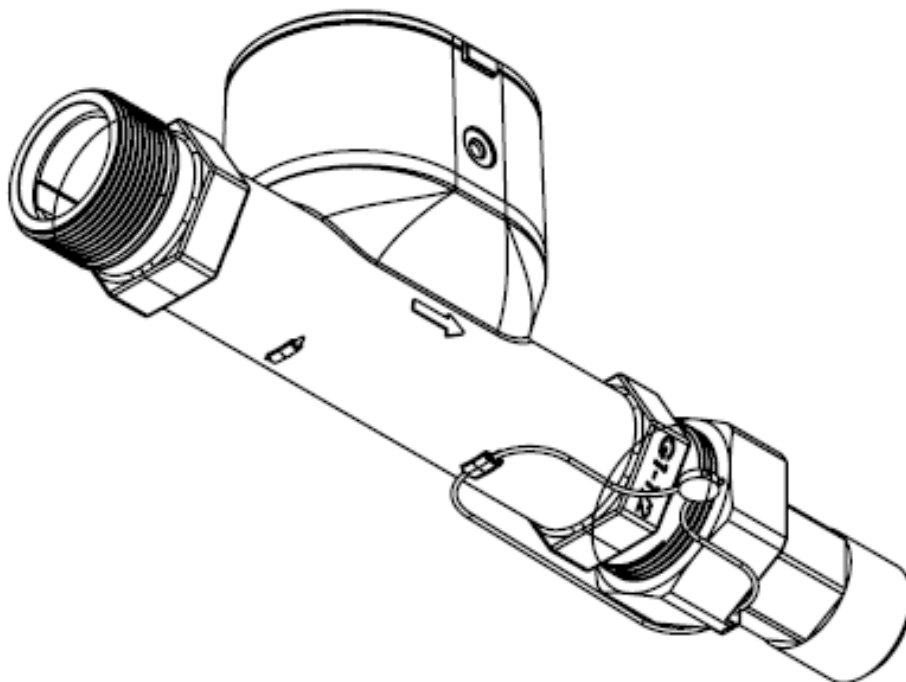
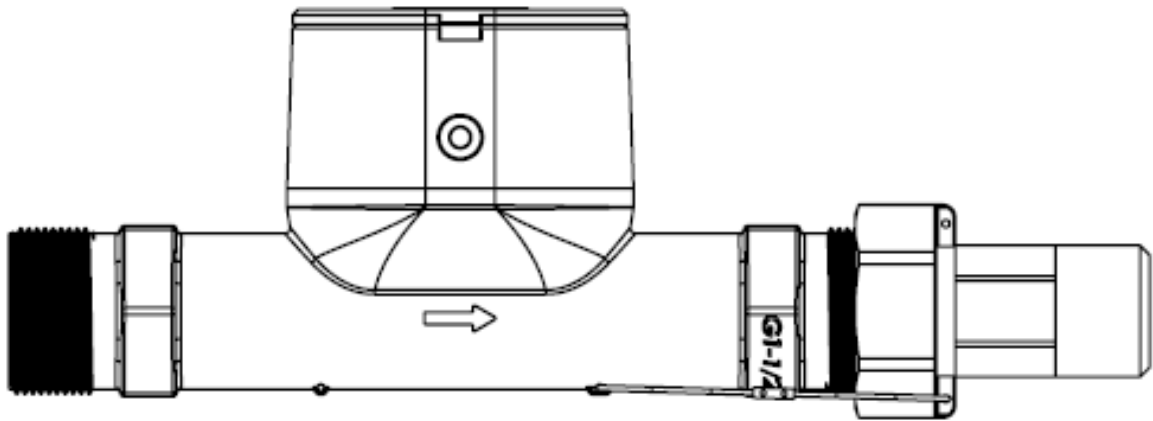
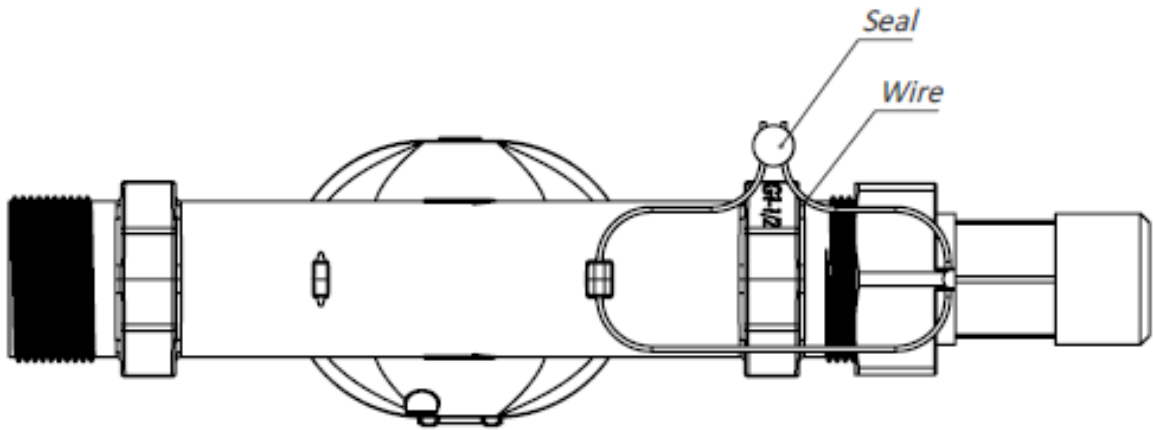
Example of sealing water meter after installation.

D.1 - G ¾



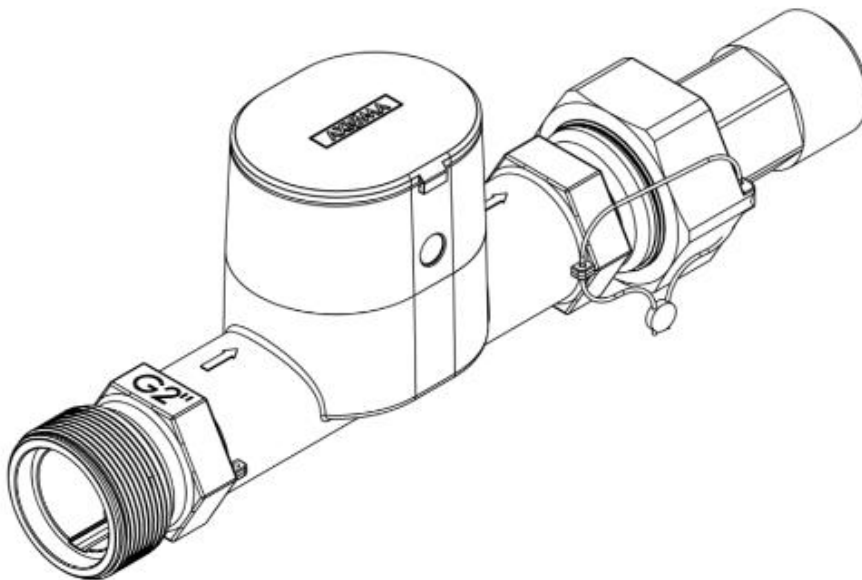
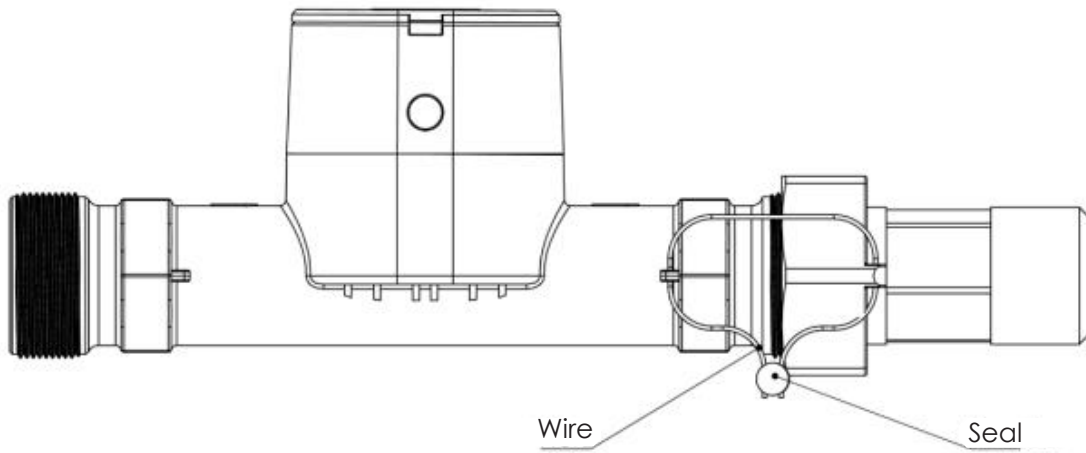
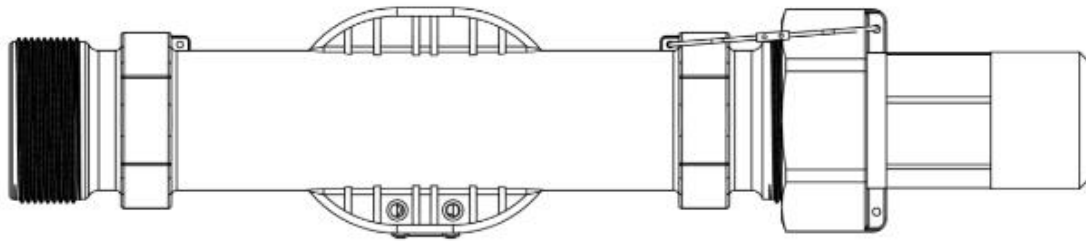
ANNEX D.2 G1 ¼

D.2 - G1 ¼ :



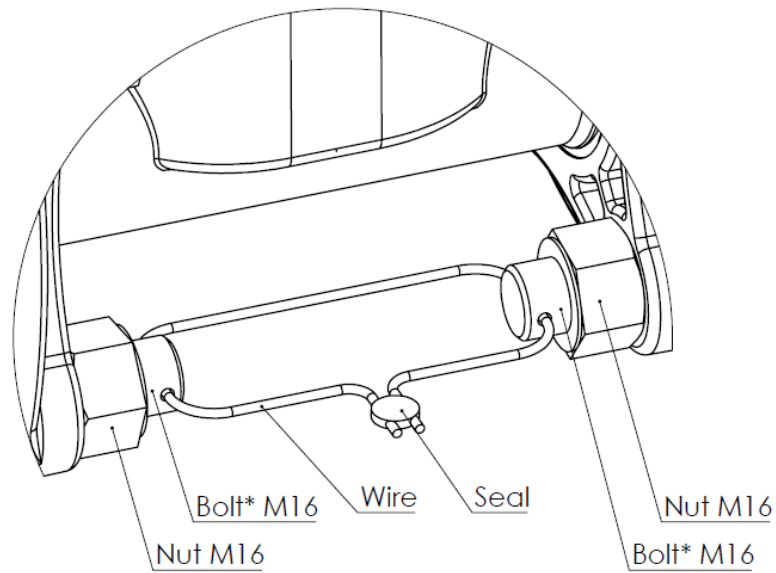
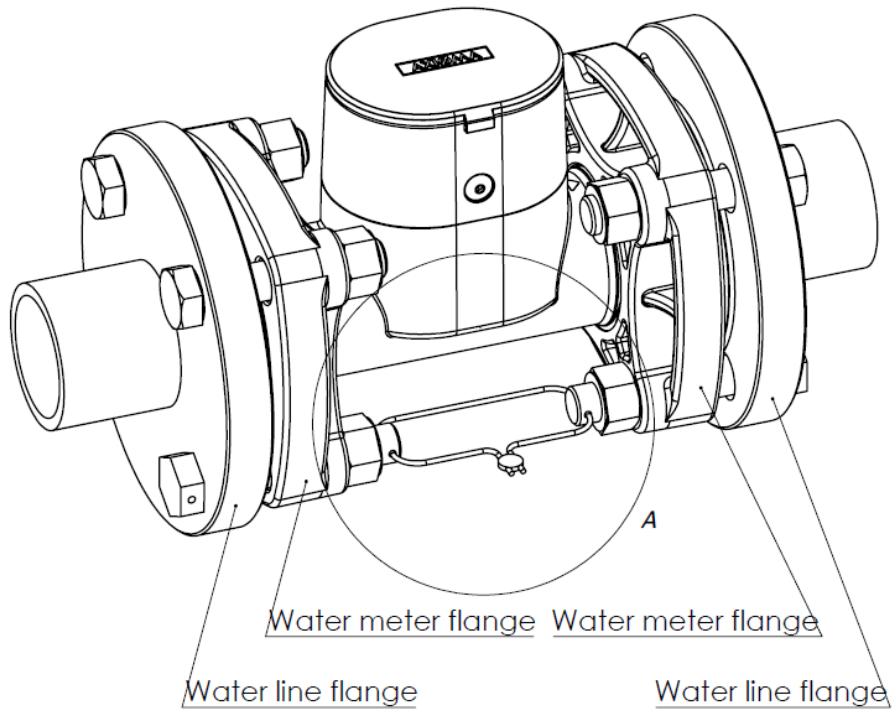
ANNEX D.3 G1 ½

D.3 - G1 ½



ANNEX D.4 DN50

D.4 - DN50



* - special bolt with a drilled hole for wire attachment;
(special nuts with a drilled hole can also be used if desired)

WARRANTY

Manufacturer gives warranty that meter parameters will meet the technical requirements, listed in the paragraph 2 of this document, if transportation, storage, and operation conditions will be followed.

Warranty period – 6 years from manufacturing date.

QALCCOSONIC W1

AXIØMA

Where
innovation
becomes
affordable