



1228s

Multidrop

INSTRUCTIONS

Installation and Operation of the
AMC-1228s Electrochemical Sensor
Module For Use With Multidrop AMC
Monitors

IMPORTANT:

Please read these installation and operating instructions completely and carefully before starting.

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NOTE

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1 GENERAL INFORMATION

1.1 WARRANTY

The AMC-1228s is warranted against defects in material and workmanship for a period of two years from date of delivery. Maintenance items are not warranted. During the warranty period, *The Armstrong Monitoring Corporation* will repair or replace components that prove to be defective in the opinion of AMC. Any equipment deemed to be defective by the user should be returned to *The Armstrong Monitoring Corporation* for evaluation (see product return below). Site visits by Armstrong personnel, to evaluate/repair equipment, are not covered by this warranty. AMC is not liable for auxiliary interfaced equipment, nor for consequential damage. This warranty shall not apply to any product, which has been modified in any way, which has been repaired by any other party other than a qualified technician or authorized AMC representative, or when failure is due to misuse or conditions of use.

Note: Extended warranty mail in calibration programs are available (please call 1-800-465-5777).

1.2 LIABILITY

All AMC products must be installed and maintained according to instructions. Only qualified personnel should install and maintain the equipment.

AMC shall have no liability arising from auxiliary interfaced equipment, for consequential damage, or the installation and operation of this equipment. AMC shall have no liability for labour or freight costs, or any other costs or charges in excess of the amount of the invoice for the products.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND SPECIFICALLY THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE THEREOF.

WARNING

CHECK TO ASSURE THE WORKING AREA IS FREE FROM HAZARDS DURING INSTALLATION OR WHEN PERFORMING MAINTENANCE, AND USE PROPER PRECAUTIONS.

1.3 PRODUCT RETURN

All products returned for warranty or service should be shipped by prepaid freight. Please obtain a Return Material Authorization (RMA) number from AMC prior to shipping and ensure this RMA number is clearly visible on the outside of the shipping container. Material shipped without RMA will be rejected and returned. All products returned to the client will be shipped by freight collect.



1.4 CONTACT INFORMATION

For information please call 1-800-465-5777 or through contacts at www.armstrongmonitoring.com or through email directly at support@armstrongmonitoring.com.

1.5 MODIFICATIONS AND SUBSTITUTIONS

Due to an ongoing development program, AMC reserves the right to substitute components and change specifications at any time without incurring any obligations.

1.6 GLOSSARY

Alarm	Alarm is an audible, visual, or physical presentation designed to warn the instrument user that a specific level of a dangerous gas/vapor concentration has been reached or exceeded.
Multidrop	Armstrong 122X series of sensor/transmitters which can be connected in a daisy chain.
Calibration	Calibration is the procedure used to adjust the instrument for proper response.
Calibration Gas	Calibration Gas is a gas of known concentration(s) used to set the instrument span or alarm level(s).
Gas Concentration	Gas Concentration is measured: <ul style="list-style-type: none">• PPM
PPM	Parts Per Million (1% volume = 10,000PPM)
Percent by volume	Concentration of gas in a mixture expressed as a percentage of total volume.
Span	Full range of a sensor i.e. a CO sensor with a range of 0-100 PPM has a 100 PPM span.
Zero Gas	Zero gas is gas with no concentration. Clean air is an excellent source for zero calibration. A known gas concentration can be entered during zero calibration.
EOL	End of Line refers to the physical last unit in the string of transmitters. The unit will be terminated by jumpers to indicate no inputs are connected

2 PRODUCT INFORMATION



Figure 2-1 AMC-1228 Sensor Module

2.1 SENSOR MODULE

Sensor Module Part Number	_____
Sensor Module Serial Number	_____
Sensor Element Part Number	_____
Sensor Element Serial Number	_____
Sensor Warranty Period	_____ years
Wire Gauge	18 AWG @ 150 ft max between units
Power Supply Requirement	6 to 30 VDC
Power Supply Requirement (BAS, Current Mode only)	24-30VDC, 250R max load
Operating Temperature	-20° to 40° C
Operating Pressure	Ambient atmospheric pressure
Relative Humidity	0 to 99% RH, non-condensing
Sensor Warranty	_____



2.2 FACTORY CALIBRATION

	AMC1228-20s	AMC1228-28s
Gas Type	CO	NO ₂
Low Alarm Setting	25ppm *	1ppm *
High Alarm Setting	100ppm *	3ppm *
Calibration Adapter Part Number.....	AMC-FE2	

* Alarm settings represent typical factory defaults, alarms can be configured as desired, see section 5.2.

Note:

All Armstrong Monitoring systems must be installed and maintained according to instructions, to ensure proper operation. Only qualified technicians should install and maintain the equipment. Qualified personnel should perform the installation according to applicable electrical codes, regulations and safety standards. Ensure correct cabling practices are implemented.



3 PRODUCT DESCRIPTION

In this section a general product description is given followed by a detailed list of the AMC-1228s unit's internal features.

3.1 GENERAL DESCRIPTION

The AMC-1228s sensor unit provides continuous, reliable surveillance of surrounding air for presence of hazardous gases (listed in section 2.2 FACTORY CALIBRATION, page 4). This unit is designed to allow interconnection in series as in a "daisy chain" configuration (refer to Figure 4-4) to a single or multi-zone AMC Series monitor or to any other monitor which can accept voltage or current signal as specified in section 5.1 OPERATION. A maximum of eight (8) sensor modules can be connected to each zone. The units can also be branched out from the central line allowing maximum flexibility. Each unit produces Low alarm, High alarm and sensor Fail signals, which are transferred from one sensor to the next up the line back to the monitor.

3.1.1 INTERNAL FEATURES

Each sensor module features alarm indicators, adjustment trimmers and connection terminal blocks, as listed and described below.

- 1) SENSOR: Electrochemical cell, factory calibrated.
- 2) HIGH ALARM INDICATOR: High conditions of gas are indicated by a red LED.
- 3) LOW ALARM INDICATOR: Low conditions of gas are indicated by a yellow LED.
- 4) POWER/FAULT INDICATOR: The Green Led in normal operation (JB-5) installed is used as a power indicator. If JB-5 is removed a local fault can be created which would turn off this led and send a fault condition to the monitor.
- 5) HIGH ALARM ADJUSTMENT: Sets the high alarm trip point.
- 6) LOW ALARM ADJUSTMENT: Sets the low alarm trip point.
- 7) SPAN SIGNAL ADJUSTMENT: Sets the sensitivity of the sensor. Used for calibration.
- 8) TERMINATING JUMPERS: Jumper clips are supplied installed on the circuit card. When connecting additional sensor modules, the jumper clip corresponding to the terminal block must be removed. Refer to section 4.2.2 TERMINATION, for more details.
- 9) OUTPUT TERMINAL BLOCK: The output terminal (labeled -, S, +, SHLD) connect to the (-,s,+, Gnd) terminals in the monitor, or to the input (-,S,+, SHLD) terminals of another sensor module.
- 10) INPUT TERMINAL BLOCKS: The input terminal (-, S, +, SHLD) are used to connect

- 11) CURRENT INPUT SELECT: Installing jumpers JB2(CH 1) and/or JB1(CH2) enables a current signal input for the desired channel
- 12) SIGNAL OUTPUT SELECT Jumper clips are supplied installed on the circuit card. JB6 must be installed for either voltage mode or current mode. Compatibility for voltage or current mode must be observed.
- 13) CHANNEL INPUT LED INDICATORS Visual indicators for channel inputs. Reflects each channels Power/Fail, Low Alarm, High Alarm status.

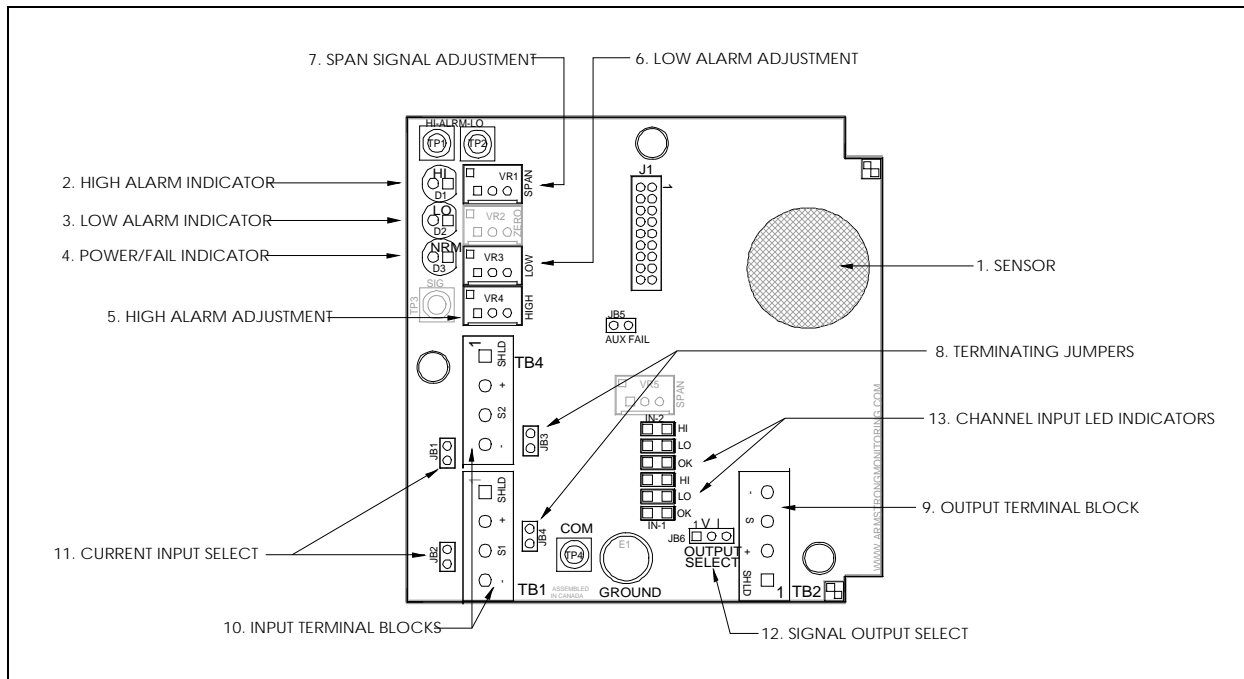


Figure 3-1 Internal Features of the AMC-1228s Sensor Module



4 INSTALLATION

This section relates to the proper installation of the AMC-1228s unit. The topics of proper location, sensor wiring selection, and multi-unit interconnection are all discussed in detail.

4.1 LOCATION AND MOUNTING

Mount the sensor unit on a solid, non-vibrating surface or structure, easily accessible for status checking and calibration. The unit must be mounted in an area where the local concentration of gas is unaffected by the presence of ventilation systems.

Mounting height depends on gas type and application. The AMC-1228-28s detects NO₂ gas, while the AMC-1228-20s detects CO. For these typical applications of AMC-1228s, install unit 1.2 – 1.5 m (4-5 ft) from the floor. For further recommendations contact AMC at 1-800-465-5777

4.1.1 MOUNTING

1. Remove cover and mounting bracket with transmitter.
2. Mount housing using defines mounting holes. Figure 4-1 or Figure 4-2
3. Drill holes for conduit and then install conduit. See Warning below.
4. Reattach cover and bracket.

Warning:

Conduit should enter the housing from the bottom to ensure best protection against ingress of condensation.

Conduit entry from the top from the top of the housing is Not Recommended. However, if conduit entry through the top is the only available option, a Condensation Drip Shield is provided to help protect the electronics from water ingress due to condensation from the EMT conduit. If conduit entry is through the top of the housing, a drain hole must be drilled into the bottom side of the housing to allow the condensation to exit the housing. Any water damage related to conduit entry from the top will not be covered under warranty.

NOTE:

Mounting arrangement of the housing depends on the location and mounting surface. Mounting hardware is NOT supplied.



Figure 4-1 Enclosure Mounting Dimensions and Orientation

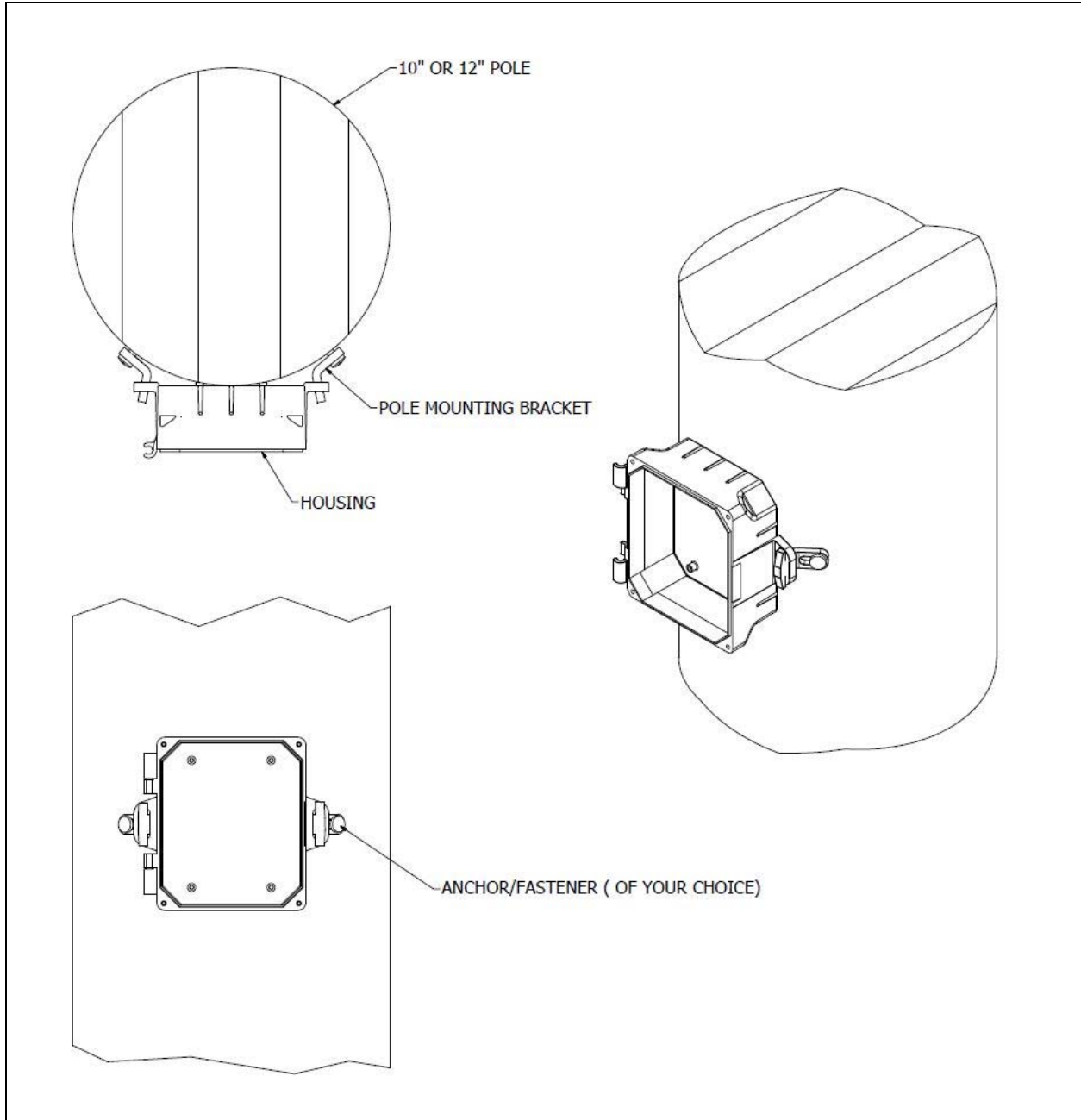


Figure 4-2 Pole Mounting

4.2 CABLE SELECTION AND WIRING

To gain access to the terminal blocks, remove the four (4) screws and front panel from the housing. This will expose the field wiring terminals. The sensor module output (-, S, +, SHLD) terminal block, connects to the input terminal block of the previous unit, or to the sensor/transmitter terminal block in the monitor, as shown in Figure 4-3.

NOTE:

Turn off the power supply before removing or replacing the sensor.



Connection should be made using 3-conductor, shielded cable with the shield grounded at the monitor. When more than one unit is in a string, the shielding of the cable should be continuous from the monitor to the last unit in the string. The cable shielding should be connected to the shld terminals at each unit. Run cable through steel conduit for best signal transmission and maximum noise rejection. A maximum length of 150 feet of 18 AWG size cable is allowed between each unit as well as between the monitor and first unit(s). A maximum of 8 units per channel is standard. For other distances, cable sizes, or desired number of units exceeding 8 units consult with The Armstrong Monitoring Corporation.

4.2.1 MULTI-UNIT INTERCONNECTION

Each sensor module is designed to interconnect to other units in series and/or branching configurations. Various typical configurations are shown in Figure 4-3, illustrating the versatility of this type of system. Because each unit is pre-calibrated, additional units can be added to a system without altering the monitor settings. When multiple units are interconnected, either one or both jumpers need to be removed (refer to section 4.2.2 TERMINATION and Figure 4-3).

4.2.2 TERMINATION

For each unused input terminal block, the corresponding jumper MUST be left installed (as shown in Figure 4-3). Failure to do so may cause the system to malfunction. Termination detailed as follows:

Input CH1 - TB1	JB4	JB2
None	Installed	Not Installed
Voltage	Not Installed	Not Installed
Current	Not Installed	Installed
Input CH2 - TB4	JB3	JB1
None	Installed	Not Installed
Voltage	Not Installed	Not Installed
Current	Not Installed	Installed
Output - TB2	JB6-1-2	JB6-2-3
Voltage	Installed	Not Installed
Current	Not Installed	Installed

Table 1: Terminations

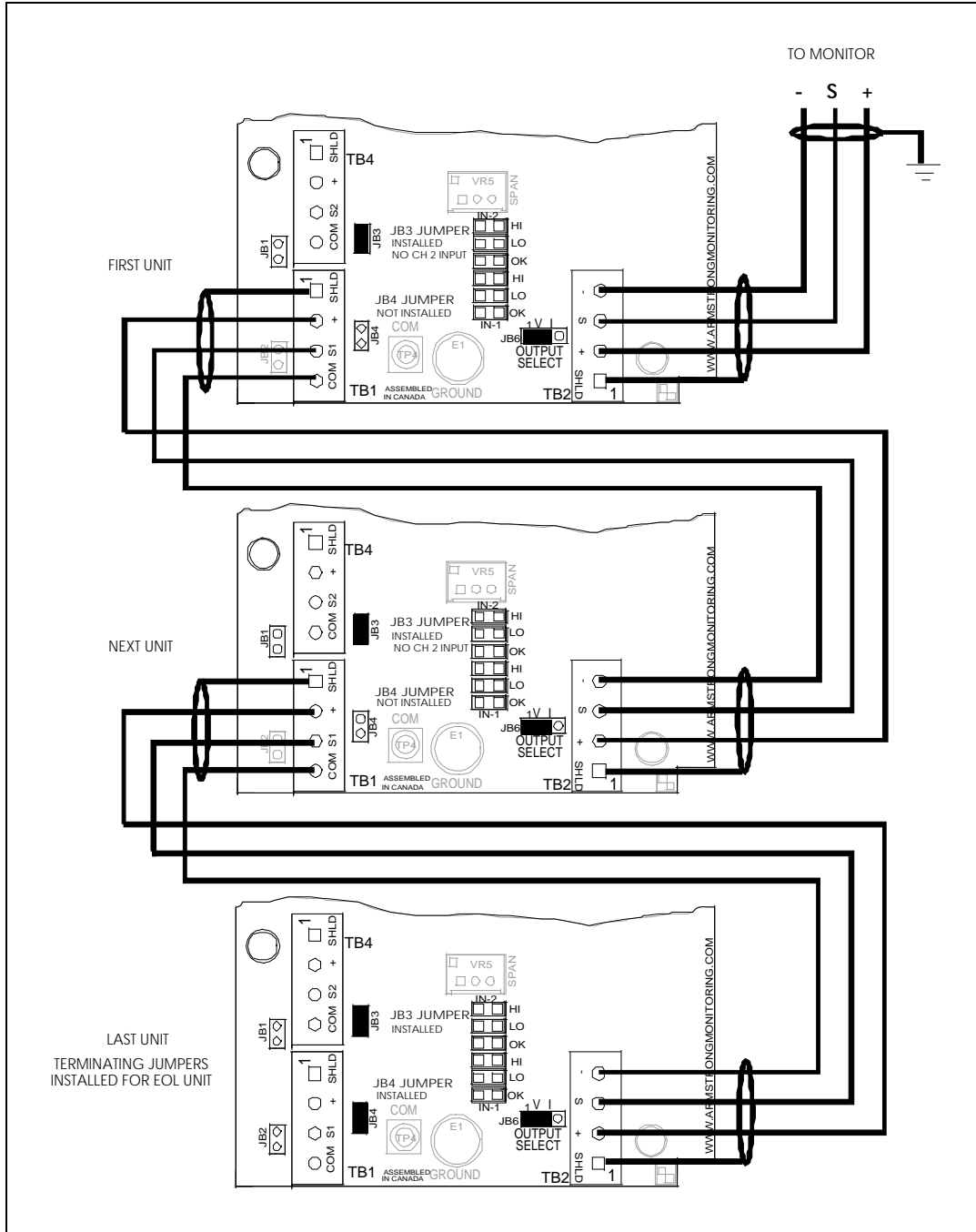


Figure 4-3 Detail Wiring of Sensor Modules

TYPICAL SYSTEM CONFIGURATIONS FOR ONE MONITOR AND 8 SENSORS.

LEGEND:
M = MONITOR
S = SENSOR MODULE

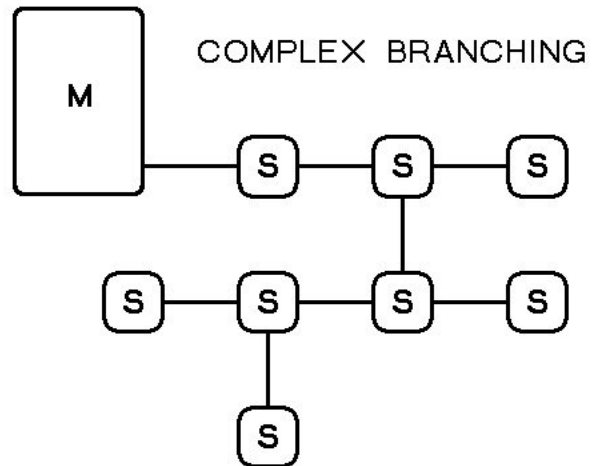
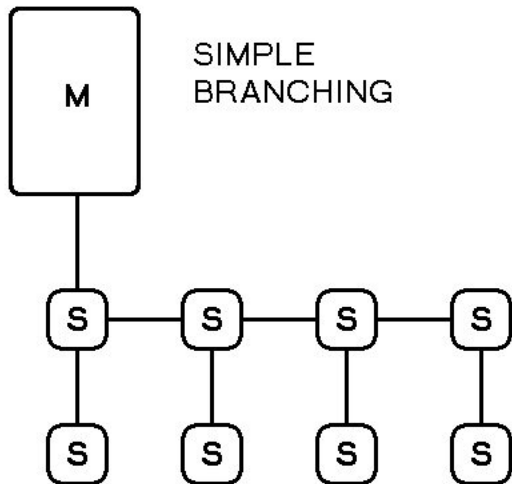
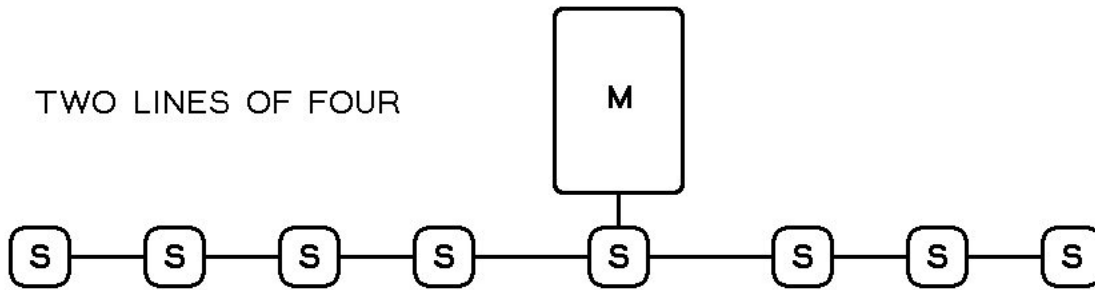
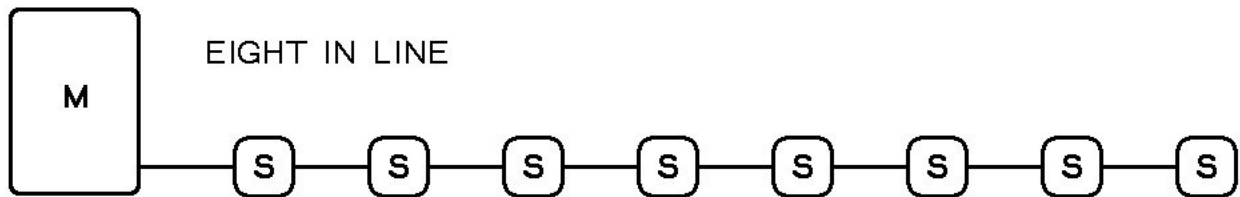


Figure 4-4 Typical System Configuration Layouts



5 OPERATION AND CALIBRATION

This section covers instructions for the proper operation and calibration of the AMC-1228s unit. The operation principles are described in further detail, followed by different types of periodic adjustments that might be required throughout the lifetime of the equipment.

5.1 OPERATION

In general, after the stabilization period and in a clean air environment, the sensor module should be displaying a Green Power On LED. This green indicator, as well as the yellow and red alarm indicators, are all visible through windows on the front panel.

Operation condition	Voltage Mode	Current Mode
Fail	0 VDC	0 mA
Normal	1 VDC	4 mA
Low Alarm	2 VDC	8 mA
High Alarm	3 VDC	12 mA

Table 2: Input and Output Magnitudes in Various Conditions in Current or Voltage Mode

5.1.1 ALARM CONDITIONS

If any gas exceeds the LOW alarm trip point setting, the yellow LED will turn ON and the unit will transmit a signal and also turn ON the yellow LED at the monitor. Likewise, if any gas exceeds the HIGH alarm trip point setting, the red LED's will turn ON.

5.1.2 FAULT SUPERVISION

The AMC-1228s is equipped with both fault detection and generation circuitry. When a fault is detected at either input of the AMC-1228s or a local fault is generated by removing JB-5 termination the AMC-1228s will forward a fault signal to the monitor.

5.2 CALIBRATION

The AMC-1228s sensor module is factory calibrated at levels based on set standards. Calibration is recommended two times per year. All on-site adjustments are made at each sensor module. Recalibration is necessary when replacing the sensor or changing the alarm trip point settings.

The Armstrong Monitoring Corporation offers the following plans:

1. On site installation and calibration by Armstrong Monitoring
2. On site calibration by Armstrong Monitoring
3. Training by Armstrong Monitoring
4. Extended warranty calibration program
5. EZ Cal Sensor Replacement Program



Refer to section 2.2 FACTORY CALIBRATION, page 4. Specify each sensor module's model number and gas when requesting any of the above.

For further information please contact the factory. Direct service enquiries to The Armstrong Monitoring Corp at (800)465-5777 or service@armstrongmonitoring.com. The unit should not need re-calibration when first installed and powered up, but a test for correct operation is recommended after a stabilization period.

NOTE:

The calibration procedure may cause false alarm and/or signal loss to the monitor. Appropriate precautions may be required.

5.2.1 On Site Calibration Equipment Required

- Digital multi-meter with a minimum display range of 0 to 10.0 VDC.
- Miniature screwdriver or trimmer adjustment tool.
- Calibration adapter, available from AMC
- Zero and Span gases (Contact AMC for information)

5.2.2 Span Adjustment

1. Signal is measured from TP4 (COM) to TP3 (SIG) (see Figure 5 for location).
2. Apply calibration gas to sensor.
3. Using Span Adjust Trimmer adjust signal voltage to proportional calibration gas concentration.
 - Max voltage for full scale = 3VDC
 - if required use equation below to set Span

I.E. Full Scale = 100ppm CO
1228s voltage for full scale = 3VDC
Calibration Gas = 50ppm CO

$$\begin{aligned} \text{TP3 (SIG)} &= \text{Full Scale} = 100\text{ppm CO} \\ &= 3\text{VDC}/\text{Full Scale} \times \text{Calibration Gas} \\ &= (3\text{VDC}/100\text{ppm}) \times 50\text{ppm} \\ &= 1.5\text{VDC} \end{aligned}$$

I.E. Full Scale = 10ppm NO₂
1228s voltage for full scale = 3VDC
Calibration Gas = 6ppm NO₂

$$\begin{aligned} \text{TP3 (SIG)} &= \text{Full Scale} = 10\text{ppm NO}_2 \\ &= 3\text{VDC}/\text{Full Scale} \times \text{Calibration Gas} \\ &= (3\text{VDC}/10\text{ppm}) \times 6\text{ppm} \\ &= 1.8\text{VDC} \end{aligned}$$

5.2.3 Alarm Adjustment

Alarm Adjustment can be made with the corresponding High (VR4) or Low (VR3) Trimmer. Adjust the corresponding Alarm Voltage to the appropriate fraction of full-scale gas concentration. Alarm Voltage can be measured from TP4 (COM) to Low test point (TP2) and High test point (TP1). (see Figure 5 for location).

I.E. for setting NO₂ low Alarm trip point.
 Full Scale = 10ppm NO₂
 Alarm Trip Point = 1ppm NO₂
 1228s voltage for full scale = 3VDC

$$\begin{aligned} \text{LO Alarm trip point} &= 3\text{VDC}/\text{Full Scale} \times \text{alarm Trip Point} \\ &= (3\text{VDC}/10\text{ppm}) \times 1\text{ppm} \\ &= 0.3\text{VDC} \end{aligned}$$

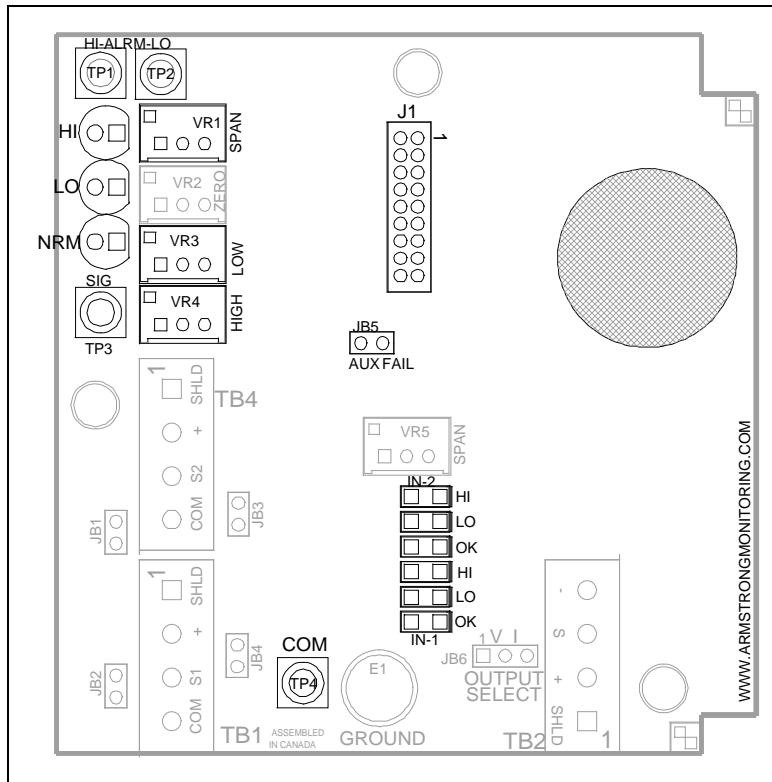


Figure 5-1 Span and Alarm Adjustment

CAUTION:

Only qualified personnel should perform the actual calibration. Users are advised to consult The Armstrong Monitoring Corporation as to the recommended calibration gas concentration for the application, and any other questions.



6 MAINTENANCE

This section covers topics related to the maintenance of the AMC-1228s unit. A general description of maintenance to be carried out is followed by a verification of operation and then details about the sensor replacement.

6.1 GENERAL

The sensor unit should be brushed or wiped clean once a year or more, of any dust or dirt which settles on it, depending on the accumulation. The unit **SHOULD NOT** be submerged or placed under conditions where water or other liquids would be able to enter the transmitter.

6.2 VERIFICATION OF OPERATION

Verification of operation should be performed at least once every 6 months. For highly demanding applications more frequent verification is recommended.

6.3 SENSOR REPLACEMENT

The sensor should be replaced when the sensor no longer adequately responds to test gas.

CAUTION:

Turn off the power supply before attempting the following.

When the sensor needs replacing, reorder the Part Number listed in section 2.1 SENSOR MODULE (page 3). To replace the sensor element, remove the four screws and cover plate from the housing. Unplug the used sensor element from its socket and discard then plug in the replacement sensor element. Refer to Section 5.2 for calibration as it must be performed on newly installed sensors. Reinstall the cover plate and screws.

NOTE:

30 minutes is required for a new sensor to stabilize before calibration.

7 INSTALLATION TIPS

CABLING

- Cabling – Use 3 conductor shielded cable with the 1228s. A maximum length of 150 feet of 18 AWG size cable is allowed between each unit as well as between the monitor and first unit(s). A maximum of 8 units per channel is standard. For other distances, cable sizes, or desired number of units exceeding 8 units consult with The Armstrong Monitoring Corporation.
- Route cabling in EMT (Electrical Metal Tube) conduit to avoid damage to cabling and help shield wiring from electro-magnetic interference (EMI) or radio frequency interference (RFI).
- Sensor cable sheath must be grounded at the monitor end only; the cable sheath at the sensor must be connected to the SHLD terminals. Use electrical tape as required on shield to avoid electrical contact with any components in the housing.
- Route cabling away from AC power cabling and any source of electro-magnetic interference (EMI) or radio frequency interference (RFI) such as power transformers, electric motors, etc.
- All cabling must enter the sensors and monitors from the bottom to ensure protection against water damage due to water inside the conduit from condensation or leaks.
- Ensure that there are no short or open circuits in the sensor cabling.
- Verify that there is no AC or DC voltage present on the sensor cabling prior to connecting the cabling to either the sensor or the monitor.

EQUIPMENT LOCATION

- Mount all equipment away from any source of electro-magnetic interference (EMI) or radio frequency interference (RFI) such as power transformers, electric motors, etc.
- Mount sensors in accordance with the installation guidelines for the specific species of gas to be detected; i.e. CO sensors should be mounted at breathing height etc.
- Equipment must be positioned such that the chance of water damage is minimized; i.e. away from fire suppression sprinkler heads, away from wet or damp locations where there would be a risk of water damage.
- Ensure a balanced layout of sensors to cover the intended area.
- Ensure that sensors are not in close proximity to clean air sources.
- Weather shields are available for use in locations exposed to water spray or rainfall.