Model 3050-AP
Moisture Analyzer

User Manual

PN 305562901 Rev. G
Configurator Software Version 1.73

Process Instruments
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Newark, DE 19702

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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

WARRANTY AND CLAIMS

We warrant that any equipment of our own manufacture or manufactured for us pursuant to our specifications which shall not be, at the time of shipment thereof by or for us, free from defects in material or workmanship under normal use and service will be repaired or replaced (at our option) by us free of charge, provided that written notice of such defect is received by us within twelve (12) months from date of shipment of portable analyzers or within eighteen (18) months from date of shipment or twelve (12) months from date of installation of permanent equipment, whichever period is shorter. All equipment requiring repair or replacement under the warranty shall be returned to us at our factory, or at such other location as we may designate, transportation prepaid. Such returned equipment shall be examined by us and if it is found to be defective as a result of defective materials or workmanship, it shall be repaired or replaced as aforesaid. Our obligation does not include the cost of furnishing any labor in connection with the installation of such repaired or replaced equipment or parts thereof, nor does it include the responsibility or cost of transportation. In addition, instead of repairing or replacing the equipment returned to us as aforesaid, we may, at our option, take back the defective equipment, and refund in full settlement the purchase price thereof paid by Buyer.

Process photometric analyzers, process moisture analyzers, and sampling systems are warranted to perform the intended measurement, only in the event that the customer has supplied, and AMETEK has accepted, valid sample stream composition data, process conditions, and electrical area classification prior to order acknowledgment. The photometric light sources are warranted for ninety (90) days from date of shipment. Resale items warranty is limited to the transferable portion of the original equipment manufacturer's warranty to AMETEK. If you are returning equipment from outside the United States, a statement should appear on the documentation accompanying the equipment being returned declaring that the goods being returned for repair are American goods, the name of the firm who purchased the goods, and the shipment date.

The warranty shall not apply to any equipment (or part thereof) which has been tampered with or altered after leaving our control or which has been replaced by anyone except us, or which has been subject to misuse, neglect, abuse or improper use. Misuse or abuse of the equipment, or any part thereof, shall be construed to include, but shall not be limited to, damage by negligence, accident, fire or force of the elements. Improper use or misapplications shall be construed to include improper or inadequate protection against shock, vibration, high or low temperature, overpressure, excess voltage and the like, or operating the equipment with or in a corrosive, explosive or combustible medium, unless the equipment is specifically designed for such service, or exposure to any other service or environment of greater severity than that for which the equipment was designed.

The warranty does not apply to used or secondhand equipment nor extend to anyone other than the original purchaser from us.

THIS WARRANTY IS GIVEN AND ACCEPTED IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION AND WARRANTIES OF FITNESS OR OF MERCHANTABILITY OTHER THAN AS EXPRESSLY SET FORTH HEREIN, AND OF ALL OTHER OBLIGATIONS OR LIABILITIES ON OUR PART. IN NO EVENT SHALL WE BE LIABLE UNDER THIS WARRANTY OR ANY OTHER PROVISION OF THIS AGREEMENT FOR ANY ANTICIPATED OR LOST PROFITS, INCIDENTAL DAMAGES, CONSEQUENTIAL DAMAGES, TIME CHANGES OR ANY OTHER LOSSES INCURRED BY THE ORIGINAL PURCHASER OR ANY THIRD PARTY IN CONNECTION WITH THE PURCHASE, INSTALLATION, REPAIR OR OPERATION OF EQUIPMENT, OR ANY PART THEREOF COVERED BY THIS WARRANTY OR OTHERWISE. WE MAKE NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF FITNESS OR OF MERCHANTABILITY, AS TO ANY OTHER MANUFACTURER'S EQUIPMENT, WHETHER SOLD SEPARATELY OR IN CONJUNCTION WITH EQUIPMENT OF OUR MANUFACTURE. WE DO NOT AUTHORIZE ANY REPRESENTATIVE OR OTHER PERSON TO ASSUME FOR US ANY LIABILITY IN CONNECTION WITH EQUIPMENT, OR ANY PART THEREOF, COVERED BY THIS WARRANTY.

Table of Contents

Safety Notes

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

AN OPERATING PROCEDURE WHICH, IF NOT STRICTLY OBSERVED, MAY RESULT IN PERSONAL INJURY OR ENVIRONMENTAL CONTAMINATION.

AN OPERATING PROCEDURE WHICH, IF NOT STRICTLY OBSERVED, MAY RESULT IN DAMAGE TO THE EQUIPMENT.

IMPORTANT INFORMATION THAT SHOULD NOT BE OVERLOOKED.

READ THIS MANUAL BEFORE BEGINNING THE INSTALLATION AND OPERATION OF THE 3050-AP ANALYZER SYSTEM. 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.

"Read and adhere to this warning when explosion proof housing is in use:

WARNING - Before removing cover, turn off all air and sample lines to isolate analyzer from process and wait 5 minutes for pressuresto bleed down. Diffi culty turning cover could indicate pressure build-up inside enclosure due to extraordinary conditions.

Electrical Safety

Up to **240Vac** may be present in the analyzer housings. Always shut down power source(s) before performing maintenance or troubleshooting. Only a qualified electrician should make electrical connections and ground checks.

Grounding

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

VERIFY GROUND CONTINUITY OF ALL EQUIPMENT BEFORE APPLYING POWER.

Electromagnetic Compatibility (EMC)

READ AND FOLLOW THE RECOMMENDATIONS IN THIS SECTION IN ORDER 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-AP 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 certain installation techniques and wiring practices be used in order that erratic behavior of the Analyzer, or its electronic neighbors be prevented or minimized. 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 such that the shield materials can be wrapped backwards onto the cable jacket and captured inside the gland, tightened up against the metal interior.

Inductive loads connected to the low voltage "Alarm Contacts" is not recommended. However, if this becomes a necessity, proper techniques and wiring practices must be adhered to. 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 the use of 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 whereby its unshieled 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.

SPECIAL WARNINGS AND INFORMATION FOR PROPER USE OF THIS EQUIPMENT

This equipment is suitable for use in non-hazardous areas only.

If the 3050-AP is to be powered by a source of 24 Vdc other than that supplied by AMETEK, the power source's output must be isolated from hazardous mains voltages by use of double or reinforced insulation, having a minimum dielectric strength 2300 Vac.

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 one of the following these steps:

- When the equipment is ready to be disposed of, take it to your local or regional waste collection administration for recycling.
- In some cases, your "end-of-life" product may be traded in for credit towards the purchase of new AMETEK instruments. Contact your dealer to see if this program is available in your area.
- If you need further assistance in recycling your AMETEK product, contact our office listed in the front of the instruction manual.

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CHAPTER 1

Overview

The 3050-AP Moisture Analyzer is a smart sensor that measures trace concentrations of moisture in a process gas stream. The 3050-AP is compatible with He, Ar, Ne, Xe, Kr, O_2, N_2, NO, CO, CO_2, refrigerants, air, and specialty gases. The analyzer is calibrated to measure moisture contents from 1 to 2500 ppmv. Data output can be in units of ppmv, ppmw, dew point Centigrade, dew point Fahrenheit, lb/mmscf, and mg/Nm^3.

The heart of the 3050-AP is a quartz crystal microbalance (QCM) sensor that is sensitive to moisture. The QCM moisture sensor is simply a quartz crystal oscillator, in which the quartz crystal has been coated with a proprietary hygroscopic coating. This coating selectively, and reversibly, absorbs moisture from a sample gas stream. As the crystal is exposed to a gas stream containing water vapor, the hygroscopic coating absorbs moisture from the gas stream, changing the mass of the coating. Changes in the mass are detected as changes in the natural resonance frequency of the oscillator.

The QCM sensor is alternately exposed to the sample gas and a dry reference gas. A dry reference gas is produced by passing a portion of the sample gas through a dryer to remove any moisture present (i.e. - the moisture content of the dry reference is less than 0.025 ppmv). The difference in the resonant frequency of the QCM sensor, as measured when exposed to each of the two

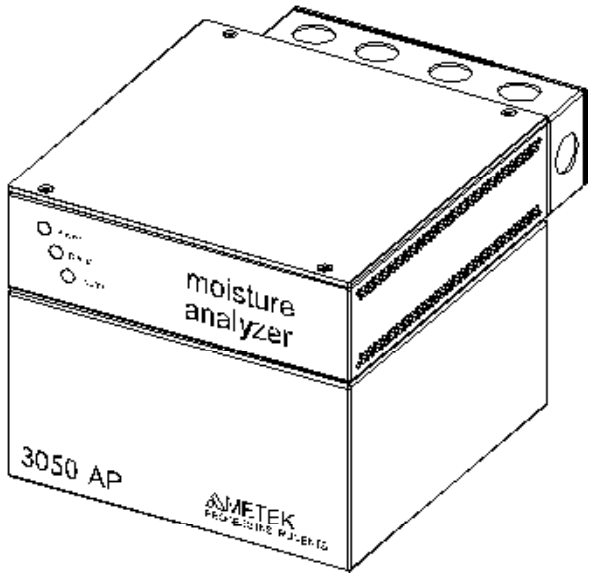


Figure 1.1: 3050-AP Analyzer

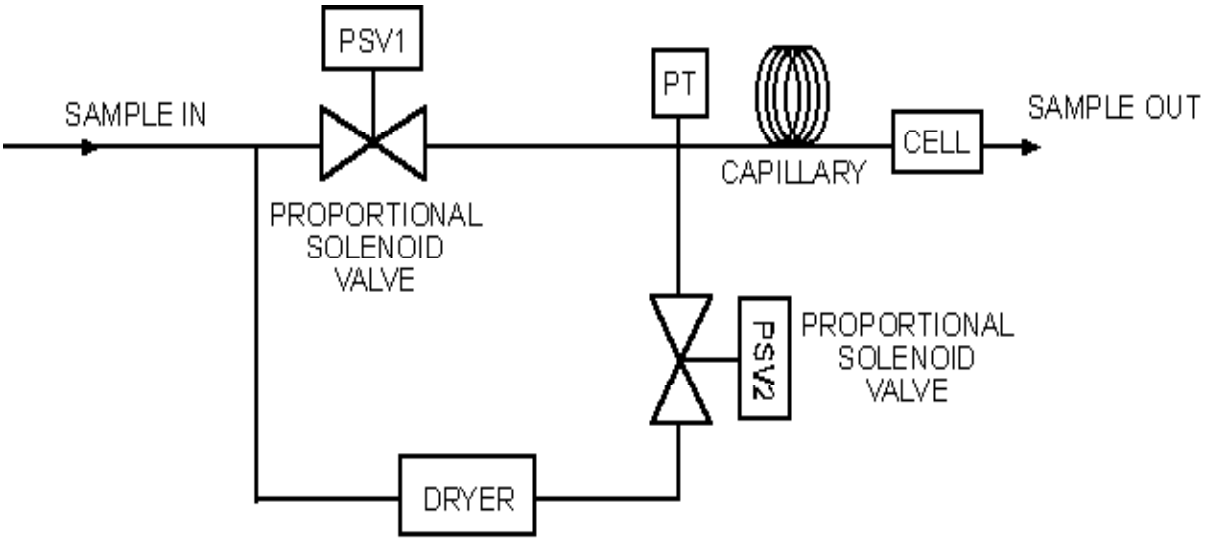


Figure 1.2: 3050-AP Flow Diagram

gas streams, is a function of the moisture content of the sample gas. Thus, the moisture concentration of the sample gas is determined from this frequency difference. The calibration data, which relates the moisture concentration of the gas stream to the measured frequency difference, are stored in an EE-PROM within the QCM sensor module.

Controller Communication

All analyzer functions are controlled by a microprocessor housed within the smart sensor. Communication with the smart sensor is achieved through the following connections:

- One analog input, 4 to 20 mA
- One analog output, 4 to 20 mA, isolated. Can be either loop powered or powered by the analyzer.
- Three alarm contacts, (dry relay contacts)
- One RS-232 serial port
- One RS-485 serial port.

The 3050-AP has no local user programming functions. It requires serial communication with an external PC for configuration. Once configured, the analyzer is capable of stand alone operation. The analyzer is factory configured and packaged with configurator software for initial setup of operating parameters. For enhanced interface and process monitoring, AMETEK offers optional System 2000 Software with graphical user interface to record and process your data in a Windows 95/NT format. User provided software may also be used with the 3050-AP serial ports.

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 OLV product. Specifically, in the gas list we have cited two 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.

Internal Timing

The analyzer operates in two timing modes. The normal mode consists of short intervals of sample and reference gas. The sensor saver mode reduces the exposure of the sensor to the sample gas by increasing the time spent on the dry reference.

If the analyzer detects abnormal degradation of sensor proformance over time in the normal mode, the analyzer will automatically switch to sensor savor mode. Once the analyzer switches to sensor savor mode, it will not switch back on its own.

The sensor saver mode extents the life of the sensor, but provides slower response time. The analyzer updates every 2.5 minutes instead of 1 minute; however, the analyzer still responds within specifications. Refer to analyzer specifications on page 1-4.

Specifications

Ranges: Calibrated 0.1 to 2500 parts per million by volume (ppmv) Readings can also be displayed in units of ppmw, lb/mmscf, mg/Nm^3, and dew point (requires process pressure input).

Analog Outputs: Isolated 4 to 20 mA, 100 to 500Ω Analog output (software configurable)

Serial Communication: RS-232 or RS-485, two and four wire mode

Alarm Contacts: Concentration Alarm
Data Valid
System Alarm
Hermetically sealed reed type
30 Vac max, 60 Vdc max
10 VA max, Resistive

Limit of Detection: 0.1 ppmv when used with 3050-OLV dryer

Sensitivity:0.1 ppmv or 1% of reading which ever is greater

Accuracy:+/- 10% of reading from 1-2500 ppmv

Reproducibility: +/- 5% of reading from 1-2500 ppmv

Response Time:63% to a step change in less than 5 minutes

Exhaust Pressure: Atmospheric

Allowable Inlet Pressure Range 20-50 psig Maximum

Gas Flow Requirements: <100 SCCM

Weight of Analyzer: 3.1 Kg

Area Classification: Non-Hazardous locations only

European Compliance: EMC EN61326-1 Industrial
LVD Safety EN 61010-1, (UL 3101-1, CSA 1010.1)

Voltage and Power Requirements: Analyzer: 24 Vdc, 50 watts

Analyzer Environmental Conditions: Ambient Temperature; Analyzer 5°C to 50°C
Relative humidity up to 90%, noncondensing
Pollution Degree 2
Maximum altitude 2000 meters
Installation Category II
Indoor use only

Minimum PC Requirements for Software: Pentium 100
16 MB RAM for Windows 95,
32 MB RAM for Windows NT
Microsoft Windows 95 or Windows NT 4.0

Table 1.1: Model 3050-AP Gas List

The following gases have been tested for chemical compatibility with the seals and gaskets used in this instrument :

air
nitrogen
oxygen
helium
neon
argon
krypton
xenon
Freon 12
Freon 114
Freon 116
Sulfur Hexafluoride

NOTE

Contact AMETEK Service with inquiries regarding other applications.

Chapter 2

Installation

Unpacking and Inspection

Remove components from the packing case(s) carefully; check contents against packing list. Inspect all components for obvious damage and broken/loose parts or fittings. Notify the carrier and AMETEK Service (1-800-537-6044) immediately if parts are missing or damage is found.

Space Requirements

The bench top model requires a bench area of approximately 20 x 20 x 18cm (8 x 8 x 7 inches) plus clearance for analyzer connections and external components. Refer to Figures 2.1 and 2.2.

Power Requirements

The analyzer operates on 24Vdc. If 24Vdc is not available, a stand alone 24Vdc power supply with universal input (85-265V, 47-63 Hz), PN 230550001 can be purchased from AMETEK. If the analyzer is powered by a 24 Vdc source other than that supplied by AMETEK, the power source's output must be isolated from hazardous mains voltages by use of double or reinforced insultation having a minimum dielectric strength of 2300 Vac.

System Tubing

Recommended system tubing is 1/8 inch OD, 316 stainless steel meeting ASTM #632 specifications (AMETEK PN 571061017 or better). For low-level (<20 ppmv) measurements 1/8 inch OD, 316L VAR stainless steel tubing with a finish of 10RA (or less) is highly recommended.

Dry Reference Gas

An external dryer (AMETEK Dryer PN 305400901S or equivalent) is required to dry reference gas to less than 0.025 ppmv.

Dryers must be periodically replaced. In normal use, the dryer (PN 305400901S) should dry a 50-ppm reference gas to specification for 1 year.

Sample Gases

The 3050-AP is designed to operate on a clean gas stream; specifically, the sample gas stream must be free of particulates and aerosols. If the 3050-AP analyzer is being used on a clean gas stream (i.e. - free from particulates and aerosols), AMETEK Process Instruments recommends that the analyzer be installed in accordance with the information provided in the following

Sections of this manual. However, if the process gas stream contains, or has the possibility of containing particulate materials, AMETEK Process Instruments recommends that a inline, 1/8" tube 7 UM filter (supplied) be installed an the inlet of the analyzer. AMETEK filter (part number 271639001) is ideally suited for this purpose, and will mount directly on the inlet fitting of the analyzer. While installing this filter at the inlet of the analyzer will protect the analyzer from any particulates present in the sample gas, it will also increase the response time of the system. This increase in response time is caused by the large surface area of the filter element.

If you have questions concerning the sampling requirements of your process gas, please contact us at any of the addresses located in the front of this manual.

Sample pressure and temperature requirements

Pressure reduction is user supplied to ensure sample pressure to the analyzer remains within the minimum and maximum range of 20 - 50 psig. The pressure reducer/regulator with gauge should be installed near the sample tap in-between the tap and analyzer. Refer to figure 2.3. For optimum performance, sample line should be heat traced to maintain a constant sample temperature. Optimum sample gas input is 60°C.

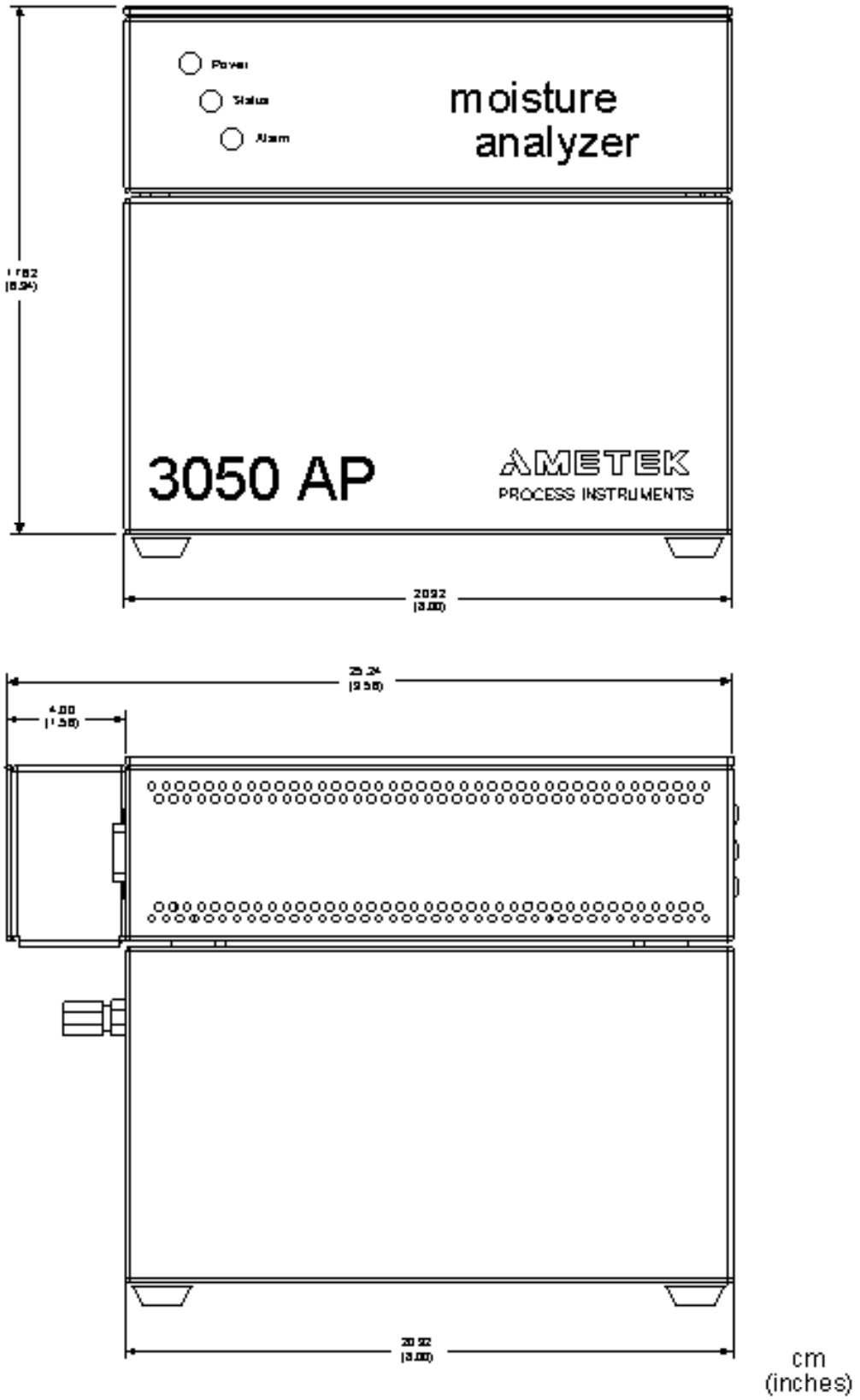


Figure 2.1: Model 3050-AP front and side view

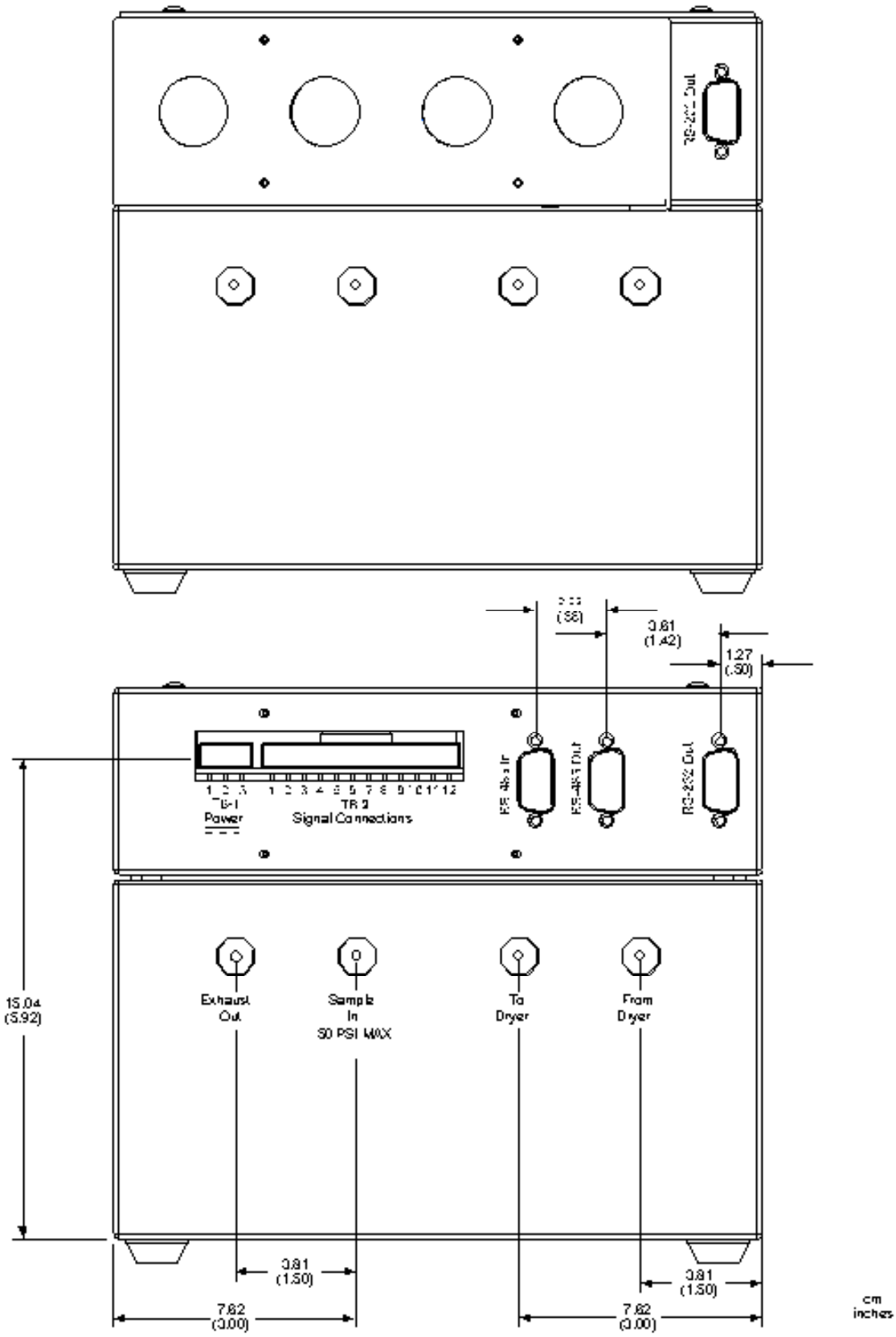


Figure 2.2: Model 3050-AP rear view

Mechanical Installation

Locate the 3050-AP as close as possible to the sample source. The unit should be protected from direct exposure to weather and located so that the ambient temperature specifications will not be exceeded. Refer to Figure 2.2 for connection locations.

1. If not already installed, install a main process shut-off valve and pressure reducer (recommended) at the sample tap. Refer to figure 2.3.

2. Connect the dryer input to the "to dryer" 1/8-inch compression fitting. Connect the dryer output to the "from dryer" 1/8-inch compression fitting. Refer to dryer connection instructions and figure 2.4.

3. Connect the exhaust fitting to appropriate vent system.

Leave "exhaust out" fitting capped or blocked with an isolation valve until sample gas is flowing. This prevents ingress of wet ambient air. "Sample in" is protected with internal valve, which is closed when power is off.

4. Open the main process shut-off valve and purge sample line to an appropriate area for at least five minutes. Close the main process shut-off valve. This will help prevent contamination from entering the cell.

5. Connect the sample line to the sample inlet 1/8-inch compression fitting.

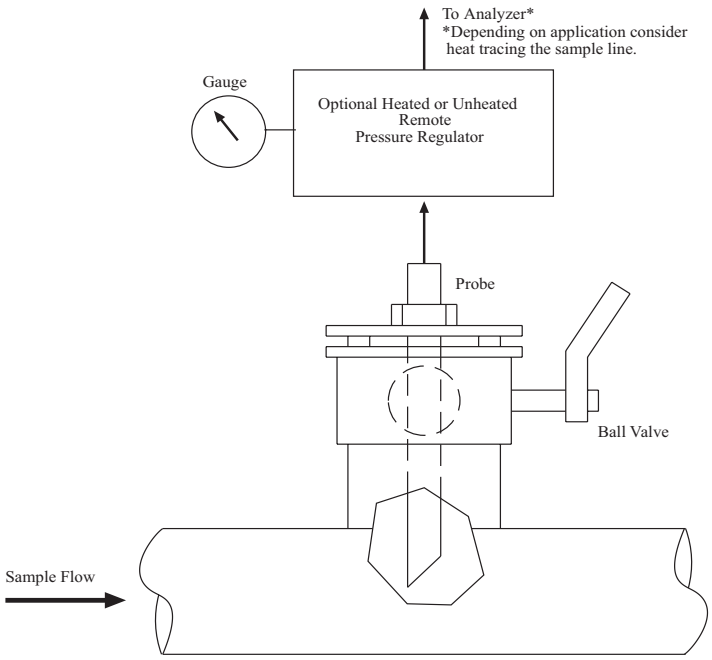


Figure 2.3: Typical Probe Installation

Dryer Installation Instructions

Tools needed to install dryer:

One common flat-head screwdriver

Two 7/16-inch wrenches

One 5/8-inch wrench

One 3/4-inch wrench

1. To alleviate stress on the tube connections attach dryer to dryer bracket using two 10-32 screws, flat and lock washers. Refer to figure 2.4

2. Install adapter tubes into the dryer input and output on the analyzer.

    a. Assemble loose female VCR nuts and VCR glands.

    b. Remove plastic dust caps from the dryer input and output on the analyzer.

    c. Remove compression nuts and verify ferrule is properly installed.

    d. Reinstall nuts to finger tight.

    e. Insert adapter tubes through female compression nuts and ferrules until they bottom out.

    f. Using two 7/16-inch wrenches (one to hold the bulkhead fitting), swage the compression fittings into the bulkhead fittings on the analyzer. For proper installation, the fitting should be 1/4 turn past finger-tight.

3. Attach dryer to adapter tubes.

Do not leave the dryers open to ambient air. The high moisture levels present in ambient air can damage or shorten the life span of these components. Make dryer connections promply.

    a. Remove female VCR nuts from dryer VCR glands.

    b. Verify VCR gaskets are in place.

    b. Align adapter tubs with dryer VCR glands.

    c. Slide female nuts over VCR adapters and screw nuts onto dryer glands. Secure VCR nut behind VCR adapter on dryer with 5/8-inch wrench. Use a 3/4-inch wrench to tighten nuts 1/8 turn past finger-tight.

    d. Check for leaks.

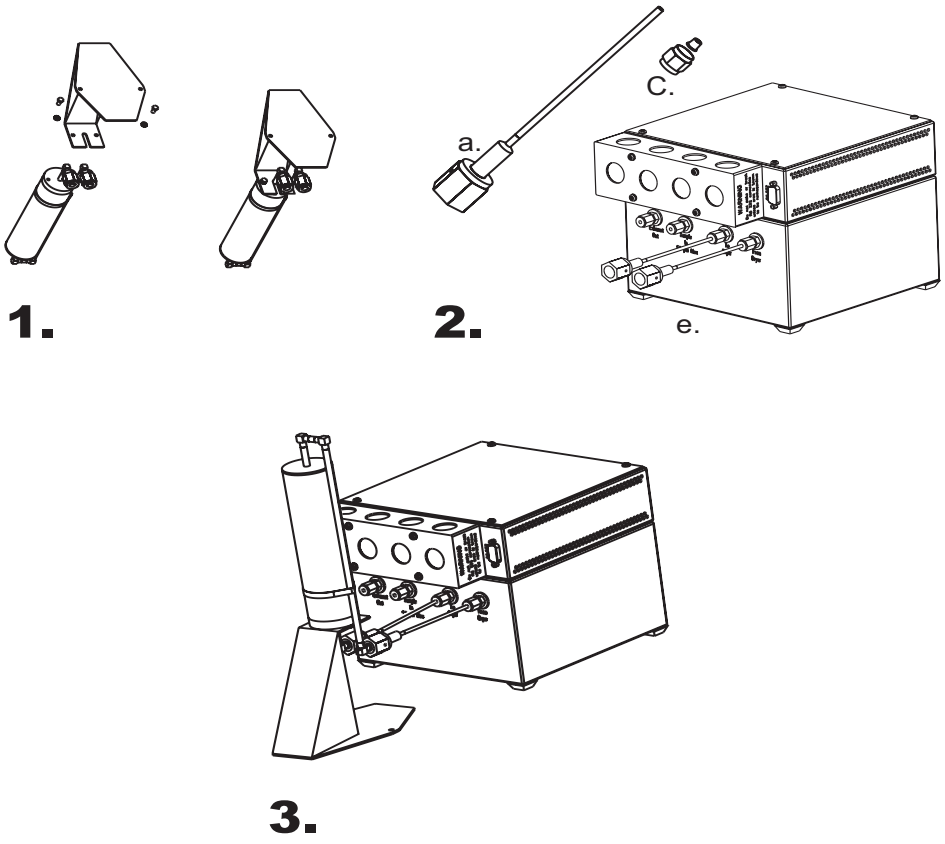


Figure 2.4: Dryer Installation

Electrical Connections

1. Remove terminal cover.

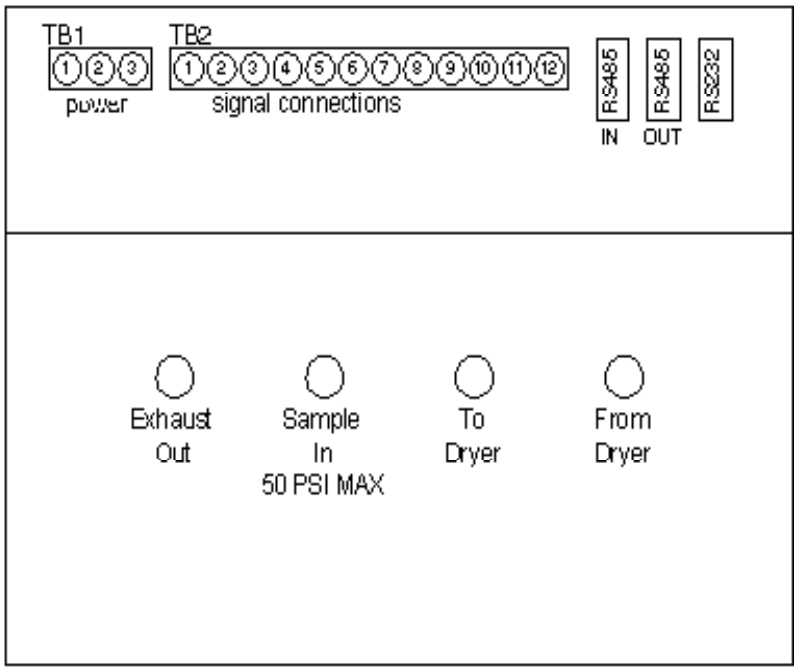
2. Connect the 4 to 20 mA analog output and alarm contacts from the analyzer to user recording equipment. Refer to figure 2.5 and figure 2.6.

3. Connect RS-232 or RS-485 serial communication from analyzer to the PC being used for customer parameter setup. Refer to figures 2.7 through 2.9.

4. Insert the RS-485 termination plug into the RS-485 out connection if communicating with one analyzer or the last in a chain. Refer to figure 2.8.

5. Connect 24Vdc power to analyzer.

3050-AP Connections



Rear View

Power

Terminal	Function
1	DC Power, 24 +/- 4 Volts, 3.15 Amps, Fused
2	DC Common
3	Chassis Ground

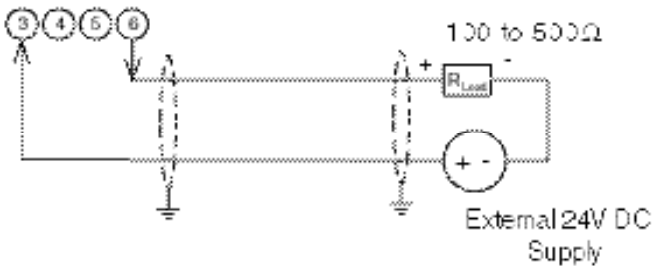
Signal Connections

Terminal	Function
1	Remote Pressure Transmitter +
2	Remote Pressure Transmitter Return
3	4-20 Ma Output Source
4	Isolated 24V power supply +, 50 mA maximum
5	Isolated 24V power supply -
6	4-20 Ma Output Return
7	System Alarm Relay
8	System Alarm Relay
9	Concentration Alarm Relay #1
10	Concentration Alarm Relay #1
11	Data Valid Relay #2
12	Data Valid Relay #2

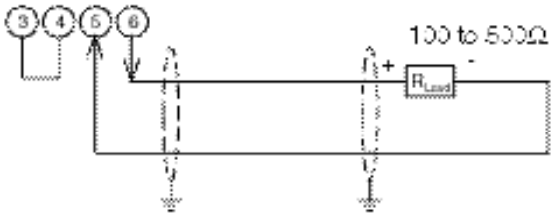
Figure 2.5: 3050-AP Power and Signal Connections

4-20 mA Output Wiring

4-20 Ma Output, Loop Powered (TB2)



4-20 Ma Output, Self Powered (TB2)



Notes

1. Cable should be shielded with single twisted pair.

2. Cable shields should be tied to the chassis at each 3050-AP. If this is not possible (for example, in the case of a ground loop), tie the shield at the PC or DCS to chassis and remaining shield to earth through a 0.1uF @ 500V ceramic capacitor.

3. The 3050-AP signal common is connected to earth ground. If the analog output is also grounded, the analog output will no longer be electrically isolated. Contact AMETEK if this situation occurs.

Analyzer power must be removed when connecting or disconnecting the 4-20 mA signal.

The 4-20 mA loop circuit must have a load resistance of between 100 and 500 ohms or malfunction may occur. If a loop check is performed, the resistor must be placed in series with the ohmmeter.

Figure 2.6: 4-20 mA Output Wiring

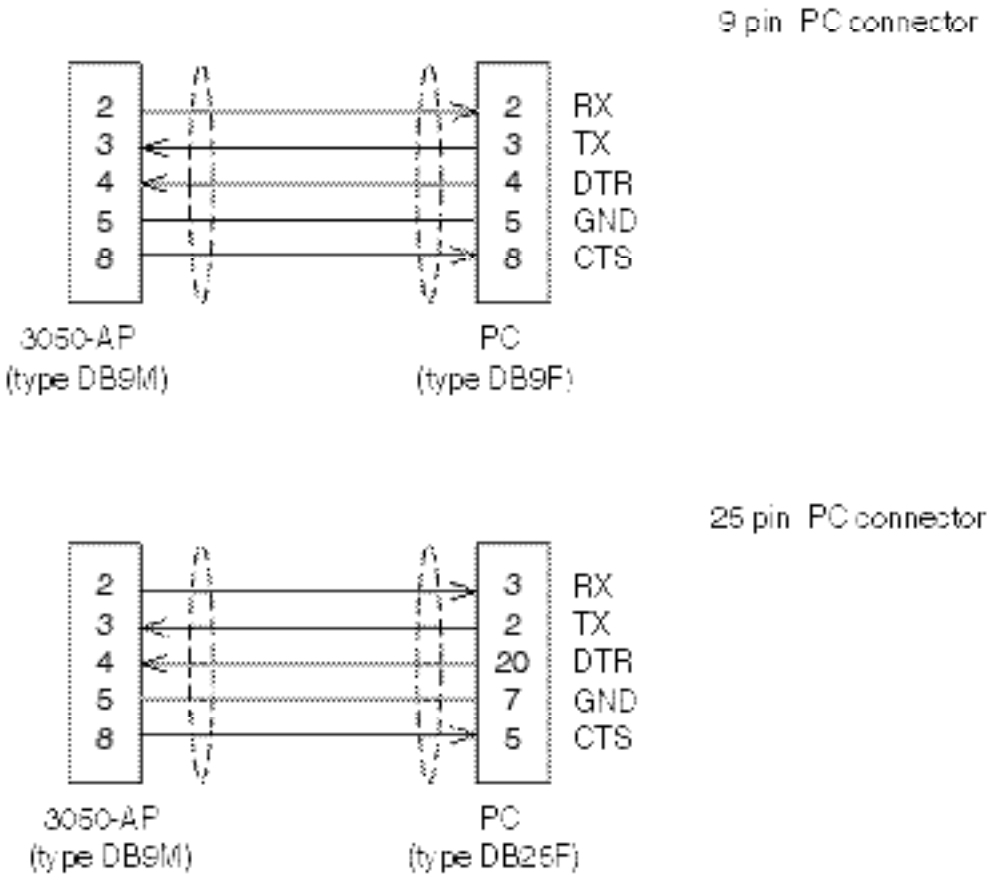
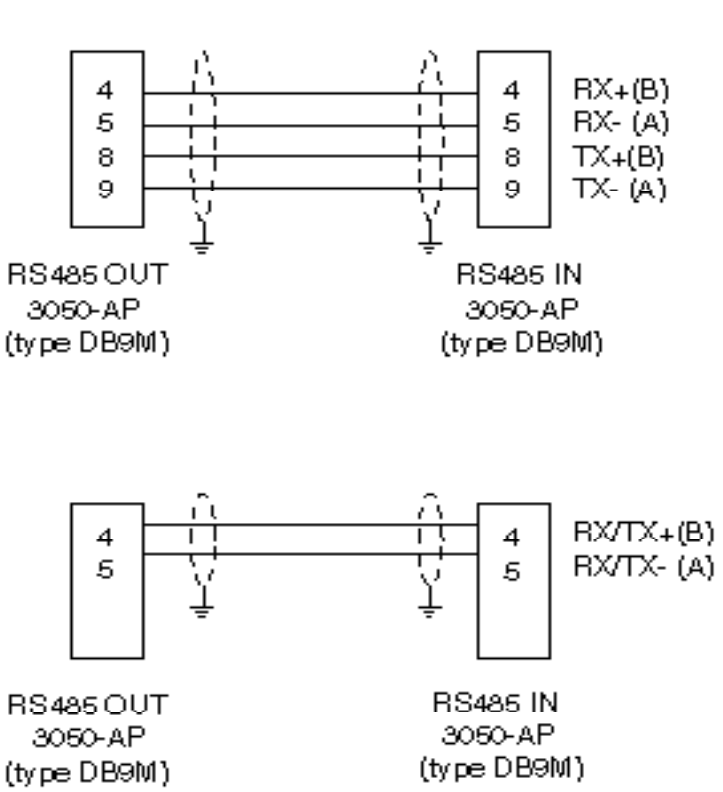


Figure 2.7: RS-232 Wiring

RS485 Cables, Multiple 3050-AP's



Notes

1. Total cable length not to exceed 1000m. Cable should be low capacitance type for use in RS-485 applications (nominal impedance of 120 Ohms, shielded twisted pairs).For example, Belden 9841 in two wire applications, Belden 9842 in 4 wire applications.

2. Install terminator plug (p/n 305 900 901) in RS485 OUT position of last controller in networks with both single and multiple 3050-AP's.

3. Cable shields should be tied to the chassis at each 3050-AP. If this is not possible (for example, in the case of a ground loop) , tie the shield at the PC or DCS to chassis and all other shields to earth through a 0.1 uF @ 500 V ceramic capacitor.

Figure 2.8: RS-485 Cables, Multiple 3050-OLV's

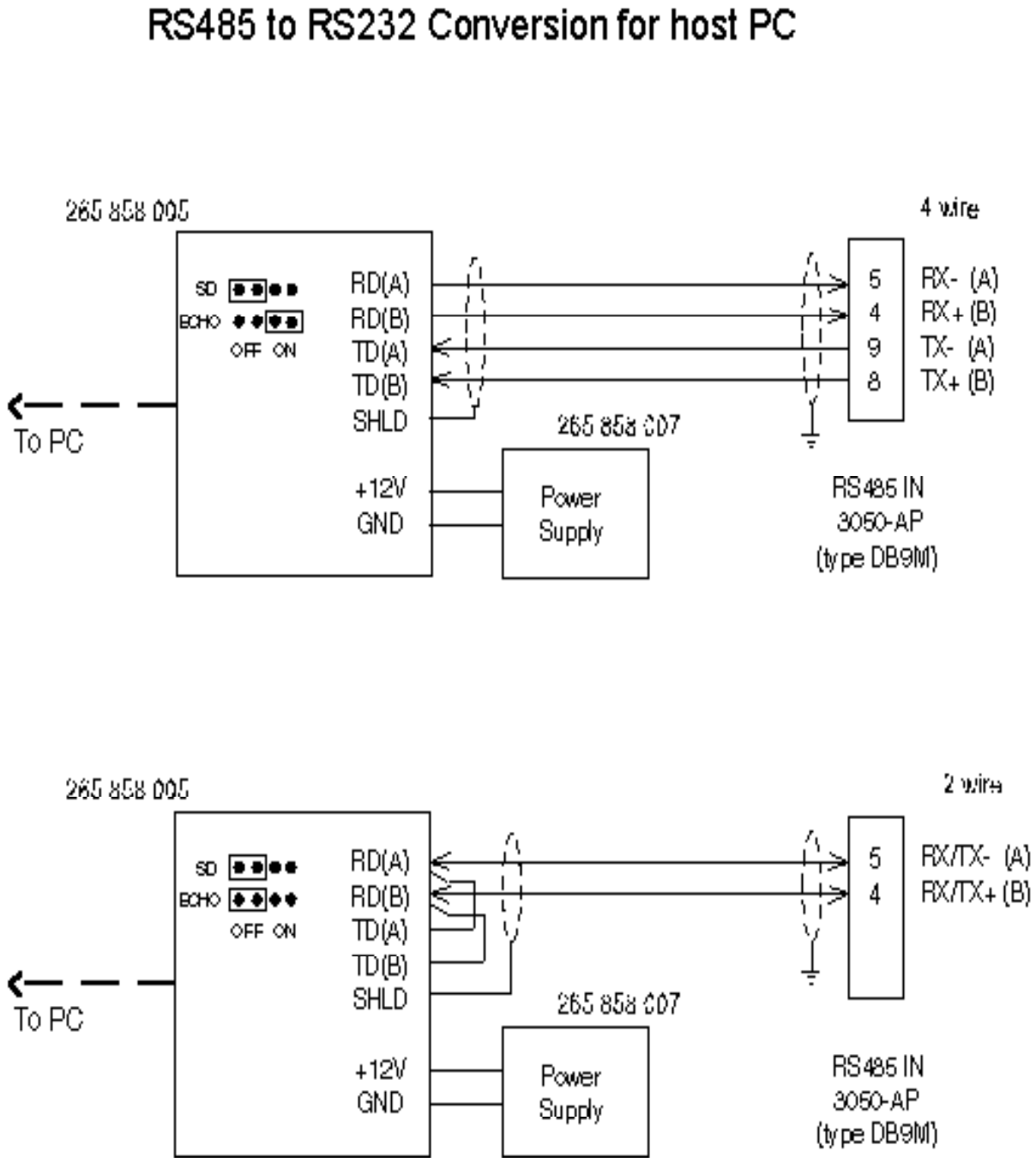


Figure 2.9: RS-485 to RS-232 Conversion for host PC

Analyzer Start-up

1. Turn on power source.

2. Open main process shut-off valve. Adjust sample pressure between 20 and 50 psig. Allow the analyzer to dry down before recording moisture concentration measurements.

Dry Down Period

Allow a minimum of two hours for the analyzer to dry down and stabilize. Allow a minimum of three days for sample tubing. System alarms are normal during this period. When dry down is complete, cell frequency will be stable and the recorded data will have leveled off.

Status LEDs and Alarms

There are three LEDs used for local indication of the system status. The green LED indicates power is supplied to the system. The red LED is used to reflect the status of the concentration, data valid, and system alarms. In the event of a concentration alarm, the red LED will be on. The yellow LED reflects sample flow status. On indicates sample gas is being measured, off indicates dry reference gas. In the event of a system alarm, the red LED will signal the source of the problem. The red LED will flash on for one second and off for one second with the number of flashes as indicated in Table 2.1. Once a flash sequence has completed, the LED will remain off for five seconds. At the end of the pause period, the sequence will be repeated. If there are multiple system alarms then the highest priority alarm will be indicated until it clears. The alarms are listed in order of priority with the higher priority alarm having the fewest flashes.

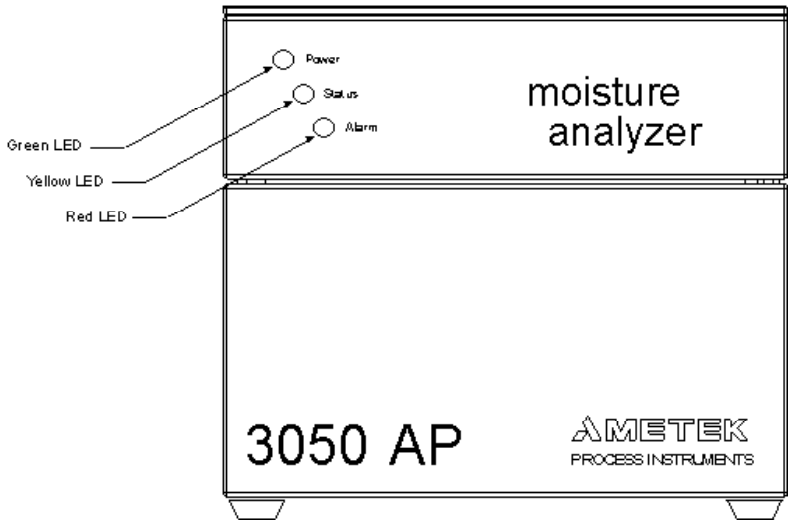


Figure 2.10

Table 2.1 LEDs and Alarms

Alarm Source / LED Flashes per Cycle		Problem	Action
Memory Failure*	1	CPU hardware failure	Call AMETEK Service.
Sample Sensor Failure*	2	Sample senor hardware failure	Replace sensor or call AMETEK Service.
Oven Temperature*	4	Oven temperature is out of tolerance.	This will occur during start-up until the oven warms up. Call AMETEK Service if problem persists.
Flow Out of Tolerance*	5	Sample flow rate too high or too low	Check inlet and outlet pressure. Call AMETEK Service if problem persists.
Battery Low*	6	Battery needs to be replaced. Analyzer detected problem with reference gas.	Call AMETEK Service.
Reference Gas*	7	Excessive internal temperature.	Check and/or replace dryer. Call AMETEK Service if problem persists.
Enclosure Temperature	8	Dryer failure Imminent	External temperature should be 80°C or less. Call AMETEK Service.
Dryer Alarm	10	Moisture concentration is out of user defined limits.	Replace dryer
Concentration Alarm	11		Review alarm settings.

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. Red LED flashes 11 times if an invalid condition occurs.

* Indicates System Alarm and Data Invalid Signal

Chapter 3

Setting Up System Parameters

The configurator software provides a graphical user interface to set up your analyzer parameters. Use the configurator software to set up your analyzer(s). While you can use the configurator software to set up multiple analyzers, you can only view the status of a single analyzer at a time. If using System 2000 Software, refer to the System 2000 manual.

PC Requirements for Configurator Software

- Windows 98, Windows 95 or Windows NT 4.0
- 640x480, 256-color display.

Configurator Software Installation

1. Insert the Setup Disk 1 in your floppy disk drive.
2. Choose RUN... from the Windows Start Menu.
3. Type the drive letter, followed by a colon (:) and a backslash (\ ) and the word "setup."
   Example: **a:\setup**
4. Follow the instructions on your screen. Click Next to continue the Setup process.


NOTE

Configurator installation disk 2 may not be asked for depending on windows version.


NOTE

Turn off all power saving modes.

Configuring Your Device

This section provides instructions for setting up your 3050-AP Moisture Analyzer operating parameters using the configurator software.

1. Define device and communication settings using the General Tab. Refer to figures 3.1 and 3.2.

- Device Section

  Name — Provide a name for the device.
  Description — Provide optional description information.
  Save Configuration — Saves analyzer internal parameters to a file. The save as dialog box will appear so that you can name the file.
  Restore Configuration — Restores analyzer internal parameters from a file. The open dialog box will appear so that you can open the file. This button may be used for emergency recovery.

- Live Data

  Not Checked — System uses demonstration data.
  Checked — System uses live data from analyzer.

- Status — Displays on-line, off-line, or demo online.

NOTE

To save configuration settings to the analyzer, press the APPLY button. OK and CANCEL will close the configurator application.

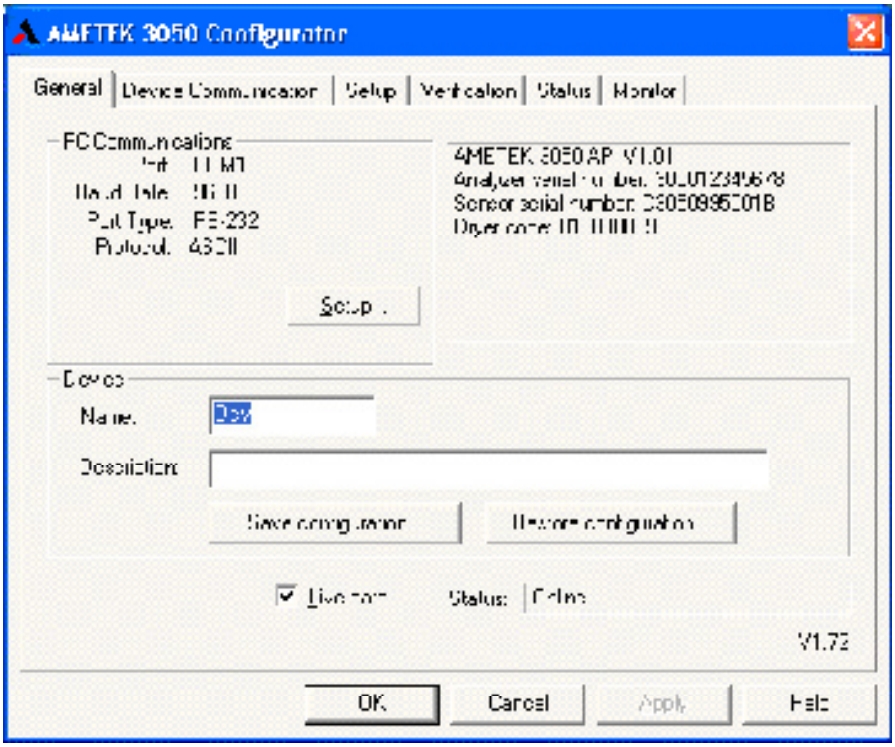


Figure 3.1. AMETEK 3050-AP Configurator - General Tab

- PC Communications Section

Setup	Click on the setup button to setup PC communications.
Port	Select the COM port on the computer used to connect to your device.
Baud Rate	Select the baud rate at which data will be transferred. (Either 9,600 or 19,200)
RS-232 Port	Click if device is using the RS-232 communications port.
RS-485 Port	Click if device is using the RS-485 communications port.
Address	Type the network address of the device.

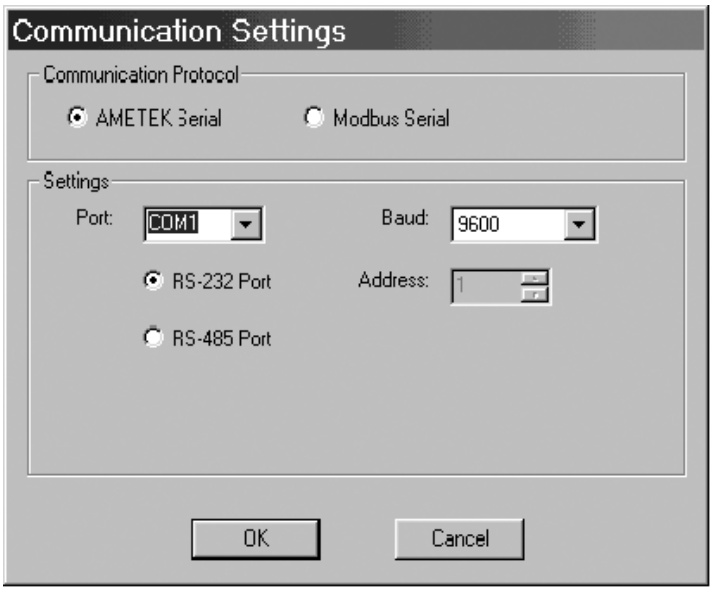


Figure 3.2. AMETEK 3050-AP Configurator - General Tab - Serial Port
(The AP Analyzer does not support the modus option.)

2. Define Device Communications using the Device Communication Tab. Refer to figure 3.3.

- Baud Rate — Select the baud rate at which data will be transferred.
- RS-485 — Identifies the analyzer's address and what type of serial communication cable is being used.

  Address — Type the network address for the device being connected.
  Two-wire RS-485 — Click if device is using two-wire serial cable.
  Four-wire RS-485 — Click if device is using four-wire serial cable.

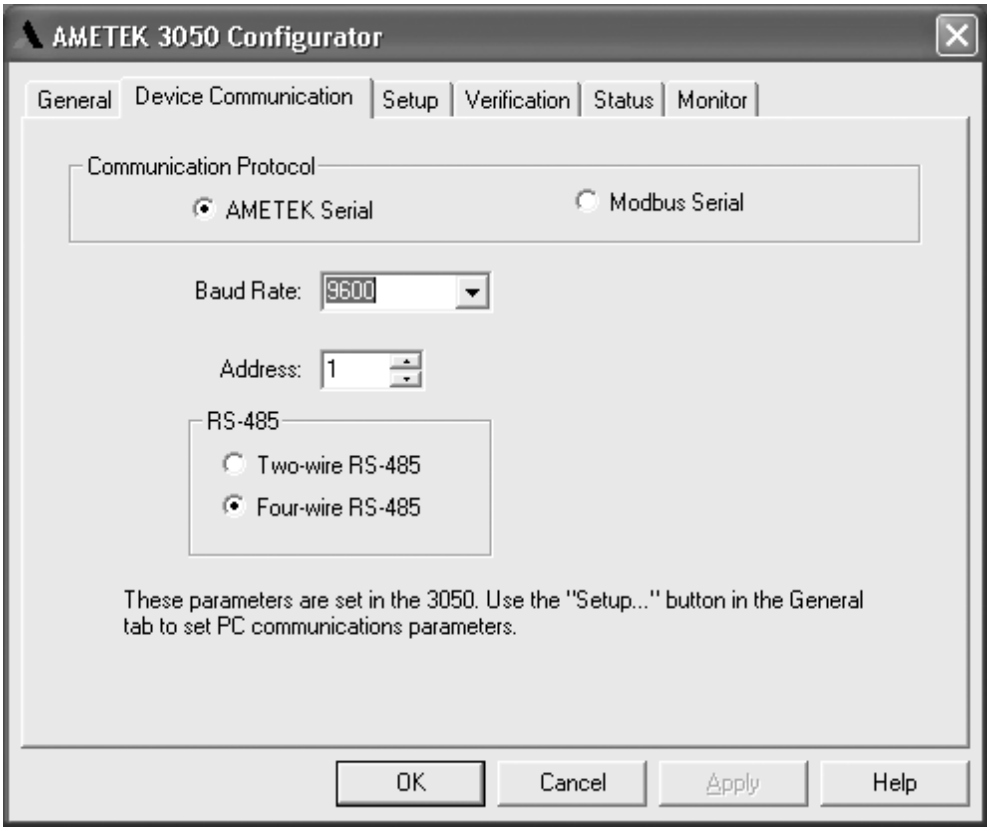


Figure 3.3. AMETEK 3050-AP Configurator ***- Device Communication Tab***
(The AP Analyzer does not support the modus option.)

3. Define System Parameter Settings using the Setup Tab. Refer to figure 3.4.

- Gas — List box allows the user to specify the sample gas stream being analyzed.
- Units — List box allows the user to specify the unit of measure for data output.

NOTE

All values entered must be the same unit of measure as selected.

- Process Pressure — Used when dewpoint C or dewpoint F is selected as unit of measure.

Units — List box allows the user to specify the unit of measure for pressure input.
Fixed — Check if a fixed input. Enter value
External — Check if external input. Enter values for 4 mA and 20 mA points.

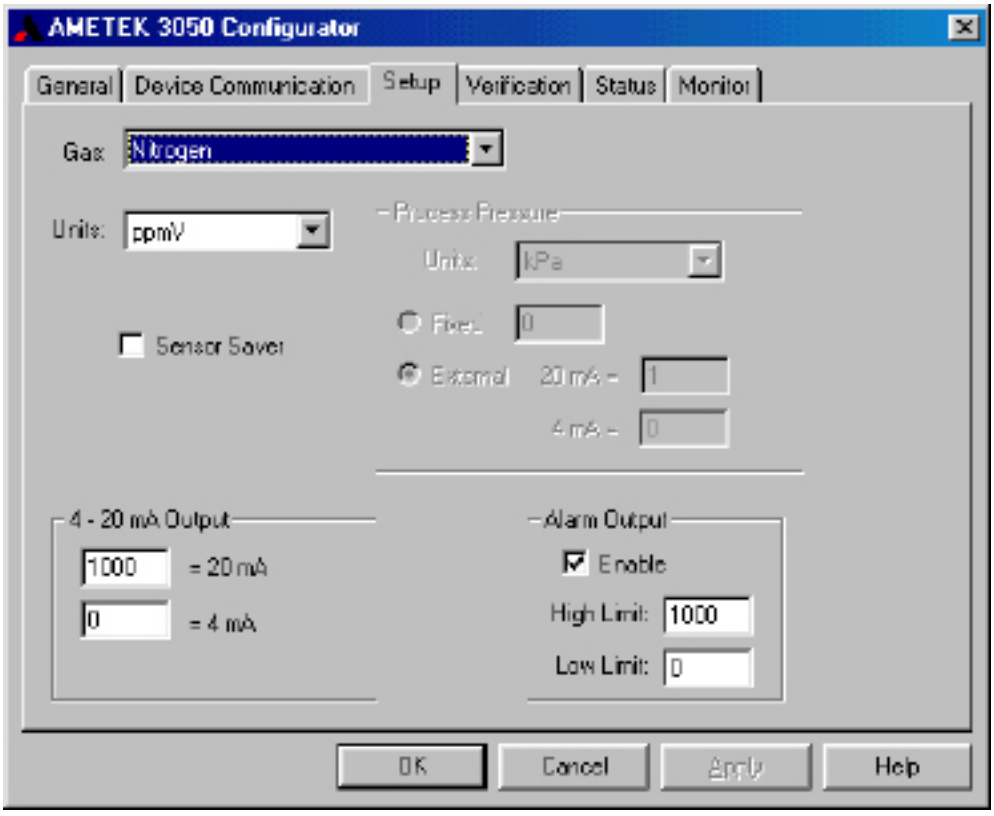


Figure 3.4. AMETEK 3050-AP Configurator ***- Setup Tab***

- Sensor Saver

  Not Checked Analyzer operates with a rapid cycle time, minimizing system response time.
  Checked Analyzer operates with a slow cycle time, maximizing cell life at the expense of system response time.

- 4 to 20 mA output Outputs moisture concentration .

  20 mA Enter upper range output value.
  4 mA Enter lower range output value.
  Hold during verify and zero Check to hold moisture output at last measured value during verification and zero.

- Alarm Output

  Enable Check to activate alarm.
  High limit Enter high limit value
  Low limit Enter low limit value

4. Define Dryer and Clock Settings using the Verify Tab. Refer to figure 3.5.

   - Dryer Production Code Enter dryer production code number when installing dryer.

   - Set Clock Press button to set clock on analyzer.

   - Adjust Span Enter new span value. Use the following sequence to obtain new value.

     1. Change span to 1.0

     2. Inject gas of a known moisture concentration into sample inlet until reading stablizes. View concentration reading on Status Tab.

     3. Calulate new span value.

$$\frac{\text{Actual gas concentration}}{\text{3050 concentration reading (Status Tab)}} = \text{new span}$$

Example:

$$\frac{\text{50 ppmv}}{\text{45 ppmv}} = 1.11$$

     4. Enter new span value and press enter.

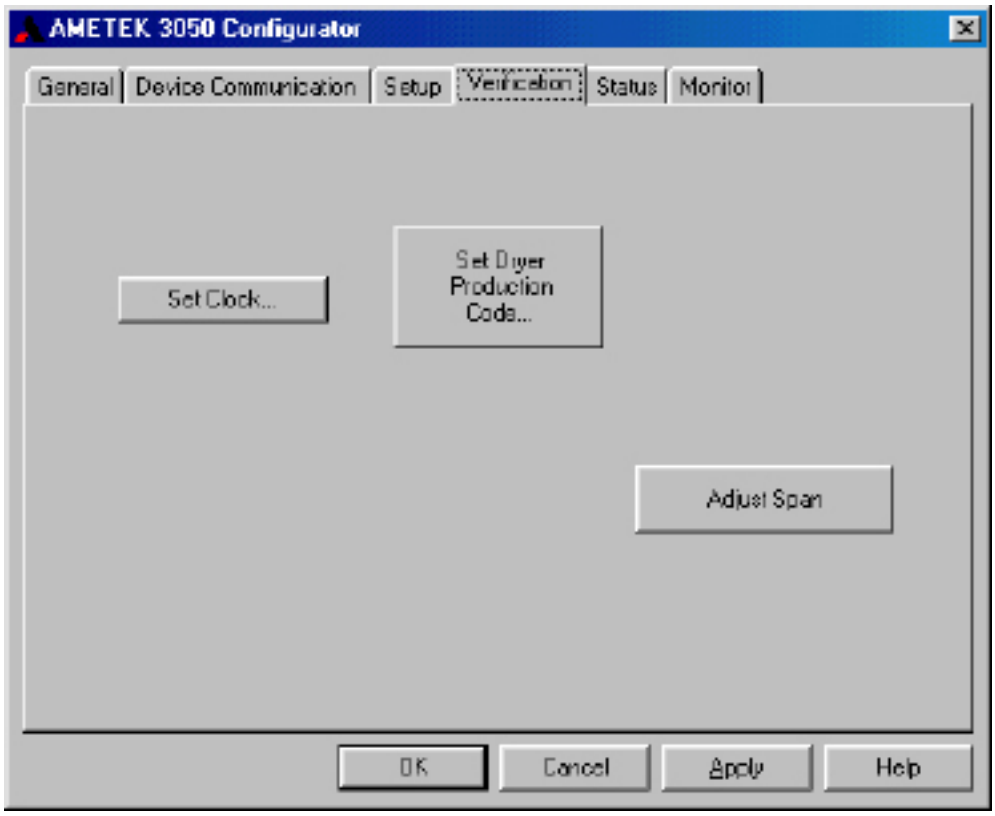


Figure 3.5. AMETEK 3050-AP Configurator - *Verification Tab*

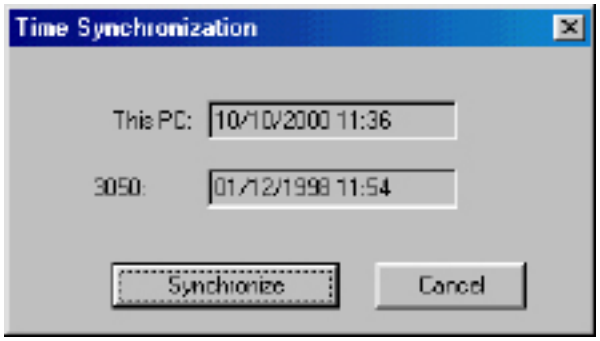


Figure 3.6. AMETEK 3050-AP Configurator - *Set Clock*

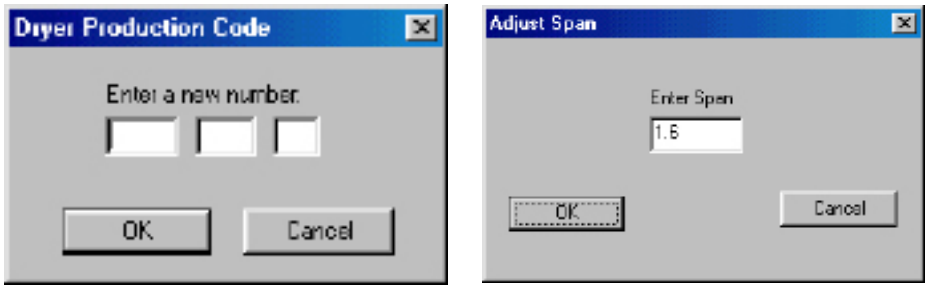


Figure 3.7. AMETEK 3050-AP Configurator
- Dryer Production Code & Adjust Span

5. View 3050-AP Analyzer readings using the Status Tab. Refer to figure 3.8.

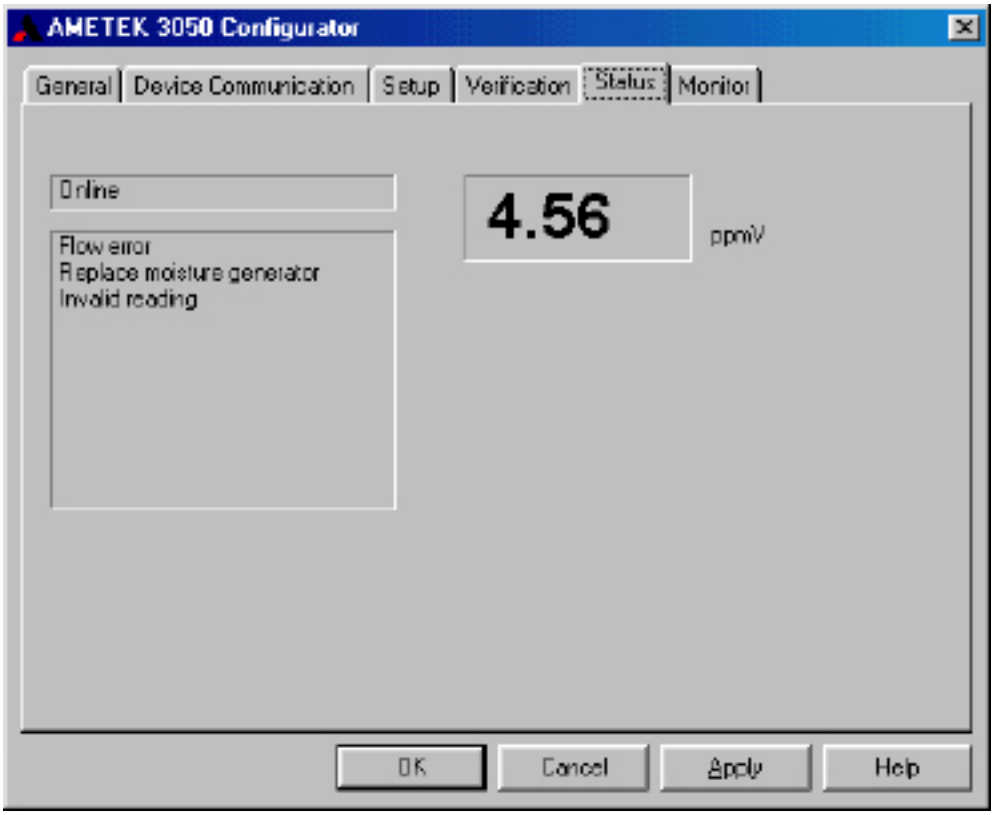


Figure 3.8. AMETEK 3050-AP Configurator - *Status Tab*

- Upper left list box — Displays the analyzer's connection status. It displays whether the analyzer is on-line, off-line, or in demo mode.
- Lower left list box — Displays system conditions and alarms.

  List Examples:
  Verification Pending
  Flow Error
  Replace Moisture Generator
  Calibration Error
  Oven Temperature Error
  Invalid Reading
- Upper right list box — Displays analyzer measurements.
- Alarm Output — Displays high and low limit readings from the analyzer.

6. View 3050-AP Analyzer parameter readings using the Monitor Tab. Refer to figure 3.9. From this tab you can also collect data, test the alarm contacts and mA output of the analyzer.

NOTE

Using the test buttons takes the analyzer offline.

The Test Alarms push buttons allow you to toggle the alarm contacts to an opened or closed state. Use a multi-meter set to ohms to read resistance. Refer to figure 2.5 for location of contacts on analyzer.

- Opened contacts should read infinity.
- Closed contacts should read zero.

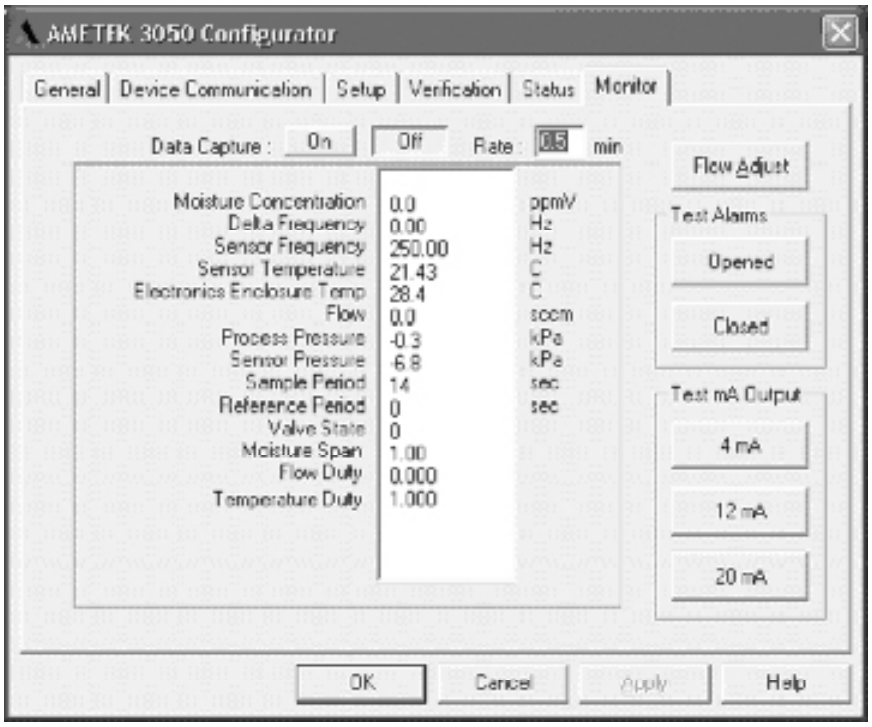


Figure 3.9. AMETEK 3050-AP Configurator - *Monitor Tab*
(The AP Analyzer does not support the Flow Adjust option.)

The Test mA Output push buttons allow you to test the analog outputs. Use a meter to test output. Refer to figure 2.6 of for wiring.

To discontinue test mode, press another tab. Test mode will automatically time out after 10 minutes of inactivity.

NOTE

When analyzer switches from test mode to online, the analyzer resets itself.

Data Capture

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

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

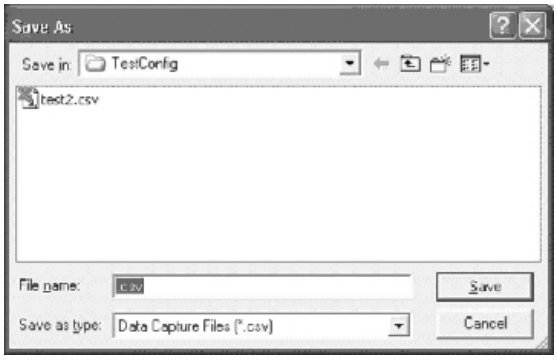


Figure 3-9b. Monitor tab - Save As.

Off
Data collection will terminate and the file will close whenthe Off button is pressed or another configurator 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 minute or more.

Chapter 4

Replacement Parts

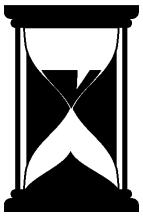
Table 1 lists the replacement parts available for the Model 3050-AP Moisture Analyzer. Please contact the AMETEK Sales office (800-222-6789) for pricing and ordering information.

Table 4.1: Model 3050-AP Replacement Parts

Part Description	AMETEK Part Number
Sensor Assembly *	305 122 901S
CO_2 Calibrated Sensor Assembly	305 122 903S
Dryer *	305 400 901S
User Manual	305 562 901
MCU Board	305 110 908S
Interface Board	305 113 901
Sample Capillary	305 431 902S
RS-485 to RS-232 Converter	265 858 005
RS-485 to RS-232 Self-powered Converter	590 858 901
RS-485 Termination Plug	305 900 901
RS Converter Power Supply, Universal	269 128 002
Bench Top 24 Volt DC Power Supply	230 550 001
Fuse, 3.15A	280 750 251
Fuse, 0.125A, 250V	280 750 238

* Recommended Stock Spare Parts

?? ANSWERS TO YOUR QUESTIONS



MINUTES OR HOURS,

WE'RE THERE FOR YOU

The choice is yours...

Whether by phone or in person, we can meet the needs required to keep your analyzer running at peak performance. Our factory is located in Newark, Delaware with a satellite location in Houston, Texas. Depending on the programs you select; we will have a factory trained representative talking to you within minutes - 24 hours a day, 365 days a year or on site within 24 hours. We also stock parts at both of our locations.

ANYTIME / ANYWHERE

AMETEK SERVICE & AFTERMARKET SALES SUPPORT

• PRE-INSTALLATION INSPECTIONS

To insure you order the correct analyzer with the options your operation requires, schedule a factory trained Service Engineer to inspect the proposed analyzer location. The on-site charge for this visit can be deducted from the start-up charge, if you select that option.

• START UPS

Your decision to buy an AMETEK analyzer is greatly appreciated. After the time and money spent on your analyzer, wouldn't you expect a fast and successful start up? We can insure that will happen! Schedule us to be there before you power up the system. We will guarantee a satisfactory commissioning of your analyzer.

• WARRANTY VALIDATION

Upon start-up, we will validate your 1 year warranty. This validation will enable you to extend your warranty for 2 or 3 years. AMETEK's warranty policy covers all parts, on-site time and travel time. Incurred costs will be the responsibility of the customer.

• WARRANTY EXTENSIONS

AMETEK offers a 2 or 3 year warranty extension for your analyzers. The warranty is identical to the original policy supplied with the analyzer.

• SPARE PARTS KITS

Spare parts kits are available for all AMETEK analyzers. These kits are conveniently arranged to enable each customer to repair 75% to 95% of all failures likely to occur.

• ASAP

AMETEK SERVICE ASSISTANCE PROGRAM AMETEK's exclusive ASAP program lets you select a service package from a menu of service options. ASAP options include 24 hour phone support, 24 hour on-site guarantee, rapid parts shipment, and many more service benefits. ASAP plans may be written to provide coverage for a single analyzer or all of the AMETEK process analyzers at your facility.

• AFTERMARKET SALES

Our Aftermarket Sales group will keep you supplied with the parts to maintain your analyzer to factory specifications. This is also the group that will keep your analyzer current with upgrades and retrofits.

• TECHNICAL SUPPORT

Just call 1-800-537-6044 and a factory trained Service Engineer will be there to answer your questions. With over 200 years of combined field service experience, our engineers are available to provide operational support or troubleshooting expertise.

• TRAINING

We will train your service technicians at our Technology Transfer Center located in Newark, Delaware, or at your facility. Our TTC has equipment similar to yours for hands-on training. A diploma will be presented upon completion of the course.

AMETEK

PROCESS INSTRUMENTS

455 Corporate Blvd., Newark, Delaware 19702
Telephone: (302) 456-4400 1-800-537-6044
Fax: (302) 456-4444

Chapter 5

Glossary of Terms

Annunciator Display	A graphical representation of a panel annunciator on which alarm status of 3050-AP results are displayed.
Address	A decimal number that must be assigned to a Model 3050-AP, when the host PC is communicating with multiple Model 3050-AP Moisture Analyzers.
Alarm Output	Relay contact, which opens to indicate a concentration alarm. The alarm set points can be changed via the configurator software.
Appropriate Vent System	Gas manifold designed to transport the gas exhausted from the analyzer to a safe disposal.
Baud Rate	The rate, in bits per second, at which serial communications take place between the 3050-AP analyzer and the host PC.
Configuration	A set of operating parameters that has been set up using the configurator software for control of a single Model 3050-AP Moisture Analyzer.
Configurator Software	A Windows-based graphical user interface that provides a means for communicating with a single Model 3050-AP Moisture Analyzer.
Contaminates	Liquids, solids, or gases that cause deterioration of system performance.
Contaminate Trap	A small packed column designed to remove glycols and other contaminates that may degrade the performance of the QCM sensor.
Custom Display	A display mode in which any combination of Trend, Tabular, Meter or Annunciator displays may be combined and stored as a display configuration under a unique file name. The display configuration may be assigned to one of three buttons on the main tool bar, for instantaneous activation of the custom display mode.
Data Valid	Relay contact, which opens to indicate a verification is in process or an alarm condition. The data valid contact opens on all alarms and stays closed during normal functions and readings.
Device	A single 3050-AP Moisture Analyzer, or an addressable I/O device, such as an Optomux module.

Display Mode	One of five different means of displaying 3050-AP results on-screen.
EEPROM	Electrical Erasable Programmable Read Only Memory
Four-Wire Mode	RS-485 communication mode, in which four wires are used, connected to the "Send Data" and "Receive Data" terminals. Bi-directional communications may take place simultaneously using four-wire mode.
LED	Light Emitting Diode
Lbs/mmscf	Pounds per million standard cubic feet (101.3 Kpa, 15.6°C)
Loop Powered	Refers to powering the 4-20 mA analog output from an external power supply. The analog outputs on the 3050-AP can be powered from either the loop or the analyzer.
mA	Milliamp
mg/Nm^3	Milligrams per normal cubic meter
Meter Display	A graphical representation of a vertical panel meter, on which 3050-AP analyzer results are displayed.
PC	Personal computer
Port	The specific COM (serial) port of a host PC that will be used for RS-232 serial communication with a Model 3050-AP.
ppmv	Parts per million by volume
ppmw	Parts per million by weight
Process Pressure	The pressure of the process gas, expressed in one of various possible units. Only required when engineering units of "dewpoint" are selected. The pressure may be entered as a fixed value, or as an input to the 3050-AP from a pressure transmitter with a 4-20mA output, with specified scaling.
Resonance Frequency	The frequency at which the QCM operates.
RS-232	A serial communication protocol, in which the RS-232 serial output of a Model 3050-AP Analyzer may be directly connected to one of the COM ports of a personal computer (PC). Distance between the analyzer and the PC is limited to a maximum of 10 meters.

RS-485	A serial communication protocol, in which the RS-485 serial output of a Model 3050-AP analyzer may be input to a converter, which converts it to RS-232 protocol, then input to one of the COM ports of a PC. Alternatively, RS-485 may be run directly into a PC with an RS-485 interface board installed. RS-485 may be run in either 2-wire mode, or 4-wire mode, over distances up to 1000 meters between the analyzer and the PC or converter.
Sample	Gas that is being measured for moisture content.
SCCM	Standard cubic centimeters per minute (101.3 Kpa, 0°C)
Sensor Frequency	Signal frequency produced by the QCM module. This frequency is a function of moisture content of the sample gas.
Sensor Saver	A mode in which the analyzer timing is configured such that the reference gas is flowing for a greater portion of time than the sample gas. This helps to prolong the life of the QCM sensor.
SLPM	Standard liters per minute (101.3 Kpa, 0°C)
Span Adjustment	The adjustment of the analyzers response to match the target value of a known gas concentration.
System Alarm	The analyzer operating condition which requires prompt user attention.
Tabular Display	A table, on which results from one or more 3050-AP analyzers are displayed in real-time.
Trend Display	A line plot of 3050-AP analyzer results with respect to time.
Two-Wire Mode	RS-485 communication mode, in which only two wires are used, connected to the “Send Data” and “Receive Data” terminals. Simultaneous bi-directional communications are not possible using two-wire mode.
Units	Specific engineering units in which the Model 3050-AP moisture results are represented. Examples are ppmv, ppmw, etc..

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