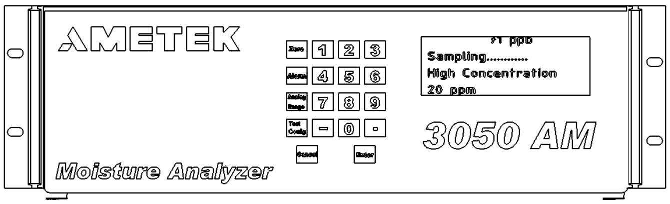
AMETEK®

PROCESS INSTRUMENTS

USER MANUAL

3050-AM Moisture Analyzer



PN 305804901, Rev YA

Every successful enterprise has as its driving force someone with vision, courage and determination to make it succeed. Within the AMETEK Process Moisture Analysis business, such a person was John Day. Over a period of many years of practical experience working with customers, John became the committed "product champion" of the Quartz Crystal Microbalance method of moisture measurement. He constantly provided ideas on applications, marketing and product improvements which he felt were desirable for increasing the worldwide business.

Sadly, John was not to live to see the full results of this inspiration, so we proudly dedicate this new product to his memory.

JOHN DAY
1952 – 1997

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Contents

Safety 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.

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

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

Read this manual before beginning the installation and operation of the 3050-AM Analyzer. Failure to do so, and or use of the equipment in a manner not specified in this manual or accompanying documents, may impair the protection against fire, electrical shock and injury originally provided by this equipment. In addition, failure to follow the installation and start-up instructions may void the instrument warranty.

Electrical Safety

Hazardous voltages are present in the analyzer housings 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.

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..

WARNING

Verify ground continuity of all equipment before applying power.

Sample Gas

WARNING

Potential hazards of the Sample gas should be taken into consideration before connecting the Sample gas to the analyzer. Personal protective equipment and proper ventilation should be used if Sample gas is toxic, flammable, or corrosive. Check the Sample gas line and all connections for leaks before powering up. Consult plant safety personnel for appropriate exhaust venting guidelines for specific Sample gas type.

Personnel and Equipment 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, or troubleshooting of the analyzer must review and follow these Warnings and Cautions.

WARNING

Do Not Operate without Covers
To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.

WARNING

Use Caution When Lifting
Use caution when lifting the analyzer from its crate.

WARNING

Use Proper Attire
Equipment is hot, user should wear protective groves while handling the equipment.

CAUTION

Use Proper Wiring
To avoid fire hazards, use only the wiring specified in the "Installation and Start-Up" chapter of this manual.

CAUTION

Avoid Electrical Overload
To avoid electrical shock or fire hazard, do not apply a voltage to a terminal that is outside the range specified for that terminal.

CAUTION

Ground the Product
Follow the grounding instructions provided in the "Installation and Start-Up" chapter of this manual. Before making connections to the input or output terminals of this product, ensure that the product is properly grounded.

CAUTION

Use Proper Fuse
To avoid fire hazard, use only the fuse type and rating specified for this product.

Use Proper Power Source
Do not operate this product from a power source that applies more than the voltage specified.

Do Not Operate with Suspected Failures
If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Explosive Atmosphere
To avoid injury or fire hazard, do not operate this product in an explosive atmosphere unless you have purchased options that are specifically designed for these environments.

Special Warnings and Information

Equipment Used in Class I, Division 2 Hazardous Locations

WARNING

Explosion Hazard – Substitution of Components May Impair Suitability for Class I, Division 2.

AVERTISSEMENT – Risque d'explosion – La substitution de composants peut rendre ce materiel inacceptable pour les emplacements de Classe I, Division 2.

Refer to the "Safety Critical Components" in the Spare Parts list in Chapter 4 of this manual.

WARNING

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

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

All input and output wiring must be in accordance with Class I, Division 2 wiring methods (NEC Sec 501.4(b) or CEC 18-152) (UL1604/CSA#213) and in accordance with the authority having jurisdiction.

Dryer Warning

WARNING

When removing and installing dryers, please follow all handling guidelines provided in the MSDS (located in the back of the manual). When shipping the analyzer with the dryers installed, consult the MSDS for appropriate shipping information and instructions.

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.

The various configurations of the 3050-AM Moisture 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 manual rely heavily on the use of metallic shielded cables used to connect to the customer's equipment and power. Foil and braid shielded I/O and DC power 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 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.

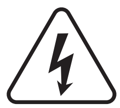
Inductive loads connected to the low voltage "Alarm Contacts" are not recommended. However, if this becomes a necessity, adhere to proper techniques and wiring practices. Install an appropriate transient voltage suppression device (low voltage MOV, "Transzorb," or R/C) as close as possible to the inductive device to reduce the generation of transients. Do not run this type of signal wiring along with other I/O or DC 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 and DC 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.

Warning Labels

These symbols may appear on the instrument in order 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

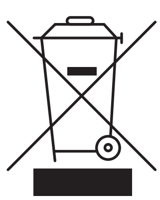
Caution – Refer to accompanying documents
(ATTENTION – SE RÉFERER AUX DOCUMENTS JOINTS)
Achtung – Beachten Sie beiliegende Dokumente

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

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 https://www.ametekpi.com/customersupport/requestsupport.

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Overview

The 3050-AM Moisture Analyzer reliably measures low concentrations of moisture in high purity gases at concentrations down to 0.1 parts-per-million by volume (PPMV), using a quartz crystal microbalance (QCM) Sensor. The calibrated range of the 3050-AM is 0–100 PPMV with a trend indication for measured concentrations to 1000 PPMV. The QCM-Sensor technology used in this analyzer is compatible with inert gases, air, oxygen, nitrogen, hydrogen, many Freons (12, 114, 116, etc.), and some specialty gases (e.g., sulfur hexafluoride). Carbon dioxide requires a custom Sensor assembly. Contact AMETEK Service to confirm compatibility with other gases.

Figure 1-1.
3050-AM Moisture Analyzer.

Controller/Communications

All analyzer functions are controlled by microprocessors housed within the analyzer. These include:

- One (1) fully configurable analog output (4–20 mA) that can be self-powered or externally powered.
- Three (3) alarm contacts (data valid, concentration alarm, and system alarm).
- One (1) RS-232 or one (1) RS-485 serial interface provides communication between the analyzer and your recording or data acquisition equipment.

The 3050-AM Analyzer is configured, and analyzer parameters are set, by using either the analyzer display, keypad and function keys, or using an external PC.

- 4-line x 20-character LCD display that provides moisture data, system operating parameters, system messages, and alarm conditions.
- An 18-button keypad on the front of the unit that is used to set or change operating parameters and system values.
- Serial interface to an external PC.

Contact Closure Signals

The 3050-AM Analyzer provides the following contact closure signals.

System Alarms

Activates (contact opens) when a condition exists that makes analyzer output questionable. Such conditions include:

- Cell Temperature alarm
- Zero error
- Battery alarm

Moisture Concentration Alarm

Activates (contact opens) when a moisture concentration exceeds the programmed alarm levels.

Data Valid

Activates (contact opens) when any system alarm is present. Additionally, the contact will open when the analyzer is in a Zero cycle.

Moisture Sensor

Quartz Crystal Microbalance (QCM)

The 3050-AM Analyzer uses a QCM Sensor to measure water vapor concentration. This is a piezoelectric device that is capable of extremely sensitive mass measurement. To make the QCM sensitive to water vapor the surface is coated with a thin film of hygroscopic material. When gas flows through the Sensor, the coating absorbs or desorbs moisture, changing the natural resonance frequency of the crystal.

Gas Measurement Cycle

The gas measurement cycle is divided into two periods.

- During the first period of the cycle, dry Reference gas flows through the Sensor assembly and the frequency is recorded.
- During the second period of the cycle, Sample gas flows through the Sensor and a second measurement of the Sensor frequency is recorded.
- The difference between these two frequency measurements is known as the delta frequency (Δf). The Δf value is a function of the moisture concentration in the Sample gas.

Gas Flow

Sample System

The 3050-AM Moisture Analyzer sample system enables the analyzer to make reliable water vapor measurements at concentrations down to 0.1 PPMV. The sample system serves several purposes:

- It controls the sample conditions at the Sensor assembly (e.g., flow rate, temperature, pressure). Hence, the QCM-based Sensor is isolated from variations in the ambient conditions that would otherwise alter the response characteristics of the Sensor.
- The sample system is designed to continuously switch the Sensor assembly between the Sample gas and a dry Reference gas. This sample switching scheme yields both higher sensitivity and reduced drift in the Sensor readings.
- The sample system's design provides a means of challenging the analyzer with a known source of dry gas to validate the baseline readings and to compensate for any minor changes in background offsets. As such, the 3050-AM is designed to deliver reliable, long-term performance from the QCM-based Sensor.

Sample Flow

In the normal operation of the 3050-AM Analyzer, the Zero module (the section enclosed in the dotted line in Figure 1-2) is turned off so that the Sample gas enters the analyzer and passes through diaphragm valve 2 (**DV2**). After exiting **DV2**, the flow splits into two (2) paths: the Sample gas path and the Reference gas path. The sample path flows through the first proportional valve (**PSV1**) and the reference path flows through a dryer and **PSV2**. The two (2) proportional valves (**PSV1** and **PSV2**) control the flow rate of the gas streams. They also determine which gas stream (Sample or Reference) passes through to the QCM Sensor. By measuring the pressure drop across the capillary tube, the 3050-AM Analyzer provides a feedback signal (the flow rate of the Sample gas) to the proportional valves. As a result, the 3050-AM Analyzer alternately exposes the QCM Sensor to a controlled flow of the Sample and dry Reference gases.

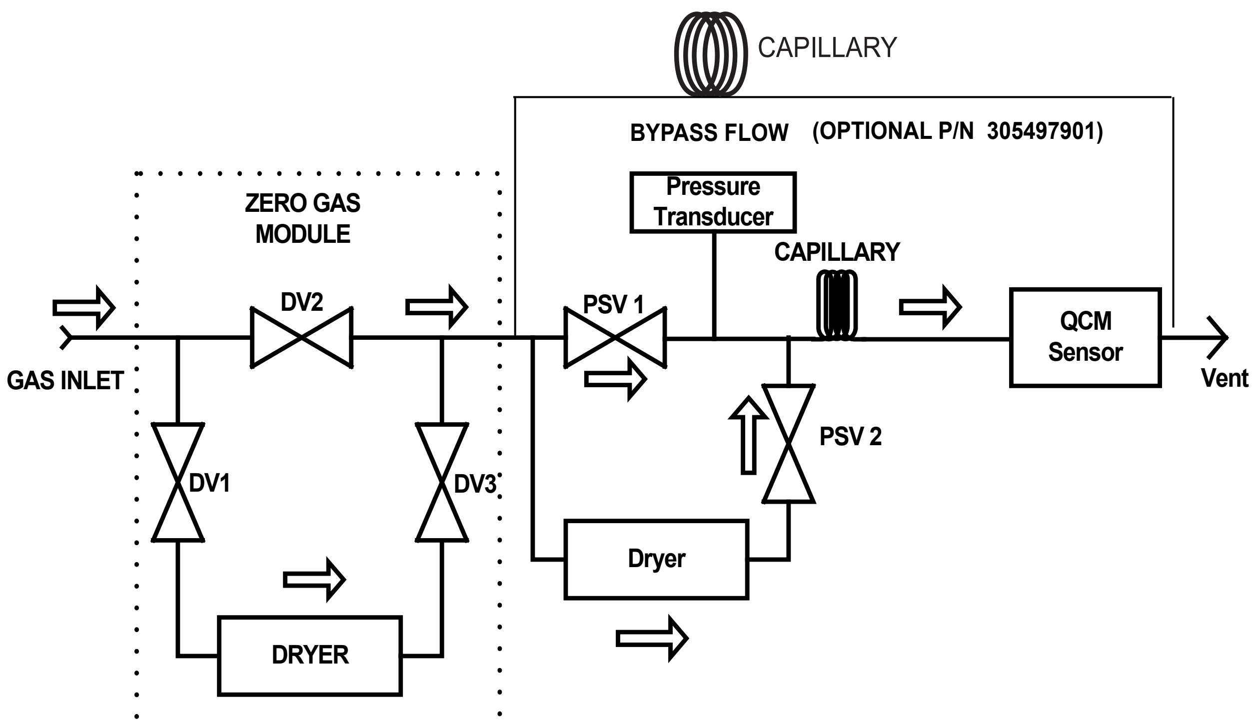

Figure 1-2.
Flow schematic for the 3050-AM sample manifold.

Zero Gas Module

The Zero gas module, shown inside of the dotted rectangle in Figure 1-2, is used to provide a dry gas stream at the inlet of the analyzer. Functionally, the Zero gas module is a very simple device, consisting of only three (3) diaphragm valves and a dryer. The diaphragm valves used in this device are UHP grade components; all surfaces are electropolished, and the gas connections are welded. Because of the high quality of the surfaces in these components, residual moisture retention is minimized. Therefore, the assembly is capable of rapidly achieving a dry condition once the Zeroing cycle has been initiated.

Under normal operation of the analyzer, both **DV1** and **DV3** remain closed to protect the dryer, while **DV2** is open to allow the flow of Sample gas into the analyzer. When performing the Zeroing operation, **DV2** is closed, while both **DV1** and **DV3** are open. Thus, the flow of Sample gas is diverted through the dryer, providing a dry reference (<10 PPBV) for the analyzer. By providing this dry Reference gas, the Zero gas module enables the offsets present in the system (e.g., electronic offsets, offsets caused by pressure differences in the different flow paths, and offsets caused by low-level outgassing of water vapor from upstream valving) to be measured. Normally, the magnitude of these offsets is relatively small – less than the equivalent of 0.1 PPMV.

Zeroing the Analyzer

The Zero process is used to correct any offsets in the sample system. By comparing the two (2) Zero readings (Reference and Sample) with the internally generated "Zero" gas, any offset can be Zeroed out. This is done by measuring the Zero offset frequency and storing it in memory. This offset is then subtracted from Δf before the sample moisture concentration is calculated.

NOTE

AMETEK recommends performing a Zero every 24 hours for the first month of operation. After this start-up period, the analyzer will have dried down sufficiently to increase the Zeroing interval to one (1) week. AMETEK recommends that the duration of the Zero cycle be set to 120 (i.e., 2 hours).

Dew/Frost Point Measurements

Dew point values are calculated from the moisture concentration measurements (PPMV) and the sample or process pressure. For temperatures below 0 °C, the 3050-AM uses equations to determine the water vapor pressure over ice, rather than over super-cooled water. Thus, the 3050-AM reports a frost-point temperature consistent with the physical form of the condensed phase in a real process stream.

- Water in super-cooled liquid state will only exist as a transient species, as the first bit of condensate starts to form on a smooth-chilled surface (i.e., the true method of measuring a dew point).
- Given more time, the dew layer will turn to ice if the temperature is below the freezing point.
- While the frost-point temperature will be higher than the dew point temperature, the exact magnitude of the difference will be a function of both the pressure and dew/frost point temperature.

Another consideration, when using the 3050-AM Analyzer to calculate dew/frost point temperatures, is the sample or process pressure. The range of process pressures allowed by the 3050-AM is restricted for many Sample gases. Many gases liquefy at relatively low pressures, so calculating a dew/frost point temperature for these compounds has no value. Therefore, the 3050-AM is designed to report an error condition, the process pressure alarm, to alert the user to conditions that result in ambiguous dew/frost point values.

Calculation of Dewpoint Values for Hydrocarbon Streams

The calculation of dewpoint values for hydrocarbon streams is covered by several standards. Because there are differences between the dewpoint values calculated with the older North American standard (ASTM D1142, which is based on the work published in IGT Research Bulletin #8) and the new European standard (ISO 18453, which is based on the work presented in GERG-Water Correlation: GERG Technical Monograph TM14, 2001), AMETEK has provided a means of using either method in the 3050-AM product. Specifically, in the gas list we have cited two (2) separate entries for natural gas. The first entry is labeled "Natural Gas," and will provide dewpoint/frostpoint values consistent with ASTM D1142. The second entry is labeled "Natural Gas GERG," and will provide dewpoint/frostpoint values consistent with ISO 18453. All other aspects of analyzer performance are identical for both of the two natural gas listings.

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Installation and Start-Up

Safety Considerations

This chapter contains information about the installation and setup of the 3050-AM Moisture Analyzer.

NOTE

Before beginning the installation of the analyzer and before powering it up, review and follow all safety information following the Table of Contents near the beginning of this manual. This information describes procedures to follow to avoid personal injury and/or damage to the equipment. All regulatory agency and personnel safety procedures for your jurisdiction must be followed.

WARNING

Read this entire chapter before installing the 3050-AM Moisture Analyzer. Failure to do so may impair protection against fire, electric shock and injury originally provided by this equipment. Do not use this analyzer in a manner not specified in this manual.

WARNING

The installation 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

This equipment is suitable for use in Class I Division 2, Groups A,B,C,D or Non-Hazardous locations only.

Pre-Installation Requirements

Personnel Technical Level Required for Installation

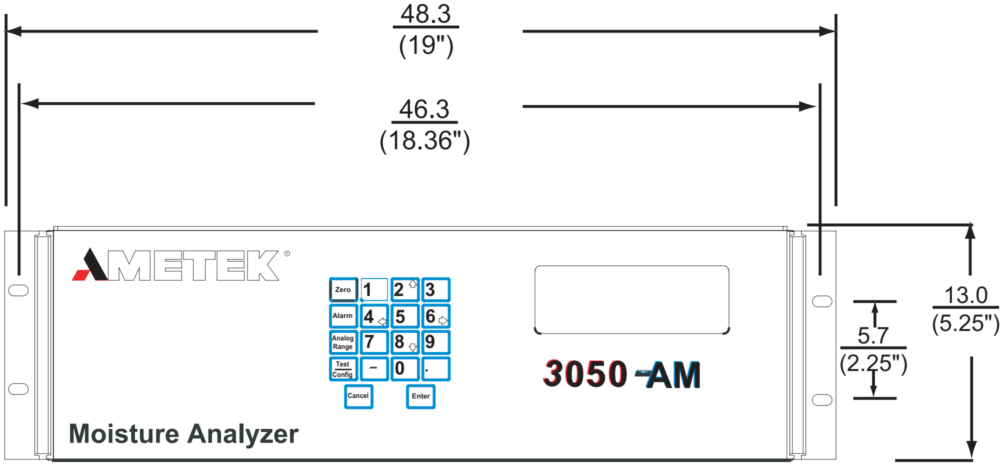
NOTE

The operations in this section should be performed only by qualified service personnel experienced in electrical safety techniques. Never service the analyzer unless power has been removed from the analyzer, and the analyzer has been allowed to cool enough to work on. Always use gloves when working on the analyzer.

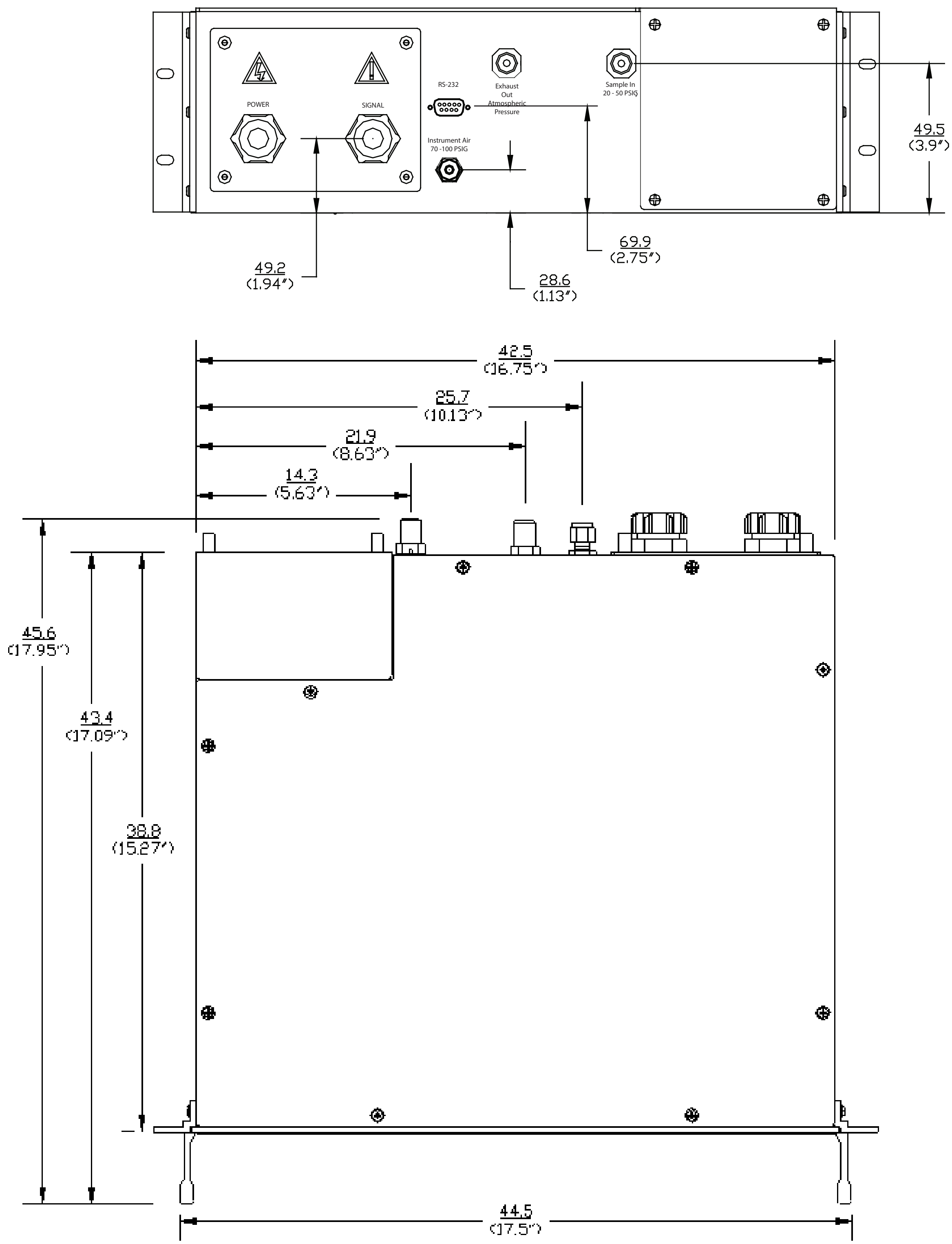
Analyzer Requirements

Space Requirements

The 3050-AM Analyzer requires an area 48 cm wide x 13 cm high x 42 cm deep (19" x 5.25" x 16.5") plus rear clearance for analyzer connections and proper ventilation (Figures 2-1.1 and 2-1.2). It should be located as close as possible to the sample tap.



Figures 2-1.1.
3050-AM Analyzer dimensions.



Figures 2-1.2.
3050-AM Analyzer dimensions.

Unpacking and Inspecting the Equipment

Remove any packing material from the 3050-AM Moisture Analyzer shipping crate. Check for damage. If equipment is damaged, notify the carrier and contact AMETEK (https://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 installing and operating the analyzer/equipment.

Tools, Equipment, and Supplies Required for Installation

To install the analyzer you need the following tools, equipment, and supplies:

- Set of open-end wrenches for fittings.
- Set of metric hexagonal wrenches.
- Set of ball drivers.
- Wire cutters, strippers, and crimpers.
- Flat blade instrument screwdriver.
- Soft, nonabrasive cloth.
- Wrist strap (for grounding).
- Detergent-based leak detector (Snoop® or another suitable leak detection agent is permissible).

Electrical Requirements

The 3050-AM Analyzer must be installed in a general purpose area. It does not have an On/Off power switch so power must be applied through a circuit breaker switch at the AC source.

General Purpose Installation:

- Power connection can be made using the supplied power cord(s) terminated with a locally approved wall socket plug, or
- The analyzer can be hard-wired.

Instrument Air Supply

- Use dry instrument air (70–100 PSI) that is free of oils and other contaminants for valve operation. N_2 can be used as an alternate.

  If there is any doubt about the cleanliness of the air supply, connect it through oil / air separators.
- Air tubing must be fitted to a 1 /4-inch Swagelok® fitting.

Sample Temperature and Pressure Requirements

Inlet sample temperature:	0 °C to 100 °C (32 °F to 212 °F)
Optimum input gas temperature:	60 °C ± 5 °C (140 °F ± 9 °F)

NOTE

For optimum performance, the sample line should be heat traced to maintain a constant sample temperature.

Minimum input pressure:	42 kPa (6 PSIG)
Maximum pressure:	345 kPa (50 PSIG)

If necessary, a UHP pressure regulator can be installed at the main process shut-off valve.

CAUTION

Consult plant safety personnel for appropriate exhaust venting guidelines for specific Sample gas type.

User-Supplied Items Interconnect Wiring

The user must supply all wiring for serial communication, analog output, and alarm relays. Recommended wire is 22 gauge, twisted/shielded pair.

External Sample Tubing

- Sample input tubing length should be as short as possible.
    - For optimum performance, sample tubing should be thermally controlled to maintain a constant sample input temperature. Optimal results are obtained with the sample line maintained at 60 °C.
    - Recommended Sample gas input tubing is 1/4-inch OD, electro polished 316L VAR stainless steel (AMETEK Part No. 257707002 or equivalent).
- Exhaust pressure must be atmospheric.
- Input and exhaust tubing must be fitted with female 1/4-inch VCR connectors.

Rear Panel Connections and Analog Interface Board

See Figures 2-2 and 2-3 for location of analyzer connections on the Rear Panel and **Analog Interface** board. Remove Terminal Cover to access **Interface** board.

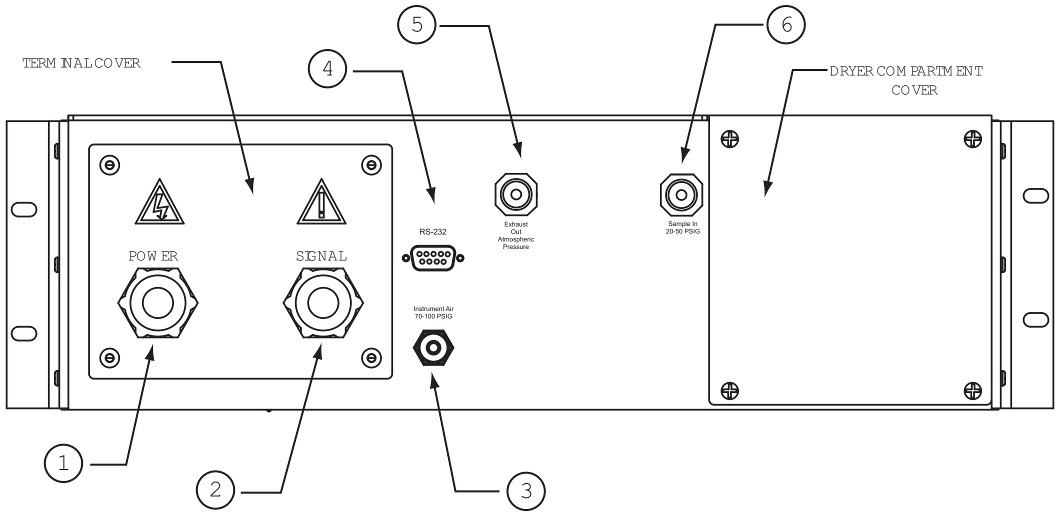


Figure 2-2. 3050-AM Rear Panel connections.

	Item	Function
1	Power Conduit	Cable gland for analyzer power cord.
2	Signal Conduit	Cable gland for signal connections
3	Instrument Air Fitting	Input port for instrument air used to operate internal diaphragm valves; 1/4-inch Swagelok fitting.
4	RS-232 Serial Port	User serial communications interface. Serial wiring supplied by user. Observe caution regarding use in hazardous locations.
5	Exhaust Fitting	Vent port for cell exhaust; 1/4-inch male VCR connector.
6	Sample Inlet Fitting	Input port for Sample gas; 1/4-inch male VCR connector.
7	—	—

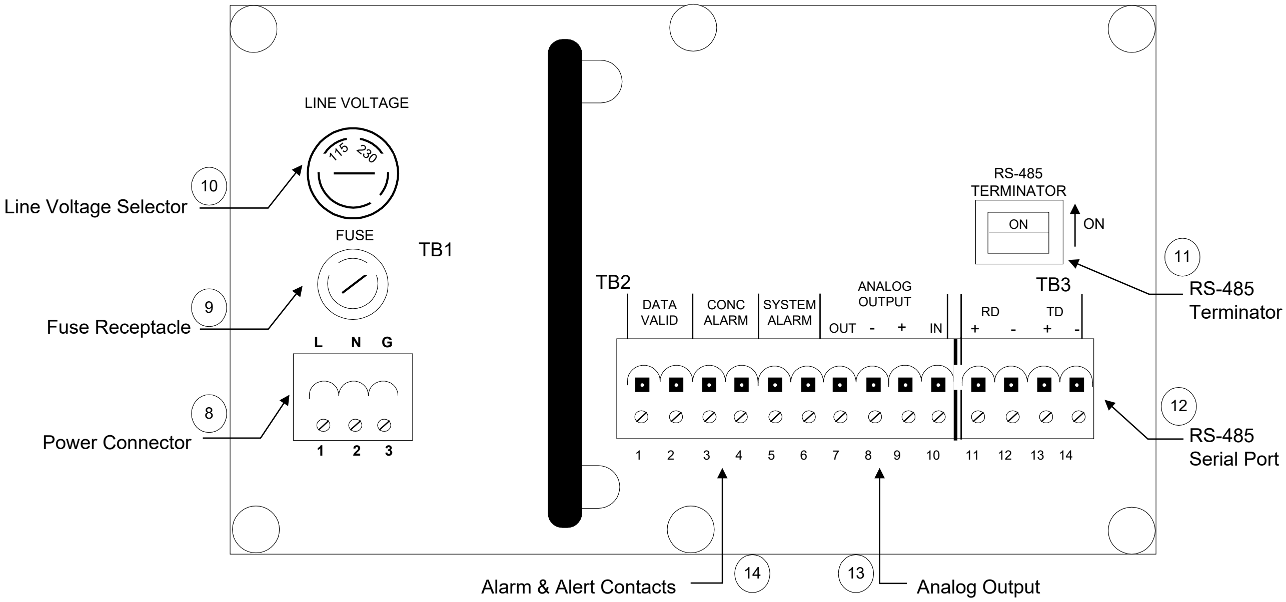


Figure 2-3.
3050-AM Analog Interface board connections.

	Item	Function
8	Power connector	Connect hot (1) and neutral (2) to power connector and ground to chassis.
9	Fuse Receptacle	2 A 250 V, time lag, T-type.
10	Line Voltage Selector	Select 120 or 240 Volt line voltage.
11	RS-485 Terminator	RS-485 Terminator switch is on if the analyzer is the only analyzer on line or the last in a chain.
12	RS-485 Serial Port	User serial communications interface. Serial wiring supplied by user.
13	Analog Output	4–20 mA output to user recording equipment. Wiring supplied by user.
14	Alarm Contacts	Connections for: Data Valid, Concentration Alarm, and System Alarm. Wiring supplied by user.

Installing the Dryers

Prior to operating the 3050-AM Analyzer, the dryers must be installed. Two (2) dryers have been supplied with this analyzer. Make sure that you have the two (2) new dryers, and four (4) new VCR gaskets available before beginning installation.

CAUTION

The amount of time that the dryer fittings are left open should be kept to less than one (1) minute to avoid damage to the device.

To install the dryers (see Figures 2-4.1 and 2-4.2):

1. Loosen the four (4) captured screws that secure the Dryer Compartment Cover (on the analyzer's Rear Panel, see Figure 2-4.1), and remove the cover.
2. Install one (1) dryer in the top position (Sample System Dryer) and one (1) in the bottom position (Zero Dryer).
3. Remove the dryer mounting screws that secure the dryers in place and set them aside.
4. Working with one dryer at a time to minimize the time that the device is exposed to room air, remove the first dryer from its packaging. Loosen the 1/8-inch VCR fittings.

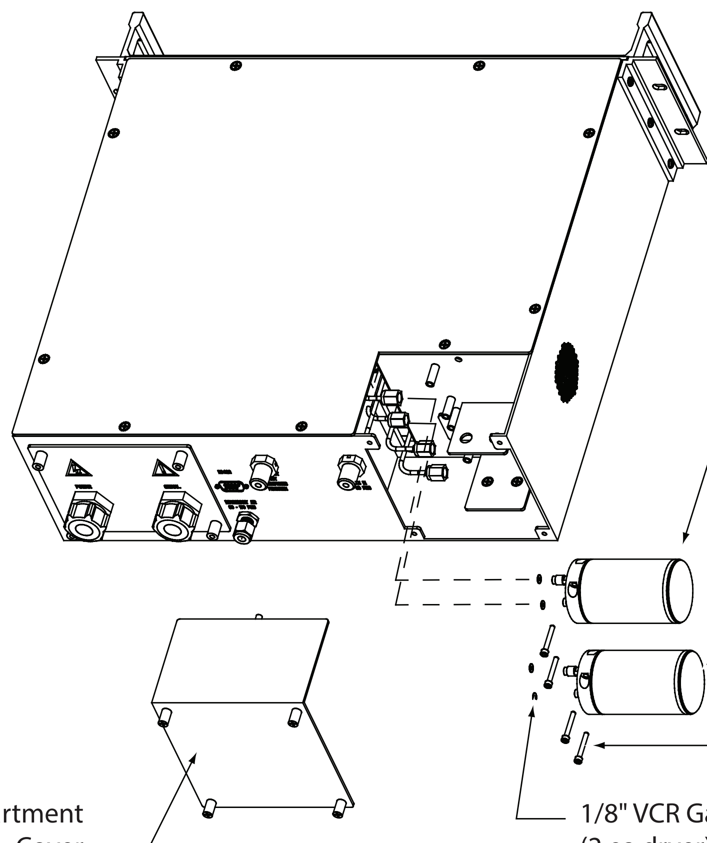


Figure 2-4.1.
Dryer installation locations.

5. Using two (2) of the dryer mounting screws, attach the dryer in the top or sample system position (Figure 2-4.2).

6. Working quickly, install a new 1/8-inch VCR gasket in both of the fittings, and tighten the two (2) VCR nuts over the fittings until they are finger tight.

7. Tighten the nut an additional 1/8 turn.

8. Repeat Steps 6 through 9 for the second dryer, which you will mount in the bottom or zero dryer position (Figure 2-4.2).

9. Replace the dryer compartment cover.

10. The production codes for the dryers supplied with the analyzers have been entered at the factory, so there is no need to enter them during an initial startup of the analyzer. For all subsequent replacement/installations of replacement dryers, you will need to enter a production code for the reference dryer (see details in Chapter 3).

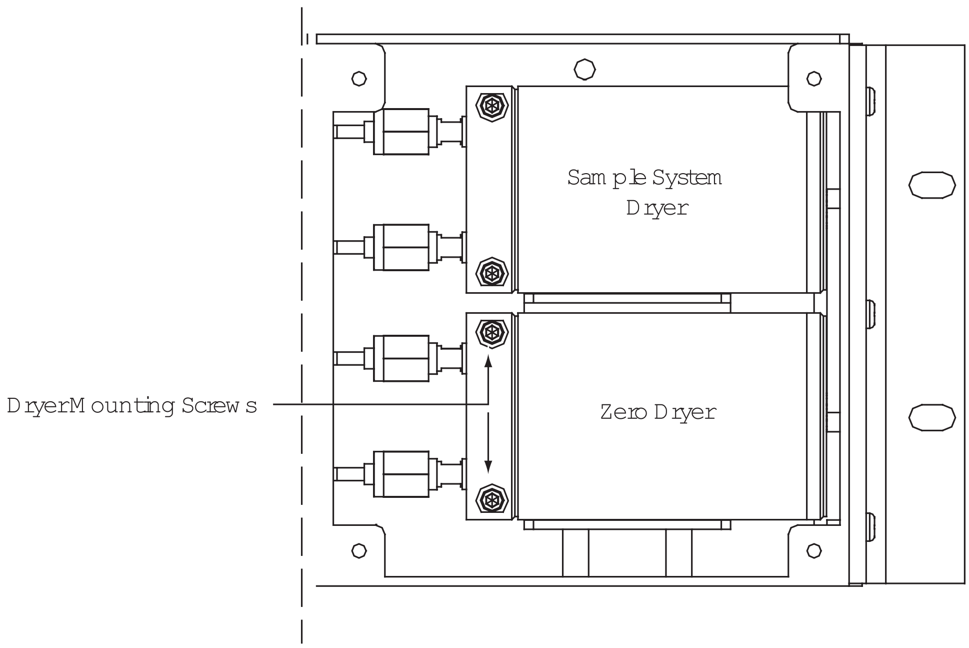


Figure 2-4.2.
Inside dryer compartment.

Gas Connections

Install a main process shut-off valve and pressure regulator (recommended) at the sample tap. Locate the analyzer as close as possible to the sample source.

CAUTION

The amount of time that the analyzer gas fittings are left open should be kept to less than one (1) minute.

To make the gas connections (refer to Item numbers in Figure 2-5):

1. Remove the VCR plugs and gaskets from the Sample gas inlet fitting (Item 6) and exhaust fitting (Item 5). Discard the gaskets. Remove the cap from the instrument air fitting (Item 3). Keep the VCR fitting caps. If you have to ship the analyzer or if it has to be disconnected for an extended period of time, reinstall the caps using new gaskets.

2. Connect the Sample gas input tube to the analyzer Sample gas inlet 1/4-inch VCR fitting (Item 6). Be sure to use a new gasket.

3. Connect the exhaust tube to the analyzer exhaust 1/4-inch VCR fitting (Item 5). Use a new gasket. The exhaust must be vented to an appropriate vent system.

4. Connect a clean, dry instrument air supply (70-100 PSIG) to the instrument air 1/4-inch Swagelok fitting (Item 3). If the cleanliness of the air supply is questionable, connect using oil/air separators.

5. Check all Sample gas input and exhaust fittings for leaks.

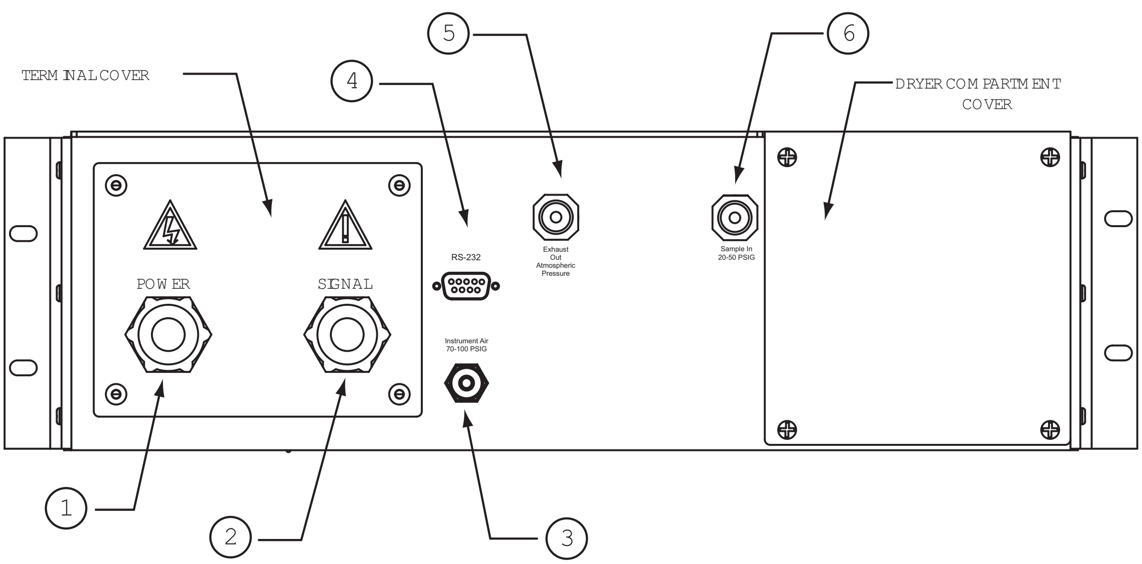


Figure 2-5. 3050-AM Analyzer gas connections.

Electrical Connections

This analyzer has an internal AC voltage selector that must be set correctly to prevent damage. Only qualified service personnel may access the interior of the analyzer. If qualified service personnel are not available, contact AMETEK Service.

Voltage Selection

The 3050-AM Analyzer comes from the factory set to operate on 120 VAC. If you must switch the setting to 240 VAC (or back to the 120 VAC setting), follow the procedure below.

You must follow this procedure to prevent damage to/malfunction of the analyzer.

To change the voltage setting (Figure 2-6):

1. Ensure that the area is non-hazardous and the analyzer has been de-energized and power disconnected
2. Remove the Terminal Cover the analyzer Rear Panel.
3. Select 115 or 230 VAC on the voltage selector (Item 10) located on the top left-hand side of the user **Analog Interface** board.
4. Replace Terminal Cover.
5. Clearly mark the operating voltage on the analyzer serial number label, in the lower right-hand corner of the analyzer Rear Panel.

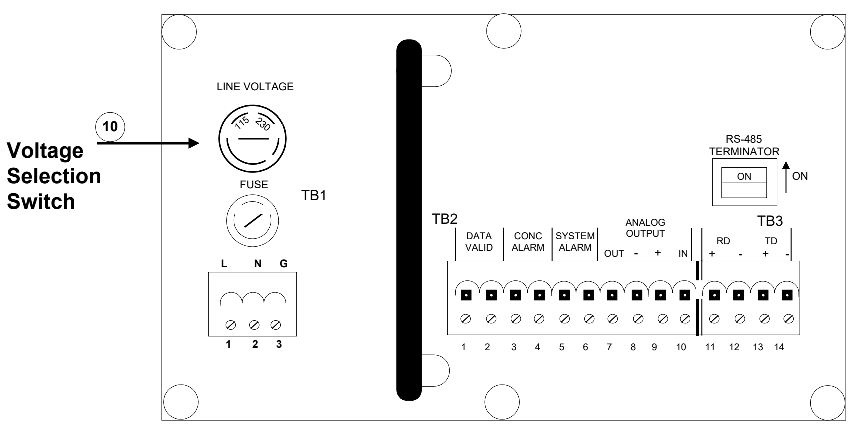


Figure 2-6.
115 / 230 voltage selection switch.

Power Connection

If the factory-supplied flexible power cord is not long enough or is not compliant with local standards, a 3-meter European-type harmonized power cord is also included.

Ensure that the area is safe and replace the power cord as follows:

1. Disconnect the power from the analyzer and remove the Terminal Cover from the Rear Panel.

2. Unplug the power connector (Figure 2-7) and unscrew the two (2) plug screws that secure the "1" (**LINE**) and "2" (**NEUTRAL**) wires in place.

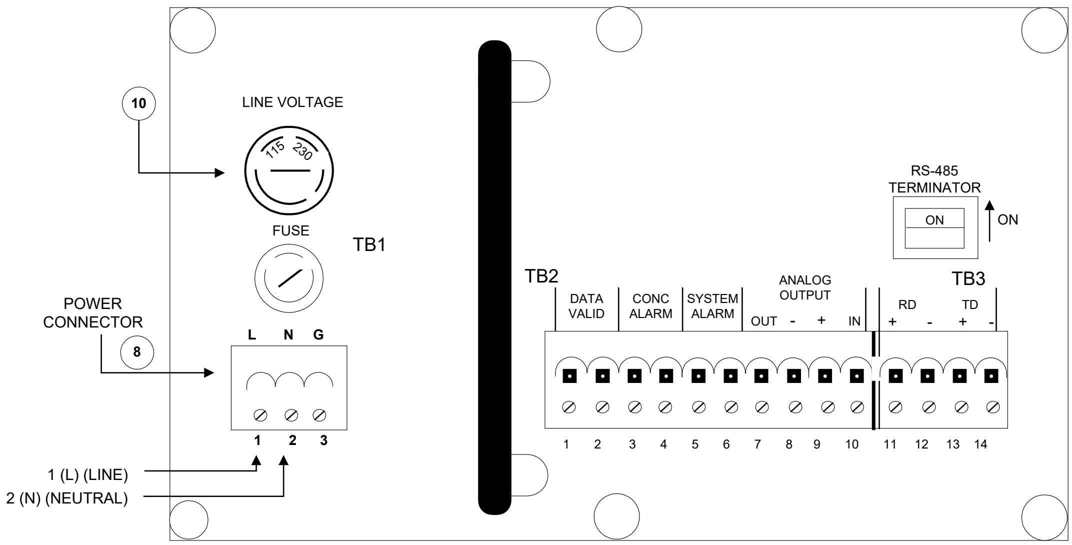


Figure 2-7.
Remove 1 (L) and 2 (N).

3. Remove the ground wire from the threaded chassis stud (Figure 2-8).

4. Loosen and remove the power cord strain relief cap with compression bushing (Item 1 in Figure 2-2) and pull out the power cord.

5. Prepare the new power cord using the original cord as a guide:

    a. Remove the outer jacket.

    b. Measure the length of the wires.

    c. Strip lengths of wires.

    d. Ring connector termination, etc.

6. Feed the strain relief cap with compression bushing onto the new cord and tighten securely as per original. If the new cord is a smaller diameter than the original, consider using the alternate bushing that is included with the European cord. Ensure that the power cord does not slip when pulled or pushed from the outside.

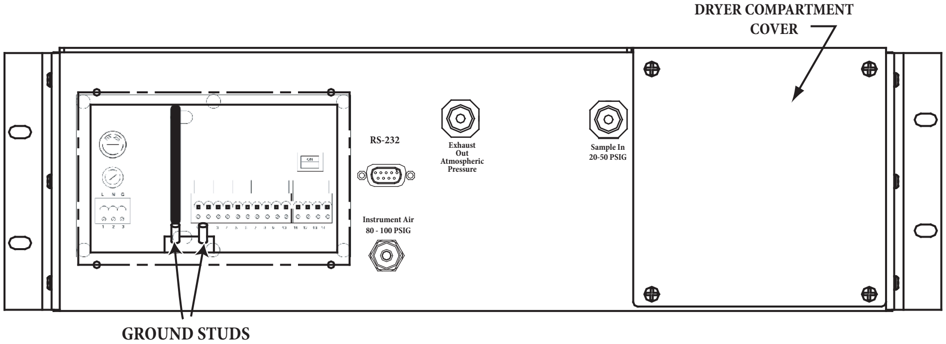


Figure 2-8.
Attach ground wire to threaded chassis stud.

7. Reconnect 1 (**L**) and 2 (**N**) wires (Figure 2-7) by screwing in the two (2) plug screws. Make the ground connection to the threaded chassis stud (Figure 2-8). Do not use the ground position on the power connector. Plug in the power connector.

8. Connect a proper, locally recognized plug or terminator to the end of your cord.

9. Replace the Rear Panel.

10. Reconnect power.

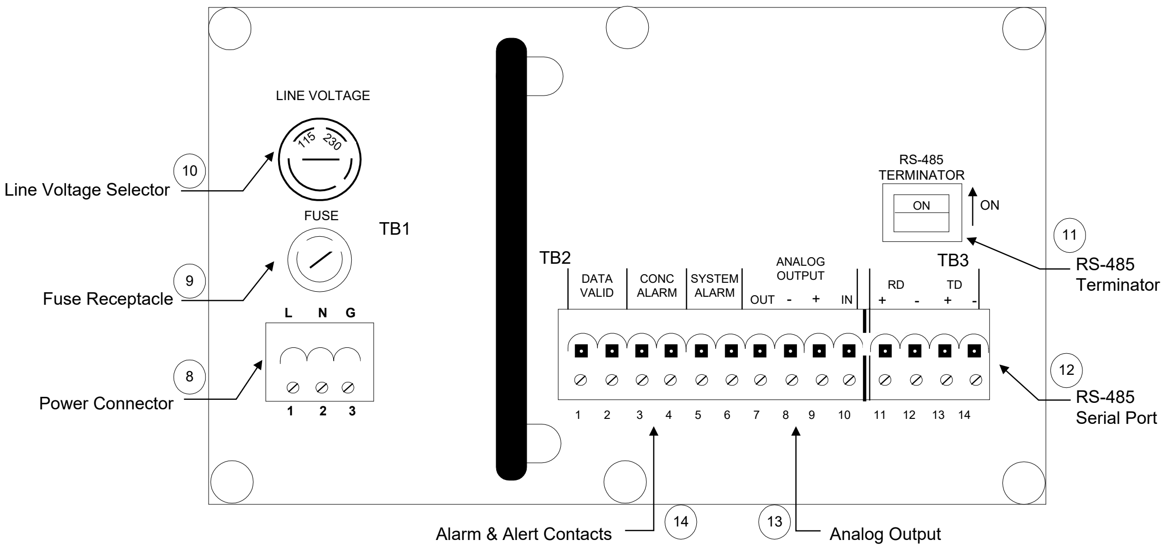


Figure 2-9.
Communication connections on the 3050-AM Analyzer Analog Interface board.

Communication Connections – Analog Outputs, Alarm/Data Valid, RS-232/RS-485

To make the communication connections (refer to Item numbers in Figures 2-9 and 2-2):

1. Disconnect the power from the analyzer and remove the Terminal Cover from the Rear Panel.

2. Connect the 4–20 mA analog output (Item 13) (see also Figures 2-10.1 and 2-10.2) and alarm and data valid terminals (Item 14) on the **Analog Interface** board to the analyzer through the metallic signal conduit (Item 2, Figure 2-2).

3. Connect the RS-232 or RS-485 serial communication to the analyzer. The RS-485 connection, analog output, and alarm/data valid contacts share the same cable.

4. If using RS-485 communications, turn on the RS-485 Terminator switch (Item 11) if communicating with one analyzer or the last in a chain of analyzers.

NOTE

2-wire and 4-wire mode selection is performed using software.

5. Replace Terminal Cover.

Signal Connections (4–20 mA)

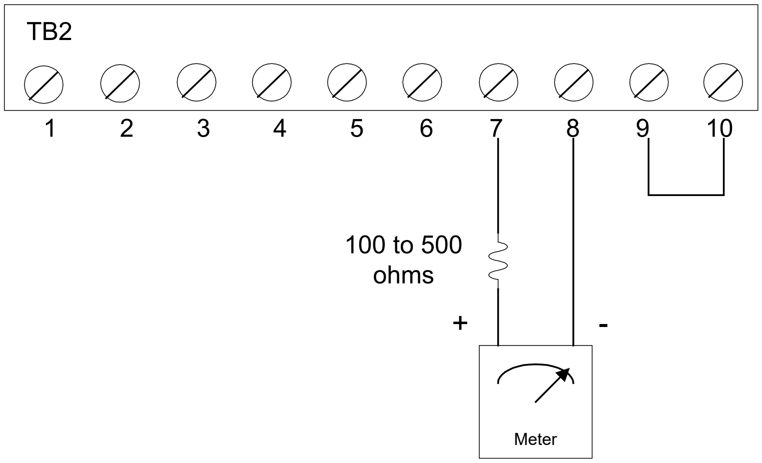


Figure 2-10.1.
Self-powered 4-20 mA output connections.

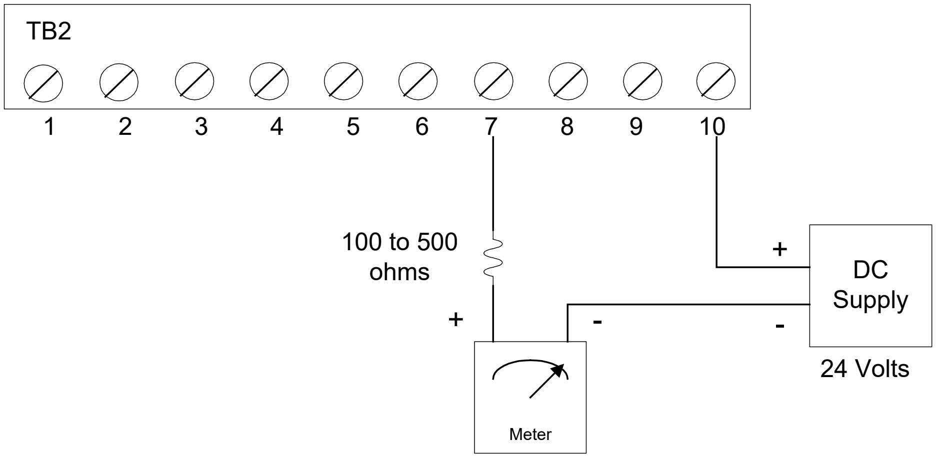


Figure 2-10.2.
Externally powered
4–20 mA output connections.

Overview of the Keypad

The 3050-AM Moisture Analyzer keypad (Figure 2-11) is used to access menus and sub-menus and system values for the function keys, and to configure your analyzer parameters.

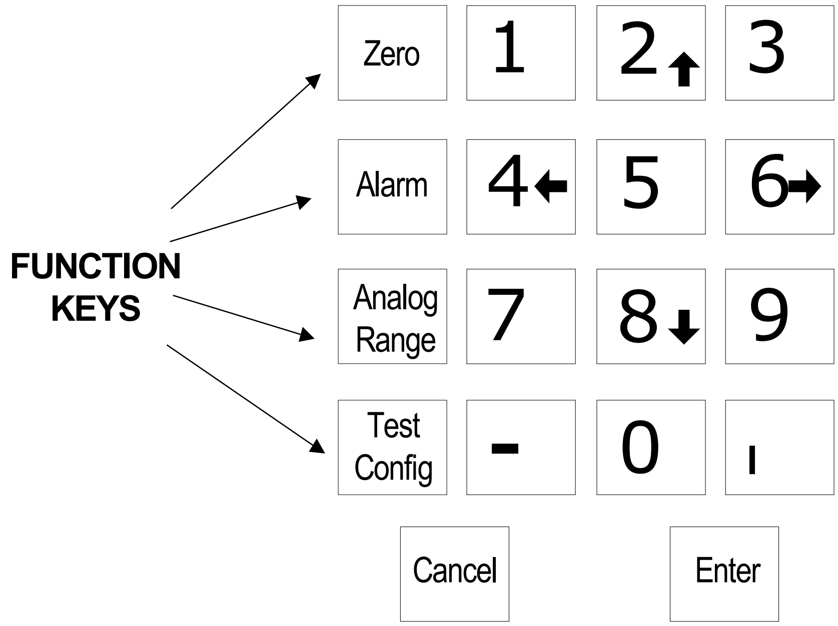


Figure 2-11.
3050-AM Analyzer keypad.

Function Keys

Press one (1) of the four (4) function keys to access the **Main Menu** for that category as well as sub-menus and system values.

Key	Function
Zero	Used to define on-demand Zero settings, and initiate a Zero cycle.
Alarm	Used to define alarm output settings.
Analog Range	Used to scale the 4–20 mA output in proportion to the moisture concentration.
Test Config	Used to define device and communication settings.
Arrow keys (2, 4, 6, 8)	Scroll up, down, left, and right through menu items and system value lists.
Number keys (0 through 9)	Enter values. Use the (-) and (.) to enter negative values or numbers that require a decimal point.

To highlight an item, scroll through the menu items until the small arrowheads point to your choice as shown in Figure 2-12. Up and down arrow symbols displayed on the right-hand side of the screen indicate that there are more menu items above or below the currently displayed items.

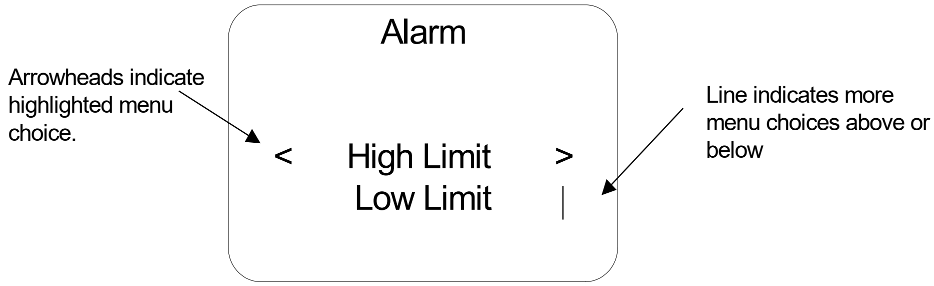


Figure 2-12.
Display showing alarm sub-menu with arrowheads for highlighting menu items.

Once a menu has been accessed, use the arrow keys to scroll through the menu until the desired item is highlighted. Press **Enter** to select the menu item. Depending on the selected menu item, more menus will be displayed or data may be entered. Follow the instructions on the display.

Except where otherwise noted:

Key	Function
Press **Enter**	Save changes and return to previous menu.
Press **Cancel**	To exit without saving when entering data. (Any changes made will not be saved.) To go back through previous levels, one level at a time, until the display returns to the normal operation screen, when browsing the menu list.

Overview of Display

The default display has four lines (Figure 2-13):

Line 1	Sample concentration
Line 2	Status message
Line 3	Alarm message
Line 4	Alarm value

There is also a series of dots after the "**Status**" message that "beat" to indicate the analyzer is functioning.

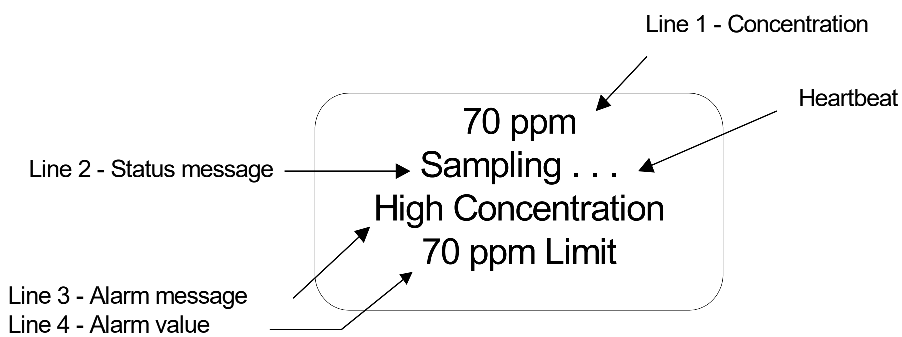


Figure 2-13.
Default normal operation display.

Initial Start-Up

To power up and prepare the 3050-AM Analyzer for operation:

1. Open the main sample shutoff valve at the source.
2. Adjust the sample pressure (6 to 50 PSIG).

CAUTION

Maximum inlet pressure is 50 PSIG. Damage can occur if higher pressures are introduced to the analyzer.

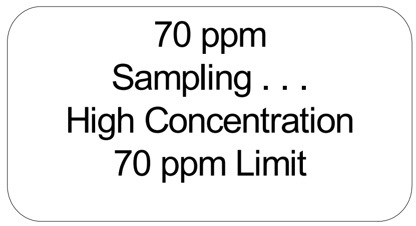


Figure 2-14.
Default normal operation screen. Values are for example only.

3. Turn on the AC power at the source. Boot-up information will appear on the display followed by the operation screen (Figure 2-14).
4. Once Sample gas flow starts, the analyzer will be in the normal operating mode. Lines 3 and 4 will flash various messages and alarm conditions at start-up.
5. Allow the analyzer to warm up for a minimum of 45 minutes.

Dry-Down Period

Sample must be flowing during the dry-down period. You should allow 5 to 7 days for the analyzer to dry down and stabilize. During this period, the concentration value shown on the display and the data recorded from output should show a steadily decreasing trend. System alarm messages may be displayed during this period.

When the dry down is complete, the concentration value on the display should be stable and the recorded data should have leveled off. Zero alarms will still be on the display.

NOTE

If the concentration value is still decreasing after the initial dry down period, allow additional dry down time.

The 3050-AM Analyzer is now fully operational with factory default configuration of the analog output and concentration alarms. You are ready to do an initial Zero cycle.

Procedure for Speeding up the Dry Down Period

To decrease the time required to dry down the 3050-AM Analyzer:

1. Make all gas connections and apply power to the analyzer. Allow the analyzer to warm up and run with the factory-default settings for a period of 6 to 12 hours.

2. At the end of this interval, set as follows:

   Zero Schedule Type to "Daily"

   Zero Duration to 720 cycles (i.e., 12 hours)

   Zero Hour to '1'

   The exact menu location for each of these parameters can be found by referring to the Menu Map at the beginning of Chapter 4.

   Once you apply these settings, the analyzer will run a 12-hour Zero every day at 1 AM. The analyzer will spend 50 % of the time on the Sample gas and 50 % of the time on the internal Zero. These settings enable the analyzer to more effectively dry all of the surfaces within the sample manifold.

3. After 3 to 4 days, the analyzer setup can be returned to normal operation (e.g., factory default values).

Performing an Initial Zero

To start the initial Zero cycle:

1. Press the **Zero** key.

2. Press the '**8**' key (arrow down) until you see **Zero** between the arrows. Select **Zero** by pressing **Enter**.

This initial Zero cycle takes approximately two (2) hours. When the Zero cycle is complete, the analyzer will adjust the offset and automatically return to normal sampling.

NOTE

*The 3050-AM Analyzer requires time to fully recover to normal operation after Zeroing. During the recovery period, "**Equilibrating**" will be shown on line 2 of the display.*

Configuring the 3050-AM Analyzer for Serial Communications

Protocol

The protocol used for the 3050-AM Analyzer is a master/slave, command/response communication with the master initiating all transfers. The message format for transfers initiated by the master is illustrated in Figure 2-15.

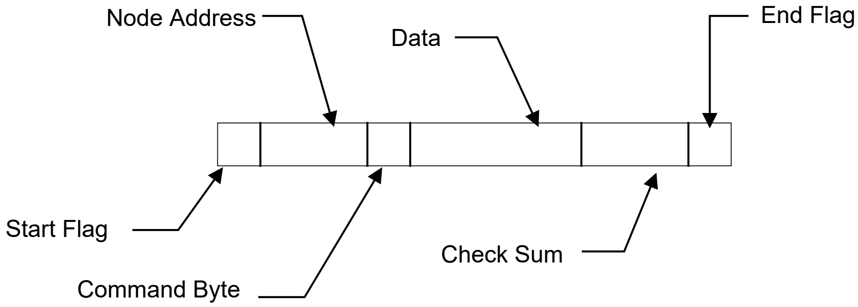


Figure 2-15.
Message format for transfers initiated by the master.

- All elements of this protocol are sent as ASCII characters.
- The Start Flag is the character '>', **$3E**.
- The End Flag is a carriage return, **$0D**.
- The Node address is a two byte hexadecimal ASCII value in the range **$00** through **$EF**.
- Addresses **$F0** through **$FF** are reserved.
- The command byte is a single ASCII character.
- The Data field is of variable length and contains ASCII characters.
- The checksum is a two byte ASCII hexadecimal field representing the modulo 256 sum of Node Address, Command Byte, and Data fields (excludes the start flag).
- A master can issue a wildcard in lieu of a checksum.

The checksum for a slave response is the modulo 256 sum of all characters preceding the checksum *including the response code.* The message format for slave responses containing a data field is illustrated in Figure 2-16.

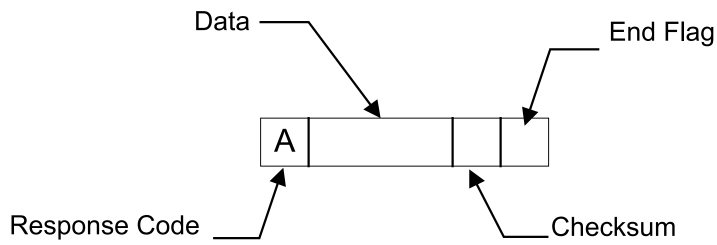


Figure 2-16.
Slave response message format.

The message format for slave acknowledge without a data field is illustrated in Figure 2-17.

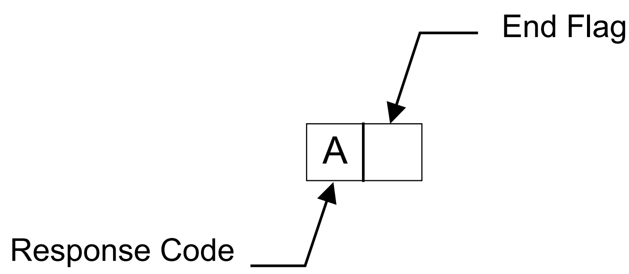


Figure 2-17.
Message format for slave acknowledge.

The message format for slave failure response is illustrated in Figure 2-18.

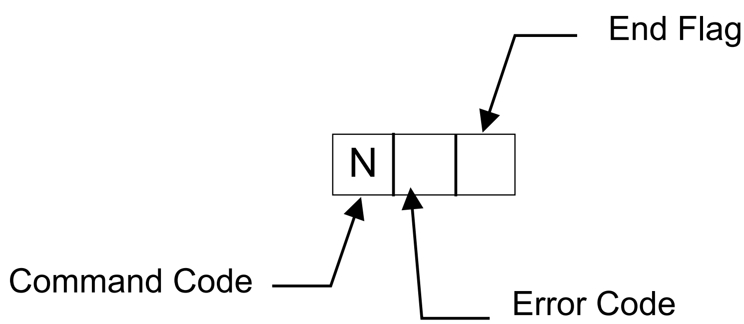


Figure 2-18.
Slave failure response format.

Special Addresses

Addresses **$F0** through **$FF** are reserved for special functions with address **$F0** used as a broadcast address.

Address $F0

Node address **$F0** is used as a single point address (i.e., it is intended for use in configurations with a single slave). The slave will respond to all messages with node address **$F0**. You must be careful to prevent multiple slaves from receiving commands with the broadcast address as this will cause a bus contention.

Defined Commands (Master to Slave)

The commands that can be issued from the master are listed in Figure 2-19.

Command Byte	Function
A	Echo
B	Bad Command
C	Acknowledge
F	Read Data
G	Not Used
H	Write Data
L	Write Cell EEPROM
Q	Quit Zero
R	Analyzer Reset
T	Toggle Test Mode
Z	Initiate Zero

Figure 2-19.
Defined Commands table.

Echo (A)

Echo implements a loop back function to test the integrity of the serial communication. Any text transmitted by the master is returned.

Example:
Master: >99ABCDEFG4E[CR]
Slave: AABCDEFG1D[CR]

Bad Command (B)

This command is not recognized by the slave. It will therefore result in a type 01 failure response.

Example:
Master: >99BB4[CR]
Slave: N01[CR]

Acknowledge (C)

Requests a simple acknowledge from the slave. Useful to determine if there is a device at that node address.

Example:
Master: >99CB5[CR]
Slave: A[CR]

Read Data (F)

The data field of this frame contains the handle for a system variable. See Figures 2-21.1 and 2-21.2 (Variable tables) for a list of defined handles for system variables.

Example:
Master: >34F0512[CR]
Slave: A1234540[CR]

Write Data (H)

The data field of this frame contains the handle for a system variable. See Figures 2-21.1 and 2-21.2 (Variable tables) for a list of defined handles for system variables.

Example:
Master: >34H05123.40C[CR]
Slave: A[CR]

Write Cell EEPROM (L)

Copy cell serial number and cell calibration coefficients into cell EEPROM.

Example:
Master: >34LB3[CR]
Slave: A[CR]

Quit (Q)

Zero cycle is terminated immediately and normal operation resumed.

Example:
Master: >34QB8[CR]
Slave: A[CR]

Zero (Z)

Initiates a Zero cycle.

Example:
Master: >34Z??[CR] (*Note the use of wildcard in place of checksum)*
Slave: A[CR]

Defined Responses (Slave to Master)

There are three (3) possible responses to a communication transfer initiated by the master. These are a **Simple Acknowledge**, **Acknowledge with Data**, and a **Failure** message.

Simple Acknowledge

If the received command does not require data to be returned, a simple acknowledge consisting of an ASCII 'A' will be sent.

Example:
Slave: A[CR]

Acknowledge with Data

If a command issued by the master requires data in response, an Acknowledge with Data response will be issued. This response consists of an ACSII 'A' followed by data and checksum.

Example:
Slave: A0123456A6[CR]

Failure

All failure responses consist of an ASCII '**N**' followed by a two byte hexadecimal ASCII failure code. Defined failure codes are given in the table below.

Example:
Slave: N01[CR]

Figure 2-20.
Defined Failure Codes.

Failure Code	Description
0	Unknown Command Byte
02	Check Sum
05	Parameter Out of Range

Variables Table

Name	ID	HEX	Description	Type	Typical Value
Press Units	13	D	Process pressure units of measure	Integer	0
MaxZeroError	18	12	Maximum Zero error allowed	Float	0.5
MaxZeroDrift	19	13	Maximum Zero drift allowed	Float	1.0
AnalogOutSpan	29	1D	Analog output span	Float	1.0
AnalogOutOffset	30	1E	Analog output offset	Float	0.0
Baud	40	28	Serial communication speed	Integer	9600
SerialMode	41	29	RS-485 two wire or four wire mode	Integer	1(four wire)
NodeAddress	42	2A	RS-485 analyzer address	String	1
AnalyzerName	43	2B	Ametek analyzer name	String	5830
Gas	44	2C	Sample gas name	String	Nitrogen
Alarm1Hi	46	2E	High concentration limit	Float	100.0
Alarm1Lo	47	2F	Low concentration limit	Float	0.0
MaxCalError	55	37	Maximum verification error allowed	Float	unused
KFactor	56	38	Gas based coefficient	Float	1.0
CalHour	57	39	Verification schedule parameter	Integer	13
CalPeriod	58	3A	Verification schedule parameter	Integer	15
CalMonthDays	59	3B	Verification schedule parameter	Integer	1
CalWeekDays	60	3C	Verification schedule parameter	Integer	1
CalType	61	3D	Verification schedule parameter	Integer	0
SerialNumber	62	3E	Analyzer manufacturing number	String	123
CellSerialNumber	63	3F	Sensor manufacturing code	String	583015
MoistureGeneratorSN	64	40	Moisture generator production code	String	020101305012
Version	65	41	Embedded software version	String	1.00
HoldOut	69	45	Hold out during Zero and Zero	Integer	1(hold)
VerDurationLimit	71	47	Minimum Zero cycles number	Integer	15
ZeroOnly	72	48	Start Zero only flag	Integer	1(Zero only)
EnableAlarm1	73	49	Enable or disable concentration alarm	Integer	1(enable)
DryerDateCode	75	4B	Dryer production code	String	010080009
DryerPpmHours	76	4C	Dryer consumption in 1000 ppm hours	Float	20000.00
LCDcontrast	79	4F	Display contrast setting	Integer	5
LCDbacklight	80	50	Display back light on or off	Integer	1(on)
AdjustFreqOffset	81	51	Adjust frequency offset after Zero	Integer	1(adjust)
ZeroHour	82	52	Zero schedule parameter	Integer	13
ZeroPeriod	83	53	Number of cycles to stay in Zero	Integer	15
ZeroMonthDays	84	54	Zero schedule parameter	Integer	1
ZeroWeekDays	85	55	Zero schedule parameter	Integer	1
ZeroType	86	56	Zero type(daily,monthly,weekly)	Integer	0(daily)
Pressure1	87	57	Sensor pressure value	Float	14.7 psi
CellTemp	88	58	Sensor temperature value	Float	60.0 degreeC
AnalogOutput	89	59	Current output reading	Float	12.0 mA
EETemp	90	5A	Electronics enclose temperature	Float	55.0 degreeC

Figure 2-21.1.
Variables table.

Name	ID	HEX	Description	Type	Typical Value
Moisture	91	5B	Moisture concentration reading	Float	20.0 ppm
HeldConc	92	5C	Held moisture concentration reading	Float	22.0 ppm
Frequency	93	5D	Sensor frequency reading	Float	1200 Hz
DeltaFrequency	94	5E	Wet minus dry reading	Float	0.01 Hz
Flow3	97	61	Held and displayed flow	Float	50.0 sccm
ValveState	99	63	0-sample, 1-ver, 2-reference, 3-zero	Integer	0 (sample)
Hour	100	64	Analyzer current time read	Integer	13
Minute	101	65	Analyzer current time read	Integer	36
Second	102	66	Analyzer current time read	Integer	10
Month	103	67	Analyzer current time read	Integer	12
Day	104	68	Analyzer current time read	Integer	5
Year	105	69	Analyzer current time read	Integer	2002
Date	106	6A	Analyzer current date	String	02/24/02
Time	107	6B	Analyzer current time	String	08:45
SystemState	108	6C	Alarm status word	Integer	1024
DataState	110	6D	Data ready variable	Integer	0
ModelName	119	77	Analyzer model name	String	5830
ReferencePer	120	78	Current reference period time	Integer	15
SamplePer	121	79	Current sample period time	Integer	21
WetFreq	122	7A	Wet frequency reading	Float	1234 Hz
DryFreq	123	7B	Dry frequency reading	Float	1230 Hz
WeekDay	124	7C	Current day of the week	Integer	1
MoistureSpan	125	7D	Concentration coefficient	Float	1.0
CalCycleCount	126	7E	Verification cycles count down timer	Integer	15
ZeroCycleCount	128	80	Zero cycles count down	Integer	8
EquilCal	129	81	Equilibration cycles number set	Integer	3
FrequencyOffset	131	83	Zero correction coefficient	Float	0.0
Font	156	9C	Display font flag	Integer	0
EquilZero	157	9D	Zero equilibration cycles set	Integer	3
BypassState	159	9F	State of a bypass valve	Integer	1(closed)
OldFreqOffset	166	106	Offset before the last correction	Float	0.0
MoistureUnits	168	108	Moisture units of measure set	Integer	0
PpmW	169	109	PpmV to PpmW conversion factor	Float	0.6431
IgnoreSpanDrift	170	10A	Ignore span drift flag	Integer	0
OldMoistSpan	171	10B	Moisture span before the correction	Float	0.0

Figure 2-22.2.
Variables table (continued).

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Communicating with the 3050-AM Moisture Analyzer can be done using the built-in user interface or using the AMETEK 3050 Analyzer Configurator Software. Both methods are described in this chapter.

Working From the Built-in User Interface

The built-in user interface consists of the LCD display screen and keypad on the front of the 3050-AM Moisture Analyzer. Using a combination of the function keys, numbers, and other characters, you can set the parameters for your analyzer.

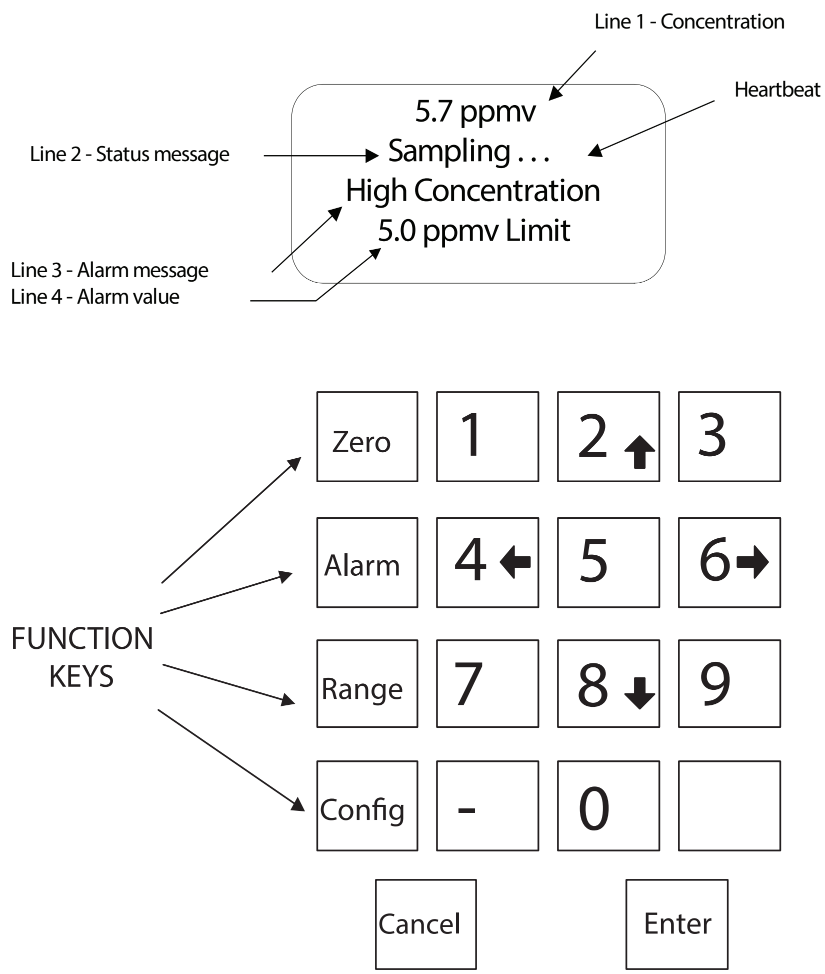


Figure 3-1.
Keypad and LCDdisplay for the 3050-AM Moisture Analyzer.

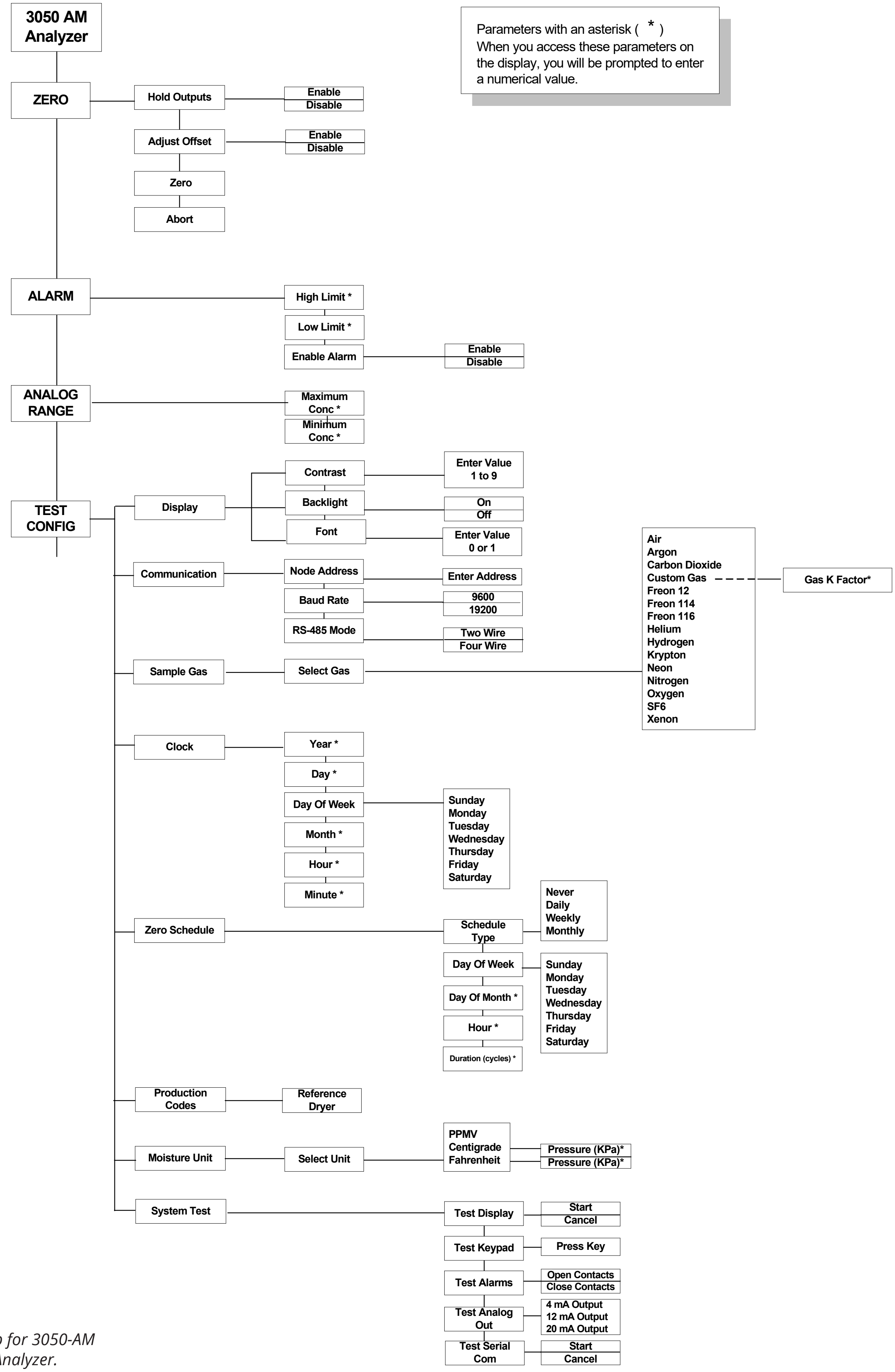


Figure 3-2.
Menu Map for 3050-AM Moisture Analyzer.

Zero Key

Use the **Zero** key to define on-demand Zero settings.

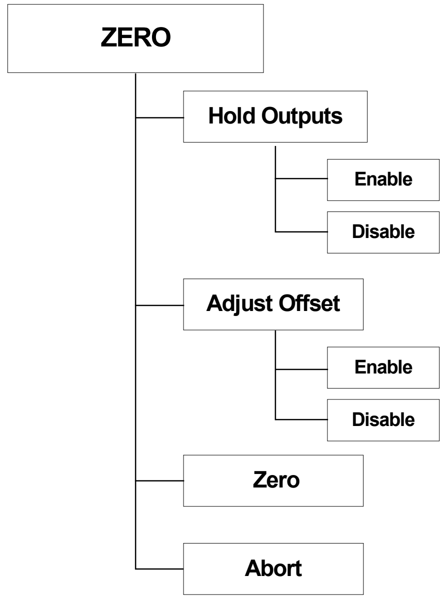


Figure 3-3.
Main Menu, Zero key.

Hold Outputs

Enable

Select this function to hold the output at the last valid reading during a Zero.

Disable

Select this function to allow the output to change during a Zero.

Adjust Offset

Enable

Select this function to adjust the offset at the end of a Zero cycle.

Disable

Select this function if you do not want to adjust the offset.

Zero

This function initiates a Zero cycle.

Abort

This function aborts a Zero/Verification cycle and returns the analyzer to normal operation.

Alarm Key

Use the **Alarm** key to define alarm output settings.

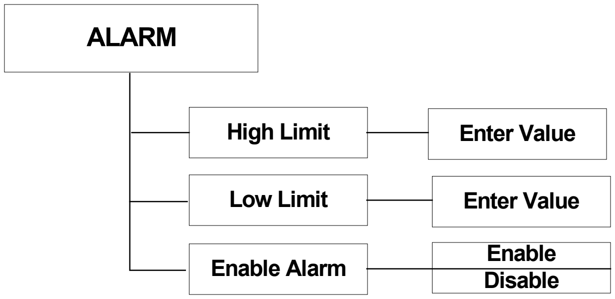


Figure 3-4.
Main Menu, Alarm key.

High Limit

Enter the high limit value in moisture units selected.

Low Limit

Enter the low limit value in moisture units selected.

Enable Alarm

Select **Enable** or **Disable** to activate the moisture concentration alarm relay.

Range Key

Use the **Range** key to define your 4–20 mA output setting.

Use this setting to scale the 4–20 mA output. The 4–20 mA output is proportional to the moisture readings.

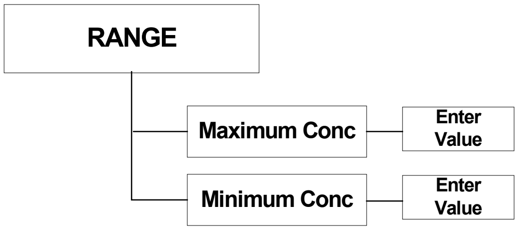


Figure 3-5.
Main Menu, Range key.

Maximum Conc.

Enter the moisture reading equivalent to 20 mA.

Minimum Conc.

Enter the moisture reading equivalent to 4 mA.

Example:

To scale the analog output to represent a 0–100 PPMV range, enter the following settings:

Maximum Conc.: 100

Minimum Conc.: 0

Config Key

The **Config** key is used to define device and communication settings.

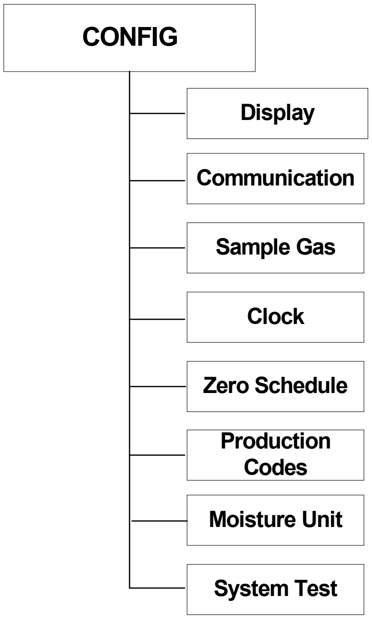


Figure 3-6.1.
Main Menu, Config key.

Display

Select the format for the display you want to use.

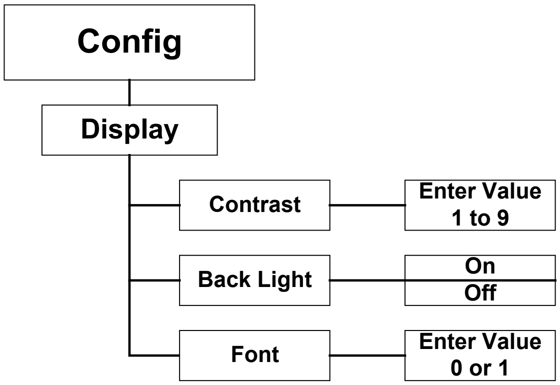


Figure 3-6.2.
Display menu.

Contrast

Enter a value from '1' to '9'. The default is '5'.

Back Light

Select **On** or **Off**. The default is **On**.

Font

This is a factory-set parameter that identifies the type used for the display on the analyzer.

Communication

Select communication setup.

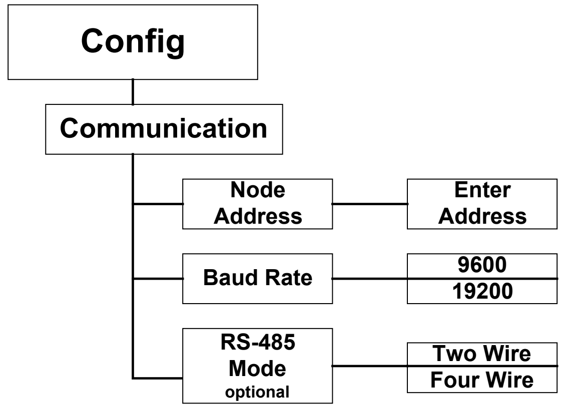


Figure 3-6.3.
Communication menu.

Node Address

Enter the address for RS-485 serial communications (0–240). Address 240 is reserved (see the "Special Addresses" section in Chapter 2 for details).

Baud Rate

Select the baud rate at which you transfer data (9600 or 19200). The default is 9600.

RS-485 Mode (Optional)

Select 2-wire or 4-wire. The default is 4-wire.

Sample Gas

This list allows you to specify the Sample gas you want to analyze.

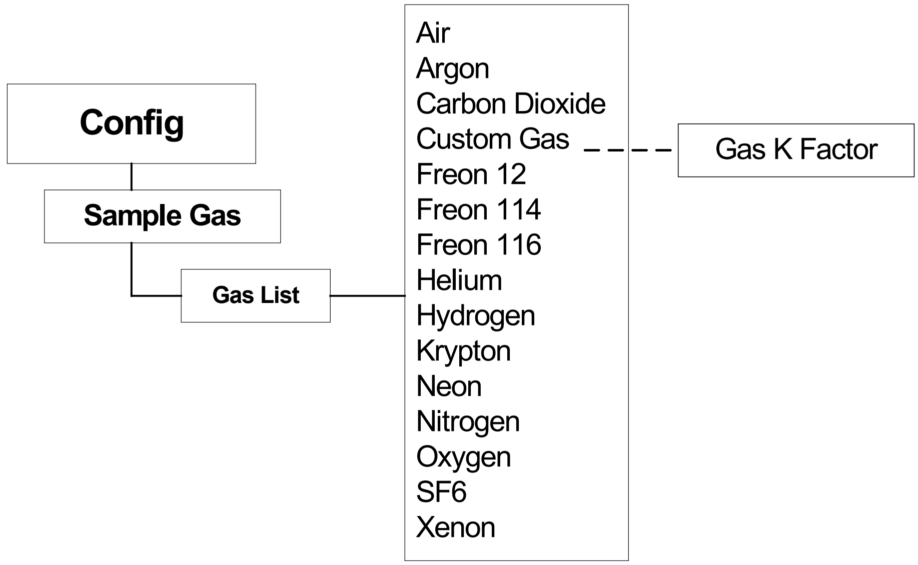


Figure 3-6.4.
Sample Gas menu.

Select Gas

Press **Enter** to move to the listing of Sample gases. Scroll up/down the list to select the correct Sample gas.

Custom gas

If you select the **Custom Gas** selection and press **Enter**, you will be prompted to enter a **Gas K Factor**. The **Gas K Factor** is a parameter used by the flow meter in the 3050-AM to adjust for the molar heat capacities of different gases. Nitrogen is used as the Reference gas for the K factors, and its value is defined as 1.000.

Please contact AMETEK Service for assistance, before running gases that are not listed in the menu on the 3050-AM Analyzer.

NOTE

If a custom gas is entered, the conversion to units of dew point will be based on an ideal gas model, without any enhancement factor.

Clock

Use this function to set the clock on your analyzer.

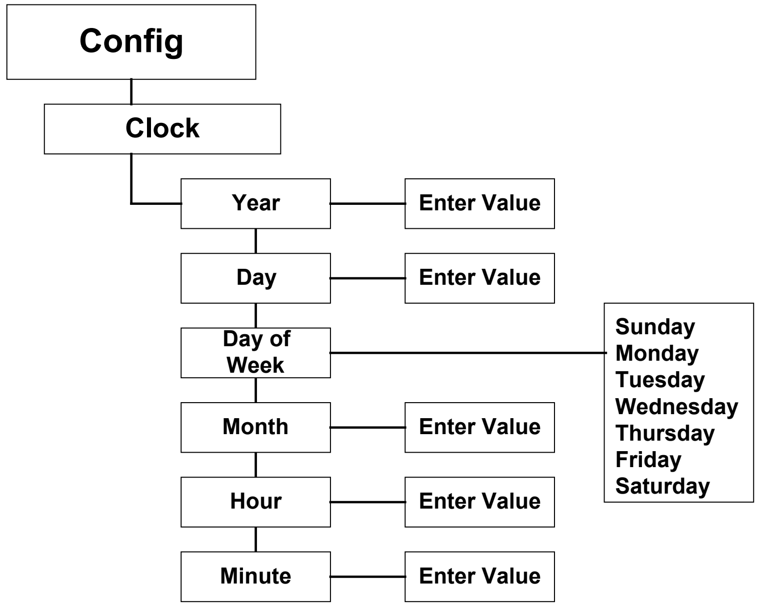


Figure 3-6.5.
Clock menu.

Year

Enter the 4-digit value for the year.

Day

Enter the 2-digit value for the day.

Day of the Week

Select the day of the week from the list.

Month

Enter the 2-digit value for the month.

Hour

Enter the value using the 24-hour clock.

Minute

Enter the 2-digit value for minutes.

Zero Schedule

Use this function to schedule automatic analyzer Zeroing.

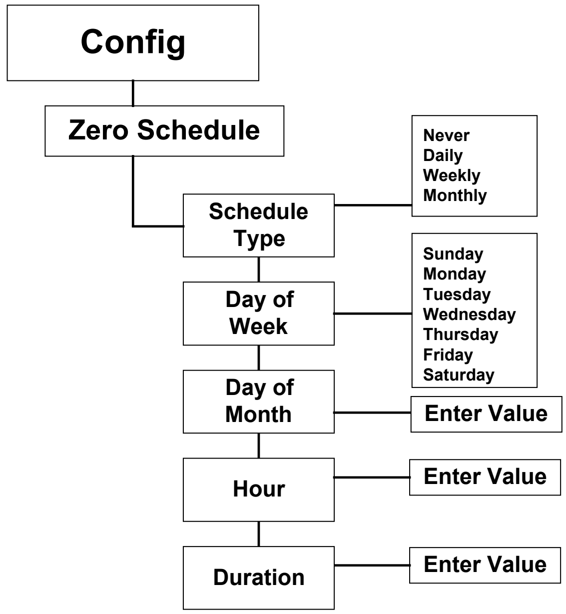


Figure 3-6.6.
Zero Schedule menu.

Schedule Type

Choose the preferred Schedule Type:
Never, **Daily**, **Weekly**, or **Monthly**.

Day of the Week

Select the day of the week from the list.

Day of the Month

Enter the 2-digit value for the day of the month.

Hour

Enter the 2-digit value for the hour of the day using a 24-hour clock. Zero is the starting hour.

Duration

Enter the Zero period value in minutes.

NOTE

AMETEK recommends performing a Zero every 24 hours for the first month of operation. After this start-up period, the analyzer will have dried down sufficiently to increase the Zeroing interval to 1 week. AMETEK recommends that the duration of the Zero cycle be set to 120 (i.e., 2 hours).

Production Codes

Use this function to enter the production codes for the reference dryer.

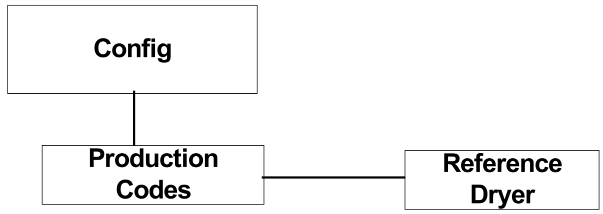


Figure 3-6.7.
Production Codes menu.

Reference Dryer

The dryer production code is required for proper operation of the analyzer. This number contains the dryer capacity value, which is used to estimate the life expectancy of the device.

NOTE

Use caution, as entering a "new" value informs the analyzer that a new dryer has been installed in the reference leg of the analyzer. The remaining dryer capacity is reset when a new number is entered.

Moisture Unit

Select Unit

The units for the moisture readings can be selected from a list. Pressing **Enter** at the "**Select Unit**" prompt displays the list. (If a dew/frost point is selected, you must enter a value for the process pressure in units of kPa.

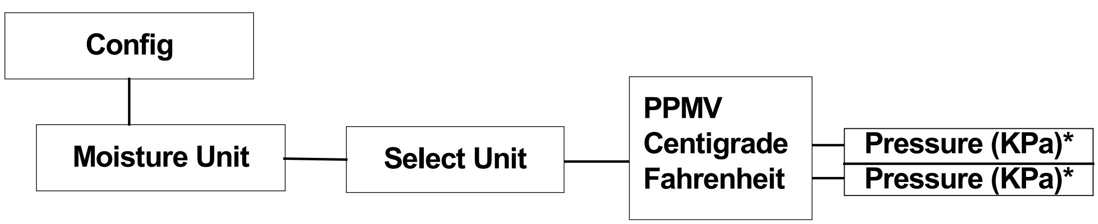


Figure 3-6.8.
Moisture Unit menu.

NOTE

If you change the moisture units, remember to make the necessary changes to the Alarm and Analog Range settings.

System Test

Use the **System Test** key to perform tests on various components of the analyzer.

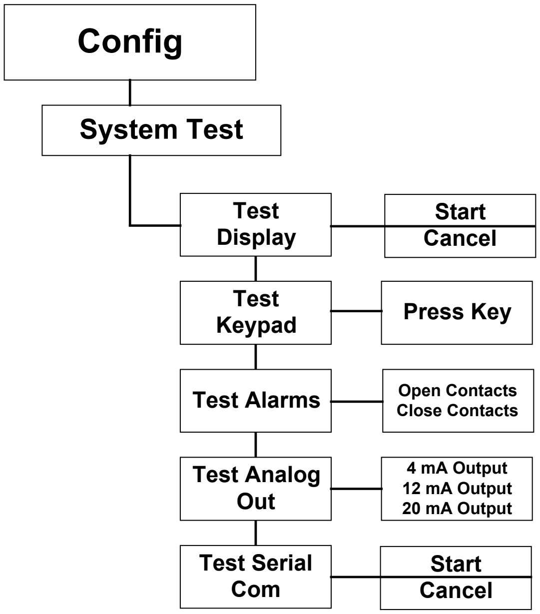


Figure 3-6.9.
System Test menu.

Test Display
Tests the display by providing a "checker board" pattern on the display.

Test Keypad
Tests the keypad by echoing characters to the display.

Test Alarms
Tests the alarm contacts by toggling them open / close.

Test Analog Output
Tests the analog output by allowing the user to set outputs to 4, 12, or 20 mA.

Test Serial Communications
Performs a "loop back" test and reports the result to the display.

Working From the AMETEK 3050 Configurator Software

The Configurator Software provides a graphical user interface to set up parameters for either a single analyzer or multiple analyzers.

NOTE

Although you can set and view parameters for multiple analyzers using the 3050 Configurator Software, you can only work with one analyzer at any time.

Configurator Software Installation

1. Insert the Configurator Software CD into CD ROM drive.

2. The installation program should begin to run immediately. If it does not start automatically, click **RUN**... from the Windows **Start** menu. Type the drive letter, followed by a colon (:) and a backslash (\ ) and the word "setup.exe" (d:\setup.exe) and click **OK** to start the installation program.

3. Follow the instructions on the subsequent screens to complete the installation. When you get to the **Setup Complete** screen, click **Finish** to complete the installation. The default location for the 3050-AM software is in the **AMETEK, Inc.** folder.

NOTE

Turn off all power saving modes.

Configuring the 3050-AM

This section provides instructions for setting up your operating parameters using the Configurator Software.

Working From the General Tab

Use the **General** tab to view the current configuration and define parameters for the analyzer and for **PC communications** (Figure 3-7).

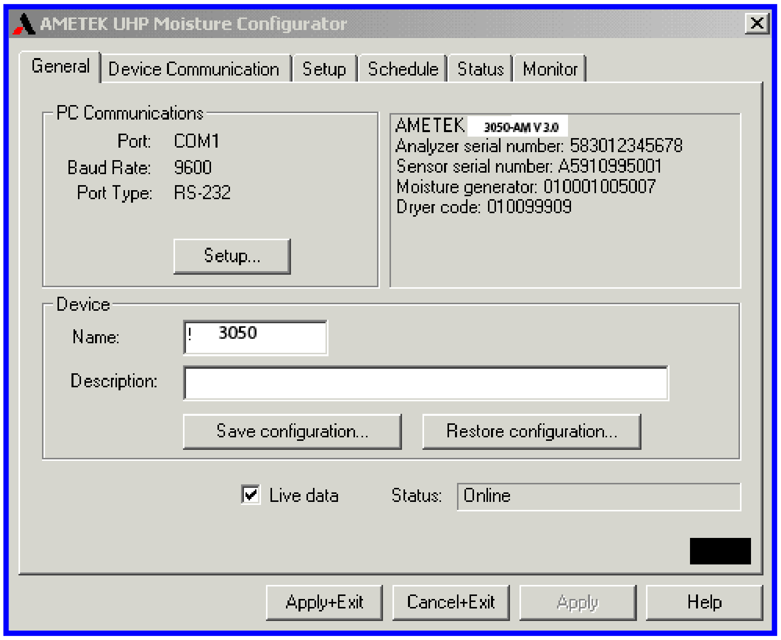


Figure 3-7.
General tab Configurator Software.

NOTE

After initial setup, any changes to the analyzer communications parameters must be made using the ***Device Communications*** *tab. These changes must be made before you make any changes to the computer serial port settings.*

PC Communications Setup Options

Displays information that has been configured from the **Serial Port Configuration** dialog box.

Click the **Setup** button to configure **PC Communication**s. The **Serial Port Communication** screen opens (Figure 3-8).

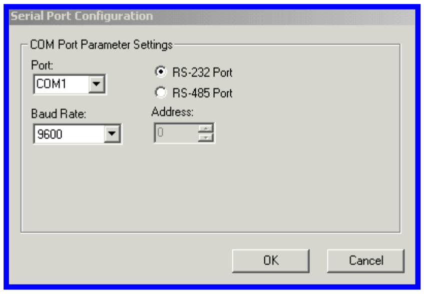


Figure 3-8.
PC Serial Communications setup screen.

Port

Select the COM port on your computer where the connection to the analyzer is installed.

Baud Rate

Select the baud rate at which data will be transferred.

RS-232 Port

Click if the analyzer is connected to an RS-232 port.

RS-485 Port

Click if the analyzer is connected to an RS-485 port.

Address

Type the network address to which the analyzer is connected.

To save **PC Communications** settings, click **OK**.

To abort changes you have made, click **Cancel.**

Device

Name

Type in a name for the analyzer.

Description

Type in a description for the analyzer.

Save configuration button

Save the analyzer's internal parameters to a file. The **Save As** dialog box opens so that you can name and save the file.

Restore configuration button

Restore the analyzer's internal parameters from a file. The **Open** dialog box appears so that you can select and open the file.

NOTE

*The **Restore configuration** button can also be used to restore the analyzer communications parameters.*

Live Data check box

Checked

The system connects to and uses live data from the analyzer.

Not checked

The system uses demonstration data.

Status message field

Indicates if the analyzer is on-line, off-line, or in demo mode.

On-Line

The PC and analyzer are connected and communicating properly.

Off-Line

The **Live Data** box is checked on the **General** tab and the connection is broken or off-line.

Demo Mode

The **Live Data** box is not checked on the **General** tab. No analyzer is connected through the serial port. This allows you to exercise program options without communication with the analyzer.

Serial Numbers

The analyzer name and analyzer software version are displayed on the first line in the upper right-hand corner. The **analyzer serial number** and **sensor serial number**, and the **dryer code** are also displayed.

In the lower right-hand corner, above the **Help** button, is the **Configurator Software version number**.

Saving Analyzer Configuration Settings

To save all of the settings made on the **General** tab, click **Apply.**

To save settings and exit the program, click **Apply+Exit.**

To abort changes you have made, click **Cancel+Exit**. This will close the Configurator Software program.

Working From the Device Communication Tab

> NOTE
>
> *For initial setup of PC communication parameters, use the **Setup** button on the **General** tab.*

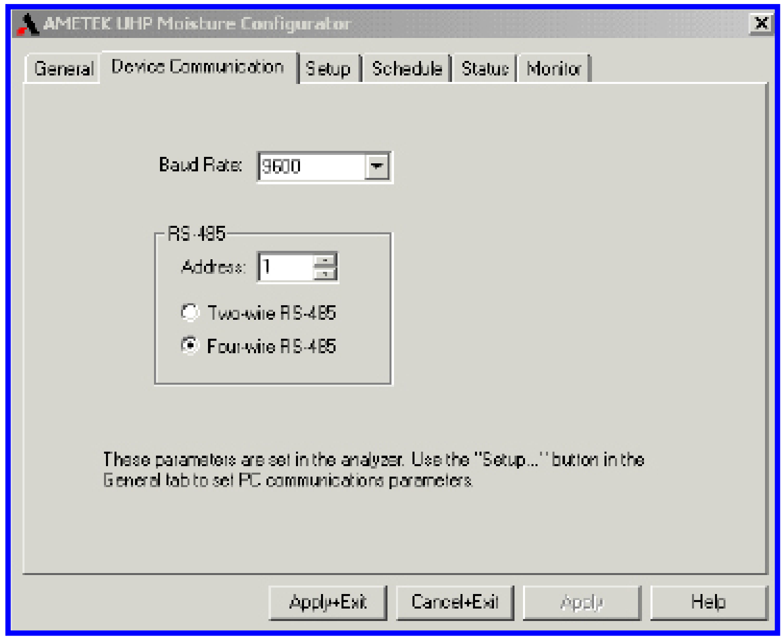


Figure 3-9.
Device Communication setup screen.

Configuring Multiple Analyzers

Use the **Device Communication** tab to set the analyzer's communication parameters to agree with the PC settings when controlling analyzers in a daisy chain.

Changing Communication Parameters

- Change the ANALYZER parameter(s) first.
- Click **Apply** to confirm the change. This may cause the analyzer to go off-line.
- Change the PC settings or physical wires/cables.
- Reset the analyzer by recycling power.

Parameters on the **Device Communications** tab include:

Baud Rate
Select the baud rate at which data will be transferred.

RS-485
Identifies the analyzer's address and the type of serial communication cable that is being used.

Address
Type the network address for the analyzer being connected.

Two-Wire RS-485
Click if you are using a 2-wire cable.

Four-Wire RS-485
Click if you are using a 4-wire cable.

Saving Your Settings

To save settings on the **Device Communications** tab, click **Apply.**

To save settings and exit the program, click **Apply+Exit.**

To abort changes you have made, click **Cancel+Exit**. This will close the Configurator Software program.

Working From the Setup Tab

Use the **Setup** tab to define analyzer parameters.

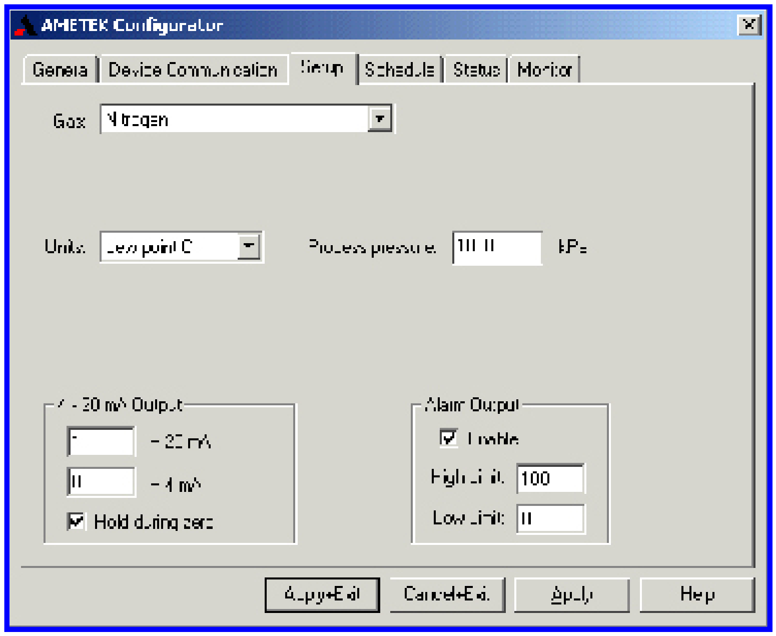


Figure 3-10.
Schedule tab.

Gas

Select the gas being sampled.

NOTE

***Dewpoint Temp** – If you select dewpoint temp, the **Process Pressure** box is activated and you must enter a process pressure parameter in kPa.*

Units

Select the unit of measurement.

Process pressure

Enter the process pressure in kPa.

4–20 mA Output

Set up your analog output range.

20 mA

Enter your high analog output limit.

4 mA

Enter your low analog output limit.

Hold during zero

Check this box to hold analyzer output during Verification and Zero.

Alarm Output

Set up the limits for the concentration alarm.

Enable check box

Check this box to enable the concentration alarm.

High Limit

Enter the high limit for the concentration alarm.

Low Limit

Enter the low limit for the concentration alarm.

Working From the Schedule Tab

Use the **Schedule** tab to schedule routine **Zero**.

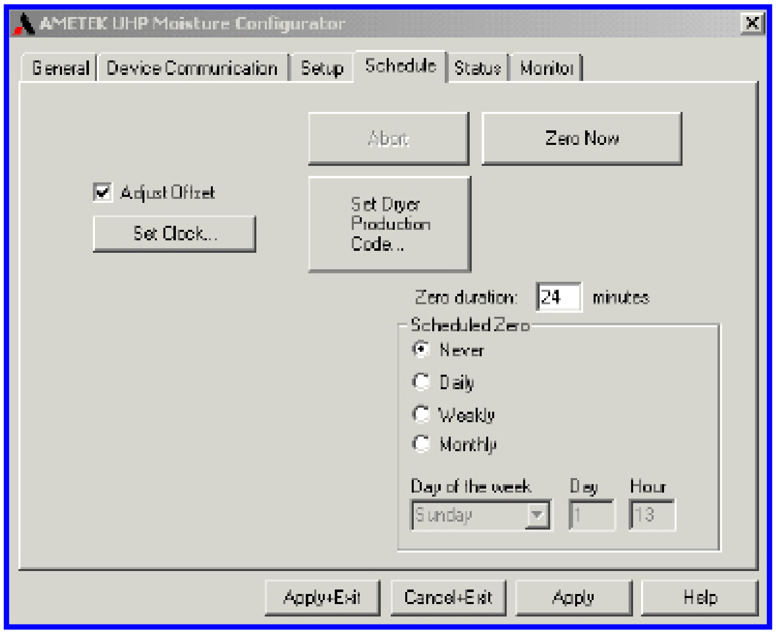


Figure 3-11.1. Schedule tab.

Abort button

Click to terminate Verification or Zero.

Zero Now button

Click to begin Zero cycle now.

Adjust Offset check box

Checked

The analyzer performs an offset adjustment at the end of the Zero cycle.

Not checked

The analyzer verifies only.

Set Clock (Time Synchronization)

Click **Set Clock** to synchronize the clock within the analyzer with the PC. The **Time Synchronization** box opens with the PC time and date and the analyzer time and date. Click S**ynchronize** to set the time, or click **Cancel** to close the box.

Set Dryer Production Code button

Click to enter the **Dryer Production Code** for the dryer that is installed in the analyzer. Click **OK** to accept.

NOTE

You must enter a new dryer code each time you replace the dryer.

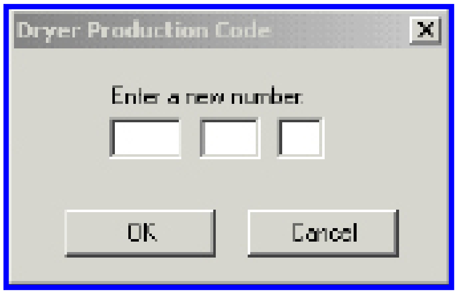


Figure 3-11.2.
Dryer Production Code entry screen.

Zero Duration

Enter the Verification duration in minutes. The system defaults to the minimum time required.

Scheduled Zero

Schedule routine Verifications by clicking the **Daily**, **Weekly**, or **Monthly** button.

Never

No Zero cycle will be done. Scheduling fields at the bottom of the box are not available.

Daily

To run a Zero daily, select this option and then enter the time of day (1 through 24) in the **Hour** field at the bottom of this group.

NOTE

The analyzer uses a 24-hour clock. Example: 1:00 PM = 13 hours.

Weekly

To run a Zero weekly, select this option and then select the day of the week from the drop-down list under **Day of the week** at the bottom of this group. You must also enter the time of day (1 through 24) in the **Hour** field at which the Zero cycle will begin.

Monthly

To run a Zero monthly, select this option and then enter the numeric (1 through 28) day of the month in the **Day** field and time of day (1 through 24) in the **Hour** field at which the Zero cycle will begin.

Saving Your Settings

To save settings on the **General** tab, click **Apply.**
To save settings and exit the program, click **Apply+Exit.**

To abort changes you have made, click **Cancel+Exit**. This will close the Configurator Software program.

Working From the Status Tab

Use the **Status** tab to view current readings and the status of the analyzer.

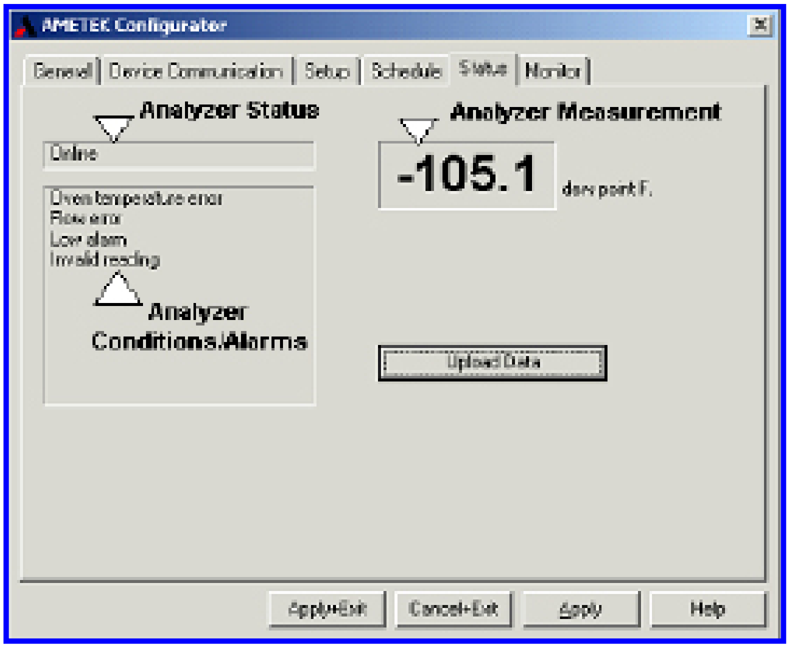


Figure 3-12. Status tab.

Upload Data

Click **Upload Data** to save data from the analyzer to a file. The **Save As** screen opens so that you can browse to where you want to save the file. The file format is Excel-compatible CSV format. Concentration readings data for the last 24 hours can be written to this file from the analyzer's data buffer.

Working From the Monitor Tab

Use the **Monitor** tab to check on analyzer operation. From this tab you can also collect data from the analyzer.

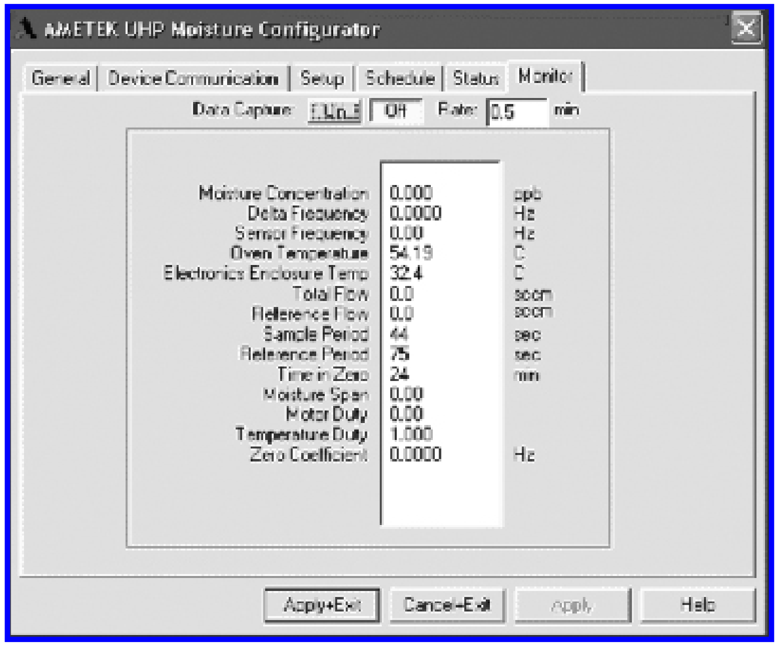


Figure 3-13.
Monitor tab.

Data Capture

The data capture feature allows the user to collect and save analyzer data displayed on the **Monitor** tab to an Excel compatible file.

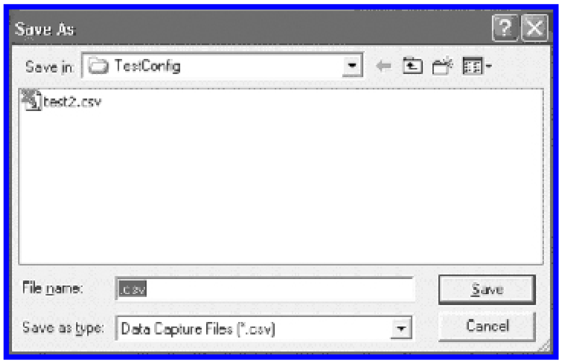


Figure 3-14.
Monitor tab – Save As.

On

Press the **On** button to start data collection. Specify the file name in the **Save As** dialog and press the **Save** button. The file format is ".csv" which is Excel compatible. All data displayed on the **Monitor** tab will be stored in the specified file.

Off

Data collection will terminate and the file will close when the **Off** button is pressed or another Configurator Software tab is selected.

Rate

The preferred data collection rate is "0.5" minutes and is set as the default. A record is created every 30 seconds. The collection rate can be increased to one (1) minute or more.

Maintenance and Troubleshooting

This chapter describes how to request technical support and authorization on returning equipment, and lists spare parts required for general and continued operation. This chapter also includes information about how to replace parts in the 3050-AM Moisture Analyzer.

WARNING

The operations in this chapter should be performed only by qualified service personnel experienced in electrical safety techniques.

NOTE

Before working on the 3050-AM Analyzer, read the entire procedure you will be performing to learn how to safely and properly perform maintenance or service the analyzer.

Aftermarket Excellence and Long-Term Commitment to Safety and Quality

Our goal is to make your experience with our products exceptional. We stand behind our analyzers with a broad service offering that provides a sense of security long after the initial purchase has been made. We commit to fulfilling your service needs with speed, quality, and professional consideration.

From delivering on-site technical support to in-house repair at one of our service centers, our experienced technicians are knowledgeable and helpful. We also offer remote virtual support and a variety of training options.

Scan the QR code or click the link below to request expert Aftermarket support for parts, repairs, service, training, and more:

www.ametekpi.com/customersupport/aftermarket

3050-AM Analyzer Replacement Parts

NOTE

** Indicates recommended stock spare parts to have on hand.*

Refer to the Figure number listed for the location of the part.

Part Description	**AMETEK Part No.**	**Figure**
Battery, Lithium	280750043	—
EEPROM, programmed	305858901S	—
Front Panel	305808901	1-1, 2-1.1
*Fuse, 2 Amp, 250 V	271291001	2-3
LCD Display with 6-inch cable	591136901	1-1
MCU Board	305110906S	4-7, 4-10
PCB Assembly, Analog Interface Board	591144901	2-2, 2-3, 4-7, 4-9
PCB Assembly, User Interface Board	591200901	4-13
PCB Assembly, 3050 AP/AM Adapter	305517901	—
Pilot Valve Manifold Assembly	583011901S	4-7, 4-11
Sample and Reference Proportional Valves	305705901	4-4
Power Supply (±15 V, 5 V)	T460-048	—
Power Supply (24 V)	271768001	4-1, 4-7
Dryer	583072901S	2-4.1
Oven Fan (Large)	583090901	4-2
Oven Fan (Small)	305640901	4-2
Enclosure Fan	583069901	4-1
Pressure Transducer	305686901S	4-1
*Sensor Assembly	305122906S	4-2, 4-3, 4-4
Zero Module Manifold	583008901	4-1, 4-2
Capillary Replacement FRU	305856901S	4-2, 4-4
SAFETY CRITICAL COMPONENTS		
Thermostat, Recognized/Certified component	269253001	—
Fan, Recognized/Certified component	271767001	—

Servicing the 3050-AM Analyzer

NOTE

Make sure that power has been disconnected from the analyzer before attempting to remove or replace any of the parts.

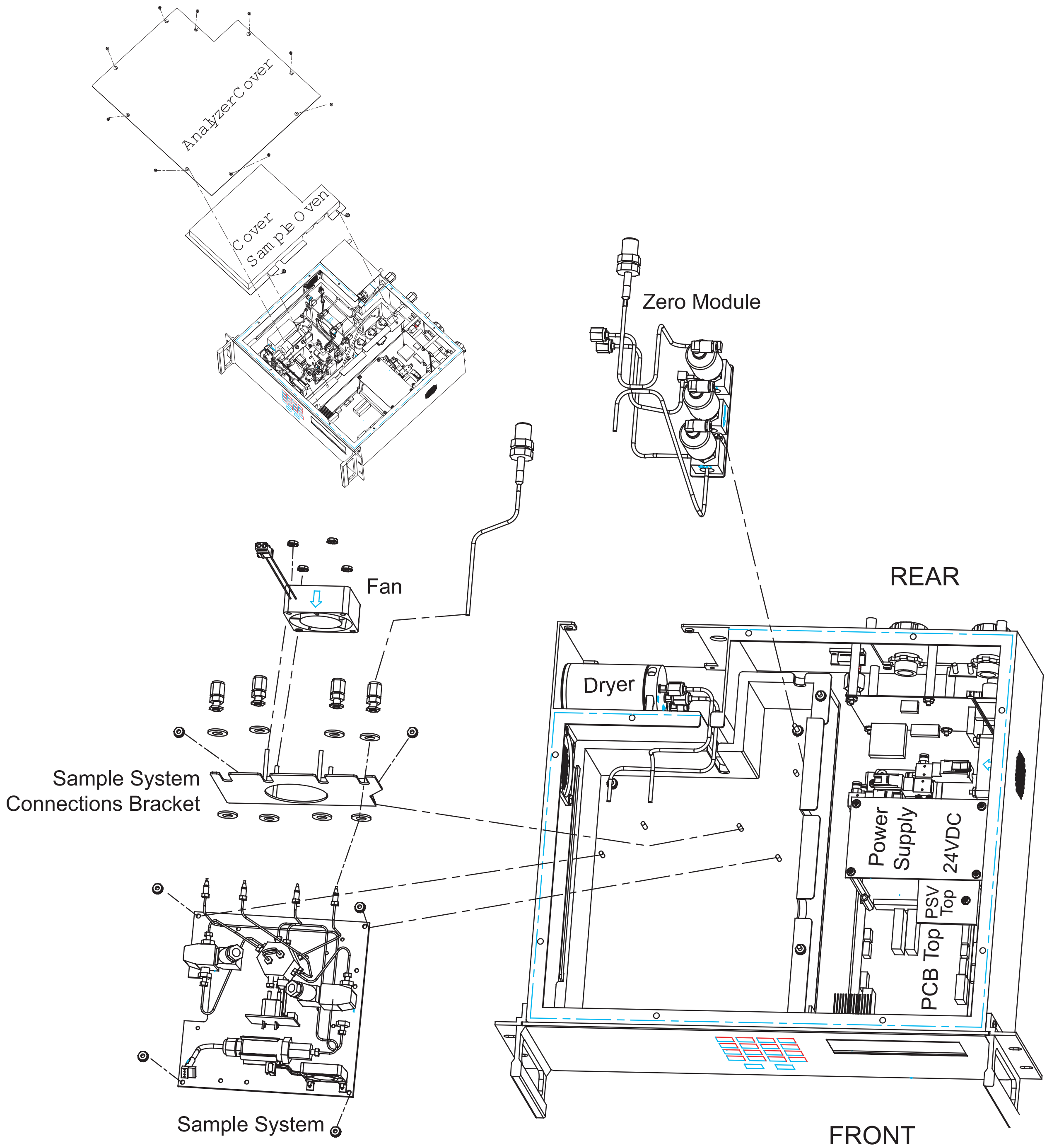


Figure 4-1.
3050-AM exploded view.

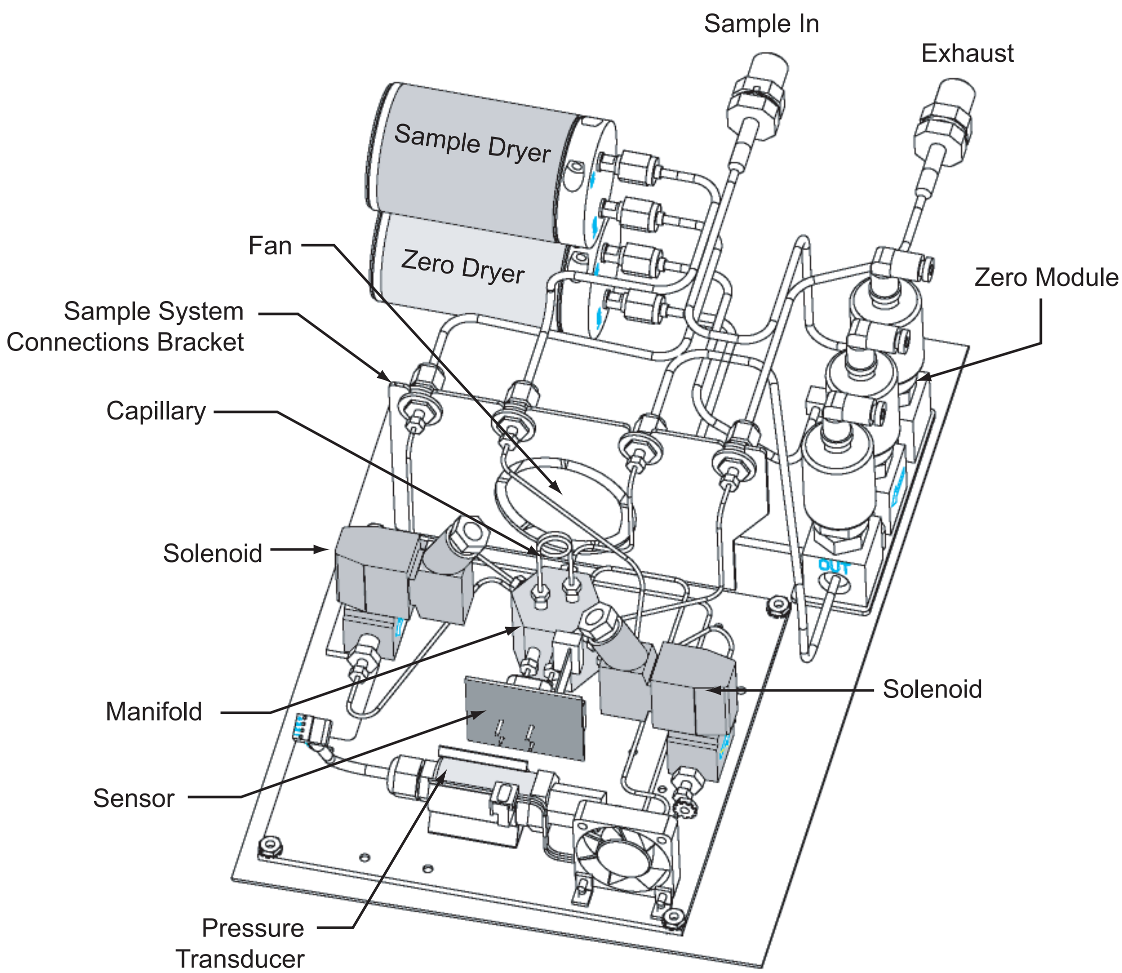


Figure 4-2.
3050-AM sampling system.

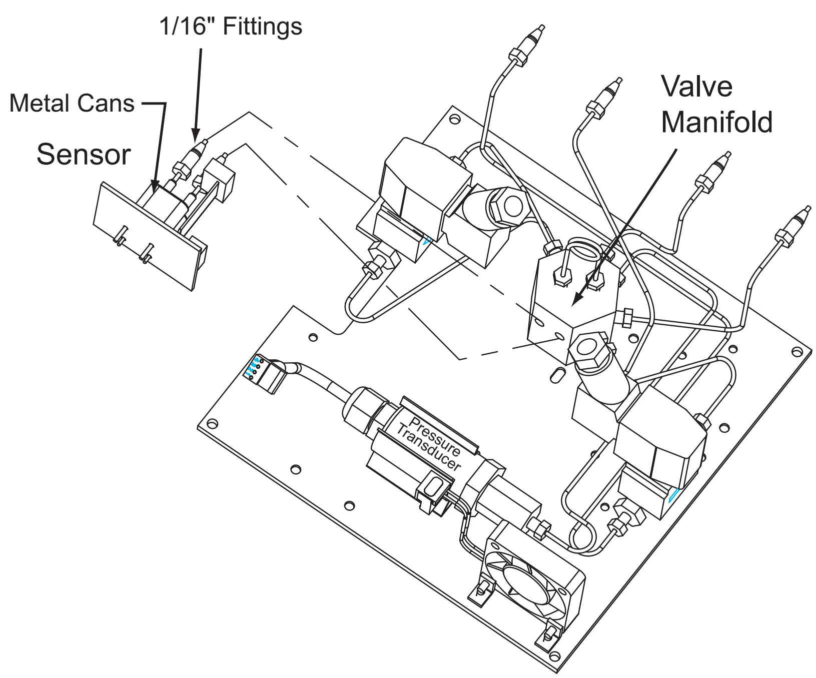


Figure 4-3.
Sensor removal in 3050-AM.

Sensor

Removing the Sensor

1. Remove the top cover from the analyzer.

2. Remove the cover from the Sample Oven. Facing the front of the 3050-AM Analyzer, the Sensor is the small PC board with two (2) metal cans in the center of the sample manifold plate (Figure 4-3).

3. Disconnect the two (2) 1/16-inch fittings that connect the Sensor to the stream switching valve manifold in the center of the sample manifold plate (Figure 4-3).

4. Lift the Sensor assembly from the Oven compartment being careful to free the ribbon cable attached to it from the other wires that pass through to the electronics compartment.

5. Disconnect the ribbon cable from the **Analog Interface** board and discard the old Sensor.

Installing the Sensor

1. Mount the new Sensor on the stream switching valve manifold by carefully inserting and tightening the two (2) 1/16-inch fittings.

2. Run the ribbon cable from the Sensor through the slotted opening in the Oven wall into the electronics compartment.

3. Connect the ribbon cable plug to position **P2** on the **Analog Interface** board (Figure 4-9).

4. Replace the Oven cover and secure it with the two (2) nuts.

5. Replace the analyzer cover and secure it with the mounting screws.

Capillary

The capillary (Figure 4-4) is a part of the flow meter in the analyzer and can easily be replaced when necessary.

Removing the Capillary

1. Remove the top cover from the analyzer and remove the cover from the Sample Oven. Facing the front of the 3050-AM Analyzer, the capillary is found on top of the stream switching manifold (Figure 4-4).

2. Disconnect the capillary and remove it by loosening both nuts and gently pulling the tubing out of the stream switching manifold block.

Installing the Capillary

1. To install the capillary, gently push the tubing ferrules on the capillary into the tubing on the manifold block until flush and tighten the nuts to secure.

2. Replace the Oven cover and secure it with the two (2) nuts. Replace the analyzer cover and secure it with the mounting screws.

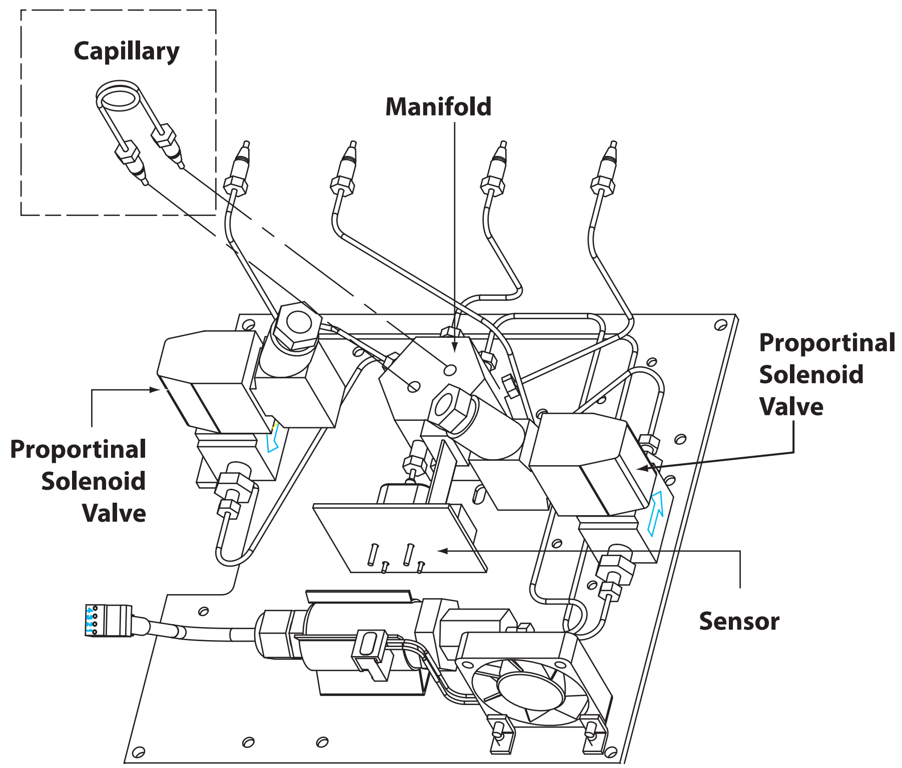


Figure 4-4.
Capillary location – 3050-AM.

Proportional Solenoid Valves

Removing the Solenoid Valve

1. Remove the top cover from the analyzer.

2. Remove the cover for the Sample Oven.

3. Disconnect all of the 1/16-inch fittings from the sample system connections bracket.

4. Remove the four (4) nuts that secure the sample manifold plate (the square aluminum mounting plate, located in the front section of the Oven), and gently lift the manifold out of the Oven).

NOTE

All of the wiring connections should still be intact at this time; you will need to rest the sample manifold plate on top of the analyzer to perform the valve replacement.

5. Disconnect the 1/16-inch fittings on the inlet and outlet located on either side of the solenoid valve by loosening the nut and gently pulling the tube out (Figure 4-5).

6. Remove the adaptor fittings from either side of the solenoid and put aside.

7. Using a flat-head screwdriver, remove the screws that secure the valve body to the sample manifold plate; set the screws aside.

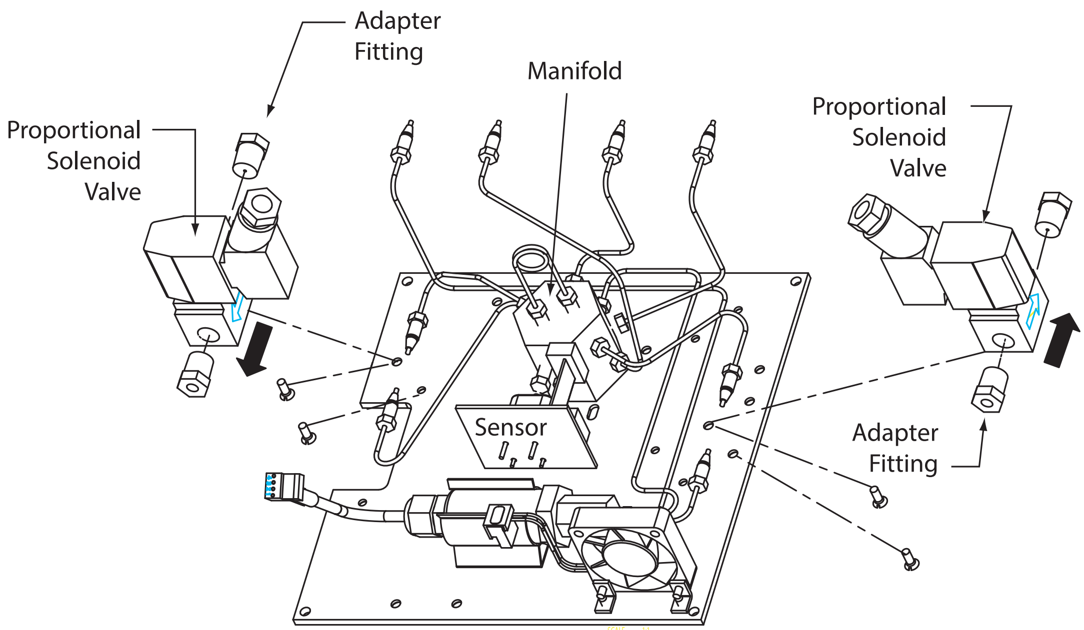


Figure 4-5.
3050-AM proportional solenoid valves.

Installing the New Valve

1. Carefully, mount the new proportional solenoid valve on the sample manifold plate using the two (2) flat-head screws.

2. Install the reserved adapter fitting on the inlet and outlet on either side of the solenoid and then reconnect the 1/16-inch fitting at the inlet and outlet of the valve, gently pushing the tubing in and securing with the nut.

3. Place the sample manifold plate back in the Oven and secure with the four (4) mounting screws.

4. Reconnect the two (2) 1/16-inch fittings on the sample system connections bracket in the center of the Oven (Figure 4-2).

5. Replace the Sample Oven cover and secure it with the two (2) nuts (Figure 4-1).

6. Replace the analyzer cover and secure it with the mounting screws.

Dryers

Removing the dryers

1. At the rear of the analyzer, locate the dryer compartment on the right-hand side (Figure 4-6.1.).

2. Use a #2 Philips screwdriver to loosen the four (4) captured screws on the compartment cover.

3. Remove the cover from the analyzer.

4. The sample system (reference) dryer is located in the top position, and the Zero dryer is located in the bottom position.

5. Taking one (1) dryer at a time, use a 7/64-inch hex wrench to remove the mounting screws that pass through the top of the dryer body and set them aside.

6. Loosen the 1/8-inch VCR fittings on the dryer and remove the dryer from the analyzer. Discard the used VCR gaskets from the fittings.

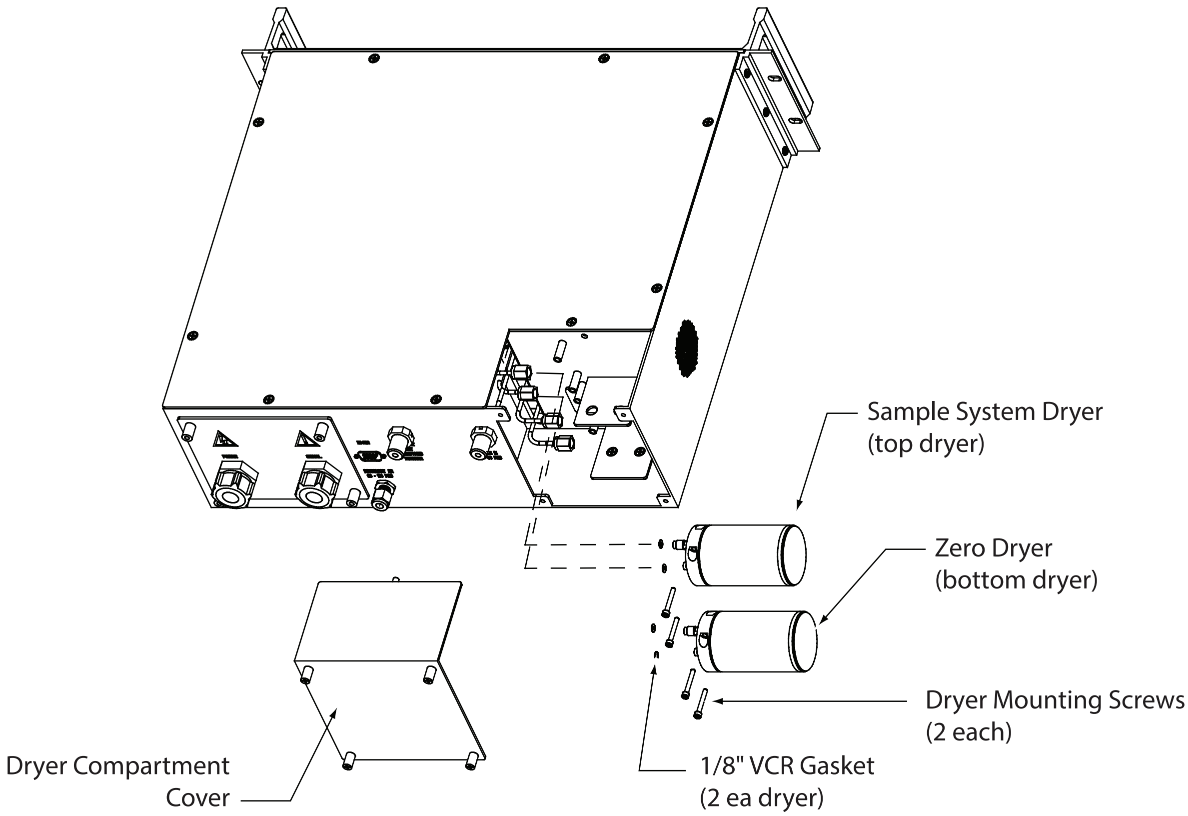
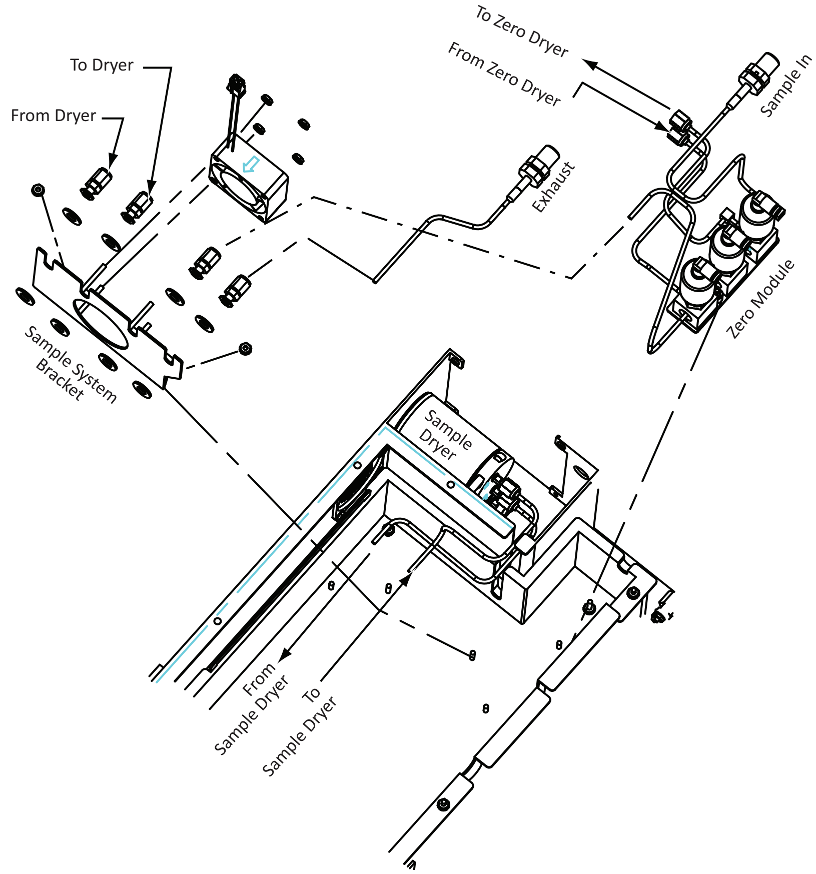


Figure 4-6.1.
3050-AM dryers, location.

Installing the New Dryer

Minimize the time that the dryer is exposed to the atmosphere after removing the protective caps. AMETEK recommends that the dryer be exposed for less than one (1) minute.

1. Insert the replacement dryer into the dryer port on the analyzer. Use the new VCR gaskets provided with the dryer in each of the fittings.
2. Tighten the VCR fittings until they are finger tight.
3. Install the dryer mounting screws to secure the dryer to the bracket.
4. Tighten both of the VCR fittings so that the nuts are 1/8 of a turn past finger tight.
5. Place the dryer compartment cover onto the rear of the analyzer and secure with the four (4) captured screws.
6. Enter the production code for the new dryer.



To Sample Dryer

Figure 4-6.2.
3050-AM dryers, connections.

Power up the analyzer. Wait until the boot-up sequence is complete.

1. On the 3050-AM Analyzer display keypad, press the **CONFIG** key.

2. Scroll down to **Production Codes** and press **Enter**.

3. Select **Reference Dryer** and press **Enter**. Enter the dryer production code and press **Enter**.

4. Press **Cancel** several times to reverse through the menu and return to the normal operating screen.

Maintenance of the Electronics Module

The Electronics Module was designed to easily identify and service the boards and power supplies used in the 3050-AM Analyzer. These components include:

- MCU Assembly
- Analog Interface Assembly
- Power Supply
- Fan
- Pilot Valve Manifold

Removing the Electronics Module From the 3050-AM

CAUTION

Disconnect all power to the analyzer before removing the Electronics Module.

Tools Required

- 1/4-inch nut driver
- 1/16-inch hex wrench
- Phillips and slotted screwdrivers

Procedure for Removing the Electronics Module

Use Figure 4-7 as a reference for locating the items described in this procedure.

- Locate the four (4) Phillips head screws on the Electronics Module.
- Using the appropriate tool, remove the mounting hardware.
- With all the interconnecting wiring and tubing still attached, remove the Electronics Module from the 3050-AM Enclosure by pulling up and slightly towards the front of the analyzer.
- Once you remove the Electronics Module from the 3050-AM Enclosure, you can place it on the 3050-AM Enclosure as a resting fixture. However, take care not to scratch the 3050-AM Enclosure with the Electronics Module (a piece of cardboard can be placed under the Electronics Module to protect the enclosure).

All of the components are now accessible for maintenance or replacement.

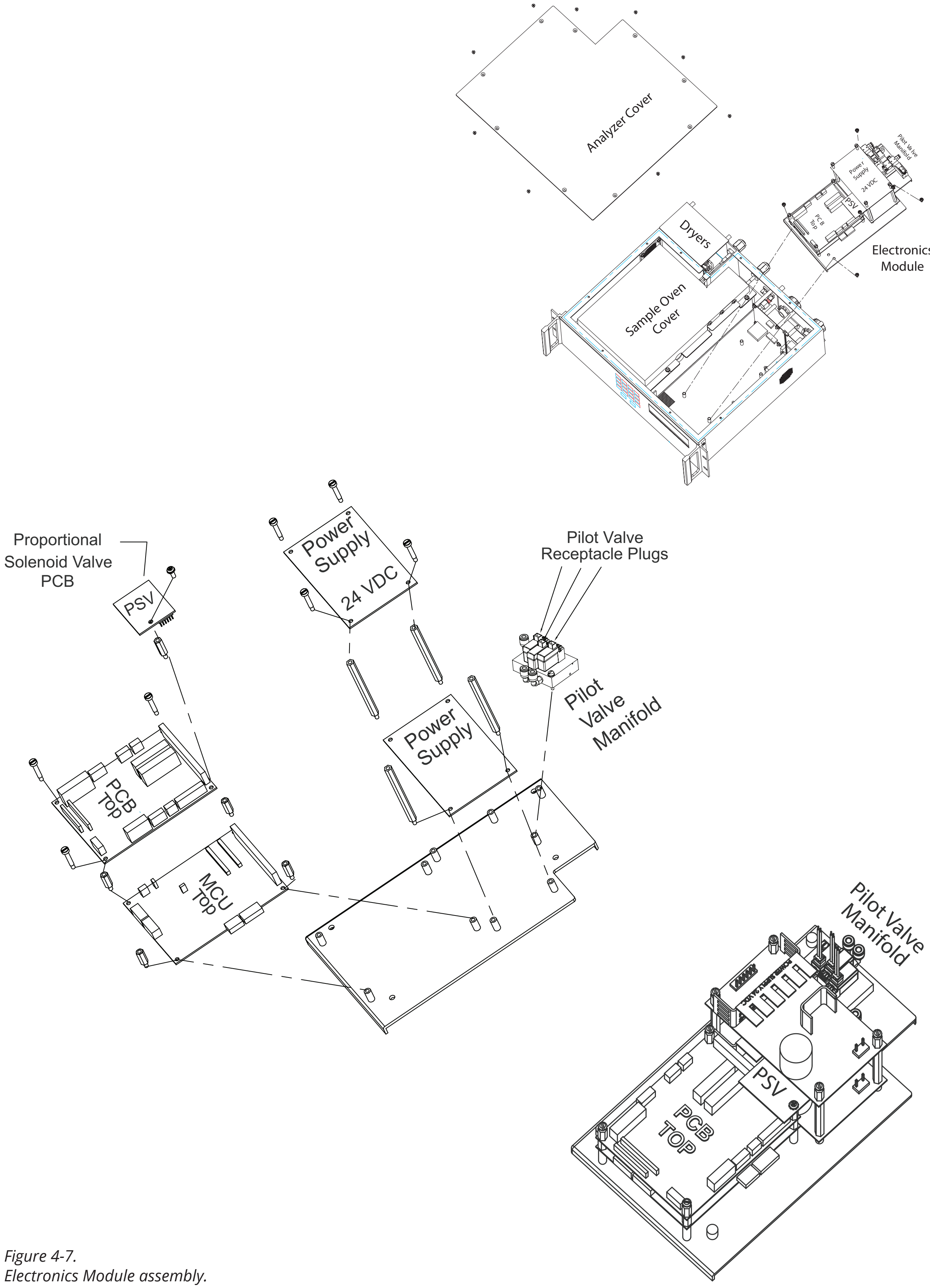


Figure 4-7.
Electronics Module assembly.

Proportional Solenoid Valve (PSV) Board

The **Proportional Solenoid Valve** board (AMETEK Part No. 305705901) is mounted on the top corner of the **PCB** board (Figure 4-7). To remove the **PSV** board, loosen the knurled screw that secures the board in place and carefully lift the board off by disengaging the series of pins securing it to the **PCB** board. Replace the board by carefully engaging the series of pin connectors on the **PSV** board to the **PCB** board to remount (Figure 4-8).

Analog Interface Board

The **Analog Interface** board (AMETEK Part No. 591144901) is located on top of the **MCU** board at the front of the Electronics Module (Figures 4-7 and 4-9).

Removing the Analog Interface Board

- Remove the three (3) knurled screws that secure the board in place. One of the screws secures the **PSV** board in place. Remove as described above.
- Unplug the connectors attached to the **Analog Interface** board (Figures 4-7 and 4-9).
- Carefully, lift the board until it slides free of the connector.

Replacing the Analog Interface Board

- Position the new **Analog Interface** board on the connector and press firmly to insert.
- Replace the screws removed earlier, replacing the **PSV** board as well. Do not overtighten.
- Plug in the **Analog Interface** board connectors and the **PSV** board connector.

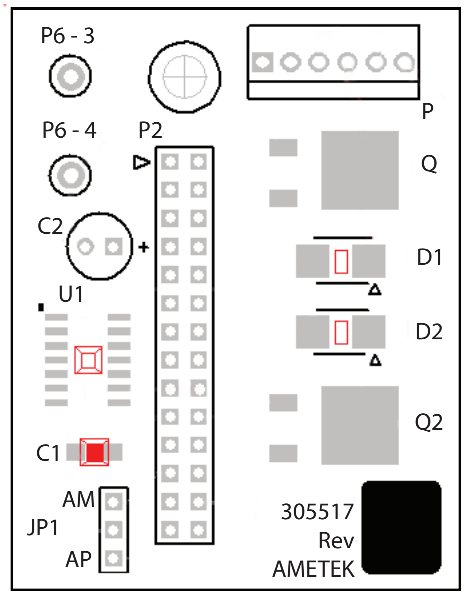
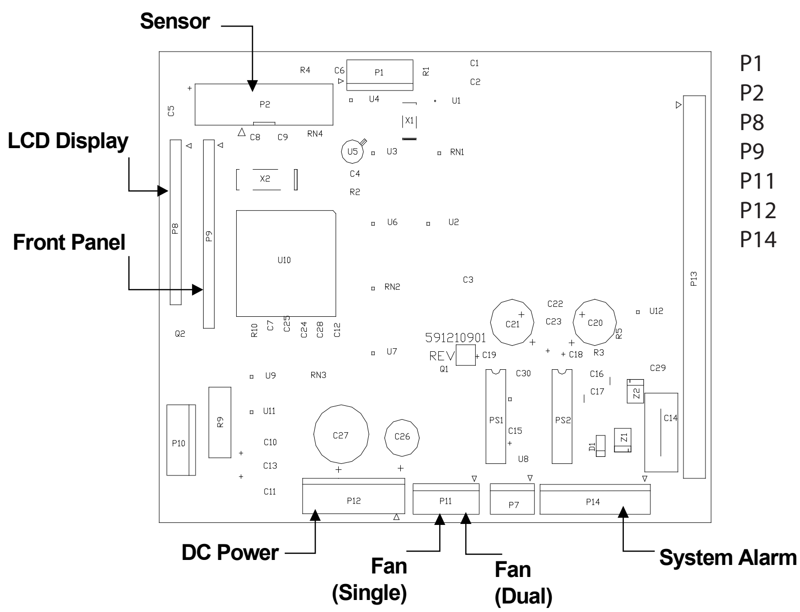


Figure 4-8.
Analog Interface board connections.



P1	Pressure Transducer
P2	Sensor
P8	LCD Display
P9	Front Panel
P11	Single Fan and Dual Fan
P12	DC Power
P14	System Alarm

Figure 4-9.
Analog Interface board.

MCU Board

The **MCU** board (AMETEK Part No. 305110906S) is located below the **Analog Interface** board (Figures 4-7 and 4-10).

Removing the MCU Board

- Remove the **Analog Interface** board as described in the previous section.
- Using a 1/16-inch hex wrench, remove the four (4) standoffs that secure the **MCU** board in place. Unplug all connectors.

Replacing the MCU Board

- Install the new **MCU** board on the mounting plate using the four (4) stand-offs removed and a 1/16-inch hex wrench.
- Remount the **Analog Interface** board as described in the previous section.

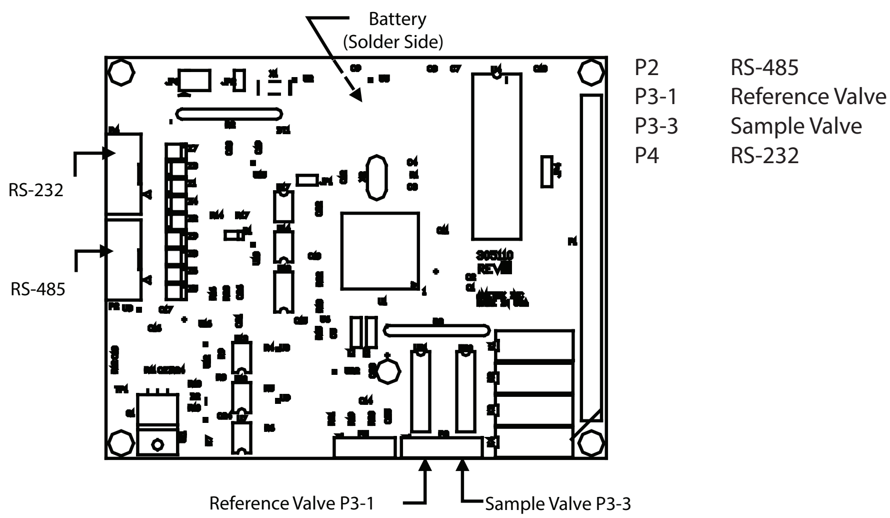


Figure 4-10.
MCU board connections.

Pilot Valve Manifold

The Pilot Valve Manifold (AMETEK Part No. 583011901S) is found on the side of the **Power Supply** Board (Figures 4-7 and 4-11).

Removing the Pilot Valve Manifold

1. Using a #2 Philips screwdriver, loosen the two (2) captured screws that secure the Pilot Valve Manifold to the sample manifold plate.

2. Disconnect the pilot valve receptacle plugs (Figure 4-11).

3. Use a 1/16-inch slotted screwdriver to remove the two (2) screws at the side of the manifold (Figure 4-11).

NOTE

The mounting screws for the two manifolds are different size.

4. Detach the tubing from the manifold by holding the tubing retaining collar and pulling the tubing free. Make sure that you identify the tubing for proper position when replacing.

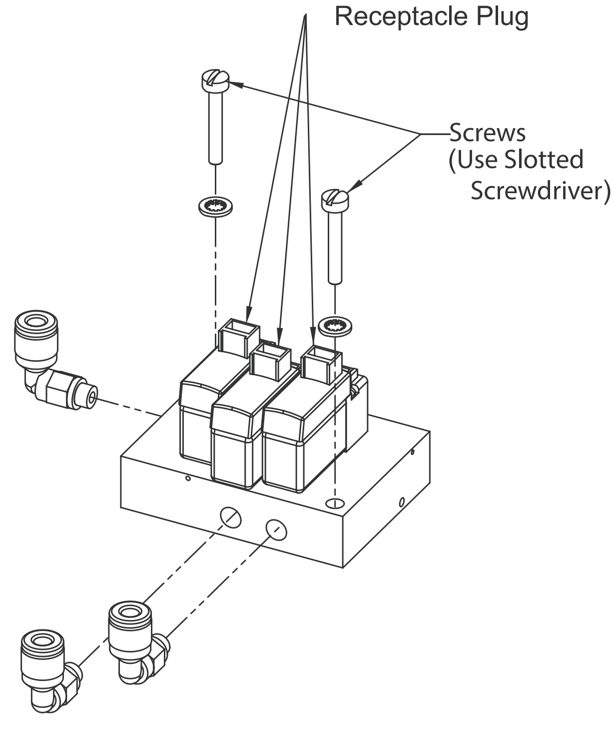


Figure 4-11.
3050-AM Pilot Valve Manifold.

Replacing the Pilot Valve Manifold

1. Position the Pilot Valve Manifold on the Electronics Module mounting plate. Attach with the four (4) screws you removed earlier.

2. Attach the tubing you identified and removed earlier. Make sure that you are attaching the correct tubing to each valve.

3. Secure the Pilot Valve Manifold to the sample manifold plate using the Philips-head captured screws.

Reinstalling the Electronics Module

Once you have serviced the various components in the Electronics Module, reassemble the analyzer.

1. Carefully reposition the Electronics Module above and to the front of the analyzer. Lower the module into the analyzer so the screws at the four corners can be attached.

2. Attach the mounting plate of the Electronics Module to the analyzer assembly using the four (4) captured screws you removed earlier.

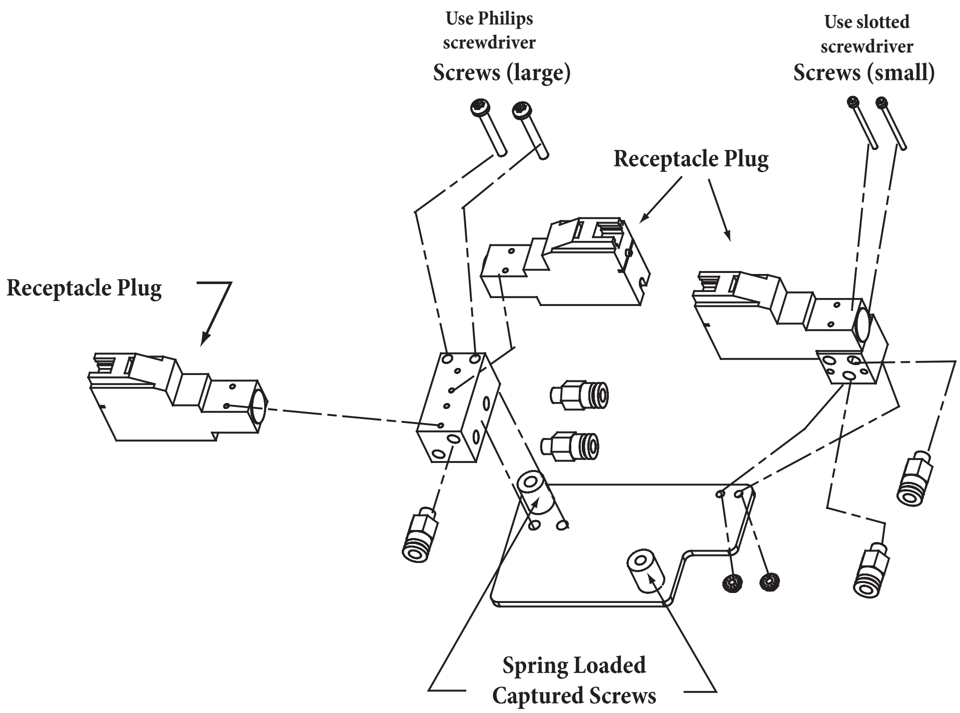
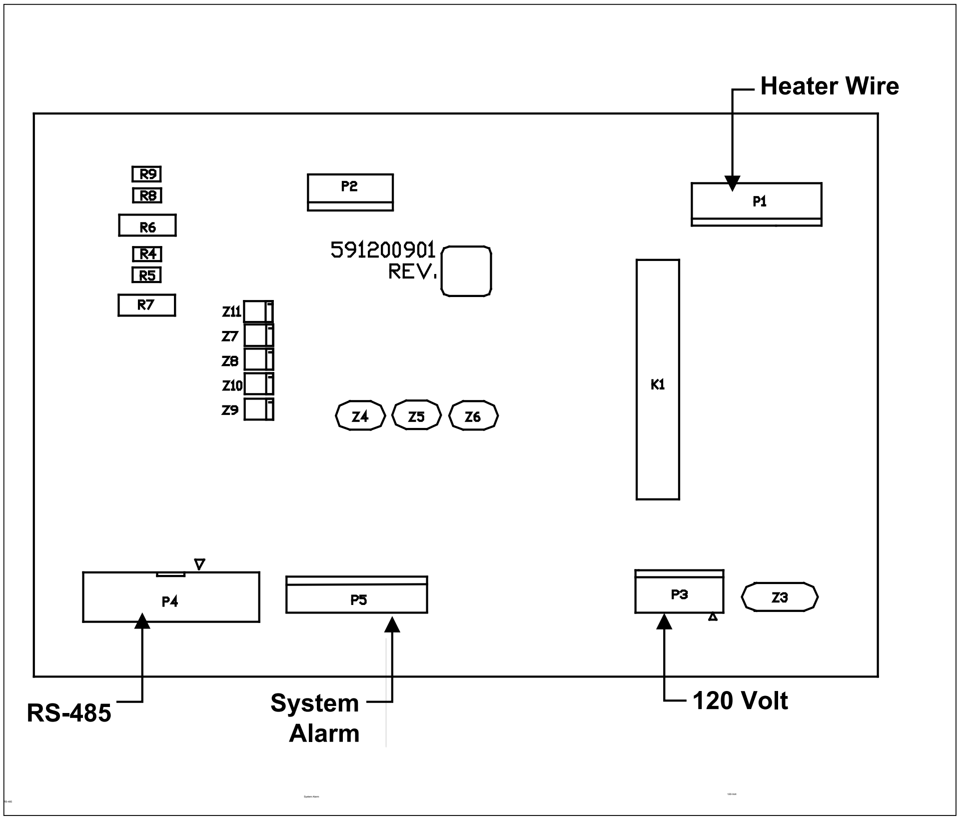


Figure 4-12. 3050-AM Module reinstallation.

Board Connections

User Interface Board



P1	Heater Wire
P3	120-Volt
P4	RS-485
P5	System Alarm

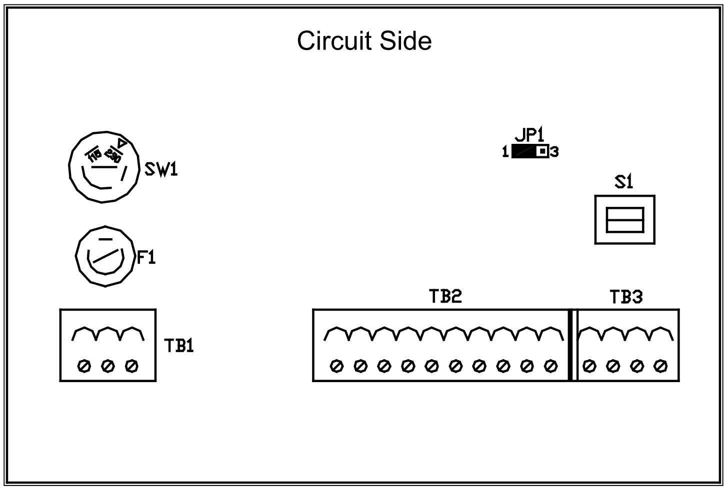


Figure 4-13.
User Interface board.

Alarm Messages

This section lists the Alarm messages that can be triggered by the system, to alert you to potential or impending problems with the analyzer.

When an alarm is triggered, the alarm message is displayed on the on the third and fourth line of the built-in LCD display screen. Alarm names (Conditions), Descriptions, and Corrective Action to take to correct the alarm, are also included.

Alarm Condition / Description / Corrective Action	System Alarm
Zero Alarm Frequency offset adjustment exceeds 0.5 Hz limit, or 1.0 Hz accumulated shift limit. ***Corrective Action:*** Repeat Zero cycle. Contact AMETEK Service if problem persists.	**Yes**
Sensor Alarm Sensor frequency out of range (250–10000 Hz), or Sensor memory corrupt. ***Corrective Action:*** Replace Sensor or contact AMETEK Service.	**Yes**
Oven Temperature Alarm Oven temperature out of range (59–61°C). ***Corrective Action:*** Oven temperature alarms are normal during instrument startup. Contact AMETEK Service if problem persists.	**Yes**
Flow Alarm Gas flow out of range (45–55 SCCM). ***Corrective Action:*** Check inlet and outlet pressures. Contact AMETEK Service if problem persists.	**Yes**
Battery Alarm Low battery voltage detected. ***Corrective Action:*** Replace battery or contact AMETEK Service.	**Yes**

Alarm Condition / Description / Corrective Action	System Alarm
Reference Gas Alarm Delta frequency is less than -0.3 Hz. ***Corrective Action:*** Zero analyzer. Check and/or replace dryer. Contact AMETEK Service if problem persists.	**Yes**
Enclosure Temperature Electronics compartment temperature Exceeds 70°C. ***Corrective Action:*** Contact AMETEK Service.	**Yes**
Dryer Alarm Dryer capacity exceeded. ***Corrective Action:*** Replace dryer.	**No**
Concentration Alarm Moisture concentration exceeds the user-defined limits. ***Corrective Action:*** This is a user-defined alarm.	**No**
Analyzer Offline Active during Zero cycle, and when any system alarm is present. ***Corrective Action:*** Readings obtained when the invalid signal is active are not a reliable measure of the Sample gas.	**No**
Process Pressure Alarm Process pressure for Sample gas exceeds limits for conversion to dew point. *Note:* *The pressure limit is different for each of the gases in the list.* ***Corrective Action:*** Contact AMETEK Service.	**No**

NOTE

The Data Valid contact Opens on all alarms and stays Closed during normal functions and readings. An Open Data Valid contact indicates Verification is in process or an alarm condition. The RED LED flashes 11 times if an invalid condition occurs.

Specifications

Compatible Gases

NOTE

All specifications subject to change without notice.

Air, argon, carbon dioxide, custom gas, Freon 12, Freon 114, Freon 116, helium, hydrogen, krypton, neon, nitrogen, oxygen, SF6, and xenon. Carbon dioxide requires a custom Sensor assembly. Contact AMETEK Service to confirm compatibility with other gases.

CAUTION

Read the Dryer Warning in the "Special Warnings and Information" section in the beginning of this manual for more information.

3050-AM Moisture Analyzer Specifications

Specification	**Description**
Range	Calibrated range of 0–100 PPMV. Trend indication to 1000 PPMV
Limit of Detection	0.1 PPMV nominal
Accuracy	±10 % of reading OR 0.1 PPMV, whichever is greater.
Response Time	Typical 63 % of a step change in either direction in less than 5 minutes
Sample Inlet Pressure Requirement	42 kPa to 345 kPa (6 PSIG to 50 PSIG)
Exhaust Pressure	Atmospheric
Sample Flow Requirement	Approximately 50 SCCM Approximately 900 SCCM @ 50 psig inlet with Bypass Option
Inlet Gas Temperature	0 °C to 100 °C (32 °F to 212 °F) Optimal results are obtained when inlet gas temperature is maintained at 60 °C (140 °F).
Outputs	4-line x 20-character LCD display One (1) 4–20 mA DC analog output RS-232 / RS-485 serial port

Specification	Description
Alarms/Alerts	Three (3) independent contact closures of 30 VAC or 60 VDC maximum, 10 VA or 1 A maximum resistive, for system alarm, moisture concentration alarm, and data valid. All are fail-safe by default. Alarms are available on RS-485 interface.
Environmental Conditions	5 °C to 50 °C (41 °F to 122 °F) [Optimal performance in low-level applications is obtained when ambient temperature is maintained at a constant temperature (±2 °C)] 90 % RH maximum, noncondensing IEC Pollution Degree 2 Maximum altitude 2,000 meters (6560 feet) IEC Installation Category II Indoor use only, IEC 529; IP40
Utility Requirements	***Power Consumption*** 100–127 VAC, 47–63 Hz, 185 W Maximum 220–240 VAC, 47–63 Hz, 185 W Maximum OR ***Instrument Air*** Minimum 483–690 kPa (70–100 PSIG), -40 °C dew point 5-micron filter recommended
Mounting	19-inch rack
Dimensions	Width: 48 cm (19 inches) Height: 13 cm (5.25 inches) Depth: 42 cm (16.5 inches)
Net Weight	9.8 Kg (22 lb)

3050-AM Moisture Analyzer Approvals and Certifications

Design Classifications	MET Certified to:	UL1604 and CSA213
	General Safety Requirements:	UL3101, CSA1010
	Complies with:	UL1604 and CSA213
	Class I, Division 2, Groups A,B,C,D T4	
	EMC Directive:	EN61326-1
	Industrial Low Voltage Directive:	EN61010-1

QUICK REFERENCE CARD

Reference Chapter 2 of the 3050-AM Moisture Analyzer *User Manual.*

INSTALLATION AND START-UP

Incoming sample temperature	0 °C and 100 °C
Optimum input gas temperature	60 °C ±5 °C
Minimum input pressure	6 PSIG
Maximum pressure	50 PSIG
Wiring	22 gauge twisted/shielded pair
Sample Input Tubing	1/4" OD, electropolished 316L VAR SS

Make sure power is OFF before you begin installation.

Rear Panel Connections:

1. Remove terminal cover to access **Analog Interface** board.
2. Install main process shut-off valve and pressure regulator at sample tap.

Gas Connections:

1. Remove VCR plugs and gaskets from sample inlet fitting and exhaust fitting and connect sample input tube and exhaust tube. Vent exhaust to vent system.
2. Connect instrument air supply to instrument air fitting.
3. Select 120 or 240 VAC on voltage selector. Mark operating voltage on rear panel.

Electrical Connections:

1. Make sure the installed power cord has an approved terminator plug per NEC and CEC regulations.
2. Wire the analyzer per requirements for non-hazardous location per instructions in Chapter 2 of the analyzer *User Manual*.

Communications Connections:

1. Connect 4–20 mA analog output and Alarm/Data Valid terminals on interface board to analyzer using metallic signal conduit.
2. Connect the RS-232 or RS-485 serial communications to analyzer. RS-485 connection shares same cable and metallic signal conduit as analog output and Alarm/Data Valid contacts.
3. RS-485 Communications: RS-485 terminator switch is turned to ON, only if your unit is a dedicated analyzer or if it is the last analyzer in a chain of multiple analyzers.

Replace all analyzer covers before continuing.

Initial Startup:

1. Open the main shutoff valve at the source.
2. Turn on the AC power at the source.
3. Once the sample flow starts, the analyzer will be in normal operating mode. Allow analyzer to warm up for 45 minutes.

Dry Down:

Allow 5 to 7 days for the analyzer to dry down and stabilize. At end of dry down period, concentration value on display will be stable and recorded data will level off. Zero alarms will still be on the display. See Chapter 2 of the analyzer *User Manual* for more details on dry down and information on shortening the dry-down process.

Zero Cycle:

Perform a Zero cycle after the dry down.

Press **Zero** key and then the '**8**' key (Down arrow key) until you see **Zero**. Press the **Enter** key to select.

The Zero cycle takes approximately 2 hours. When the Zero cycle is complete, the analyzer will adjust the Zero Offset and automatically return to normal sampling.

ANALYZER PARAMETERS

Zero key

Hold Outputs	Enable or Disable
Adjust Ofst/Span	Enable or Disable
Zero	Zeros the analyzer on demand.
Abort	Aborts Zero cycle

Alarm key

High Limit	Enter value in PPMV
Low Limit	Enter value in PPMV
Enable Alarm	Select Enable or Disable

Analog Range key

Maximum Concentration
Enter moisture concentration equivalent to 20 mA.

Minimum Concentration
Enter moisture concentration equivalent to 4 mA.

Test Config key

Display

Contrast	Default is 5
Back Light	Default is ON.

Communication

Baud Rate	Default is 9600
RS-485 Mode	Default is 4-wire

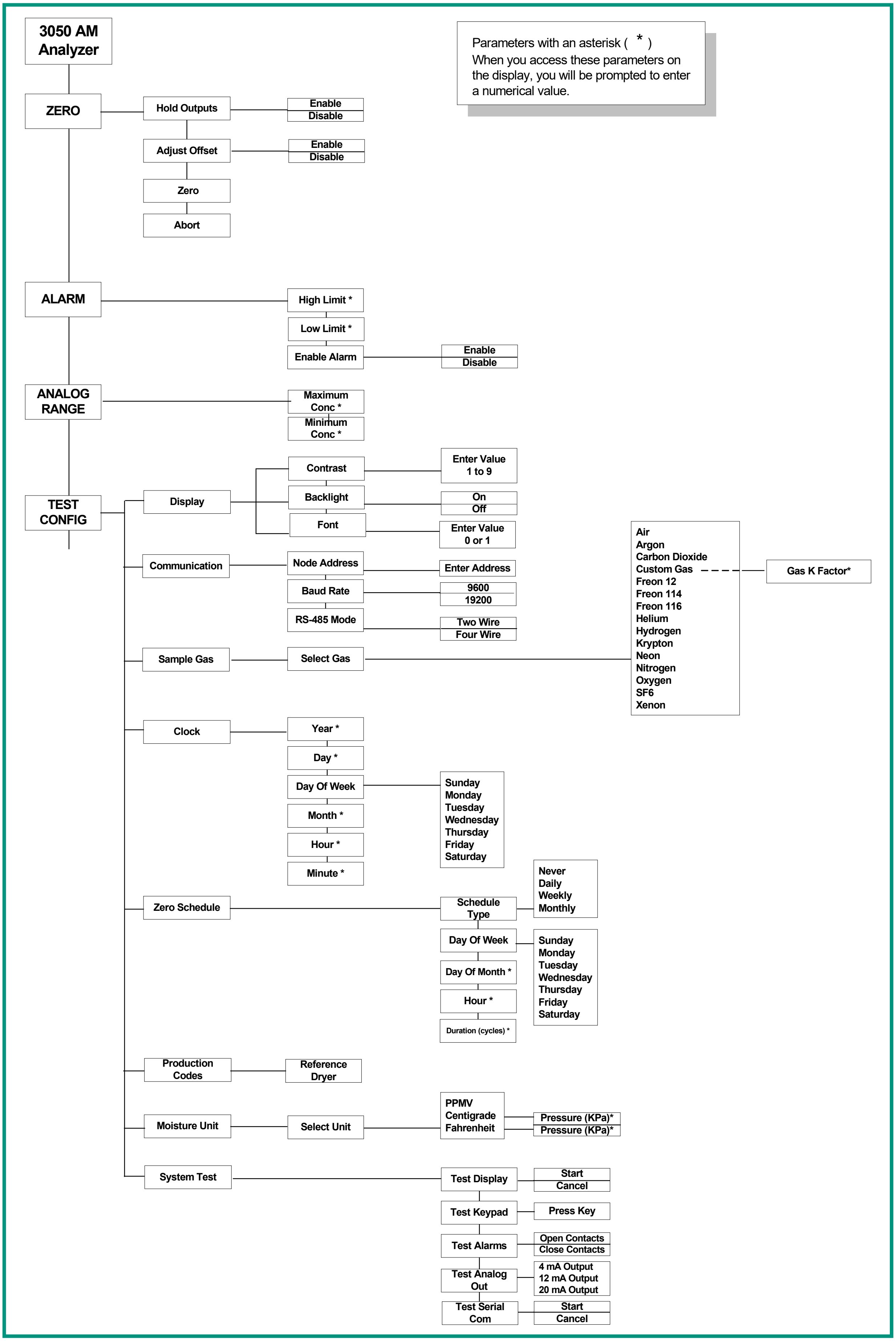
Sample Gas
Select the gas you want to analyze.

Clock
Enter hours using the 24-hour clock.

Zero Schedule
Schedule Type, Day of Week, Day of Month, Hour and Duration

Production Codes
Production codes for the reference dryer.

System Test
Test Display
Test Keypad
Test Alarms
Test Analog Output
Test Serial Communications


3050 AM Analyzer
Parameters with an asterisk (*) When you access these parameters on the display, you will be prompted to enter a numerical value.
ZERO
Hold Outputs
Enable
Disable
Adjust Offset
Enable
Disable
Zero
Abort
ALARM
High Limit *
Low Limit *
Enable Alarm
Enable
Disable
ANALOG RANGE
Maximum Conc *
Minimum Conc *
TEST CONFIG
Display
Contrast
Enter Value 1 to 9
Backlight
On
Off
Font
Enter Value 0 or 1
Communication
Node Address
Enter Address
Baud Rate
9600
19200
RS-485 Mode
Two Wire
Four Wire
Sample Gas
Select Gas
Air
Argon
Carbon Dioxide
Custom Gas
Freon 12
Freon 114
Freon 116
Helium
Hydrogen
Krypton
Neon
Nitrogen
Oxygen
SF6
Xenon
Gas K Factor*
Clock
Year *
Day *
Day Of Week
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Month *
Hour *
Minute *
Zero Schedule
Schedule Type
Never
Daily
Weekly
Monthly
Day Of Week
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Day Of Month *
Hour *
Duration (cycles) *
Production Codes
Reference Dryer
Moisture Unit
Select Unit
PPMV
Centigrade
Fahrenheit
Pressure (KPa)*
Pressure (KPa)*
System Test
Test Display
Start
Cancel
Test Keypad
Press Key
Test Alarms
Open Contacts
Close Contacts
Test Analog Out
4 mA Output
12 mA Output
20 mA Output
Test Serial Com
Start
Cancel

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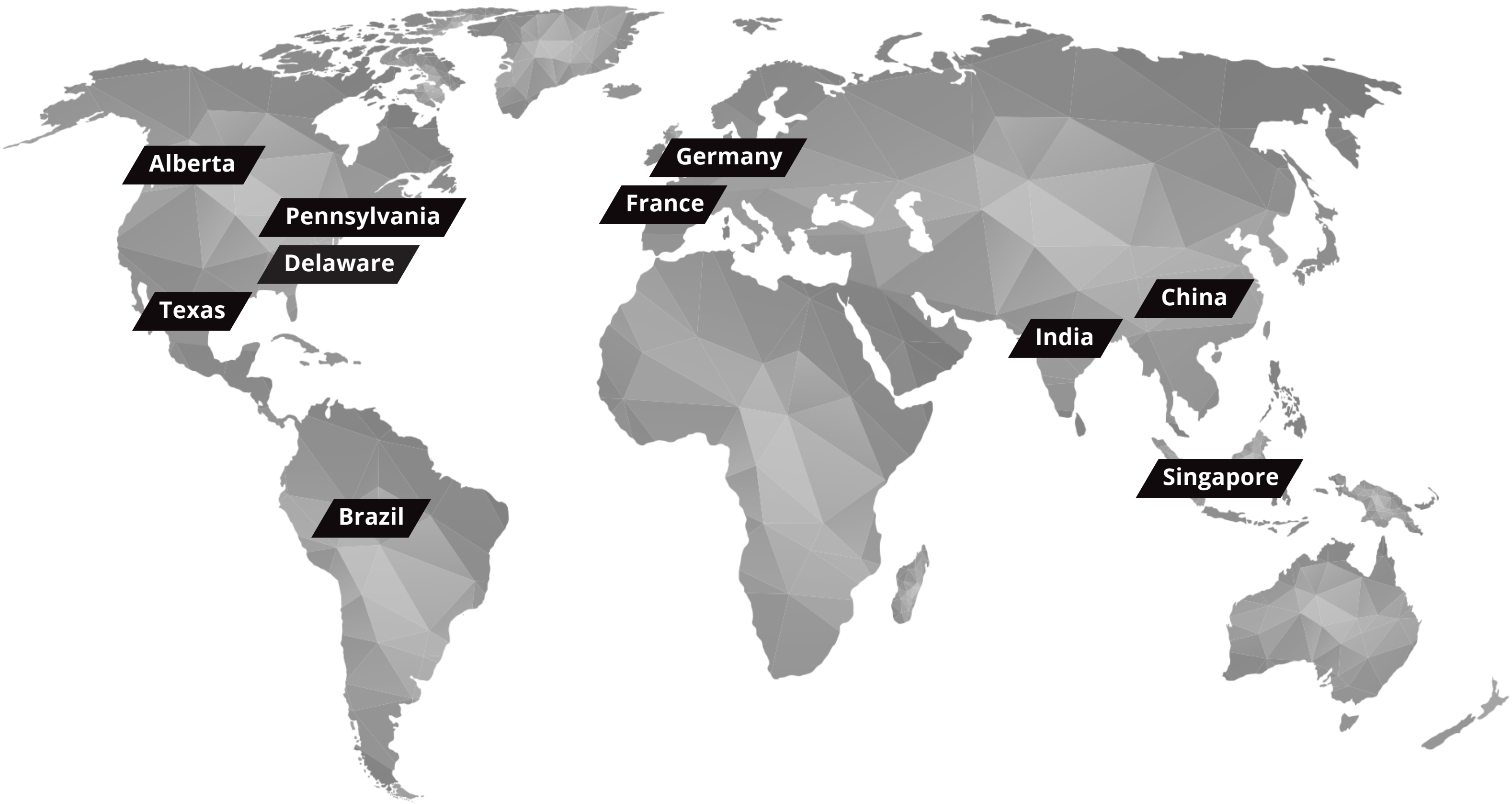

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