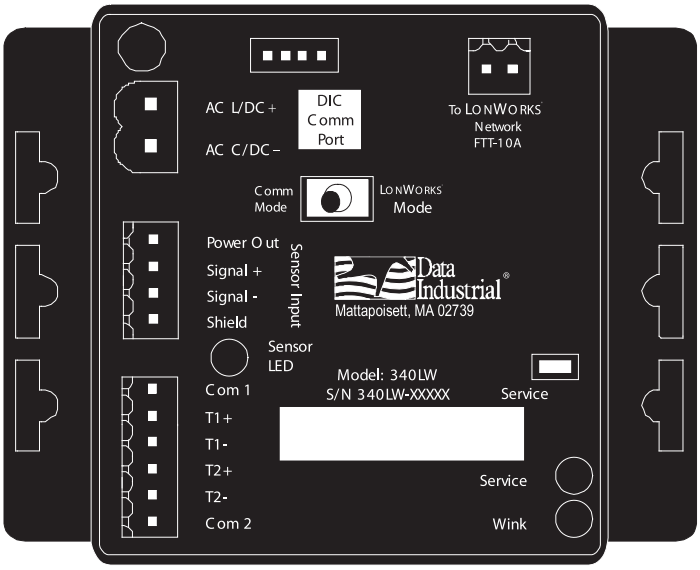
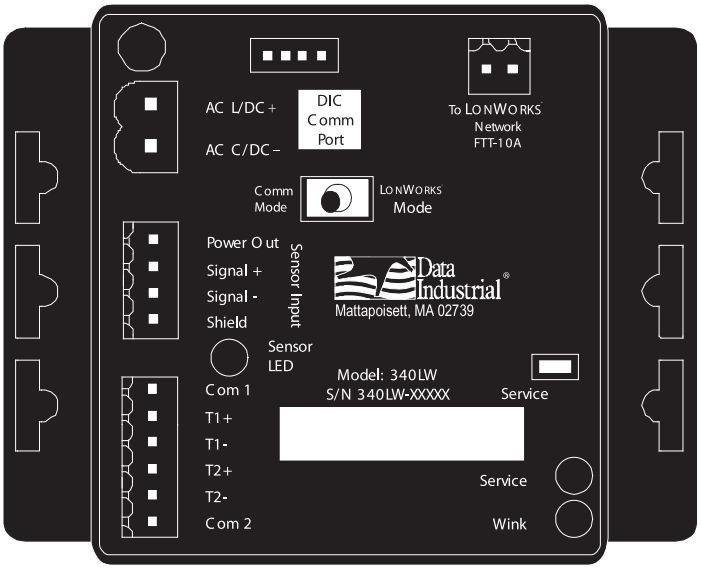
Badger® Series 340LW	Btu Transmitter With LONWORKS®	Installation & Operation Manual





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

The Series 340LW calculates thermal energy using the signal from a flow sensor installed in a closed pipe system, and the signals from two 10kΩ 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 Series 340LW is commissioned using Badger Meter Windows® based software. Calibration information for the flow sensor, units of measurement and output scaling may 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 Series 340LW Transmitter features three LED's to verify input and output signals.

The LONWORKS communications protocol allows the Series 340LW to be assigned to any one of 255 addresses on a single 2-wire buss. Outputs may 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 Series 340LW Btu Transmitter operates on AC or DC power supplies ranging from 12 to 24 volts.

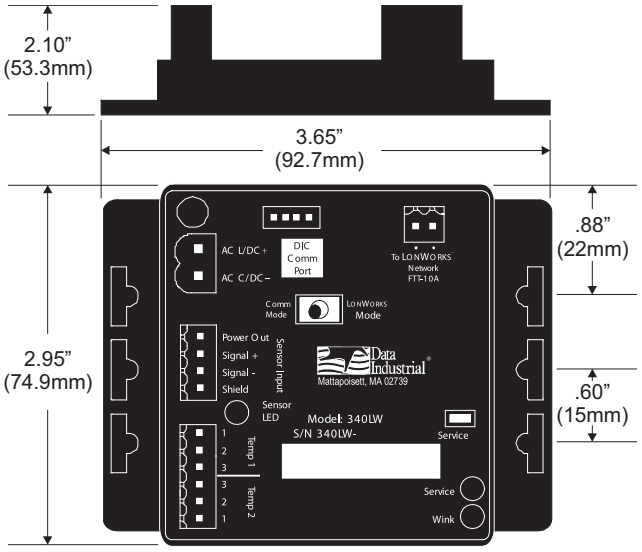
The compact cast epoxy body measures 3.65 inch (93mm) x 2.95 inch (75mm) and can be easily mounted on panels, DIN rails or enclosures.

Mechanical installation

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

Location

Although the Series 340LW 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.



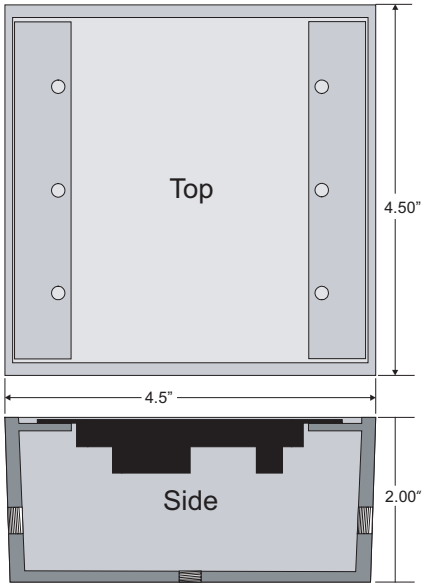
Series 340LW Dimensions

Surface Mount Installation

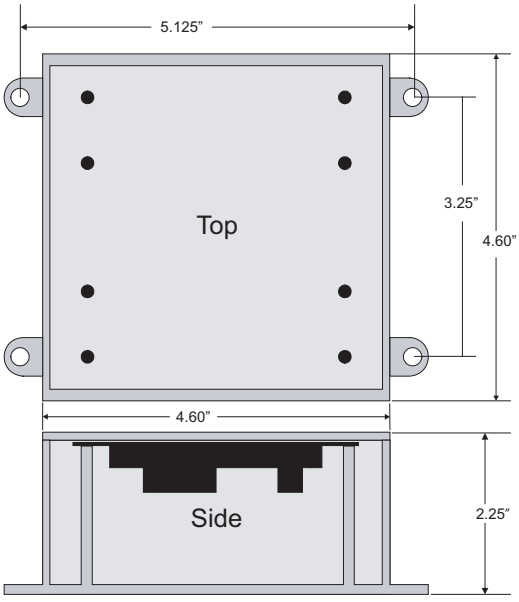
The Series 340LW may be mounted to the surface of any panel using double-sided adhesive tape or by attaching fasteners through the holes in the mounting flanges of the unit.

Din Rail Mounting

Optional clips snap onto the mounting flanges allowing the Series 340LW to be attached to DIN 15, 32, 35 mm DIN rail systems.



340LW Metal Box Dimensions



340LW Plastic Box Dimensions

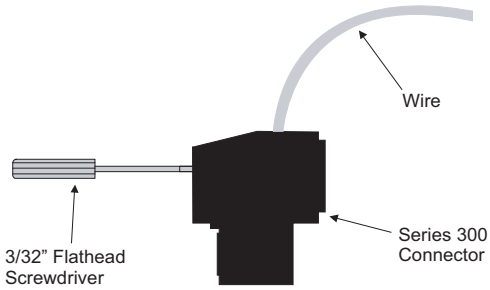
Wall Mounting

Optional metal and plastic enclosures are available to mount the Series 340LW 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 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 Series 340LW 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 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.



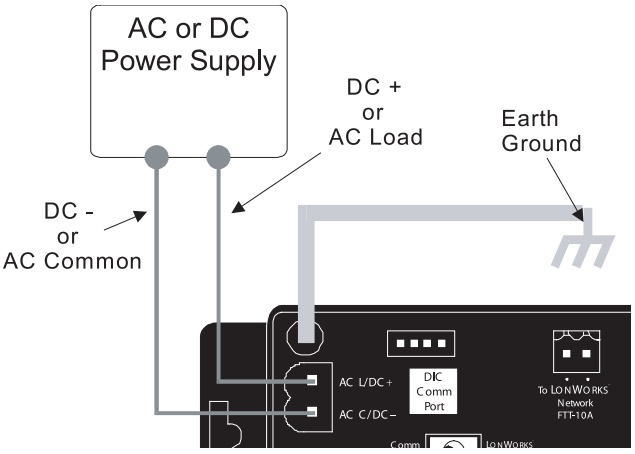
Side View - Typical 300 Series Removable Connector Wiring

Electrical Installation

All connections to the Badger® Series 340LW are made to screw terminals on removable headers.

Power Supply Wiring

The Series 340LW 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.



Sample Power Supply Wiring Diagram

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

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

When operating a Series 340LW from AC power, one side of the AC voltage source should be grounded to earth ground. This grounded AC source side should be connected to the Series 340LW “ACC/DC-” power input terminal, the other side being connected to the Series 340LW “ACL/DC+” terminal. (This arrangement is like that in normal 110 VAC power, which has a “neutral” or common side and a “hot” or line side.

For optimal noise immunity and when operating the Series 340LW with a “zero threshold, sine wave” flow sensor, the ground lug on the Series 340LW 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 (-).

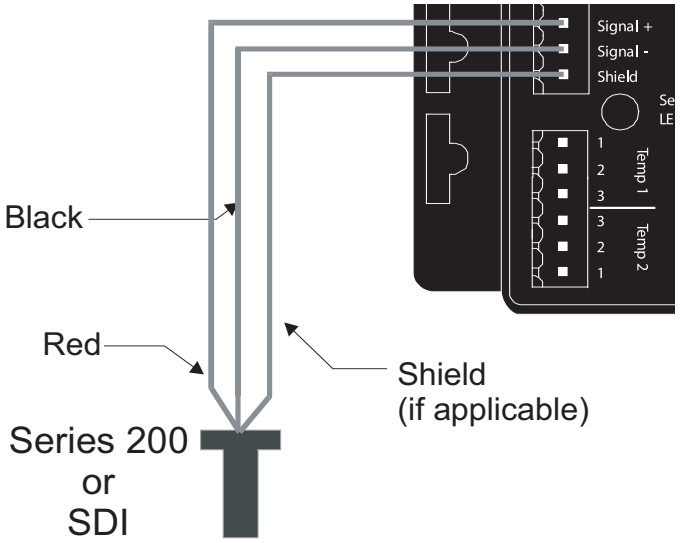
Note:
Included with every Series 340LW is a Model 340LWIK kit containing a screw, lockwasher and ground lead to connect the Series 340LW to earth ground. Connect the earth ground lug of the series 340LW to a solid earth ground with as short a wire as possible. This will help prevent electrical interference from affecting the Series 340LW’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 sensor signal (+), black wire to sensor signal (-) and the bare wire to shield.

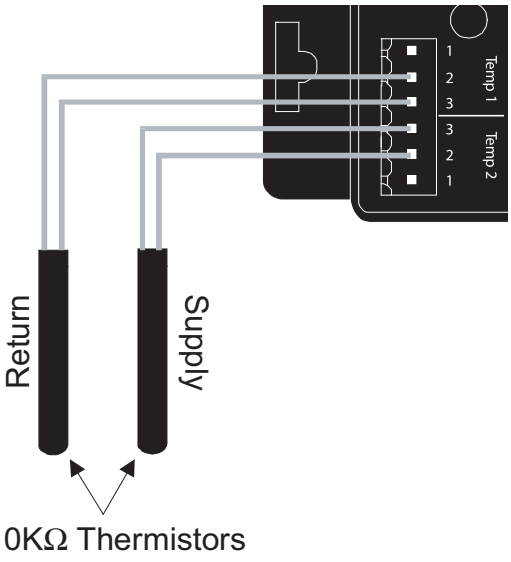
SDI Series
Connect the plus (+) terminal of the sensor to sensor signal (+) on the transmitter and the minus (-) terminal of the sensor to sensor signal (-) on the transmitter. Connect the shield terminal of the sensor to the shield terminal of the transmitter.

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.



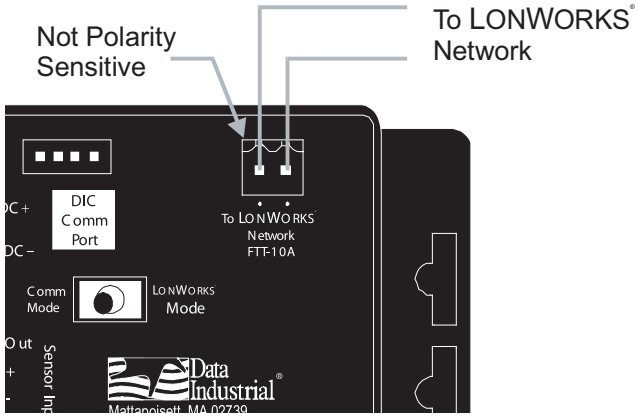
Sample Sensor Wiring Diagram

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



Thermistor Wiring Diagram

Connecting the LONWORKS® Bus
The LONWORKS network connection is not polarity sensitive. Refer to”commissioning” section



Programming in Comm Mode

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

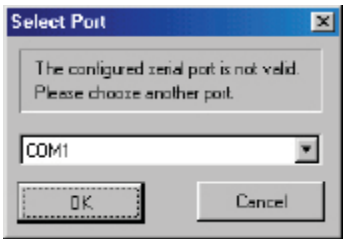
1. Load the interface software into the computer.

2. Connect the computer to the Series 340 transmitter with the Badger Meter Model A-301 communications cable to the socket labeled COMM PORT, taking care to properly align the tab on the plug and socket to maintain polarity. Connect the DB9 connector of the Badger Meter Model A301 communications cable to a PC com port that has the Series 340 software installed.

3. Move the Protocol Switch to the Comm Mode.

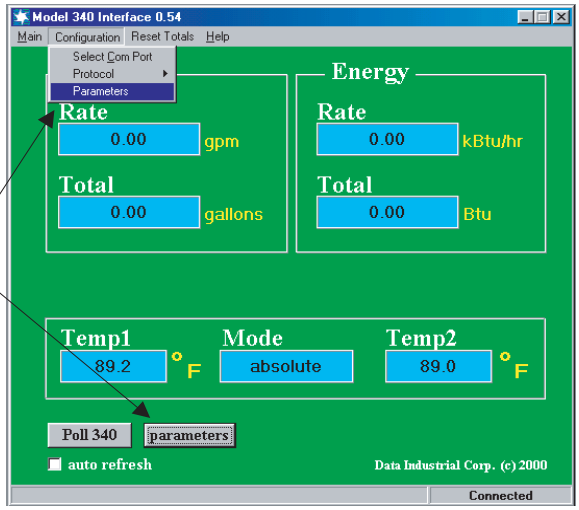
4. Connect the Series 340 transmitter to a power supply.

5. Open the interface software and select the appropriate COMM PORT as shown in the dialog box below.



6. Open the Parameters Screen as shown below.

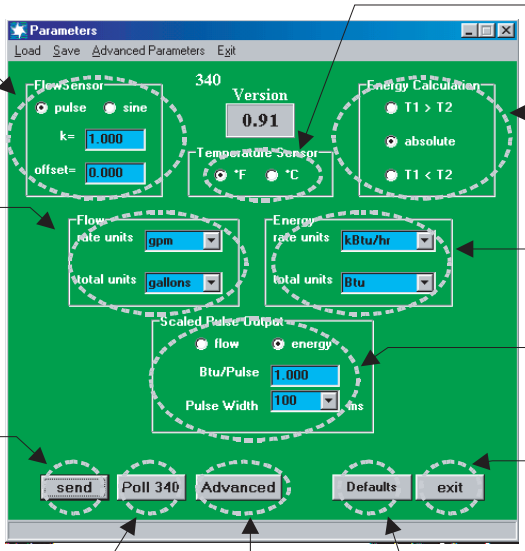
To go to the calibration settings screen select “parameters” from either place shown



Programming in Comm Mode

Step 7
When programming is complete, be sure to return the “Comm Mode/LonWorks Mode” Switch to the LonWorks Mode position.

8. Program using diagram below as a reference.



Step 1
Select the flow sensor type (sine or pulse) and enter the K and Offset ***-see note #1***

Step 2
Select the desired temperature sensor units

Step 3
Select the method of computing the temperature differential ***see note #2***
Typically:
T1>T2 for Heating
T1<T2 for Cooling

Step 4
Select the desired flow rate and total units here **(see special note #2)**

Step 5
Select the desired energy rate and total units here **(see special note #2)**

Step 6
Select the output units per pulse, and the pulse width

Step 7
Press send to transmit calibration data to the Series340

Step 8
Press to exit parameters screen and to go back to main screen

Press to refresh the parameters screen with the current 430 settings.

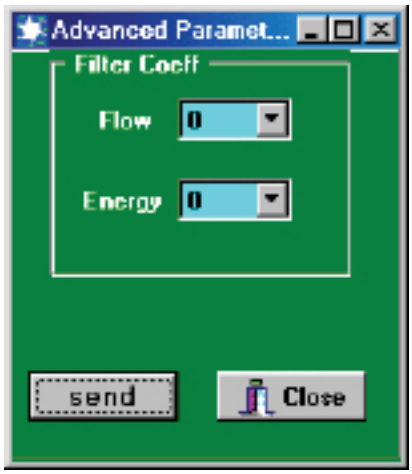
See Note #3

Press to restore the factory default settings to the screen
Note: Must press "send" before values take effect.

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 below.



Commisioning:
Before the Badger® Series 340LW can be used on the LonWorks network, a network tool must commission it.

The 340 LW has a red “Wink” LED and a green “Service” LED.

The green “Service” LED has is used to report the commission status.
If commissioned, on power-up the green LED turn ON for a few seconds, and then turn off.
If not commissioned the green LED will flash at about a ½ Hz rate.
If the LED turns ON, then OFF, and then ON steady, contact the factory.

Special notes for operation

1. comm status
   =0 - booted up, no comm with internal uart
   =1 - connected to internal uart
   =2 - LONWORKS® mode
   =3 - commode

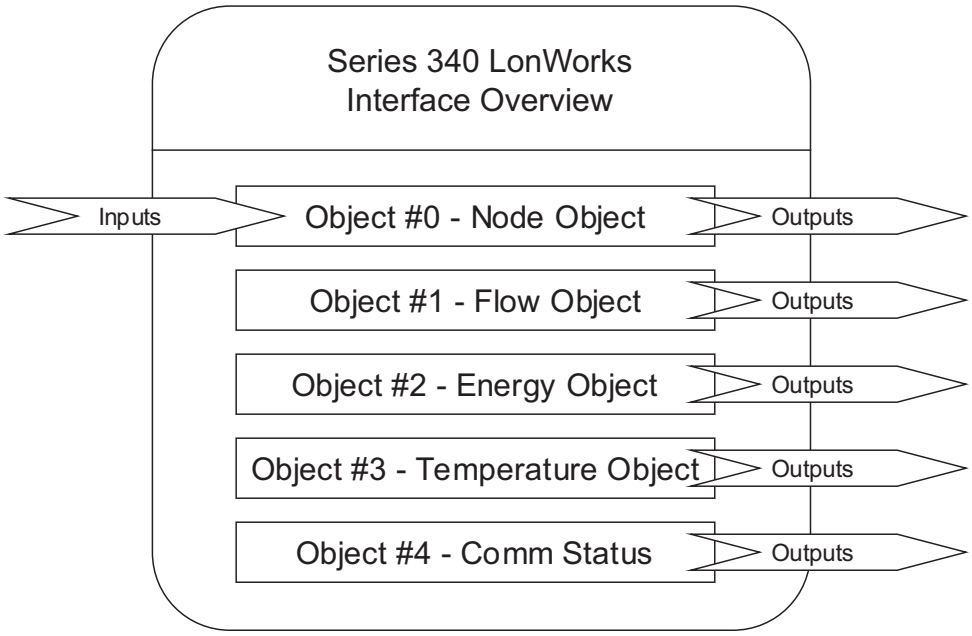
2. units that must be set by the 340 PC software for this software revisions to work properly
   gpm
   gallons
   kbtu/hr
   btu

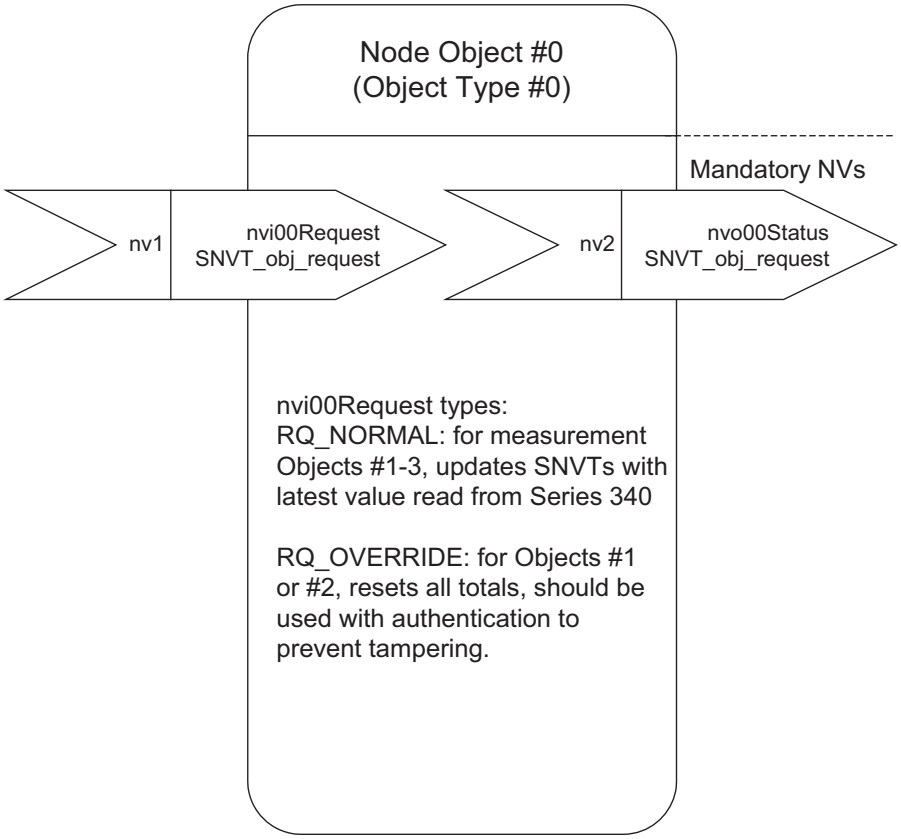
3. all configuration properties (CPs) are set to ten second updates for each outgoing measurement network variable, can be modified via LonMaker browser

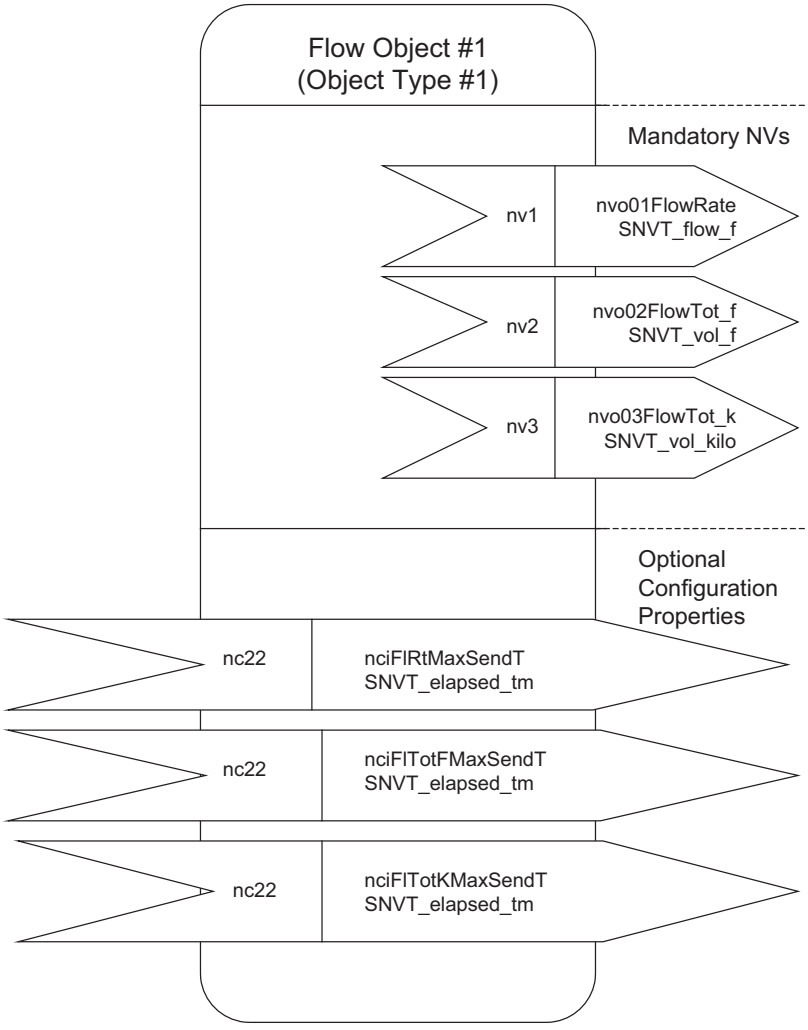
4. internal measurement readings are updated every ten seconds (this update rate is not changeable)

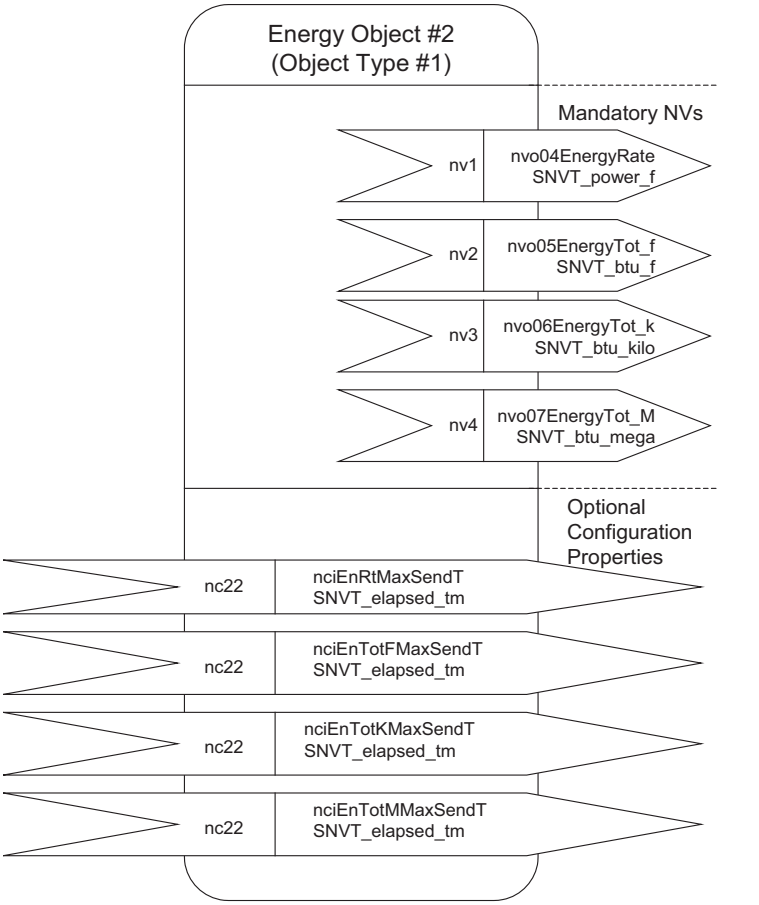
5. to reset total, send the following to nvi00Request in the LonMaker browser
   “1,RQ_OVERRIDE”
   “2,RQ_OVERRIDE”
   either of the above will reset <u>both</u> flow total and energy total

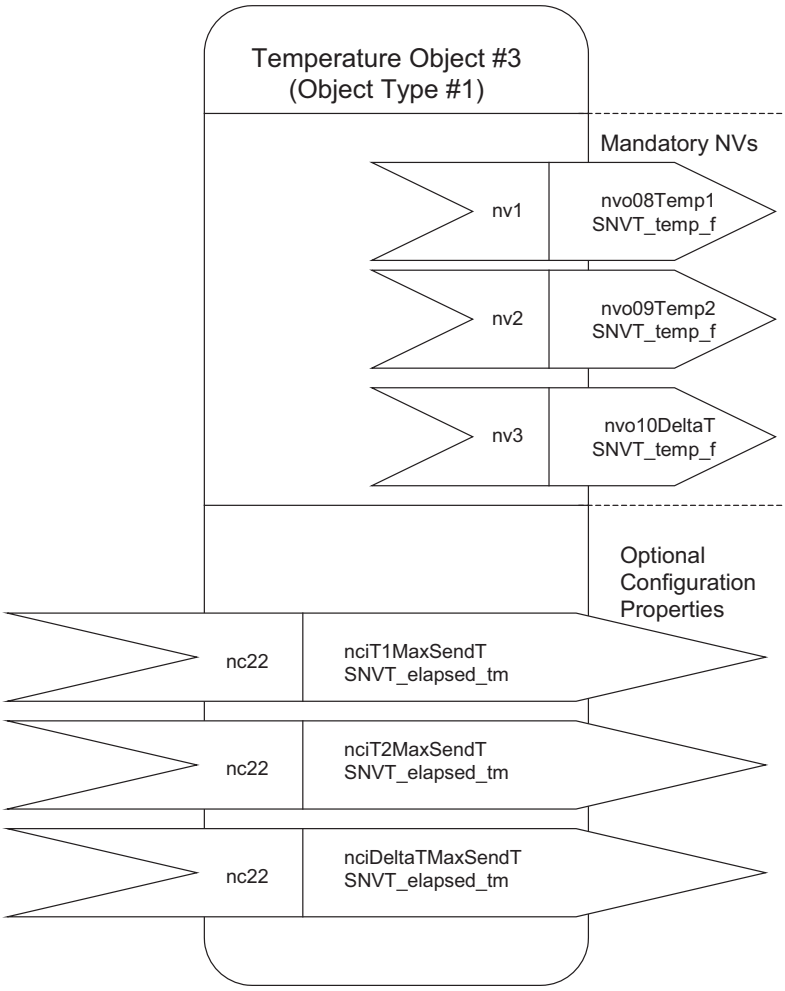
Series 340 LonWorks
LonMark Implementation

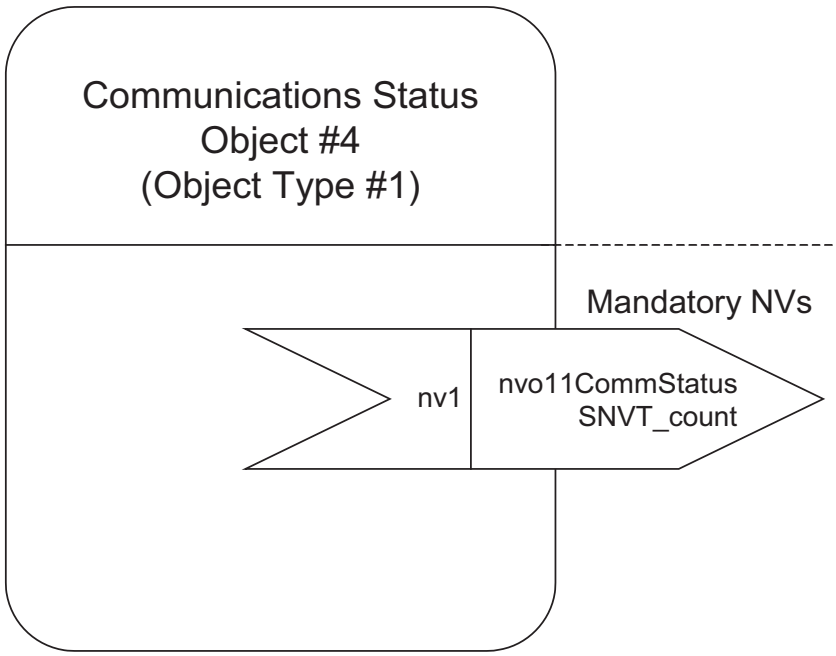



Node Object #0
(Object Type #0)
Mandatory NVs
nv1
nvi00Request
SNVT_obj_request
nv2
nvo00Status
SNVT_obj_request
nvi00Request types:
RQ_NORMAL: for measurement Objects #1-3, updates SNVTs with latest value read from Series 340
RQ_OVERRIDE: for Objects #1 or #2, resets all totals, should be used with authentication to prevent tampering.


Flow Object #1
(Object Type #1)
Mandatory NVs
nv1
nvo01FlowRate
SNVT_flow_f
nv2
nvo02FlowTot_f
SNVT_vol_f
nv3
nvo03FlowTot_k
SNVT_vol_kilo
Optional
Configuration
Properties
nc22
nciFlRtMaxSendT
SNVT_elapsed_tm
nc22
nciFlTotFMaxSendT
SNVT_elapsed_tm
nc22
nciFlTotKMaxSendT
SNVT_elapsed_tm


Energy Object #2
(Object Type #1)
Mandatory NVs
nv1
nvo04EnergyRate
SNVT_power_f
nv2
nvo05EnergyTot_f
SNVT_btu_f
nv3
nvo06EnergyTot_k
SNVT_btu_kilo
nv4
nvo07EnergyTot_M
SNVT_btu_mega
Optional
Configuration
Properties
nc22
nciEnRtMaxSendT
SNVT_elapsed_tm
nc22
nciEnTotFMaxSendT
SNVT_elapsed_tm
nc22
nciEnTotKMaxSendT
SNVT_elapsed_tm
nc22
nciEnTotMMaxSendT
SNVT_elapsed_tm


Temperature Object #3
(Object Type #1)
Mandatory NVs
nv1
nvo08Temp1
SNVT_temp_f
nv2
nvo09Temp2
SNVT_temp_f
nv3
nvo10DeltaT
SNVT_temp_f
Optional
Configuration
Properties
nc22
nciT1MaxSendT
SNVT_elapsed_tm
nc22
nciT2MaxSendT
SNVT_elapsed_tm
nc22
nciDeltaTMaxSendT
SNVT_elapsed_tm



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 (0.1 lk)

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

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 270Ω 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

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
Measurement Outputs
Transmitted in SI units

Flow
Rate and total

Energy
Rate and total

Temperature

PROGRAMMING
Requires PC or laptop running Windows® XP or Vista

Badger Meter Model A-340LW programming kit containing software and Model A301 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	

(This page intentionally left blank)

Data Industrial®

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

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.

BadgerMeter, Inc.
P.O. Box 581390, Tulsa, Oklahoma 74158
(918) 836-8411 / Fax: (918) 832-9962
www.badgermeter.com