



System-40

BTU MEASUREMENT 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.



Engineered • Wet Calibrated • Factory Configured

Measure with Confidence

No-Fault Warranty • On-Time Delivery • Customer Support

• 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.

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

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.

*National Institute of Standards and Technology

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.

Matched Platinum 1000 Ω RTD Temperature Sensors - Sensors are paired in a matching process that ensures a differential measurement uncertainty of better than $\pm 0.18^\circ\text{F}$.

Suitable for Water and Water/Glycol Solutions - The 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
- NSF/ANSI 61 & 372
- BTL Certified to ASHRAE 135:2009



SPECIFICATIONS*

SYSTEM-40 TRANSMITTER		
PERFORMANCE	CALCULATOR ACCURACY	Computation Error: $\leq 0.09\%$ at 30°F Δt
	REPEATABILITY	$\leq \pm 0.2\%$
OPERATING CONDITIONS	OPERATING TEMPERATURE	-13°F to 131°F
	STORAGE TEMPERATURE	-14°F to 158°F
INPUT POWER**	20-28V AC/DC, 50/60 Hz, 5 VA maximum	
I/O SIGNAL**	AVAILABLE OPTIONS	- Two (2) aux pulsed inputs & one (1) aux pulsed output - One (1) aux pulsed input, one (1) aux pulsed output & one (1) analog output
	ISOLATED ANALOG OUTPUT	May be programmable for energy rate, flow rate, supply temperature, return temperature or ΔT Configurable: 4-20 mA, 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 Rating: 50 mA, 30 V Contact Pulse Duration: 50, 100, 500 or 1000 ms
	ISOLATED TOTALIZING PULSE INPUTS	For use with devices providing sinking open collector or dry contact outputs Input Rating: 30 VDC, 10 mA maximum Pulse Duration: 50 ms minimum
ELECTRONICS ENCLOSURE**	IP65 polycarbonate with display	
NETWORK CONNECTIONS**	Isolated RS485 serial interface	
	AVAILABLE OPTIONS	- 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 – 127 (1 – 247 MODBUS® RTU)
	DEVICE INSTANCE RANGE	1 – 4,194,302 (BACnet® only)
	PARITY	None, Even, Odd (MODBUS® RTU only)
APPROVALS	FCC	Part 15, Subpart B
	BTU	Certified to ASHRAE 135:2009

*Specifications subject to change without notice.

**See model codification for additional information regarding option selections.

SPECIFICATIONS CONTINUED*

SYSTEM-40 FLOW SENSOR		
PERFORMANCE	SENSING METHOD	Inline wetted ultrasonic sensing (no moving parts)
	ACCURACY	±1% of reading over 25:1 turndown ±2% of reading over 100:1 turndown Overall turndown exceeds 500:1
OPERATING CONDITIONS	FLUID TEMPERATURE	32°F to 250°F
	MAXIMUM OPERATING PRESSURE	400 psi (threaded only)
	PRESSURE DROP	Less than 1 psi at 4 ft/s, decreasing at lower velocities
TEMPERATURE SENSORS	Field serviceable MID certified matched pair of 2-wire 1000Ω platinum RTDs Calibrated to a differential measurement uncertainty of ±0.18°F	
WETTED COMPONENTS	Lead-free brass, PEEK	
PIPE SIZE RANGE**	½ - 2½" nominal diameter	
PROCESS CONNECTIONS**	AVAILABLE OPTIONS	• Male NPT threads • 2½" meter provided with ANSI Class 150 raised face flanges
APPROVALS	NSF/ANSI	61
	NSF/ANSI	372

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**See model codification for additional information regarding option selections.

TYPICAL INSTALLATION

(Meter should be installed on return line for best performance but can be field configured for install on the supply line.)

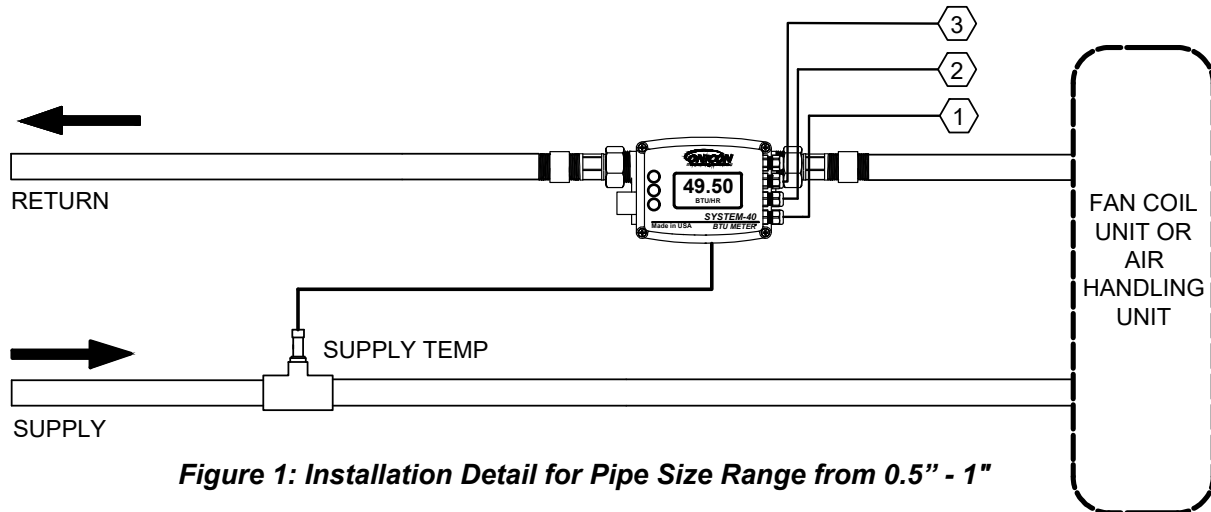


Figure 1: Installation Detail for Pipe Size Range from 0.5" - 1"

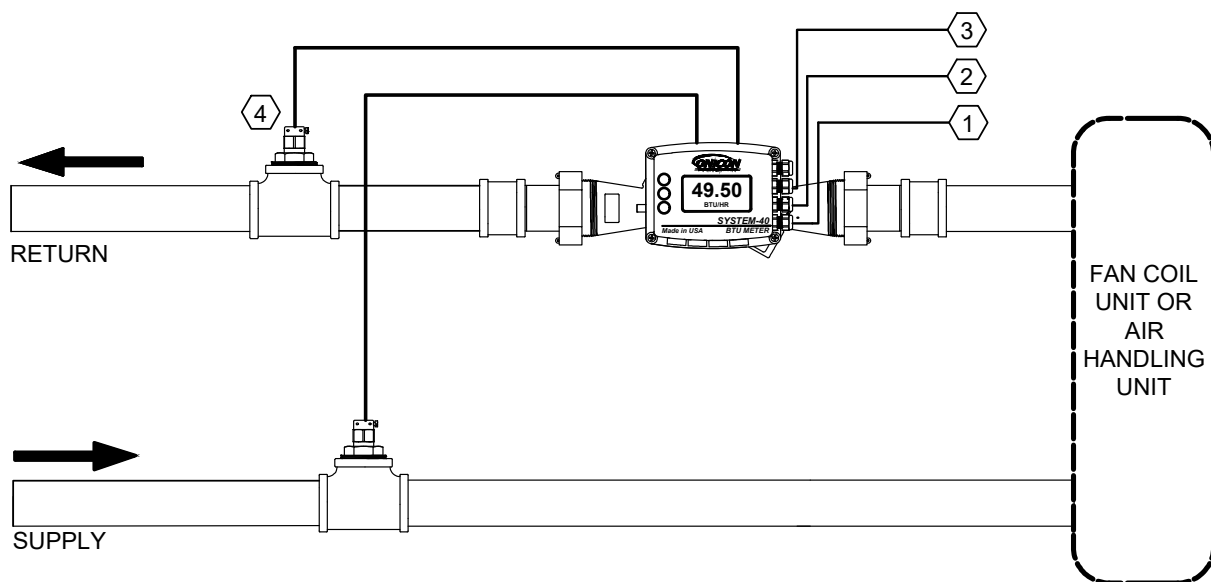


Figure 2: Installation Detail for Pipe Size Range from 1.25" - 2.5"

1. Input Power: 24 VAC/VDC, 5 VA maximum
2. Three (3) auxiliary signals can be configured as pulse inputs/ outputs or as an analog output
3. Isolated RS485 serial interface, BACnet MS/TP or MODBUS RTU
4. Remote temperature sensor installed downstream of flow meter body

METER DESIGN DETAILS

Meter Size	Process Connection Type	Typical Design Flow	Minimum Flow	Flow @ Max Analog Output	1% of Rate Flow Range	2% of Rate Flow Range	C _v	Volume per Pulse	Length with Fittings
(Nominal Size)		(gpm)	(gpm)	(gpm)	(gpm)	(gpm)		(gal)	(in)
½"	Male NPT	6.6	0.03	15	0.6 - 15	0.15 - 0.6	6.08	1	11.2
¾"	Male NPT	6.6	0.03	15	0.6 - 15	0.15 - 0.6	6.08	1	11.7
¾" (Hi-Flow)	Male NPT	11.0	0.05	25	1.0 - 25	0.25 - 1.0	8.81	1	11.7
1"	Male NPT	11.0	0.05	25	1.0 - 25	0.25 - 1.0	8.81	10	12.3
1" (Hi-Flow)	Male NPT	15.4	0.07	35	1.4 - 35	0.35 - 1.4	12.17	10	15.0
1¼"	Male NPT	26.4	0.12	60	3 - 60	0.6 - 3	36.95	10	15.3
1½"	Male NPT	44.0	0.20	100	5 - 100	1.0 - 5	51.20	10	17.0
2"	Male NPT	66.0	0.30	150	8 - 150	1.5 - 8	101.20	10	17.6
2½"	Class 150 Flange	110.0	0.50	250	12 - 225	2.5 - 12 & 225 - 250	156.20	10	11.8

METER ORDERING INFORMATION

System-40 Meter Model Number Codification = **SYS-40-AAA-BCD-EFG**

SYS-40 = Integral BTU Meter

AAA = Nominal Meter Size (inches)

050 = ½"	130 = 1¼"
340 = ¾"	150 = 1½"
341 = ¾" High Flow	020 = 2"
010 = 1"	250 = 2½"
011 = 1" High Flow	

B = Process Connection Type

0 = NPT Threads
1 = ANSI Class 150 flange ¹

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)
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F = Analog & Pulse Input/Output Configuration

2 = Two (2) aux pulse inputs and one (1) aux pulse output ²
6 = One (1) aux pulse input, one (1) aux pulse output and one (1) analog output

G = Temperature Sensor Type

0 = Threaded RTDs w/gaskets for direct insertion (wetted sensors) - One (1) integral, one (1) remote ³
1 = Threaded RTDs for use with thermowells – Two (2) remote ⁴
2 = Push-in RTDs for use with thermowells – Two (2) remote ⁵

- [1] Required for 2½" meter, NOT available on ½" 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" = 050-250. Requires thermowell INSTL kit INSTL4005-TSD, INSTL4007-TSD, INSTL4008-TSD or INSTL4009-TSD

