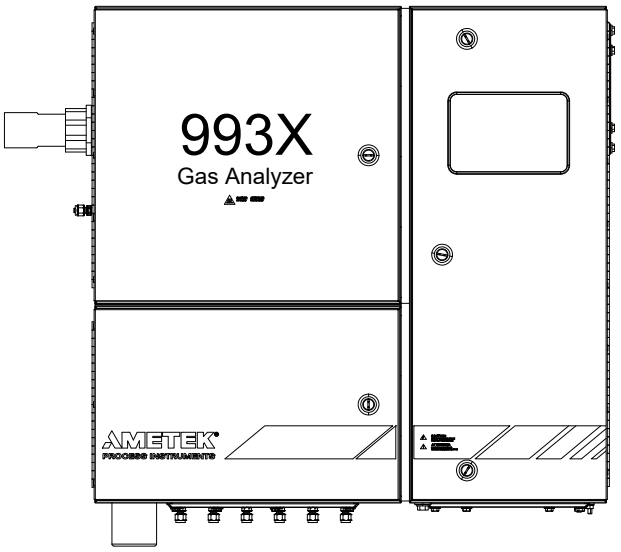
AMETEK®
PROCESS INSTRUMENTS

ESSENTIAL HEALTH and SAFETY

993X and 993X-H Gas Analyzer Series
Class I, Division 2 and ATEX/IECEx Zone 2



PN 903-8820_English,Rev C

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

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Overview

About This Document

This document describes the essential health and safety (EH&S) requirements for the 993X and 993X-H (High Ambient) Analyzer Series intended for use in Class I, Division 2, and ATEX/IECEx Zone 2 environments.

References to 993X in this document cover all derivative models of the analyzer series, where 'X' can be an alphanumeric character such as 0–9, a–z, or A–Z (example, 9931, 9932, 9933, or 9934). "-H" refers to the high ambient temperature (up to +60 °C) version of the analyzer series.

The procedures and information discussed in this document include only the steps to install, operate, and prepare for servicing the 993X Analyzer. They do, however, include all relevant safety warnings and cautions to ensure the safety of personnel and the analyzer in explosive atmosphere locations.

AMETEK takes great effort to ensure that its translations of documents into foreign languages are accurate and complete. However, in the case of any discrepancies between the English version and the translated version, the original English version shall take precedence. AMETEK will not assume liability for any such discrepancies, or issues arising from them.

Manufacturer's Address

This product is manufactured in Canada:

AMETEK Canada LP
2876 Sunridge Way N.E.
Calgary, Alberta, Canada
T1Y 7H9
Tel: 1-403-235-8400

Important Safety Information

This section describes important safety information to avoid personal injury and damage to the equipment while installing, operating, maintaining, or servicing the equipment. All safety regulations, standards, and procedures at the analyzer location must be followed.

All personnel involved with the installation, start-up, operation, maintenance, service, and/or troubleshooting of the analyzer – and before opening it at any time after it has been in operation – must review and follow all Warnings, Cautions, and Notes in this document. This information contains important safety and general information about the analyzer.

WARNINGS, CAUTIONS, and NOTES contained in this manual emphasize critical instructions as follows:

An operating procedure which, if not strictly observed, may result in personal injury or environmental contamination.

An operating procedure which, if not strictly observed, may result in damage to the equipment.

Important information that should not be overlooked.

Burn hazard. Hot surface. Do not touch, allow to cool before servicing.

Warnings, Cautions, Notes

Before installing, operating, and performing any maintenance, service, and/or troubleshooting on the analyzer, read and follow all safety information in this document (and in the analyzer User Manual). Misuse of this product could result in personal injury and/or damage to the equipment or its installation site. ***All regulatory agency and personnel safety procedures for your jurisdiction must be followed.***

All covers and doors must be tightly fastened with all screws or latches and the Measuring Cell and Optical Bench Assemblies must remain in place while the circuits are live.

If installed in a hazardous classified area and it is necessary to open the analyzer's covers or doors while the circuits are live, first test the area for flammable gases and proceed only when the area is safe.

When the Electronics Enclosure's door is open, take appropriate precautions to avoid electrical shock. Hazardous voltages are present inside.

Always disconnect AC mains power and/or alternate power sources (example, for relay contacts) to the analyzer before opening any covers or doors on the analyzer, before making any wiring or cable connections, and before removing any sample system assemblies and components from the analyzer.

All electrical connections, adjustments, or servicing of the analyzer must be performed only by properly trained and qualified personnel.

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

Because ultraviolet (UV) radiation can harm your eyes, never view the light emanating through the end window of the hollow cathode lamp. If the source lamp must be viewed while energized, wear UV coated safety glasses that block UV radiation.

If it becomes necessary to handle any of the electronic circuit boards, do not subject the boards to static discharge. The ideal solution is a static-safe work area. Since such areas typically are not available at field installation sites, the use of a wrist strap connected directly to a ground is recommended. If a wrist strap is not available, you should at the very least touch the metal chassis (to discharge static electricity buildup on yourself) before, and handle/touch the boards only by their edges, to avoid touching any of their components.

The electronic circuit boards and other static-sensitive components should be stored and transported in static-shielding carriers or packages.

For electric-shock protection, the analyzer must be operated from a grounded power source that has a securely connected protective-ground contact.

Warning Labels

These symbols may appear on the instrument to alert you of existing conditions.

Protective Conductor Terminal
(BORNIER DE L'ECRAN DE PROTECTION)
Schutzerde

Caution – Risk of electric shock
(ATTENTION – RISQUE DE DÉCHARGE ÉLECTRIQUE)
Achtung – Hochspannung Lebensgefahr

Caution – Refer to accompanying documents
(ATTENTION – SE RÉFERER AUX DOCUMENTS JOINTS)
Achtung – Beachten Sie beiliegende Dokumente

CAUTION – Hot Surface
(ATTENTION – SURFACE CHAUDE)
Achtung – Heiße Oberfläche

Electrical Safety

High voltages are present inside the Electronics Enclosure. Always shut down power source(s) before performing maintenance or troubleshooting. Only a qualified electrician should make electrical connections and ground checks.

Any use of the equipment in a manner not specified by the manufacturer may impair the safety protection originally provided by the equipment.

Grounding

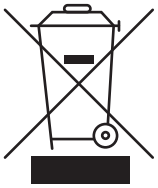
Instrument grounding is mandatory. Performance specifications and safety protection are void if instrument is operated from an improperly grounded power source.

Verify ground continuity of all equipment before applying power.

Environmental Information (WEEE)

This AMETEK product contains materials that can be reclaimed and recycled. In some cases the product may contain materials known to be hazardous to the environment or human health. In order to prevent the release of harmful substances into the environment and to conserve our natural resources, AMETEK recommends that you arrange to recycle this product when it reached its "end of life."

Waste Electrical and Electronic Equipment (WEEE) should never be disposed of in a municipal waste system (residential trash). The Wheelie Bin marking on this product is a reminder to dispose of the product properly after it has completed its useful life and been removed from service. Metals, plastics, and other components are recyclable and you can do your part by doing one of the following steps:



- When the equipment is ready to be disposed of, take it to your local or regional waste collection administration for recycling.
- If you need further assistance in recycling your AMETEK product, contact us through our Customer Support page at https://www.AMETEKpi.com/customersupport/request-support.

UV Source Lamps Disposal

AMETEK recommends that all UV lamps – whether they are new, used, or damaged in any way – need to be disposed of in an environmentally safe manner.

Most UV lamps do not contain restricted substances listed under European RoHS 2 Directives. However, special handling requirements are required for some lamps if they are broken. Two examples include Cadmium and Beryllium lamps.

Electromagnetic Compatibility (EMC)

Read and follow the recommendations in this section to avoid performance variations or damage to the internal circuits of this equipment when installed in harsh electrical environments.

This equipment complies with the requirements relating to electromagnetic compatibility. However, some electronic devices may be susceptible to interference, therefore, ensure that this equipment is used in a suitable environment.

The various configurations of the 993X Analyzer should not produce, or fall victim to, electromagnetic disturbances as specified in the European Union's EMC Directive. Strict compliance to the EMC Directive requires that certain installation techniques and wiring practices are used to prevent or minimize erratic behavior of the Analyzer or its electronic neighbors. Below are examples of the techniques and wiring practices to be followed.

In meeting the EMC requirements, the various Analyzer configurations described in this document rely heavily on the use of metallic shielded cables to connect to the customer's equipment and power. Foil and braid shielded I/O cables are recommended for use in otherwise unprotected situations. In addition, hard conduit, flexible conduit, and armor around non-shielded wiring also provides excellent control of radio frequency disturbances. However, use of these shielding techniques is effective only when the shielding element is connected to the equipment chassis/earth ground at both ends of the cable run. This may cause ground loop problems in some cases. These should be treated on a case-by-case basis. Disconnecting one shield ground may not provide sufficient protection depending on the electronic environment. Connecting one shield ground via a 0.1 microfarad ceramic capacitor is a technique allowing high frequency shield bonding while avoiding the AC ground metal connection. In the case of shielded cables, the drain wire or braid connection must be kept short. A 5 cm (two-inch) connection distance between the shield's end and the nearest grounded chassis point, ground bar or terminal is highly recommended. An even greater degree of shield performance can be achieved by using metallic glands for shielded cable entry into metal enclosures. Expose enough of the braid/foil/drain where it passes through the gland so that the shield materials can be wrapped backwards onto the cable jacket and captured inside the gland, and tightened up against the metal interior.

Inductive loads connected to the low voltage "Alarm Contacts" are not recommended. However, if this becomes a necessity, adhere to proper techniques and wiring practices. Install an appropriate transient voltage suppression device (low voltage MOV, "Transzorb," or R/C) as close as possible to the inductive device to reduce the generation of transients. Do not run this type of signal wiring along with other I/O in the same shielded cable. Inductive load wiring must be separated from other circuits in conduit by using an additional cable shield on the offending cable.

In general, for optimum protection against high frequency transients and other disturbances, do not allow installation of this Analyzer where its unshielded I/O circuits are physically mixed with AC mains or any other circuit that could induce transients into the Analyzer or the overall system. Examples of electrical events and devices known for the generation of harmful electromagnetic disturbances include motors, capacitor bank switching, storm related transients, RF welding equipment, static, and walkie-talkies.

Supplier's Declaration of Conformity

47 CFR § 2.1077 Compliance Information
Unique Identifier: (e.g., 993X Gas Analyzer)
Responsible Party – U.S. Contact Information:
AMETEK
2876 Sunridge Way NE
Calgary, AB, Canada T1Y 7H9
Tel: +1 403 235 8400
ametekpi.com

FCC Compliance Statement (993X Gas Analyzer subject to Part 15):
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

Canadian Department of Communication Compliance Statement:
This device complies with Industry Canada's rules regarding electromagnetic compatibility. Operation is subject to the following two conditions:
(1) this device may not cause interference, and
(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Special Warnings and Information

Equipment Used in Hazardous Locations

Refer to Specifications in this document for details about the suitability of this equipment in hazardous locations. This analyzer must not be commissioned until a person trained in the area of evaluating equipment for use in hazardous classified locations has confirmed that this equipment and its installation are in compliance with the requirements for the area.

Explosion Hazard – Substitution of Components May Impair Suitability for Class I, Division 2, and ATEX/IECEx Zone 2.

Risque d'explosion – La substitution de composants peutrendre ce materiel inacceptable pour les emplacements de Classe I, Division 2,et ATEX/IECEx Zone 2.

Explosion Hazard – Do Not Disconnect Equipment Unless Power Has Been Switched Off or the Area is Known to be Non-Hazardous.

Risque d'explosion – Avant de déconnecter l'équipement, coupez le courant où vous assurez que l'emplacement est designé non dangereux.

Warning – Explosion Hazard – Do not open when an explosive atmosphere is present.

Avertissement – Risque d'explosion – Ne pas ouvrir en présence d'une atmosphère explosive.

Warning – Do not remove or replace fuse when energized.

Avertissement – Ne pas retirer ou remplacer le fusible lorsqu'il est sous tension.

All input and output wiring must be in accordance with wiring methods authorized for the area classification by the authority having jurisdiction and IEC 60079-14. Although the probability of leaks of the sample system is very low, a loose fitting could allow hazardous sample gas to flow into the analyzer's Electronics Enclosure and the wiring area. Tests have indicated that with the sample system completely disconnected, all doors closed and at atmospheric pressure, with an inlet pressure of 13 PSI applied to both Inlet and Vent ports, the pressure in the Electronics Enclosure will rise to 0.5 mBar (0.2" WC).

About the Analyzer

The AMETEK 993X Gas Analyzer uses photometric analysis to continuously measure the concentration of various gas components (for example, H_2S levels in pipeline quality natural gas). The 993X Analyzer can also use various sensor technologies to measure the concentration of one or multiple gas components – i.e., hydrogen (H_2), carbon dioxide (CO_2), and/or total hydrocarbons (THC) – in a gas stream.

The measurements can be viewed using the analyzer's built-in Human-Machine Interface (HMI).

Specifications

For the purpose of this document, specifications listed here apply primarily to the utilities required for this 993X Gas Analyzer.

Electrical	The 993X Analyzer is available in two (2) configurations, configured at the factory per customer/end user requirements, as follows: • 120 VAC ±10 %, 50/60 Hz, <400 VA (standard temperature), <550 VA (high temperature), or • 240 VAC ±10 %, 50/60 Hz, <400 VA (standard temperature), <550 VA (high temperature)
Communication	• **RS-485 Serial Port** One (1) RS-485 Serial port, 4-wire (full-duplex) or 2-wire (half-duplex), supports Modbus® RTU protocol available to a customer Modbus® RTU master. • **Micro-USB Port** One (1) Micro-USB port, isolated, on each Controller board installed (used for analyzer firmware upgrade only). • **Ethernet** One (1) RJ-45 port, 10/100 BaseT(X), Auto MDI/MDI-X - Modbus® TCP via primary IP address - FTP and HTTP via secondary IP address
Customer Outputs	• **Analog Outputs** Four (4) analog output channels, isolated as a group, not individually. Each channel is user-configurable individually as 0–20 mADC, 4–20 mADC, 0–5 VDC, or 1–5 VDC. • **Relay Contacts** Five (5) Relay Contacts, Form A (SPST), Normally Open (NO). User-configurable as Status alarms and Process alarms. Switching: Maximum 240 VDC, 0.5 ADC, limited to 10 W Carry: Maximum 1.2 ADC
Customer Inputs	**Dry Contact Inputs** Four (4) dry contact inputs, isolated as a group, not individually. User-configurable to trigger analyzer Calibration actions. Voltage: 5 VDC, unregulated Current: 0.5 mADC approximately
Environmental	Ambient Temperature: 993X: -20 °C to +50 °C (-4 °F to +122 °F) 993X-H: +10 °C to +60 °C (50 °F to +140 °F) Relative Humidity: 5–95 % RH Maximum Altitude: 2000 meters Installation Category II: Overvoltage Category Pollution Degree 2: Maximum

Ingress Protection	The analyzer is rated for ingress protection IP66 per IEC 60529 or NEMA Type 4X.
Sample Pressure Limits	9933: At analyzer sample inlet port: Minimum: 690 kPag (100 PSIG) Maximum: With CRN Filterblock installed: 10342 kPag (1500 PSIG) With non-CRN Filterblock installed: 13790 kPag (2000 PSIG) 993X: Maximum Cell pressure: 1380 kPag (200 PSIG) Sample Inlet pressures are application-specific and hardware dependant, but can be as high as 13790 kPag (2000 PSIG). Take appropriate safety measures for handling pressurized lines. Please see documentation shipped with the analyzer for details.
Physical Dimensions (Analyzer, on Standard Backpan)	993X: / 993X-H: Height: 1169 mm (46") / 1169 mm (46") Width: 839 mm (33") / 1253 mm (49.3") Depth: 318 mm (12.5") / 318 mm (12.5") Weight: 100 kg (220 lb) / 106.8 kg (235 lb) Approximate weight, entire system and standard backpan only (may vary, depending on system).
993X-H Cooling Air Supply	Instrument air supply meeting ANSI/ISA – S7.0.01 (1996) Quality Standard, pressure not exceeding 6.9 BAR (100 PSIG) and temperature not exceeding 49 °C (120 °F).
Hydrogen Sensor (Optional)	Technology: Thermal Conductivity (TC) Range: 0–10 % (Other ranges available. Contact AMETEK Service.) Accuracy: H2: ±2.0 % full-scale of standard range. (Based on a full-scale of 0–10 % H2 in a Scot Contactor Overhead application, where the sensor is in a temperature-controlled Oven.) Cross-Talk on H2: ±1.3 % of H2 full-scale. This is the RMS error in the reading due to CO2, H2O, and pressure effects. Temperature Drift: 1 % of customer full-scale over a 15 °C temperature change. 24-Hour Drift: 1 % of customer full-scale.

Carbon Dioxide Sensor (Optional)	Technology:	Non-Dispersive Infrared (NDIR)
	Range:	0–2 % (Other ranges available. Contact AMETEK Service.)
	Accuracy:	CO_2: ±5.0 % full-scale of standard range. (Based on a full-scale of 5 % CO_2 in a pipeline application, where the sensor is in a temperature controlled environment.)
	Cross-Talk:	No significant cross-talk from water, H_2S, or hydrocarbons onto the CO_2 measurement.
	Temperature Drift:	1 % of customer full-scale over a 15 °C temperature change.
	24-Hour Zero Drift:	1 % of customer full-scale.

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Approvals and Certifications

Directives and Standards

The 993X Analyzer is certified with regard to electrical safety for Pollution Degree 2 (normally nonconductive environmental pollution occurs with occasional condensation) and Installation Category II (local level transients, less than those found at power distribution level). Mains supply voltage fluctuations are not to exceed 10 % of the nominal supply voltage.

Directive	Standards / Notes
Electromagnetic Compatibility (EMC) 2014/30/EU	IEC/EN 61326-1 IEC/EN 55011 (CISPR 55011) IEC/EN 61000-6-2 IEC/EN 61000-4-2 IEC/EN 61000-4-3 IEC/EN 61000-4-4 IEC/EN 61000-4-5 IEC/EN 61000-4-6 IEC/EN 61000-4-11
Restriction of Hazardous Substances Directive 2011/65/EU	Including 2015/863/EU EN 50581:2012 EN/IEC 63000:2018
Low Voltage Directive 2014/35/EU	EN 61010-1:2010/A1:2019
EU	ATEX Directive: 2014/34/EU RoHS Directive: 2011/65/EU Low Voltage Directive: 2014/35/EU ATEX Certificate No.: ETL23ATEX0313X 993X: Ⓔx II 3 G Ex ec IIC T4...T3 Gc -20 °C ≤ Ta ≤ +50 °C 993X-H: Ⓔx II 3 G Ex ec h IIC T3 Gc +10 °C ≤ Ta ≤ +60 °C EN IEC 60079-0:2018 EN IEC 60079-7:2015/A1:2018

Directive	Standards / Notes
IECEx	IECEx Certificate No.: IECEx ETL 23.0037X 993X: Ex ec IIC T4...T3 Gc -20 °C ≤ Ta ≤ +50 °C 993X-H: Ex ec h IIC T3 Gc +10 °C ≤ Ta ≤ +60 °C IEC 60079-0:2017 Edition:7.0 IEC 60087-7:2017 Edition:5.1 ISO 80079-36:2016 Edition:1.0
UKCA	UKCA Certificate No.: 993X: ITS23UKEX0736X Ex ec IIC T4...T3 Gc -20 °C ≤ Ta ≤ +50 °C BS EN IEC 60079-0:2018 BS EN IEC 60079-7:2015/A1:2018
North America	993X and 993X-H: Class I, Division 2, Groups A,B,C,D UL121201 / CSA C22.2, #213 UL 61010-1-12 / CSA C22.2

Analyzer Markings

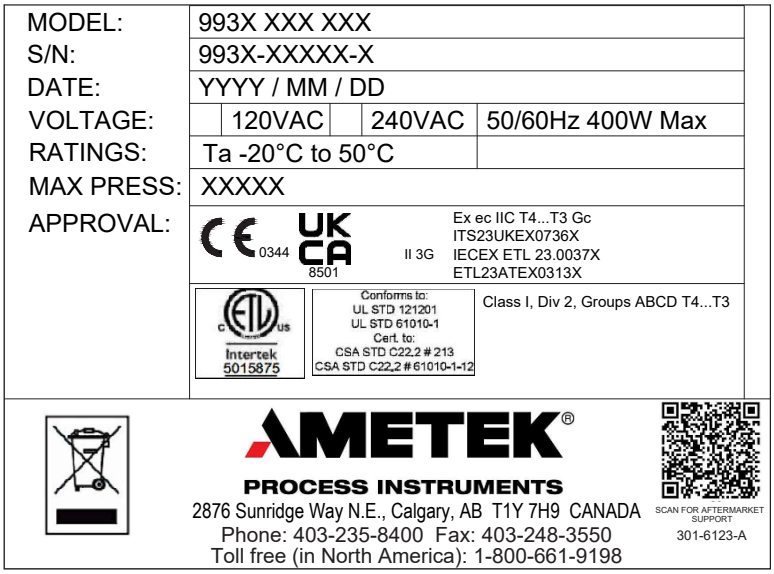

Figure 1.1.
993X Gas Analyzer label.

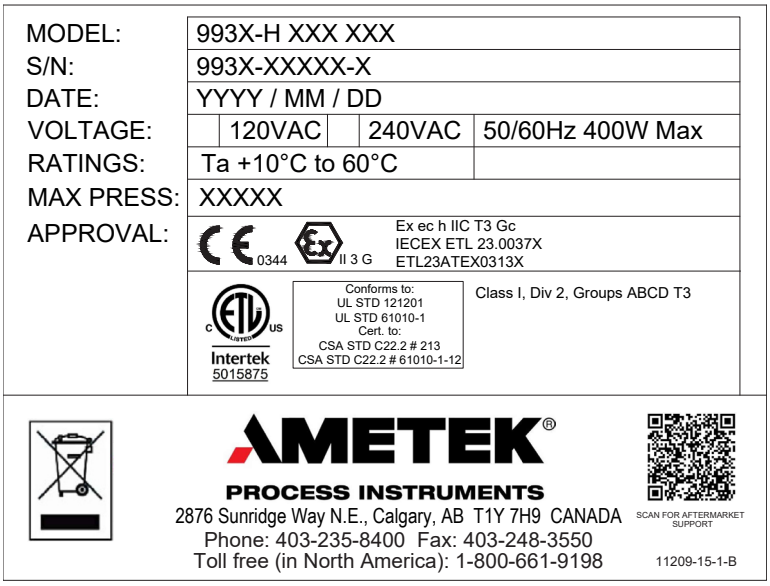

Figure 1.2.
993X-H Gas Analyzer label.

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Installing the 993X Analyzer

Pre-Installation Requirements

Installation drawings in this section are for typical installations. Customer-specific drawings supplied with the system supersede the drawings included here.

The installation of the 993X Gas Analyzer must be in accordance with all of the customer (end user) and local regulatory standards and procedures. There are no operator-serviceable components inside the 993X Analyzer. Refer service requirements to qualified personnel.

Read this entire section before beginning installation of the 993X Analyzer. Failure to do so, and / or use of the 993X Analyzer in a manner not specified in this manual, may impair the protection against fire, electrical shock, and personal injury originally provided by this equipment.

Personnel Technical Level Required for Installation

Installation must be performed by qualified persons in accordance with local electrical safety codes (i.e., NEC, CEC, IEC 60079-14), where applicable. Prior to installation please consult the local codes in order to understand what is acceptable. To the extent this information is not consistent with local codes, the local codes should be followed. It is recommended that only trained personnel perform these installation steps.

Unpacking and Inspecting the Equipment

The standard analyzer system weighs approximately 100.0 kg (220 lb) (specific weight varies, depending on system). AMETEK recommends using a lifting hoist or jack to lift the analyzer when removing it from its crate, and when installing it.

Lift the analyzer out of its shipping container using only its backpan. Do not use any part of the analyzer enclosures to lift it out of its shipping container, or to transport it.

Upon receiving the analyzer system, carefully remove it from its packing crate and check the exterior of the analyzer for damage. Open the Electronics Enclosure door and inspect all interior components for obvious damage and broken/loose parts or fittings within the enclosure to ensure they are secure and there is no physical damage that may have been caused during shipping. Open the Oven Enclosure and the Sample Flow Enclosure (if equipped) and inspect all interior components for obvious damage and broken/loose parts or fittings within those enclosures.

The Optical Bench Assembly is shipped in a separate box. Check this box for any physical damage that may have been caused during shipping. If the box is damaged, open it and check the sealed ESD-safe packaging protecting the Optical Bench. If the ESD-safe packaging is not damaged and there appears to be no damage to the Optical Bench, replace it – in its sealed ESD-safe packaging – in its shipping box. Reseal the box and store it as per the storage requirements. If the Optical Bench appears to be damaged open the ESD packaging (**follow ESD precautions to prevent ESD damage to the electronics**), observe the Optical Bench, and contact AMETEK Service with details of the damage. Reseal the ESD-safe packaging while awaiting instructions from AMETEK.

If equipment is damaged, notify the carrier and contact AMETEK Service (https://www.ametekpi.com/customersupport/requestsupport) immediately if parts are missing or damage is found, and to verify if damaged parts will require replacement prior to safely installing and operating the analyzer/equipment.

Analyzer Site Preparation

The 993X Analyzer is approved for installation in hazardous areas classified as Class I, Division 2, and ATEX/IECEx Zone 2.

Observe the following guidelines when selecting an analyzer installation location:

- Select a readily accessible position for the analyzer to allow for routine maintenance.
- Regardless of which installation method is used, the location should be free from excessive vibration and the ambient temperature should be maintained within the limits listed in the specifications.
- The 993X Analyzer provides ingress protection IP66 / NEMA 4X per IEC 60529. When installed at a high ambient temperature location, a sunshade or sunshield should be deployed to protect the analyzer from direct sunlight exposure.

Space Requirements

Refer to Dimensions drawings shipped with the analyzer for mounting hole dimensions.

Mechanical Installation

Analyzer Installation Guidelines

Install the analyzer in its designated location before installing the Optical Bench in the Electronics Enclosure.

- The analyzer system comes mounted on a backpan. See Figure 2.1 for the backpan and mounting hole locations and dimensions, plus necessary clearances on all sides that are required for service. For your system, refer to Final "As-Built" drawings in the analyzer Documentation Package, shipped with the analyzer.
- Install the analyzer at an accessible location as close as possible to the sample extraction point to minimize sample transport time and, if the Sample Line must be heated, minimize the heating requirements.
- Always install the analyzer in a location that is as free as possible from vibrations.
- The 993X and 993X-H Analyzers are rated for outdoor operation (IP66 / NEMA 4X) and ambient -20 °C to +50 °C (-4 °F to +122 °F) [993X] / +10 °C to +60 °C (+50 °F to +140 °F) [993X-H].

  The analyzer should be shaded from direct sunlight to minimize solar heating and to allow for better viewing of the HMI (Human-Machine Interface).

Tools, Equipment, and Supplies Required for Installation

To install the analyzer, you need the following:

- M4 hex driver required to turn the Upper/Lower Cam Pins used to secure the Optical Bench on the Optical Bench Mount inside the Electronics Enclosure.

More information about the equipment supplied and installed by the customer can be found in the installation procedures, later in this section.

- One (1) power-disconnect switch (**supplied and installed by the customer/end user**), rated for appropriate supply voltage of the analyzer and at the installation site, and certified for the hazardous location (to satisfy local electrical codes, the switch must be certified by the local authority for the appropriate hazardous location).
- One (1) AC breaker (**supplied and installed by the customer/end user**), rated for appropriate supply voltage of the analyzer and at the installation site, and certified for the hazardous location (to satisfy local electrical codes, the breaker must be certified by the local authority for the appropriate hazardous location).
- Strain relief or Cable Glands (**supplied and installed by the customer/end user**), to install in Electronics Enclosure to secure the supply power wiring. The Strain relief or Cable Glands must be approved by the local authority for the appropriate hazardous location and must be rated for the maximum wattage for the analyzer (marked on the Product Label on the analyzer).
- Supply of adequately-sized electrical supply cable, which must be approved for the local wiring regulations and electrical codes for the hazardous location, **and which must be rated at 600 Volts and 105 °C (221 °F)**.

Analyzer Installation Drawings

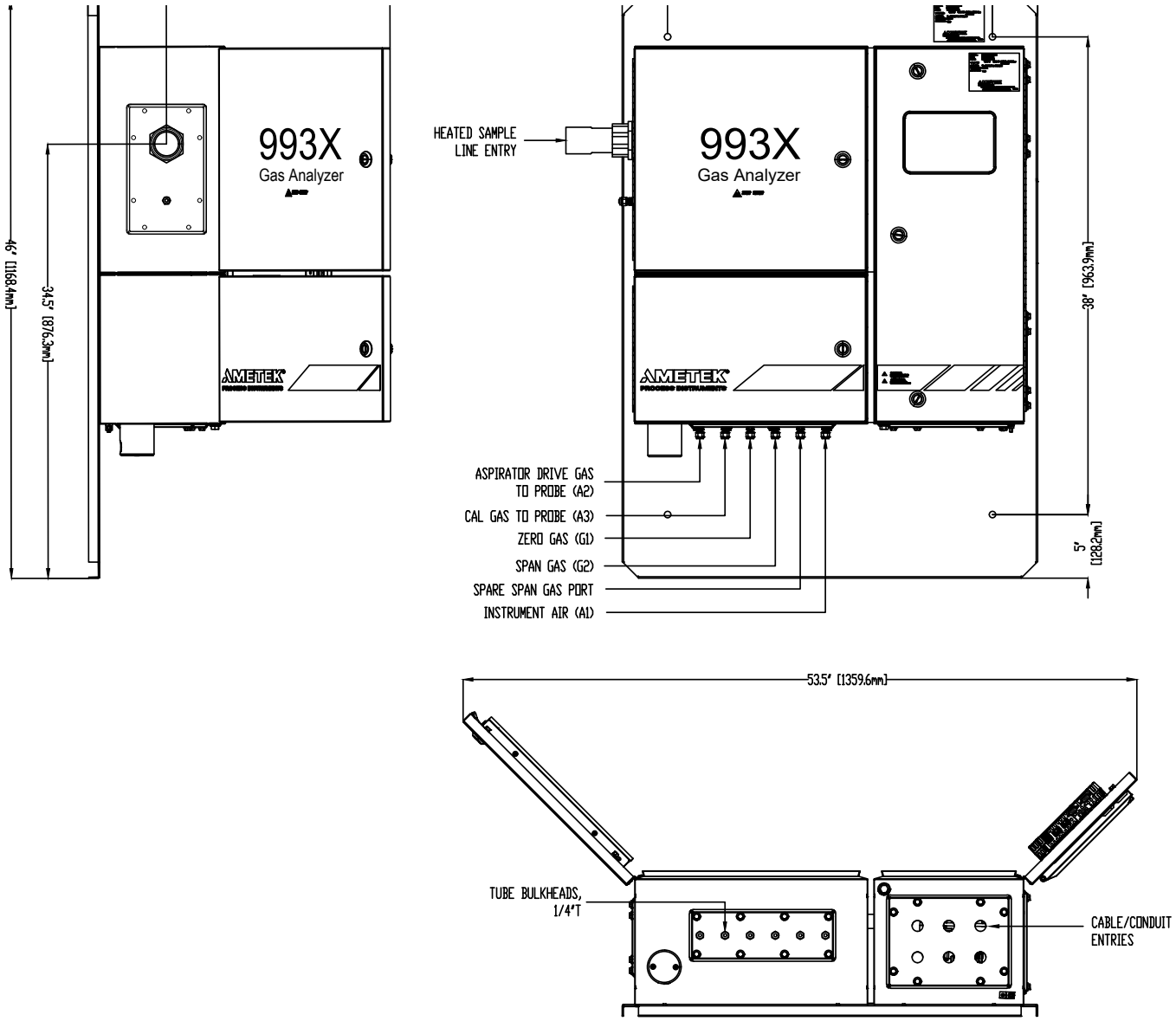


Figure 2.1.
993X Analyzer backpan mounting details.

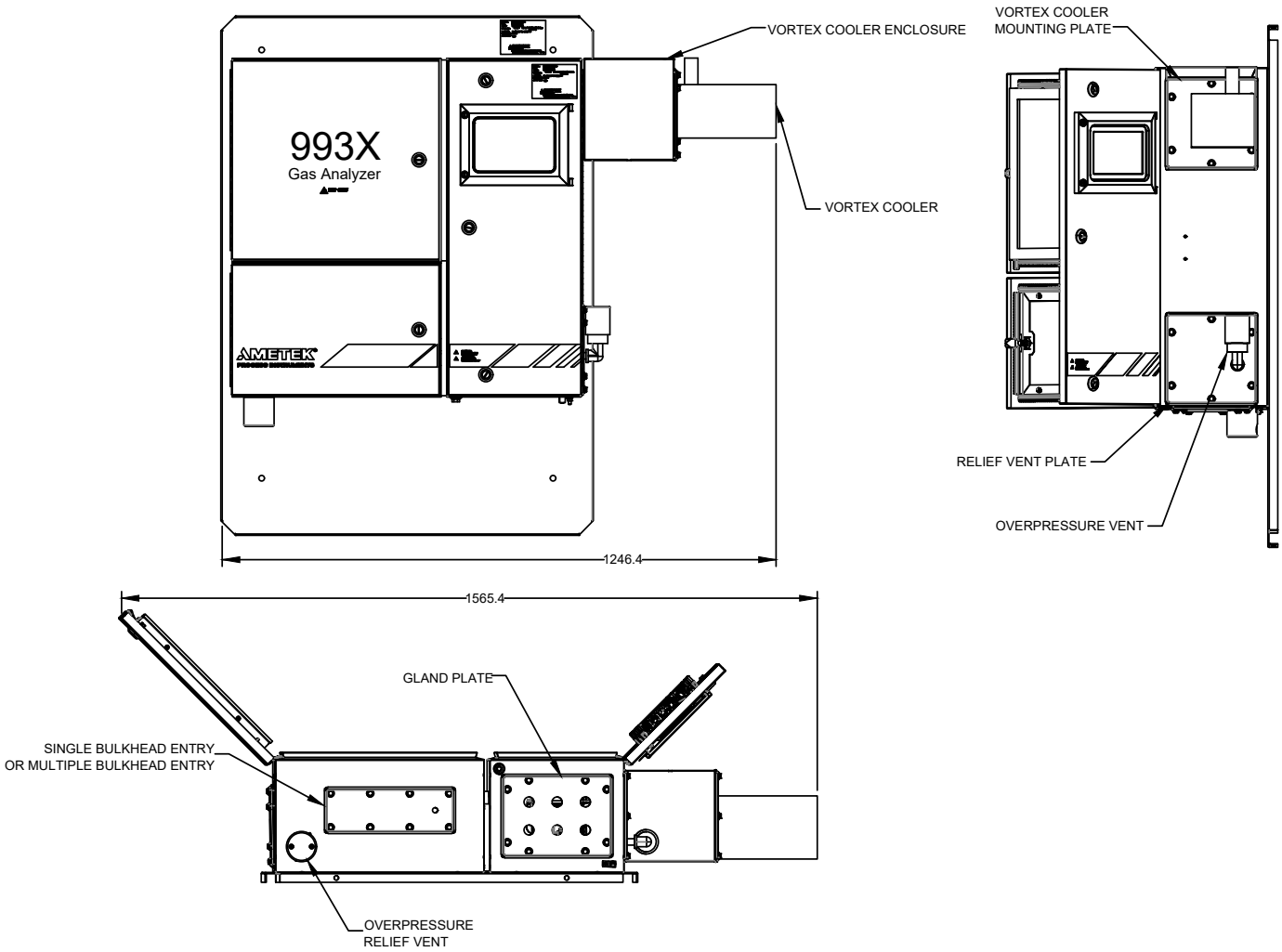


Figure 2.2.
993X-H Analyzer backpan mounting details.

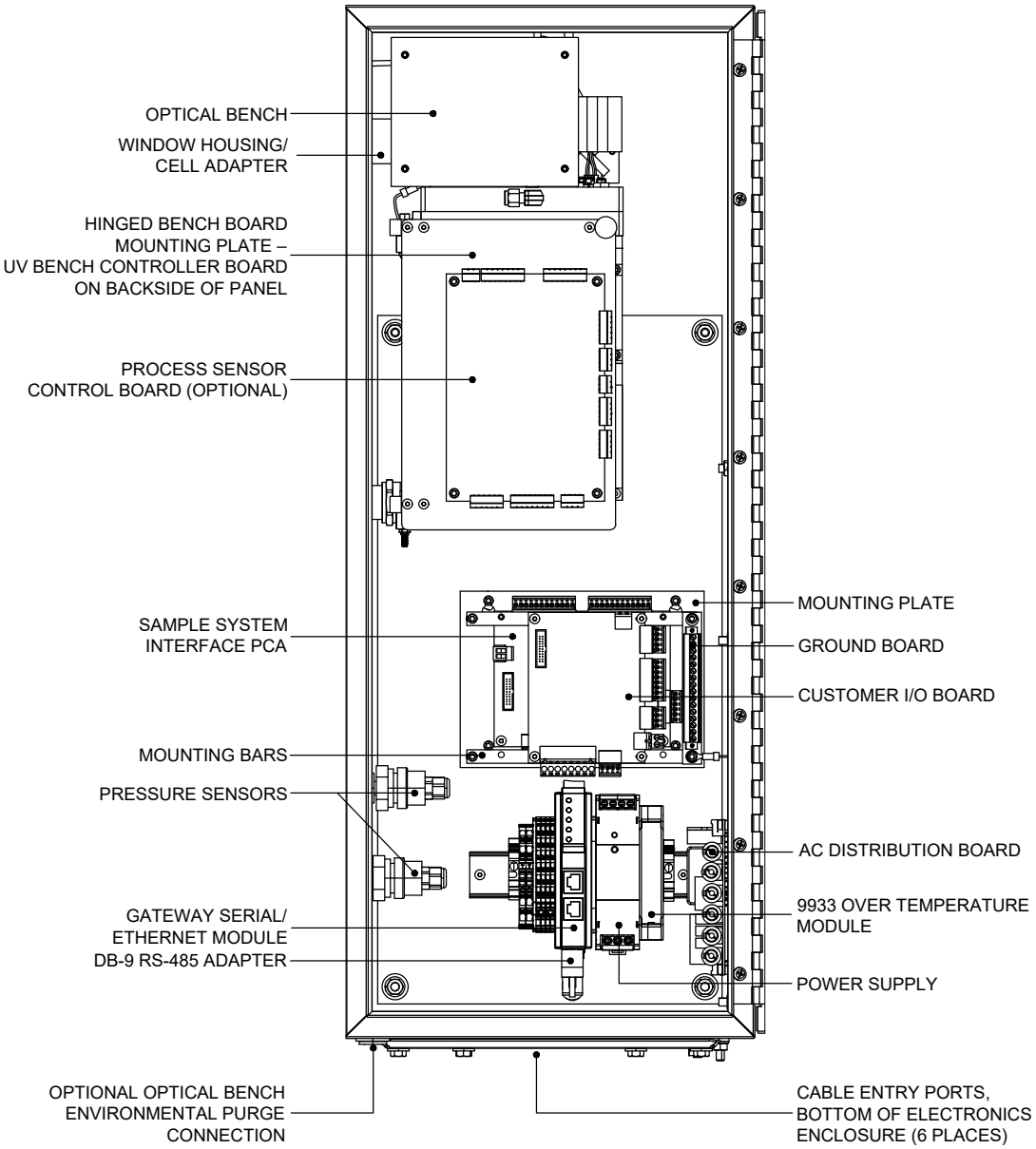


Figure 2.3.
Electronics Enclosure layout.

Installing the Optical Bench Assembly

Do not install the Optical Bench in the analyzer until after the analyzer has been installed in its designated location.

All electrical connections to the Optical Bench are made via pre-wired connector plugs. No hard wiring is required. See Figure 2.9 for the wiring diagram.

To install the Optical Bench:

Ensure there is no power being supplied to the analyzer while installing the Optical Bench.

While installing the Optical Bench in the analyzer, take care not to damage any components, wires, or cables on it or within the Electronics Enclosure.

Take precautions against ESD (electrostatic discharge) damage while performing the following operations. Precautions include using a grounded wrist strap, working on a grounded (anti-static) work surface, and storing electronic assemblies in anti-static packaging.

1. Open the Optical Bench Assembly shipping box and remove the packing material so you will be able to remove the Optical Bench from its box.

After the Optical Bench Assembly has been installed, store its shipping box and packing material in a safe location so that it can be used to safely return the Optical Bench to AMETEK, in the event it needs to be returned to the factory.

2. Open the Electronics Enclosure door. Carefully cut the two (2) tie wraps (see Figure 3.1) to release the cable assemblies and the desiccant pack. Discard the tie wraps and desiccant pack.

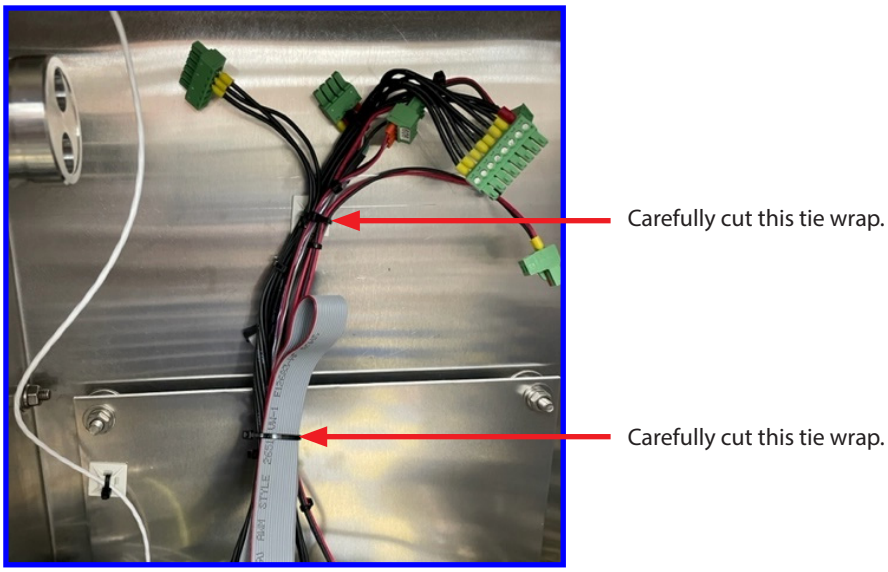


Figure 3.1.
Optical Bench installation preparation, inside Electronics Enclosure.

3. Locate the Upper/Lower Cam Pins on the Optical Bench Mount and use a M4 hex driver to turn them to the "LOOSE" position (see removal/installation instructions on PMT Cover). See Figure 3.2 for proper Cam Pin orientation ("LOOSE" position) during Bench installation.

NOTE

The Cam Pins must stay aligned and in the "LOOSE" position while the Optical Bench is being installed in the Electronics Enclosure. The lined groove on the head of each Cam Pin must be parallel to the Measuring Cell until the Optical Bench is in place.

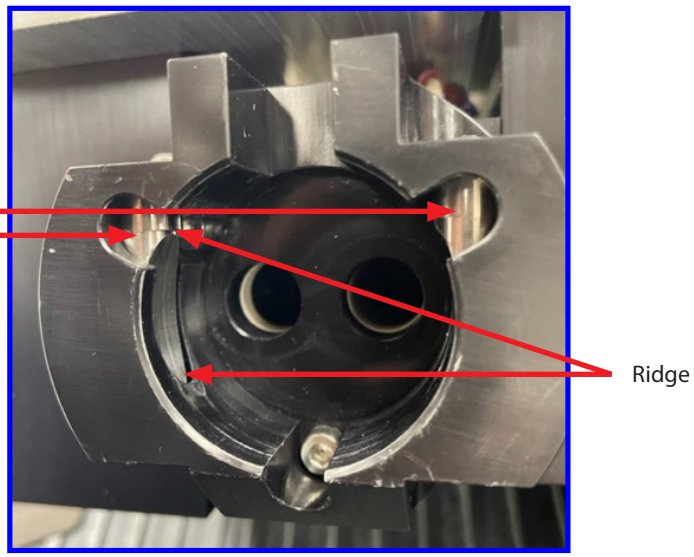


Figure 3.2.
Optical Bench Mount view with Cam Pins positioned in the "LOOSE" position.

While holding the Optical Bench by its upper portion with one hand, carefully install it in the Electronics Enclosure by fitting the Optical Bench Mount over the Cell Window Housing Adapter. Use a M4 hex driver to rotate the Lower Cam Pin counter-clockwise and the Upper Cam Pin clockwise until they are tight ("CLAMPED" position). Figure 3.3.1 shows the Optical Bench installed in the Electronics Enclosure.

CAUTION

Do not lift the Optical Bench using its circuit boards or the hinged Bench Board Mounting Plate.

Use an M4 hex driver to loosen/tighten the Cam Pins during removal/installation of the Optical Bench.

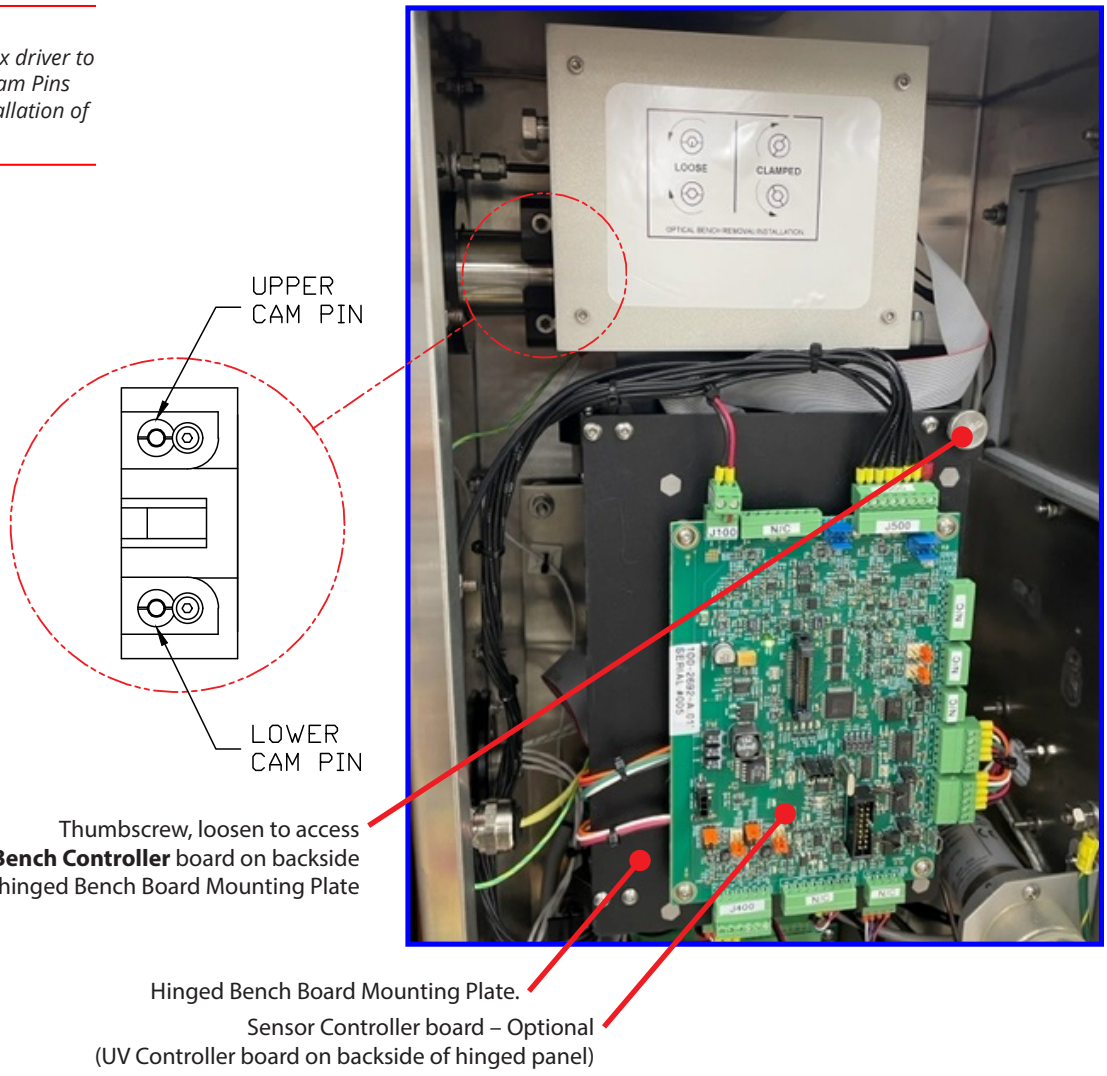


Figure 3.3.1.
Upper/Lower Cam Pin locations and orientation, inside Electronics Enclosure.

4. Locate and connect the two (2) GREEN/YELLOW ground wire disconnect terminals, one from the interior of the Electronic Enclosure and one from the Optical Bench.

5. Connect the wiring connectors to the following circuit boards:

   - **UV Bench Controller** board (Part No. 100-2482)
     Loosen the thumbscrew and swing the hinged Bench Board Mounting Plate (Figure 3.3.2) outward to access the **UV Bench Controller** board, located on the backside of the hinged panel. Make the following connections:
     - Connect the DC Power Line connector plug to **J101**.
     - Connect the Cell Pressure Transducer connector plug to the upper row of **J601**.
     - Connect the SSR Relay Control connector plug to **J608**.
     - Connect the Oven and Heater RTD connector plugs to **J702**.
     - Connect the **Customer I/O** ribbon cable to **J602**.
     - Connect the **Sample System Interface** board ribbon cable to **J402**.

     Swing the hinged Bench Board Mounting Plate back toward the Optical Bench and tighten the thumbscrew.

*Note that **J703** (Bench RTD Connector location) is shown in Figure 3-3.2 is for illustration purposes only. Its connector plug does not have to be connected/disconnected to remove/replace the Optical Bench.*

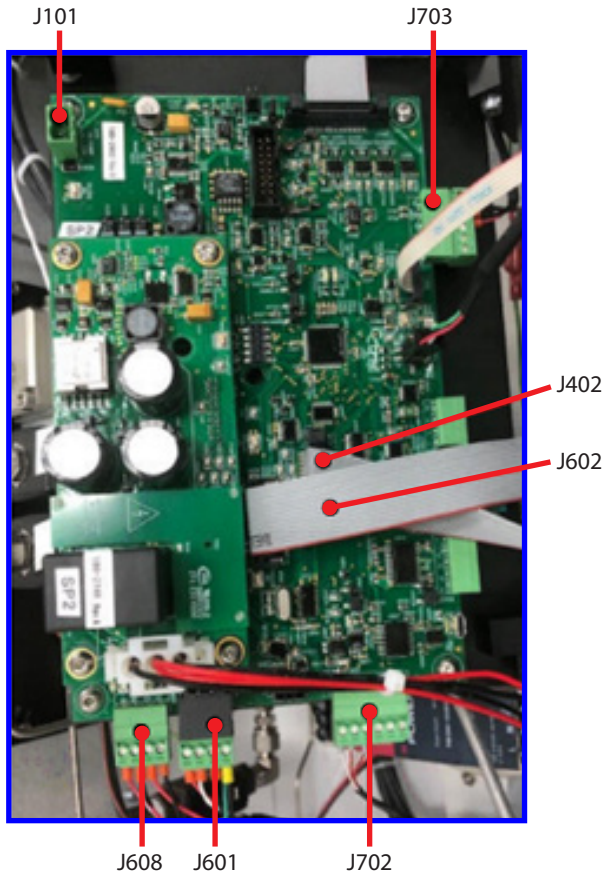


Figure 3.3.2.
Wiring connectors to UV Bench Controller board.

- Connect the Bench Heater connector plug to **J3** (**Pins 1** and **2**) on the **AC Distribution** board (Part No. 100-2733), as shown in Figure 3.4.

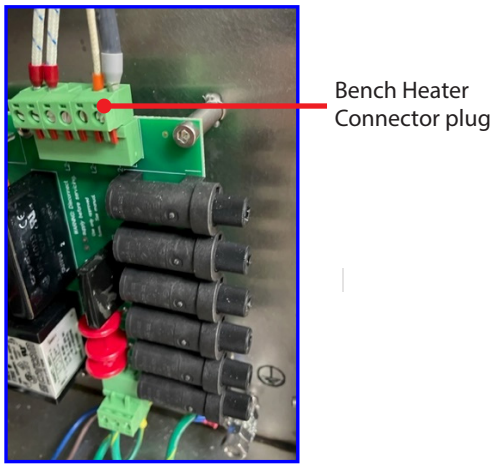


Figure 3.4.
AC Distribution board, inside Electronics Enclosure.

- **Optional – Sensor Controller** board (Part No. 100-2692)
  If your analyzer has the **Sensor Controller** board installed:
  - Connect the Sensor wiring connector plugs to **J400** and **J500A**.
  - Connect the DC Power Line connector plug to **J100**.

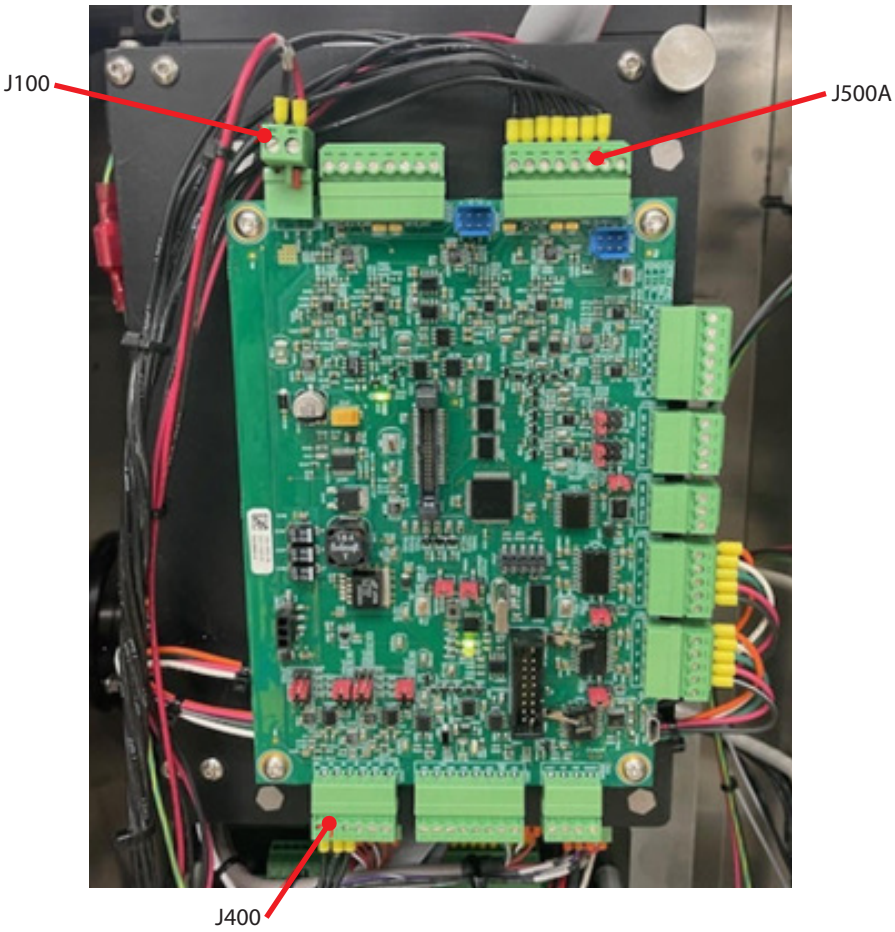


Figure 3.5.
Wiring connectors to optional Process Sensor Controller board

6. **Optional – Optical Bench Environmental Purge** connection (required only if the optional **Optical Bench Environmental Purge** is installed on your system):
   Connect the 1/4-inch purge tube fitting to the purge fitting at the lower-left, bottom location inside the Electronics Enclosure, as shown in Figure 3.6. See Figure 2.2 for the external Environmental Purge connection point.

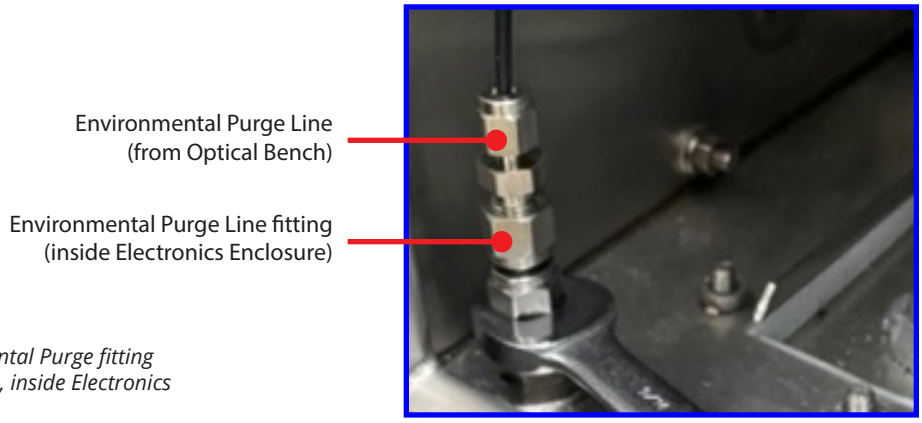


Figure 3.6.
Environmental Purge fitting connection, inside Electronics Enclosure.

   Turn on the purge air supply after connecting the purge tube to the purge fitting.

The Optical Bench installation is complete.

Removing the Optical Bench Assembly

If the Optical Bench is being removed to return it to AMETEK, obtain the original shipping box and packaging material and use that box to properly and safely return the assembly to AMETEK, as mentioned in this procedure. If the Optical Bench is being removed to allow for other service of the analyzer, skip that step.

To remove the Optical Bench:

Ensure there is no power being supplied to the analyzer while removing the Optical Bench.

While removing the Optical Bench from the analyzer, take care not to damage any components, wires, or cables within the Electronics Enclosure. Do not lift the Optical Bench using its circuit boards or the hinged Bench Board Mounting Plate.

Take precautions against ESD (electrostatic discharge) damage while performing the following operations. Precautions include using a grounded wrist strap, working on a grounded (anti-static) work surface, and storing electronic assemblies in anti-static packaging.

1. Take all necessary steps to safely power down and prepare the analyzer for service.

Hazardous Locations
Before proceeding, test the area around the analyzer for explosive gases and proceed only when the area is found to be safe.

Do not open the Electronics Enclosures, and do not power up/down the analyzer or any computer if there is an explosive gas atmosphere present.

If returning the Optical Bench to AMETEK, open the Optical Bench Assembly box and prepare it for the Optical Bench.

2. Open the Electronics Enclosure door. Locate and disconnect the GREEN/YELLOW ground wire disconnect terminals, one from the interior of the Electronic Enclosure and one from the Optical Bench.

3. Disconnect the wiring connectors from the following boards:

   - **Optional – Sensor Controller** board (Part No. 100-2692)
     If your analyzer has the **Sensor Controller** board:
     - Disconnect the two (2) Sensor wiring connector plugs from **J400** and **J500**.
     - Disconnect the DC Power Line connector plug from **J100**.

   - **UV Bench Controller** board (Part No. 100-2482)
     Loosen the thumbscrew and swing the hinged Bench Board Mounting Plate (Figure 4.3) outward to access the **UV Bench Controller** board, located on the backside of the hinged panel and:
     - Disconnect the DC Power Line connector plug from **J101**.
     - Disconnect the Cell Pressure Transducer connector plug from the upper row of **J601**.
     - Disconnect the SSR Relay Control connector plug from **J608**.
     - Disconnect the Oven and Heater RTD connector plugs from **J702**.
     - Disconnect the **Customer I/O** board ribbon cable from **J602**.
     - Disconnect the **Sample System Interface** board ribbon cable from **J402**.

     Swing the hinged Bench Board Mounting Plate back toward the Optical Bench and tighten the thumbscrew.

   - Disconnect the Bench Heater connector from **J3** (**Pins 1** and **2**) on the **AC Distribution** board (Part No. 100-2733), as shown in Figure 4.1.

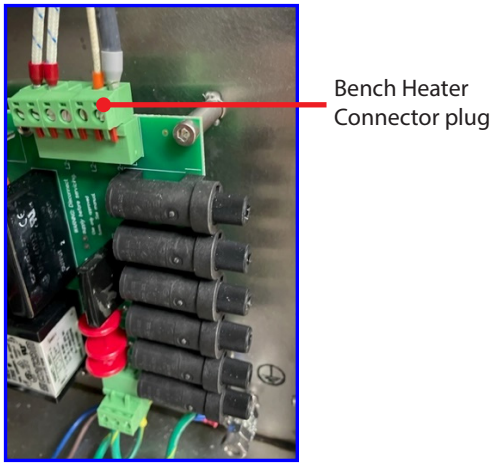


Figure 4.1.
AC Distribution board, inside Electronics Enclosure.

- **Optional – Process Sensor Controller** board (Part No. 100-2692)
  If your analyzer has the **Process Sensor Controller** board installed:
  - Connect the Sensor wiring connector plugs to **J400** and **J500A**.
  - Connect the DC Power Line connector plug to **J100**.

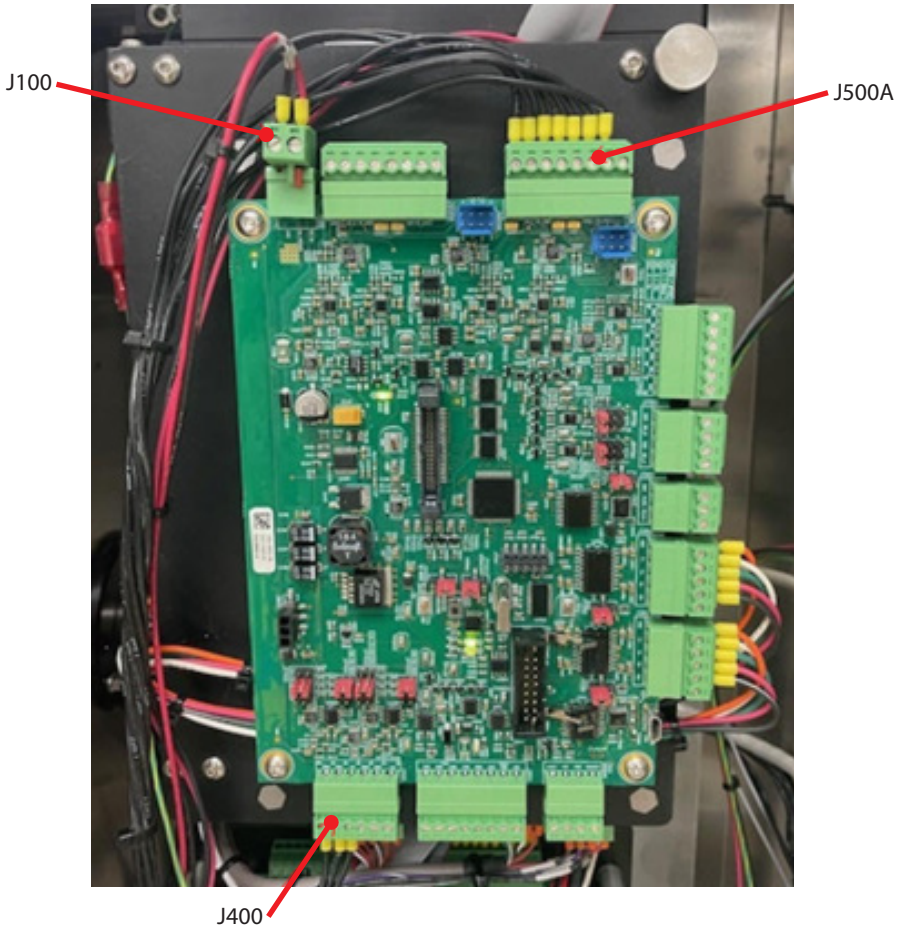


Figure 4.2.
Wiring connectors to optional Process Sensor Controller board

4. **Optional – Optical Bench Environmental Purge** connection (required only if the optional **Optical Bench Environmental Purge** is installed on your system), as shown in Figure 4.3:
   Turn off the purge air supply. Disconnect the 1/4-inch purge tube from the fitting at the bottom interior of the Electronics Enclosure.

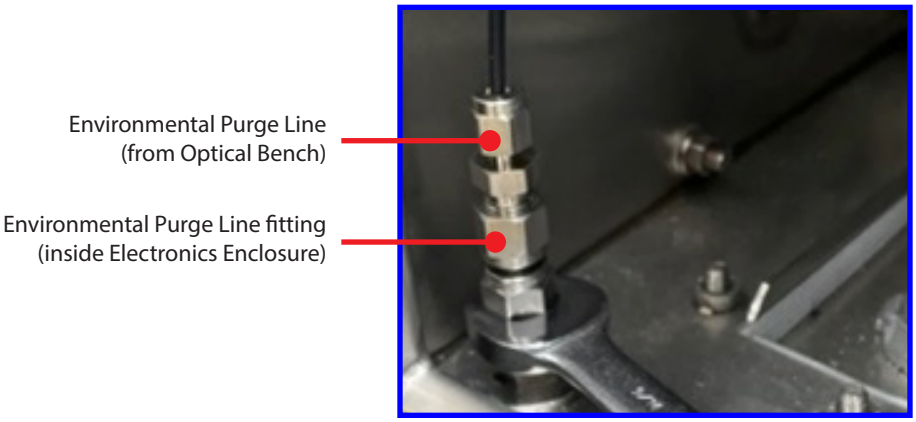


Figure 4.3.
Purge fitting connections, inside Electronics Enclosure.

5. Locate the Upper/Lower Cam Pins on the Optical Bench Mount (Figure 4.4) and use a M4 hex driver to rotate them to the "LOOSE" position (see removal/installation instructions on PMT Cover). See Figure 4.4 for proper Cam Pin orientation ("LOOSE" position) during Bench removal.

6. While holding the Optical Bench by its upper portion with one hand, carefully back it away from the Cell Window Housing Adapter and remove it from the Electronics Enclosure.

Do not lift the Optical Bench using its circuit boards or the hinged Bench Board Mounting Plate.

Place the Optical Bench on a suitable work bench to work on it or, if returning it to AMETEK, place it in its shipping box with all original packaging material.

After the Optical Bench has been removed from the Electronics Enclosure, AMETEK recommends using a tie wrap to secure all of the loose wires together and another tie wrap to secure the ribbon cables, as shown in Figure 4.5.

7. Close and secure the Electronics Enclosure door with all three (3) latches.

The Optical Bench Assembly removal is complete.

Use an M4 hex driver to loosen/tighten the Cam Pins during removal/installation of the Optical Bench.

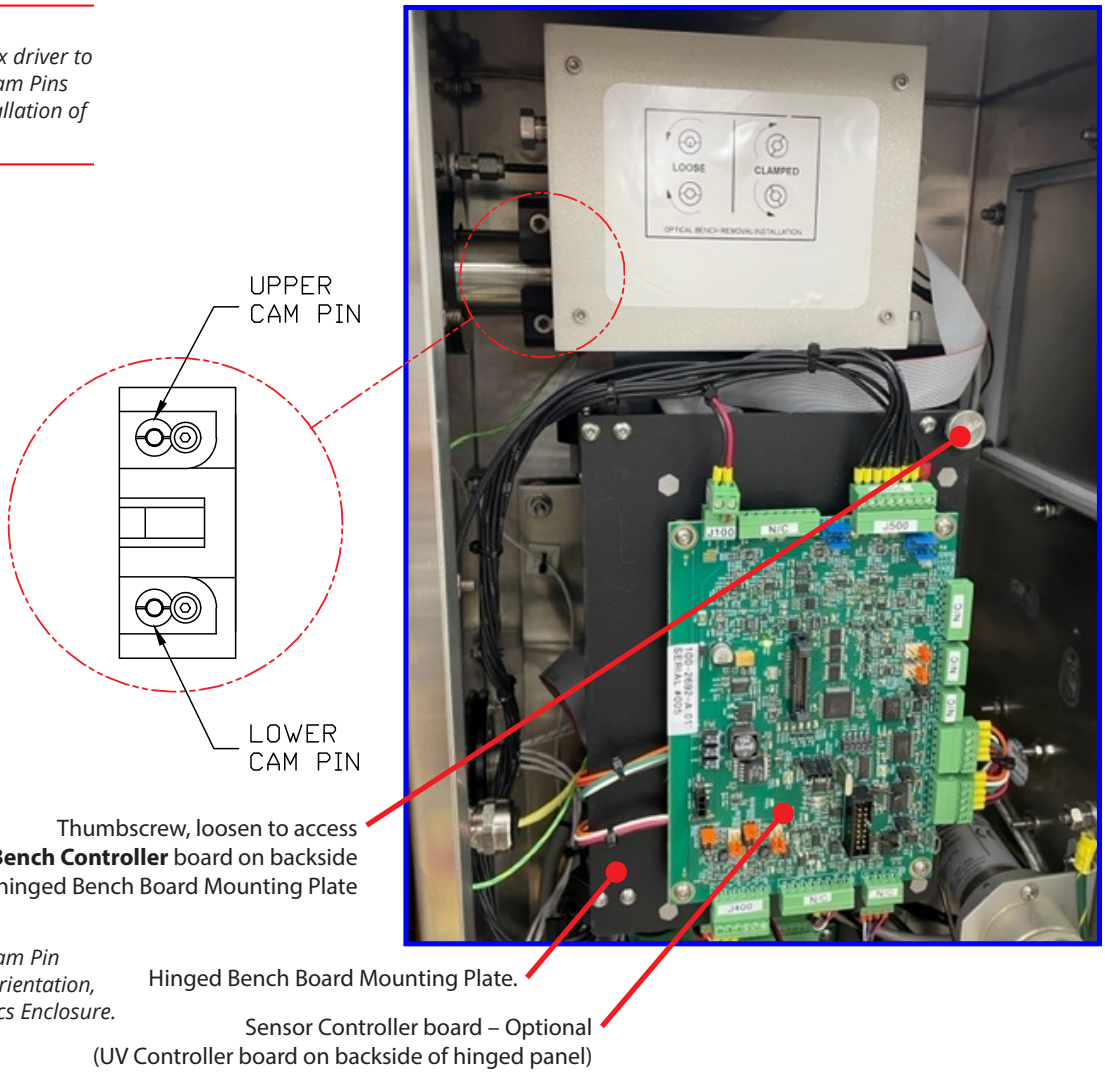


Figure 4.4.
Upper/Lower Cam Pin locations and orientation, inside Electronics Enclosure.

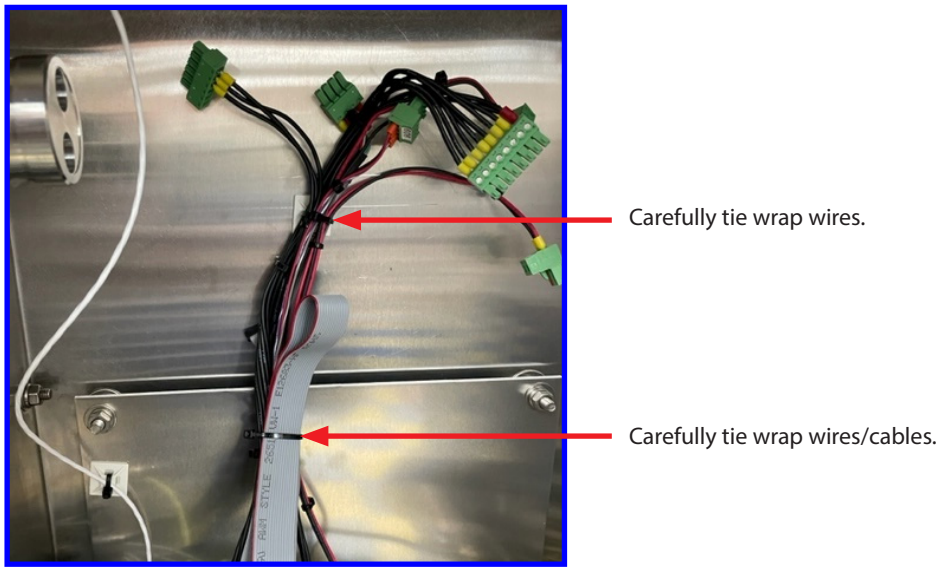


Figure 4.5.
Optical Bench installation preparation, inside Electronics Enclosure.

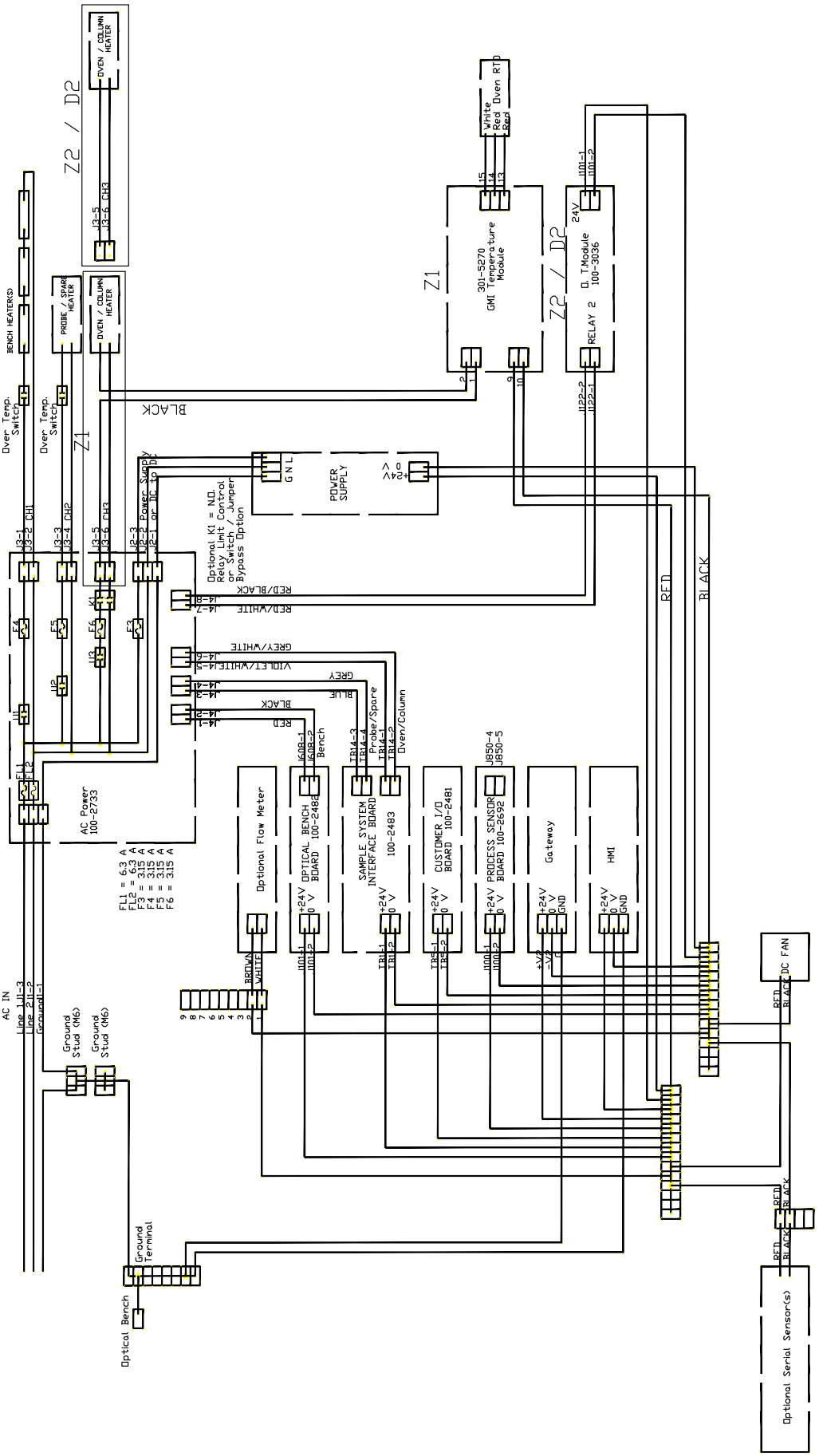


Figure 5.1.
Analyzer Internal Wiring Diagram.

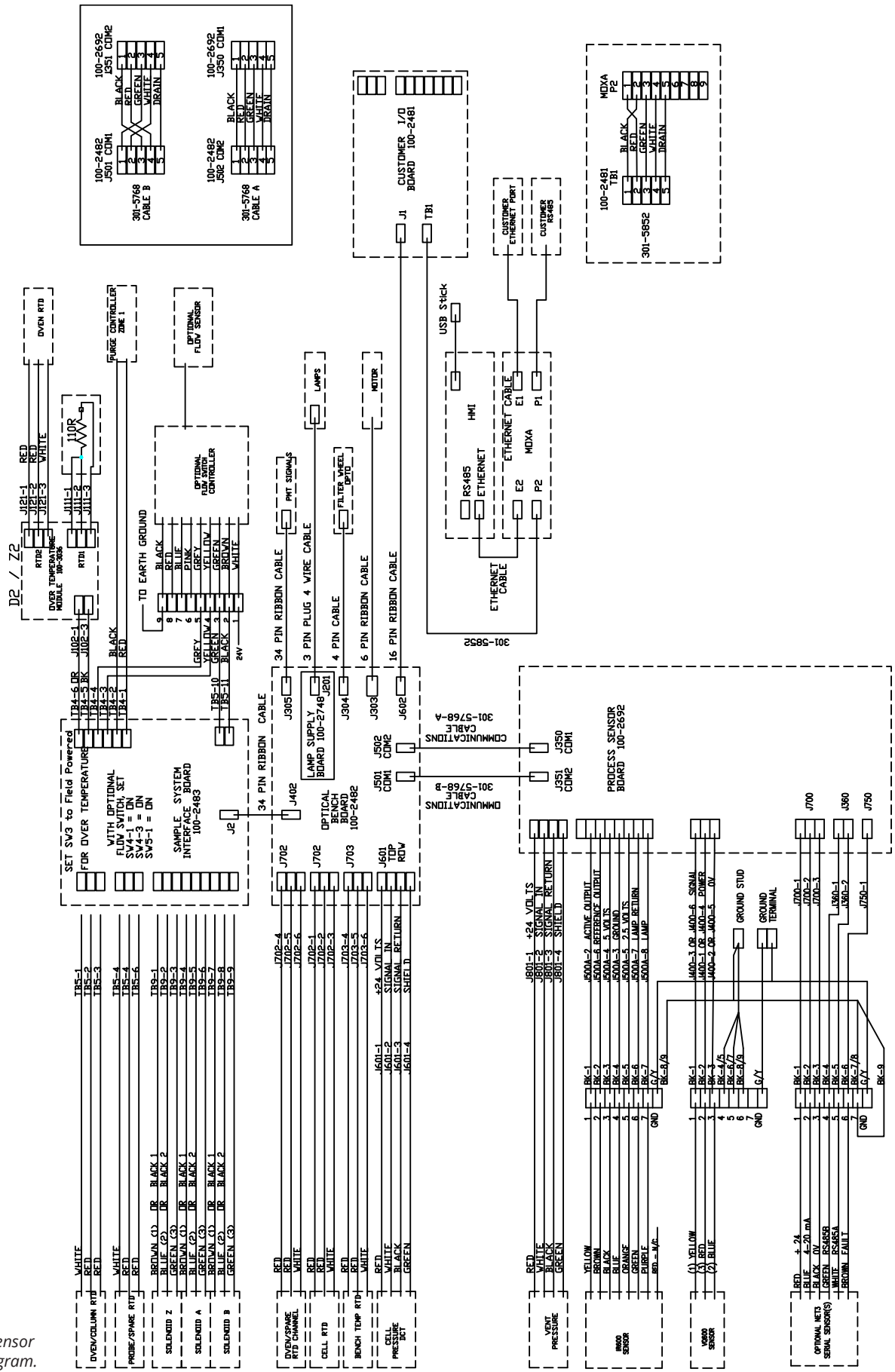


Figure 5.2.
Analyzer Sensor Wiring Diagram.

Installing a Power-Disconnect Switch and/or Breaker (Supplied by Customer/End User)

The power-disconnect switch and/or AC breaker, and the electrical supply cable used to connect between these devices and the analyzer, are to be supplied and installed by the customer/end user. Both the power-disconnect switch and/or AC breaker must be rated for appropriate supply voltage of the analyzer and at the installation site, and both must certified for the hazardous location.

The electrical supply cable – also supplied and installed by the customer/end user – must be adequately-sized and be approved for the local wiring regulations and electrical codes for the hazardous location, ***and must be rated at 600 Volts and 105 °C (221 °F).***

To install the power-disconnect switch:

Choose a suitable location, near the 993X Analyzer and in an easily accessible area, to mount the switch. Connect the switch to the analyzer using the electrical supply cable.

Add a label to or near the power-disconnect switch that clearly states its use (e.g., "AMETEK 993X Analyzer AC Mains Power-Disconnect Switch").

For safety reasons during maintenance, the power-disconnect switch allows the AC mains power to be disconnected from the analyzer prior to performing service on the analyzer.

To install the AC breaker:

If also using an AC breaker choose a suitable location, upstream of the 993X Analyzer power-disconnect switch, to install the breaker. Connect the AC breaker to the power-disconnect switch using properly rated electrical supply cable.

Add a label to or near the breaker that clearly states its use (e.g., "AMETEK 993X Analyzer AC Mains Power Breaker").

For safety reasons during maintenance, this breaker allows the AC Mains power to be disconnected from the analyzer prior to performing service on the analyzer.

Installing the Sample System

All regulatory agency, personnel safety procedures, and installation/removal procedures must be followed during the installation/removal of the sample system components. A breathing apparatus must be worn when installing/removing equipment from the sample gas extraction point. The sample stream may be under positive pressure, and 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.

Sample Prerequisites

The following are typical conditions which the sample gas must meet:

- The dewpoint temperature of all components in the sample must be lower than the lowest expected operating temperature of the Measuring Cell (i.e., components of the sample gas mixture must not condense within the analytical system).
- When introduced into the analyzer, the pressure and temperature of the Calibration Gas mixture should be as close as possible to the temperature and pressure that will exist in the Measuring Cell during normal operation of the analyzer.
- The sample gas should be free of particulate materials.

The volume of the sample system will affect the response time of the overall system.

Installing and Connecting the Sample and Vent Lines

The analyzer is supplied with Sample Line Inlet and Vent Line Outlet connection fittings inside the Oven Enclosure (Figure 6.1). Unless otherwise specified, the sample system fittings are 1/4-inch Swagelok® connectors.

The connectors required for connecting to the customer's sample system are also 1/4-inch Swagelok® tube fittings.

Appropriate ferrules for the tubing material must be used – supplied by customer.

Install the Zero gas line at the same time as you make the Sample and Vent Line connections to the analyzer.

To install the Sample and Vent Lines:

1. Route the Sample Line from the analyzer to the gas sample probe at the sample extraction point.

   Route the Vent Line (if used) from the analyzer to the gas disposal location (example, vent to atmosphere, return to process, etc.).

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

2. If using a boot on the Sample Inlet at the analyzer, thread the boot onto the threaded connector on the left side of the analyzer (Sample Inlet) and then insert the Sample Line through it and into the Analyzer Oven. Make the connection for the Sample Line at the analyzer and then at the gas sample probe.

   Make the connection for the Vent Line at the analyzer and at the gas disposal location (vent pipe to atmosphere, return to process, etc.).

If solenoids are added to the sample system to control the flow of sample and calibration gases, it is the responsibility of the customer.

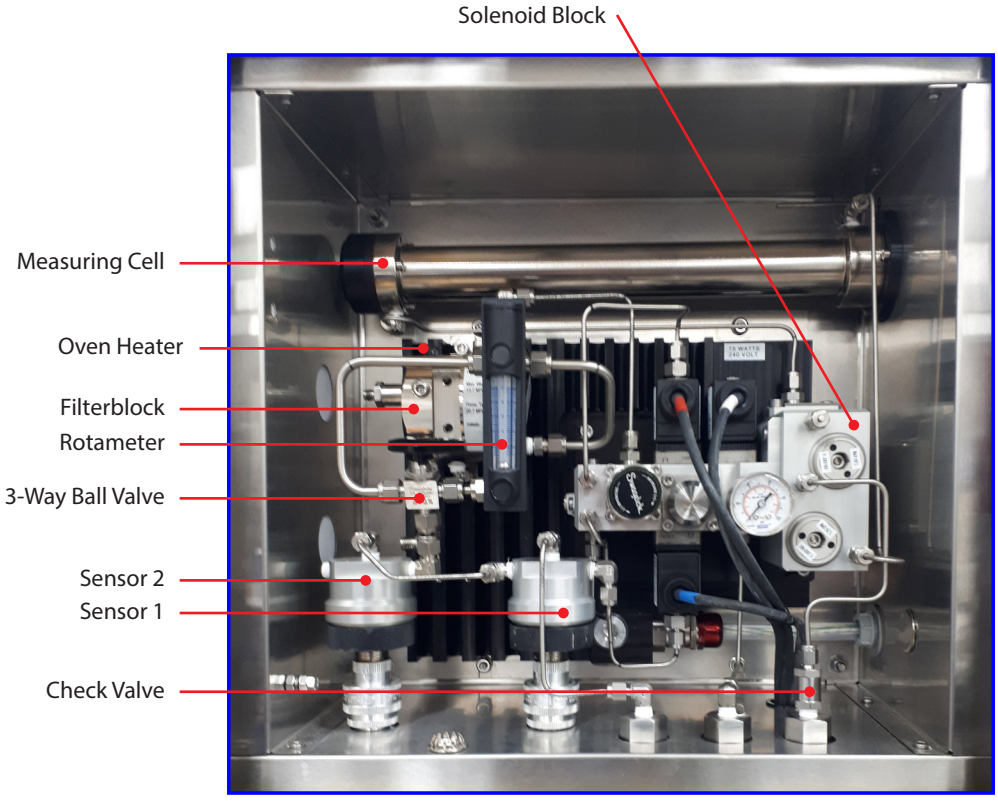


Figure 6.1.
Analyzer Oven Enclosure layout example (9933WM Analyzer shown).

Figure 6.2.
Analyzer Sample Flow Enclosure layout example (9933WM Analyzer shown).

Connecting the Zero Gas

The analyzer is supplied with a Zero gas inlet connection fitting on the Lower Enclosure.

Install the Zero gas line at the same time as you make the Sample and Vent Line connections to the analyzer.

Zero gas connection requirements:

- The Zero gas must be dry and must not contain any components which absorb ultraviolet light (radiation) at the wavelengths employed by the analyzer, nor contain any components which might react with components in the sample gas mixture. Nitrogen (UHP) or Instrument Air (as per ANSI/ISA S7.0.01 (1996) Quality Standard for Instrument Air) that meets these requirements are suitable for use as a Zero gas for the analyzer.

- A supply of 1/4-inch non-rigid tubing, such as Teflon, for the Zero gas line. Length will vary, depending on the distance between the analyzer and the Zero gas cylinder. Appropriate ferrules for the tubing material must be used. Supplied/installed by the customer/end user.

- Adjust the Zero gas pressure to be similar to the Sample gas pressure, which is recommended to be 550 kPa (80 PSIG), prior to initiating an Auto-Zero.

To install the Zero gas line:

1. Route the Zero gas line from the analyzer to the Zero gas cylinder.

2. Connect the Zero gas line to the Zero gas cylinder and to the Zero gas inlet on the Lower Enclosure (see Figure 6.3).

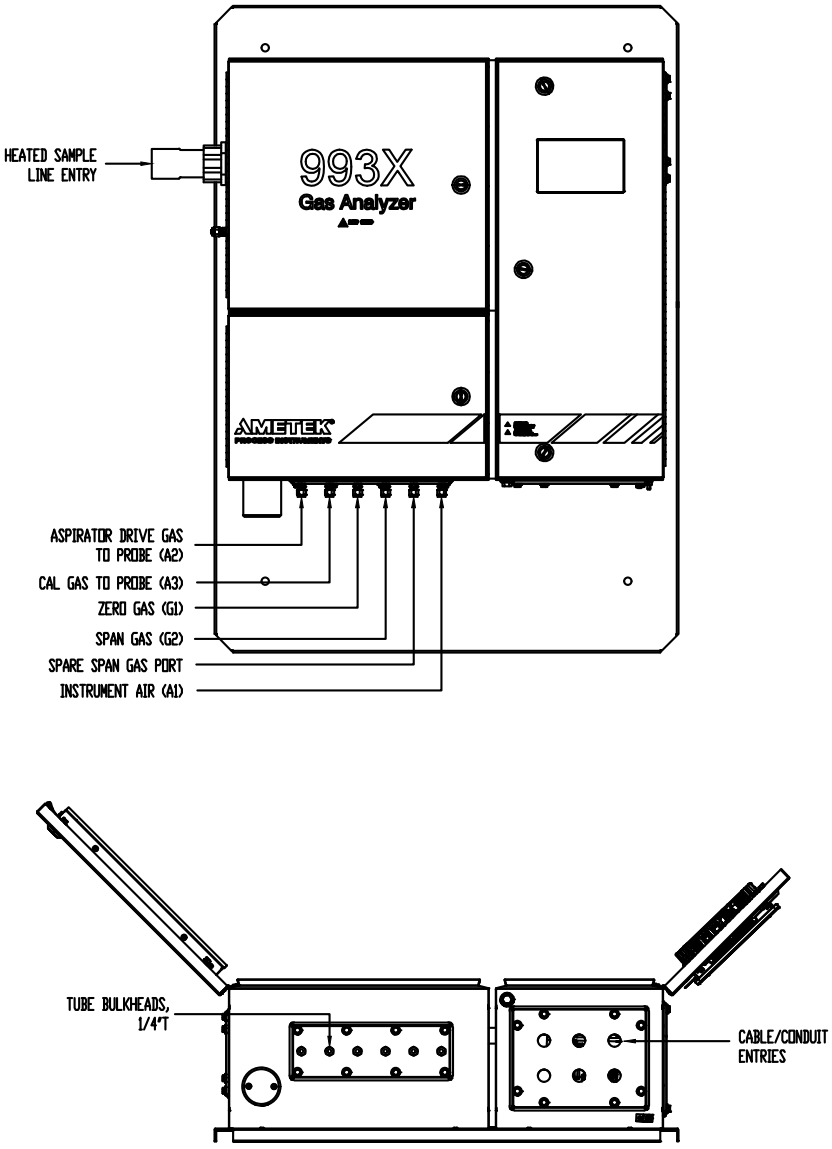


Figure 6.3.
Tube Bulkheads location (993X Analyzer model shown).

AC Power and Signal Connections

Check ground continuity to all electrical enclosures before applying power.

Connections to the AC source must be made only by qualified electricians. AC source must be single-phase, grounded-neutral type.

Cable glands suitable for use in Division 2, Zone 2 areas must be used for all field wiring.

The nominal operating voltage and power consumption is indicated on the Product Label on the Electronics Enclosure door (Figure 7.1). Verify that the operating voltage indicated on the label agrees with the operating voltage indicated on the documentation supplied with the analyzer. The analyzer is intended for use in Installation Category II (Overvoltage Category) and AC power requirements for each analyzer system are specified on the system electrical drawings. The AC electrical supply cable must be approved for the local wiring regulations and electrical codes for the hazardous location, **and must be rated at 600 Volts and 105 °C (221 °F)**.

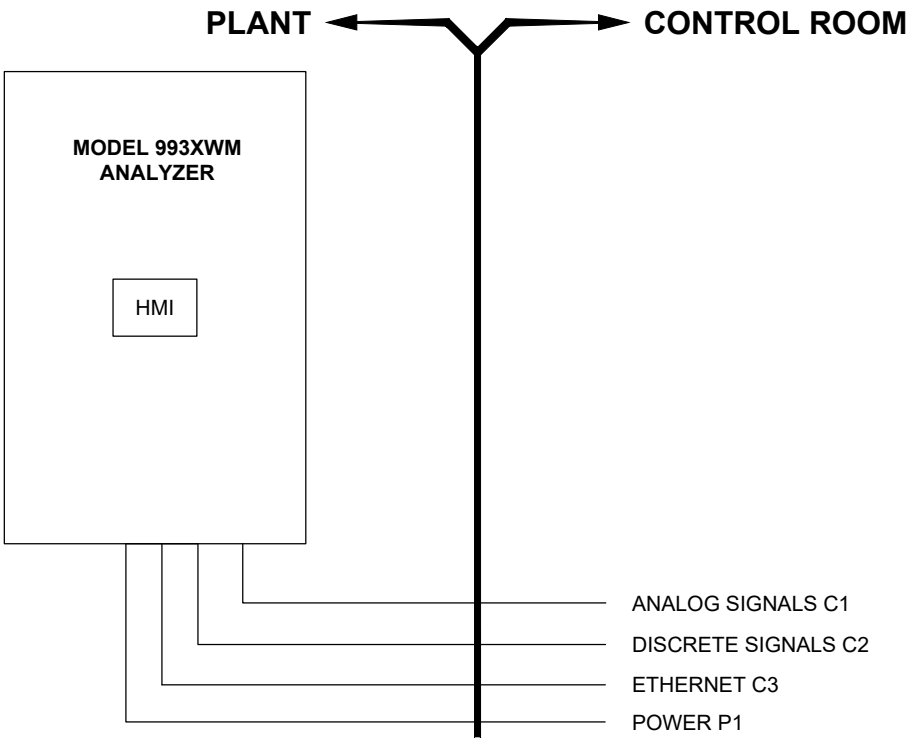


Figure 7.1.
Signal and AC power cabling.

Digital Communication

The analyzer can be configured to communicate simultaneously via its RS-485 serial port and its Fast Ethernet connection.

NOTE

Contact your Network Administrator for information about proper settings required to establish Modbus and Ethernet communications.

WARNING

Always disconnect AC mains power and/or alternate power sources (example, for relay contacts) to the analyzer before opening any covers or doors on the analyzer, before making any wiring or cable connections, and before and before removing any sample system assemblies and components from the analyzer.

Figure 7.2.
Digital Communication options and (Oven) Heater Over-Temperature Protection/ Trip Module (inside Electronics Enclosure).

Connections for Modbus® RTU on the RS-485 (Optional)

The RS-485 terminals can be used for remote communication with a Distributed Control System (DCS), Data Acquisition System (DAS), or Programmable Logic Controller (PLC) using Modicon Modbus® RTU protocol. The Modbus® RTU protocol can be used with the analyzer operating as a slave device, responding to Modbus queries within one second, and providing full access to all registers. See Figure 7.2 for the location of the RS-485 terminals inside the Electronics Enclosure.

After the analyzer installation is complete (including all I/O Signal, Relay Contact, and AC Power connections), if the optional Modbus RTU is being used, configure and enable the RS-485 port for Modbus® communications as described in "Start-Up and Verification" (Powering Up the Analyzer) later in this document.

Connections for Permanent Ethernet Connection (Optional)

When using the Ethernet interface (using Modbus-TCP) on the analyzer, the minimum requirements for the Ethernet cable is a shielded CAT 5e cable to connect the analyzer to the network, up to a maximum of 100 m from the hub/switch/router. The Ethernet interface supports a 10Base-T/100Base-TX connection. For hazardous locations and/or lengths greater than 100 m, special requirements may be necessary. Contact your network administrator for information.

Connect the Ethernet cable between the RJ-45 Ethernet port on the Modbus gateway inside the Electronics Enclosure (see Figure 7.2) and the network.

The Ethernet cable normally has a very low voltage rating; therefore, for user safety, ensure that it is physically prevented from crossing or touching any wiring carrying AC Power.

After the analyzer installation is complete (including all I/O Signal, Relay Contact, and AC Power connections), if the optional Ethernet Interface is being used, configure and enable the Ethernet parameters.

About the HMI's USB Flash Drive

The HMI's USB Flash Drive comes inserted in its high-retention USB connector, mounted below the analyzer HMI (Human-Machine Interface) on the inside of the Electronics Enclosure door (see Figure 7.3). The USB Flash Drive can be used to transfer analyzer data to a desktop computer or to upgrade the HMI-Display firmware. Otherwise, removing the USB drive is not recommended.

WARNING

Always disconnect AC mains power and/or alternate power sources (example, for relay contacts) to the analyzer before opening any covers or doors on the analyzer, before making any wiring or cable connections, and before and before removing any sample system assemblies and components from the analyzer.

Figure 7.3. Human-Machine Interface (HMI), rear view, inside Electronics Enclosure door.

About the Micro-USB Ports on the Controller Boards

One (1) Micro-USB port is included on each Controller board installed, and is used only to upgrade the individual Controller board analyzer firmware. These ports should not be used for normal analyzer operation.

WARNING

One (1) Micro-USB port is included on each Controller board installed, and is used only to upgrade the individual Controller board analyzer firmware. These ports should not be accessed for normal analyzer operations. If necessary, contact AMETEK Service.

Connecting I/O Signals, Relay Contacts, and AC Power

The Cable Entry Cover Plate provides multiple cable entry ports at the bottom of the Electronics Enclosure. Plug each unused cable entry port with an appropriate threaded plug (supplied by AMETEK).

Shielding is required to maintain EMC compliance. If shielded cable is used it should be terminated only at the end of the user device. ***The cable glands must meet the requirements of local wiring regulations and electrical codes.***

Input/Output Signal and Relay Contact Connections

The terminal blocks for connection to the digital input and output signals, analog output signals, and the status relay contacts are located on the **Customer I/O** board. See Figure 2.2 for the location of Cable Entry Ports, and Figure 8 for the Customer Connection points.

Signal wires, contained within cable that is approved locally for the hazardous area, enter the Electronics Enclosure through one of the Cable/Conduit Entry Ports on the bottom of the Electronics Enclosure (Figure 7.1). The terminal assignments are identified in the Customer Connections diagram (Figure 8).

To terminate the input/output signals and relay contacts:

1. Open the Electronics Enclosure to access the **Customer I/O** board.

2. Route cable or conduit carrying the input/output and relay contact wiring to the Cable Entry Ports on the bottom of the Electronics Enclosure.

   Route the wiring through one of the Cable/Conduit Entry Ports and then to the **Customer I/O** board.

   Connect the strain relief or cable gland to the Cable Entry Port, and then terminate the wiring at the **Customer I/O** board using the supplied connectors (blank connectors inserted in the **Customer I/O** board).

Customer Connections – Terminal Torque Specifications

Torque specifications for the terminals on the **Customer Connections** board:

- Terminals on Connectors **TB4** and **TB7** require 0.5–0.6 Nm.
- Terminals on Connectors **TB1**, **TB2**, **TB3**, and **TB6** require 0.22–0.25 Nm.

Figure 8. Customer Connections.

ANALYZER CONNECTIONS ⟷ **CUSTOMER CONNECTIONS**

TB2

CH1	A+	1
	A ⏚	2
CH2	B+	3
	B ⏚	4
CH3	C+	5
	C ⏚	6
CH4	D+	7
	D ⏚	8

ANALOG OUTPUTS
Four Analog Output channels isolated as a group
Each Output selectable as Current or Voltage via switch on Customer I/O board (100–2481)
Each Output is software configurable as 0–20mADC, 4–20mADC, 0–5VDC or 1–5VDC

TB4

Relay 1		1
Relay 1		2

Each relay is software configurable as combination of Fault, Warning, CAL, or Process Alarm.
Relay Contact, Form A (SPST), Normally–Open
Switching: Maximum 240VDC, 0.5ADC, limited to 10W
Carry: Maximum 1.2ADC

TB7

Relay 2		1
Relay 2		2
Relay 3		3
Relay 3		4
Relay 4		5
Relay 4		6
Relay 5		7
Relay 5		8

STATUS RELAY OUTPUTS
Each relay is software configurable as combination of Fault, Warning, CAL, or Process Alarm

Relay Contacts 2–5, Form A (SPST), Normally–Open
Switching: Maximum 240VDC, 0.5ADC, limited to 10W
Carry: Maximum 1.2ADC

TB3

C1 +5VDC		1
C1 ⏚		2
C1 +5VDC		3
C1 ⏚		4

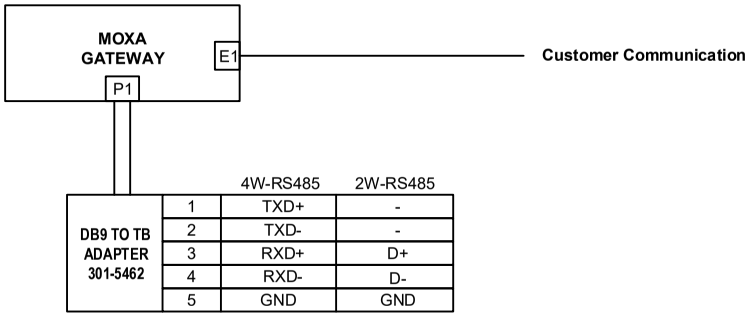
DRY CONTACT INPUTS
Two Dry Contact Input channels isolated as a group
Voltage: 5VDC unregulated
Each contact input is software configurable to trigger an action.

TB6

C3 +5VDC		1
C3 ⏚		2
C4 +5VDC		3
C4 ⏚		4

DRY CONTACT INPUTS
Two Dry Contact Input channels isolated as a group Voltage: 5VDC unregulated
Current: 0.5mADC approximately
Each contact input is software configurable to trigger an action.

ANALYZER CONNECTIONS ⟷ **OPTIONAL CUSTOMER CONNECTIONS**



Software configurable as 4W–RS485 or 2W–RS485

Making AC Power Connections

The operating voltage of the analyzer is indicated on the Product Label on the Electronics Enclosure door. Verify the operating voltage on the label agrees with the operating voltage indicated on the documentation supplied with the analyzer. If there is a discrepancy, contact the local distributor or the factory.

The 993X Analyzer is available in two operating voltage configurations (120 VAC or 240 VAC), configured by AMETEK at the factory per customer/end user requirements.

See the Product Label on the Electronics Enclosure door for the operating voltage for your analyzer before working on the analyzer.

For electric-shock protection, the analyzer must be operated from a grounded power source that has a securely connected protective-ground contact.

Never operate the analyzer with the protective ground disconnected.

To connect AC Power to the 993X Analyzer:

1. Open the Electronics Enclosure door.

2. Remove one of the plugs from the Cable Entry Cover Plate to use for the AC power cable.

3. The customer/end user must provide a strain relief or cable gland acceptable to the local inspection authority and certified for the area classification. The customer/end user must also provide AC Power using adequately sized wiring rated at 600 Volts and 105 °C (221 °F) and approved for the area classification.

   Wiring and methods of connection must meet the requirements of the local inspection authority. Power must be provided via a mains breaker using adequately sized wiring and a Disconnect Switch rated for the area classification must be provided within close proximity of the analyzer to remove AC power to the device if servicing is required.

4. Feed the AC power cable through the Power Entry Port on the bottom of the Electronics Enclosure (see Figure 7.1).

   Connect the **GND** wire to the **Ground Stud** (see Figure 5.1).

   Connect the **L1** and **L2(N)** wires to the terminals on the **AC Distribution** Board (see Figure 5.1).

5. Close the Electronics Enclosure door.

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System Start-Up and Verification

When powering up the analyzer, certain checks should be performed to ensure the analyzer is operating properly and is ready to be commissioned into operation.

Resolve any problems before proceeding to the next start-up stage.

Before proceeding, test the area around the analyzer for flammable gases and proceed only when the area is found to be safe.

Do not open the Electronics Enclosure, and do not power up/down the analyzer or computer if there is a flammable gas atmosphere present.

Before operating the analyzer for the first time, following a power-up or reset, or after maintenance, you must manually block off the sample gas flow.

Also, for verification and troubleshooting purposes during power up, it will be necessary to work with the Electronics Enclosure door open. Before powering up the analyzer, test the area for flammable gases. If a flammable gas atmosphere is present, do not apply power to the analyzer or any alternate power sources that supply power to the analyzer components. Proceed only when the area is found to be safe.

When the Electronics Enclosure is open, take appropriate precautions to avoid electrical shock. Hazardous voltages are present inside.

Powering Up the Analyzer

When powering up the analyzer, certain checks should be performed to ensure the analyzer is operating properly. These checks are discussed in the following procedure. If there are problems encountered during power-up, refer to "Performing Start-Up Diagnostic Checks" (following this procedure) for help in diagnosing and correcting problems.

If the analyzer enclosure doors are open, do not cycle the analyzer power On if there is a flammable gas atmosphere present.

Before applying power to the analyzer, test the area around the analyzer for flammable gases and proceed only when the area is found to be safe.

To apply power to the analyzer:

1. Close the analyzer's AC breaker, then switch the analyzer power-disconnect switch to the On position. This will also apply power to the analyzer and its HMI.

   When the HMI is powered up, the message "**Connecting to controller(s)...**" is displayed.

   If this screen does not appear within approximately 30 seconds, cycle the analyzer power Off then On again. If this screen still does not appear, check the AC power connection to the analyzer. If they are Off, check the AC power to ensure it is present, and check for blown fuses.

*The fuse label is located on the inside analyzer panel adjacent to the **AC Distribution** board. Refer to this label for the fuse ratings and locations for the appropriate power rating of your analyzer. If necessary, refer to the Product Label on the Electronics Enclosure door for the operating voltage and power consumption of your analyzer.*

   If there is still no response from the analyzer, contact the local distributor or factory.

If the HMI displays the message "**UV 99xx Controller not connected to HMI unit**" check the Communications Cables between the **UV Bench Controller** board and the Modbus Gateway on **P2** or between the Modbus Gateway on **E1** and the HMI to ensure they are properly connected. Refer to the Analyzer Internal Component Layout drawing (Figure 4) and the Analyzer Internal Wiring Diagram (Figure 2.9) for the locations of the connection points on the **UV Bench Controller** board and the Modbus Gateway.

If the Communications Cables are properly connected between the **UV Bench Controller** board and the Modbus Gateway, the HMI display will power up properly and will automatically default to the **HOME** screen.

2. Allow the analyzer to stabilize for approximately 30 minutes before continuing.

3. If the **DIAG** menu button on the **HOME** screen is flashing, or showing YELLOW or RED text, it indicates there are active ***Fault*** or ***Warning*** status conditions (some of which may be due to cold analyzer temperature zones). View the active status conditions from the **System Status** diagnostic screen to check for status code names. Low Temperature-related conditions will clear after the analyzer has warmed up to normal operating temperature.

4. Set the HMI Date and Time to local time.

5. Set the nominal Measuring Cell *Pressure* and *Temperature* to correspond with your process conditions.

6. Enter the calibration gas concentration(s).

7. From the **HOME** screen, view the gas components and parameters that have been selected for display at the factory.

8. Perform a manual Zero on the analyzer and then, optionally, perform a manual Span.

The analyzer is ready to begin sampling gas.

Performing Start-Up Diagnostic Checks

This checklist describes problems that may be encountered while powering up the analyzer and/or preparing it for normal operation. If the analyzer experiences problems during power-up, review this checklist and perform the corresponding corrective action to fix any problems.

Problem Encountered
One or both source lamps are not firing. Note that the lamps are almost completely covered by a housing, but a flashing orange glow will be visible when looking at the lamp from the socket end, or when looking through the viewing holes.

Corrective Action
Take appropriate safety precautions and:

- On the **UV Bench Controller** board, check the connectors from the lamp-socket cables to ensure they are properly connected and there is no damage.
- Check to ensure that both lamp-socket connectors are fully inserted into the base of the lamps.
- Make adjustments to the lamps. Perform an Auto-Setup, if necessary, to ensure the lamps are operating at peak efficiency.

Problem Encountered
Temperature zone values do not increase.

Corrective Action
Take appropriate safety precautions and:

- Check the fuses for the temperature zones to ensure they have not blown. These fuses are located on the **AC Distribution** board in the Electronics Enclosure (see Figures 2.3 and 5.1).
- Check for proper wiring terminations for the appropriate temperature zone.
- Check the Temperature Control Module to see if it has been triggered. A RED LED on the module will indicate a problem. To reset the Temperature Control Module and correct this problem, lift its cover and press its Reset button, or cycle the analyzer AC mains power Off-On.

CONFIG→UV Bench Temp Control

Problem Encountered
The **Bench** or **Cell** temperature zone value is greater than 3 °C of its setpoint temperature (view the **UV Bench Temperature Control** screen to check its **Setpoint** value). A high temperature value may indicate a faulty RTD for the related temperature zone.

Corrective Action
Take appropriate safety precautions and check the related RTD for a short or an open circuit. If necessary, replace the RTD with an AMETEK-approved replacement part. Contact AMETEK Service for assistance.

Problem Encountered
Temperature Low alarm(s) remains active after the analyzer has been allowed to warm up for at least 30 minutes.

The "**Bench Temperature Low**" or "**Cell Temperature Low**" or "**Zone'#' Temperature Low**" status will typically be triggered upon start-up due to low temperatures in these temperature zones, but will reset after the analyzer has warmed up to normal operating temperatures.

Corrective Action
Take action to clear the alarms if these or other alarms remain active after the analyzer has warmed up to normal operating temperature.

Problem Encountered
During the normal Human-Machine Interface (HMI) start-up sequence:

- The message "**Connecting to controller(s)...**" appears on the HMI, followed by the **HOME** screen appearing, do not occur, or
- The message "**UV 99xx Controller not connected to HMI unit**" appears on the HMI, and the **HOME** screen does not appear immediately after applying AC power.

Corrective Action
Take all necessary precautions and check the AC wiring to ensure it is properly connected.

Also, take all necessary precautions and ensure the connectors on all cables between the HMI and the analyzer are properly connected, and check these cables for damage. If damaged, take all necessary precautions and replace the cables.

Problem Encountered
Flashing **DIAG** button (RED or ORANGE) on the **HOME** screen.

Corrective Action
Check the **System Status** diagnostic screen to view current status conditions.

DIAG→System Status

Certain status conditions will be active until the analyzer has warmed up to normal operating temperature, at which time they should clear automatically.

Pressure Leak Check

The analyzer has been checked at the factory for pressure leaks. However, fittings can loosen during transport. Also, fittings are tightened when the Sample, Vent, and other lines are connected during initial installation, and fittings are loosened/retightened whenever the Measuring Cell is removed and reinstalled (i.e., for service). Therefore, the entire analyzer sample system must be checked for leaks before any sample gas is introduced into the sample system for the first time or following the replacement of any lines/fittings or Measuring Cell or other sample system parts.

Hazardous Locations
Before proceeding, test the area around the analyzer for explosive gases and proceed only when the area is found to be safe.

Preventing leaks in the sample system is critical to ensure proper analyzer operation. If sample gas migrates into the Optical Bench Assembly or Reflector Block due to a leak in the Measuring Cell, the optics will become damaged and most likely require replacement. Most leaks are preventable with the regular replacement of the Measuring Cell o-rings.

This procedure discusses how to perform a leak check on the 9933WM Analyzer. For other analyzer models, refer to the User Manual *specific to that analyzer.*

To leak check the sample system:

1. From the **Calibration** menu, change the **Flow Control** setting to **Auto**.

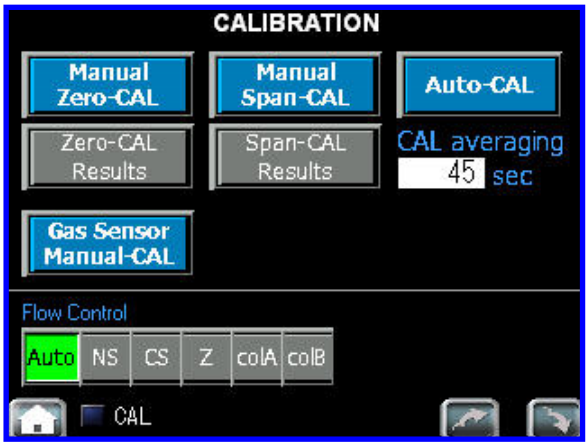

Figure 8.1.
Calibration menu (shown with Gas Sensor option enabled).

2. Close the sample inlet valve. Purge the analyzer sample system with Zero gas for 2–3 minutes.

3. From the **Auto-CAL** screen, press **NS** (non-sampling) to shut off the sample gas flow.

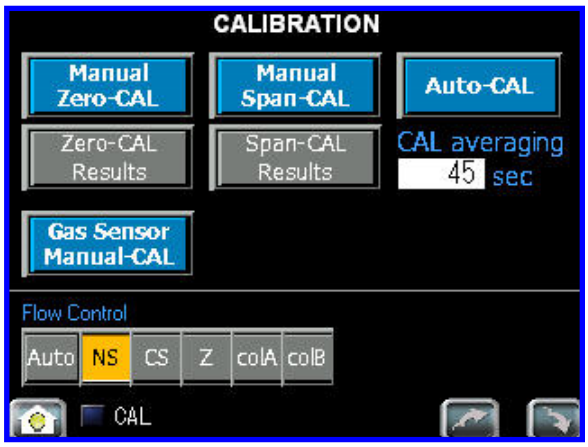

Figure 8.2.
Auto-CAL screen, NS (non-sampling) Flow Control mode enabled.

Bleed down the sample system to atmospheric pressure (check gauge).

CAUTION

To avoid tearing the Membrane Filters in the Filterblock, always bleed down the sample system pressure on the downstream (outlet) side of the Filterblock. Pressure differentials of more than 210 kPa (30 PSI) from the inlet side to the outlet side can tear the Filters and they will have to be replaced .

Close the valve on the Vent Line (or remove the Vent Line and cap the Vent Outlet).

If the Sample Line is connected to the analyzer, disconnect it from the Sample Inlet fitting and connect Zero gas to the Sample Inlet fitting.

4. From the **Auto-CAL** screen, press **colA** to force gas flow through Column A.

CAUTION

To avoid damaging the pressure transducer, do not set the pressure higher than the pressure transducer rating, either 0–210 kPa (0–30 PSIA), 0–700 kPa (0–100 PSIA), or 1380 kPa (200 PSIA) for the 0–3450 kPa (0–500 PSIA) transducer. 1380 kPa (200 PSIA) is the maximum Cell Pressure allowed for the analyzer certification. Refer to system drawings for your system's pressure transducer rating.

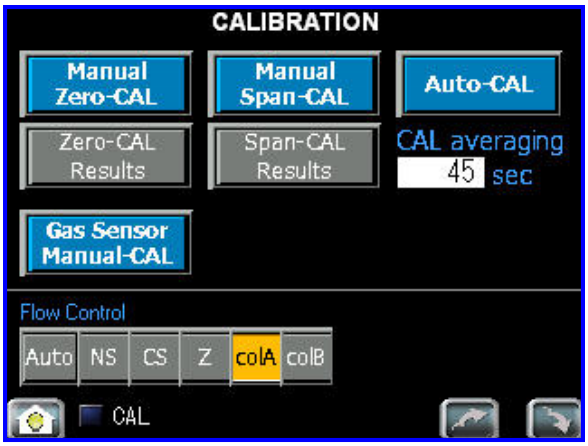

Figure 8.3.
Auto-CAL screen, colA (Column A) Flow Control mode enabled.

5. While observing the Sample Gas Pressure Gauge on the analyzer Column Block, use the Sample Gas Pressure Regulator to increase the Zero gas pressure to 550 kPa (80 PSIG).

6. Shut off the Zero gas flow at the cylinder and wait approximately two minutes to allow the pressure in the sample system to stabilize. If the reading on the pressure gauge starts to decrease, use a leak detection fluid (such as Snoop®) on the sample system to find the problem area.

7. Repeat Steps 4 through 6, but press **colB** to force gas flow through Column B in Step 4.

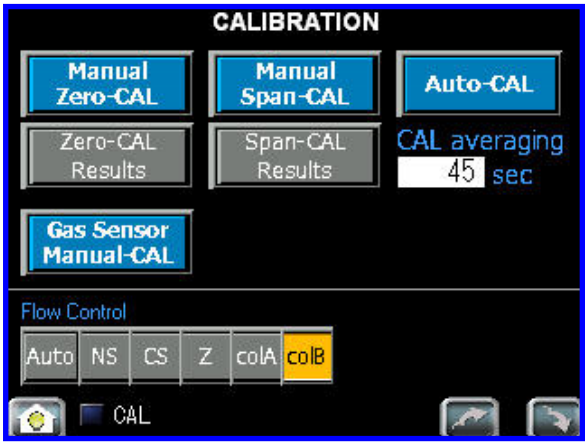

Figure 8.4.
Auto-CAL screen, colB (Column B) Flow Control mode enabled.

8. From the Vent Outlet, bleed down the sample system to atmospheric pressure (check gauge).

CAUTION

To avoid tearing the Membrane Filters in the Filterblock, always bleed down the sample system pressure on the downstream (outlet) side of the Filterblock. Pressure differentials of more than 210 kPa (30 PSI) from the inlet side to the outlet side can tear the Filters and they will have to be replaced .

9. After the sample system has been bled down, recap the Vent Outlet.

   Disconnect the Zero gas from the Sample Inlet fitting and reconnect it to the Zero Gas fitting on the analyzer.

   Reconnect the Sample Line to the Sample Inlet fitting on the analyzer. Keep the Sample Inlet valve closed.

10. From the **Auto-CAL** screen, press **Z** to force the analyzer to continuous Zero gas flow.

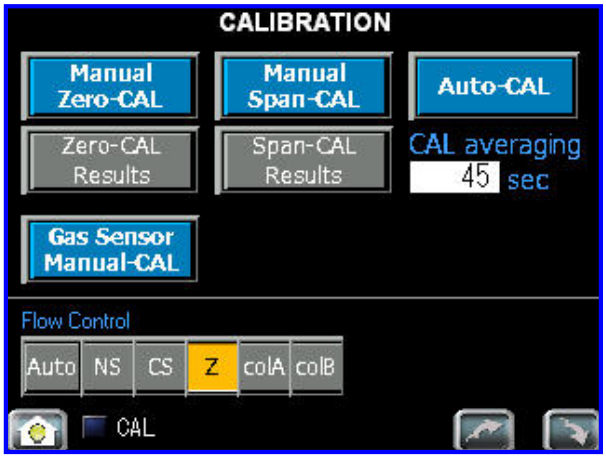

Figure 8.5.
Auto-CAL screen, Z (Continuous Zero Gas Flow) Flow Control mode enabled.

11. Increase the pressure of the Zero gas to 550 kPa (80 PSIG). Use the pressure gauge mounted on the Column Block to observe the pressure.

12. Repeat Step 6 (shut off Zero gas) to check if there's a leak at the Sample Inlet fitting. If so, check the connection and fix the leak before continuing.

13. Repeat Step 8 to safely bleed down the sample system and remove the cap fitting from the Vent Outlet.

14. After the sample system has been bled down, remove the cap from the Vent Outlet and reconnect the Vent Line to it.

15. From the **Auto-CAL** screen, press **Auto** to return the Flow Control mode to analyzer automatic control.

16. Open the valves isolating the analyzer from the sample stream. Set the pressure to 550 kPa (80 PSIG) using the Sample Gas Pressure Regulator or the Rotameter.

If using the Rotameter, the arrow on the handle of the three-way valve must be facing downward while setting the sample gas flow rate.

After the flow rate has been set, switch the Bypass Valve to BYPASS by turning it 180° (arrow on valve handle facing upward). This will ensure no damage is done to the Rotameter during Column switching.

The procedure is complete and the analyzer is ready to analyze sample gas.

Before performing any maintenance on the analyzer, test the area around the analyzer for flammable gases and proceed only when the area is found to be safe.

Cleaning the Human-Machine Interface (HMI)

Clean the graphic panel on the HMI regularly to avoid dust build-up. When cleaning the graphic panel, power to the HMI (analyzer) must be OFF. Using a damp cloth to avoid electrostatic discharge, wipe the graphic display panel.

Cleaning / Replacing Parts in the Sample System

To clean and/or replace parts in the various assemblies that make up the sample system analyzer:

The 993X Analyzer is available in two operating voltage configurations (120 VAC and 240 VAC), configured by AMETEK at the factory per customer/end user requirements.

See the Product Label on the Electronics Enclosure door for the operating voltage for your analyzer before working on the analyzer.

1. Take all necessary steps to safely power down the analyzer and prepare it for servicing. To do this:

   a. Manually Zero the analyzer for 2–3 minutes.

   b. After the Zero is complete, bleed down the sample system to atmospheric pressure (check gauge).

To avoid tearing the Membrane Filters in the Filterblock, always bleed down the sample system pressure on the downstream (outlet) side of the Filterblock. Pressure differentials of more than 210 kPa (30 PSI) from the inlet side to the outlet side can tear the Filters and they will have to be replaced .

Close the valve on the Sample Line to isolate the analyzer from the sample stream.

Close the valve on the Vent Line (or remove the Vent Line and cap the Vent Outlet) to isolate the analyzer from the sample stream.

Before powering down the analyzer (Step 1-c), test the area around the analyzer for flammable gases and proceed only when the area is found to be safe.

c. Power down the analyzer.

Wait 5 minutes to allow the high-voltage capacitors in the source-lamp power supply to discharge.

d. Open the Electronics Enclosure door.

2. If gas fittings were disconnected/reconnected while servicing the analyzer, perform a leak (pressure) check on the sample system fittings to ensure there are no leaks in the sample system. Refer to "Pressure Leak Check" in this document.

   After you are sure there are no leaks, return to this procedure and continue with the remaining steps.

3. Close the Electronics Enclosure door and secure it with its latches.

4. Take all necessary steps to properly and safely power up the analyzer and commission it into operation:

   a. Close the analyzer's breaker and then switch the analyzer's power-disconnect switch to the On position. This will also apply power to the HMI.

   b. Manually Zero and Span the analyzer and then return the analyzer to Sample mode.

   c. Open the isolation valve on the Sample Probe and the Vent Valve to allow the flow of sample gas through the sample system.

5. Adjust the sample gas flow rate to the normal operating flow rate.

The procedure is complete.

Troubleshooting

Status Code Message	Description / Trigger Condition / Corrective Action
Bench temperature low *CONFIG→UV Bench Temp Control*	The Bench temperature is 3 Celsius degrees below the Bench temperature control setpoint. **Trigger Conditions** • This status condition may be triggered upon analyzer power-up while the Bench is warming up to its operating temperature control setpoint, but will clear after the Bench has properly warmed up to its normal operating temperature and has stabilized. • Problem with Bench Heater. • Problem with the **UV Bench Controller** board. **Corrective Actions** • From the HMI: - If the analyzer has been operating under normal conditions, view the **BenchT** reading (from the **HOME** screen). Then, view the **UV Bench Temperature Control** screen and check the **Bench *Setpoint*** temperature to verify if the **BenchT** temperature reading is 3 Celsius degrees below the **Bench *Setpoint*** value. Also, compare the **Bench *Setpoint*** temperature to the **Bench Temp *Setpoint*** value listed on the "*993X_CFG Report*" document shipped with the analyzer. If the *993X_CFG Report*" document. • Check the ambient temperature around the analyzer; if it is lower than the **Bench *Setpoint***, increase the surrounding temperature to within the Bench Block measuring range (±3 Celsius degrees of the **Bench *Setpoint*** temperature). • Take appropriate safety precautions, open the Electronics Enclosure door, and: - Check the Bench Temperature Sensor to ensure it is properly connected at the **UV Bench Controller** board (**J603**) and inspect the wiring for damage (cuts, nicks, burn marks, etc.). - Check the Bench Temperature Heater Circuit wiring to ensure it is properly connected at the **UV Bench Controller** board (**J604**) and inspect it for damage (cuts, nicks, burn marks, etc.). • Take appropriate safety precautions, isolate the analyzer sample system, power down the analyzer, and: ***Warning:*** ***Allow the interior of the analyzer to cool down enough to ensure safe handling of components within the Electronics Enclosure.*** - Test the Bench Temperature Sensor and Heater for proper operation. Use a multimeter to measure the resistance of the Temperature Sensor and the Heater to test for an open circuit. After this check has been made, cycle the analyzer AC power back On; this will also reset the analyzer and may also clear any problems with the **UV Bench Controller** board. • Contact AMETEK Service if: - The Optical Bench OverTemp Switch, Temperature Sensor, or Heater (or their wiring), appears damaged – order new parts. - Cycling the AC power Off-On does not reset the condition. This can indicate a problem with the **UV Bench Controller** board firmware, or a problem with the Bench Temperature Sensor Signal Measurement Circuit or Bench Heater Control Circuit. - You need to verify operation or to order replacement parts, or you require replacement instructions.

Status Code Message	Description / Trigger Condition / Corrective Action
Bench temperature high *CONFIG→UV Bench Temp Control*	The Bench temperature is 3 Celsius degrees above the Bench temperature control setpoint. **Trigger Conditions** • Problem with Bench Heater. • Problem with the **UV Bench Controller** board. **Corrective Actions** • From the HMI: - If the analyzer has been operating under normal conditions, view the **BenchT** reading (from the **HOME** screen). Then, view the **UV Bench Temperature Control** screen and check the **Bench *Setpoint*** temperature to verify if the **BenchT** temperature is 3 Celsius degrees above the **Bench *Setpoint*** value. Also, compare the **Bench *Setpoint*** temperature to the **Bench Temp *Setpoint*** value listed on the "993X_CFG Report" document shipped with the analyzer. If the **Bench *Setpoint*** temperature is different, change it to match the value on the "993X_CFG Report" document. • Take appropriate safety precautions, open the Electronics Enclosure door, and: - Check the Bench Temperature Sensor to ensure it is properly connected at the **UV Bench Controller** board (**J603**) and inspect the wiring for damage (cuts, nicks, burn marks, etc.). - Check the Bench Temperature Heater Circuit wiring to ensure it is properly connected at the **UV Bench Controller** board (**J604**) and inspect it for damage (cuts, nicks, burn marks, etc.). • Take appropriate safety precautions, isolate the analyzer sample system, power down the analyzer, and: ***Warning:*** ***Allow the interior of the analyzer to cool down enough to ensure safe handling of components within the Electronics Enclosure.*** - Test the Bench Temperature Sensor and Heater for proper operation. Use a multimeter to measure the resistance of the Temperature Sensor and the Heater to test for an open circuit. After this check has been made, cycle the analyzer AC power back On; this will also reset the analyzer; this may also clear any problems with the **UV Bench Controller** board. • Contact AMETEK Service if: - The Optical Bench OverTempSwitch, Temperature Sensor, or Heater (or their wiring), appears damaged – order new parts. - Cycling the AC power Off-On does not reset the condition. This can indicate a problem with the **UV Bench Controller** board firmware, or a problem with the Bench Temperature Sensor Signal Measurement Circuit or Bench Heater Control Circuit. - You need to verify operation or to order replacement parts, or you require replacement instructions.

Status Code Message	Description / Trigger Condition / Corrective Action
Bench board temperature high	The **UV Bench Controller** board temperature is above 65 °C. The **UV Bench Controller** board temperature is typically considered to be the air temperature within the Electronics Enclosure in most cases. ***Trigger Condition:*** • Overheating inside the Electronics Enclosure. **Corrective Actions** • Check the ambient temperature around the analyzer and adjust it if necessary. • Contact AMETEK Service if: - The Optical Bench OverTemp Switch, Temperature Sensor, or Heater (or their wiring), appears damaged – order new parts. - Cycling the AC power Off-On does not reset the condition. This can indicate a problem with the **UV Bench Controller** board firmware, or a problem with the Bench Temperature Sensor Signal Measurement Circuit or Bench Heater Control Circuit. - You need to verify operation or to order replacement parts, or you require replacement instructions.

Status Code Message	Description / Trigger Condition / Corrective Action
Cell pressure range error *CONFIG→ UV Analysis→ Sample Cell Conditions*	The measured Cell Pressure is outside ±15 % of the nominal Cell Pressure. **Trigger Conditions** • The Nominal Cell Pressure value has not been entered or is incorrect. • Problem with sample system (e.g., plugging, or faulty regulator). • Problem with Pressure Transducer scaling parameters. • Problem with the Pressure Transducer cable. • Problem with the Pressure Transducer. **Corrective Actions** • From the HMI: - View the **Sample Cell Conditions** screen and check the **Nominal Cell Pressure** value to verify it agrees with the ***Pressure*** value listed on the "993X_CFG Report" document, or that of the process pressure. If necessary, change the **Nominal Cell Pressure** value. - View the **Flow** reading on the **HOME** screen to verify there is a flow of sample gas. If there is no flow or low flow, it may indicate a plug in the sample system. Unplug the lines if necessary. Also, check the **Cell Pressure *Low Scale/High Scale*** parameters. Compare the readings to the value listed on the *"993X_CFG Report"* document and adjust the scaling parameters if necessary. • Take appropriate safety precautions, open the Electronics Enclosure door, and check the Cell Pressure Transducer cable to ensure it is properly connected at the **UV Bench Controller** board (**J601**). Inspect the cable for damage (cuts, nicks, burn marks, etc.). • Take appropriate safety precautions, isolate the analyzer sample system, power down the analyzer, and: - Test the Cell Pressure Transducer for proper operation. Use a multimeter to measure the resistance of the pressure transmitter to test for an open circuit. After this check has been made, cycle the analyzer AC power back On; this will also reset the analyzer; this may also clear any problems with the boards. • Contact AMETEK Service if: - The cable appears damaged or the Pressure Transducer does not appear to be operating properly – order a new part and replace it. - Cycling the AC power Off-On does not reset the condition. This can indicate a problem with the Flow Sensor Signal Conditioning Circuit on the **UV Bench Controller** board. - You need to verify operation or to order replacement parts, or you require replacement instructions.

Status Code Message	Description / Trigger Condition / Corrective Action
Temperature zone-n sensor error	This status indicates the system has detected a faulty Column Block temperature (zone-A). zone-B (Not applicable on 9933RM/WM Analyzers) zone-C (Not applicable on 9933RM/WM Analyzers) ***Trigger Condition:*** • The measured Column Block temperature sensor has failed. • The measured Column Block temperature sensor has been incorrectly wired (connected to the wrong termination location). ***Corrective Action:*** Take appropriate safety precautions, open the Electronics Enclosure doors, and: • Power down analyzer safely: - Disconnect the RTD connection (**TB5**) on the **Sample System Interface** board and check for appropriate resistance as per **PT100** conversation table. • If the RTD does not read proper resistance, replace the RTD. • If RTD reads proper resistance and the Column Block is too hot, replace the **Sample System Interface** board component. • Contact AMETEK Service to verify operation before replacing this board.
Temperature zone-n high *CONFIG→ Sample System→ Temperature Control*	This status indicates the system has detected that temperature zone-A (Column Block) is reading high. zone-B (not applicable on 9933RM/WM Analyzers) zone-C (not applicable on 9933RM/WM Analyzers) ***Trigger Condition:*** • The measured Column Block temperature sensor is 3 °C *above* the control setpoint. ***Corrective Action:*** • From the HMI, view the **Sample System Temperature Control** screen and check the Column Temperature ***Setpoint*** (**ColmnT**). Adjust the **ColmnT *Setpoint*** if necessary. Take appropriate safety precautions, open the Electronics Enclosure doors, and: • Check the heater control circuit: Check fuse **F5** on the **AC Distribution** board (see Figure 9). If the fuse has blown, replace it. • Check the Column Block temperature sensor (RTD) – inside the Column Block – for a short or an open circuit. See "Column Block Preventive Maintenance" earlier in this chapter for more information. Replace the RTD, if necessary. • Contact AMETEK Service to verify operation before removing this component.

Status Code Message	Description / Trigger Condition / Corrective Action
Temperature zone-n low	This status indicates the system has detected that temperature zone-A (Column Block) is reading low. zone-B (not applicable on 9933RM/WM Analyzers) zone-C (not applicable on 9933RM/WM Analyzers) ***Trigger Condition:*** • The measured Column Block temperature sensor is 30 °C *below* the control setpoint. ***Corrective Action:*** • From the HMI, view the **Sample System Temperature Control** screen and check the Column Temperature ***Setpoint*** (**ColmnT**). Adjust the **ColmnT *Setpoint*** if necessary. Take appropriate safety precautions, open the Electronics Enclosure doors, and: • Check the heater control circuit: Check fuse **F5** on the **AC Distribution** board (see Figure 9). If the fuse has blown, replace it. • Check the Column Block temperature sensor (RTD) – inside the Column Block – for a short or an open circuit. See "Column Block Preventive Maintenance" earlier in this chapter for more information. Replace the RTD, if necessary. • Contact AMETEK Service to verify operation before removing this component

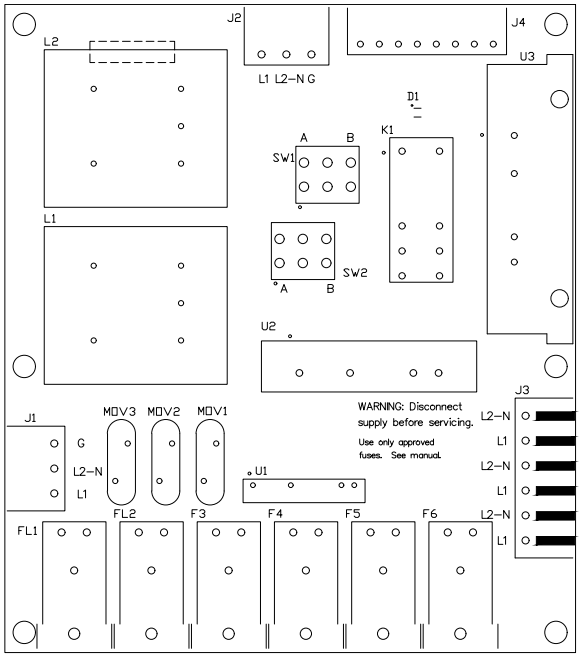

Figure 9.
AC Distribution board (Part No. 100-2733).

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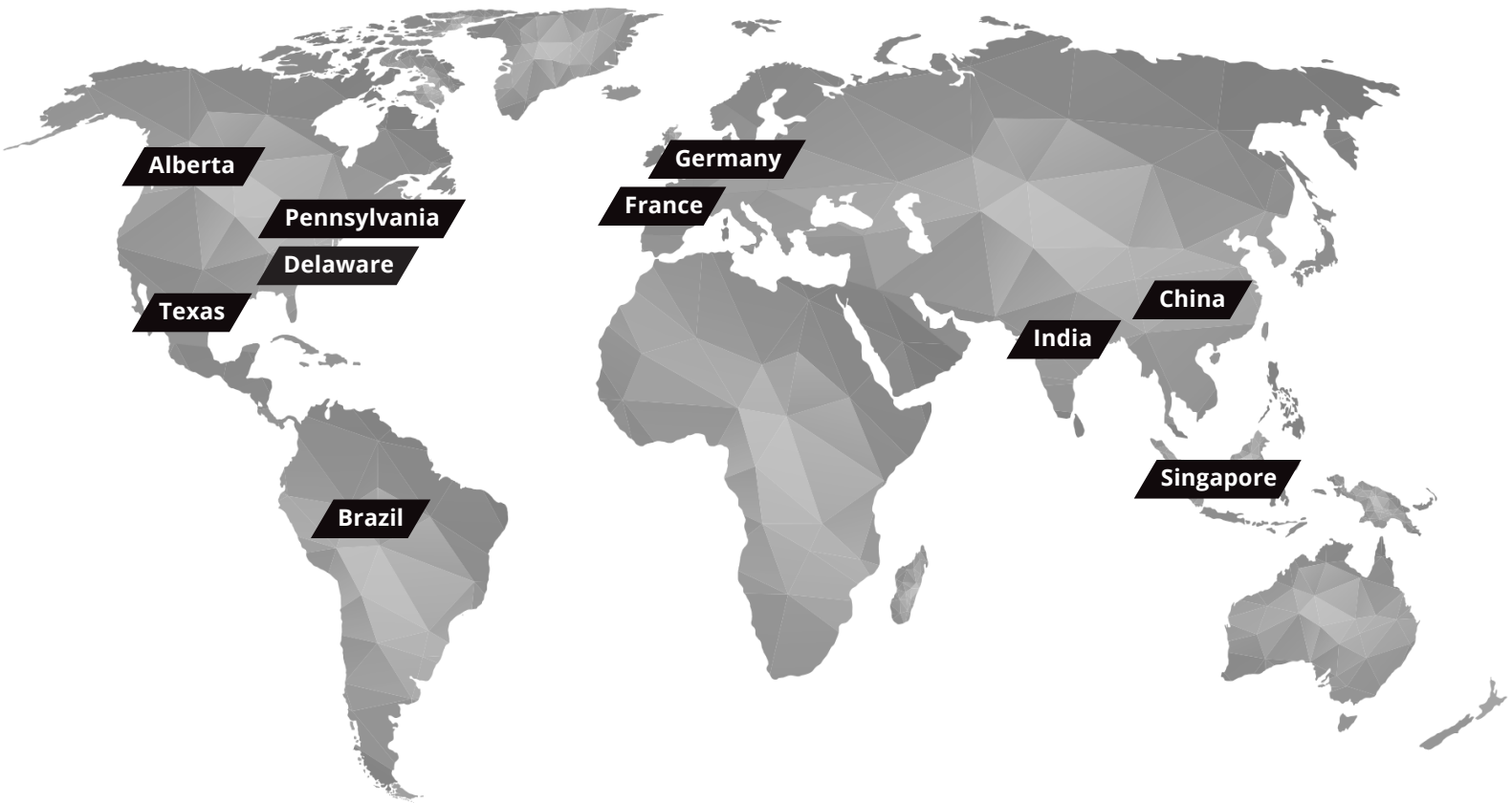

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