



**ONICON**  
Flow and Energy Measurement

# F-4300

## CLAMP-ON ULTRASONIC FLOW METER/ THERMAL ENERGY MEASUREMENT SYSTEM

ONICON's F-4300 Clamp-on Ultrasonic Flow Meter/ Thermal Energy Measurement System is the non-invasive approach to highly accurate hydronic flow measurement. The time-tested design incorporates matched transducers and easy to use mounting hardware making it ideal for installation in systems where shutdowns are impractical.

When provided with the BTU meter option, the F-4300 becomes a complete hydronic energy measurement system.



• Chilled Water • Hot Water • Domestic Water • Condenser Water •

# F-4300

## CLAMP-ON ULTRASONIC FLOW METER/ THERMAL ENERGY MEASUREMENT SYSTEM



ONICON F-4000 Series Ultrasonic Flow Meters utilize the differential transit time method to measure the velocity of relatively clean liquids in full pipes. By measuring the difference between transit times of ultrasonic sound waves traveling between two transducers, the flow velocity and direction are accurately determined.

### DESCRIPTION

ONICON F-4300 Clamp-on Ultrasonic Flow Meters/ Thermal Energy Measurement Systems offer an ideal solution for liquid flow measurement in existing systems when it is impractical to install traditional inline or insertion style flow meters. The innovative design incorporates matched precision clamp-on transducers and signal processing circuitry to accurately measure the flow of most liquids over a wide velocity range.

Each F-4300 is provided with transducers and easy-to-use mounting hardware, factory supplied transducer cabling, and a wall mount enclosure with LCD and user interface keypad. When ordered with the BTU (energy) option, the F-4300 is provided with a matched pair of temperature sensors.

Output signals include analog output(s), digital outputs, digital inputs (energy version) and an isolated RS485 output for connecting to BACnet MS/TP or MODBUS RTU networks.

### APPLICATIONS

- Chilled water, hot water, condenser water & water/glycol systems for HVAC
- Steam condensate (pumped)
- Domestic/municipal water
- Process water & other clean liquids

### FEATURES

#### Ideal Solution for Retrofits & Baseline Monitoring -

Clamp-on transducers allow for quick and easy installation with no system shutdown and no pressure drop, on a number of pipe materials and sizes, from 1/2" through 48". The built-in 128 megabyte data logger makes it an ideal solution for baseline monitoring.

#### Simple to Install and Commission -

Every ONICON F-4300 is individually configured and programmed using customer specific application data. Complex field programming is not required.

#### High Confidence and Reliability -

ONICON provides transducers that are optimized for specific pipe conditions, providing a strong, stable signal with an outstanding signal-to-noise ratio.

#### Native BACnet & MODBUS Communications -

The F-4300 is provided with a single RS485 output that can be configured to operate on BACnet® MS/TP or MODBUS® RTU networks. A MODBUS® TCP/IP network version can also be provided in lieu of the RS485 connection.

#### BTU (Energy) Meter Option -

When ordered with the BTU meter option, the F-4300 becomes a complete thermal energy measurement system providing accurate flow, energy, and temperature data.

### CALIBRATION

All F-4300 flow/ energy meters and temperature sensors are wet-calibrated in a flow laboratory against standards that are directly traceable to National Institute of Standards and Technology (N.I.S.T.). A certificate of calibration accompanies every meter.



Typical Installation on Steel Pipe

# F-4300

## CLAMP-ON ULTRASONIC FLOW METER/ THERMAL ENERGY MEASUREMENT SYSTEM



### SPECIFICATIONS\*

F-4300 TRANSMITTER		
TRANSMITTER PERFORMANCE	ACCURACY	± 1.0% of reading from 1.5 to 40 ft/s (0.46 to 12.2 m/s) (26:1 range) ± 0.015 ft/s (±0.0046 m/s) for velocities below 1.5 ft/s (0.46 m/s)
	REPEATABILITY & LINEARITY	± 0.25%
DIFFERENTIAL TEMPERATURE SENSORS	Temperature sensors meet EN1434/CSA C900.1 accuracy requirements for 1K sensors for cooling applications, 32°F to 77°F Temperature sensors meet EN1434/CSA C900.1 accuracy requirements for 2K sensors for heating applications, 140°F to 212°F	
	ONICON CURRENT BASED TEMP SENSOR**	Precision solid state current based sensors. Signal (mA) is unaffected by wire length. Overall differential temperature measurement uncertainty of ± 0.15°F over the application range
	PT1000 RTD TEMP SENSOR**	1000Ω platinum RTDs calibrated to a differential measurement uncertainty of ± 0.18°F over the stated range
OPERATING CONDITIONS	AMBIENT OPERATING	-5°F to 140°F
INPUT POWER	AVAILABLE OPTIONS	<ul style="list-style-type: none"><li>• 24 V AC/DC, 50/60 Hz, 10 VA max</li><li>• 110-240 VAC, 50/60 Hz, 10 VA max</li></ul>
I/O SIGNAL	ANALOG OUTPUT(S)	Flow Meter: One (1) isolated AO, 4-20 mA or 0-5 VDC BTU Meter Option: Three (3) isolated AOs, 4-20 mA or 0-5 VDC
	DIGITAL OUTPUTS	Flow Meter: Two (2) programmable DOs, SPST, form A, N.O. BTU Meter Option: Six (6) programmable DOs DO 1-2 : SPST, form A, N.O. DO 3-6: SPDT, form C Pulse duration: 500 ms Min. pulse interval: 2s Max. load voltage/current: 50V/ 250mA AC/DC
	DIGITAL INPUTS	BTU Meter Option: Three (3) DIs For use with open collector sinking or contact closure outputs Input voltage logic low: < 0.5 VDC Input voltage logic high range: 5 - 24 VDC Min. pulse interval: 2s
ELECTRONICS ENCLOSURE	NEMA 4X (IP67) polycarbonate enclosure with clear shatter proof cover	
	DISPLAY	Large, easy to read, backlit, 128 x 64 dot matrix display
	DATA LOGGER	Built-in 128 MB data logger with type A USB output. Capacity for 26 million data points
PROGRAMMING	Menu driven via five (5) programming keys	
ELECTRICAL CONNECTIONS	Enclosed terminal blocks, cable access through three (3) ½" conduit openings for signal and power, and one (1) ¾" conduit opening for transducer cables.	
NETWORK CONNECTIONS	AVAILABLE OPTIONS	<ul style="list-style-type: none"><li>• RS485 serial interface, BACnet MS/TP (default) or MODBUS RTU</li><li>• Optional MODBUS TCP/IP (24 VDC only)</li></ul>

\* SPECIFICATIONS subject to change without notice.

\*\* Installation hardware are provided separately.

**F-4300****CLAMP-ON ULTRASONIC FLOW METER/ THERMAL ENERGY MEASUREMENT SYSTEM****SPECIFICATIONS CONTINUED\***

NETWORK CONFIGURATION & ADDRESSING	BAUD RATES	4800, 9600, 19200, 38400, or 76800
	DEVICE ADDRESS RANGE	1 - 247
	DEVICE INSTANCE RANGE	1 – 4,194,302 (BACnet® only)
	PARITY	None, Even, Odd (MODBUS® RTU only)
APPROVALS	CE	2014/30/EU EMC Directive
<b>F-4300 FLOW SENSOR</b>		
PERFORMANCE	SENSING METHOD	Ultrasonic differential transit time velocity measurement via non-wetted transducers
OPERATING CONDITIONS	FLUID PROPERTIES	Clean liquids in full (pressurized) pipes
	FLUID VELOCITY RANGE	0.07 ft/s to 40 ft/s
	FLUID TEMPERATURE RANGE	-40°F to 250°F
	PIPE MATERIALS	Suitable for use in a wide range of metallic and non-metallic piping systems
	PIPE SIZE RANGE	1/2" through 48", based on transducer series selected.
TRANSDUCER DESIGN - 10 SERIES	OPERATING FREQUENCY	2.56 Mhz
	PIPE SIZE RANGE	1/2" through 4"
	TRANSDUCER HOUSING	CF8M 316 Stainless Steel
	CABLE CONNECTIONS	<ul style="list-style-type: none"> <li>• Triax cable with BNC style connectors and sealing jacket</li> <li>• Triax cable with NEMA 6 (IP67) direct connection for wet locations</li> </ul>
	MOUNTING KIT	304 Stainless Steel mounting brackets with conduit connection, 200 Series Stainless Steel pipe clamps, and alignment and spacer tool
TRANSDUCER DESIGN - 20 SERIES	OPERATING FREQUENCY	1.28 Mhz
	PIPE SIZE RANGE	2" through 10"
	TRANSDUCER HOUSING	CF8M 316 Stainless Steel
	CABLE CONNECTIONS	Triax cable with BNC style connectors and sealing jacket
	MOUNTING KIT	304 Stainless Steel mounting brackets with conduit connection, 200 Series Stainless Steel pipe clamps, and alignment and spacer tool
TRANSDUCER DESIGN - 30 SERIES	OPERATING FREQUENCY	640 kHz
	PIPE SIZE RANGE	12" through 48"
	TRANSDUCER HOUSING	CF8M 316 Stainless Steel
	CABLE CONNECTIONS	Triax cable with BNC style connectors and 1/2" MNPT conduit connection and NEMA 4 (IP66) threaded strain relief.
	MOUNTING KIT	304 Stainless Steel mounting brackets with conduit connection, 200 Series Stainless Steel pipe clamps, and alignment and spacer tool

\* SPECIFICATIONS subject to change without notice.

**SPECIFICATIONS CONTINUED\***

PIPE MATERIAL**	PIPE SCHEDULE
Carbon Steel	Schedule 40, Schedule 80, Schedule Standard
PVC	Schedule 40, Schedule 80, Schedule Standard
Copper	Type L, Type K
Stainless Steel	Schedule 5S, Schedule 10S, Schedule 40S
Ductile Iron (cement lined or unlined)	Thickness Class 50, Thickness Class 51, Thickness Class 52, Thickness Class 53, Thickness Class 54, Thickness Class 55, Thickness Class 56
HDPE	SDR 7.4, SDR 11, SDR 17, SDR 17.6, SDR 21

\* SPECIFICATIONS subject to change without notice.

\*\*Contact factory for pipe materials not listed.

**FLOW RANGES**

The F-4300 has an operating range of 0.1 ft/s - 20 ft/s. The table below shows the corresponding volumetric ranges (GPM) by nominal pipe size.

OPERATING RANGE FOR 10 SERIES & 20 SERIES TRANSDUCERS	
PIPE SIZE (inches)	FLOW RATE (GPM) (0.1 ft/sec - 20 ft/sec)
1/2	0.06 - 12
3/4	0.2 - 28
1	0.3 - 48
1 1/4	0.4 - 76
1 1/2	0.6 - 110
2	1.0 - 200
2 1/2	1.5 - 230
3	2.3 - 460
4	4.0 - 800
5	6.2 - 1,200
6	9.0 - 1,800
8	16 - 3,100
10	25 - 4,900

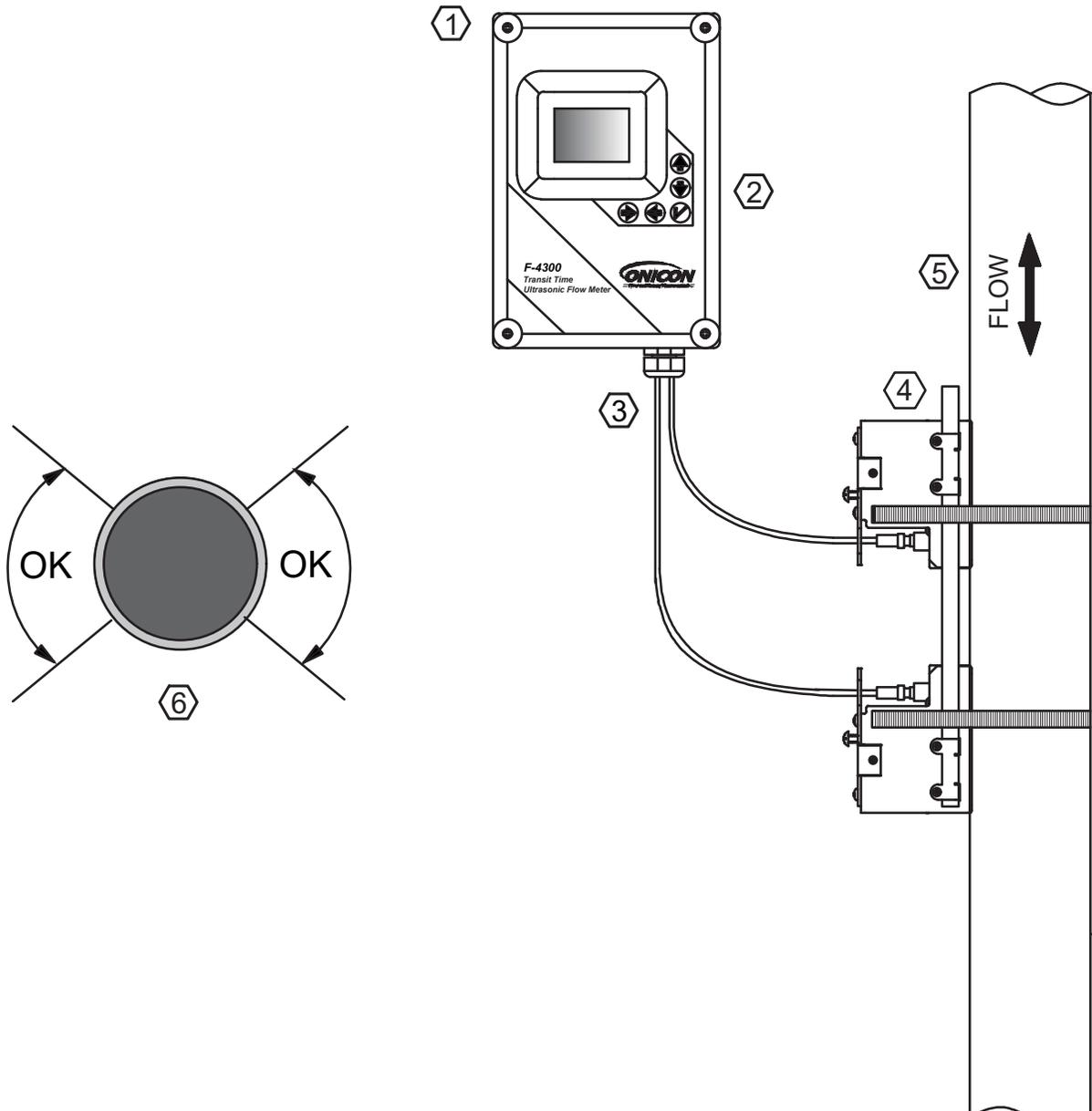
OPERATING RANGE FOR 30 SERIES TRANSDUCERS	
PIPE SIZE (inches)	FLOW RATE (GPM) (0.1 ft/sec - 20 ft/sec)
12	35 - 7,050
14	43 - 8,600
16	57 - 11,400
18	73 - 14,600
20	91 - 18,100
24	132 - 26,500
26	166 - 33,100
30	221 - 44,100
34	283 - 56,600
36	318 - 63,500
42	432 - 86,400
48	564 - 112,500

# F-4300

## CLAMP-ON ULTRASONIC FLOW METER/ THERMAL ENERGY MEASUREMENT SYSTEM

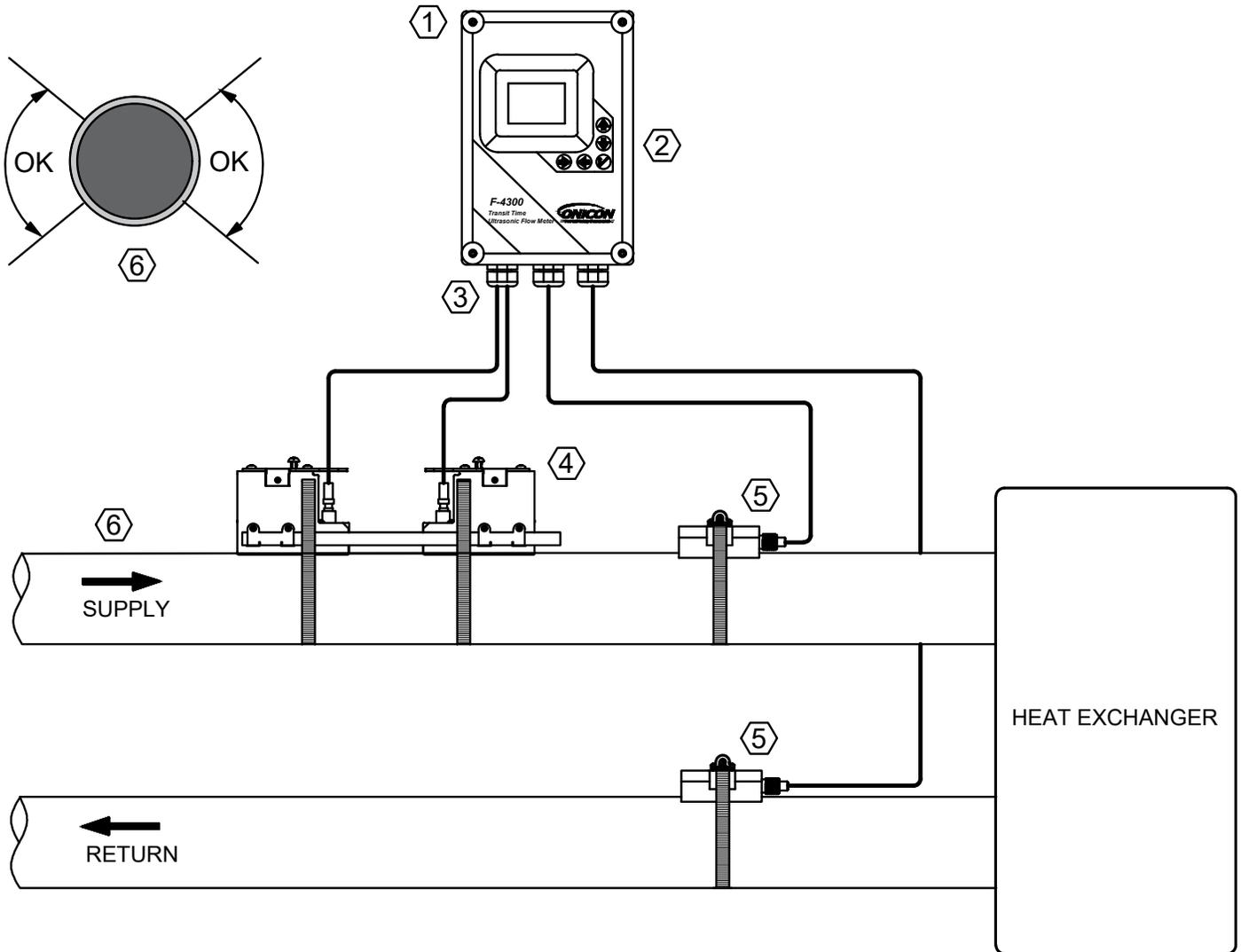


### TYPICAL F-4300 INSTALLATION



1. NEMA 4X (IP67) polycarbonate enclosure with clear shatter proof cover.
2. Backlit LCD display with menu, driven via five (5) programming keys.
3. Triaxial transducer cables. The maximum allowable cable length is 100 ft.
4. Mounting hardware, includes: mounting brackets, mounting strap kit and alignment tool.
5. Vertical pipe: mounting on a vertical pipe is recommended, when flow is in the upward direction. When mounting on a vertical pipe flowing in a downward direction, make sure there is sufficient back pressure in the system to maintain a full pipe.
6. Horizontal pipe: avoid mounting transducers on the top of a horizontal pipe. The best placement on a horizontal pipe is either the 2:00 to 4:00 or 8:00 to 10:00 positions.

TYPICAL F-4300 BTU (ENERGY) INSTALLATION



1. NEMA 4X (IP67) polycarbonate enclosure with clear shatter proof cover.
2. Backlit LCD display with menu, driven via five (5) programming keys.
3. Triaxial transducer cables. The maximum allowable cable length is 100 ft.
4. Mounting hardware, includes mounting brackets, mounting strap kit and an alignment and spacer tool.
5. Supply and return temperature sensors. Installation style varies (immersion or clamp-on style).
6. Horizontal pipe: avoid mounting transducers on the top of a horizontal pipe. The best placement on a horizontal pipe is either the 2:00 to 4:00 or 8:00 to 10:00 positions.  
 Vertical pipe: mounting on a vertical pipe is recommended when flow is in the upward direction. When mounting on a vertical pipe flowing in a downward direction, make sure there is sufficient back pressure in the system to maintain a full pipe.

## METER ORDERING INFORMATION

### Meter Model Number Coding = F-4300-ABCD-EEFF-GG

#### A = Electronics Enclosure

1 = NEMA 4X Polycarbonate

#### B = Input Power

1 = 24 V AC/DC

2 = 110 - 240 VAC

#### C = Feature Set & I/O

1 = Flow only, one (1) AO, two (2) DO and RS485, BACnet or MODBUS

2 = Flow only, one (1) AO, two (2) DO and MODBUS TCP/IP <sup>1</sup>

3 = Flow and Energy, three (3) AO, three (3) DI, six (6) DO and RS485, BACnet or MODBUS

4 = Flow and Energy, three (3) AO, three (3) DI, six (6) DO and MODBUS TCP/IP <sup>1</sup>

#### D = Transducer Cable Length

1 = 25' transducer cable, BNC connector <sup>2</sup>

2 = 50' transducer cable, BNC connector <sup>2</sup>

3 = 100' transducer cable, BNC connector <sup>2</sup>

4 = 25' transducer cable, submersible connection (NEMA 6 - IP67) <sup>3</sup>

5 = 50' transducer cable, submersible connection (NEMA 6 - IP67) <sup>3</sup>

6 = 100' transducer cable, submersible connection (NEMA 6 - IP67) <sup>3</sup>

7 = 25' transducer cable, BNC connector, threaded strain relief (NEMA 4 - IP66) <sup>4</sup>

8 = 50' transducer cable, BNC connector, threaded strain relief (NEMA 4 - IP66) <sup>4</sup>

9 = 100' transducer cable, BNC connector, threaded strain relief (NEMA 4 - IP66) <sup>4</sup>

#### EEFF = Transducer Series & Installation Hardware

1212 = Includes pair of 10 Series transducer, 37 deg. w/ 1/2" to 4" nom. pipe diameter SS mounting bracket

2X21 = Includes pair of 20 Series transducer, 35 to 41 deg. w/ 2" to 6" nom. pipe diameter SS mounting bracket <sup>5</sup>

2X22 = Includes pair of 20 Series transducer, 35 to 41 deg. w/ 8" to 10" nom. pipe diameter SS mounting bracket <sup>5</sup>

3231 = Includes pair of 30 Series transducer, 37 deg. w/ 12" to 16" nom. pipe diameter SS mounting bracket

3232 = Includes pair of 30 Series transducer, 37 deg. w/ 18" to 48" nom. pipe diameter SS mounting bracket

#### GG = Temperature Sensor Selection

00 = Flow only

O1 = Matched pair of current (mA) based sensors, CHW/CW range <sup>6</sup>

O2 = Matched pair of current (mA) based sensors, HHW range <sup>6</sup>

R2 = Matched pair of 4 wire PT1000 RTDs, 1/2" to 2 1/2" line size, 32°F to 250°F <sup>6</sup>

R3 = Matched pair of 4 wire PT1000 RTDs, 3" and larger line size, 32°F to 250°F <sup>6</sup>

S6 = Matched pair of PT100 current (mA) based sensors, -4°F to 104°F <sup>6</sup>

#### Notes

<sup>1</sup> MODBUS TCP/IP requires 24 VDC input power

<sup>2</sup> Only available for transducer series EEFF = 1212, EEFF = 2X21 and EEFF = 2X22

<sup>3</sup> Only available for transducer series EEFF = 1212

<sup>4</sup> Only available for transducer series EEFF = 3231 and EEFF = 3232

<sup>5</sup> Actual transducer selected, 21 through 24, is factory selected at time of order

<sup>6</sup> Only available for feature set C = 3 and C = 4

