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.
INSTALLATION

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.

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.

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.

**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.

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.

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.

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.

**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.
Commissioning:
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 both flow total and energy total

Series 340 LonWorks
LonMark Implementation

Series 340 LonWorks
Interface Overview

Object #0 - Node Object

Object #1 - Flow Object

Object #2 - Energy Object

Object #3 - Temperature Object

Object #4 - Comm Status
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.
Energy Object #2
(Object Type #1)

Mandatory NVs

- nv1
  - nvo04EnergyRate
  - SNVT_power_f

- nv2
  - nvo05EnergyTot_f
  - SNVT_blu_f

- nv3
  - nvo06EnergyTot_k
  - SNVT_blu_kilo

- nv4
  - nvo07EnergyTot_M
  - SNVT_blu_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
Communications Status
Object #4
(Object Type #1)

Mandatory NVs

nvo11CommStatus

nvt_countnvo

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

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