Impeller
Data Industrial®

Transmitters

Model 340LW Btu with LonWorks®

Badger Meter

XMT-UM-01656-EN-07 (September 2015)

User Manual

CONTENTS

DESCRIPTION

The Badger Meter Model 340LW Btu transmitter is an economical, compact device for sub-metering applications that use the LonWorks® protocol in an addressable network.

The Model 340LW transmitter calculates thermal energy using the signal from a flow sensor installed in a closed pipe system, and the signals from two 10k Ω temperature thermistors installed in the systems inlet and outlet points. 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 Model 340LW transmitter is commissioned using Badger Meter Windows® based software. Calibration information for the flow sensor, units of measurement and output scaling can be preselected or entered in the field. While the unit is connected to a PC or laptop computer, real-time flow rate and total, temperatures and energy rate and total are available.

The Model 340LW transmitter features three LEDs to verify input and output signals.

The LonWorks communications protocol allows the Model 340LW transmitter to be assigned to any one of 255 addresses on a single 2-wire bus. Outputs can include raw data such as flow rate and temperature of either thermistor, or computed or stored data such as energy rate, energy total, flow total or temperature differential.

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

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

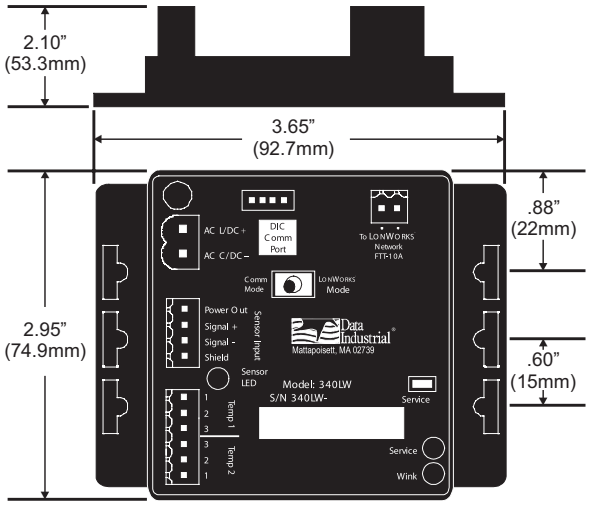

Figure 1: Model 340LW dimensions

SCOPE AND PURPOSE

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

MECHANICAL INSTALLATION

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

Location

Although the Model 340LW transmitter 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 340LW 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 to mount the Model 340LW transmitter to a wall when no other enclosure is used. The enclosure is first attached to the wall using fasteners through its mounting holes. After wiring, the transmitter can be attached to the enclosure with the terminal headers facing in using the slots in the mounting flanges. As an alternate mounting arrangement, the transmitter can be fastened to the box cover using double-sided adhesive tape.

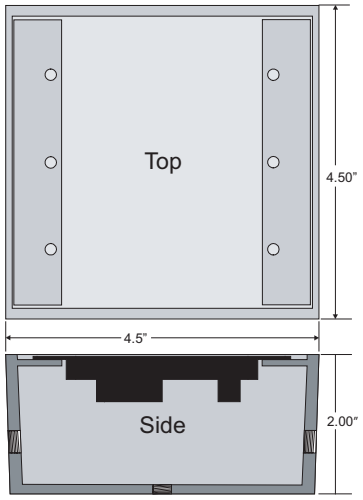

Figure 2: Metal box dimensions

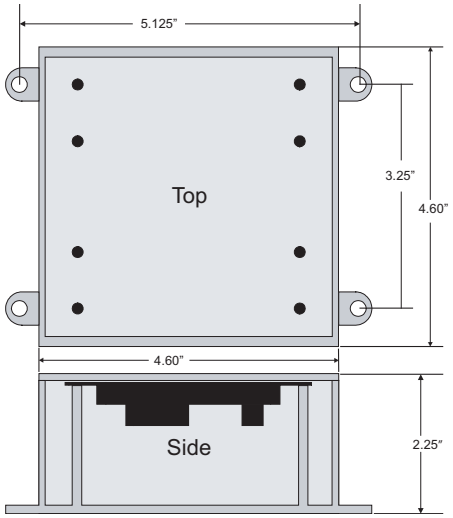

Figure 3: Plastic box dimensions

TEMPERATURE SENSOR INSTALLATION

Location of the temperature sensors with regard to the flow sensor is important for 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 340LW transmitter are made to screw terminals on removable headers.

Power Supply Wiring

The Model 340LW transmitter requires 12…24 Volt AC or DC to operate. Power connections are made to the ORANGE header. Connections are labeled beside the header.

Observe the polarity shown on the label. See *Figure 5*.

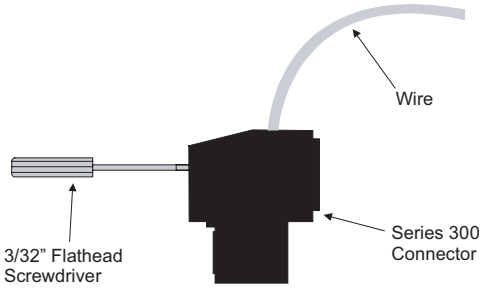

Figure 4: Side view of typical removable connector wiring

When powered with AC power provided by a transformer secondary, the Model 340LW transmitter causes DC current to flow in the transformer secondary. When several Model 340LW transmitters are powered in parallel by the same transformer secondary, the currents will add and a sufficient secondary DC current can flow to cause transformer core saturation. Improper operation can result.

When powering multiple Model 340LW transmitters, a DC power supply with appropriate output capability should be used to prevent this situation. For instance, sixteen Model 340LW transmitters will require 16 x 70mA = 1120mA. A 1.5 Amp, 12…24 Volt DC power supply would handle such a load.

When operating a Model 340LW transmitter from AC power, ground one side of the AC voltage source to earth ground. Connect the grounded AC source side to the Model 340LW transmitter "ACC/DC–" power input terminal. Connect the other side to the Model 340LW transmitter "ACL/DC+" terminal. (This arrangement is like that in normal 110V AC power, which has a "neutral" or common side and a "hot" or line side.)

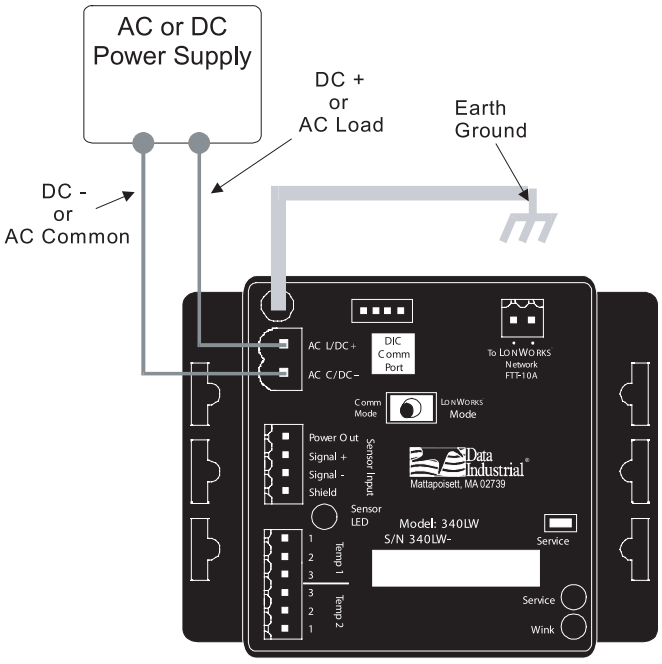

Figure 5: Sample power supply wiring diagram

For optimal noise immunity and when operating the Model 340LW transmitter with a "zero threshold, sine wave" flow sensor, the ground lug on the transmitter should be connected to earth ground.

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 Model 340LW transmitter is a Model 340LWIK kit containing a screw, lock washer and ground lead to connect the Model 340LW to earth ground. Connect the earth ground lug of the Model 340LW transmitter to a solid earth ground with as short a wire as possible. This will help prevent electrical interference from affecting normal operation.

Sensor Wiring

All flow sensor types connect to the four terminal header labeled "Sensor Input" as shown in *Figure 6*.

Series 200

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

SDI Series

Connect the plus (+) terminal of the sensor to sensor signal (+) on the transmitter and the minus (–) terminal of the sensor to sensor signal (–) on the transmitter.

Connect the shield terminal of the sensor to the shield terminal of the transmitter.

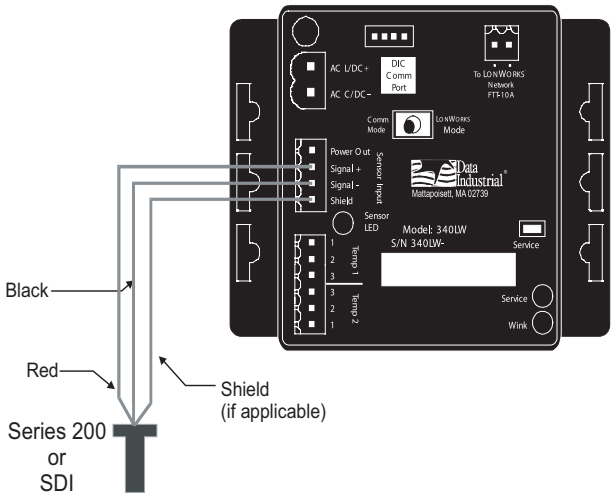

Figure 6: Sample sensor wiring diagram

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.

Temperature Element Wiring

Badger Meter thermistors are not polarity sensitive.

Connect the thermistor closest to the flow sensor to the Model 340LW transmitter terminal block marked TEMP 1, and the other thermistor wires to the terminal marked TEMP 2 as shown in *Figure 7*.

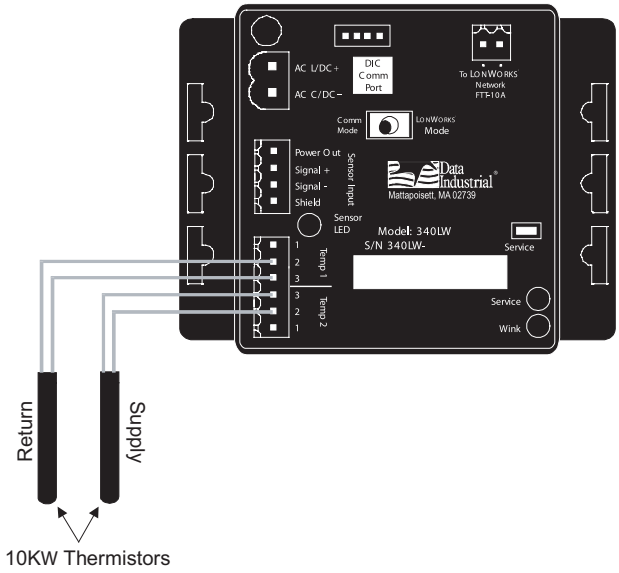

Figure 7: Thermistor wiring diagram

Connecting the LonWorks Bus

The LonWorks network connection is not polarity sensitive. See *"Commissioning" on page 9* .

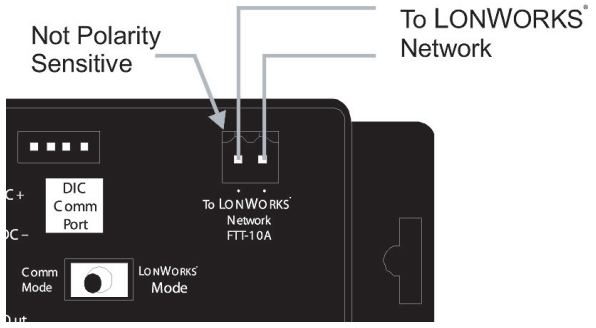

Figure 8: LonWorks network connection

PROGRAMMING IN COMM MODE

Programming the Model 340LW is accomplished by installing the Badger Meter programming software on a computer and entering data on templates of the Windows® based program.

1. Load the interface software on the computer.
2. Connect the computer to the Model 340LW transmitter socket labeled COMM PORT with the Badger Meter Model A-301 communications cable, taking care to properly align the tab on the plug and socket to maintain polarity.
3. Connect the DB9 connector of the communications cable to a PC com port that has the Model 340 programming software installed.
4. Move the Protocol Switch to the **Comm Mode**.
5. Connect the transmitter to a power supply.
6. Open the interface software and use the drop-down menu to select the appropriate COMM PORT as shown in *Figure 9*. Then select **OK**.

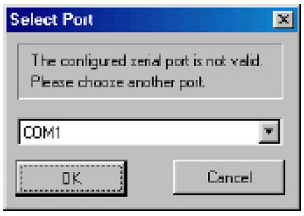

Figure 9: Select the COM port

7. Open the Parameters screen to program the transmitter as shown below. See*"Programming" on page 8* for more information.

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

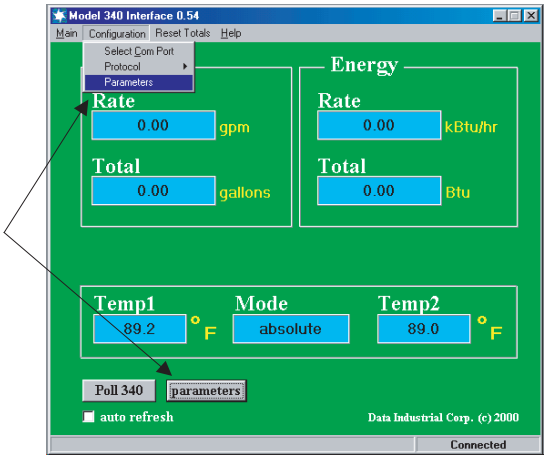

Figure 10: Parameters screen

8. When programming is complete, be sure to return the "Comm Mode/LonWorks Mode" switch on the transmitter to the LonWorks Mode position.

Programming

Program the transmitter using the diagram below as a reference.

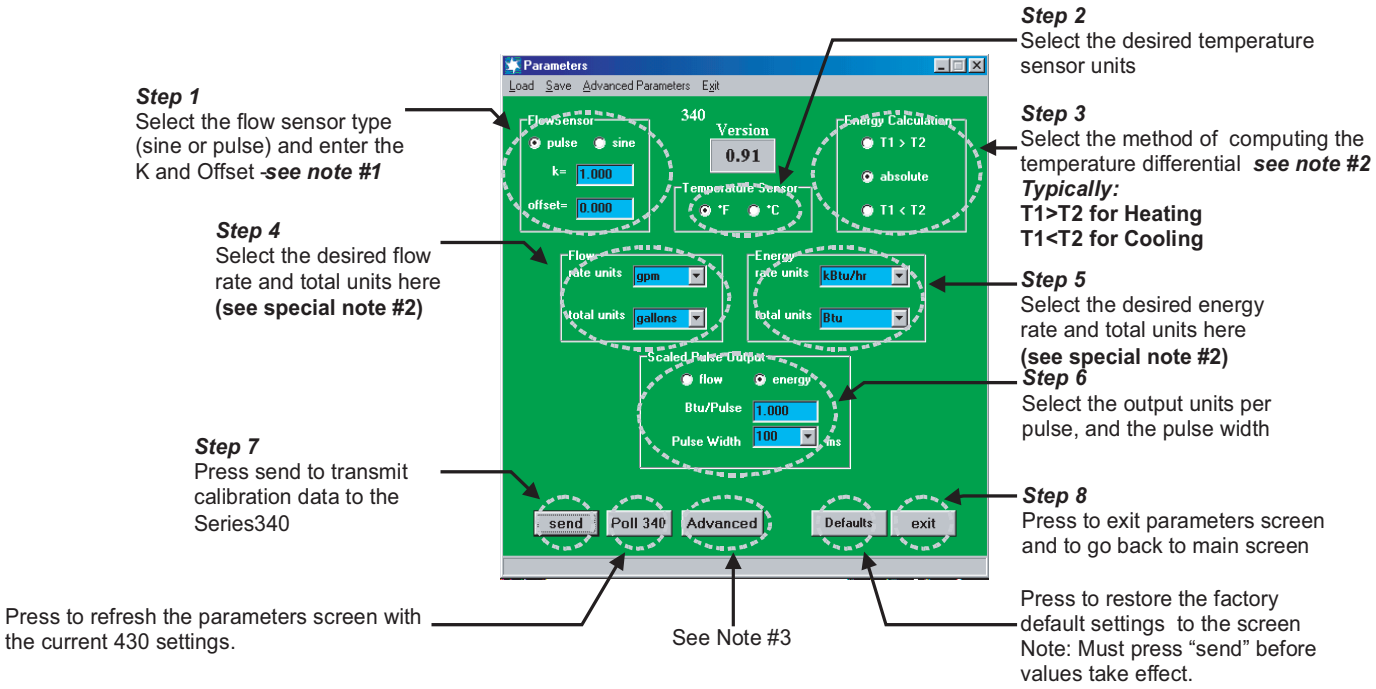

Figure 11: Programming diagram

NOTE: **#1** Badger Meter flow sensor K and Offset information is printed in the flow sensor owners manual, and 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. See the dialog box in *Figure 12*.

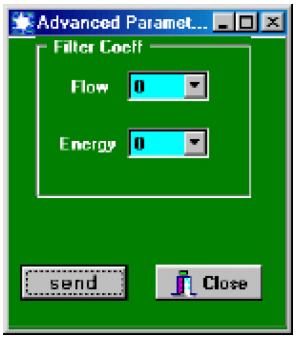

Figure 12: Flow and energy filters

COMMISSIONING

Before the Model 340LW transmitter can be used on the LonWorks network, a network tool must commission it.

- The Model 340LW transmitter has a red "Wink" LED and a green "Service" LED.
- The green LED is used to report the commission status.
- If commissioned, on power-up the green LED turns ON for a few seconds, and then turns off.
- If not commissioned the green LED will flash at about a 1/2 Hz rate.
- If the LED turns ON, then OFF, and then ON steady, contact the factory.

Special Notes for Operation

- Comm status

  =0 booted up, no comm with internal UART

  =1 connected to internal UART

  =2 LonWorks mode

  =3 comm mode

- Units that must be set by the programming software for the software revisions to work properly

  gpm

  gallons

  kbtu/hr

  btu

- All configuration properties (CPs) are set to ten second updates for each outgoing measurement network variable, and can be modified via the LonMaker browser.
- Internal measurement readings are updated every ten seconds. (This update rate is not changeable.)

- To reset total, send the following to nvi00Request in the LonMaker browser
  "1,RQ_OVERRIDE"
  "2,RQ_OVERRIDE"
  Either of the above will reset both flow total and energy total.

LONMARK IMPLEMENTATION

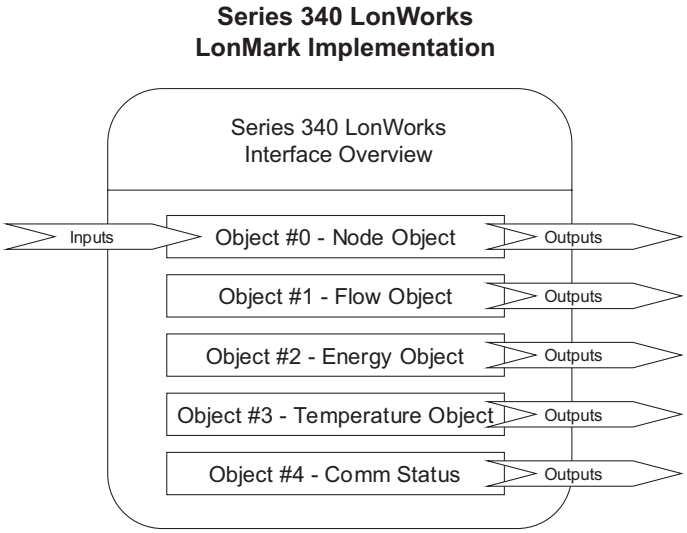

Figure 13: Interface overview

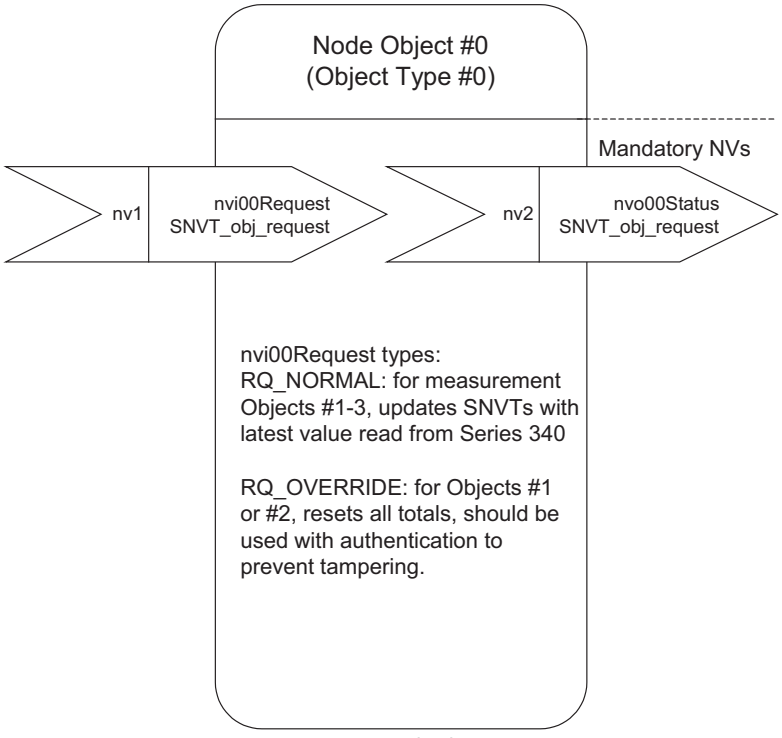

Figure 14: Node Object

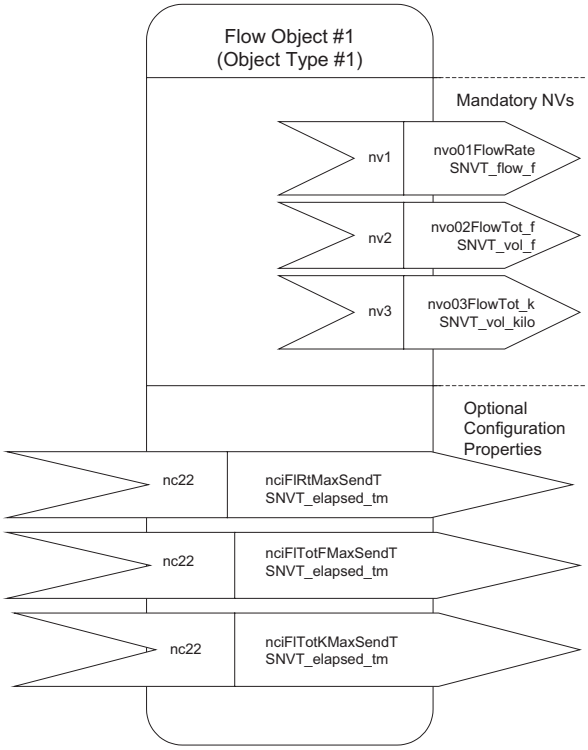

Figure 15: Flow Object

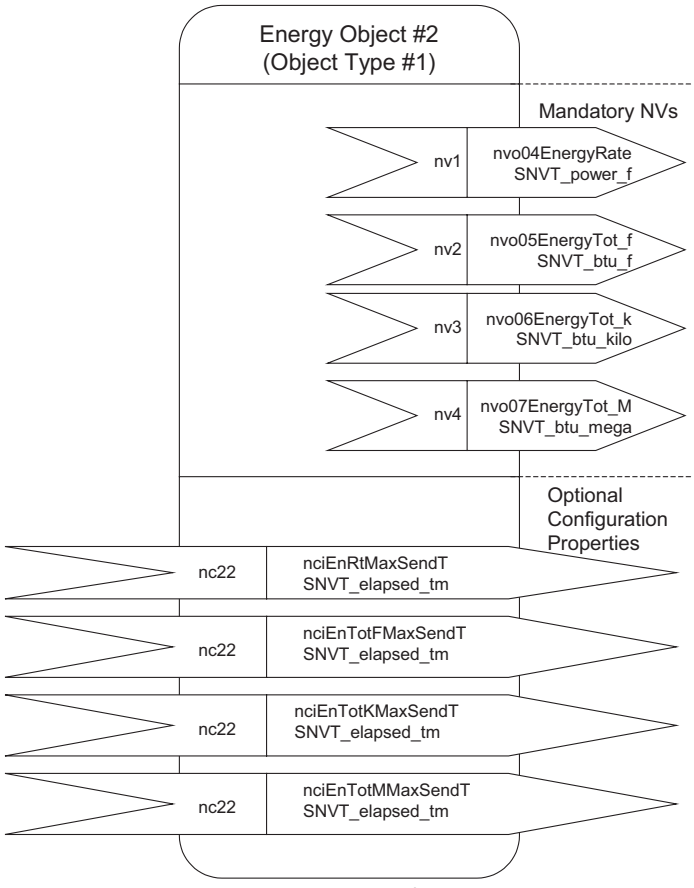

Figure 16: Energy Object

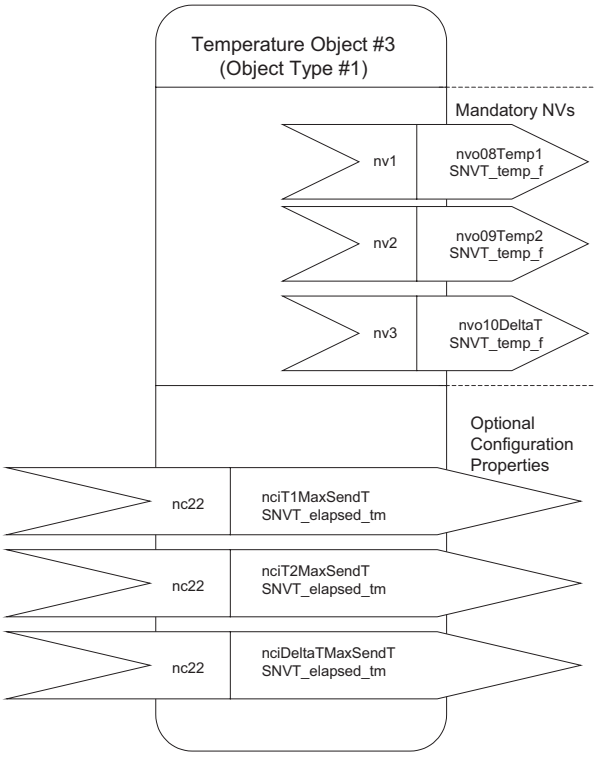

Figure 17: Temperature Object

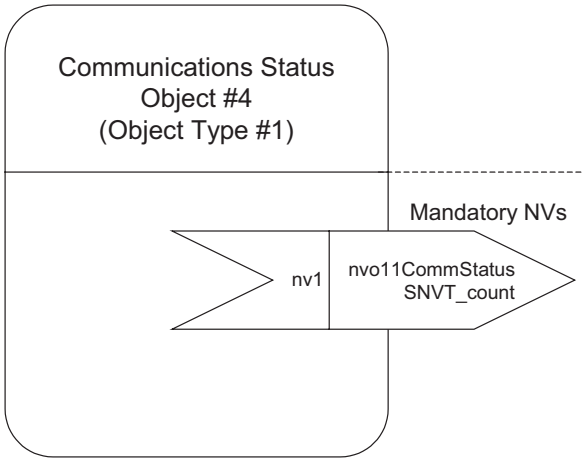

Figure 18: Communication Status Object

Output SNVT Types

flow rate->	SNVT_flow_f_	–1E38 ..1E38 l/sec	
flow total->	SNVT_vol_f	0.. 1E38 liter	
	SNVT_vol_kilo	0.. 6,553.5 kiloliters (o.1lk)	
energy rate->	SNVT_power_f	–1E38 .. 1E38 watts	
energy total->	energy, thermal->	SNVT_btu_f	0.. 1E38 btu
		SNVT_btu_kilo	0.. 65,535 kilo btu
		SNVT_btu_mega	0.. 65,535 mega btu
temps (temp1, temp2, delta T)->	SNVT_temp_f	–273.17 .. 1E38ºC	

SPECIFICATIONS

Flow Sensor Input		
All Sensors	Excitation voltage 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…10 kHz	
Pull-up	To 9.1V DC with 2k Ω	
Sine Wave Sensors		
Signal Amplitude	10 mV p-p threshold	
Signal Limits	Vin < 35V (DC or AC peak)	
Frequency	0…10 kHz	
Power		
Power Supply Options	12 to 24V DC	12 to 24V AC
Current Draw	60 mA at 12V DC	
Temperature Sensor Input	Two required: 10k Ω thermistor, 2 wire, type II, 10k Ω at 25ºC	
Operating Temperature	-29…70ºC	-20…158ºF
Storage Temperature	-40… 85ºC	-40…185ºF
Weight	4.8 oz with headers installed	
Sensor Calibration		
Data Industrial	Use K and offset values provided in sensor owner's manual	
Other Sensors	Check with factory	
Units of Measure		
Measurement Outputs	Transmitted in SI units	
Flow	Rate and total	
Energy	Rate and total	
Temperature	Temperature 1	Temperature 2
Programming	Requires PC or laptop running Windows® 7, XP or Vista and A301-20 programming kit containing software and programming cable	
Accessories	A301-20 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	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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