



ONICON
Flow and Energy Measurement

System-40 BTU Meter System

The System-40 series is a family of inline BTU meters that provide accurate and reliable energy, flow and temperature measurement for a variety of applications.



• Chilled Water • Hot Water • Condenser Water •

DESCRIPTION

System-40 Series BTU Meters provide highly accurate thermal energy measurement in water and water/glycol heating and cooling systems. Each meter includes an integral inline flow sensor and a pair of precision matched temperature sensors. The compact design also features an easy to operate user interface and is available in several different configurations.

FEATURES

Reliable No-Moving-Parts Design - Wetted transducers measure the ultrasonic signal transit time differential, which correlates directly to the flow rate. The direct beam path orientation significantly enhances signal strength and long term reliability.

Highly Accurate Over a Wide Flow Range - The flow sensor is accurate to within $\pm 1\%$ of reading over the normal (25:1 turndown) operating range and within $\pm 2\%$ of reading over an extended (100:1 turndown) range.

User Friendly Backlit Display - The bright, easy-to-read, backlit display uses "smart button technology" to simplify page navigation and programming. This eliminates the need for special configuration tools.

CALIBRATION

Each System-40 is subjected to a comprehensive series of conformance tests which ensures that each meter is fully functional and meets the published performance and accuracy specifications. The absolute accuracy of conformance test equipment is directly traceable to NIST*. A certificate of conformance is provided.

APPLICATIONS

Monitoring chilled water, hot water and condenser water in AHU and CRAC units for:

- Commercial office tenant billing
- Residential apartment and condominium tenant billing

Monitoring renewable energy resources for:

- Solar thermal applications
- Ground source heat pumps
- Geothermal heating systems

Matched Platinum 1000 Ω RTD Temperature

Sensors - Sensors are paired in a matching process that ensure a differential measurement uncertainty of better than $\pm 0.18^\circ\text{F}$.

Suitable for Water and Water/Glycol Solutions -

System-40 is field programmable for both water and water/glycol solutions to ensure accurate flow and energy measurement.

Detachable Display - The display for the system-40 is easily detached from the flow sensor. This allows for remote mount installation up to 5ft from the sensor body.

Built-in Interval Data Logger - Energy and volume totals are date/time stamped and logged within the meter along with other analytical data. This data is available via BACnet®.

APPROVALS

- FCC: Part 15, Subpart B
- ANSI/NSF 61 & 372
- BTL Certified to ASHRAE 135:2009



*National Institute of Standards and Technology

GENERAL SPECIFICATIONS*

ACCURACY	±1% of reading over 25:1 turndown ±2% of reading over 100 :1 turndown Overall turndown exceeds 500 :1 Repeatability: ≤±0.2% Meets EN1434 Class 1 accuracy requirements
TEMPERATURE SENSORS	Field serviceable MID certified matched pair of 2-wire 1000Ω platinum RTDs Calibrated to a differential measurement uncertainty of ±0.18°F Meets EN1434/C900.1 accuracy requirements for 3K sensors
CALCULATOR	Computation error: ≤ 0.09% at 30°F Δt Meets EN1434 Class 1 requirements with 3K minimum Δt
PIPE SIZE RANGE	½ - 2½" nominal diameter
PIPING SYSTEM CONNECTIONS	Male NPT threads 2½" meter provided with ANSI Class 150 raised face flanges
FLUID TEMPERATURE RANGE	32 to 250°F
MAXIMUM OPERATING PRESSURE	400 psi
PRESSURE DROP	Less than 1 psi at 4 ft/s, decreasing at lower velocities
MATERIALS	Wetted components: Lead-free brass, PEEK Enclosure: Polycarbonate
ENVIRONMENTAL	Meets EN1434/C900.1 Class A requirements Operating Temperature Range: -13 to 131°F Storage Temperature Range: -14 to 158°F Enclosure Rating: IP65
POWER SUPPLY REQUIREMENTS	20-28V AC/DC, 50/60 Hz, 5 VA maximum
ISOLATED ANALOG OUTPUT	May be programmable for energy rate, flow rate, supply temperature, return temperature or Δt Configurable as: 4-20mA, 0-5 V or 0-10 V output
ISOLATED TOTALIZING SOLID STATE CONTACT CLOSURE PULSE OUTPUTS	May be programmed for energy, volume, alarm indication, mode indication or MODBUS coil indication Contact ratings: 50 mA, 30 V Contact pulse duration: 50, 100, 500 or 1000 ms
ISOLATED TOTALIZING PULSE INPUTS	For use with sinking open collector or dry contact outputs Input rating: 30 VDC, 10 mA maximum Pulse duration: 50 ms minimum
NETWORK CONNECTIONS	Isolated RS485 serial interface
COMMUNICATION PROTOCOLS	BACnet® MS/TP per ASHRAE Standard 135.1: 2009 MODBUS® RTU
NETWORK CONFIGURATION & ADDRESSING	Baud Rates: 4800, 9600, 19200, 38400, 76800, or 115200 Device Address Range: 1 – 255 (1 - 247 MODBUS® RTU) Device Instance Range: 1 – 4,194,303 (BACnet® only) Parity: None, Even, Odd (MODBUS® RTU only)

*Specifications subject to change without notice.

TYPICAL SYSTEM-40 INSTALLATION

(Meter may be installed in either supply or return line)

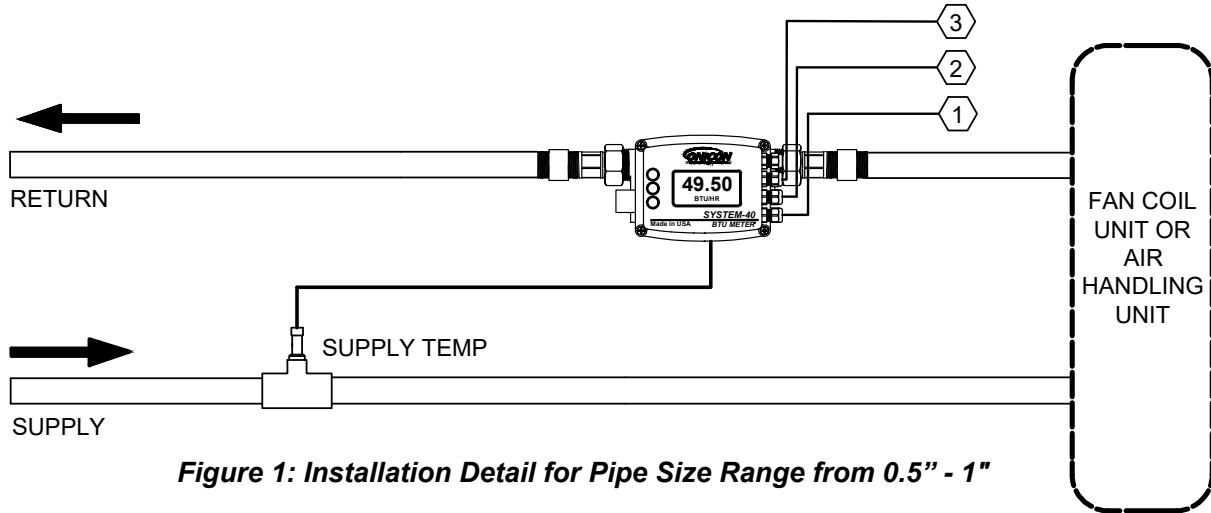


Figure 1: Installation Detail for Pipe Size Range from 0.5" - 1"

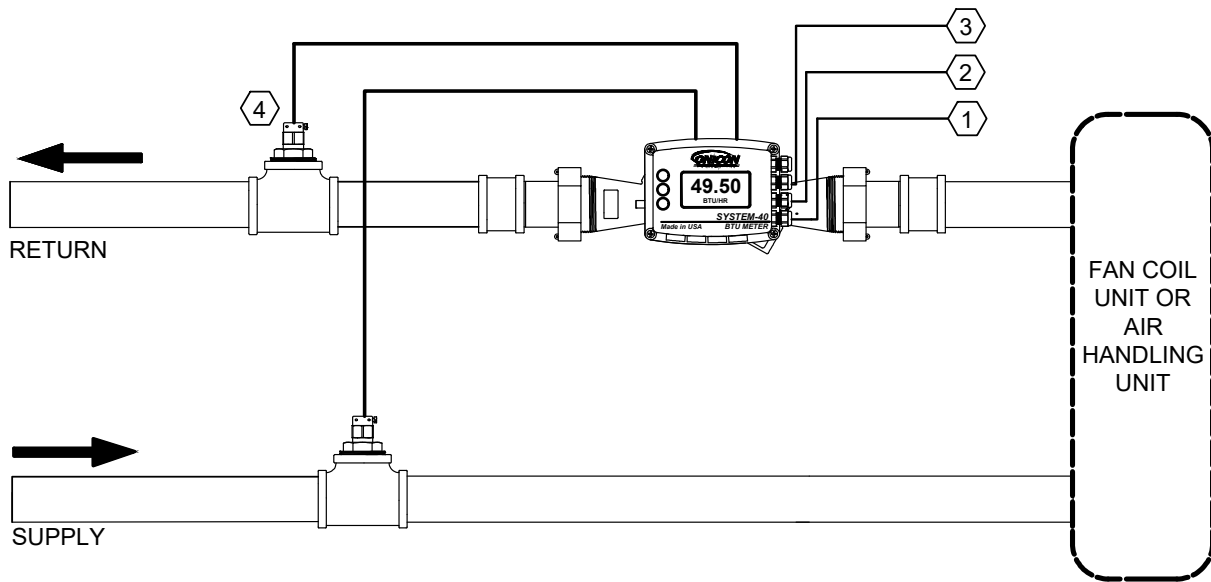


Figure 2: Installation Detail for Pipe Size Range from 1.25" - 2.5"

NOTES

- ① Input Power
20-28V AC/DC, 5 VA maximum
- ② Input and output signals
Three (3) auxiliary signals can be configured as pulse inputs / outputs or as an analog output
- ③ RS485 BACnet or MODBUS
- ④ Remote temperature sensor, installed downstream of flow meter body

METER DESIGN DETAILS

Meter Models with Flow Ranges in GPM							
Meter Size	Process Connection Type	Typical Design Flow	1% of Rate Range	2% of Rate Range	Min Flow	C _v	Length with Couplings or Flanges
(Nominal Size)		(gpm)	(gpm)	(gpm)	(gpm)	(gpm)	(in)
1/2"	Male NPT	6.6	0.6 - 15	0.15 - 15	0.03	6.08	11.2"
3/4"	Male NPT	6.6	0.6 - 15	0.15 - 15	0.03	6.08	11.7"
3/4" (high flow)	Male NPT	11	1 - 25	0.25 - 25	0.05	8.81	11.7"
1"	Male NPT	11	1 - 25	0.25 - 25	0.05	8.81	12.3"
1" (high flow)	Male NPT	15.4	1.4 - 35	0.35 - 35	0.07	12.17	15"
1 1/4"	Male NPT	26.4	3 - 60	0.6 - 60	0.12	20.26	15.25"
1 1/2"	Male NPT	44	5 - 100	1 - 100	0.2	33.85	17"
2"	Male NPT	66	8 - 150	1.5 - 150	0.3	101.2	17.6"
2 1/2"	Class 150 Flange	110	12 - 225	2.5 - 250	0.5	156.2	11.81"

METER ORDERING INFORMATION

Meter Model Number Coding = SYS-40-AAA-BCD-EFG-(SPC)

SYSTEM-40 = Integral BTU Meter

AAA = Nominal Meter Size in Inches

050 = 1/2" 130 = 1 1/4"
 340 = 3/4" 150 = 1 1/2"
 341 = 3/4" High Flow 020 = 2"
 010 = 1" 250 = 2 1/2"
 011 = 1" High Flow

B = Process Connection Type

0 = NPT Threads
 1 = ANSI Class 150 Flange¹

C = Display / Interface

1 = IP65 Enclosure with Display

D = Input Power

0 = 24 V AC/DC

E = Serial Communications

1 = RS485 (BACnet MS/TP or MODBUS RTU)

F = Analog & Pulse Input/Output Configuration

2 = Two (2) Aux Pulse Inputs and One (1) Aux Pulse Output²
 6 = One (1) Aux Pulse Input, One (1) Aux Pulse Output and
 One (1) Analog Output

G = Temperature Sensor Type

0 = Direct Insertion - One (1) integral, one (1) remote³
 1 = Direct Insertion - Two (2) remote⁴
 2 = Push in Thermowell Style - Two (2) remote⁵

SPC = Special Configuration

CONFIGURATION NOTES

- [1] Required for 2 1/2" meter, NOT available on 1/2" to 2" meters
- [2] Default configuration, pulse inputs and outputs can be configured in the field
- [3] Valid for "AAA" meter size = 050-011. Requires reducer bushing INSTL4002-TSI or INSTL4004-TSI
- [4] Valid for "AAA" meter size = 050-011. Requires thermowell INSTL kit INSTL4001-TSD or INSTL4003-TSD
- [5] Valid for "AAA" = 340-250. Requires thermowell INSTL kit INSTL4005-TSD, INSTL4007-TSD, INSTL4008-TSD or INSTL4009-TSD