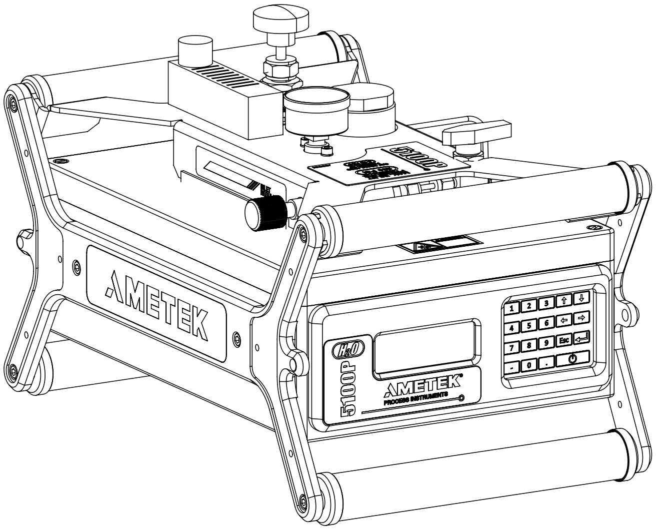
PROCESS INSTRUMENTS

ESSENTIAL HEALTH and SAFETY

5100P TDLAS Analyzer
Division 2/Zone 2



PN 9000-302-VE Rev A

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

Contents

Overview

About This Document

This document describes the Essential Health and Safety (EH&S) requirements for the components that make up the 5100P TDLAS Analyzer intended for use in Division2/Zone 2 hazardous locations.

The procedures and information discussed in this document include only abbreviated steps to install, operate, and perform maintenance on the 5100P TDLAS Analyzer. They do, however, include all relevant safety warnings and cautions to ensure the safety of personnel and the 5100P TDLAS Analyzer in Division2/Zone 2 hazardous locations.

NOTE

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.

Important Safety Information

Warnings, Cautions, Notes

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

Important information that should not be overlooked.

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

Une procédure ou une alerte de processus qui, si elle n'est pas strictement observée, indique un risqué potential de blessure sérieuse d'une personne ou une contamination environmentale.

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

Une procédure de fonctionnement ou une situation qui, si elle n'est pas strictement observée, indique une risqué potential de blessure mineure ou modérée d'une personne ou un dommage d'equipement.

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

Electrical Safety

WARNING

Hazardous voltages may be present in the analyzer enclosure when power is applied to the system. Always shut down power source(s) before performing maintenance or troubleshooting. Only a qualified electrician should make electrical connections and ground checks.

AVERTISSEMENT

Des tensions dangereuses peuvent être présentes dans l'analyseur de logement lorsque l'alimentation est appliquée au système. Arrêtez toujours sources d'énergie avant d'effectuer l'entretien ou le dépannage. Seul un électricien qualifié doit faire les connexions électriques et contrôles au sol.

WARNING

Any use of the equipment in a manner not specified by the manufacturer can impair the safety protection originally provided by the equipment. Follow all instructions and warnings in this guide.

AVERTISSEMENT

Toute utilisation de l'équipement d'une façon non spécifiée par le fabricant peut nuire à la protection de sécurité initialement offert par l'équipement.

WARNING

EXPLOSION HAZARD
Substitution of components can impair suitability for explosive atmosphere use.

AVERTISSEMENT

RISQUE D'EXPLOSION
Le remplacement de composants peut nuire à l'aptitude à l'utilisation en atmosphère explosive.

WARNING

EXPLOSION HAZARD
DO NOT connect USB or charger unless the surrounding area is verified to be non-hazardous.

AVERTISSEMENT

RISQUE D'EXPLOSION
Avant de connectex USB ou alimentation electrique, s'assureer que l'emplacement est designe non dangereux.

WARNING

If the vent on the rear of the instrument becomes damaged, it must be replaced before further use of the instrument.

Sample Gas Safety

WARNING

Potential hazards presented by the Sample gas should be taken into consideration before connecting the sample to the analyzer.

- *Personal protective equipment (PPE) and proper ventilation must be used if the Sample gas is toxic, flammable, or corrosive.*
- *Check the sample line and all connections for leaks before introducing process gas.*
- *Consult your Plant Safety Personnel for appropriate exhaust-venting guidelines for the specific sample-gas type.*

AVERTISSEMENT

Les dangers potentiels de l'échantillon de gaz devraient prendre en considération avant de brancher l'échantillon jusqu'à l'analyseur.

- *Équipement de protection individuelle et une ventilation adéquate doivent servir si l'échantillon de gaz est toxiques, inflammables ou corrosifs.*
- *Consultez l'exemple de ligne et tous les raccords d'étanchéité avant l'introduction du gaz de processus.*
- *Consulter le personnel de sécurité usine pour connaître les instructions ventilation d'échappement approprié pour le type de gaz échantillon spécifique.*

Electromagnetic Compatibility (EMC)

CAUTION

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.

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

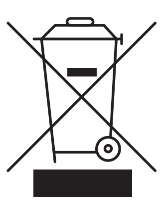
CAUTION – Hot Surface
(ATTENTION – SURFACE CHAUDE)
Achtung – Heiße Oberfläche

DANGER – LASER LIGHT WHEN OPEN. AVOID DIRECT EYE EXPOSURE

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 reaches 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 www.AMETEKPI.com/customersupport/aftermarket.

Special Conditions of Safe Use

Do not connect to power supply or USB ports while in hazardous locations.

FCC – Supplier's Declaration of Conformity Compliance Information Statement

47 CFR § 2.1077 Compliance Information
Unique Identifier: 5100P TDLAS Analyzer

150 Freeport Road
Pittsburgh PA 15238
Tel: +1 412 828 9040
www.ametekpi.com

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.

5100P TDLAS Analyzer Specifications

For the purpose of this document, specifications listed here apply primarily to the utilities required for the 5100P TDLAS Analyzer. For a complete listing of all 5100P TDLAS Analyzer specifications, refer to the 5100P TDLAS Analyzer *User Manual*.

Specification	
Principle of Operation	Tunable diode laser absorption spectroscopy (TDLAS)
Inputs	Onboard User Interface with 19-key keypad (includes Power On/Off key).
Outputs	• 20-character by 4-line LCD display with white LED backlight • 5100P Application Software
Battery Type / Life	• Rechargeable Sealed Lead Acid Battery • A minimum of eight (8) hours of operation at room temperature with the backlight turned Off. Operation at temperature extremes will decrease the run time on the battery.
Inlet Pressure Range for Sample Panel	There are three Sample Panel options available (application-specific): **Standard Sample Panel** 1.03–17.2 BARG (15–250 PSIG) **Low Pressure Sample Panel** 0.06–1.03 BARG (1–15 PSIG) **No Sample Panel** 0.06–0.7 BARG (1–10 PSIG)
Sample (Measuring) Cell Pressure	Atmospheric
Sample Gas Temperature	-20 to +50 °C (-4 to 122 °F)
Sample Flow Rate	1–2 SLPM (2–4 SCFH), recommended
Environmental Ratings	Ambient Temperature: -20 to +50 °C (-4 to 122 °F) Maximum Altitude: 2000 meters Relative Humidity (ambient): 0–90 %, non-condensing Pollution Degree: 2 Overvoltage Category: I Ingress Rating: IP65 RoHS Compliant
Power Requirements*	Battery Charger Input: 100–250 VAC 50–60 Hz 0.5 Amp Battery Charger Output: 7.35 VDC; 2 Amps *Use only the AMETEK provided Battery Charger, PN 7001-874-SE.

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5100P Analyzer Directives and Standards

IECEx	Certificate No.: IECEx ETL 19.0060X Marking: Ex nA ic op pr IIC T3 Gc Using the following standards: IEC 60079-0:2011 Ed. 6.0 IEC 60079-11:2011 Ed. 6.0 IEC 60079-15:2010 Ed. 4
ATEX	Certificate No.: ITS19ATEX25194X Marking: II 3 G Ex nA ic op pr IIC T3 Gc -20 °C ≤ Tamb ≤ +50 °C Directive 2014/34/EU using the following standards: EN 60079-0:2012+A11:2013 EN 60079-11:2012 EN 60079-15:2010 EN 60079-28:2007
NEC/CEC	Class I and II, Division 2, and Class III, Divisions 1 and 2 Groups A,B,C,D; T3; -20 °C ≤ Tamb ≤+50 °C Using the following standards: UL 121201:2017 Ed.9 CSA C22.2 No. 213:2017 Ed.3

5100P Analyzer Marking

Connecting and Starting Up the 5100P

Safety Considerations

WARNING

Before connecting, operating, or servicing the AMETEK 5100P Analyzer and before powering it up, review and follow all safety information in the "Overview" section of this document, and all safety information in this section and in the application-specific 5100P Analyzer Manual Supplements *shipped with the system. This information describes procedures to follow to avoid personal injury and/or damage to the equipment. All regulatory agency and personnel safety procedures for your jurisdiction must be followed.*

WARNING

The connection and operation of the analyzer must be in accordance with all of the customer and local regulatory standards and procedures. There are no operator-serviceable components inside the analyzer. Refer all servicing to qualified personnel.

WARNING

Ensure the area is safe for the operation of this equipment.

WARNING

Ensure all personnel performing work with the analyzer and Sample gas stream are familiar with all applicable safe handling procedures.

WARNING

Ensure all required Personal Protective Equipment (PPE) is appropriately used.

WARNING

Ensure the Sample gas stream is properly connected to the analyzer.

Ensure the Drain Valve connection on the Sample Panel and the Outlet (Exhaust) fitting on the analyzer are connected to a safe venting point that is at atmospheric pressure.

Pre-Installation Requirements

Storage Prior to Installation

If the analyzer is stored for any period of time prior to installation, store it in its shipping case, in an environment where it is not subject to dripping or splashing liquids, corrosive gases, high humidity, or excessive heat or cold. Recommended storage conditions include:

Temperature:	-20 to +50 °C (-4 to 122 °F)
Relative Humidity:	<90 %

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

Uncrating and Inspecting the Analyzer

Open the shipping and storage case the 5100P Analyzer is shipped in and inspect the instrument for damage. If equipment is damaged, notify the carrier and contact AMETEK Service (www.AMETEKPI.com/customersupport/aftermarket) immediately if parts are missing or damage is found, and to verify if damaged parts will require replacement prior to safely connecting and operating the analyzer.

Utilities Required for the Analyzer

- AC power connection, to charge the built-in Battery Pack (International Power Adaptor supplied.)

Charging the 5100P Analyzer Battery Pack

The 5100P Analyzer is designed for battery operation, and it is important to ensure that its Battery Pack has been fully charged prior to using the analyzer.

To charge the Battery Pack:

CAUTION

Charge the 5100P Analyzer only in non-hazardous locations.

1. Connect the Battery Charger cord to the Charger Port on the back of the 5100P Analyzer. To do this, remove the Dust Cap from the Charger Port, and align and insert the keyed/male-threaded charger connector end into the Charger Port (Figure 1). Tighten the connector finger tight.

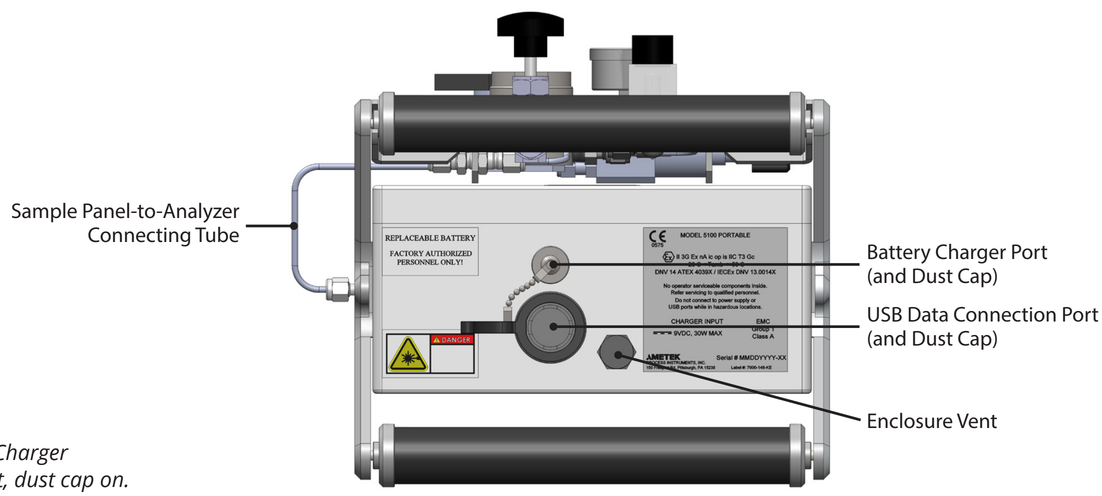


Figure 1.
5100P Battery Charger connection port, dust cap on.

CAUTION

Use only the AMETEK provided Battery Charger (PN 7001-874-SE), 110 VAC–250 VAC, 47–63 Hz, input 7.35 VDC, 2 A Output.

2. If required, connect the International Power Adaptor to the Battery Charger's power cord and use the appropriate line plug adapter (i.e., US, European, etc.) to plug the cord into a power outlet.

3. After the charger has been connected to the AC mains voltage, one of two LEDs will turn on:

   - The YELLOW LED indicates that the charger is in *Charging* mode.
   - The GREEN LED indicates that the charger is connected to power.
   - When the Battery Pack is fully charged, the GREEN LED will be On and the YELLOW LED will be Off.

4. Charge the 5100P for a minimum of eight (8) hours, (or overnight, if possible) prior to operating the analyzer using its Battery Pack. This should provide 8-plus hours of continuous analyzer use. If required, the 5100P can remain connected to the charger for an indefinite period while charging.

Extending Battery Life

Because the 5100P Analyzer is designed to be operated from the internal battery pack, it is important to operate the analyzer in a manner consistent with obtaining maximum usable battery life between charges. If used properly, a fully charged battery will provide a minimum of eight (8) hours of operation. Consider the following measures to maximize the operational time on a fully charged battery:

- Turn Off the power when the analyzer is not being used to measure Sample gas.
- The backlight for the display will time out and turn Off automatically, according to the **Backlight Timer** setting. Set the **Backlight Timer** to the shortest practical duration to avoid draining the battery. See “Changing the Backlight Time” in Chapter 3 of the 5100P TDLAS Analyzer *User Manual* for information on how to set this timer.
- Temperature extremes require extra power to run the TDL spectrometer circuitry.

NOTE

The battery pack will last longer when the analyzer is operated at or near room temperature.

- Do not store the 5100P for longer than three (3) months (90 days) without using the analyzer, or performing a full charging cycle. Always fully charge the battery pack (minimum of 8 hours) prior to using the analyzer.

5100P Analyzers With and Without a Sample Conditioning Panel

The 5100P Analyzer is typically supplied with a Sample Conditioning Panel – connected to the analyzer – which provides pressure reduction, filtering, and flow control adjustment. A Sample gas supply line is connected to the Sample Panel using an 1/8-inch Swagelok® compression fitting.

The 5100P Analyzer can be operated without the integrated Sample Conditioning Panel supplied by AMETEK. **However, certain conditions must be met for systems without a Sample Conditioning Panel, as described under "No Sample Panel" in this section.**

At the Sample Panel Inlet, a valve is provided to isolate the analyzer from the sample stream. Downstream of the isolation valve, a pressure regulator is used to reduce the Sample gas pressure to the target operating pressure of the panel.

The major components of the integrated Sample Conditioning Panel and their functions are described below and illustrated in the Sample Panel Flow diagrams (Figures 2.1 and 2.2).

Component	Function
Inlet Valve	Use this valve to isolate the 5100P Analyzer from the Sample Gas stream, and to allow the flow of Sample Gas into the Sample Conditioning Panel.
Outlet Fitting/Panel Exhaust (to instrument)	Provides the Sample Gas connection point out of the Sample Conditioning Panel (Panel Exhaust), which flows to the Inlet port on the 5100P Analyzer.
Regulator	Available only on the Standard Pressure Sample Conditioning Panel, use the regulator to reduce the Sample Gas pressure to the desired operating pressure of the Sample Conditioning Panel (typically set to 0.4–0.7 BARG/6–10 PSIG).
Gauge	Displays the pressure of the Sample Gas being delivered to the analyzer.
Filter	This filter (membrane separator) removes any entrained (trapped) liquids and particulate matter from the Sample Gas and protects the analyzer.
Flow Meter with Valve	Use this to set the Sample Gas flow to between 1–2 LPM and to protect the analyzer.
Drain Valve	Open this valve to remove liquids and particulate matter (separated by the Filter) from the Sample Gas, before it travels to the 5100P where it is measured. Typical setting is to turn the valve 1/8-turn counter-clockwise from the fully closed position.

Standard Pressure Sample Panel (Typical Operation)

The *Standard* 5100P Sample Conditioning Panel (Figure 2.1) operates with a raw Sample gas pressure of 1.03–17.2 BARG (15–250 PSIG).

Downstream of the Inlet Valve, a pressure regulator is used to reduce the Sample gas pressure to the recommended operating pressure of the 5100P Analyzer (0.4–0.7 BARG [6–10 PSIG]).

The Sample gas passes through the Filter (membrane separator) to remove any entrained (trapped) liquids and particulate matter before the gas passes through the Flow Meter.

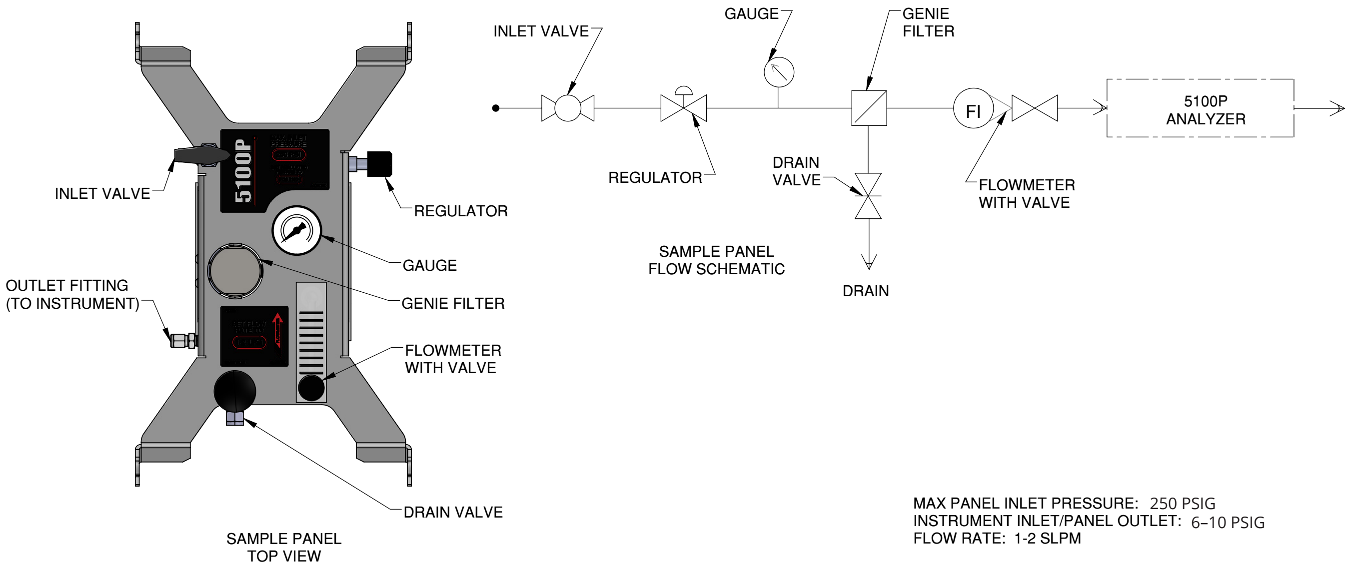


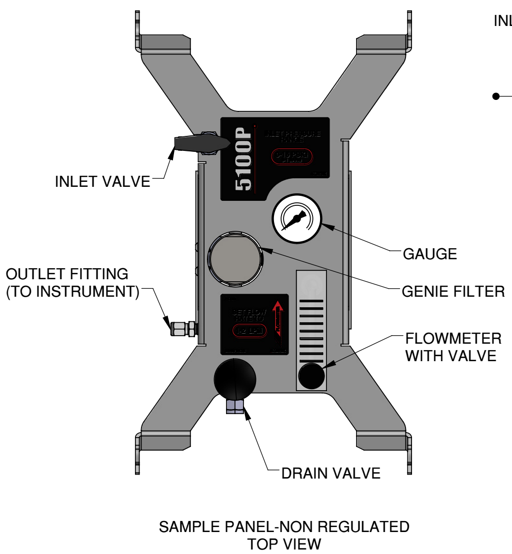
Figure 2.1.
Sample Panel Flow Diagram, Maximum 250 PSIG (Standard version).

Low Pressure Sample Panel (Optional Operation)

The Low Pressure 5100P Sample Conditioning Panel (Figure 2.2) operates with a raw Sample gas pressure of 0.06–1.03 BARG (1–15 PSIG).

Upstream of the AMETEK Sample Panel Inlet Valve, a pressure regulator (installed by customer/end user) is used to reduce the Sample gas pressure to the recommended operating pressure of the 5100P Gas Analyzer (0.4–0.7 BARG [6–10 PSIG]).

The low pressure Sample gas is passed through the Filter (membrane separator) to remove any entrained (trapped) liquids and particulate matter before the gas is passed through the Flow Meter.



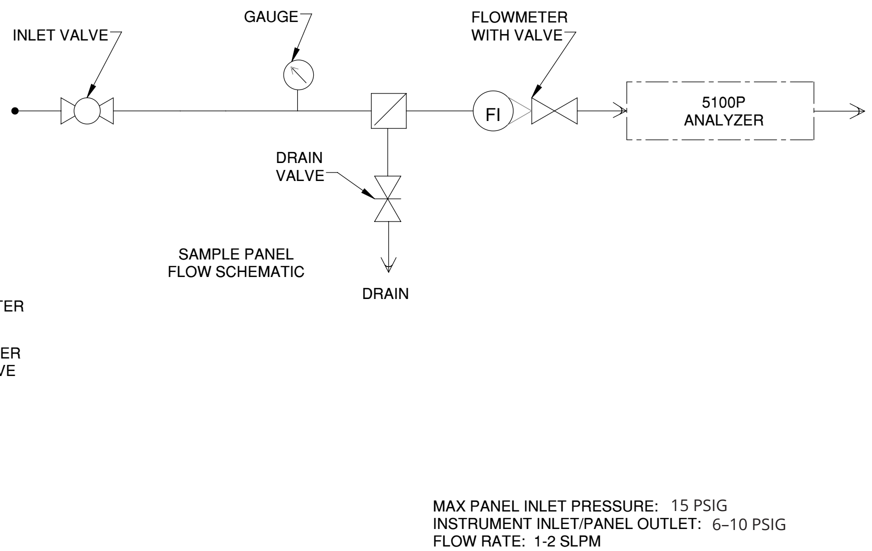


Figure 2.2.
Sample Panel Flow Diagram, Maximum 15 PSIG (Low Pressure version).

No Sample Panel

WARNING

5100P Analyzers that will be used in ATEX/IECEx Zone 2 areas must have an AMETEK-supplied Sample Conditioning Panel.

When operating the 5100P Analyzer without an AMETEK-supplied Sample Conditioning Panel, precautions must be taken to ensure the accuracy of performance and reduce possible maintenance issues.

Ensure the following conditions are met:

- Sample flow rate needs to be controlled between 1–2 LPM.
- The Sample Inlet pressure must be 0.4–0.7 BARG (6–10 PSIG).
- Liquid and solid particulates must be removed from the Sample gas by using appropriate filters (supplied by Customer). AMETEK recommends using a 2-micron particulate filter and a filter membrane capable of removing any liquids, including droplets.

CAUTION

Failure to provide a properly conditioned Sample gas can result in physical damage to the 5100P and may also result in incorrect analyte concentration measurements.

Connecting and Preparing the 5100P Analyzer

For normal operation, position the Sample Conditioning Panel vertically, so that the Inlet Valve is located at the top of the panel. The analyzer should be standing vertically on the supporting structure – with the User Interface display facing upward – so that the flow of Sample gas is correctly metered.

WARNING

Hazardous Locations

- *Do not connect the 5100P Analyzer to a computer (via the USB port).*
- *To meet Hazardous Location and Ingress Protection ratings, ensure the protective caps for the Battery Charger and USB Data Connection ports (on the 5100P Rear Panel) are securely installed on their respective ports.*
- *When working with the 5100P Analyzer in Division 2/Zone 2 hazardous locations, use only the built-in Battery Pack to power the analyzer. Do not connect and use the Battery Charger to supply power to the analyzer.*
- *Ensure the area is safe for the operation of this equipment.*
- *Ensure all personnel performing work with the analyzer and Sample gas stream are familiar with all applicable safe handling procedures.*
- *Ensure all required Personal Protective Equipment (PPE) is being appropriately used.*
- *Ensure the drain connection of the Sample Panel and the outlet of the analyzer are connected to a safe venting point that is at atmospheric pressure.*

NOTE

Before connecting Sample gas and operating the 5100P Analyzer and its Sample Conditioning Panel, read the entire section "Introduction to the User Interface" in Chapter 3 of the 5100P TDLAS Analyzer User Manual *to learn how to navigate through the screens to work on the analyzer.*

Connecting Sample Gas to the 5100P Sample Panel

Before connecting the Sample gas to the Sample Conditioning Panel and analyzer, verify the operating pressure of the Sample gas line does not exceed the maximum rating of the Sample Panel. Check the label on the analyzer's Sample Panel to verify the maximum pressure rating for your system.

To connect the Sample gas line and operate the Sample Panel:

1. Before beginning, close the Sample Panel's Inlet Valve to isolate the 5100P Sample Conditioning Panel from the sample line (see Figures 2.1 and 2.2 for location of Inlet Valve). The Inlet Valve is closed when it is in the vertical position (when the 5100P is also in the vertical position).

   Systems with the *Standard* (1.03–17.2 BARG/15–250 PSIG) Sample Conditioning Panel only:
   Fully close the Regulator on the AMETEK Sample Conditioning Panel. (Fully clockwise = Closed.)

2. Connect the sample line to the 1/8-inch compression fitting on the Sample Panel's Inlet Valve.

3. Ensure there are no leaks at this connection. Use Snoop® or another suitable leak detection agent to check the connections.

4. Open the main process Isolation Valve (by customer/end user) on the process pipe to start the flow of Sample gas to the Sample Panel.

5. Open the Drain Valve 1/8-turn by turning the valve 1/8-turn counter-clockwise from the fully closed position.

6. Turn the Inlet Valve on the Sample Panel to the Open position.

7. Using the Regulator, adjust the sample pressure to between 0.4–0.7 BARG (6–10 PSIG).

8. Adjust the Flow Meter Valve to set the Sample gas flow to between 1–2 LPM (see Figures 2.1 and 2.2 for location of Flow Meter with Valve).

9. After the flow rate of the Sample gas has stabilized to 1–2 LPM through the 5100P, the analyzer is ready to measure the analyte concentration in the gas stream. See "System Start-Up and Verification" in this document for information about operating the analyzer.

Disconnecting Sample Gas From the 5100P Sample Panel

To disconnect the 5100P from the Sample gas stream:

1. Close the main process Isolation Valve (by customer/end user) on the process pipe.

2. Fully open the Drain Valve on the Sample Panel. Wait one (1) minute to allow the Sample gas pressure to bleed down.

3. After the pressure in the panel has bled down (gauge reads zero ('**0**')), close the Inlet Valve on the Sample Panel. Close all other Sample Panel valves to ensure no contaminates enter the panel.

4. Disconnect the sample line from the 5100P Sample Panel and replace the caps on the exposed fittings on the Sample Panel or 5100P Analyzer.

CAUTION

Change the Filter Elements in the Filter (membrane separator) on a regular basis. Refer to Chapter 4 (Maintenance and Troubleshooting) of the 5100P TDLAS Analyzer User Manual *for more information.*

Do not operate the 5100P Sample Panel with a damaged o-ring in the Filter Assembly.

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Powering up the 5100P Analyzer

WARNING

Hazardous Locations
Ensure the Dust Caps for the USB and Battery Charger ports on the Rear Panel connections are installed.

WARNING

Ensure the Sample gas stream is properly connected to the analyzer.

Ensure the Drain Valve connection on the Sample Panel and the Outlet (Exhaust) fitting on the analyzer are connected to a safe venting point that is at atmospheric pressure.

After the Sample Gas stream has been connected to the analyzer, the Drain and Exhaust lines have been connected and routed to a safe venting location, and the connections have been tested for leaks, the analyzer can be powered up and commissioned into normal operation.

To power up the 5100P Analyzer:

1. Press the **Power On/Off** key (⏻) on the analyzer User Interface keypad. While the system is starting up the message "**Initializing**" is displayed.

2. While the laser is tuning, the message "**Searching please wait...**" will be displayed. The start-up sequence typically takes approximately one (1) minute.

3. After the laser has tuned, the analyzer will be in normal operating mode and the User Interface will default to the **HOME** screen (Figure 3).

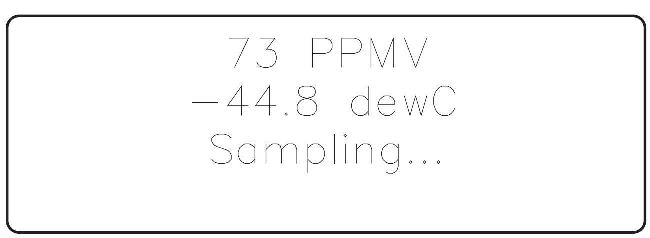

Figure 3.
HOME screen.

Analyte information will begin to display on the User Interface screen (see Figure 3 for an example screen from an analyzer measuring water vapor).

The analyte concentration is displayed on the first line.

- If water vapor is the analyte, the Dew Point temperature (e.g., dewC) is displayed on the second line.
- For most applications, the factory default setting for the analyte concentration units is parts per million by volume (PPMV). Other options for this setting can be configured in the Units menu.

Communicating With the 5100P TDLAS Analyzer Via the 5100P Application Software

The PC-based 5100P Application Software (standard with each unit) provides enhanced functionality over the 5100P User Interface, and can be used to communicate with the analyzer via a desktop or laptop computer. The PC-to-analyzer connection is via a USB cable (Type B).

Install the Application Software prior to connecting the 5100P to your computer. Refer to Chapter 3 of the 5100P TDLAS Analyzer *User Manual* for details.

WARNING

Hazardous Locations
Do not install the Application Software on the PC in a known Hazardous Location.

Starting the 5100P Application Software and Establishing Communication Between the Analyzer and Computer

This section discusses how to start the Application Software and establish communications with the analyzer. Before beginning, you should have already installed the Application Software, as explained in the 5100P TDLAS Analyzer *User Manual*.

WARNING

Hazardous Locations
Do not remove the dust cap from the USB Connection Port and do not connect the USB cable to the 5100P in Hazardous Locations. The cable and connection port are intended for use only in non-hazardous or General Purpose areas.

To establish communication between the analyzer and computer:

1. Turn On the 5100P. The analyzer powers up and initializes.

2. Remove the Dust Cap from the USB Data Connection Port – on the Rear Panel of the 5100P Analyzer (see Figure 4) – and insert one end of the USB cable (Type B) into the USB Port on the 5100P.

3. Connect the other end of the USB cable into a USB port on the computer.

4. Turn On the computer and start the Application Software by clicking the **Ametek 5100P.exe** icon, located on the PC's desktop.

   From the **Start** menu, locate the **Ametek 5100P** icon and double-click it to run the software and display the **HOME** screen.

   If the software does not start and displays the message "**Can not connect the device, check the connection or reset the device**." click **OK** to close the message. From the **Start** menu, locate the **Ametek 5100P** icon and right-click on it to display a flyout menu. Choose **Run as administrator**. Enter the **User Name** and **Password** and click **Yes**. The 5100P Application Software will start, and display the **HOME** screen.

5. If communications between the devices are established, the analyzer will upload and display data on the Application Software **HOME** screen.

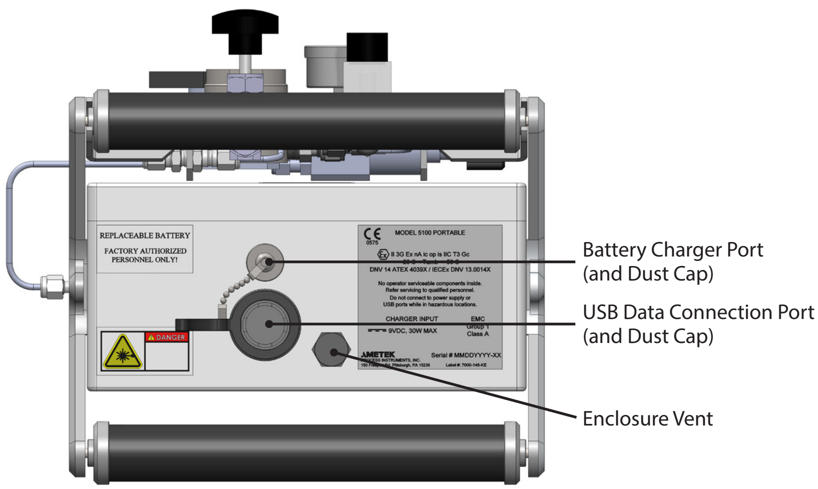

Figure 4.
5100P USB Data Connection Port, dust cap on.

Closing the 5100P Application Software

After you are finished communicating with the analyzer, close the Application Software and disconnect the computer from the analyzer:

1. From the 5100P Application Software, click the **X** in the upper-right corner of the window.

2. The message “**Exit 5100P TDLAS Windows Application?**” will appear. Click **Yes** to exit, or **No** to continue working with the software.

3. If you are finished working with the 5100P Analyzer, press the Power On/Off key to power down the analyzer.

4. Disconnect the USB cable from the computer and from the USB port on the 5100P. Replace the Dust Cap on the USB Data Connection Port On the Rear Panel of the 5100P Analyzer.

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Under normal operation, the AMETEK 5100P Analyzer will deliver many years of maintenance-free operation.

Most instances of maintenance can be prevented by ensuring that a clean Sample gas stream (i.e., free of aerosols and particulate material) is provided to the analyzer. Because of this, it is important to use the Sample Panel provided with the analyzer and properly inspect and replace the Filter Elements at regular intervals. This will prevent any liquids and particulate matter from entering the instrument. When not connected to sample lines and vents, the inlet and outlet connections of the 5100P and Sample Panel should be capped to prevent particulates from entering the Sample Panel or the analyzer.

WARNING

The sample containment system must be checked for leaks after performing any service work or maintenance on either the instrument or Sample Panel.

Safely Powering Down the 5100P Analyzer to Perform Maintenance

For certain maintenance procedures, the analyzer must be powered down.

WARNING

Before powering down the analyzer read and follow the Warnings and Cautions under "Electrical Safety," "Sample Gas Safety," and other safety information near the beginning of this document.

WARNING

Before proceeding, test the area around the analyzer for flammable gases. If an explosive gas atmosphere is present, do not disconnect power from the analyzer or any alternate power sources that supply power to the analyzer components. Proceed only when the area is found to be safe.

Before performing maintenance on the 5100P Analyzer, power down the analyzer by pressing the **Power On/Off** button on the front panel.

If process gas and vent lines are connected, disconnect the lines and replace the caps on the Sample Panel connections to prevent unwanted ambient items like dust and water from entering the analyzer sample path.

Maintenance

Under normal operating conditions, the Sample Panel requires very little maintenance. This section describes the maintenance required to keep the 5100P Analyzer operating at peak efficiency.

Safety Considerations

WARNING

Before working on the analyzer, read the entire procedure you will be performing to learn how to safely perform maintenance on and troubleshoot the 5100P Analyzer.

WARNING

Before performing any maintenance, service, or troubleshooting on the analyzer, review and follow all safety information in the "Overview" section of this document, and all safety information in this section and in the application-specific 5100P Analyzer Manual Supplements *shipped with the system. 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 5100P Analyzer before performing the maintenance and troubleshooting procedures described in this section.

After the 5100P has been safely powered down, or removed to a safe, non-hazardous area, perform the required maintenance as described in the 5100P TDLAS Analyzer *User Manual*.

Troubleshooting – Alarms

This section lists the Alarm messages that can be triggered by the system, to alert you to potential or impending problems with the analyzer. Descriptions of the Alarms, along with possible trigger conditions, and corrective action to take to correct the Alarm, are also included. Alarm messages are displayed on the 5100P User Interface (**Alarms** screen) and, when working on the 5100P using the 5100P Application Software connected to a computer (**Alarms** screen). The 5100P maintains a history of alarms, which can be viewed on the 5100P Application Software.

<table>
<tr><th>Alarm Condition / Description / Corrective Action</th><th>Alarm Type</th></tr>
<tr><td>Concentration Hi (User Interface)
Concentration High (5100P Application Software)

The measured concentration of the analyte in the Sample gas exceeds the user-defined alarm limit.

IMPORTANT:
Alarm-limit values correspond to the output concentration units that have been selected.

Corrective Action:

From the User Interface:

• View the Alarm Concentration screen and edit the Hi Limit value. Refer to “Editing Alarm Concentration Low/High Setpoints“ in Chapter 3 of the 5100P Analyzer User Manual for information on how to change this value.

From the 5100P Application Software:

• View the Settings screen and edit the Alarms Output High Limit value. Refer to “Configuring the 5100P Parameters From the Setup Screen“ in Chapter 3 of the 5100P Analyzer User Manual for information on how to change this value.</td><td>Warning</td></tr>
<tr><td>Concentration Lo (User Interface)
Concentration Low (5100P Application Software)

The measured concentration of the analyte in the Sample gas is below the user-defined alarm limit.

IMPORTANT:
Alarm-limit values correspond to the output concentration units that have been selected.

Corrective Action:

From the User Interface:

• View the Alarm Concentration screen and edit the Lo Limit value. Refer to “Editing Alarm Concentration Low/High Setpoints“ in Chapter 3 of the 5100P Analyzer User Manual for information on how to change this value.

From the 5100P Application Software:

• View the Settings screen and edit the Alarms Output Low Limit value. Refer to “Configuring the 5100P Parameters From the Setup Screen“ in Chapter 3 of the 5100P Analyzer User Manual for information on how to change this value.</td><td>Warning</td></tr>
</table>

<table>
<tr><th>Alarm Condition / Description / Corrective Action</th><th>Alarm Type</th></tr>
<tr><td>TEC Temp Hi (User Interface)
TEC Temperature High (5100P Application Software)

The temperature of the laser exceeds the factory-set tolerance band. This alarm is active if the ambient temperature for the analyzer exceeds the rated 50 °C (122.0 °F) or if there is a problem with the analyzer's laser temperature-control circuit.

IMPORTANT:
The factory-set tolerance band varies from analyzer to analyzer as the exact operating temperature of the lasers varies. Do not assume the tolerance band for every 5100P is exactly the same.

Corrective Action:
Confirm local ambient and Sample gas temperatures are less than 50 °C (122.0 °F). Protect the 5100P Analyzer from direct sunlight and/or operate it only when ambient temperatures are within the defined range of -20 °C to +50 °C (-4 °F to 122.0 °F). If sample temperatures are consistently near or greater than 50 °C (122.0 °F), efforts should be made to cool the sample before it is analyzed in the 5100P.
It is also common to see this error message displayed during the analyzer startup sequence, when the analyzer initializes the laser temperature-control circuit by starting at the high end of its allowed temperature range. If the analyzer has been powered up for 3–5 minutes and local ambient and sample temperatures are not changing significantly, the alarm should not persist. If the alarm message appears repeatedly, contact AMETEK Service and Support for assistance.</td><td>Warning</td></tr>
<tr><td>TEC Temp Lo (User Interface)
TEC Temperature Low (5100P Application Software)

The temperature of the laser drops below the factory-set tolerance band. This alarm is active if the ambient temperature for the analyzer exceeds the rated -20 °C (-4.0 °F) or if there is a problem with the analyzer's laser temperature-control circuit. This alarm may occur during the analyzer startup sequence, but can be reset after the analyzer has reached normal operating temperature.

IMPORTANT:
The factory-set tolerance band varies from analyzer to analyzer as the exact operating temperature of the lasers varies. Do not assume the tolerance band for every 5100P is exactly the same.

Corrective Action:
Confirm local ambient and Sample gas temperatures are greater than -20 °C (-4.0 °F). Protect the 5100P Analyzer from extreme cold and/or operate it only when ambient temperatures are within the defined range of -20 °C to +50 °C (-4 °F to 122.0 °F). If sample temperatures are consistently below -20 °C (-4.0 °F), efforts should be made to warm the sample before it is analyzed in the 5100P.
It is also common to see this error message displayed during the analyzer startup sequence, when the analyzer initializes the laser temperature-control circuit by starting at the high end of its allowed temperature range. If the analyzer has been powered up for 3–5 minutes and local ambient and sample temperatures are not changing significantly, the alarm should not persist. If the alarm message appears repeatedly, please AMETEK Service and Support for assistance.</td><td>Warning</td></tr>
</table>

Alarm Condition / Description / Corrective Action	Alarm Type
Cell Temp Hi **(User Interface)** **Cell Temperature High** **(5100P Application Software)** The temperature of the Measuring Cell exceeds the allowed operating range for the analyzer. This condition exists when the analyzer is used in ambient temperatures that exceed the rated range of 50 °C (122.0 °F) or if the temperature of the Sample gas supplied to the analyzer exceeds the rated value. ***Corrective Action:*** • Protect the 5100P Analyzer from direct sunlight and/or operate it only when ambient temperatures are within the defined range of -20 °C to +50 °C (-4 °F to 122.0 °F). If sample temperatures are consistently near or greater than 50 °C (122.0 °F), efforts should be made to cool the sample before it is analyzed in the 5100P.	Warning
Cell Temp Lo **(User Interface)** **Cell Temperature Low** **(5100P Application Software)** The temperature of the Measuring Cell drops below the allowed operating range for the analyzer. This condition exists when the instrument is used in ambient temperatures that exceed the rated range of -20 °C (-4.0 °F), or if the temperature of the Sample gas supplied to the analyzer is below the rated value. ***Corrective Action:*** • Protect the 5100P Analyzer from extreme cold and/or operate it only when ambient temperatures are within the defined range of -20 °C to +50 °C (-4 °F to 122.0 °F). If sample temperatures are consistently below -20 °C (-4.0 °F), efforts should be made to warm the sample before it is analyzed in the 5100P.	Warning
System Fault **(User Interface and 5100P Application Software)** The 5100P has detected a failure in the **Detector** electronics. ***Corrective Action:*** Take appropriate safety precautions, and: • Turn Off the power to the analyzer. Restart the 5100P. If the alarm message appears repeatedly, contact AMETEK Service and Support for assistance.	Fatal
Data Invalid **(User Interface and 5100P Application Software)** The 5100P is unable to lock on the absorption line. Values are invalid. This alarm can occur during startup or if the analyzer is exposed to a sudden change in the ambient temperature. The analyzer should re-establish and verify line-lock within a few moments and return to normal operation. ***Corrective Action:*** • If the analyzer has been powered up for 3–5 minutes and local environmental and sample temperatures are not changing significantly, the alarm should not persist. If the alarm message appears repeatedly, contact AMETEK Service and Support for assistance.	Fatal

Alarm Condition / Description / Corrective Action	Alarm Type
Battery Lo **(User Interface)** **Battery Low** **(5100P Application Software)** The 5100P's internal battery needs to be charged. There is approximately 5–10 minutes of analyzer run-time before it will power itself down completely. Typically, a minimum of eight (8) hours of charging (or overnight, if possible) should provide 8-plus hours of continuous analyzer use. ***Corrective Action:*** Take appropriate safety precautions, and: • Using the supplied Battery Charger, charge the analyzer in an approved and safe location prior to use. If the analyzer Low Battery alarm persists after charging, contact AMETEK Service and Support for assistance.	Warning
Clipping Spectra **(5100P Application Software)** The 5100P's *Sample* and/or *Reference* Detector voltage exceeds expected range. ***Corrective Action:*** Contact AMETEK Service and Support for assistance.	Warning
Low Signal (Power) **(5100P Application Software)** The 5100P the signal from the Optical Cell is too low. ***Corrective Action:*** Contact AMETEK Service and Support for assistance.	Warning
Calibration Invalid **(5100P Application Software)** The factory calibration has become corrupted and the results are no longer valid. ***Corrective Action:*** Contact AMETEK Service and Support for assistance.	Fatal

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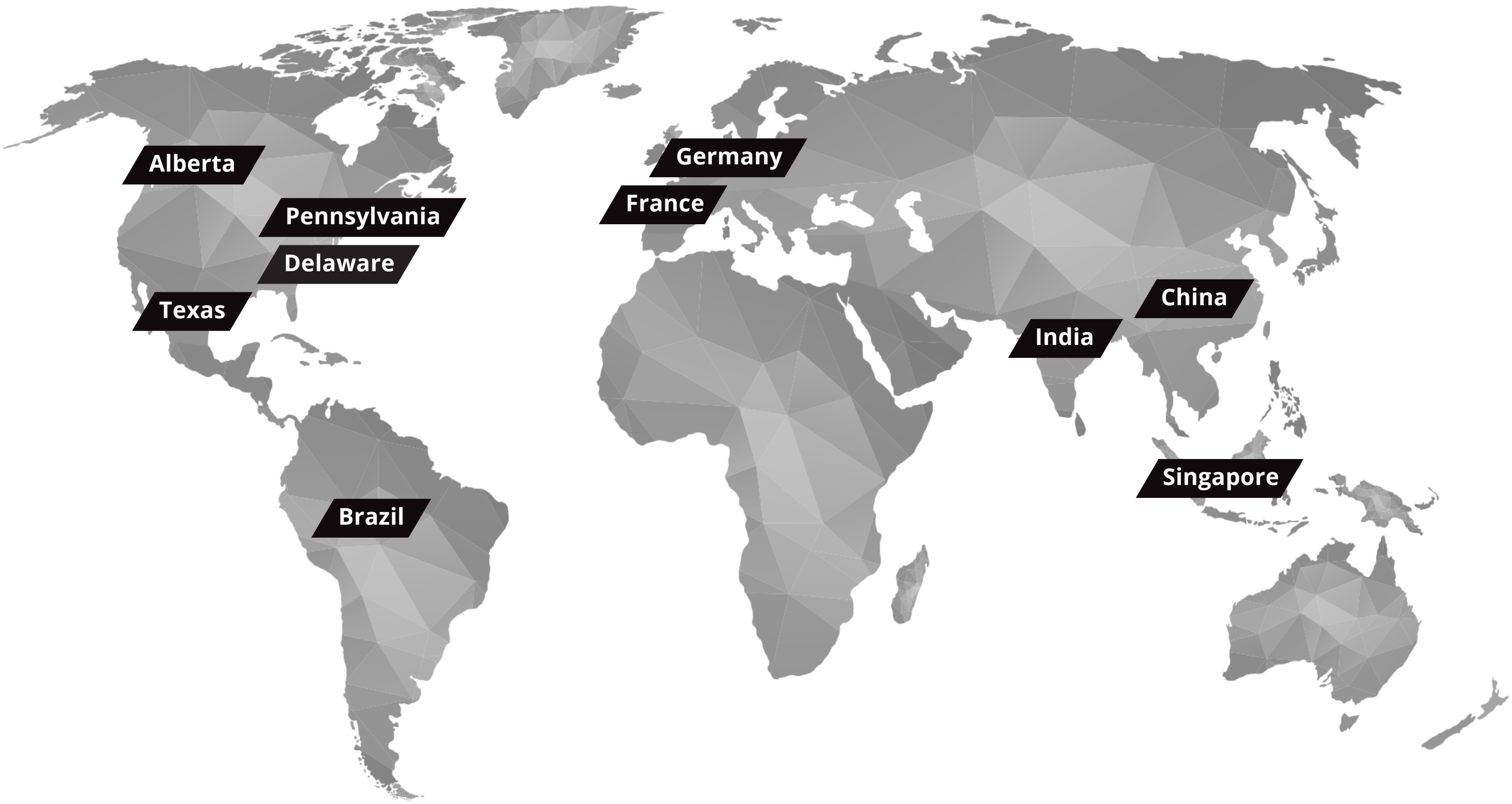

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