Severe Service Probe (SSP)

Installation, Operation, and Maintenance Guide

AMETEK® Canada
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OVERVIEW

About the Severe Service Probe (SSP) System

The Severe Service Probe (SSP) System has been designed to work with AMETEK Model 909/910/919/920 Hot-Wet SO2 Analyzers and for use in Severe Service applications in Hazardous Area Locations.

The SSP System is designed to improve sampling reliability on SO2 Analyzer sample systems, reduce operational downtime, and reduce maintenance activities and frequency on SO2 Analyzer Sample Systems.

The SSP System incorporates a dedicated Programmable Logic Controller (PLC) with its own Human Machine Interface (HMI) that allows you to monitor the complete SSP System and to allow manual and remote changes to all integral system parameters, manual and remote initiation of the SSP System functions, and interface with the SO2 Analyzer.

The SSP System incorporates precise temperature control of its heated components and configurable sample system blowback features to cleanse its Heated Sample Lines, Heated Sample Filter, and Heated Sample Probe Tube with instrument air blowback operations.

Depending on site requirements or preferences, the SSP System has various communication capabilities that allow it to be linked and communicate with the site's various DCS and Maintenance computer systems.

The SSP System consists of the following essential components (see Figures 1-1, 1-2.1, 1-2.2, 1-2.3, 1-3, and 1-4).

Component	**Function**
For New Applications In new applications the Severe Service Probe System consists of:	
SS PLC Enclosure	The SS PLC Enclosure (Figure 1-1) comes complete with an Allen-Bradley Micrologix Programmable Logic Controller (PLC), an Allen-Bradley Panelview Plus Human-Machine Interface (HMI), and Modbus Serial-to-Ethernet Gateway and Ethernet Switch. The PLC, which is the central processing unit (CPU) of the Severe Service Probe System, comes equipped with I/O boards that reads RTDs from temperature-controlled loads, and performs PID control of the various heaters and control solenoids that make up the SSP System. The HMI allows you to view live SSP and system data and diagnostics and to set up, adjust, and manually control the operations of the SSP System such as blowback timers. The HMI (subsequently referred to as the SSP HMI) also allows you to initiate a SO2 Analyzer Auto-Zero, Calibration, and Validation. This is accomplished via TCP/IP to the SSP HMI and to a DCS configured with a RS-Linx Driver. The Modbus Gateway provides Modbus RTU Serial RS-422 to AMETEK Model 909/910/919/920 SO2 Analyzers. Modbus TCP/IP from DCS to PLC is also possible.
Severe Service Probe (SSP)	The SSP System (Figures 1-2.1, 1-2.2, and 1-2.3) comes equipped with a Heated Sample Probe Tube, Heated Sample Probe Filter, Heated Enclosure, and Blowback circuits for both the Probe Filter and Probe Tube. During Blowback operation, the blowback air is alternated between cleansing the Probe Filter and the Probe Tube. The SSP can also be equipped with an optional, integrated Pitot Tube or an optional, Pitot Tube/Thermocouple (AMETEK Model 909 and 910 SO2 Analyzers only, see Figure 1-3). The SSP comes with an adapter flange that slopes the Heated Probe Tubes 10 to 15 Degrees downwards, to help with natural drainage of condensates that can accumulate inside a cold probe tube. All wetted components used in the SSP are either 316 SS, Hastelloy C-276, or PTFE Teflon. Materials used are determined by the sample gas at each SSP System installation.

Component	Function
Heated Sample Line Bundle	The Heated Sample Line Bundle (Figure 1-4), which uses PTFE Teflon tubing, delivers the sample gas from the Sample Probe to the AMETEK SO2 Analyzer. The Heated Sample Gas Line, which is made up of two heated sample tubes (one is a spare) and one unheated Calibration Gas tube, is custom-built for the site and cannot be altered in the field. The Heated Sample Gas Line is controlled and monitored by the SO2 Analyzer, and monitored by the SS PLC Enclosure.

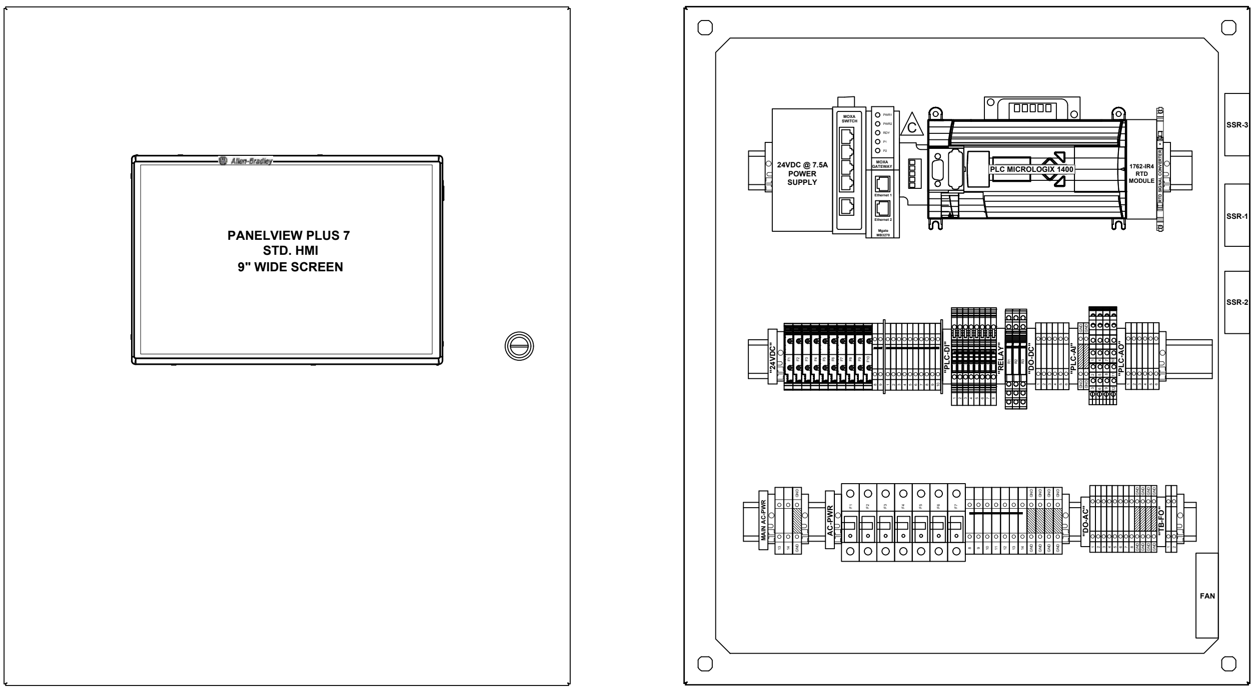
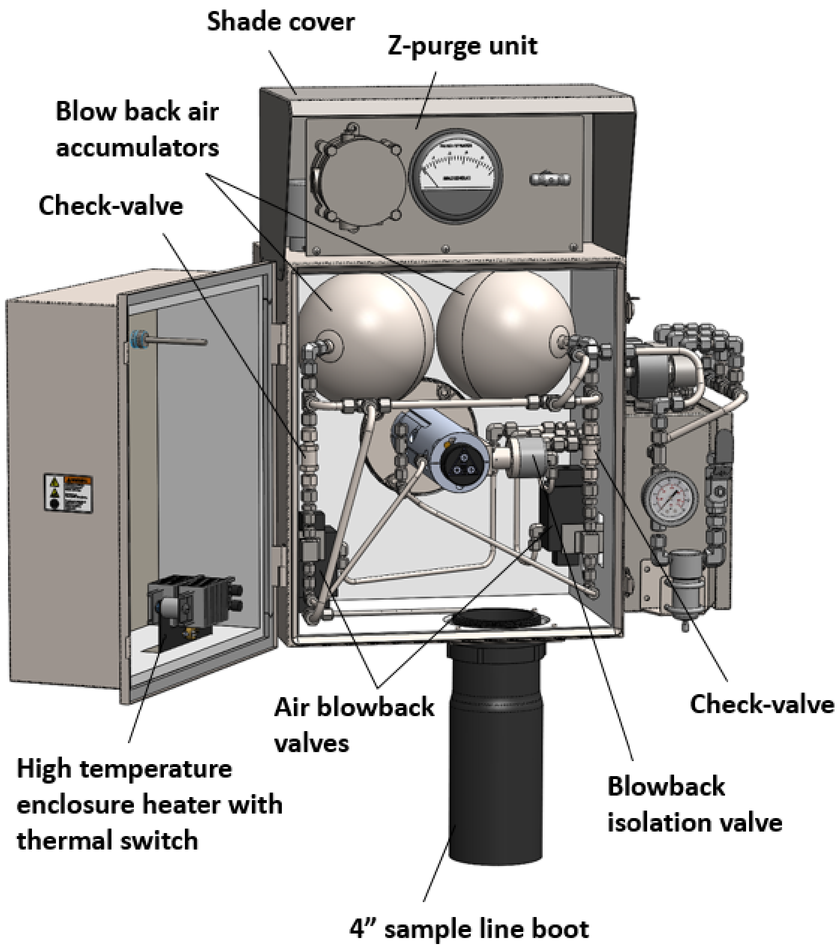


Figure 1-1.
SS PLC Enclosure,
Component layout.

The layout of Figures 1-2.1 and 1-2.2 may not be exactly as shown. Refer to Final As-Built drawings shipped with the SSP System for specific drawings for your system.



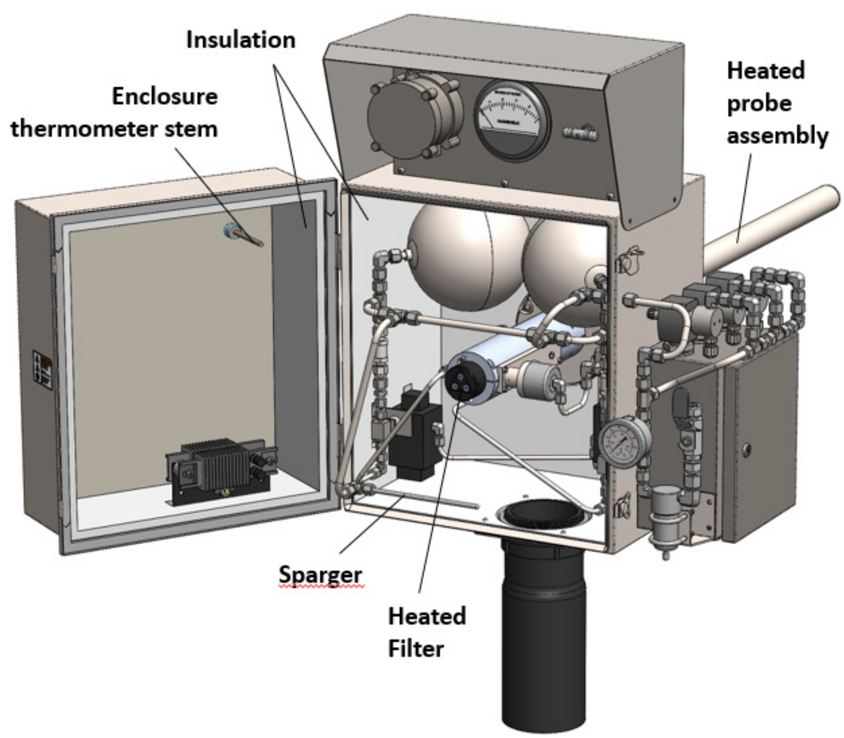


Figure 1-2.1.
Severe Service Probe, component layout.

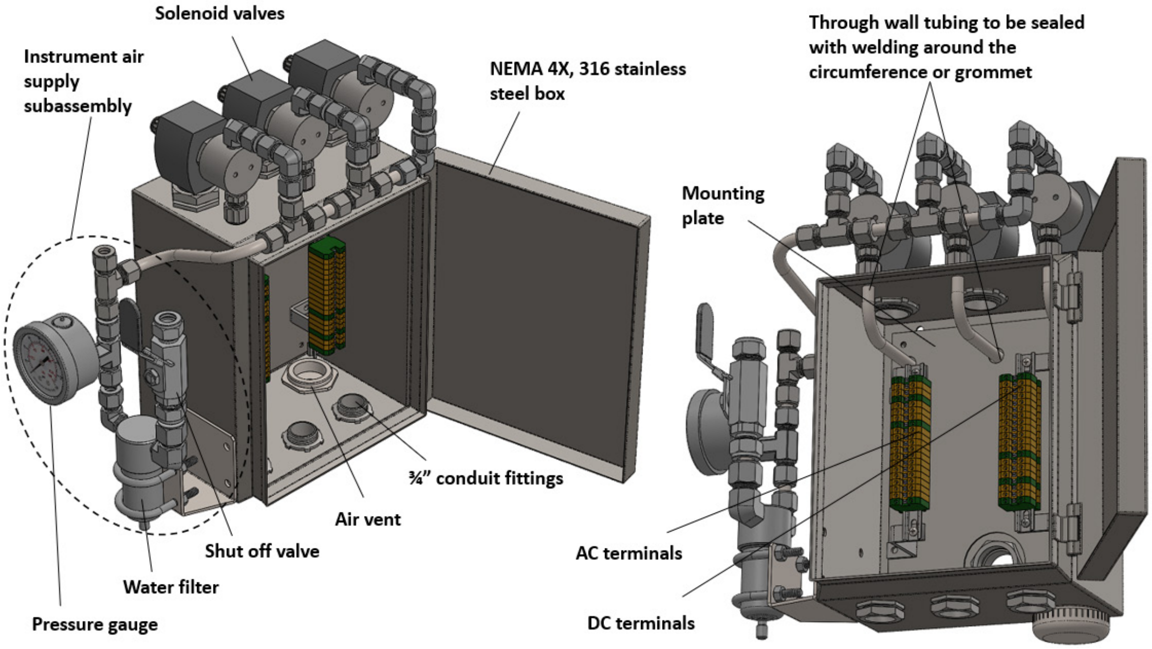


Figure 1-2.2.
Electrical Box/Instrument Air Supply Assembly/ Solenoid Valves (Severe Service Probe), Component layout.

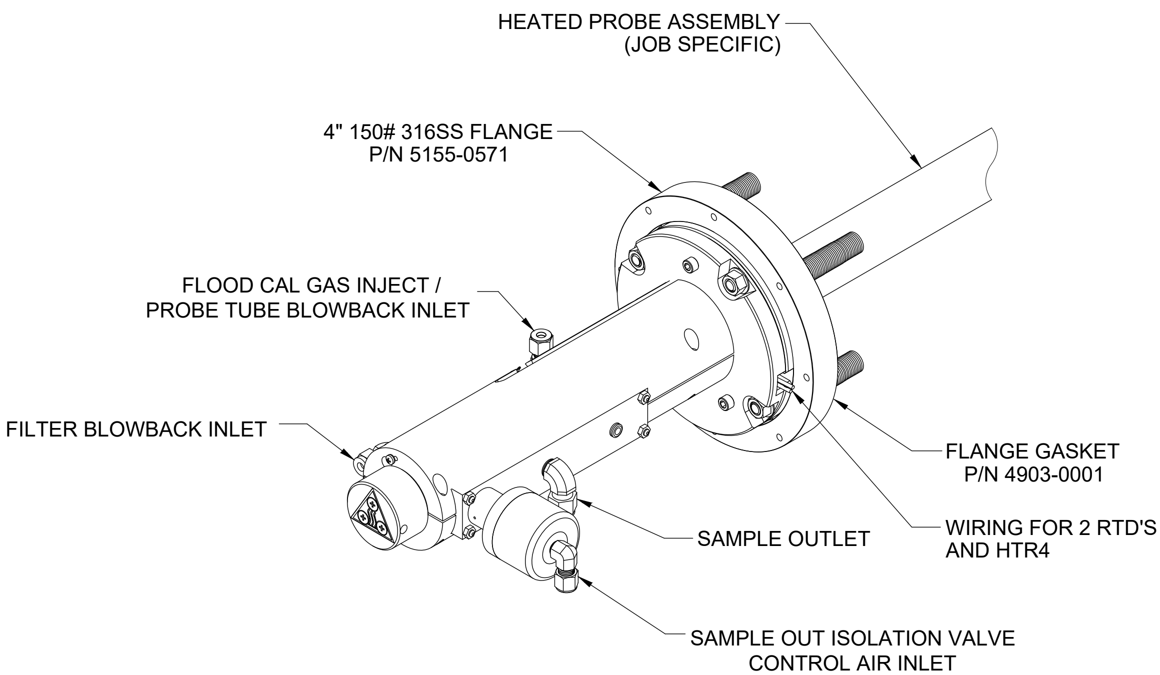


Figure 1-2.3.
Severe Service Probe/ Filter Chamber.

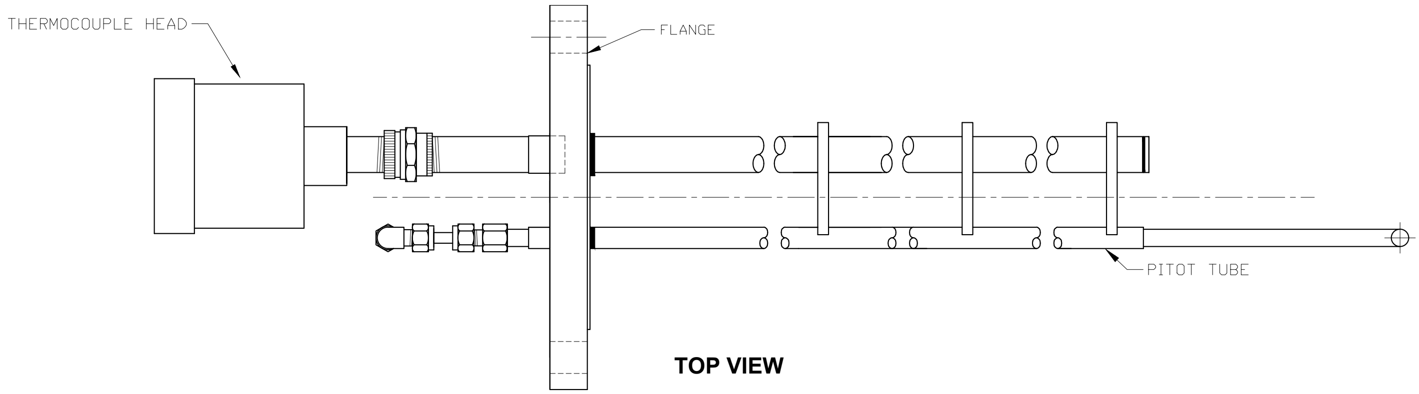


Figure 1-3.
Severe Service Probe, with Pitot Tube/ Thermocouple option.

NOTE

Figure 1-3 illustrates the Severe Service Probe with the Pitot Tube/ Thermocouple option, which is available only for AMETEK Model 909 and Model 910 Analyzers.

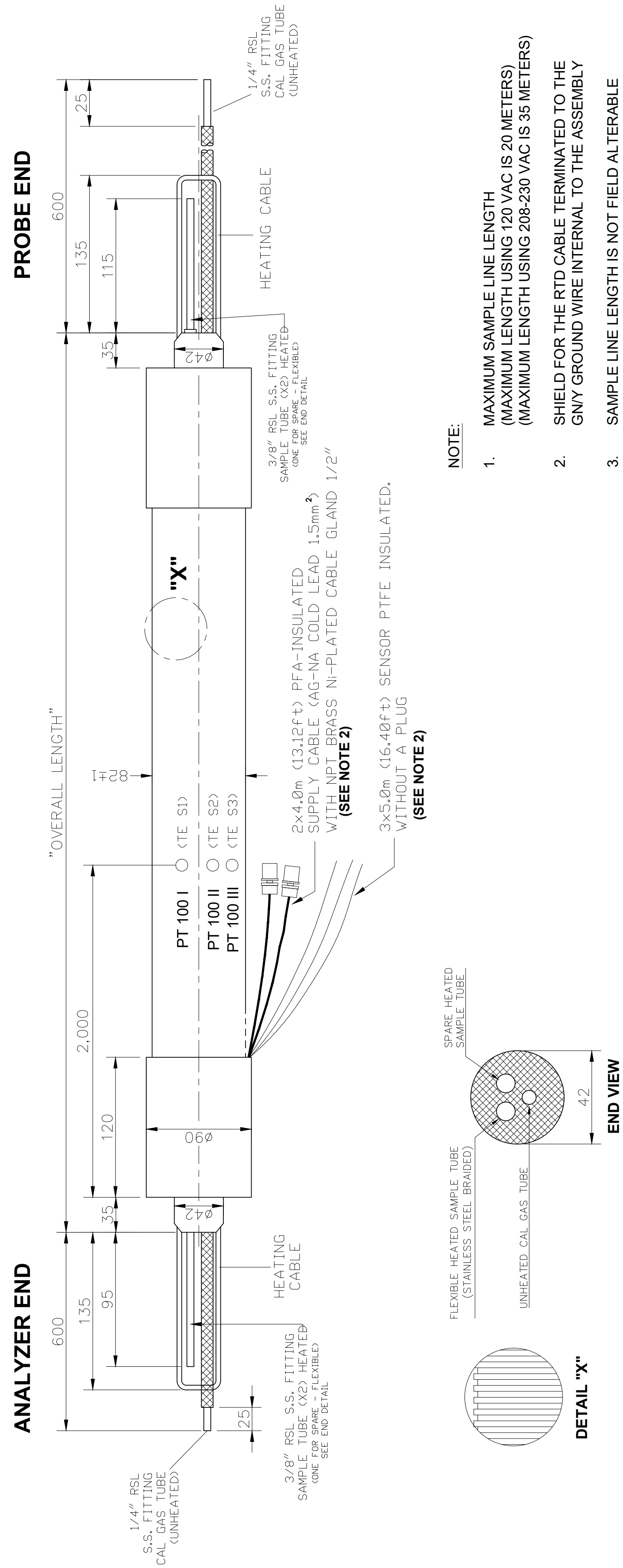


Figure 1-4.
SS Heated Sample Line Bundle, example.

Important Safety Information

Before installing, operating, or servicing the Severe Service Probe – and before opening it at any time after it has been in operation – read and follow all Warnings, Cautions, and Notes in this Guide, in the AMETEK SO2 Analyzer manual, and in the Universal Analyzers Inc. Severe Service Gas Sample Probe *Instruction Manual*. This information contains important safety and general information about the analyzer.

Working with the SS PLC Enclosure open is typically limited to installation, start-up (and verification), and certain troubleshooting and maintenance procedures. In these cases, appropriate safety conditions must have been met, as per company policy, to work with the SS PLC Enclosure open.

WARNING

*The SS PLC Enclosure, Severe Service Probe Enclosure, and AMETEK SO2 Analyzer shall not be opened unless the area has been tested and is known to be free of flammable materials or unless all devices within have been de-energized. Power shall not be restored after the SSP Enclosure and/or AMETEK SO2 Analyzer has been open until the SSP Enclosure and Analyzer Enclosure (if purged) have been purged for the minimum purge time (minutes) at the required flow rate (LPM) – see the "**WARNING – INSTRUCTIONS**" label on the side of the SSP Enclosure door and on the AMETEK SO2 Analyzer enclosure for additional details.*

The safety of this equipment relies on the provision of proper purging and pressurizing when used in hazardous locations. It must not be put into use without "special permission" from the inspection authority having jurisdiction.

WARNING

The SS PLC Enclosure, Severe Service Probe Enclosure, and AMETEK SO2 Analyzer use multiple power supplies. Always disconnect main AC power and/or alternate power sources to the SS PLC Enclosure, SSP Enclosure, and SO2 Analyzer before removing any sample system assemblies and components, or before opening any covers on the SS PLC Enclosure, SSP Enclosure, or SO2 Analyzer.

If it is necessary to open any enclosures on the SS PLC Enclosure, SSP Enclosure, or SO2 Analyzer while the circuits are live, test the area for explosive gases and proceed only when it is found to be safe (as per end user company policy). When the enclosures are open, take appropriate precautions to avoid electrical shock and burns. Hazardous voltages and extremely high temperatures are present inside.

WARNING

Any electrical connections, adjustments, or servicing of the SS PLC Enclosure and SSP should be performed only by properly trained and qualified personnel.

All electrical connections, materials, and methods (plus all safety standards and procedures) must be made in compliance with local wiring regulations and electrical code for the hazardous area, as specified by the Owner Company, local electrical-inspection authority, and National/EU regulations.

WARNING

Before performing any maintenance on the SSP, familiarize yourself with safe and proper Shutdown procedures, as discussed in this Guide, the AMETEK SO2 Analyzer manual, and the Universal Analyzers Inc. Severe Service Gas Sample Probe Instruction Manual.

Working in This Guide

This guide is intended to specifically discuss the installation, operation, and maintenance of all essential components that make up the SSP System. While the SSP System works in conjunction with AMETEK SO2 Analyzers, refer to dedicated AMETEK SO2 Analyzer manuals for complete information about the specific SO2 Analyzer employed as part of this system. For additional, detailed information about the SSP, refer to the Universal Analyzers Inc. Severe Service Gas Sample Probe *Instruction Manual*, shipped with the SSP System.

While working in this guide, icons in the outside page margins represent various kinds of information that serve as *reminders* or extra information about the topic.

Descriptions of SSP Human-Machine Interface (SSP HMI) menus, terms, characters, parameters, and commands can be found in Chapter 4 in this guide.

Example:
See "Working From the HOME screen" in Chapter 4 for status messages that can appear here.

Reminder icon:
These reminders indicate related information about the topic, certain actions that are necessary before continuing with the current procedure, or information that is recommended by AMETEK. See example at left.

Example:
HOME (screen)→Maintenance

Severe Service Probe HMI (SSP HMI) Navigation icon:
While working from the Human-Machine Interface, use these navigational aids to quickly access software screens. See example at left, and see "Working From the HMI" in Chapter 4.

SPECIFICATIONS

This section primarily discusses specifications for the Severe Service (SS) PLC Enclosure and the Severe Service Probe (SSP) Enclosure, with some basic information about the Sample Probe. For complete Sample Probe specifications, refer to the Universal Analyzers Inc. Severe Service Gas Sample Probe *Instruction Manual*.

Ambient Limits, SS PLC Enclosure

Temperature

0 °C–40 °C (32 °F–104 °F)

Humidity

0–95 % RH

Sample Transport

By aspiration, using air or N_2 as the drive gas.

Sample Flow

5–60 L/min (0.177–1 SCFM)

Instrument Air Requirements (Sample Probe only)

Pressure:	420–840 KPAG (60–120 PSIG) – GP applications 420–840 KPAG (60–120 PSIG) – Hazardous Locations
Flow:	60–120 L/min (2–4 SCFM)
Air Quality:	As per ANSI/ISA-S7.0.01 (1996) Quality Standard for Instrument Air

Physical Dimensions

SS PLC Enclosure

Height:	508.0 mm (20.0")
Width:	508.0 mm (20.0")
Depth:	203.2 mm (8.0") Requires minimum 508.0 mm (20.0") in front of SS PLC Enclosure for door swing.
Weight:	11.3 kg (25 lb)

SSP Enclosure

Height:	485.14 mm (19.1") – without Z-Purge Unit 739.14 mm (29.1") – with Z-Purge Unit
Width:	584.2 mm (23.0") – with Electrical Box
Depth:	342.9 mm (13.5") Requires minimum 609.6 mm (24") in front of SSP Enclosure for door swing.
Weight:	Approximately 36.3 kg (80 lb)

Electrical Requirements

Supply Voltage

SS PLC Enclosure and Severe Service Probe

120 V 50/60 Hz 20 A (or as specified on Final “As-Built” drawings)
(240 V Model also available)

A 24 VDC power supply located inside the SS PLC Enclosure supplies power to the SS PLC Enclosure and its Human-Machine Interface (HMI).

SS Heated Sample Line Bundle

Refer to Sample Line Final “As-Built” drawings for details.

Approvals

The SS PLC Enclosure is rated Class 1 Division 2 Group C,D T4. All components have individual Type certifications, typically non-incendive; therefore, no Z-purge is required.

The SS Probe Enclosure is rated Class 1 Division 2 Group C,D T3.

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INSTALLATION AND START-UP

WARNING

The installation of the Severe Service Probe (SSP) System must be in accordance with all of the end user and local regulatory standards and procedures. There are no operator-serviceable components inside the SSP System. Refer servicing to qualified personnel.

This section describes how to install the AMETEK Severe Service Probe (SSP), which will be installed at the same time as the AMETEK SO2 Analyzer.

Safety Considerations

WARNING

Before installing the Severe Service Probe System and powering it up, review and follow all safety information in this chapter, in the section "Important Safety Information" in Chapter 1, and under "Personnel and Equipment Safety Information" following the Table of Contents in the AMETEK SO2 Analyzer manual. This information describes procedures to follow to avoid personal injury and/or damage to the equipment. ***All regulatory agency and personnel safety procedures for your jurisdiction must be followed.***

WARNING

Take all appropriate safety precautions to prepare for replacing an existing Sample Valve or Sample Probe with an AMETEK Severe Service Probe System.

This includes obtaining a "hot permit" plus meeting all other safety requirements, as required by company and hazardous areas safety policies.

WARNING

Under normal operating conditions, lethal concentrations of toxic gases from the sample stream may be present within the sample system. The sample system is defined as all components in the analyzer system – and all sample system parts in the Severe Service Probe System – through which sample gas passes.

Depending on the application and process status, a breathing apparatus may have to be worn when installing/removing equipment from the sample gas extraction point. If the sample stream is under positive pressure, injury or death from inhaling toxic gases in the sample stream could result from attempting to install/remove equipment without the use of a breathing apparatus.

The Severe Service PLC Enclosure, Severe Service Probe, and Analyzer Oven enclosure and components within these enclosures are hot; take precautions to avoid burning yourself.

Pre-Installation Requirements

Storage Prior to Installation

If the Severe Service PLC Enclosure, the Severe Service Probe, and Severe Service Heated Sample Line Bundle are stored for any period of time prior to installation, store the equipment in an environment where it is not subject to dripping or splashing liquids, corrosive gases, high humidity, or excessive heat or cold. Recommended storage conditions include:

Temperature:	0 °C to 50 °C (32 °F to 122 °F)
Relative Humidity:	< 70 %

Failure to comply with these storage conditions will void your warranty.

Uncrating and Inspecting the Severe Service Probe System

Upon receiving the SSP System, remove the components from their shipping crates and examine their exteriors for any obvious damage. Repackage and reseal all components in their original shipping crates until they are ready to be installed.

Supplies and Equipment Required for Installation

For all customer/end-user installation responsibilities, refer to Final "As-Built" drawings package shipped with the system.

Installing the Severe Service Probe System

When the SSP System is ordered as an integral part of a new AMETEK SO2 Hot-Wet Analyzer and sample system, the analyzer will incorporate various Pressure and Flow Regulation components that are used to control Sample Line Isolation/Blowback portion of the SSP System. It will also incorporate the necessary communication components.

The system also includes the SS PLC Enclosure, SSP, and the SS Heated Sample Line Bundle.

Installing the AMETEK SO2 Analyzer

Install the AMETEK SO2 Analyzer in a temperature-controlled shelter. Refer to the AMETEK Analyzer manual for complete installation details, and install the analyzer along with the SSP System.

Installing the SS PLC Enclosure

NOTE

While installing the SS PLC Enclosure, refer to PLC-related Final "As-Built" drawings for important installation information. These drawings are included in the Documentation Package shipped with the system.

AMETEK recommends installing the SS PLC Enclosure as close as possible to the SO2 Analyzer, in a temperature-controlled shelter.

The SS PLC Enclosure is rated Class 1 Division 2 Group C,D T4. All components have individual Type certifications, typically non-incendive; therefore, a Z-purge is not required.

Power feed options to the SS PLC Enclosure include:
120 V 60 Hz 20 A (or as specified on Final "As-Built" drawings)

A 24 VDC power supply, located inside the SS PLC Enclosure, supplies power to the SS PLC Enclosure and its Human-Machine Interface (HMI).

Allow 508.0 mm (20.0") in front of the SS PLC Enclosure to allow for door swing.

The surrounding ambient temperature of the SS PLC Enclosure must be between 0–40 °C (32–104 °F).

Installing the Sample System Components

NOTE

While installing the Severe Service sample system components, refer to related Final "As-Built" drawings included in the Documentation Package shipped with the system.

Installing the Severe Service Probe

Depending on the system, the Severe Service Probe options include:

- Standard Severe Service Probe
- Severe Service Probe with integrated Pitot Tube and/or Thermocouple (this option is available only for AMETEK Model 909 and Model 910 SO2 Analyzers)
  OR
  Severe Service Probe with separate Pitot Tube/Thermocouple (this option is available only for AMETEK Model 909 and Model 910 SO2 Analyzers)

NOTE

When installing the Severe Service Probe, refer to all related Installation drawings, which are part the Final "As-Built" drawings package shipped with the system. These drawings include important installation information, such as clearances for all components and for flange installations.

After the Probe has been installed, make the Probe electrical connections, as indicated on Sample Probe Wiring Schematic, part of the Final "As-Built" drawings package shipped with the system.

The layout of Figure 3-1 may not be exactly as shown. Refer to Final As-Built drawings shipped with the SSP System for specific drawings for your system.

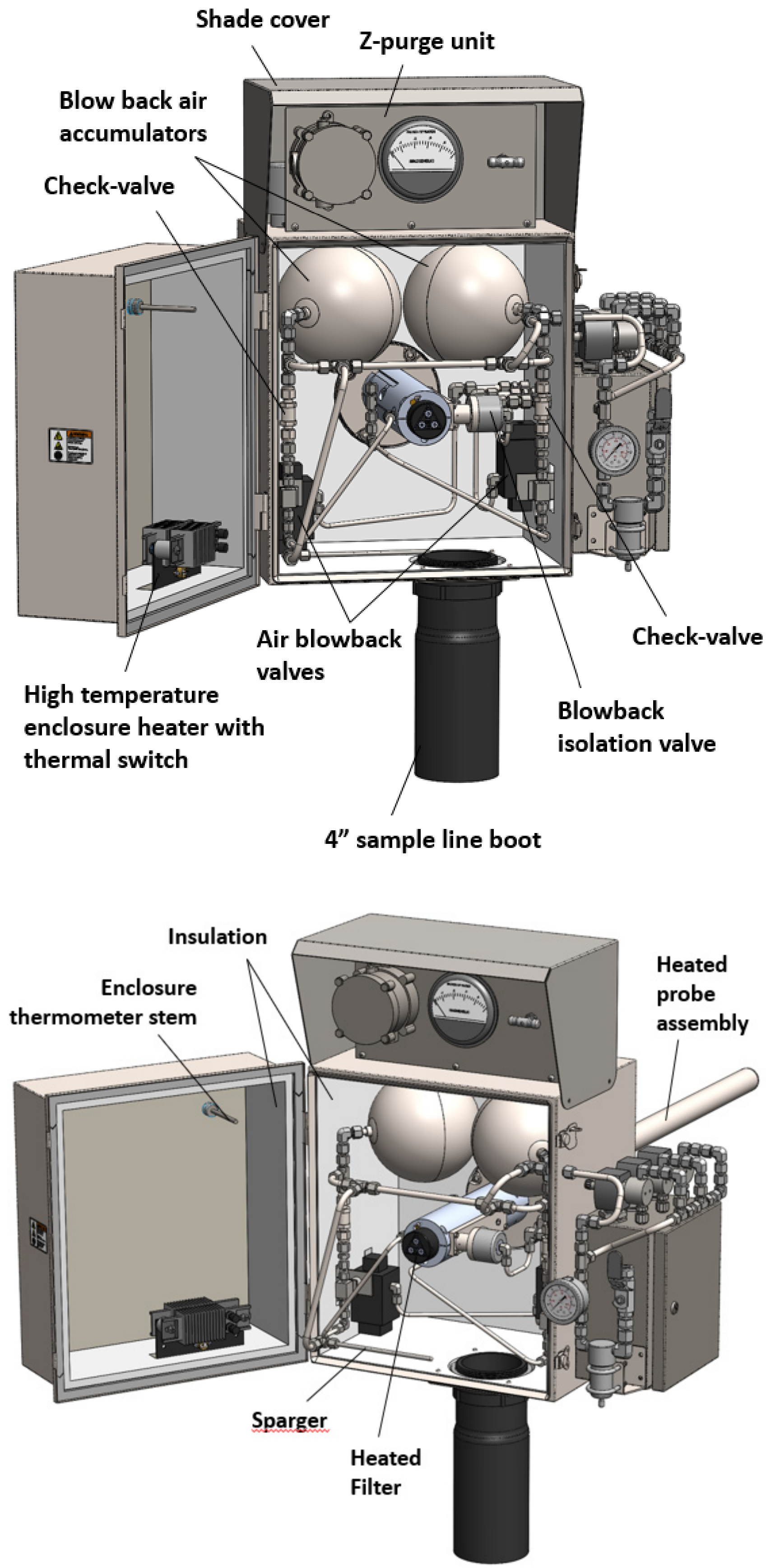

Figure 3-1.
Severe Service Probe enclosure, Component layout.

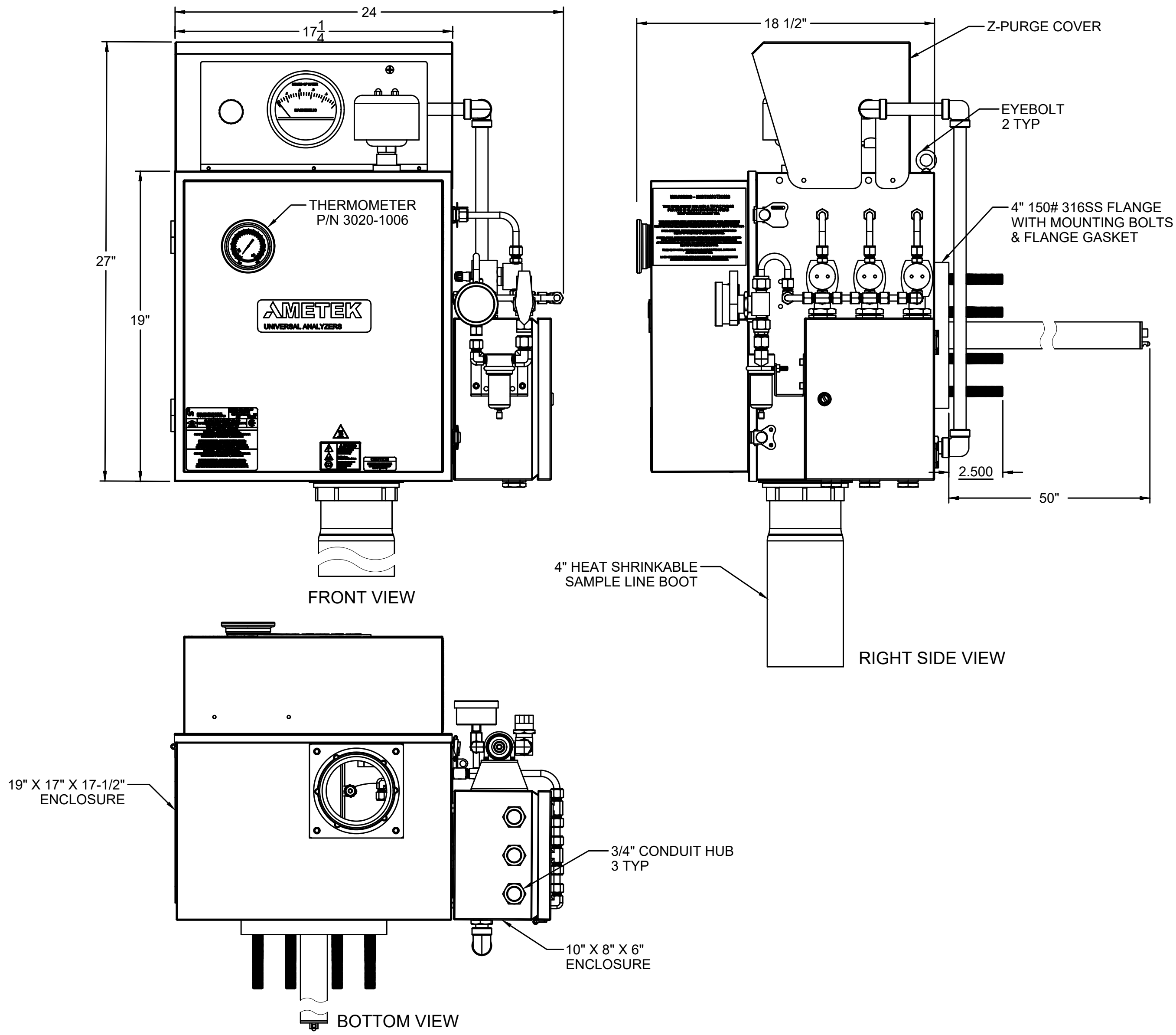

Figure 3-2.
Severe Service Probe enclosure.

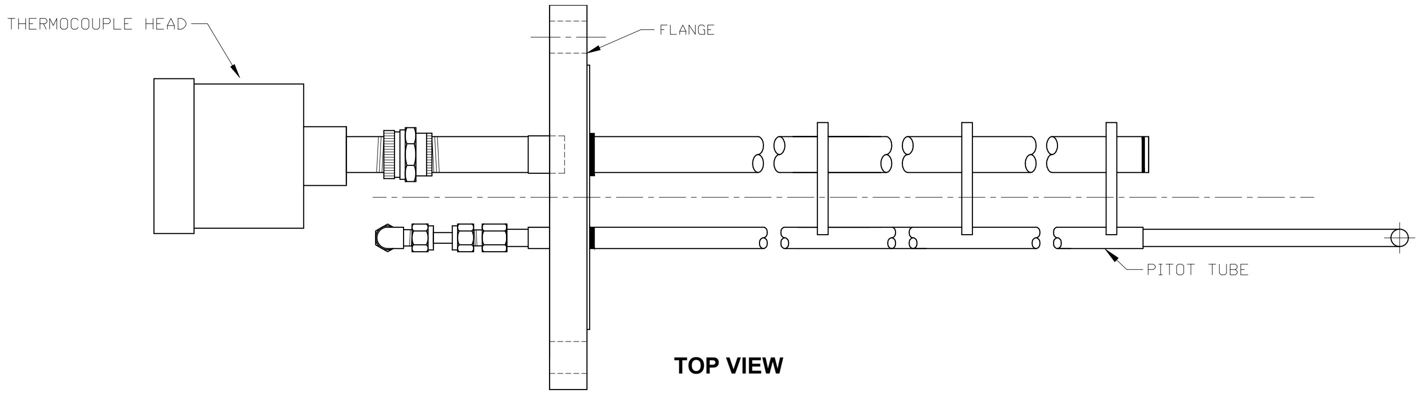

Figure 3-3.
SSP, with Pitot Tube/ Thermocouple option.

NOTE

Figure 3-3 illustrates the Severe Service Probe with the Pitot Tube/ Thermocouple option, which is available only for AMETEK Model 909 and Model 910 Analyzers.

Installing the SS Heated Sample Line Bundle

The installation of the SS Heated Sample Line Bundle can vary slightly, depending on Sample Line length. Refer to Sample Line-related Final "As-Built" drawings shipped with the system for details.

CAUTION

Do not lift or support the SS Heated Sample Line by its tubing fittings. Doing so can pull the fitting off the sample transport tube. A wire mesh cable support (example, Kellems grips, as indicated on system drawings) must be installed on the line before lifting it and when a line is to be suspended vertically. The Sample Line is custom-built for each installation; it cannot be cut to length on-site.

To avoid damaging the Sample Line, use two wrenches to ensure that the fitting body does not turn on the Teflon tube.

To install the SS Heated Sample Line Bundle:

NOTE

Before beginning, identify the "Analyzer End" and "Probe End" of the heated Sample Line.

1. Unwrap and lay out the Sample Line, with the "Analyzer End" at the shelter that houses the SO2 Analyzer (see "Sample Line Details" and "Mounting Recommendations for Sample Lines" drawings, part of the Final "As-Built" drawings package shipped with the system).

   Route the Sample Line (also contains the Calibration Gas tube) through the hole marked "Sample Line" on the side of the shelter and then to the Analyzer Oven.

   Route the "Probe End" of the Sample Line from the analyzer to the Sample Probe on the process stack.

   Ensure there are no loops, sags, or other traps in the Sample Line. Provide support where needed.

2. The used sample gas will be routed to a safe location and vented to atmosphere, as per company site policy. The Vent line is supplied by customer/end-user.

   Route the Vent Line tube through the hole marked "Vent Line" on the side of the shelter and then to the Analyzer Oven.

Ensure there are no loops, sags, or other traps in the Vent Line. Provide support where needed.

Refer to the Sample Line Final "As-Built" drawings shipped with the system.

3. Make the Sample Line connections inside the Analyzer Oven.

Route the Sample Line through the upper hole on the side of the Analyzer Oven. Connect the Sample tube to the Sample Inlet fitting in the Oven. Connect the Calibration Gas tube to the CAL Gas fitting in the Oven.

CAUTION

Do not add extra insulation to the Sample Line. This will result in a local hot spot and cause premature failure of the line.

Route the Vent Line tube through the lower hole on the side of the Analyzer Oven. Connect it to the Sample Outlet fitting in the Oven.

4. Connect the Sample Line to the Sample Probe.

Secure the Vent Line tube to its dispersal location, where it will vent to atmosphere.

Make the Sample Line heater/ground wiring connections, as indicated on the Sample Line connection/termination diagrams, part of the Final "As-Built" drawings package shipped with the system.

CAUTION

Connect the ground lead to the ground terminals before connecting the heater leads.

Installing the Plant Air or Plant Nitrogen

These lines are supplied by the customer. For details about your system and supply line requirements (tubing and fitting sizes, pressure requirements), refer to the "System Block Diagram," part of the Final "As-Built" drawings package shipped with the system.

The recommended Zero Gas is UHP Nitrogen or Instrument Air for non-flammable streams.

NOTE

If using Instrument Air, it must meet the ANSI/ISA S7.0.01 (1996) specifications at all times. If the Instrument Air cannot meet these requirements, an inlet filter system must be installed.

Refer to the Final "As-Built" drawings for important installation information about the system.

Before installing these lines, blow down (purge) the lines to remove any liquids or particulate that may be present in the lines before connecting them to the SO2 Analyzer and Sample Probe.

Making the Electrical Connections

After all of the equipment and components have been installed, route and connect wiring/conduit and cables and make the electrical connections between the equipment and components. As wiring requirements can vary from site to site, specific wiring drawings are not included in this manual.

Refer to the AMETEK Model 909/910/919/920 SO2 Analyzer manual for information about making analog input/output signal, alarm relay contact, and AC power connections to the analyzer. Also, refer to the SSP System Final "As-Built" drawings package shipped with the system for SSP System equipment and component wiring diagrams.

Start-Up and Verification

This section describes equipment and controls on the SSP System that require adjustments and settings before, during, and after power-up. This section also describes what to expect from the SSP System upon power-up, and how to determine that the system is ready for service. Refer to the AMETEK SO2 Analyzer manual for details about analyzer start-up and verification requirements. After both the analyzer and the SSP System are ready for operation, the entire system can be commissioned into service.

NOTE

Figure 3-1 illustrates the locations of SSP System equipment and controls that require adjustments. For equipment and controls specific to your system, refer to the Final "As Built" drawings package shipped with the system.

NOTE

Before working from the SSP Human-Machine Interface (SSP HMI), read and understand how to work from the SSP HMI, described in Chapter 4 and Chapter 5.

WARNING

*The SSP Enclosure must be purged for 15 minutes at the maximum flow rate before AC power is applied to the system. See the "**WARNING – INSTRUCTIONS**" label on the side of the SSP Enclosure door for additional details.*

The SSP Enclosure purge system indicator (on the SSP Purge Pressure Magnahelic) must be displaying GREEN before powering up or down the SSP System.

Powering Up the Severe Service Probe System and SO2 Analyzer

The PLC (and HMI) power is supplied from the SS PLC Enclosure's 24 VDC power supply. When the HMI is powered up, it defaults to the **HOME** screen (Figure 3-4). The SSP has its own, separate power supply.

NOTE

Before powering up the SSP System and AMETEK SO2 Analyzer, ensure that all equipment, plumbing connections, and electrical connections have been made and verified (as described earlier in this chapter), and the entire SS Sampling System has been leak checked (and passed), as described under "Sample System Leak Check" in the AMETEK Model 9XX SO2 Analyzer manual.

WARNING

Do not open or close the fuses in the SS PLC Enclosure for any of the Probe Heaters or the 24 VDC Power Supply (or open/close the explosion-proof power-disconnect switches for this equipment) until after the SSP Enclosure has purged for 15 minutes at the maximum flow rate, or sooner if the area has been tested and is known to be safe.

To power up the SSP System and AMETEK SO2 Analyzer, and prepare them for normal operation:

1. Close the explosion-proof power-disconnect switch for the SO2 Analyzer to apply power to the analyzer and place it in *manual Backpurge* Flow Control mode. (If the analyzer is already in *Automatic* Flow Control mode, it will automatically go into *automatic Backpurge* mode).

NOTE

Refer also to the AMETEK SO2 Analyzer manual for details about powering up the SO2 Analyzer and its temperature circuits.

Close the Analyzer Oven fuse to apply power to its Heater.

Close the Sample Line fuse(s) (or close the explosion-proof power-disconnect switch, if used) to apply power to the Sample Line circuitry.

Close the explosion-proof power-disconnect switch for the SS PLC Enclosure to apply power to the SS PLC Enclosure, which also supplies power to the SSP HMI and PLC via a 24 VDC power supply housed in the SS PLC Enclosure.

Close the explosion-proof power-disconnect switch for the SSP Enclosure.

NOTE

The SO2 Analyzer will take approximately two hours (from a cold start) to warm up to normal operating temperature. The SSP will take approximately one hour for its heated Filter and its Enclosure Heater to warm up to operating temperature.

☞ *Analyzer User Interface:* *TStPt screen (RUN→F4 0→ 1..4*

SSP HMI: HOME screen

Temperature zone alarms on the analyzer User Interface and the SSP HMI will be triggered and displayed while the system is warming up. You can monitor the different temperature zones on the analyzer User Interface (**TStPt**, or **Temperature Zone Set Point** screen) and the SSP HMI (**HOME** screen, Figure 3-4). **Following start-up, record the value for each zone to help you determine later if the signal wiring is properly terminated and if all the circuitry is operating properly.**

Leave the analyzer in *Backpurge* mode until all temperature control zones have warmed up to normal operating temperatures (no alarms) and stabilized (as indicated in Figure 3-4).

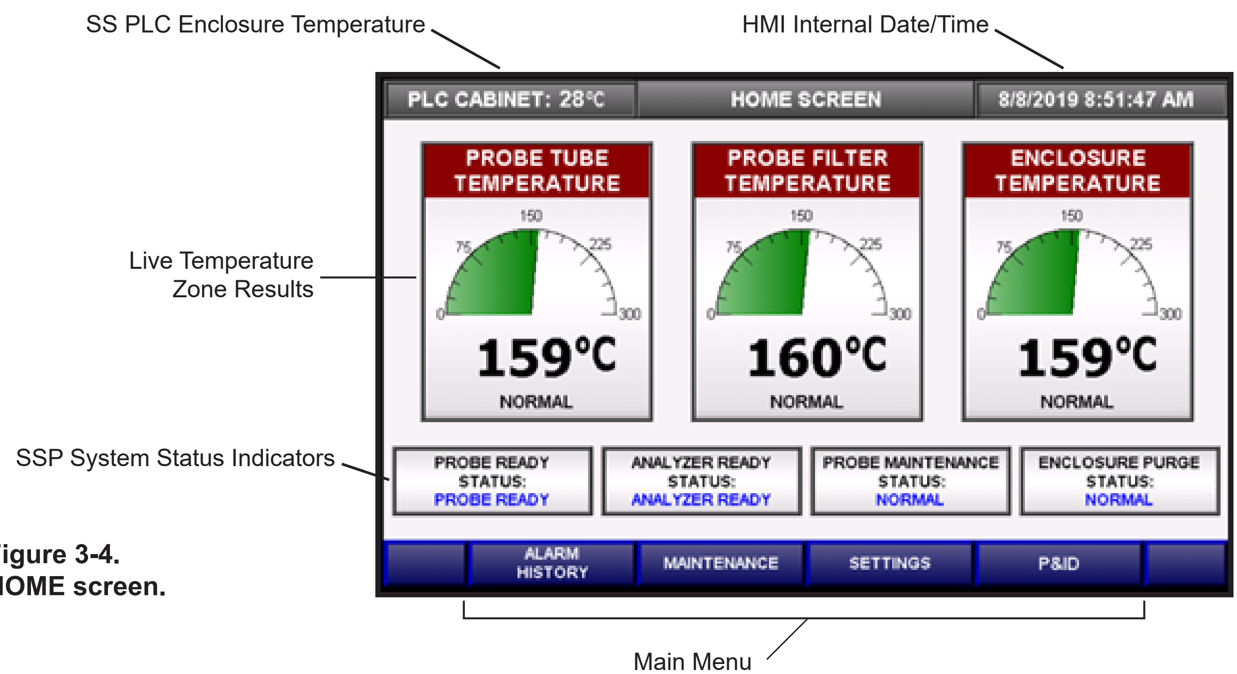

Figure 3-4.
HOME screen.

2. While the system is warming up, set up or verify SSP System parameters from the SSP HMI:

   a. From the main **SETTINGS** screen, configure the **Blowback Timers** and **Auto-Zero Timers** parameters (see “Configuring SSP Operating Parameters” in Chapter 4 for more information).

NOTE

*The Sample Probe Blowback operation is controlled by the SS PLC, all analyzer Sample Probe Blowback timing parameters (i.e., **PrbT1** (**Interval**), **PrbT2** (**Duration**), **PrbT3** (**Pulse With**)) must be set to ‘**0**’ (zero).*

Blowback Timers

- Enter the **Start Time** (***Hour*** and ***Minutes***) of the first Sample Probe Blowback operation of the day.
- Enter the **T-interval Setting** (**hours**) of the Sample Probe Blowback interval.
- Enter the **T-pulse Setting** (**seconds**) of the Sample Probe Blowback air pulse.
- Enter the **T-recharge Setting** (**seconds**) of the Air Accumulator recharge time.
- Enter the number of Blowback air pulses (**N-pulse**) in one Sample Probe Blowback operation.

Auto-Zero Timers

- Enter the **Start Time** (***Hour*** and ***Minute***) of the first Auto-Zero operation of the day.

HOME (screen)→ Settings→Clock Settings

   b. From the **CLOCK SETTINGS** screen, verify that the date and time of the **HMI Internal Date/Time** clock (primary clock) is current for your location and that the **PLC (Processor) Clock** has synchronized with the **HMI Internal Date/Time** clock (synchronization occurs every 10 minutes). If the **HMI Internal Date/Time** clock needs to be adjusted, follow the instructions on the **CLOCK SETTINGS** screen (see “Viewing the HMI and PLC Processor Clocks” in Chapter 4 for more information).

HOME (screen)→ Settings→Temperature Alarm Settings

   c. From the **TEMPERATURE ALARM SETTINGS** screen, set the upper temperature value at which each of the Sample Probe temperature zone alarms will be triggered (see “Temperature Alarm Settings” in Chapter 4).

☞ *HOME (screen)→ Maintenance*

d. From the **MAINTENANCE** screen, press the **Operator Maintenance *Normal/Maintenance*** button to place the SSP System in *Maintenance* mode. The **Operator Maintenance** area will be ORANGE when the system is in *Maintenance* mode.

   Follow the AMETEK SO2 Analyzer startup and configuration procedures and check it for alarms (refer to the AMETEK Model 9XX Analyzer manual).

e. Exit *Maintenance* mode by pressing the **Operator Maintenance *Normal/Maintenance*** button to return the SSP System to normal operating mode, then press the **Back** button on the **MAINTENANCE** screen) to back out of the **MAINTENANCE** screen.

3. Observe the following:

   a. From the SSP HMI **HOME** screen, check the **Probe Tube**, **Probe Filter**, and **Probe Enclosure** temperature zone readings to ensure they are all increasing (check the values you recorded for each zone following start-up).

      After all Sample Probe temperature zones are at normal operating conditions (i.e., within ±5 C° of setpoint), the Probe Ready Status Relay is energized to indicate that the SSP is ready to extract stack gas (providing the Blowback sequence is not in progress).

   b. From the **P&ID** screen, observe the operation of the SS Heated Sample System solenoids, valves, and flow.

   c. From any main screen (except the **CLOCK SETTINGS** and **TEMPERATURE ALARM SETTINGS** screens) view the **Status Indicator** for alarm conditions.

      If any alarm conditions exist, return to the **HOME** screen and press the **Alarm History** button to view the **ALARM LOG** screen to determine the source of the alarm. For information on how to troubleshoot the alarm, review the “SSP System Alarms and Corrective Action” section in Chapter 5.

      After the conditions which triggered the alarm have been corrected, press the **Ack Alarm** (or **Ack All**) button to acknowledge the alarm(s), then press the **Clear All** button to clear the alarms.

4. Allow the system to stabilize, and then perform the following operations from the **MAINTENANCE** screen:

   a. Press the **Operator Maintenance** ***Normal/Maintenance*** button to place the SSP System in *Maintenance* mode ("**Probe Maintenance On**" will be displayed in this field).

   b. Manually start the Sample Probe Blowback function by pressing the **Probe Blowback** ***Start*** button ("**Probe in Blowback**" will be displayed in this field). The Blowback function will cycle through its sequence based on the **Blowback Timer** settings. After the Blowback function has completed its cycle, "**Probe Blowback Off**" will be displayed.

   c. Manually start the Analyzer Auto-Calibration function by pressing the **Analyzer Auto-Cal** ***Start*** button ("**Analyzer Auto-Cal On**" will be displayed in this field). The Analyzer Auto-Cal function will trigger the SO2 Analyzer to cycle through its Auto-Cal sequence based on the analyzer Auto-Cal settings.

   d. Manually start the Analyzer Auto-Zero function by pressing the **Analyzer Auto-Zero** ***Start*** button ("**Analyzer Auto-Zero On**" will be displayed in this field). The Analyzer Auto-Zero function will trigger the SO2 Analyzer to cycle through its Auto-Zero sequence based on the analyzer Auto-Zero settings.

   e. Manually change the state of the **Analyzer Auto-Calibration & Auto-Zero** function by pressing its **Enable/Disable** button ("**Analyzer Auto-Zero Enabled**" will be displayed in this field). This will trigger the Auto-Zero and Auto-Span functions to be initiated from the analyzer. Press the **Enable/Disable** button (again) to return the SSP System to its original setting ("**Analyzer Auto-Zero Disabled**" will be displayed in this field).

   f. Manually change the state of the **Calibration/Verification** function by pressing its **Validation/Calibration** button ("**Calibration Enabled**" or "**Verification Enabled**" will be displayed in this field). If "**Calibration Enabled**" is active, the system will initiate a SO2 Analyzer Auto-Calibration; if "**Verification Enabled**" is active, the system will initiate a SO2 Analyzer Auto-Calibration but with the analyzer's **Adjust Disable** function turned On.

g. Manually change the state of the **Auto-Zero After Blowback** function by pressing its ***Enable/Disable*** button ("**Auto-Zero After Blowback Enabled**" or "**Auto-Zero After Blowback Enabled**" will be displayed in this field). If "**Auto-Zero After Blowback Enabled**" is active, this will ensure an Auto-Zero cannot be initiated after a Sample Probe Blowback function has been performed; if "**Auto-Zero After Blowback Disabled**" is active, this will allow an Auto-Zero to be initiated after a Sample Probe Blowback function has been performed.

h. Manually change the state of each of the system's solenoids (in the **Manual Solenoid Control** area):

   i. Press the **Probe Isolation Solenoid** ***Start*** button. You should hear the solenoid click when it changes state. This isolates the Sample Probe from the Sample Line. Press the **Stop** button to return the solenoid to its original state.

   ii. Press the **Probe Filter Blowback Solenoid** ***Start*** button. You should hear the solenoid click when it changes state. This starts a Probe Blowback function. Press the **Stop** button to return the solenoid to its original state.

   iii. Press the **Probe Tube Blowback Solenoid** ***Start*** button. You should hear the solenoid click when it changes state. This starts a Blowback function at the Probe Tube. Press the **Stop** button to return the solenoid to its original state.

5. After all temperature zones have stabilized at their normal operating temperatures, and there are no alarm conditions or other conditions, record all temperatures, pressures, and flow rate for future reference.

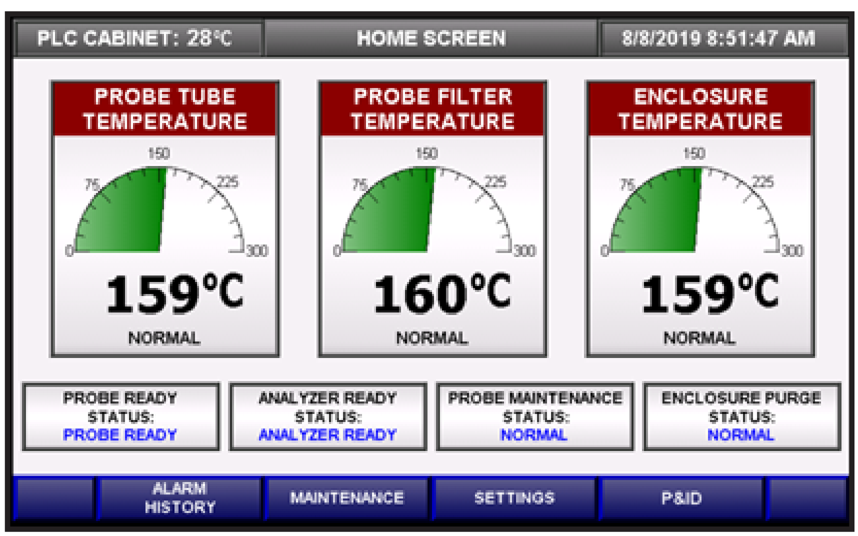

Figure 3-5. HOME screen (system ready to sample).

6. Perform a leak check to ensure there are no leaks in the system. Refer to the AMETEK Model 9XX SO2 Analyzer manual for information on how to perform a leak check.

   After the leak check has passed, place the SO2 Analyzer in ***Automatic*** Flow Control mode.

7. Ensure all flow rates and pressure settings have been made as per the instructions in the AMETEK Model 9XX Analyzer manual, and the "Piping and Instrumentation Diagrams (P&ID)" which is part of the Final "As-Built" drawings shipped with the system.

If the **Probe Ready Status** indicator reads "**Probe Ready**" and the **Analyzer Ready Status** indicator reads "**Analyzer Ready**," the SSP System is ready for normal sampling.

HUMAN MACHINE INTERFACE (HMI) OPERATIONS

The Severe Service (SS) PLC Enclosure includes a Human Machine Interface (HMI) that allows the operator to view essential Severe Service Probe (SSP) System operating parameters and diagnostics information, and to set up, adjust, and control (manually or automatically) integral SSP System functions, such as Probe Blowback Operation.

The SS PLC Enclosure communicates with the AMETEK Model 9XX SO2 Analyzer via Modbus to perform essential programmed actions, primarily related to the Probe Blowback Operation functions.

NOTE

Before working from the SSP HMI, read the entire section titled "Working From the Human-Machine Interface (HMI) Screens" in this chapter and all SSP HMI operations in "Chapter 5 – Maintenance and Troubleshooting" to learn how to navigate through the screens to view data, make changes to SSP System settings, and to initiate SSP System functions.

See also the Analyzer/Severe Service Probe Timing Diagram Appendix C of this guide.

Working From the Human-Machine Interface (HMI) Screens

The SSP HMI on the SS PLC Enclosure is a graphical touchscreen that allows you to view Severe Service Probe System data and diagnostic information, and allows you to change Severe Service Probe System settings.

NOTE

Communication between the SS PLC Enclosure/SSP HMI and the customer's Plant Communication Network is made via an Ethernet communication cable using Modbus TCP and Allen-Bradley TCP/IP.

Communication between the analyzer and the SS PLC Enclosure/SSP HMI is made via the analyzer's RS-422 Serial Communication Port using Modbus RTU.

CAUTION

To safely power down the SSP System, and therefore the SSP HMI, take all appropriate safety precautions and open the SS PLC Enclosure Disconnect Switch and then open the SSP Disconnect Switch to remove power from these components.

*Do not use the **Exit Program** button on the **SETTINGS** screen. See "Configuring SSP Operating Parameters" in this chapter for more information about this button.*

Working From the HMI

While working from the SSP HMI, the following rules apply:

- When the SSP HMI is powered up, the system will begin its initialization sequence.

  If the Modbus communication between the SSP System and the analyzer fail during start-up, or anytime, the "**Modbus Serial Comm. Alarm**" will be triggered and displayed. Check the communications cable and ensure it is properly connected between the analyzer and the SS PLC Enclosure (**J108** on the analyzer's **Termination** board is connected via serial RS-422 to the Moxa Gateway module in the SO2 analyzer, and that Moxa Gateway module is connected to the Ethernet switch in the SSP via Ethernet).

  If the communications cable is properly connected between the analyzer and the SS PLC Enclosure, the display will power up properly and will automatically default to the **HOME** screen. Refer to the section "Working From the Home Screen" in this chapter.

- From the **HOME** screen, navigate through the various screens by touching the corresponding **Main Menu** button. These buttons/screens and their parameters are described in this chapter.

- To view a different screen from any screen, press the menu button for the screen you wish to display.

- To return to the **HOME** screen from the **SETTINGS** or **P&ID** screen, press the **Home Screen** button.

- To return to the previous screen from the **ALARM LOG** screen, press the **Previous** button.

- To return to the previous screen from the **MAINTENANCE**, **SETTINGS**, or **P&ID** screens, press the **Back** button.

- To exit out of the **CLOCK SETTINGS** or **TEMPERATURE ALARM SETTINGS** screens, press the **Close** button.

- If the screen goes into screen saver mode, touch the screen anywhere to refresh the display.

Working From the HOME Screen

The **HOME** screen displays real-time SSP and system temperatures, and SSP and analyzer status. The **HOME** screen also displays the system **Main Menu** buttons, which allow you to access important system information, such as viewing system and analyzer status and maintenance information, current and historical alarms, and Flow Control operations (**P&ID** screen). Descriptions of the **Main Menu** items are described in this chapter, and in Chapter 5.

NOTE

*During normal sampling and maintenance conditions, the **HOME** (Figures 4-1.1 and 4-1.2) and **P&ID** (Figures 4-2.1, 4-2.2, 4-2.3, 4-2.4, 4-2.5) screens display essential information about the Severe Service Probe System.*

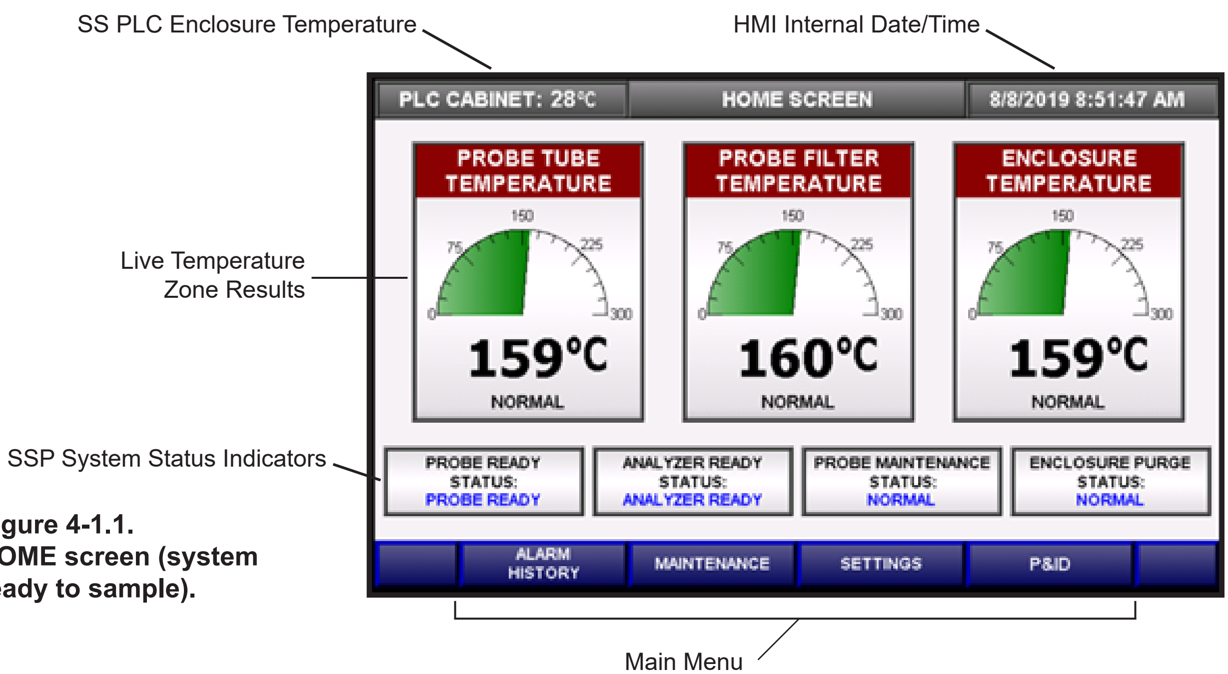

Figure 4-1.1.
HOME screen (system ready to sample).

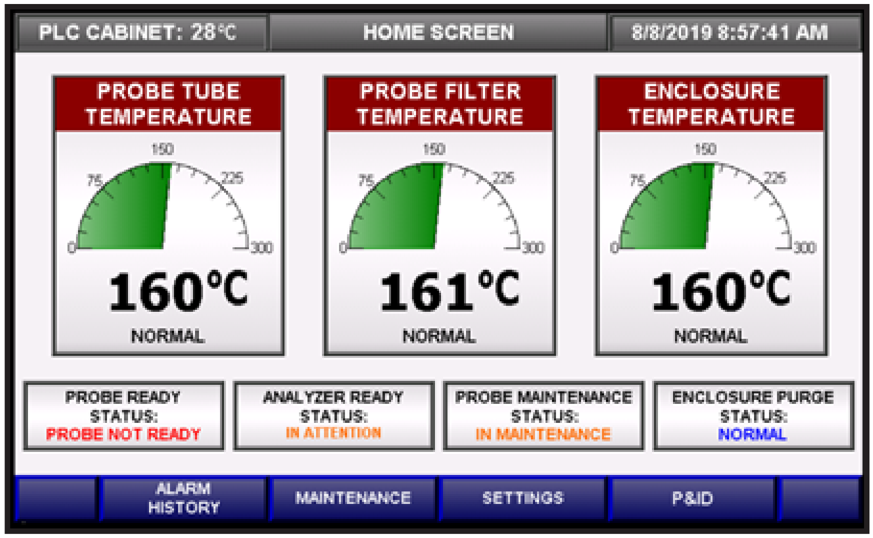

Figure 4-1.2. HOME screen (system in Maintenance mode).

Descriptions of the Temperature Gauges and Status Indicators include:

PLC Cabinet (Enclosure) Temperature
Displays the real-time temperature measured inside the SS PLC Enclosure.

HMI Internal Date/Time
Displays the **Date** and **Time** of the HMI clock, which is used for time-stamping alarms, and for Sample Probe *Blowback* functions.

Probe Tube Temperature gauge
Displays the real-time temperature of the Sample Probe Tube, inside the stack. Also displays operational messages about the Sample Probe Tube, below the temperature reading:

Normal
Indicates the Sample Probe Tube temperature is at Normal operating conditions, and is within its Low and High Alarm Setpoint values.

Low Temp. Alarm
Indicates the Sample Probe Tube temperature has fallen below its Low Alarm Setpoint value. Check the **ALARM LOG** screen to verify this condition, and review the section “Severe Service Probe System Alarms and Corrective Action” in Chapter 5 for information about corrective action to take to correct and reset the alarm.

High Temp. Alarm
Indicates the Sample Probe Tube temperature has risen above its High Alarm Setpoint value. Check the **ALARM LOG** screen to verify this condition, and review the section “Severe Service Probe System Alarms and Corrective Action” in Chapter 5 for information about corrective action to take to correct and reset the alarm.

Probe Filter Temperature gauge

Displays the real-time temperature of the Filter, inside the Sample Probe. Also displays operational messages about the Probe Filter, below the temperature reading:

Normal

Indicates the Probe Filter temperature is at Normal operating conditions, and is within its Low and High Alarm Setpoint values.

Low Temp. Alarm

Indicates the Probe Filter temperature has fallen below its Low Alarm Setpoint value. Check the **ALARM LOG** screen to verify this condition, and review the section “Severe Service Probe System Alarms and Corrective Action” in Chapter 5 for information about corrective action to take to correct and reset the alarm.

High Temp. Alarm

Indicates the Probe Filter temperature has risen above its High Alarm Setpoint value. Check the **ALARM LOG** screen to verify this condition, and review the section “Severe Service Probe System Alarms and Corrective Action” in Chapter 5 for information about corrective action to take to correct and reset the alarm.

Enclosure Temperature gauge

Displays the real-time temperature inside the SSP Enclosure. Also displays operational messages about the SSP Enclosure Temperature, below the temperature reading:

Normal

Indicates the Enclosure temperature is at Normal operating conditions, and is within its Low and High Alarm Setpoint values.

Low Temp. Alarm

Indicates the Enclosure temperature has fallen below its Low Alarm Setpoint value. Check the **ALARM LOG** screen to verify this condition, and review the section “Severe Service Probe System Alarms and Corrective Action” in Chapter 5 for information about corrective action to take to correct and reset the alarm.

High Temp. Alarm

Indicates the Enclosure temperature has risen above its High Alarm Setpoint value. Check the **ALARM LOG** screen to verify this condition, and review the section “Severe Service Probe System Alarms and Corrective Action” in Chapter 5 for information about corrective action to take to correct and reset the alarm.

Probe Ready Status indicator

Displays the ready status of the SSP. Additional SSP status messages are also displayed in the title bar of the **ALARM LOG**, **MAINTENANCE**, **SETTINGS**, and **P&ID** screens. (See the section "Viewing Live Status of the Severe Service Probe System Process Controls and Instrumentation on the P&ID Screen" for descriptions). Messages include:

Probe Ready

Displayed when the Probe is ready for sampling; all temperatures are within customer-selected temperature parameters and there are no alarm conditions.

Probe Not Ready

Displayed when the Probe is not ready for sampling; the Probe is not up to operational temperature or there is a problem with the Probe. View the **ALARM LOG** screen for Probe-related alarms.

Analyzer Ready Status indicator

Displays the ready status of the AMETEK SO2 Analyzer. Additional Analyzer status messages are also displayed in the title bar of the **ALARM LOG**, **MAINTENANCE**, **SETTINGS**, and **P&ID** screens (see Figure 4-2.1 for location and section "Viewing Live Status of the Severe Service Probe System Process Controls and Instrumentation on the P&ID Screen" for descriptions). Messages include:

Analyzer Ready

Displayed when the SO2 Analyzer is ready for sampling; the analyzer is up to operating temperature and there are no problems with the analyzer.

In Calibration

Displayed when a calibration function has been initiated by the analyzer.

In Attention

Displayed when a there is a problem with the analyzer; the analyzer requires operator attention. The analyzer will continue to operate under this condition, but the problem should be corrected. Refer to the AMETEK SO2 Analyzer manual (*Troubleshooting and Diagnostics* section) for related alarm conditions, and subsequent corrective action.

In Fault

Displayed when a there is a serious problem with the analyzer; the analyzer requires immediate operator attention. The analyzer results will not be valid under this condition. Refer to the AMETEK SO2 Analyzer manual (*Troubleshooting and Diagnostics* section) for related alarm conditions, and subsequent corrective action.

Probe Maintenance Status indicator

Displays the current maintenance status of the SSP. Status messages (and causes for the messages) include:

In Maintenance

Displayed when the SSP has been placed in *Maintenance* mode, which occurs whenever the user is performing maintenance on the Probe or sample system. All automated blowback or calibration/validation operations will be disabled when the Probe is in *Maintenance* mode.

Normal

Displayed when the SSP System is operating under normal sampling conditions.

Enclosure Purge Status indicator

Displays the current status of the SSP Enclosure. Status messages include:

Normal

Displayed when the SSP Enclosure is properly pressurized.

Loss of Purge

Displayed when the SSP Enclosure pressure is lost or reduced to an unacceptable level due to a problem with the Z-Purge Controller or air pressure. This in turn will trigger a "**Probe Not Ready**" status message and "**Probe Enclosure Loss of Purge**" digital output open contact.

Viewing Live Status of the Severe Service Probe System Process Controls and Instrumentation on the P&ID Screen

The **P&ID** screen displays a graphical representation of the current status of the various flow control zones that make up the SSP System. This screen allows you to determine if the system is operating properly, and to determine where problems exist in the sample system.

Green = solenoid valve is energized
Blue = pneumatic valve is pressurized
Blue = valve is de-energized or depressurized

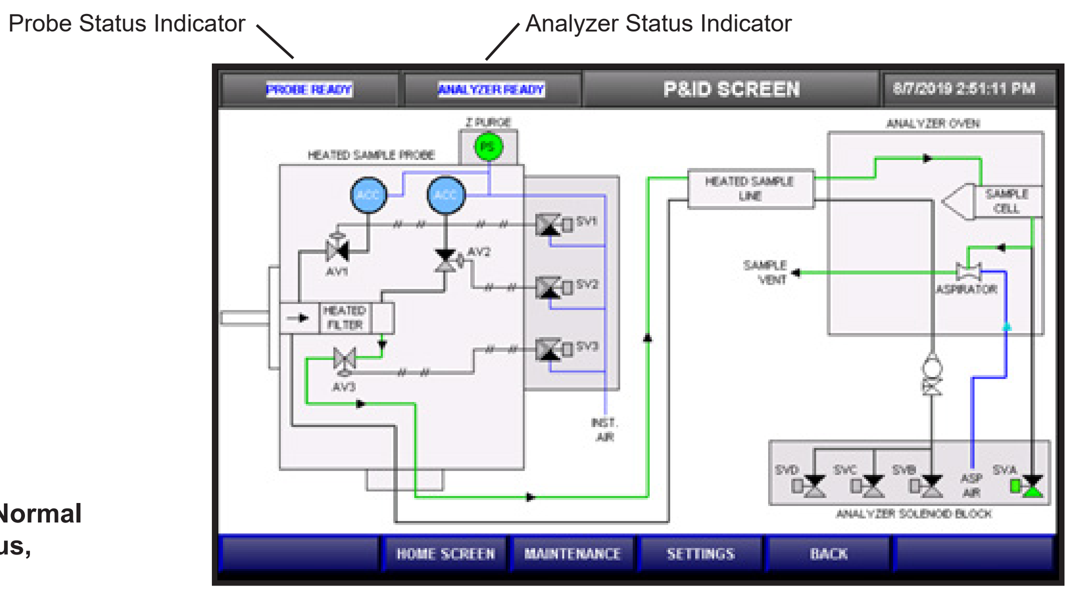

Figure 4-2.1.
P&ID screen (Normal operating status, sampling).

Probe Status indicator
: Displays the current status of the SSP. Messages include:

Probe Ready
: Displayed when the Probe is ready for sampling; there are no problems with the Probe.

Probe in Blowback
: Displayed when the Probe Blowback function has been initiated. This message will be displayed for the duration of the Blowback sequence.

Probe in Maintenance
: Displayed when the Probe operation has been changed to *Maintenance* mode. This will occur when an automatic or manual calibration has been initiated. This message will be displayed for the duration of the calibration sequence.

Probe in Alarm
: Displayed when there is a serious problem with the Probe. View the **ALARM LOG** screen for Probe-related alarms.

Analyzer Status indicator

Displays the current status of the AMETEK SO2 Analyzer. Messages include:

Analyzer Ready

Displayed when the SO2 Analyzer is ready for sampling; there are no problems with the analyzer.

Analyzer In Fault

Displayed when a there is a serious problem with the analyzer; the analyzer requires immediate operator attention. The analyzer results will not be valid under this condition. Refer to the AMETEK SO2 Analyzer manual for Analyzer-related alarms.

Analyzer In Attention

Displayed when a there is a problem with the analyzer; the analyzer requires operator attention. The analyzer will continue to operate under this condition, but the problem should be corrected. Refer to the AMETEK SO2 Analyzer manual for Analyzer-related alarms.

Analyzer In Calibration

Displayed when a calibration function has been initiated by the analyzer.

When the analyzer initiates a Backpurge due to a "Detected Fault", the Analyzer Status Indicator will be flashing.

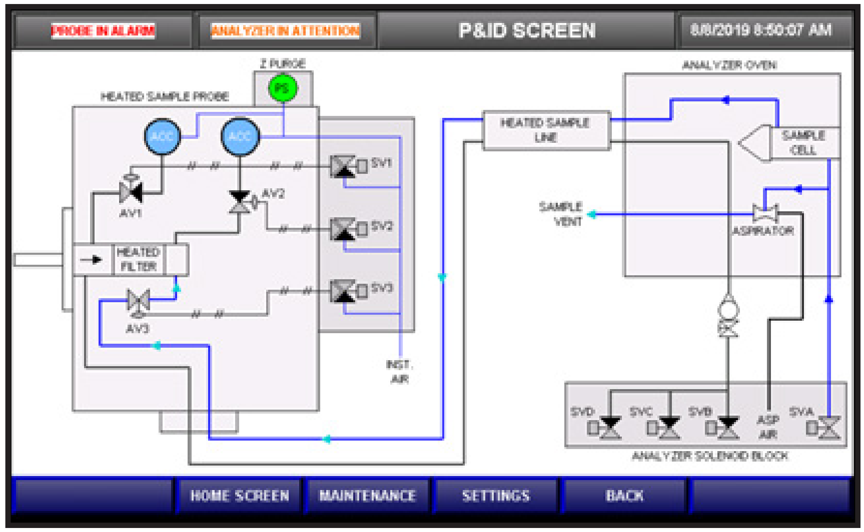

Figure 4-2.2.
P&ID screen (Analyzer initiated Backpurge due to "Detected Fault"), example.

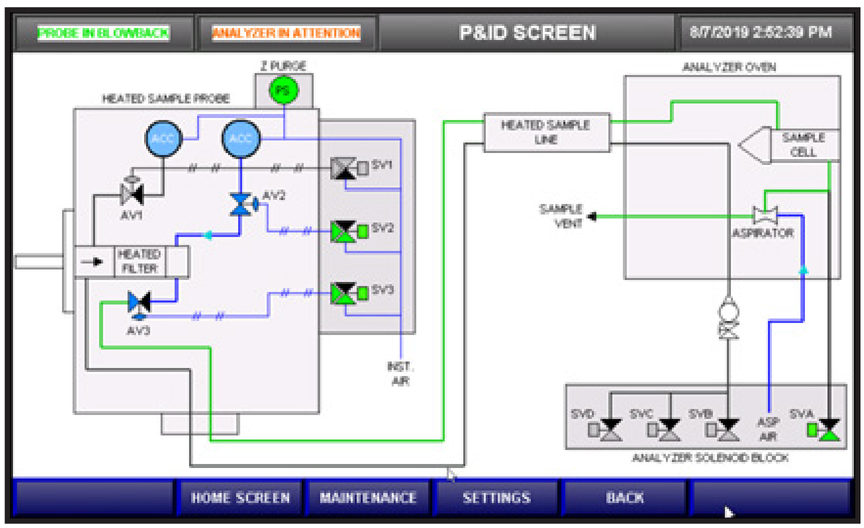

Figure 4-2.3.
P&ID screen (Probe in Blowback), example.

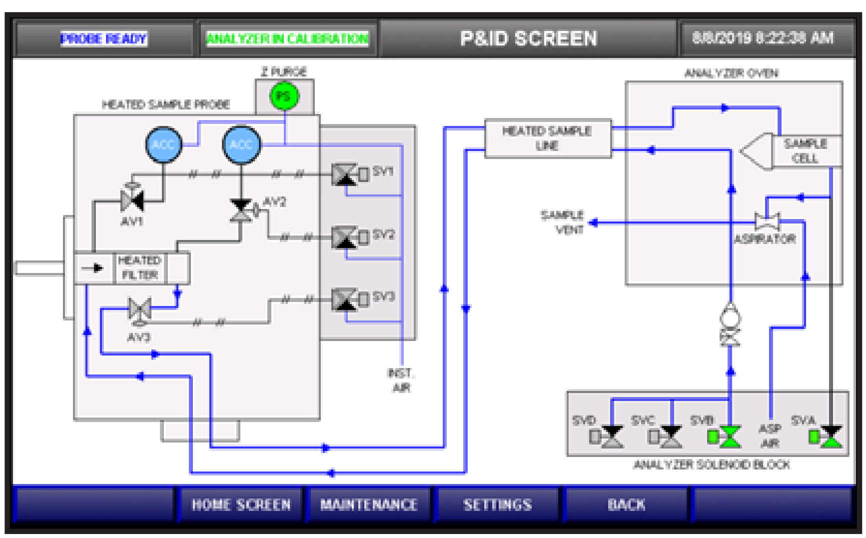

Figure 4-2.4.
P&ID screen (Analyzer AutoZero), example.

Pop-up Alarm Banner

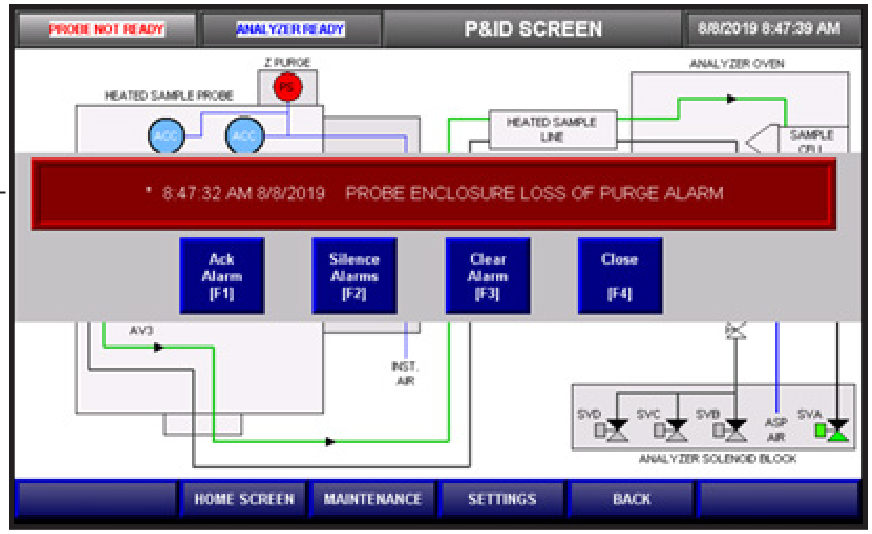

Figure 4-2.5.
P&ID screen (Probe Enclosure Loss of Purge, pop-up alarm triggered), example.

NOTE

*For descriptions of **F1**, **F2**, **F3**, **F4** (seen in the pop-up alarm banner in Figure 4-2.5), see the section "Viewing the Alarm Log" in Chapter 5.*

Configuring SSP Operating Parameters

The **SETTINGS** screen allows you to configure the ***Temperature Control Timers*** and ***Blowback Timers***, to control how and when the Sample Probe blowback functions occur, to ensure proper operation of the Sample Probe and the overall SSP System. From this screen you can also access the **CLOCK SETTINGS** screen (to view the current ***Time*** and ***Date***) and the **TEMPERATURE ALARM SETTINGS** screen (to set the ***SSP temperature High/Low Alarm*** values). See "Making Changes to the Blowback Timers, Auto-Zero Timers, and Temperature Alarm Settings," for information on how to make changes.

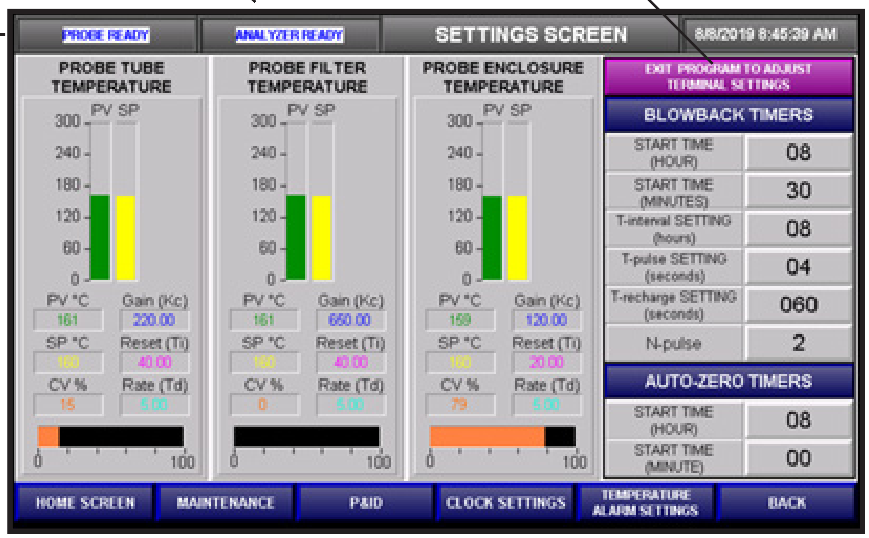

Figure 4-3.
Settings screen.

CAUTION

*Do not press the **Exit Program to Adjust Terminal Settings** (or, simply, **Exit Program**) button unless the SSP HMI display has locked up completely (not recommended during normal operation). This button is required to exit out of the application program and to access the HMI settings (for example, to make HMI Date/Time adjustments).*

AMETEK recommends that you do not use this button unless you are familiar with the internal operations of the Allen-Bradley PanelView Plus HMI and PLC systems. Contact AMETEK service personnel for more information about the use of this button.

To safely power down the SSP System, and therefore the HMI software, take all appropriate safety precautions and open the SS PLC Enclosure Disconnect Switch and then open the SSP Disconnect Switch to remove power from these components.

Parameters on this screen include:

Probe Status / **Analyzer Status** indicators

Displays the current status of the SSP and SO2 Analyzer. Refer to "Viewing Live Status of the Severe Service Probe System Process Controls and Instrumentation on the P&ID Screen" in this chapter for status messages that can appear here.

Probe Tube Temperature PID Control Parameters

Allows you to configure Probe Tube temperature control parameters.

Probe Filter Temperature PID Control Parameters

Allows you to configure Probe Filter temperature control parameters.

Probe Enclosure Temperature PID Control Parameters

Allows you to configure Probe Enclosure temperature control parameters.

Configurable PID control parameters for the **Probe Tube**, **Probe Filter**, and **Probe Enclosure** temperature zones include:

PV °C

This is the measured Process Variable temperature (°C).

Gain (Kc)

This is the controller Proportional Gain parameter for the PID algorithm.

SP °C

This is the desired control Set Point for each temperature zone (°C).

Reset (Ti)

This is the *Integral* parameter for the PID temperature control algorithm (minutes per repeat).

CV %

This is the PID control Variable percentage (0–100 %).

Rate (Td)

This is the *Derivative* parameter for the PID temperature control algorithm (minutes).

Blowback Timers

This area displays and allows you to configure the different timers used to control the blowback functions of the SSP and its Pitot Tube/ Thermocouple Probe. System Blowback Timers include:

Start Time (Hour)

This timer allows you to set the ***hour*** (0–23) in which the Blowback functions will occur, based on a 24-hour clock. This timer setting uses the PLC Processor Clock (see “Viewing the HMI and PLC Processor Clocks” in this section).

Start Time (Minute)

This timer allows you to set the ***minute*** (0–59) in which the Blowback functions will occur, based on the **Start Time (Hour)** setting. This timer setting uses the PLC Processor Clock.

T-interval Setting (hours)

This timer allows you to set the *interval* (in ***hours***, 0–8) between Probe Blowbacks. For example, to configure a Blowback to occur every hour, enter ‘**1**’ in this field. The T-interval Setting time is displayed along with a countdown timer (time remaining until the next Blowback) on the **MAINTENANCE** screen (see *Probe Blowback Time to Next Operation*).

T-pulse Setting (seconds)

This timer allows you to set the duration (***seconds***, 1–10) of each Blowback actuation pulse (the length of time pressurized air will flood the Probe).

T-recharge Setting (seconds)

This timer allows you to set the duration (***seconds***, 60–240) the analyzer will allow the Blowback system to build up pressure between pulses (air bursts, which blow back debris into the stack).

N-pulse

This timer allows you to set the number of times the system will pulse a burst of air (which blows back debris into the stack) during each Blowback (1–8).

Auto-Zero Timers

Allows you to configure Probe Tube temperature parameters.

Start Time (Hour)

This timer allows you to set the ***hour*** (0–23) in which the SO2 Analyzer Auto-Zero function will occur, based on a 24-hour clock. This timer setting uses the PLC Processor Clock (see “Viewing the HMI and PLC Processor Clocks” in this section).

Start Time (Minute)

This timer allows you to set the ***minute*** (0–59) in which the SO2 Analyzer Auto-Zero function will occur, based on the **Start Time (Hour)** setting. This timer setting uses the PLC Processor Clock.

Viewing the HMI and PLC Processor Clocks

This screen allows you to view the current time of the HMI's internal clock and the PLC's clock. These clocks are used for time-stamping system alarms and Sample Probe Blowback timer settings.

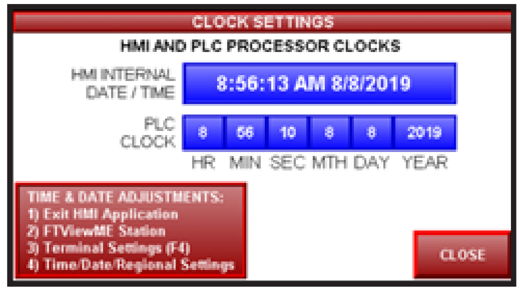

Figure 4-4.
Clock Settings screen.

HMI Internal Date/Time

Allows you to view the HMI clock, which is set from the HMI terminal settings. The HMI Date and Time are used for time-stamping alarms.

If the **HMI Internal Date/Time** are not current for your location and need to be adjusted, view the main **SETTINGS** screen (see Figure 4-3) and press the **Exit Program to Adjust Terminal Settings** button to view the **Date/Time Setup** screen. Follow the "**Time & Date Adjustments**" instructions on the **CLOCK SETTINGS** screen (Figure 4-4) to change the HMI internal date and/or time. Save the settings and exit out of the **Date/Time Setup** screen. Take appropriate safety precautions and cycle the HMI Power Off-On to allow the changes to take effect.

NOTE

For more information about setting the HMI Date and Time, refer to the refer to the section "Time and Date Settings" in the Allen-Bradley PanelView Plus 7 Standard Terminals User Manual.

PLC Clock

Allows you to view the current PLC clock time, which will be used for Sample Probe Blowback timer functions.

The PLC clock will synchronize with the HMI clock every 10 minutes to prevent drift between the device clocks. When clock / date changes are made in the HMI terminal settings, it may take up to 10 minutes for the PLC clock to synchronize with the HMI clock settings.

Temperature Alarm Settings

This screen allows you to configure the ***Low*** and ***High*** temperature settings of the various SSP temperature zones. An alarm will be triggered for the corresponding zone when the process variable is above or below the temperature value entered for each zone.

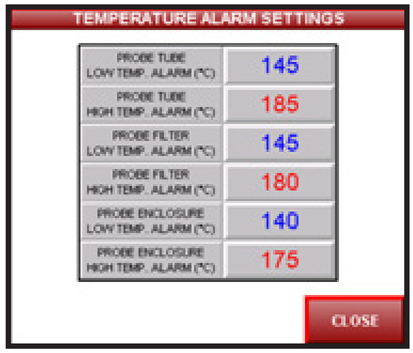

Figure 4-5. Temperature Alarm Settings screen.

Probe Tube Low Temp. Alarm (°C)

Allows you to configure the *low* value (range: 0–180) monitored at the Probe Tube, at which this alarm will be triggered. The default setting is 145 °C.

Probe Tube High Temp. Alarm (°C)

Allows you to configure the *high* value (range: 0–250) monitored at the Probe Tube, at which this alarm will be triggered. The default setting is 185 °C.

Probe Filter Low Temp. Alarm (°C)

Allows you to configure the *low* value (range: 0–180) monitored at the Probe Filter, at which this alarm will be triggered. The default setting is 145 °C

Probe Filter High Temp. Alarm (°C)

Allows you to configure the *high* value (range: 0–250) monitored at the Probe Filter, at which this alarm will be triggered. The default setting is 180 °C.

Probe Enclosure Low Temp. Alarm (°C)

Allows you to configure the *low* value (range: 0–180) monitored within the Probe Enclosure, at which this alarm will be triggered. The default setting is 140 °C.

Probe Enclosure High Temp. Alarm (°C)

Allows you to configure the *high* value (range: 0–250) monitored at the Probe Enclosure, at which this alarm will be triggered. The default setting is 175 °C.

Making Changes to the Blowback Timers, Auto-Zero Timers, and Temperature Alarm Settings

To change a value for one of the Blowback or Auto-Zero Timers, or to change the Temperature **Low**/**High** Alarm setpoints, view the appropriate screen and tap the numeric field for the parameter to be changed. When you tap a numeric field, the numeric keypad is displayed.

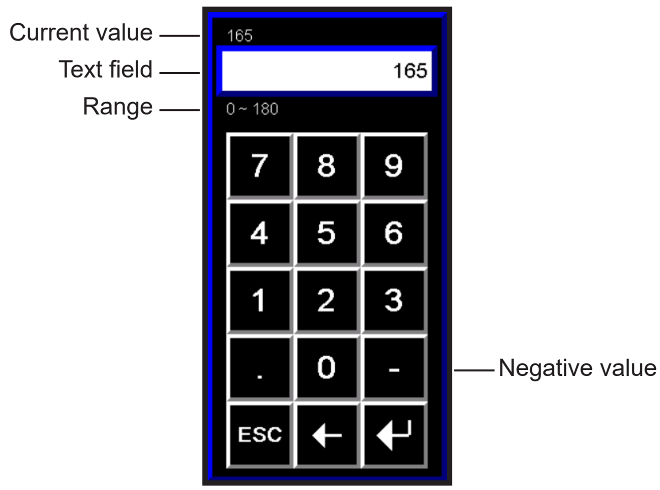

Figure 4-6.
Numeric keypad.

While working from the numeric keypad (i.e., when changing a Low/High Temperature Alarm):

- The value in White text *above* the numerical entry field is the current value. The value in White text *below* the numerical entry field is the range in which that parameter can be set.
- Press the digit keys (**0–9**) and the decimal key (**.**) to enter the new value. This will overwrite the original value.
- To save a new value, press the **Enter** key (). The change will take effect immediately.
- To move the cursor (data entry point) to the left, press the **Left** arrow key ().
- To discard the changes without saving a new value, press the **ESC** key.

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MAINTENANCE AND TROUBLESHOOTING

This chapter discusses working from the **MAINTENANCE** screen to prepare the Severe Service Probe (SSP) System for maintenance or service, or when performing manual Blowback or Auto-Zero operations. This chapter also briefly discusses preventive maintenance (replacing internal parts) to keep the SSP System operating at peak efficiency. Finally, this chapter discusses how to view alarm status conditions, and how to diagnose and troubleshoot problems with the analyzer.

WARNING

Before beginning any preventive maintenance on the SSP System, review the Warnings under "Important Safety Information" in Chapter 1 and "Safety Considerations" in Chapter 3 of this guide, and follow those Warnings and all other safety precautions to safely prepare the SSP System, its Sample Probe, and the SO2 Analyzer for maintenance.

Maintenance

While maintenance functions on the SSP System are in progress, the **HOME** screen displays indications of the system being in *Maintenance* mode. For example, in Figure 5-1, the **Probe Ready Status** indicates "**Probe Not Ready**", the **Analyzer Ready Status** indicates "**In Attention**", and the **Probe Maintenance Status** indicates "**In Maintenance**".

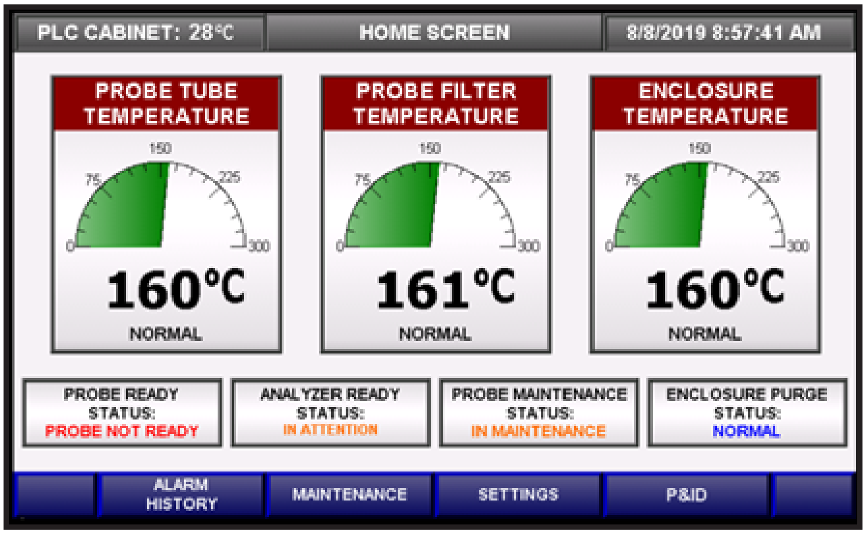


Figure 5-1. HOME screen, SSP System in Maintenance mode.

The **MAINTENANCE** (Figure 5-2.1) screen allows you to prepare the SSP System (and Sample Probe) for maintenance or service. This screen also allows you to individually activate the Probe Isolation, Probe Filter Blowback, and Probe Tube Blowback solenoid valves for troubleshooting purposes while in *Maintenance* mode. In *Maintenance* mode, sampling cannot occur, and all automated Probe Blowback and Analyzer calibration operations are disabled. This screen can also be used to view and initiate the status of essential SSP System functions. Figures 5-2.1, 5-2.2, and 5-2.3 illustrate the **Maintenance** screen in different states of operation.

Probe Status Indicator   Analyzer Status Indicator

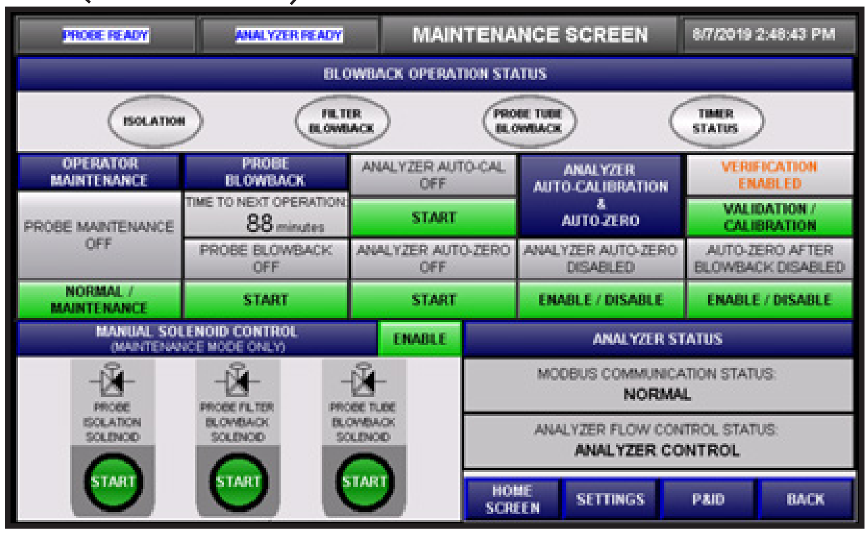


Figure 5-2.1. Maintenance screen.

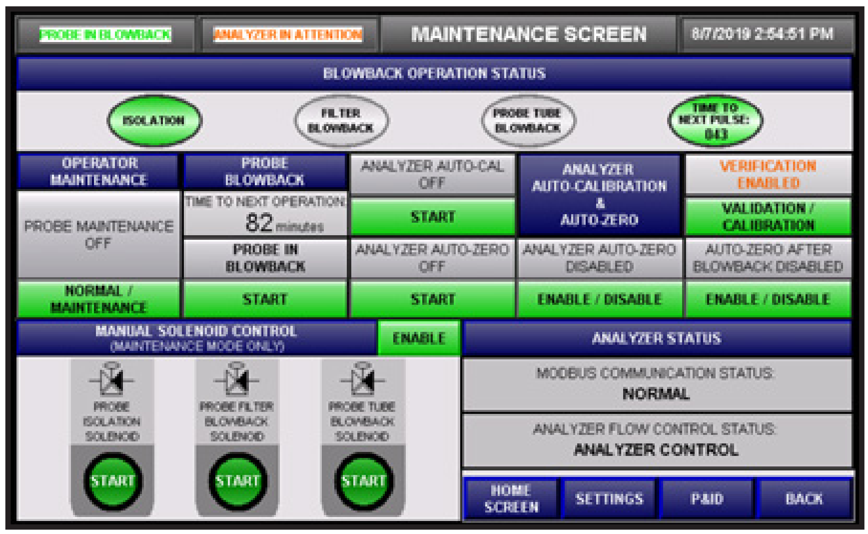


Figure 5-2.2. Maintenance screen, Probe Blowback sequence in progress: Blowback "Isolation" Valve energized/ Time to Next Pulse displayed.

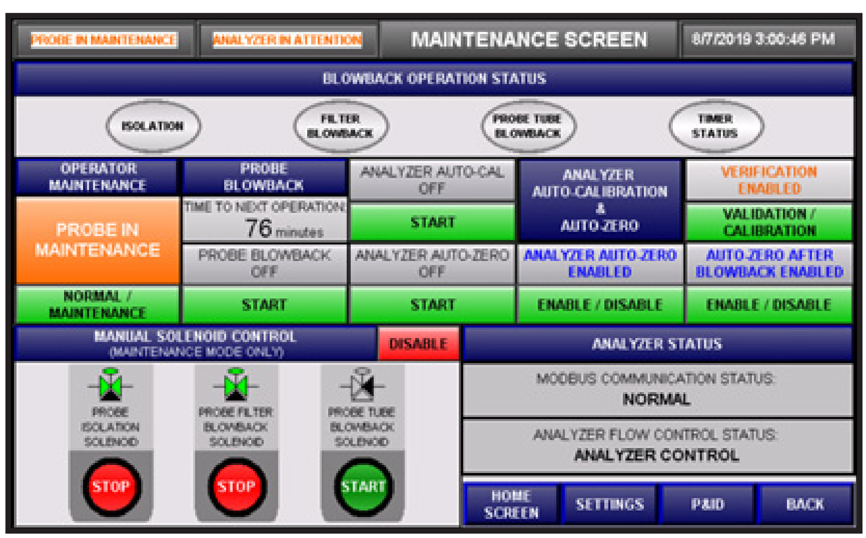


Figure 5-2.3. Maintenance screen, Probe in Maintenance: Probe Isolation and Probe Filter Blowback solenoid valves activated.

Probe Status / **Analyzer Status** indicators

Displays the current status of the SSP and SO2 Analyzer. Refer to "Viewing Live Status of the Severe Service Process Controls and Instrumentation on the P&ID Screen" in Chapter 4 for messages that can appear here.

Blowback Operation Status indicators

This area displays the operational status of various Blowback Operation functions. When a function is in operation, the corresponding indicator will be Green. Multiple functions can be operational (and therefore, Green, at the same time). See also the Analyzer/SSP System Timing Diagram in Appendix C of this guide.

Isolation

When this indicator is Green, it indicates that the Probe Blowback Isolation solenoid has been energized, which isolates the probe from the process stack; Probe Blowback functions are in progress.

Filter Blowback

When this indicator is Green, it indicates that the Probe Filter Blowback Air solenoid has been energized, which blows bursts of air through the Probe Filter (alternating between the Probe Filter and Probe Tube) to cleanse the Filter and Tube. The **T-pulse Setting** determines this duration.

Probe Tube Blowback

When this indicator is Green, it indicates that the Probe Tube Blowback Air solenoid has been energized, which blows bursts of air through the Probe Tube (alternating between the Probe Tube and Probe Filter) to cleanse the Probe Tube. The **T-pulse Setting** determines this duration.

Timer Status

When this indicator is Green, it will indicate the specific function of the Probe Blowback Operation that is currently being performed, and the amount of time remaining for that function, including:

Time to Next Pulse

This timer displays the time remaining (in seconds) until the next pulse (air burst, which blows back debris into the stack). The **T-recharge Setting** determines this duration.

Operator Maintenance

Before performing maintenance on the Sample Probe, the SSP System must be placed into *Maintenance* mode. To do this, press the ***Enable*** button and then press the **Start** button (in the **Manual Solenoid Control** area).

When the SSP System is in *Maintenance* mode all concentrations will be held at the values they were at the time the Probe was placed in *Maintenance* mode.

To return the Sample Probe to normal operating mode, press the ***Disable*** button. This will cancel all Maintenance actions, return all solenoids to normal state, and all concentrations will be live.

This area also displays the current status of the Sample Probe:
- *Probe Maintenance Off*
- *Probe in Maintenance*

Probe Blowback

This area displays the **Time to Next Operation** (minutes) of the next Probe Blowback (set from the **Blowback Timers** on the **SETTINGS** screen). To initiate a manual Probe Blowback, press the ***Start*** button.

This area also displays the current status of the Probe Blowback function:
- *Probe Blowback Off*
- *Probe in Blowback*

Analyzer Auto-Calibration & Auto-Zero

This area displays the current status of the Analyzer Auto-Calibration and Auto-Zero functions.

Analyzer Auto-CAL Off/In Progress

Allows you to manually *start* and *stop* a SO2 Analyzer Auto-Calibration, by pressing the ***Start*** button (the header will change to **Analyzer Auto-CAL in Progress** and the button will change to ***Stop***).

Analyzer Auto-Zero Off/In Progress

Allows you to manually *start* and *stop* a SO2 Analyzer Auto-Zero, by pressing the ***Start*** button (the header will change to **Analyzer Auto-Zero in Progress** and the button will change to ***Stop***).

Analyzer Auto-Zero Enabled/Disabled

Allows you to manually *enable* or *disable* a SO2 Analyzer daily recurring Auto-Zero operation. Press ***Enable*** to allow the SO2 Analyzer Auto-Zeroes to continue to operate according to the SO2 Analyzer Auto-Zero timer setting (which is set on the **SETTINGS** screen). In the *Enabled* state, the heading will display **Analyzer Auto-Zero Enabled**; the **Enable** button will be GREY and the **Disable** button will be RED.

Press ***Disable*** to prohibit SO2 Analyzer daily recurring Auto-Zero operations. In the *Disabled* state, the heading will display **Analyzer Auto-Zero Disabled**; the **Enable** button will be GREEN and the **Disable** button will be GREY.

Calibration/Verification Enabled

Allows you to manually perform an automated analyzer validation sequence, calibration sequence, or zero operation.

Calibration Enabled

Performs a SO2 Analyzer Auto-Calibration sequence. Refer to the SO2 Analyzer manual for complete details about performing an Auto-Calibration.

Validation Enabled

Performs a SO2 Analyzer Auto-Calibration sequence, but with the analyzer's Adjust Disable function turned ON, which disables the Zero Offset and Span Correction at the end of the sequence.

Auto-Zero After Blowback Enabled/Disabled

Allows you to manually control whether or not the analyzer will perform an Auto-Zero after a Probe Blowback function.

When you press the GREEN **Enable** button, the heading will display **Auto-Zero After Blowback Enabled**; the **Enable** button will be GREY and the **Disable** button will be RED.

When you press the RED **Disable** button, the heading will display **Auto-Zero After Blowback Disabled**; the **Disable** button will be GREY and the **Enable** button will be GREEN.

Manual Solenoid Control (Maintenance Mode Only)

Allows you to manually control the various solenoids that control the SSP Blowback operations.

These functions can only be manually controlled if the **Manual Solenoid Control** ***Enable*** button has been pressed and the SS Sample System (including the Sample Probe) is in *Maintenance* mode (i.e., the **Operator Maintenance** ***Enable*** button has been pressed – "**Probe in Maintenance**" is displayed).

With the system in *Maintenance* mode:
- Press the **Probe Isolation Solenoid** ***Start*** button to manually turn on the Isolation solenoid to isolate the Probe from the Sample System.
- Press the **Probe Filter Blowback Solenoid** ***Start*** button to manually turn on the Probe Filter Blowback solenoid.
- Press the **Probe Tube Blowback Solenoid** ***Start*** button to manually turn on the Probe Tube Blowback solenoid valve.

Analyzer Status

Displays the current status of essential, related analyzer functions.

Modbus Communication Status

Displays the status of the analyzer Modbus communications with the customer PLC.
- *Normal*
- *Fault*

Analyzer Flow Control Status

Displays the current state of the analyzer Flow Control mode:
- *Analyzer Control*
- *Continuous Backpurge*
- *Continuous Sample*
- *Continuous Zero*
- *Continuous Span Gas1*
- *Continuous Span Gas2*

Severe Service Probe System Preventive Maintenance

Generally, maintenance is typically limited to the Severe Service Probe, more specifically due to plugging in the Sample Probe. Occasionally other parts may require replacement, due to failure or damage.

WARNING

Before performing any maintenance on the Severe Service Probe System, familiarize yourself with safe and proper Shutdown procedures, as discussed in this manual, the AMETEK SO2 Analyzer manual, and the Universal Analyzers Inc. Severe Service Gas Sample Probe Instruction Manual.

Before powering down the SS PLC Enclosure, SSP, SS Heated Sample Line Bundle, and SO2 Analyzer, take all necessary precautions to safely power down all units. For additional information about powering down the SSP System, refer to the Universal Analyzers Inc. Severe Service Gas Sample Probe *Instruction Manual*.

Replacing the Sample Probe Filter

The SS PLC Enclosure/SSP and components within each enclosure are hot; take precautions to avoid burning yourself.

If the Heated Filter Element requires replacing, take all appropriate safety precautions to shut down the SS Probe and replace the Filter, as described in the sections “Shutdown” and “Maintenance” in the Universal Analyzers Inc. Probe *Instruction Manual* shipped with the system.

Replacing Other Parts in the SSP System

If any parts that make up the Severe Service Probe, or within the Severe Service Probe Enclosure, or within the SS PLC Enclosure require replacement, take all appropriate safety precautions to shut down the SS Probe System as described in the “Shutdown” section of the Universal Analyzers Inc. Probe *Instruction Manual* shipped with the system.

Diagnostics and Troubleshooting

The SSP System incorporates a built-in diagnostics function that continuously monitors the operation of essential system temperatures, purge system pressure in the SSP Enclosure, and Modbus communications. Alarms generated by operating conditions that exceed the factory-set high/low temperature setpoints, or generated by loss of SSP Enclosure purge pressure, or problems with Modbus communications between the SO2 Analyzer and the SS PLC Enclosure are displayed on the SSP HMI.

Viewing the Alarm Log

This section describes how the SSP System detects and displays these alarms on the **ALARM LOG**.

The **ALARM LOG** screen displays SSP System alarm description (**Message**), in order of occurrence (**Alarm time**), and when the alarm was acknowledged (**Acknowledge time**) by the user.

NOTE

*An alarm with an asterisk (*) preceding the alarm (see Figure 5-3.2) indicates the alarm is still active; it must be acknowledged (see Figure 5-3.2) before the system will be able to continue operating normally.*

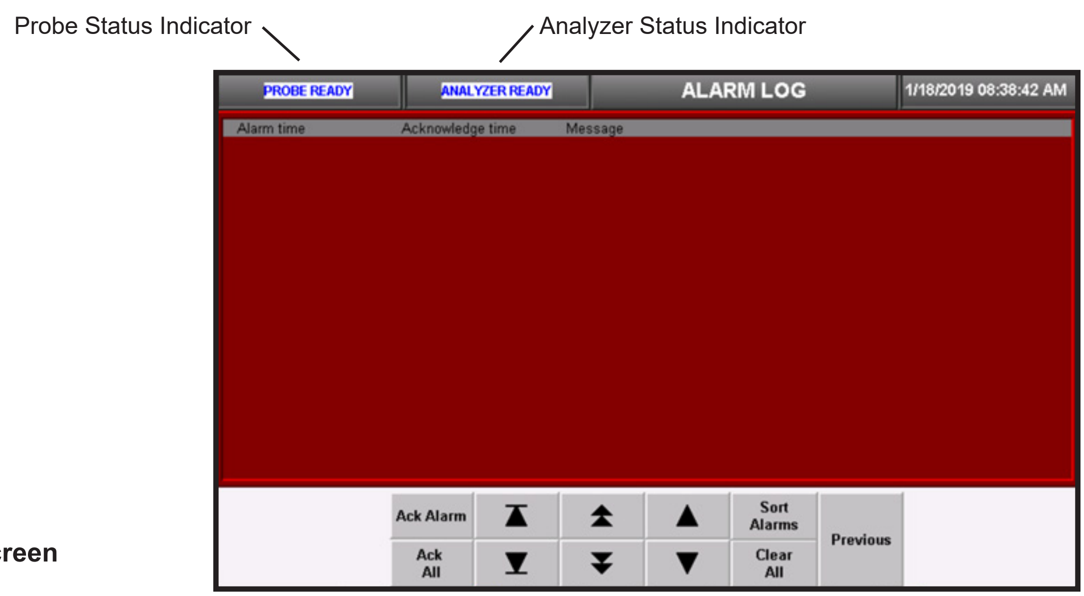


Figure 5-3.1. Alarm Log screen (No alarms).

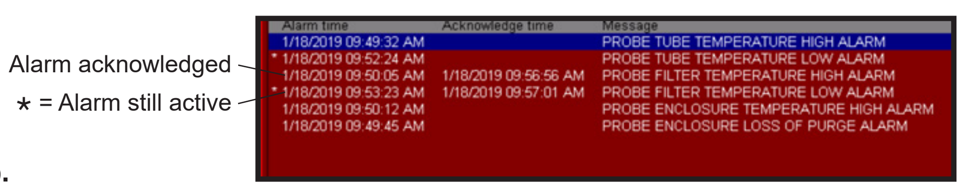


Figure 5-3.2. Alarm Log screen (Alarms active and Alarms Acknowledged).

Probe Status / **Analyzer Status** indicators

Displays the current status of the Sample Probe and SO2 Analyzer. Refer to “Viewing Live Status of the SSP System Process Controls and Instrumentation on the P&ID Screen” in Chapter 4 for status messages that can appear here.

Alarm Log operation and navigation buttons

These buttons allow you scroll through the alarms, and perform various functions to view, acknowledge, and clear alarms.

Ack Alarm button

Press **Ack Alarm** to acknowledge and silence the selected alarm. The date and time of the acknowledgment will be displayed under the **Acknowledge time** column.

Ack All button

Press **Ack All** to acknowledge all alarms that have not be acknowledged. The date and time of the acknowledgment will be displayed under the **Acknowledge time** column.

Sort Alarms button

Press **Sort Alarms** to sort alarms by date and time (under **Alarm)** or alphabetically (alarm name, under **Message**).

Clear All button

Press **Clear All** to clear all *acknowledged* alarms.

Previous button

Press **Previous** to view the previously viewed screen.

Navigation buttons

Use the following buttons to navigate through the alarms list:

	Press this button to scroll to the top of the alarms list (newest alarm).
	Press this button to scroll to the bottom of the alarms list (oldest alarm).
	Press this button to fast forward up the alarms list.
	Press this button to fast forward down the alarms list.
	Press this button to scroll up the alarms list, one alarm at a time, and to select an alarm.
	Press this button to scroll down the alarms list, one alarm at a time, and to select an alarm.

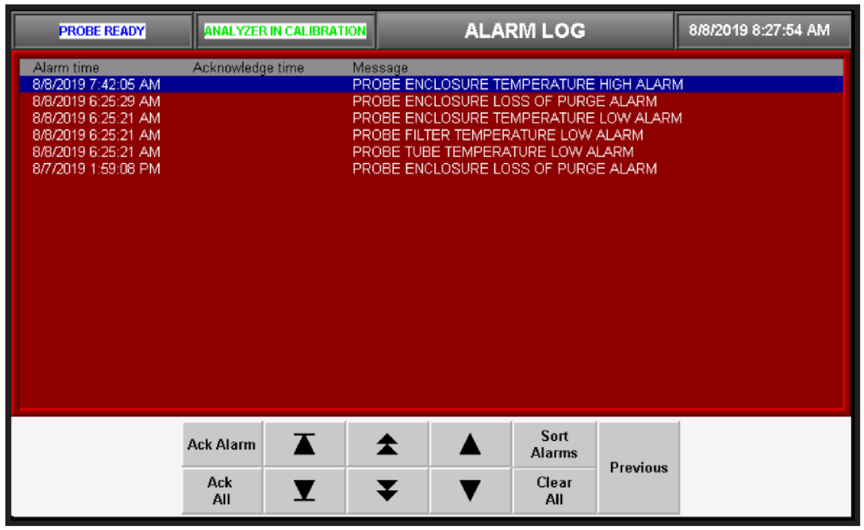


Figure 5-3.3.
Alarm Log screen (Alarms active).

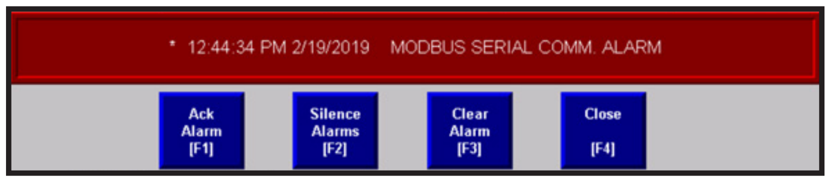


Figure 5-3.4.
Alarm triggered, pop-up alarm banner displayed (Modbus Serial Comm alarm).

Pop-up Alarm banner (Figure 5-3.4)

When an alarm is triggered, a pop-up alarm banner is displayed. Action must be taken to remove this indicator.

Ack Alarm [F1] button

Press the **Ack Alarm** button (or press **F1** on the customer DCS\DAS\PLC system) to acknowledge and silence the selected alarm. The pop-up alarm banner will be removed and time of the acknowledgment will be displayed on the main **ALARM LOG** screen under the **Acknowledge time** column.

Silence Alarms [F2] button

Press the **Silence Alarms** button (or press **F2** on the customer DCS\DAS\PLC system) to silence any audible signal triggered by alarms.

Clear Alarm [F3] button

Press the **Clear Alarm** button (or press **F3** on the customer DCS\DAS\PLC system) to clear the current alarm from the pop-up alarm banner, without removing it from the alarm history.

Close [F4] button

Press the **Close** button (or press **F4** on the customer DCS\DAS\PLC system) to close the pop-up alarm banner.

Severe Service Probe System Alarms and Corrective Action

This section lists system alarms that are triggered due to low and high temperature zones being controlled and monitored by the SSP System and the AMETEK SO2 Analyzer. The following list includes the *Alarm Message* (name), the main reason the alarm is set (*Description*), the reason(s) the alarm is set (*Trigger Condition*), and suggested *Corrective Action* to reset each alarm.

Alarm Message	Description / Trigger Condition / Corrective Action
Temperature Low Alarm (Probe Enclosure) (Probe Filter) (Probe Tube)	One or more of the temperature zones (at left) is operating below its **Set Point** value (which is set on the **TEMPERATURE ALARM SETTINGS** screen). ***Trigger Conditions:*** • This alarm will occur during a cold start, but will clear when the operating temperature of all controlled zones are within their normal operating ranges. If this alarm is caused by a low temperature in any of the temperature zones, the analyzer will automatically switch to *Backpurge* mode to ensure the sample system does not become plugged due to a low temperature in one of its zones. • This alarm can be caused by a power interruption/disconnection or a power spike. ***Corrective Actions:*** • From the SSP HMI: - Check the current temperature (**HOME** screen) for each temperature zone and compare it to its **Set Point** temperature (**TEMPERATURE ALARM SETTINGS** screen). - Check each of the associated configuration parameters for temperature control (**TEMPERATURE ALARM SETTINGS** screen). These parameters may have been lost as a result of a power interruption/disconnection or a power spike. Verify that power is being supplied to the SSP System. • Take appropriate safety precautions, open the SSP Enclosure, and: - Check the corresponding fuse for the zone which caused the alarm. • Take appropriate safety precautions, open the SS PLC Enclosure, and: - Check the corresponding fuse for the zone which caused the alarm. • Other checks/corrective action: - Check the electrical connections between the Sample Probe/Probe Filter and the SS PLC Enclosure. Check for proper connections and damage to the wiring. For Sample and Vent Line over-temperature wiring details, refer to Sample Line-related Final “As-Built” drawings shipped with the system. - Using an Ohm Meter, measure the resistance of the temperature sensor (RTD) for the zone which caused the alarm. Test it for an open circuit. **If the RTD is faulty, contact AMETEK for assistance.** • Contact AMETEK if: - The cable appears damaged – order a new part and replace it. - You need to verify operation or to order replacement parts, or you require replacement instructions.

Alarm Message	Description / Trigger Condition / Corrective Action
Temperature High Alarm **(Probe Enclosure)** **(Probe Filter)** **(Probe Tube)**	One or more of the temperature zones (at left) is operating above its **Set Point** value (which is set on the **TEMPERATURE ALARM SETTINGS** screen). ***Trigger Conditions:*** • If the SSP System detects one or more of these temperature zones has exceeded its Set Point value, the system will automatically switch to *Backpurge* mode and also de-energize the over-temperature relay for the zone that has exceeded its limit. This cuts power to the corresponding heater. The alarm must be acknowledged by pressing the **Ack Alarm** button. This also re-energizes the over-temperature relay, which restores power to the corresponding heater. ***Corrective Actions:*** • From the SSP HMI: - Check the current temperature (**HOME** screen) for each temperature zone and compare it to its **Set Point** temperature (**TEMPERATURE ALARM SETTINGS** screen). - Check each of the associated configuration parameters for temperature control (**SETTINGS** screen). These parameters may have been lost as a result of a power interruption or a power spike. • Take appropriate safety precautions, open the SS PLC Enclosure, and: - Check the fuse for the zone which caused the alarm. • Other checks/corrective action: - Check the electrical connections between the Sample Probe/Probe Filter and the SS PLC Enclosure. Check for proper connections and damage to the wiring. For Sample and Vent Line over-temperature wiring details, refer to Sample Line-related Final “As-Built” drawings shipped with the system - Using an Ohm Meter, measure the resistance of the temperature sensor (RTD) for the zone which caused the alarm. Test it for an open circuit. **If the RTD is faulty, contact AMETEK for assistance.** • Contact AMETEK if: - The cable appears damaged – order a new part and replace it. - You need to verify operation or to order replacement parts, or you require replacement instructions.

Alarm Message	Description / Trigger Condition / Corrective Action
PLC Cabinet Temperature High Alarm (>50 °C)	The temperature inside the SS PLC Enclosure is operating above 50 °C. ***Trigger Conditions:*** • This alarm will occur if the temperature inside the SS PLC Enclosure rises above 50 °C. The alarm condition will be displayed on the screen, and recorded in the **ALARM LOG**. ***Corrective Actions:*** • From the SSP HMI: - Check the **ALARM LOG** for recurring alarms. • Take appropriate safety precautions, open the SS PLC Enclosure, and: - Check the internal fan to ensure it is still operating. - Check other electronics in the Enclosure for signs of overheating (odors, burn marks, etc.).
Probe Enclosure Loss of Purge Alarm	Loss of pressure in the SSP Enclosure (on the process stack) has been detected. This is a serious system error that requires immediate attention. When this occurs, the system will automatically switch to *Backpurge* mode until purge pressure is restored. The **Probe Ready Status Indicator** will display "**Probe Not Ready**". This can occur if the purge system air supply line is compromised (air pressure drop or failure, air supply line is damaged, air supply pressure drops below the pressure switch setting of 0.1 "WC, or if the Z-Purge Controller becomes damaged or fails. ***Corrective Actions:*** • Take appropriate safety precautions to power down the SSP, SS PLC Enclosure, and the SO2 Analyzer and: - Check the purge system air supply line to ensure it is not damaged or plugged, and that its connections have not been damaged. - Check the Instrument Air supply to ensure there is sufficient pressure to maintain an appropriate purge. - Check the Z-Purge Controller for damage or other potential causes of failure.
Modbus Serial Comm. Alarm	An error in Modbus serial communications between the SO2 Analyzer and the PLC has been detected. ***Corrective Actions:*** • Take appropriate safety precautions to power down and then open the SS PLC Enclosure and the SO2 Analyzer. Check the communications wiring for proper connections and damage (cuts, nicks, burn marks, etc.) at the following locations: - The cable between the SS PLC Enclosure (at **P1** on the Modbus Gateway) and the SO2 Analyzer (at the analyzer's RS-422 port connection). - The cable between the SS PLC Enclosure (at **E2** on the Modbus Gateway) and the customer DCS. • Check to ensure the SO2 Analyzer and SS PLC have power and are operating properly.

Alarm Message	Description / Trigger Condition / Corrective Action
Replace PLC Battery	This alarm is triggered when the SS Enclosure PLC battery is nearing the end of its useful life. Failure to replace the Lithium battery in a timely manner will result in disabling the RTC (real time clock) and any logic functions associated with the RTC. ***Corrective Actions:*** • Order a new battery (see Part Number options in Chapter 6). After receiving the battery, take appropriate safety precautions, open the SS PLC Enclosure, and replace the battery. See the "Heated Probe/PLC Controller Enclosure, AC and DC Power Fuse Locations" drawing in Appendix B for battery location.

SERVICE AND PARTS

This chapter discusses what to do if you need technical support from AMETEK, or if you are returning parts for service. This chapter also lists the recommended spare parts to have on hand to ensure preventive (or unscheduled) maintenance is performed as needed.

Technical Support

AMETEK Western Research is committed to providing you the best technical support in the industry. If you need service or application assistance, contact your local or nearest AMETEK Service Centre or the AMETEK factory at (403) 235-8400 or 1-800-661-9198, or contact your local AMETEK Western Research representative.

NOTE

For office locations and contact information, refer to the "Offices" page near the beginning of this manual, or visit us at www.ametekpi.com.

Before contacting AMETEK with questions regarding the installation, operation, or maintenance/troubleshooting of your Severe Service Probe (SSP) System, carefully review the contents of this manual. If you are unable to find an explanation for your problem in this manual, please gather the following information prior to contacting AMETEK:

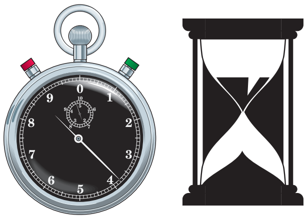
- Severe Service Probe (SSP) System serial number.
- Purchase order number.
- AMETEK part number for the specific component you are enquiring about.
- Information describing the problem.
- Billing address, shipping address, and telephone number.

Returning Equipment

If you need to return parts or equipment for repair, you will need a Return Material Authorization (RMA) number. This will ensure your equipment is serviced and returned to you in a prompt and efficient manner. To obtain a RMA number, contact your local or nearest AMETEK Service Centre and have the following information available:

- Severe Service Probe (SSP) System serial number.
- Purchase order number.
- Billing address, shipping address, and telephone number.

?? ANSWERS TO YOUR QUESTIONS ??



**MINUTES OR HOURS,
WE'RE THERE FOR YOU**

The choice is yours...

Whether by phone or in person, we can meet the needs required to keep your Severe Service Probe (SSP) System running at peak performance. Our factories are located in Calgary, Alberta and Newark, Delaware with a Sales & Service Centre in Houston, Texas. Depending on the programs you select, we will have a factory-trained representative talking to you within minutes – 24 hours a day, 365 days a year or on-site within 24 hours. We stock parts at all three locations.

ANYTIME / ANYWHERE

AMETEK SERVICE and AFTERMARKET SALES SUPPORT

• PRE-INSTALLATION INSPECTIONS

To ensure you order the correct analyzer with the options your operation requires, schedule a factory-trained Service Engineer to inspect the proposed SSP System location. The on-site charge for this visit can be deducted from the start-up charge if you select that option.

• START UPS

Your decision to buy an AMETEK SSP System is greatly appreciated. After the time and money spent on your SSP System, wouldn't you expect a fast and successful start up? We can ensure that will happen! Schedule us to be there before you power up the system. We will guarantee a satisfactory commissioning of your SSP System.

• WARRANTY VALIDATION

Upon start-up, we will validate your 1 year warranty. AMETEK's warranty policy covers all parts and on-site time. Incurred costs will be the responsibility of the customer.

• WARRANTY EXTENSIONS

AMETEK offers a 2 or 3 year warranty extension for your SSP System . The warranty is identical to the original policy supplied with the SSP System. Contact AMETEK Service for more details.

• SPARE PARTS

These parts allow each customer to properly maintain their SSP System according to the recommended Preventive Maintenance Schedule, to ensure optimal operations.

• ASAP

AMETEK SERVICE ASSISTANCE PROGRAM. AMETEK's exclusive ASAP program lets you select a service package from a menu of service options. ASAP options include 24 hour phone support, 24 hour on-site guarantee, rapid parts shipment, and many more service benefits. ASAP plans may be written to provide coverage for a single SSP System, or all of the AMETEK SSP Systems at your facility.

• AFTERMARKET SALES

Our Aftermarket Sales group will keep you supplied with the parts to maintain your SSP System to factory specifications. This is also the group that will keep your SSP System current with upgrades and retrofits.

• TECHNICAL SUPPORT

Just call AMETEK and a factory trained Service Engineer will be there to answer your questions. With over 200 years of combined field service experience, our engineers are available to provide operational support or troubleshooting expertise.

• TRAINING

We will train your service technicians at our Technology Transfer Centres located in Calgary, Newark, or at your facility. Our TTCs have equipment similar to yours for hands-on training. A diploma will be presented upon completion of the course.

AMETEK
PROCESS INSTRUMENTS
Canada: 1-800-661-9198 U.S.A.: 1-800-537-6044

Recommended Preventive Maintenance Spare Parts

This section lists the recommended spare parts to have readily available to ensure the Severe Service Probe (SSP) will continue to operate at peak efficiency.

NOTE

For drawings that illustrate the locations of Severe Service Probe System spare parts, see Appendix B in this manual, and the Drawings section in the Universal Analyzers Inc. Severe Service Gas Sample Probe Instruction Manual.

Content is subject to change without notice.

Severe Service Probe Spare Parts

Filter Chamber Assembly

UAI Part No.	Description
4980-0328 5209-1001	**Filter Element, 2 µm 316 SS (Heated Filter Assembly)** Full Assembly, Filter Cap
4904-0036	**O-Ring, #2-318, KALREZ, Max. Temp. 600 °F (Filter Element, Heated Filter Assembly)**
4904-0016	**O-Ring, #2-217, KALREZ, Max. Temp. 600 °F (Filter Element, Heated Filter Assembly)**
4904-0046	O-Ring, #2-210, KALREZ, Max. Temp. 600 °F (Filter Chamber Manifold, Heated Filter Assembly)
4904-0002	O-Ring, #2-213, KALREZ, Max. Temp. 600 °F (Filter Chamber Manifold, Heated Filter Assembly)
5209-0180	Isolation Valve (AV3) (Filter Chamber Manifold, Heated Filter Assembly)
3014-0054	Heater Rod (HTR1) (Chamber Oven Top, Heated Filter Assembly)
3014-1058	Heater Rod (HTR2, HTR3) (Chamber Oven Bottom, Heated Filter Assembly)
1150-0059	RTD (Quantity 2) (Heated Filter Assembly) (Chamber Oven Top, Heated Filter Assembly)

See the "Filter Chamber Assembly" drawing in Appendix B for locations. UAI Part No.: Order Parts from Universal Analyzers Inc.
(See also Universal Analyzers Inc. Model HRSS Extractive Gas Sample Probe *Instruction Manual* for additional spare part numbers.)

NOTE

Parts listed in ***bold typeface*** *above are required as part of regular Preventive Maintenance to ensure your system operates at peak efficiency and minimal downtime. Because site conditions can vary, ensure proper quantities are on-site based on expected recurring maintenance requirements.*

All other parts listed are shown as replacement parts in the event of failure of those parts. For all parts listed without Part Numbers, contact AMETEK or Universal Analyzers Inc. directly.

Heated Chamber to Heated Probe Connection

UAI Part No.	Description
4903-1001	Gasket, Sub-Flange (Probe Filter Chamber, inside Probe Enclosure)
4903-0001	Gasket, Main Flange (Probe Filter, outside Probe Enclosure)
4904-0019	O-Ring, # 2-016, Viton (Filter Chamber Manifold, Heated Filter Assembly)
4904-0041	O-Ring, # 2-012, Viton (Filter Chamber Manifold, Heated Filter Assembly)

See the "Chamber Installation" drawing in Appendix B for locations. UAI Part No.: Order Parts from Universal Analyzers Inc.

Probe Enclosure Heater

UAI Part No.	Description
3014-0066	Enclosure Heater (HTR5, HTR6)
—	Enclosure Heater Safety Switch (TS1)

See the "Enclosure Heater Assembly" drawing in Appendix B for locations. UAI Part No.: Order Parts from Universal Analyzers Inc.

Velocity Probe (Optional)

Part No.	Description
* Custom	Pitot Tube
* Custom	Thermocouple (in Pitot Tube)
* Custom	Velocimeter Assembly
* Custom	DP Cell

NOTE: These parts are available only for use with systems using AMETEK Model 909/910 Analyzers.
See Final "As-Built" drawings shipped with your system.
* Custom Part No.: Contact Universal Analyzers Inc. to order parts.

SSP Enclosure Spare Parts

SSP Enclosure

UAI Part No.	Description
4955-2921	Solenoid Valve (SV1, SV2, SV3) (located on Electrical Box, exterior)
4955-2098	Air Blowback Isolation Valve (AV1, AV2) (located inside SSP Enclosure)
—	* Instrument Air Supply Subassembly (located on Electrical Box)

See the "Filter Chamber Assembly" drawing in Appendix B for locations. UAI Part No.: Order Parts from Universal Analyzers Inc.
* See the "Interior Door View" drawing in Appendix B for location.

Heated Probe/PLC Controller Enclosure Spare Fuses

NOTE

Replacement fuses are required only if the fuse fails/blows; however, AMETEK recommends having replacements on-site to ensure continued proper operation and minimal downtime in the event of failure.

For Fuse Part Numbers, contact AMETEK directly.

AC Power Fuses

Part No.	Fuse No.	Load Description (SSP Component)
—	F1	Fuse, 5 A, IEC 10x38 Fast Acting (Probe Tube Heater)
—	F2	Fuse, 10 A, IEC 10x38 Fast Acting (Probe Filter Heater)
—	F3	Fuse, 10 A, IEC 10x38 Fast Acting (Probe Enclosure Heater)
—	F4	Fuse, 5 A, IEC 10x38 Fast Acting (Spare)
—	F5	Fuse, 5 A, IEC 10x38 Fast Acting (24 VDC Power Supply)
—	F6	Fuse, 5 A, IEC 10x38 Fast Acting (Spare)
—	F7	Fuse, 10 A, IEC 10x38 Fast Acting (Spare)

See the "Heated Probe/PLC Controller Enclosure, AC and DC Power Fuse Locations" drawing in Appendix B for locations.
Note: Contact AMETEK for fuse Part Numbers.

DC Power Fuses, 24 VDC

Part No.	Fuse No.	Load Description (SSP Component)
—	F1	Fuse, 1.0 A, 5x20 (Ethernet Switch, MOXA)
—	F2	Fuse, 1.0 A, 5x20 (Ethernet Gateway, MOXA)
—	F3	Fuse, 3.0 A, 5x20 (Panelview Plus 7 HMI)
—	F4	Fuse, 3.0 A, 5x20 (PLC Main)
—	F5	Fuse, 3.0 A, 5x20 (PLC (VDC2) Load)
—	F6	Fuse, 3.0 A, 5x20 (Solenoid Control Valves (SV1, SV2, SV3))
—	F7	Fuse, 1.0 A, 5x20 (PLC-DI)
—	F8	Fuse, 0.5 A, 5x20 (Fan Blower)
—	F9	Fuse, 0.5 A, 5x20 (RTD Signal Converter)
—	F10	Fuse, 1.0 A, 5x20 (Spare)

See the "Heated Probe/PLC Controller Enclosure, AC and DC Power Fuse Locations" drawing in Appendix B for locations.
Note: Contact AMETEK for fuse Part Numbers.

SS PLC Enclosure, Miscellaneous Spare Parts

Part No.	Description
	Battery, PLC Lithium (located inside SS PLC Enclosure)
1747-BA	(from Allen-Bradley)
CR14250SE-TC23-1	(from Sanyo)

The battery is only required in the event that the "Replace PLC Battery" alarm is triggered and displayed on the **ALARM LOG** screen.

Ordering a Documentation Package DVD or a Printed Copy of the Severe Service Probe IOM Guide

The standard Documentation Package shipped with the SSP System consists of a *Documentation Package* DVD. To order another copy of the *Documentation Package* DVD or a printed copy of the Severe Service Probe *Installation, Operation, and Maintenance Guide*, use the ordering information below:

Part No.	Description
100-2953	Severe Service Probe (SSP) Documentation Package DVD (comes with a PDF version of the SSP *Installation, Operation, and Maintenance Guide*)
903-8802	Severe Service Probe (SSP) *Installation, Operation, and Maintenance Guide*, Printed Copy

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APPENDIX A – MICROLOGIX 1400 PLC MODBUS MAP

This appendix contains the Modbus Map for the Micrologix 1400 PLC system.

Micrologix 1400 PLC Modbus Map

REV. 0

2/25/2019

Modbus 0xxxx Coils

AB_ADDRESS	Modbus Address (MB_ address)	DATA TYPE	DESCRIPTION	ACCESS	COMMENTS
B10:0/0	MB_00001	BIT	PROBE READY STATUS	READ/WRITE	0 = NOT READY, 1 = READY
B10:0/1	MB_00002	BIT	PROBE TUBE TEMP. HIGH	READ/WRITE	0 = NORMAL, 1 = ALARM
B10:0/2	MB_00003	BIT	PROBE TUBE TEMP. LOW	READ/WRITE	0 = NORMAL, 1 = ALARM
B10:0/3	MB_00004	BIT	PROBE FILTER TEMP. HIGH	READ/WRITE	0 = NORMAL, 1 = ALARM
B10:0/4	MB_00005	BIT	PROBE FILTER TEMP. LOW	READ/WRITE	0 = NORMAL, 1 = ALARM
B10:0/5	MB_00006	BIT	PROBE ENCLOSURE TEMP. HIGH	READ/WRITE	0 = NORMAL, 1 = ALARM
B10:0/6	MB_00007	BIT	PROBE ENCLOSURE TEMP. LOW	READ/WRITE	0 = NORMAL, 1 = ALARM
B10:0/7	MB_00008	BIT	MODBUS SERIAL COMM. ALARM	READ/WRITE	0 = NORMAL, 1 = ALARM
B10:0/8	MB_00009	BIT	PROBE ISOLATION SOLENOID VALVE	READ/WRITE	0 = OFF, 1 = ON
B10:0/9	MB_00010	BIT	PROBE TUBE BLOWBACK SOLENOID VALVE	READ/WRITE	0 = OFF, 1 = ON
B10:0/10	MB_00011	BIT	PROBE FILTER SOLENOID VALVE	READ/WRITE	0 = OFF, 1 = ON
B10:0/11	MB_00012	BIT	NOT USED	-	-
B10:0/12	MB_00013	BIT	LOSS OF Z PURGE ALARM	READ/WRITE	0 = NORMAL, 1 = ALARM
B10:0/13	MB_00014	BIT	PROBE IN MAINTENANCE STATUS	READ/WRITE	0 = NORMAL, 1 = IN MAINTENANCE
B10:0/14	MB_00015	BIT	PLC CABINET TEMPERATURE HIGH	READ/WRITE	0 = NORMAL, 1 = ALARM
B10:0/15	MB_00016	BIT	NOT USED	-	-

Channel 0
Modbus RTU Slave
RS-485 2 Wre
19.2K-N-8-1
RTU # 1

Micrologix 1400 PLC Modbus Map

Rev. 0 2/25/2019

Modbus 4xxxx Holding Regs

AB_SYMBOL	Modbus Address (MB_ address)	DATA TYPE	DESCRIPTION	UNITS	ACCESS	COMMENTS
N13:0	MB_40001	Unsigned 16-Bit Integer	HEATED PROBE TUBE TEMP.	DEG. C	READ ONLY	
N13:1	MB_40002	Unsigned 16-Bit Integer	HEATED PROBE FILTER TEMP.	DEG. C	READ ONLY	
N13:2	MB_40003	Unsigned 16-Bit Integer	PLC CABINET TEMP.	DEG. C	READ ONLY	
N13:3	MB_40004	Unsigned 16-Bit Integer	HEATED PROBE ENCLOSURE TEMP.	DEG. C	READ ONLY	
N13:4	MB_40005	Unsigned 16-Bit Integer	HEATED PROBE TUBE SETPOINT	DEG. C	READ/WRITE	
N13:5	MB_40006	Unsigned 16-Bit Integer	HEATED PROBE FILTER SETPOINT	DEG. C	READ/WRITE	
N13:6	MB_40007	Unsigned 16-Bit Integer	PROBE TUBE HEATER DUTY CYCLE	%	READ ONLY	
N13:7	MB_40008	Unsigned 16-Bit Integer	PROBE FILTER HEATER DUTY CYCLE	%	READ ONLY	
N13:8	MB_40009	Unsigned 16-Bit Integer	HEATED PROBE ENCLOSURE SETPOINT	DEG. C	READ/WRITE	
N13:9	MB_40010	Unsigned 16-Bit Integer	PROBE ENCLOSURE HEATER DUTY CYCLE	%	READ ONLY	
N13:10	MB_40011	Unsigned 16-Bit Integer	PROBE STATUS	NONE	READ ONLY	1=PROBE FAULT, 5=BLOWBACK, 9=PROBE READY

Channel 0
Modbus RTU Slave
RS-485 2 Wre
19.2K-N-8-1
RTU # 1

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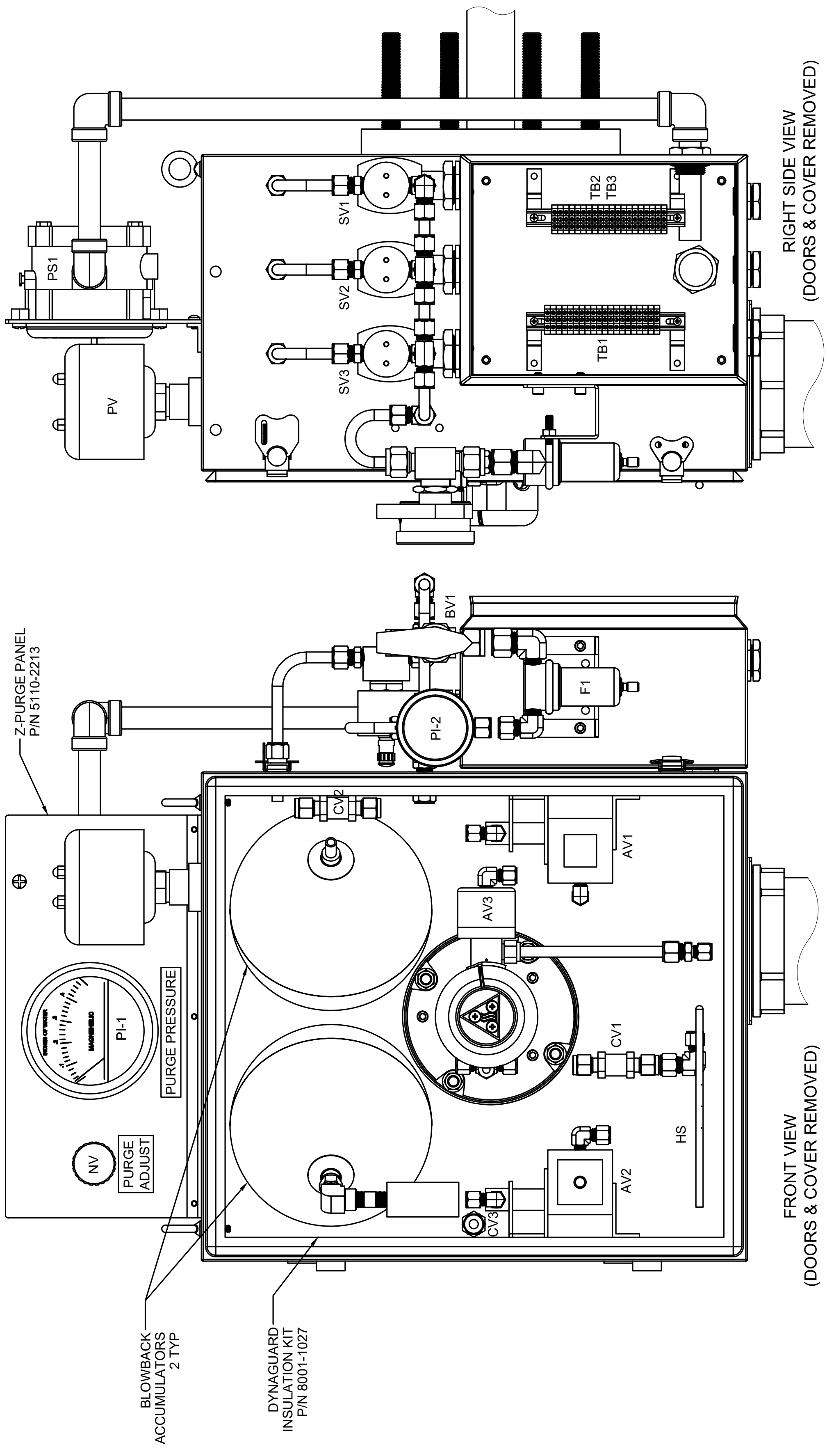
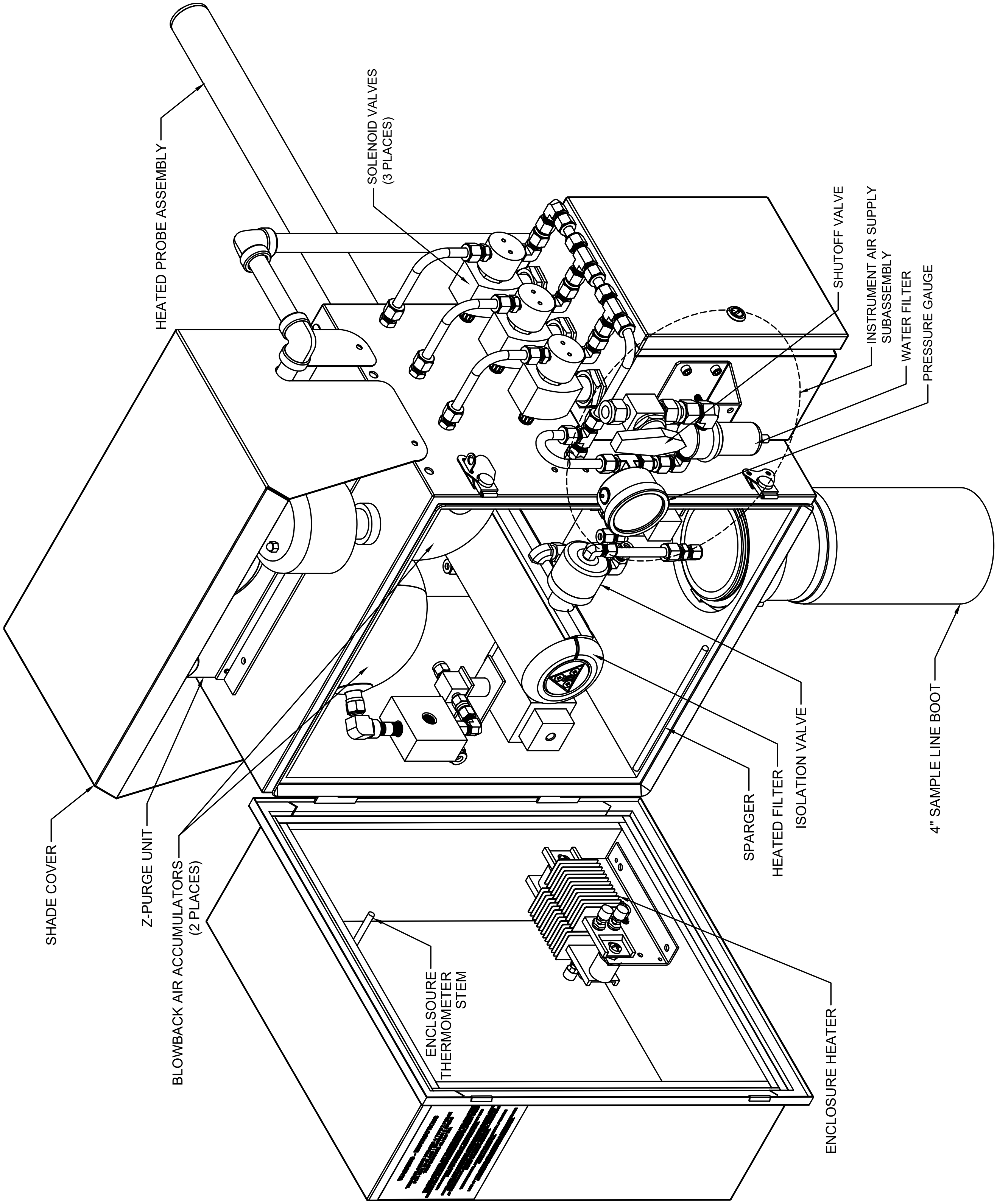
APPENDIX B – DRAWINGS

This appendix contains Severe Service Probe System drawings, most of which are not included in the main body of this manual. Many of these drawings can be used to locate spare parts, as described in Chapter 6 – Service and Parts.

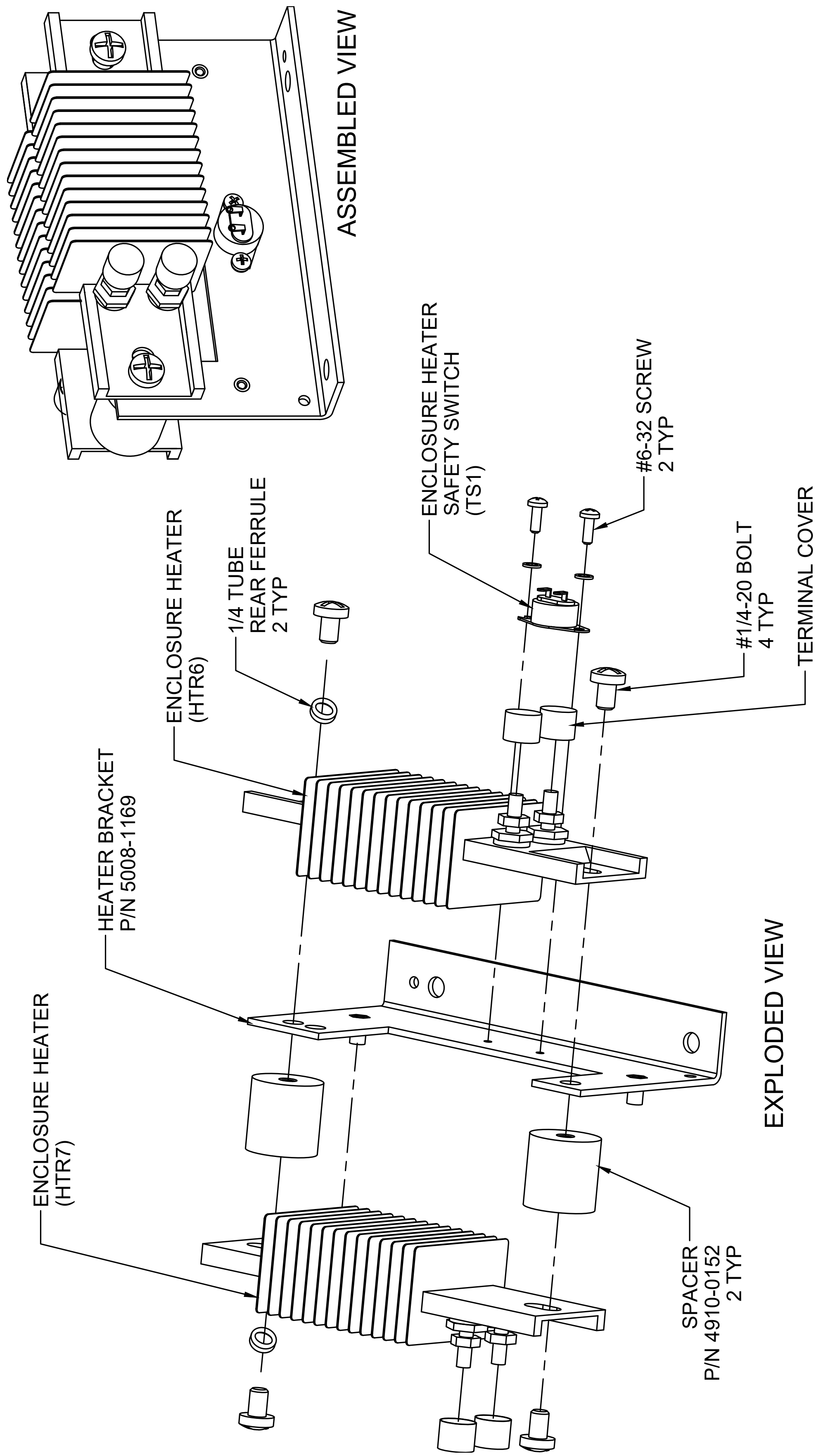
Severe Service Probe, Interior Layout



Severe Service Probe, Interior Door View



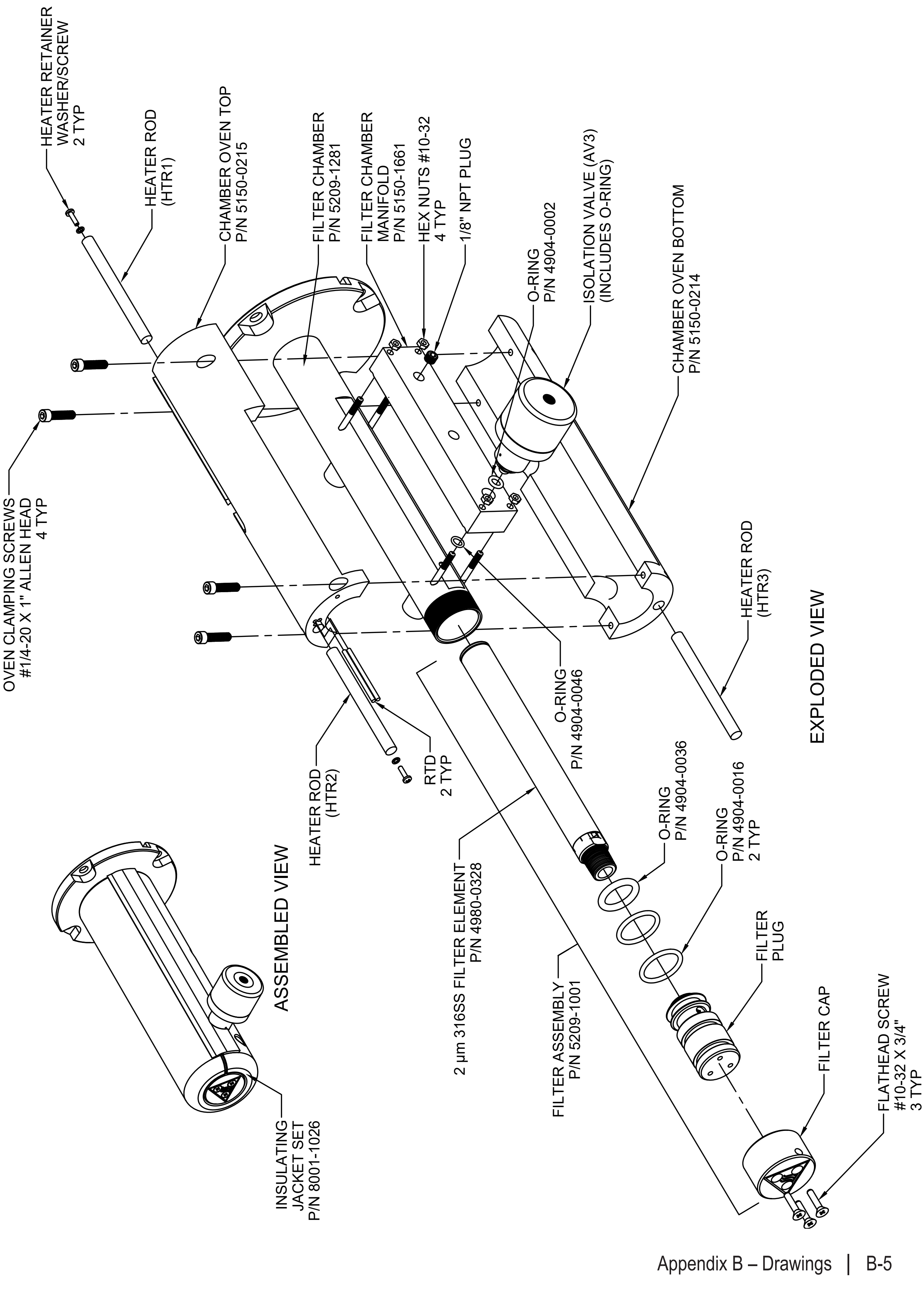
Severe Service Probe, Enclosure Heater Assembly



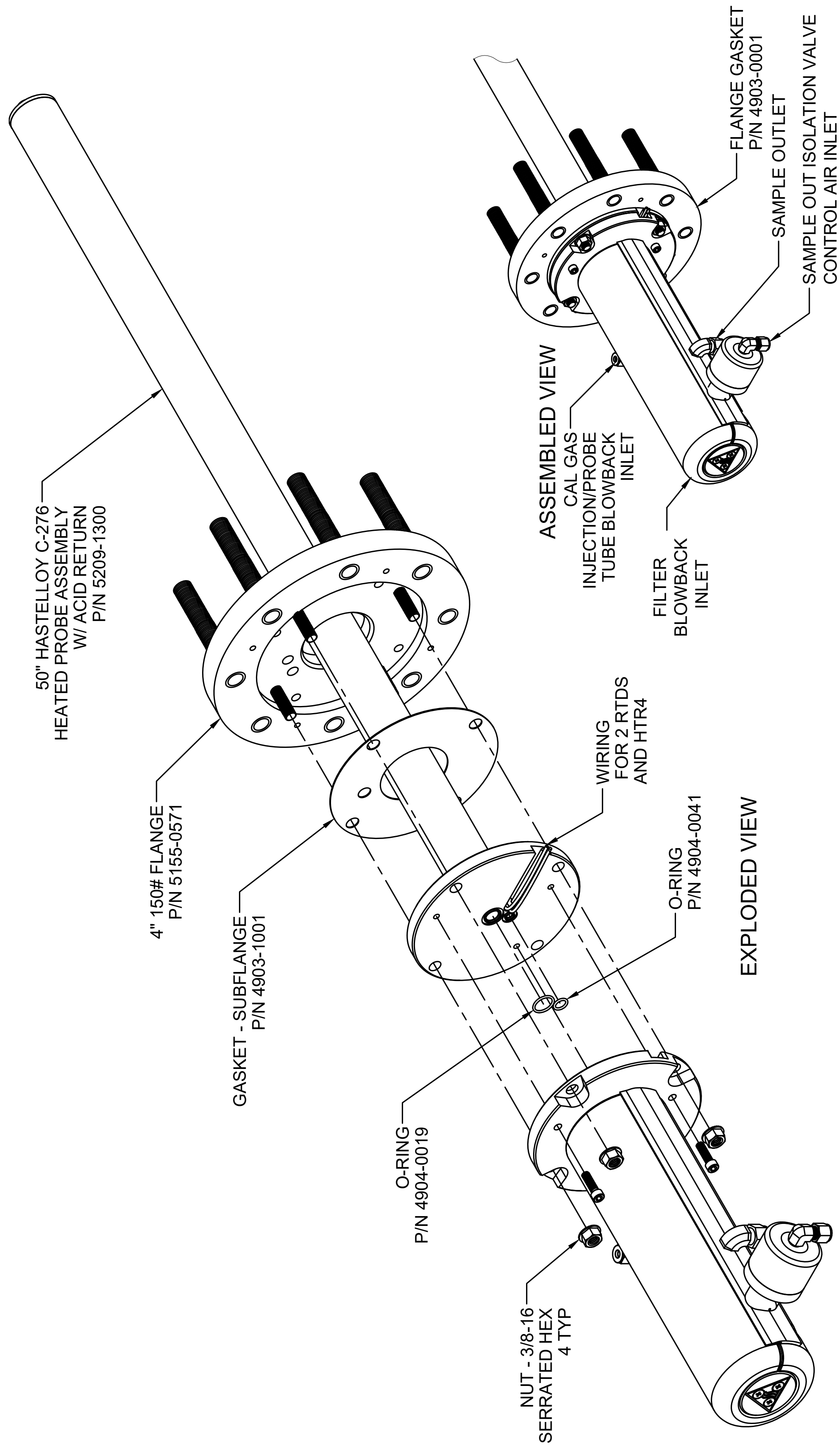
NOTES:

1. USE #10 RING TERMINAL (P/N 3211-0111) & HIGH TEMP HEAT SHRINK (P/N 3910-0028) TO CONNECT WIRES TO HEATER TERMINALS.

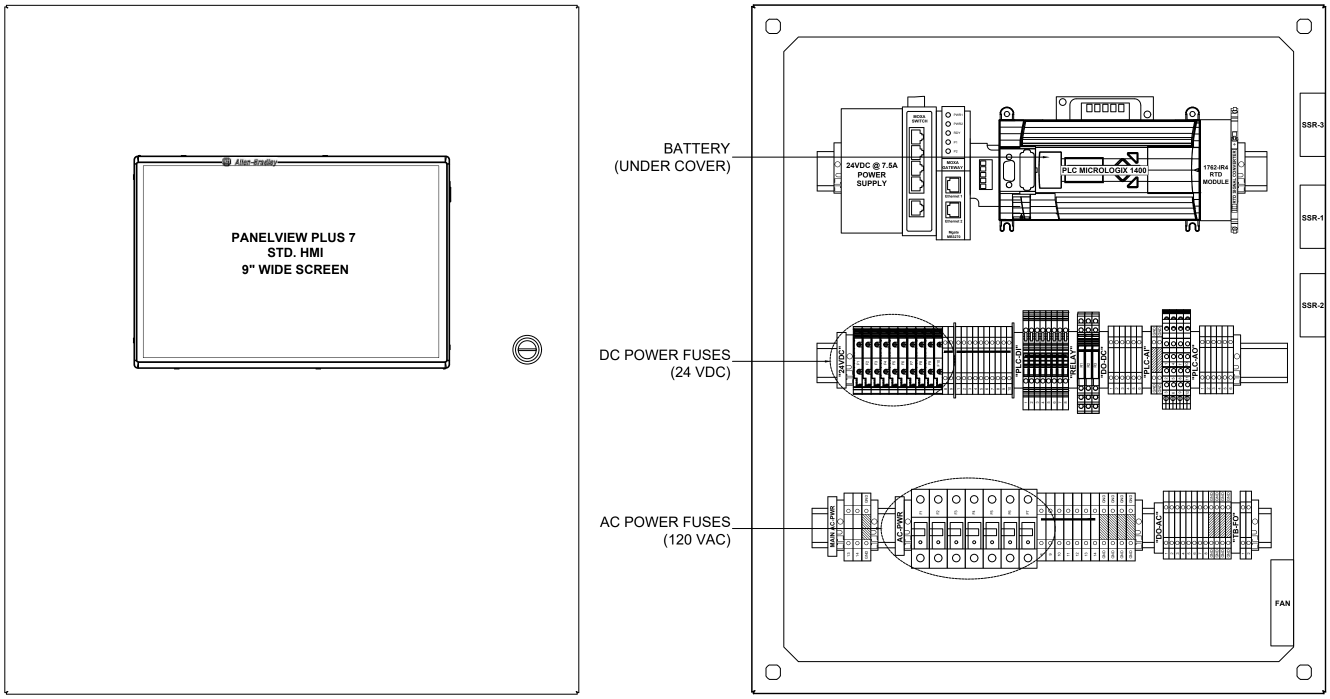
Severe Service Probe, Filter Chamber Assembly



Severe Service Probe, Chamber Installation



Heated Probe/PLC Controller Enclosure, AC and DC Power Fuse Locations



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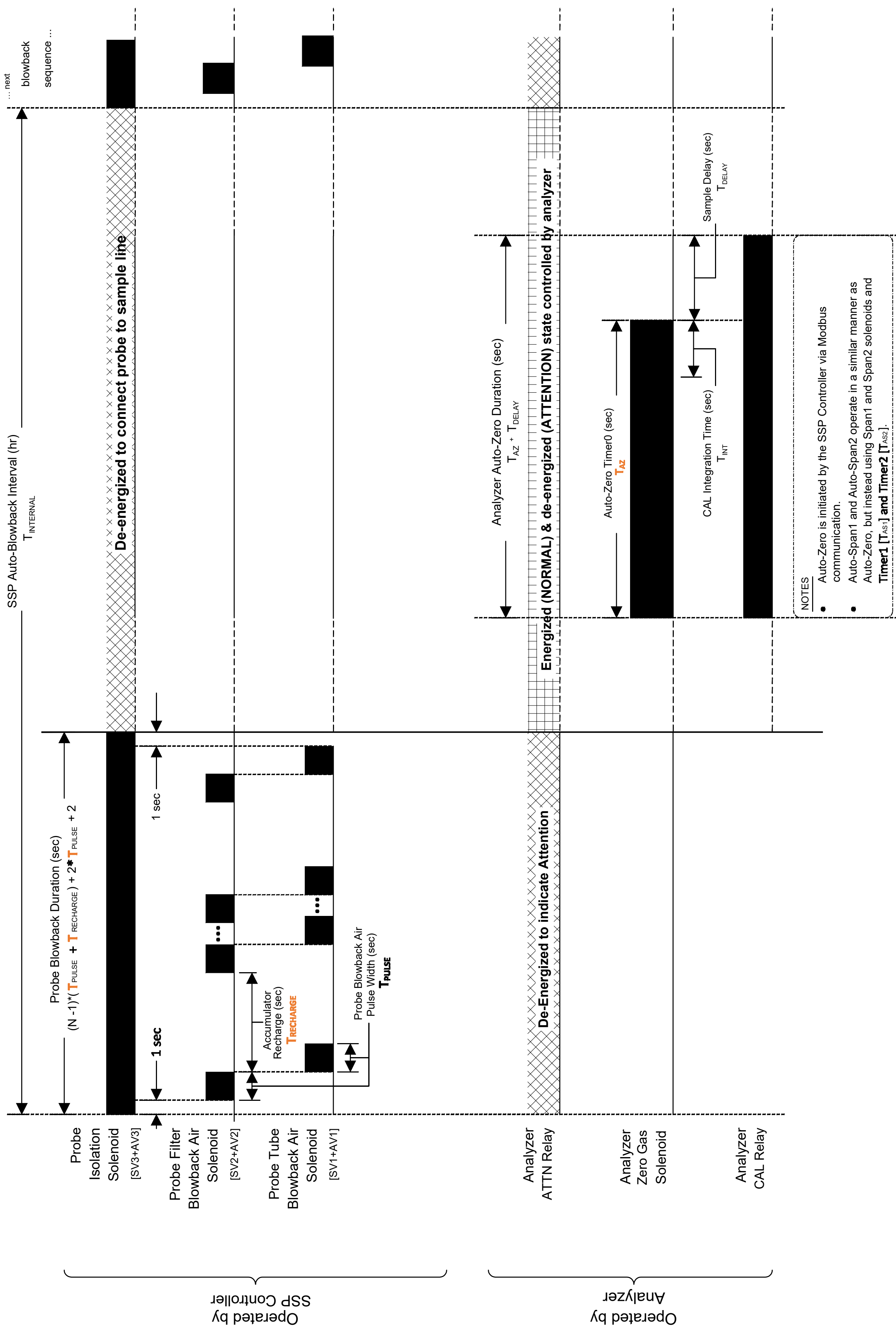
APPENDIX C – ANALYZER/SSP TIMING DIAGRAM

This appendix contains the "Analyzer/SSP Timing Diagram" that illustrates the SS Probe blowback and AMETEK SO2 Analyzer calibration timing sequences.


SSP Auto-Blowback Interval (hr)
T_INTERNAL
... next blowback sequence ...
Probe Blowback Duration (sec)
(N -1)*(T_PULSE + T_RECHARGE) + 2*T_PULSE + 2
1 sec
1 sec
De-energized to connect probe to sample line
Accumulator Recharge (sec)
T_RECHARGE
Probe Blowback Air Pulse Width (sec)
T_PULSE
De-Energized to indicate Attention
Energized (NORMAL) & de-energized (ATTENTION) state controlled by analyzer
Analyzer Auto-Zero Duration (sec)
T_AZ + T_DELAY
Auto-Zero Timer0 (sec)
T_AZ
CAL Integration Time (sec)
T_INT
Sample Delay (sec)
T_DELAY
NOTES
• Auto-Zero is initiated by the SSP Controller via Modbus communication.
• Auto-Span1 and Auto-Span2 operate in a similar manner as Auto-Zero, but instead using Span1 and Span2 solenoids and Timer1 [T_AS1] and Timer2 [T_AS2].
Probe Isolation Solenoid [SV3+AV3]
Probe Filter Blowback Air Solenoid [SV2+AV2]
Probe Tube Blowback Air Solenoid [SV1+AV1]
Analyzer ATTN Relay
Analyzer Zero Gas Solenoid
Analyzer CAL Relay
Operated by SSP Controller
Operated by Analyzer

SUPPLEMENTAL INFORMATION

If your Severe Service Probe System includes optional, job-specific equipment or functions, this section will include additional information that can assist you with the installation, operation, and maintenance/diagnostics of the system. Examples of additional information that can be included in this section includes Final "As-Built" drawings and/or manual supplements. For electronic manuals (i.e., PDF versions), any additional information will also be in PDF format. For hard copy (paper) versions of this manual, any supplemental information will also be in paper.

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