# VUSWM

Ultrasonic water meter DN15 – DN600 with factory-integrated communication – NB-IoT, wM-Bus, LoRaWAN, M-Bus and more

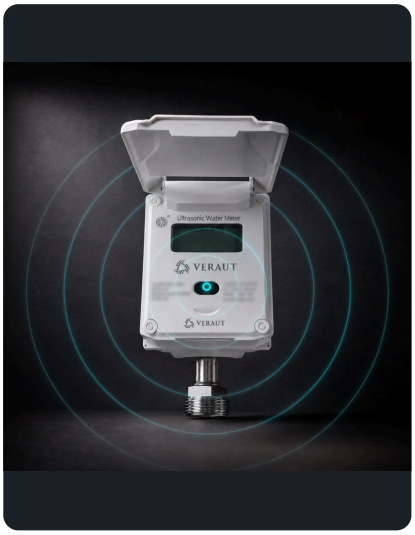
MID 2014/32/EU · MI-001 | OIML R 49:2013 | CLASS 2 | UP TO R 800 | U0 / D0 | IP68 | > 13 YRS BATTERY

## One measuring platform from the service connection to the trunk main

The VUSWM is a static ultrasonic water meter for cold and hot water, available on **one single measuring platform** from the domestic metering point up to the trunk main. Measuring technology, communication options, data model and software integration are identical across the entire size range. This considerably simplifies procurement, stockholding, installation training and system integration in large-scale rollouts.

Measurement is based on the **transit-time difference principle**: piezoelectric transducers transmit and receive ultrasonic waves with and against the direction of flow, and the difference in transit time is proportional to flow velocity. As no moving part sits in the measuring path, there is no mechanical wear – accuracy remains stable over the entire service life and no recalibration is required. Sand, suspended solids and air bubbles do not affect the measurement.

The communication version is defined at the time of ordering and integrated into the meter ex works; NB-IoT, wireless M-Bus, LoRaWAN, M-Bus, RS485/BACnet and pulse output are available. In the **NB-IoT version**, data is transmitted at board level directly over the licensed mobile network into the target platform – with no plug-on module, no gateway and no dedicated radio infrastructure.




### DN15 – DN600

19 sizes on one platform – identical metrology, communication and data model across the entire range.

### NB-IoT ex works

Standard version, integrated at board level – no plug-on module, no gateway, no dedicated radio network. Alternatively wM-Bus, LoRaWAN, M-Bus, RS485 or pulse.

### U0 / D0

No straight inlet or outlet sections required – across all sizes. Saves space in chambers, basements and retrofits.

### > 13 years

Battery life DN15 – DN300: two full verification cycles without battery replacement. DN350 – DN600 over 6 years.

## Product features

- Static ultrasonic meter without moving parts – no wear, no recalibration
- Straight measuring tube for low pressure loss; unaffected by sand, suspended solids and air bubbles
- Selectable turndown ratio **R 250 / R 400 / R 500 / R 800**, accuracy class 2 to MID
- Bidirectional measurement with separate totalisation of reverse flow
- Any mounting position – horizontal, vertical or inclined, with no loss of accuracy
- Local data logger: 720 days at hourly resolution, 36 monthly and 16 annual values
- Automatic retransmission of buffered values after a communication outage (NB-IoT version)
- Leakage, reverse flow, empty pipe, tamper, temperature and battery alarms
- Non-resettable calculator, sealing and protected metrological software

## Typical applications

- **Drinking water supply** – consumption metering in residential, commercial and industrial use
- **Billing** – custody transfer metering to MID 2014/32/EU and OIML R 49
- **Sub-metering** – cost allocation in residential and commercial buildings
- **Network monitoring** – district metering, minimum night flow, loss localisation
- **Pressure monitoring** – network pressure and load analysis with optional pressure sensor
- **Remote shut-off** – remote opening and closing with optional valve (DN15 – DN25)
- **Smart metering rollouts** – area-wide deployment without dedicated radio infrastructure

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## 01 Hydraulic performance data

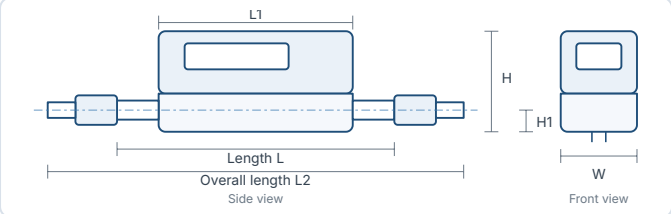
| DN | Q3 M³/H | Q1 M³/H | LENGTHS MM | THREAD / FLANGE |
|---|---|---|---|---|
| **15** | 2.5 | 0.00313 | 110 / 165 / 175[1] | G ¾ B / G 1¼ B[1] |
| **20** | 4 | 0.005 | 130 / 190 / 195 / 175[1] | G 1 B / G 1¼ B[1] |
| **25** | 6.3 | 0.00788 | 160 / 225 / 260 | G 1¼ B |
| **32** | 10 | 0.0125 | 180 / 230 / 260 | G 1½ B |
| **40** | 16 | 0.02 | 200 / 245 / 300 | G 2 B |
| **50** | 25 | 0.03125 | 200 / 270 / 280 / 300 | 4 × ø18 |
| **50** | 40 | 0.05 | 200 / 270 / 280 / 300 | 4 × ø18 |
| **65** | 40 | 0.05 | 200 / 300 | 4 × ø18 |
| **80** | 63 | 0.07875 | 225 / 300 / 350 / 370 | 8 × ø18 |
| **100** | 100 | 0.125 | 250 / 350 / 360 / 370 | 8 × ø18 |

| DN | Q3 M³/H | Q1 M³/H | LENGTHS MM | THREAD / FLANGE |
|---|---|---|---|---|
| **125** | 160 | 0.2 | 250 / 350 | 8 × ø18 |
| **150** | 250 | 0.3125 | 300 / 350 / 500 | 8 × ø22 |
| **200** | 400 | 0.5 | 350 / 500 | 12 × ø22 |
| **250** | 630 | 0.7875 | 400 / 450 | 12 × ø26 |
| **300** | 1000 | 1.25 | 450 / 500 | 12 × ø26 |
| **350** | 1600 | 2.0 | 500 | 16 × ø26 |
| **400** | 2500 | 3.125 | 500 / 550 / 600 | 16 × ø30 |
| **450** | 2500 | 3.125 | 600 | 20 × ø30 |
| **500** | 4000 | 5.0 | 600 / 650 / 800 | 20 × ø33 |
| **600** | 4000 | 5.0 | 750 / 800 | 20 × ø36 |

Q1 at R 800; for R 250 / R 400 / R 500, Q1 = Q3 / R. Q2 = 1.6 × Q1 · Q4 = 1.25 × Q3. [1] DN15 / DN20 optionally G 1¼ B, length 175 mm. Pressure loss ≤ 0.25 / 0.40 bar (Δp 25 / Δp 40) for DN15 – DN40, ≤ 0.10 / 0.25 bar (Δp 10 / Δp 25) from DN50. Further lengths are type-approved for each size – list on request.

## 02 Installation dimensions DN15 – DN40

| DN | H MM | H1 MM | W MM | L1 MM | L2 – L | THREAD A | UNION B |
|---|---|---|---|---|---|---|---|
| **15** | 91 | 31 | 90 | 97 | + 94 | G ¾ B | R ½ |
| **20** | 91 | 28 | 90 | 97 | + 104 | G 1 B | R ¾ |
| **25** | 91 | 25 | 90 | 97 | + 120 | G 1¼ B | R 1 |
| **32** | 128 | 29 | 90 | 97 | + 120 | G 1½ B | R 1¼ |
| **40** | 139 | 36 | 90 | 97 | + 128 | G 2 B | R 1½ |




L = length as per table 1. L2 = overall length including unions at both ends. Dimensions from DN50 on request.

## 03 Construction and materials

| | |
|---|---|
| **Body DN15 – DN40** | Brass or stainless steel SUS304, threaded connection |
| **Body DN50 – DN600** | Grey or ductile cast iron, coated, flanged connection |
| **Measuring tube** | Stainless steel SUS304 / SUS316L (1.4301 / 1.4404), analysis to ISO 16143-1 |
| **Transducers** | Piezoceramic in stainless steel: 2 sensors (DN15 – DN40), 2 pairs (DN50 – DN300), 3 pairs (DN350 – DN600) |
| **Ingress protection** | IP68, permanently submersible |
| **Calculator** | Non-resettable – no change to measuring program or data after factory programming |

## 04 Accuracy and classification

| | |
|---|---|
| **Maximum permissible error** | ± 2 % for Q2 ≤ Q ≤ Q4 (≤ 30 °C), ± 3 % (> 30 °C), ± 5 % for Q1 ≤ Q < Q2 |
| **Accuracy class** | Class 2 to MID 2014/32/EU, Annex III (MI-001) |
| **Turndown ratio Q3/Q1** | Selectable R 250 / R 400 / R 500 / R 800 (OIML R 49-1:2013) |
| **Temperature class** | T30 / T50; DN15 – DN40 additionally T70 |
| **Flow profile sensitivity** | U0 / D0 – no straight inlet or outlet sections required |
| **Working pressure** | MAP 10 (1.0 MPa), MAP 16 (1.6 MPa); MAP 25 optional |
| **Ambient temperature** | −25 °C to +55 °C |
| **Environmental classes** | Mechanical M1, electromagnetic E1 / E2 |
| **Flow direction** | Forward and reverse, depending on parameter setting |
| **Display range** | 99 999 m³ (DN15 – DN40), 99 999 999.99999 m³ (from DN50) |
| **Test resolution** | 0.01 dm³ (DN15 – DN40) |

## 05 Installation and operating conditions

| | |
|---|---|
| **Medium temperature** | 0.1 – 30 °C or 0.1 – 50 °C by class; DN15 – DN40 optionally 70 °C |
| **Mounting position** | Horizontal, vertical or inclined, with no loss of accuracy |
| **Straight sections** | Not required (class U0 / D0) |
| **Power supply** | 3.6 V lithium cell, replaceable; optionally 24 VDC external |
| **Battery life** | > 13 years (DN15 – DN300), > 6 years (DN350 – DN600); depending on transmission interval, signal quality, temperature |
| **Flow direction** | Arrow on the meter body |



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## 06 NB-IoT communication

| | |
|---|---|
| **Availability** | Standard version – alternatives see 09 |
| **Technology** | 3GPP Cat-NB2 (Rel. 13/14), licensed spectrum; integrated at board level ex works, no plug-on module |
| **Link budget** | 164 dB MCL – up to 20 dB margin over GSM |
| **Frequency bands EU** | Band 3 (1800 MHz), band 8 (900 MHz) and band 20 (800 MHz) |
| **SIM** | Included, no separate mobile contract required |
| **Transmission interval** | 1 minute to 1 day, configurable |
| **Backend** | MQTT, REST, webhook; VERILOG or existing HES / MDM / ERP systems |
| **Encryption** | AES-128/256 to 3GPP, SIM-based device authentication, optional APN with VPN |
| **Resilience** | Three-stage watchdog with automatic recovery |
| **Energy management** | Adaptive transmit power and sleep depth by signal quality and temperature |
| **Antenna** | Internal, optional external SMA connector |

## 07 Alarm and status functions

| | |
|---|---|
| **Leakage** | Continuous flow over a defined period, including very low flow rates |
| **Reverse flow** | Detection and separate totalisation |
| **Empty pipe** | Dry running or partially filled measuring tube |
| **Tamper** | Housing opened, sealing status in the telegram |
| **Temperature** | Medium temperature above or below limits |
| **Battery** | Early warning for meter and communication module |
| **Signal quality** | Warning on weak radio signal strength |
| **Device status** | Temporary / permanent device error, application status |

## 08 Display, data logger and diagnostics

LC display with selectable menus (normal, scrolling and single-value display); from DN50 as single- or dual-screen version. Operation is contactless via a **magnetic switch** – hold the magnetic pen on the symbol position of the display.

| | |
|---|---|
| **Displayed values** | Forward volume (default) and reverse volume, instantaneous flow, water temperature, pipe pressure (with pressure sensor), date / time |
| **Service values** | Operating and alarm hours, primary / secondary address, battery voltage, software version and checksum, display test |
| **Alarm symbols** | Empty pipe, transducer fault with channel, water temperature < 4 °C |
| **Data logger** | 720 daily values at hourly resolution, 36 monthly and 16 annual values |
| **Retransmission** | Buffered values transmitted automatically with time stamp (NB-IoT version) |

## 09 Communication interfaces

The communication version is defined at the time of ordering and integrated ex works; field retrofit is not intended. Telegrams to EN 13757.

| | |
|---|---|
| **NB-IoT** | 3GPP Cat-NB2, direct transmission without gateway (standard version) |
| **Optical** | Standard, EN 1434-3 / EN 61107, bidirectional, 2400 baud |
| **M-Bus (wired)** | EN 13757, 300 – 9600 bit/s |
| **wireless M-Bus** | 433 / 868 / 169 MHz, EN 13757, OMS |
| **RS485 / BACnet** | 300 – 9600 bit/s, EN 13757, Modbus, BACnet |
| **LoRa / LoRaWAN** | EU868 |
| **Cellular (alternative)** | GPRS, LTE Cat-1 and 4G |
| **Pulse** | Volt-free, 2- or 5-wire (S0 / reed) |

## 10 Versions and options

| | |
|---|---|
| **Pressure sensor** | Pipe pressure measurement with display and transmission in kPa |
| **Shut-off valve** | DN15 – DN25: remote opening and closing |
| **External antenna** | SMA connector with extension cable |
| **External supply** | 24 VDC additional supply |
| **Display version** | From DN50 single- or dual-screen display |
| **Retrofit unit** | External NB-IoT device for existing meters with pulse or encoder output |

### Approvals, standards and test evidence

| | |
|---|---|
| **Conformity assessment** | MID 2014/32/EU, Annex II modules B + D, Annex III MI-001; notified body NB 2275 (MRC, RO) |
| **Certificates** | EU type examination RO-2275-26715 (DN15 – DN40) and RO-2275-26716 (DN50 – DN600), valid until 14 Apr 2036; module D RO-2275-26-454, valid until 23 Feb 2029 |
| **Standards and evidence** | OIML R 49-1/-2:2013, EN 13757; WRAS (GB), PZH (PL), material and IP test reports by SGS – on request. Verification period Germany: cold water 6 years (MessEV annex 7), extension by sampling procedure under § 35 MessEV |
| **Marking and security** | CE and metrology marking with the identification number of the notified body (art. 21 MID); mechanical sealing, software and data electronically protected |

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