Impeller
Data Industrial®

Transmitters

Model 340N2 Btu

Badger Meter

XMT-UM-01655-EN-08 (March 2016)

User Manual

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DESCRIPTION

The Badger Meter Model 340N2 Btu transmitter is an economical, compact device for sub-metering applications using Johnson Controls Metasys® Network Companion and Facilitator Supervisory Systems.

The Model 340N2 transmitter works in conjunction with a flow sensor and two temperature sensors to calculate thermal energy by measuring liquid flow and inlet and outlet temperatures in a closed pipe system. The transmitter requires two 10 kΩ thermistors for temperature input. The transmitter can accept the signal from most Badger Meter raw pulse flow sensors, as well as many other pulse and sine wave devices.

The onboard microcontroller and digital circuitry make precise measurements and produce accurate, drift-free outputs. The Model 340N2 transmitter is configured using Badger Meter Windows® based programming software. Calibration information for the flow sensor, units of measurement and output scaling may be preselected or entered in the field. Btu transmitter information is available when connected to a PC or laptop computer. This information includes real-time flow rate, flow total, both T1 and T2 temperature probe information, energy rate, and energy total.

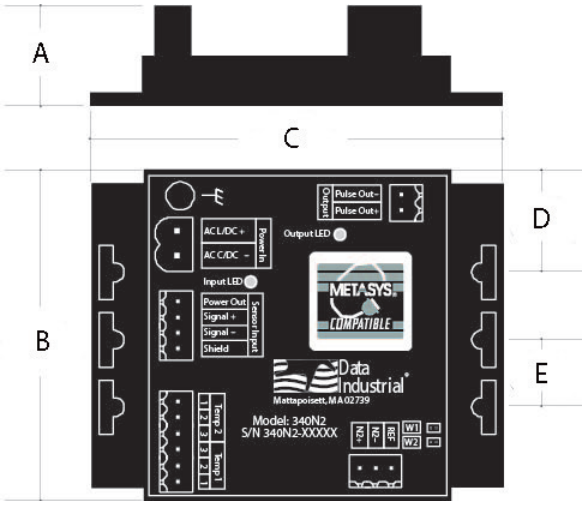
The Model 340N2 transmitter features two LED's to verify input and output signals.

The primary output is the Johnson Controls N2 communications protocol that allows the Model 340N2 transmitter to be assigned an address and allow all measurement parameters—inlet and outlet temperature, flow rate, flow total, energy rate and energy total—to be transmitted from as many as 32 units on a single 3-wire RS-485 bus.

The secondary output for the Model 340N2 transmitter is an isolated solid state switch closure that is user programmed for units of energy or flow. The output pulse width is adjustable from 50 mS…5 sec.

The Model 340N2 transmitter operates on AC or DC power supplies ranging from 12…24 volts.

The compact cast epoxy body measures 3.65 x 2.95 inches (93 x 75 mm) and can be easily mounted in panels, enclosures or on DIN rails.



A	B	C	D	E
1.60 in.	2.95 in.	3.65 in.	.88 in.	.60 in.
41 mm	75 mm	93 mm	22 mm	15 mm

Figure 1: Model 340N2 dimensions

SCOPE AND PURPOSE

This manual provides instructions for installing and programming the Model 340N2 Btu transmitter.

INSTALLATION

Mechanical Installation

The Model 340N2 transmitter can be surface mounted onto a panel, attached to DIN rails using adapter clips or wall mounted using optional enclosures.

Location

Although the device is encapsulated, all wiring connections are made to exposed terminals. The unit should be protected from weather and moisture in accordance with electrical codes and standard trade practices.

In any mounting arrangement, the primary concerns are ease of wiring and attachment of the programming cable. The unit generates very little heat so no consideration need be given to cooling or ventilation.

Surface Mount Installation

The Model 340N2 transmitter can be mounted to the surface of any panel using double-sided adhesive tape or by attaching fasteners through the holes in the mounting flanges of the unit.

Din Rail Mounting

Optional clips snap onto the mounting flanges allowing the transmitter to be attached to DIN 15, 32, 35 mm DIN rail systems.

Wall Mounting

Optional metal and plastic enclosures are available for the Model 340N2 transmitter. The enclosure is first attached to the wall using fasteners through its mounting holes.

After wiring, the transmitter may be attached to the enclosure with the terminal headers facing in using the slots in the mounting flanges. As an alternate mounting arrangement, the Model 340N2 transmitter can be fastened to the box cover using double-sided adhesive tape.

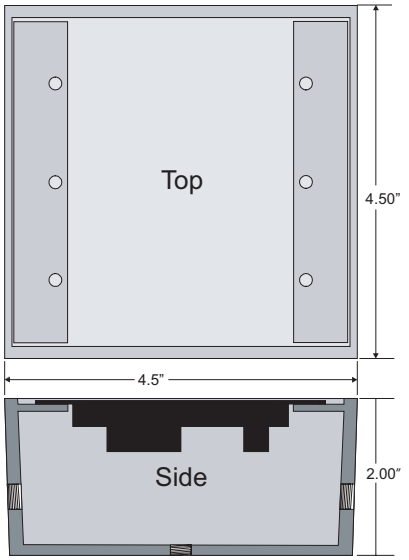


Figure 2: Metal box dimensions

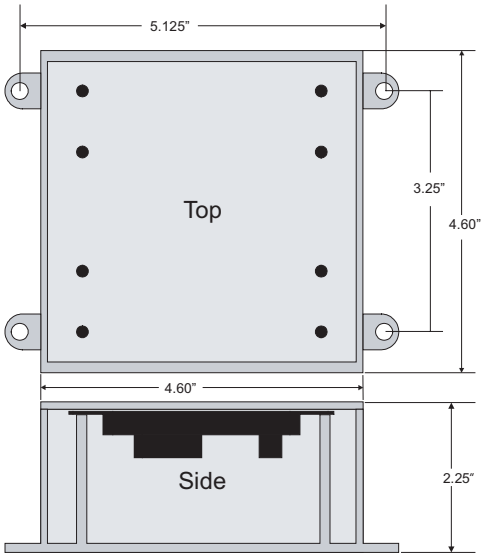


Figure 3: Plastic box dimensions

TEMPERATURE SENSOR INSTALLATION

The location of the temperature sensors with regard to the flow sensor is important to the accuracy of the energy calculation. **Temperature sensor T1 must be located closest to the flow sensor.** A distance of 5 pipe diameters will give the greatest accuracy. **Always install the temperature sensor downstream of the flow sensor.**

ELECTRICAL INSTALLATION

All connections to the Model 340N2 transmitter are made to screw terminals on removable headers.

Power Supply Wiring

The Model 340N2 transmitter requires 12…24 volts AC or DC to operate. The power connections are made to the ORANGE header. The connections are labeled beside the header. Observe the polarity shown on the label.

If a Badger Meter plug in type power supply (Model A-1026 or A-1028) is used, connect the black/white striped wire to the terminal marked positive (+) and the black wire to the terminal marked negative (–).

NOTE: Included with every Model 340N2 transmitter is a Model 340N2IK kit containing a screw, lockwasher and ground lead to connect the transmitter to earth ground. Connect the earth ground lug of the Model 340N2 transmitter to a solid earth ground with as short a wire as possible. This will help prevent electrical interference from affecting normal operation.

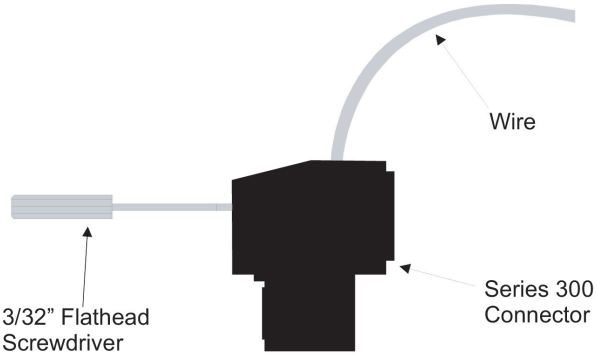


Figure 4: Side view of typical Series 300 removable connector wiring

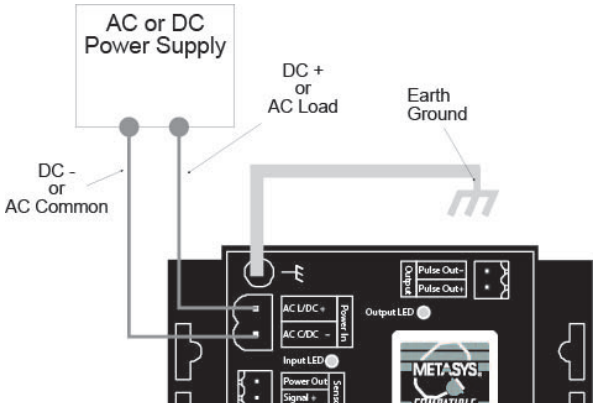


Figure 5: Sample power supply wiring diagram

Sensor Wiring

All flow sensor types connect to the four terminal header labeled "Sensor Input".

Series 200

Connect the red wire to sensor signal (+), black wire to sensor signal (–) and the bare wire to shield. See *Figure 6*.

SDI Series (standard pulse output option)

Connect ***SDI number 3 sensor signal*** to the ***Model 340N2 transmitter sensor signal (+)*** and the ***SDI number 2 sensor common terminal*** to ***Model 340N2 transmitter sensor signal (–)***. Connect the shield terminal of the SDI sensor to the shield terminal of the Model 340N2 transmitter.

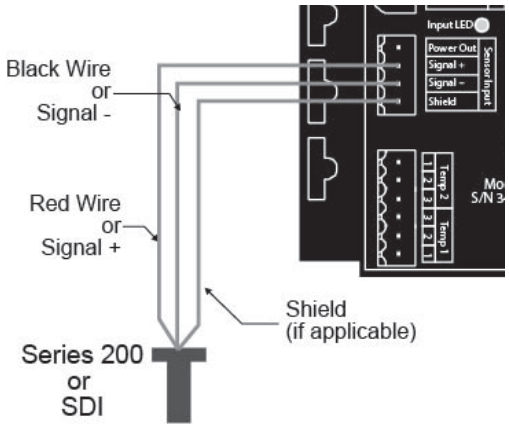


Figure 6: Sample sensor wiring diagram

Other Sensors

The sensor input Power Out terminal supplies nominal 12V DC excitation voltage for three wire sensors. Connect sensor signal + and sensor signal – wires to transmitter terminals.

NOTE: The green input LED toggles on and off as sensor pulses are received. With no flow input the LED will remain in its last state (either on or off).

Temperature Element Wiring

Badger Meter thermistors are not polarity sensitive.

Connect the thermistor closest to the flow sensor of the Model 340N2 transmitter terminal marked Temp 1 number 3 and number 2. Connect the other thermistor wires to the transmitter terminal marked Temp 2 number 3 and number 2.

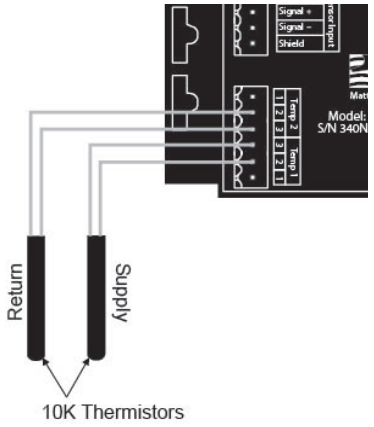


Figure 7: Thermistor wiring diagram

Pulse Output Wiring

The Model 340N2 transmitter has solid state switch output, rated for a maximum sinking current of 100 mA @ 36V DC. In most cases the transmitter pulse out (+) will connect to the input pulse (+) and the pulse out (–) terminal to the input pulse (–) of the receiving device. The separate two terminal removable header on the Model 340N2 is labeled Output. Observe the electrical polarity of the output.

NOTE: When the solid state switch is closed the red output LED will turn on.

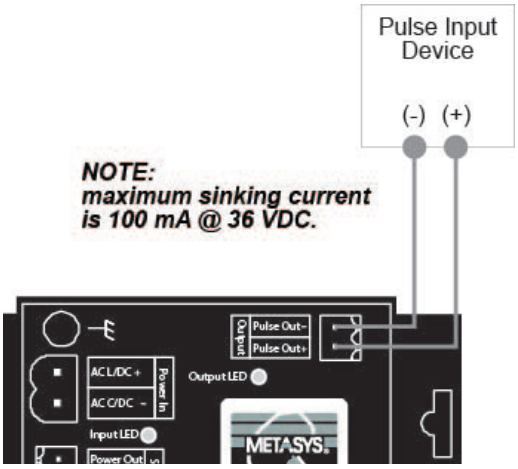


Figure 8: Sample pulse output wiring

Connecting the N2 Bus

Observe polarity when connecting the Model 340N2 transmitter. Connect the ***N2+***, ***N2-*** and ***Ref*** to the appropriate connections in the N2 network.

NOTE: The Model 340N2 transmitter default address must be changed before it is introduced into an existing network to avoid any possible address conflicts. See *"Programming" on page 7* programming instructions.

If the transmitter is connected at the end of the N2 network, jumpers W1 and W2 can be shorted for biasing and terminating of the network. The Model 340N2 biasing circuitry is shown in the diagram in *Figure 10*.

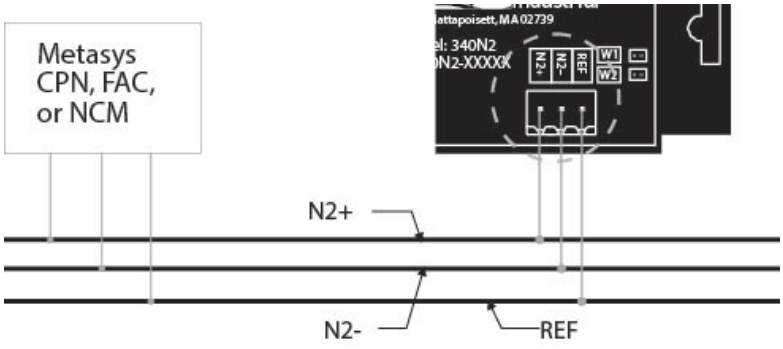


Figure 9: Sample wiring to N2 network

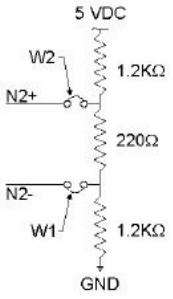


Figure 10: Biasing circuitry

PROGRAMMING

Prior to introducing the Model 340N2 transmitter to an N2 network, it needs to be configured for the pipe size and desired units of measure. In addition, the default network address should be changed to an unused address to avoid any conflicts with other instruments on the N2 network. Programming the Model 340N2 transmitter is accomplished using Badger Meter computer software, available at *www.badgermeter.com*.

1. Load the software on the computer.
2. Connect the Model 340N2 transmitter to the computer using the Badger Meter Model A-302 programming cable. (If the A-302 programming cable is not available, a B&B Electronics Model 485SD9TB can be used.)
   - Connect the RS232 side of the cable to the computer serial COM port. A USB to serial port adapter can be used.
   - Connect the RS485 side of the cable to the transmitter RS-485 connector.
3. Connect the transmitter to a power supply.
4. Launch the software application.
5. Select **340** from the **Device** option in the menu bar and **N2** from the **Device Type** drop-down menu as shown in *Figure 11*.
6. From the **Configuration** option in the menu bar, select **Set Comm Port**. The Comm Settings window opens as shown in *Figure 12*.

   NOTE: If you need help determining the correct COMM port, go to **Windows Control Panel**> **System**> **Device Manager> Ports** to find the Comm port.
7. Select the Comm port. Then click **OK**.

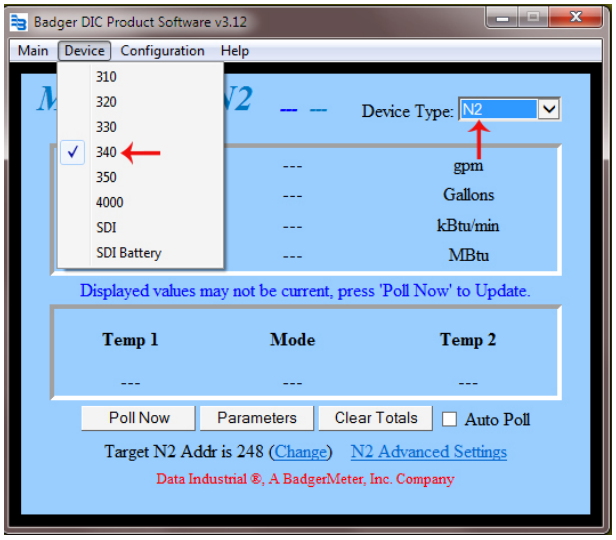


Figure 11: Device 340 N2

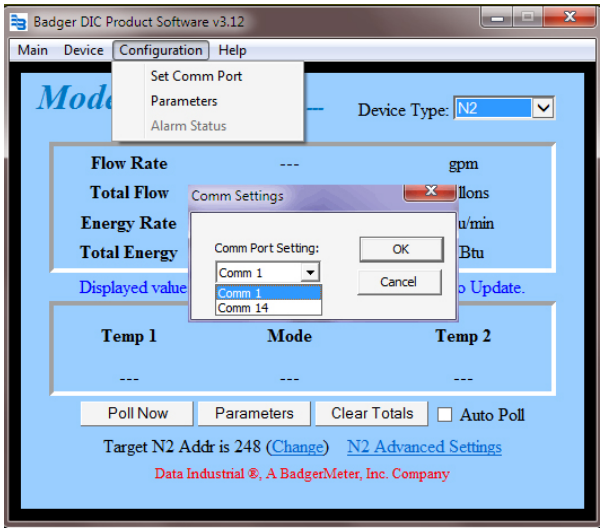


Figure 12: Set Comm port

8. Set the transmitter **Address**. The transmitter must have a unique address to establish communication. The default Address is *248* when the transmitter is new.

- If you know the current transmitter Address, click **Change** to open the Address window and select the correct Address from the drop-down menu. See *Figure 13*. Then click **Apply**.
- If you do not know the Address of the current transmitter or other devices on the string that might be in conflict, select **N2 Advanced Settings** (*Figure 14*) to open the Advanced N2 Configuration window. Then click **Scan** to see the list of known Addresses.

  To scan for other devices on the network string, the three wire RS-485 network wires must be added to the Three Terminal A-301-20 cable connector.

  When the Scan is complete, scroll down to see the last assigned Address. Then click the *New Address* drop-down menu to select the next Address number for the transmitter, and click **Assign**. The example in *Figure 14* shows **154** is assigned. Click **Exit** to close the N2 Advanced Settings window. The new Address number you assigned will display at the bottom of the screen in the *Target N2 Address* field. See *Figure 15*.

NOTE: The "Target N2 Address" must match the current setting in the 340N2. The Address cannot be changed unless the current Address matches the existing 340N2 Address. If the A-302 cable is used alone, the only Address found will be the 340N2 itself.

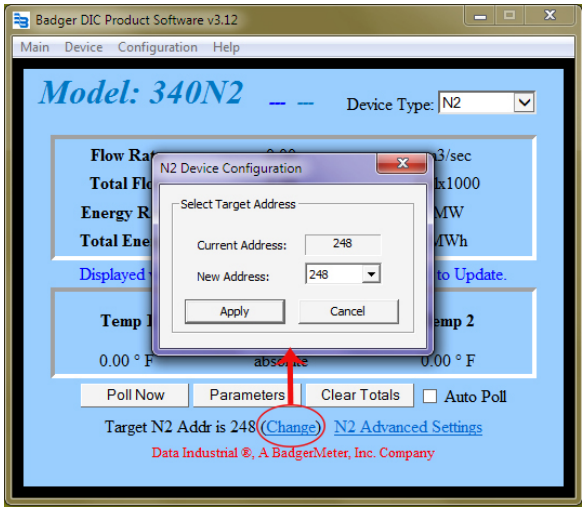


Figure 13: Change Address

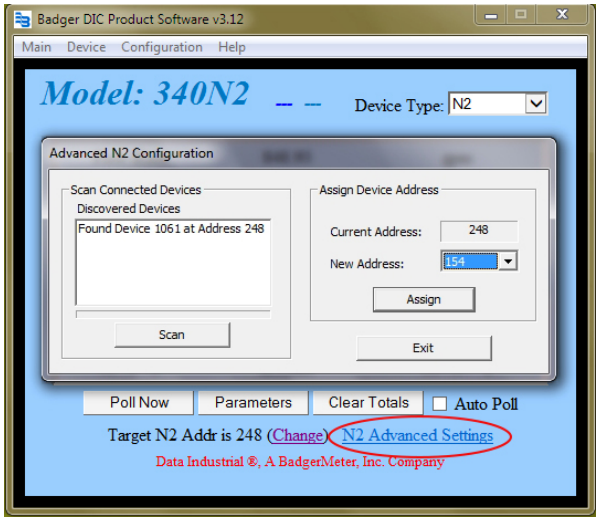


Figure 14: Scan Addresses

9. When the Device Type, Comm port and Address have been properly selected, click the **Poll Now** button to establish communication (*Figure 15*).

   The dashes on the screen will be replaced with values.

   - **Poll Now** is used to refresh the screen and update the values.
   - **Auto Poll** automatically refreshes the screen approximately every 5 seconds.

     NOTE: If **Poll Now** or **Auto Poll** are not selected, the values displayed will not be current.

   - **Clear Totals** can be used to reset the totals to zero.

10. Click the **Parameters** button to open the Parameters screen for programming the transmitter. See *"Programming the Transmitter" on page 9* for details.

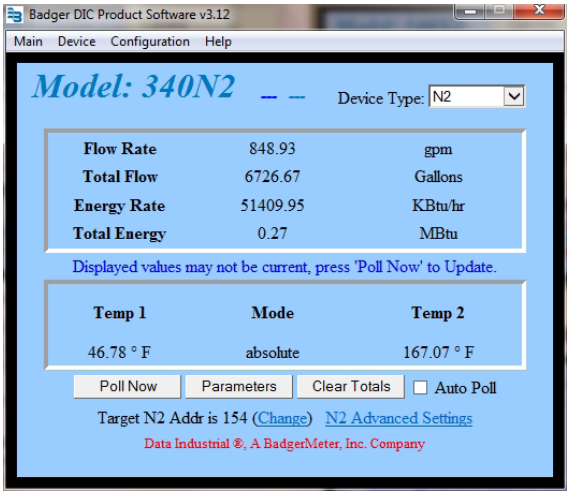


Figure 15: Poll Now

Programming the Transmitter

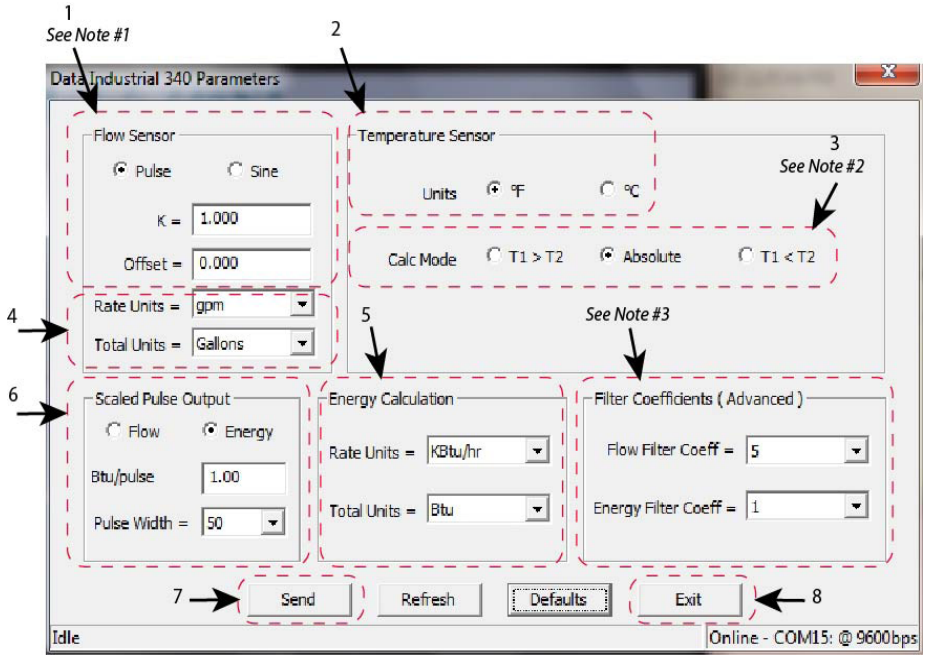


Figure 16: Parameters screen

Program the transmitter using the diagram in *Figure 15* as a reference.

1. Select the flow sensor type and enter the K and Offset values. See **Note #1**.
2. Select the desired temperature sensor units.
3. Select the method of computing the temperature differential. See **Note #2**.
4. Select the desired flow rate and total units.
5. Select the desired energy rate and total units.
6. Select the output units per pulse and the pulse width.
7. Click **Send** to transmit the calibration data to the transmitter.

   Other options:
   Refresh: Rereads the unit and refreshes the screen with the current transmitter settings. This option will overwrite any changes not sent to the transmitter.

   Defaults: Restores the factory default settings to the screen.
8. Click **Exit** to close the Parameters screen and return to the main screen.

NOTE: **#1** Badger Meter sensors are pulse type sensors. The K and Offset information is printed in the owner's manual shipped with the product. Calibration constants for other sensors must be supplied by the manufacturer.

NOTE: **#2** Typically the Temperature measured by T1 will be greater than T2 in a heating application, and less than T2 in a cooling application. The selection of one of these choices will determine if energy calculations are made for heating only (**T1>T2**), cooling only (**T1<T2**), or both (**absolute**).

NOTE: **#3** Filter Coefficients (Advanced) allows adjustment of the flow and energy filters. A scale of 0…10 is used with 10 providing the greatest degree of smoothing. Decreasing the filter setting to less than the default value (5) makes the readings sensitive to noise. Increasing the filter setting can make computed values slow to respond to legitimate changes in flow and temperature. Either may affect accuracy.

METASYS NETWORK SETUP

To incorporate point data into the Metasys Network and the Metasys Companion Network, the following Point Map is provided.

NPT[1]	NPA[2]	UNITS	POINT DESCRIPTION	RANGE/VALUE	NOTES
			Binary output (2:4)		
BO	01	n/a	Reset total	1 = reset totals	Note 1
			Float data (1:5, 2:5)		
ADF	01	gpm (flow rate conv coeff)	Flow rate	0– max float	
ADF	02	gallons (flow total conv coeff)	Flow total	0– ((2^32) –1)	
ADF	03	kBtu/hr (energy rate conv coeff)	Energy rate	0– max float	
ADF	04	Btu (energy total conv coeff)	Energy total	0– ((2^32) –1)	
ADF	05	°F or °C	Temp1		
ADF	06	°F or °C	Temp2		
ADF	07	n/a	Flow rate conversion coefficient	0– max float	
ADF	08	n/a	Flow total conversion coefficient	0– max float	
ADF	09	n/a	Energy rate conversion coefficient	0– max float	
ADF	0A	n/a	Energy total conversion coefficient	0– max float	
			Integer date (1:6, 2:6)		
ADI	01	n/a			Note 2

[1] Network Point Type
[2] Network Point Address

NOTE: **#1** This point resets flow and energy totals when sent an override of value 1. It will recognize this command, but keep a value of 0 always.

NOTE: **#2** 0 = Fahrenheit; 1 = Centigrade

⚠CAUTION

Badger Meter has decided not to implement the change of state feature in the Model 340N2 Btu transmitter. By our decision not to use this feature, normal Metasys COS (alarm limits for analog values and normal condition for binary) notification will be defeated. If COS notification is required, it is necessary for the operator to perform the following:

1. Map the specific object(s) requiring COS to a CS object.
2. Define an AD or BD object with the CS object of the required COS point, as the associated in.
3. Assign alarm limits to the AD.
4. The AD or BD point will only be scanned at a minimum of 30 seconds.
5. The normal state of the BO must be updated (written to) by GPL.

Analog/binary input points that are mapped in directly that do not support COS will never report a change of state condition. They will report the current value when read, but no alarm notification will occur. A read will only occur if a focus window is open or a feature requires the current value.

SPECIFICATIONS

Power		
Power Supply Options	12…35V DC ±5%	12…24V AC ±10%
Current Draw	60 mA at 12V DC	
Flow Sensor Input		
All Sensors	Separate excitation voltage is provided for three wire sensors: 7.9…11.4V DC with 270 Ω source impedance	
Pulse Type Sensors		
Signal Amplitude	2.5V DC threshold	
Signal Limits	Vin < 35V (DC or AC peak)	
Frequency	0.4…1.0 kHz	
Pull-up	To 9.1V DC with 2 kΩ	
Sine Wave Sensors		
Signal Amplitude	10 mV p-p threshold	
Signal Limits	Vin < 35V (DC or AC peak)	
Frequency	0.4…1.0 kHz	
Temperature Sensor Input	Two required: 10 kΩ thermistor, 2 wire, type II, 10 kΩ at 77° F (25° C)	
Pulse Output		
Opto-isolated solid state switch		
Operating voltage range	0…±60V (DC or AC peak)	
Closed (on) state	Load current, 700 mA max. over operating temperature range	
	On-resistance, 700 mΩ max. over operating temperature range	
Open (off) state	Leakage at 70º C <1µA at 60V (DC or AC peak)	
N2 Output	RS-485 output compliant with EIA/TIA-485 standards	
Operating Temperature	–20…158° F	–29…70° C
Storage Temperature	–40…185° F	–40… 85° C
Weight	4.8 oz with headers installed	
Sensor Calibration		
Data Industrial	Use K and offset values provided in sensor owners manual	
Other Sensors	Check with factory	
Units of Measure		
Flow	Rate: gpm, gph, l/sec, l/min, l/hr, ft3/sec, ft3/min, ft3/hr, m3/sec, m3/min, m3/hr	
	Total: gallons, liters, cubic feet, cubic meters	
Energy	Rate: kBtu/min, kBtu/hr, kW, MW, hp, tons	
	Total: Btu, kBtu, MBtu, kWh, MWh, kJ, MJ	
Temperature Units	Fahrenheit	Centigrade
Programming	Requires PC or laptop running Windows® 7, XP or Vista and A302-20 programming kit	
Accessories	A302-20 programming kit	

FACTORY DEFAULTS

	Default Values	Customer Values
Serial Number	n/a	
Version	n/a	
Temperature Units	°F	
Sensor Type	Pulse	
K=	1	
Offset=	0	
Flow Rate Units	gpm	
Flow Total Units	gallons	
Energy Rate Units	kBtu/hr	
Energy Total Units	Btu	
Energy Calculation	absolute	
Flow Filter	5	
Energy Filter	1	
Scaled Pulse Output Units	energy	
Scaled Pulse Output Units Per Pulse	1	
Scaled Pulse Output Pulse Width	100	

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