

## U11 High-Accuracy Clamp-On Ultrasonic Flow Meter

Wall-mount transit-time transmitter ·  $\pm 0.5\%$  accuracy · flow (F) or heat / cooling energy (E) version



The U11 is an industrial-grade, high-accuracy transit-time ultrasonic flow meter. An industrial FPGA raises the signal sampling rate and bubble tolerance, and the in-house TGA timing algorithm lets the meter ride through intermittent bubbles or particles lasting up to 5 seconds.

The transducers clamp onto the outside of the pipe, so the meter is installed without cutting the pipe and without stopping the water or the process. Flow is measured in both directions.

Add two PT1000 temperature sensors and the U11 becomes a heat / cooling energy meter for chilled-water, heating and HVAC systems.

$\pm 0.5\%$  accuracy   Repeatability 0.1%    $\pm 0.01$  to  $\pm 12$  m/s   Pipe 15–5000 mm  
4–20 mA · RS485 Modbus   Sensors IP68   CE · UKCA

### TECHNICAL SPECIFICATIONS

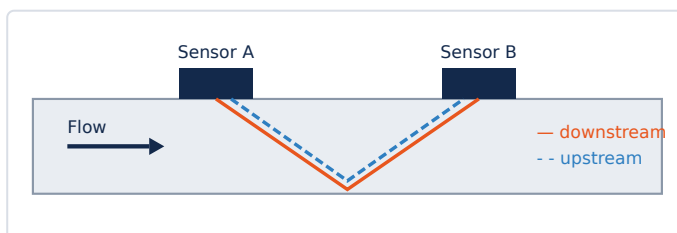
| Parameter                     | U11                                                                                      |
|-------------------------------|------------------------------------------------------------------------------------------|
| <b>Measuring principle</b>    | Transit-time ultrasonic, clamp-on (insertion sensors optional)                           |
| <b>Accuracy</b>               | $\pm 0.5\%$                                                                              |
| <b>Repeatability</b>          | 0.1%                                                                                     |
| <b>Linearity</b>              | $\pm 1\%$                                                                                |
| <b>Velocity range</b>         | $\pm 0.01$ m/s to $\pm 12$ m/s, bidirectional                                            |
| <b>Sampling rate</b>          | Up to 300 measurements per second                                                        |
| <b>Pipe size</b>              | 15–5000 mm, depending on sensor (see sensor options)                                     |
| <b>Liquid</b>                 | Single, sound-conducting liquid; full pipe                                               |
| <b>Liquid temperature</b>     | $-40$ to $+80$ °C (A2 standard) · up to $+130$ °C (H1A, I1) · up to $+180$ °C (H2A, I1H) |
| <b>Analog output</b>          | 4–20 mA, max. load 750 $\Omega$                                                          |
| <b>Pulse output</b>           | OCT, 0–9999 Hz (minimum and maximum frequency adjustable)                                |
| <b>Relay output</b>           | SPST, max. 1 Hz, 0.4 A @ 125 V AC or 2 A @ 30 V DC                                       |
| <b>Communication</b>          | RS485 and RS232, Modbus protocol; HART optional                                          |
| <b>Output selection</b>       | Choose any two: OCT pulse, relay, RS232 Modbus, RS485 Modbus, 4–20 mA                    |
| <b>Display</b>                | 240 × 128 backlit LCD with keypad                                                        |
| <b>Data storage</b>           | Fcard, expandable to 32 GB; one record every 60 s, up to 12 years of records             |
| <b>Power supply</b>           | 90–245 V AC, 48–63 Hz, or 10–36 V DC                                                     |
| <b>Ambient humidity</b>       | 0–99% RH                                                                                 |
| <b>Transmitter dimensions</b> | 254 × 230 × 64 mm (W × H × D), wall-mount                                                |
| <b>Sensor protection</b>      | IP68                                                                                     |
| <b>Sensor cable</b>           | Standard 9 m; custom length up to 274 m (B1 / B1H standard 5 m)                          |
| <b>Certifications</b>         | CE, UKCA                                                                                 |

The flow meter is for non-hazardous areas; there is no explosion-proof version.

### KEY FEATURES

- $\pm 0.5\%$  accuracy, 0.1% repeatability
- Fast response: up to 300 measurements/s
- Tolerates intermittent bubbles or particles for up to 5 s
- No pipe cutting, no water or process shutdown
- Bidirectional flow measurement
- One sensor pair covers DN25 to DN1200
- Low power consumption, stable long-term reading
- Heat / cooling energy version with PT1000 sensors

### MEASURING PRINCIPLE



The meter compares the transit times of ultrasonic signals sent with and against the flow along the same path to calculate mean flow velocity. The TGA algorithm (transit-time plus TDC timing) resolves time to tens of picoseconds.

## SENSOR OPTIONS

| Code | Type            | Protection | Liquid temperature | Notes                  |
|------|-----------------|------------|--------------------|------------------------|
| A2   | Clamp-on        | IP68       | −40 to +80 °C      | Standard sensor        |
| H1A  | Clamp-on        | IP68       | −40 to +130 °C     | High temperature       |
| H2A  | Clamp-on        | IP68       | −40 to +180 °C     | High temperature       |
| B1   | Clamp-on, 2 MHz | IP68       | 0 to +65 °C        | Small pipes DN15–DN40  |
| B1H  | Clamp-on, 2 MHz | IP68       | 0 to +115 °C       | Small pipes DN15–DN40  |
| I1   | Insertion       | IP68       | −40 to +130 °C     | G1" process connection |
| I1H  | Insertion       | IP68       | −40 to +180 °C     | G1" process connection |



DT double-rail mounting bracket for A2, H1A and H2A sensors. PT1000 temperature sensors (clamp-on or insertion) are used with the E (energy) version.

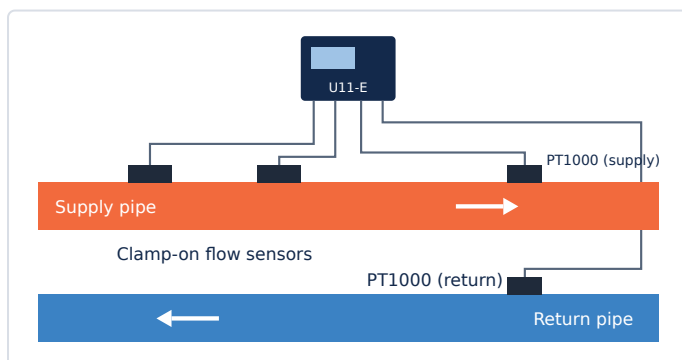
## ORDERING CODE

|                      |   |                             |   |                        |   |                             |   |                          |   |                    |   |                              |
|----------------------|---|-----------------------------|---|------------------------|---|-----------------------------|---|--------------------------|---|--------------------|---|------------------------------|
| <b>U11</b><br>Series | - | <b>F / E</b><br>Transmitter | - | <b>A2...</b><br>Sensor | - | <b>2 outputs</b><br>Signals | - | <b>B2 / Bxx</b><br>Cable | - | <b>T</b><br>PT1000 | - | <b>H / R / DT</b><br>Options |
|----------------------|---|-----------------------------|---|------------------------|---|-----------------------------|---|--------------------------|---|--------------------|---|------------------------------|

| Field                     | Codes                                                                                                                                      |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Series                    | U11 — high-accuracy industrial transit-time flow meter                                                                                     |
| Transmitter type          | <b>F</b> ultrasonic flow meter · <b>E</b> ultrasonic heat / cooling energy meter                                                           |
| Sensor code               | A2 · H1A · H2A · B1 · B1H · I1 · I1H (see sensor options)                                                                                  |
| Output signals (choose 2) | <b>10</b> OCT pulse · <b>1R</b> relay · <b>R2</b> RS232 Modbus · <b>R4</b> RS485 Modbus · <b>1M</b> 4–20 mA                                |
| Cable (m)                 | <b>B2</b> standard 9 m · <b>Bxx</b> custom length, max. 274 m (code B274). B1 / B1H standard cable is 5 m.                                 |
| Temperature sensor        | Default: none · <b>T</b> PT1000                                                                                                            |
| Options                   | <b>H</b> HART protocol · <b>R</b> dual relay output (with H or R, RS232 is not available) · <b>DT</b> double-rail bracket for A2, H1A, H2A |

Example: **U11-F-A2-101M-B2** = U11 flow meter, A2 clamp-on sensors, OCT pulse and 4–20 mA outputs, 9 m cable.

## HEAT / COOLING ENERGY METER (E VERSION)

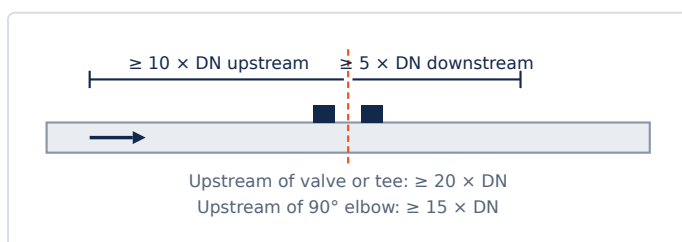


The E version adds two matched PT1000 temperature sensors and an energy calculation module to the flow meter. One sensor is fitted on the supply (inlet) line and one on the return (outlet) line of the heat-exchange circuit.

From the temperature difference and the measured flow, the U11 calculates the heat or cooling energy released or absorbed by the water between inlet and outlet.

Typical uses: water-based heating systems, air-conditioning and chilled-water systems, cooling-water loops in plant rooms and data centres.

## STRAIGHT PIPE RUN



Where possible, keep the sensors away from valves, tees, elbows and other fittings. Provide at least **10 × DN** of straight pipe upstream and **5 × DN** downstream of the sensors.

When the disturbance upstream is a valve or a tee, the recommended upstream run is  $\geq 20 \times \text{DN}$ ; after a 90° elbow it is  $\geq 15 \times \text{DN}$ . With two or more disturbances, follow the length required by the strongest one.

## INSTALLATION GUIDELINES

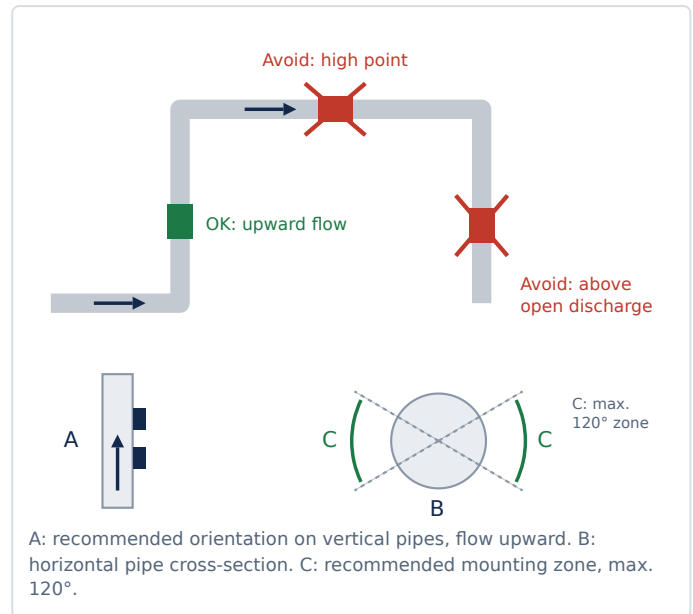
**Location.** A full pipe is the condition for correct measurement. Gas pockets or large bubbles in the measuring section increase the error, so avoid:

- the highest point of the pipe, where bubbles collect;
- the section directly above a downward, open-discharge pipe.

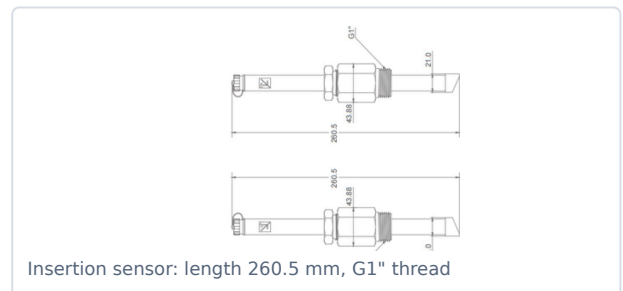
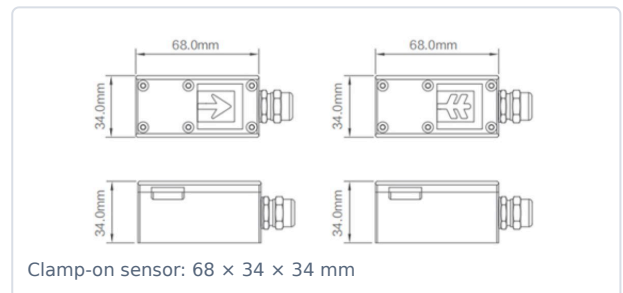
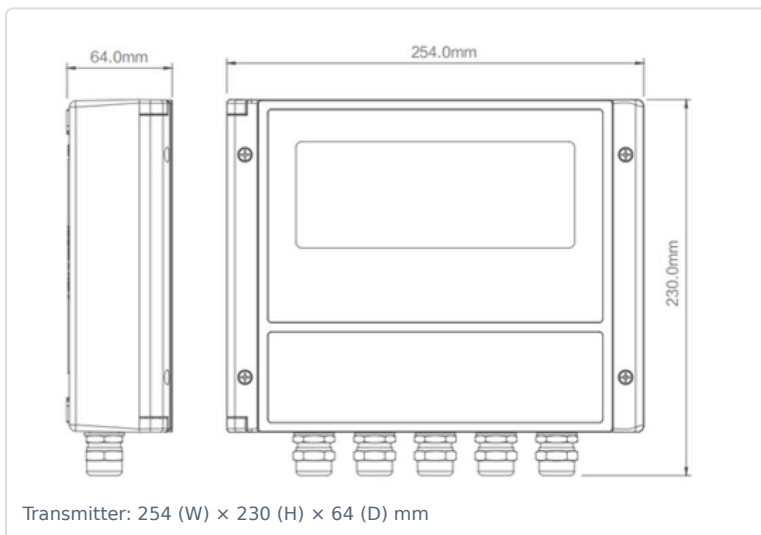
**Downward pipes.** When the meter must sit on a downward discharge pipe, fit an orifice plate or a reduced section downstream so the pipe cannot run empty.

**Vertical pipes.** Choose a section with upward flow (view A). Solids settle and gas rises away from the sensors, so the pipe self-vents and solids do not stick.

**Horizontal pipes.** Mount the sensors within zone C of view B, away from gas at the top and sediment at the bottom of the pipe.



## DIMENSIONS (mm)



## TYPICAL APPLICATIONS

- Data-centre and HVAC chilled / cooling water
- Heat and cooling energy metering (E version)
- Water treatment, pure and ultrapure water
- Petroleum and chemical process liquids
- Energy-saving retrofits on existing pipes

## OEM SUPPLY

OEM volume supply for equipment builders and system integrators. Private label on request.

Validation samples 1-5 pcs in 5-7 working days.

**Send your pipe list for sizing — we reply within 24 hours**

**Email** [info@segmensensor.com](mailto:info@segmensensor.com)  
**Phone** +86 138 2870 4591  
**Online form** [www.segmensensor.com/contact.html](http://www.segmensensor.com/contact.html)

Please include pipe material, outer diameter, wall thickness, liquid and temperature, plus the outputs you need.



Product page