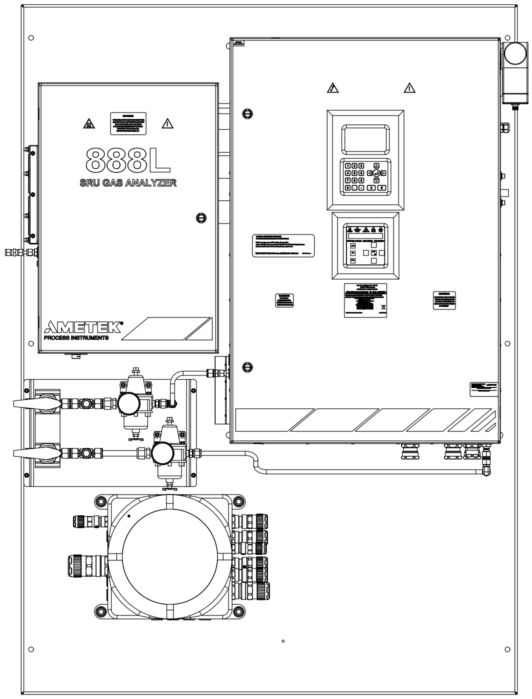
MANUAL SUPPLEMENT

888L Tail Gas Analyzer
ATEX-IECEx



PN 883075901 Rev A

To obtain a PDF of this manual, visit our Products page at www.ametekpi.com.

Contents

This page intentionally left blank.

Overview

About This Manual Supplement

This document is intended to supplement the AMETEK 888 Tail Gas Analyzer ATEX-IECEx *User Manual* when the 888L Tail Gas Analyzer is purchased.

Use the 888 Tail Gas Analyzer ATEX-IECEx *User Manual* for all general information about the 888 Analyzer, and use the 888L Tail Gas Analyzer ATEX-IECEx *Manual Supplement* for all differences between the 888L Tail Gas Analyzer and the 888 Tail Gas Analyzer. Use the information in this *Supplement* in place of corresponding information in the 888 Tail Gas Analyzer ATEX-IECEx *User Manual* including installation, maintenance and troubleshooting, spare parts, specifications, and drawings of the overall system.

For assistance and additional information contact your AMETEK distributor representative, or AMETEK Service.

About the 888L Tail Gas Analyzer

A variation of the field-proven 888 top-of-the-pipe air demand analyzer, the 888L Tail Gas Analyzer enables users to remotely mount the 888L Analyzer (and its analytical Cell Enclosure) away from the sample extraction point.

The 888L consists of three key components:

- Analyzer system, consisting of Electronics Enclosure (with built-in User Interface), Cell Enclosure, and Customer Connection Enclosure.

- Remotely mounted Probe Enclosure (with Sample Probe and Demister), installed at the Sample Tap on the Tail Gas Pipe.

- Heated sample lines (Sample Bundle) used to transport Sample Gas from the Probe Enclosure (at the Sample Tap), to the analyzer, and back to the Tail Gas Pipe.

Using the Analyzer *User Manual* and *Manual Supplement*

- The analyzer *User Manual* and this *Manual Supplement* contain references about operating this equipment in Hazardous Locations and how to safely perform maintenance on the analyzer in these locations. Read and follow these Warnings and Cautions to ensure safe handling and maintenance of the analyzer at all times while operating and performing maintenance on it.

- This *Manual Supplement* is set up to include the same chapter names as those in the 888 Analyzer *User Manual* to make it easier to locate differences between the standard 888 Analyzer and the derivative 888L Analyzer.

- This *Manual Supplement* contains information and drawings that are intended to replace information and Figures in the analyzer manual.

  In cases where this supplement references a drawing that is in the analyzer manual, the Figure number will also include a Chapter number (e.g., 1-7 or 2-1.2).

  To use this Supplement:

  - The **Section/Chapter** heading refers to the *Section* title and the *Chapter* number (or *Appendix*) in the 888 Analyzer *User Manual* for which information/drawings are to be replaced by information in this Supplement.

  - The **Page(s)** heading refers to the analyzer *User Manual's* page number on which the information in the analyzer manual is to be replaced by information in this Supplement.

  - The **Instructions** heading lists the exact information from the analyzer *User Manual* that is to be replaced by information in this Supplement.

  Example of headings:

Section/Chapter	Page(s)	Instructions
About the Analyzer Sample System	1-9 and 1-10	Use the information and Figure 1-6 below in place of the information and Figure 1-6 in the 888 Analyzer *User Manual*.

Section/Chapter	Page(s)	Instructions
Overview	1-1	Use Figure 1-1 and the information below in place of Figure 1-1 and the information in the 888 Analyzer *User Manual*.

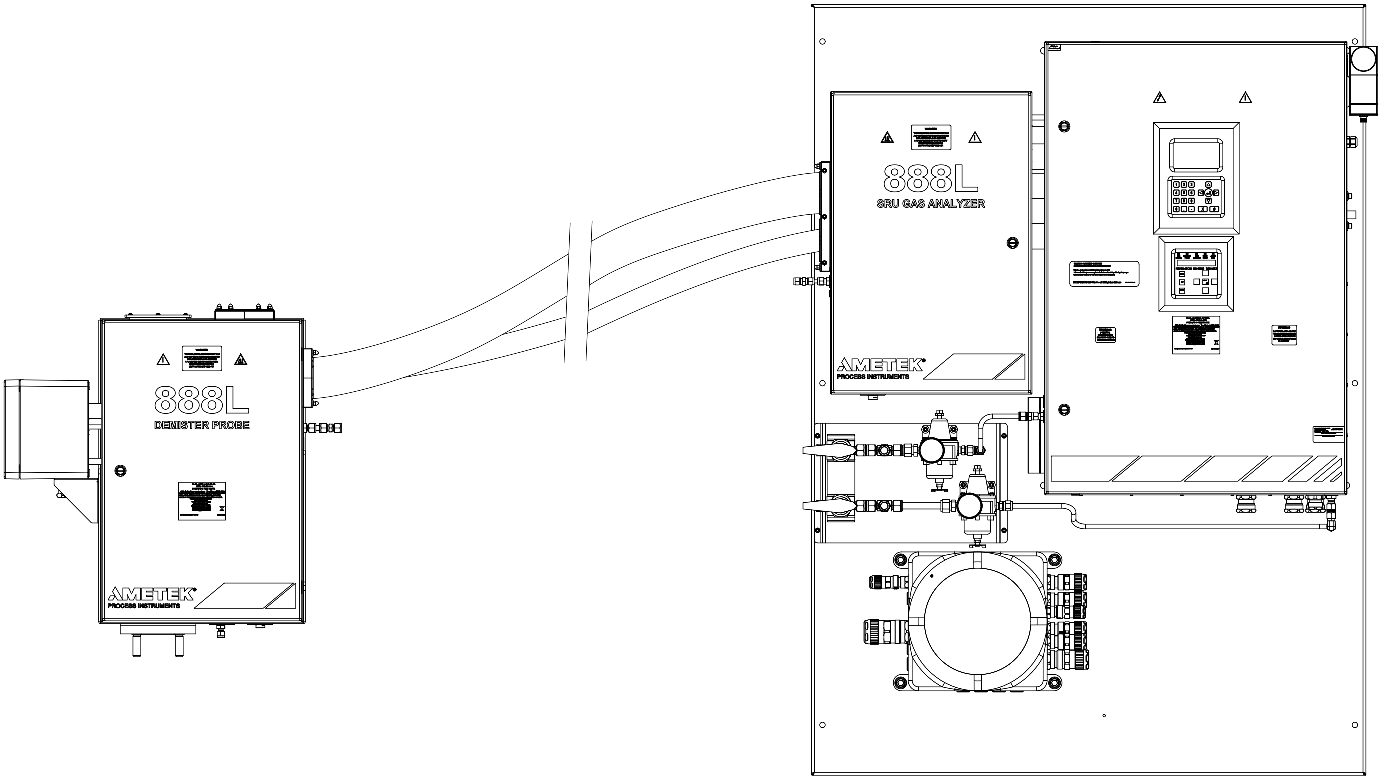


Figure 1-1.
888L Analyzer (ATEX-IECEx) on backpan, with remotely mounted Probe Enclosure.

The 888L Analyzer system and its Sample System consist of five enclosures (Figure 1-1):

- Electronics Enclosure, with User Interface and X-Purge Interface – on backpan.
- Cell Enclosure, temperature-controlled – on backpan.
- Customer Connection Enclosure, for *Signals* and *Power* – on backpan.
- Probe Enclosure – remotely mounted on the Sample Tap on the Tail Gas Pipe.
- Probe Connection Enclosure, for *Signals* and *Power* – on Probe Enclosure.

The Electronics, Cell, and Customer Connection enclosures are mounted on a rigid mounting panel (backpan) and the entire analyzer system is installed remotely from the Sample Gas extraction point. The analyzer is designed for outdoor, hazardous area installations but can be installed in a temperature-controlled shelter if required.

Section/Chapter	Page(s)	Instructions
About the Analyzer Electronics	1-3, 1-4	Use the information below in place of the "About the Analyzer Electronics" information in the 888 Analyzer *User Manual*. Use Figure 1-2 below in place of Figure 1-2 in the 888 Analyzer *User Manual*.

Component	Function
Electronics Purge Components	Refer to the sections "Purging the Electronics Enclosure" and "Specifications" in this Supplement for information on purging the Electronics Enclosure.

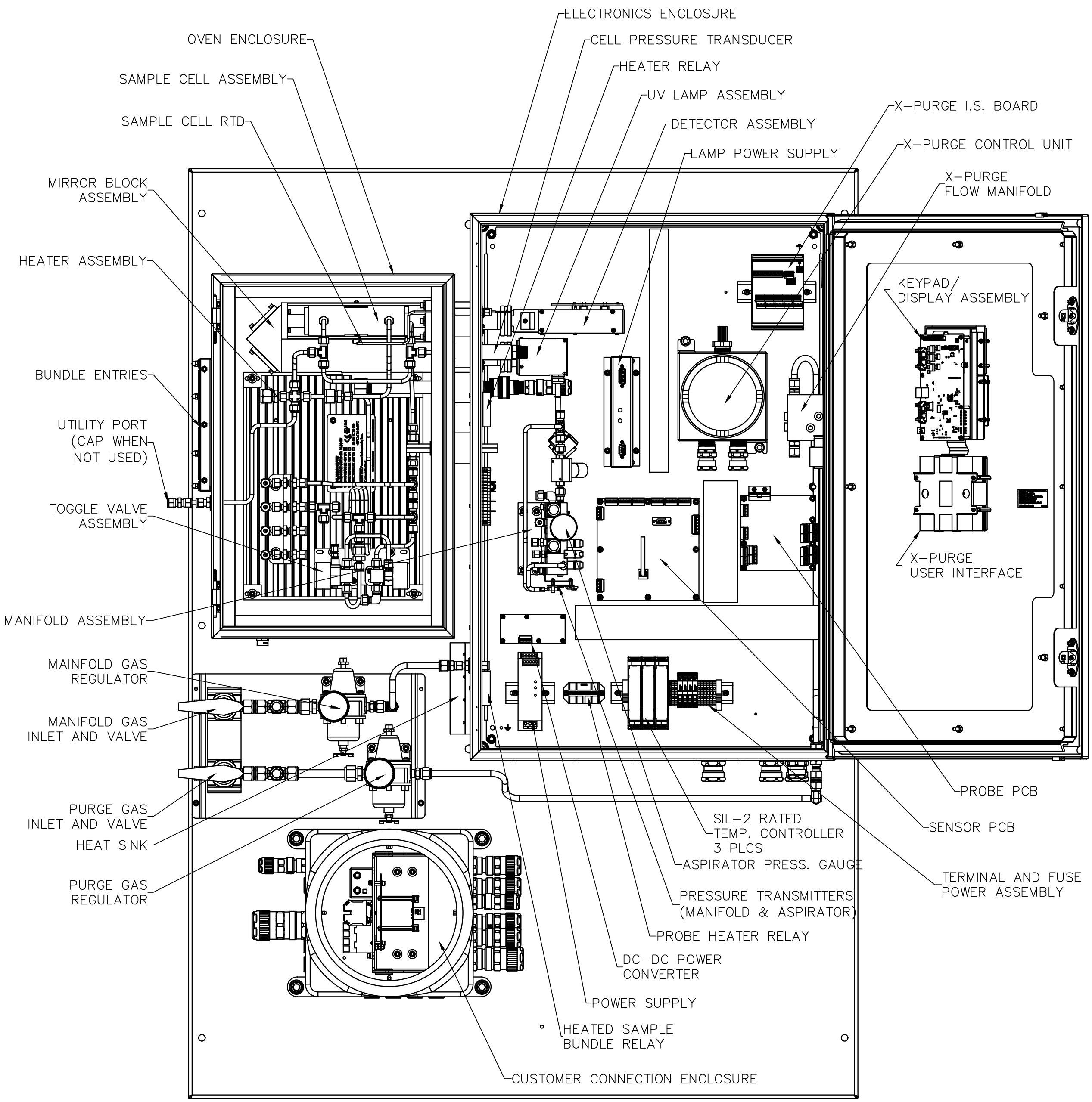


Figure 1-2.
888L Analyzer: Electronics, Cell, and Customer Connection Enclosures, component layout, Zone 1.

Section/Chapter	Page(s)	Instructions
Oven Enclosure Layout	1-6, 1-7, 1-8	Use the information and Figures 1-2, 1-4, 1-5.1, 1-5.2, and 1-5.3 in this supplement and below in place of the Oven Enclosure Layout information and Figures 1-2, 1-4.1, 1-4.2, 1-5.1, and 1-5.2 in the 888 Analyzer *User Manual*.

About the Cell Enclosure

The Cell Enclosure is located on the Analyzer Backpan, along with the Electronics Enclosure and Customer Connection Enclosure.

Component	Function
Light Tube/ Mirror Block Assembly	The Cell Enclosure optics consist of a Light Tube and Mirror Block assembly (Figure 1-4). The Light Tube is used to maintain optical alignment. An RTD is mounted to the Light Tube to monitor Measuring Cell temperature. Due to the slow thermal response of the Light Tube, the RTD response is a better indication of the sample system components than if it was mounted in the air. The Mirror Block includes two (2) second surface mirrors 90 degrees to each other. The two mirrors redirect the light from the Xenon Lamp through the Measuring Cell back to the Detector Assembly.
Measuring (Sample) Cell	The Measuring Cell (Figure 1-4) module consists of either a 2.5" (6.35 cm) or 5" (12.7 cm) 316 stainless steel Cell Body, two (2) UV-grade fused silica windows, two (2) Teflon® gaskets, two (2) Viton o-rings, and two (2) 316 stainless steel end caps. The fused silica Windows are sealed with o-rings at both ends. The retaining rings and Teflon® gaskets hold the Window against the o-rings. The Cell Body has two (2) 1/4-inch Swagelok tube fittings to couple with the rest of the sample system. The Measuring Cell is secured to the Light Tube via one (1) stainless steel plate and a thumb screw located below the center of the Cell Body.
Heater Assembly	The Cell Enclosure is electrically heated using a 400 W Heater Assembly (Figure 1-2). The heater contains two (2) RTDs for heater fin temperature feedback and over-temperature protection. One SIL 2 rated "Temperature Signal Converter" is wired into the power loop for over-heating protection.
Heat Exchanger	Two (2) 1/4-inch aluminum Heat Exchangers are used in the sample system, one (1) in the Probe Enclosure and one (1) in the Cell Enclosure. The Heat Exchanger in the Cell Enclosure (**HE2**) is used to pre-heat Zero gas. During Zero flush, **SV2** opens allowing air or nitrogen to flow through a protective check valve (**CV2**) and flow control orifice (**O2**). The Zero gas supply is heated before flushing out the Measuring Cell and coming into contact with sample system components that must remain at Cell Enclosure temperature.

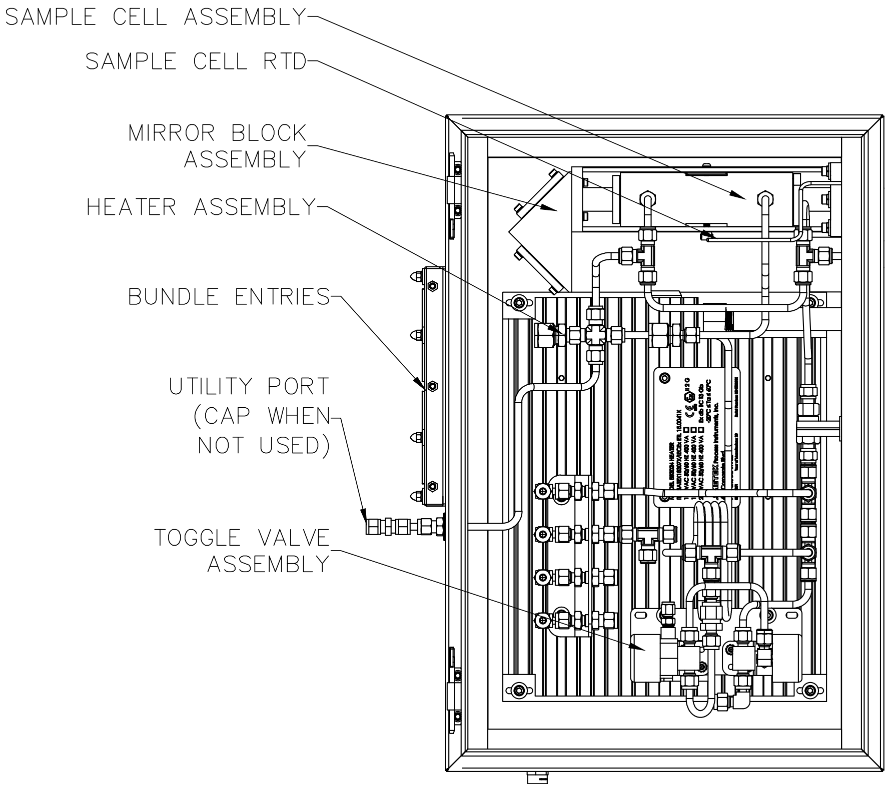


Figure 1-4.
888L Cell Enclosure: Component Layout.

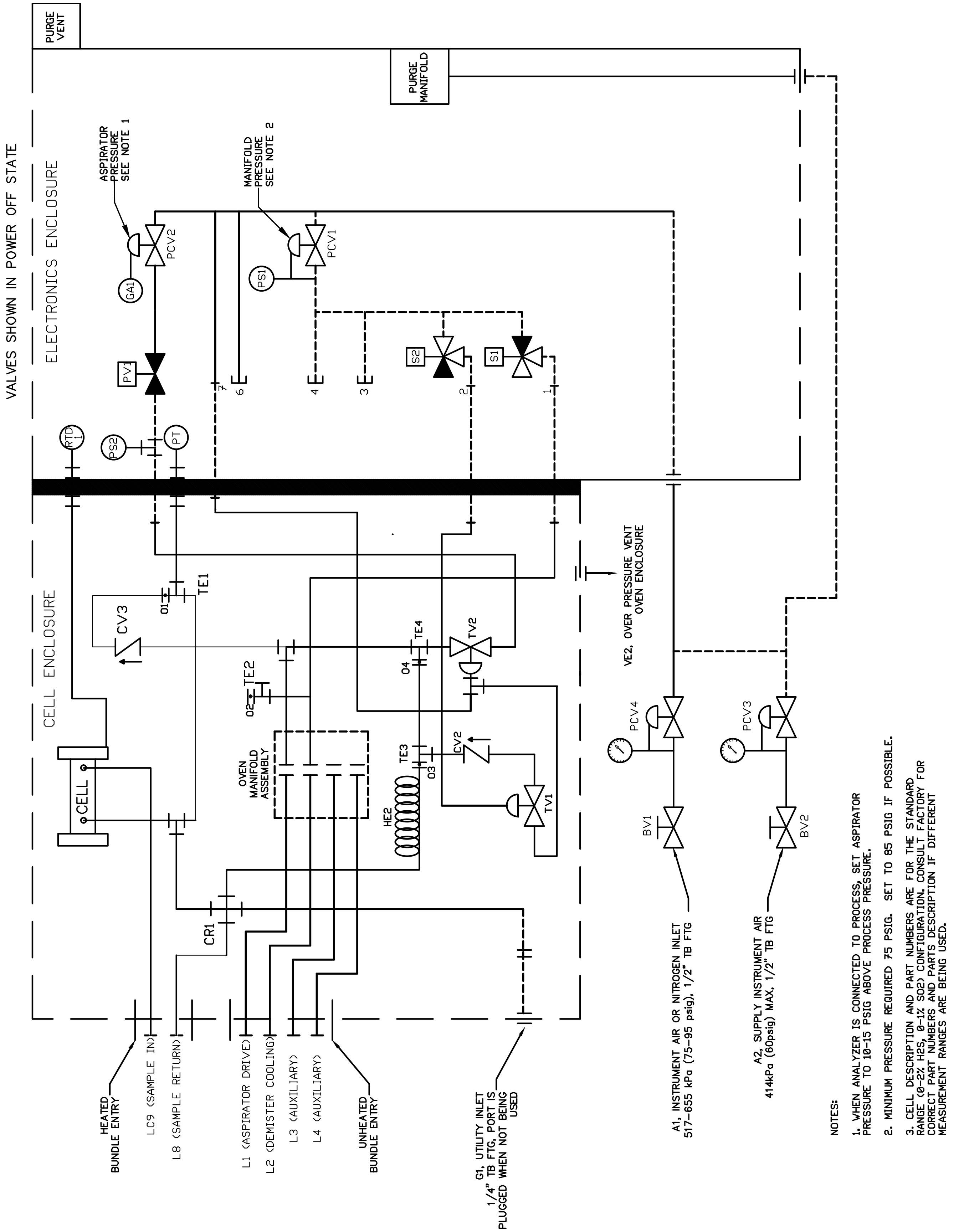


Figure 1-5.1.
888L Cell Enclosure: Flow Diagram, systems Without Steam Blowback.

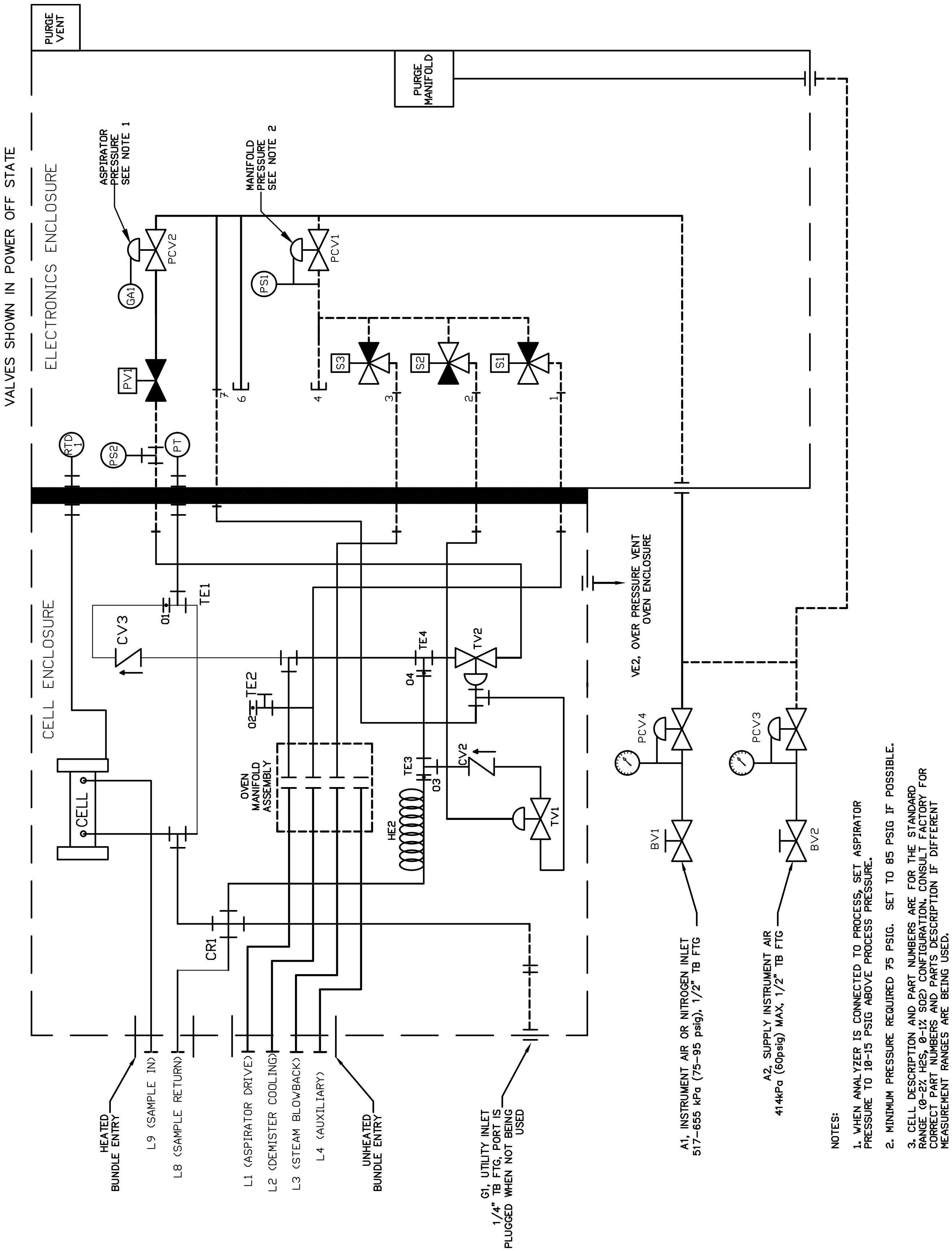


Figure 1-5.2.
888L Cell Enclosure: Flow Diagram, systems With Steam Blowback.

Flow Diagram Legend – Cell Enclosure	
Note that this Legend applies to 888L Analyzers *without* the Steam Blowback function (Figure 1-5.1) and *with* the Steam Blowback function (Figure 1-5.2), except where noted.	
Item	**Description**
CELL (See Note 3 in Figures 1-5.1 and 1-5.2)	Cell Assembly, Standard Body
	Cell Body, 5" (Standard)
	Window, Fused Silica, 1.5"
	O-ring, Viton
	Gasket, Teflon
BV1, BV2	Ball Valve, 1/2"
CV2	Check Valve, Zero Flush
CV3	Check Valve, Aspirator
CR1	Union Cross
GA1	Gauge, Aspirator, 0–30 PSIG
HE2	Heat Exchanger, Zero Flush
O1	Orifice, 200 micron
O2, O4	Orifice, 150 micron
O3	Orifice, 1 millimeter
PCV1	Pressure Regulator, Manifold, 0–100 PSIG
PCV2	Pressure Regulator, Aspirator, 0–30 PSIG
PCV3	Pressure Regulator, Purge, 0–60 PSIG
PCV4	Pressure Regulator, Air Inlet, 0–100 PSIG
PS1	Pressure Sensor, Manifold, 0–100 PSIG
PS2	Pressure Sensor, Aspirator, 0–30 PSIG
PT	Pressure Transducer, 0–100 PSIA
PV1	Valve, Proportional Control, Aspirator
RTD1	RTD, Cell
S1,S2	Solenoid Valve (Demister Cooling, Toggle Valve Actuation)
S3	**Analyzers with Steam Blowback only:** Solenoid Valve (Steam Blowback/Cell Isolation)
TE1	Tee, Pressure Transducer
TE2	Tee, Cell Purge with Orifice
TE3	Tee, Zero Flush Purge
TE4	Tee, Aspirator Purge with Orifice
TV1,TV2	Toggle Valve, 1/4"

Figure 1-5.3.
888L Cell Enclosure:
Flow Diagram Parts Legend (refer to Figures 1-5.1 and 1-5.2).

Section/Chapter	Page(s)	Instructions
About the Analyzer Sample System	1-9, 1-10, 1-11	Use the information and Figures 1-1, 1-2, 1-6.1, 1-6.2, 1-6.3, 1-6.4, 1-6.5, 1-6.6, 1-6.7, and 1-6.8 in this supplement and below, in place of the information and Figures 1-1, 1-2, 1-4.1, 1-4.2, 1-5.1, 1-5.2, and 1-6 in the 888 Analyzer *User Manual*.

About the Analyzer Sample System, Probe Enclosure

Refer to Figures 1-1, 1-2, 1-6.1, 1-6.2, 1-6.3, 1-6.4, 1-6.5, 1-6.6, 1-6.7, and 1-6.8 for components listed in this section.

Sample gas is extracted from the process by a probe inserted into the gas stream through a one-inch, heated ball valve on the pipe (supplied by customer or AMETEK). The sample is drawn through the Probe and the Demister (part of the Probe Enclosure), and then transported (at approximately 1.5 L/minute by an air-operated aspirator) via the Heated Sample Bundle to the Analyzer Over, where it enters the Measuring Cell.

When the analyzer starts Zero calibration or a Zero and Span calibration, the aspirator shuts off and the solenoid valve (**SV2**) is opened to flush out the sample system and Measuring Cell. The flush air is driven through the Measuring Cell to the aspirator, and the air is also flushed back through the Demister.

A Steam Blowback option is available for sour water stripper gas applications to minimize the build-up of salts that can clog the Demister. When a Steam Blowback process is initiated, superheated steam is passed through the Steam Blowback Valve (**FV3**) into the top of the Demister.

Component	Function
Probe	The standard probe is a 1/2-inch 316 stainless steel tube with a wall thickness of 0.035". The probe has a standard length of 36" and can be trimmed to final length at installation. Longer probe lengths are also available upon request.
Demister	The Demister (Figure 1-6.2) is used to condense sulfur vapor in the sample stream by lowering the Sample Gas temperature to 129 °C. The Demister cooling is done by injecting air around the central Demister tube that has been fitted with heat transfer fins. Two (2) coalescing pads (one Teflon® pad and one stainless steel pad) are located inside the Demister. The Demister pads provide increased surface area to help condense the sulfur vapor present in the stream. The air or nitrogen that is used to cool the Demister originates from Solenoid Valve 1 (**SV1**) on the solenoid valve manifold in the Electronics Enclosure. The air or nitrogen enters the Cell Enclosure through the tube bushing assembly. The Demister temperature is measured by RTD 2.

Component	**Function**
Aspirator	The Aspirator Pressure Regulator (**PCV2**) and Proportional Solenoid Valve (**PV1**) control the flow of instrument air or nitrogen through the aspirator. The air flow to the aspirator enters through the tube bushing assembly into the Cell Enclosure where the aspirator drive air is pre-heated by an aluminum heat exchanger. There is also a check valve in series with the aspirator drive air. The gas flow produces a slight negative pressure in the Measuring Cell to move process gas through the Measuring Cell. The desired sample flow rate is 1.5, ±0.5 liters-per-minute. The Manifold assembly (Figure 1-6.1) is located in the Electronics Enclosure. Observe the Aspirator Pressure Regulator Gauge while adjusting the Aspirator Pressure Regulator to produce an output of approximately 10 PSI above process pressure. The analyzer will control the duty cycle to the Proportional Valve to keep the sample flow rate at the desired level. Alternately, the analyzer can be configured to manually set the **PV1** duty cycle. The Proportional Solenoid Valve (**PV1**) is used to regulate Sample Gas flow of the aspirator. The resulting vacuum then pulls Sample Gas from the process stream and into the Measuring Cell. If the proportional valve reaches its maximum or minimum control range and the flow is incorrect, a **Sample Flow out of Range** alarm will be set.
Heater Assembly	The Probe Enclosure (Figure 1-6.2) is electrically heated using a 400 W heater assembly. The heater contains two (2) RTDs for heater fin temperature feedback and over-temperature protection. One SIL 2 rated "Temperature Signal Converter" is wired into the power loop for over-heating protection.
Heat Exchanger	Two (2) 1/4-inch aluminum Heat Exchangers are used in the sample system, one (1) in the Probe Enclosure and one (1) in the Cell Enclosure. The Heat Exchanger (**HE1**, Figure 1-6.3) in the Probe Enclosure is used to pre-heat the aspirator drive. During normal sampling, air or nitrogen flows through the heat exchanger and protective check valve (**CV1**) using **PV1** to control the flow. The aspirator gas is heated before contacting the aspirator and pipe flange that must remain at Probe Enclosure temperature.
Steam Blowback Valve (Optional)	The optional Steam Blowback three-way valve (**FV3**, Figure 1-6.4) is used to direct steam back through the Demister and process probe. Steam Blowback is used to reduce the build-up of salts in the Demister. The valve is actuated using a high temperature, low pressure (50 PSIG) pneumatic operator. The valve and operator are located inside the Probe Enclosure. The outlet of the Demister is connected to the common port of the three-way valve. During normal sampling, the valve position is such that the Sample Gas is directed to the Measuring Cell. During Steam Blowback, the valve is switched and steam is directed through the Demister, isolating the Measuring Cell at the same time.
Probe Connection Enclosure	All customer power and signal connections from the Customer Connection Enclosure (on the analyzer backpan) are made within the Probe Connection Enclosure (Figures 1-6.6 and 1-6.7).

Component	Function
Heated Sample Bundle	The Heated Sample Line Bundle (Figure 1-6.8) uses stainless steel tubing to deliver the Sample Gas (via the Sample Inlet tube, **L9**) from the Probe Enclosure to the Cell Enclosure. After the gas sample has been analyzed, the used Sample Gas is then returned (via the Sample Return tube, **L8**) to the Tail Gas Pipe. The Heated Sample Line Bundle also contains the electrical leads that provide power from the analyzer to the Sample Line Heater and RTDs. The Heated Sample Line Bundle, which is controlled and monitored by the 888L Analyzer, is custom-built for the site and cannot be altered in the field.
Unheated Sample Bundle	The Unheated Sample Bundle (Figure 1-6.8) uses PTFE Teflon tubing for the Aspirator Drive tube (**L1**), Demister Cooling tube (**L2**), optional Steam Blowback tube (**L3**), and Auxiliary tube (spare, **L4**). The Unheated Sample Bundle is custom-built for the site and cannot be altered in the field.

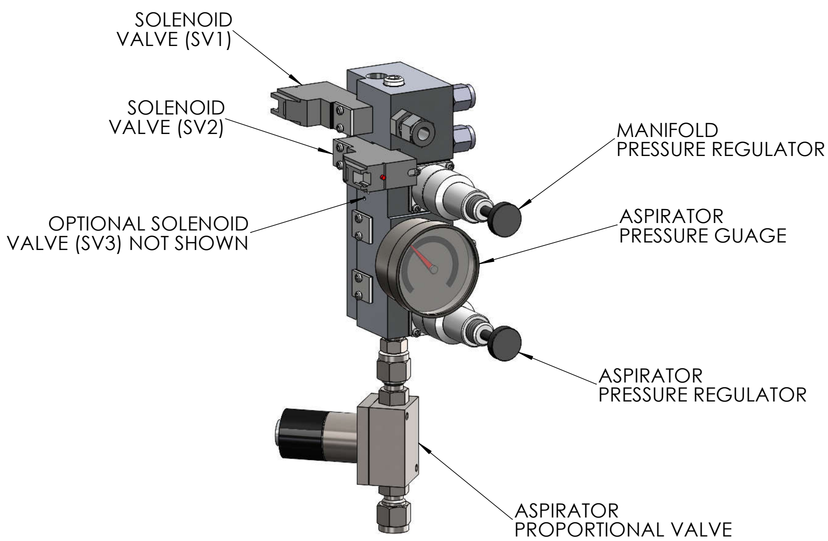


Figure 1-6.1.
Aspirator Regulator and Proportional Solenoid Valve.

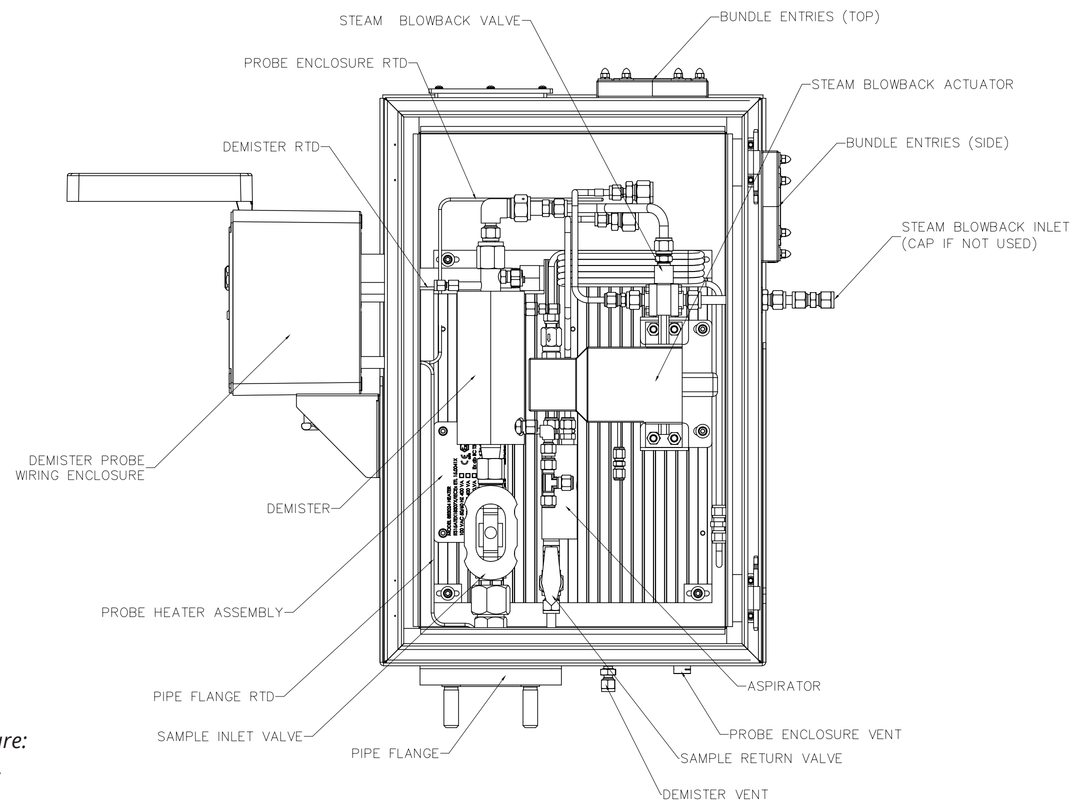


Figure 1-6.2.
888L Probe Enclosure:
Component Layout.

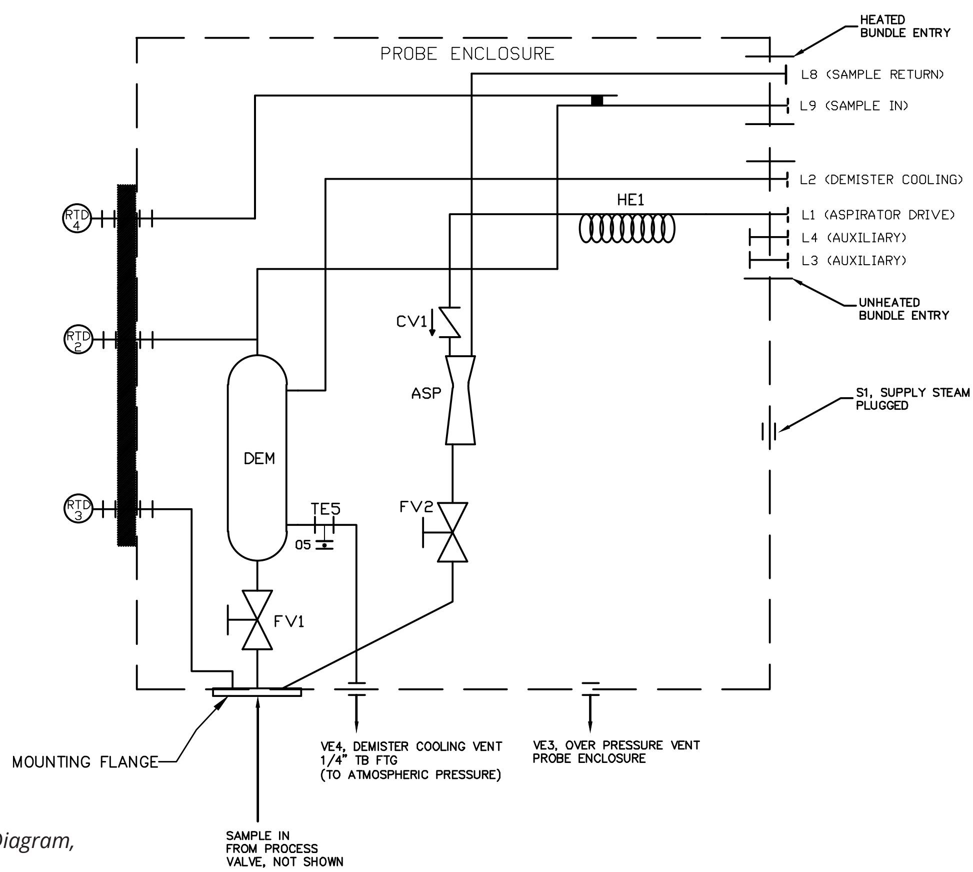


Figure 1-6.3.
888L Probe Enclosure: Flow Diagram,
Without Steam Blowback.

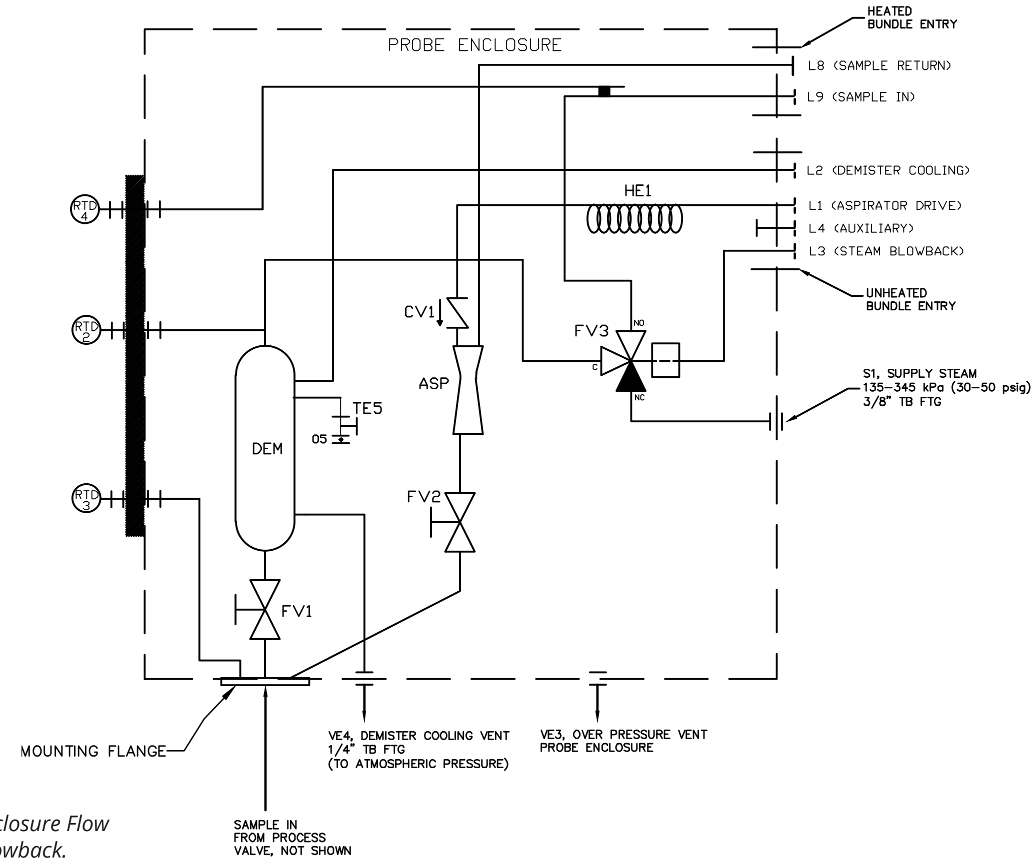


Figure 1-6.4
888L Analyzer: Probe Enclosure Flow Diagram, With Steam Blowback.

Flow Diagram Legend – Probe Enclosure	
Note that this Legend applies to 888L Analyzers *without* the Steam Blowback function (Figure 1-6.3) and *with* the Steam Blowback function (Figure 1-6.4), except where noted.	
Item	**Description**
ASP	Aspirator
CV1	Check Valve, Aspirator
DEM	Demister Assembly
	Demister Pad, Teflon
	Demister Pad, Stainless Steel
FV1	Valve, Sample Inlet
FV2	Valve, Sample Return
FV3	**Analyzers with Steam Blowback only:** Valve, Steam/Cell Isolation
HE1	Heat Exchanger, Aspirator Drive
O5	Orifice, 1 millimeter
RTD2	RTD, Demister
RTD3	RTD, Flange
RTD4	RTD, Probe Enclosure
TE5	Tee, Probe Purge with Orifice

Figure 1-6.5.
888L Probe Enclosure: Flow Diagram Parts Legend (refer to Figures 1-6.3/1-6.4).

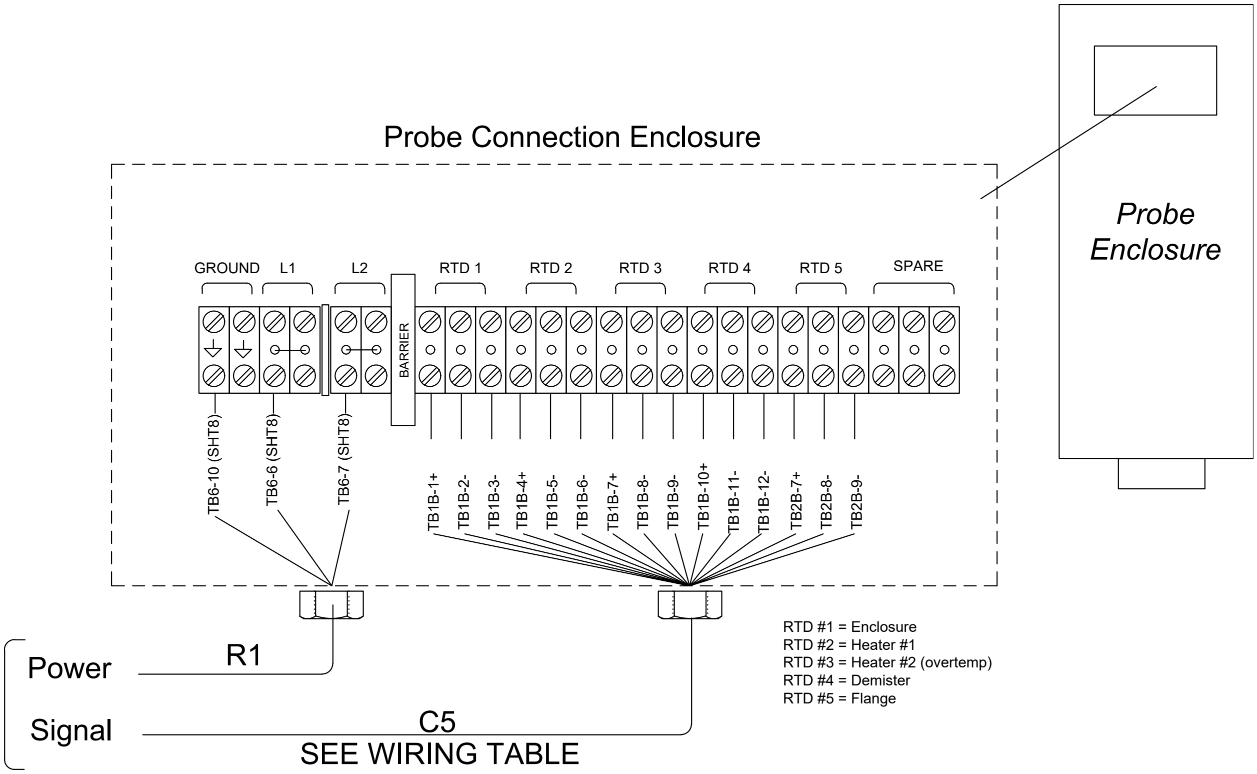


Figure 1-6.6.
888L Probe Connection Enclosure: Termination Points.

Probe Connection Enclosure Legend	
Terminal Position	**Wire Number**
TB1B-1	1 (WHITE)
TB1B-2	1 (BLACK)
TB1B-3	2 (WHITE)
TB1B-4	2 (BLACK)
TB1B-5	3 (WHITE)
TB1B-6	3 (BLACK)
TB1B-7	4 (WHITE)
TB1B-8	4 (BLACK)
TB1B-9	5 (WHITE)
TB1B-10	5 (BLACK)
TB1B-11	6 (WHITE)
TB1B-12	6 (BLACK)
TB2B-7	7 (WHITE)
TB2B-8	7 (BLACK)
TB2B-9	8 (WHITE)

Figure 1-6.7.
888L Probe Enclosure Connections Legend.

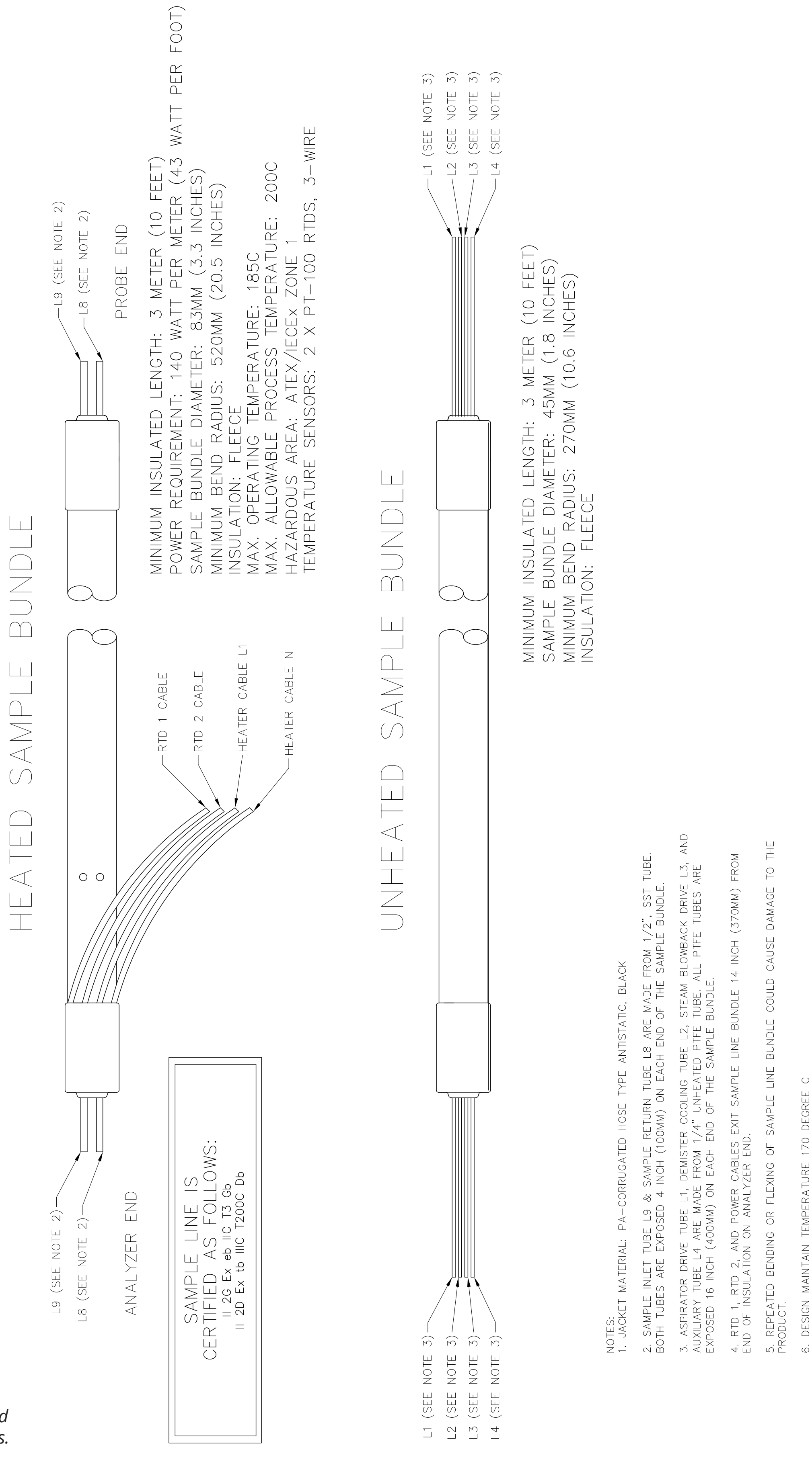


Figure 1-6.8.
888L Analyzer: Heated and Unheated Sample Bundles.

Section/Chapter	Page(s)	Instructions
About the Customer Connection Enclosure	1-12	Use the information and Figures 1-7.1 and 1-7.2 below in place of the information and Figure 1-7 in the 888 Analyzer *User Manual*.

About the Customer Connection Enclosure

The Customer Connection Enclosure is located on the Analyzer Backpan, along with the Electronics Enclosure and Cell Enclosure.

Component	Function
General	All customer power and signal connections are made within the Customer Connection Enclosure (Figures 1-7.1 and 1-7.2).
Alarm Relays	There are four (4) relays maintained by the analyzer. All relays are fail-safe; this means that an open contact indicates a problem: Note: See "Analyzer Timing Periods" in Chapter 2 for more information about Relays 1, 2, 3, and 4. • **System Alarm** Relay 1 is used to indicate a System Alarm condition, which occurs when there is a condition that prevents the analyzer from making a measurement. When this happens, the relay contact opens and activates the alarm. Relay 3 and Relay 4 can also be configured to trigger a System Alarm condition. • **Data Valid Alarm** Relay 2 is used to indicate that the current concentration measurements and analog outputs are valid. If the data is NOT valid, the relay contact is open. • **Two user-programmable relays** Relays 3 and 4 can be used to configure a selected parameter, its upper limit, and its lower limit. If the selected parameter is out of range, the corresponding relay contact opens and an alarm activates. Note: Relays 3 and 4 can optionally be configured as a System Alarm.
Analog Outputs	Four (4) configurable 4–20 mA outputs.
Remote Input	One (1) Remote Input which can be used to initiate one of the following options: • Photo Span Calibration • Zero Calibration • Steam Blowback Note: See Final "As-Built" drawings for 888L Analyzer wiring diagrams.

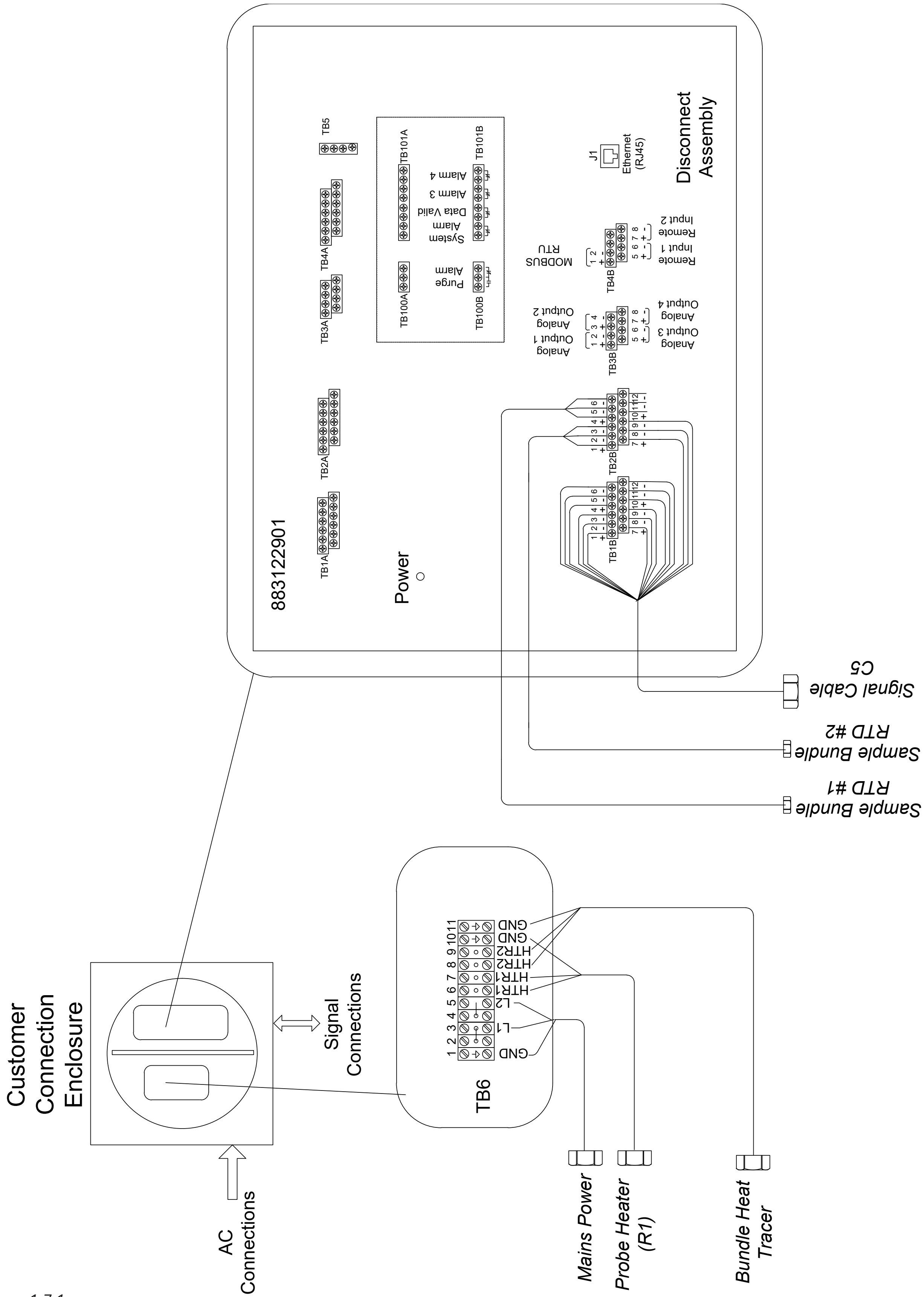
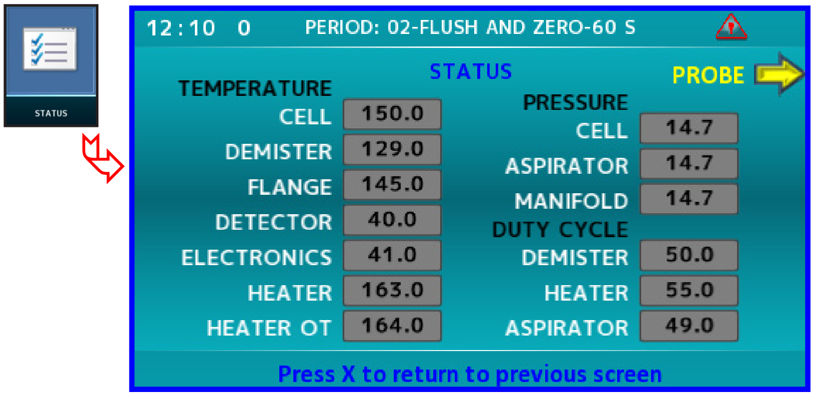


Figure 1-7.1.
888L Customer Connection Enclosure.

Customer Connection Enclosure Legend	
Terminal Position	**Wire Number**
TB1B-1	1 (WHITE)
TB1B-2	1 (BLACK)
TB1B-3	2 (WHITE)
TB1B-4	2 (BLACK)
TB1B-5	3 (WHITE)
TB1B-6	3 (BLACK)
TB1B-7	4 (WHITE)
TB1B-8	4 (BLACK)
TB1B-9	5 (WHITE)
TB1B-10	5 (BLACK)
TB1B-11	6 (WHITE)
TB1B-12	6 (BLACK)
TB2B-7	7 (WHITE)
TB2B-8	7 (BLACK)
TB2B-9	8 (WHITE)

Figure 1-7.2.
888L Customer Connection Enclosure Legend.

Section/Chapter	Page(s)	Instructions
Working in This Manual	1-14	Use the example image below in place of the example image in the 888 Analyzer *User Manual*.



Installation and Start-Up

While installing the 888L Tail Gas Analyzer, use the AMETEK 888 Tail Gas Analyzer ATEX-IECEx *User Manual* as your main source of installation information, and use this *Manual Supplement* for the differences that are specific to the 888L Analyzer.

Section/Chapter	**Page(s)**	**Instructions**
Tools, Equipment, and Supplies Required for Installation	2-4	Add the following information, which is to be supplied by the customer, to the list.

To install the analyzer you need the following tools, equipment, and supplies (in addition to the items listed in the AMETEK 888 Tail Gas Analyzer ATEX-IECEx *User Manual*):

- 2" 150# or DIN equivalent RF stainless steel flange connection (supplied by customer).

Section/Chapter	Page(s)	Instructions
Installation and Start-Up	2-5	Use Figure 2-1.1 below in place of Figure 2-1.1 in the 888 Analyzer *User Manual*.

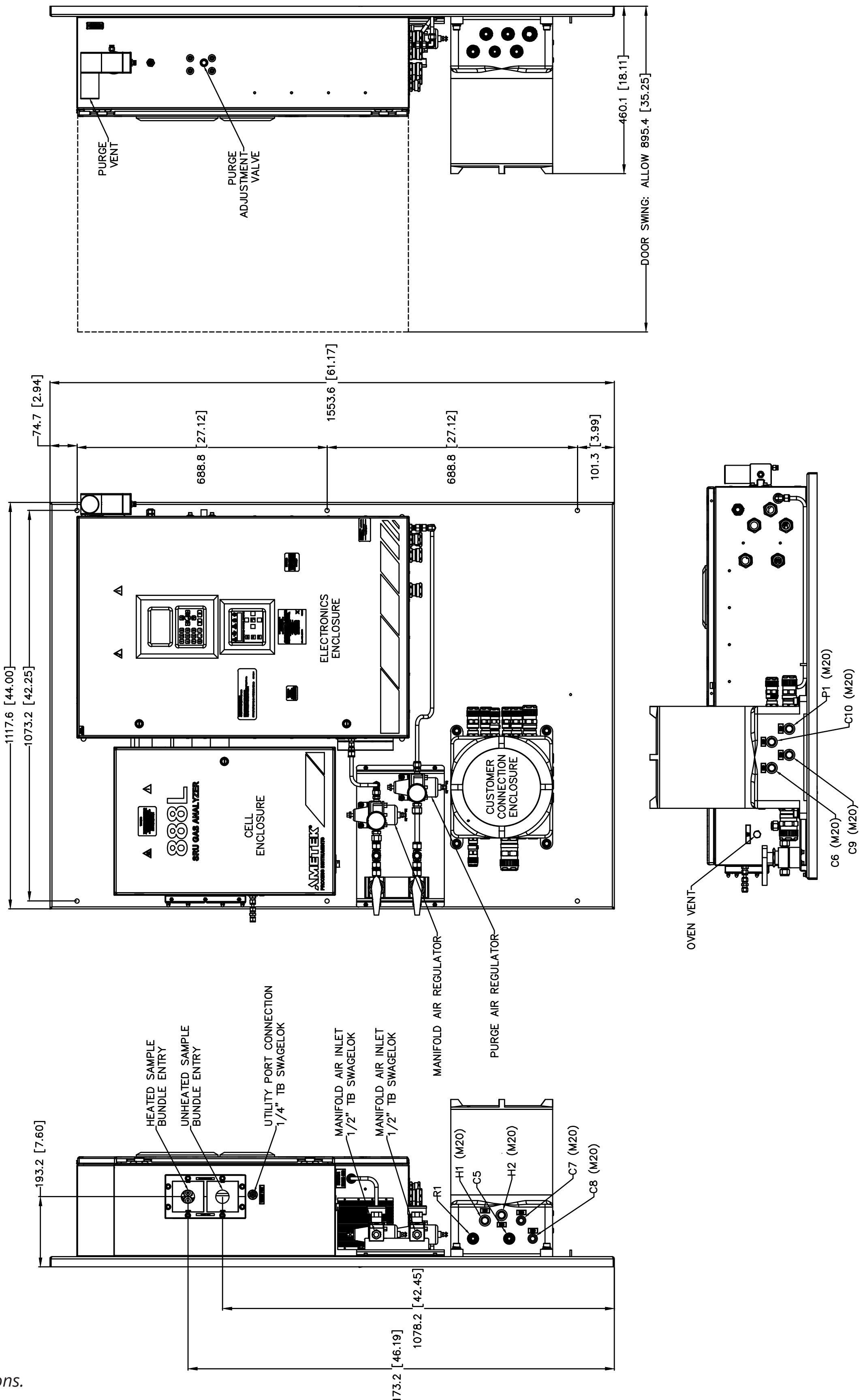


Figure 2-1.1.
888L Analyzer, dimensions.

Section/Chapter	Page(s)	Instructions
Installation and Start-Up	2-6	Use Figures 2-1.2 and 2-1.3 below in place of Figure 2-1.2 in the 888 Analyzer *User Manual*.

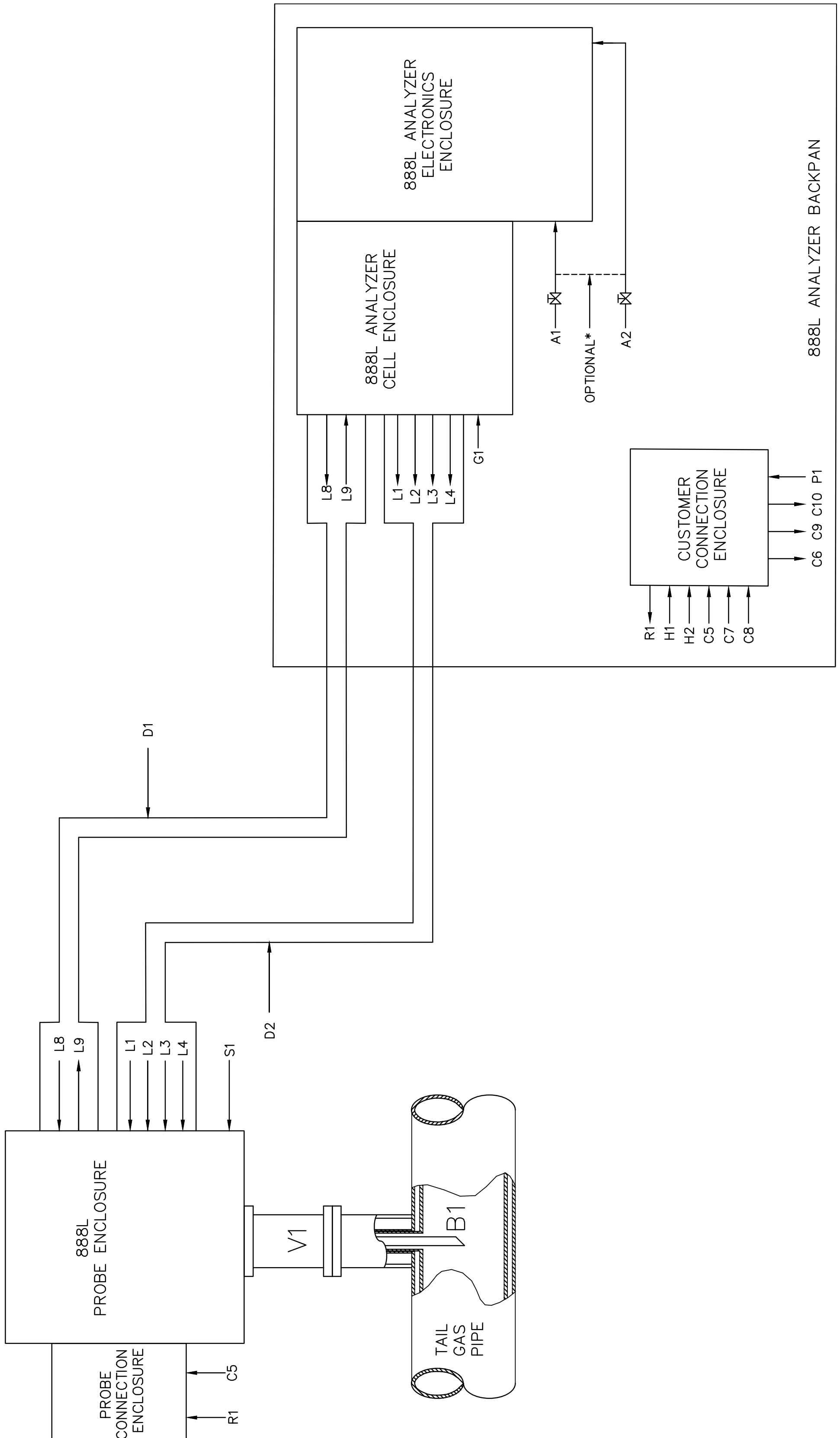


Figure 2-1.2.
888L Analyzer Block Diagram, system and end user utility requirements.

Block Diagram Legend		
Designator	**Description**	**Requirements**
A1	Regulated Instrument Air/Nitrogen	517–655 kPa (75–95 PSIG)
A2	Regulated Instrument Air	345–690 kPa (50–100 PSIG)
C5	Signal Connection, Analyzer to Probe	
C6	Discrete Signals	
C7	Sample Line RTD1	
C8	Sample Line RTD2	
C9	RS-485 Communications	
C10	Analog Output Signals	
L1	Aspirator Drive	
L2	Demister Cooling	
L3	Steam Blowback (Optional)	
L4	Auxiliary	
L8	Sample Return	
L9	Sample Inlet	
P1	AC Power	120/240 VAC, 720 W
S1	Steam Supply (Optional)	207–345 kPa (30–50 PSIG)
G1	Utility Port (plug when not used)	
R1	Probe Power Cable	
H1	Heated Sample Bundle Power, Line	
H2	Heated Sample Bundle Power, Neutral	
D1	Sample Bundle (Heated)	
D2	Sample Bundle (Unheated)	
B1	Sample Probe	
V1	Steam Jacketed Ball Valve	517–690 kPa (75–100 PSIG)

Figure 2-1.3.
888L Block Diagram Legend.

Section/Chapter	Page(s)	Instructions
Installing the Probe	2-12	Use the information below in place of the section "Installing the Probe" in the 888 Analyzer *User Manual*. Add Figure 2-2.1 to this section, and use Figures 2-2.2 and 2-2.4 (or Figures 2-2.3 and 2-2.5) below, in place of Figure 2-2.1 (or Figure 2-2.2) in the 888 Analyzer *User Manual*. Add Figures 2-2.6 and 2-2.7.

Installing the Probe Enclosure and Probe

NOTE

Refer to Figures 2-1.1, 2-1.2, 2-2.1, and 2-2.2/2-2.4 (or Figures 2-2.3/ 2-2.5) for all inlet, valve, and vent locations. See also Figures 2-2.6 and 2-2.7 for a legend of components.

The probe enters the Probe Enclosure through a Conax gland with a Teflon ferrule which uses a nut to seal the probe. The nut can be tightened or loosened to slide the probe, pull it out, or insert another probe for service or maintenance.

1. Install the probe into the 1/2-inch tube fitting on the Sample Inlet Ball Valve (**FV1**) using the supplied stainless steel ferrule. Make sure the fitting is tight and leak free.

    - Make sure the flange fitting components (nut, SST ferrule, and Teflon® seal) are loosely installed on the flange fitting.
    - Verify that the Sample Inlet Ball Valve (**FV1**) is closed.
    - Scribe a mark on the probe just under the ball valve to aid in orienting the probe correctly.

WARNING

All personnel in the immediate area MUST wear a fresh-air breathing apparatus for the remaining installation steps. Do not remove the breathing apparatus until installation is complete and all fittings have been checked for toxic gas leaks.

2. Install the probe through the sample inlet flange, main process valve, and into the process:

    - Slide the probe tube down into the flange fitting. If the probe tube is longer than 16 inches, it may be necessary to remove the Sample Probe Access Door (at top of Probe Enclosure – see Figure 2-2.1) and lower the Probe/Valve assembly through the top of the Probe Enclosure . Tighten the compression fitting enough to create a seal around the probe while still allowing the probe to slide. Depending on the length of the probe, it may be necessary to remove the Sample Inlet Valve handle (at **FV1** – see Figure 2-2.4 or 2-2.5) to allow the valve to fit through the opening in the top of the Probe Enclosure. **If removing this handle, the handle must be placed in the closed position before removing it.**

- Verify that the analyzer Sample Inlet Ball Valve (**FV1**) is closed and remains closed. Continue to slide the probe down through the flange. When the probe tip touches the ball of the main sample valve, back the probe out 1/2-inch and etch a mark on the probe at the top of the flange tube fitting. Open the main sample valve slightly and check for leaks, continue inserting the probe as far as possible. Fully tighten the flange compression fitting. This etched mark will be used for probe removal and replacement.

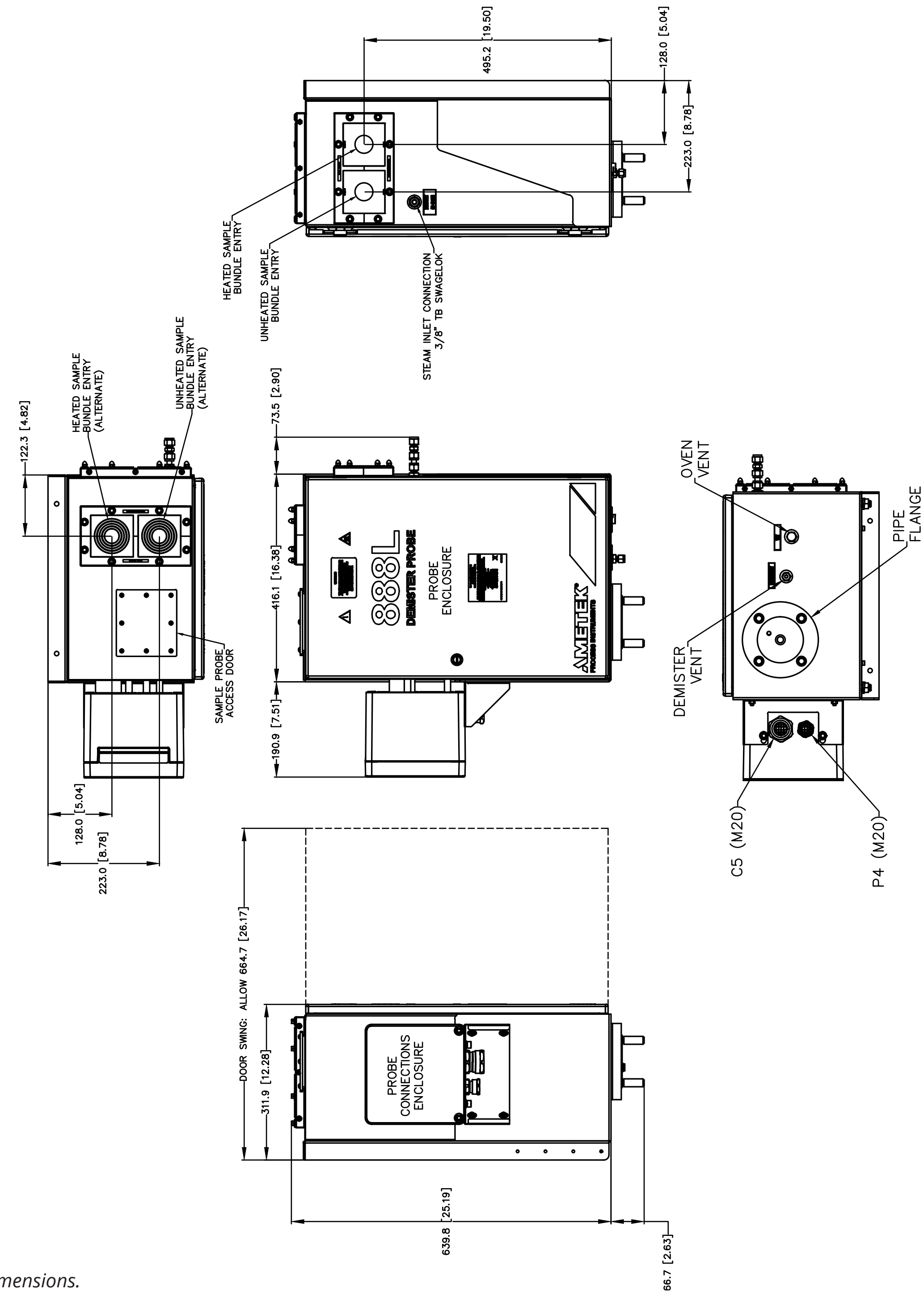


Figure 2-2.1.
888L Probe Enclosure, dimensions.

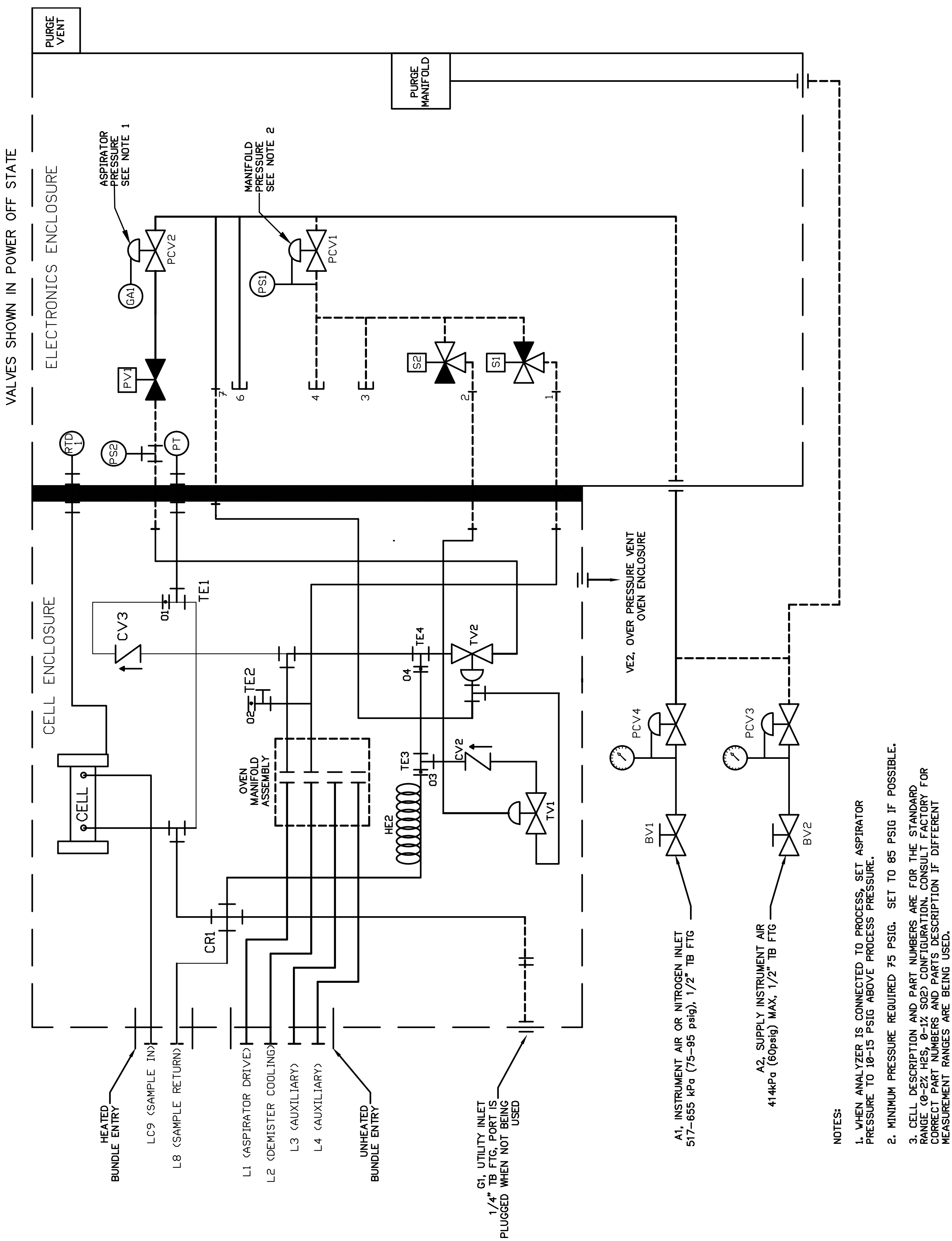


Figure 2-2.2.
888L Cell Enclosure: Inlet, Valve, and Vent Locations/Flow Diagram, systems Without Steam Blowback.

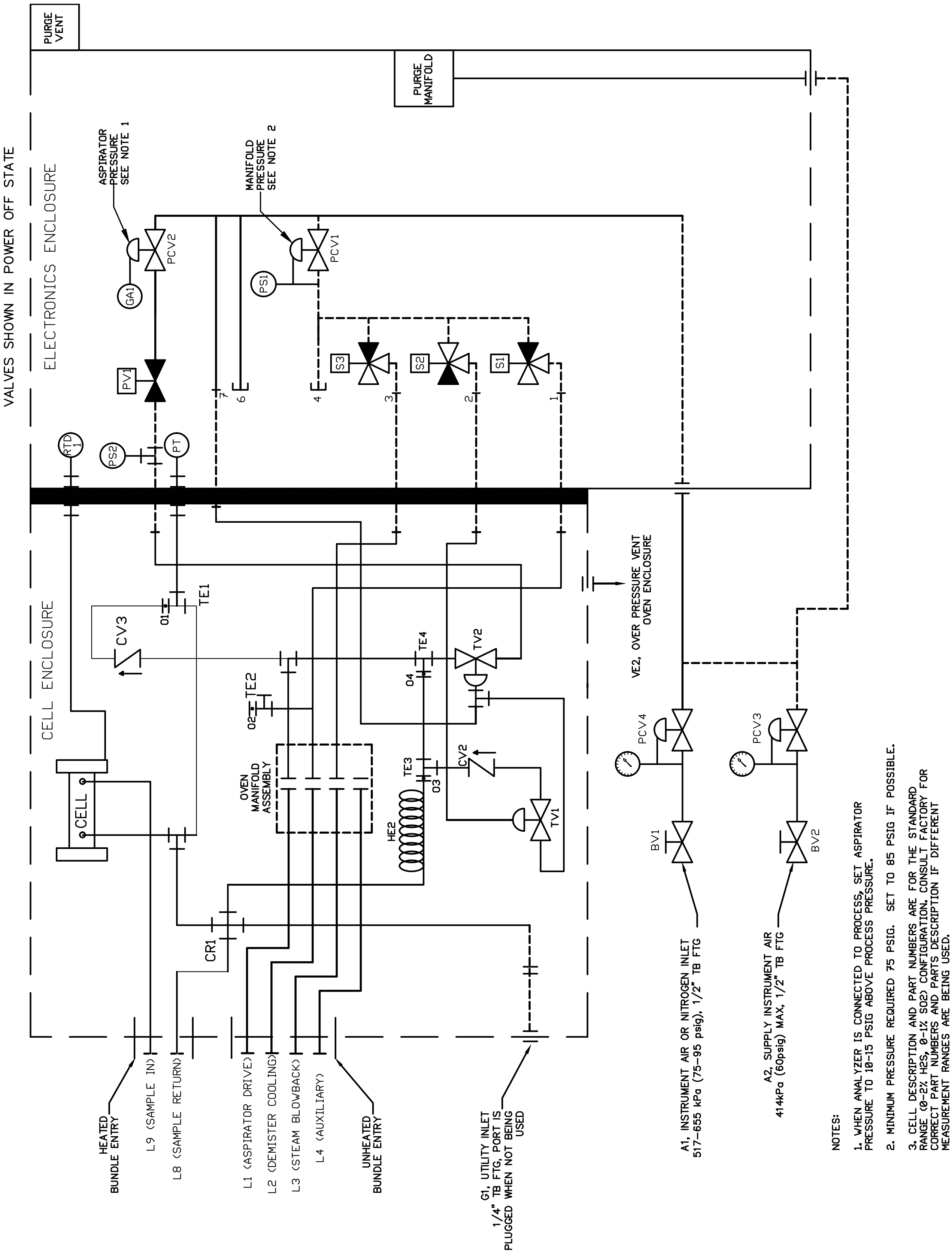


Figure 2-2.3.
888L Cell Enclosure: Inlet, Valve, and Vent Locations/Flow Diagram, systems With Steam Blowback.

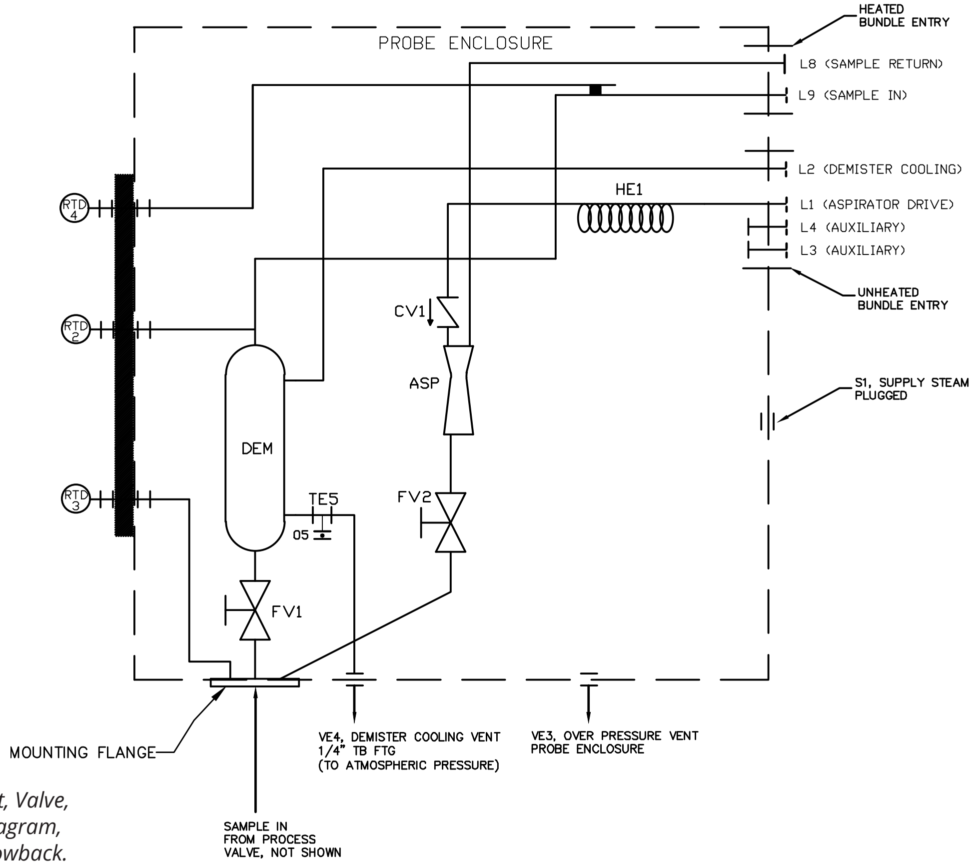


Figure 2-2.4.
888L Probe Enclosure: Inlet, Valve, and Vent Location/Flow Diagram, systems Without Steam Blowback.

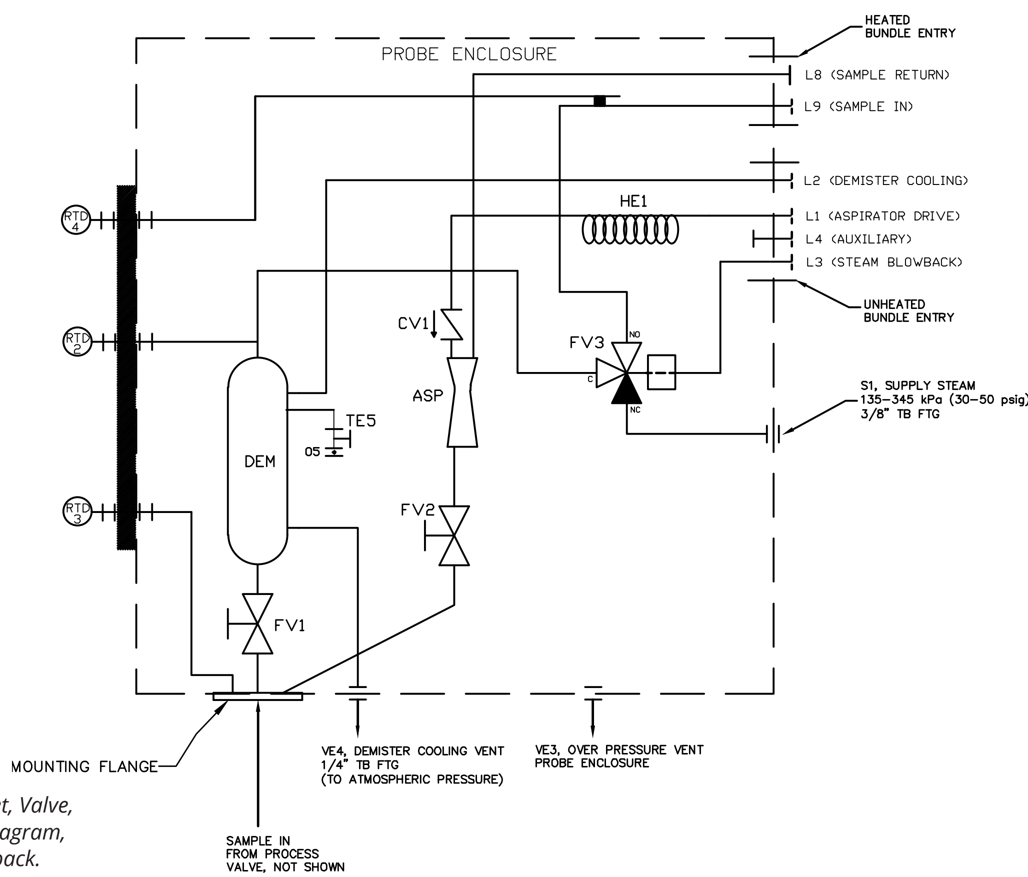


Figure 2-2.5.
888L Probe Enclosure: Inlet, Valve, and Vent Location/Flow Diagram, systems With Steam Blowback.

Flow Diagram Legend – Cell Enclosure	
Note that this Legend applies to 888L Analyzers *without* the Steam Blowback function (Figure 2-2.2) and *with* the Steam Blowback function (Figure 2-2.3), except where noted.	
Item	**Description**
CELL (See Note 3 in Figures 2-2.2 and 2-2.3)	Cell Assembly, Standard Body
	Cell Body, 5" (Standard)
	Window, Fused Silica, 1.5"
	O-ring, Viton
	Gasket, Teflon
BV1, BV2	Ball Valve, 1/2"
CV2	Check Valve, Zero Flush
CV3	Check Valve, Aspirator
CR1	Union Cross
GA1	Gauge, Aspirator, 0–30 PSIG
HE2	Heat Exchanger, Zero Flush
O1	Orifice, 200 micron
O2, O4	Orifice, 150 micron
O3	Orifice, 1 millimeter
PCV1	Pressure Regulator, Manifold, 0–100 PSIG
PCV2	Pressure Regulator, Aspirator, 0–30 PSIG
PCV3	Pressure Regulator, Purge, 0–60 PSIG
PCV4	Pressure Regulator, Air Inlet, 0–100 PSIG
PS1	Pressure Sensor, Manifold, 0–100 PSIG
PS2	Pressure Sensor, Aspirator, 0–30 PSIG
PT	Pressure Transducer, 0–100 PSIA
PV1	Valve, Proportional Control, Aspirator
RTD1	RTD, Cell
S1,S2	Solenoid Valve (Demister Cooling, Toggle Valve Actuation)
S3	**Analyzers with Steam Blowback only:** Solenoid Valve (Steam Blowback/Cell Isolation)
TE1	Tee, Pressure Transducer
TE2	Tee, Cell Purge with Orifice
TE3	Tee, Zero Flush Purge
TE4	Tee, Aspirator Purge with Orifice
TV1,TV2	Toggle Valve, 1/4"

Figure 2-2.6.
888L Cell Enclosure:
Flow Diagram Parts Legend (refer to Figures 2-2.2 and 2-2.3).

Flow Diagram Legend – Probe Enclosure	
Note that this Legend applies to 888L Analyzers *without* the Steam Blowback function (Figure 2-2.4) and *with* the Steam Blowback function (Figure 2-2.5), except where noted.	
Item	**Description**
ASP	Aspirator
CV1	Check Valve, Aspirator
DEM	Demister Assembly
	Demister Pad, Teflon
	Demister Pad, Stainless Steel
FV1	Valve, Sample Inlet
FV2	Valve, Sample Return
FV3	**Analyzers with Steam Blowback only:** Valve, Steam/Cell Isolation
HE1	Heat Exchanger, Aspirator Drive
O5	Orifice, 1 millimeter
RTD2	RTD, Demister
RTD3	RTD, Flange
RTD4	RTD, Probe Enclosure
TE5	Tee, Probe Purge with Orifice

Figure 2-2.7.
888L Probe Enclosure:
Flow Diagram Parts Legend
(refer to Figures 2-2.4 and 2-2.5).

Section/Chapter	Page(s)	Instructions
Installing the Demister	2-16, 2-17	Use the information and Figures 2-3 below in place of the information and Figures 2-3.1 and 2-3.2 in the 888 Analyzer *User Manual*.

Installing the Demister

The Demister Assembly – shipped in a separate box – must be installed in the Probe Enclosure after the Probe Enclosure has been installed on the Sample Tap on the Tail Gas Pipe.

The electrical connections to the Demister are made via pre-wired connector plugs. No hard wiring is required.

The Demister is a silver insulated assembly (Figure 2-3). The sample gas flows through the Demister at a lower temperature than the rest of the Probe Enclosure. If there are droplets of sulfur in the sample stream, they will condense and fall away from the sample gas.

The RTD at the top-left of the Demister measures the temperature. The location of this RTD allows for easier removal of the Demister when servicing or replacing, since the RTD can retract.

WARNING

*Take necessary precautions to ensure that neither the Sample Inlet Ball Valve (**FV1**) nor the Sample Return Valve (**FV2**) is inadvertently opened during the Demister installation procedure.*

To install the Demister (refer to Figures 2-3):

1. Place the Demister on top of the Sample Inlet Ball Valve (**FV1**). Make sure that the 1/8-inch tube fitting is facing the Probe Enclosure. (See also Figure 1-2 in Chapter 1.)

2. Locate the 1/8-inch Demister RTD in the Probe Enclosure and insert it into the 1/8-inch fitting near the top of the Demister.

3. Push the Demister onto the probe as far as necessary until it meets with the 3/4-inch compression fitting connecting the Demister to the Sample Inlet Ball Valve. It may be necessary to slightly loosen the compression fitting on the sample inlet flange and pull the probe/valve assembly up slightly to line up the Demister RTD connection. Loosen only as required.

CAUTION

Make sure that the seal between the probe tube and the compression fitting is maintained so that no process gas leaks around the fitting.

4. Retighten after the 3/4-inch compression fitting is secured.

5. Align the outlet of the Demister to the installed sample system components.

6. Install the remaining tubing connections packaged separately. Refer to the Flow Diagram in the Customer Drawing Package for appropriate connections.

7. Using recommended tightening procedures, verify that all compression fittings inside the Probe Enclosure are tightened.

8. Test all sample tap connections and the Sample Inlet Ball Valve to make sure there are no toxic process gas leaks. When satisfied that no leaks are present, remove the breathing apparatus and proceed with the remainder of the start-up procedure.

9. Remove handle of the steam jacketed main sample ball valve to ensure valve cannot be closed while the sample probe is in place. Secure handle nearby so that it is available when needed.

Figure 2-3 in this document replaces Figure 2-3.1 and 2-3.2 in the 888 Analyzer User Manual.

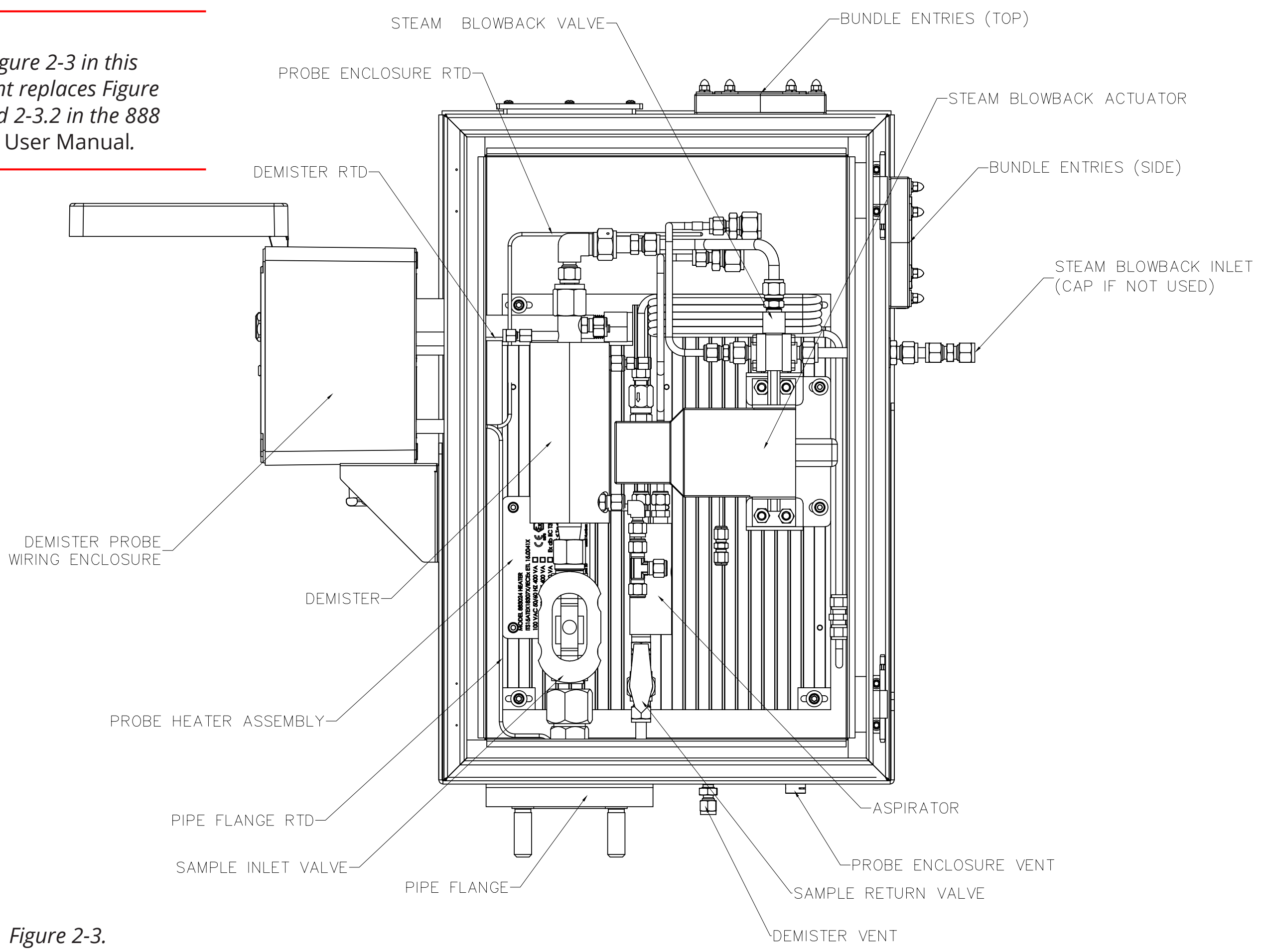


Figure 2-3.
888L Probe Enclosure with optional Cell Isolation/Steam Blowback Valve and Steam Blowback Actuator.

Section/Chapter	Page(s)	Instructions
Installing the Sample Bundle	2-18	Add the section "Installing the Sample Bundles" and Figure 2-4.1 and 2-4.2 below following the section "Installing the Demister" in the 888 Analyzer *User Manual*.

Installing the Sample Bundles

The Heated Sample Bundle and Unheated Sample Bundle must be supplied by AMETEK due to certification requirements and custom lengths.

CAUTION

Do not lift or support the Sample Bundles by their-tubing fittings. Doing so can pull the fitting off the sample transport tube. A wire mesh cable support must be installed on the line before lifting it. The Sample Bundles are custom-built for each installation; they cannot be cut to length on-site.

To avoid damaging the Sample Inlet and Sample Return tubes, use two wrenches to ensure that the fitting body does not turn on the stainless steel tubes.

Repeated bending or flexing of the Sample Bundles could cause damage to the lines.

Installing the Heated Sample Bundle

To install the Heated Sample Bundle:

1. If an explosion-proof power-disconnect switch has already been installed for the Heated Sample Bundle, open it to ensure there is no power being supplied to this temperature zone circuit.

NOTE

Keep the power-disconnect switch open until the entire system has been installed, the leak check has been completed, and the analyzer is ready for normal operation.

2. Unwrap and lay out the Heated Sample Bundle, with the electrical leads at the analyzer.

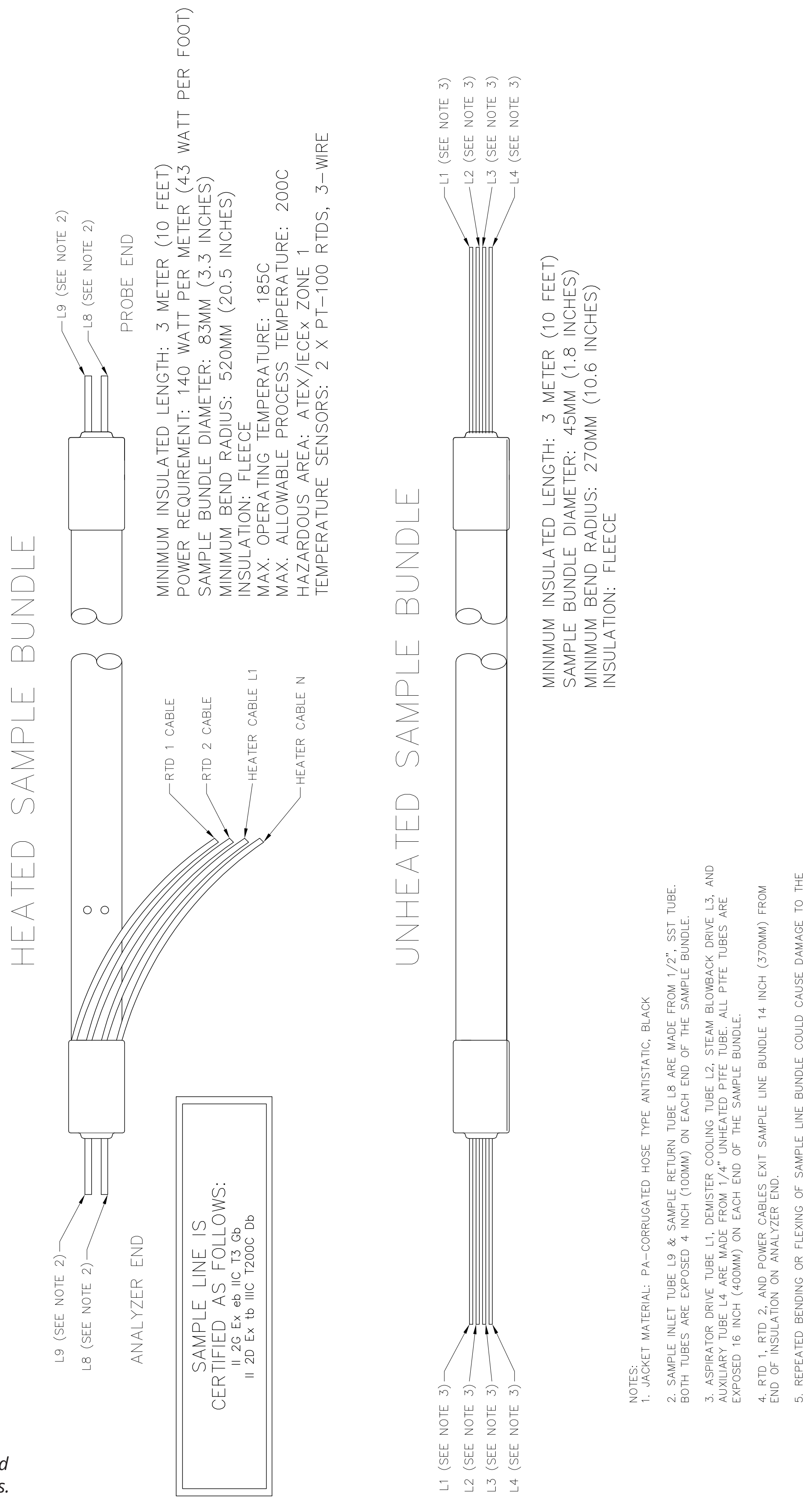


Figure 2-4.1.
888L Analyzer: Heated and Unheated Sample Bundles.

3. Route the Heated Sample Bundle from the analyzer to the Probe Enclosure.

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

   Refer to the Sample Line Arrangement drawing shipped with the analyzer.

4. Make the Sample Inlet and Vent Return tubing connections inside the Cell Enclosure:

   Route the Heated Sample Bundle through the Heated Sample Bundle Entry port on the left side of the Cell Enclosure.

   Connect the Sample Inlet tube to the Sample Inlet fitting on the Measuring Cell.

   Connect the Vent Return tube to the Sample Outlet fitting on the Measuring Cell.

CAUTION

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

5. Route the Heated Sample Bundle through the Heated Sample Bundle Entry port on the right side of the Probe Enclosure.

   Connect the Sample Inlet tube (**L9** in Sample Bundle) to the Sample In (**L9**) and the Vent Return tube (**L8** in Sample Bundle) to the Sample Return (**L8**) inside the Probe Enclosure.

6. Terminate the Sample Line and Vent Line wiring as indicated in the section "AC Power and Signal Connections " in this Supplement, and Figure 2-4.2.

CAUTION

Connect the ground lead from each line to the ground terminals before connecting the heater leads.

NOTE

When terminating the temperature sensor (RTD) leads, either sensor in a line can be used as the Control or Over-Temperature sensor (RTD).

Installing the Unheated Sample Bundle

To install the Unheated Sample Bundle:

1. Unwrap and lay out the Unheated Sample Bundle. Refer to the Sample Line Arrangement drawing shipped with the analyzer for proper orientation.

2. Route the Unheated Sample Bundle from the analyzer to the Probe Enclosure.

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

3. At the Probe Enclosure, route the Unheated Sample Bundle through the Unheated Sample Bundle Entry port on the right side of the Probe Enclosure.

   Connect the Aspirator Drive tube (**L1** in Sample Bundle) to **L1** (Aspirator Drive connection) and the Demister Cooling tube (**L2** in Sample Bundle) to **L2** (Demister Cooling connection) inside the Probe Enclosure.

   For systems with Steam Blowback
   Connect the Steam Blowback tube (**L3** in Sample Bundle) to **L3** (Steam Blowback/Auxiliary) inside the Probe Enclosure. For system without Steam Blowback **L3** is considered Auxiliary.

   Auxiliary tube (L4)
   Connect the Auxiliary tube (**L4** in Sample Bundle) to **L4** (Auxiliary) inside the Probe Enclosure.

4. At the Cell Enclosure, route the Unheated Sample Bundle through the Unheated Sample Bundle Entry port on the left side of the Cell Enclosure.

   Connect the Aspirator Drive tube (**L1** in Sample Bundle) to **L1** (Aspirator Drive connection) and the Demister Cooling tube (**L2** in Sample Bundle) to **L2** (Demister Cooling connection) inside the Cell Enclosure.

   For systems with Steam Blowback
   Connect the Steam Blowback tube (**L3** in Sample Bundle) to **L3** (Steam Blowback/Auxiliary) inside the Cell Enclosure.
   For system without Steam Blowback **L3** is considered Auxiliary.

   Auxiliary tube (L4)
   Connect the Auxiliary tube (**L4** in Sample Bundle) to **L4** (Auxiliary) inside the Cell Enclosure.

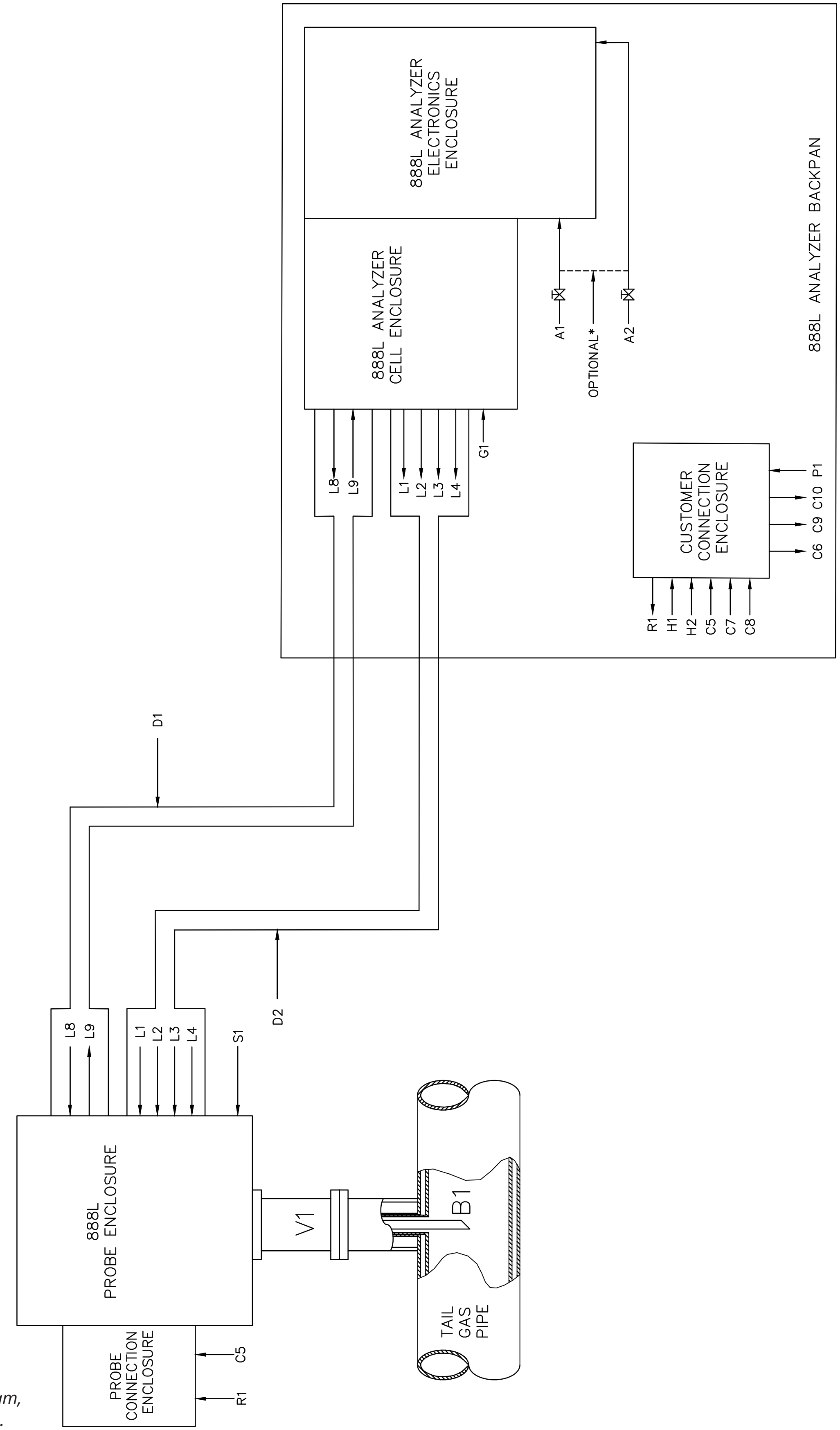


Figure 2-4.2
888L Analyzer Block Diagram, Sample Bundle Connection.

Block Diagram Legend		
Designator	**Description**	**Requirements**
A1	Regulated Instrument Air/Nitrogen	517–655 kPa (75–95 PSIG)
A2	Regulated Instrument Air	345–690 kPa (50–100 PSIG)
C5	Signal Connection, Analyzer to Probe	
C6	Discrete Signals	
C7	Sample Line RTD1	
C8	Sample Line RTD2	
C9	RS-485 Communications	
C10	Analog Output Signals	
L1	Aspirator Drive	
L2	Demister Cooling	
L3	Steam Blowback (Optional)	
L4	Auxiliary	
L8	Sample Return	
L9	Sample Inlet	
P1	AC Power	120/240 VAC, 720 W
S1	Steam Supply (Optional)	207–345 kPa (30–50 PSIG)
G1	Utility Port (plug when not used)	
R1	Probe Power Cable	
H1	Heated Sample Bundle Power, Line	
H2	Heated Sample Bundle Power, Neutral	
D1	Sample Bundle (Heated)	
D2	Sample Bundle (Unheated)	
B1	Sample Probe	
V1	Steam Jacketed Ball Valve	517–690 kPa (75–100 PSIG)

Figure 2-4.3.
888L Block Diagram Legend.

Section/Chapter	Page(s)	Instructions
AC Power and Signal Connections	2-18	Use the information ("To make the AC power and signal connections:"), Figure 2-4.2 (earlier in this Supplement), and Figures 2-5.1 and 2-5.3 below in place of the information and Figure 2-4 in the 888 Analyzer *User Manual*.

WARNING

Be sure to read and follow the Warnings in the 888 Analyzer User Manual*, in the section "AC Power and Signal Connections."*

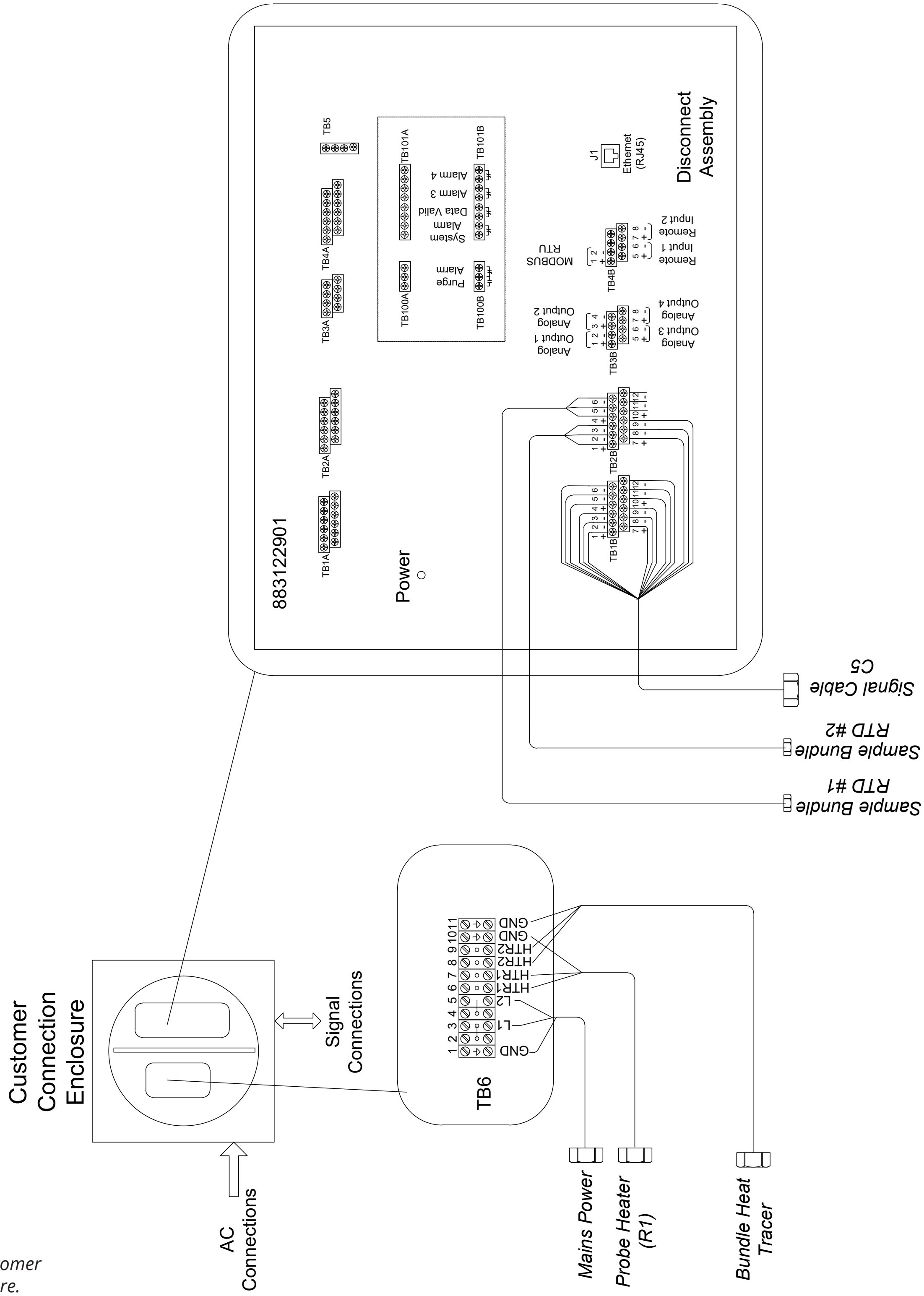


Figure 2-5.1.
888L Analyzer: Customer Connection Enclosure.

Customer Connection Enclosure Legend	
Terminal Position	**Wire Number**
TB1B-1	1 (WHITE)
TB1B-2	1 (BLACK)
TB1B-3	2 (WHITE)
TB1B-4	2 (BLACK)
TB1B-5	3 (WHITE)
TB1B-6	3 (BLACK)
TB1B-7	4 (WHITE)
TB1B-8	4 (BLACK)
TB1B-9	5 (WHITE)
TB1B-10	5 (BLACK)
TB1B-11	6 (WHITE)
TB1B-12	6 (BLACK)
TB2B-7	7 (WHITE)
TB2B-8	7 (BLACK)
TB2B-9	8 (WHITE)

*Figure 2-5.2.
888L Analyzer: Customer
Connection Enclosure Legend.*

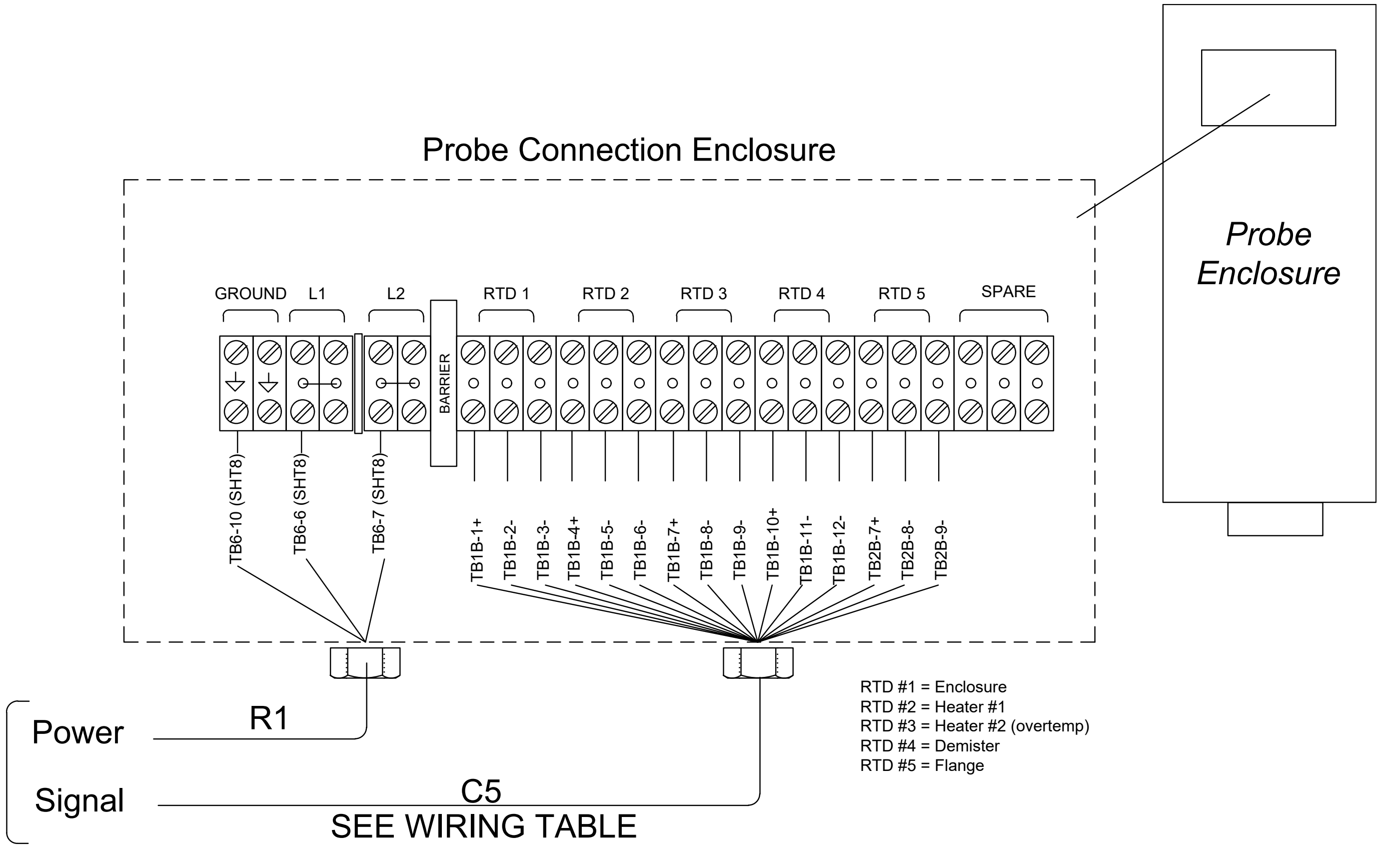


Figure 2-5.3.
888L Probe Connection Enclosure: Termination Points.

Probe Connection Enclosure Legend	
Terminal Position	**Wire Number**
TB1B-1	1 (WHITE)
TB1B-2	1 (BLACK)
TB1B-3	2 (WHITE)
TB1B-4	2 (BLACK)
TB1B-5	3 (WHITE)
TB1B-6	3 (BLACK)
TB1B-7	4 (WHITE)
TB1B-8	4 (BLACK)
TB1B-9	5 (WHITE)
TB1B-10	5 (BLACK)
TB1B-11	6 (WHITE)
TB1B-12	6 (BLACK)
TB2B-7	7 (WHITE)
TB2B-8	7 (BLACK)
TB2B-9	8 (WHITE)

Figure 2-5.4.
888L Analyzer: Probe Enclosure Connections Legend.

To make the AC power and signal connections (refer to Figures 2-4.1, 2-4.2, 2-5.1, and 2-5.3):

1. **Probe Heater/Power and Probe Signal cable connections:**

NOTE

The Probe Heater/Power and Probe Signal cables typically come factory-terminated (inside the Customer Connection Enclosure) and with glands installed and sealed. If so, follow Step 1-a and skip Step 1-b.

*Probe cables **R1** and **C5** are supplied by AMETEK.*

a. Lay out the Probe Heater/Power cable ("**R1**" in Figures 2-4.2, 2-5.1, and 2-5.3) and the Probe Signal cable ("**C5**" in Figures 2-4.2, 2-5.1, and 2-5.3) between the analyzer and the Probe Connection Enclosure. These cables can be routed with the two (2) Sample Bundles. Secure the cables as necessary.

b. **Systems without factory-terminated Probe Heater/Power cable and Probe Signal cable:**
Lay out the Probe Heater/Power cable ("**R1**") and the Probe Signal cable ("**C5**") between the analyzer and the Probe Connection Enclosure.

At the analyzer:
Route the Probe Heater/Power cable (**R1**) into the Customer Connection Enclosure and make the terminations at **TB6** (Figure 2-5.1).

Route the Probe Signal cable (**C5**) into the Customer Connection Enclosure and make the terminations at **TB1B** (Figure 2-5.1).

NOTE

When routing the Probe Heater/Power and Probe Signal cables into the Customer Connection Enclosure, be sure to install the cable glands and the sealing compound (both supplied by AMETEK), as per the instructions included in the gland packaging.

If necessary, contact AMETEK Service for additional instructions.

c. At the Probe, route the Probe Heater/Power cable (**R1**) into the Probe Connection Enclosure and make the terminations at **TB6** (Figure 2-5.3).

Route the Probe Signal cable (**C5**) into the Probe Connection Enclosure and make the terminations at **TB1B/TB2B** (Figure 2-5.3).

2. **Heated Sample Bundle connections (installed earlier):**
Route the power wiring (**H1** – Line/**H2** – Neutral) and RTDs (**C7** and **C8**) from the Heated Sample Bundle (Bundle Heat Tracer) into the analyzer's Customer Connection Enclosure and terminate the wiring as shown in Figures 2-4.1 and 2-5.1. Install supplied cable glands and sealing compound per the instructions in the Note in Step 1-b.

3. **Make the AC mains Power and Signal connections to the analyzer (as shown in Figure 2-5.1):**

WARNING

Before making the AC mains power connections to the analyzer, ensure the proper voltage requirements are available for the installation site, as indicated on the product label on the analyzer Electronics Enclosure.

   a. The 888L Analyzer is considered permanently connected and stationary equipment. It is supplied, as ordered by the customer, configured as either a 120 VAC or a 240 VAC unit and contains voltage-dependent subassemblies. Do not attempt conversion in the field by unqualified personnel. Power requirements for the equipment are specified on labels on the analyzer.

   b. AC power must be three-wire, single phase, with line hot (18 AWG), grounded neutral (18 AWG), and separate earth/protective ground (**PE**) (14 AWG). The analyzer must be externally connected to an M5 stud via an 11 AWG wire located on the backpan, near the Customer Connection Enclosure (see Figure 2-1.1 for connection details). **DO NOT CONNECT SPLIT-PHASE POWER TO THIS ANALYZER.**

      Four (4) M20 holes are provided for Power and Signal cable gland entry/installation. If the incoming power cable is too large, a separate junction box must be provided that can accept the main cable and suitable jumpers used from this box to the analyzer's junction box. Ensure that all unused M20 holes are plugged with hardware appropriate to the area classification.

      As a permanently connected piece of equipment without an accessible power switch, the installation must have the following characteristics:

      - The installation must include an external disconnect device, such as a switch or circuit breaker, included as part of the installation. The electrical specifications of this device must accommodate the power and environmental requirements of the equipment for the particular application.

      - This disconnect device must be in close proximity to the equipment and in easy reach of an operator.

      - The device must be permanently marked as the disconnect device for this equipment.

   c. Signal I/O connections are also made in the Customer Connection Enclosure. All customer wiring must have a minimum working voltage of 300 VRMS. Refer to the Specifications section of this *Manual Supplement* for customer signal input voltage and current restrictions. A separate junction box may be required if the signal cables are too large in diameter to fit the M20 entry holes.

Section/Chapter	Page(s)	Instructions
Purging the Electronics Enclosure	2-22 to 2-24	Use the information and Figure 2-6 below in place of the information and Figure 2-6 in the 888 Analyzer *User Manual*.

Purging the Electronics Enclosure

A Purge Controller and vent system maintain a positive pressure to prevent explosive gases from entering the Electronics Enclosure. On start-up, the Purge Controller will automatically monitor the purge gas flow to ensure a minimum of five (5) air exchanges before providing power to the Electronics Enclosure. The controller then monitors the enclosure's internal pressure. In the event that positive pressure is lost, power will be disconnected from the analyzer electronics. All input and output signals are disconnected by relays in the flameproof enclosure should power be interrupted by the Purge Controller.

CAUTION

A regulated supply of instrument air must be connected to the Purge Air Regulator. The regulator is located on the backpan. Refer to the Specifications section in this supplement for instrument air specifications.

CAUTION

The installer must install a second pressure regulator on the input of the unit to mitigate any risk from a single regulator failure in the system.

CAUTION

After the analyzer is installed on a process gas pipe, instrument air pressure must be maintained at all times, even when the analyzer is powered down or off-line, to keep corrosive gases and moisture out of the enclosures and prevent damage.

For the Electrical Enclosure Purge System to operate properly the enclosure's door must be securely closed.

Adjusting the Purge Adjustment Valve

*Purge Controller **Setup** and **Bypass** passwords are required to make changes to the Purge Controller*.

The Purge Controller is programmed at the factory to run automatically. However, it may be necessary to make adjustments based on the utilities present at the installation site.

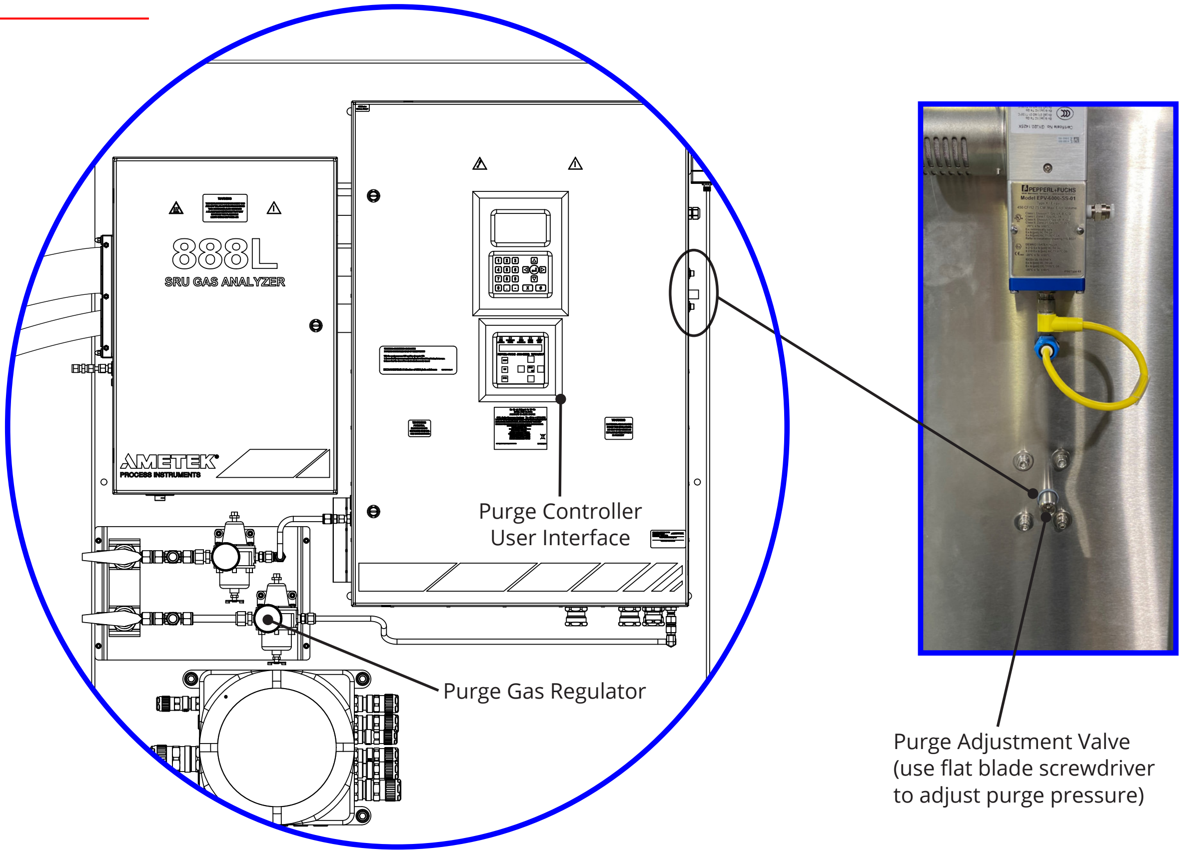


Figure 2-6.
888L Analyzer: Purge Controller and Default Passwords.

To adjust the Purge Controller:

1. Connect a regulated source of instrument air to the purge inlet.

2. After power has been applied, the Purge Controller will start a fast purge of the Electronics Enclosure.

   If a fast purge does not start:
   Check the BLUE "SAFE PRESSURE" indicator on the Purge Controller to ensure that it is turned On.

   If the BLUE "SAFE PRESSURE" indicator is not turned On:
   Locate the adjustment valve at the top of the Purge Controller. Use a flat blade screwdriver to adjust the pressure (maximum 60 PSIG). Turn the valve slowly counter-clockwise until the BLUE indicator turns On, ensuring that the Purge Controller senses sufficient pressure in the Electronics Enclosure.

3. The Purge Controller will purge the Electronics Enclosure for a minimum of five (5) air exchanges. After a short period, the time remaining for the fast purge will be displayed on the Purge Controller. After the time is displayed, it will take three (3) minutes for the fast purge to complete.

4. The gauge on the Purge Air Regulator on the backpan should read a nominal 104 kPa (15 PSI) during the fast purge. Adjust the regulator if necessary to read the nominal pressure.

5. After the fast purge is complete, the Purge Controller will connect power to the analyzer electronics. The flow rate will drop noticeably and the gauge on the purge regulator will increase several PSI. This change in the pressure reading is normal. Do not readjust the regulator.

NOTE

Refer to the Pepperl+Fuchs 6000 Series Purge Controller Instruction Manual for further details on the Purge Controller (visit https://files.pepperl-fuchs.com/).

NOTE

*Purge Controller default **Setup** and **Bypass** passwords:*

Default Setup Password:

Default Bypass Password:

This page intentionally left blank.

User Interface

Section/Chapter	Page(s)	Instructions
User Interface Components	3-2	Use Figure 3-1.2 below in place of Figure 3-1.2 in the 888 Analyzer *User Manual*.

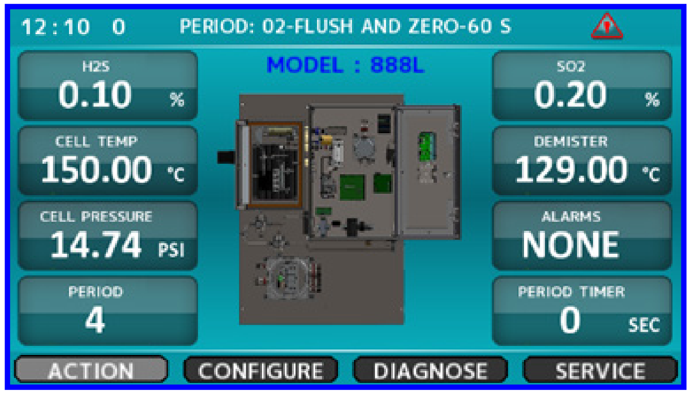


Figure 3-1.2.
888L Analyzer: HOME screen, LCD Display (User Interface).

Section/Chapter	Page(s)	Instructions
Working From the HOME Screen	3-7	Use Figure 3-4 below in place of Figure 3-4 in the 888 Analyzer *User Manual*.

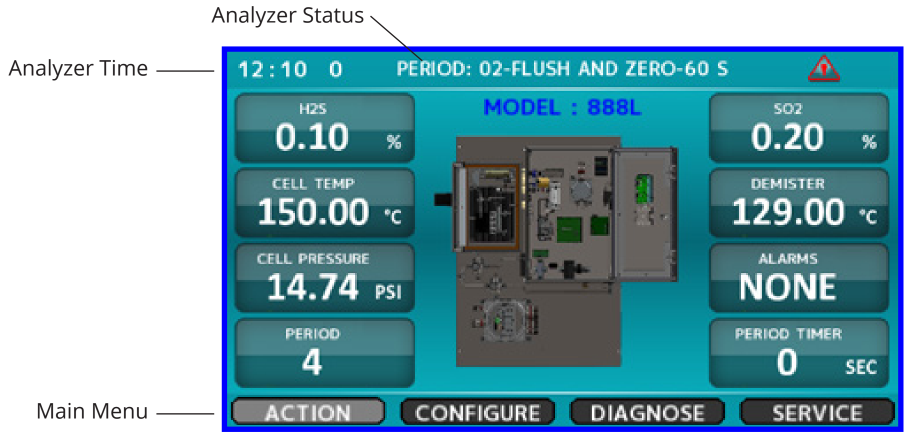
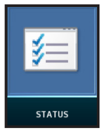


Figure 3-4.
888L Analyzer: HOME screen layout.

Section/Chapter	Page(s)	Instructions
Viewing Analyzer Parameters (Status screen)	3-12	Use Figures 3-11.1 and 3-11.2 below in place of Figure 3-11 in the 888 Analyzer *User Manual*.

Parameters on Figures 3-11.1 and 3-11.2 are read only.



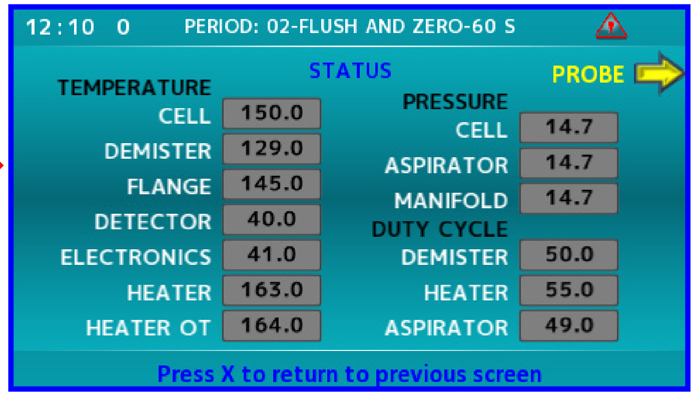


Figure 3-11.1. 888L Analyzer: Status screen 1 of 2.

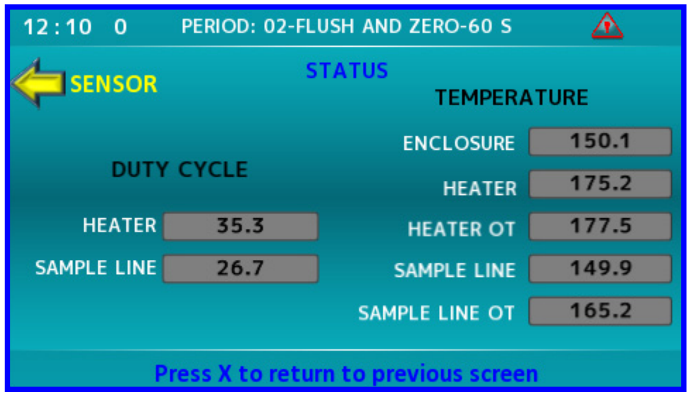


Figure 3-11.2. 888L Analyzer: Status screen 2 of 2.

Section/Chapter	Page(s)	Instructions
Configuring Temperature Settings	3-13	Use Figure 3-12.1 below in place of Figure 3-12.1 in the 888 Analyzer *User Manual*.

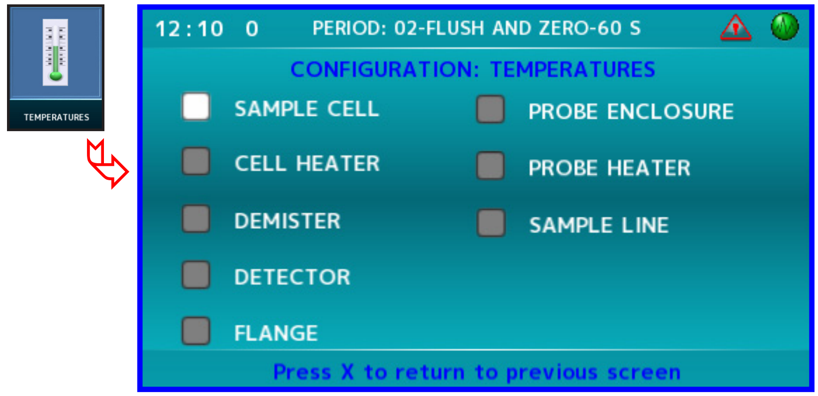


Figure 3-12.1
888L Analyzer: Temperatures Configuration sub-menu.

Section/Chapter	Page(s)	Instructions
(See Instructions)	3-16	After the section "Setting Flange Temperature Parameters" add the following new sections (including screens): • "Viewing Probe Enclosure Heater Temperature Parameters" • "Viewing Probe Heater Temperature Parameters" • "Viewing Sample Line Heater Temperature Parameters and Changing the Sample Line Setpoint"

Viewing Probe Enclosure Heater Temperature Parameters

The **Probe Enclosure Heater Temperature** screen is used to view the Probe Enclosure Heater parameters.

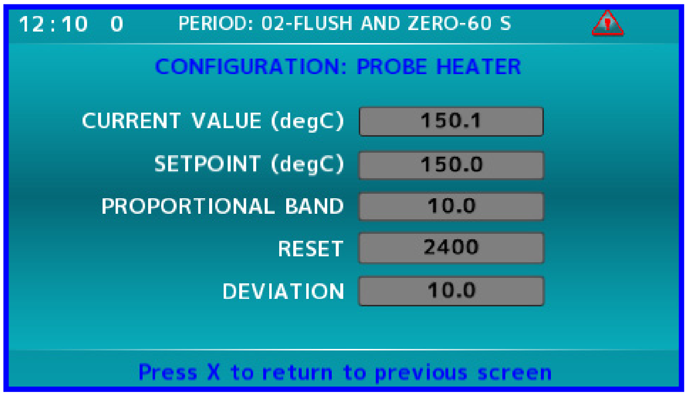


Figure 3-12.6.
888L Analyzer:
Probe Enclosure Heater
Temperature Parameters screen.

Current Value

This is the current temperature (° C) inside the Probe Enclosure. It cannot be changed.

Setpoint

This is the target temperature (° C) of the control loop, to maintain the Probe Enclosure temperature.

Proportional Band and **Reset**

These parameters are used by the control loop to regulate temperature. **Do not change these without consulting AMETEK.**

Deviation

This temperature (° C) sets the alarm limit for the selected device. In Figure 3-12.2, if the **Current Value** differs by more than 5.00 degrees (° C) from the **Setpoint**, an alarm will be set.

Viewing Probe Heater Temperature Parameters

The **Probe Heater Temperature** screen is used to view the Probe Heater parameters.

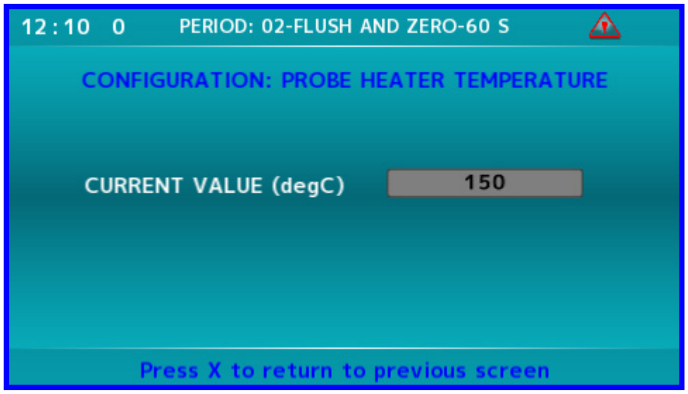


Figure 3-12.7.
888L Analyzer:
Probe Heater Temperature Parameter screen.

Current Value

This is the current temperature (° C) of the Probe Heater. It cannot be changed.

Viewing Sample Line Heater Temperature Parameters

The **Sample Line Heater Temperature** screen is used to view the Sample Line Heater parameters.

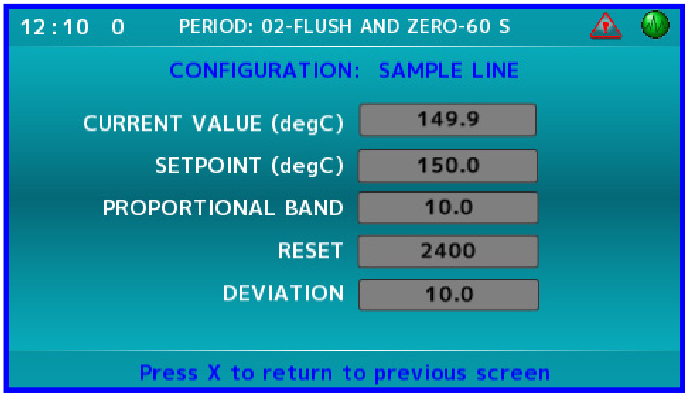


Figure 3-12.8.
888L Analyzer:
Sample Line Heater Temperature Parameters screen.

Current Value

This is the current temperature (° C) of the Sample Line Heater. It cannot be changed.

Setpoint

This is the target temperature (° C) of the control loop, to maintain the Sample Line temperature.

Proportional Band and **Reset**

These parameters are used by the control loop to regulate the temperature of the Sample Line. **Do not change these without consulting AMETEK.**

Deviation

This temperature (° C) sets the alarm limit for the Sample Line. In Figure 3-12.2, if the **Current Value** differs by more than 5.00 degrees (° C) from the **Setpoint**, an alarm will be set.

Section/Chapter	Page(s)	Instructions
Viewing the Firmware Versions	3-38	Use Figure 3-17.3 below in place of Figure 3-17.3 in the 888 Analyzer *User Manual*. Add the Probe Firmware Version description.

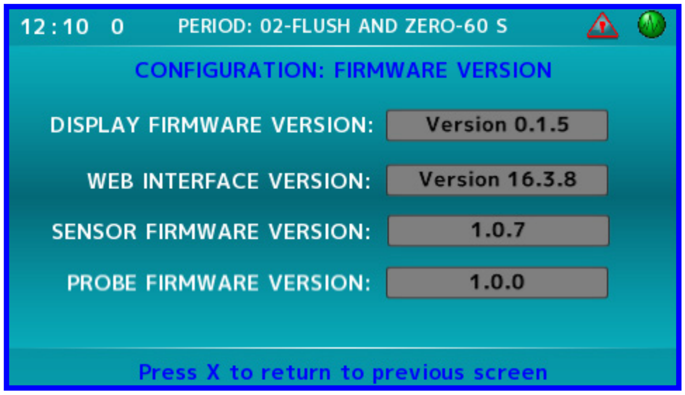


Figure 3-17.3.
888L Analyzer:
Firmware Version screen.

Probe Firmware Version

This is the version of the Probe firmware.

Section/Chapter	Page(s)	Instructions
Upgrading System Firmware	3-39	Use Figure 3-17.5.1 and the information below in place of Figure 3-17.5.1 in the 888 Analyzer *User Manual*.

There are three versions of firmware that can be upgraded. The **Display** and **Web Files** firmware are resident on the User Interface. The **Sensor** firmware is resident on the 888 Analyzer. The **Probe** firmware is resident on the Probe.

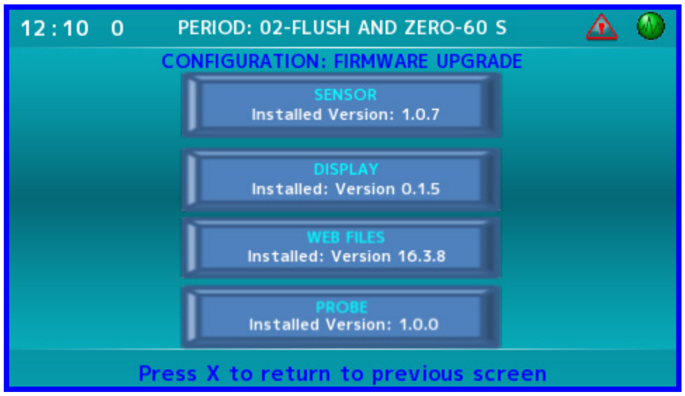


Figure 3-17.5.1.
Firmware Upgrade Screen 1.

This page intentionally left blank.

Section/Chapter	Page(s)	Instructions
Spare Parts Lists (Chapter 4)	4-4 to 4-6	Use the Spare Parts information below in place of the Spare Parts information in the 888 Analyzer *User Manual*.

Spare Parts Lists

NOTE

"M.S." next to the Chapter/Figure No. locator – view the location of the part in this document (888L Tail Gas Analyzer *Manual Supplement*, PN 883075901).

"U.M." next to the Chapter/Figure No. locator – view the location of the part in the 888 Tail Gas Analyzer *User Manual*, PN 883056901).

888L Tail Gas Analyzer Spare Parts – Start-Up and 1-Year Maintenance

Description	AMETEK Part No.	Chapter/Figure No.
Electronics Enclosure		
Fuse, 1 A, 250 V, Size 6.3 X 32 MM, Slow-Blow (QTY: 2)	273582001	Appendix A (M.S.)
Fuse, 4 A, 250 V, Size 6.3 X 32 MM, Slow-Blow (QTY: 4)	273582002	Appendix A (M.S.)
Fuse, 12 A, 250 V, Size 6.3 X 32 MM, Slow-Blow (QTY: 2)	273582004	Appendix A (M.S.)
Battery, Lithium	280750043	A-6 (U.M.)

Cell Enclosure		
Measuring Cell Rebuild Kit, 888: Includes O-rings (QTY: 10), Gaskets (QTY: 10), Quartz Windows (QTY: 2)	883065901S	A-1 (U.M.)
Conax Gland Seal	200859002	—

Probe Enclosure		
Demister Pad Kit, 888: Includes SST Pads (QTY: 2) and Teflon Pads (QTY: 2)	883026904S	1-6.2 (M.S.)

888L Tail Gas Analyzer Spare Parts – General

NOTE

All individual parts or kits are quantity (QTY) one (1) unless noted otherwise.

Description	AMETEK Part No.	Chapter/Figure No.
Electronics Enclosure		
Battery, Fuse, and Varistors Kit	883064901S	1-2 (U.M.), Appendix A (M.S.)
888 Flash Lamp Lens Replacement Kit	883076901	1-2 (M.S.)
Assembly, Xenon Flash Lamp, Tested	403225901	1-2 (M.S.)
Assembly, PCB Xenon Lamp Board, RoHS	100-2061	1-2 (M.S.), Appendix A (U.M.)
Assembly, 888 Detector	883005901	1-2 (M.S.), Appendix A (U.M.)
Detector CAL Filter Assembly	883005902	1-2 (M.S.), Appendix A (U.M.)
Detector Printed Circuit Board (PCB), RoHS	883048901	1-2 (M.S.), Appendix A (U.M.)
Assembly, Pressure Sensors on Bracket	883010901	1-2 (M.S.)
Power Supply DIN Rail Mount Output 24 VDC 5 A 120 W	273524001	1-2 (M.S.)
Assembly PCB DC/DC Converter	883049901	1-2 (M.S.)
Temperature Signal Converter, 24 VDC, IECEx and SIL-2 CER	273563001	1-2 (M.S.)
Assembly, Sensor Interface, RoHS, Serial Number Required	883047901	1-2 (M.S.), Appendix A (U.M.)
Programmed, AMEVision Board (Host Display Board), Serial Number Required	883057901S	1-2 (M.S.), Appendix A (U.M.)
Assembly, PCB, Keypad Display MCU Board	8000-122-SE	A-12 (U.M.)
LCD Display, Color, 4.2", 1/4 VGA, 480 X 272, 3.3 V	1000-617-JE	3-1.1 (U.M.), Appendix A (U.M.)
Keypad, Host Interface, SST	273398001	3-1.3 (U.M.), Appendix A (U.M.)
Gauge, Pressure, Dual 200 KPA/30 PSIG Back Center Mount	251744000	1-2 (M.S.), 2-9 (U.M.)
Proportional Valve	273408002	1-6.1 (M.S.)
Regulator, Manifold Block, 1–100 PSIG	301-0431	1-6.1 (M.S.), 2-9 (U.M.)
Regulator, Proportional Valve, 0–25 PSIG	301-0430	1-6.1 (M.S.), 2-9 (U.M.)
Valve Solenoid 12 VDC 3-Way	301-0424	1-5.1, 1-5.2, 1-5.3 (M.S.)
Fuse, 1 A, 250 V, Size 6.3 X 32 MM, Slow-Blow – QTY 2	273582001	Appendix A (M.S.)
Fuse, 4 A, 250 V, Size 6.3 X 32 MM, Slow-Blow – QTY 4	273582002	Appendix A (M.S.)
Fuse, 12 A, 250 V, Size 6.3 X 32 MM, Slow-Blow – QTY 2	273582004	Appendix A (M.S.)
Battery, Lithium – QTY 1	280750043	A-6 (U.M.)

Description	AMETEK Part No.	Chapter/Figure No.
X-Purge IS Board	273530004	1-2 (M.S.)
X-Purge Control Unit	273530006	1-2 (M.S.)
X-Purge Flow Manifold	273530007	1-2 (M.S.)
X-Purge Vent	273530002	1-5.1 (M.S.)
Probe PCB (Probe Controller)	883106901	1-2 (M.S.)
Heated Sample Bundle Relay	273091001	1-2 (M.S.)

Cell Enclosure		
Measuring Cell Rebuild Kit, 888: Includes O-rings (QTY: 10), Gaskets (QTY: 10), Quartz Windows (QTY: 2)	883065901S	1-4 (M.S.), Appendix A (M.S.)
888 Demister Pad Kit: Includes SST Pads (QTY: 2) and Teflon Pads (QTY: 2)	883026904S	1-6.2 (M.S.)
Assembly, Standard Range Measuring Cell (5")	883034901	1-2 (M.S.), Appendix A (U.M.)
Assembly, High Range Measuring Cell (2.5")	883034902	1-2 (M.S.), Appendix A (U.M.)
Assembly, 888 Pressure Transducer with Connector	883038902	1-2, 1-5.2, 1-5.2 (M.S.)
Mirror Block Assembly (part of Measuring Cell)	883023902	1-4 (M.S.). Appendix A (U.M.)
Toggle Valve	273749001	1-2, 1-4, 1-5.2, 1-5.2 (M.S.)
Check Valve, Aspirator	203790001	1-2, 1-4, 1-5.2, 1-5.2 (M.S.)
Check Valve, Zero Flush	273700001	1-2, 1-4, 1-5.2, 1-5.2 (M.S.)
Orifice, Division 2 Electronic Section Purge, 200 Micron	273454002	1-2, 1-4, 1-5.2, 1-5.2 (M.S.)
Orifice, Pressure Transducer Purge, 50 Micron	273455002	1-5.2, 1-5.2 (M.S.)
Orifice, Zero Flush, 1 mm	301-0160	1-5.2, 1-5.2 (M.S.)
Orifice, Trickle Purge between Aspirator and Zero Flush Valves, 150 Micron	273757001	1-5.2, 1-5.2 (M.S.)
120 VAC, Complete Heater Assembly, with RTDs, Cartridge and Plate, ATEX/IECEx Zone 1 OR 240 VAC, Complete Heater Assembly, with RTDs, Cartridge and Plate, ATEX/IECEx Zone 1	883024912 883024913	1-2, 1-4 (M.S.)
Conax Gland Seal	200859002	—
RTD, Cell, 12", Formed	883095001	1-4 (M.S.)
Zero Flush Coil	883125004	1-5.2 (M.S.)

Customer Connection Enclosure		
888 Signal Disconnect Assembly	883110901	1-2, 1-7.2 (M.S.)

Description	AMETEK Part No.	Chapter/Figure No.
Probe Enclosure		
RTD, Demister, 8"	273402004	1-6.2 (M.S.)
120 VAC, Complete Heater Assembly, with RTDs, Cartridge and Plate, ATEX/IECEx Zone 1 OR 240 VAC, Complete Heater Assembly, with RTDs, Cartridge and Plate, ATEX/IECEx Zone 1	883024912 883024913	1-6.2 (M.S.)
Probe Enclosure RTD	883095005	1-6.2, 1-6.4 (M.S.)
Aspirator Coil	883125014	1-6.2, 1-6.4 (M.S.)
Flange RTD	883095003	1-6.2, 1-6.4 (M.S.)

Exterior/Backpan		
Manifold Regulator	883039903	1-2, 1-6.1 (M.S.)
Purge Regulator	883039904	1-2, 1-5.1 (M.S.)
Gasket, Double Block SJ Ball Valve	883097002	—
Heated Sample Line (Tubing) (Heated Sample Bundle) (Connected between Analyzer/Customer Connection Enclosure and Probe Enclosure Probe Connection Enclosure.)	Consult Factory	1-6.1 (M.S.)
Utilities Line (Tubing) (Unheated Sample Bundle) (Connected between Analyzer and Probe Enclosure.)	Consult Factory	1-6.1 (M.S.)
Probe Heater/Power Cable (R1) (Runs between Analyzer Customer Connection Enclosure and Probe Connection Enclosure.)	Consult Factory	—
Probe Signal Cable (C5) (Runs between Analyzer Customer Connection Enclosure and Probe Connection Enclosure.)	Consult Factory	—

Section/Chapter	Page(s)	Instructions
Diagnostic Flowcharts (Chapter 4)	4-8, 4-9	Use the Diagnostics Flowcharts information below in place of the Diagnostics Flowcharts in the 888 Analyzer *User Manual*.

Probe or Oven/Cell Enclosure Temperature Not Reaching Setpoint

The 888L Tail Gas Analyzer has two heated enclosures:

- The Oven/Cell Enclosure (houses the Measuring Cell) is located on the analyzer backpan, next to the analyzer's Electronics Enclosure.
- The Probe Enclosure is remotely mounted at the Sample Tap on the process stream.

If issues arise that lead to problems with either enclosure, this Diagnostic Flowchart applies to both heated enclosures.

NOTE

Ambient conditions and the analyzer's T3 heater rating (maximum of 200 °C) can cause the Measuring Cell to take more than an hour to reach operating temperature.

HOME→Configure→ Status

If the Oven/Cell Enclosure or Probe Enclosure temperature is not reaching its programmed setpoint – typically 150 °C for both – there are several possible causes. (Note that the typical deviation allowed is ±10 °C.) From the User Interface, view the **Status** screen and check the **Cell *Temperature*** and **Heater *Duty Cycle*** values on the **Oven (Sensor) Enclosure *Status*** screen, and check the **(Probe) Enclosure *Temperature*** and **Heater *Duty Cycle*** values on the **Probe Enclosure *Status*** screen. If the **Heater *Duty Cycle*** is at 100 % and the **Cell *Temperature*** or **Enclosure *Temperature*** is not increasing, use the following checks to resolve problems with the corresponding temperature that is not reaching or maintaining its target value.

HOME→CONFIGURE→ Pressures→Aspirator

Possible Cause	Corrective Action
Door is not closed	Confirm Enclosure Doors are closed and properly latched.
Open Heater Fuse	Check the Heater fuse inside the Electronics Enclosure. It is located on terminal block **TB1**: - Probe Heater fuse – **Terminal 6**) - Cell Heater fuse – **Terminal 5**)
Excessive Flow Through the Aspirator	Excessive gas flow through the Aspirator (located in the Probe Enclosure) can cool down the Cell Enclosure. From the User Interface, view the **Aspirator Pressure** screen and check the **Flow Setpoint** value. The analyzer should be configured to produce 1–2 liters per minute through the Measuring Cell. If necessary, change the flow to within this range.
	Continued next page.

Possible Cause	Corrective Action
	Continued from previous page.
Probe or Oven/Cell Enclosure Heater RTD Failure	From the User Interface, view the **Current Alarms** screen to check for an active **Probe** or **Cell Heater RTD Failure** alarm. Also, view the **Status** screen and check the **Probe** or **Cell *Temperature***. If the either Heater's RTD is open or shorted, the **Probe** or **Cell *Temperature*** value will display 999 °C.
Contact AMETEK Service for troubleshooting assistance.	

HOME→Diagnose→Alarms→Current

Demister Temperature Not Reaching Setpoint

HOME→Configure→Status

If the Demister is not reaching its programmed setpoint, there are several possible causes. From the User Interface, view the **Status** screen to check the **Demister *Temperature*** and **Demister *Duty Cycle*** values. If the Demister Duty Cycle is at 100 % and the Demister Temperature is not increasing, use the following checks to resolve problems with the Demister temperature not reaching or maintaining its target.

Possible Cause	Corrective Action
Demister temperature over 130 °C	The Demister setpoint is normally 129 °C. View the **Status** screen and check the **Demister *Temperature***. If it is 130 °C or higher, check the **Demister Temp** screen and check its Setpoint value. Change this setting if necessary.
Excessive Instrument Air flow cooling the Cell Enclosure	Check Demister operation: The Demister is cooled by flushing itself with Instrument Air. The Demister temperature will be below the Cell Enclosure temperature. From the **Status** screen check the **Demister *Duty Cycle***. If it is above 75 %, this could indicate a problem with the cooling air flow.
Demister RTD Failure	From the User Interface, view the **Current Alarms** screen to check for any active **Demister RTD Failure** alarms. Also, view the **Status** screen and check the **Demister *Temperature***. If the Demister Heater RTD is open or shorted, the **Demister *Temperature*** value will display 999 °C.

Section/Chapter	Page(s)	Instructions
Diagnostic Flowcharts (Chapter 4)	4-8, 4-9	Use the Diagnostics Flowcharts information below in place of the Diagnostics Flowcharts information in the 888 Analyzer *User Manual*.

Heated Sample Bundle Temperatures Not Reaching Setpoint

If the Heated Sample Bundle is not reaching its programmed setpoint, review this chart to determine causes and corrective measures. From the User Interface, view the **Status-Probe** screen to check the **Sample Line *Temperature*** value, and the **Sample Line *Duty Cycle*** value. If the **Sample Line *Duty Cycle*** is at 100 % and the **Sample Line *Temperature*** is not increasing, use the following checks to resolve problems with the Sample Line temperature-not reaching or maintaining its target value.

HOME→Configure→Status

Possible Cause	Corrective Action
Heated Sample Bundle Temperature is Incorrectly Set	The **Sample Line** setpoint is normally 150.0 °C, ±10.0 °C. View the **Status** screen and check the **Sample Line *Temperature***. If it is outside of the expected range, check the **Sample Line** screen and check its **Setpoint** value. Change this setting if necessary.
Heated Sample Bundle RTD Failure	If the Sample Line Heater RTD is open or shorted, the value will display 999 °C.
Open Heater Fuse	Check the Heater fuse inside the Electronic Enclosure. It is located on terminal block **TB1** (Sample Line fuse – **Terminal 7**. Replace the fuse if necessary.
Contact AMETEK Service for troubleshooting assistance.	

Section/Chapter	Page(s)	Instructions
Alarm Conditions and Corrective Actions	4-30	Use the descriptions for Alarms 11 (Demister RTD Failure) and 12 (Flange RTD Failure) below in place of the descriptions for Alarms 11 and 12 in the 888 Analyzer *User Manual*.

Alarm Number	Alarm Condition / Description / Corrective Action	Alarm Level	Modbus Bit
11	**Demister RTD Failure [Hardware alarm]** This alarm indicates the Demister temperature sensor (RTD) has failed. This RTD monitors the Demister temperature and if it fails, this Level 1 alarm is set. The RTD could be defective or one of its three wires may have been disconnected. User intervention is needed to clear the alarm condition. ***Warning:*** ***Ex DB Enclosure Warning*** *DO NOT OPEN, MAINTAIN, OR SERVICE THE ANALYZER IN AN AREA WHERE AN EXPLOSIVE ATMOSPHERE MAY BE PRESENT.* ***Corrective Action:*** • **Contact AMETEK Service to verify the operation of the RTD.**	1	11
12	**Flange RTD Failure [Hardware alarm]** This alarm indicates the Flange temperature sensor (RTD) has failed. This RTD monitors the Flange temperature and if it fails, this Level 2 alarm is set. The RTD could be defective or one of its three wires may have been disconnected. The analyzer is still capable of making concentration measurements. However, Flange temperature cannot be monitored until the RTD is repaired/replaced. User intervention is needed to clear the alarm condition. ***Warning:*** ***Ex DB Enclosure Warning*** *DO NOT OPEN, MAINTAIN, OR SERVICE THE ANALYZER IN AN AREA WHERE AN EXPLOSIVE ATMOSPHERE MAY BE PRESENT.* ***Corrective Action:*** • **Contact AMETEK Service to verify the operation of the RTD.**	2	12

Section/Chapter	Page(s)	Instructions
Alarm Conditions and Corrective Actions	4-34	Add the following Alarms 24–32 following the list of existing Alarms (1–23) in the 888 Analyzer *User Manual*.

Alarm Number	Alarm Condition / Description / Corrective Action	Alarm Level	Modbus Bit
24	**Probe Encl Temp Out of Range** The Probe Enclosure temperature has exceeded its upper or lower limits. This alarm can occur during a cold start, but will clear when the Probe Enclosure temperature is within its normal operating range. In the case of a Low Temperature alarm, the system will remain in a Zero Flush state, where instrument air is flowing through the system. This alarm can also be caused by a power interruption/disconnection. This alarm will clear after the RTD sensor measures a temperature within the operating limits of the Probe Enclosure. ***Warning:*** ***Ex DB Enclosure Warning*** *DO NOT OPEN, MAINTAIN, OR SERVICE THE ANALYZER IN AN AREA WHERE AN EXPLOSIVE ATMOSPHERE MAY BE PRESENT.* ***Corrective Action:*** • Confirm that the Probe Enclosure door is closed securely and locked. From the User Interface: • Check the current Probe Enclosure temperature (**PROBE ENCL HTR** on the **STATUS** screen) and compare it to its **Setpoint** temperatures on the **CONFIGURATION: PROBE ENCL TEMP** screen). Contact AMETEK Service if: • If the RTD is reading '**999**' on the display. • You need to verify operation, order replacement parts, or if you require replacement instructions.	1	24

Alarm Number	Alarm Condition / Description / Corrective Action	Alarm Level	Modbus Bit
25	**Probe Encl RTD Failure** This alarm indicates the Probe Enclosure temperature sensor (RTD) has failed. This RTD monitors the temperature inside the Probe Enclosure and if it fails, this Level 1 alarm is set. In this case the analyzer will enter a zero flush state. The RTD could be defective, or one of its three wires may have been disconnected. A possible failure mode is breakage of the RTD element. In this case the RTD output on the status screen will read '999'. **This is a safety issue as the heater cannot be allowed to exceed 200 °C and reach the auto-ignition temperature of process gas. There are two (2) redundant sensors in the heater.** User intervention is needed to clear the alarm condition. ***Corrective Action:*** ***Warning:*** ***Ex DB Enclosure Warning*** *DO NOT OPEN, MAINTAIN, OR SERVICE THE ANALYZER IN AN AREA WHERE AN EXPLOSIVE ATMOSPHERE MAY BE PRESENT.* **Contact AMETEK Service for troubleshooting assistance.**	1	25
26	**Sample Line Temp Out of Range** The Sample Line temperature has exceeded its upper or lower limits. This alarm can occur during a cold start, but will clear when the Sample Line temperature is within its normal operating range In the case of a Low Temperature alarm the system will remain in a zero flush state, where instrument air is flowing through the system. This alarm can also be caused by a power interruption/disconnection. ***Corrective Action:*** From the User Interface: • Check the current temperature (STATUS screen) for the Sample Line temperature and compare it to its Setpoint temperatures (CONFIGURATION: SAMPLE LINE TEMP screen). ***Warning:*** Take appropriate safety precautions before moving onto the checks. Checks: • Inspect the RTD cable for damage that runs between the sample line and customer Exd disconnect casting. Contact AMETEK Service if: • There is no visible damage and the problem persists. • The cable appears damaged, as this will require additional sample line components.	1	26

Alarm Number	**Alarm Condition / Description / Corrective Action**	Alarm Level	Modbus Bit
27	**Sample Line RTD Failure** This alarm indicates the Sample Line temperature sensor (RTD) has failed. This RTD monitors the temperature of the Sample Line and if it fails, this Level 1 alarm is set. The RTD could be defective or one of its three wires may have been disconnected. A possible failure mode is breakage of the RTD element. In this case the RTD output on the status screen will read 999. **There are two redundant sensors in the sample line which is T3 rated.** User intervention is needed to clear the alarm condition. ***Corrective Action:*** **Contact AMETEK for any sample line RTD failure.**	1	27
28	**Probe Heater RTD Open** The analyzer has detected an open circuit on the Probe Heater temperature sensor (RTD). Possible causes include a broken resistive element or a bad connection on the terminal block. ***Corrective Action:*** ***Warning:*** ***Ex DB Enclosure Warning*** *DO NOT OPEN, MAINTAIN, OR SERVICE THE ANALYZER IN AN AREA WHERE AN EXPLOSIVE ATMOSPHERE MAY BE PRESENT.* **Contact AMETEK Service ~~for troubleshooting assistance~~.**	1	28
29	**Probe Heater OT RTD Open** The analyzer has detected an open circuit on the Probe Heater temperature sensor (RTD). Possible causes include a broken resistive element or a bad connection on the terminal block. ***Corrective Action:*** ***Warning:*** ***Ex DB Enclosure Warning*** *DO NOT OPEN, MAINTAIN, OR SERVICE THE ANALYZER IN AN AREA WHERE AN EXPLOSIVE ATMOSPHERE MAY BE PRESENT.* **Contact AMETEK Service ~~for troubleshooting assistance~~.**	1	29

<table>
<tr><th>Alarm Number</th><th>Alarm Condition / Description / Corrective Action</th><th>Alarm Level</th><th>Modbus Bit</th></tr>
<tr><td>30</td><td>Probe Controller Comm Error

This serious system alarm indicates the Probe Controller board cannot establish reliable communications with the 888 Analyzer. This can occur due to lose cable connections on the controller board or if the board needs to be replaced.

Corrective Action:

• Take appropriate safety precautions to power down the analyzer and Heated Probe. Open the Electronics Enclosure and ensure there is no visible damage to the probe controller board/ Check the communications wiring for proper connections and damage (cuts, nicks, burn marks, etc.) at the following locations:

• A majority of the cables from the probe controller board run through the SIL modules and into the Exd casting. Contact Ametek service for further troubleshooting and diagnosis.

Contact AMETEK Service further troubleshooting and diagnosis.</td><td>1</td><td>30</td></tr>
<tr><td>31</td><td>Alarm Unused 1

Reserved for future use.</td><td>1</td><td>31</td></tr>
<tr><td>32</td><td>Alarm Unused 2

Reserved for future use.</td><td>1</td><td>32</td></tr>
</table>

Specifications

Section/Chapter	Page(s)	Instructions
Alarm Conditions and Corrective Actions	4-34	Use the Specifications information below in place of the Specifications information in the 888 Analyzer *User Manual*.

WARNING

Specifications included in this chapter are typical for the ranges listed. For custom ranges/applications, consult with your AMETEK representative.

888L Tail Gas Analyzer Specifications

Analyzer Specifications	
Principle of Operation	The 888 Analyzer uses non-dispersive ultraviolet (UV) spectroscopy to accurately monitor hydrogen sulfide (H_2S) and sulfur dioxide (SO_2) concentrations in sulfur recovery tail gas.
Ranges	**Standard Range:** 0–2 % H2S 0–1 % SO2 **High Range:** 0–4 % H2S 0–2 % SO2 Other ranges available upon request.
Performance	All performance specifications are based on normal operation that includes periodic Zero and Photo Span calibration.
Accuracy	±1 % of full-scale range (H2S, SO2)
Reproducibility	±1 % of full-scale range (H2S, SO2)
Repeatability	<1 % of full scale range
Response Time	90 % in <15 seconds, typical with photo noise at default
Zero Drift	<0.5 % of full-scale range
Noise	±0.5 % of full-scale range
Analog Outputs	Four (4) programmable 4–20 mA self-powered (24 VDC) analog outputs, electronically isolated from the controller, but not each other. Outputs cannot be loop powered. Maximum 1000 Ohms load resistance.

Analyzer Specifications	
Digital (Discrete) Outputs	Four (4) programmable relay contacts rated 30 VAC, 60 VDC, 10 VA, maximum, resistive load only) (Used for System Alarm, Data Valid Alarm, and two configurable digital outputs.)
Remote Digital (Discrete) Input	One (1) isolated digital input, contact closure (user configurable to initiate Calibration)
Local User Interface	- 4.2" LCD color, 1/4 VGA display - 19-key piezoelectric keypad (suitable for use with a gloved hand)
Serial Communications	Isolated RS-485 serial communication; Modbus RTU; Ethernet; two-wire half duplex; 9600 baud. Modbus query rate limited to 50 queries per second. Modbus TCP supports a single TCP master.
Ethernet	Fast Ethernet; 100 Mbs Telnet, Modbus TCP. AMEVision User Interface functions as a Web server for remote monitoring and configuration.
USB Connectivity	USB 2.0 (supports MSD class)
Environment	Ambient Temperature: -20 °C to 60 °C (-4 °F to 140 °F) Maximum Altitude: 2000 meters Relative Humidity: 10 to 90 %, non-condensing Note: For IECEx Zone 1 hazardous locations, the analyzer must be shaded from direct sunlight.
Enclosures	Electronics and Cell Enclosures, backplate, and keypad are 316 stainless steel. Customer Connection Enclosure is made from cast aluminum.
Process Sample Pressure	Typically 13.8-48.2 kPa (2–7 PSIG)
Power Requirements	115 VAC, ±10 %, 47–63 Hz, 740 VA maximum 230 VAC, ±10 %, 47–to 63 Hz, 740 VA maximum
Calibration	Factory calibrated. Automatic calibration capability (no hazardous or toxic calibration gases are needed)
Purge Alarm	Rating: 2 Amps, 240 VAC Resistive Alarm Connection: Loss of Purge Pressure; Form C Contact
Cell Battery Type	Primary Lithium poly-carbon monofluoride (Li/CF(n)) (Real Time Clock Battery for 8000-122-SE AMEVision User Interface.) Type: Coin Dimensions: 3.2 mm (H) X 20 mm (D), ±0.3 mm Operating Temp: -30 °C to +80 °C Nominal Voltage: 3.3 V Minimum Internal Resistance: 13 mΩ Capacity: 190 mAh Weight: 2.6 g

Analyzer Specifications	
Utility Requirements	***Power Consumption*** (specified at time of purchase) 120 VAC (105–132 VAC), 47–63 Hz, 1000 W OR 240 VAC (209–264 VAC), 47–63 Hz, 1000 W ***Instrument Air*** Instrument Grade Air or Nitrogen: 517–655 kPa (75–95 PSIG) Air Quality per ANSI/ISA-S7.0.01 (1996). ***Purge Supply Pressure (Zone 1 Units Only):*** Instrument Grade Air: 345–690 kPa (50–100 PSIG) - Capacity of 141–340 SLPM. - Purge requires external Pressure Regulator. - Purge Alarm contact rated 2 Amp, 24 VDC resistive.
Utility Requirements (continued)	***Steam Blowback Pressure (if equipped):*** 207–345 kPa (30–50 PSIG) Steam quality should be supplied at a temperature between 135 °C and 150 °C (275 °C and 302 °C). ***Steam Jacketed Ball Valve Pressure (if equipped):*** 517–690 kPa (75–100 PSIG)
Physical Dimensions	888L Zone 1 Analyzers: Electronics/Cell/Customer Connection Enclosures on Backpan: Width: 46 cm (18.11") Height: 111.7 cm (43.98") Length: 155.3 cm (61.14") Weight: 163.3 kg (360 lb) (without Steam Blowback option) Probe/Probe Enclosure: Width: 31.2 cm (12.28") Height: 68.1 cm (26.81") Length: 70.7 cm (26.83") Weight: 36.3 kg (80 lb) (*without* Steam Blowback option) 40.8 kg (90 lb) (*with* Steam Blowback option) Electronics/Cell/Customer Connection Enclosures on Backpan and Probe/Probe Enclosure, Overall/Combined: Weight: *Without* Steam Blowback option: 199.6 kg (440 lb) *With* Steam Blowback option: 204.1 kg (450 lb)

Analyzer Specifications	
Sample Line	***Power Requirements*** 230 V, 100 W/m of Sample Line - 2800 W at 240 V - 1400 W at 120 V ***Temperature*** Maintain: 150 °C (302 °F) Maximum Operating: 200 °C (392 °F) T3, Zone 1 and 2 temperature class ***Physical Dimensions*** Up to 20 meters at 240 V and up to 10 meters at 120 V. Outer diameter 83 mm, tapering down to 45 mm on both ends. PTFE insulated heating cable.

888L Tail Gas Analyzer Options – Specifications

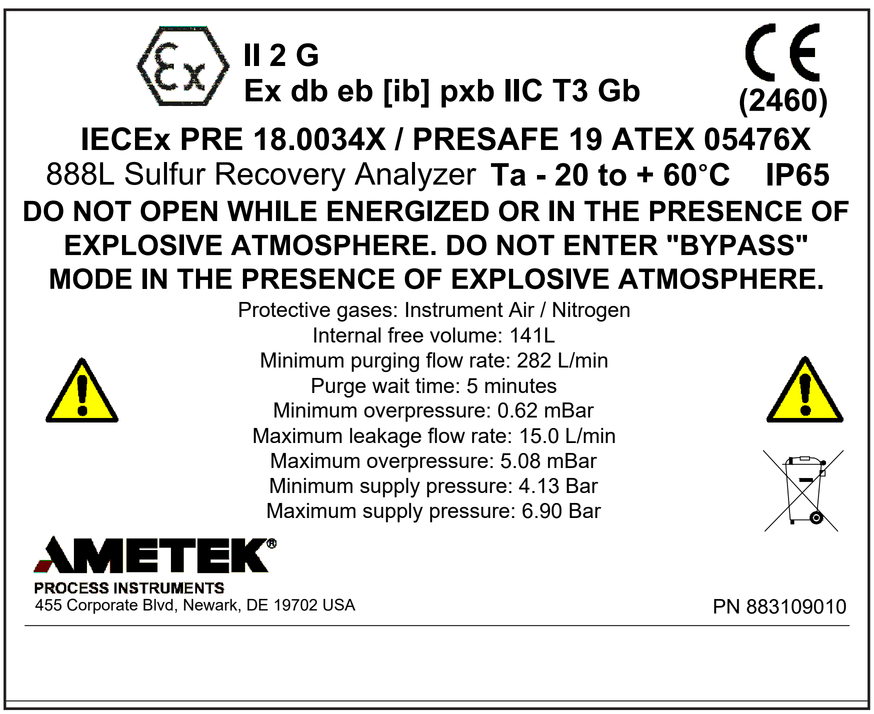
Specifications	
Options	***Measurement Range*** **Standard Range:** 0–2 % H2S and 0–1 % SO2 **High Range:** 0–4 % H2S and 0–2 % SO2 **Pit Gas Range:** 0–5 % H2S and 0–1 % SO2 ***Steam Blowback*** See “Utility Requirements” in these Specifications. ***Sample Probe*** Hot Insertion probe. Fixed probe with double block isolation. NACE/3.1 optional certification.

888L Tail Gas Analyzer Approvals and Certifications

888L Analyzer Directives and Standards

IECEx	Certificate Number: IECEx PRE 18.0034X Using the following standards: IEC 60079-0:2017 Edition 7.0 IEC 60079-1:2014-06 Edition 7.0 IEC 60079-2:2014-07 Edition 6.0 IEC 60079-7:2017 Edition 5.1
ATEX	Certificate Number: Presafe 19 ATEX 05476X Directive 2014/34/EU using the following standards: EN IEC 60079-0:2018 EN 60079-1:2014 EN 60079-2: 2014 EN 60079-7:2015/A1:2018
General Safety US/CAN	Directive 2014/35/EU using the following standard: EN 61010-1: 2010 Edition 3.0 UL/CSA 61010-1: 2010 Edition 3.0 (cETLus)
EMC	Directive 2014/30/EU using the following standards: EN 61326-1: 2013 Edition IEC 61326-1: 2013 Edition

888L Analyzer Marking

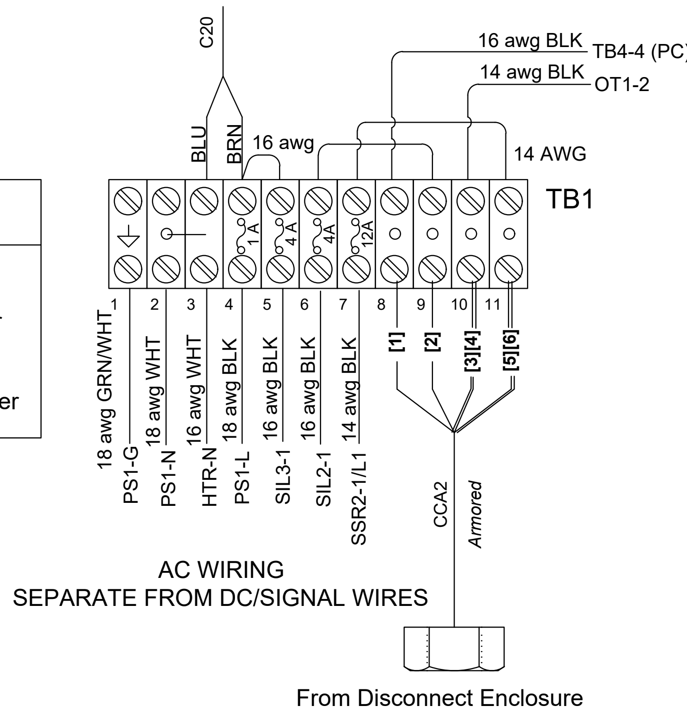


This page intentionally left blank.

Appendix A – Drawings / Wiring Diagrams

Section/Chapter	Page(s)	Instructions
Fuse Locations, Electronics Enclosure	A-3	Use the Fuse Terminal strip drawing below in place of the Fuse Terminal strip drawing in the 888 Analyzer *User Manual*.

Fused Terminal	Rating	Function
4	1 Amp	Electronics Power
5	4 Amp	Sample Oven Heater
6	4 Amp	Probe Heater
7	12 Amp	Sample Bundle Heater



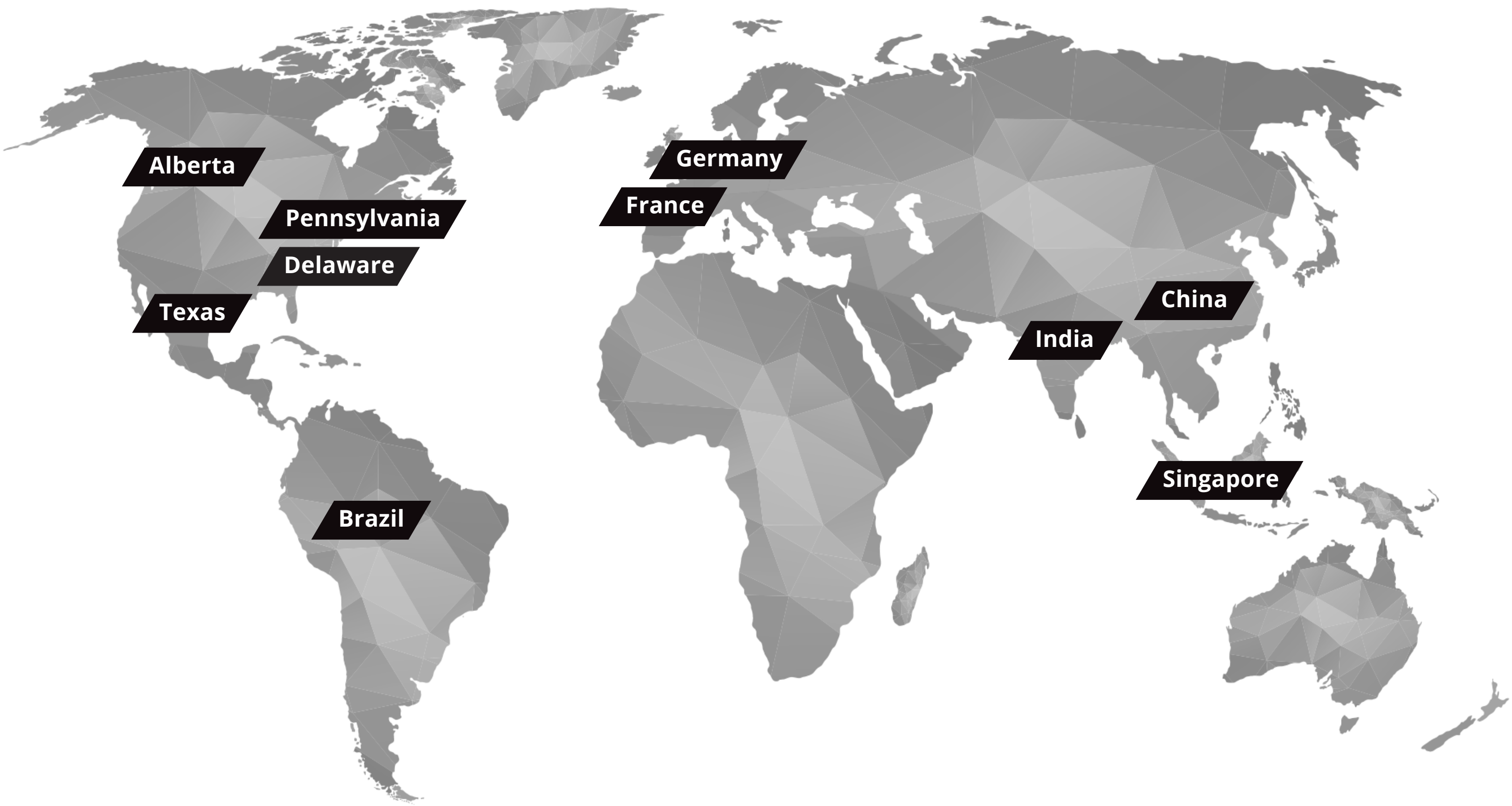
This page intentionally left blank.

***AMETEK Process Instruments** delivers worldwide sales and service support through a network of direct and factory-trained global distribution channels.*

AMETEK Service Assistance Program plans offer coverage up to 24 hours a day, 365 days of the year.

As worldwide experts in the manufacture of process analyzers and instrumentation, we have supplied solutions to industry since 1962, providing the widest range of analysis technology available.

Through process application consulting, we create custom-designed solutions that meet the needs of your specific application or process.



SALES, SERVICE & MANUFACTURING

USA - Pennsylvania
150 Freeport Road
Pittsburgh PA 15238
Tel: +1 412 828 9040
Fax: +1 412 826 0399

USA - Delaware
455 Corporate Blvd.
Newark DE 19702
Tel: +1 302 456 4400
Fax: +1 302 456 4444

Canada - Alberta
2876 Sunridge Way NE
Calgary AB T1Y 7H9
Tel: +1 403 235 8400
Fax: +1 403 248 3550

WORLDWIDE SALES AND SERVICE LOCATIONS

USA
Tel: +1 713 466 4900
Fax: +1 713 849 1924

Brazil
Tel: +55 19 2107 4100

France
Tel: +33 1 30 68 89 20
Fax: +33 1 30 68 89 99

Germany
Tel: +49 2159 9136 0
Fax: +49 2159 9136 39

India
Tel: +91 80 6782 3200
Fax: +91 80 6780 3232

Singapore
Tel: +65 6484 2388
Fax: +65 6481 6588

China
Beijing
Tel: +86 10 8526 2111
Fax: +86 10 8526 2141
Chengdu
Tel: +86 28 8675 8111
Fax: +86 28 8675 8141
Shanghai
Tel: +86 21 5868 5111
Fax: +86 21 5866 0969

AMETEK® PROCESS INSTRUMENTS

One of a family of innovative process analyzer solutions from AMETEK Process Instruments.
Specifications subject to change without notice.