# SERIES TUF | ULTRASONIC ENERGY METER


## FEATURES/BENEFITS

- **Lower maintenance costs with local parameter display and no moving parts**
- **Seamless data transfer with serial communication output standard**
- **Eliminate the need for multiple units with a flow and temperature monitor in one**

## APPLICATIONS

- Heat metering
- Utilities billing
- Tenant billing
- Monitoring of water heating or cooling: radiators, fan coils

## DESCRIPTION

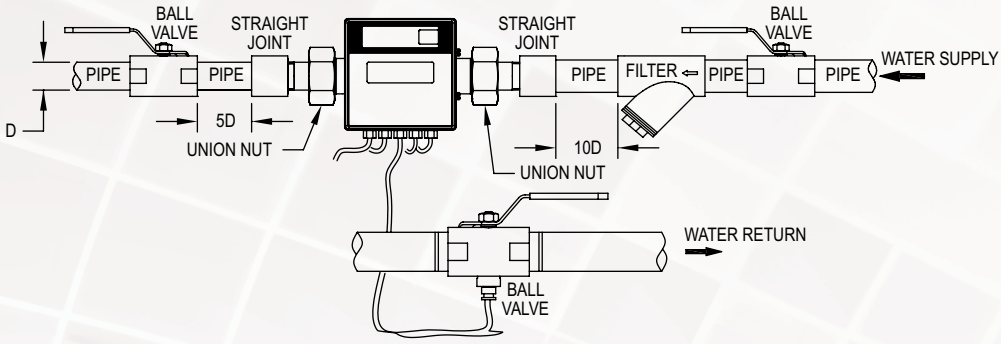
The **Series TUF Ultrasonic Energy Meter** is a highly accurate and stable energy meter. It utilizes ultrasonic technology to measure heating and cooling energy consumption. The Series TUF incorporates a flowmeter, temperature meter, and a calculator into a single, compact unit. The size and lack of moving parts means the Series TUF requires minimal maintenance. The 8-digit LED display enables easy reading of the meter's recorded values; including temperature, flow-rate, energy consumption, etc. These features make it ideal for installation on chillers, boilers, and individual apartment piping. With the optional couplings it is capable of being used with either NPT or BSPT pipe sizes. It is the perfect meter for tenant billing applications.

## SPECIFICATIONS

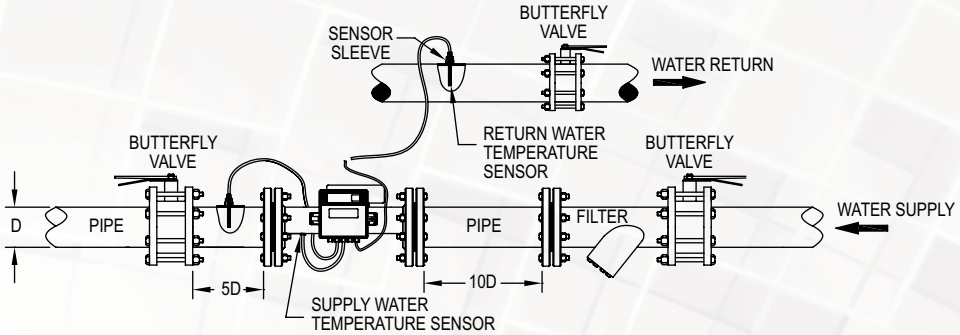
| | |
|---|---|
| **Service** | Clean, compatible liquids. |
| **Wetted Materials** | Brass and 316L SS. |
| **Range** | See chart. |
| **Display** | 8-digit LED. |
| **Accuracy** | BTU: EN1434/CJ128 Class 2; Flow: ±(2+(0.02 Qp/Q))%; Temperature: ±0.1°C. |
| **Power Requirements** | 24 VAC/VDC (model dependent)•• or 3.6 V ER26500 lithium metal battery, user supplied and installed, battery acts as back-up if power is lost. |
| **Power Consumption** | 1 W. |
| **Temperature Limits** | Ambient: 41 to 131°F (5 to 55°C); Process: 36 to 203°F (2 to 95°C). |
| **Humidity Limit** | <93%. |
| **Pressure Limits** | 232 psi (16 bar) for DN15 to DN40; 362 psi (25 bar) for >DN50. |
| **Pressure Drop** | <1.5 psi (10 kPa). |
| **Process Connection** | See chart. |
| **Serial Communications** | Modbus® RTU or BACnet MSTP (selectable)•. |
| **Enclosure Rating** | IP65. |
| **Enclosure Material** | Plastic. |
| **Repeatability** | Flowmeter: 1%. |
| **Electric Connections** | 3 ft (0.91 m) 4x0.2 mm² cable with terminal block. |
| **Flow Direction** | Unidirectional. |
| **Mounting Orientation** | Horizontal or vertical. |
| **Weight** | See chart. |
| **Compliance** | CE. |

•M-BUS available upon request.
••Power supply must be floating, not grounded. Model numbers ending in "-DC" are for DC only applications.

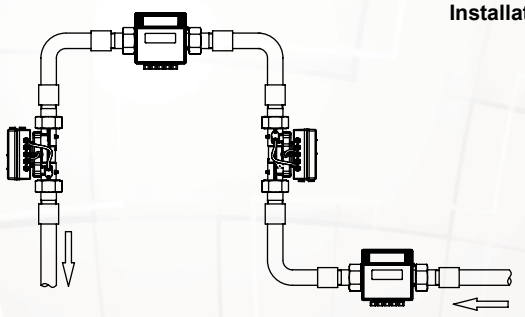
## INSTALLATION



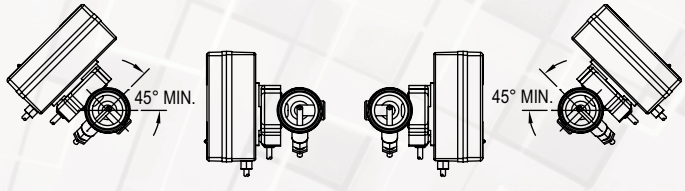

**Installation diagram for TUF-150/400**




**Installation diagram for TUF-500/2000**

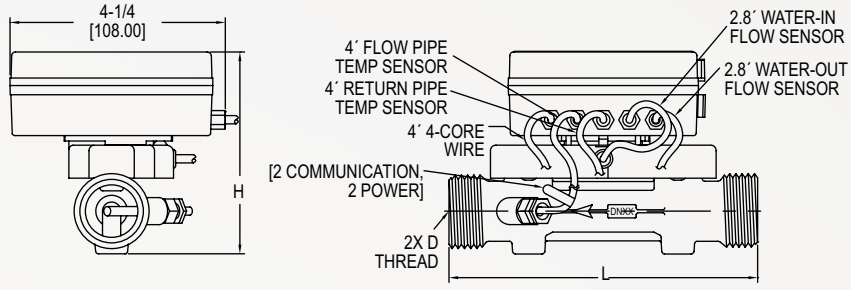


**Installation positions**

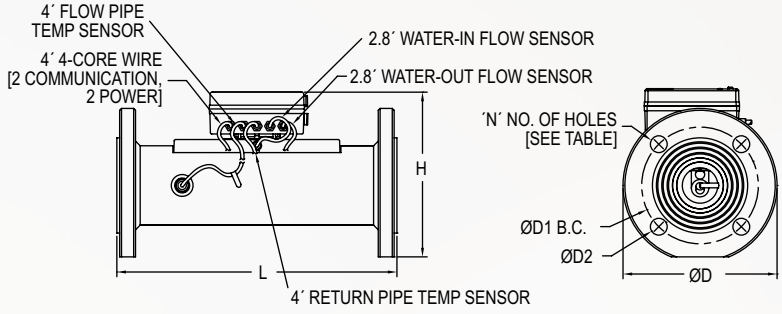



**Mounting rotation**

## DIMENSIONS AND WIRING DIAGRAM




| Model | Dimensions in [mm] L | D | H | Flow Rate GPM [LPM] Max Flow (Qs) | Nominal Flow Range (Qp) | Min Flow (Qi) | Weight lb [kg] |
|---|---|---|---|---|---|---|---|
| **TUF-150-XX** | 4-21/64 [110.00] | G3/4B | 3-31/32 [101.00] | 13 [50] | 6.6 [25] | 0.1 [0.5] | 3.1 [1.4] |
| **TUF-200-XX** | 5-1/8 [130.00] | G1B | 3-31/32 [101.00] | 22 [83] | 11 [42] | 0.2 [0.8] | 3.1 [1.4] |
| **TUF-250-XX** | 6-19/64 [160.00] | G11/4B | 4-11/64 [106.00] | 31 [117] | 15 [58] | 0.3 [1.2] | 4.1 [1.8] |
| **TUF-320-XX** | 7-3/32 [180.00] | G11/2B | 4-29/64 [113.00] | 53 [200] | 26 [100] | 0.5 [2] | 5.2 [2.3] |
| **TUF-400-XX** | 7-7/8 [200.00] | G2B | 4-49/64 [121.00] | 88 [333] | 44 [167] | 0.9 [3.3] | 6.6 [3.0] |




| Model | Dimensions in [mm] L | ØD | H | ØD1 | ØD2 | N | Flow Rate GPM [LPM] Max Flow (Qs) | Nominal Flow Range (Qp) | Min Flow (Qi) | Weight lb [kg] |
|---|---|---|---|---|---|---|---|---|---|---|
| **TUF-500-XX** | 7-7/8 [200] | 6-1/2 [165.00] | 9-27/32 [250] | 4-59/64 [125.00] | 45/64 [18.00] | 4 | 132 [500] | 66 [250] | 0.7 [2.5] | 30.8 [14] |
| **TUF-650-XX** | 7-7/8 [200] | 7-9/32 [185.00] | 10-7/16 [265] | 5-45/64 [145.00] | 45/64 [18.00] | 4 | 220 [833] | 110 [417] | 1.1 [4.2] | 30.2 [13.7] |
| **TUF-800-XX** | 8-55/64 [225] | 7-7/8 [200.00] | 11-1/32 [280] | 6-19/64 [160.00] | 45/64 [18.00] | 8 | 352 [1333] | 176 [667] | 1.8 [6.7] | 37.5 [17] |
| **TUF-1000-XX** | 9-27/32 [250] | 8-21/32 [220.00] | 12-13/64 [310] | 7-3/32 [180.00] | 45/64 [18.00] | 8 | 528 [2000] | 264 [1000] | 2.6 [10] | 41.8 [19] |
| **TUF-1250-XX** | 9-27/32 [250] | 9-27/32 [250.00] | 12-63/64 [330] | 8-17/64 [210.00] | 45/64 [18.00] | 8 | 881 [3333] | 440 [1667] | 4.4 [17] | 57.3 [26] |
| **TUF-1500-XX** | 11-13/16 [300] | 11-7/32 [285.00] | 14-11/64 [360] | 9-29/64 [240.00] | 55/64 [22.00] | 8 | 1321 [5000] | 660 [2500] | 6.6 [25] | 70.5 [32] |
| **TUF-2000-XX** | 13-25/32 [350] | 13-25/64 [340.00] | 15-15/16 [405] | 11-39/64 [295.00] | 55/64 [22.00] | 12 | 2202 [8333] | 1101 [4167] | 11 [42] | 141 [64] |

## HOW TO ORDER

- Choose 1 ultrasonic energy meter model
- Choose pipe fitting model given the appropriate fitting size (for DN15 to DN40 only)*

**Example:** TUF-150-MD, Fitting Size: A, select pipe fitting Model WM-ACC-C01 or WM-ACC-C11.
**Note:** Series TUF units are factory set for supply line installation. (Can be modified in the field via communication protocol.)

| Ultrasonic Energy Meter Model | Body Size** | Pipe Size | | Fitting Size | Communication | Meter Connection | GPM (LPM) | | | Weight lb (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | in | mm | | | | Min Flow (Qi) | Nominal Flow Range (Qp) | Max Flow (Qs) | |
| **TUF-150-MD** | DN15 | 1/2 | 15 | A | Modbus® | G-3/4 | 0.1 (0.5) | 6.6 (25) | 13 (50) | 3.1 (1.4) |
| **TUF-200-MD** | DN20 | 3/4 | 20 | B | Modbus® | G1 | 0.2 (0.8) | 11 (42) | 22 (83) | 3.1 (1.4) |
| **TUF-250-MD** | DN25 | 1 | 25 | C | Modbus® | G1-1/4 | 0.3 (1.2) | 15 (58) | 31 (117) | 4.1 (1.8) |
| **TUF-320-MD** | DN32 | 1-1/4 | 32 | D | Modbus® | G1-1/2 | 0.5 (2) | 26 (100) | 53 (200) | 5.2 (2.3) |
| **TUF-400-MD** | DN40 | 1-1/2 | 40 | E | Modbus® | G2 | 0.9 (3) | 44 (167) | 88 (333) | 6.6 (3) |
| **TUF-500-MD*** | DN50 | 2 | 50 | - | Modbus® | Flange | 1.3 (5) | 66 (250) | 132 (500) | 33 (15) |
| **TUF-650-MD** | DN65 | 2-1/2 | 65 | - | Modbus® | Flange | 2.2 (8.3) | 110 (417) | 220 (833) | 10.1 (4.6) |
| **TUF-800-MD** | DN80 | 3 | 80 | - | Modbus® | Flange | 3.5 (13.3) | 176 (667) | 352 (1333) | 13.5 (6.1) |
| **TUF-1000-MD** | DN100 | 4 | 100 | - | Modbus® | Flange | 5.3 (20) | 264 (1000) | 528 (2000) | 16.5 (7.5) |
| **TUF-1250-MD** | DN125 | 5 | 125 | - | Modbus® | Flange | 8.8 (33) | 440 (1667) | 881 (3333) | 21.1 (9.6) |
| **TUF-150-BN** | DN15 | 1/2 | 15 | A | BACnet | G-3/4 | 0.1 (0.5) | 6.6 (25) | 13 (50) | 3.1 (1.4) |
| **TUF-200-BN** | DN20 | 3/4 | 20 | B | BACnet | G2 | 0.2 (0.8) | 11 (42) | 22 (83) | 3.1 (1.4) |
| **TUF-250-BN** | DN25 | 1 | 25 | C | BACnet | G1-1/4 | 0.3 (1.2) | 15 (58) | 31 (117) | 4.1 (1.8) |
| **TUF-320-BN** | DN32 | 1-1/4 | 32 | D | BACnet | G1-1/2 | 0.5 (2) | 26 (100) | 53 (200) | 5.2 (2.3) |
| **TUF-400-BN** | DN40 | 1-1/2 | 40 | E | BACnet | G2 | 0.9 (3) | 44 (167) | 88 (333) | 6.6 (3) |
| **TUF-500-BN*** | DN50 | 2 | 50 | - | BACnet | Flange | 1.3 (5) | 66 (250) | 132 (500) | 33 (15) |
| **TUF-650-BN** | DN65 | 2-1/2 | 65 | - | BACnet | Flange | 2.2 (8.3) | 110 (417) | 220 (833) | 10.1 (4.6) |
| **TUF-800-BN** | DN80 | 3 | 80 | - | BACnet | Flange | 3.5 (13.3) | 176 (667) | 352 (1333) | 13.5 (6.1) |
| **TUF-1000-BN** | DN100 | 4 | 100 | - | BACnet | Flange | 5.3 (20) | 264 (1000) | 528 (2000) | 16.5 (7.5) |
| **TUF-1250-BN** | DN125 | 5 | 125 | - | BACnet | Flange | 8.8 (33) | 440 (1667) | 881 (3333) | 21.1 (9.6) |

| Model | Power Requirements |
|---|---|
| **TUF-XXX-XX** | 24 VAC/VDC |
| **TUF-XXX-XX-DC** | 24 VDC |

*A pipe fitting is required to use the DN15 to DN40 energy meters. The DN50 has a flange connection and does not require a pipe fitting.
**For additional sizes up to 8″ (203.2 mm) contact factory.

## ACCESSORIES

| Fitting Size | Pipe Fitting Model*** | Process Connection Size | Weight lb (kg) |
|---|---|---|---|
| A | WM-ACC-C01 | 1/2″ NPT | 0.6 (0.3) |
| A | WM-ACC-C11 | 1/2″ BSPT | 0.6 (0.3) |
| B | WM-ACC-C02 | 3/4″ NPT | 1.2 (0.5) |
| B | WM-ACC-C12 | 3/4″ BSPT | 1.2 (0.5) |
| C | WM-ACC-C03 | 1″ NPT | 1.8 (0.8) |
| C | WM-ACC-C13 | 1″ BSPT | 1.8 (0.8) |
| D | WM-ACC-C14 | 1-1/4″ BSPT | 2.3 (1.1) |
| E | WM-ACC-C05 | 1-1/2″ NPT | 4.4 (2) |
| E | WM-ACC-C15 | 1-1/2″ BSPT | 4.4 (2) |

***Each model includes 1 fitting.



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