SYSTEM-20

BTU METER
INSTALLATION AND OPERATION GUIDE

ONICON
Flow and Energy Measurement

c UL US LISTED

For Software Version 0.1.15 and Higher

DOC-0003557 Rev.F

SAFETY INFORMATION

This meter was calibrated at the factory before shipment. To ensure correct use of the meter, please read this manual thoroughly. Regarding this Manual:

- This manual should be passed on to the end user.
- Before use, read this manual thoroughly to comprehend its contents.
- The contents of this manual may be changed without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without ONICON's written permission.
- ONICON makes no warranty of any kind with regard to this material, including, but not limited to, implied warranties of merchantability and suitability for a particular purpose.
- All reasonable effort has been made to ensure the accuracy of the contents of this manual. However, if any errors are found, please inform ONICON.
- ONICON assumes no responsibilities for this product except as stated in the warranty.
- If the customer or any third party is harmed by the use of this product, ONICON assumes no responsibility for any such harm owing to any defects in the product which were not predictable, or for any indirect damages.

SAFETY PRECAUTIONS:

The following general safety precautions must be observed during all phases of installation, operation, service, and repair of this product. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. ONICON Incorporated assumes no liability for the customer's failure to comply with these requirements. If this product is used in a manner not specified in this manual, the protection provided by this product may be impaired. The following messages are used in this manual:

WARNING (1)

Messages identified as "Warning" contain information regarding the personal safety of individuals involved in the installation, operation or service of this product.

CAUTION (2)

Messages identified as "Caution" contain information regarding potential damage to the product or other ancillary products.

IMPORTANT NOTE (3)

Messages identified as "Important Note" contain information critical to the proper operation of the product.

See pages A-4 through A-6 for French Translations of all WARNINGS, CAUTIONS and IMPORTANT NOTES.

IMPORTANT NOTES.

Voir page A-4 par A-6 pour les traductions en français de tous les AVERTISSEMENTS, MISES EN GARDE ET REMARQUES IMPORTANTES.

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SECTION 1.0 INTRODUCTION

1.1 PURPOSE OF THIS GUIDE

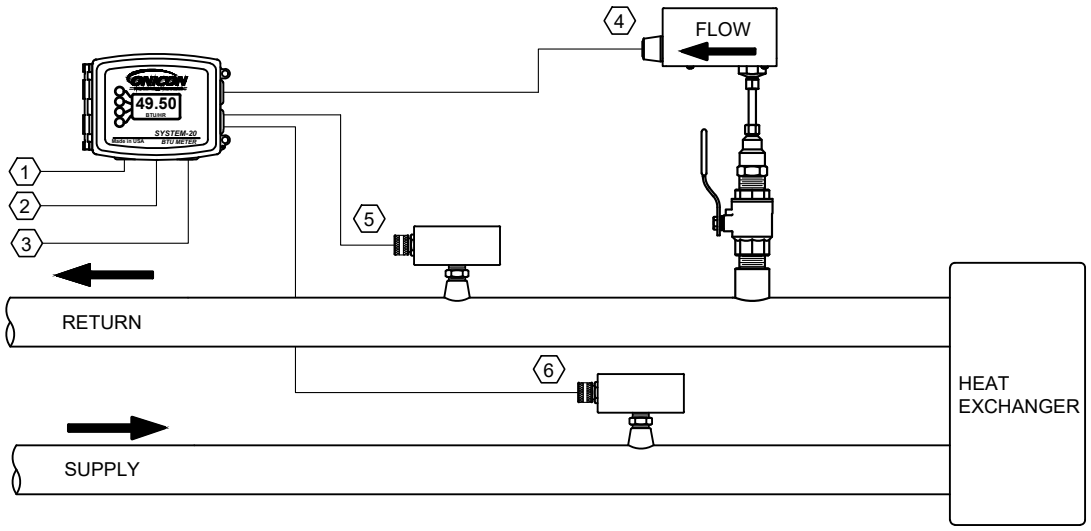
The purpose of this guide is to provide installation and commissioning procedures, and basic operating and servicing instructions for the ONICON SYSTEM-20 BTU Meter.

WARNING (4)

Only qualified service personnel should attempt to install or service this product. Serious injury may result from the improper installation or use of this product.

1.2 TYPICAL SYSTEM-20 BTU METER

ONICON's System-20 is a true heat (Btu) computer, which accepts data from several sensors, performs a series of computations with that data, and displays and/or transmits the results as an indication of the amount of heat (Btus) being transferred per unit time or as a totalized amount.



1. Class II Input Power 20-28 AC/DC, 50/60 Hz
2. Input and Output Signals - Three (3) pulse iinputs, three (3) pulse outputs, one (1) analog output
3. RS485 BACnet or MODBUS
4. ONICON Water Flow Meter (ordered separately)
5. Return Temperature Sensor
6. Supply Temperature Sensor

1.3 STANDARD FEATURES AND SPECIFICATIONS

- Single mode Btu calculations, in either the heating or cooling mode, are totalized, and displayed.
- Two-pipe dual mode Btu calculations in both the heating mode and the cooling modes, are totalized and displayed.
- A single isolated RS485 serial interface is provided for BACnet® MS/TP or MODBUS® RTU.
- Three field configurable pulse outputs may be used for totalization, alarm indication and mode status.
- Three auxiliary pulse inputs may be used to totalize data from external devices. This data may also be transmitted via the network interface and viewed on the local display.
- A single field configurable isolated analog output is provided for energy rate, flow rate or temperature.

1.4 ADDITIONAL REQUIRED HARDWARE

The System-20 must be connected to a suitable volumetric flow meter and a matched pair of temperature sensors in order to calculate and report heat data. Please refer to ONICON's flow meter literature, or contact ONICON for help in selecting the flow meter that will best fit your requirements.

Flow Meter Model	Line Sizes	Straight Run Required	Notes
F-1100 Single Turbine Insertion Flow Meter	1 ¼" and larger	25	Can be used in 1" copper lines
F-1200 Dual Turbine Insertion Flow Meter	2 ½" and larger	15	
F-11XX Inline Turbine Flow Meter	¾" and 1"	25	
F-3500 Insertion Electromagnetic Flow Meter	1 ¼" and larger	See manual	
FT-3100 and F-3200 Inline Electromagnetic Flow Meters	¼" and larger	5	
F-4300 Clamp-on Ultrasonic Flow Meter	2" and larger	See manual	
F-4600 Inline Ultrasonic Flow Meter	½" - 2 ½"	See manual	

Temperature/Sensors

ONICON Standard Temperature Sensors (32°F – 200° F)

Pair of solid state temperature sensors with 0 – 20 mA outputs. Suitable for use with fluid temperatures up to 200° F.

Platinum RTD Temperature Sensors (32°F – 250° F)

Pair of 4-wire 1000 Ω Platinum RTD temperature sensors. Suitable for use with fluid temperatures up to 250° F.

Please refer to ONICON's System-20 product literature, or contact ONICON for help in selecting the temperature sensors and thermowells that will best fit your requirements.

1.5 WORKING ENVIRONMENT

The System-20 was designed for installation and use in typical domestic and commercial environments that are free of corrosive liquids and fumes, direct liquid exposure, temperature extremes and vibrations.

The operating ambient air temperature range is -13°F to 140° F. The electrical power should be relatively clean, free of high frequency noise, large voltage transients, and protected from power surges and brown outs.

CAUTION (5)

The System-20 battery cannot be retrofitted or replaced. Risk of fire explosion, and burns. DO NOT recharge, disassemble, crush, heat above 212°F (100°C) or incinerate. Please check your local ordinances for information concerning battery disposal.

IMPORTANT NOTE (6)

The System-20 may be installed outdoors in protected spaces away from direct sunlight, rain, sleet or snow.

1.6 SERIAL NUMBER

The serial number of your System-20 is located on the top and inside the enclosure. The serial number is a unique identifier for the product. Please have this number available when contacting ONICON for assistance.

SECTION 2.0 UNPACKING

The System-20 is generally shipped in one package unless optional hardware or equipment is ordered. (Thermowells may have been shipped in advance.)

2.1 CHECKING THAT YOU HAVE RECEIVED EVERYTHING

Please notify ONICON immediately if any of these items are missing.

Standard Documentation Includes:
The System-20 BTU Meter Installation and Operation Guide
The System-20 Certificate of Calibration

The System-20
Remove the System-20 from the shipping carton and inspect it for physical damage. Notify the freight carrier and ONICON immediately if any items are damaged in transit. Save all packaging.

Btu meters ordered with a flow meter and temperature sensors will be delivered configured and programmed for use together as a system. The System-20 and the temperature sensor serial numbers will match. The flow meter serial number will be shown on the certificate of calibration and on the System-20 display.

Temperature Sensors
If ordered, temperature sensors will generally be packed in the same carton with the System-20. Inspect the sensors and cables for damage. Each sensor will have a label attached with a serial number.

Flow Meter
If ordered, the flow meter will be packaged in a separate carton. The flow meter ordered with this Btu meter came complete with an instruction manual. Please refer to it for detailed information regarding its installation, commissioning, and operation.

Flow Meter & Temperature Sensor Installation Hardware
Installation hardware is ordered separately from the System-20, temperature sensors and flow meter. Note that this hardware is frequently shipped in advance of the meter(s).

SECTION 3.0 INSTALLATION

The System-20 BTU Meter should be installed by personnel with related knowledge and experience in the heating, cooling, and fluid metering fields. ONICON is available to assist with technical recommendations and to provide guidance by telephone and/or e-mail during the installation and commissioning process. On-site field engineering, installation, and service are also available at an additional cost. The installer should use good trade practices and must adhere to all state and local building codes.

Before you begin, clean the external surfaces of all pipes at the installation sites so that they are free of debris, foreign matter, solids, leak inhibitors, and chemically aggressive substances. Flush the entire system so that it is free of flux, solder, pipe and tube cuttings and any other debris.

3.1 SITE SELECTION

Careful attention to the site selection for the system components will help ensure an accurate energy measurement, help the installers with the initial installation, reduce start-up problems, and make future maintenance easier. For example, do not install the flow meter where it will be difficult for personnel to perform periodic maintenance. When selecting a site for mounting the components, refer to Section 1.5: WORKING ENVIRONMENT, as well as the following:

IMPORTANT NOTE (7)

Proper site selection is critical to the performance of this Btu meter. Both the flow sensor and the temperature sensors must be properly located within the piping system in order to ensure an accurate energy measurement.

The System-20
Find an easily accessible location where field wiring connections can be made and meter readings can be taken from floor level. Mount the enclosure on a vibration free surface. Avoid locations such as the plenum of a fan coil, heat exchanger or any housing that may contain electric motors or other strong sources of electrical interference.

The Flow Meter
When properly installed, the flow meter will only measure flow associated with that portion of the piping system for which the energy measurement is being made. The flow meter may be installed in either the supply or return line. Choose the location with the longest straight run of unobstructed pipe. Please refer to the flow meter installation manual for specific information regarding the straight run requirements for the flow meter.

The Temperature Sensors
The two temperature sensors must be located so they accurately measure only the temperature of the supply line entering and the return line leaving the portion of the piping system for which the energy measurement is being made.

If possible, find an easily accessible location where field wiring connections can be made from floor level. This will facilitate future service. Place the temperature sensors away from strong sources of electrical noise that might affect the performance of the sensors.

One temperature sensor thermowell will need to be placed in the same pipe with the flow meter. It must be located at least five pipe diameters downstream of the flow meter leaving enough clearance to remove either sensor from the pipe without interference from the other sensor.

3.2 MECHANICAL INSTALLATION

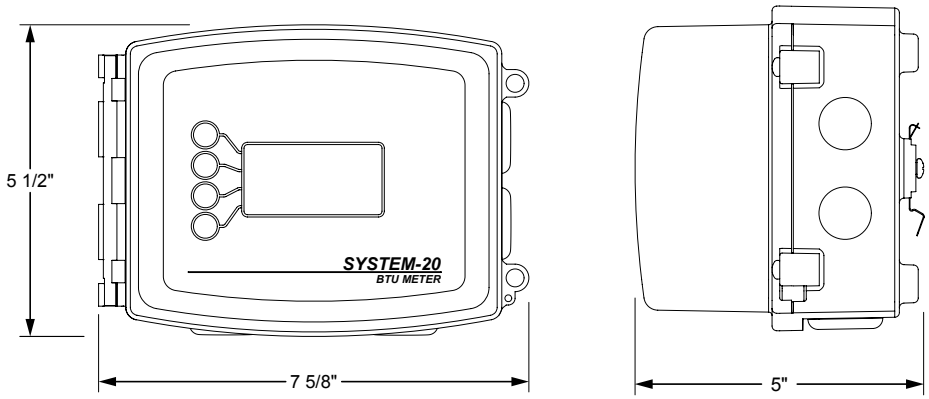
IMPORTANT NOTE (8)

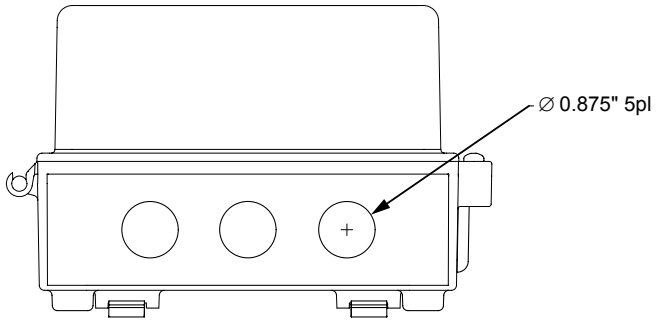
The components of the ONICON System-20 BTU Measurement System must be configured, programmed and installed together as a system. Mixing components from different systems may result in significant measurement errors.

Find an easily accessible location where electrical connections can be made and meter readings can be taken from the floor level.

Mount the Btu meter on a vibration-free surface. Avoid sites such as the plenum of a fan coil, heat exchanger, or other housings containing motors.

The meter must be installed in protected spaces away from direct sunlight, rain, sleet or snow.





CAUTION (9)

DO NOT drill holes in the enclosure. Use only the openings that are provided.

IMPORTANT NOTE (10)

Bonding between conduit connections is not automatic and shall be provided as part of the installation.

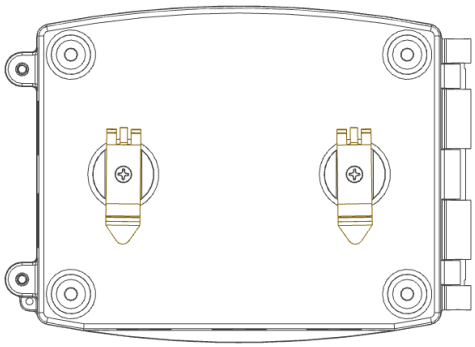
3.2.1 Mounting the Enclosure

Use four screws for mounting the Btu meter. The mounting surface must be structurally sound and capable of withstanding a minimum weight of 40 lbs (18 kg).

Use the following screws for mounting.

- Four Machine screws - #10-24 X 1.5”
- Four Wood screws - No. 10 X 1.5”
- Four Concrete screws - 3/16” X 1.5” with ¼" maximum hex, Phillips or slot heads

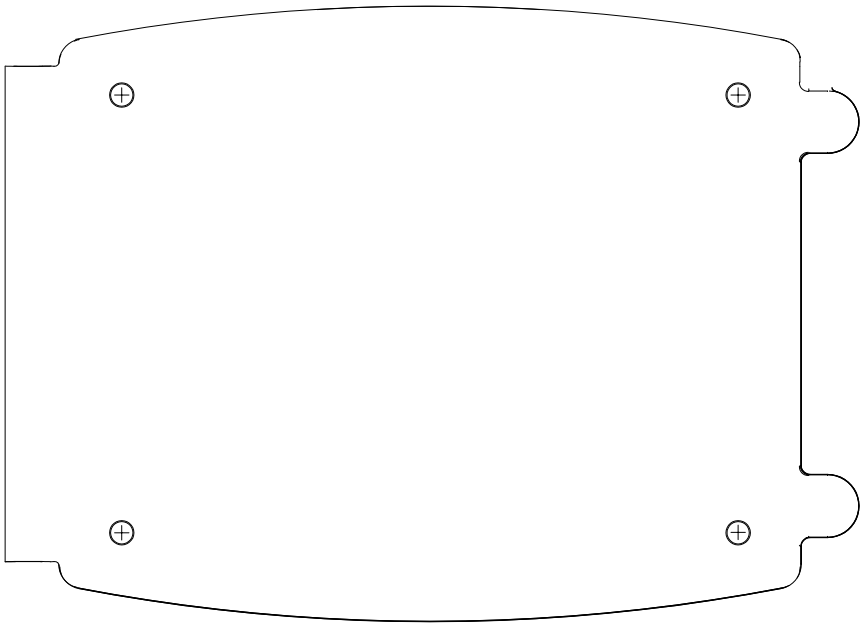
Four mounting holes have been provided in the base of the enclosure shown below. Push out the rubber seals by inserting the mounting screws. Use the drilling template provided in Appendix 5 of this manual to drill the 4 holes required to mount the enclosure.



A DIN rail mounting hardware kit has been provided with this meter. Mount the DIN rail clips as shown.

CAUTION (11)

DO NOT USE THE ENCLOSURE AS A TEMPLATE FOR DRILLING HOLES. Do not drill holes in the enclosure. Use only the openings that are provided.



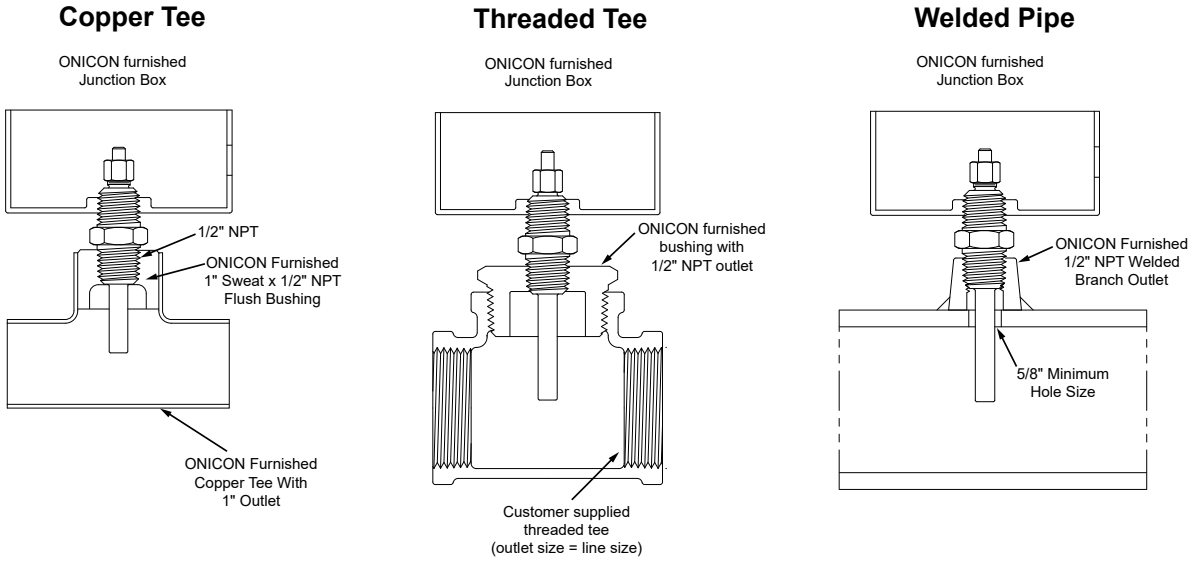
3.2.2 Thermowell Installation

IMPORTANT NOTE (12)

It is important that no dirt or other foreign material be allowed into the thermowells as this could affect the thermal response of the system.

3.2.2.1 Standard Thermowells

Standard thermowells are for new construction or scheduled shutdown. The most common installation methods are shown below. Refer to Appendix A-6 for thermal insulator installations. Consult ONICON for special applications.



NOTES: 1. Thermowell length varies with pipe size.
2. Use no additional bushings to ensure that tip of thermowell is inserted into flow stream.

3.2.2.2 Hot Tap Thermowells

Hot tap thermowells are designed for retrofit applications where it is not practical to isolate and drain the pipe section prior to installation. The thermowell is installed through a 1" full port ball valve as shown in the drawing on next page. A wet tap drilling machine equipped with a ⅞" drill is required to perform this type of installation.

Install the valve assembly as shown in the drawing on the next page and then drill the ⅞" hole using the wet tap drilling machine. Once the valve assembly has been installed and the hole has been drilled, the thermowell can be inserted into the flow stream without a system shutdown.

WARNING (13)

SYSTEM MAY BE UNDER HIGH PRESSURE. ***Hold the conduit box firmly by hand before slowly loosening the position clamping nut when installing, adjusting or removing the thermowell. Failure to do this will allow the pressure to suddenly and rapidly force the thermowell from the pipe, potentially causing serious injury. The thermowell could also be damaged or break apart causing a break in the water seal resulting in the loss of large amounts of water.***

Insertion of the Hot Tap Thermowell

1. Calculate the insertion force (lbs) required by multiplying the system pressure (psig) by 0.11. The person inserting the thermowell should ensure adequate footing for the force required prior to opening the valve.

2. After applying thread seal tape, thread the hot tap adapter into the valve. Firmly grasp the wiring enclosure, loosen the position clamping nut, open the valve, and carefully push the thermowell into the flow stream. Use the attached gauge to set the insertion depth.

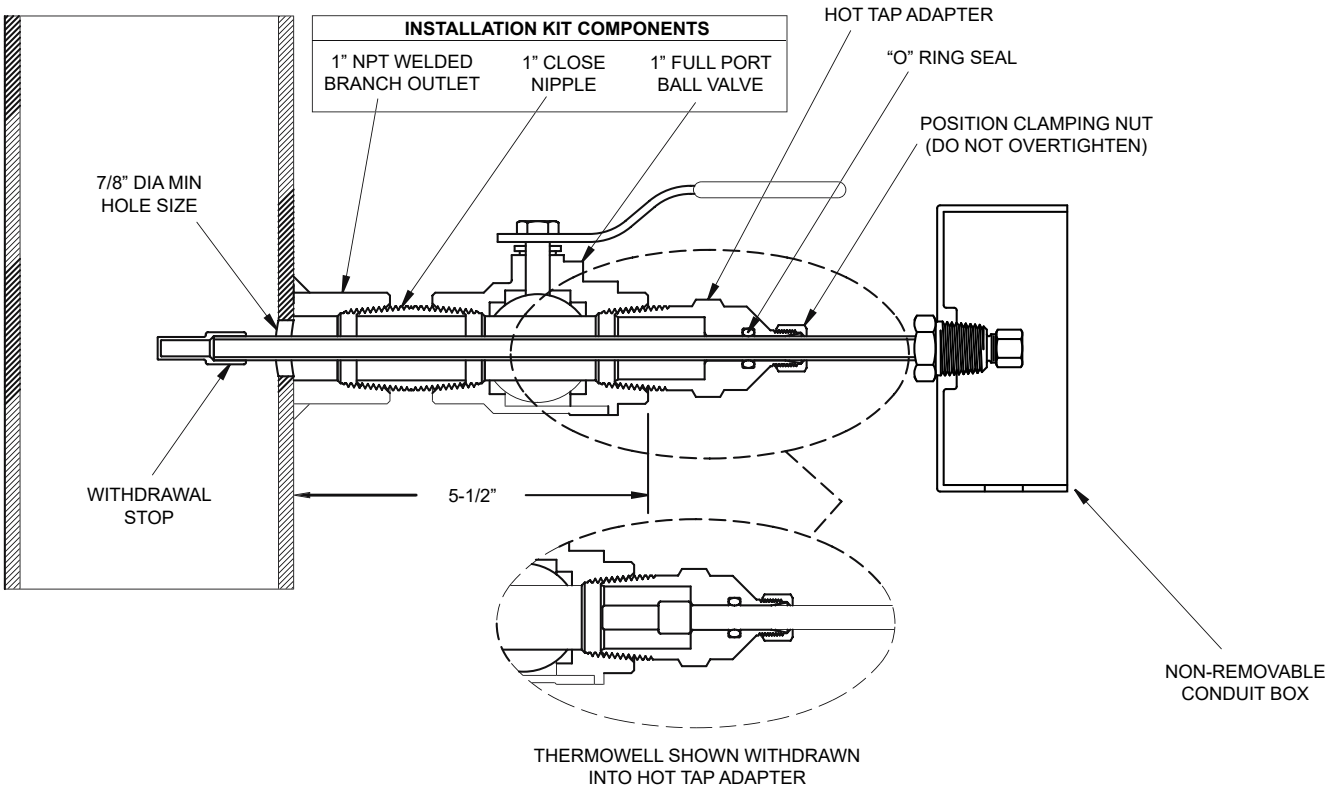
CAUTION (14)

Excessive vibration can damage the thermowell. Insert the thermowell to the proper depth using gauge supplied as shown. Reduce the insertion depth as necessary if strong vibrations are felt during insertion, making certain that the tip of the thermowell remains fully in the flow stream.

Carefully tighten the position clamping nut that is located at the top of the 1" NPT hot tap adapter fitting. Do not release the wiring enclosure until the position clamping nut has been tightened.

CAUTION *(15)*

DO NOT OVER TIGHTEN THE POSITION CLAMPING NUT. If fluid leaks, do not attempt to correct by tightening this nut further. An internal o-ring seals the fluid. Contact ONICON for assistance in the event of a leak.



Removal of the Hot Tap Thermowell

WARNING (16)

Maintain a firm hold on the wiring enclosure until the thermowell is completely withdrawn and the valve is closed.

1. System pressure will try to push the thermowell out of the flow stream when the clamping nut is released. Be sure to establish safe footing prior to loosening the clamping nut. The force pushing out against the thermowell is the same as the insertion force.
2. Grasp the wiring enclosure firmly, holding the thermowell in the pipe and then loosen the position clamping nut. Slowly withdraw the thermowell from the pipe.
3. After the thermowell is completely withdrawn, carefully close the isolation valve.

IMPORTANT NOTE (17)

Rotating the thermowell as you slowly withdraw it through the valve will ensure that the lower tip is fully withdrawn and completely free of the valve. If resistance is felt when closing the valve, open valve fully and rotate the well as you pull it further out of the pipe.

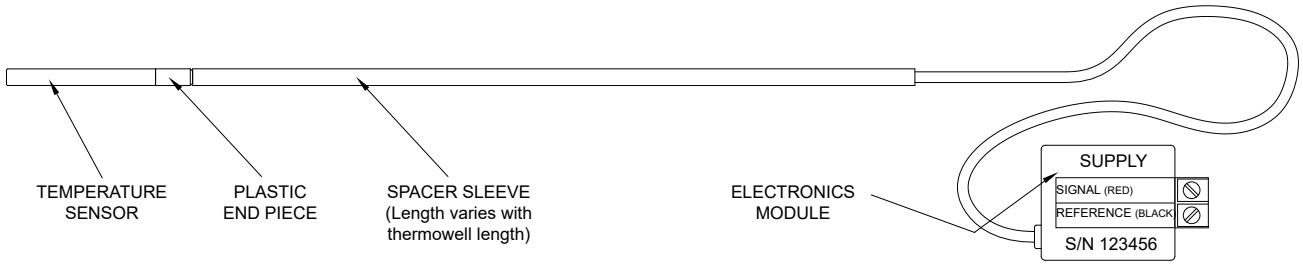
3.2.3 Temperature Sensor Installation

When ordered with the System-20, temperature sensors are factory matched and tagged by serial number to a specific Btu meter. ONICON standard temperature sensors are also designated and labeled as the SUPPLY or RETURN sensor and must be installed per these labels.

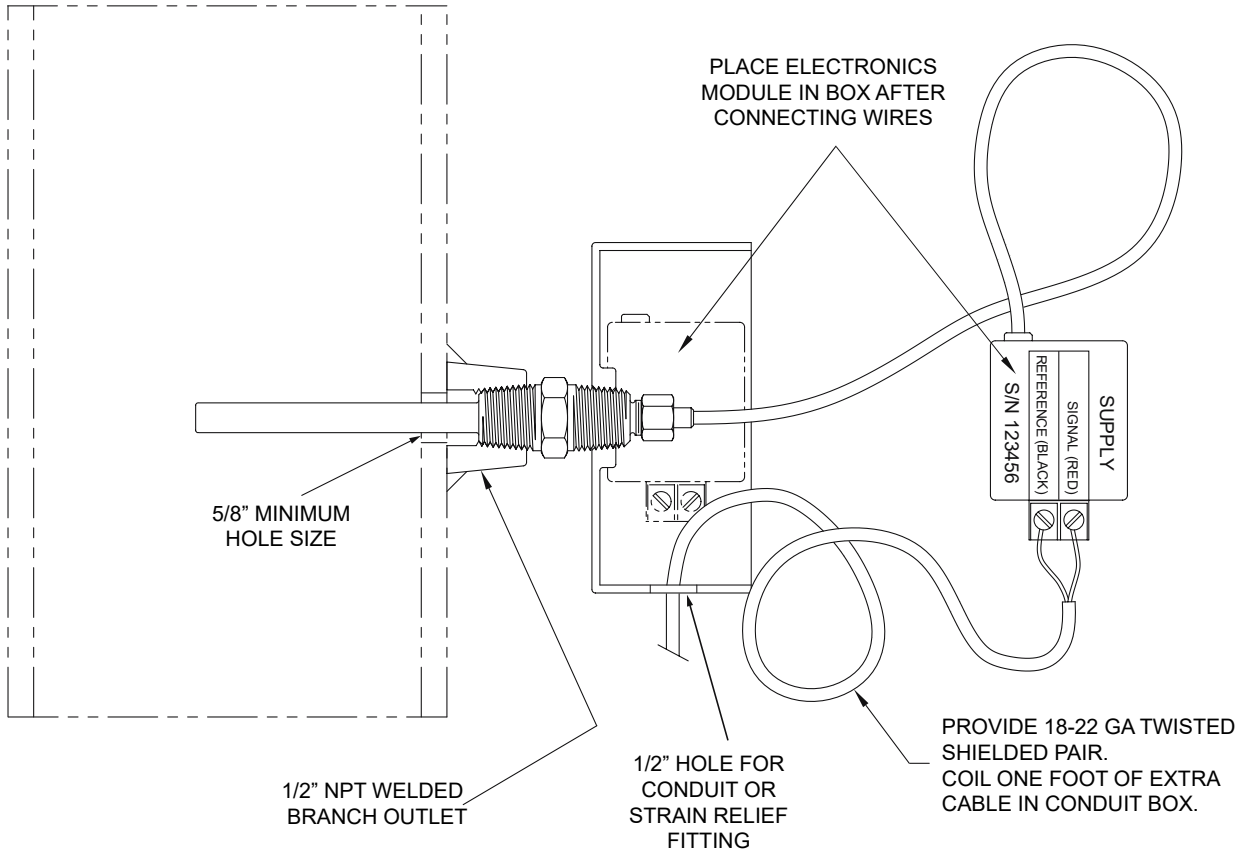
3.2.3.1 ONICON Standard Temperature Sensor Installation

ONICON standard temperature sensors must be used as a pair to maintain differential accuracy. They are also designated and labeled as the SUPPLY or RETURN sensor and must be installed accordingly. To install, apply a thin coat of thermal compound to the sensor tip area and insert it all the way into the thermowell until it contacts the bottom of the cavity. Gently tighten the retainer nut. DO NOT OVERTIGHTEN. The thermowell completely seals the plumbing system without the retainer nut. The only purpose for the nut is to ensure that the sensor tip will remain in contact with the bottom of the thermowell.

TEMPERATURE SENSOR



TEMPERATURE SENSOR INSTALLED IN THERMOWELL

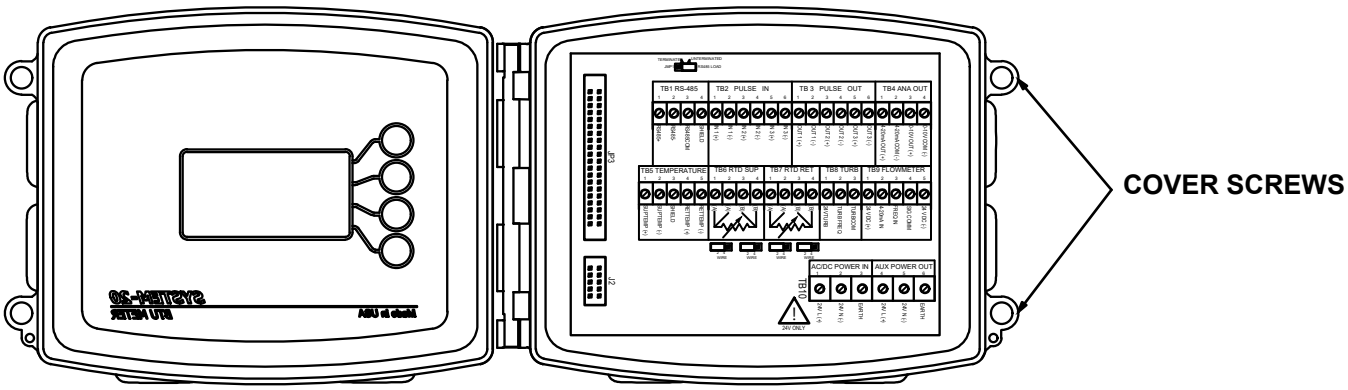


CAUTION (18)

DO NOT OVERTIGHTEN. The thermowell completely seals the plumbing system. Screwing in the sensor just ensures that the sensor tip will remain in contact with the bottom of the thermowell.

3.3 ELECTRICAL INSTALLATION

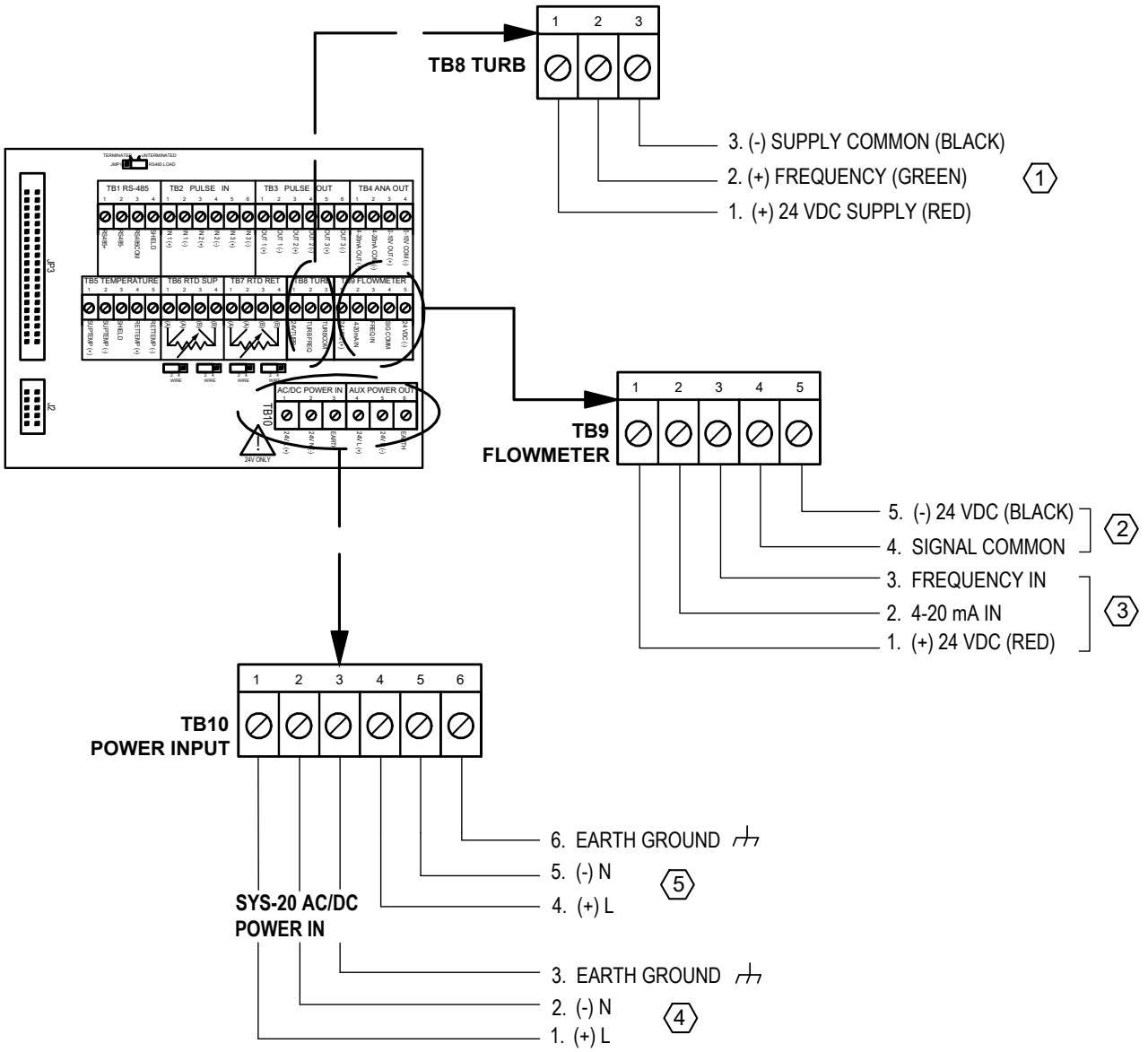
The System-20 is provided with three ¾" conduit openings along the bottom of the enclosure for power and signal cables. Two openings are provided with knockout seals. The power cable should enter the enclosure through the right hand opening. Do not remove the seals from unused openings. To access the wiring connections, remove the two cover screws shown below.



WARNING (19)

Disconnect main power before proceeding.

3.3.1 Power and Signal Wiring Connections



1. This terminal block is ONLY for use with ONICON F-1000 Series Turbine Flow Meters.
2. Voltage output for use with non-ONICON Flow Meters - 24VDC @ 50 mA maximum.
3. See meters installation & operation guide for additional information on properly wiring & grounding the meter.
4. Class II power supply requirements:
   20 - 28 V AC/DC, 50 / 60 Hz
   500 mA DC or 1A AC total input current.
5. 24 VAC aux power output connection for all flow meters except the F-1000 Series.

WARNING (20)

The System-20 must be connected to earth ground for proper operation. Failure to do so may result in erratic operation.

CAUTION (21)

Minimum temperature rating of the cable to be connected to the field wiring terminals, 140°F (60°C).

IMPORTANT NOTE (22)

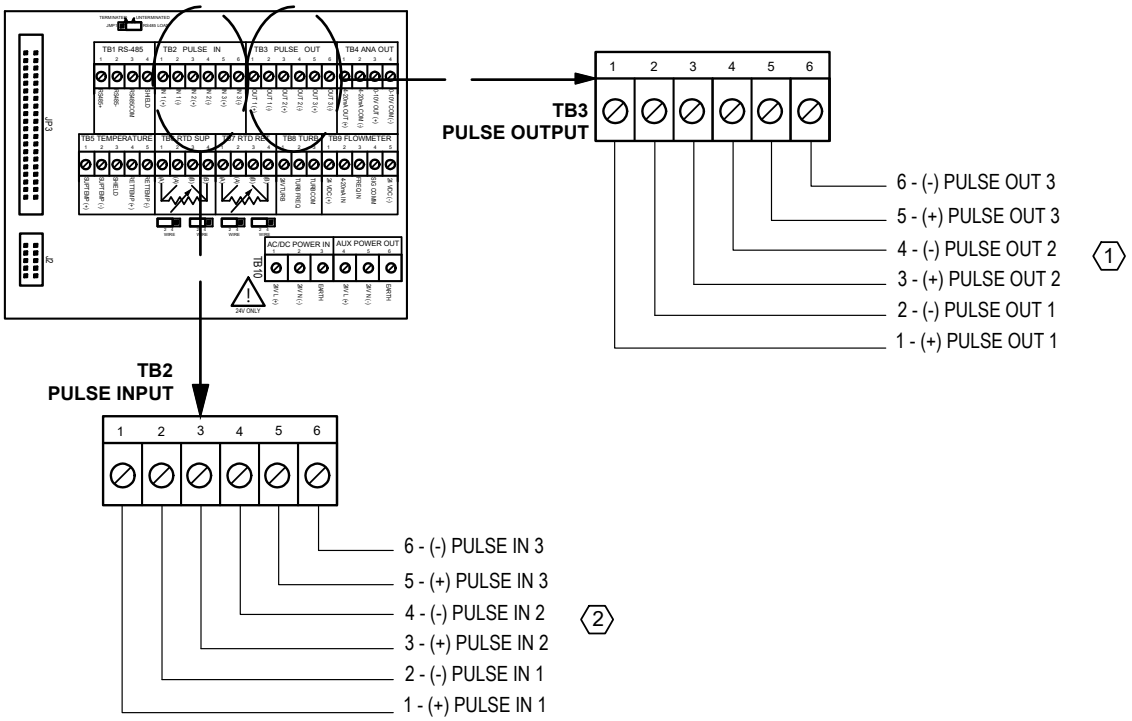
The System-20 shall be used with an external Class II power supply.

FLOW METERS OUTPUT SIGNAL CONNECTIONS					
	Models	System-20 Terminal #	Signal Input to System-20	System-20 Terminal #	Power Output to Flow Meters
Flow Meters with Frequency Output	F-1000 Series	TB8-2	(+) Frequency Input (Green)	TB8-1 TB8-3	(+) 24 VDC Supply (Red) (-) Supply Common (Black)
	F-3500 Series FSM-3 Series FT-3100 Series F-3200 Series Non-ONICON Meters	TB9-3 TB9-4 TB2-5 TB2-6	(+) Frequency Input (Green)	TB10-4	(+) 24 VAC/DC
			(-) Signal Common (Yellow)	TB10-5	(-) 24 VAC/DC
			(+) Direction (bi-directional) (Orange/ Black)	TB10-6	Earth Ground
			(-) Direction (bi-directional) (White/ Black)		
Note: Wiring colors are ONLY applicable for F-3500 Series					

	Models	System-20 Terminal #	Signal Input to System-20	System-20 Terminal #	Power Output to Flow Meters
Flow Meters with Active Analog Output	F-4300 Series F-4600 Series * F-1500 Series * F-2000 Series Non-ONICON Meters	TB9-2 TB9-4 TB2-5 TB2-6	(+) 4-20 mA (Blue)	TB10-4	(+) 24 VAC/DC
			(-) Signal Common (Brown)	TB10-5	(-) 24 VAC/DC
			(+) Direction (bi-directional switch/ contacts)	TB10-6	Earth Ground
			(-) Direction (bi-directional switch/ contacts)		
Note: Wiring colors are ONLY applicable for F-4600 Series * Requires external input powers					

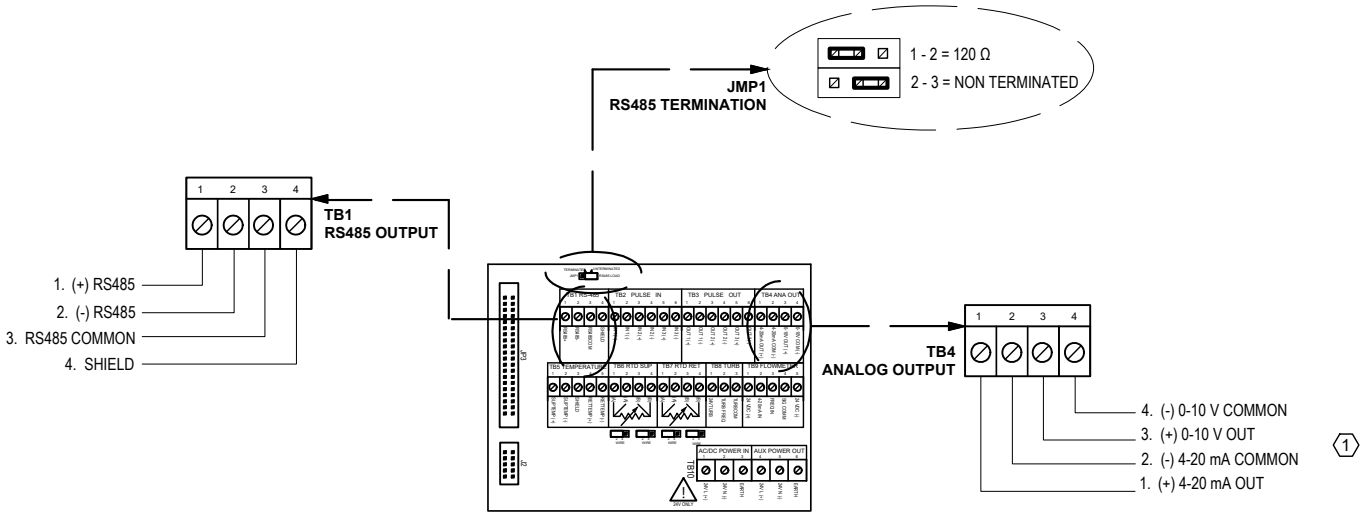
Flow Meters with Loop Power/ Passive Analog Output	Models	System-20 Terminal #	Signal Input to System-20
	* F-1500 Series * F-2000 Series	TB9-1 TB9-1	(+) 24 VDC (+) 4-20 mA
* Requires external input powers. Refer to flow meter model number to confirm output signal type.			

3.3.2 Pulse Input and Output Wiring Connections



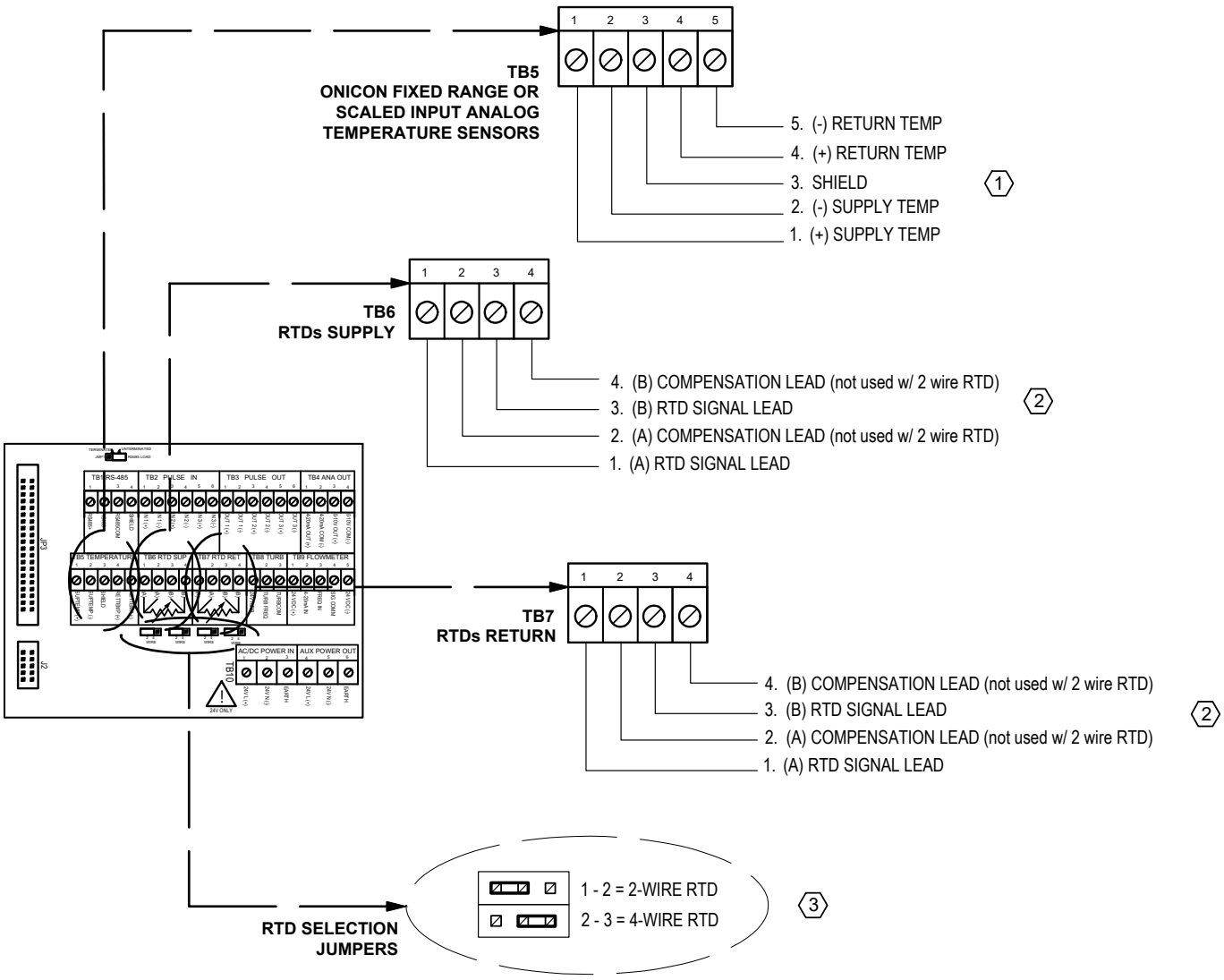
1. Maximum 30 V, 50 mA Pulse duration: 50, 100, 500 or 1000 ms
2. For use with devices providing sinking open collector or dry contact outputs.

3.3.3 Analog Output and Serial Communication Wiring Connections



1. Terminals TB4-3 & TB4-4 configured as 0-5V or 0-10V output

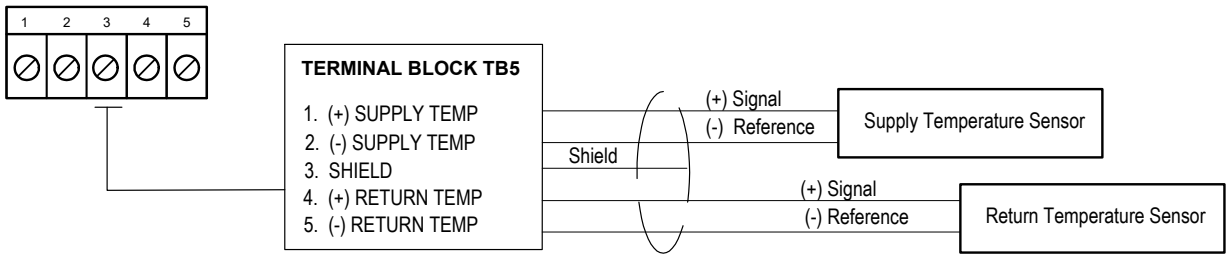
3.3.4 Temperature Sensor Wiring Connections



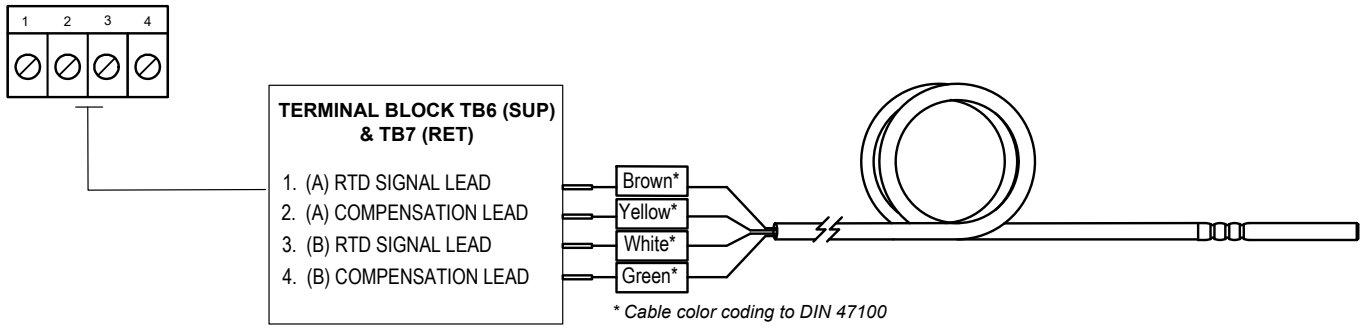
1. This terminal block for use with an ONICON fixed range (O1 & O2) or loop powered 4-20mA scalable range temperature sensors. See Temperature Inputs Wiring Diagram on page 20 for additional information.
2. These terminal blocks for use with an 1000 ohms platinum RTD temperature sensors (R2 & R3). See Temperature Inputs Wiring Diagram on page 20 for additional information.
3. Select jumper position 1 & 2 for 2-wire RTD or 2 & 3 for 4-wire RTD.

3.3.5 Temperature Input Wiring Details

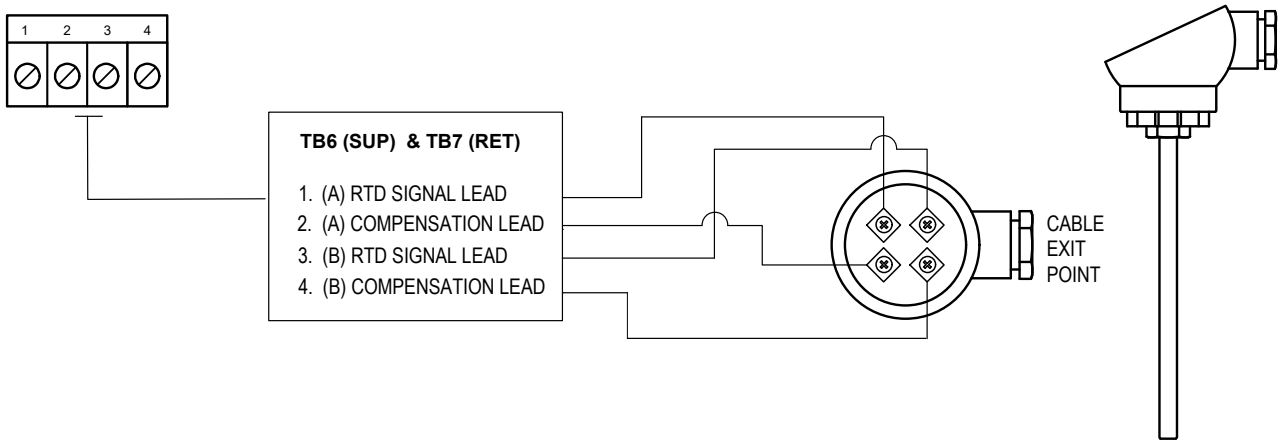
ONICON FIXED RANGE or LOOP POWERED 4-20mA SCALABLE RANGE TEMPERATURE INPUTS



1000 OHMS 4-WIRE PLATINUM RTD TEMPERATURE INPUTS w/ ATTACHED PIGTAILS CABLE



1000 OHMS 4-WIRE PLATINUM TEMPERATURE INPUTS w/ INTEGRAL CONDUIT READY JUNCTION BOX

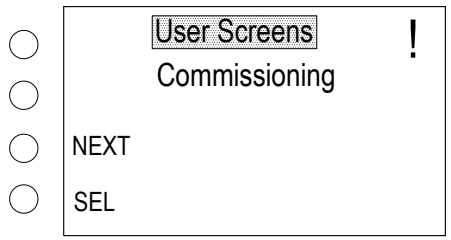


Refer to Temperature Sensor Connection on page 19 for additional details on the terminal location.

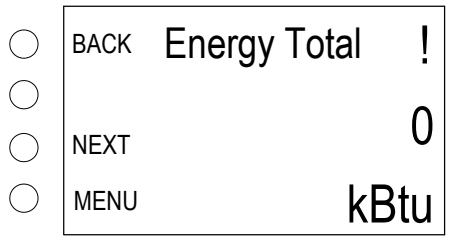
SECTION 4.0 START-UP AND COMMISSIONING

4.1 START-UP

When power is first applied to the meter the display will be illuminated and the following start screen will appear. Momentarily press SEL (select) to access the operating mode (User Screens) display pages.



Verify that the meter is functional by stepping through the display pages and confirming the flow rate and temperature data is within expected norms. Momentarily press NEXT or BACK to change the displayed page. A complete list of the display pages is provided on the following pages.



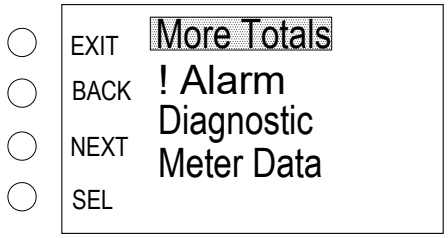
When reviewing the displayed data, note the factory programmed engineering units on each display page (e.g. kBtu, gallons, kBtu/h, gpm, °F, etc.). Note any changes that may be necessary. These will need to be made during commissioning.

When reviewing the Supply and Return temperature display pages, note which one has the word "FLOW" in the lower left corner of the page. This is an indication of the flow sensor location in the piping system. Verify the actual location of the flow sensor in the piping system. It is critical that the correct location (supply or return) be programmed into the meter.

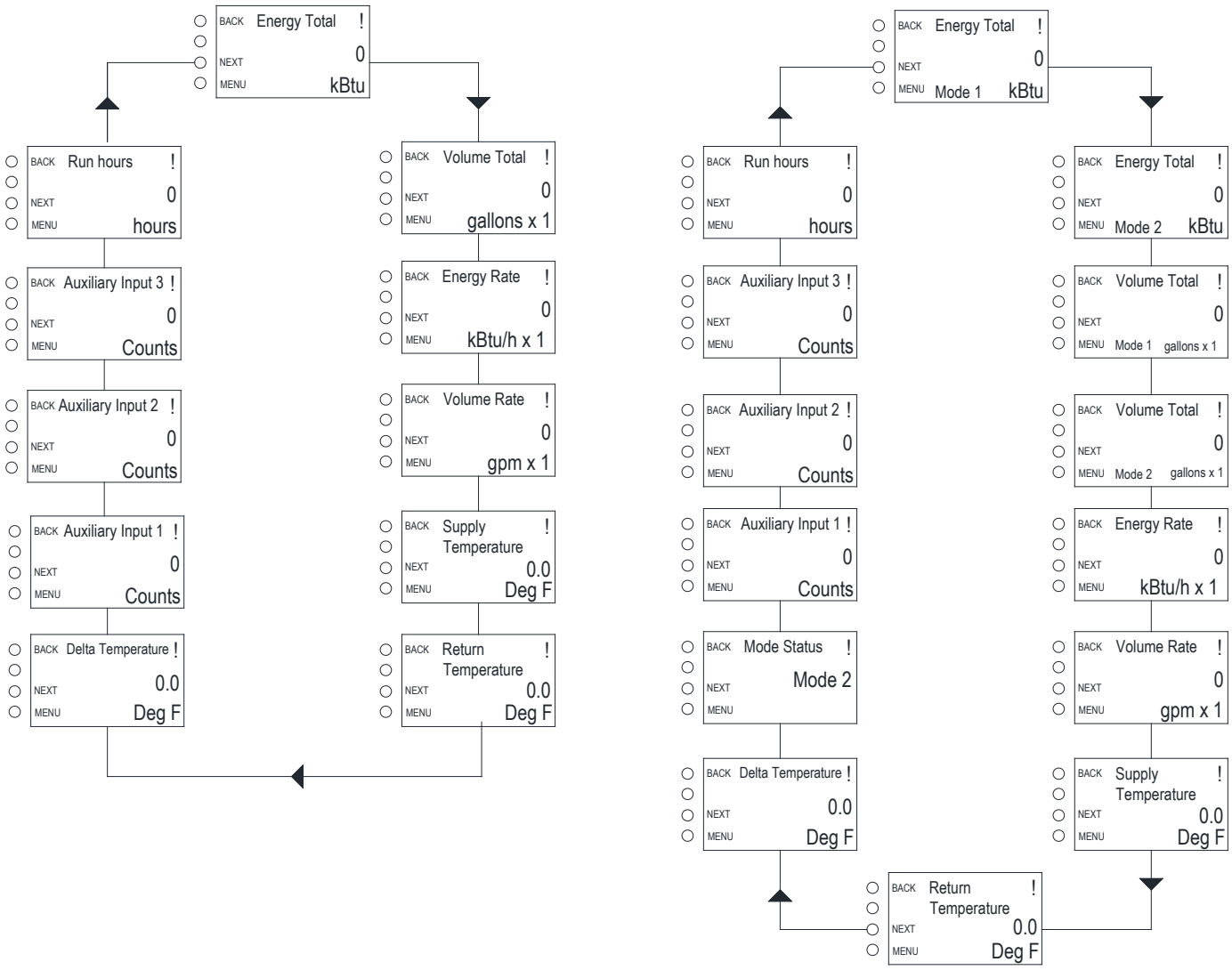
CAUTION (23)

During start-up and commissioning, the FLOW location must be properly identified as being in the supply or return pipe of the heat exchange circuit. The sensor's position must then be programmed into the meter. Failure to do so will result in significant errors in both the flow and energy measurements.

To return to the commissioning mode from the user screens, momentarily press MENU. The following page will appear. Momentarily press EXIT to return to the start screen.

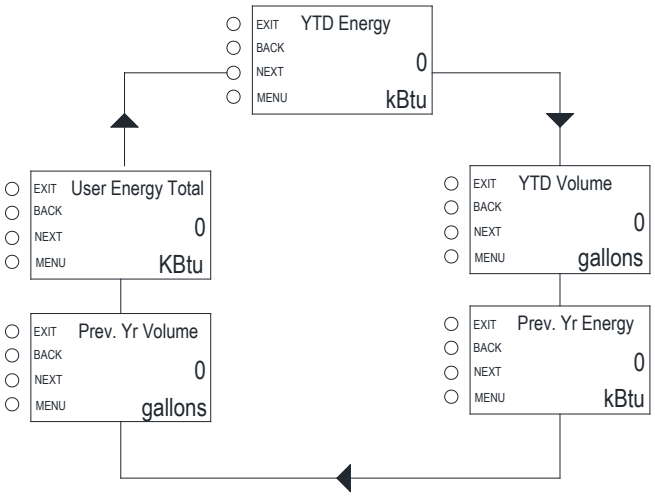


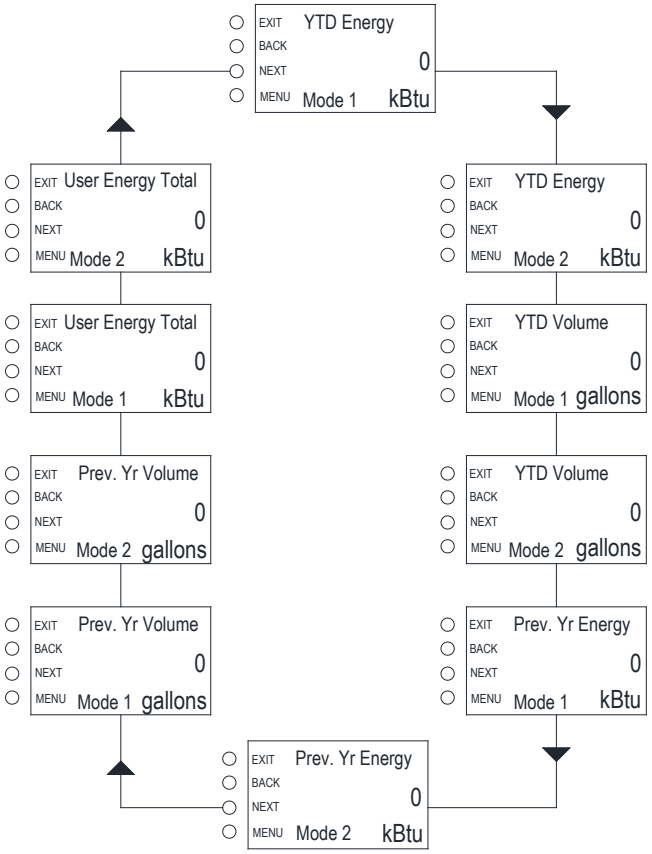
4.1.1 Single and Dual Mode Display Pages



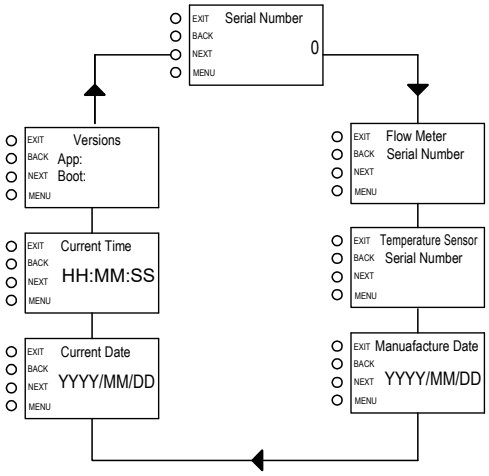
* Auxiliary input pages only appear when enabled.

4.1.2 Additional Display Pages

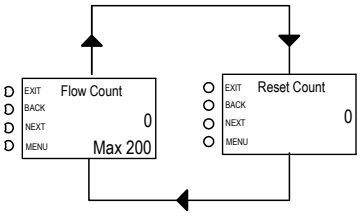




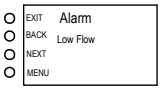
Meter Data



Diagnostics



Alarms



Alarm Mesages
Flow Temp Open
Low Flow
Low Supply Temp
Low Return Temp
dt< Minimum

4.2 COMMISSIONING

The last step in the installation process is commissioning the meter. Commissioning is a two-step process. The first step is to review the mechanical installation to confirm that the flow sensor and temperature sensor(s) are properly located in the piping system. The second step is a review of the meter program settings. Both steps must be completed in order to finish the installation. A simple commissioning checklist is shown below. A copy of this may be found online at www.onicon.com/system20.html.

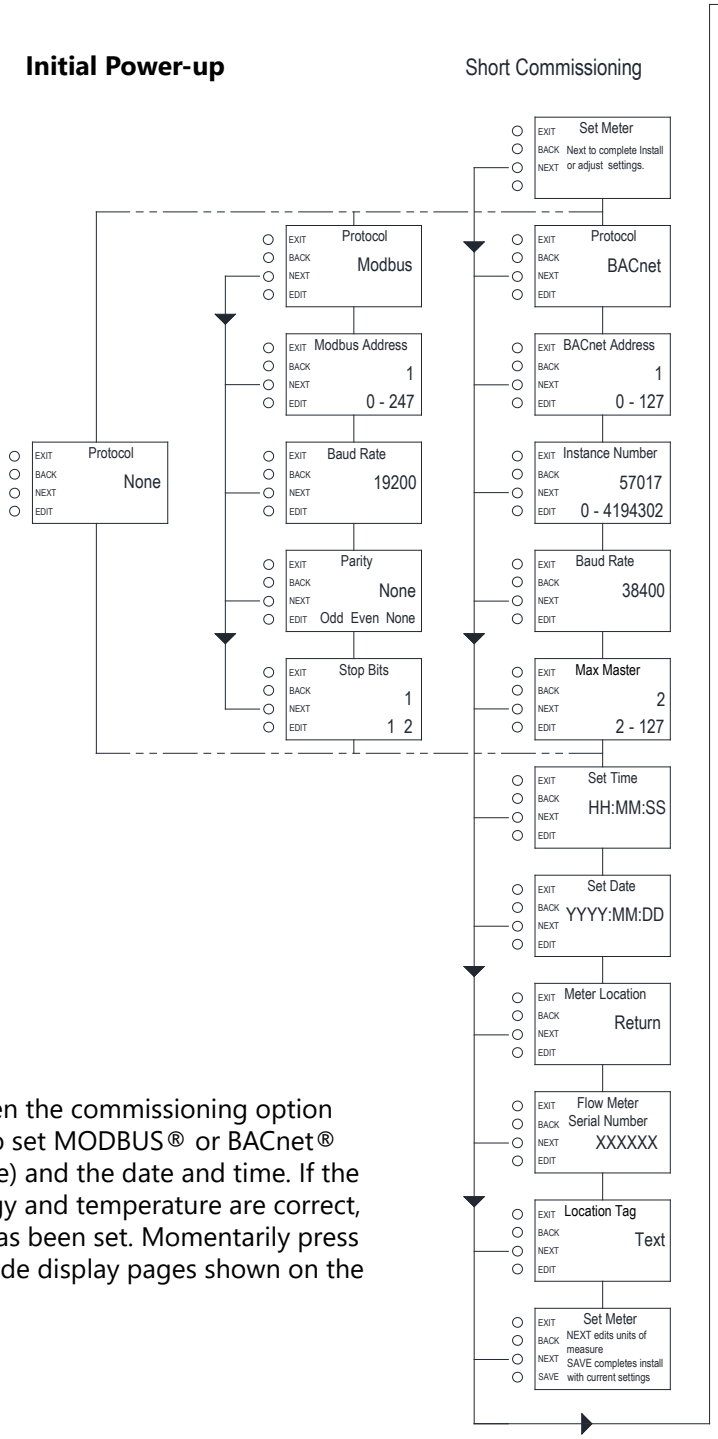
Commissioning Checklist

Part 1 Mechanical Installation

- ❑ Confirm that the system components are installed in the correct locations (Sec. 1.5 & 3.1).
- ❑ Confirm that the flow sensor is properly installed and correctly oriented with respect to flow direction (flow meter manual).

Part 2 Programming

- ❑ Confirm that the flow sensor location in the piping system (supply or return) is programmed into the meter (Sec. 4.1 & 4.2.1).
- ❑ Verify that the Units of Measure Settings in the meter are correct (Sec. 4.1 & 4.2.1).
- ❑ Confirm that there are no alarm indications and the meter is functional (Sec. 4.1.2 & 5.0).

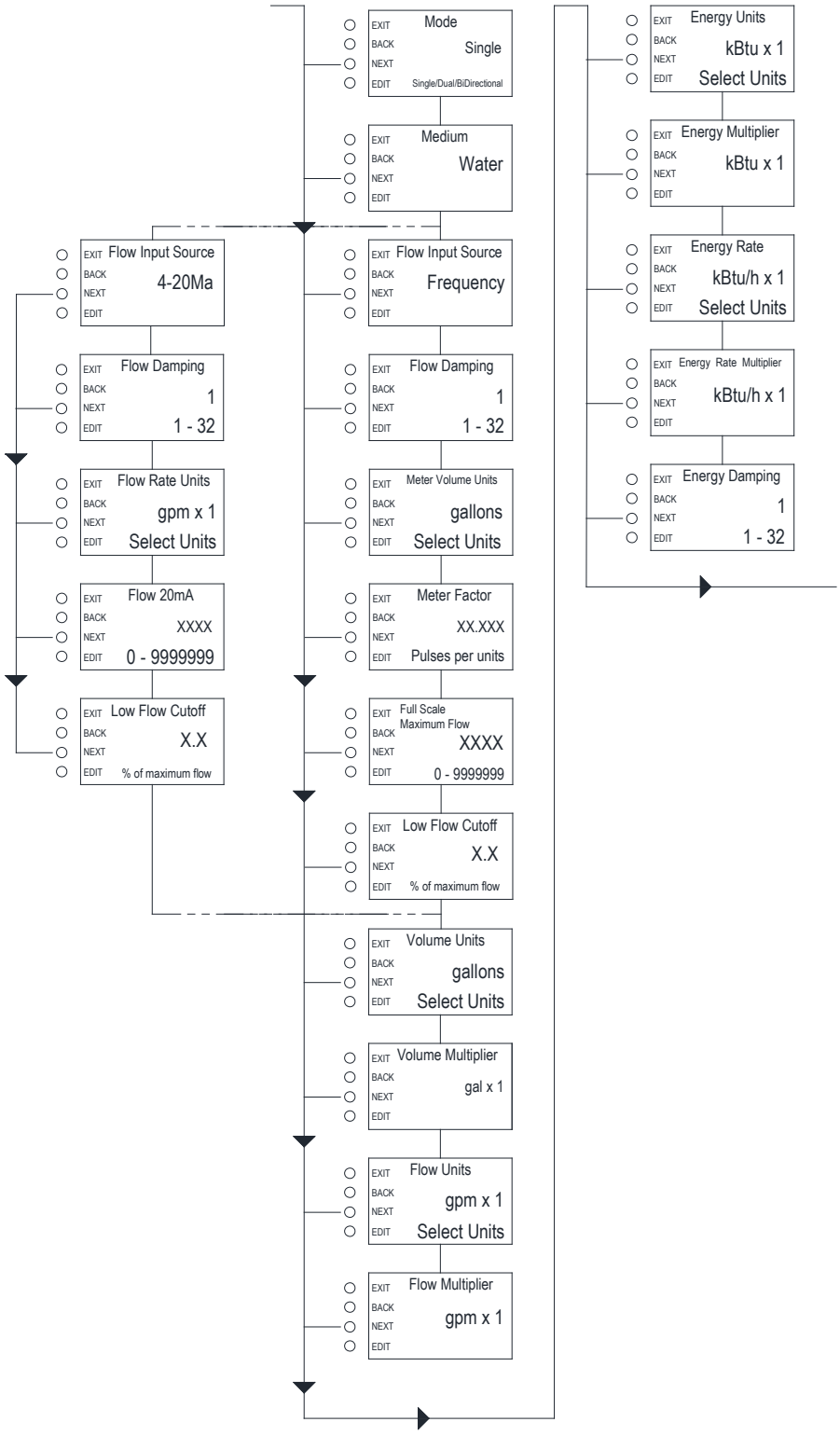


4.2.1 Commissioning Following Initial Power-up

During initial power-up, the display pages will appear when the commissioning option is selected. The settings shown below allow the installer to set MODBUS® or BACnet® parameters, the flow sensor location (supply or return pipe) and the date and time. If the factory pre-programmed engineering units for flow, energy and temperature are correct, press SAVE to exit commissioning once the correct date has been set. Momentarily press NEXT if you wish access the remaining commissioning mode display pages shown on the following pages.

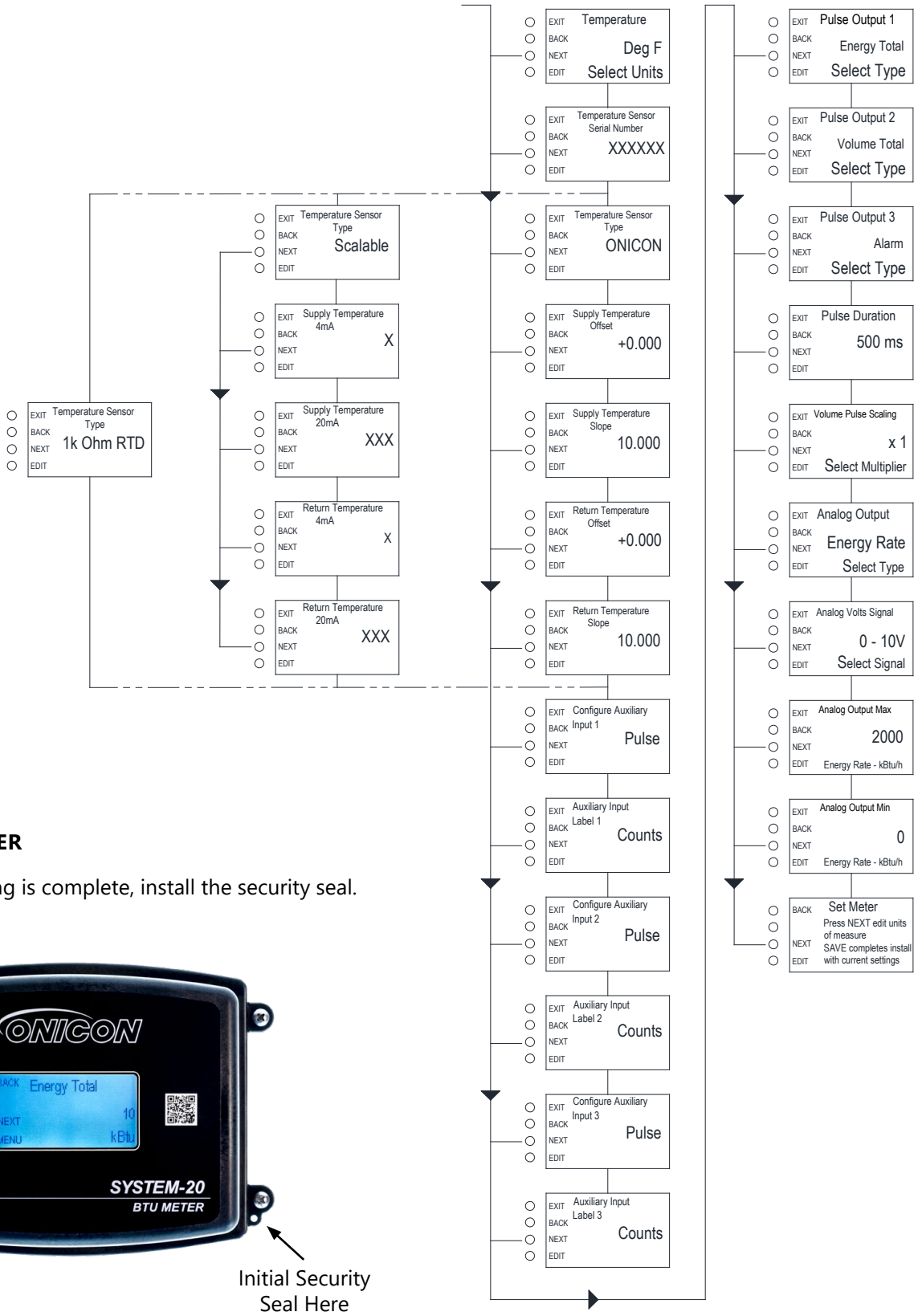
Continued from Previous Page

Units of Measure Settings



Continued from Previous Page

Units of Measure Settings Continued



4.3 SEALING THE METER

Once commissioning is complete, install the security seal.

Initial Security Seal Here

SECTION 5.0 DIAGNOSTIC FUNCTIONS

The ONICON System-20 has self diagnostic functions that continually monitor key operating parameters. A list of the alarm messages is shown below.

Displayed Message	Description
System Fault	This message indicates a hardware malfunction. The meter will not calculate energy in this state.
Dt< Minimum	This is a warning message that the delta temperature is low.
Empty Pipe	The pipe is empty.
Flow RTD Open	The SUPPLY temperature sensor in the flow body is reading open. The meter will not calculate energy in this state.
Flow RTD Short	The SUPPLY temperature sensor in the flow body is reading as a short circuit. The meter will not calculate energy in this state.
Remote RTD Open	The remote RETURN temperature sensor is reading open. The meter will not calculate energy in this state.
Remote RTD Short	The remote RETURN temperature sensor is reading as a short circuit. The meter will not calculate energy in this state.
Low Flow	The flow reading is below the minimum flow threshold of the meter (e.g. 0.03 gpm for ½" meter). The meter will not calculate energy in this state.
High Flow	This is a warning message that the flow reading is above the maximum flow rate of the meter (e.g. 15 gpm for ½" meter).

SECTION 6.0 BACNET® MS/TP

BACnet MS/TP, serial interface connections are connected at terminal block TB1.

Transceiver:	2-wire, half-duplex (1/4 unit load)
BACnet® address (MAC address) range:	1 - 255 (Default: 017)
Device Instance:	0 - 4,194,303 (Default: 57017)
Baud rate:	9600, 19200, 38400 or 76800 (Default: 38400)
Termination:	120 Ω or none (Default: none)
Biasing:	None
Flow control:	None

6.1 BACNET OBJECT TYPES

BACnet Object Type and Number of Objects Implemented

Device	1
Analog Input	10
Analog Value	34
Binary Value	12
Multi-State Object	1
Trend Log Multiple	1

6.2 PROTOCOL IMPLEMENTATION STATEMENT

BACnet Protocol Revision:	10
Device Profile (Annex L):	BACnet® Application Specific Controller (B-ASC)
MS/TP master (Clause 9), baud rate(s):	9600, 19200, 38400 & 76800
Device Address Binding:	No
BBMD support registration by Foreign Devices:	No
Character Set Supported:	ANSI X3.4

BACnet Interoperability Building Blocks Supported (Annex K):
Data Sharing - ReadProperty-B (DS-RP-B)
Data Sharing - ReadProperty Multiple - B (DS-RPM-B)
Data Sharing - WriteProperty-B (DS-WP-B)
Data Sharing - WriteProperty Multiple - B (DS-WPM-B)
Device Management - Dynamic Device Binding - B (DM-DDB-B)
Device Management - Dynamic Object Binding - B (DM-DOB-B)
Device Management - DeviceCommunicationControl-B (DM-DCC-B)
Device Management - Time Synchronization - B (DM-TS-B)
Device Management - UTC Time Synchronization - B (DM-UTC-B)
Trending - View and Modify Multiple Values - I - B (T-VMMV-I-B)

Standard Object Types Supported:

Device Object	Binary Value Object
Analog Input Object	Multi-State Value
Analog Value Object	Trend Log Multiple

6.3 DEVICE OBJECT

Property	Default Value	Read-only or Writable	Comment
Object Identifier	57017	Writable	0-4,194,303
Object Name	System-20-XXXXXX	Read-only	
Object Type	Device	Read-only	
System Status	Operational	Read-only	
Vendor Name	ONICON Inc.	Read-only	
Model Name	System-20	Read-only	
Firmware Rev.	000.000.000	Read-only	
Location	Customer Location	Writable	32 char. Max
Description	Customer Description	Writable	32 char. Max
Protocol Version	1	Read-only	
Protocol Revision	10	Read-only	
Services Supported	Read property, Read property multiple, Write property, Write property multiple, Read range, Who-has, I have, Who-is, I-am, Device communications control, Time synchronization, UTC time synchronization	Read-only	
Object Types Supported	Analog input, Analog value, Binary input, Device, Multi-state value, Trend log multiple	Read-only	
Object List	(Device, 57017), (analog input, 1 – 10), (analog value, 1 – 24), (binary value, 1 – 10), (trend log multiple, 1), (multi-state value, 1)	Read-only	
Max ADPU Length	480	Read-only	
Local Time	Device current time	Read-only	
Local Date	Device current date	Read-only	
UTC Offset	-300	Writable	
Daylight Savings Status	False	Writable	
APDU Time-out	6000	Read-only	
# of APDU Retries	3	Writable	
Max Master	127	Read-only	
Device Address Binding	N/A	Read-only	Active
Database Revision	1	Read-only	

6.4 ANALOG INPUT(S)

Property	Default Value	Read-only or Writable
Object Identifier	Analog input 1 to 10	Read-only
Object Name	Various	Read-only
Object Type	Analog-input	Read-only
Present Value	REAL	Writable
Description	Analog-input,# Name	Read-only
Status Flags	(F,F,F,F)	Read-only
Event State	Normal	Read-only
Reliability	No-fault-detected	Read-only
Out-of-Service	FALSE	Writable
Update interval	100	Read-only
Units	Various	Read-only
Min-Present-Value	-1000000000	Read-only
Max-Present-Value	1000000000	Read-only
Resolution	0.000001	Read-only

Objects List	
Object Identifier	**Function**
Analog input 1	Energy rate
Analog input 2	Volume rate
Analog input 3	Supply temperature
Analog input 4	Return temperature
Analog input 5	Delta temperature
Analog input 6*	Peak energy rate
Analog input 7*	Average delta temp

* Time interval set by Trend Log Object

BACnet Engineering Units for Analog Inputs **(Defaults)**

Energy rate: **kBtu/h**, tons, kW or MW

Volume rate: **gpm**, l/s, ft3/m or m3/h

Temperature: **°F** or °C

6.5 ANALOG VALUE(S)

Property	Default Value	Read-only or Writable
Object Identifier	Analog value 1 to 24	Read-only
Object Name	Various	Read-only
Object Type	Analog-value	Read-only
Present Value	REAL	Writable
Description	Analog-value,# Name	Read-only
Status Flags	(F,F,F,F)	Read-only
Event State	normal	Read-only
Reliability	No-fault-detected	Read-only
Out-of-Service	FALSE	Writable
Units	Various	Read-only
Priority Array	{NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL}	Read-only
Relinquish Default	0	Read-only

Analog Value Objects	
Object Identifier	**Function**
Analog value 1	Single mode energy total
Analog value 2	Mode 1 energy total
Analog value 3	Mode 2 energy total
Analog value 4	Single mode Y-T-D energy total
Analog value 5	Mode 1 Y-T-D energy total
Analog value 6	Mode 2 Y-T-D energy total
Analog value 7	Single mode previous year energy total
Analog value 8	Mode 1 previous year energy total
Analog value 9	Mode 2 previous year energy total
Analog value 10	Single mode user defined energy total
Analog value 11	Mode 1 user defined energy total
Analog value 12	Mode 2 user defined energy total
Analog value 13	Single mode incremental energy total
Analog value 14	Mode 1 incremental energy total
Analog value 15	Mode 2 incremental energy total
Analog value 16	Single mode volume total
Analog value 17	Mode 1 volume total
Analog value 18	Mode 2 volume total
Analog value 19*	Single mode Y-T-D volume total
Analog value 20*	Mode 1 Y-T-D volume total
Analog value 21*	Mode 2 Y-T-D volume total
Analog value 22*	Single mode previous year volume total
Analog value 23	Mode 1 previous year volume total
Analog value 24	Mode 2 previous year volume total
Analog value 25	Single mode user defined volume total
Analog value 26	Mode 1 user defined volume total
Analog value 27	Mode 2 user defined volume total
Analog value 28	Single mode incremental volume total
Analog value 29	Mode 1 incremental volume total
Analog value 30	Mode 2 incremental volume total
Analog value 31	Aux pulse input 1 total
Analog value 32	Aux pulse input 2 total
Analog value 33	Aux pulse input 3 total
Analog value 34	Run hours

* Time interval set by Trend Log Object

BACnet Engineering Units for Analog Values **(Defaults)**

Energy: **kBtu**, MBtu, ton-hours, kJ, MJ, kWh or MWh

Volume: **gallons**, liters, ft3 or m3
Auxiliary pulse inputs: **No units** (counts)
Run hours: **Hours**

6.6 BINARY VALUE(S)

Property	Default Value	Read-only or Writable
Object Identifier	Binary value 1 to binary value 10	Read-only
Object Name	Various	Read-only
Object Type	Binary-value	Read-only
Present Value	0	Writable
Description	Binary-value,# Name	Read-only
Status Flags	(F,F,F,F)	Read-only
Event State	Normal	Read-only
Reliability	No-fault-detected	Read-only
Out-of-Service	FALSE	Writable
Elapsed Active Time	Various	Read-only
Priority Array	(NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL, NULL)	Read-only
Relinquish Default	0	Read-only

Binary Value Objects		
Object Identifier	**Description**	**Notes**
Binary value 1	Mode indication	0 = mode 1, 1 = mode 2
Binary value 2	Location	0 = supply, 1 = return
Binary value 3	Single mode user energy total reset	1 = reset total
Binary value 4	Mode 1 user energy total reset	1 = reset total
Binary value 5	Mode 2 user energy total reset	1 = reset total
Binary value 6	Single mode user volume total reset	1 = reset total
Binary value 7	Mode 1 user volume total reset	1 = reset total
Binary value 8	Mode 2 user volume total reset	1 = reset total
Binary value 9	Aux total 1 reset	1 = reset total
Binary value 10	Aux total 2 reset	1 = reset total
Binary value 11	Aux total 3 reset	1 = reset total
Binary value 12	Flow direction	1 = reverse flow

6.7 MULTI STATE VALUE

Property	Default Value	Read-only or Writable
Object Identifier	Multi state value 1	Read-only
Object Name	Meter Status	Read-only
Object Type	Multi-state-value	Read-only
Present Value	1	Writable
Description	Multi-state-value,# Name	Read-only
Status Flags	(F,F,F,F)	Read-only
Event State	Normal	Read-only
Reliability	No-fault-detected	Read-only
Out-of-Service	FALSE	Writable
Number of States	11	Read-only
State Text	Normal, Low Supply Temperature, High Supply Temperature, Low Return Temperature, Delta T< Minimum, High Energy Rate, Low Signal Quality, Comm Error, Low Supply Voltage, System Fault	Read-only
Relinquish Default	0	Read-only

Multi-state Object		
Object Identifier	**Description**	**Notes**
Multi-state value 1	Reports the operating status of the meter 1 = Normal 2 = Low Supply Temperature 3 = High Supply Temperature 4 = Low Return Temperature 5 = High Return Temperature 6 = Delta T < Minimum 7 = High Energy Rate 9 = Comm error 10 = Low Supply Voltage 11= System Fault	Numeric values indicate meter status.

6.8 TREND LOG MULTIPLE

Property	Default Value	Read-only or Writable
Object Identifier	Trend log multiple 1	Read-only
Object Name	Log Data	Read-only
Object Type	Trend-log-multiple	Read-only
Description	Trend-log-multiple,# Name	Read-only
Status Flags	(F,F,F,F)	Read-only
Event State	Normal	Read-only
Reliability	No-fault-detected	Read-only
Enable	TRUE	Writable
Log Device Property		Read-only
Logging Type	POLLED	Read-only
Log Interval	90000	Writable
Stop When Full	FALSE	Read-only
Buffer Size	480	Read-only
Log Buffer		Read-only
Record Count	0	Writable
Total Record Count	0	Read-only

Trend log Multiple Object		
Object Identifier	**Description**	**Notes**
Trendlog Multiple 1	Logs the following BACnet objects: Peak energy rate Average delta temp Incremental energy total mode 1 Incremental energy total mode 2 Incremental volume total mode 1 Incremental volume total mode 2 Meter status (multi-state object)	The log buffer holds 120 records and then rolls over with the first in as first out. The logging interval can be set from 30 seconds to 1 hour via BACnet. The default interval is 15 minutes.

SECTION 7.0 MODBUS

MODBUS, serial interface connections are connected at terminal block TB1.
Transceiver: 2-wire, half-duplex (1/4 unit load)
MODBUS address range: 1 - 247 (Default: 017)
Data format: 8 bit
Stop Bits: 1
Parity: None (Default), Odd, or Even
Byte Order: ABCD
Baud rate: 4800, 9600, 19200, 38400, 57600, 76800 or 115200 (Default: 9600)
Termination: Jumper selectable 120Ω resistor (See page 18)
Biasing: None

Engineering Units	Abbreviation	Engineering Units	Abbreviation
Energy Rate		**Energy Total**	
Btu per hour x 1,000	kBtu/hr	Btu x 1,000	kBtu
Tons	Tons	Btu x 1,000,000	MBtu
Watts x 1,000	kW	Ton-hour	TonHr
Watts x 1,000 x 1,000,000	MW	Joules x 1,000,000	MJ
Volume Rate (FLow)		Watt-hours x 1,000	kWHr
Gallons per minute	GPM	**Volume Total**	
Liters per second	L/s	Gallons	Gal
Cubic feet per minute	fT^3/min	Liters	Liters
Cubic meters per hour	m^3/hr	Cubic Feet	ft^3
Temperature		Cubic Meters	m^3
Degrees Fahrenheit	ºF		
Degrees Celsius	ºC		
Velocity (Flow velocity, Fluid speed of sound)			
Feet per second	ft/s		
Meters per second	m/s		

Function Codes Supported
01 - Read Coil(s)
02 - Read Discreet Input(s)
03 - Read Holding Register(s)
04 - Read Input Register(s)
05 - Write Single Coil
06 - Write Single Register
08 - Diagnostic
15 - Write Multiple Coils
16 - Write Multiple Registers
17 - Report Slave ID

7.1 MODBUS MEMORY MAP

Register Address	Description	Register Type	Data Range	Over Range	Read/Write	Comments
1	Reset User Defined Energy Total - Single Mode	Coil	NA	NA	Read/Write	Turn coil ON (1) to reset total on System-20. Turn coil to OFF (0)once reset is complete.
2	Reset User Defined Energy Total - Mode 1	Coil	NA	NA	Read/Write	Turn coil ON (1) to reset total on System-20. Turn coil to OFF (0)once reset is complete.
3	Reset User Defined Energy Total - Mode 2	Coil	NA	NA	Read/Write	Turn coil ON (1) to reset total on System-20. Turn coil to OFF (0)once reset is complete.
4	Reset User Defined Volume Total - Single Mode	Coil	NA	NA	Read/Write	Turn coil ON (1) to reset total on System-20. Turn coil to OFF (0)once reset is complete.
5	Reset User Defined Volume Total - Mode 1	Coil	NA	NA	Read/Write	Turn coil ON (1) to reset total on System-20. Turn coil to OFF (0)once reset is complete.
6	Reset User Defined Volume Total - Mode 2	Coil	NA	NA	Read/Write	Turn coil ON (1) to reset total on System-20. Turn coil to OFF (0)once reset is complete.
7	Reset Aux Input Total - Input 1	Coil	NA	NA	Read/Write	Turn coil ON (1) to reset total on System-20. Turn coil to OFF (0)once reset is complete.
8	Reset Aux Input Total - Input 2	Coil	NA	NA	Read/Write	Turn coil ON (1) to reset total on System-20. Turn coil to OFF (0)once reset is complete.
9	Reset Aux Input Total - Input 3	Coil	NA	NA	Read/Write	Turn coil ON (1) to reset total on System-20. Turn coil to OFF (0)once reset is complete.
10	Reset Aux Input Total - All Inputs	Coil	NA	NA	Read/Write	Turn coil ON (1) to reset total on System-20. Turn coil to OFF (0)once reset is complete.
11	Aux Output 1	Coil	NA	NA	Read/Write	Turn coil ON (1) to latch Aux I/O # 1 closed. Turn coil to OFF (0) to latch I/O # 1 open. Aux I/O # 1 must have been configured as an output at the factory, and programmed for "MODBUS Coil" in the commissioning menu.
12	Aux Output 2	Coil	NA	NA	Read/Write	Turn coil ON (1) to latch Aux I/O # 2 closed. Turn coil to OFF (0) to latch I/O # 2 open. Aux I/O # 2 must have been configured as an output at the factory, and programmed for "MODBUS Coil" in the commissioning menu.
13	Aux Output 3	Coil	NA	NA	Read/Write	Turn coil ON (1) to latch Aux I/O # 3 closed. Turn coil to OFF (0) to latch I/O # 3 open. Aux I/O # 3 must have been configured as an output at the factory, and programmed for "MODBUS Coil" in the commissioning menu.

Register Address	**Description**	**Register Type**	**Data Range**	**Over Range**	**Read/ Write**	**Comments**
10001	Mode Indication	Discrete Input	0-1	NA	Read Only	0- Heating Mode or Forward Direction, 1- Cooling Mode or Reverse Direction
10002	Location	Discrete Input	0-1	NA	Read Only	0- Supply, 1- Return
10003	Single/Dual/Bidirectional	Discrete Input	0-1	NA	Read Only	0- Single Mode, 1- Dual/Bi-Directional Mode
Register Address	**Description**	**Register Type**	**Register Type**			**Comments**
30001	Energy Rate - kBtu/hr	Input Register	Floating Point Register (1 of 2)			
30002	Energy Rate - kBtu/hr	Input Register	Floating Point Register (2 of 2)			
30003	Energy Rate - Tons	Input Register	Floating Point Register (1 of 2)			
30004	Energy Rate - Tons	Input Register	Floating Point Register (2 of 2)			
30005	Energy Rate - kW	Input Register	Floating Point Register (1 of 2)			
30006	Energy Rate - kW	Input Register	Floating Point Register (2 of 2)			
30007	Energy Rate - MW	Input Register	Floating Point Register (1 of 2)			
30008	Energy Rate - MW	Input Register	Floating Point Register (2 of 2)			

30009	Volume Rate - GPM	Input Register	Floating Point Register (1 of 2)	
30010	Volume Rate - GPM	Input Register	Floating Point Register (2 of 2)	
30011	Volume Rate - L/s	Input Register	Floating Point Register (1 of 2)	
30012	Volume Rate - L/s	Input Register	Floating Point Register (2 of 2)	
30013	Volume Rate - ft3/min	Input Register	Floating Point Register (1 of 2)	
30014	Volume Rate - ft3/min	Input Register	Floating Point Register (2 of 2)	
30015	Volume Rate - m3/hr	Input Register	Floating Point Register (1 of 2)	
30016	Volume Rate - m3/hr	Input Register	Floating Point Register (2 of 2)	
30017	Flow Temperature - °F	Input Register	Floating Point Register (1 of 2)	Temperature measured by RTD in flow meter location
30018	Flow Temperature - °F	Input Register	Floating Point Register (2 of 2)	Temperature measured by RTD in flow meter location
30019	Flow Temperature - °C	Input Register	Floating Point Register (1 of 2)	Temperature measured by RTD in flow meter location
30020	Flow Temperature - °C	Input Register	Floating Point Register (2 of 2)	Temperature measured by RTD in flow meter location
30021	Remote Temperature - °F	Input Register	Floating Point Register (1 of 2)	Temperature measured by remote RTD
30022	Remote Temperature - °F	Input Register	Floating Point Register (2 of 2)	Temperature measured by remote RTD
30023	Remote Temperature - °C	Input Register	Floating Point Register (1 of 2)	Temperature measured by remote RTD
30024	Remote Temperature - °C	Input Register	Floating Point Register (2 of 2)	Temperature measured by remote RTD
30025	Delta Temperature - °F	Input Register	Floating Point Register (1 of 2)	
30026	Delta Temperature - °F	Input Register	Floating Point Register (2 of 2)	
30027	Delta Temperature - °C	Input Register	Floating Point Register (1 of 2)	
30028	Delta Temperature - °C	Input Register	Floating Point Register (2 of 2)	
30029	Energy Total - Single Mode - kBtu	Input Register	Floating Point Register (1 of 2)	
30030	Energy Total - Single Mode - kBtu	Input Register	Floating Point Register (2 of 2)	
30031	Energy Total - Single Mode - MBtu	Input Register	Floating Point Register (1 of 2)	
30032	Energy Total - Single Mode - MBtu	Input Register	Floating Point Register (2 of 2)	
30033	Energy Total - Single Mode - TonHr	Input Register	Floating Point Register (1 of 2)	
30034	Energy Total - Single Mode - TonHr	Input Register	Floating Point Register (2 of 2)	
30035	Energy Total - Single Mode - MJ	Input Register	Floating Point Register (1 of 2)	
30036	Energy Total - Single Mode - MJ	Input Register	Floating Point Register (2 of 2)	
30037	Energy Total - Single Mode - kWHr	Input Register	Floating Point Register (1 of 2)	
30038	Energy Total - Single Mode - kWHr	Input Register	Floating Point Register (2 of 2)	
30039	Energy Total - Mode 1 - kBtu	Input Register	Floating Point Register (1 of 2)	
30040	Energy Total - Mode 1 - kBtu	Input Register	Floating Point Register (2 of 2)	
30041	Energy Total - Mode 1 - MBtu	Input Register	Floating Point Register (1 of 2)	
30042	Energy Total - Mode 1 - MBtu	Input Register	Floating Point Register (2 of 2)	
30043	Energy Total - Mode 1 - TonHr	Input Register	Floating Point Register (1 of 2)	
30044	Energy Total - Mode 1 - TonHr	Input Register	Floating Point Register (2 of 2)	
30045	Energy Total - Mode 1 - MJ	Input Register	Floating Point Register (1 of 2)	
30046	Energy Total - Mode 1 - MJ	Input Register	Floating Point Register (2 of 2)	
30047	Energy Total - Mode 1 - kWHr	Input Register	Floating Point Register (1 of 2)	
30048	Energy Total - Mode 1 - kWHr	Input Register	Floating Point Register (2 of 2)	
30049	Energy Total - Mode 2 - kBtu	Input Register	Floating Point Register (1 of 2)	
30050	Energy Total - Mode 2 - kBtu	Input Register	Floating Point Register (2 of 2)	
30051	Energy Total - Mode 2 - MBtu	Input Register	Floating Point Register (1 of 2)	
30052	Energy Total - Mode 2 - MBtu	Input Register	Floating Point Register (2 of 2)	
30053	Energy Total - Mode 2 - TonHr	Input Register	Floating Point Register (1 of 2)	
30054	Energy Total - Mode 2 - TonHr	Input Register	Floating Point Register (2 of 2)	

30055	Energy Total - Mode 2 - MJ	Input Register	Floating Point Register (1 of 2)	
30056	Energy Total - Mode 2 - MJ	Input Register	Floating Point Register (2 of 2)	
30057	Energy Total - Mode 2 - kWHr	Input Register	Floating Point Register (1 of 2)	
30058	Energy Total - Mode 2 - kWHr	Input Register	Floating Point Register (2 of 2)	
30059	Year to Date Energy Total - Single Mode - kBtu	Input Register	Floating Point Register (1 of 2)	
30060	Year to Date Energy Total - Single Mode - kBtu	Input Register	Floating Point Register (2 of 2)	
30061	Year to Date Energy Total - Single Mode - MBtu	Input Register	Floating Point Register (1 of 2)	
30062	Year to Date Energy Total - Single Mode - MBtu	Input Register	Floating Point Register (2 of 2)	
30063	Year to Date Energy Total - Single Mode - TonHr	Input Register	Floating Point Register (1 of 2)	
30064	Year to Date Energy Total - Single Mode - TonHr	Input Register	Floating Point Register (2 of 2)	
30065	Year to Date Energy Total - Single Mode - MJ	Input Register	Floating Point Register (1 of 2)	
30066	Year to Date Energy Total - Single Mode - MJ	Input Register	Floating Point Register (2 of 2)	
30067	Year to Date Energy Total - Single Mode - kWHr	Input Register	Floating Point Register (1 of 2)	
30068	Year to Date Energy Total - Single Mode - kWHr	Input Register	Floating Point Register (2 of 2)	
30069	Year to Date Energy Total - Mode 1 - kBtu	Input Register	Floating Point Register (1 of 2)	
30070	Year to Date Energy Total - Mode 1 - kBtu	Input Register	Floating Point Register (2 of 2)	
30071	Year to Date Energy Total - Mode 1 - MBtu	Input Register	Floating Point Register (1 of 2)	
30072	Year to Date Energy Total - Mode 1 - MBtu	Input Register	Floating Point Register (2 of 2)	
30073	Year to Date Energy Total - Mode 1 - TonHr	Input Register	Floating Point Register (1 of 2)	
30074	Year to Date Energy Total - Mode 1 - TonHr	Input Register	Floating Point Register (2 of 2)	
30075	Year to Date Energy Total - Mode 1 - MJ	Input Register	Floating Point Register (1 of 2)	
30076	Year to Date Energy Total - Mode 1 - MJ	Input Register	Floating Point Register (2 of 2)	
30077	Year to Date Energy Total - Mode 1 - kWHr	Input Register	Floating Point Register (1 of 2)	
30078	Year to Date Energy Total - Mode 1 - kWHr	Input Register	Floating Point Register (2 of 2)	
30079	Year to Date Energy Total - Mode 2 - kBtu	Input Register	Floating Point Register (1 of 2)	
30080	Year to Date Energy Total - Mode 2 - kBtu	Input Register	Floating Point Register (2 of 2)	
30081	Year to Date Energy Total - Mode 2 - MBtu	Input Register	Floating Point Register (1 of 2)	
30082	Year to Date Energy Total - Mode 2 - MBtu	Input Register	Floating Point Register (2 of 2)	
30083	Year to Date Energy Total - Mode 2 - TonHr	Input Register	Floating Point Register (1 of 2)	
30084	Year to Date Energy Total - Mode 2 - TonHr	Input Register	Floating Point Register (2 of 2)	
30085	Year to Date Energy Total - Mode 2 - MJ	Input Register	Floating Point Register (1 of 2)	
30086	Year to Date Energy Total - Mode 2 - MJ	Input Register	Floating Point Register (2 of 2)	
30087	Year to Date Energy Total - Mode 2 - kWHr	Input Register	Floating Point Register (1 of 2)	
30088	Year to Date Energy Total - Mode 2 - kWHr	Input Register	Floating Point Register (2 of 2)	
30089	Previous Year Energy Total - Single Mode - kBtu	Input Register	Floating Point Register (1 of 2)	
30090	Previous Year Energy Total - Single Mode - kBtu	Input Register	Floating Point Register (2 of 2)	
30091	Previous Year Energy Total - Single Mode - MBtu	Input Register	Floating Point Register (1 of 2)	
30092	Previous Year Energy Total - Single Mode - MBtu	Input Register	Floating Point Register (2 of 2)	
30093	Previous Year Energy Total - Single Mode - TonHr	Input Register	Floating Point Register (1 of 2)	
30094	Previous Year Energy Total - Single Mode - TonHr	Input Register	Floating Point Register (2 of 2)	
30095	Previous Year Energy Total - Single Mode - MJ	Input Register	Floating Point Register (1 of 2)	
30096	Previous Year Energy Total - Single Mode - MJ	Input Register	Floating Point Register (2 of 2)	
30097	Previous Year Energy Total - Single Mode - kWHr	Input Register	Floating Point Register (1 of 2)	
30098	Previous Year Energy Total - Single Mode - kWHr	Input Register	Floating Point Register (2 of 2)	
30099	Previous Year Energy Total - Mode 1 - kBtu	Input Register	Floating Point Register (1 of 2)	
30100	Previous Year Energy Total - Mode 1 - kBtu	Input Register	Floating Point Register (2 of 2)	
30101	Previous Year Energy Total - Mode 1 - MBtu	Input Register	Floating Point Register (1 of 2)	
30102	Previous Year Energy Total - Mode 1 - MBtu	Input Register	Floating Point Register (2 of 2)	
30103	Previous Year Energy Total - Mode 1 - TonHr	Input Register	Floating Point Register (1 of 2)	
30104	Previous Year Energy Total - Mode 1 - TonHr	Input Register	Floating Point Register (2 of 2)	
30105	Previous Year Energy Total - Mode 1 - MJ	Input Register	Floating Point Register (1 of 2)	

30106	Previous Year Energy Total - Mode 1 - MJ	Input Register	Floating Point Register (2 of 2)	
30107	Previous Year Energy Total - Mode 1 - kWHr	Input Register	Floating Point Register (1 of 2)	
30108	Previous Year Energy Total - Mode 1 - kWHr	Input Register	Floating Point Register (2 of 2)	
30109	Previous Year Energy Total - Mode 2 - kBtu	Input Register	Floating Point Register (1 of 2)	
30110	Previous Year Energy Total - Mode 2 - kBtu	Input Register	Floating Point Register (2 of 2)	
30111	Previous Year Energy Total - Mode 2 - MBtu	Input Register	Floating Point Register (1 of 2)	
30112	Previous Year Energy Total - Mode 2 - MBtu	Input Register	Floating Point Register (2 of 2)	
30113	Previous Year Energy Total - Mode 2 - TonHr	Input Register	Floating Point Register (1 of 2)	
30114	Previous Year Energy Total - Mode 2 - TonHr	Input Register	Floating Point Register (2 of 2)	
30115	Previous Year Energy Total - Mode 2 - MJ	Input Register	Floating Point Register (1 of 2)	
30116	Previous Year Energy Total - Mode 2 - MJ	Input Register	Floating Point Register (2 of 2)	
30117	Previous Year Energy Total - Mode 2 - kWHr	Input Register	Floating Point Register (1 of 2)	
30118	Previous Year Energy Total - Mode 2 - kWHr	Input Register	Floating Point Register (2 of 2)	
30119	User Defined Energy Total - Single Mode - kBtu	Input Register	Floating Point Register (1 of 2)	
30120	User Defined Energy Total - Single Mode - kBtu	Input Register	Floating Point Register (2 of 2)	
30121	User Defined Energy Total - Single Mode - MBtu	Input Register	Floating Point Register (1 of 2)	
30122	User Defined Energy Total - Single Mode - MBtu	Input Register	Floating Point Register (2 of 2)	
30123	User Defined Energy Total - Single Mode - TonHr	Input Register	Floating Point Register (1 of 2)	
30124	User Defined Energy Total - Single Mode - TonHr	Input Register	Floating Point Register (2 of 2)	
30125	User Defined Energy Total - Single Mode - MJ	Input Register	Floating Point Register (1 of 2)	
30126	User Defined Energy Total - Single Mode - MJ	Input Register	Floating Point Register (2 of 2)	
30127	User Defined Energy Total - Single Mode - kWHr	Input Register	Floating Point Register (1 of 2)	
30128	User Defined Energy Total - Single Mode - kWHr	Input Register	Floating Point Register (2 of 2)	
30129	User Defined Energy Total - Mode 1 - kBtu	Input Register	Floating Point Register (1 of 2)	
30130	User Defined Energy Total - Mode 1 - kBtu	Input Register	Floating Point Register (2 of 2)	
30131	User Defined Energy Total - Mode 1 - MBtu	Input Register	Floating Point Register (1 of 2)	
30132	User Defined Energy Total - Mode 1 - MBtu	Input Register	Floating Point Register (2 of 2)	
30133	User Defined Energy Total - Mode 1 - TonHr	Input Register	Floating Point Register (1 of 2)	
30134	User Defined Energy Total - Mode 1 - TonHr	Input Register	Floating Point Register (2 of 2)	
30135	User Defined Energy Total - Mode 1 - MJ	Input Register	Floating Point Register (1 of 2)	
30136	User Defined Energy Total - Mode 1 - MJ	Input Register	Floating Point Register (2 of 2)	
30137	User Defined Energy Total - Mode 1 - kWHr	Input Register	Floating Point Register (1 of 2)	
30138	User Defined Energy Total - Mode 1 - kWHr	Input Register	Floating Point Register (2 of 2)	
30139	User Defined Energy Total - Mode 2 - kBtu	Input Register	Floating Point Register (1 of 2)	
30140	User Defined Energy Total - Mode 2 - kBtu	Input Register	Floating Point Register (2 of 2)	
30141	User Defined Energy Total - Mode 2 - MBtu	Input Register	Floating Point Register (1 of 2)	
30142	User Defined Energy Total - Mode 2 - MBtu	Input Register	Floating Point Register (2 of 2)	
30143	User Defined Energy Total - Mode 2 - TonHr	Input Register	Floating Point Register (1 of 2)	
30144	User Defined Energy Total - Mode 2 - TonHr	Input Register	Floating Point Register (2 of 2)	
30145	User Defined Energy Total - Mode 2 - MJ	Input Register	Floating Point Register (1 of 2)	
30146	User Defined Energy Total - Mode 2 - MJ	Input Register	Floating Point Register (2 of 2)	
30147	User Defined Energy Total - Mode 2 - kWHr	Input Register	Floating Point Register (1 of 2)	
30148	User Defined Energy Total - Mode 2 - kWHr	Input Register	Floating Point Register (2 of 2)	
30149	Volume Total - Single Mode - Gal	Input Register	Floating Point Register (1 of 2)	
30150	Volume Total - Single Mode - Gal	Input Register	Floating Point Register (2 of 2)	
30151	Volume Total - Single Mode - Liters	Input Register	Floating Point Register (1 of 2)	
30152	Volume Total - Single Mode - Liters	Input Register	Floating Point Register (2 of 2)	
30153	Volume Total - Single Mode - ft3	Input Register	Floating Point Register (1 of 2)	
30154	Volume Total - Single Mode - ft3	Input Register	Floating Point Register (2 of 2)	

30155	Volume Total - Single Mode - m3	Input Register	Floating Point Register (1 of 2)	
30156	Volume Total - Single Mode - m3	Input Register	Floating Point Register (2 of 2)	
30157	Volume Total - Mode 1 - Gal	Input Register	Floating Point Register (1 of 2)	
30158	Volume Total - Mode 1 - Gal	Input Register	Floating Point Register (2 of 2)	
30159	Volume Total - Mode 1 - Liters	Input Register	Floating Point Register (1 of 2)	
30160	Volume Total - Mode 1 - Liters	Input Register	Floating Point Register (2 of 2)	
30161	Volume Total - Mode 1 - ft3	Input Register	Floating Point Register (1 of 2)	
30162	Volume Total - Mode 1 - ft3	Input Register	Floating Point Register (2 of 2)	
30163	Volume Total - Mode 1 - m3	Input Register	Floating Point Register (1 of 2)	
30164	Volume Total - Mode 1 - m3	Input Register	Floating Point Register (2 of 2)	
30165	Volume Total - Mode 2 - Gal	Input Register	Floating Point Register (1 of 2)	
30166	Volume Total - Mode 2 - Gal	Input Register	Floating Point Register (2 of 2)	
30167	Volume Total - Mode 2 - Liters	Input Register	Floating Point Register (1 of 2)	
30168	Volume Total - Mode 2 - Liters	Input Register	Floating Point Register (2 of 2)	
30169	Volume Total - Mode 2 - ft3	Input Register	Floating Point Register (1 of 2)	
30170	Volume Total - Mode 2 - ft3	Input Register	Floating Point Register (2 of 2)	
30171	Volume Total - Mode 2 - m3	Input Register	Floating Point Register (1 of 2)	
30172	Volume Total - Mode 2 - m3	Input Register	Floating Point Register (2 of 2)	
30173	Year to Date Volume Total - Single Mode - Gal	Input Register	Floating Point Register (1 of 2)	
30174	Year to Date Volume Total - Single Mode - Gal	Input Register	Floating Point Register (2 of 2)	
30175	Year to Date Volume Total - Single Mode - Liters	Input Register	Floating Point Register (1 of 2)	
30176	Year to Date Volume Total - Single Mode - Liters	Input Register	Floating Point Register (2 of 2)	
30177	Year to Date Volume Total - Single Mode - ft3	Input Register	Floating Point Register (1 of 2)	
30178	Year to Date Volume Total - Single Mode - ft3	Input Register	Floating Point Register (2 of 2)	
30179	Year to Date Volume Total - Single Mode - m3	Input Register	Floating Point Register (1 of 2)	
30180	Year to Date Volume Total - Single Mode - m3	Input Register	Floating Point Register (2 of 2)	
30181	Year to Date Volume Total - Mode 1 - Gal	Input Register	Floating Point Register (1 of 2)	
30182	Year to Date Volume Total - Mode 1 - Gal	Input Register	Floating Point Register (2 of 2)	
30183	Year to Date Volume Total - Mode 1 - Liters	Input Register	Floating Point Register (1 of 2)	
30184	Year to Date Volume Total - Mode 1 - Liters	Input Register	Floating Point Register (2 of 2)	
30185	Year to Date Volume Total - Mode 1 - ft3	Input Register	Floating Point Register (1 of 2)	
30186	Year to Date Volume Total - Mode 1 - ft3	Input Register	Floating Point Register (2 of 2)	
30187	Year to Date Volume Total - Mode 1 - m3	Input Register	Floating Point Register (1 of 2)	
30188	Year to Date Volume Total - Mode 1 - m3	Input Register	Floating Point Register (2 of 2)	
30189	Year to Date Volume Total - Mode 2 - Gal	Input Register	Floating Point Register (1 of 2)	
30190	Year to Date Volume Total - Mode 2 - Gal	Input Register	Floating Point Register (2 of 2)	
30191	Year to Date Volume Total - Mode 2 - Liters	Input Register	Floating Point Register (1 of 2)	
30192	Year to Date Volume Total - Mode 2 - Liters	Input Register	Floating Point Register (2 of 2)	
30193	Year to Date Volume Total - Mode 2 - ft3	Input Register	Floating Point Register (1 of 2)	
30194	Year to Date Volume Total - Mode 2 - ft3	Input Register	Floating Point Register (2 of 2)	
30195	Year to Date Volume Total - Mode 2 - m3	Input Register	Floating Point Register (1 of 2)	
30196	Year to Date Volume Total - Mode 2 - m3	Input Register	Floating Point Register (2 of 2)	
30197	Previous Year Volume Total - Single Mode - Gal	Input Register	Floating Point Register (1 of 2)	
30198	Previous Year Volume Total - Single Mode - Gal	Input Register	Floating Point Register (2 of 2)	
30199	Previous Year Volume Total - Single Mode - Liters	Input Register	Floating Point Register (1 of 2)	
30200	Previous Year Volume Total - Single Mode - Liters	Input Register	Floating Point Register (2 of 2)	
30201	Previous Year Volume Total - Single Mode - ft3	Input Register	Floating Point Register (1 of 2)	
30202	Previous Year Volume Total - Single Mode - ft3	Input Register	Floating Point Register (2 of 2)	
30203	Previous Year Volume Total - Single Mode - m3	Input Register	Floating Point Register (1 of 2)	
30204	Previous Year Volume Total - Single Mode - m3	Input Register	Floating Point Register (2 of 2)	
30205	Previous Year Volume Total - Mode 1 - Gal	Input Register	Floating Point Register (1 of 2)	

30206	Previous Year Volume Total - Mode 1 - Gal	Input Register	Floating Point Register (2 of 2)	
30207	Previous Year Volume Total - Mode 1 - Liters	Input Register	Floating Point Register (1 of 2)	
30208	Previous Year Volume Total - Mode 1 - Liters	Input Register	Floating Point Register (2 of 2)	
30209	Previous Year Volume Total - Mode 1 - ft3	Input Register	Floating Point Register (1 of 2)	
30210	Previous Year Volume Total - Mode 1 - ft3	Input Register	Floating Point Register (2 of 2)	
30211	Previous Year Volume Total - Mode 1 - m3	Input Register	Floating Point Register (1 of 2)	
30212	Previous Year Volume Total - Mode 1 - m3	Input Register	Floating Point Register (2 of 2)	
30213	Previous Year Volume Total - Mode 2 - Gal	Input Register	Floating Point Register (1 of 2)	
30214	Previous Year Volume Total - Mode 2 - Gal	Input Register	Floating Point Register (2 of 2)	
30215	Previous Year Volume Total - Mode 2 - Liters	Input Register	Floating Point Register (1 of 2)	
30216	Previous Year Volume Total - Mode 2 - Liters	Input Register	Floating Point Register (2 of 2)	
30217	Previous Year Volume Total - Mode 2 - ft3	Input Register	Floating Point Register (1 of 2)	
30218	Previous Year Volume Total - Mode 2 - ft3	Input Register	Floating Point Register (2 of 2)	
30219	Previous Year Volume Total - Mode 2 - m3	Input Register	Floating Point Register (1 of 2)	
30220	Previous Year Volume Total - Mode 2 - m3	Input Register	Floating Point Register (2 of 2)	
30221	User Defined Volume Total - Single Mode - Gal	Input Register	Floating Point Register (1 of 2)	
30222	User Defined Volume Total - Single Mode - Gal	Input Register	Floating Point Register (2 of 2)	
30223	User Defined Volume Total - Single Mode - Liters	Input Register	Floating Point Register (1 of 2)	
30224	User Defined Volume Total - Single Mode - Liters	Input Register	Floating Point Register (2 of 2)	
30225	User Defined Volume Total - Single Mode - ft3	Input Register	Floating Point Register (1 of 2)	
30226	User Defined Volume Total - Single Mode - ft3	Input Register	Floating Point Register (2 of 2)	
30227	User Defined Volume Total - Single Mode - m3	Input Register	Floating Point Register (1 of 2)	
30228	User Defined Volume Total - Single Mode - m3	Input Register	Floating Point Register (2 of 2)	
30229	User Defined Volume Total - Mode 1 - Gal	Input Register	Floating Point Register (1 of 2)	
30230	User Defined Volume Total - Mode 1 - Gal	Input Register	Floating Point Register (2 of 2)	
30231	User Defined Volume Total - Mode 1 - Liters	Input Register	Floating Point Register (1 of 2)	
30232	User Defined Volume Total - Mode 1 - Liters	Input Register	Floating Point Register (2 of 2)	
30233	User Defined Volume Total - Mode 1 - ft3	Input Register	Floating Point Register (1 of 2)	
30234	User Defined Volume Total - Mode 1 - ft3	Input Register	Floating Point Register (2 of 2)	
30235	User Defined Volume Total - Mode 1 - m3	Input Register	Floating Point Register (1 of 2)	
30236	User Defined Volume Total - Mode 1 - m3	Input Register	Floating Point Register (2 of 2)	
30237	User Defined Volume Total - Mode 2 - Gal	Input Register	Floating Point Register (1 of 2)	
30238	User Defined Volume Total - Mode 2 - Gal	Input Register	Floating Point Register (2 of 2)	
30239	User Defined Volume Total - Mode 2 - Liters	Input Register	Floating Point Register (1 of 2)	
30240	User Defined Volume Total - Mode 2 - Liters	Input Register	Floating Point Register (2 of 2)	
30241	User Defined Volume Total - Mode 2 - ft3	Input Register	Floating Point Register (1 of 2)	
30242	User Defined Volume Total - Mode 2 - ft3	Input Register	Floating Point Register (2 of 2)	
30243	User Defined Volume Total - Mode 2 - m3	Input Register	Floating Point Register (1 of 2)	
30244	User Defined Volume Total - Mode 2 - m3	Input Register	Floating Point Register (2 of 2)	
30245	Auxiliary Pulse Input Count- Input 1	Input Register	Floating Point Register (1 of 2)	Unitless count. Value is representative of the total number of pulses received on input.
30246	Auxiliary Pulse Input Count- Input 1	Input Register	Floating Point Register (2 of 2)	Unitless count. Value is representative of the total number of pulses received on input.
30247	Auxiliary Pulse Input Count- Input 2	Input Register	Floating Point Register (1 of 2)	Unitless count. Value is representative of the total number of pulses received on input.
30248	Auxiliary Pulse Input Count- Input 2	Input Register	Floating Point Register (2 of 2)	Unitless count. Value is representative of the total number of pulses received on input.

30249	Auxiliary Pulse Input Count- Input 3	Input Register	Floating Point Register (1 of 2)	Unitless count. Value is representative of the total number of pulses received on input.
30250	Auxiliary Pulse Input Count- Input 3	Input Register	Floating Point Register (2 of 2)	Unitless count. Value is representative of the total number of pulses received on input.
30251	Run Hours	Input Register	Floating Point Register (1 of 2)	
30252	Run Hours	Input Register	Floating Point Register (2 of 2)	
30253	Meter Status	Input Register	Short Integer Register	0 Normal 1 Low Supply Temperature 2 High Supply Temperature 3 Low Return Temperature 4 High Return Temperature 5 Delta T < Minimum 6 High Energy Rate 8 Comm Error 9 Low Supply Voltage 10 System Fault

7.2 DIAGNOSTIC FUNCTION CODE

The MODBUS implementation of the System-20 supports the use of function code 08, Diagnostic.

When using function code 08, you must also specify the "sub-function" code when sending the message to the System-20.

The following sub-functions are supported by the System-20:

Sub-function Code		Name
Hex	Decimal	
00	00	Return Query Data
01	01	Restart Communications Option
04	04	Force Listen Only Mode
0B	11	Return Bus Message Count*
0C	12	Return Bus Communication Error Count*
0D	13	Return Bus Exception Error Count*
0E	14	Return Server Message Count[1]
0F	15	Return Server No Response Count[1]
11	17	Return Server Busy Count[1]
12	18	Return Bus Character Overrun Count[1]

* Count available in System-20 diagnostic menu page 1.

[1] Count available in System-20 diagnostic menu page 2.

Description of Sub-functions:

00 Return Query Data

The data passed to the System-20 in the request data field is to be returned (looped back) in the response. The entire response message should be identical to the request.

01 Restart Communications Option

The System-20 serial line port will be initialized and restarted, and all of its communications event counters are cleared. If the port is currently in Listen Only Mode, no response is returned. This function is the only one that brings the port out of Listen Only Mode. If the port is not currently in Listen Only Mode, a normal response is returned. This occurs before the restart is executed.

04 Force Listen Only Mode

Forces the System-20 to its Listen Only Mode for MODBUS communications. This isolates it from the other devices on the network, allowing them to continue communicating without interruption from the addressed System-20. No response is returned. When the remote device enters its Listen Only Mode, all active communication controls are turned off. The Ready watchdog timer is allowed to expire, locking the controls off. While the device is in this mode, any MODBUS messages addressed to it or broadcast are monitored, but no actions will be taken and no responses will be sent.

The only function that will be processed after the mode is entered will be the Restart Communications Option function (function code 8, sub-function 1).

11 (0B Hex) Return Bus Message Count

The response data field from the System-20 returns the quantity of messages that it has detected on the communications system since its last restart, restart communications option, or power-up.

This count is also available in the System-20's diagnostic menu page.

12 (0C Hex) Return Bus Communication Error Count

The response data field returns the quantity of CRC errors encountered by the System-20 since its last restart, restart communications option, or power-up.

This count is also available in the System-20's diagnostic menu page.

13 (0D Hex) Return Bus Exception Error Count

The response data field returns the quantity of MODBUS exception responses returned by the System-20 since its last restart, restart communications option, or power-up.

This count is also available in the System-20's diagnostic menu page.

14 (0E Hex) Return Server Message Count

The response data field returns the quantity of messages addressed to the System-20, or broadcast, that the System-20 has processed since its last restart, restart communications option, or power-up.

This count is also available in the System-20's diagnostic menu page.

15 (0F Hex) Return Server No Response Count

The response data field returns the quantity of messages addressed to the System-20 for which it has returned no response (neither a normal response nor an exception response), since its last restart, restart communications option, or power-up.

This count is also available in the System-20's diagnostic menu page.

17 (11 Hex) Return Server Busy Count

The response data field returns the quantity of messages addressed to the System-20 for which it returned a Server Device Busy exception response, since its last restart, restart communications option, or power-up.

This count is also available in the System-20's diagnostic menu page.

18 (12 Hex) Return Bus Character Overrun Count

The response data field returns the quantity of messages addressed to the System-20 that it could not handle due to a character overrun condition, since its last restart, restart communications option, or power-up. A character overrun is caused by data characters arriving at the port faster than they can be stored, or by the loss of a character due to a hardware malfunction.

This count is also available in the System-20's diagnostic menu page.

7.3 REPORT SLAVE ID FUNCTION CODE

The MODBUS implementation of the System-20 supports the use of function code 17, Report Slave ID. When a message is sent to the System-20 requesting to report the slave ID, the following information is returned:

System-20-XXXXXX; where XXXXXX - serial number of the System-20

The System-20 will report data in decimal or HEX, depending on the control system settings. The data must be converted from decimal/HEX to ASCII in order to form the string.

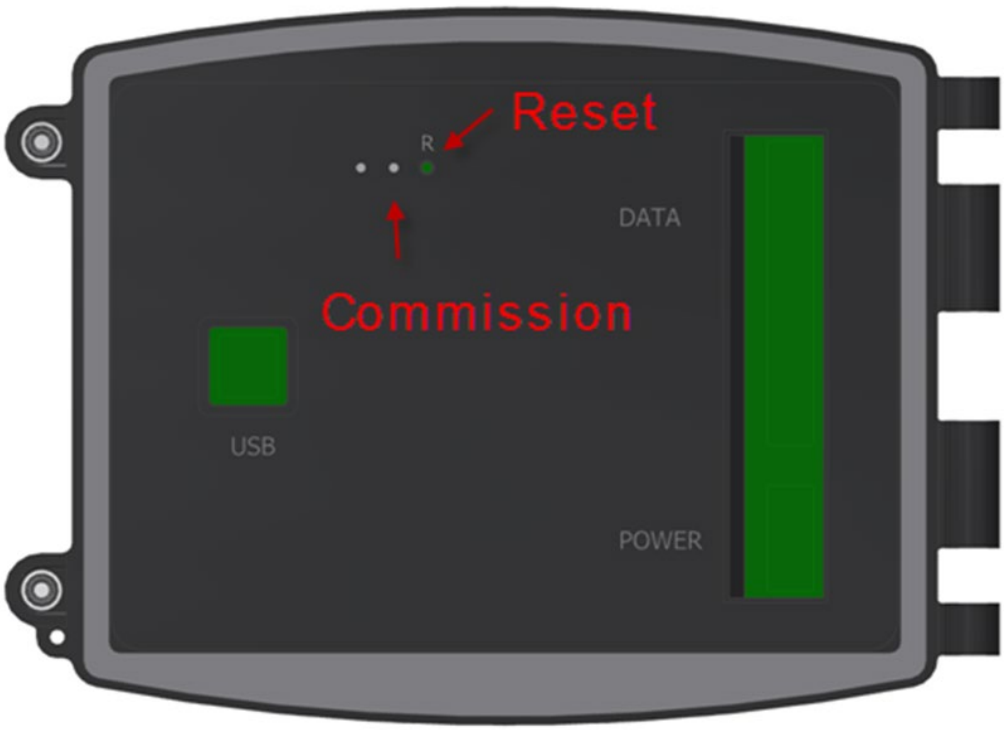
APPENDIX

CHANGING RS485 SETTINGS OR METER PROGRAMMING AFTER COMMISSIONING

RS485 settings and meter programming, including date and time settings, can be changed after commissioning is complete. In order to accomplish this it will be necessary to re-open the enclosure (Refer to section 3.3). Once the cover is open locate the reset and commissioning push-button shown in the drawing below.

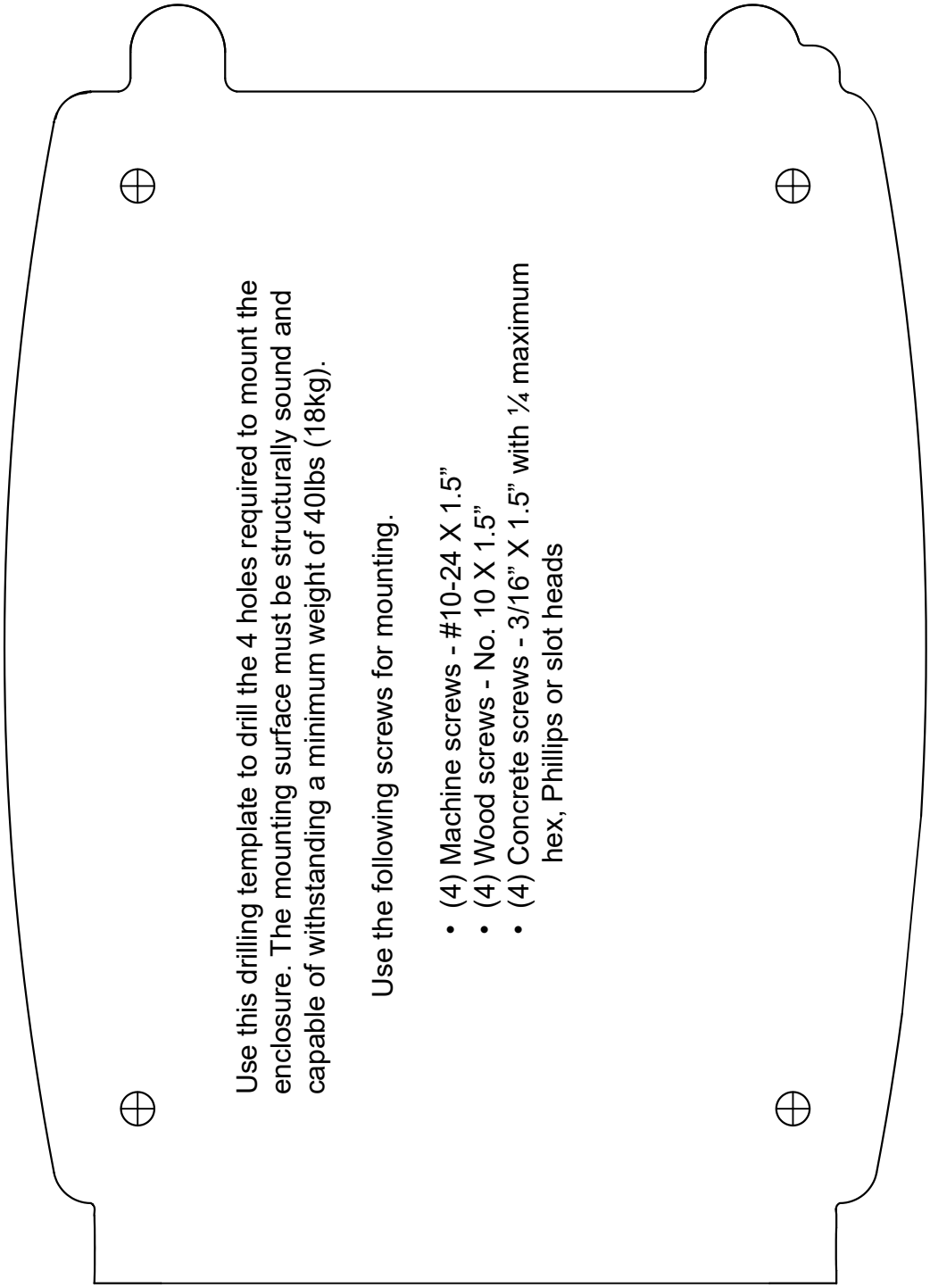
Procedure for Entering the Commissioning Mode

Once the cover is open locate the commissioning button shown in the diagram below. It is immediately to the left of the button marked R. You will need a small diameter probe (1/16") to break the seal and press the button. A straightened paperclip can be used for this. Briefly pressing commissioning once will allow you to re-enter the commissioning mode. Follow the instructions starting in section 4.1 and re-commission the meter. Once the meter is re-commissioned, install a new tamper seal over the commissioning button opening.

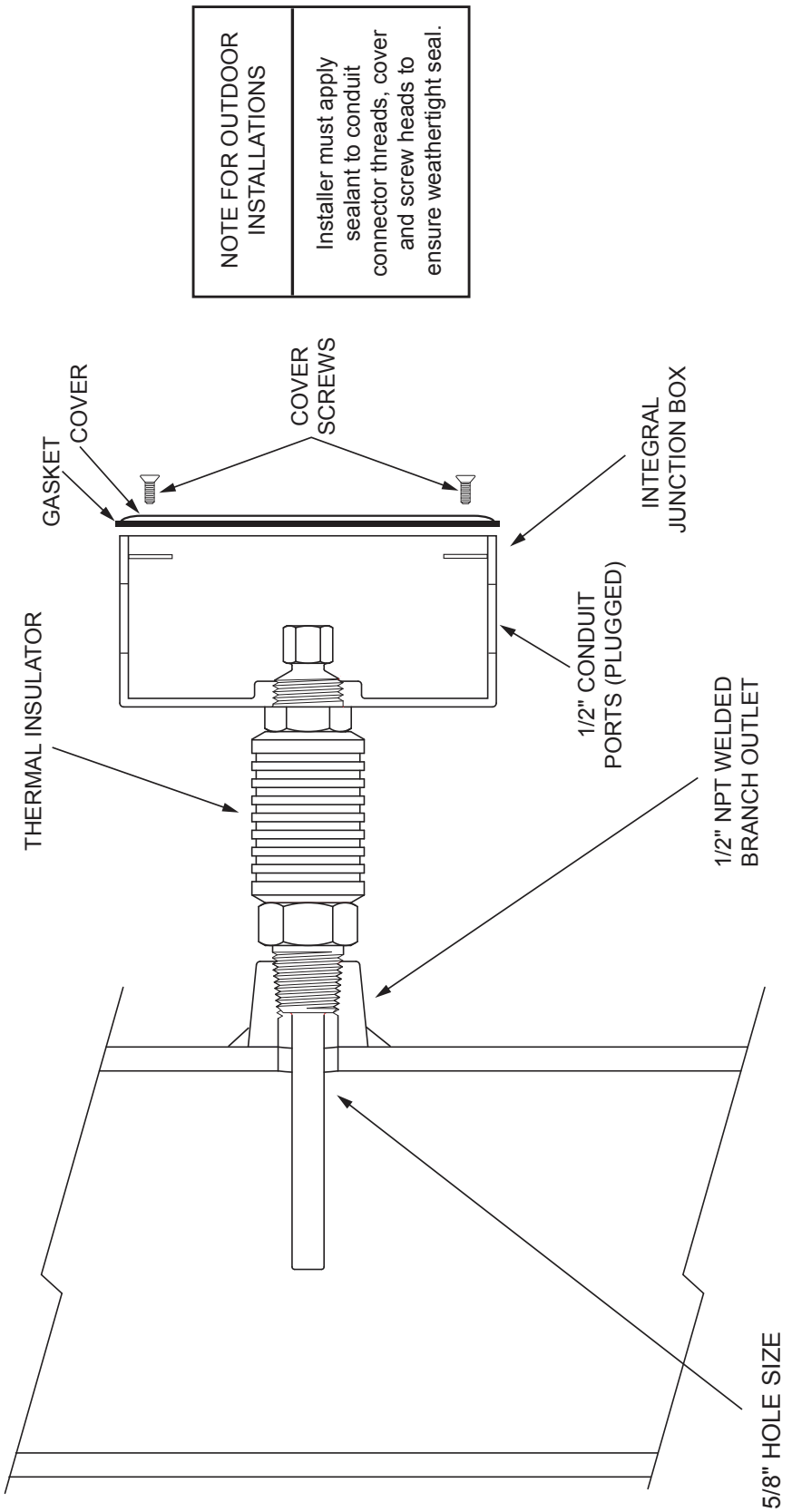


IMPORTANT NOTE:
It will be necessary to break the seal covering the commissioning push-button when reentering the commissioning mode. The seal should be replaced when changes are complete.

1:1 SYSTEM-20 DRILLING TEMPLATE



OUTDOOR THERMOWELL ASSEMBLY IN WELDED PIPE



FRENCH TRANSLATION OF ALL WARNING, CAUTION AND IMPORTANT NOTES (Traductions en français de tous les AVERTISSEMENTS, MISES EN GARDE ET REMARQUES IMPORTANTES)

AVERTISSEMENT **1**
Les messages identifiés comme étant des « Avertissements » comportent de l'information concernant la sécurité personnelle des personnes impliquées dans l'installation, le fonctionnement et l'entretien de ce produit.

MISE EN GARDE **2**
Les messages identifiés comme étant des « Mises en garde » comportent de l'information concernant les dommages potentiels qui pourraient affecter le produit ou tout autre produit connexe.

REMARQUE IMPORTANTE **3**
Les messages identifiés comme étant des « Remarques importantes » comportent de l'information essentielle au bon fonctionnement du produit.

AVERTISSEMENT **4**
Seul un technicien qualifié devrait tenter d'installer ou d'effectuer l'entretien de ce produit. Des blessures graves peuvent découler de la mauvaise installation ou utilisation de ce produit.

ATTENTION **5**
La batterie du System-20 ne peut pas être ajoutée ou remplacée. Risque d'explosion d'incendie et de brûlures. NE PAS recharger, désassembler, écraser, chauffer à une température supérieure à 212 ° F (100 ° C) ou incinérer. Veuillez vérifier vos ordonnances locales pour des informations concernant la mise au rebut de la batterie.

REMARQUE IMPORTANTE **6**
Le System-20 peut être installé à l'extérieur dans des espaces protégés à l'abri de la lumière directe du soleil, de la pluie, du grésil ou de la neige.

REMARQUE IMPORTANTE **7**
Une sélection appropriée du site est essentielle pour garantir la performance de ce compteur BTU. Le capteur de débit et les capteurs de température doivent être bien placés dans le système de canalisation afin de garantir la précision de la mesure énergétique.

REMARQUE IMPORTANTE **8**
Les composantes du Système de mesure en BTU du Système-20 ONICON doivent être configurées, programmées et installées ensemble pour créer un système. Mélanger des composantes provenant de systèmes différents peut conduire à d'importantes erreurs de mesure.

MISE EN GARDE **9**
La liaison des raccords de conduits n'est pas automatique et devrait être fournie dans le cadre de l'installation.

MISE EN GARDE **10**
NE PAS percer de trous dans le boîtier. N'utilisez que les orifices fournis.

MISE EN GARDE **11**
NE PAS UTILISER LE BOÎTIER À TITRE DE MODÈLE POUR PERCER DES TROUS. Ne pas percer de trous dans le boîtier. N'utilisez que les orifices fournis.

REMARQUE IMPORTANTE **12**
Il est important de veiller à ce qu'aucune saleté ni autre corps étranger ne pénètre les puits thermométriques car ceci pourrait avoir un impact sur la réponse thermique du système.

MISE EN GARDE **13**
LE SYSTÈME PEUT ÊTRE SOUS HAUTE PRESSION. Assurez-vous de maintenir fermement à la main la boîte de jonction avant de desserrer lentement l'écrou de serrage de la position lors de l'installation, du réglage ou du retrait du puits thermométrique. Le non respect de cette instruction laissera la pression expulser soudainement et rapidement le puits thermométrique du tuyau, ce qui pourrait entraîner des blessures graves. Le puits thermométrique pourrait également être endommagé ou brisé, provoquant ainsi une rupture dans le joint hydraulique et par conséquent la perte de grandes quantités d'eau.

MISE EN GARDE **14**
Des vibrations excessives risquent d'endommager le puits thermométrique. Insérez le puits thermométrique à la profondeur adéquate en utilisant la jauge fournie tel qu'indiqué. Diminuez la profondeur d'insertion au besoin si des fortes vibrations sont ressenties lors de l'insertion, en vous assurant que l'extrémité du puits thermométrique reste entièrement dans le flux.

MISE EN GARDE **15**
NE PAS TROP SERRER L'ÉCROU DE SERRAGE DE LA POSITION. En cas de fuites de liquide, ne pas tenter d'y remédier en serrant encore plus l'écrou. Un joint torique d'étanchéité interne retient le liquide. Veuillez communiquer avec ONICON pour obtenir de l'aide en cas de fuite.

AVERTISSEMENT **16**
Maintenez un contrôle ferme sur le boîtier de câblage jusqu'à ce que le puits thermométrique soit complètement retiré et la vanne complètement fermée.

REMARQUE IMPORTANTE **17**
Le fait de faire pivoter le puits thermométrique pendant que vous le retirez délicatement à travers la vanne permettra d'assurer que l'extrémité inférieure est complètement retirée et détachée de la vanne. Si vous sentez une résistance en fermant la vanne, ouvrez entièrement la vanne et faites pivoter le puits pendant que vous le retirez du tuyau.

REMARQUE IMPORTANTE **18**
NE PAS TROP SERRER. Le puits thermométrique scelle complètement le système de plomberie. Le vissage du capteur permet d'assurer que l'extrémité du capteur reste en contact avec le fond du puits thermométrique.

AVERTISSEMENT **19**
Débranchez l'alimentation principale avant de continuer

AVERTISSEMENT **20**
Le System-20 doit être connecté à la terre pour un fonctionnement correctement. Ne pas le faire peut entraîner un fonctionnement erratique

ATTENTION **21**
Température nominale minimum du câble à connecter aux bornes de câblage, 140F (60C)

REMARQUE IMPORTANTE **22**
Le System-20 doit être utilisé avec une alimentation externe de Classe II. AC/DC

MISE EN GARDE **23**
Lors du démarrage et de la mise en service, l'emplacement associé au DÉBIT doit être correctement identifié dans le tuyau d'alimentation ou de retour du circuit d'échange thermique. L'emplacement du capteur doit être ensuite programmé dans le compteur. Le non respect de cette instruction provoquera d'importantes erreurs de mesures du flux et de l'énergie.

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