Impeller
by Badger Meter

Industrial Flow Monitors

Series 3050

Badger Meter

DSY-UM-01668-EN-01 (July 2017)

User Manual

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INTRODUCTION

The Badger Meter® Data Industrial® Series 3050 BTU flow monitor is an economical, full featured, compact unit designed for sub-metering applications.

The two line × 16-character alphanumeric display shows any combination of *Energy Rate*, *Energy Total*, *Flow Rate* or *Flow Total*. You can configure both preprogrammed and user-defined units of measure.

The Series 3050 BTU flow monitor accepts pulse or linear analog input signals. Like all Data Industrial flow monitors, the Series 3050 BTU flow monitor may be field-calibrated. For Data Industrial sensors, *K* and *offset* numbers are entered, while other pulse or frequency output sensors may use a *K-factor* only. Analog inputs are fully programmable for slope and intercept.

The flow monitor requires two temperature units and can accept 10 kΩ thermistors, 100 Ω three-wire RTDs or user-defined custom thermistors or RTDs.

The panel-mounted model has a NEMA 4X rated front panel and conforms to DIN Standard dimensions, 96 mm × 96 mm, for meter sizes and panel cutouts. An optional NEMA 4 wall-mount model is also available.

Programming

You can program the flow sensor from the front panel by entering a *K* and *offset* or only a *K-factor*, depending on the flow sensor used.

Programming is menu driven. All data is entered using the LCD/keypad interface. A password gate is included to prevent unauthorized access to programming parameters. Programming flexibility is extended to units of measure. In addition to several factory units of measure, the Series 3050 BTU flow monitor software lets you create custom units for rate and total.

The Series 3050 BTU flow monitor provides one Form C solid-state relay, and one solid-state switch output. Both are fully programmable as *Pulse* or *Volume*, or *Setpoint* control-based *Flow Rate*, *Flow Total*, *Energy Rate*, *Energy Total*, *Temperature 1*, *Temperature 2* or *Delta T*. For pulse output, you can program both the resolution and the pulse width. The *Setpoint* control is extremely versatile with fully independent *set* and *release* points, each with its own *time delay*.

LEDs on the front panel indicate status of both the relay and pulse outputs.

All calibration information, units of measure and flow totals are stored in a non-volatile memory that does not require battery backup for data retention.

Options

- Analog output
- USB
- RS485
- BACnet
- Modbus®
- Wall mounting

SAFETY INFORMATION

The installation of the flow monitor must comply with all applicable federal, state, and local rules, regulations, and codes. Failure to read and follow these instructions can lead to misapplication or misuse of the flow monitor, resulting in personal injury and damage to equipment.

UNPACKING AND INSPECTION

Upon opening the shipping container, visually inspect the product and applicable accessories for any physical damage such as scratches, loose or broken parts, or any other sign of damage that may have occurred during shipment.

NOTE: If damage is found, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier. A claim for equipment damage in transit is the sole responsibility of the purchaser.

INSTALLATION

Mechanical Installation

The Series 3050 BTU flow monitor can be either panel-mounted or wall-mounted.

Location

In any mounting arrangement, the primary concern is easy viewing and convenient operation of the keypad. The unit generates very little heat, so no consideration need be given to cooling or ventilation. However, prolonged direct sunlight can damage the front panel so some level of shading is recommended, especially if installed in a tropical climate.

Panel Mount Installation

The Series 3050 BTU flow monitor panel-mount model is designed for through-panel mounting, which allows access to the back of the unit. The monitor is secured to the panel by two draw brackets shown in *Figure 1* below. Also refer to *Figure 2* for monitor and panel cutout dimensions.

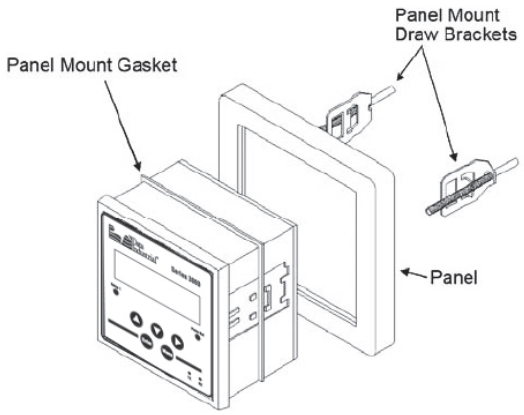


Figure 1: Panel mounting

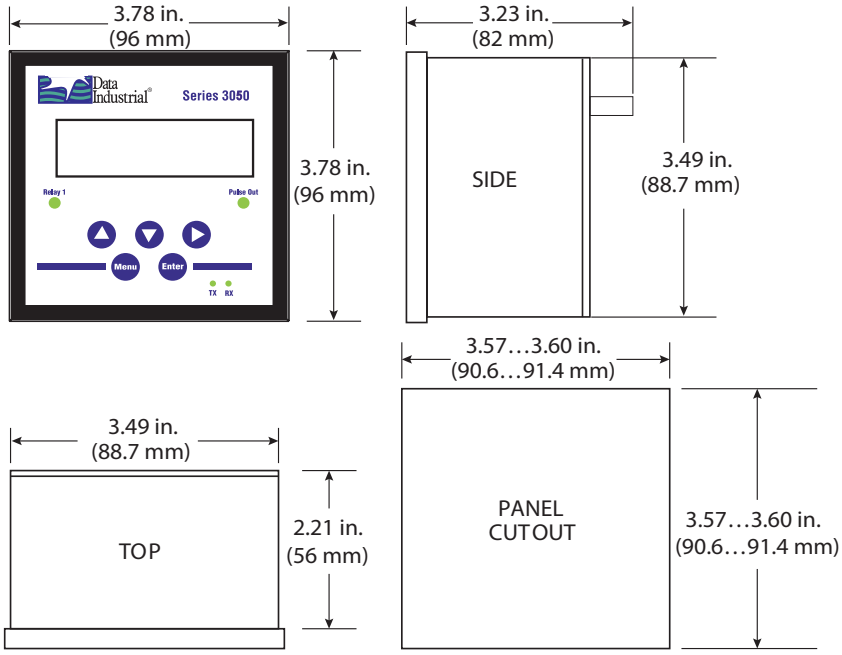


Figure 2: Panel-mount dimensions and panel cutout

Wall Mount Installation

The Series 3050 BTU flow monitor wall-mount model is designed to mount onto a wall with four bolts or screws. The mounting hole pattern and box dimensions for the Series 3050 BTU flow monitor NEMA4 wall-mount model are shown in *Figure 3*.

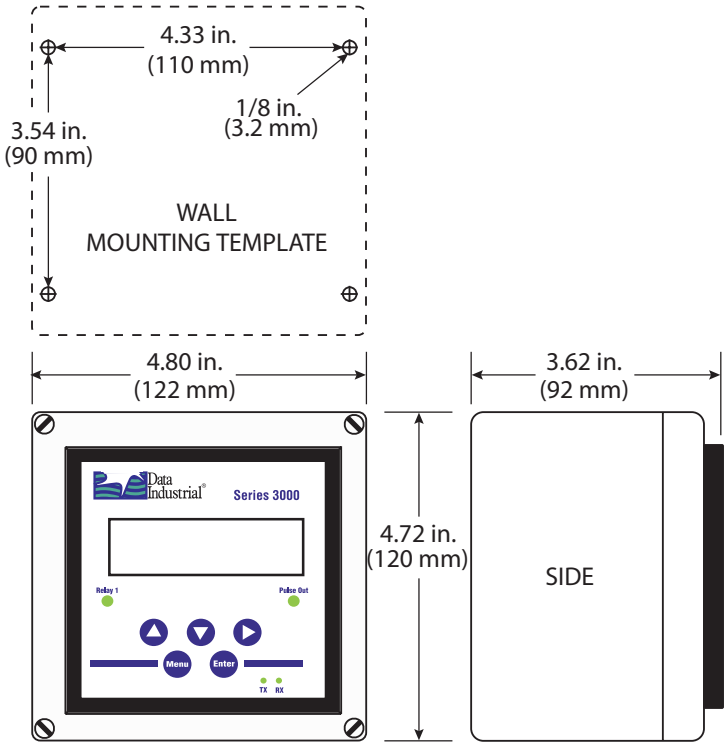


Figure 3: Wall-mount dimensions and cutout

Electrical Installation

Power Supply Wiring

The Series 3050 BTU flow monitor requires 12…24 V DC/AC to operate. Check the *"Specifications" on page 31* for DC current draw and AC Volt-Amp requirements.

Always use a fused circuit.

Connect the positive of the power supply to the flow monitor terminal marked (ACL/DC+), and connect the negative of the power supply to the flow monitor terminal marked (ACC/DC-).

If a Badger Meter Data industrial plugin power supply (Model A-1028) is being used, connect the black-white wire to the terminal marked (ACL/DC+) and the black wire to the terminal marked (ACC/DC-).

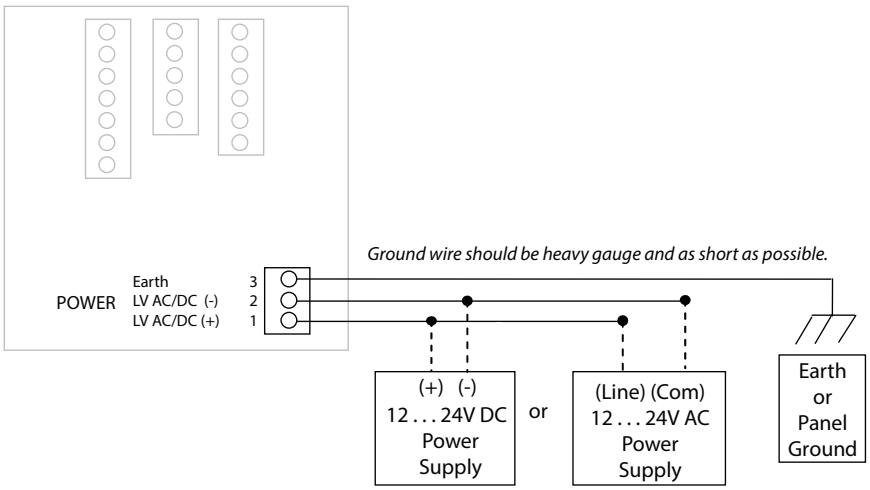


Figure 4: Power supply wiring

Flow Sensor Wiring

The Series 3050 flow sensor inputs are extremely versatile, designed to accept either two-wire or three-wire pulse inputs (Data Industrial 200 Series, SDI or 4000 Series) or Analog inputs. Although different rear panel terminals are used, all parameters are set with the LCD/keypad interface. There are no internal or external jumpers, switches or potentiometers to move or adjust.

The following pulse input types are accommodated:

- **Pulse-DI**: Used for all Badger Meter Data Industrial Flow Sensors. Provides an internal pullup resistor and uses K and "Offset" values for calibration.
- **Pulse–K Factor**: Accepts non zero-crossing inputs but provides no internal pullup, classical K (pulses/gallon) values for calibration.
- **Pullup-K Factor**: Provides an internal pullup resistor and uses classical K (pulses/gallon) values for calibration.

NOTE: All the above pulse input types wire the same as shown in *Figure 5 on page 9*. See the *"Programming Flowcharts"* on *page 18 through page 25* for required input configuration.

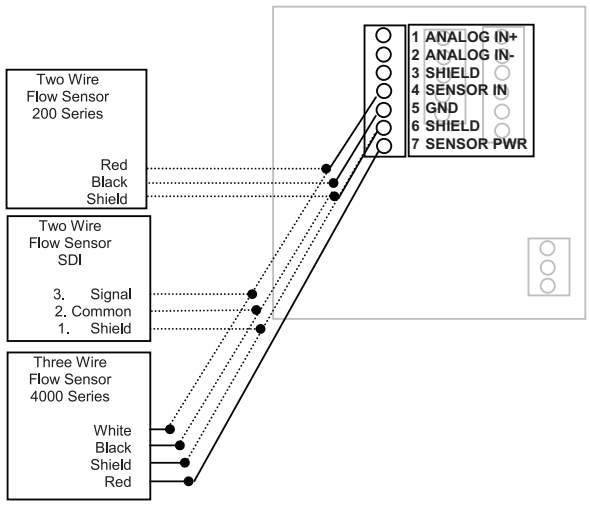


Figure 5: Data industrial flow sensor wiring examples (two- and three-wire pulse types)

Analog Input

As an alternative to the pulse inputs, the Series 3050 BTU flow monitor can accept an Analog input. The input is non-isolated, but can accept 0…1V DC, 0…5V DC, 0…10V DC, 0…20 mA and 4…20 mA with both factory-defined and custom units of measure.

Low impedance 100 Ω input for current inputs optimizes performance and flexibility or loop power supplies. Both the low-end and high-end scaling are independent and can be field-configured.

NOTE: See the *"Programming Flowcharts"* on *page 18 through page 25* for required input configuration.

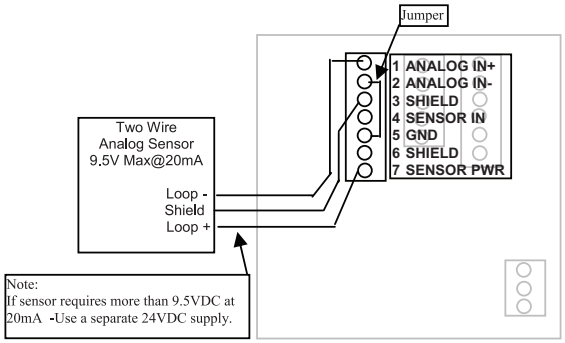


Figure 6: 4…20 mA analog loop powered wiring

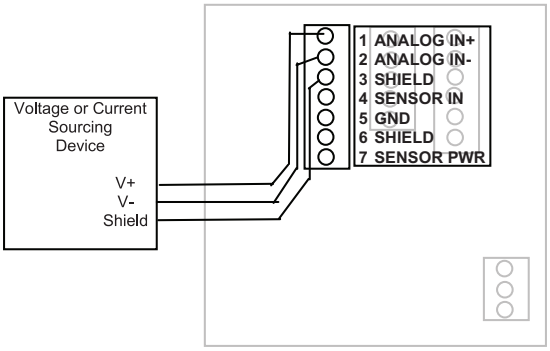


Figure 7: Voltage or current sourcing analog inputs

Temperature Input

The Series 3050 BTU flow monitor can accept inputs from either a pair of thermistors or RTDs. The inputs are labeled *T1* and *T2*. Since the *T1* sensor is used to convert the volumetric flow (Example: GPM) to the mass flow (Example: Lbs/Hr) used in the BTU calculations, the sensor connected to *T1* should be in the same supply or return line as the flow sensor.

The temperature inputs of the flow monitor are extremely versatile. In addition to the factory default two-wire 10k @ 77° F Type II Thermistors and three-wire 100 Ω platinum RTDs, the unit can be programmed in the field for a wide variety of custom RTDs and thermistors. See the *"Programming Flowcharts"* on *page 18 through page 25*. Contact the factory for assistance with any custom inputs.

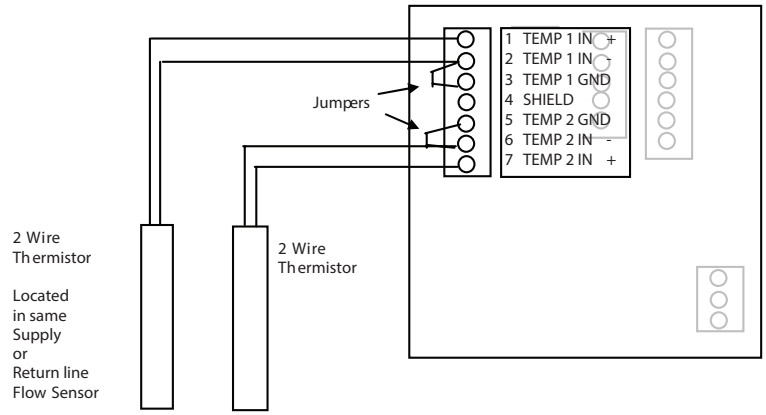


Figure 8: Wiring two-wire thermistors and RTDs

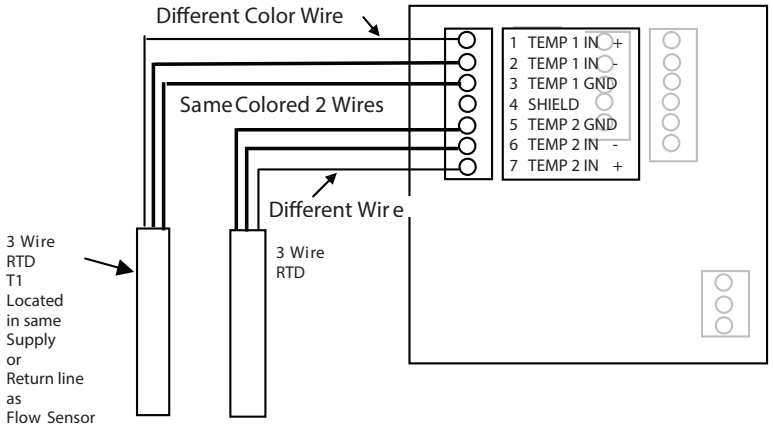


Figure 9: Wiring three-wire RTDs

Solid-State Switch and Form C Output Wiring

The Series 3050 BTU flow monitor has one Normally Open (N.O.) solid-state switch, and one solid-state Form C relay.

See the *"Specifications" on page 31* for maximum voltage and current ratings for each type output. These outputs are completely independent, electrically isolated, and can be programmed as either *Pulse* or *Setpoint* outputs.

When the *Totalizer* function is selected, the unit of measure and resolution are independent from the displayed units and can be programmed where one pulse occurs once every 0000000.1…999999999.0 of units selected, with any pulse width from 0001…9999 mS.

When the *Alarm* is selected as the unit of measure and the resolution is independent from the displayed units, it allows the unit to be programmed as either a high or low rate *Setpoint*. Since the *Setpoint*, *Release Point* and their associated time delays are fully independent, this output can be either a classical high rate or low rate alarm, depending on the settings selected. When design planning, keep in mind that although both of these outputs can be programmed as alarm points only, the relay provides both N.O. and N.C. contacts. The switch is a simple N.O. contact.

Example of High Flow Setpoint Control
The *Setpoint* must be a value greater than the *Release Point*.

The relay output will have continuity between its N.C. terminal and *COM* until the flow has exceeded the *Setpoint* (*SETPT*) for a continuous period of time exceeding the *Setpoint Delay* (*SDLY*), at which time the N.C. connection will open and the N.O. contact will have continuity to the *COM* terminal. When the flow has dropped below the *Release Point* (*RELP*) for a continuous period of time exceeding the *Release Point Delay* (*RDLY*), the relay states will return to their original states. If the latch has been set to *ON*, the relay will not release until manually reset once the *Setpoint* and *Setpoint Delay* have been satisfied. Sources for the *Setpoint* control can be *Flow Rate*, *Energy Rate*, *T1*, *T2* or *Delta T*.

Example of Low Flow Setpoint Control
The *Setpoint* must be a value less than the *Release Point*.

The relay output will have continuity between its N.C. terminal and *COM* until the flow drops below the *Setpoint* (*SETPT*) for a continuous period of time exceeding the *Setpoint Delay* (*SDLY*), at which time the N.C. connection will open and the N.O. contact will have continuity to the *COM* terminal. When the flow has again risen above the *Release Point* (*RELP*) for a continuous period of time exceeding the *Release Point Delay* (*RDLY*), the relay states will return to their original states. If the latch has been set to *ON*, the relay will not release until manually reset once the *Setpoint* and *Setpoint Delay* have been satisfied. Sources for the *Setpoint* control can be *Flow Rate*, *Energy Rate*, *T1*, *T2* or *Delta T*.

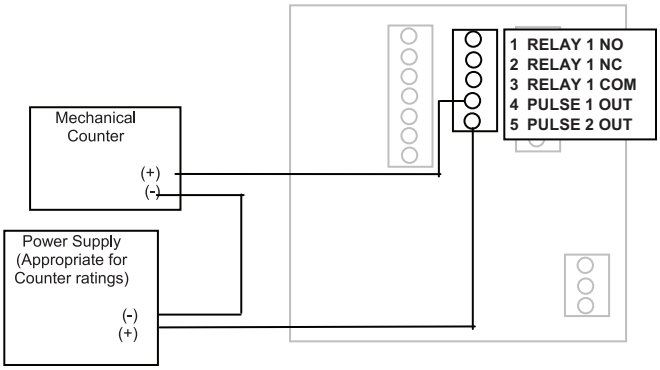


Figure 10: Relay and switch wiring examples

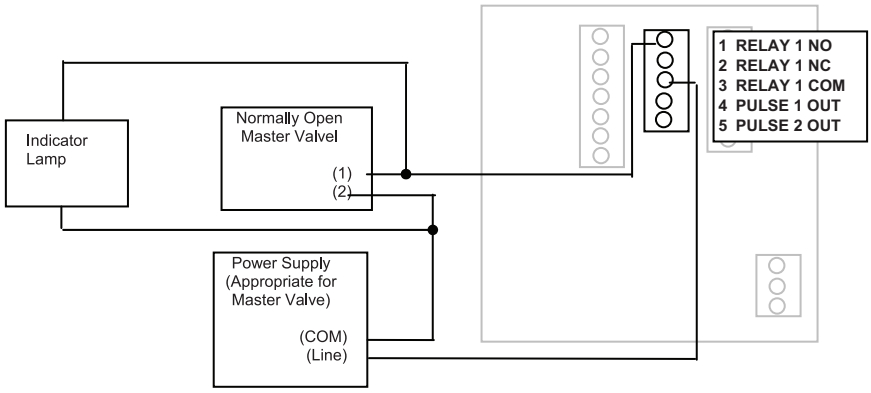


Figure 11: Relay and switch wiring examples (continued)
Chiller control based on high energy usage with indication.

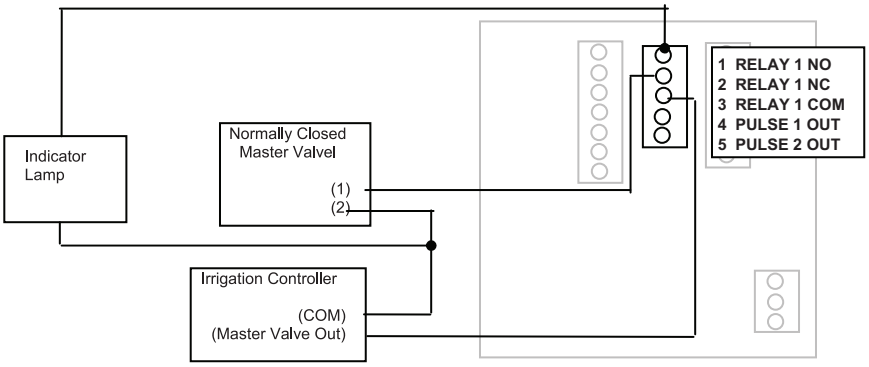


Figure 12: Relay and switch wiring examples (continued)
Chiller control based on low temperature warning with indication.

OUTPUT OPTION CARD

If the Series 3050 BTU flow monitor was ordered with the Output Option card, it will have these additional outputs:

- **Analog Output** (0…20 mA or 4…20 mA) that can be converted externally to 0…5V DC, 1…5V DC with a 250 Ω resistor; or 0…10V DC or 2…10V DC with a 500 Ω resistor. A 15V DC power supply is provided to permit current sinking or sourcing. The Series 3050 BTU flow monitor has special software that permits the Analog output.
- **USB** for direct access to a computer using a standard mini-USB cable.
- **RS-485** for fully addressable Modbus or BACnet communication.

Analog Output

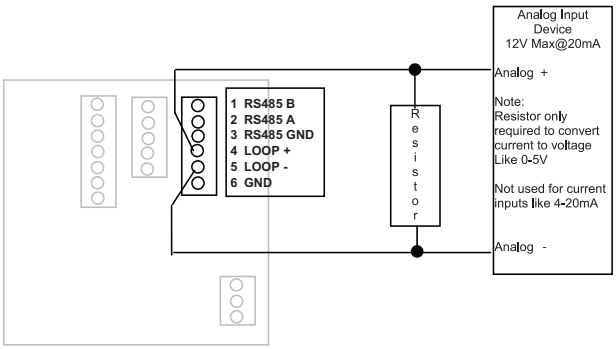


Figure 13: Current sourcing analog output

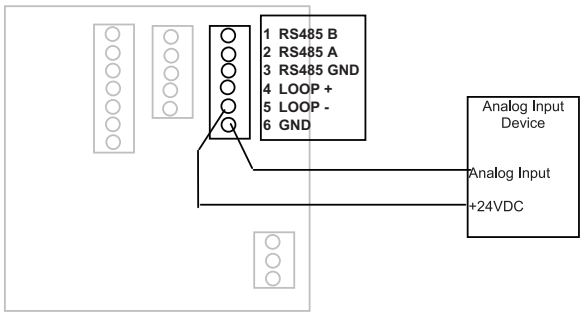


Figure 14: Current sinking analog output

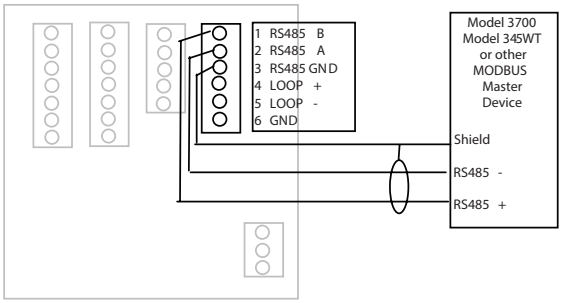


Figure 15: Analog output wiring

Modbus Points

All of the following are available as Input Registers.

Addr Function

- Flow 1 Rate (GPM)
- Flow 2 Rate
- Flow 1 Total (gallons)
- Flow 2 Total
- BTU Rate (kBTU/hr)
- BTU Total (kBTU)
- Batch 1 Count
- Batch 2 Count
- Temp 1 (deg F)
- Temp 2
- Temp Delta (T2-T1)

USB Port

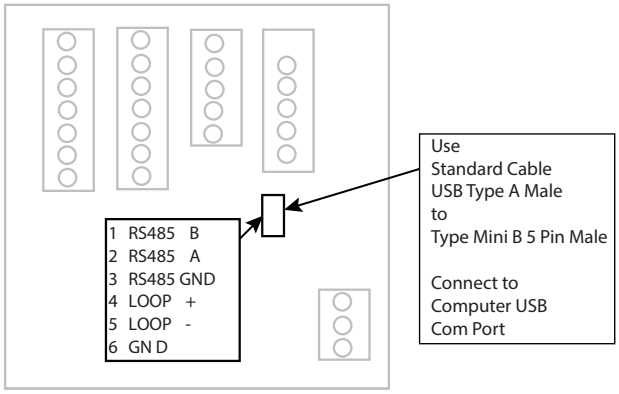


Figure 16: USB analog output

NOTE: Communication via the USB port requires Windows HyperTerminal or other similar communications software. This port is part of the *Analog Output Option* card. See *"USB Communication" on page 26* for instructions on how to use this port.

DISPLAY AND KEYPAD

The Series 3050 BTU flow monitor has a two line by 16-character display with two modes of operation and 5 keys on the front panel for programming.

Menu	1-Switch to main menu 2-Backward/Previous menu	**Up Arrow**	1-Select Menu option 2-Increase numerical value
Enter	1-Save value 2-Forward/Next menu	**Down Arrow**	1-Select Menu option 2-Decrease numerical value
		Right Arrow	1-Select Menu option 2-Move cursor to the right

When the Series 3050 BTU flow monitor is first powered up, it runs through internal self checks while displaying "**Badger Meter DIC Initializing."** At the end of this cycle its normal mode display will appear.

In the normal mode, if still using the factory defaults, flow rate will be displayed on the top line, and flow total displayed on the bottom. Both lines can be custom-defined in the field as desired. In the normal mode the **Enter** key has no function.

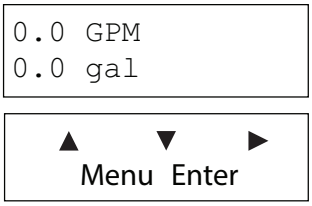


Figure 17: Normal mode display

The other mode is the program mode, used to configure the unit. Press **Menu** to enter and exit this mode. See *"Programming" on page 17*.

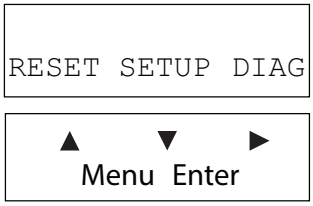


Figure 18: Program mode display

PROGRAMMING

With the normal mode display showing, press **Menu** to enter the programming mode. In this mode, you use the three arrow keys (▲▼▶) on the *selection* screens to select the option displayed above the key, and on the o*ption list* screens to scroll up or down a list of choices, like a pull-down menu. Most screens presenting choices show three choices, one for each arrow key. When the number of choices exceeds three, a small arrow (→) appears on the upper right of the display, indicating there are more choices on that level. Press **Enter** to toggle to the next set of choices. Once the selection has been made, press **Enter** to complete the selection. Press **Menu** again to return to the normal mode display.

Selection Screens

Most selection screens show three choices, one for each arrow (▲▼▶) key. When the number of choices exceeds three, a small arrow (→) appears on the upper right side of the display, indicating there are more choices on that level. Press **Enter** to view the next set of choices.

For example, pressing **Menu** from the normal mode screen shows the *RESET SETUP DIAG* screen. Pressing the **Up Arrow** key brings up the *RESET* screens. Pressing the **Down Arrow** key brings up the *SETUP* screens and pressing the **Right-Arrow** key brings up the *DIAG* (diagnostic) screens. In this example, if you press the **Down Arrow** key, this screen appears:

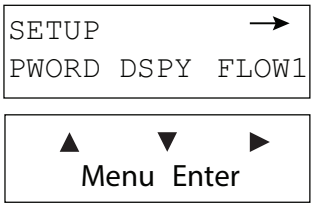


Figure 19: Selection screen

Option List Screens

Units of measure is an example of an options list screen.

Press the **Up Arrow** key to scroll up the list or press the **Down Arrow** key to scroll down the list. In this case, the list starts with *GPM; gal/s; gal/hr;…LPM;….* and ends with *Custom Units*.

With a selection highlighted, press **Enter** to complete the selection or press **Menu** to leave the selection unchanged. The *Right-Arrow* key has no function on this type of screen.

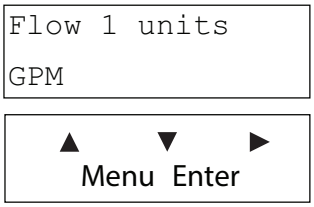


Figure 20: Option list screen

Data Screens

Some screens are data entry screens. For example, the *Setpoint* or *Custom Unit* screens.

When a data entry screen is active, the current value displays. The left-most digit flashes. Press the **Up Arrow** key to increase the value. Press the **Down Arrow** key to reduce the value. If the decimal point is flashing, press the **Up Arrow** key to move the decimal point to the right or press the **Down Arrow** key to move the decimal point to the left.

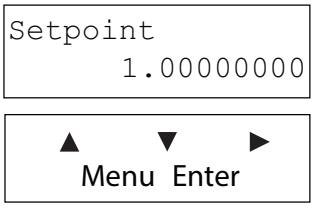
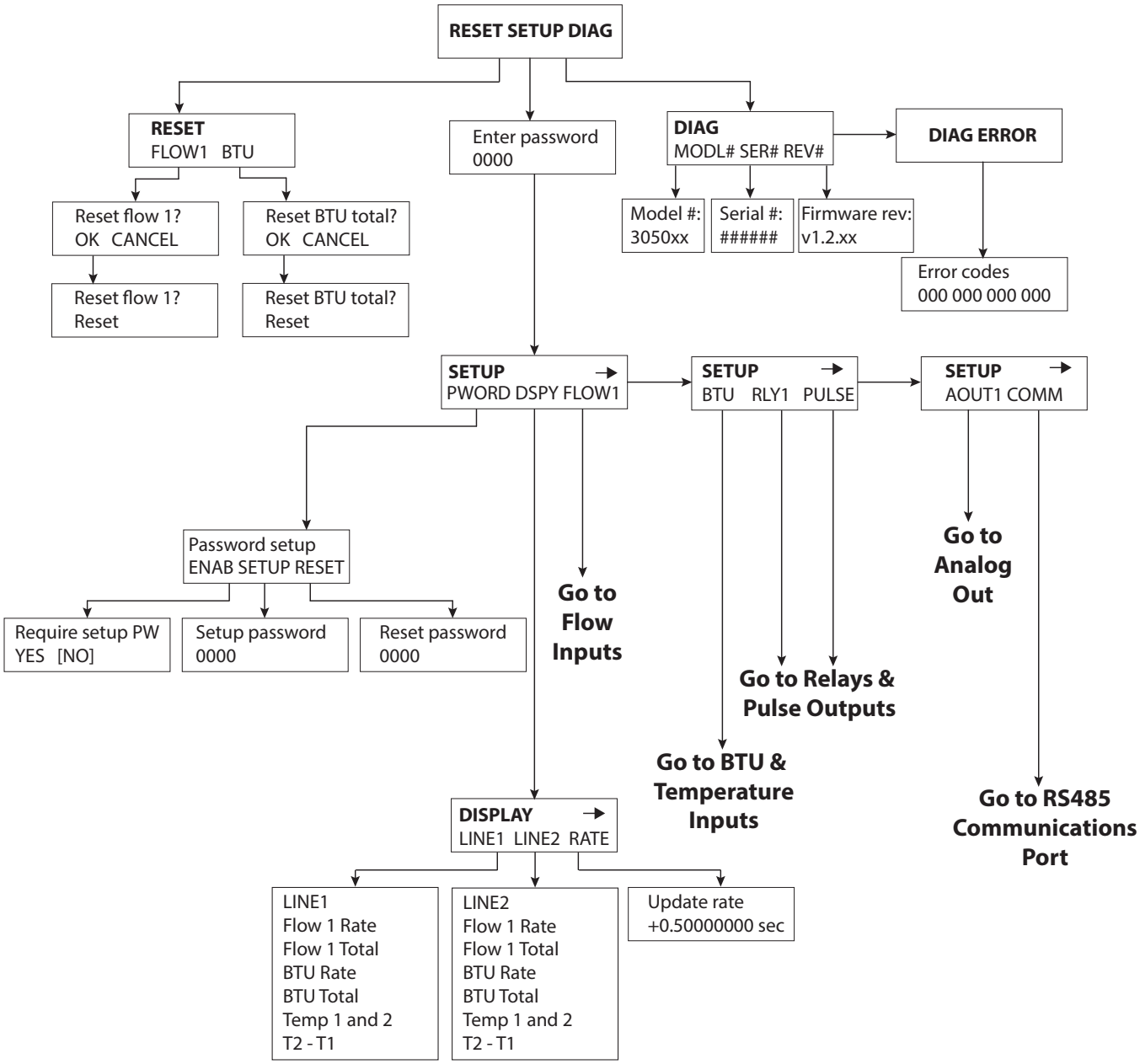
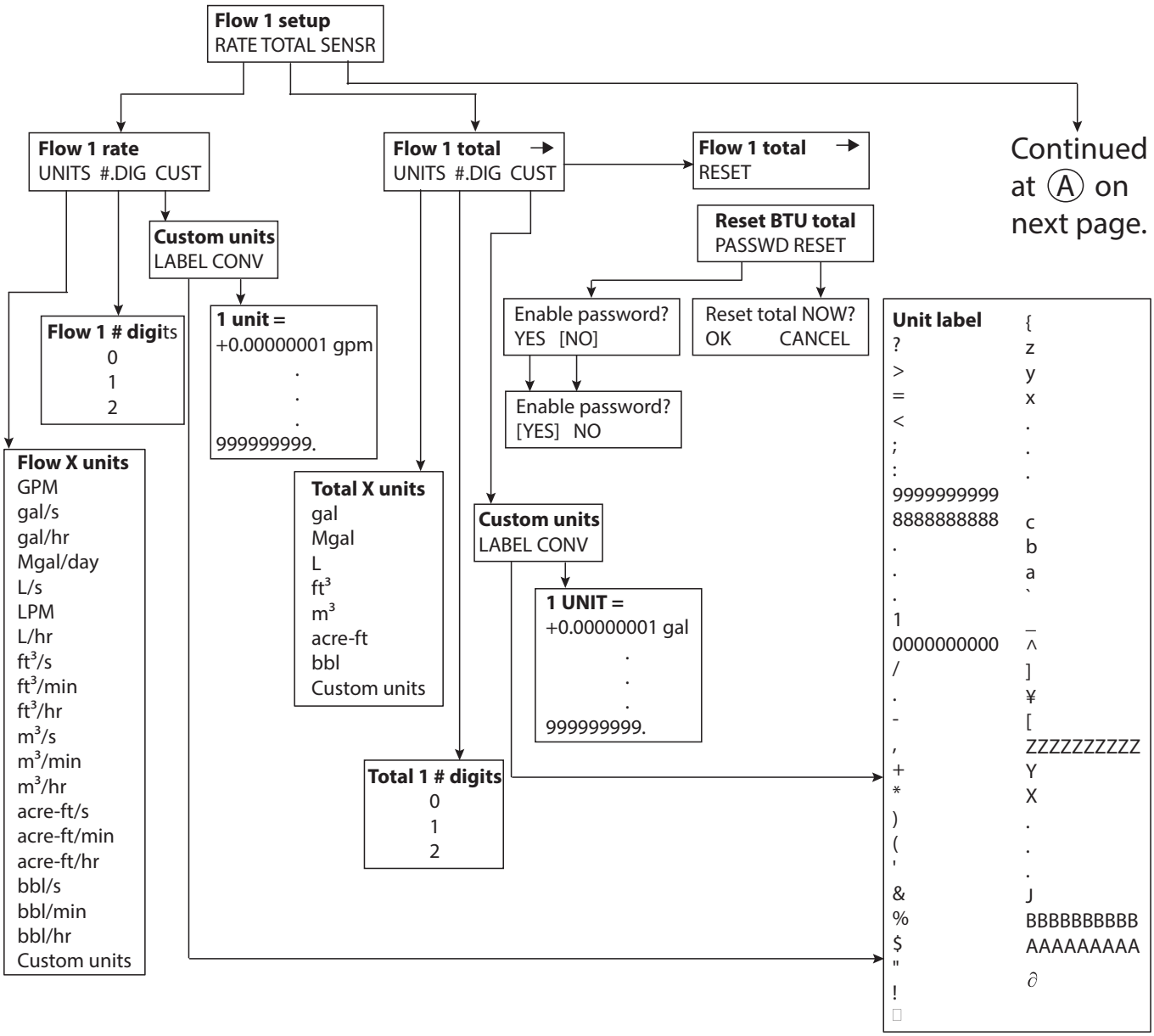


Figure 21: Data screen

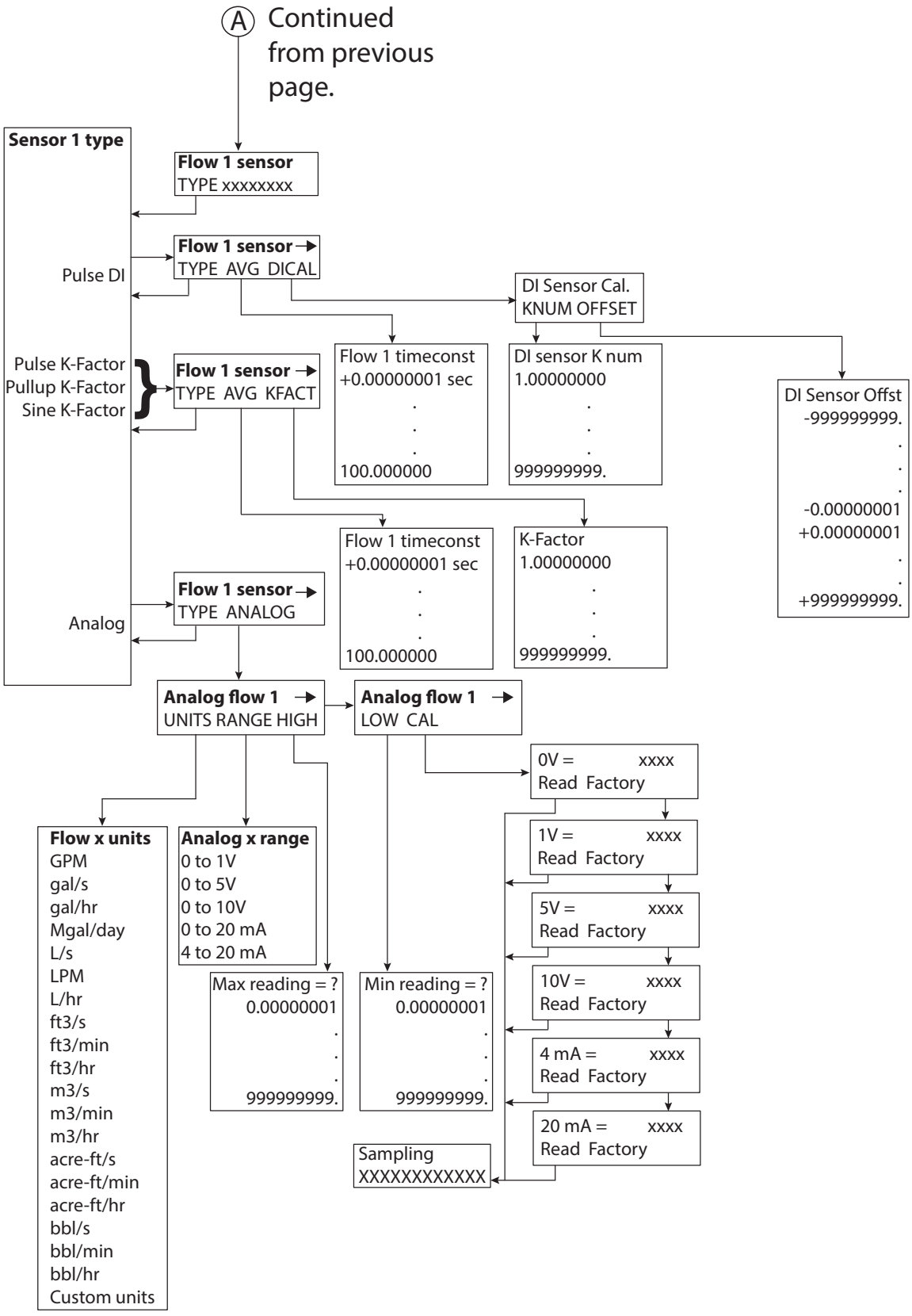
Programming Flowcharts



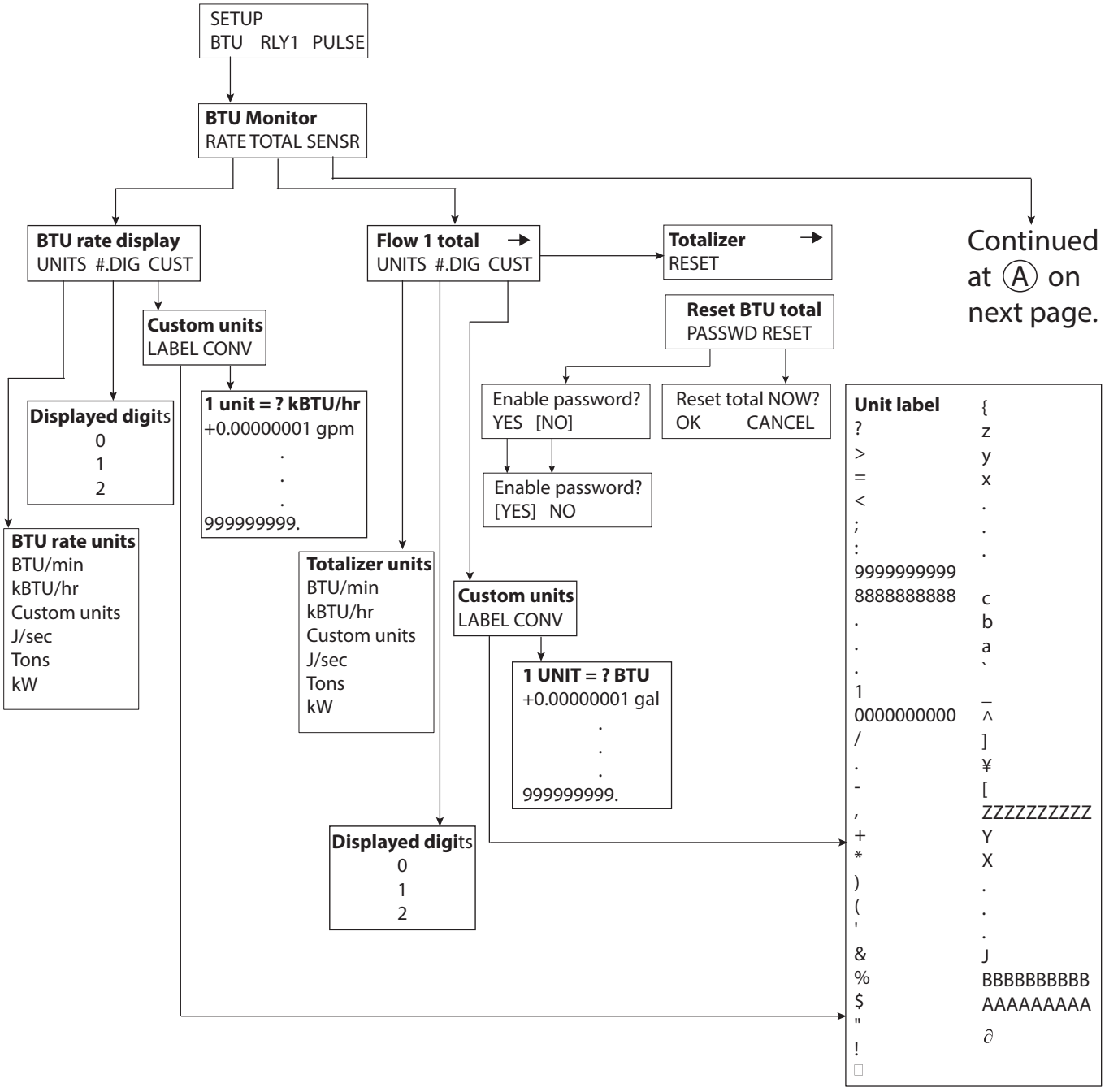
Flow Inputs Flowchart



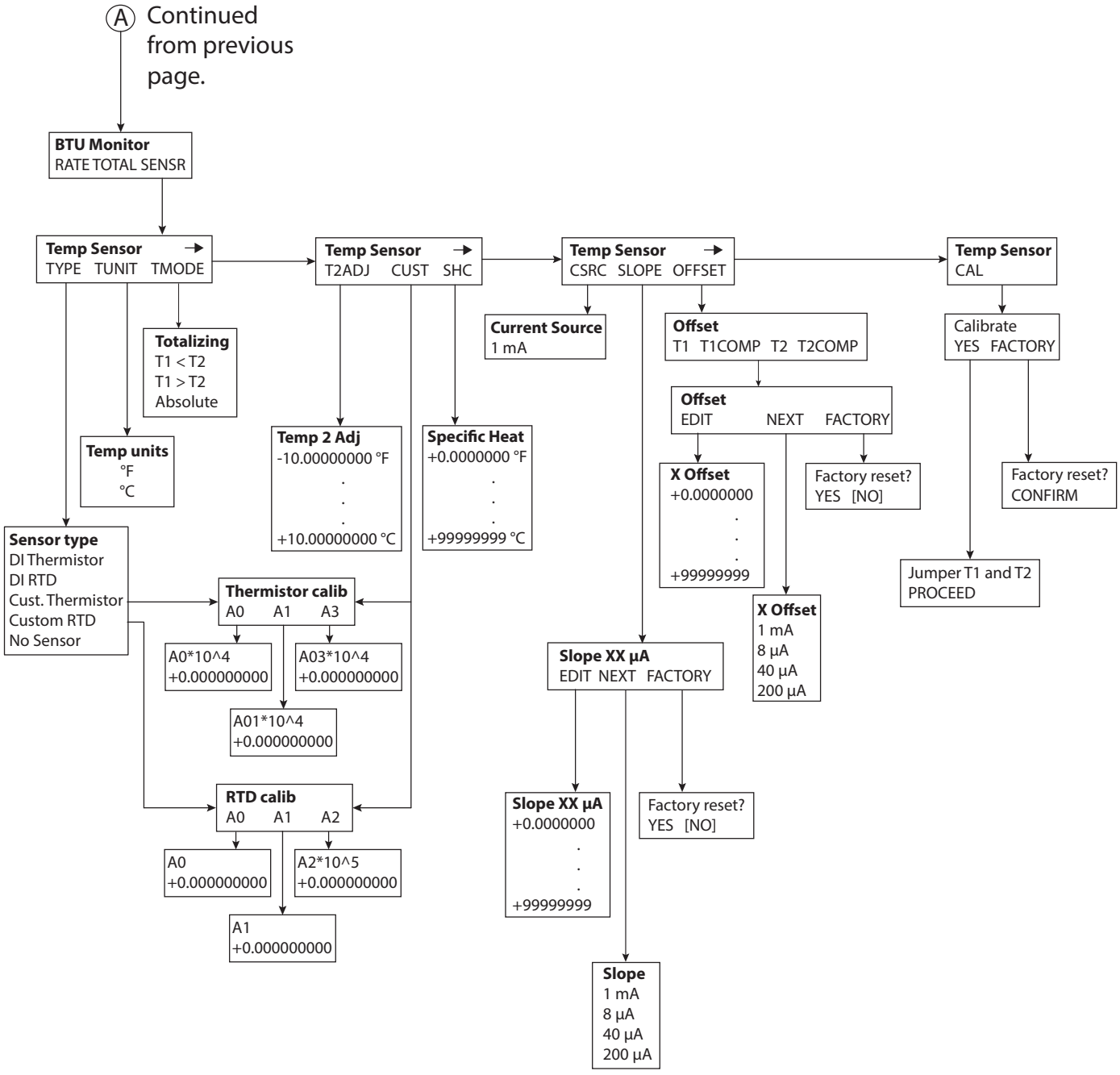
Flow Inputs Flowchart (continued)



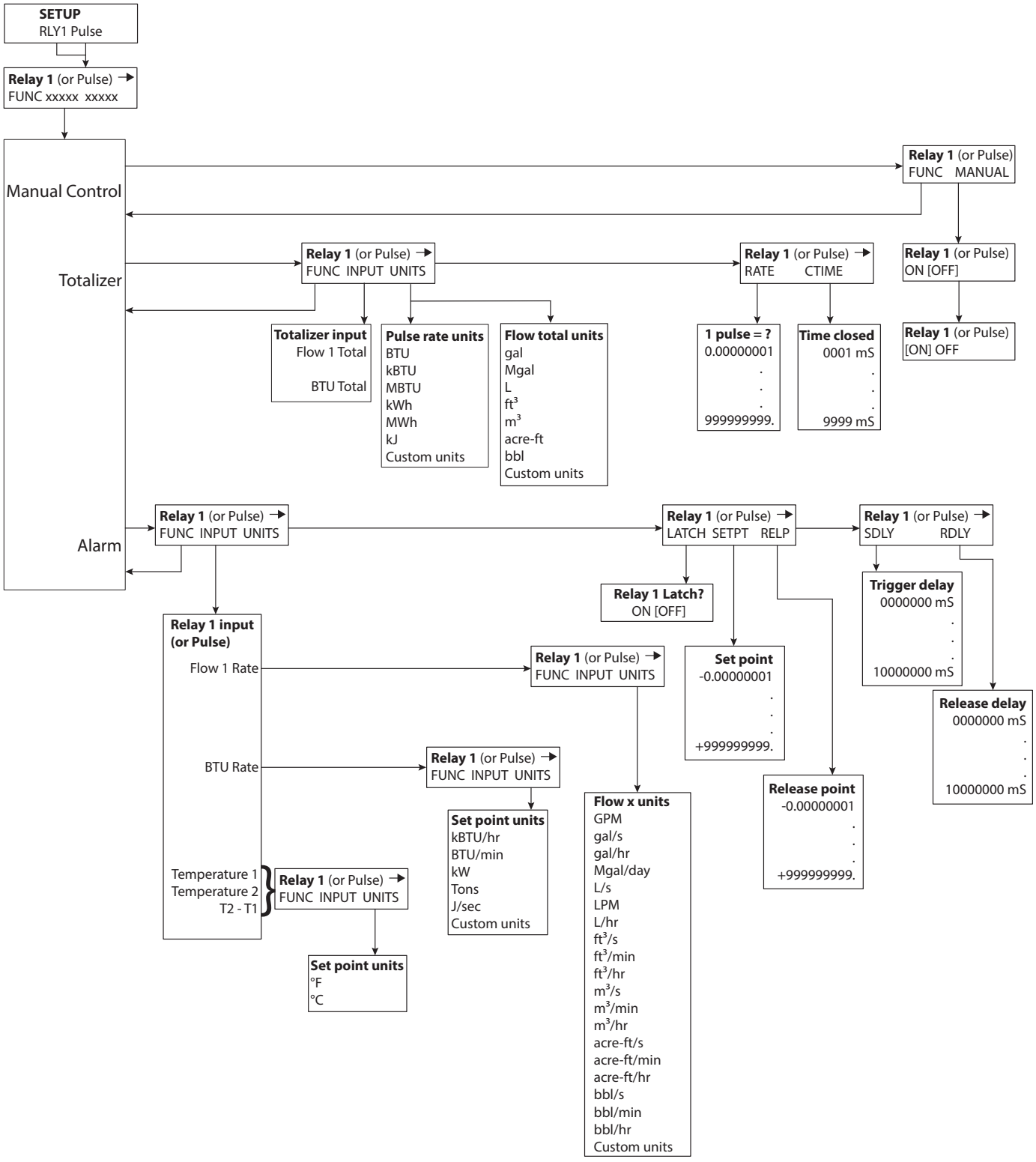
BTU and Temperature Inputs



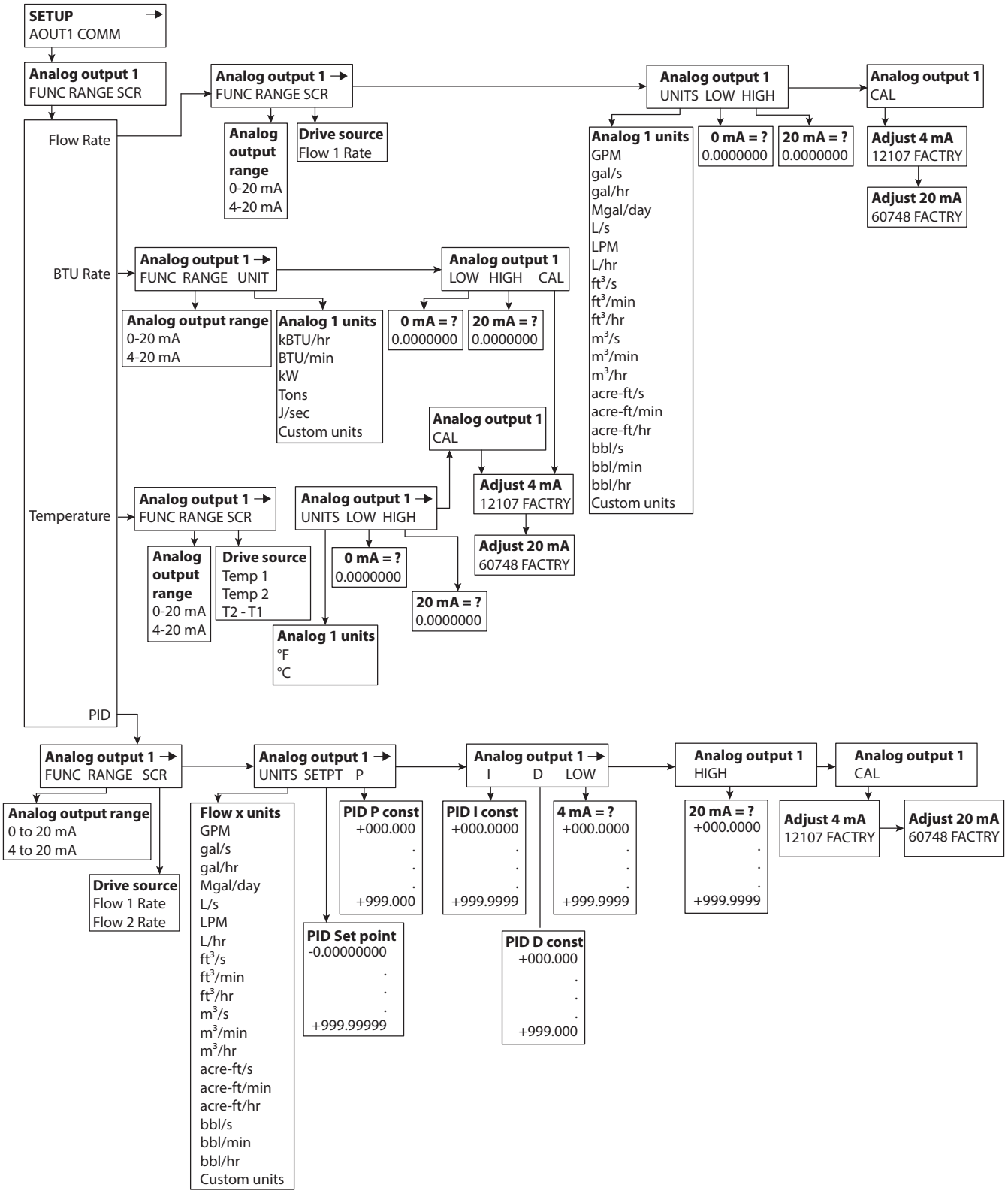
BTU and Temperature Inputs (continued)



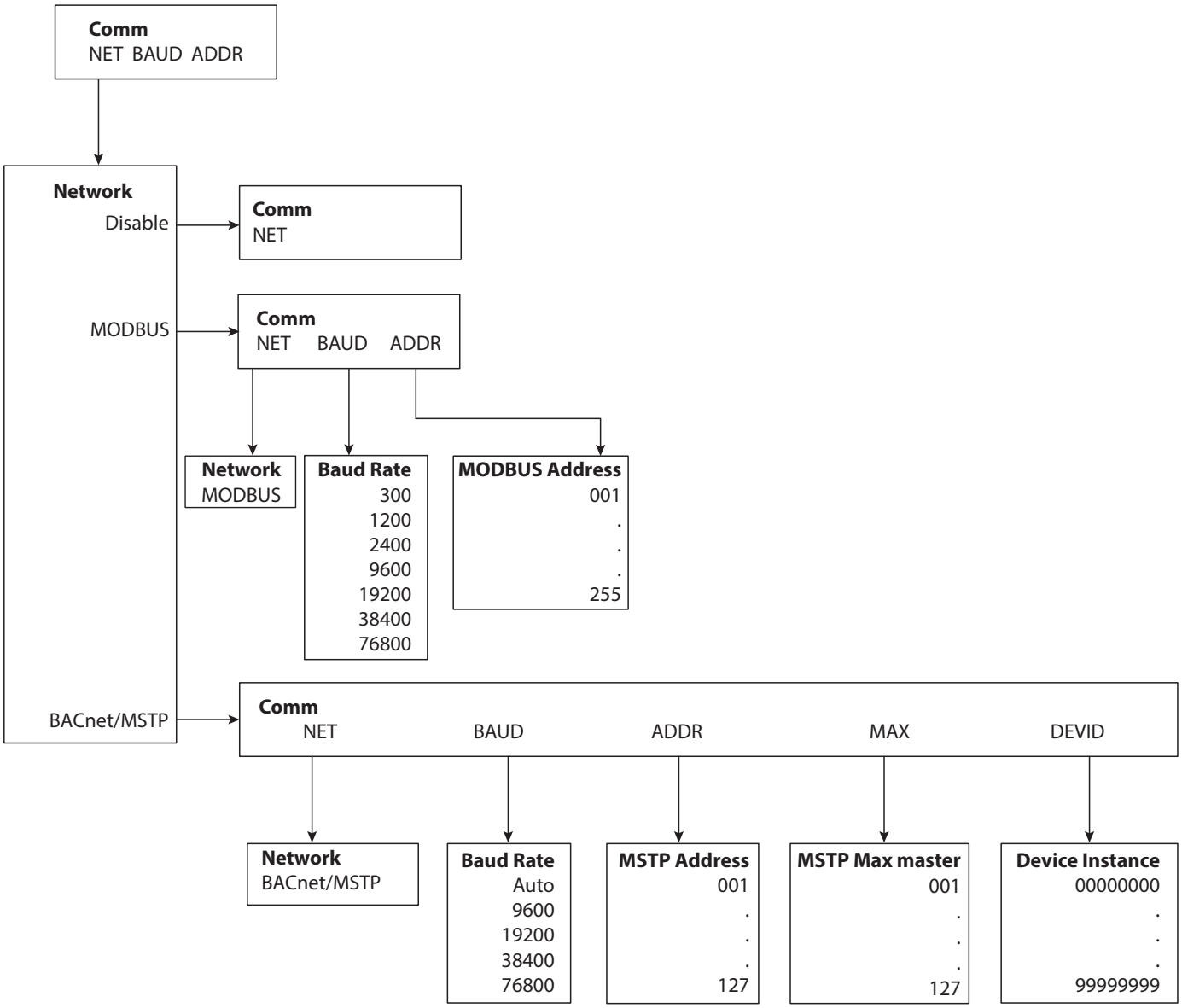
Relays and Pulse Outputs Flowchart (Manual, Setpoint Rate and Pulse/Volume)



Analog Output Flowchart



RS485 Communication Port Flowchart



USB Communication

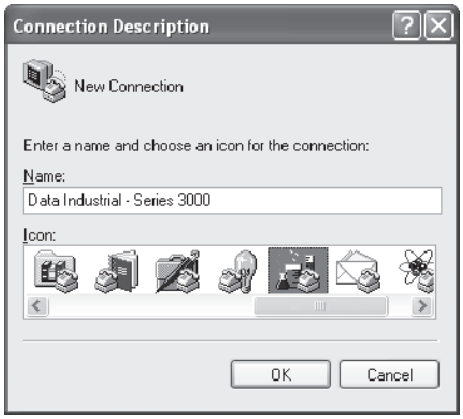
If you order the Series 3050 BTU flow monitor with an Analog Output Option card, a five-pin USB connector is also included. As much as possible, the commands mimic the use of the front panel controls.

To use this feature, you need:

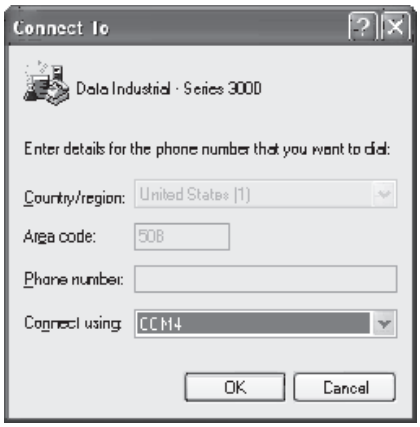
- A PC with USB ports and Windows HyperTerminal or other communications software
- Windows 7 or Windows XP operating system
- FTDI Virtual COM port drivers from *http://www.ftdichip.com/FTDrivers.htm*
- A USB 2.0 A to Mini-B 5-pin cable

To communicate using HyperTerminal:

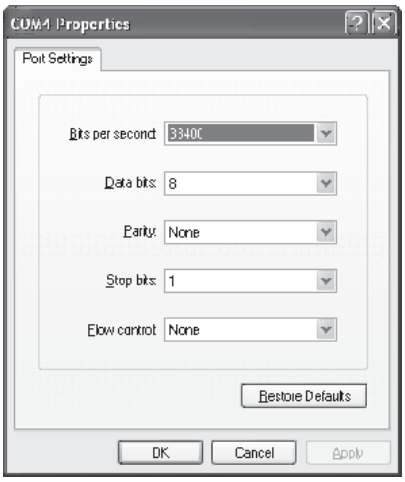
1. Make sure that the Series 3050 BTU flow monitor has a Mini-B five-pin connector on the back panel. The Series 3050 BTU flow monitor must have an Analog Output Option card installed and the monitor marked **Series # 3050-1x**.
2. Check that the appropriate FTDI Virtual COM port drivers are installed on your computer.
3. Plug the USB 2.0 A end of the cable into a USB port on your computer. Plug the Mini-B five-pin end into the back of the Series 3050 BTU flow monitor.



4. Run HyperTerminal (from the Windows Start Menu) and create a new connection with a name and icon.

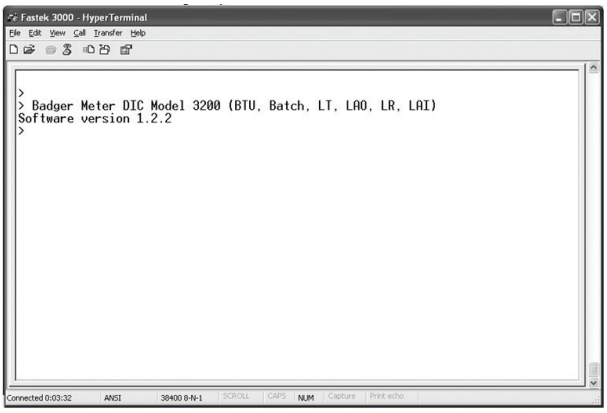


5. Configure this port as:
   - ◊ Bits per second: 38400
   - ◊ Data bits: 8
   - ◊ Parity: None
   - ◊ Stop bits: 1
   - ◊ Flow control: None



6. When connected, a greater-than (>) symbol appears in the upper left corner of the main HyperTerminal display screen. Press **Enter**. Both the Rx and Tx LEDs on the front of the flow monitor flash once, and the "Badger Meter DIC … Software Version…" text message appears.

The Series 3050 BTU flow monitor is now communicating, ready to take commands from the lists on the following pages.



COMMAND LISTS

USB Command List

In the list below, brackets indicate an argument, specifying its type and value range. For instance [0-18] stands for any number between 0 and 18 (inclusive).

Example: "display line1 = 1" sets Line 1 of the display to display #1, which happens to be the totalizer for flow channel 1.

Diagnostics:

id – show model number & software version
echo [on/off] – turn on/off interactive command line:
with echo off, this interface is more amenable to scripting; it still accepts the same commands.
Any command entered without an " = " sign and variable will display the current setting.
Example: Typing "display line1" returns "0" which is the variable for Flow rate.
read flow [1-2] – read the current flow on channel 1 or 2 in GPM.
read flow [1-2] total – read the current total flow on channel 1 or 2 in gallons.

Display Configuration

display line1 = [0-18] – set line 1 of the display
display line2 = [0-18] – set line 2 of the display
valid options are:
0: flow 1 rate
1: flow 1 total
2: flow 2 rate
3: flow 2 total
4: flow 1+2 rate
5: flow 1+2 total
6: flow 1-2 rate
7: flow 1-2 total
8: flow 2-1 rate
9: flow 2-1 total
14: BTU rate
15: BTU total
16: temperature 1&2
17: temperature 1-2

display urate = [0.1-10] – set the update rate of the display, in seconds

Flow Input Channel Configuration

flow [1-2] sensor type = [0-4] – flow sensor type:
0: PulseDI,
1: PulseKFactor,
2: PullupKFactor
3: Analog
flow [1-2] sensor dical k = [x] – DI-type flow sensor k
flow [1-2] sensor dical off = [x] – DI-type flow sensor offset
flow [1-2] sensor kfact = [x] – K factor for non-DI sensors
flow [1-2] sensor analog units = [0-19] – flow units for analog input
flow [1-2] sensor analog range = [0-4] – current range for analog input
flow [1-2] sensor analog high = [x] – flow rate @max current
flow [1-2] sensor analog low = [x] – flow rate @min current
flow [1-2] sensor avg = [0-100] – averaging "time constant," in seconds:
flow [1-2] rate units = [0-19] – flow (channel) rate units to display.
0: GPM
1: gal/s
2: gal/hr
3: Mgal/day
4: L/s
5: LPM
6: L/hr
7: ft3/s
8: ft3/min
9: ft3/hr
10: m3/s
11: m3/min
12: m3/hr
13: acreft/s
14: acreft/min
15: acreft/hr
16: bbl/s
17: bbl/min
18: bbl/hr
19: Custom
flow [1-2] rate ndigits = [2-10] – number of decimal places to show for flow rate
flow [1-2] rate custom label = [string] – set the label for custom units
flow [1-2] rate custom conv = [0-100] – conversion factor for custom units
flow [1-2] total units = [0-7] – set the totalizer units to display
0: gal
1: Mgal
2: L
3: ft3
4: m3
5: acreft
6: bbl
7: Custom

BTU Configuration

BTU rate units = [0-5] – set the BTU rate units:
0: kBTU/hr
1: BTU/min
2: kW
3: TR
4: J/s
5: Custom
BTU rate ndigits = [2-10] – number of decimal digits to display
BTU rate custom label = [string] – BTU rate custom unit label
BTU rate custom conv = [0-100] – custom unit conversion factor
BTU total units = [0-6] – BTU totalizer units:
0: BTU
1: kBTU
2: MBTU
3: kWh
4: MWh
5: kJ
6: Custom
BTU total ndigits = [2-10] – number of decimal digits to display
BTU total custom label = [string] – BTU totalizer custom unit label
BTU total custom conv = [0-100] – custom unit conversion factor
BTU total mode = [0-2] – totalizer mode:
0: Heating
1: Cooling
2: Heating & Cooling
BTU sensor type = [0-4] – temperature sensor type:
0: DI Thermistor
1: DI RTD
2: Custom Thermistor
3: Custom RTD
4: No sensor
BTU sensor correct_k = [0-10] – correction factor
BTU sensor temp_unit = [0-1] – temperature units to display
0: deg F
1: deg C
BTU sensor t2adj = [-10-10] – t2a

Relay Output Configuration

relay [1-5] func = [0-9] – relay function; relay 5 is the pulse output
0: Totalizer
1: Alarm
2: Manual Control
relay [1-5] input = [0-8] – relay input; depends on source
for totalizer:
0: Flow 1 Total
for alarms:
0: Flow 1 Rate
relay [1-5] units = [0-19] – units on setpoints/rates; depends on src/input
flow units: same as 'flow [1-2] rate units' above
volume units: same as 'flow [1-2] total units'
relay [1-5] manual = [on/off] – manually set relay on or off, if in manual mode
relay [1-5] rate = [x] – totalizer rate
relay [1-5] ctime = [0-10000] – pulse width in milliseconds
relay [1-4] latch = [on/off] – turn on/off relay latching
relay [1-4] setpoint = [x]
relay [1-4] releasepoint = [x]

Analog Output Configuration

analogout [1-2] func = [0-3]
0: Flow rate
1: BTU rate
2: Temperature
3: PID control
analogout [1-2] src = [0-4]
for flow rate:
0: Flow 1 rate
1: Flow 2 rate
2: Flow sum
3: Flow 1-2
4: Flow 2-1
for BTU rate: not used
for temperature:
0: Flow rate
1: Temp 2
2: Temp Delta
for PID control:
0: Flow 1 rate
1: Flow 2 rate
analogout [1-2] range – [0-1]
0: 0-20mA
1: 4-20mA
analogout [1-2] low = [x] – value corresponding to 0 (or 4) mA
analogout [1-2] high = [x] – value corresponding to 20mA
analogout [1-2] setpoint = [x] – PID setpoint
analogout [1-2] P = [x] – PID constants
analogout [1-2] I = [x] – PID constants
analogout [1-2] D = [x] – PID constants

RS485 Comm Port Configuration

comm baudrate = [0-7]
- 0: Auto
- 1: 300
- 2: 1200
- 3: 2400
- 4: 9600
- 5: 19200
- 6: 38400
- 7: 76800

comm mstpaddr = [0-127] – BACnet/MSTP address
comm maxmaster = [0-127] – BACnet/MSTP max master address
comm devinst = [x] – BACnet device instance ID
comm mbslaveaddr = [0-255] – Modbus slave address

Modbus

Addr Function

1 Flow 1 rate (GPM)
2 Flow 2 rate
3 Flow 1 Total (gallons)
4 Flow 2 Total
5 BTU Rate (kBTU/hr)
6 BTU Total (kBTU)
7 Batch 1 Count
8 Batch 2 Count
9 Temp 1 (deg F)
10 Temp 2
11 Temp Delta (T2-T1)

Troubleshooting

Trouble Codes

1 Relay 1 totalizer rate exceeded
2 Relay 2 rate exceeded
3 Relay 3 rate exceeded
4 Relay 4 rate exceeded
5 Pulse out rate exceeded
20 Error reading EEPROM on faceplate
21 Error writing EEPROM
22 Analog Input card missing
24 Temperature Input card missing
25 Invalid flow units configured
26 Invalid volume units configured
27 Bad input frequency
29 Internal error calculating flow rate
31 Error reading from analog input AD converter channel 1
32 Error reading from analog input AD converter channel 2
36 Error writing to analog input AD converter channel 1
37 Error writing to analog input AD converter channel 2
50 Error reading I2C address 0 (relays, buttons, and LEDs)
51 Error writing to I2C address 0
52 Error reading I2C address 1 (analog input card control lines)
53 Error writing I2C address 1
54 Error reading I2C address 2 (temperature input card control lines)
55 Error writing I2C address 2
71 Watchdog timer reset occurred
82 Fatal error initializing EEPROM

FLOW SENSOR INPUTS

Type	Threshold	Signal Input	Frequency	Pull-up	Impedance	Aux. Power	Calibration
Pulse-DI	2.5V DC	30V DC	0.4 Hz…10 kHz	1K…12V DC	—	12V DC @30mA	K + Offset
Pulse K-factor	2.5V DC	30V DC	0.4 Hz…10 kHz	—	—	12V DC @30mA	Pulse/Gal
Pull-up K-factor	2.5V DC	30V DC	0.4 Hz…10 kHz	1K…12V DC	—	12V DC @30mA	Pulse/Gal
Analog 4…20mA	10mVPP	50 mA Fused	—	—	100 Ω	12V DC @30mA	Linear
Analog 0…20mA	—	50 mA Fused	—	—	100 Ω	12V DC @30mA	Linear
Analog 0…1V DC	—	30V DC	—	—	100 Ω	12V DC @30mA	Linear
Analog 0…5V DC	—	30V DC	—	—	100 Ω	12V DC @30mA	Linear
Analog 0…10V DC	—	30V DC	—	—	100 Ω	12V DC @30mA	Linear

SPECIFICATIONS

Voltage	12…24V DC/AC (limit: 8…35V DC); (limit: 8…28V AC)		DC current draw (~ 280 mA) AC Power rating (~5 VA)
Operating Temperature	–4…158° F (–20…70° C)		
Storage Temperature	–22…176° F (–30…80° C)		
Weight	Panel Mount: 12 oz		
Pulse and Relays	Both pulse and relay are fully functional as either totalizing or setpoint outputs		
Pulse Electrical	1 Amp at 35V DC/30V AC	**Closed**: 0.5 Ω at 1 Amp; **Open**: $>10^8$ Ω	
Relay Electrical	**Resistive Load**: 5A @ 120V AC/30V DC	**Inductive Load**: 1A @ 120V AC/30V DC	
Pulse/Unit Volume (Totalizer)	**Driving Source:** flow total, BTU total	**Rate:** 1 pulse per 1.0000000…99999999 units	**Contact Time:** 1…9999 mS
Setpoint (Alarm)	**Driving Source:** flow rate, BTU rate, temperature 1, temperature 2, delta T	**Units**: Any predefined or custom unit	**Setpoint**: 1.0000000…999999999
	Delay to Set: 1…9999 sec	**Release Point**: 1.0000000…999999999	**Delay to Release**: 1…9999 sec
Optional Analog Output	**Driving Source**: flow rate, BTU rate, temperature 1, temperature 2, delta T, PID control	**Range**: 4…20 mA; 0…20 mA (isolated current sinking or sourcing)	**Sinking**: 30V DC @ 0 mA max.; 3V @ 20 mA min. **Sourcing**: 600 W max load
USB Communication	Provides complete access to all programming and operation features		**Requirements**: USB 2.0 A to Mini-B, five-pin cable
RS-485 Communication	Supports Modbus and BACnet/MSTP		
Accessories	Programming kit; wall-mount kit		
Temperature Inputs	Two of 2-wire 10k type II thermistor; 25…170° F (–3.9…76.7° C) or custom field-defined		
	3-wire platinum 100Ω RTD; 25…250° F (–3.9…121.1° C) or custom field-defined		
	Unis of Measure: °F and °C	**Energy Rate Units**: kBTU/hr; BTU/min; kW; Tons; J/Sec; and field programmed custom units	**Operating Mode**: T1<T2; T1>T2; absolute; Defines how reverse energy flows are handled (T1 should be installed in the same pipe as the flow sensor)
	Zeroing: Compensate for variances between temperature elements by adjusting T2 reading to match T1 reading.	**Constant**: Single point correction for variances in specific heat of transfer liquid.	**Energy Total units**: kBTU; Mbtu; kWh; MWh; kJ; and field programmed custom units
Units of Measure	Rate	US gpm; US gal/sec; gal/hr; US mgal/day; lps; lpm; lph; ft^3/Sec; ft^3/min; ft^3/hr; m^3/sec; m^3/min; m^3/hr; acre-ft/sec; acre-ft/min; acre-ft/hr; bbl/sec; bbl/min; bbl/hr; and field programmed custom units 0.00…999999999	
	Total	US mgal; liters; ft^3; m^3; acre-ft; bbl; and field programmed custom units 0.00…999999999	

PART NUMBER MATRIX

	Example:	3050	-	x	x
SERIES					
	Btu Monitor	3050			
OPTIONS					
	No Option			0	
	Analog Output, RS485 with BACnet and Modbus, and USB			1	
MOUNTING					
	Panel Mount				0
	Wall Mount				1

Figure 7: Series 3050 BTU flow monitor part number matrix

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