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nire, IL 60069

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800-323-2000
847-955-8200

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847-634-2840

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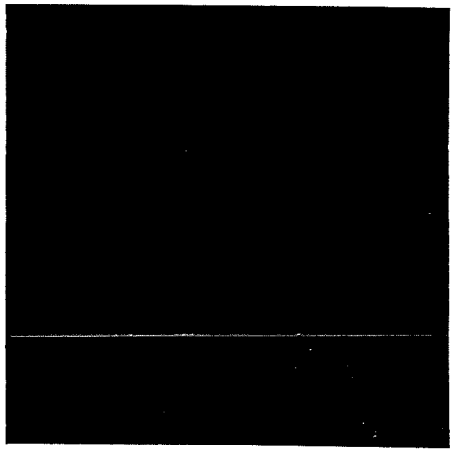
technical handbook



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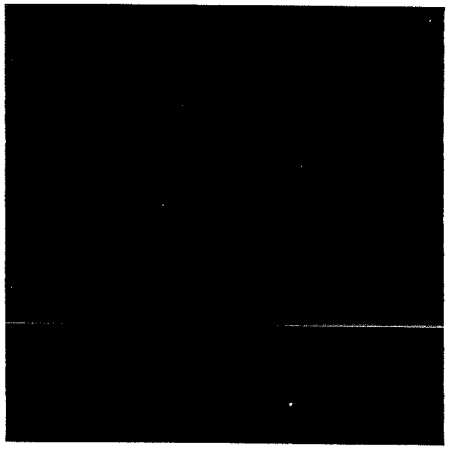

mda scientific

LIFELINE®
Gas Monitors

P/N 1998-0144 (Rev. 2.1)

Technical Handbook

zellweger analytics

Your Uptime Is Our Top Priority

Congratulations on your purchase of the *LIFELINE* gas monitor. It will provide you with years of reliable exposure protection.

Because your uptime is our top priority, Zellweger Analytics provides you with both local service and a 24-hour Emergency Service Hotline.

During Business Hours:

Zellweger Analytics, Inc.

MDA Scientific Products:	(Toll-Free)	800-323-2000
Headquarters:		847-955-8200
Mid-Atlantic:		610-560-6000
Gulf Coast:		512-452-9718
Southwest:		760-942-3142
West Coast:		408-261-8802
Northwest		503-639-3202

Zellweger Analytics, Ltd. (UK): 44-1-202-676-161

Luwa Japan, Ltd. (Japan): 81-3-5484-8711

24-Hour Emergency Hotline (U.S.A.): 847-634-2840

Record your serial number and installation date here for easy reference:

_____ _____

(To save time when calling for service, please have the serial number of your instrument available.)

IMPORTANT: Immediate Action Requested
Warranty and Manual Registration Card

Warranty: Each new *LIFELINE* gas monitor manufactured and/or sold by Zellweger Analytics or its authorized agents is warranted to be free from defects in material and workmanship. Our responsibility is limited to repairing or replacing any instrument or part thereof for a period of two years after the start-up or 30 months after shipment, whichever comes first, when, in our opinion, the repair or replacement is covered by this warranty. Any defective equipment must be returned prepaid to the Zellweger Analytics factory for service. Field service is not included.

This warranty does not cover components that are expendable in normal use and thus have an unpredictable life, such as filters and fuses. Sensor cells and pumps are warranted for one year.

Instruments which have been repaired or replaced during the warranty period are warranted for the remainder of the unexpired portion of the original warranty period.

Zellweger Analytics is released from all obligations under its warranty in the event repairs or modifications are made by persons other than its own authorized personnel, unless such work is authorized in writing by Zellweger Analytics.

Please register your instrument by completing and returning the card below to Zellweger Analytics. The information on this form ensures that any essential product information and manual updates are directed to the end user of the instrument.

Also, please take a few moments and give us your comments on the clarity and usefulness of this manual; your input will help us considerably when making future revisions.

LIFELINE Gas Monitors (Rev. 2.1)

(Please type or print clearly)

Serial Number: _____ Installation Date _____

User Name: _____ Title: _____

Company: _____

Address: _____

_____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Comments: _____

_____

_____

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 28 LINCOLNSHIRE, IL

POSTAGE WILL BE PAID BY ADDRESSEE

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IN THE
UNITED STATES

Zellweger Analytics, Inc.
405 Barclay Blvd.
P.O. Box 1405
Lincolnshire, IL 60069-9842

Symbols Used on MDA Scientific Instruments

Overview

Your Zellweger Analytics MDA Scientific instrument uses several symbols to provide information. Each symbol provides a graphic representation of equivalent words. The symbols are easily recognizable in any language.

Below is a listing of symbols used on MDA Scientific products and a brief description of what the symbols represent. (Your instrument model might not use all of the symbols listed here.)

Symbols

Power Switch ON


Power Switch OFF


Power Indicator LED


Locked Keypad LED


Alarm LED


Caution - Refer to accompanying documents. Caution statements are used to indicate hazards or unsafe practices which could result in minor personal injury or product or property damage.

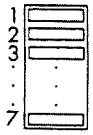

Warning - Refer to accompanying documents. Warning statements are used to indicate hazards or unsafe practices which could result in severe personal injury or death.

(Continued)

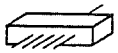
Symbols (continued)

Caution - Risk of electrical shock

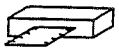
Caution - Hot Surface



Equipment Mounting Position in Rack



Printer Share Box



Printer

Direct Current (D.C.)

Ground Terminal

EMC Considerations

Overview

Your Zellweger Analytics MDA Scientific instrument has been designed to comply with applicable EMC standards at the time of manufacture. The design includes filtering, shielding, and bypassing techniques. At the time of certification, simulated customer Input/Output (I/O) schemes were tested.

All methods used in your equipment for emission supression and reduction of susceptibility are interactive. Modifications to the instrument will most likely result in increased emissions and higher vulnerability to other radiated fields.

Following the guidelines in this EMC Considerations section will ensure your instrument maintains the highest degree of EMC integrity. The guidelines listed apply only to I/O emissions, and do not apply to A.C. and D.C. instrument power connections.

Cabling

At a very minimum, all cables should include a braided shield. Ideal results have been obtained with twisted pair cabling which has a foil shield surrounding each pair plus foil and 90% braid shielding around the bundle. While this yields the best results, it can be very expensive. In addition, ensure local electrical code requirements are met.

(Continued)

Cabling Type

Braid: Must have a minimum 90% coverage

Foil: When used with braid, provides 100% coverage.

Note: Do not use foil alone. It has a tendency to break.

Twisted pair: Provides for cancelling of magnetic fields

Stranded pair: Provides the greatest surface area

MDA Scientific product testing uses >90% braid with foil (around the bundle); twisted pair; stranded 24 AWG (minimum wiring for all qualification and certification testing).

Shield Termination

Continuation of the shield to the cabinet earth ground is most important.

For discrete wire terminations, pigtails to the cabinet (connector) ground should be extremely short (absolutely no greater than three inches).

For multiconductor connector terminations, only 360° shielded shells should be used.

Connectors

All qualification and certification of MDA Scientific products were achieved with high quality connectors, providing 360° shield coverage. These connectors generally had metal shells.

Failure to properly secure the connector to the equipment will result in high emission levels. Also, poorly constructed or improperly assembled connectors can be a high source of radiated noise, and provide a path for external signals into the instrument.

Contents

(continued)

Chapter 1 Introduction

Overview

LIFELINE is the product name for a series of electrochemical cell-based products used to detect toxic gas. The product line consists of four types of gas detectors to provide a wide range of locations and applications. Current gas concentrations and operating status can be read directly from the unit's display. Output from these detectors can be sent to a controller system, a programmable logic controller (PLC), or used to drive relays to activate alarms or other signaling devices. The four types of *LIFELINE* toxic gas detectors are:

Passive transmitter, a compact, rugged detector which can be installed easily and operates with minimum maintenance.

Remote transmitter with Remote Sensor, which allows the sensor to be mounted up to ten meters or more from the transmitter. With the remote sensor model, the transmitter can be mounted in a location which is convenient for viewing the display while the sensor is monitoring in a hard-to-reach location.

The **Extractive transmitter** is a small monitoring instrument equipped with a sample pump, which draws its sample from a remote location through sample tubing. Flow is also monitored by a transducer circuit.

(continued)

The **Pyrolyzer transmitter** is specifically designed to monitor nitrogen trifluoride (NF_3).* When monitoring NF_3, the sample is super-heated (pyrolysis), converting the NF_3 into hydrogen fluoride, which is then monitored by the sensor. A built-in algorithm provides a direct reading in ppm of NF_3. The circuit is monitored for both flow and pyrolyzer faults.

* This detector uses an active sampling system.

This manual provides instructions to install, operate, and maintain the *LIFELINE* gas detectors. Along with this manual, other sources of information include an extensive electronic Help file resident in the *LIFELINE-PC* software, and data sheets for each type of sensor available for *LIFELINE* products.

Safety Notices

There are three levels of safety notices used in this manual, warning, caution, and note. Below are examples of each of these safety notices and the conventions used in this manual:

⚠ WARNING:

A WARNING indicates a situation in which personal injury may occur.

⚠ Caution:

A **Caution** indicates a condition in which damage may occur to equipment or material.

Note:
A note provides helpful information for proper operation of your *LIFELINE* product.

Controls and Indicators

The *LIFELINE* transmitters are designed as sophisticated gas detection equipment, yet simple to operate. The controls and indicators are shown below in Figure 1.

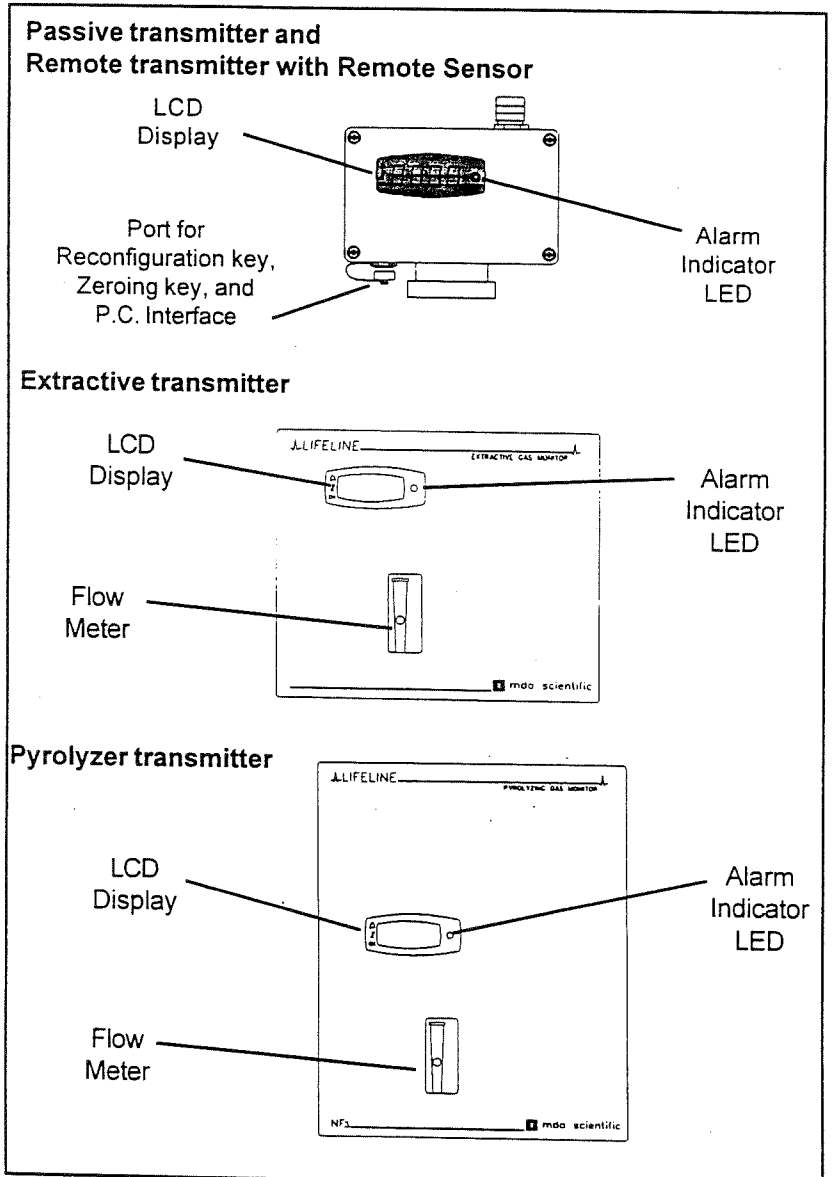


Figure 1. *LIFELINE* Controls and Indicators

Chapter 2 Installation

Mounting the Units

Mounting the Passive Transmitter (and Passive Transmitter with Remote Sensor)

Use the optional wall mount bracket (P/N 2105D0558) to mount a passive or passive remote unit as shown in Figure 2. Appropriate hardware should be used to secure the bracket to a wall. Attach the transmitter to the wall mount bracket using M3 by 20 mm screws.

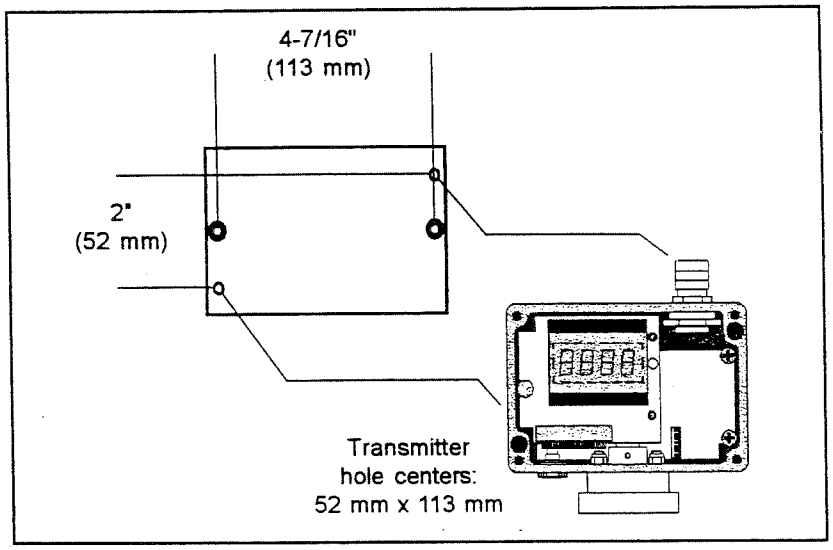


Figure 2. Mounting the Passive Transmitter

Mounting the Extractive and Pyrolyzer Transmitters

⚠ Caution:

Extractive and pyrolyzer units must be mounted in a vertical position.

The extractive and pyrolyzer units use wall mount brackets included with the units. The hardware used to attch the enclosure to the wall mount brackets is included. Use one of the mounting configurations shown in Figures 3 and 4.

Appropriate hardware (not included) should be used to secure the brackets to a wall.

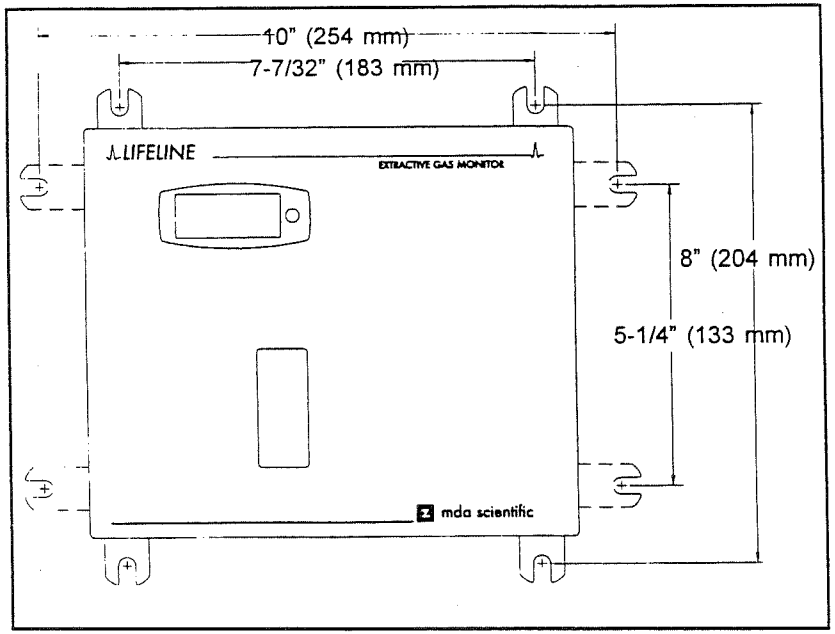


Figure 3. Mounting the Extractive Transmitter

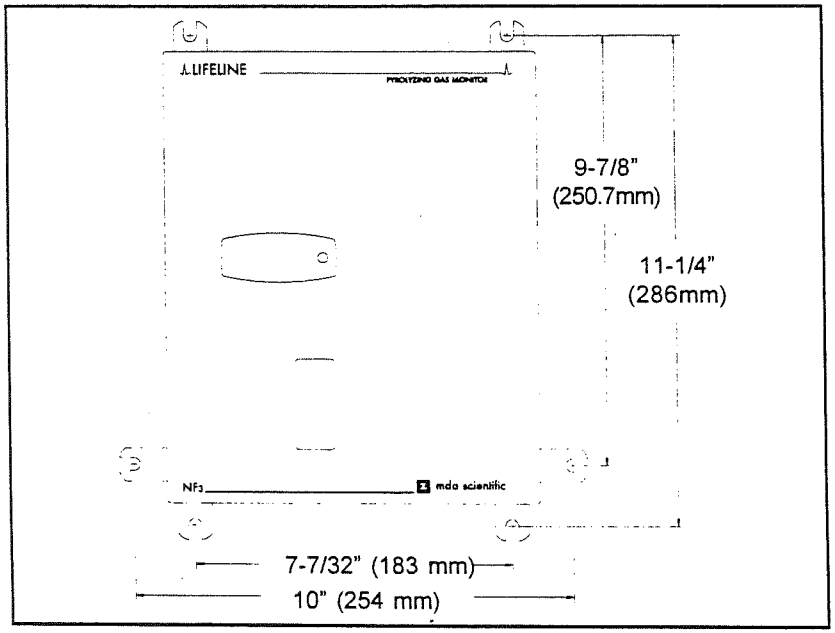


Figure 4. Mounting the Pyrolyzer Transmitter

Wiring

Power Requirements:

The *LIFELINE* units operate at the following voltages and power ratings (voltages are measured at the transmitter):

Passive:	18 - 30 VDC, 0.6 W max.
Passive (remote sensor):	18 - 30 VDC, 0.6 W max.
Extractive:	18 - 30 VDC, 5 W
Pyrolyzer	18 - 30 VDC, 42 W
Relay Module	18 - 30 VDC, 3 W

⚠ Caution:

A separate power supply is required to power the extractive, pyrolyzer, and relay units. Do not use the 4-20 mA loop for this power. Loop power (4-20 mA) will be inaccurate unless the 4-20 mA line is an independent wire run.

Wiring Requirements

Braided shielded cable must be used. The wire guage sizes are:

Passive and Remote Sensor Transmitters:	16-28 AWG
Extractive Transmitter:	12-22 AWG
Pyrolyzer* Transmitter:	12-16 AWG
Relay Module:	12-22 AWG

* Wire runs from supply to the pyrolyzer transmitter should not exceed 400 feet. If a greater distance is required, contact Zellweger Analytics for assistance.

(continued)

Wiring Requirements (continued)

The passive and passive remote units have Intrinsically Safe (IS) certification. To ensure IS certification, the cable shield of these units must terminate to the "Shield" terminal on the input terminal block. If the braided cable includes a drain wire, the drain should be terminated to the terminal block "Shield" location.

For Pyrolyzer, Extractive, and relay units, the shield should be terminated at the enclosure entry.

Transmitters require an independent power supply. If installing multiple extractive and/or pyrolyzer units, a single power supply may be used (if it provides sufficient power) for all units, as long as the transmitter 4-20 mA loop is powered separately.

Wiring Requirements (continued)

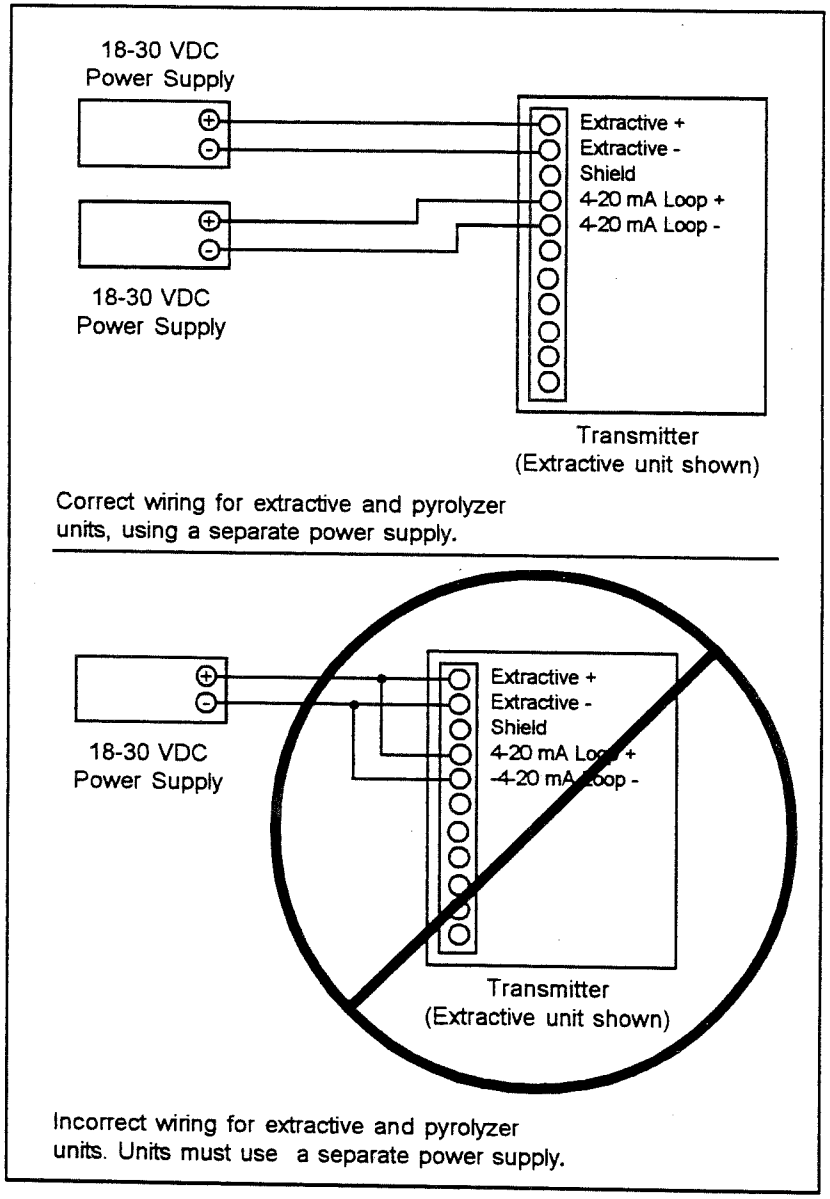


Figure 5. Separate Power Runs for Extractive and Pyrolyzer Units (Extractive unit shown)

Wiring Terminations

Passive Transmitter

The passive transmitter requires (18-30 VDC) 4-20 mA loop power only. The 4-20 mA cable must be installed through the cable gland at the top of the transmitter. Disconnect the connector from the terminal strip. Route the cable through the gland as shown in Figure 6.

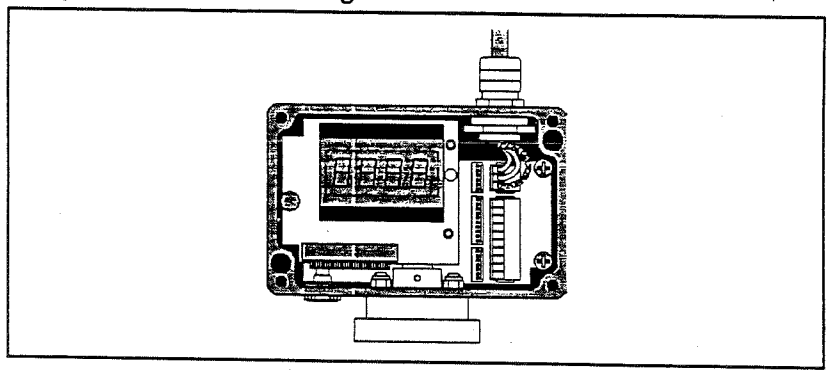


Figure 6. Wiring the Passive Transmitter

⚠ Caution:

Incorrect wiring could damage the transmitter. Follow the wiring instructions shown in Figure 7 to ensure correct terminal locations.

Attach the wires to the connector and insert the connector onto the terminal strip. (Refer to Figure 7 for wire terminal locations).

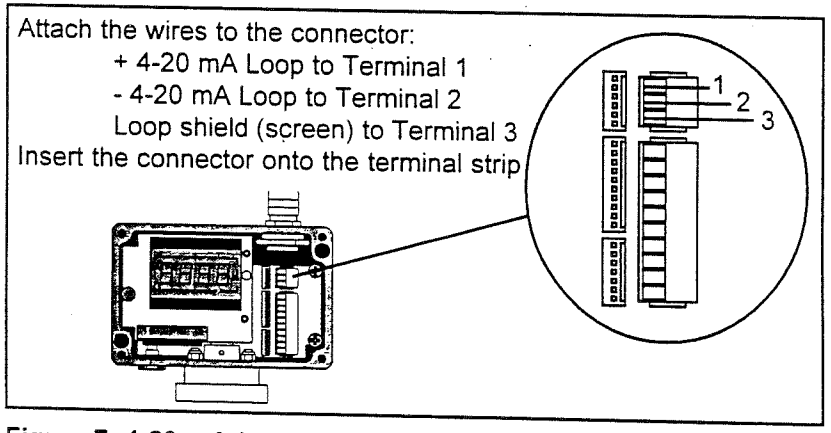


Figure 7. 4-20 mA Loop Wiring Connection

Wiring Terminations (continued)

Remote Transmitter with Remote Sensor Wiring

A sensor is installed on a remote transmitter via the sensor cable. A DB-9 connector on one end of this cable connects to the remote sensor. The wires in the cable are color coded. (Refer to Figure 8.) Route the sensor cable through the gland on the bottom of the transmitter. Attach the wires to the connector as shown in Figure 8. When the wires are attached to the connector, install the connector onto the terminal strip. Attach the cable shield (screen tag) to the cable gland mounting screw.

The 4-20 mA Loop power wiring is identical to the passive transmitter.

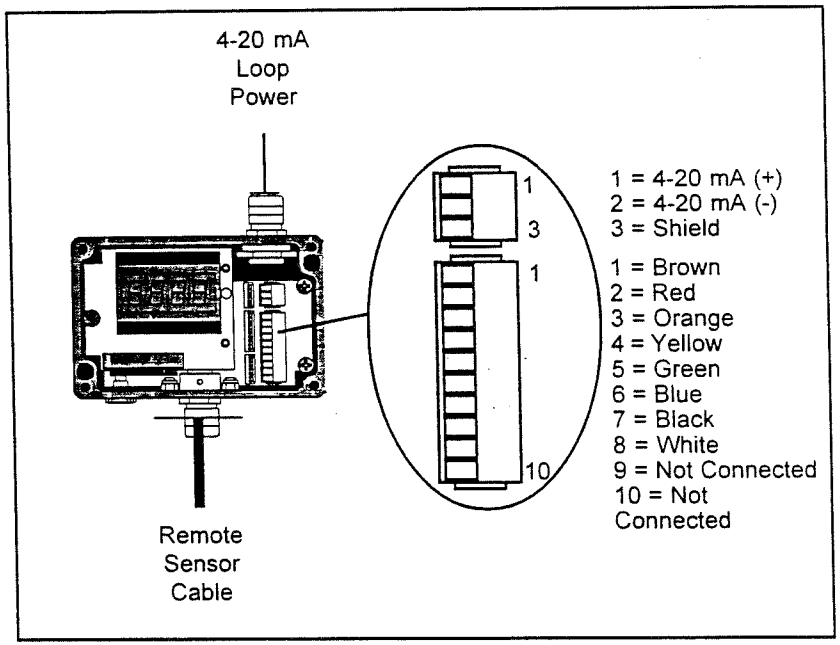


Figure 8. Remote Sensor Wiring Connection

⚠ Caution:

The remote sensor cable can be used only with a remote transmitter unit.

Wiring Terminations (continued)

Extractive Transmitter Wiring

The cable feed for the extractive unit is located at the side or bottom of the extractive cabinet, depending on how the unit was ordered. (Refer to Figure 9.) The cabinet knockout fits U.S.A. 1/2-inch (7/8-inch (22 mm) hole) conduit connector. Use appropriate hardware to protect the cables entering the cabinet.

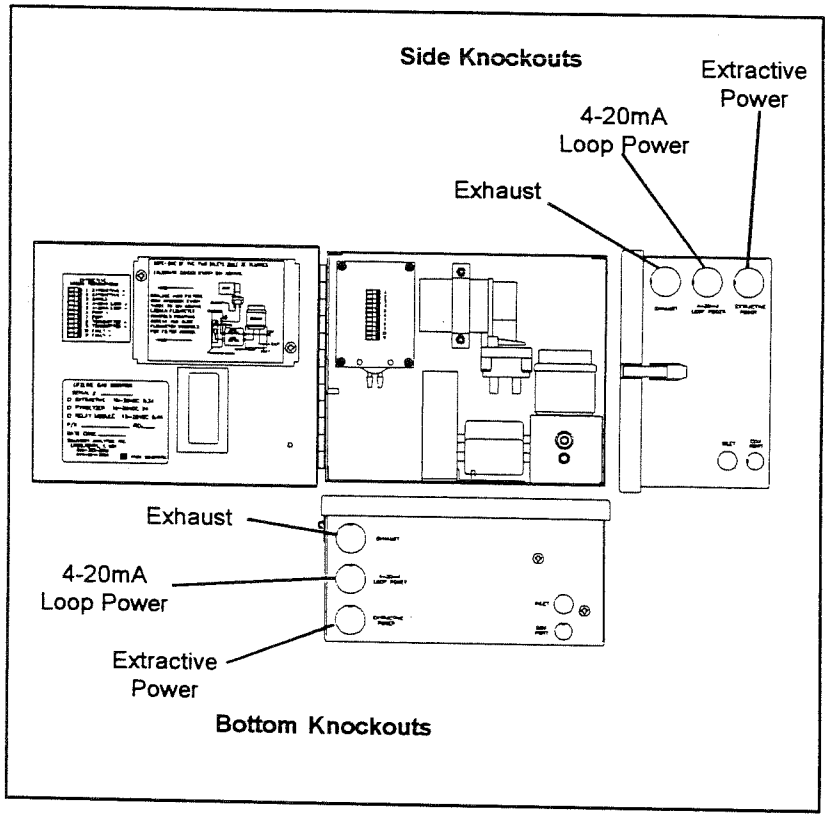


Figure 9. Extractive Unit Electrical Knockout Locations

Wiring Terminations (continued)

Extractive Transmitter Wiring

Wire the extractive unit as shown in Figure 10. The electrical terminal block is located in the upper left section of the extractive unit cabinet.

⚠ Caution:

Separate wire runs are required to power the extractive unit. Do not use the 4-20 mA loop for this power. Loop power (4-20mA) will be inaccurate unless the 4-20mA loop is an independent wire run.

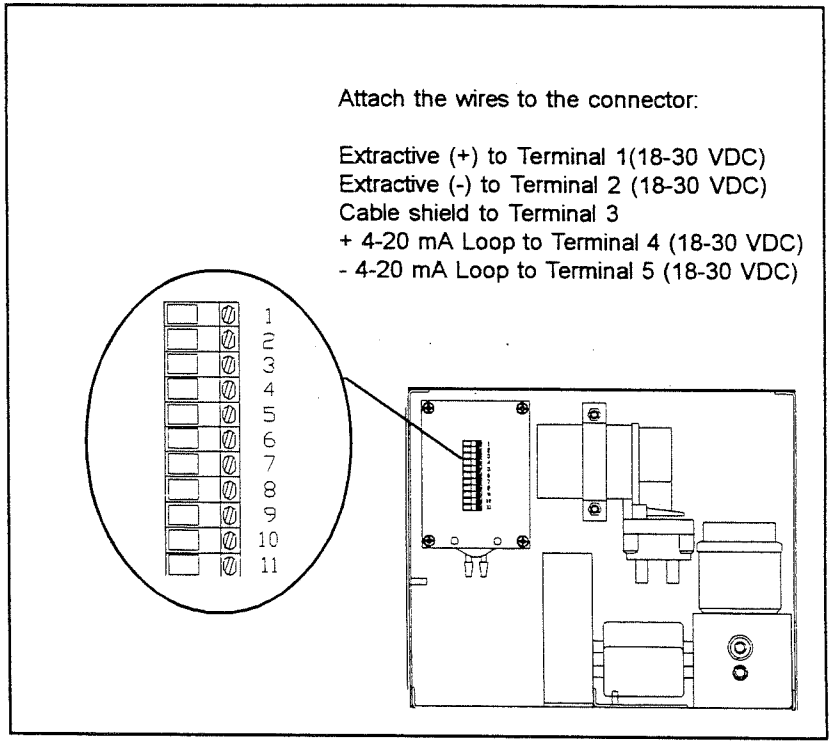


Figure 10. Extractive Unit Wiring Terminations

Wiring Terminations (continued)

Pyrolyzer Transmitter Wiring

The cable feed for the pyrolyzer unit is located at the side or bottom of the pyrolyzer cabinet, depending on how the unit was ordered. (Refer to Figure 11.) The cabinet knockout fits a U.S.A. 1/2-inch (7/8-inch (22 mm) hole) conduit connector. Use appropriate hardware to protect the cables entering the cabinet.

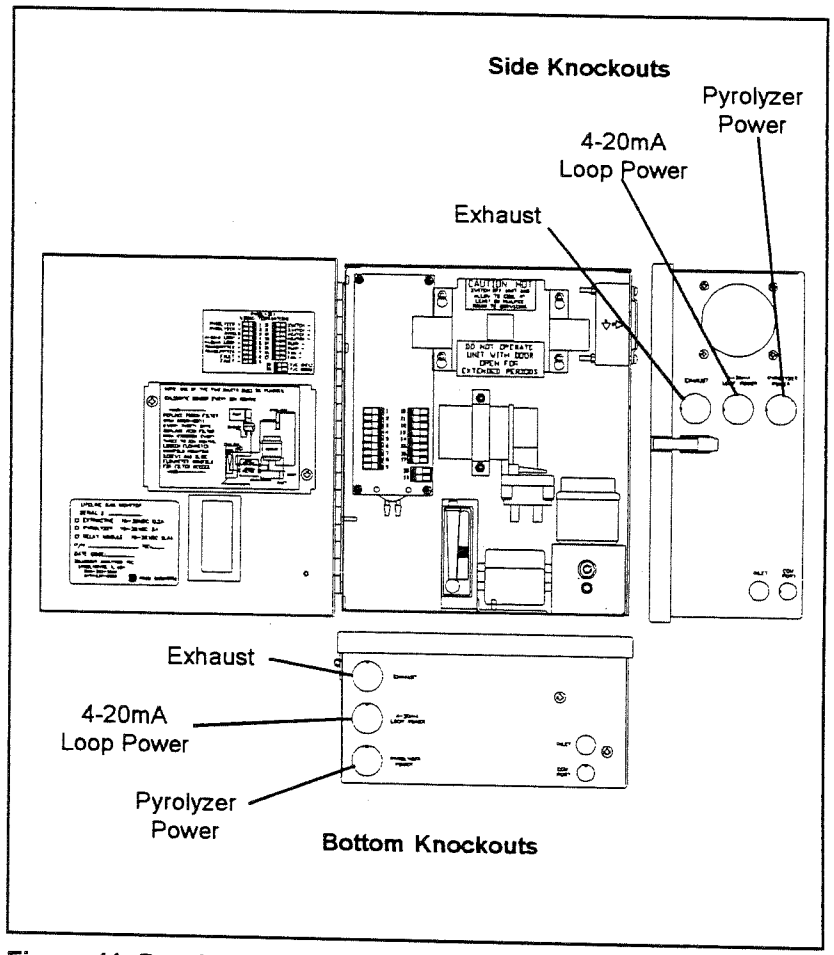


Figure 11. Pyrolyzer Unit Electrical Knockout Locations

Wiring Terminations (continued)

Pyrolyzer Transmitter Wiring

Wire the pyrolyzer unit as shown in Figure 12. The electrical terminal block is located in the middle left section of the pyrolyzer unit cabinet.

⚠ Caution:

Separate wire runs are required to power the pyrolyzer unit. Do not use the 4-20 mA loop for this power. Loop power (4-20 mA) will be inaccurate unless the 4-20 mA loop is an independent wire run.

Note:

A separate 18-30 VDC power source should be used for the pyrolyzer unit.

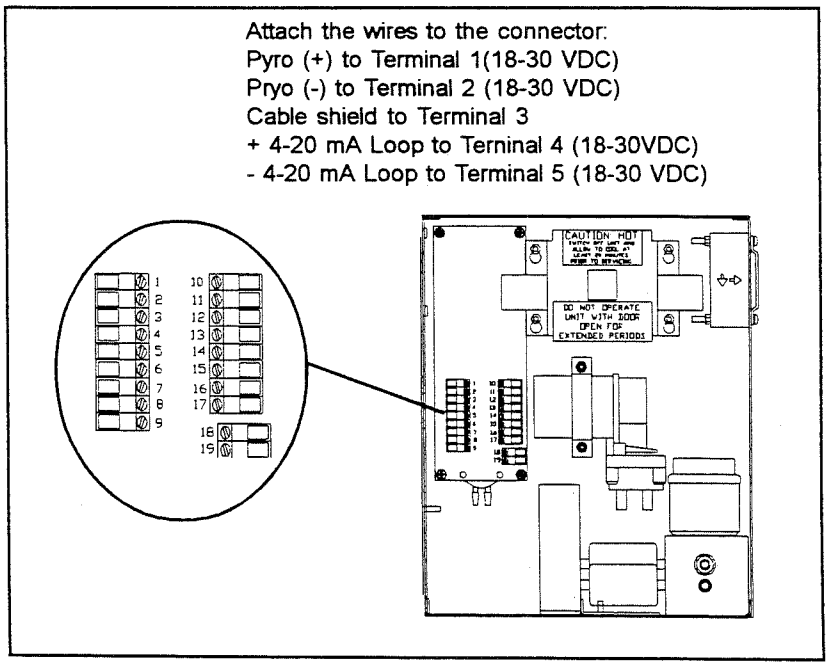


Figure 12. Pyrolyzer Unit Wiring Terminations

Inlet/Exhaust Tubing

⚠ Caution:

Sample inlet tubing must be FEP Teflon®. Material which is not FEP Teflon can adsorb some of the target gas, causing under-reporting of actual gas concentrations.

Extractive and pyrolyzer units use external tubing for sample inlet and exhaust. Make certain the tubing used for sample lines meets the following specifications:

Sample line (inlet) tubing: 1/4-inch O.D. x 3/16-inch I.D. FEP Teflon, 50-feet maximum.

Exhaust tubing: 1/4-inch O.D. x 3/16-inch I.D. polypropylene, 50-feet maximum.

⚠ Caution:

Use a tubing cutter to ensure all tubing is cut evenly. Sample and exhaust lines should not be crimped, bent to less than a 5-inch radius, or placed in an area where weight would collapse the tubing.

Using the Quick Connect/Disconnect Fittings

The sample inlet and exhaust ports each have quick connect/disconnect fittings with an internal O-ring and an external locking insert. (Refer to Figure 13.)

To install tubing into the fittings, follow these steps:

1. Insert the tubing into the inlet through the gray locking insert.
2. Press the tubing in past the first resistance point (at the O-ring) until the tubing is firmly seated against the tubing stop.

Inlet/Exhaust Tubing (continued)

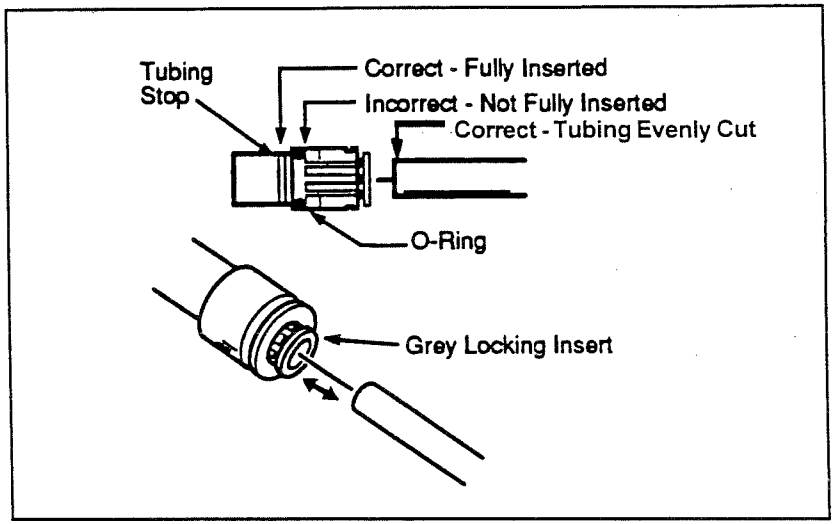


Figure 13. Quick Connect/Disconnect Tubing Fitting

To remove the tubing:

1. Press the outer ring of the gray locking insert inward toward the fitting.
2. Pull firmly on the tubing while continuing to press the insert ring toward the fitting.

Exhaust Lines

Use the quick connect/disconnect fitting to connect the 1/4-inch O.D. exhaust line to the exhaust port. The maximum length for exhaust lines is 50 feet.

⚠ WARNING:

Toxic levels of the sample may be present at the sample exhaust. Connect the sample exhaust to an appropriate exhaust vent.

One possible exhaust method is to return the sample exhaust to the sample duct, downstream from the sample point.

Sample Line Filter

A sample line filter can be used (Extractive and Pyrolyzer units only) to remove particulates in dusty applications. The chart below lists the sample line filter part number (P/N) recommended for particular gases. The filter should be installed at the end of the sample line, as close to the sample point as possible.

Gas	Filter P/N
Ammonia (NH_3)	780248[1]
Arsine (AsH_3)	780248[1]
Carbon Monoxide (CO)	780248[1]
Chlorine (Cl_2)	1830-0055[2]
Diborane (B_2H_6)	780248[1]
Hydrogen (H_2)	780248[1]
Hydrogen Bromide (HBr)	1830-0055[2]
Hydrogen Chloride (HCl)	1830-0055[2]
Hydrogen Fluoride (HF)	1830-0055[2]
Nitrogen Trifluoride (NF_3)	780248[1]
Phosphine (PH_3)	780248[1]
Silane (SiH_4)	780248[1]
TEOS ($Si(CH_3CH_2O)_4$)	780248[1]

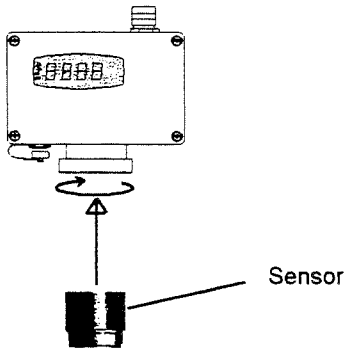
[1] Replacement interval for P/N 780248 is 6 months, more often in very dusty applications.

[2] Filter Assembly P/N 1830-0055 uses a one micron Teflon membrane (P/N 0235-1072, 100 per pack). Replace the filter membrane every 30 days. Also, every 6-12 months, a cotton swab should be used to clean dust from the filter housing.

New sensors continue to be developed. If you have a sensor which is not on this chart, consult the sensor data sheet for the recommended end-of-sample-line filter.

Installing/Replacing Sensors

Passive Transmitter



Insert the sensor into the transmitter.
Tighten the locking ring.
Note: Turn locking ring from right to left until snug. Do not over-tighten.

Figure 14. Attaching the Sensor to the Passive Transmitter

Passive Transmitter with Remote Sensor

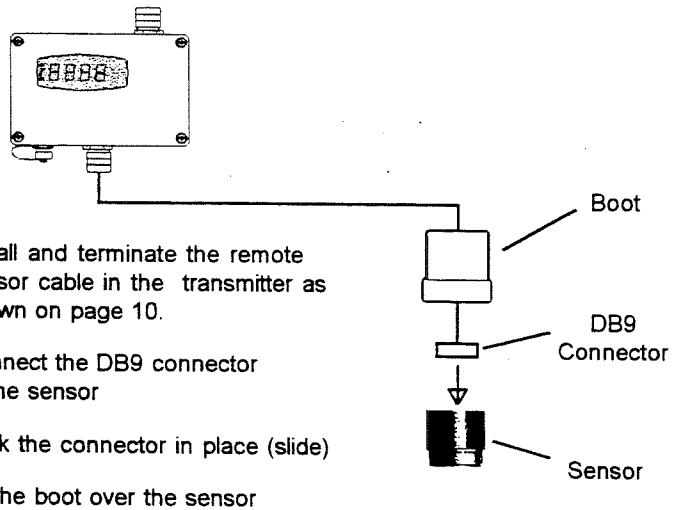


Figure 15. Attaching the Remote Sensor

Extractive Transmitter

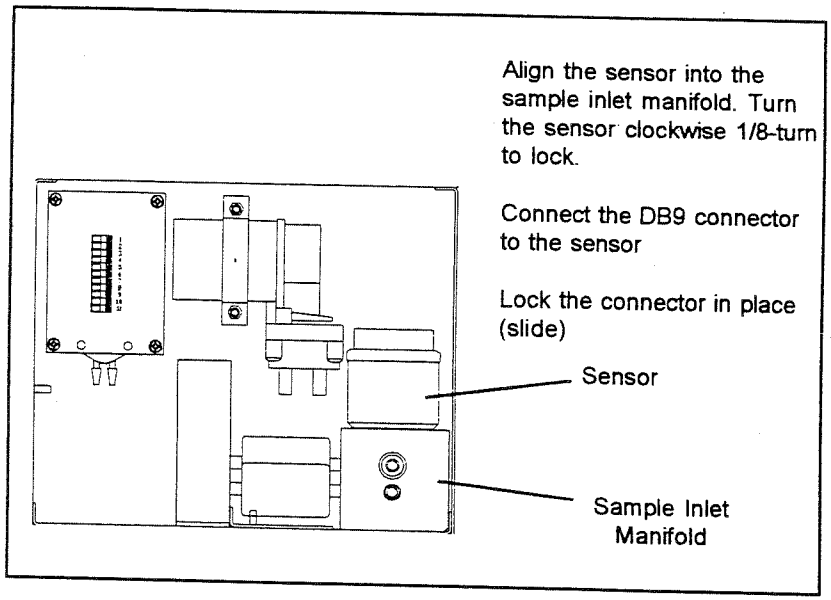


Figure 16. Installing the Sensor in the Extractive Transmitter

Pyrolyzer Transmitter

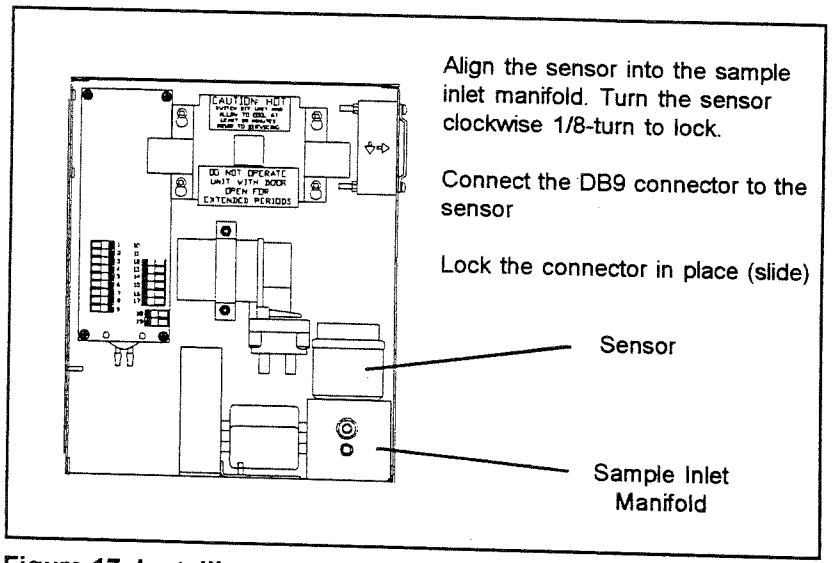


Figure 17. Installing the Sensor in the Pyrolyzer Transmitter

Installing Transmitters to a PLC

Consult the instructions for the programmable logic controller (PLC) which will be used on your system. Connect the transmitter 4-20 mA loop power to the loop power terminals on the PLC. Refer to Figure 18 for a simplified view of a typical PLC.

Note:
The *LIFELINE* Quick Start Guide which came with your *LIFELINE* product shows a typical hook-up for a Sieger Series 57 controller.

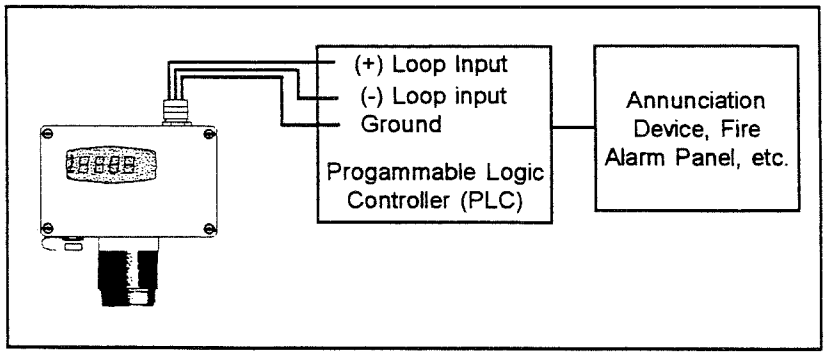


Figure 18. Simplified Hookup to a PLC

LIFELINE units have a 3-4 mA circuit that indicates maintenance or calibration requirements. It can be used with PLCs or control systems that support 3-20 mA signals.

Installing Transmitters to a PC

The *LIFELINE* transmitters can be connected to a personal computer (PC) or laptop computer, configured and operated using optional *LIFELINE-PC* software.

When using a computer to configure units, *LIFELINE-PC* software can configure transmitters, read information (and graphs), permit calibration of sensors (in situ), enable "maintenance mode" for gas challenges, interpret diagnostics, display the last ten faults, test the display, LED, 4-20 mA loop, and set new alarm levels.

LIFELINE-PC software includes easy-to-use interactive screens, a complete tutorial, and an extensive Help program to guide you through every step, from software installation to system operation. Calibration routines and gas testing are included in this software.

The transmitter uses PC interface cable P/N 2105B0451 to connect to a computer. Figure 19 shows a typical transmitter to laptop computer hookup. Connect the PC interface cable to the port on the bottom of the transmitter (passive transmitter shown) and the 485/232 converter (included with the software). Connect the RS232 side of the 485/232 converter to the serial port on the computer.

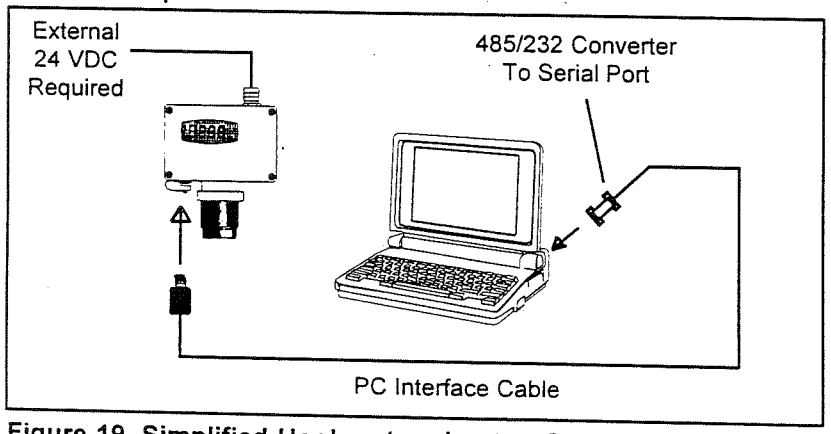


Figure 19. Simplified Hookup to a Laptop Computer

Chapter 3 Operation

Overview

Your *LIFELINE* system can operate as a self-contained gas detection system or as a point monitoring system which transmits its data to a programmable logic controller (PLC) or personal computer (PC).

LIFELINE transmitters are designed as "Plug-and-Play" components which can monitor points in a variety of configurations (passive, passive with remote sensor, extractive, and pyrolyzer). Optional accessories such as the duct mounting adapter and relay module give you the flexibility to configure your system to your exact requirements.

Optional *LIFELINE-PC* software provides full capability to configure sensors, calibrate and test transmitters, and select transmitter display options. The software contains easy-to-use menus and screens, and contains an extensive Help program to guide you through every procedure.

This chapter highlights the basic system operation, sensor swapping, configuration, and diagnostics. The chapter also includes reference charts, and provides information and requirements for using the optional *LIFELINE-PC* software.

Initial Configuration

Transmitters are shipped configured in the "Maintenance Mode." After you have completed the physical installation of the unit, you must configure the transmitter to operate with the specific sensor you have installed.

When power is applied, the transmitter display will indicate either Fault 20 - In Maintenance Mode or Fault 11 - Incorrect Type. Insert the Configuration Key (P/N 2105B0549; the configuration key has a green cover) into the port on the bottom of the transmitter. After two to five seconds, remove the key. The transmitter is now configured to monitor the gas listed on the sensor housing's label.

Stabilization time varies depending on the electrochemical cell in the sensor. This time can be as little as 10 seconds and as long as 30 minutes. Upon sensor stabilization, the *LIFELINE* transmitter begins monitoring.

Note:
Pyrolyzer units require a warm-up time before gas detection can occur. This warm-up time is typically 10 minutes. If warm-up time exceeds 20 minutes, contact your Zellweger Analytics service representative.

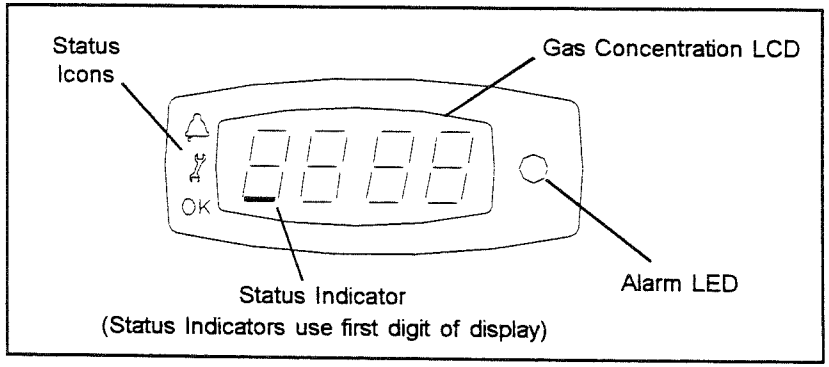


Figure 20. Gas Concentration Display and Alarm LED Indicator

The gas concentration is read directly from the LCD on the front of the transmitter. (Refer to Figure 20.) The first digit of the display may be used optionally to show a Status Indicator Bar to indicate the current transmitter status: normal monitoring (OK icon), maintenance required (wrench icon), or alarm condition (bell icon). Status indicators can be enabled by using the optional *LIFELINE-PC* software or a Zellweger Analytics Service Technician.

A gas alarm is indicated by the LED located to the right of the gas concentration display. Due to Intrinsic Safety (IS) considerations that limit power consumption, the alarm LED is operational only at 1/4 of full scale for each type of gas. Normally (though not always) the alarm LED will illuminate at TLV-level events. Note that the default settings on sensors, however, are 1/2 and 1 TLV. The 1/2 TLV alarm will not energize the alarm LED.

Alarm levels are factory set for each sensor, normally at 1/2 TLV for alarm level 1 and 1 TLV for alarm level 2. (Other alarm levels can be set by using the optional *LIFELINE-PC* software to modify the alarm levels. Alarm levels are set in the Configure Transmitter section of the software.) Alarm levels are stored in the transmitter. Using the Configuration Key updates the transmitter to the sensor's defaults.

Setting the Flow (Extractive and Pyrolyzer Units)

For extractive and pyrolyzer units, the sample flow rate must be set. Adjust the flow meter so that the float ball is centered in the green area on the flow meter scale. (Refer to Figure 21.)

For extractive and pyrolyzer flow diagrams, refer to the Specifications chapter in the back of this manual.

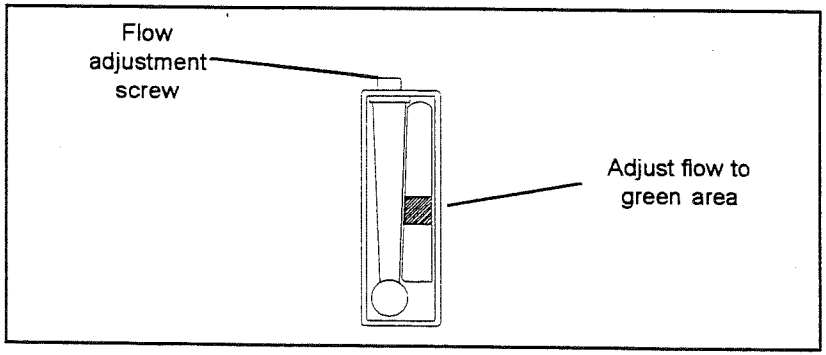


Figure 21. Adjusting the Flow Meter

Using the Configuration Key

The optional Configuration Key (P/N 2105B0549; the Configuration Key has a green cover) can be used to change a transmitter's monitoring from one gas to another. This allows a quick changeover and provides an opportunity to monitor more than one gas from an individual unit. If a sensor is changed for another sensor of a different gas type, the transmitter's self-diagnostics will issue a Sensor Fault Code (F11 - Incorrect Type). The fault code is designed to protect you from installing the wrong sensor in the transmitter. However, if it is your intention to changeover to monitor a different gas, simply insert the Configuration Key into the communication port (refer to Figure 22). After

two to five seconds, remove the key. The communication port is located on the bottom of the passive and passive remote transmitters. On extractive and pyrolyzer transmitters, the communication port is located on the bottom or side of the enclosure. The transmitter will automatically reconfigure to the "new" gas.

When changing gas types, the alarm levels will default to those contained in the "new" sensor, usually 1/2 and 1 TLV. Reconfiguration takes about two to five seconds to complete.

Note:
Remember to change any gas identification, alarm settings, and labels if you are using a PLC, controller, or alarm system.

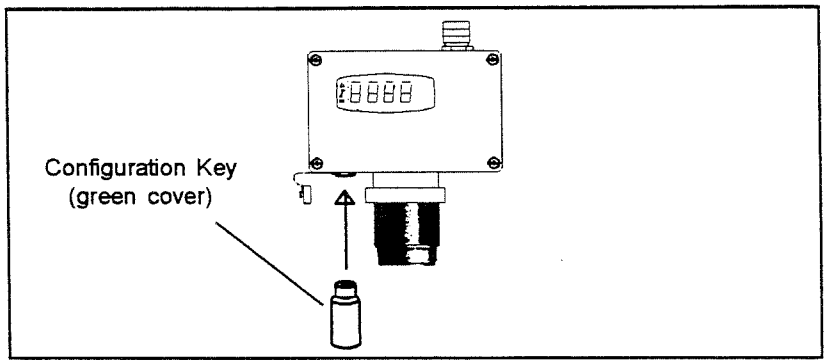


Figure 22. Using the Configuration and Zeroing Keys

Using the Zeroing Key

The Zeroing Key (P/N 2105B0550; the zeroing key has a black cover) is used to reset a transmitter if the transmitter readings have drifted slightly. Before using the zeroing key, ensure that you do not have a gas background at the sensor. Insert the zeroing key into the communication port (refer to Figure 23). After two to five seconds, remove the key. The display should show a zero reading. If the display still shows the previous reading, either the transmitter or sensor needs servicing.

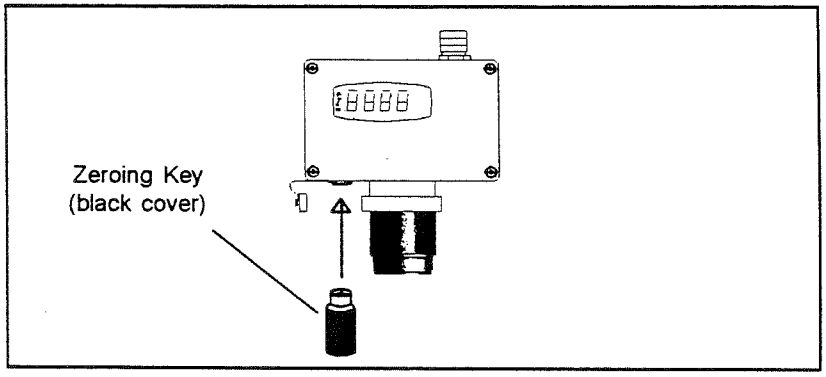


Figure 23. Using the Configuration and Zeroing Keys

Sensor Stabilization

Sensors require a stabilization period upon transmitter power-up. The display will show a number which is a percentage of time remaining until stabilization occurs (maximum time is 30 minutes). If the sensor cannot lock into stabilization, the display will show F14 (Failed to Stabilize) fault. Ensure that no background gas is present at the sensor. Insert the Zeroing key, wait two to five seconds, then remove the key. The system will again attempt to stabilize the sensor. If F14 appears again, install another sensor.

System Diagnostics

The *LIFELINE* system has extensive self-diagnostics. The diagnostics communications are categorized in three groups: 1) Sensor Calibration Codes, 2) Sensor Fault Codes, and 3) Transmitter Fault Codes. The Codes are listed below:

Sensor Calibration Codes

C10 Drifted Out of Limits
C11 Cell Was Overrange
C12 Slight Over Temperature
C13 Calibrate Soon
C14 Calibrate Now
C15 Cell or Filter Change Needed (Countdown)
C16 Sensor Change Needed (Dosage)
C17 Sensor "Heartbeat" Too Low
C18 Interferent Gas Present
C30 Pump or Pyrolyzer Warning

Sensor Fault Codes

F10 No Sensor
F11 Incorrect Sensor Type
F12 Corrupt EEPROM
F13 Analog Failure
F14 Failed to Stabilize
F15 Way Over Temperature
F16 Cell Life Expired
F17 No Cell "Heartbeat"
F18 Cell Too Noisy

Transmitter Fault Codes

F20 In Maintenance Mode
F21 RAM Check Failed
F22 Flash ROM Check Failed
F23 Corrupt EEPROM
F24 Incompatible Configuration
F25 Incompatible Sensor
F30 Pump or Pyrolyzer Failure

For a detailed description of these codes, refer to the Troubleshooting section of this manual.

How the 4-20 mA signal is used

When operating a transmitter from a PLC or other controller, it is helpful to know what levels of loop current are used to indicate various conditions. Figure 24 shows the 4-20 mA scale (the range of the scale used is actually lower than 4 mA and higher than 20 mA). The 1 Hz modulation, or maintenance indication, is used to report that maintenance is either needed or is taking place. The ranges used are as follows:

Fault codes	<3.2 mA
Calibration codes	3.2 to 3.8 mA
Gas Concentration	4 - 20.5 mA

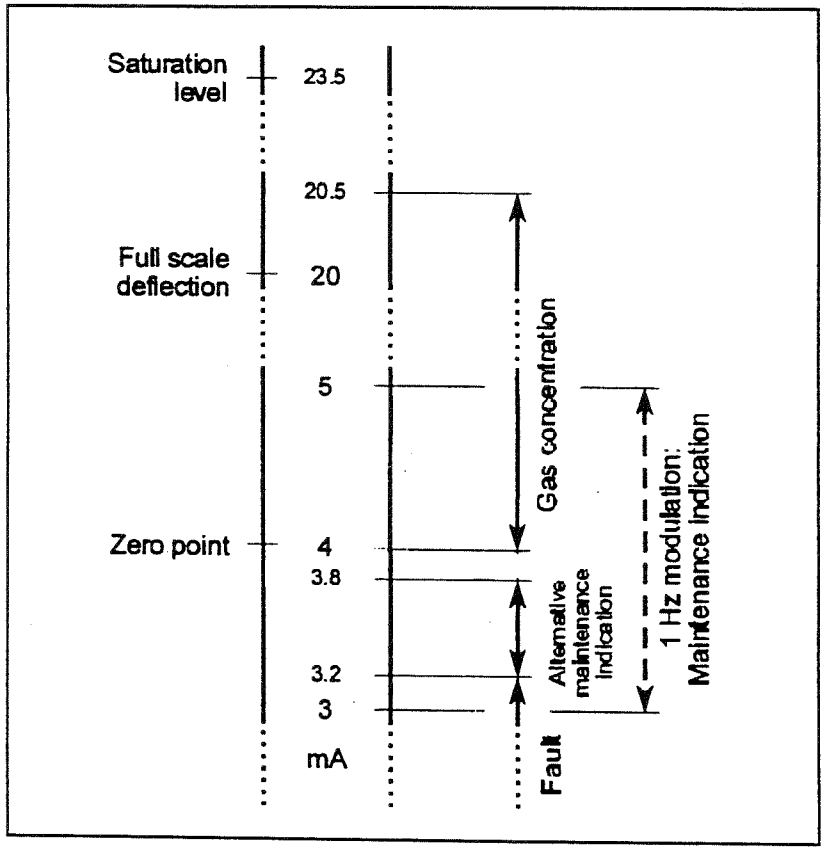


Figure 24. Levels Used on the 4-20 mA Scale

Sensor Exchange

Data sheets are available for each *LIFELINE* sensor. Refer to the data sheet for the recommended sensor replacement interval. *LIFELINE* diagnostics will also indicate when a sensor needs replacement or when its life expectancy is nearing the end (refer to Troubleshooting, Sensor Calibration Codes C15 and C16, and Sensor Fault Code F16).

Remove sensors in an exact reverse order as they were installed. Install a new sensor, and the unit is again ready to monitor. You may have to use the zeroing key when replacing a sensor. Also, if the sensor is a different gas type, you must use the configuration key for sensor changeover.

Zellweger Analytics offers a sensor exchange program for *LIFELINE* sensors. If you are using this program, follow the instructions for returning and receiving sensors. If you would like more information about the sensor exchange program, contact your local Zellweger Analytics representative.

Calibration

The transmitter does not require scheduled calibration. At the factory, each transmitter's analog output is calibrated. Sensors require factory-calibration for cell and temperature specifications every six months.

Some local codes may require challenge of all life-safety equipment. *LIFELINE* sensors (and the cell within the sensor) can be calibrated on-site using calibration gases. This "span calibration" most often uses the target gas to perform a gas challenge. (Refer to the Gas Challenging section on page 33.)

Your Zellweger Analytics service engineer can perform

on-site testing and certified calibration of your *LIFELINE* products to meet your local code requirements and ensure continued and accurate gas detection.

Span calibration generally should be performed using the gas that the sensor is designed to detect, however, a cross-calibrant gas can sometimes be used. The optional *LIFELINE-PC* software is used to perform on-site calibration. Sensor calibration is quick and easy using the software. An extensive Help menu provides complete step-by-step instructions. The sensor calibration window is shown in Figure 25.

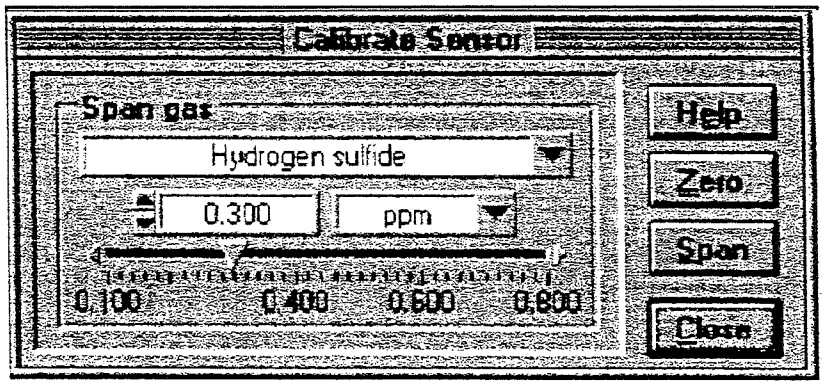


Figure 25. Calibrate Sensor Screen, *LIFELINE-PC* Software

For Passive and Passive with Remote Sensor Transmitters, the *LIFELINE* Flow-through Calibration Housing (P/N 2105D0566) is used for gas calibration. This housing is specially designed to fit onto the bottom of the sensor. It allows connection of tubing from the calibration gas source and to exhaust venting while concentrating the calibration gas directly on the electrochemical cell.

Gas Challenging

Note:
Observe proper safety guidelines while handling toxic gas mixtures in field situations. Ensure that the challenge gas can be safely extracted.

Calibrating *LIFELINE* sensors should be done only by personnel who have attended Zellweger Analytics' calibration training classes or by certified calibration centers recognized by Zellweger Analytics' "sensor exchange" program.

Gas challenges to sensors may be required for occupancy permits, or by local fire department officials on an annual or periodic basis. Please observe the following guidelines when gas challenging *LIFELINE* gas monitors.

Note:
LIFELINE sensors contain a dosage integration algorithm that reduces the effective life of a sensor when high dosages are presented to the sensor, as high dosages can adversly affect calibrations. As the calibration interval is reduced, use the lowest amount of gas that can be generated in a stable manner to avoid shortening sensor service life.

A concentration at or just below the TLV level of target gas will permit the challenge to be effective, quick, and not reduce the service life of the sensor within the six-month calibration interval that is preset on your sensors.

(continued)

Gas Challenging (continued)

Please generate gases at the following levels:

Sensor Type	Challenge Gas/ Method	Challenge Level
Ammonia (NH_3)	Ammonia/ 2	25 ppm
Arsine (AsH_3)	Arsine/ 1	25 ppb
Carbon Monoxide (CO)	Carbon Monoxide/ 2	25 ppm
Chlorine (CL_2)	Chlorine/ 2	0.5 ppm
Diborane (B_2H_6)	Diborane/ 2	100 ppb
Hydrogen (H_2)	Hydrogen/ 2	250 ppm
Hydrogen Bromide (HBr) *	Hydrogen Chloride*/ 2	3 ppm
Hydrogen Chloride (HCl)**	Hydrogen Chloride/ 2	5 ppm
Hydrogen Fluoride (HF)**	Hydrogen Fluoride/ 2	3 ppm
Nitrogen Trifluoride (NF_3)	Nitrogen Trifluoride/ 2	10 ppm
Phosphine (PH_3)	Phosphine/ 1	300 ppb
Silane (SiH_4)	Silane/ 2	5 ppm
Tetraorthosilicate (TEOS)***	Carbon Monoxide***/ 2	10 ppm

Method 1: Permeation Device
Method 2: Gas Cylinder (add ambient humidity)
* Due to field generation difficulties with HBr, we recommend using HCl to test HBr. The HBr sensor will overreport HCl levels by a factor of 3. (3 ppm HCl reads as 9 ppm HBr)
** Use these sensors for gases that hydrolize to HCl or HF, even in low ambient RH conditions, such as BCl_3, BF_3, SiH_2Cl_2, WF_6, etc. Use the mineral acid component to determine which sensor i.e., HCl for BCl_3, etc.
*** Use Carbon Monoxide to challenge TEOS sensors. TEOS is very difficult to generate in stable concentrations in the field. A one-to-one (1:1) correlation exists between TEOS and CO.

Gas mixtures for gas challenges should be generated with humidity present at or near what would be observed in you facility. Normally, in semiconductor fabs this level ranges from 42-55% RH. While lower levels of humidity will generally improve response times, they should not be used for calibration as sensors would underreport events if they were calibrated in a dry atmosphere, when detection must later occur in a "real life" humidified environment.

Gas must be presented to sensors at a level that will not over pressurize the membrane surface of the electrochemical sensor cell. Too strong a gas stream can lead to over reporting of concentrations. New and refurbished *LIFELINE* sensors are "factory calibrated" at 700 cc of flow (except NF_3 which is calibrated and regulated at 350 cc). *LIFELINE* extractive gas monitors are regulated to 700 cc. The *LIFELINE* duct adapter is designed to operate at about 700cc as well. (Refer to Duct Mounting Adapter section of this manual for correct application and installation).

To gas challenge a unit without setting off alarms, follow these steps:

1. Within *LIFELINE-PC* software, set the unit in the maintenance mode (found under Configure Transmitter).
2. The unit will continue to recognize the sensor previously installed.
3. The unit will toggle between F20 and a reading (0). The unit can then be gas challenged.
4. Present gas to the unit. The display will report increasing levels, however, the LED on the display will not be activated.
5. The transmitter will not send a signal on the 3-20 mA circuit, with the exception of the maintenance circuit report (3.5 mA).
6. Adjust the unit back to correct sensor type only after the reading has returned to zero to ensure you are back in the monitoring mode.

Filter Replacement

Extractive and pyrolyzer units require routine filter replacement. The acid filter (P/N 710235) must be replaced every three to six months on both the extractive and pyrolyzer units. The Freon filter (P/N 1830-0027) must be replaced in the pyrolyzer unit every 30 days.

An instruction label explaining the filter replacement procedure is located inside the cabinet door of the extractive and pyrolyzer units. These labels are shown in Figure 26.

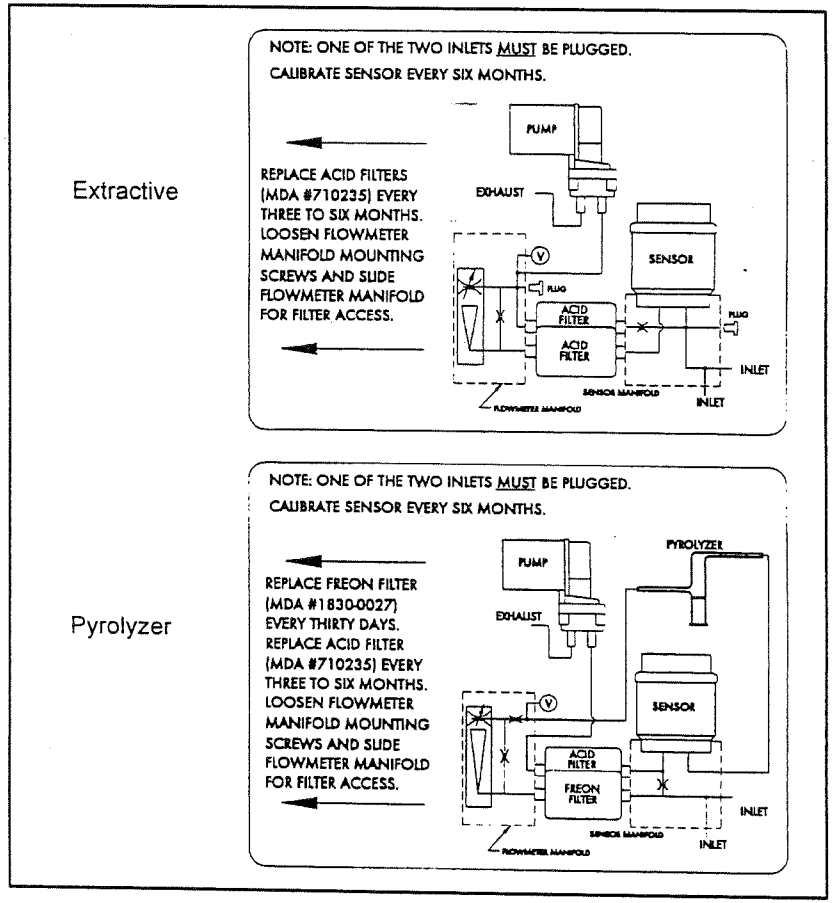


Figure 26. Filter Replacement Instruction Labels

Troubleshooting

Fault and Calibration Messages

This section provides a listing of fault and calibration messages which you may see on your *LIFELINE* system. The possible cause and remedies are also provided.

F10 - No Sensor

No sensor is attached to the transmitter. Attach a suitable sensor to the unit.

F11 - Incorrect Sensor Type

The attached sensor is not the type specified in the transmitter configuration. Either replace the sensor with the correct type, or reconfigure the transmitter.

F12 - Corrupt EEPROM

The sensor EEPROM could not be read by the transmitter. The sensor is likely to be faulty; replace it with a new one.

F13 - Analog Failure

The signals from the sensor are not readable. This is likely due to a hardware fault in the sensor, but could be due to a badly fitted sensor. Try disconnecting the sensor and reconnecting it. If this does not work, replace the sensor.

F14 - Failed to Stabilize

Electrochemical cells require time to stabilize. The attached sensor exceeded the maximum allowed stabilization time. Try performing a zero calibration or replace the sensor.

F15 - Way Over Temperature

The operating temperature range of the sensor has been exceeded by more than 5 °C. Ensure that the ambient temperature is within the allowed range and then clear the message log.

F16 - Cell Life Expired
Either the consumable or operational life of the sensor has expired. Replace the sensor.

F17 - No Cell "Heartbeat"
The system continuously monitors the sensor for signs of possible failure. This fault indicates that the cell is no longer operating correctly. Replace the sensor.

F18 - Cell Too Noisy
The output from the cell in the sensor is too noisy to allow an accurate gas reading to be made. Replace the sensor.

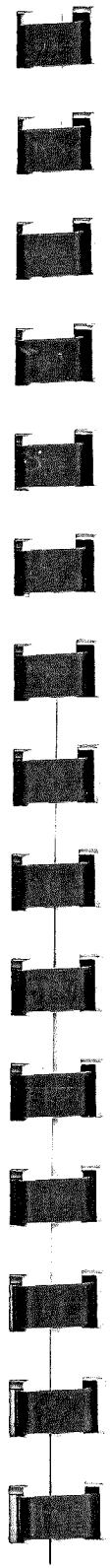
F20 - In Maintenance Mode
The transmitter has not been configured for detecting gas. Select the required sensor type in the transmitter configuration or use the Configuration Key.

F21 - RAM Check Failed
A self-test of the transmitter RAM has detected a problem. This is likely due to a hardware fault. Replace the transmitter unit.

F22 - Flash ROM Check Failed
A self-test of the transmitter FLASH (used to store the program code) has failed. This is likely due to either a hardware fault or an incorrectly programmed unit. Replace the transmitter unit.

F23 - Corrupt EEPROM
The transmitter EEPROM could not be read. Replace the transmitter unit.

F24 - Incompatible Configuration
The transmitter EEPROM cannot be understood by the transmitter software. This could occur after an unsuitable or incomplete software upgrade. Replace the transmitter unit.



F25 - Incompatible Sensor
The sensor is of a newer design than the transmitter software can process. Upgrade the transmitter's software.

F30 - Pump or Pyrolyzer Failure
There is a problem with the pump or pyrolyzer systems. Check for: 1.) a blocked sample line, 2.) a pump failure, 3.) pyrolyzer failure, 4.) correct wiring, 5.) separate line for the 24 V power supply.

C10 - Drifted Out of Limits
The *LIFELINE* transmitter attempts to automatically compensate for cell drift. This warning indicates that the sensor has drifted too far in a negative direction since the last calibration. Use the Zero Key or replace the sensor.

C11 - Cell Was Overrange
The sensor has produced a reading over the specified full scale. This may have shortened the cell life, or adversely affected the calibration. This configuration may be configured to latch, and may need to be cleared.

C12 - Slight Over Temperature
The operating temperature range of the sensor has been exceeded by more than 2 °C. Ensure that the ambient temperature is within the allowed range, and then clear the message log.

C13 - Calibrate Soon
The sensor will require calibration soon. The length of warning given may be configured. The time remaining until calibration is required can be found in the Information window (when using *LIFELINE* software).

C14 - Calibrate Now
The sensor requires immediate calibration.

C15 - Cell or Filter Change Needed (Countdown)
The operational life of the sensor has nearly expired. The length of warning given may be configured. The remaining life can be found in the Information window (when using *LIFELINE* software).

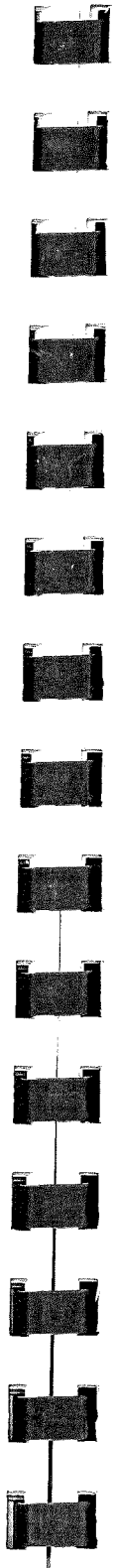
C16 - Sensor Change Needed (Dosage)
The consumable life of the sensor has nearly expired. This warning is given when the remaining life has fallen to 10%. The remaining life can be found in the Information window (when using *LIFELINE* software).

C17 - Sensor "Heartbeat" Too Low
The system continuously monitors the sensor for signs of possible failure. This warning indicates that the cell could fail in the near future.

C18 - Interferent Gas Present
Some cross-sensitive gases cause negative readings with EC cells. Minor amounts are masked within *LIFELINE* software. However, amounts in excess of 0.4 of a TLV will report a C18 error indicating a negative interferent has been detected, and action should be taken to correct the condition. Remedy: identify and remove the interferent (i.e. scrubber filters).

A C18 notification could also be issued when a sensor, having just seen gas, is rezeroed while still a substantial level above zero. As the sensor continues to fall to a true zero, the shift would cause a C18 to appear on the transmitter display. Remedy: use the Zero Key (black cover) to rezero the transmitter.

C30 - Pump or Pyrolyzer Warning
This indicates that the pump or pyrolyzer could require maintenance soon.



Chapter 4 Spare Parts, Options, and Accessories

Sensors
Heartbeat™ Sensors include a sensor housing and new electrochemical cell calibrated to detect a particular gas and remain operational for six months under normal conditions. Most sensors are shipped with 1/2 and 1 x TLV as default alarm settings for local display and annunciation. Building alarms are set via 4-20 mA circuits contained in control card systems, PLCs, or other loop-activated systems.

Initial System Sensors	Range	Part Number
Ammonia (NH_3)	0 - 100 ppm	2105B0340
Arsine (AsH_3)	0 - 200 ppb	2105B0341
Carbon Monoxide (CO)	0 - 100 ppm	2105B0342
Chlorine (Cl_2)	0 - 2 ppm	2105B0343
Diborane (B_2H_6)	0 - 400 ppb	2105B0344
Hydrogen (H_2)	0 - 1000 ppm	2105B0345
Hydrogen Bromide (HBr)	0 - 12 ppm	2105B0346
Hydrogen Chloride (HCl)	0 - 20 ppm	2105B0347
Hydrogen Fluoride (HF)	0 - 10 ppm	2105B0348
Nitrogen Trifluoride (NF_3)	0 - 40 ppm	2105B0349
Phosphine (PH_3)	0 - 1.2 ppm	2105B0350
Silane (SiH_4)	0 - 20 ppm	2105B0351
Tetraorthosilicate (TEOS)	0 - 40 ppm	2105B0352

Optional Heartbeat Sensor Exchange Program

Twice yearly, shipment of freshly calibrated sensors will be sent to replace sensors on site. Replaced sensors must be returned to a local sensor service center in the packaging provided. Exchanged sensors feature freshly calibrated cells to cover the six month period until the next sensor exchange. Part numbers for the sensor exchange program are listed below:

Initial System Sensors	Range	Part Number
Ammonia (NH_3)	0 - 100 ppm	2105B0740
Arsine (AsH_3)	0 - 200 ppb	2105B0741
Carbon Monoxide (CO)	0 - 100 ppm	2105B0742
Chlorine (Cl_2)	0 - 2 ppm	2105B0743
Diborane (B_2H_6)	0 - 400 ppb	2105B0744
Hydrogen (H_2)	0 - 1000 ppm	2105B0745
Hydrogen Bromide (HBr)	0 - 12 ppm	2105B0746
Hydrogen Chloride (HCl)	0 - 20 ppm	2105B0747
Hydrogen Fluoride (HF)	0 - 10 ppm	2105B0748
Nitrogen Trifluoride (NF_3)	0 - 40 ppm	2105B0749
Phosphine (PH_3)	0 - 1.2 ppm	2105B0750
Silane (SiH_4)	0 - 20 ppm	2105B0751
Tetraorthosilicate (TEOS)	0 - 40 ppm	2105B0752

LIFELINE-PC Setup and Calibration Software

This Windows®-based programs permits notebook PC setup of transmitters and sensors and interrogation of units under operating conditions. The software permits archiving of transmitter/sensor data via Excel or other spreadsheet programs. Transmitters can also be reconfigured with the software. Adjustment to the local transmitter annunciation and display is accessed through the program. The PC Interface Kit includes software, cable and connectors, and an "on-line Help" instruction. The software is not required for *LIFELINE* gas monitor operation.

Description:	Part Number:
PC Interface Kit	2105B0445

Remote Sensor Cables

These cables permit operation of remote sensors at varying distances from *LIFELINE* passive/remote transmitter units. Sensor replacement does not involve any sensor cable adjustment. Cables require initial installation into the remote transmitter.

Description:	Part Number:
3 Foot Cable*	2105B0235
10 Foot Cable*	2105B0236
30 Foot Cable*	2105B0237

*The transmitter is rated "Intrinsically Safe (IS)" when using the 3, 10, or 30-foot remote cables. Longer lengths are possible; however, this violates the IS design.

Note:

Remote cables must be used with passive/remote sensor transmitters only. The remote cable cannot be fitted to standard passive transmitters.

Relay Module

This separately powered (18-30 VDC) relay module provides convenient, local relay interface for fault/gas annunciation. Figure 27 shows the relay module in a typical application. Three output relays are provided and switched via the 4-20 mA signals from a transmitter. The relays are nonlatching and rated at 2 Amperes. The relay module's terminal board connections are shown in Figure 28.

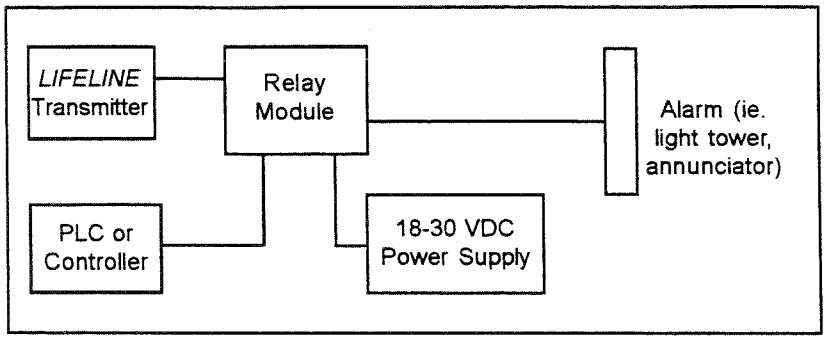


Figure 27. Relay Module Block Diagram

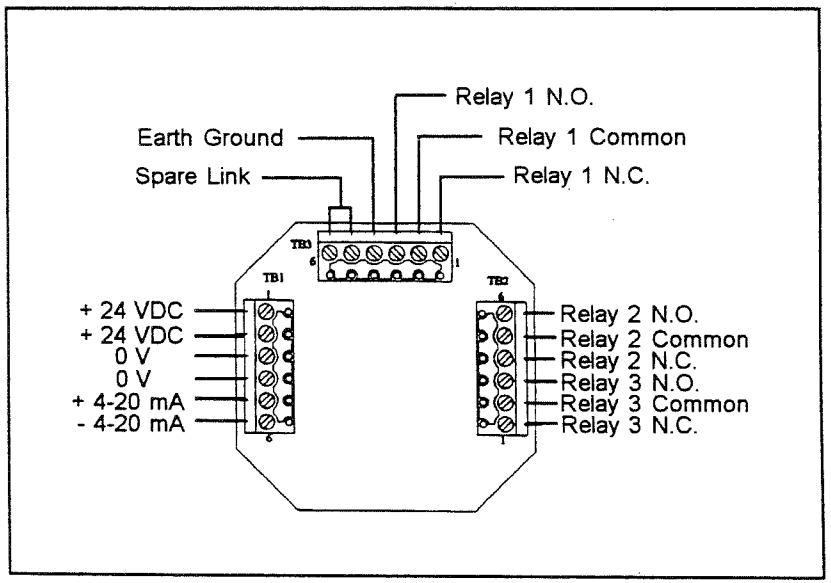


Figure 28. Relay Module Terminal Board Connectors

When wiring the Relay Module option, separate power supplies should be used for power (18-30 VDC) and the 4-20 mA power. Refer to Figure 29. Do not use jumpers across the 4-20 mA and 18-30 VDC lines.

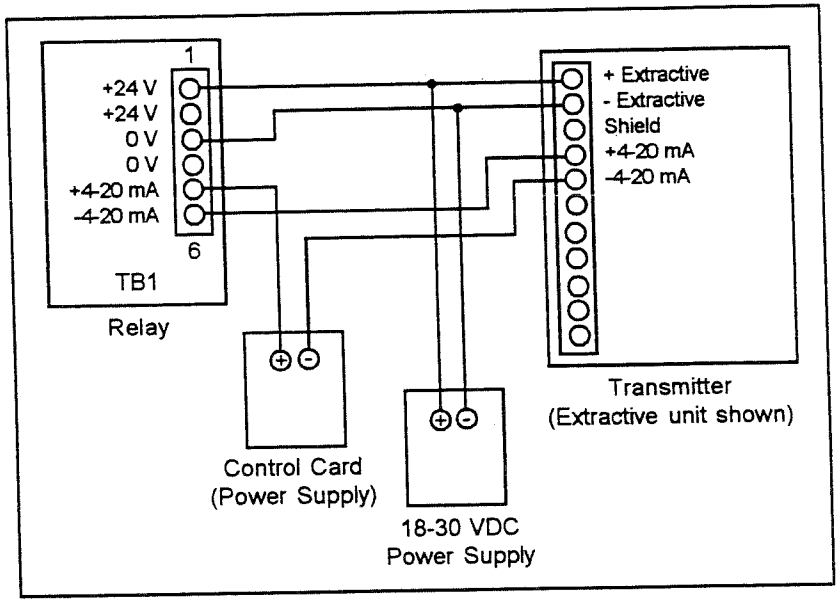


Figure 29. Relay Module Wiring Diagram (Typical)

The relay module is preset at the factory. Three levels are set: 3.2 mA at relay 3, 6 mA at relay 1, and 8 mA at relay 2. The relays are set in the de-energized state.

Upon power up, the transmitter 4-20 mA loop will rise above the relay 3 threshold, providing no faults are present, thus energizing the relay for fail-safe operation. If energized relays are required, move the links from the bottom position to the top position for the appropriate relay. Refer to Figure 30.

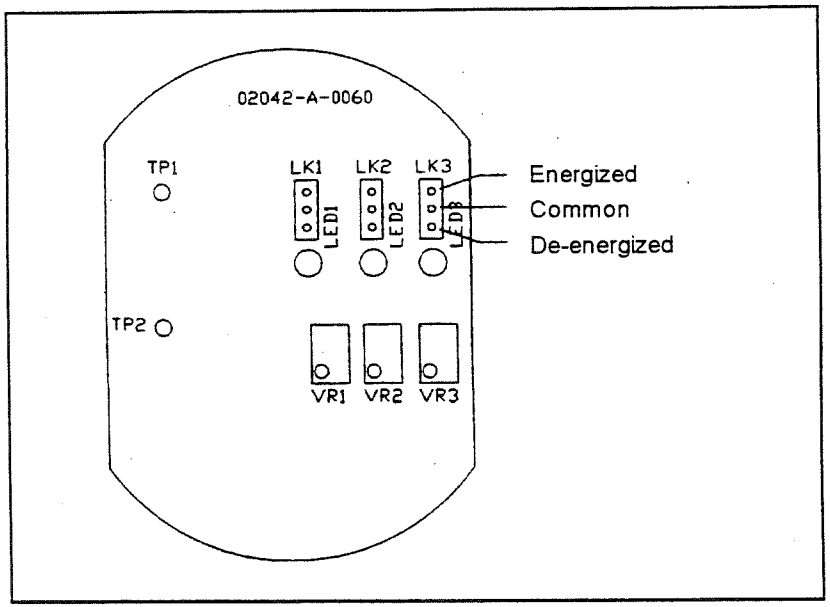


Figure 30. Relay Links Diagram.

Verifying set points at installation is highly recommended. Also, if you plan to adjust the set points, it is recommended to make the changes during installation.

There are two adjustment methods, one using the *LIFELINE-PC* software, and the other using a current calibrator. Both methods are described here as step-by-step instructions.

Note:
During adjustment, output relays will change states and trigger any connected external devices.

Relay Module Adjustment Method 1
(using *LIFELINE-PC* software)

1. Verify the relay and transmitter are properly wired (refer to Figure 29).

2. Connect the computer to the *LIFELINE* transmitter. (Refer to Chapter 2, Installing Transmitters to a PC.)

3. Enter the Diagnostics mode and select Loop Test.

4. Set the 4-20 mA loop to the desired value. The 4-20 mA can be observed using a DVM across TP1 (+) and TP2 (-). Adjust VR1 until LED1 switches on. (Refer to Figure 30.)

5. Repeat Step 4 for VR2 (LED2) and VR3 (LED3).

Relay Module Adjustment Method 2
(using a current calibrator)

1. Verify the relay and transmitter are properly wired (refer to Figure 29).

2. Remove the 4-20 mA wires at the Relay Option and replace with the current calibrator.

3. Set the 4-20 mA current calibrator (per manufacturer's instructions) to the desired value. The 4-20 mA can be observed using a DVM across TP1 (+) and TP2 (-). Adjust VR1 until LED1 switches on. (Refer to Figure 30.)

4. Repeat Step 3 for VR2 (LED2) and VR3 (LED3).

Duct Mounting Assembly

The duct mounting assembly allows mounting of *LIFELINE* sensors directly into ducts from 4 to 16 inches in diameter. The installation uses a minimum number of holes drilled into the ductwork, while allowing quick changeover for exchanging sensors. (Refer to Figure 31.) The duct mounting kit includes a sensor duct adapter, O-ring, gaskets, and hardware.

When changing a duct-mounted sensor, pull back the protective boot and disconnect the cable plug. This is a slide locking plate on the connector. Twist the sensor counterclockwise 1/8-turn to release. Install a new sensor in reverse order.

Note:
When replacing the sensor, verify that the O-rings remain in place.

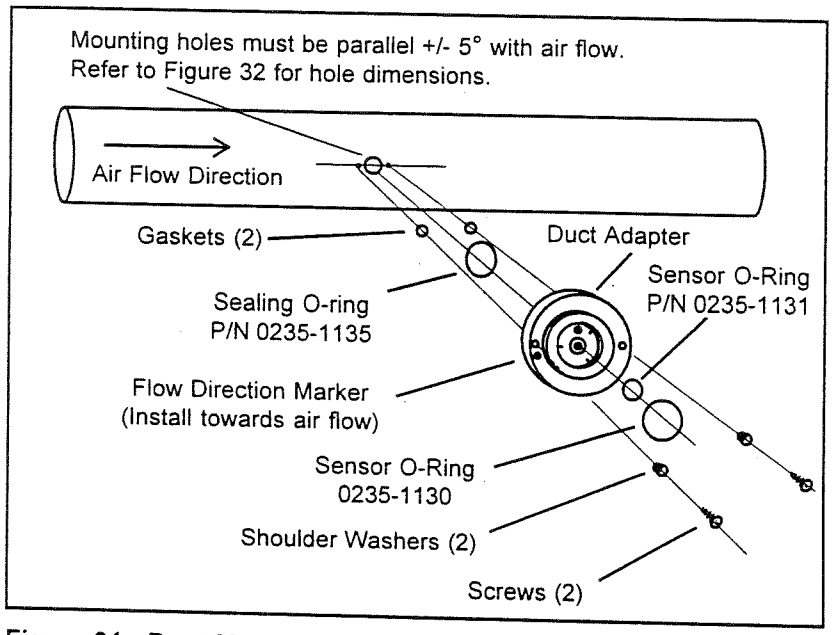


Figure 31. Duct Mounting Adapter

Duct mounting is simple. One 7/8-inch (22 mm) hole and two smaller 9/64-inch (3.6 mm) holes for #8 sheet metal screws are the only installation intrusion to the ductwork. The sheet metal screw holes must be parallel within +/- 5° of the direction of air flow in the duct. A hole template is shown in Figure 32.

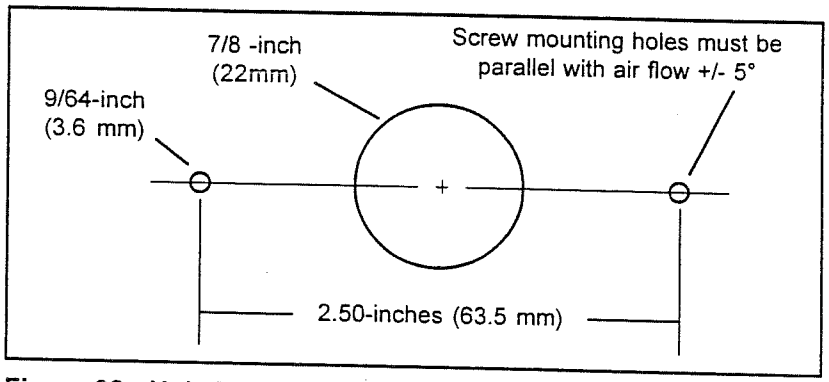


Figure 32. Hole Template for Duct Mounting Adapter

Description:	**Part Number:**
Duct Mounting Assembly	1283-1047

Ensure the duct flow is at the following normal flow rates. You may wish to adjust flow, or, alternatively, select an Extractive system to ensure adequate flow is presented to one *LIFELINE* sensor. Observe the following duct diameter flow rates:

Pipe Internal Diameter	**Minimum Flow in cfm (m^3/min.)**	**Maximum Flow in cfm (m^3/min.)**
4 inches (10.16 cm)	65 (1.84)	90 (2.55)
6 inches (15.24 cm)	144 (4.08)	201 (5.70)
8 inches (20.32 cm)	257 (7.28)	357 (10.10)
10 inches (25.40)	400 (11.33)	558 (15.80)
12 inches (30.48)	577 (16.34)	803 (22.74)
14 inches (35.56 cm)	786 (22.26)	1095 (31.00)
16 inches (40.64 cm)	1026 (29.05)	1430 (40.49)

Accessories and Replacement Items For All Systems

Description:	Part Number:
Transmitter Zeroing Key	2105B0550
Transmitter Configuration Key	2105B0549
PC Interface Cable Assembly	2105B0451
Software (license for additional sites)	2105B0446
Communications Socket Assembly	2105B0191
PC Interface Kit	2105B0445

For Passive and Remote Transmitters

Description:	Part Number:
Duct Mounting Adapter	1283-1047
Transmitter Wall Mounting Bracket	2105D0558
Sensor Wall Mounting Bracket	2105D0557
Replacement IPA Interference Filter for CO	2105B0555
LIFELINE Flow-Through Calibration Housing	2105D0566

For Extractive and Pyrolyzer Transmitters

Description:	Part Number:
Sample Tubing, FEP Teflon, 30 feet	1283-0031
Sample Tubing, FEP Teflon, per foot	102598
Exhaust Tubing, Poly P, 30 feet	1283-0032
Exhaust Tubing, Poly P, per foot	100440
Brushless Pump, 24 VDC	0235-1084
Acid Srubber Filter	710235
Freon Filter	1830-0027
Sensor Manifold O-ring (Outer)	0235-1130
Sensor Manifold O-ring (Inner)	0235-1131
Fan, 24 VDC	102541
Pyrolyzer Assembly	1283A1032
Replacement Quartz and Insulator Assy.	1283-1069
Heater for Pyrolyzer	0050-0008
Charcoal Filter Option	MVIP-2038

Accessories and Replacement Items (continued)

For Extractive and Pyrolyzer Transmitters (continued)

Description:	Part Number:
Flowmeter (Extractive)	0235-1106
Flowmeter (Pyrolyzer)	0235-1126
Thermocouple for Pyrolyzer	0050-0006
Fuse (Extractive) 0.63 A Slo-Blo	102669
Fuse (Pyrolyzer) 4 A Slo-Blo	102441

Additional User Interface Kits

A User Interface Kit is supplied with each order. The kit contains one each of the following: zeroing key, configuration key, technical handbook, and diagnostic card. Additional user interface kits are available as listed below:

Description:	Part Number:
User Interface Kit	1283K1043

Printed Documentation

Each *LIFELINE* transmitter is shipped with a *Quick Start Guide* to facilitate installation and provide basic operating instructions. In addition, one *LIFELINE* Technical Handbook is shipped with each system order. A Configuration Key, a Zeroing Key, and a laminated *LIFELINE* Diagnostics card (provides sensor calibration and fault codes, and transmitter fault codes) are provided. Additional copies of the printed documentation are available as listed below:

Description:	Part Number:
Additional *Quick Start Guide*	1998-0143
Technical Handbook	1998-0144
Laminated *LIFELINE* Diagnostics Card	1998-0137

LonWorks® Capability

LIFELINE LonWorks are equipped with an Echelon® Neuron® transceiver device for LonWorks networks. Each Neuron device includes the capability to communicate with other devices using a firmware protocol (LonTalk® protocol). LonTalk is a complete seven-layer communications protocol that ensures that devices can interoperate on a LonWorks network using an efficient and reliable communications standard.

The LonWorks network is a collection of LonWorks devices that communicate and interact with one another. All devices in the same network belong to the same domain or set of domains. This network can contain a single channel or multiple channels connected by routers.

A LonWorks network offers cost-effective, easy-to-implement network solutions for many gas monitoring and control systems because of its ability to connect to several new and existing communications systems. Contact your Zellweger Analytics Representative for more information about networking applications.

Chapter 5 General Specifications

Mechanical

Passive and Remote Transmitters:

Size:	4.92 inches (125 mm) W x 3.15 inches (80 mm) H x 2.25 inches (57 mm) D
Weight:	<1.4 kg

Extractive Transmitter:

Size:	8.5 inches (215.9 mm) W 7 inches (177.8 mm) H 4.25 inches (108 mm) D
Weight:	8 lbs. (3.63 kg)

Pyrolyzer Transmitter:

Size:	8.5 inches (215.9 mm) W 10.37 inches (263.4 mm) H 4.25 inches (108 mm) D
Weight:	10 lbs. (4.54 kg)

Environmental:

Temperature Range:	0 to +40 °C operational 0 to +5 °C optimal storage
Humidity:	10 to 90% RH

Passive System Certification:

Certification:	Designed to be: Intrinsically Safe CENELEC: Ex II 2G EEx ia II C T4 UL: Class 1 (zone 1) Ex ia II C T4

(Continued)

Electromagnetic Compatibility (EMC)

EMC Compliance: EN50081-1 emissions
EN50082-1 susceptibility
CE certified for sale in Europe
Consistent with semi S2-93
specification or U.S.A.

Power Requirements:

Passive transmitter:	18 - 30 VDC, 0.6 W
Passive transmitter: (with remote sensor):	18 - 30 VDC, 0.6 W
Extractive* transmitter:	18 - 30 VDC, 5 W
Pyrolyzer* transmitter:	18 - 30 VDC, 42 W
Relay* Module:	18 - 30 VDC, 3 W

* An additional 24 VDC source is required; refer to page 7 for details.

Flow Diagrams (Extractive and Pyrolyzer Units)

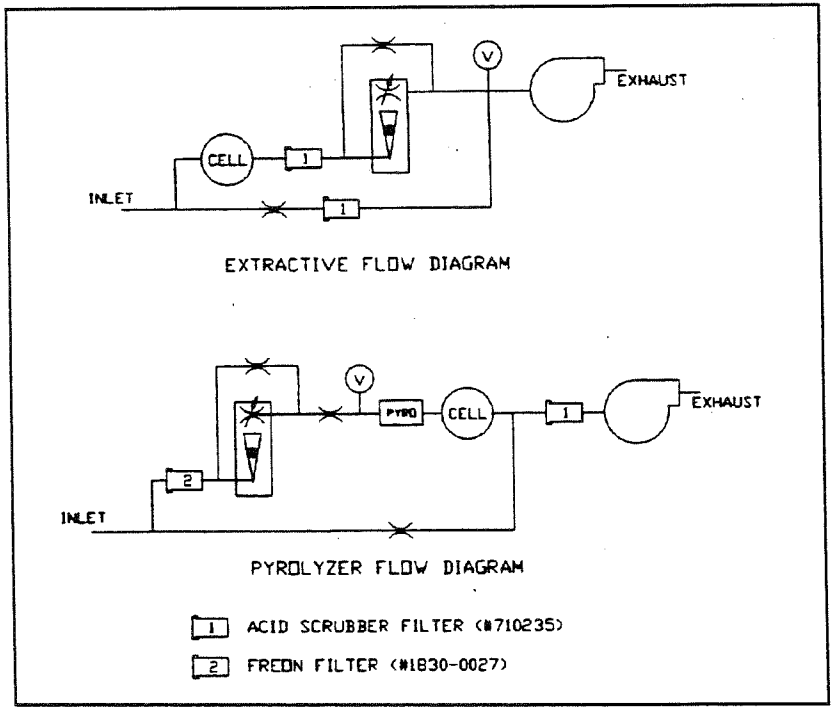


Figure 33. Extractive and Pyrolyzer Flow Diagrams

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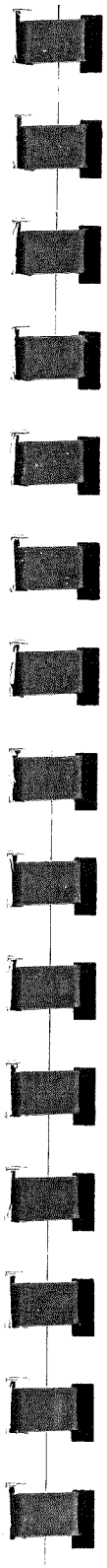

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