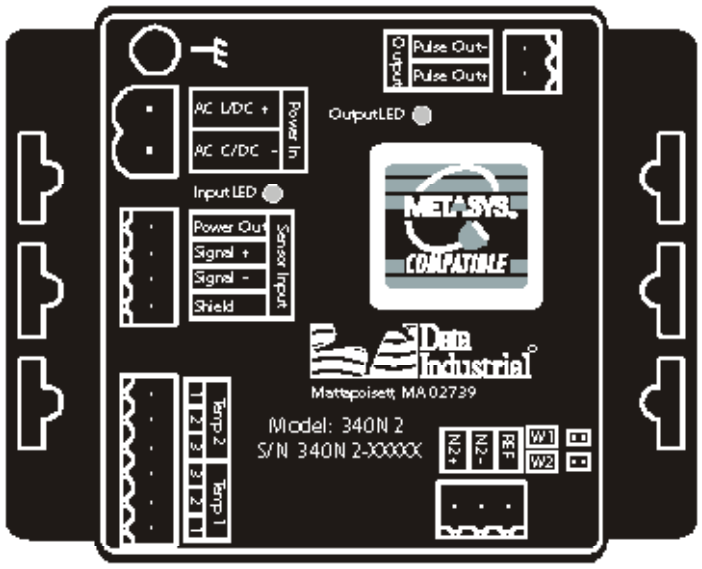
Badger® Series 340N2	METASYS® Compatible Energy Transmitter	Installation & Operation Manual



INTRODUCTION

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

The Badger® Series 340N2 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 Series 340N2 requires two 10 kΩ thermistors for temperature input. The flow input may be provided by any Badger Meter sensor and many other pulse or sine wave signal flow sensors.

The onboard microcontroller and digital circuitry make precise measurements and produce accurate, drift-free outputs. The Series 340N2 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 Series 340N2 transmitter features two LED's to verify input and output signals.

The primary output for the Series 340N2 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 to 5 sec.

The secondary output is the Johnson Controls N2 communications protocol that allows the Series 340N2 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 255 units on a single 3-wire RS-485 bus.

The Series 340N2 Btu transmitter operates on AC or DC power supplies ranging from 12 to 24 volts.

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

INSTALLATION

Mechanical Installation

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

Location

Although the Series 340N2 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 Series 340N2 may 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 Series 340N2 to be attached to DIN 15, 32, 35 mm DIN rail systems.

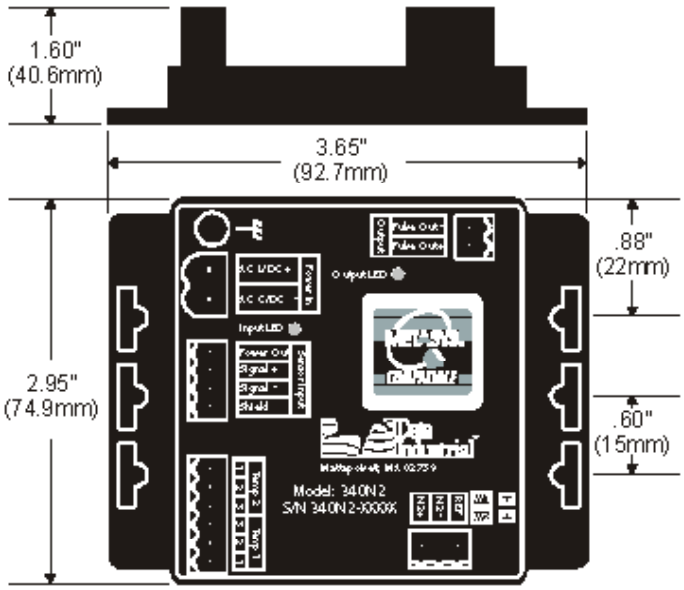
Wall Mounting

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

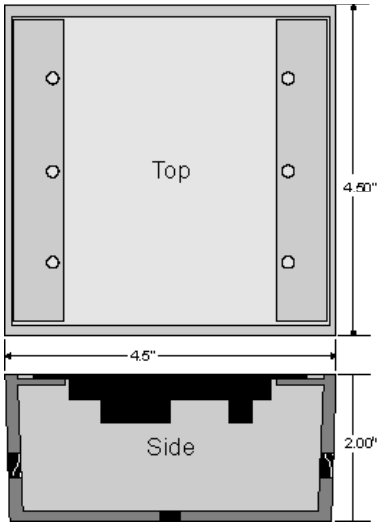
After wiring, the transmitter may be attached to the enclosure with the terminal headers facing in using the slots in the Series mounting flanges. As an alternate mounting arrangement, the 340N2 may be fastened to the box cover using double-sided adhesive tape.

Temperature Sensor Installation

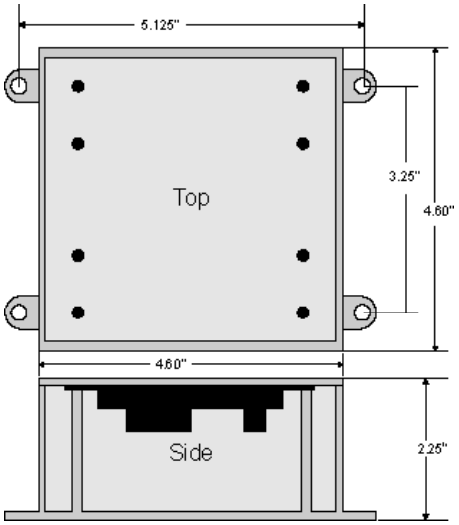
The location of the temperature sensors with regard to the flow sensor is important to the accuracy of the energy calculation. **Temperature sensor T1 must be located closest to the flow sensor.** A distance of 5 pipe diameters will give the greatest accuracy. **Always install the temperature sensor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



Series 340N2 Dimensions



340N2 Metal Box Dimensions



340N2 Plastic Box Dimensions

Electrical Installation
All connections to the Series 340N2 are made to screw terminals on removable headers.

Power Supply Wiring
The Badger® Series 340N2 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-503) 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 Series 340N2 is a Model 340N2IK kit containing a screw, lockwasher and ground lead to connect the Series 340N2 to earth ground. Connect the earth ground lug of the Series 340N2 to a solid earth ground with as short a wire as possible. This will help prevent electrical interference from affecting the Series 340N2's normal operation.

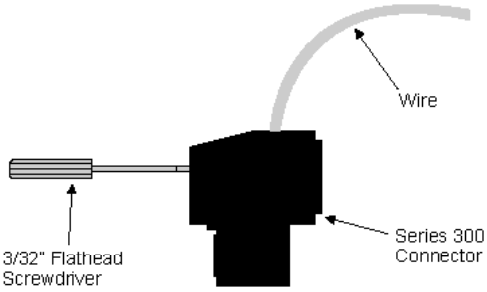
Sensor Wiring
All flow sensor types connect to the four terminal header labeled "Sensor Input".

Series 200
Connect the red wire to Series 340N2 Sensor signal (+), connect the flow sensor black wire to Series 340N2 Sensor signal (-) and the bare wire to shield.

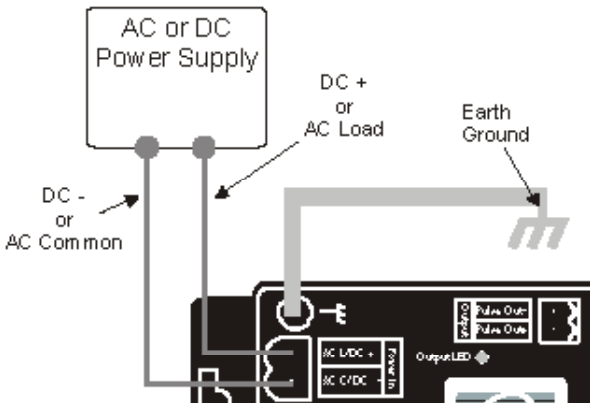
SDI Series (standard pulse output option)
Connect ***SDI number 3 sensor signal*** to the ***Series 340N2 transmitter sensor signal (+)*** and the ***SDI number 2 sensor common terminal*** to ***Series 340N2 transmitter sensor signal (-)***. Connect the shield terminal of the SDI sensor to the shield terminal of the Series 340N2 transmitter.

Other Sensors
The Sensor Input ***power out*** terminal supplies nominal 12VDC excitation voltage for 3 wire sensors. Connect sensor ***signal +*** and sensor ***signal -*** wires to transmitter terminals.

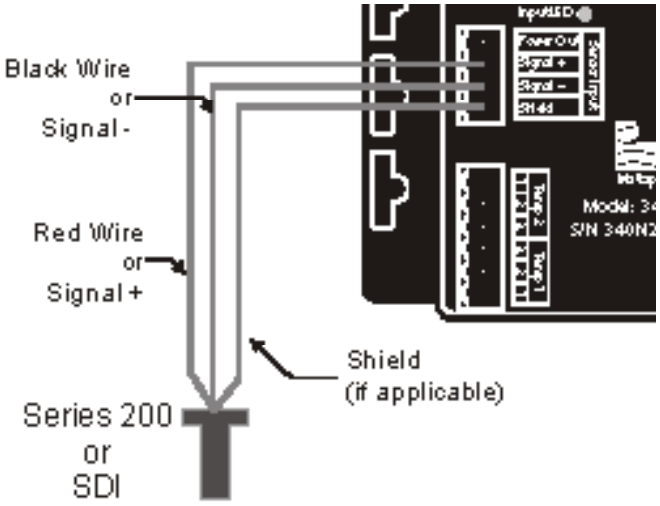
Note:
The green input LED toggles on and off as sensor pulses are received. With no flow input the LED will remain in its last state (either on or off).



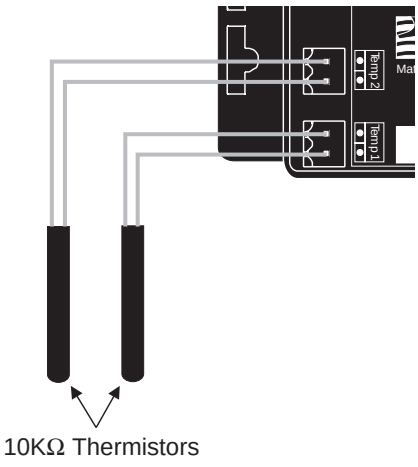
Side View - Typical Series 300 Removable Connector Wiring



Sample Power Supply Wiring Diagram



Sample Sensor Wiring Diagram

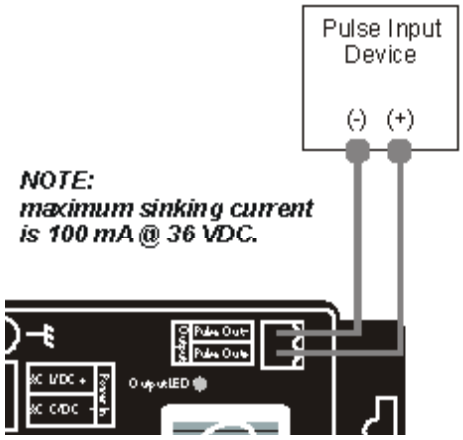


Thermistor Wiring Diagram

Temperature Element Wiring
The Badger Meter thermistors are not polarity sensitive. Connect the thermistor closest to the flow sensor to the Series 340N2 terminal block marked ***Temp 1 number 3 and number 2***. The other thermistor wires to Series 340N2 terminal marked ***Temp 2 number 3 and number 2.***

Pulse Output Wiring
The Badger® Series 340N2 has solid state switch output rated for a maximum sinking current of 100 mA @ 36 VDC. In most cases the Series 340N2 pulse out (+) will connect to the unput pulse (+) and the Series 340N2 pulse out (-) terminal to the input pulse (-) of the receiving device. The separate two terminal removable header on the Series 340N2 is labeled Output. Observe the electrical polarity of the output.

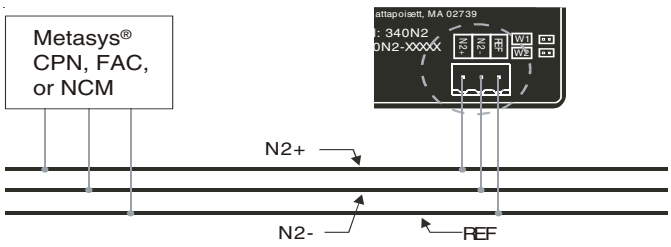
Note:
When the solid state switch is closed the red output LED will turn on.

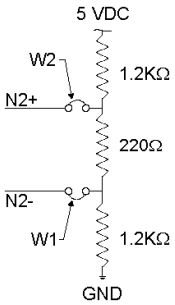


Sample Pulse Output wiring Diagram

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

Note:
The Series 340N2 default address must be changed before it is introduced into an existing network to avoid any possible address conflicts. See programming instructions on the following page.





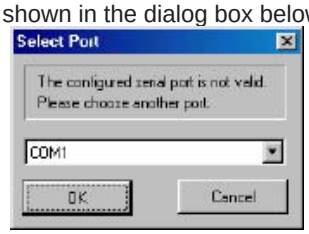
Sample wiring to N2 Network

If the Series 340N2 is connected at the beginning or the end of the N2 network, jumpers W1 and W2 can be shorted for biasing and terminating of the network. The Series 340N2 biasing circuitry is shown in the diagram on the right.

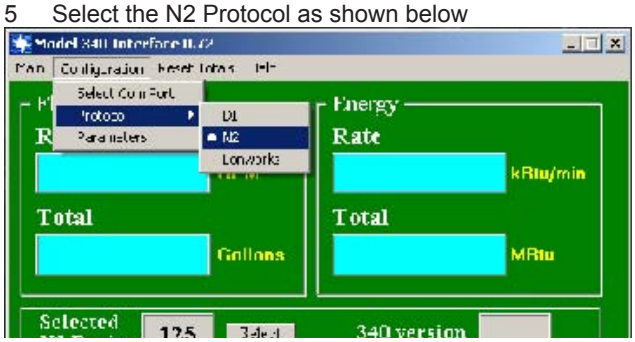
Programming the Badger® Series 340N2

Prior to introducing the Badger Series 340N2 onto a N2 network, it needs to be configured for the pipe's size, desired units of measure, and its the default network address should be changed to an unused address to avoid any conflicts with other instruments on the N2 network. Programming the Series 340N2 is accomplished using the Badger Meter PC software.

1. Load the interface software into the computer that was shipped with the Model A-302 programming cable or download from our website.
2. The Series 340N2 buss connector should be connected to a Com port using Badger Meter Model A-302 programming cable. (If not available a B&B Electronics Model 485SD9TB may be used) The RS232 side should be connected to a PC Com port and the RS485 side to the Series 340N2.
3. Connect the Series 340N2 transmitter to a power supply.
4. Open the interface software and select the appropriate Com port as shown in the dialog box below.

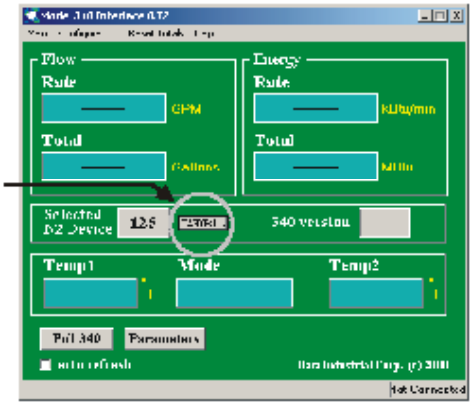


5 Select the N2 Protocol as shown below

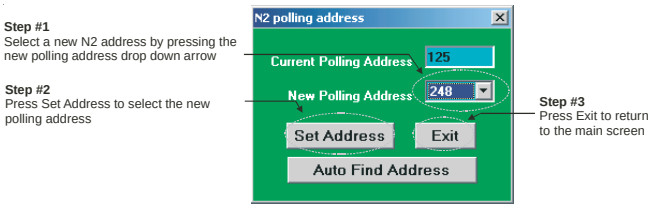


6. If the Series 340N2 is new from the factory the default Series 340N2 address is 248. If the selected Series 340N2 address is wrong the unit will not communicate with the software. To select the correct polling address press the select button as shown below.

Press the select button to enter the N2 polling address screen

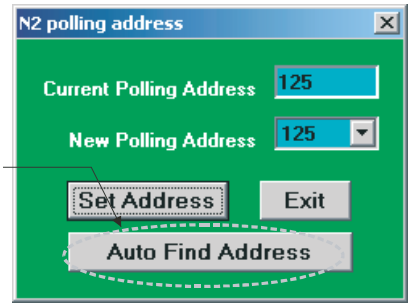


7. If the Series 340N2 has a known address then select it with the New Polling Address drop down menu as shown below and press the Set Address button then the exit button. Proceed to step 11.



8. If the Series 340N2 polling address is not known then press the Auto Find Address button as shown below.

Press the Auto Find Address to search for the Series 340N2 Polling address

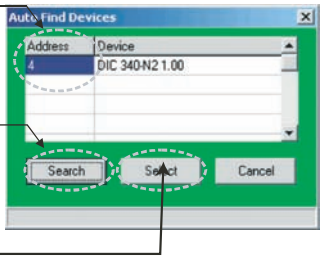


9. Search for the Series 340N2 polling address by following the steps as shown below.

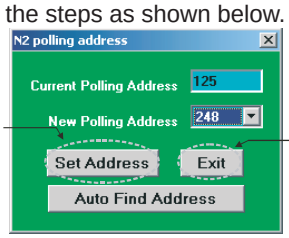
Step 2
Select the detected Series 340N2 address

Step 1
Press the search button to begin the search for the Series 340N2 polling address once an address has been found press the stop button.

Step 3
Press the Select button to return to the N2 polling address window with the auto find address



10. Then follow the steps as shown below.

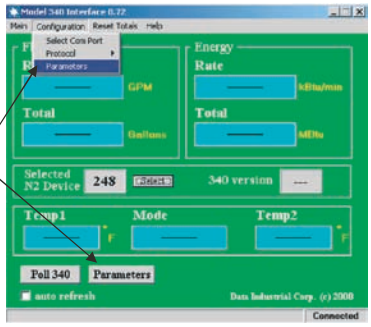


Step #1
Press Set Address to select the new polling address

Step #2
Press Exit to return to the main screen

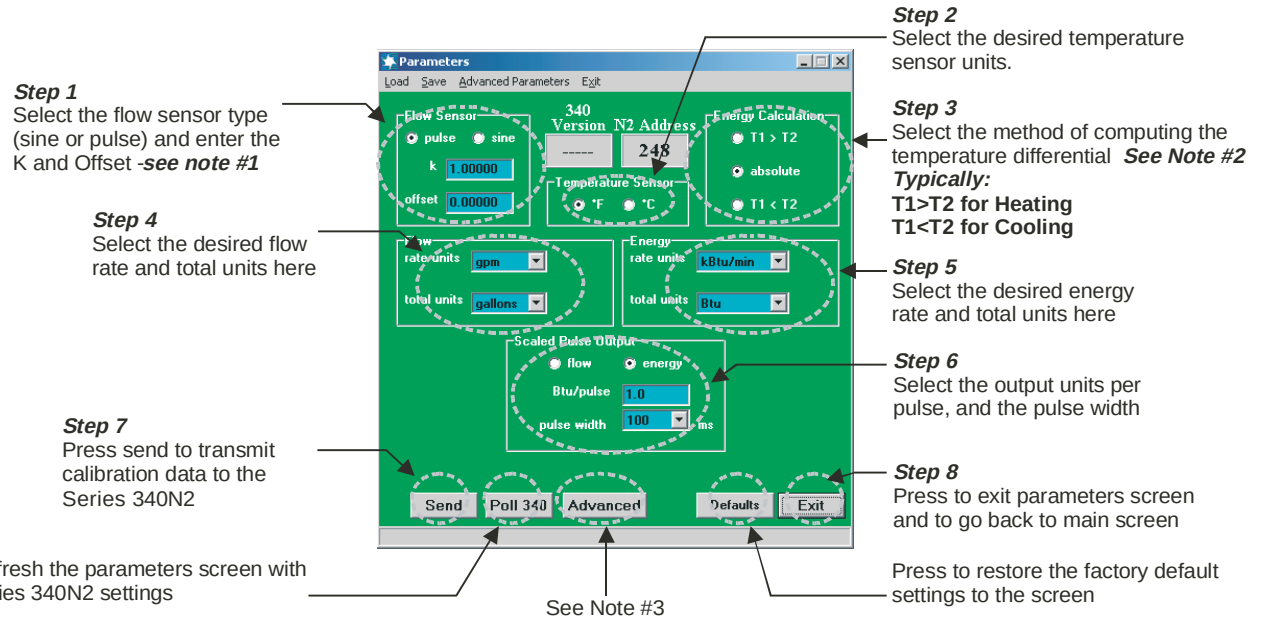
11. Open the Parameters Screen as shown below.

To go to the calibration settings screen select "parameters" from either place shown.



12. Program using diagram below as a reference.

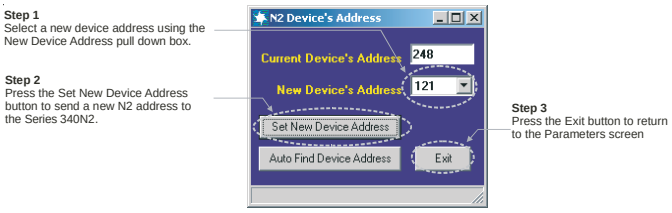
13. Set the Series 340N2 address by pressing the Advanced button in the Parameters window opening the Advanced Parameters window. Press the Change Device's Address button and set as shown below.



Note: must press "send" before values take effect

⚠CAUTION

Will overwrite any changes not sent to Series 340N2.



Note #1:

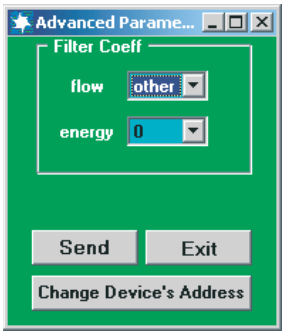
Badger Meter sensors are pulse type sensors. The K and Offset information is printed in the owners manual shipped with the product. This information is also available on our website. Calibration constants for other sensors must be supplied by the manufacturer.

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

The filter coefficient screen allows adjustment of the flow and energy filters. A scale of 0-10 is used with 10 providing the greatest degree of smoothing. Settings greater then "10" are permitted by selecting other. However, settings greater then "10" should be used with extreme caution as it will cause the Series 340N2 to respond very slowly to actual changes in flow and energy. This could cause misreporting of fast changing flow and energy consumption data. See the dialog box below.



Metasys® Network Setup
To incorporate point data into the Metasys Network and the Metasys Companion Network the following Point Map is provided

Series 340N2 Point Map

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 data (1:6, 2:6)		
ADI	01	n/a	Temperature Units	(0-1)	Note 2

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

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

⚠CAUTION

Badger Meter, Inc. has decided not to implement the change of state feature in our Badger® Series 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:
- 12-35 VDC +/- 5%
- 12-24 VAC +/- 10%

Current Draw:
- 60 mA @ 12 VDC

Flow Sensor Input

All sensors:
- Excitation voltage 3 wire sensors:
  - 7.9 – 11.4 VDC 270W source impedance

Pulse type sensors:
- Signal amplitude:
  - 2.5 VDC threshold
- Signal limits:
  - Vin < 35V (DC or AC peak)
- Frequency:
  - 0-10kHz
- Pull-up:
  - 2 kΩ

Sine wave sensors:
- Signal amplitude:
  - 10 mV p-p threshold
- Signal limits:
  - Vin < 35V (DC or AC peak)
- Frequency:
  - 0-10kHz

Temperature Sensor Input

2 required:
- 10 kΩ thermistor, 2 wire, type II, 10 kΩ @ 25°C

Pulse Output

Opto-isolated solid state switch

Operating Voltage range:
- 0 - ±60V (DC or AC peak)

Closed (on) state:
- Load Current - 700mA max. over operating temperature range
- On-resistance - 700mΩ max. over operating temperature range

Open (off) state – leakage @ 70°C
- <1µA @ 60V (DC or AC peak)

N2 Output

RS-485 output compliant with EIA / TIA - 485 standards

Operating Temperature

-29° C to +70° C
-20° F to +158° F

Storage Temperature

-40° C to +85° C
-40° F to +185° F

Weight

4.8 oz. with headers installed

SENSOR CALIBRATION

Badger Meter

Use K and Offset provided in sensor owner's manual

Other Sensors

Check with factory

UNITS OF MEASURE

Flow measurement

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 measurement

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® XP or Vista

Badger Meter Model A-302-20 programming kit containing software and Model A302-20 programming cable

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	0	
Energy Filter	0	
Scaled Pulse Output Units	energy	
Scaled Pulse Output Units Per Pulse	1	
Scaled Pulse Output Pulse Width	100	

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Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding contractual obligation exists.

Please see our website at **www.badgermeter.com** for specific contacts.

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