Product Manual

TCS Basys Controls®

SE1000

Utility Meter Pulse Transducer

SUPERTROL™ Communicating Controls

Description

The SE1000 is a microprocessor-based pulse monitoring interface designed to monitor up to four pulse inputs.

Features

- Stand-alone or network operation
- Independently programmable inputst
- 32 character LCD display
- Four pulse inputs

Mounting

The SE1000 is designed for mounting using two #10 sheet metal screws.

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Wiring

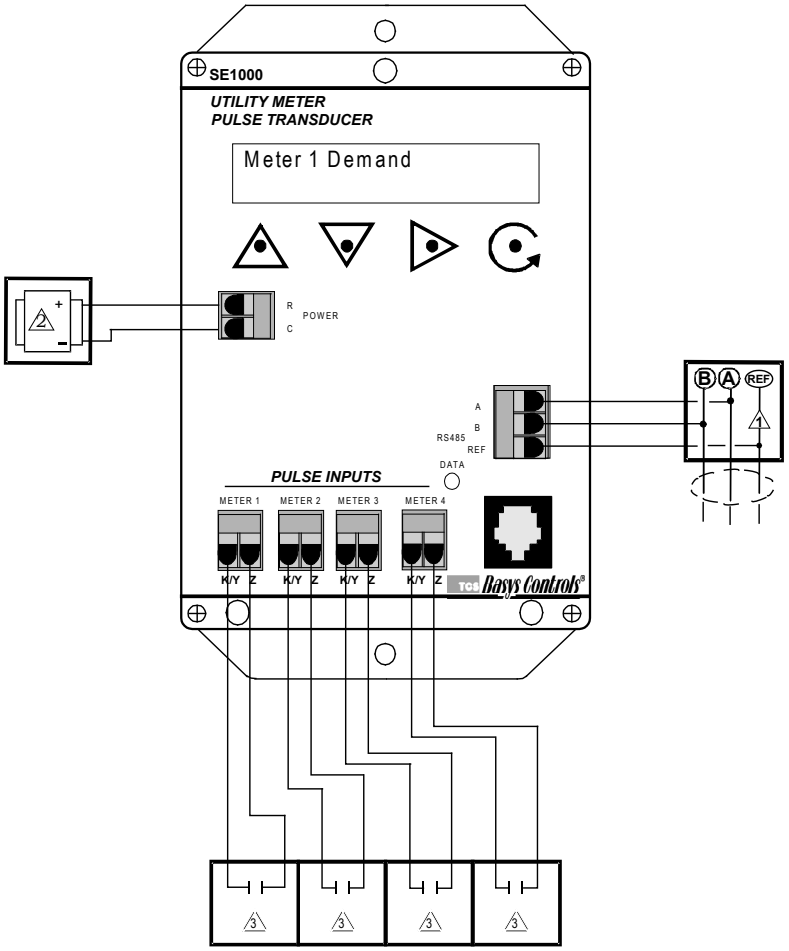
The SE1000 uses terminal designations for wiring. See diagram below.

POWERING THE SE1000

The SE1000 is powered from 24 VAC +/- 20 %.

If wiring for communications, dedicated power must be used to power the SE1000. Several “S” series controllers may be powered from the same transformer, provided that the transformer has sufficient power. (Supertrols require 5 VA @ 24 VAC.)

Caution: Do not connect to 120 VAC. When multiple TCS Basys Controls devices are using a single transformer, the polarity of the power wiring must be maintained because all TCS devices are half-wave rectified and have common return paths.



1. For communication wiring, use twisted, shielded 18 AWG. Must be run separately.
2. 24 VAC transformer. See powering instructions.
3. Pulse input from local utility.

Programming

The SZ1000 may be programmed through the display and keypad, or with a PC.

If programming with a PC, the following must be set through the keypad prior to programming:

• Address (step #2)
• Baud rate (step #3)
For more information on programming through the PC, consult your TCS software manual.

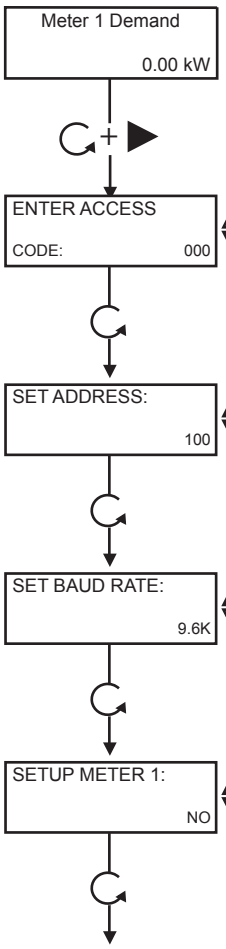
PROGRAMMING THROUGH THE KEYPAD

To access the programming screens, press both the “Scroll” and “Next” keys simultaneously.

Scroll Key - The "Scroll" key is also used to save any changes to the "current" screen and advance to the next screen while programming. The "Scroll" key is used to enter the Programming Mode when pressed with the "Next" key.

Next Key - Used to enter Programming Mode when pressed with the “Scroll” key. Also used to exit programming without saving changes to the current screen.

Increment/Decrement Keys - Used to select the desired value.



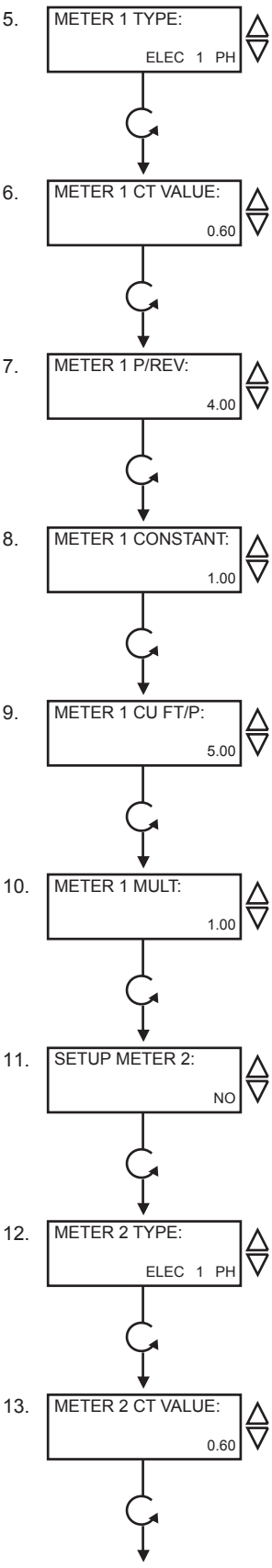
Main Monitoring Screen

Access Code Entry Screen.
Enter the access code. If the wrong access code is entered, the program reverts to the main screen. 248 is the default access code.

Controller Address Screen.
If using a PC to access the SE1000, set a unique address from 0 to 255, excluding 248.

Communication Baud Rate Screen.
Is using a PC to access SE1000, all controllers on a network must be set to the same baud rate. Choose between 2.4K, 4.8K, 9.6K and 19.2K.

Setup Meter 1 Screen.
Select either Yes or No to program Meter input one. If no is selected skip to step 11.



Meter 1 Type Screen.
Select either ELEC 1 PH, BTU, WATER, GAS, ELEC 3 PH. This screen does not show if NO was selected in step 4.

Meter 1 CT Value Screen.
Enter the value for the CT wired to Meter input 1 (this value should be provided on the CT or Energy Meter from the Utility). This screen does not show if NO was selected in step 4 or if BTU, Water or Gas was selected in step 5.

Meter 1 Pulse Per Revoltion Screen.
Enter the value for the Pulses per revoltion for meter input 1, (this value should be provided on the CT or Energy Meter from the Utility). This screen does not show if NO was selected in step 4.

Meter 1 Constant Screen.
Enter the value for the constant for meter input 1 (this value is provided from utility company). This screen does not show if NO was selected in step 4.

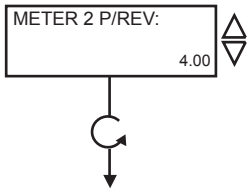
Meter 1 Cubic Feet Per Pulse Screen.
Enter the value for Cubic Feet per pulse. This only applies to **Water**, **GAS** and **BTU** (this value is provided from utility company). This screen does not show if NO was selected in step 4.

Meter 1 Multiplier Screen.
Enter the multiplier for meter input 1 (this value is provided from utility company). This screen does not show if NO was selected in step 4.

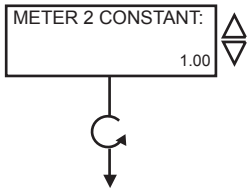
Meter 2 Setup Screen.
Select either Yes or No to program Meter input two. If no is selected skip to step 18.

Meter 2 Type Screen.
Select either ELEC 1 PH, BTU, WATER, GAS, ELEC 3 PH. This screen does not show if NO was selected in step 11.

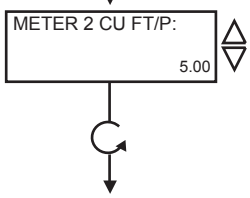
Meter 2 CT Value Screen.
Enter the value for the CT wired to Meter input 2 (this value should be provided on the CT or Energy Meter from the Utility). This screen does not show if NO was selected in step 11 or if BTU, Water or Gas was selected in step 12.

14. 

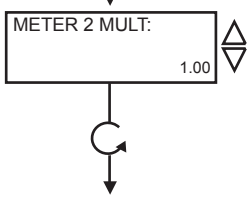
Meter 2 Pulse Per Revoltion Screen. Enter the value for the Pulses per revoltion for meter input 2 (this value should be provided on the CT or Energy Meter from the Utility). This screen does not show if NO was selected in step 11.

15. 

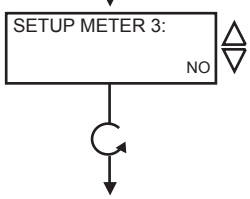
Meter 2 Constant Value Screen. Enter the value for the constant for meter input 2 (this value is provided from utility company). This screen does not show if NO was selected in step 11.

16. 

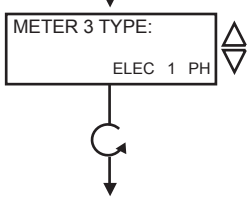
Meter 2 Cubic Feet Per Pulse Screen. Enter the value for Cubic Feet per pulse. This only applies to **Water**, **GAS** and **BTU** (this value is provided from utility company). This screen does not show if NO was selected in step 11.

17. 

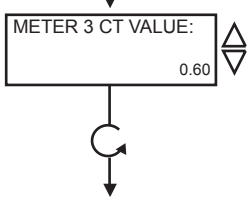
Meter 2 Multiplier Screen. Enter the multiplier for meter input 2 (this value is provided from utility company). This screen does not show if NO was selected in step 11.

18. 

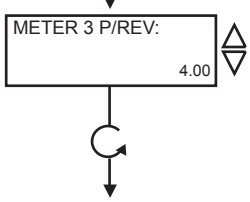
Meter 3 Setup Screen. Select either Yes or No to program Meter input two. If no is selected skip to step 25.

19. 

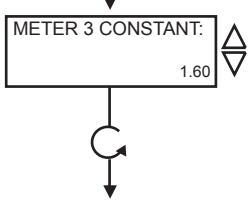
Meter 3 Type Screen. Select either ELEC 1 PH, BTU, WATER, GAS, ELEC 3 PH. This screen does not show if NO was selected in step 18.

20. 

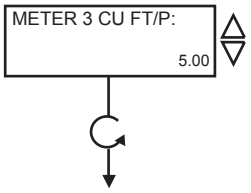
Meter 3 CT Value Screen. Enter the value for the CT wired to Meter input 3 (this value should be provided on the CT or Energy Meter from the Utility). This screen does not show if NO was selected in step 18 or if BTU, Water or Gas was selected in step 19.

21. 

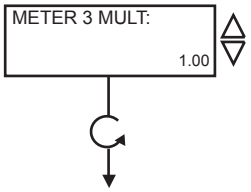
Meter 3 Pulse Per Revoltion Screen. Enter the value for the Pulses per revoltion for meter input 3 (this value should be provided on the CT or Energy Meter from the Utility). This screen does not show if NO was selected in step 18.

22. 

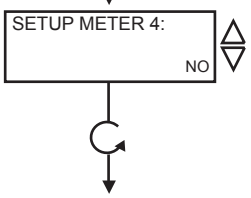
Meter 3 Constant Value Screen. Enter the value for the constant for meter input 3 (this value is provided from utility company). This screen does not show if NO was selected in step 18.

23. 

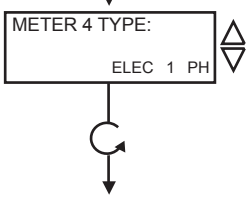
Meter 3 Cubic Feet Per Pulse Screen. Enter the value for Cubic Feet per pulse. This only applies to Water, GAS and BTU (this value is provided from utility company). This screen does not show if NO was selected in step 18.

24. 

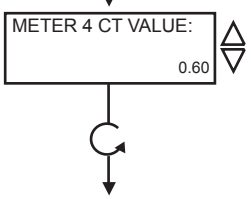
Meter 3 Multiplier Screen. Enter the multiplier for meter input 3 (this value is provided from utility company). This screen does not show if NO was selected in step 18.

25. 

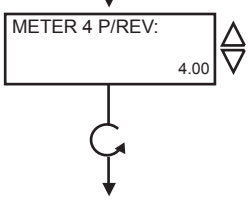
Meter 4 Setup Screen. Select either Yes or No to program Meter input two. If no is selected skip to step 32.

26. 

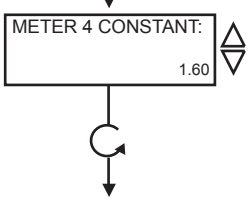
Meter 4 Type Screen. Select either ELEC 1 PH, BTU, WATER, GAS, ELEC 3 PH. This screen does not show if NO was selected in step 25.

27. 

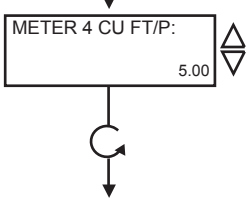
Meter 4 CT Value Screen. Enter the value for the CT wired to Meter input 4 (this value should be provided on the CT or Energy Meter from the Utility). This screen does not show if NO was selected in step 25 or if BTU, Water or Gas was selected in step 26.

28. 

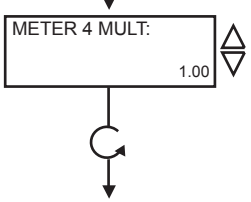
Meter 4 Pulse Per Revoltion Screen. Enter the value for the Pulses per revoltion for meter input 4 (this value should be provided on the CT or Energy Meter from the Utility). This screen does not show if NO was selected in step 25.

29. 

Meter 4 Constant Value Screen. Enter the value for the constant for meter input 4 (this value is provided from utility company). This screen does not show if NO was selected in step 25.

30. 

Meter 4 Cubic Feet Per Pulse Screen. Enter the value for Cubic Feet per pulse. This only applies to **Water**, **GAS** and **BTU** (this value is provided from utility company). This screen does not show if NO was selected in step 25.

31. 

Meter 4 Multiplier Screen. Enter the multiplier for meter input 4 (this value is provided from utility company). This screen does not show if NO was selected in step 25.

32. SET ACCESS CODE: 248

Access Code Screen.
Enter an access code (0 to 255) that will be used to enter the programming mode. The default is 248.

33. Meter 1 Demand 0.00 kW

Main Monitoring Screen.

Operation

METER INPUTS

There are four meter inputs available. Each one is setup for a dry contact and cannot be changed. Each input (Meter 1, Meter 2, Meter 3 & Meter 4) can be configured to accept signals representing electrical, BTU, water or gas usage. The required parameters will be provided by either the utility company involved or on the current transducer (CT) used to generate the pulse signal.

METER TYPES

The SE1000 supports various meter types. Selecting a meter type changes the default values as they are used to calculate meter consumption and demand for that particular meter. For each of the four SE1000 meter inputs, there are five selectable options:

ELEC 1 PH: Electric single phase meter.

ELEC 3 PH: Electric three phase meter.

GAS: Gas meter.

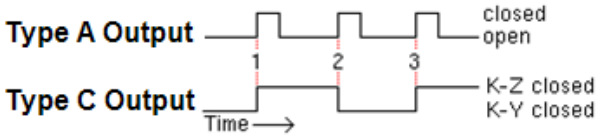
WATER: Water meter

BTU: BTU meter

Utility pulse meters can be one of two different types, depending on whether they count the leading and trailing edges of the pulse or only the leading edge of the pulse as a single count. A pulse output can be either a mechanical relay or solid state device. The pulse output corresponds to a unit/time of a monitored quantity. The amount of time between states of a pulse output corresponds to the meter demand and the number of pulses is proportional to the meter's consumption.

Below is a diagram depicting two types of utility meter pulse outputs. Meter Type A counts only the leading edge as a single pulse and the trailing edge is ignored. Meter Type C is known as a true KYZ meter and counts both the leading and trailing edges as a pulse, effectively doubling the number of pulses as seen by Meter Type A. The SE1000 measures Type A output only; however, KYZ functionality can be mimicked by using a "Meter Multiplier" value of 2.

In the following picture, both Type A and C are shown. Three pulses are shown, labeled 1, 2, and 3. Notice how the Type A output closes and opens for each pulse, where the Type C output simply changes state.



If you have a Type C device (3 terminals KYZ), you will need to double the multiplier. The SE1000 only counts the contact closures for the K and Z terminals. Doubling the multiplier will correct this problem.

PROGRAMMING THE METER CONSTANTS:

CT Value: The value of the CT wired to the meter. This value is usually provided on the CT or on the utility output meter. This value is only used for and electric meter.

P/REV: The Pulses per revolution for the meter. This value is usually provided from the utility company.

CONSTANT: The value of the constant for the meter is usually provided from the utility company and many times is located on the electric or gas bill.

CU FT/P: The value for Cubic Feet per pulse. This only applies to Water, GAS and BTU, and is usually found on the utility meter itself.

MULT: The multiplier for the meter can be used to scale the meter output or correct for KYZ meter. The multiplier is used to convert the pulses to engineering unit data. For example, if your meter provides one pulse per 0.01KWH, then a constant of 0.01 is required.

MULTIPLIER:

Each model of power meter is different and has a different multiplier. For example, if the meter is a Type A and reports 1/10 kWh per pulse, set the input multiplier to 0.1. If the meter is a Type C and reports 1/10 kWh per pulse, set the input multiplier to 0.2.

You must obtain the correct pulse multiplier from the meter manufacturer prior to configuring the SE1000.

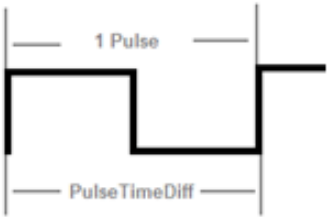
Some power meters have an option to configure the multiplier. Options often include 1, 0.1, 0.01, kWh per pulse. The best method to configure the pulse is to select the smallest multiplier available, considering the maximum load and pulse rate. To calculate the pulse rate, use the following formula:

$$\frac{\text{Pulses}}{\text{Second}} = \text{KW} * 3600 * \text{multiplier}$$

In general, the SE1000 calculates electric meter consumption and demand as follows:

$$\text{Demand} = \frac{((\text{CTValue}*\text{MtrConst}*\text{MtrMult}))}{(\text{PPRValue}*\text{PulseTimeDiff})}$$

$$\text{Consumption} = \frac{((\text{PulseCount}*\text{CTValue}*\text{MtrConst}*\text{MtrMult}))}{\text{PPRValue}}$$



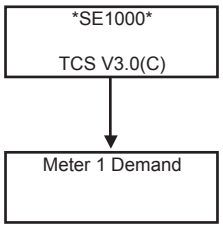
The above diagram depicts how a single pulse and the pulse time difference are represented on a pulse waveform input into the SE1000.

Checkout & Troubleshooting

CHECKOUT

You may verify the status of each meter input by pressing the "Scroll" key and then using the "Increment" and "Decrement" keys to cycle through the various screens.

1. Verify all wiring prior to powering the controller.
2. Turn power on. The controller will display a momentary screen with the model and version number, and then the main monitoring screen.



3. Take note of the current readings for all meters. Since the SE1000 is used only for monitoring, and if the readings appear to be correct, you are done.
4. If a value does not appear to be correct, scroll through the meters to view the desired input and verify that a value (other than 0) is being shown.
5. Go back into programming mode and adjust various parameters as required to make the value appear correctly.

6 If a value shown as 0, the SE1000 is not retrieving a pulse signal. Verify the pulse signal is being generated at the meter or CT and check the input wiring.

TROUBLESHOOTING

No Display

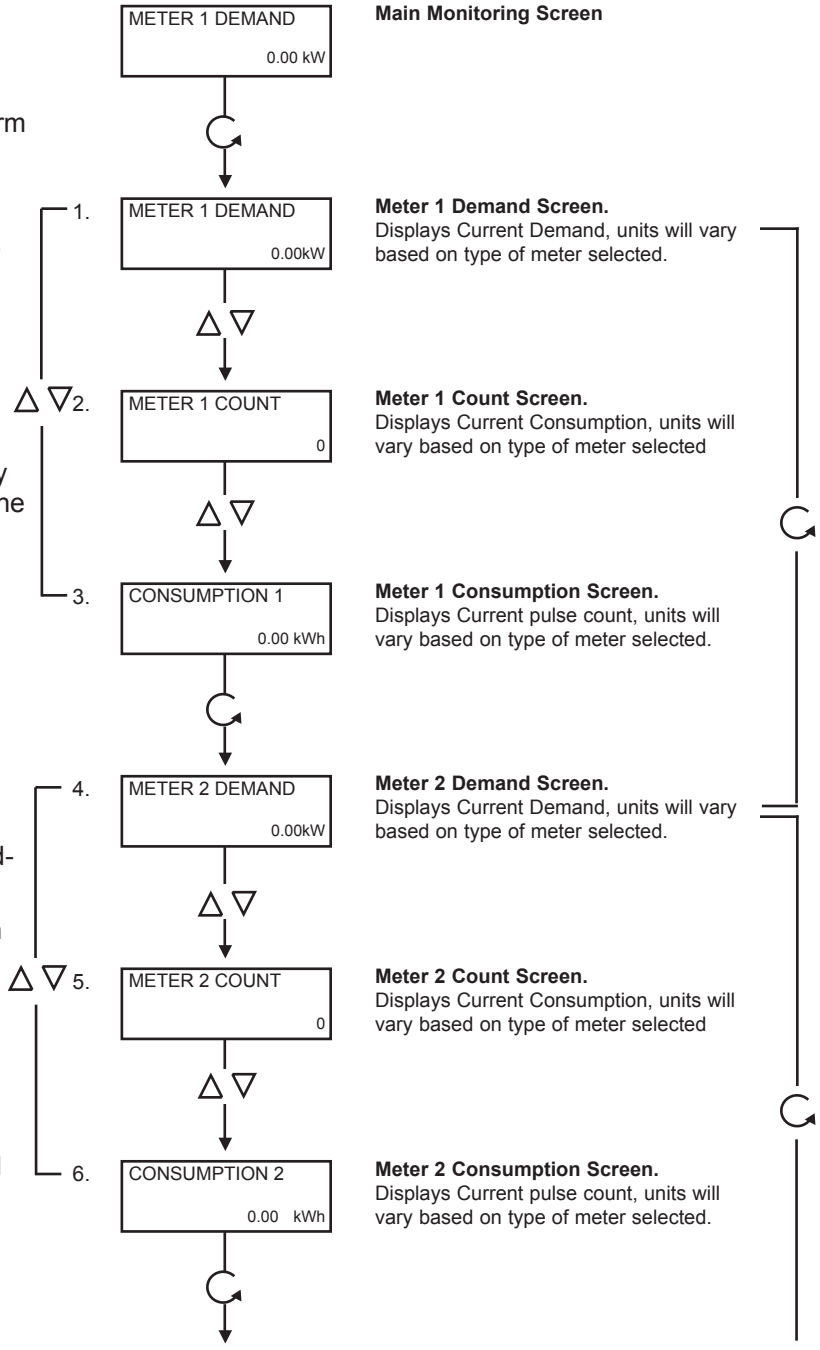
Check for 24 VAC on terminals “R” and “C”.

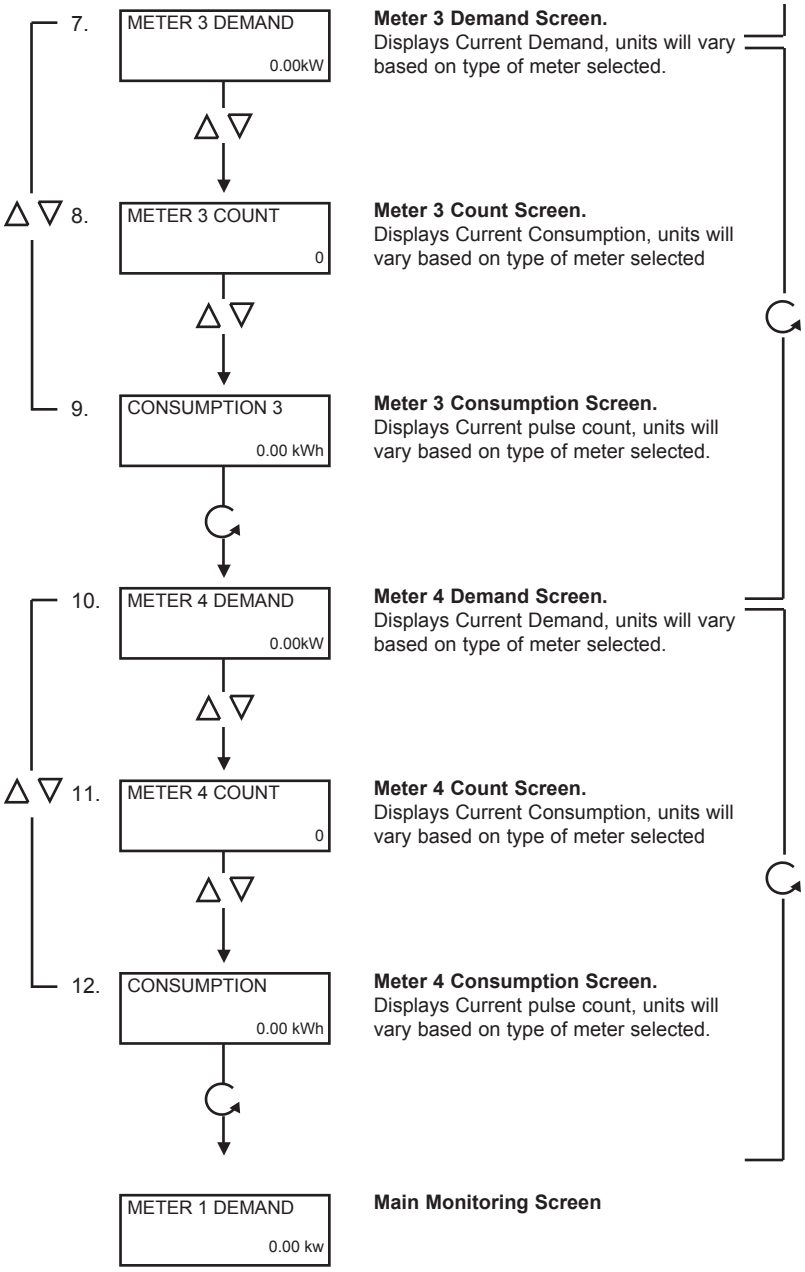
Incorrect Monitoring Value Displayed

If any of the meter inputs are showing incorrect values, verify the programming parameters for that meter. If any of the meter inputs are showing 0, verify the pulse signal is working. See checkout for details.

MONITORING SCREENS

Continually pressing the scroll button or next button and the increment/decrement button allow more extensive monitoring. The screens are shown below.





LED Description

PROGRAM/DATA

This LED will be lit when the controller is within the programming setup menus. It will blink when the unit is being accessed by a PC.