Model 9xx-Series Analyzers

Essential Health and Safety Requirements

PN 903-8606_English
Rev G

AMETEK® Canada
A DIVISION OF AMETEK PROCESS & ANALYTICAL INSTRUMENTS
Western Research

Contents

Important Notes and Safety Information

Before working on the analyzer, read and understand the following Notes, Warnings, and Cautions, which contain important safety and general information that applies to all aspects of working on the analyzer.

Additional Notes, Warnings, and Cautions are included in individual procedures in this document (and in the analyzer manual) to indicate special conditions to consider during installation, before opening its covers or doors, and while working on the analyzer.

Refer to "Electromagnetic Compatibility (EMC)" in the contents section of the analyzer manual for information about the EMC Directive regarding techniques and wiring practices to be followed.

To maintain EMC compliance in European installations, AMETEK recommends using metallic glands and shielded cable (at least 85 % coverage) for both power and signal cable connections.

Always disconnect main AC power and/or external power sources to the analyzer before opening any covers or doors on the analyzer to check or perform maintenance on any components within the enclosures.

If it is necessary to open the analyzer's covers or doors while the circuits are live, test the area for flammable gases (and proceed only when the area is safe).

Purged Analyzer (Hazardous Location) Applications
*To work on the analyzer with it powered up and its Electronics Enclosure door open, the Purge Bypass Switch must be in the "**BYPASS**" position.*

When the Electronics Enclosure and/or Disconnect Enclosure are open, take appropriate precautions to avoid electrical shock. Hazardous voltages are present inside.

All electrical connections, adjustments, or servicing of the analyzer should 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 code for the hazardous area, and be approved by the Owner Company.

The Analyzer Oven enclosure and components within the Analyzer Oven are hot; take precautions to avoid burning yourself.

Follow appropriate regulatory and/or company procedures to lock out the analyzer while working on its electronics.

While the Disconnect Enclosure is open for maintenance or repair, take extreme care to avoid scratching or damaging the joining surfaces (flamepath).

If at any time the Disconnect Enclosure door is open but is not being worked on, close and secure it with at least one screw. This will reduce the risk of inadvertently scratching or damaging the flamepath.

Before closing the door, gently clean these areas with a soft, nonabrasive cloth and make sure they are free of debris.

Purged Analyzer (Hazardous Location) Applications
[Special Conditions for Safe Use]
The analyzer may only be energized by using the Purge Bypass Switch with permission of the works manager or his proxy. The permission may only be given when it is made sure that during the time the system is energized by using this switch an explosive atmosphere is not present or when the necessary protective measures against explosion hazard have been taken ("hot permit").

The analyzer enclosure may not be opened when an explosive atmosphere is present.

Purged Analyzer (Hazardous Location) Applications
Do not apply power to the analyzer if there is damage (scratches, indentations, or wear) to any flamepath (on the Oven Heater or Disconnect Enclosure). Applying power to an analyzer with a damaged flamepath is dangerous and could result in serious injury or death, or serious damage to equipment. See "Examining and Caring for the Flamepaths" in Chapter 5 of the analyzer manual.

Replace parts immediately if damage or wear is apparent. Contact AMETEK if there is any doubt about the integrity of any flamepath.

CAUTION

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

CAUTION

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 analyzer 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 ground yourself) before handling or touching the boards.

CAUTION

Purged Analyzer (Hazardous Location) Applications
Take extreme care to avoid damaging the threads on the cable entry glands on the Disconnect Enclosure and all threaded parts on or in the Heater Plate/Seal Assemblies. Clean, defect-free threads are essential to ensure a flameproof connection.

CAUTION

Purged Analyzer (Hazardous Location) Applications:
M25 x 1.5, 6H cable entries are provided for Power (1 entry) and Signals (2 entries). See the Model 9xx-Series Analyzer Type 200 Disconnect Enclosure Details drawing (Figure 6) for cable entry locations. In all cases, all unused cable entry ports must be plugged with a certified Ex d plug.

***For Division 1/Zone 1 Installations**, all cable entry glands (one power cable entry and two signal cable entries) into the flameproof Disconnect Enclosure must be Ex d certified. Conduit or cable seals that comply with the flameproof enclosure cable entry sealing requirements of the local authority must be installed at the entries to the Disconnect Enclosure.*

***For Division 2/Zone 2 Installations** that do not use the Disconnect Enclosure, use a suitable cable entry device with a sealing ring that meets the local requirements for entries into pressurized enclosures.*

About This Document

This document primarily describes the essential health and safety requirements for the essential flameproof components that make up the 9xx-Series Analyzers intended for use in explosive atmosphere locations.

The procedures and information discussed in this document include only abbreviated steps to install, operate, and perform maintenance on the analyzer. They do, however, include all relevant safety warnings and cautions to ensure the safety of personnel and the analyzer in explosive atmosphere locations.
[For complete and detailed descriptions of the procedures discussed in this guide, refer to the analyzer manual.]

About the Model 9xx-Series Purged Analyzer

The Electronics Enclosure and its Optical Bench and Measuring Cell Extension are continuously purged with Instrument Air to adequately dilute any hazardous gases that may have been released into these areas. This function effectively prevents an internal explosion when the analyzer is powered up and operating under normal sampling conditions. AMETEK analyzers that require purged enclosures in hazardous locations use an Expo Technologies MiniPurge® System With eTimer to perform this function.

The purge air supply is normally obtained from the Instrument Air supply connected directly to the Expo MiniPurge® System. The required purge air supply pressure for your analyzer is indicated on Final "As-Built" drawings in the analyzer Documentation Package.
[Drawings for your analyzer are located in the Documentation Package shipped with the analyzer.]

After the Instrument Air supply has been connected to the MiniPurge® system, the **ALARM/PRESSURIZED** indicator on the MiniPurge® system (Figure 1) turns from RED (Alarm condition) to GREEN (Pressurized). Next, the system's eTimer begins its purge timing cycle, and the four **PURGE TIMING** indicator LEDs will flash (YELLOW) sequentially, each for 25 % of the total purge time (minimum 15 minutes). During this stage, the MiniPurge® system will purge any flammable gases that may have entered the Electronics Enclosure while its door was open, and then pressurize the enclosure. After the timing sequence is completed (LEDs off), the pneumatic switch will send a signal to the analyzer and the analyzer will power up (if the Purge Bypass Switch is in the "**ACTIVE**" position, if all fuses have been engaged, and if the external explosion-proof power-disconnect switch has been closed).

WARNING

A minimum of 15 minutes is required to properly purge and pressurize the analyzer Electronics Enclosure.The Expo Technologies MiniPurge® System uses a Battery Pack to power its purge timer. AMETEK recommends replacing the Battery Pack every three years to ensure proper and safe operation of the purging system. See "Analyzer Preventive Maintenance Schedule" in Chapter 6 for more information.

Working with the purged enclosure open is typically limited to installation, start-up (and verification), and certain troubleshooting and maintenance procedures. In these cases, the Purge Bypass Switch (Figure 1) must be in the "**BYPASS**" position (and appropriate safety conditions must have been met, as per company policy).

WARNING

Special Conditions for Safe Use:
The analyzer may only be energized by using the Purge Bypass Switch with permission of the works manager or his proxy. The permission may only be given when it is made sure that during the time the system is energized by using this switch an explosive atmosphere is not present or when the necessary protective measures against explosion hazards have been taken ("hot permit").

The analyzer enclosure may not be opened when an explosive atmosphere is present.

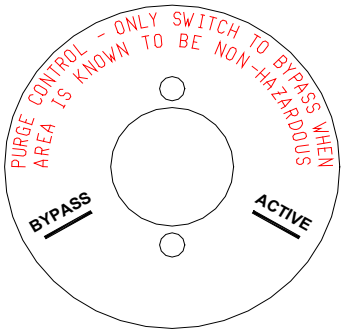

Figure 1.
Purge Bypass Switch label.

For normal analyzer operation, the Purge Bypass Switch must be in the "**ACTIVE**" position and the key must be removed (follow company policy).

About the Heater Plate Assembly

The Ex d Heater Plate Assembly is an aluminum flameproof housing that contains two Heater Cartridges and four Resistance Temperature Detectors (RTDs), two external (one of which is optional) and two internal. The Heater Plate Assembly is mounted inside the Analyzer Oven and is used to maintain optimal sample gas temperatures that are required for accurate analysis.

Generally, little or no maintenance is required except in the case of a Heater Cartridge or RTD failure.

About the Type 200 Disconnect Enclosure

The Type 200 Disconnect Enclosure is a flameproof, cast aluminum enclosure that is used to disconnect power from the analyzer in case of a purge system failure.

Specifications

Purged Analyzer Markings

ATEX- and IECEx-certified Model 9xx-Series Purged Analyzers are marked with a 30 psia Pressure Transducer label (Figure 2) or a 100 psia label (Figure 3) to indicate its ATEX and IECEx certification.

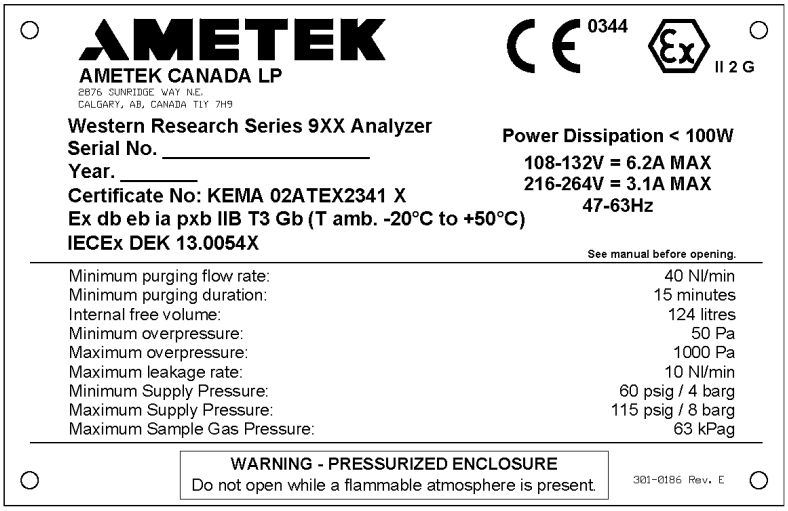

Figure 2. Model 9xx-Series Purged Analyzer label, 30 psia Pressure Transducer.

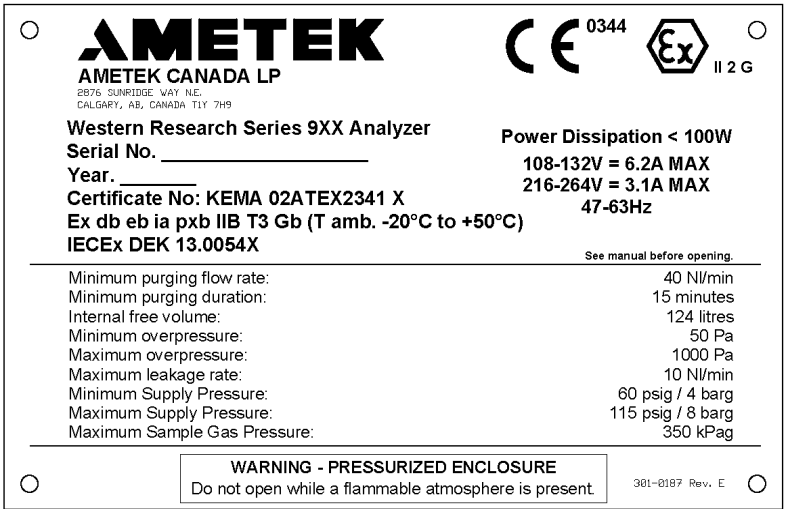

Figure 3. Model 9xx-Series Purged Analyzer label, 100 psia Pressure Transducer.

Heater Plate Markings

ATEX- and IECEx-certified Model 9xx-Series Heater Plates are marked with this label.

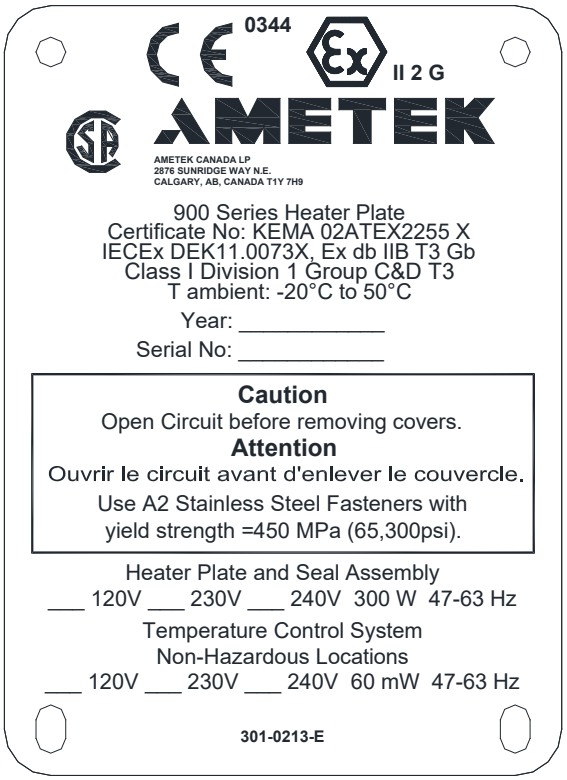

Figure 4. Model 9xx-Series Heater Plate/Seal Assembly label.

Type 200 Disconnect Enclosure Markings

ATEX- and IECEx-certified Type 200 Disconnect Enclosures are marked with this label.

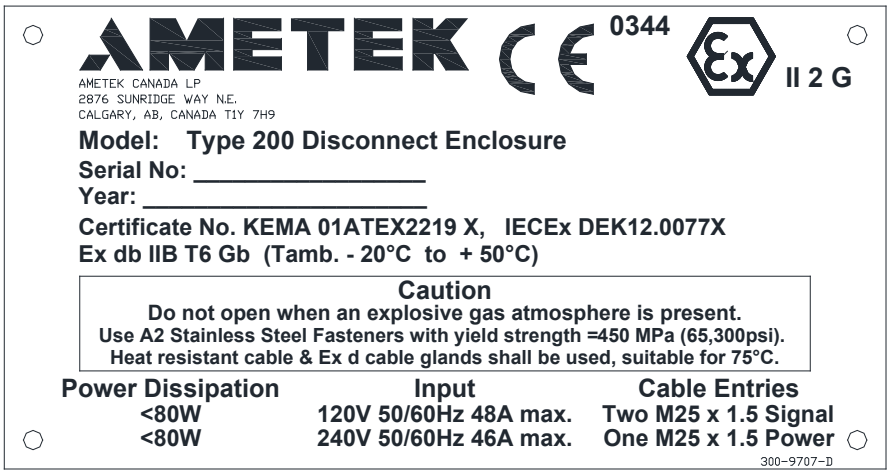

Figure 5. Type 200 Disconnect Enclosure label.

Cable Entry Ports, Type 200 Disconnect Enclosure

M25 x 1.5, 6H cable entries are provided for Power (1 entry) and Signals (2 entries). [See the Model 9xx-Series Analyzer Type 200 Disconnect Enclosure Details drawing (Figure 6) for cable entry locations.] In all cases, all unused cable entry ports must be plugged with a certified Ex d plug.

Installing the Analyzer and the Optical Bench Assembly

The analyzer and the Optical Bench Assembly are shipped in separate crates. The Optical Bench will need to be mounted in the Electronics Enclosure after the analyzer has been mounted in its designated location. All electrical connections to the Optical Bench Assembly are made via pre-wired connector plugs (no hard wiring is required).
[For complete installation information, refer to Chapter 3 of the analyzer manual.]

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

AC Power and Signal Connections

IMPORTANT
Carefully read and understand all of the electrical connection instructions – including Notes, Cautions, and Warnings – before opening and making any wiring connections in the Disconnect Enclosure.

Refer to Figure 6 while making wiring connections in the Disconnect Enclosure.
[For complete installation details, refer to "Connecting I/O Signals, Alarm Relay Contacts, and AC Power" in Chapter 3 of the analyzer manual.]

Purged Analyzer (Hazardous Location) Applications
Take extreme care to avoid damaging the threads on the cable entry glands on the Disconnect Enclosure and all threaded parts on or in the Heater Plate/Seal Assemblies. Clean, defect-free threads are essential to ensure a flameproof connection.

All electrical connections, materials, and methods (plus all safety policies and procedures) must be made in compliance with local wiring regulations and electrical code for the hazardous area, and be approved by the Owner Company.

Refer to "Electromagnetic Compatibility (EMC)" in the contents section of the analyzer manual for information about the EMC Directive regarding techniques and wiring practices to be followed.

To maintain EMC compliance in European installations, AMETEK recommends using metallic glands and shielded cable (at least 85 % coverage) for both power and signal cable connections.

Purged Analyzer (Hazardous Location) Applications
Install and connect a power-disconnect switch (breaker), rated for at least 250 VAC, 3 A 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). The power-disconnect switch (breaker) must be connected to and mounted near the analyzer, in an easily accessible area. The switch (breaker) must be clearly labeled (e.g., "AMETEK Model '9##' Analyzer Main AC Power Disconnect Switch").

For safety reasons during maintenance, this switch allows the main AC power to be disconnected from the analyzer prior to performing service on the analyzer. ***This switch (breaker) is to be supplied by the customer/end user.***

Purged Analyzer (Hazardous Location) Applications
Use a soft, nonabrasive cloth to gently clean the joining surfaces (flamepath) of the Disconnect Enclosure and its door. Close the door and replace at least (1) M10 screw while completing the installation. This will ensure the flamepath is not inadvertently damaged.

LIST OF INTERNAL COMPONENTS			
ITEM	PART TYPE	#	TOTAL NOMINAL POWER DISSIPATION
1	LINE FILTER	2	————
2	LINE FILTER	1	————
3	SURGE SUPPRESSOR	1	————
4	GFI	2	————
5	SOLID STATE RELAY	2	60W
6	ELECTR MECHANICAL RELAY	2	6W
7	SURGE SUPPRESSOR BOARD	1	————
8	SIGNAL DISCONNECT RELAY BOARD	1	3W
9	PRESSURE SWITCH	2	————
ALL COMPONENTS COMBINED			69W
MAXIMUM POWER DISSIPATION			<80W

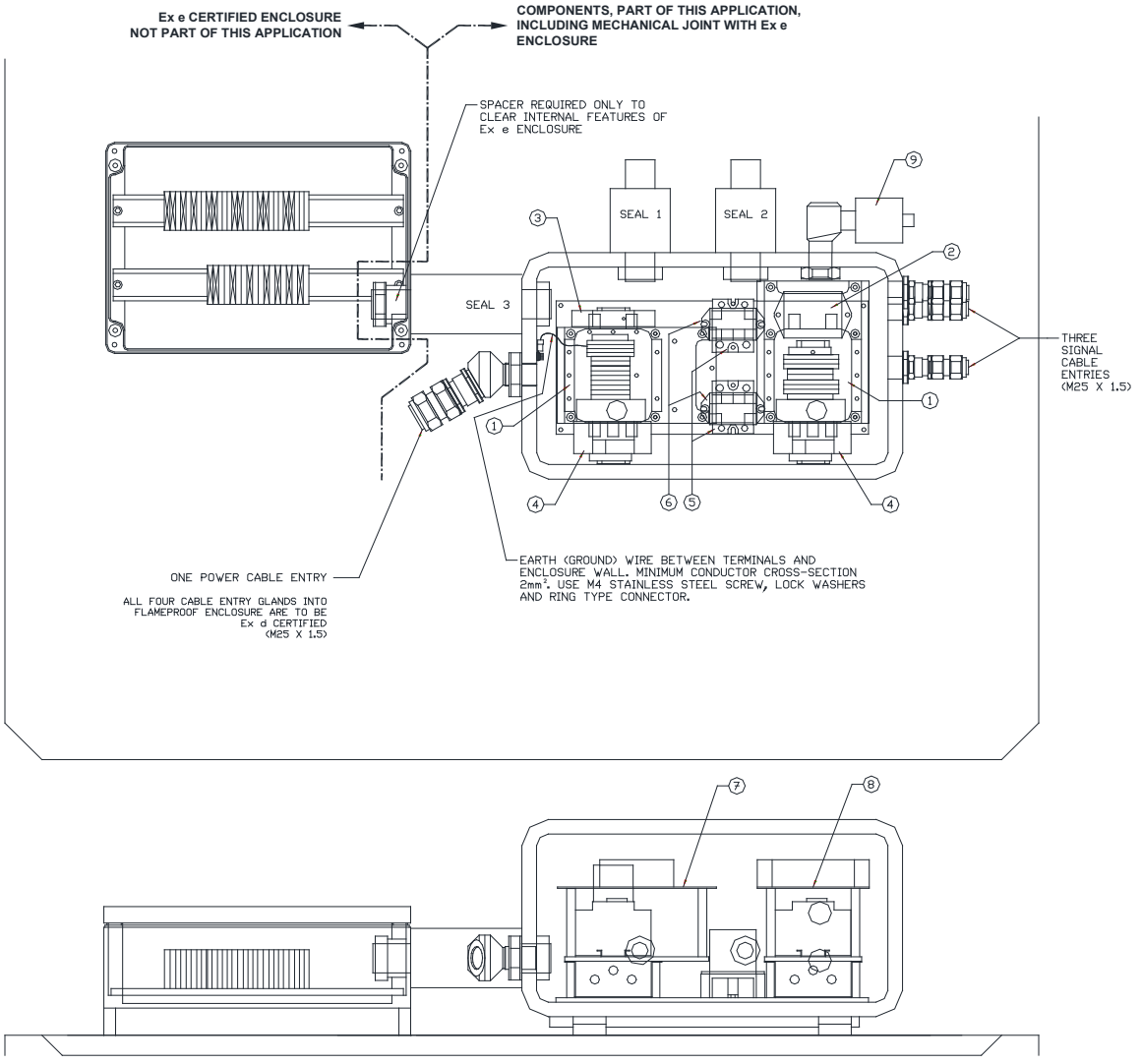

Figure 6.
Type 200 Disconnect Enclosure Details.

Powering Up the Analyzer and Performing Start-Up Checks

Before operating the analyzer for the first time, following a power-up or reset, or after maintenance, you must manually backpurge the analyzer's sample system and adjust the sample gas flow rate.

To ensure safe operating conditions, the analyzer will not power up until the Expo Technologies MiniPurge® System With eTimer has been connected to the instrument air supply (and instrument air is turned on) and has completed its purge stage (the **PURGE COMPLETE** indicator will be GREEN) and the **ALARM/PRESSURIZED** indicator is GREEN (enclosure is pressurized).
[For information about how to enable the MiniPurge system for operation, refer to the "Expo Technologies MiniPurge® System With eTimer Manual."]

After powering up the analyzer for the first time, certain checks must be performed with the Electronics Enclosure door open to ensure the analyzer is operating properly. If problems are encountered during power-up, attempt to diagnose and correct these problems.
[For detailed information about checks to perform after powering up the analyzer and what to do if problems are encountered, follow the procedures in Chapter 3 of the analyzer manual, under the section "Start-Up and Verification" (with particular emphasis on the section "Start-Up Diagnostic Checklist").]

Always disconnect main AC power and/or external power sources to the analyzer before opening any covers or doors on the analyzer to check or perform maintenance on any components within the enclosures.

If it is necessary to open the analyzer's covers or doors while the circuits are live, test the area for flammable gases (and proceed only when the area is safe).

Purged Analyzer (Hazardous Location) Applications
*To work on the analyzer with it powered up and its Electronics Enclosure door open, the Purge Bypass Switch must be in the "**BYPASS**" position.*

When the Electronics Enclosure and/or Disconnect Enclosure are open, take appropriate precautions to avoid electrical shock. Hazardous voltages are present inside.

Analyzer Maintenance and Troubleshooting

Follow the "Analyzer Preventive Maintenance Schedule" [in Chapter 5 of the analyzer manual] to ensure continued and proper operation of the analyzer. This section also includes parts that require scheduled replacement and cleaning.

Certain procedures, such as replacing the source lamps, do not require that the analyzer sample system be isolated from the sample gas stream. Adjustments to the source lamps must be done with the analyzer powered up.
[These procedures can be found in Chapter 5 of the analyzer manual.]

Before performing maintenance on the analyzer, be sure to follow appropriate actions and precautions to prepare the analyzer for service, such as properly isolating the analyzer from the sample gas stream/duct, backpurging the sample line, powering down the analyzer (unless it is necessary to keep the analyzer operating), and opening the Electronics Enclosure.

Preventive Maintenance

Before performing any maintenance, service, or troubleshooting on the analyzer, review and follow all safety information in this chapter and under "Personnel and Equipment Safety Information" following the Table of Contents. This information describes procedures to follow to avoid personal injury and/or damage to the equipment. ***All regulatory agency and personnel safety procedures for your jurisdiction must be followed.***

Personnel should be thoroughly familiar with the operation of the analyzer before performing the maintenance procedures described in this chapter.

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

1. Manually Zero the analyzer, isolate the analyzer sample system from the sample gas stream, and power down the analyzer [as described in each maintenance section in Chapter 5 of the analyzer manual].

2. Continue with the complete procedures to disassemble, clean, replace parts in, and reassemble each sample system assembly and all associated sample system tubing.

   - **Measuring Cell Assembly**
     [For information about when and how to clean and replace these parts, refer to "Measuring Cell Maintenance" in Chapter 5 of the analyzer manual.]

   - **Source Lamps**
     [For information about when and how to replace the source lamps, refer to "Source Lamp Replacement" in Chapter 5 of the analyzer manual.]

It will be necessary to work with the Electronics Enclosure door open and the analyzer powered up after replacing source lamps so that adjustments can be made to the lamps.

   - **Chopper Assembly (Model 900/910/920/930 Analyzers)**
     [For information about when and how to clean and replace these parts, refer to "Chopper Assembly Maintenance" in Chapter 5 of the analyzer manual.]

- **Heater Plate (inside the analyzer oven)**
  [For information about when and how to replace Heater Plate parts, refer to "Replacing Parts in the Heater Plate" in Chapter 5 of the analyzer manual.]

All separable joints in the Heater Plate Assembly and Seal Body are flamepaths.

Take care to avoid damaging these flamepaths when disassembling and reassembling the Heater Plate.

3. After cleaning and replacing analyzer parts, take all necessary safety precautions to prepare the analyzer for power up, then restore AC power to the analyzer.
   [Follow power-up instructions listed within each procedure in Chapter 5 of the analyzer manual.]

4. If necessary, perform a leak (pressure) check on all sample system fittings that were disconnected/reconnected.
   [These procedures are described under "Sample System Leak Check" in Chapter 3 of the analyzer manual.]

5. Prepare the analyzer to properly commission it into operation.
   [Follow instructions listed within each procedure in Chapter 5 of the analyzer manual.]

Other Maintenance

Purged Analyzer (Hazardous Location) Applications
*If it is necessary to perform maintenance on the analyzer while its circuits are live and with its Electronics Enclosure door open, first test the area for flammable gases (and proceed only when the area is safe). To work on the analyzer with it powered up and its Electronics Enclosure door open, the Purge Bypass Switch must be in the "**BYPASS**" position.*

When the Electronics Enclosure and/or Disconnect Enclosure are open, take appropriate precautions to avoid electrical shock. Hazardous voltages are present inside.

Other maintenance and diagnostic checks that may require you to work on the analyzer with its Electronics Enclosure open include resetting switches, checking cables (for proper connections and damage), checking or replacing RTDs or fuses, checking actuator positions (on PWBs), and replacing and adjusting source lamps. Many of these checks are required based on diagnostic alarms triggered by the analyzer and displayed on the User Interface Panel (or on System 200 Configurator Software screens, if used).
[For information about alarm messages and corrective action, refer to "Troubleshooting and Diagnostics" in Chapter 5 of the analyzer manual.]

If procedures for a certain maintenance task are not described in the analyzer manual, contact AMETEK Service Personnel.

For details about maintenance and cleaning parts on the Expo Technologies MiniPurge® System, refer to the "Expo Technologies MiniPurge® System With eTimer Manual" shipped with the analyzer.

Examining and Caring for the Flamepaths

The analyzer is designed with flamepaths that will prevent flame propagation from within the analyzer and its Ex d Disconnect Enclosure to the outside, should an internal explosion occur.

The flamepaths on the analyzer consist of:

- The Ex d Disconnect Enclosure joining surfaces (enclosure door and housing) and its cable entry ports, seal entries, and pressure switch entries.

  During each analyzer maintenance, use a feeler gauge to check the flamepath gap of the Disconnect Enclosure flange (enclosure door and housing joining surfaces). The gap must not exceed 0.15 mm; if the gap exceeds this value, contact AMETEK for advice. See Warning below.

- All separable joints in the Heater Plate Assembly and Seal Body. These parts include the joining surfaces of the Heater Plate, the joining surfaces of the Seal Body and its cover, the RTD mounting locations (whether RTDs are installed or their holes are plugged), and both the threaded and cylindrical end of the Thermal Insulation tube between the Heater Plate and Seal Body.

  During each analyzer maintenance, use a feeler gauge to check the flamepath gap of the Heater Plate Assembly flange (upper/lower Heater Plate joining surfaces, inside the Analyzer Oven). The gap must not exceed 0.1 mm; if the gap exceeds this value, contact AMETEK for advice. See Warning below.

Take extreme care to avoid damaging the threads on the cable entry glands on the Disconnect Enclosure and all threaded parts on or in the Heater Plate/Seal Assemblies. Clean, defect-free threads are essential to ensure a flameproof connection.

When performing equipment maintenance in hazardous areas, all safety standards and procedures must be followed, as specified by the Owner Company, local electrical-inspection authority, and National/EU regulations.

Purged Analyzer (Hazardous Location) Applications
Do not apply power to the analyzer if there is damage (scratches, indentations, or wear) to any flamepath (on the Oven Heater or Disconnect Enclosure). Applying power to an analyzer with a damaged flamepath is dangerous and could result in serious injury or death, or serious damage to equipment. Review this section for complete information about caring for the flamepaths.

Replace the parts immediately if damage or wear is apparent. Contact AMETEK if there is any doubt about the integrity of any flamepath.

Disconnect Enclosure Flamepath (Joining Surfaces)

Any time the Ex d Disconnect Enclosure is opened, inspect the flamepath for scratches, indentations, or other damage.

The surface must be smooth (0.05 mm or better) and the minimum flamepath must be at least 38 mm. When the bolts are tightened, the gap must not exceed 0.15 mm. Use A2 stainless steel fasteners with yield stress ≥450 MPa (65,300 psi).

If it is necessary to use a cleaning agent, make sure the power to the analyzer is off. Also, the agent must be nonabrasive and must not attack aluminum (example, a suitable agent is Isopropanol). Following any maintenance and/or cleaning – and after the cleaning fluid has evaporated completely – immediately close the Disconnect Enclosure.

While the Disconnect Enclosure is open for maintenance or repair, take extreme care to avoid scratching or damaging the joining surfaces (flamepath).

If at any time the Disconnect Enclosure door is open but is not being worked on, close and secure it with at least one screw. This will reduce the risk of inadvertently scratching or damaging the flamepath.

Before closing the door, gently clean these areas with a soft, nonabrasive cloth and make sure they are free of debris.

Before opening the Disconnect Enclosure, follow all necessary safety procedures to ensure the area is nonhazardous (main power to the analyzer is off, explosive gas atmosphere is not present, etc.).

Before performing maintenance on the analyzer, shut off the power to the analyzer and all alternate power supplies (if used).

Heater Plate Flamepath (Joining Surfaces)

Any time the Heater Plate and its Seal Assembly are opened, inspect the flamepath for scratches, indentations, or other damage. For all parts, the maximum surface roughness must be 6.3 μm or less. Use A2 stainless steel fasteners with yield stress ≥450 MPa (65,300 psi).

The minimum flamepath lengths and gaps for the different parts that make up the Heater Plate and its Seal Assembly are:

Heater Top/Heater Bottom
The flamepath length must 12.1 mm or greater and the gap must not exceed 0.1 mm.

Thermal Tube/Seal Body
The flamepath length must 19.2 mm or greater and the gap must not exceed 0.05 mm.

Seal Body/Seal Cover
The flamepath length must 17.4 mm or greater and the gap must not exceed 0.07 mm.

This page intentionally left blank.