
# XNX

## Technical Manual



Honeywell

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# Safety and Information

Read and understand this manual before installing, operating, or maintaining the transmitter. Pay particular attention to these warnings and cautions. All of the warnings and cautions shown here are repeated in the appropriate sections of the manual.

**⚠WARNING**

- Warnings identify hazardous or unsafe practices which could result in severe injury or death.

## Warnings

- Installation must be in accordance with the recognized standards of the appropriate authority in the country concerned.
- Any work on the interior of the detector must be conducted only by Honeywell-trained personnel
- Before carrying out any work, ensure that local regulations and site procedures are followed. Appropriate standards must be followed to maintain the overall certification of the sensor.
- To reduce the risk of ignition in hazardous atmospheres, disconnect the equipment from the supply circuit before opening the sensor enclosure. Keep the assembly tightly closed during operation. Conduit runs must have a seal fitting connected within 18 inches (45 cm) of the enclosure.
- Never open the XNX enclosure under power unless the area is known to be non-hazardous.
- Do not use the XNX Universal Transmitter in oxygen-enriched atmospheres. In oxygen-enriched atmospheres, the electrical safety is not guaranteed.
- The sensor must be earthed/grounded for intrinsic safety, electrical safety and to limit the effects of radio frequency interference. Earth/ground points are provided inside and outside the unit. EMI note for applications using shielded cable: Cable shield must provide 90% coverage of the wiring. Cable shield terminations must be made at the cable glands with suitable EMI type glands. Avoid terminating cable shields at the Earth ground lug inside the XNX enclosure. In cases where wiring is in pipe, a shielded cable is not required. The external terminal is only a supplemental bonding connection where local authorities permit or require such a connection.
- Take care when handling EC sensor cells as they may contain corrosive solutions. Do not tamper or in any way disassemble the sensor cells. Do not expose to temperatures outside the recommended range. Do not expose the sensor to organic solvents or flammable liquids.
- At the end of their working lives, sensors must be disposed of in an environmentally safe manner, in accordance with local waste management requirements and environmental legislation. Alternatively, sensors may be securely packaged, clearly marked for environmental disposal, and returned to Honeywell Analytics. Do NOT incinerate sensors as they may emit toxic fumes.
- High off-scale readings may indicate an explosive concentration of gas.
- Verify all outputs, including display, after installation, after service events, and periodically to ensure the safety and integrity of the system.
- Do not use the transmitter in oxygen-enriched atmospheres. Concentrations displayed will be adversely affected by oxygen depletion.
- After changing parameters with a handheld device, verify that the parameter settings are correct at the transmitter.
- The factory-set passcodes must be reset to prevent unauthorized access to the transmitter's menus.
- When the transmitter is equipped with the optional Remote Mount Kit, the remote sensor must be securely mounted in a fixed position. The Remote Sensor kit is not intended to be used as a handheld sensor.

- Enclosures of remotely mounted sensors contain aluminum. When installed in Zone 1 locations, be careful to avoid ignition hazards due to impact or friction.
- Install the junction box according to local codes and manufacturer's requirements.
- The enclosures of remotely mounted 705HT sensors contain aluminum. When installed in Zone 1 locations, be careful to avoid ignition hazards due to impact or friction.
- Power off the transmitter before changing S3 or S4. Failure to do this will permanently damage the transmitter. Both switches must be set in either Source or Sink prior to applying power.
- Do not set the minimum or maximum controller alarm levels at less than 10% or greater than 90% of the full scale range of the sensor. CSA and FM agency limits are 60% LEL or 0.6mg/$m^3$.
- When configuring or communicating with the transmitter using the front panel displays, resume monitoring by exiting all menus and returning to the General Status menu manually. No time outs are invoked.
- When selecting a new target gas for units with a Searchpoint Optima Plus, the sensor must be recalibrated.
- XNX Universal Transmitters carrying UL/CSA/FM approvals that are configured for devices measuring %LEL will not allow adjustments to the full scale value. The range is fixed at 100%.
- There is a potential loss of sensitivity during exposure to high concentrations of H2S. Under these conditions, set the control unit to latch at overrange. In standalone configuration, set alarms to latching. When resetting the overrange or alarm, verify correct operation of the transmitter.
- Keep the passwords in a secure area to prevent unauthorized access to the transmitter. If the passwords are lost, resetting the transmitter will require a service technician.
- When the transmitter is placed in Inhibit Mode, alarms are silenced. This will prevent an actual gas event from being reported. Inhibit Mode must be limited to testing and maintenance only. Exit Inhibit Mode after testing or maintenance activities.
- Honeywell recommends periodic bump tests (every 30 days or in accordance with customer site procedures) to the sensor to insure proper operation and compliance with the functional safety rating of the installation.
- Honeywell Analytics recommends bump testing of ClO2, Cl2, HF, and HCl sensors frequently and in accordance with customer site procedures to ensure proper operation and compliance with the functional safety rating of the installation.
- As some test gases are hazardous, exhaust the flow housing outlet to a safe area.
- Exposure to desensitizing or contaminating substances or concentrations causing operation of any alarm may affect sensor sensitivity. Following such events, verify sensor performance by performing a functional gas test (bump test).
- When servicing or replacing sensors, reduce the risk of ignition in hazardous atmospheres by declassifying the area or disconnecting the equipment from the supply circuit before opening the sensor enclosure. Keep the assembly tightly closed during operation.
- Take appropriate precautions when using toxic, flammable, or pressurized cylinders.
- XNX transmitter is SIL2 approved and please refer to XNX transmitter safety manual (1998-0808) for the detail of SIL certificate.

## ELECTROSTATIC DISCHARGE

To minimize the risk of electrostatic discharge:

- Ground the transmitter adequately
- Install the transmitter in a manner that will prevent accidental electrostatic discharges, e.g. ensure that objects do not rub against the housing etc.
- Clean the enclosure with a damp cloth when necessary

## Hazardous Location Installation Requirements

- Read and understand this manual prior to installation and use.
- Use only certified cable glands for installation.
- Shielded armored cable is required for CE compliance.
- To reduce the risk of ignition in hazardous atmospheres, conduit runs must have a pour gland installed within 18 inches (45 cm) of the enclosure.
- All ¾ inch NPT conduit, stopping plugs, and adapters must be installed with 5¼ threads (minimum) engaged to maintain the explosion-proof rating.
- The XNX cover assembly must be fully seated to the enclosure (7 threads minimum) to maintain the explosion-proof rating.
- Use only the supplied stopping plugs (Honeywell part number 1226-0258) with the XNX Universal Transmitter.
- For units fitted with the optional relay module: relay contact ratings are 250 VAC 5A, 24 VDC 5A resistive loads only.
- Use copper conductors only. Tighten terminal block screws to 4.5 lb/in (max).
- For XNX-UT**-***** transmitters, refer to XNX control drawing 1226E0402.

## Special Conditions for Safe Use

- The following applies to the HART Barrier intrinsically safe circuits: For installations in which both the Ci and Li of the intrinsically safe apparatus exceed 1% of the Co and Lo parameters of the associated apparatus (excluding the cable), then 50% of Co and Lo parameters are applicable and shall not be exceeded, i.e., the Ci of the device plus the C of the cable must be less than or equal to 50% of the Co of the associated apparatus, and the Li of the device plus the L of the cable must be less than or equal to 50% of the Lo of the associated apparatus.
- For circuits connected to the EC barrier in which the capacitance and inductance exceed 1% of the permitted values, the maximum permitted capacitance is limited to 600 nF for group IIC and 1uF for group IIIC.
- The connection to the HART circuit shall be rated a minimum of IP 6X.
- Delays resulting from transmission errors between sensor and transmitter extend response times T90 by more than one-third. The period until fault indication is 10 seconds.
- The HART interface is subject of this EC-type examination certificate only for the purpose of configuration and maintenance. The options “Modbus interface” and “FOUNDATION Fieldbus interface” are not subject of this EC-type examination certificate.
- Long-term exposure (>20 minutes) to concentrations exceeding the full-scale range of the $H_2S$ sensor Type 2 can cause it to lose sensitivity. The measured value may then decrease even though high levels of toxic gas are still present. If such conditions can occur, set the control unit to latch at overrange. In standalone operation, set alarms to latching. When resetting the overrange or alarm, verify the correct operation of the transmitter. Before re-calibrating the transmitter, verify the absence of gas.
- The flameproof joints are not intended to be repaired.

## Cautions

**⚠CAUTION**

Caution messages address situaltions that could result in damage to the transmitter or sensors.

## Notes

**⚠ NOTE**

Notes relate helpful information.

## Waste Electrical and Electronic Equipment (WEEE) Directive

This symbol indicates that the product must NOT be disposed of as general industrial or domestic waste. This product should be disposed of through suitable WEEE disposal facilities. For more information about disposal of this product, contact your local authority, distributor or the manufacturer.

## Information

Honeywell Analytics assumes no responsibility for equipment that is not installed and used following the procedures in the Technical Manual.

Ensure that the appropriate equipment has been installed. If in doubt, contact Honeywell Analytics.

Honeywell Analytics assumes no responsibility for errors or omissions in this document or the consequences of those errors or omissions. Contact Honeywell Analytics with corrections. Honeywell Analytics reserves the right to revise this document without notice. Contact the local distributor or Honeywell Analytics if additional information is needed.



## Revision History

| Revision | Comment | Date |
|---|---|---|
| Rev 13 | ECO 9425 | Oct 2018 |
| Rev 14 | ECO 9443 | Jan 2019 |
| Rev 15 | ECO 2019-4777 | Sep 2019 |

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# Introduction

# Product Description

## The Transmitter

The transmitter is a comprehensive gas detection system designed to operate in hazardous locations[1] and utilize multiple sensor technologies –catalytic bead, electrochemical (EC), or infrared (IR)– to detect toxic gases, flammable gases, and oxygen depletion gas hazards. Each technology has a dedicated personality board.

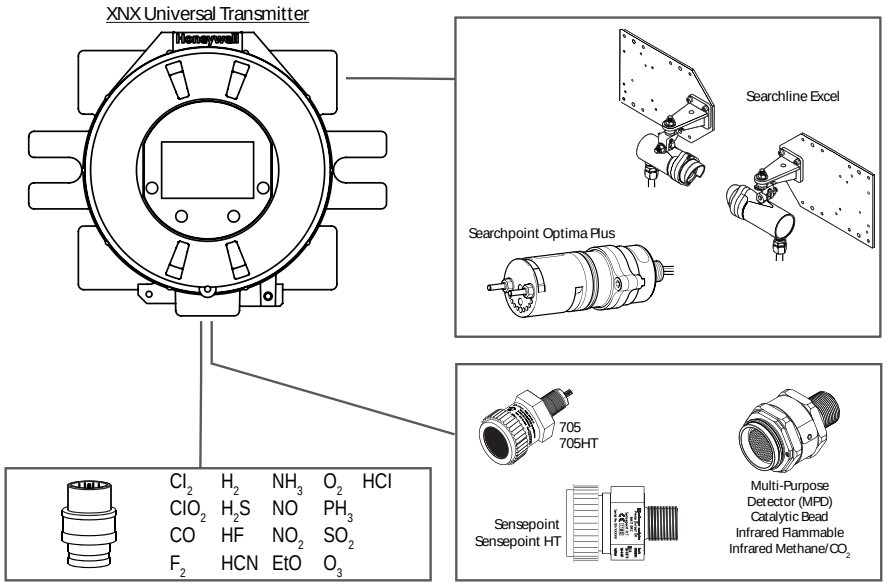
Catalytic bead technology is used with the mV personality board. Catalytic bead sensors respond to a wide variety of combustibles so are typically used for flammable gas detection.

Electrochemical technology is used with the electrochemical board. EC sensors measure toxic gases in low concentrations. The EC sensors employ the patented Reflex™ cell fault diagnosis routine. Reflex checks for cell presence, cell dry-out, and cell open or short circuit. Reflex is automatically initiated by the transmitter at eight-hour intervals. It is also initiated on power up or sensor exchange. In the event of a cell failing this test, a sensor fault code is displayed. Reflex diagnostics occur in the first minutes of the power up sequence.

Infrared technology is used with the IR board. IR sensors optically absorb gases that fall into the infrared spectrum.

For additional information about any of these sensor types, refer to the applicable data sheet for the supported sensor in Figure 1.

The transmitter also allows for an optional communication board. There are three types of boards: relay, Modbus®, or FOUNDATION™ Fieldbus. See the Communications section for additional information.




| Personality | Sensor Type | Supported Sensors |
|---|---|---|
| IR | Point and Open-Path Infrared | Searchpoint Optima Plus, Searchline Excel |
| mV | Flammable and Toxic | 705, 705HT, Sensepoint, Sensepoint HT, MPD (Catalytic Bead Flammable, IR Flammable and IR $CO_2$) |
| XNX EC | Toxic and $O_2$ Sensing | Electrochemical sensors, with Hot Swap, pre-calibrated through Intrinsically Safe (IS) barrier |

Figure 1. XNX Universal Transmitter and supported sensing technologies

The transmitter relies on 4-20mA output, refreshed at least every two seconds (once per second is typical), in which the output is proportional to the gas concentration.

[1]There are three main types of gas hazards: flammable, toxic, and asphyxiant. A flammable gas hazard is one in which there is a risk of fire and/or explosion (e.g., a situation in which a gas such as methane, butane, or propane is present). A toxic gas hazard is one in which there is a risk of poisoning (e.g., a gas such as carbon monoxide, hydrogen sulfide, or chlorine is present). An asphyxiant hazard would include a risk of suffocation through oxygen deficiency. (Oxygen can be consumed or displaced by another gas.)

## 20 mA/HART Output

All XNX Transmitters provide a 20mA Current Loop with HART Communication which can be user configured for Sink, Source (3-Wire) or Isolated (4-Wire) electrical interface based on installation requirements.

The 20mA current loop output provides an analog indication of special states, a proportional output to gas concentration and overrange indication as shown in the table below. In the event of a simultaneous alarm and fault, an alarm condition will always override fault or warning state.

| Output | Description* | Notes |
|---|---|---|
| 1.0 mA | Fault | Special State Indication |
| 2.0 mA | Warm-up<br>Inhibit<br>Bump Test<br>Calibration | |
| 3.0 mA | Warning | |
| 4-20 mA | Gas Concentration | |
| 21 mA | Overrange | |

*Alarm conditions always take priority over faults and warnings.

HART Protocol provides communications with the transmitter from a remote control system for Configuration, Status, and Diagnostics. (See the HART Protocol section for additional information)

## Communications

The XNX® Universal Transmitter is registered with the HART® Communication Foundation. The transmitter features HART over 4-20mA as standard.

Additional optional communication interfaces are available: relay communication, Modbus, or FOUNDATION Fieldbus. Each communication option has a dedicated option board. For additional information, refer to the Options section.

## Certifications

XNX-UT**-****** Versions are UL and CSA listed for installation in Class I, Division 1, Groups A, B, C and D Hazardous Locations. FM Approvals evaluation includes Class I, Zone 1, Group IIC, as well as performance tests for specific sensor/transmitter combinations. The CSA or FM certification does not cover daisy-chained XNX combustible gas transmitters, the use of HART, Modbus, or FOUNDATION Fieldbus protocols for combustible gas performance. HART, Modbus, or FOUNDATION Fieldbus protocols can be used only for data collection or record keeping with regards to combustible gas. The EC cartridge[2] and EC remote mount kit are UL classified to Canandian and US standards.

XNX-AM **-***** versions are certified to comply with the European Community ATEX Directive and the prescribed protection methods for installation in potentially explosive atmospheres.

XNX-BT**-***** versions are UL listed and INMETRO approved for compliance with both U.S. and Brazilian standards.

See the Sensor Data section for additional information on applicable approvals by part number and the Operating and Storage Conditions for Performance Tested EC Sensors section for marking.

[2]"Cartridge" and "sensor" are used interchangeably in this document.

## Patents

| Patents Applicable to the XNX Universal Transmitter | | |
|---|---|---|
| **Patent Number** | **Description** | **Application** |
| 6,123,818 | Reflex patent | Implemented in XNX |
| 6,251,232 | Reflex patent | Implemented in XNX |
| 6,351,982 | Flammable sensor housing | XNX accepts this sensor |
| 6,395,230 | Pellistor | Sensor used in XNX |
| 7,225,661 | Gas calibration adapter | Applicable to XNX |
| 7,716,962 | Method of gas calibration | Used to calibrate XNX ECC cartridges |

## Glossary

| Term | Description |
|---|---|
| bump test | a brief exposure to a gas to verify that a detector is working; also known as a functional test |
| ferrite bead | a device that suppresses noise in a circuit |
| FOUNDATION Fieldbus | an open architecture, digital, serial communication system administered by the Fieldbus Foundation |
| HART Protocol | Highway Addressable Remote Transducer Protocol; a bi-directional analog communication system developed by the HART Communication Foundation |
| intrinsic safety | design parameters for the safe operation of electrical equipment in hazardous environments; commonly abbreviated IS |
| IP rating | Ingress Protection; a system for describing a device's protection against dry materials and liquids (e.g., IP66/67) |
| latching alarm | an alarm that, once activated, must be manually reset |
| magnetic wand | a small device used to change the transmitter's settings |
| Modbus | a digital communications protocol based on RS-485 topology |
| non-latching alarm | an alarm that automatically resets when the cause of the alarm is removed |
| pellistor/bead | an electronic device used to detect combustible gases |
| personality board | a component of the transmitter that allows its operation to focus on different sensing technologies |
| POD | Personality, Options, and Display; the group of components including an XNX transmitter's personality board, display, communication board, etc. |
| span calibration | adjustment of a detector so that its scale corresponds to a gas concentration range from 0% to 100% |
| sticky gases | gases that tend to coat the surfaces they contact |
| toxic gases | gases that are poisonous to humans (refer to the gas's Safety Data Sheet for details) |
| zero calibration | adjustment of a detector so that its zero reading corresponds to a test gas concentration of 0% |

## Product Overview

The transmitter is comprised of these main parts:

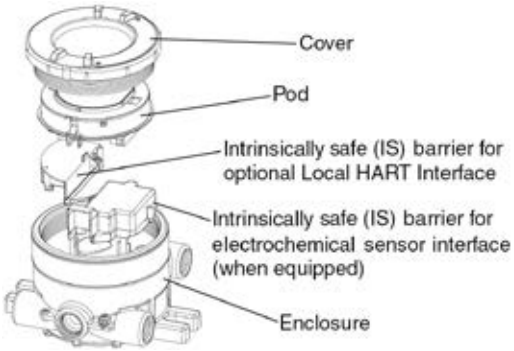



Figure 2. XNX exploded view

### Enclosure

Available in either Stainless Steel or Aluminum, with 3/4" NPT (UL/CSA or UL/ INMETRO) or M25 (ATEX/IECEx only) threaded cable/conduit ports, the transmitter enclosure is explosion-proof and suitable for use in -40°F to +149°F (-40°C to +65°C) operating conditions. A 5-coat marine finishing process provides the highest degree of corrosion protection. For more information on performance specifications, see the Specifications section.

The enclosure is equipped with up to five threaded cable/conduit ports providing functional and flexible configurations based on sensor and option choices. See Cable/conduit port assingments for port assignments and restrictions.

Stopping plugs (PN# 1226-0257 or 1226-0258) have been provided to seal unused cable/conduit ports and have been Agency evaluated/approved for use with the XNX enclosure only. The number of stopping plugs varies among available configurations.

**⚠CAUTION**

**Caution:** The stopping plugs are for use only with the XNX transmitter. Do not use them with any other device.

Mounting lugs integral to the enclosure allow easy installation on a flat surface or 2"-6" (50-150 mm) diameter pipe with the optional Pipe Mount Kit or to ceilings with the Ceiling Mount Bracket Kit.

## Cover

The transmitter cover is supplied in the identical material specified for the enclosure.

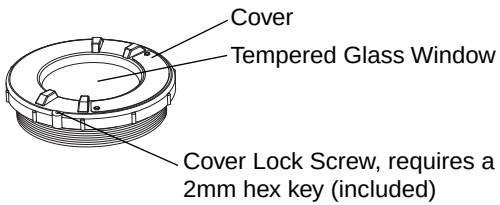



Figure 3. XNX cover components

A tempered glass window requires the use of the supplied magnetic wand/screwdriver to activate the four user interface switches located on the front of the display module. This allows for non-intrusive setup and operation.

A locking screw integrated into the cover provides positive locking that can be loosened by using the supplied 2mm hex key.

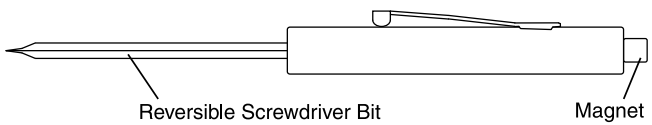



Figure 4. Magnetic wand/screwdriver

**NOTE**

**Note:** When attaching the cover or stopping plugs, coat the threads with a suitable anti-seize compound to prevent corrosion.

## POD

The POD (**P**ersonality, **O**ptions, and **D**isplay) includes circuit boards for the personality module, optional interfaces, and display.

The personality module, or circuit board, determines the transmitter behavior based on the sensor type attached to the transmitter (electrochemical cell, catalytic bead sensor, or infrared) and provides the necessary interface. Connection to the attached sensor is made through the sensor connector.

The optional communication boards vary depending on the option selected when ordered. Only one of the three available interface options (relays, Modbus, or FOUNDATION Fieldbus) can be attached to the transmitter.

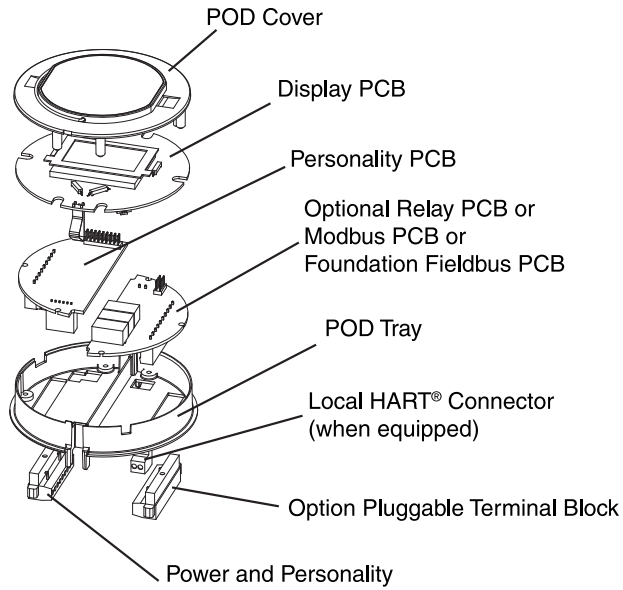



Figure 5. POD, exploded view

# Options

## Local HART

Available with any sensor technology or personality, an external access to the HART interface in the transmitter is provided. An intrinsically safe (IS) barrier inside the transmitter gives the user full control using a handheld field communicator for programming and configuration. The external interface is installed in the lower left cable/conduit port of the transmitter and is intrinsically safe. For more information, see the HART Protocol section.

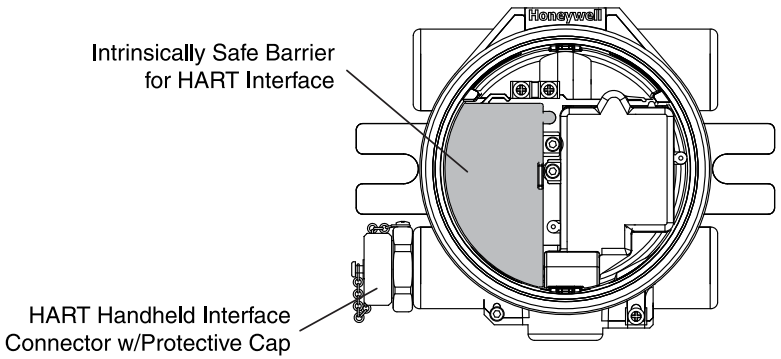



Figure 6. XNX Universal Transmitter with HART interface IS barrier

**NOTE**

**Note:** POD options are either relay, Modbus, or FOUNDATION Fieldbus.

## Relays

The relay option (XNX-Relay) provides 3 form “C” (SPDT) normally open/normally closed (NO/NC) contacts for alarm and fault indication. A remote reset input (TB4) is provided to silence alarms. Momentarily closing the the circuit between the pins of TB4 performs the same function as the Reset Alarms & Faults command.

The remote reset switch (designated TB-4 and labeled “Remote Reset SW”) is located on the relay option board. It provides a remote hardware-based reset of faults and alarms to the transmitter. In the event that direct access to the local and HART® interfaces is not possible, alarms and faults from an XNX transmitter may be reset remotely using a momentary switch. This will momentarily close the circuit between the two pins of TB4, providing the same functionality as a Reset Alarms & Faults command performed from the main screen of thelocal user or the HART interfaces.

Relays are not available when the Modbus® or FOUNDATION Fieldbus options are installed.

The transmitter has three relays: relay 1 is for alarm level 1, relay 2 is for alarm level 2, and relay 3 is for faults and special states. Two alarm levels can be set, allowing, for example, a level 1 alarm for the immediate area when a certain gas concentration is detected and a plant-wide level 2 alarm when a greater gas concentration is detected.

The maximum refresh rate of the relays is 2 seconds. See the Set Alarm Values section for more information.

## Modbus

The optional Modbus interface allows the transmitter to connect to a bus of devices and transmit data to PLCs or controllers. (For more information, see the *Modbus Protocol Manual*). Connections to the transmitter are made through a pluggable terminal block on the Modbus interface circuit board. Modbus RTU protocol uses ASCII/Hex protocols for communication.

## FOUNDATION Fieldbus

FOUNDATION fieldbus is a digital communication system which supports several types of messages. Unlike many traditional systems which require a set of wires for each device, multiple FOUNDATION fieldbus devices can be connected with a single set of wires. FOUNDATION fieldbus overcomes some of the disadvantages of proprietary networks by providing a standardized network for connecting systems and devices.

**⚠ NOTE**

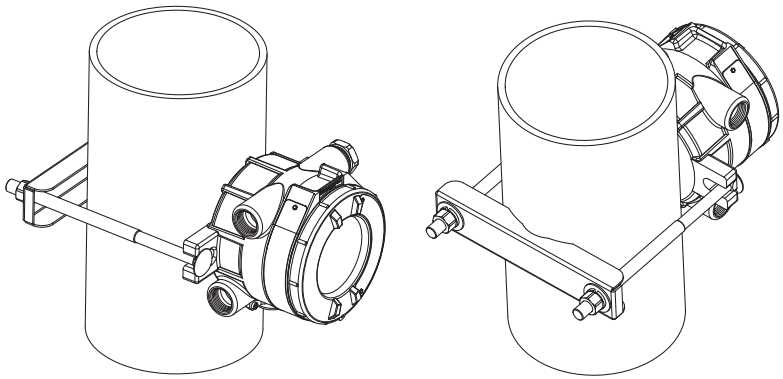
**Note:** FOUNDATION Fieldbus XNX transmitters require a separate power source and cannot be powered via the bus.

## Accessories

Refer to the Accessories/Spares section for part numbers.

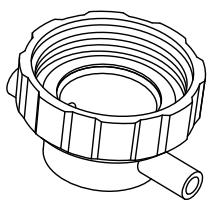
*Pipe Mount Kit*

The pipe mount kit allows the transmitter to be mounted to pipe from 2”-6” (50-150 mm) in diameter. The kit includes the pipe mount bracket, two carriage bolts, nuts, and lock washers.



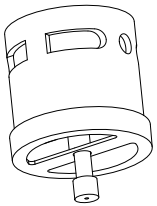
*Calibration Gas Flow Adaptor*

The calibration gas flow adaptor is used to apply calibration test gas to the sensor. It attaches to the bottom of the sensor and can be fitted without removing the standard weatherproof cover. See the Calibration section for details on gas calibration.



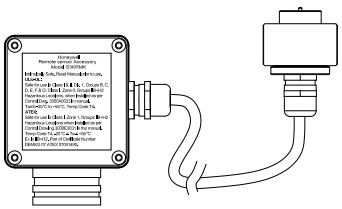
*Weatherproof Cover*

The weatherproof cap protects sensors from harsh weather.



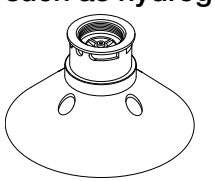
*Remote Sensor Mounting Kit for EC Sensors*

The remote sensor mounting kit allows EC sensors to be remotely mounted via an IS cable kit, available in various lengths. The kit includes shielded cable, cable glands, and remote terminal box. The cable can be cut to the required length then terminated at the remote terminal box.

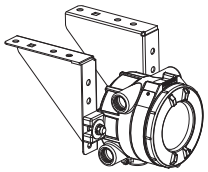


*Collecting Cone*

The collecting cone improves detection of lighter-than-air gases such as hydrogen and methane.

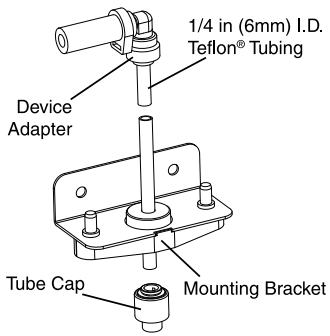


*Ceiling Mount Bracket Kit*



The optional ceiling mount bracket kit includes two stainless steel ceiling mount brackets, bolts, and nuts.

*Remote Gassing Kit*



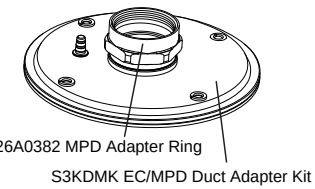

The remote gassing kit enables gas to be applied remotely for performing functional response checks (bump tests). The kit Includes: 50’ Teflon® tubing, a mounting bracket, a tube cap, and device adapters in 1/4” and 1/8” (6.3 mm and 3.2 mm) ID to attach to bump test ports on the weatherproof cap of the device.

*Extreme Weather Protector*

The extreme weather protector protects the sensor from environmental conditions in outdoor exposure applications.

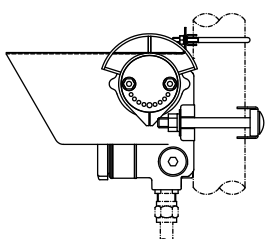
### *Duct Mount Kit*

The duct mount kit can be used with the EC sensor to detect $O_2$, CO, $H_2$, and $H_2S$ gases in ducts. When combined with the MPD Interface Adapter (available separately), the duct mount kit can accommodate the MPD to detect flammable gases in ducts. The duct mount kit includes the adapter, gasket, and required fasteners. For MPD applications, order both the Duct Mount Kit and the MPD Interface Adapter.




### *Sunshade*

The sunshade is used in environments with high heat and/or direct sunlight. It protects the sensor from environmental conditions in outdoor applications, helping to keep the internal components within the specified temperature ranges. The sunshade can be mounted to 2-inch pipe or to a wall with suitable 6mm fasteners.



## The Front Panel

The transmitter uses magnetic switches to enable non-intrusive operation. To activate a magnetic switch, hold the magnetic end of the screwdriver up to the glass window and slowly swipe the magnet directly over the switch area. For best results, hold the screwdriver as illustrated in Figure 7.

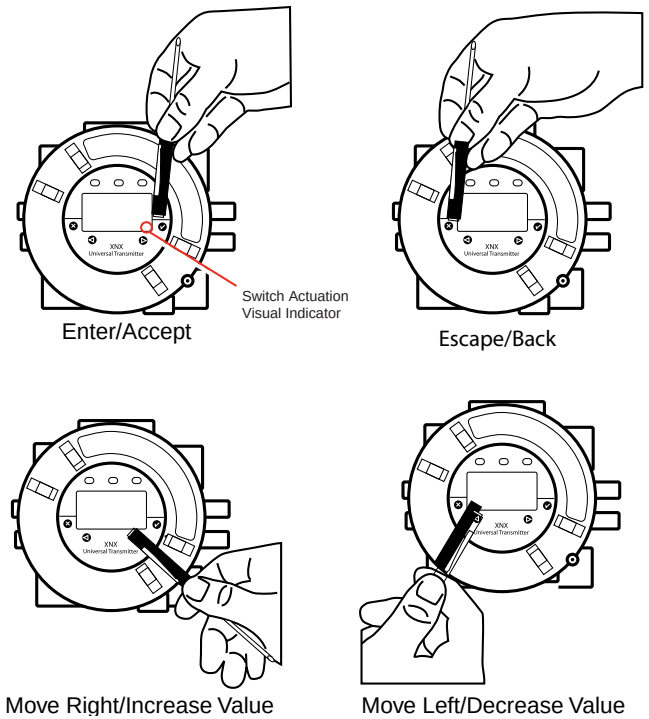



Figure 7. Using the magnetic wand

A visual indication of the switch actuation will appear in the lower right corner of the display each time the switch is activated.

In some menus where displayed values can be changed, the magnet must be swiped over the switch to cause the numeral on the display to advance through the available values. Use the ✪ switch to return to a previous menu or field.

For the purposes of this manual, the instruction to use ✔, ✪, ◄ or ►, means to activate the relevant magnetic switch as described above.

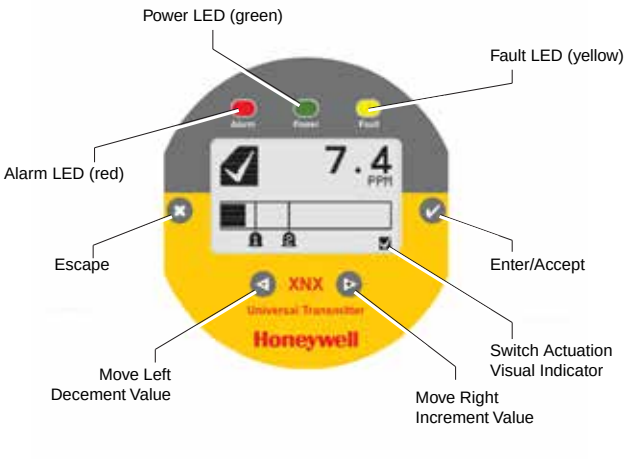



Figure 8. Front panel display of the transmitter

## Controls and Navigation

| Command | Description |
|---|---|
| Enter/Accept | The Enter/Accept switch is used to access menus, accept changes and to answer “yes” to system prompts. |
| Escape/Back | The Escape/Back switch is used to return to previous menus or to answer “no” to system prompts. |
| Move Left/ Decrease Value | The Left/Decrement arrow is used to move through menu options or decrease values when entering text or numbers. |
| Move Right/ Increase Value | The Right/Increment arrow is used to move through menu options or increase values when entering text or numbers. |

## The General Status Screen


Figure 9. General Status screen[3]

The General Status screen shows the status of the transmitter. Warnings, faults, alarm levels, and current concentration levels are displayed continuously.

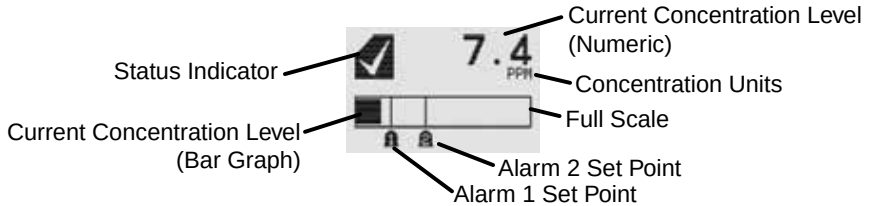



Figure 10. General Status screen, normal operating mode

The Normal Operating Mode icon indicates proper operation. The display also shows the concentration level of the target gas in two ways. In the first, a numeric value is shown in the upper right corner of the display in the units selected (ppm, %LEL, %VOL). The second concentration display is shown in the form of a bar graph representing the current concentration against full scale and in relation to the defined alarm levels. For more information on setting range and alarm levels, see the Range/ Alarm Settings section. See the EC Sensor Performance Data, Factory Mutual Verified, EC Performance Data, DEKRA EXAM Verified and the Other EC Sensors sections for negative drift and zero deviation values.

When a warning is triggered, the warning icon appears and information is displayed on the General Status Screen. The information displayed alternates between screens displaying the gas concentration and the warning code. See the Warnings and Faults section for more warning code information.

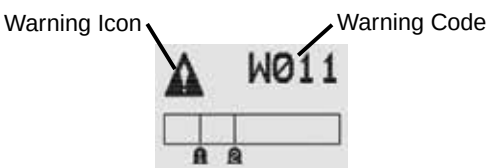



Figure 11. General Status Warning detail

[3]The LCD screen’s refresh rates are 500 milliseconds when the LCD heater is off and 1 second with the heater on.

If the fault icon is displayed, a fault condition has been triggered and the display will alternate between the target gas concentration and the fault code. See the Warnings and Faults section for more fault code information.


Figure 12. General Status Fault detail

In the event of multiple warnings or faults, the user can view all messages with the transmitter's Event History function.

When an Alarm icon is displayed, the target gas concentration exceeds one or both preset alarm levels. The General Status Screen displays the gas concentration and the alarm level exceeded.

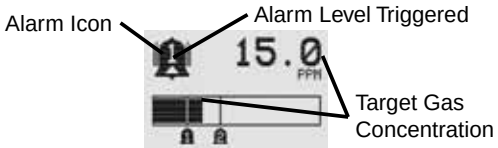



Figure 13. General Status Alarm detail

In an overrange condition, the alarm icon will display and the target gas concentration bar graph and alarm setpoints will flash.

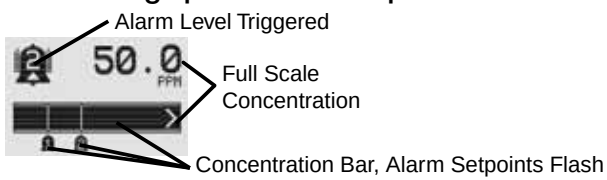



Figure 14. General Status Overrange detail

Negative values are not displayed and do not appear on the 4-20 mA output, but they are indicated by faults or warnings when preset thresholds are exceeded. (See zero deviation in the Specifications section)

In addition to the graphic alarm, fault, and warning indicators, the LEDs on the front panel flash in these patterns based on the condition:

| Condition | LED[1] | | |
|---|---|---|---|
| | Red | Green | Yellow |
| Alarm 1 | Solid | | |
| Alarm 2 | Flashing | | |
| Warning | | | Solid |
| Fault | | | Flashing[2] |
| Health | | Flashing | |

[1]The refresh rate of the LEDs is 0.5 second.

[2]Special states (Warmup, Inhibit) are not indicated by the Fault LED.

## Entering the Menu

Swiping the magnet over the magnetic switch or allows the user to reset faults or alarms, display current settings, or make adjustments to the device.

**NOTE**

**Note:** If the Easy Reset option is set to Lock, alarms and faults cannot be reset without logging in or entering a passcode. For more information, see the Configure Security section.

Swiping the or "escape" magnetic switch activates the Alarm Reset screen and allows alarms to be silenced and faults to be reset.

The ✓ switch resets all alarms and faults and returns to the General Status screen. Use the ✗ switch to return to the General Status screen without resetting the alarms and faults.


Figure 15. Alarm Reset screen

Two authorization levels control access based upon the security level of the user: Level 1 (routine maintenance) and Level 2 (technician and password administrator). The default passcodes for both levels are “0000” and must be changed after installation to control access (see the Configure Security section). In general, access to neither security level restricts the user to viewing the transmitter’s display. If desired, the Easy Reset from Main Status option allows alarm and fault resets without requiring access to either security level.


Figure 16. Passcode screen

**⚠WARNING**

**Warning:** The factory-set passcodes must be reset to prevent unauthorized access to the transmitter’s menus.

When the Passcode screen is displayed, the first passcode digit is highlighted. Use the ◀ ▶ switches to increase or decrease through the values. Once the correct value is displayed for the first digit, ✓ accepts the value and moves to the next digit or ✗ moves to the previous digit of the passcode.


Figure 17. Entering the passcode

Repeat for each of the remaining digits in the passcode. If the passcode is entered incorrectly, the Invalid Passcode screen is displayed and the user is returned to the General Status screen.


Figure 18. Invalid Passcode screen

## Displaying Transmitter Information

While in the General Status display, swipe the magnet over the magnetic switch ▶ to display information about the transmitter. The General Status display will replace the bar graph in the lower portion of the screen with the unit’s serial number, the date and time, and the unit’s part number.


Figure 19. General Status Screen with unit information

# Main Menu

**Once the proper passcode has been entered, the transmitter displays the Main Menu.**

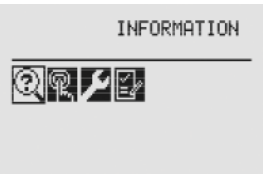



Figure 20. The Main Menu

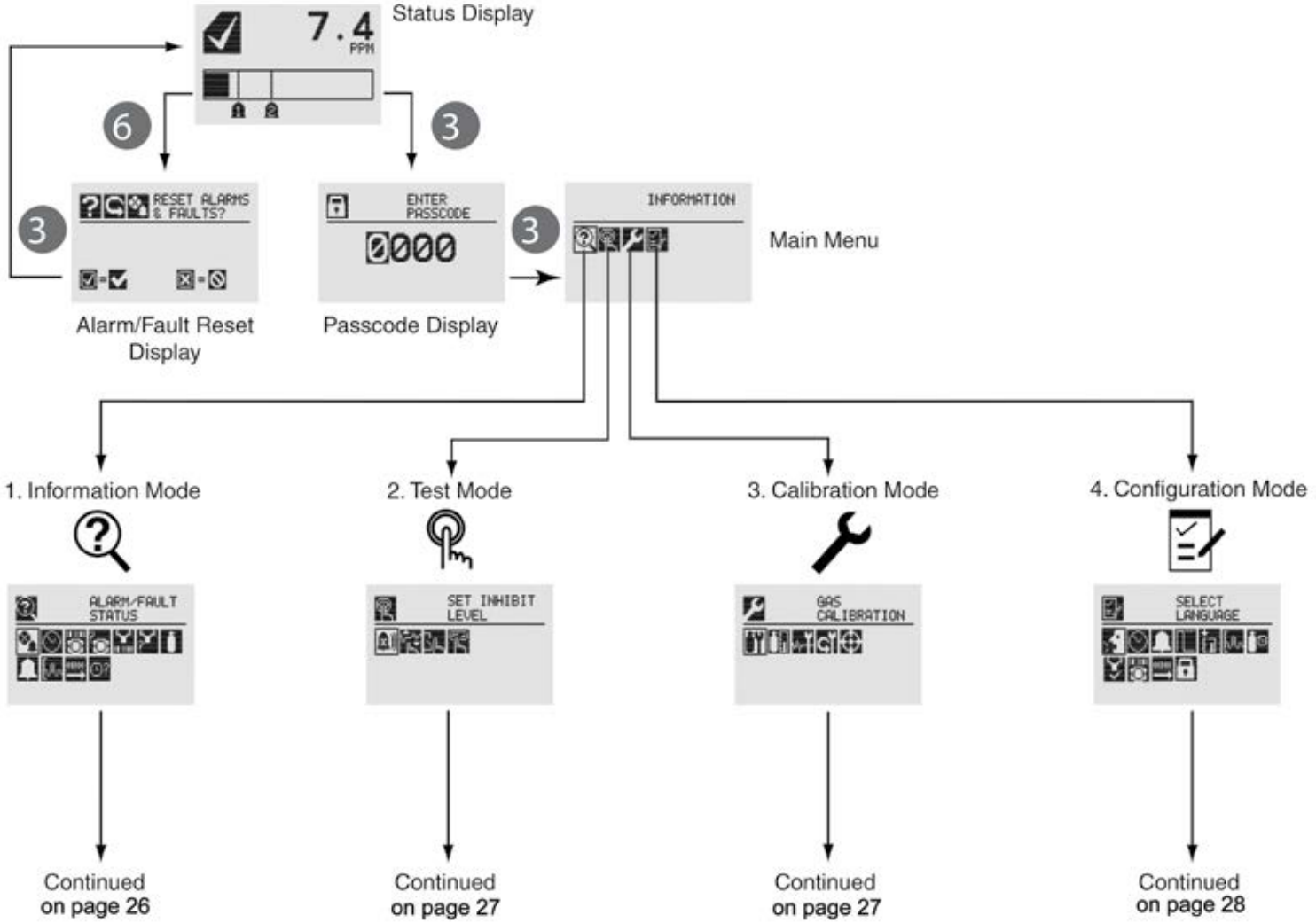
**From the Main Menu, a Level 1 user can:**

- **display the current settings/configuration**
- **test the transmitter**
- **calibrate and bump test the transmitter**
- **configure the unit for language, date and time**

**The Main Menu consists of these options:**

| Menu | | Description | See Section... |
|---|---|---|---|
| | **Configure** | Provides access to settings to configure the transmitter and connected devices | Configuring the Transmitter |
| | **Test** | Provides access to tools and settings to allow simulation of gas events to test the system | Test Menu |
| | **Information** | Displays current settings for the transmitter including optional relays and Modbus | Information Menu |
| | **Gas Calibration** | Displays the interface to calibrate sensors attached directly to the transmitter | Gas Calibration Menu |

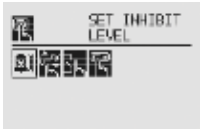
## Menu Navigation




- Information Mode
  - Alarm/Fault Status
    - Alarm/Fault
      - Confirm Alarm/Fault Reset
      - Reset Alarm/Fault
  - Date & Time
  - Transmitter ID, Serial #, Revision
    - Transmitter Data
  - Transmitter Status
    - Transmitter Status
  - Sensor Type, Serial #, Revision
    - Sensor Data
  - Sensor Status
    - Sensor Status
  - Gas Name, ID, Range
    - Gas Data
  - Range Settings, Alarm Settings
    - Range/Alarm Settings
  - mA Level Settings
    - mA Level Settings
  - Relay Settings[4]
    - Relay Settings
  - Fieldbus Settings[5]
    - Fieldbus Settings
  - Event History
    - Increment Next/Previous Event
    - Increment Next/Previous Hour
    - Increment Next/Previous Day
    - Increment Next/Previous Alarm
    - Increment Next Previous Fault

4 Optional relay only

5 Optional FOUNDATION Fieldbus and Modbus only




- Test Mode
  - Inhibit
    - Enable/Disable Inhibit
  - Force mA Output
    - Select Current: 0 to 22 mA
    - Accept
  - Force Relay[6]
    - Select Relay 1
    - Select Relay 2
    - Select Relay 3
    - Accept
  - Alarm/Fault Simulation
    - Alarm 1 Simulation
    - Alarm 2 Simulation
    - Warning Simulation
    - Fault Simulation


- Calibration Mode
  - Gas Calibration
    - Enter Span Gas Concentration (Oxygen)
    - Enter Span Gas Concentration (Not Oxygen)
  - Bump Test
  - mA Output Calibration
    - Adjust 4 mA Output
    - Adjust 20 mA Output
  - Soft Reset[7]
  - Align Excel[8]

6 Optional relay only

7 Searchpoint Optima and Searchline Excel only
8 Searchline Excel only


- Configuration Mode
  - Select Language
  - Set Date & Time
    - Set Date Format
    - Set Year, Month, Day
    - Set Hours, Minutes, Seconds
  - Sensor Type Selection
    - Set mV Sensor Type[9]
    - Set mA Sensor Type[10]
  - Gas Selection
    - Changing the Gas or Units Name
    - Gas Selections and Alarm Limits Based on mV Sensor Type
  - Range & Alarms
    - Set Range
    - Alarm 1 Type
    - Alarm 1 Setpoint
    - Alarm 1 Latching or Non-latching
    - Alarm 2 Type
    - Alarm 2 Setpoint
    - Alarm 2 Latching or Non-latching
    - Selecting the Numeric Format
  - Latching/Non-latching
  - Change Meas. Units[11]
  - mA Output Levels
    - Change mA for Inhibit
    - Change mA for Warning
    - Change mA for Overrange
    - Change mA for Low Signal
    - Change mA for Blocked Beam
  - Set Calibration Interval
  - Accept New Sensor Type[12]
    - Information screen identifying previous sensor and new sensor
    - Screen displays new type and old type
  - Set Beam Block[13]
    - Select Beam Block Threshold
    - Select Time to Beam Block
    - Select Time to Fault
  - Set Path Length[14]
    - Set New Path Length
  - Configure Unit ID
    - Edit ID
    - Clear ID
    - Default ID
  - Relay Options[15]
    - Select A1
    - Select A2
  - Fieldbus Options[16]
    - Change Fieldbus Address
    - Change Fieldbus Speed
  - Security
    - Reset and LVL1
    - LVL1 Code
    - LVL2 Code

9 Catalytic bead sensor only
10 Searchpoint Optima and Searchline Excel only
11 ECC and mV only
12 Electrochemical and catalytic bead sensors only
13 Searchline Excel only
14 Searchline Excel only
15 Optional relay only
16 Optional FOUNDATION Fieldbus and Modbus only

Honeywell

# Installation and Operation

## Sensor Mounting and Location

**⚠WARNING**

**Warning:** Installation must be in accordance with the recognized standards of the appropriate authority in the country concerned.

**Warning:** Before carrying out any work, ensure that local regulations and site procedures are followed. Appropriate standards must be followed to maintain the overall certification of the sensor.

**⚠CAUTION**

**Caution:** Locate transmitters and sensors in accordance with relevant local and national legislation, standards, and codes of practice.

**Caution:** Do not locate the transmitter where it will be exposed to direct sunlight.

**Caution:** Replace a detector only with another of the same type.

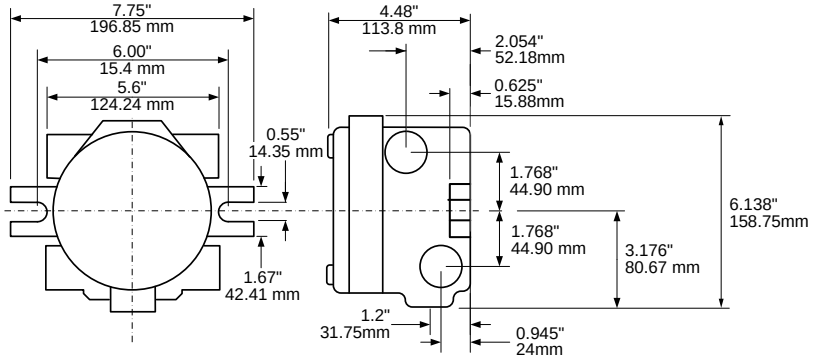
**Caution:** Mount detectors where the gas is most likely to be present.

**When determining the placement of sensors, follow the advice of safety and engineering personnel and experts having specialist knowledge of gas dispersion, the process plant system, and the equipment involved. Record the agreement reached on the location of sensors. Consider these factors when locating gas sensors:**

- **possible damage caused by natural events such as rain or flooding**
- **ease of access for functional testing and servicing**
- **how escaping gas may behave due to natural or forced air currents.**

### Mounting the Transmitter

**The transmitter can be mounted in a number of ways using the integral mounting tabs. The transmitter can be attached to flat wall surfaces or to Unistrut®. With the optional pipe mount kit, the unit can be mounted to pipe of diameter 2” to 6” (50 to 150mm). A ceiling mount bracket kit is also available.**



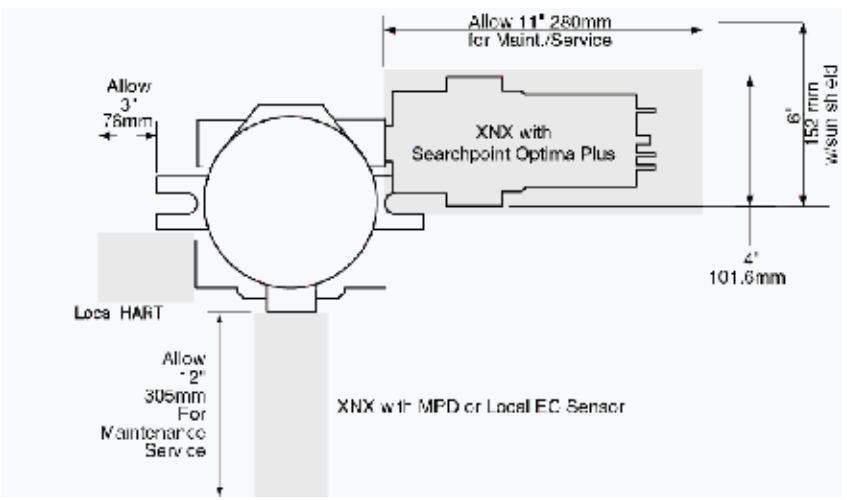




Figure 22. XNX Universal Transmitter mounting dimensions and clearances

## ⚠ WARNING

**Warning:** Any work on the interior of the detector must be conducted only by Honeywell-trained personnel

**Warning:** To reduce the risk of ignition in hazardous atmospheres, disconnect the equipment from the supply circuit before opening the sensor enclosure. Keep the assembly tightly closed during operation. Conduit runs must have a seal fitting connected within 18 inches (45 cm) of the enclosure.

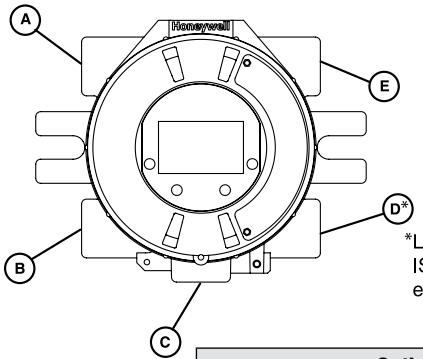
**Warning:** Never open the XNX enclosure under power unless the area is known to be non-hazardous.

**Warning:** When the transmitter is equipped with the optional Remote Mount Kit, the remote sensor must be securely mounted in a fixed position. The Remote Sensor kit is not intended to be used as a handheld sensor.

## ⚠ NOTE

**Note:** Agency certifications require that EC and mV sensors face down. Optima sensors must be mounted horizontally.

**The transmitter is configured with five cable/conduit ports built into the housing for wiring and mounting sensors. Figure 23 provides the guidelines to proper installation of the transmitter.**




**While relay wiring can use any available cable/conduit port in the enclosure, to avoid electrical noise do not use the same cable/conduit port for both relay reset and relay signal lines.**

*Limited access due to IS barrier if equipped with electrochemical cell.

| Option | Position |
|---|---|
| Local HART® Option | B |
| XNX Electrochemical Sensor - Local/Remote | C |
| MPD, 705 Series, Sensepoint Series | C |
| Searchpoint Optima Plus | A or E |
| Searchline Excel | Typically C |
| Remote Sensor Connection (except EC) | Any remaining |
| Searchpoint Optima Plus - Remote | Any remaining |
| Modbus | Any remaining |
| Relays | Any remaining |
| Foundation Fieldbus | Any remaining |
| Power | Any remaining |

**Figure 23.** Cable/conduit port assignments

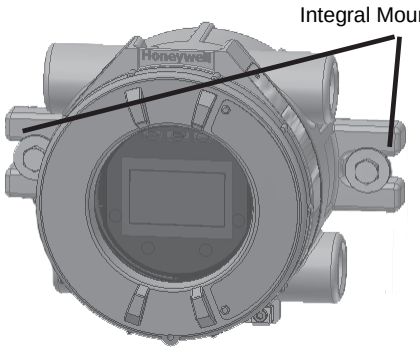



Figure 24. XNX Universal Transmitter mounting lugs

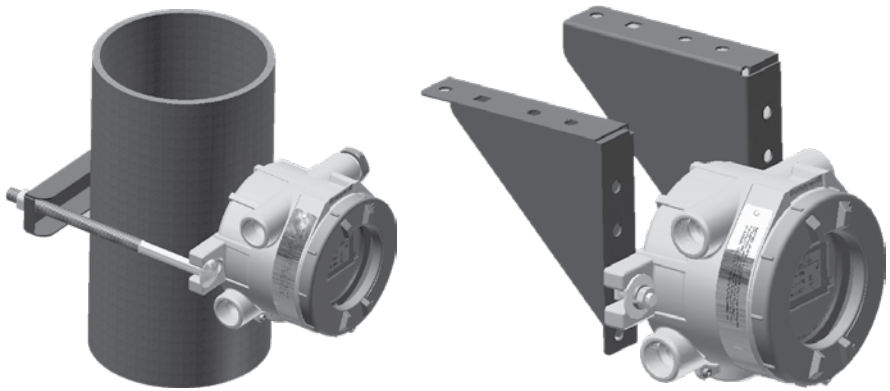
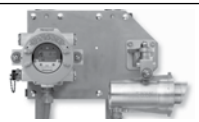


Figure 25. Optional pipe and ceiling mounts

## Wiring the Transmitter

The transmitter is available in sensor technologies, or personality options, which support a variety of sensors and applications. Each of the personalities use a dedicated interface board. Pluggable terminal blocks are used for easy connection and service. The personality boards and optional communication interfaces are enclosed in plastic housings comprising the electronics POD (**P**ersonality, **O**ptions, and **D**isplay). The Personality circuit board determines the transmitter's behavior based on the type of sensor attached to the interface. See Specifications for drift and zero deviation values.

This table illustrates the three transmitter configurations and the sensors supported by each.

| XNX IR Personality | | XNX EC Personality |
|---|---|---|
|  |  |  |
| Searchline Excel | Searchpoint Optima Plus Local/ Remote | XNX EC Sensor |
| Generic mA Sensors | | XNX EC Sensor Remote Mount Kit |

| XNX mV Personality | | |
|---|---|---|
|  |  |  |
| 705 Local / Remote | MPD Local (cat bead and IR) | Sensepoint Local / Remote |
| 705HT Local / Remote | MPD Remote | Sensepoint PPM Local/Remote |
| | | Sensepoint HT Remote |

Figure 26. XNX Transmitter personalities

**⚠CAUTION**

**Caution:** Before wiring the transmitter, confirm that the correct personality and communication boards are installed.

## General Wiring Considerations

For proper operation of the transmitter and sensor technologies, consideration of wiring-induced voltage drops, transient electrical noise, and dissimilar earth ground potentials is imperative in the design and installation of the system.

**⚠WARNING**

**Warning:** The sensor must be earthed/grounded for intrinsic safety, electrical safety and to limit the effects of radio frequency interference. Earth/ground points are provided inside and outside the unit. EMI note for applications using shielded cable: Cable shield must provide 90% coverage of the wiring. Cable shield terminations must be made at the cable glands with suitable EMI type glands. Avoid terminating cable shields at the Earth ground lug inside the XNX enclosure. In cases where wiring is in pipe, a shielded cable is not required. The external terminal is only a supplemental bonding connection where local authorities permit or require such a connection.

## Loading

When wiring for DC power, 4-20mA signal, remote wiring to sensors must be sized sufficiently to provide adequate voltages for the line length and the loads that will be used.

The use of high inrush or inductive loads may affect the performance of the transmitter. For best reliability use resistive loads only.

## Isolation

Isolate the power and signal-carrying conductors.

## Circuit Protection

Supply circuits must provide over-current protection. Consider inrush current in specifying any DC supply. Power supply range is 16 to 32 VDC for EC and mV versions, 18 to 32 VDC for Searchpoint Optima Plus and Searchline Excel, and 16 to 32 VDC depending on the limitations of the device for the generic 4-20mA input.

## Distance Considerations for Installation

Adequately powering the transmitter is the factor that determines an installation's maximum distance. The 4-20 mA output signal will easily handle the distance back to the control equipment.

The primary factors determining distance are the minimum operating voltage of the transmitter and/or sensor; the maximum current draw of the transmitter/sensor, the resistance of the wire used, the power supply voltage, and the current capacity of power supply. An additional consideration is the type of installation; specifically, how many transmitters/sensors are drawing power from the same power supply and whether these transmitters are using the same pair of wires ("daisy-chained") or have their own connections.

# Types of Installations

There are three basic types of installation: a single transmitter; multiple transmitters connected to a single power source; and multiple transmitters connected in a “daisy-chain” configuration.

## Single Transmitter

This is the simplest type of installation. It consists of a single XNX transmitter installation per power source.

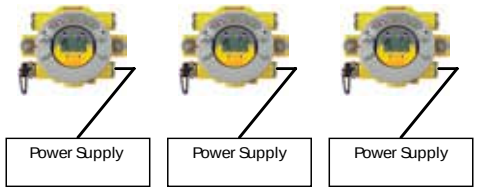



Figure 27. Single transmitter installation

*Advantages:*

- Maximum distance between power source and transmitter
- Smaller power source
- If a power source fails, only one monitoring point fails.

*Disadvantage:*

- Multiple transmitters require multiple power sources.

## Multiple Transmitters Connected to a Single Power Source

This is two or more transmitters sharing a single power source with each transmitter having its own dedicated wiring to the power source.

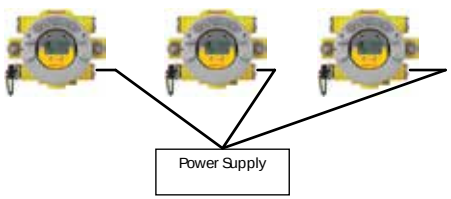



Figure 28. Multiple transmitters powered by a single power supply

*Advantages:*

- Maximum distance between power source and transmitters
- Fewer power sources.

*Disadvantages:*

- Larger power source will be needed
- If a power source fails, several monitoring points fail.

## Multiple Transmitters Connected in a “Daisy-Chain” Configuration

This configuration consists of two or more transmitters installed in a line. The power connections are installed as an extension of the previous transmitter, with the first transmitter being the only one actually wired to the power source.

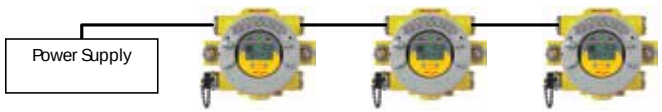



Figure 29. Daisy-chained transmitters from one power supply

*Advantages:*

- Less wire needed for installation
- Fewer power sources.

*Disadvantages:*

- Requires a larger power source
- Shorter distance between power source and transmitters.
- If a power source fails, several monitoring points fail.

## ⚠ NOTE

**Note:** CSA/FM certification does not cover daisy-chained XNX combustible gas transmitters.

### Power Source Selection

For each type of installation, selection of power supply is important. Power supplies are rated by voltage and power. The nominal voltage for all XNX transmitters is 24V with the power required depending on the number of points using the same power supply.

As a general guideline, the power supply should be capable of providing more power than is required by the installation. A 10 watt power supply is fine for a single XNX mV with catalytic sensor (6.5 watts required, see the following table) but is inadequate for a single XNX IR with Searchpoint Optima Plus (10 watts required).

| XNX Universal Transmitter Maximum Power Consumption | | | | |
|---|---|---|---|---|
| Configuration | -40°C to +65°C | | -10°C to +65°C | |
| | HART over 4-20mA (watts) | HART over 4-20mA with Relay, Modbus®, or Foundation™ Fieldbus (watts) | HART over 4-20mA (watts) | HART over 4-20mA with Relay, Modbus, or Foundation Fieldbus (watts) |
| transmitter with toxic sensors | 5.1 | 6.2 | 3.4 | 4.5 |
| transmitter with catalytic sensors | 5.4 | 6.5 | 3.7 | 4.8 |
| transmitter with infrared cartridge | 5.4 | 6.5 | 3.7 | 4.8 |
| transmitter with Searchpoint Optima Plus | 8.6 | 9.7 | 6.9 | 8.0 |
| transmitter with Searchline Excel | 12.1 | 13.2 | 10.4 | 11.5 |

To determine the wattage required, add the maximum power requirements of all the points that will share the power supply. For example, consider a system with two XNX mV transmitters with catalytic sensors (6.5 watts each) and one XNX IR with Searchpoint Optima Plus (10 watts). A 25 watt power supply would probably handle this installation, but a 30 watt power supply would be a better choice.

### Wire Selection

The type of wire used for connections has an effect on the distance of the installation. This is because some of the voltage is dropped across the cable between the power supply and the transmitter.

Thinner wire (i.e., 18 AWG) will lose more voltage than thicker wire (i.e., 12 AWG). The amount of voltage lost depends on how much current is being drawn through the wire; more current means more loss. If too much voltage is ropped across in the wiring, there may not be enough at the distant point to allow the transmitter to operate.

## Single Transmitter Distances

For installations that have dedicated wiring between the transmitter and the power supply, use the following chart. These distances assume stranded wire is used. If multiple transmitters are using the same power supply, make sure the power supply wattage rating is high enough to power all transmitters simultaneously.

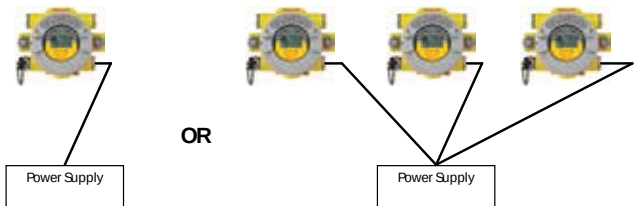



Figure 30. Single transmitter distances

| Single Transmitter Distances | | | | |
|---|---|---|---|---|
| **Configuration** | **18 AWG [1.0 mm2]** | **16 AWG [1.5 mm2]** | **14 AWG [2.0 mm2]** | **12 AWG [3.5 mm2]** |
| transmitter mV or EC with sensor | 1140 feet [347 meters] | 1810 feet [551 meters] | 2890 feet [880 meters] | 4620 feet [1408 meters] |
| transmitter IR with Searchpoint Optima Plus | 660 feet [201 meters] | 1060 feet [323 meters] | 1690 feet [515 meters] | 2690 feet [820 meters] |
| transmitter IR with Searchline Excel | 550 feet [168 meters] | 890 feet [270 meters] | 1410 feet [430 meters] | 2260 feet [690 meters] |

## Daisy-Chained Transmitter Distances

It is difficult to calculate distances for this configuration. There are many factors to be considered: distance from control room to first transmitter, distance between transmitters, sensor types, etc. A few scenarios are presented here to provide a base to work from.

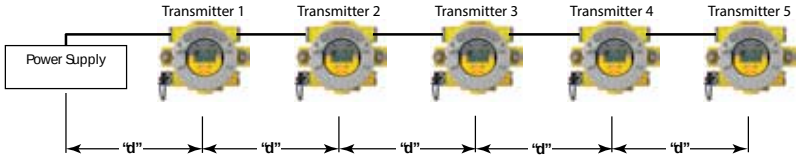



Figure 31. Daisy-chained transmitter distances

1. Several transmitters equally spaced from themselves and the power source.

| 2 Transmitters - Distance "d" | | | | |
|---|---|---|---|---|
| **Configuration** | **18 AWG [1.0 mm2]** | **16 AWG [1.5 mm2]** | **14 AWG [2.0 mm2]** | **12 AWG [3.5 mm2]** |
| transmitter mV or EC with sensor | 380 feet [115 meters] | 600 feet [183 meters] | 960 feet [292 meters] | 1540 feet [469 meters] |
| transmitter IR with Searchpoint Optima Plus | 220 feet [67 meters] | 350 feet [106 meters] | 560 feet [170 meters] | 900 feet [274 meters] |
| transmitter IR with Searchline Excel | 185 feet [56 meters] | 295 feet [90 meters] | 470 feet [143 meters] | 750 feet [229 meters] |

| 3 Transmitters - Distance "d" | | | | |
|---|---|---|---|---|
| **Configuration** | **18 AWG [1.0 mm2]** | **16 AWG [1.5 mm2]** | **14 AWG [2.0 mm2]** | **12 AWG [3.5 mm2]** |
| XNX mV or EC With Sensor | 190 feet [58 meters] | 300 feet [91 meters] | 480 feet [146 meters] | 770 feet [234 meters] |
| XNX IR with Searchpoint Optima Plus | 110 feet [33 meters] | 175 feet [53 meters] | 280 feet [85 meters] | 450 feet [137 meters] |
| XNX IR with Searchline Excel | 90 feet [27 meters] | 145 feet [44 meters] | 235 feet [71 meters] | 375 feet [114 meters] |

| 4 Transmitters - Distance "d" | | | | |
|---|---|---|---|---|
| **Configuration** | **18 AWG [1.0 mm2]** | **16 AWG [1.5 mm2]** | **14 AWG [2.0 mm2]** | **12 AWG [3.5 mm2]** |
| XNX mV or EC With Sensor | 110 feet [33 meters] | 180 feet [55 meters] | 290 feet [88 meters] | 460 feet [140 meters] |
| XNX IR with Searchpoint Optima Plus | 65 feet [20 meters] | 105 feet [32 meters] | 165 feet [50 meters] | 270 feet [82 meters] |
| XNX IR with Searchline Excel | 55 feet [17 meters] | 85 feet [26 meters] | 140 feet [43 meters] | 225 feet [68 meters] |

| 5 Transmitters - Distance "d" | | | | |
|---|---|---|---|---|
| **Configuration** | **18 AWG [1.0 mm2]** | **16 AWG [1.5 mm2]** | **14 AWG [2.0 mm2]** | **12 AWG [3.5 mm2]** |
| XNX mV or EC With Sensor | 75 feet [23 meters] | 120 feet [36 meters] | 190 feet [58 meters] | 300 feet [91 meters] |
| XNX IR with Searchpoint Optima Plus | 45 feet [13 meters] | 70 feet [21 meters] | 110 feet [33 meters] | 180 feet [55 meters] |
| XNX IR with Searchline Excel | 35 feet [11 meters] | 55 feet [17 meters] | 90 feet [27 meters] | 150 feet [46 meters] |

2. Several transmitters installed in pairs with each pair equally spaced from the next pair and the power source. These distances assume the paired transmitters are installed within 10 feet [3 meters] of each other.

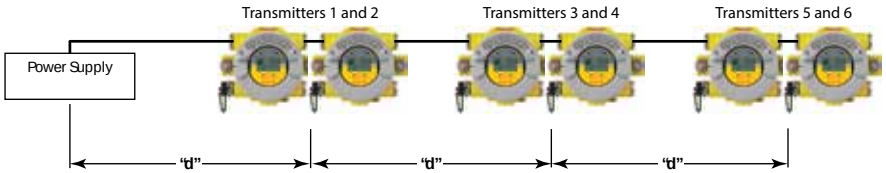



Figure 32. Transmitters in pairs

| 2 Transmitters - Distance "d" | | | | |
|---|---|---|---|---|
| **Configuration** | **18 AWG [1.0 mm2]** | **16 AWG [1.5 mm2]** | **14 AWG [2.0 mm2]** | **12 AWG [3.5 mm2]** |
| XNX mV or EC With Sensor | 485 feet [147 meters] | 775 feet [235 meters] | 1230 feet [292 meters] | 1970 feet [600 meters] |
| XNX IR with Searchpoint Optima Plus | 380 feet [115 meters] | 600 feet [180 meters] | 960 feet [290 meters] | 1540 feet [470 meters] |
| XNX IR with Searchline Excel | 280 feet [85 meters] | 440 feet [134 meters] | 700 feet [213 meters] | 1130 feet [344 meters] |

| 4 Transmitters - Distance "d" | | | | |
|---|---|---|---|---|
| **Configuration** | **18 AWG [1.0 mm2]** | **16 AWG [1.5 mm2]** | **14 AWG [2.0 mm2]** | **12 AWG [3.5 mm2]** |
| XNX mV or EC With Sensor | 190 feet [58 meters] | 300 feet [91 meters] | 480 feet [146 meters] | 770 feet [234 meters] |
| XNX IR with Searchpoint Optima Plus | 110 feet [33 meters] | 175 feet [53 meters] | 280 feet [85 meters] | 450 feet [137 meters] |
| XNX IR with Searchline Excel | 90 feet [27 meters] | 145 feet [44 meters] | 235 feet [71 meters] | 375 feet [114 meters] |

| 6 Transmitters - Distance "d" | | | | |
|---|---|---|---|---|
| **Configuration** | **18 AWG [1.0 mm2]** | **16 AWG [1.5 mm2]** | **14 AWG [2.0 mm2]** | **12 AWG [3.5 mm2]** |
| XNX mV or EC With Sensor | 95 feet [33 meters] | 150 feet [45 meters] | 240 feet [73 meters] | 385 feet [117 meters] |
| XNX IR with Searchpoint Optima Plus | 55 feet [17 meters] | 85 feet [26 meters] | 140 feet [42 meters] | 225 feet [68 meters] |
| XNX IR with Searchline Excel | 45 feet [14 meters] | 70 feet [21 meters] | 115 feet [35 meters] | 185 feet [56 meters] |

Ensure that wiring is adequately protected from mechanical damage during installation. Shorted or open-circuit wiring to an MPD **I** sensor may result in a full-scale concentration reading before the transmitter's internal diagnostics can identify the external installation fault.

## POD Connections

This illustration shows the connections available on of the terminal blocks for each type of personality board.

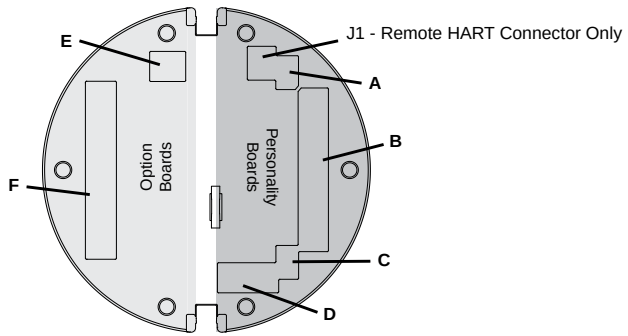



Figure 33. Personality board terminal block legend

Each of the personalities uses a single terminal block for connection with the exception of the IR personality, which features a second terminal block.

The personality boards also provide a dedicated pair of jumper switches to define output of the transmitter as isolated 4-20mA, Sink 20mA, or Source 20mA as well as a service jumper to allow power to the loop to continue when the transmitter is being serviced. A separate connector is used to activate local HART (see the Local HART Interface section).

Local HART provides an external access to control the transmitter. An intrinsically safe (IS) barrier inside the transmitter allows the user to attach an external handheld field communicator for programming and configuration. The external interface is intrinsically safe. It is installed in the transmitter's lower left cable/conduit port.

| Table A | | | | |
|---|---|---|---|---|
| **Board Type** | **Function** | | **S1** | **S2** |
| EC Personality | 4-20mA Output | Source | ▼ | ▲ |
| mV Personality | | Sink | ▲ | ▼ |
| IR Personality | | Isolated | ▼ | ▼ |

| Table B | | |
|---|---|---|
| **Board Type** | **Connection** | **Function** |
| EC Personality | TB1 | Power, 4-20mA |
| mV Personality | | Power, 4-20mA, Sensor |
| IR Personality | | Power, 4-20mA, IR Power and Signal |

| Table C | | | | |
|---|---|---|---|---|
| **Board Type** | **Function** | | **S3** | **S4** |
| IR Personality | IR 4-20mA Input | Source | ▼ | ▼ |
| | | Sink | ▲ | ▲ |

| Table D | | |
|---|---|---|
| **Board Type** | **Connection** | **Function** |
| EC Personality | J2 | EC IS Barrier |
| IR Personality | TB2 | Com A and B |

| Table E | | |
|---|---|---|
| **Board Type** | **Connection** | **Function** |
| Relay | TB4 | Remote Reset Connector |
| Modbus | SW5 | Bus Loop Terminators |
| Foundatin Fieldbus | SW5 | Simulation Mode |

| Table F | | |
|---|---|---|
| **Board Type** | **Connection** | **Function** |
| Relay | TB3 | Relay Output |
| Modbus | TB3 | Data Connection |
| Foundation Fieldbus | TB3 | Data connection |

**⚠ NOTE**

**Note:** Open loop faults are not available due to HART, Modbus, and FOUNDATION Fieldbus interfaces where a 4-20 signal cannot be used. In this case, open loop, 0mA must be used as the diagnostic.

The Option circuit boards vary depending upon the option selected when ordered. Only one of the three available interface options (relays, Modbus, or FOUNDATION Fieldbus) can be attached to the transmitter. When installed, connections to the options are made to connectors at the bottom of the POD.

## 4-20mA Output, Common Connections, and Power Settings

**⚠WARNING**

**Warning:** Power off the transmitter before changing S3 or S4. Failure to do this will permanently damage the transmitter. Both switches must be set in either Source or Sink prior to applying power.

The transmitter allows the user to configure the 4-20mA output to Sink, Source, or Isolated mode operation via two programming switches on the POD[1]. The Switch Configuration table shows the S1 and S2 setting and corresponding output configuration.

| Switch Configuration | | |
|---|---|---|
| **Mode** | **S1** | **S2** |
| Source | Down | Up |
| Sink | Up | Down |
| Isolated | Down | Down |

Most controllers in the market will accept source-configured devices. Sink-configured signals are used in older technology controllers, which reduce the need for complete system upgrades. In isolated-signal devices, if the controller fails or the mA signal wires are disconnected or broken, the field device will remain operational. Most controllers in the market will accept isolated configured devices.

Power and 4-20mA connections are made at TB-1 and are identical for the EC, IR, and mV Personality Boards. For user convenience, a second set of +Ve and -Ve power terminals have been provided to eliminate the need for a secondary junction

1 The 4-20 mA output state is refreshed at least every two seconds (once per second is typical).

box in multi-node systems when used with the supplied terminal jumpers. These jumpers enable an electrical connection without connecting to the Personality Board. Install them between pins 1 and 2 and between pins 3 and 4 to support multi-node wiring.

Keep the total load resistance for the 4-20mA between 200 and 500Ω, including the resistance of the properly selected 4-20mA cable and input impedance of the equipment to be connected.

Failure to perform 'Calibrate mA Output' or with loads outside the recommended values may result in a diagnostic warning or fault messages.

If the 20 mA output is not used, a 500 ohm resistor must be installed.

The transmitter's power consumption is dependent on the sensor and options for the specific configuration. For proper operation, the input voltage must be maintained between 16 and 32 VDC for EC and mV units and between 18 to 32 VDC for IR units.

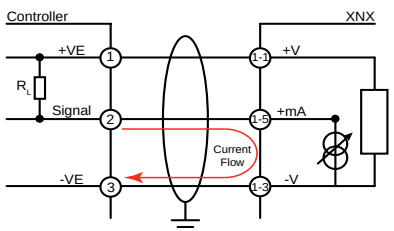



Figure 34. Sink wiring

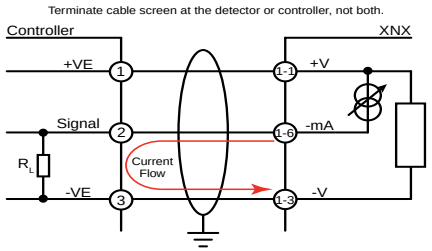



Figure 35. Source wiring

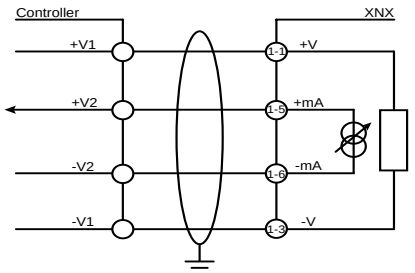



Figure 36. Isolated wiring

Labels applied to the back of the POD identify each of the connection points.

**NOTE**

**Note:** Pins 2 and 4 of terminal block TB1 have no internal connection on the personality board. When used with the terminal block jumpers, pins 2 and 4 can provide additional 4-20mA connections or supply power for daisy-chained units.

## NOTE

**Note:** FOUNDATION Fieldbus XNX transmitters require a separate power source and cannot be powered via the bus.

### FOUNDATION Fieldbus Wiring

FOUNDATION Fieldbus connections to the transmitter are made through a pluggable terminal block on the FOUNDATION Fieldbus option board, shown in Figure 38. A simulation switch (SW5) is included on the board to enable/disable simulation mode. Terminals 3-1 through 3-4 are provided to facilitate bus wiring; there is no internal connection to other XNX circuitry. Terminal 3-1 is connected internally to 3-2. Similarly, terminal 3-3 is connected internally to 3-4.

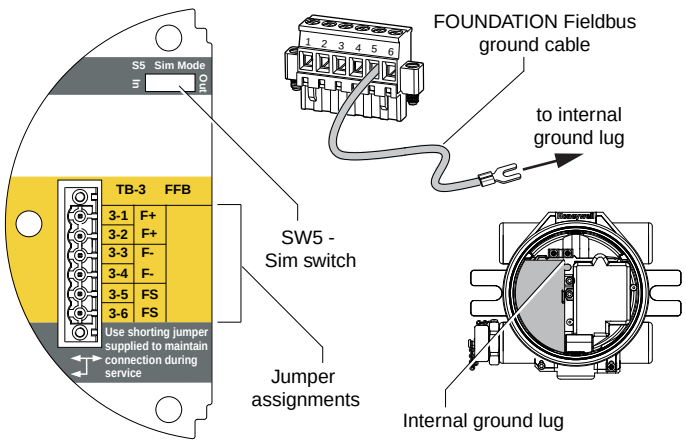



Figure 37. FOUNDATION Fieldbus option board and terminal block

### Terminal Block Connections

Connections to the transmitter are made via pluggable terminal blocks secured to the back of the POD. The terminal blocks are keyed and polarized. A color coded label assists in wiring when the block is removed from the POD.

The terminals are suitable for use with 12 to 28 AWG or 0.8 to 2.5 $mm^2$ wire. Wire insulation must be stripped 5/16” (8 mm). Tighten each terminal to a maximum of 4.5 in-lbs (0.51 Nm). Up to four terminal blocks are provided; each having 2, 6, 9, or 10 positions.

Two terminal block jumpers are included to provide an electrical connection without connection to the Personality Board. Install the jumpers between pins 1 and 2 and between pins 3 and 4 to support multi-node wiring.

## WARNING

**Warning:** When the transmitter is equipped with the optional Remote Mount Kit, the remote sensor must be securely mounted in a fixed position. The Remote Sensor kit is not intended to be used as a handheld sensor.

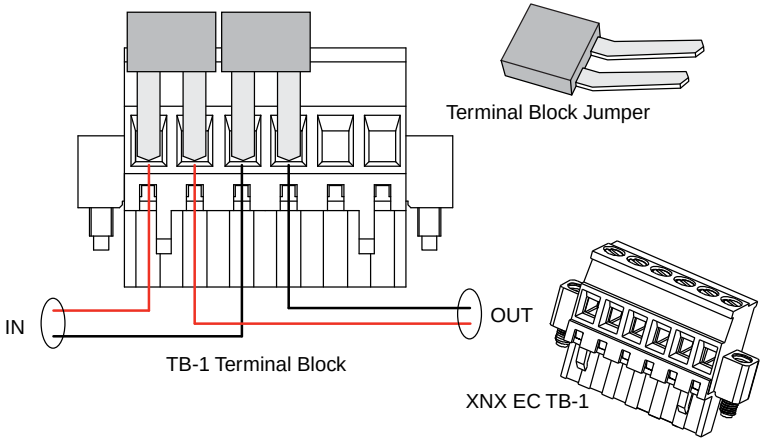
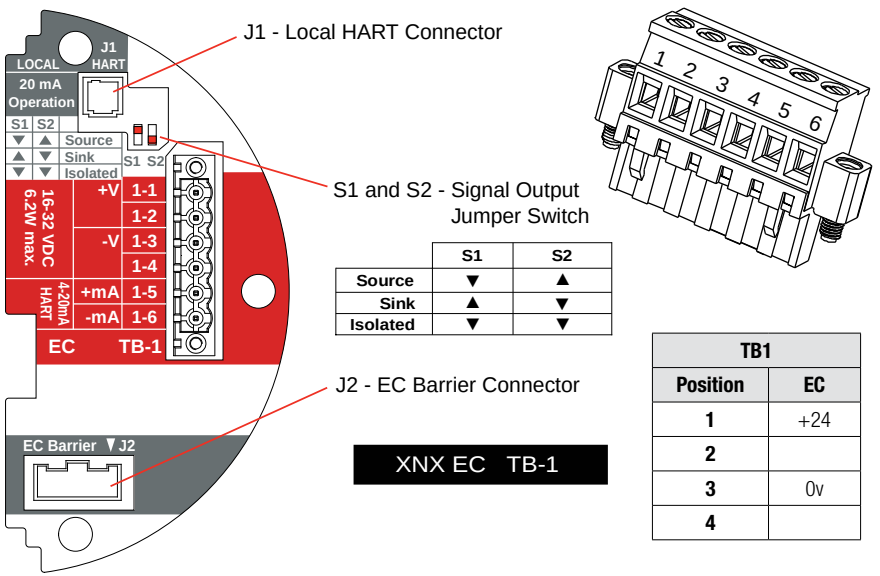



Figure 38. Pluggable terminal block and terminal block jumper

## EC Personality Wiring

**⚠CAUTION**

**Caution:** Do not force the POD into the enclosure. Doing so may result in damage to the wiring or the POD or may alter the switch settings. If resistance is felt, wires may be preventing the POD from being properly positioned.




| | S1 | S2 |
|---|---|---|
| Source | ▼ | ▲ |
| Sink | ▲ | ▼ |
| Isolated | ▼ | ▼ |

| TB1 | |
|---|---|
| **Position** | **EC** |
| 1 | +24 |
| 2 | |
| 3 | 0v |
| 4 | |

Figure 39. XNX EC personality board terminal blocks and jumper switches and terminal block assignments

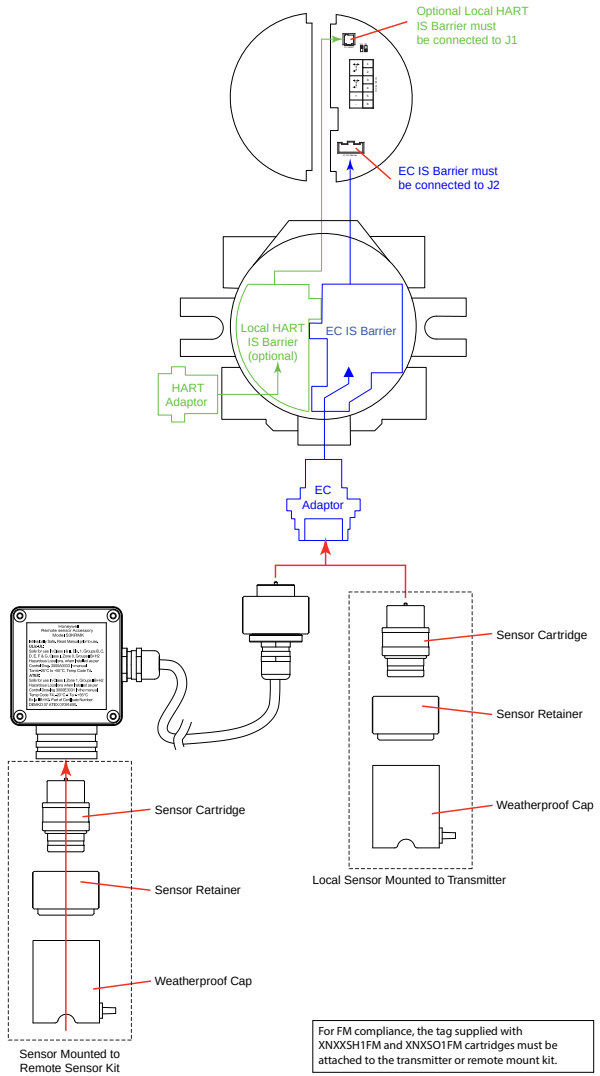



Figure 40. EC personality wiring

## Electrochemical Sensor Installation

**⚠CAUTION**

**Caution:** A missing oxygen cell will result in 0% V/V O2 gas concentration, thus triggering alarm events. In this situation, check the connection of the EC cell to the sensor connector board.

**Caution:** For biased sensors (e.g., nitrogen dioxide) remove the sensor stabilizer from the bottom of the sensor prior to installation.

Using the Installing plug-in sensor illustration as a guide, follow this procedure:

1. Verify that the label on the new sensor is the correct gas type.
2. Unscrew the weatherproof cover, loosen the retainer locking screw with the supplied hex key, and unscrew the sensor retainer.
3. Plug in the new sensor. Take care to align the sensor pins with the connector.
4. Refit the sensor retainer, tighten the locking screw with the hex key, and refit the weatherproof cover. Countdown time of up to 180 seconds (depending on the sensor type) will be displayed.
5. Acknowledge the gas type (required before proceeding). For more information on setting gas type, see the Gas Selection section.
6. After the sensor is installed and the gas type is confirmed, the range, alarm levels, and other important settings must be set; see the Configuring the Transmitter section.
7. After the transmitter has been configured, calibrate the sensor following the procedures in the Calibration section.

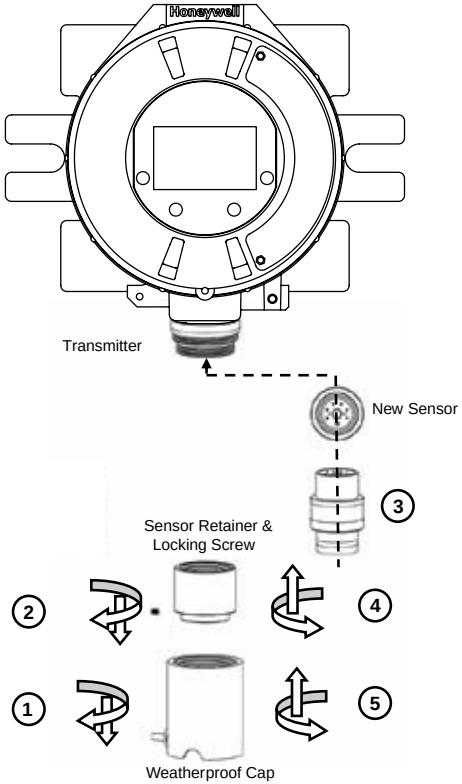



Figure 41. Installing plug-in sensor

**NOTE**

**Note:** Refer to control drawings 3000E3157 and 3000E3159 for the installation requirements and the remote mounting of EC cells.

## EC Sensor Remote Mounting Kit

The remote sensor mounting kit is used to mount the EC sensor away from the transmitter. To mount the sensor remotely, follow this procedure:

1. Unscrew the weatherproof cover, loosen the retainer locking screw and unscrew the sensor retainer.
2. Remove the sensor by pulling (without twisting).
3. Plug the remote sensor cable connector into the bottom of the transmitter and secure the retainer.
4. Route the cable to the location where the remote sensor is to be mounted.
5. Optional: make a loop of cable at the junction box. This will provide some excess for future re-terminations.
6. If necessary, cut the cable to the required length.

**CAUTION**

**Caution:** Do not cut the cable too short. Once cut, additional lengths of cable cannot be added as this will invalidate the intrinsically safe certification.

**WARNING**

**Warning:** Enclosures of remotely mounted sensors contain aluminum. Be careful to avoid ignition hazards due to impact or friction when installed in Zone 1 locations.

7. Mount the remote sensor junction box, allowing enough room below to fit the sensor and weatherproof cover. See control drawing 3000E3159 in the Remote Sensor Mount section for specific mounting information.

8. Attach the cable to the remote terminal box via the gland provided.
9. Make the connections as shown in the Installing a remote sensor mounting kit illustration on the next page.
10. Fit the Terminal box lid.
11. Plug the sensor into the socket at the bottom of the terminal box.
12. Fit the sensor retainer, tighten the locking screw, and fit the weatherproof cover.
13. Calibrate the sensor following the procedure in the Zero and Span Calibration for EC Sensors, mV Sensors, and Searchpoint Optima section.

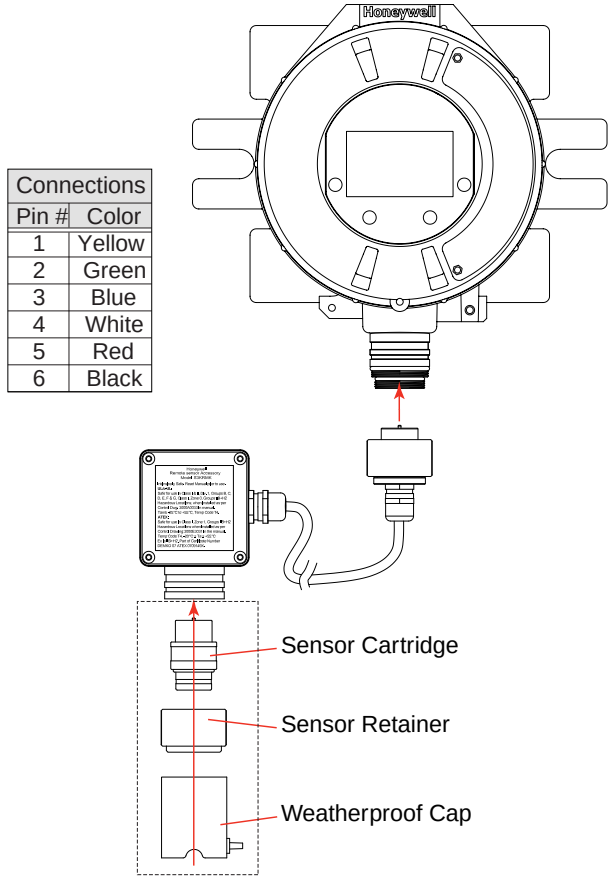



Figure 42. Installing a remote sensor mounting kit

## mV Personality Wiring

**A transmitter with the mV personality board allows interface to the Multi Purpose Detector (MPD), 705, and Sensepoint devices.**

**⚠CAUTION**

**Caution:** See Specifications to ensure that the transmitter and the mV sensor have the appropriate approvals prior to commissioning.

**Caution:** Verify that the mV sensor being installed has compatible threads (3/4 NPT or M25).

**Read the Wiring the Transmitter section which defines the power and 4-20mA output connections that are common to all personalities.**

**Connections from the mV sensor to the transmitter are made via a single pluggable terminal block. Honeywell Analytics recommends that an 8" (20 cm) service length for wiring be maintained. The wire colors for the connections for each sensor type are shown in the table on this page.**

**Verify that wires for 4-20mA outputs are routed away from sources of noise such as relay wires.**

**⚠ NOTE**

**Note:** The black and red wires from the MPD are not used with the mV personality board. Ensure that they are properly isolated from live connections. Do not cut the wires.

**⚠CAUTION**

**Caution:** Dress the wires properly so that cabling does not contact switches 1 or 2 on the back of the POD. Do not force the POD into the enclosure. Doing so may result in damage to the wiring or the POD. If resistance is felt, wires may be preventing the POD from being properly positioned.

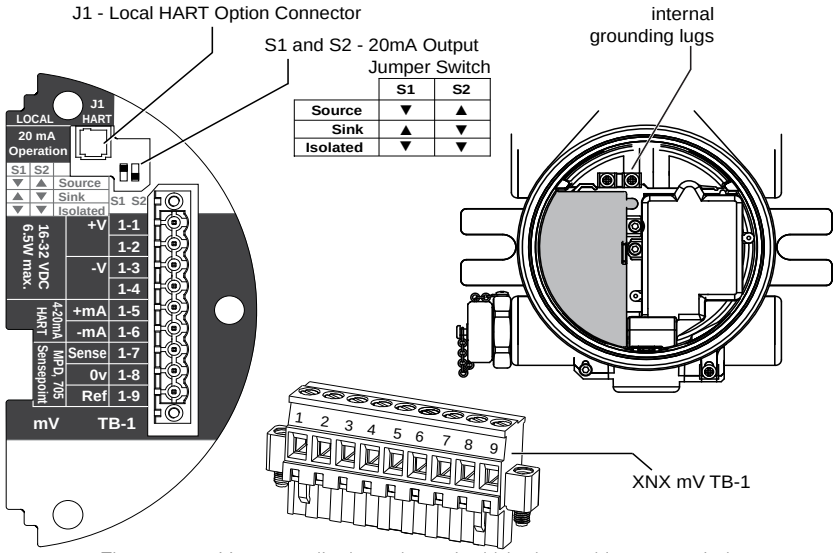



Figure 43. mV personality board terminal blocks and jumper switches

| TB-1 | Desc. | Wire Color from Sensor | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | mV Catalytic Bead Sensor | | | Sensept PPM* | mv MPD w/IR Sensor | | |
| | | MPD | 705 705HT | Sensept Senspt HT | | IR 5% | | IR Flam |
| | | | | | | $CO_2$ | $CH_4$ | |
| Pins 1-6 | | See subsections in the 4-20 mA Output, Common Connections, and Power Settings section for pin identification | | | | | | |
| 7 | Sense | Brown | | | Red | Brown | | |
| 8 | 0v | White | | | Green | White | | |
| 9 | Ref | Blue | | | Blue | Blue | | |

*Internal earth ground; approximately one inch of the black sheath that contains the Sensepoint PPM's four wires (red, blue, green, silver) must be split to allow the silver grounding wire to reach the internal grounding lugs.

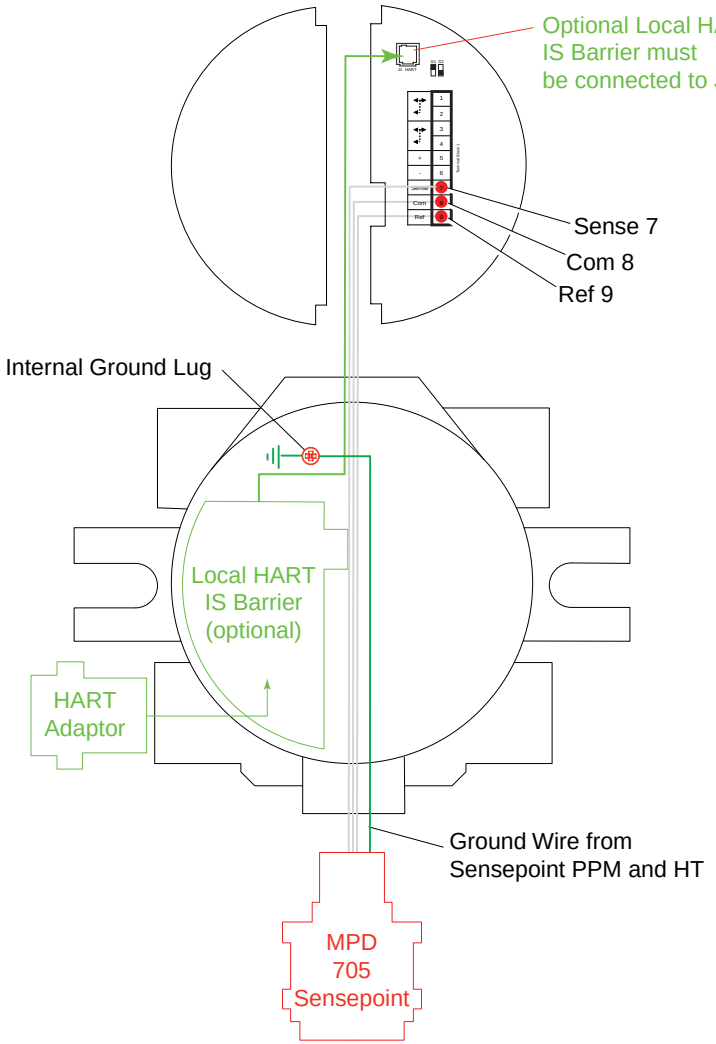


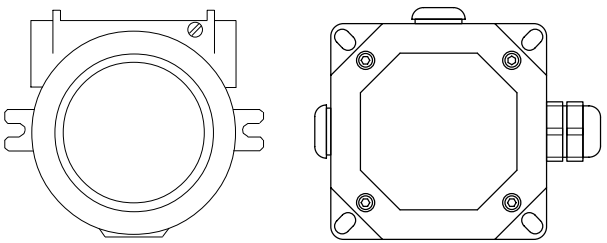

Figure 44. mV personality wiring

## mV Remote Sensor Mounting

The sensor can be mounted remotely from the transmitter; the installation will vary by installed location, sensor and thread type used. To remotely mount the sensor, follow this procedure:

1. Install a junction box appropriately rated for the environment. Allow sufficient room for the installation and calibration of the sensor. (MPD sensors must be installed with the sinter pointing down.)
2. Loosen the retainer locking screw on the transmitter with the supplied hex key.
3. Unscrew the transmitter's weatherproof cover and loosen the retainer locking screw with the supplied hex key.
4. Run conduit or cable from one of the transmitter's available conduit ports to the location of the remote terminal housing in accordance with local requirements.

   A terminal housing provides a mounting base for the sensor. The installation wiring enters the terminal housing via conduit. UL and CSA require a conduit pour fitting within 18 in. (45 cm) of each enclosure.



UL/CSA Aluminum Junction Box
2441-0022

ATEX/IEC Junction Box
00780-A-0100

Figure 45. Remote terminal housings

The distance between transmitter and remote installation must comply with these parameters to ensure proper operation. Distances are dependent on sensor types and the wire gauge used.

| AWG | Metric Wire Gauge | MPD CB1, 705 Series. Sensepoint Series Sensors | MPD IC1, IV1 & IF1 Sensors |
|---|---|---|---|
| 24 | 0.25 $mm^2$ | 12m (47 ft.) | 30m (97 ft.) |
| 22 | | 20m (65 ft.) | 50m (162 ft.) |
| 20 | 0.5 $mm^2$ | 30m (97 ft.) | 80m (260 ft.) |
| 18 | | 50m (162 ft.) | 120m (390 ft.)* |
| 16 | 1.0 $mm^2$ | 80m (260 ft.)* | 200m (650 ft.)* |

* Fluctuations in temperature have a greater impact on smaller wire diameters and therefore may require more frequent zero calibrations.

5. Wire the pluggable terminal block as shown in the mV personality board illustration then plug the connector into the back of the mV personality board. In remote mount MPD configurations, the 3 wires connecting the pluggable terminal block and the remote MPD must be routed through the supplied ferrite bead (Honeywell Analytics part no. 0060-1051, supplied in the accessory kit) as shown in Figure 46.

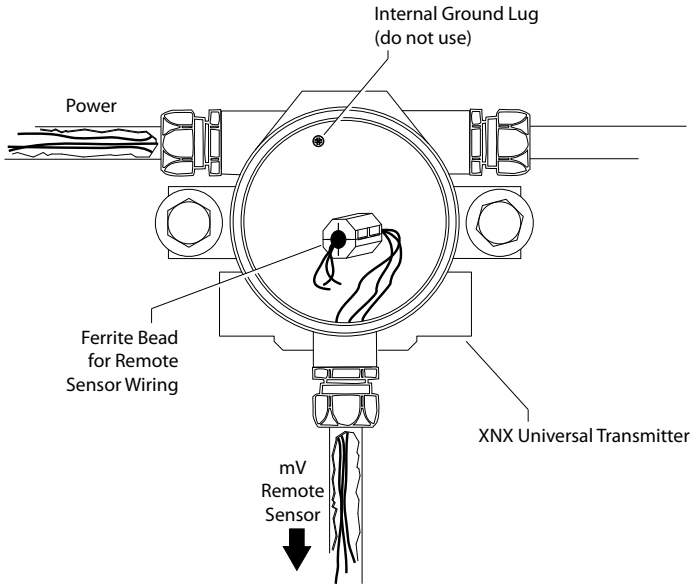



**Figure 46.** Ferrite bead wiring

6. Mount the remote sensor junction box with sufficient room below to fit the sensor and weatherproof cover.

**WARNING**

**Warning:** Install the junction box according to local codes and manufacturer's requirements.

7. Attach the conduit to the remote terminal box. The junction box provides a mounting base for the sensor and contains the associated electronic circuit.
8. In the remote junction box, connect the wires from the transmitter to the 3-way terminal block in the terminal box.

**NOTE**

**Note:** The black and red wires from the MPD are not used with the mV personality board. Ensure that they are properly isolated from live connections. Do NOT cut the wires.

**WARNING**

**Warning:** The enclosures of remotely mounted 705HT sensors contain aluminum. Be careful to avoid ignition hazards due to impact or friction when installed in Zone 1 locations.

All cable port devices and blanking elements must be certified in type of explosion protection flameproof enclosure “Ex d” or “Ex e”, suitable for the conditions of use and correctly installed.

9. Plug the connector into the back of the mV personality board.
10. Install the mV sensor.
11. Terminate wiring at the mV sensor.
12. At the transmitter, pass the wires through the ferrite bead as shown in Figure 46 and terminate the wiring at the pluggable terminal block as shown in Figure 44.
13. Fit the terminal box lid.
14. Fit the sensor retainer, tighten the locking screw and fit the weatherproof cover (if required).
15. Calibrate the sensor following the procedure in the Calibration section.

**NOTE**

**Note:** Environmental conditions that compromise the IP66 protection provided by the weatherproof cover will extend published response times. Safety protocols or maintenance procedures that consider these environmental conditions are recommended.

### IR Personality Wiring

The RS-485 digital communication is the primary interface in which the transmitter reads gas concentration and sensor status from the Optima Plus/Searchline Excel. If RS-485 communication fails, the Optima Plus/Searchline Excel 4-20mA output becomes the primary source to read gas concentration.

The transmitter allows local programming and configuration through the local LCD display as well as through the HART protocol. Gas concentrations can be viewed at the transmitter from the Searchpoint Optima Plus or Searchline Excel via 4-20mA output as well as from the digital communication connection on TB2 that can provide additional diagnostic information. The gas concentration is taken from the digital communication line as long as it is in agreement with the 4-20 mA output, otherwise the 4-20mA output takes precedence.

**CAUTION**

**Caution:** Dress the wires properly so that cabling does not contact switches 1-4 on the back of the POD.

The transmitter provides a 4-20mA output reflecting the input received. It also offers diagnostic information or data via HART or any of the additional communication options offered.

Read the Wiring the Transmitter section which defines the transmitter power and 4-20mA output connections that are common to all personalities.

**⚠CAUTION**

**Caution:** Do not force the POD into the enclosure. Doing so may result in damage to the wiring or the POD or may alter the switch settings. If resistance is felt, wires may be preventing the POD from being properly positioned.

### Searchpoint Optima Plus/Searchline Excel Connections

Connections from the Searchpoint Optima Plus or Searchline Excel to the transmitter are made via two pluggable terminal blocks (see the IR personality board wiring guide). Maintain an 8-inch service length of wiring.

In remote mount configurations, the maximum distance between the transmitter and Optima Plus or Excel is 100 feet (33 meters) using 0.75 $mm^2$ (18 AWG) wire minimum.

**⚠ NOTE**

**Note:** A second, black-handled screwdriver is included for use on terminal blocks 2 and 4. This tool is smaller than the magnetic wand and is designed to fit into the terminal connections on TB2 and TB4.

The Searchpoint Optima Plus or Searchline Excel can be supplied in either Sink or Source mode operation and is typically labeled on the white wire exiting the Searchpoint Optima Plus or Searchline Excel. Use the table in the IR personality board wiring guide to set S3 and S4 to the same output type that appears on the wire tag of the IR device.

For more information see the Searchpoint Optima Plus Operating Instructions (2108M0905) or the Searchline Excel Technical Manual (2104M0506).

### Connecting Generic mA Devices

Use the following schematics to set switches S3 and S4 They *must* be set to the same output type (which appears on the wire tag of the mA device).

The IR personality type provides for a generic mA input under sensor type configuration. The XNX® Universal Transmitter can be used to convert the mA input to be transmitted over HART® or optional Modbus® or FOUNDATION™ Fieldbus protocols and to set optional relays (if equipped). Additional configuration of gas type and unit ID for reporting is required (see the Gas Selection section). For Generic mA devices, input values below 3mA will generate Fault 155.

XNX S3 and S4 must be in the UP position
Set mA Device and XNX to the same output type.

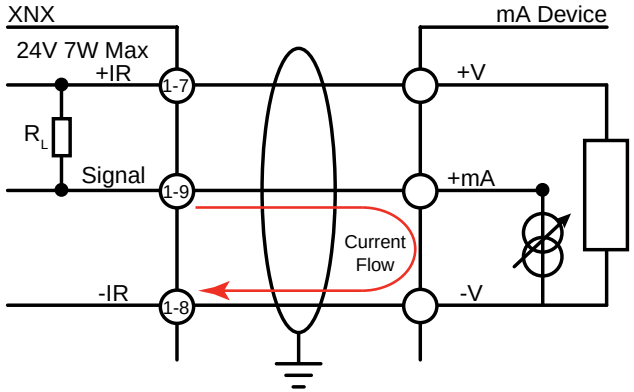



Figure 47. XNX mA input sink configuration

XNX S3 and S4 must be in the DOWN position
Set mA Device and XNX to the same output type.

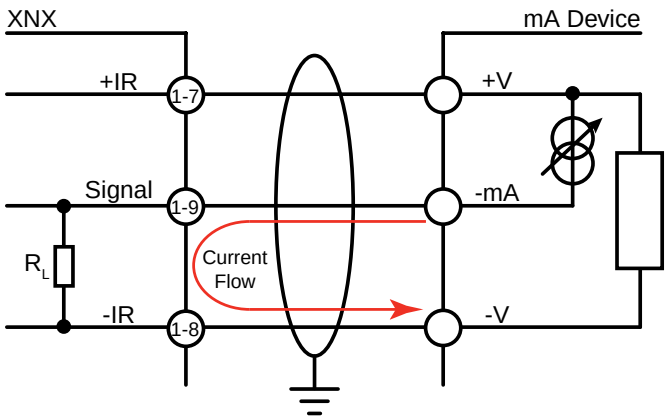
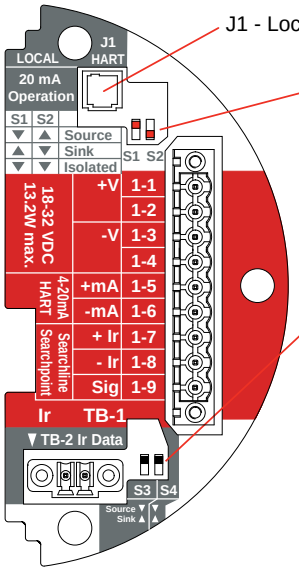


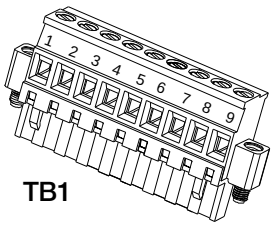

Figure 48. XNX mA input source configuration

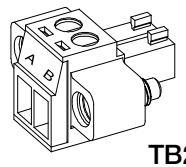



| | S1 | S2 |
|---|---|---|
| Source | ▼ | ▲ |
| Sink | ▲ | ▼ |
| Isolated | ▼ | ▼ |

| | S3 | S4 |
|---|---|---|
| Source | ▼ | ▼ |
| Sink | ▲ | ▲ |

Figure 49. IR personality board terminal blocks, jumper switches and wiring guide




| TB1 | | |
|---|---|---|
| **Terminal No.** | **Desc.** | **From Searchpoint Optima Plus Searchline Excel** |
| 1 | +24v | See the 4-20 mA Output, Common Connections, and Power Settings section . |
| 2 | | |
| 3 | 0 VDC | |
| 4 | | |
| 5 | +20mA | |
| 6 | -20mA | |
| 7 | +24VDC | Red |
| 8 | 0VDC | Black |
| 9 | Sig - 20mA | White |

| TB2 | |
|---|---|
| **Terminal No.** | **From Searchpoint Optima Plus Searchline Excel** |
| A | Blue |
| B | Orange |

| XNX | |
|---|---|
| **Desc.** | **From Searchpoint Optima Plus Searchline Excel** |
| Earth | Green/Yellow |

**Note:**
Honeywell Aanalytics recommends that Excel or Optima and the transmitter be wired to building ground. Ground the system at only one point.

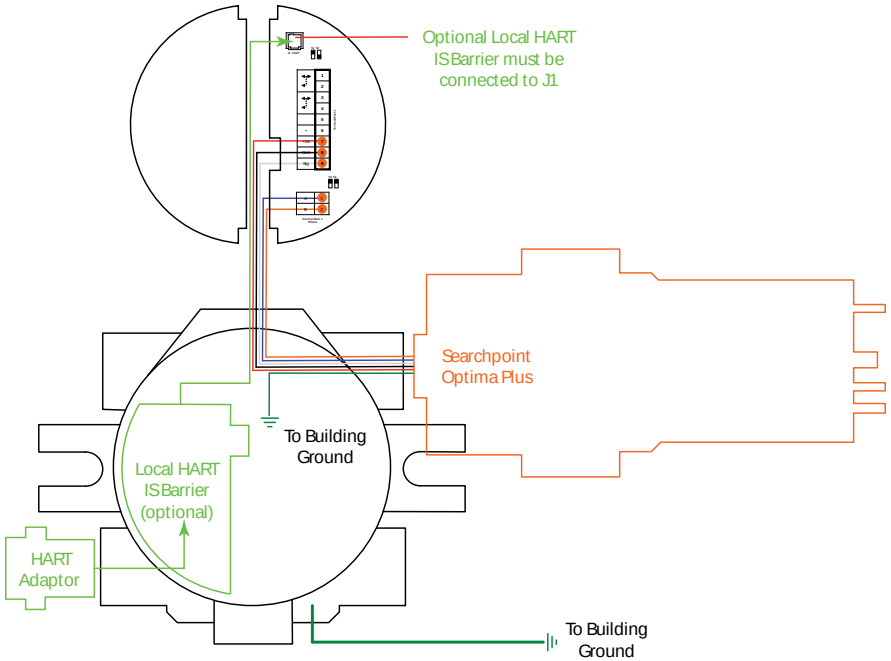



Figure 50. IR personality wiring - Searchpoint Optima Plus

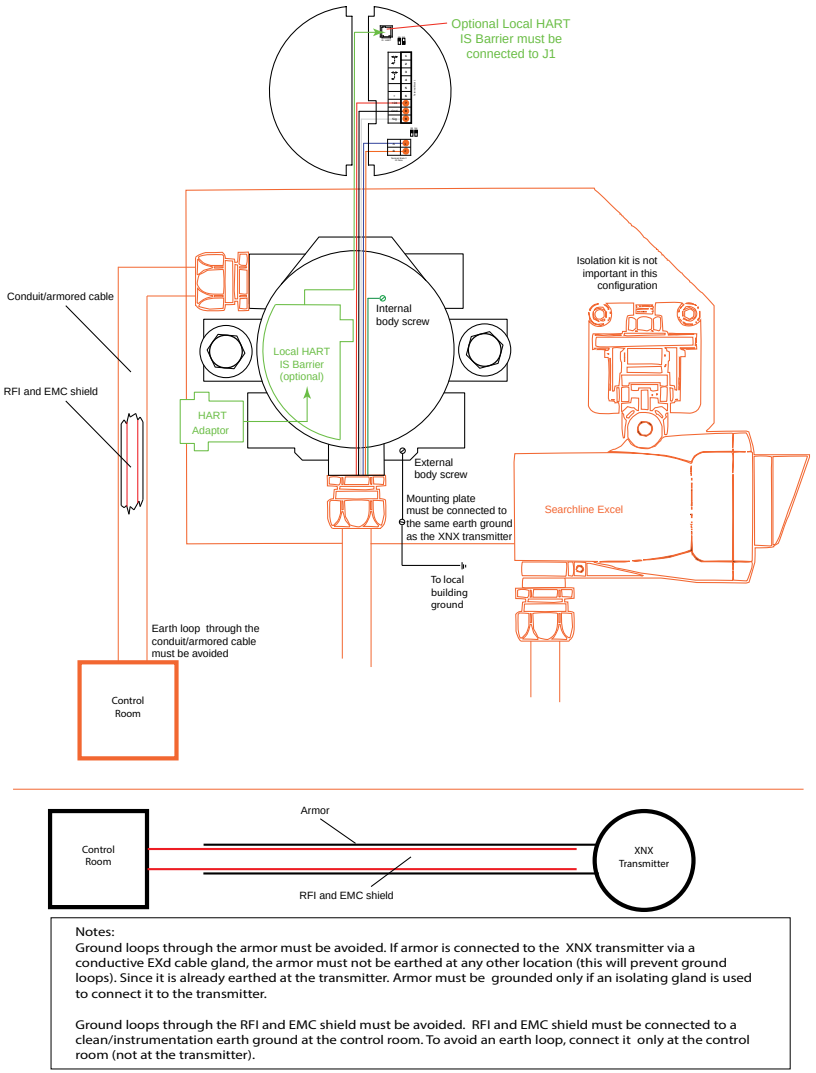



Figure 51. IR personality wiring - Searchline Excel

## Attaching the Searchpoint Optima Plus to the Transmitter

For M25 entries, insert the seal (Honeywell part number 1226-0410) into the proper cable/conduit opening then thread the locknut (Honeywell part number 1226-0409) onto the Optima to the end of the threads. Thread the Optima body into the transmitter until the seal compresses and/or the Optima bottoms out. Reverse until the semi-circular pattern of holes on the front of the weather protection are on the bottom (see below). Tighten the locknut to the transmitter body.

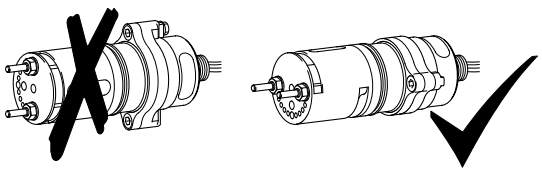


**Figure 52.** Searchpoint Optima Plus orientation

The 3/4" NPT ports do not require the seal and locknut. The form of the threads provide positive locking and sealing.

**⚠ NOTE**

**Note:** When attaching the Searchpoint Optima Plus, coat the threads with an anti-seize compound to prevent corrosion.

## Searchline Excel/Searchpoint Optima Plus Remote Installation

Junction boxes are available for the Searchline Excel and Searchpoint Optima Plus to facilitate remote mounting from the transmitter. Junction boxes are available for installations requiring UL/CSA or ATEX approvals. Consult the *Searchline Excel Technical Handbook* (Honeywell part number 2104M0506) or *Searchpoint Optima Plus Operating Instructions* (Honeywell part number 2108M0905) for specifics on remote installations or contact a Honeywell Analytics representative for more information.

## Searchpoint Optima Plus/Searchline Excel Wiring

When wiring the transmitter and the Searchpoint Optima Plus or Searchline Excel for remote applications, the general recommendations of the ANSI/TIA/EIA-485-A standard must be adhered to with the following additions:

1. When mounting the Searchline Excel sensor or Searchpoint Optima Plus detector, run the wiring between each sensor or detector and the transmitter in separate, dedicated conduits.
2. Use 18 AWG twisted shielded cable for the RS485 connection between sensor or detector and the transmitter. Verify that the shield of the cable is grounded to earth and the XNX ground on one end ONLY.
3. Avoid running wiring near main cables or other high-voltage equipment.
4. Do *not* install 120 ohm terminating resistors. These resistors are not required due to low data rates.
5. Honeywell Analytics recommends that Searchline Excel sensors or Searchpoint Optima Plus detectors and the transmitter be wired to building ground. Ground the system at only one point.
6. Perform a soft reset after connecting the Searchpoint Optima Plus detector and the transmitter for the first time. The soft reset is performed by accessing the transmitter's Calibration Menu. When the soft reset is initiated for the Optima IR sensor, the RS-485 communication will be interrupted temporarily and faults F120 and/or F161 may be observed. RS-485 communication will be re-established in a few minutes and the faults will be reset automatically in non-latching mode. The faults must be reset manually in latching mode

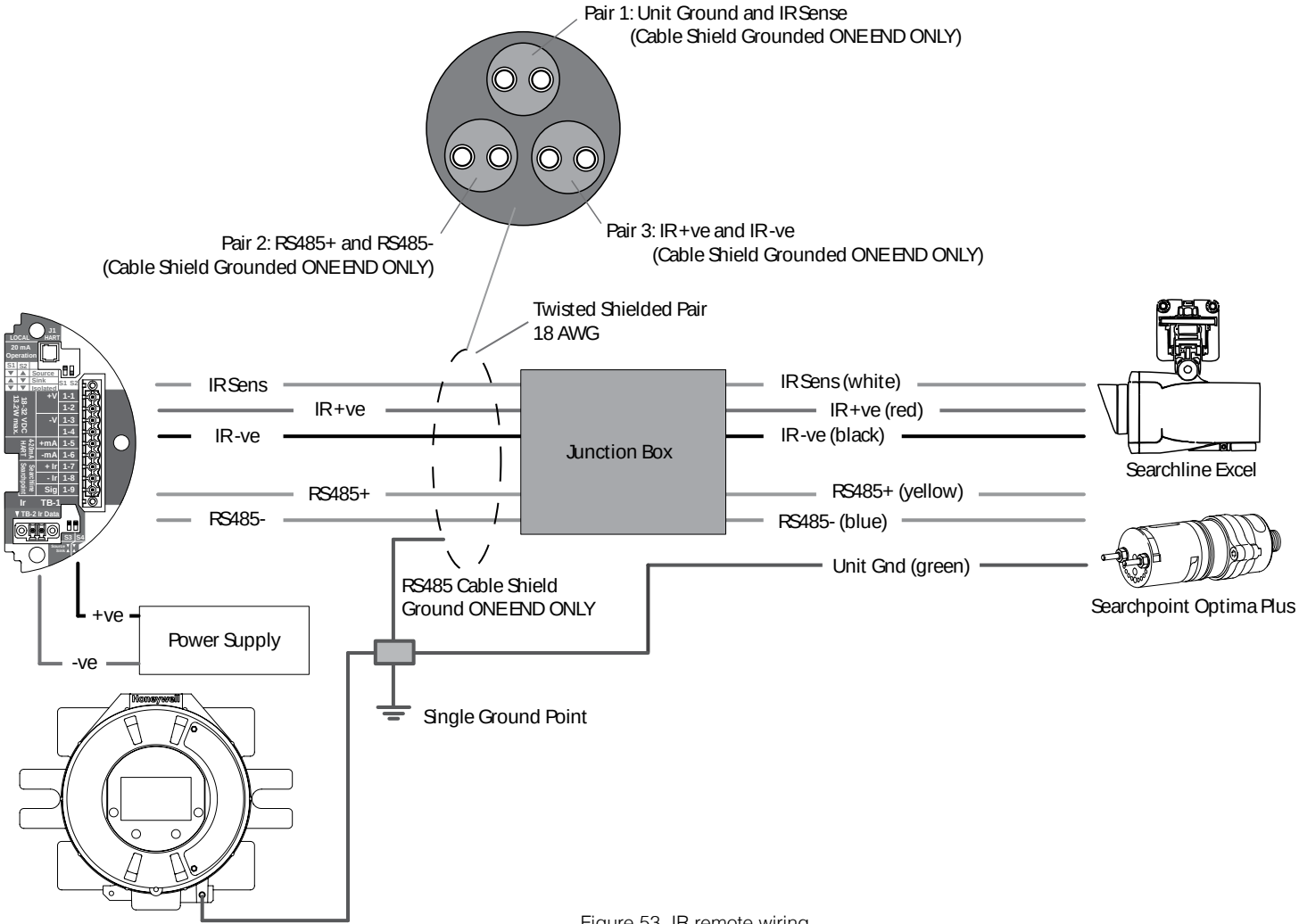



Figure 53. IR remote wiring

# Options

## Local HART Interface

Available with any sensor technology or option, this option provides an external access to the HART interface in the transmitter. An intrinsically safe (IS) barrier inside the transmitter allows the user to attach an external handheld field communicator for programming and configuration. The external interface is installed in the lower left cable/conduit port of the transmitter and is intrinsically safe.

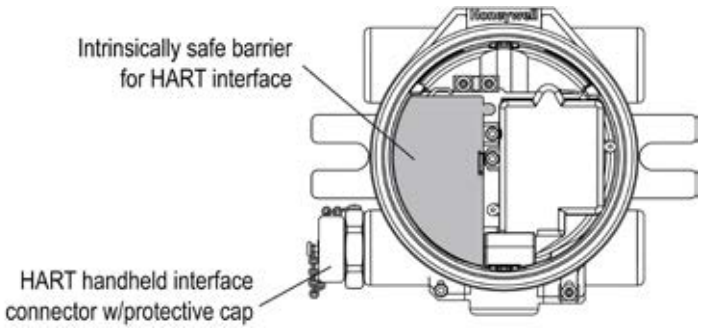



Figure 54. XNX Universal Transmitter with HART interface IS barrier installed

The HART protocol is a communication technology used with smart process instrumentation, providing two-way communication simultaneously with the 4-20mA analog signaling used by traditional instrumentation equipment. For more detailed information on HART, see the the HART Protocol section and www.fieldcommgroup.org.

Implementation of the HART protocol in the transmitter:

- Meets HART 6.0 physical layer specification
- The physical layer is tested according to HART Physical Layer Test Procedure, HCF_TEST-2.
- Data transfer rate: 1200 bps.

HART devices can operate in point-to-point or multidrop configurations.

**⚠CAUTION**

**Caution:** Device address changes must be performed only by qualified service personnel

## Point-to-Point Mode

In point-to-point mode, the 4–20 mA signal is used to communicate one process variable, while additional process variables, configuration parameters, and other device data are transferred via HART protocol, as shown in the illustration below. The 4–20 mA analog signal is not affected by the HART signal.

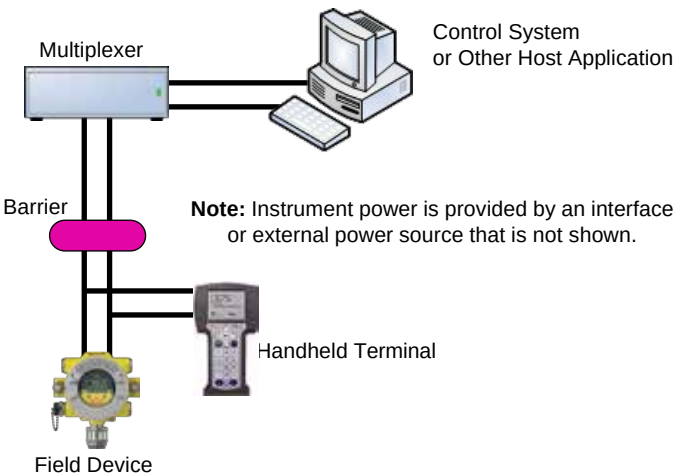



Figure 55. Point-to-point mode of operation

## Multidrop Mode

The multidrop mode of operation requires only a single pair of wires and, if applicable, safety barriers and an auxiliary power supply for up to 8 field devices (see the illustration below). All process values are transmitted via HART protocol. In multidrop mode, all field device polling addresses are >0, and the current through each device is fixed at a minimum value (typically 4 mA).

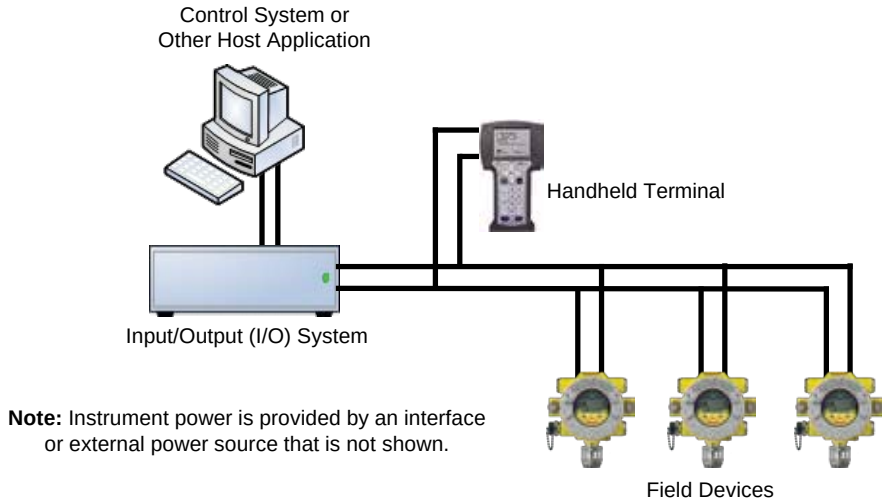



Figure 56. Multidrop mode of operation

**NOTE**

**Note:** Use multidrop connection for supervisory control installations that are widely spaced such as pipelines, custody transfer stations, and tank farms.

In general, the installation practice for HART devices is the same as conventional 4-20mA instrumentation. Individually shielded twisted pair cable, either in single-pair or multi-pair varieties, is the recommended wiring practice. Unshielded cables may be used for short distances if ambient noise and cross-talk will not affect communication.

The minimum conductor size is 0.51 mm diameter (#24 AWG) for cable runs of less than 5,000 ft. (1,524 m) and 0.81 mm diameter (#20 AWG) for longer distances.

## Cable Length

Most installations are well within the 10,000 ft. (3,000 m) theoretical limit for HART communication. However, the electrical characteristics of the cable (mostly capacitance) and the combination of connected devices can affect the maximum allowable cable length of a HART network. The table below shows the effect of cable capacitance and the number of network devices on cable length. The table is based on typical installations of HART devices in non-IS environments, i.e., no miscellaneous series impedance.

More information for determining the maximum cable length for any HART network configuration can be found in the *HART Physical Layer Specifications*.

| Cable Capacitance – pf/ft (pf/m)<br>Allowable Cable Lengths for 18 AWG (1.0 mm²) Shielded Twisted Pair Cable | | | | |
|---|---|---|---|---|
| **Number of Network Devices** | **20 pf/ft (65 pf/m)** | **30 pf/ft (95 pf/m)** | **50 pf/ft (160 pf/m)** | **70 pf/ft (225 pf/m)** |
| **1** | 9,000 ft (2,743 m) | 6,500 ft (1,981 m) | 4,200 ft (1,280 m) | 3,200 ft (975 m) |
| **2** | 8,750 ft (2,667 m) | 6,350 ft (1,935 m) | 4,075 ft (1,242 m) | 3,125 ft (953 m) |
| **3** | 8,500 ft (2,590 m) | 6,200 ft (1,890 m) | 3,950 ft (1,205 m) | 3,050 ft (930 m) |
| **4** | 8,250 ft (2,515 m) | 6,050 ft (1,845 m) | 3,825 ft (1,165 m) | 2,975 ft (905 m) |
| **5** | 8,000 ft (2,440 m) | 5,900 ft (1,800 m) | 3,700 ft (1,130 m) | 2,900 ft (884 m) |
| **6** | 7,800 ft (2,380 m) | 5,760 ft (1,755 m) | 3,620 ft (1,105 m) | 2,820 ft (860 m) |
| **7** | 7,600 ft (2,317 m) | 5,620 ft (1,713 m) | 3,540 ft (1,080 m) | 2,740 ft (835 m) |
| **8** | 7,400 ft (2,255 m) | 5,480 ft (1,670 m) | 3,460 ft (1,055 m) | 2,660 ft (810 m) |

## Relays

The relay option (XNX-Relay) provides 3 form “C” SPCO contacts for alarm and fault indication. A remote reset is provided to silence alarms.

The remote reset switch (designated TB-4 and labeled “Remote Reset SW”) is located on the relay option board. It provides a remote hardware-based reset of faults and alarms to the transmitter. In the event that direct access to the local user and HART interfaces is not possible, alarms and faults from an XNX transmitter can be reset remotely using a switch.

The transmitter can be reset by activating a momentary switch. This will momentarily close the circuit between the two pins of TB4, providing the same functionality as a Reset Alarms & Faults command performed from the main screen of the local user or the HART interfaces.

**⚠ NOTE**

**Note:** This option is not available when the Modbus or FOUNDATION Fieldbus options are installed.

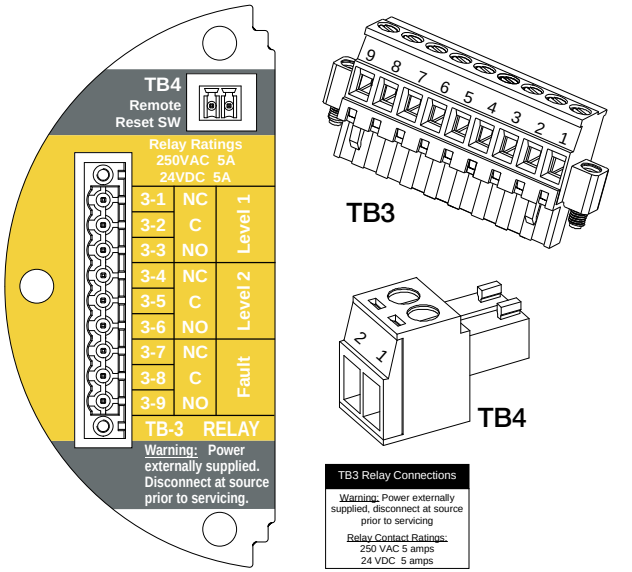
Wiring for the relays is through an available cable/conduit port to a pluggable terminal block. See Figure 33 for the terminal block legend.

The transmitter has three relays: relay 1 is for alarm level 1, relay 2 is for alarm level 2, and relay 3 is for faults and special states. All special states are indicated by the fault relay.

Honeywell Analytics recommends that the fault relay be used in all installations to maintain safe operation. See Set Alarm Values for more information.

The relay state is refreshed every 2 seconds. The fault relay is

normally energized indicating proper operation. In the event of power failure or fault, the C-NO connection will open.



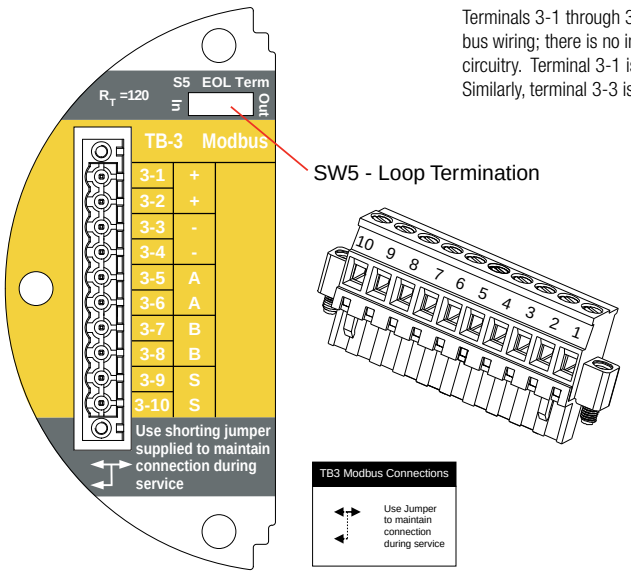

| Relay | |
|---|---|
| TB3 | |
| 1 | NC |
| 2 | C |
| 3 | NO |
| 4 | NC |
| 5 | C |
| 6 | NO |
| 7 | NC |
| 8 | C |
| 9 | NO |
| TB4 | |
| 1 | 1 |
| 2 | 2 |

Figure 57. XNX relay option board terminal blocks

## Modbus

The optional Modbus interface allows all transmitter local user interface functions and parameter settings to be transmitted.

Modbus is a master-slave protocol. Only one master (at a time) is connected to the bus. Modbus communication is always initiated by the master. The slave nodes never transmit data without receiving a request from the master node. The slave nodes never communicate with each other. The master node initiates only one Modbus transaction at a time.




Terminals 3-1 through 3-4 are provided to facilitate bus wiring; there is no internal connection to other XNX circuitry. Terminal 3-1 is connected internally to 3-2. Similarly, terminal 3-3 is connected to 3-4

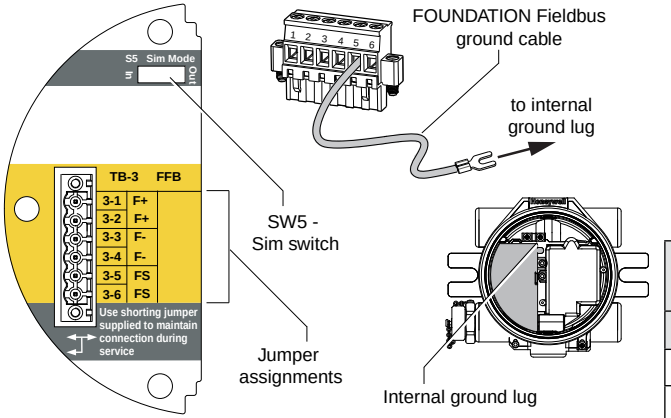
| Modbus | |
|---|---|
| TB3 | |
| 1 | + |
| 2 | + |
| 3 | - |
| 4 | - |
| 5 | A |
| 6 | A |
| 7 | B |
| 8 | B |
| 9 | S |
| 10 | S |

Figure 58. Modbus option board terminal block/jumper switch

Modbus connections to the transmitter are made through a pluggable terminal block on the Modbus interface circuit board. Modbus RTU protocol uses ASCII/Hex protocols for communication. See the Terminal block legend for the terminal block legend. A loop termination point (SW5) is included on the Modbus interface board to provide termination of the Modbus loop.

## FOUNDATION Fieldbus

FOUNDATION Fieldbus connections to the transmitter are made through a pluggable terminal block on the FOUNDATION Fieldbus option board, shown in the figure below. A simulation switch (SW5) is included on the board to enable/disable simulation mode. Terminals 3-1 through 3-4 are provided to facilitate bus wiring; there is no internal connection to other XNX circuitry. Terminal 3-1 is connected internally to 3-2. Similarly, terminal 3-3 is connected internally to 3-4.




| FOUNDATION Fieldbus | |
|---|---|
| TB3 | |
| 1 | F+ |
| 2 | F+ |
| 3 | F- |
| 4 | F- |
| 5 | FS |
| 6 | FS |

Figure 59. FOUNDATION Fieldbus option board, terminal block, jumper switch

**NOTE**

**Note:** FOUNDATION Fieldbus XNX transmitters require a separate power source and cannot be powered via the bus.

## Powering the Transmitter the First Time

*Detectors Configured for EC/mV/IR (except Searchline Excel)*

**After mounting, wiring the transmitter, wiring the specific mV or IR sensor, or installing the EC cartridge, the installation is visually and electrically tested as described below.**

**⚠WARNING**

**Warning:** This procedure must be performed only by suitably trained personnel following local and site procedures. Verify that the associated control panel is inhibited so as to prevent false alarms.

**Warning:** Do not set the minimum or maximum controller alarm levels at less than 10% or greater than 90% of the full scale range of the sensor. CSA and FM agency limits are 60% LEL or 0.6mg/$m^3$.

1. Verify that the transmitter is wired correctly according to this manual and the associated control equipment manual.
2. If equipped, unscrew the weatherproof cover, loosen the sensor retainer locking screw, and unscrew the retainer.
3. For EC sensors, plug in the sensor cartridge, taking care to align the sensor pins with the connector holes in the PCB.

**⚠CAUTION**

**Caution:** For toxic sensors, remove the shorting clip from the bottom of the sensor prior to installation. No shorting clip is provided with $O_2$ sensors.

4. Refit the sensor retainer, tighten the locking screw and refit the weatherproof cover.

**⚠ NOTE**

**Note:** Before replacing the cover on the transmitter housing, coat the threads with anti-seize compound to prevent corrosion.

**Note:** Inspect the cover O-ring for cracking or any other defects that might compromise the integrity of the seal. If it is damaged, replace with the O-ring supplied in the official service kit.

5. Apply power to the transmitter. This will in turn provide power to the sensor.
6. During warmup, the transmitter will be forced to 3 mA (inhibit mode).
7. The display will enter a start up routine displaying the initialization screen, then the transmitter loads its operating system, data from the sensor and checks if it is the same type transmitter and sensor software version numbers, gas type, the detection range and span calibration gas level, estimated time to next calibration due, and self-test result. The boot-up procedure takes about 45 seconds. The LCD and LED test is performed in the initialization after powering on. All LCD pixels and LEDs (red, green, and yellow) are turned on for 1.5 seconds. The LCD then goes blank and the LEDs turn off.


Figure 60. XNX Initialization and General Status screens

In the final stages of boot-up, warnings and faults may be observed until the user performs the proper configuration, calibration, and reset activities described in the following sections. See Warnings and Faults for detailed descriptions.

Once the General Status screen appears, the transmitter and sensor are in normal monitoring mode.

**NOTE**

**Note:** Calibration of sensors attached to the transmitter is mandatory before the sensor can be used for gas monitoring. Refer to the Calibration section for the procedure. For EC and mV personalities, perform Accept New Sensor Type before calibrating the sensor.

**Note:** For initial commissioning, refer to EN 60079-29-2.

### IR Units Configured for Searchline Excel

When powering the transmitter fitted with a Searchline Excel sensor, the following procedure must be performed by Honeywell-trained personnel to assure proper installation.

1. Verify that the transmitter is wired correctly according to this manual and the associated control equipment manual.
2. Apply power to the transmitter. This will in turn provide power to the sensor.
3. The sensor output will be forced to 3 mA (default warning).
4. The transmitter will enter a boot-up routine, displaying the initialization screen. The transmitter will load its operating system, data from the sensor, sensor software version numbers, gas type, the detection range and span calibration gas level, estimated time to next calibration due, and self-test result. This will take about 45 seconds.


Figure 61. XNX Initialization and General Status screens

In the final stages of boot-up, warnings and faults may be observed until the user performs the proper configuration, calibration, and reset activities described in the following sections. See Warnings and Faults.

5. When the transmitter completes boot-up, perform a soft reset (see the Soft Reset section) on the Searchline Excel detector from the Calibration Menu. When the soft reset is intitated, the RS-485 communication will be temporarily interrupted and faults F120 and/or F161 may be observed. The RS-485 communication will be re-established in a few minutes and the faults will automatically be reset in Non-Latching mode. F120 and/or F161 must be reset manually in Latching mode.
6. Set the Path Length section for the application, then align the transmitter and receiver (see the Align Excel section).
7. Once the alignment is complete, perform a zero calibration on the Searchline Excel detector to complete the commissioning process. See the *Searchline Excel Technical Manual* (Honeywell part number 2104M0506) for calibration information.
8. Reset any faults that appear in the transmitter's display. The transmitter and Searchline Excel sensor are now ready to monitor.

### Remote Calibration of MPD Sensors

In addition to functional gas testing to ensure the system is operating properly, remote calibration of the MPD CB1 catalytic combustible sensor and MPD IV1 and MPD IF1 infrared combustible sensors can be performed provided the following requirements are met:

- Remote sensor is installed in an indoor environment
- Internal air velocity does not exceed 0.5 m/s
- Weather housing part number 0200-A-1640 is installed on the sensor housing
- A 1 LPM regulator is used for calibration gas delivery

Perform the remote calibration procedure in accordance with The Product Specifications section except using the weather guard (Honeywell part number 0200-A-1640) instead of the regular flow housing (Honeywell part number 1226A0411).

Honeywell Analytics recommends MPD sensor calibration at a maximum interval of 180 days (the default value). This value can be reprogrammed in accordance with site procedures to assure the highest level of safety. Verify the correct operation of each sensor before each use by calibration with a certified test gas of known concentration.

The pellistors used in flammable gas sensors can suffer from a loss of sensitivity when in the presence of poisons or inhibitors, e.g., silicones, sulfides, chlorine, lead, or halogenated hydrocarbons.

## Configuring the Transmitter

The transmitter can be configured via the local user interface by using the menus available in Configure Menu. For information on accessing and navigating the menus, see Controls and Navigation. The transmitter is shipped with these settings:

| | | |
|---|---|---|
| **Display Language** | | English |
| **Date Format** | | mm/dd/yy |
| **Time Format** | | HH:MM |
| **mV Sensor Type (w/mV personality)** | | MPD-IC1 (%Vol) |
| **Alarm Levels** | | Sensor Cartridge Dependent |
| **Latching/Non-Latching Alarms** | | Alarm: Latching<br>Fault: Non-Latching |
| **Display Units** | | PPM, %VOL or %LEL<br>(dependent on personality and sensor choice) |
| **4-20 mA Levels**[1] | | Inhibit: 2.0 mA<br>Warning: 3.0 mA<br>Overrange: 21.0 mA |
| **Temperature Warning*** | | Enabled |
| **Deadband** | | Enabled |
| **Calibration Interval** | | 180 Days (HA recommends 30 day interval) |
| **Unit ID** | | XNX #nnnnnnnn |
| **Relay Settings** | | Alarm Normally De-Energized |
| **Fieldbus Settings** | **HART®** | Address: 0<br>Mode: Point-To-Point |
| | **Modbus® (if installed)** | Address: 5<br>Baud Rate: 19200 |
| **Level 1 Password Access** | | 0000 |
| **Level 2 Password Access** | | 0000 |
| **Easy Reset Enabled** | | Yes |

*Remark: Temperature warning is disabled as default for only XNX Russian version

## Configure Menu

Functions in the Configure Menu and the security levels required to change them are explained in this table.

| Symbol | Description | Security Level |
|---|---|---|
| | Select Language | 1 |
| | Set Date & Time | 1 |
| | Set mV Sensor Type | 2 |
| | Set mA Sensor Type | 2 |
| | Gas Selection | 2 |
| | Range & Alarms | 2 |
| | Latching/Non-latching | 2 |
| | Set Units | 2 |
| | mA Levels | 2 |

| Symbol | Description | Security Level |
|---|---|---|
| | Calibration Interval | 2 |
| | Accept New Sensor Type | 2 |
| | Beam Block Options | 2 |
| | Path Length | 2 |
| | Unit ID | 2 |
| | Relay Options | 2 |
| 01101 | Fieldbus Options | 2 |
| | Configure Security | 2 |
| | | |

**WARNING**

**Warning:** When configuring or communicating with the transmitter using the local user interface, resume monitoring by exiting all menus and returning to the General Status menu manually. No time outs are invoked.

**NOTE**

**Note:** With the exception of Inhbit Mode, gas measurement continues in the background allowing users to navigate screens without taking the transmitter offline.

## Select Language

Available languages for the transmitter are English, Italian, French, German, Spanish, Russian, Mandarin, and Portuguese.


Figure 62. Select Language menu

Different screens are used to display each of the eight available languages, one language per screen. Each language screen will appear in three languages: the selected language, Russian, and Mandarin. To select a new display language, use the ◀ ▶ switches to navigate through the selections. Use ✓ to make the selection or ✗ to discard the selection and return to the previous menu.


Figure 63. Language Selection Screen


Figure 64. Accept Language Change screen

## Set Date and Time


Figure 65. Set Date & Time menu

Select “Set Date and Time” to change the date format and set the transmitter’s current time/date.

### *Set Date Format*

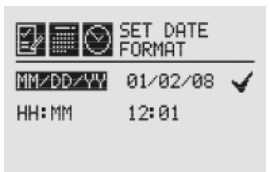



Figure 66. Set Date Format menu

Use the ◀ ▶ switches to highlight “MM/DD/YY.” Select ✓ to set the date format.

Set Date

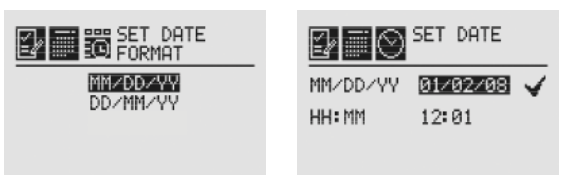



Figure 67. Set Date Format screen / Set Date menu

Use the Set Date selection to set the current date. Use the ◀ ▶ switches to select the year, month, and day. Select ✓ to set the desired date.

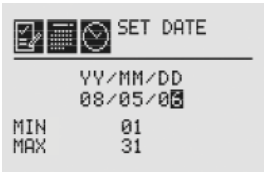



Figure 68. Setting the Date screen

Use the ◀ ▶ switches to decrease or increase the values until the desired value appears. Select ✓ to set the value and move to the next character. Repeat for each character to be changed.

### *Set Time*


Figure 69. Set Time menu

Use the ◀ ▶ switches to decrease or increase the values until the desired value appears. Use ✓ to select the value and move to the next character. Repeat for each character to be changed.


Figure 70. Set Time screen

Use the ◀ ▶ switches to navigate to the ✓. Select it to save the changes. If ✓ is not selected, no changes will be saved.

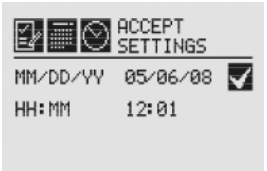



Figure 71. Accept Time-Date Changes screen

**When the new settings have been saved, the "Settings Accepted" screen will be displayed.**


Figure 72. Time-Date Settings Accepted screen

**⚠ NOTE**

**Note:** The remainder of this section requires Level 2 access.

## Set mV Sensor Type

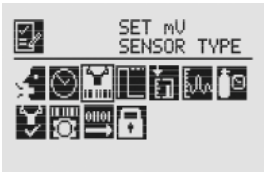



Figure 73. Set mV Sensor Type screen

**Set mV Sensor Type sets the identity of the type of mV sensor attached to the transmitter. The available mV sensor type selections are:**

| Sensor | Description |
|---|---|
| MPD-IC1 (5%V) | MPD Carbon Dioxide 5%Vol |
| MPD-IV1 (5%V) | MPD Methane 5%Vol |
| MPD-IV1 (100%L) | MPD Methane 100%LEL |
| MPD-IF1 (100%L) | MPD Flammable 100%LEL |
| MPD-CB1 (100%L) | MPD Flammable 100%LEL |
| 705-HT (20%L) | 705 Flammable 20%LEL (High-Temp) |
| 705-HT (100%L) | 705 Flammable 100%LEL (High-Temp) |
| 705-STD (100%L) | 705 Flammable 100%LEL |
| SP-HT (20%L) | Sensepoint Flammable 20%LEL (High-Temp) |
| SP-HT (100%L) | Sensepoint Flammable 100%LEL (High-Temp) |
| SP-STD (100%L) | Sensepoint Flammable 100%LEL |
| SP-PPM (10%L) | Sensepoint Flammable PPM (10%LEL equiv) |
| SP-PPM | Sensepoint Flammable PPM |
| SP-HT-NH3 | Sensepoint Ammonia 30,000 PPM |

[1]In nonane detection applications, if an MPD-CB1 sensor is employed, use star rating 2; with SP-HT sensors, use star rating 4.


Figure 74. Current configured mV sensor and mV Available Sensor list

The first screen displays the currently configured sensor. Select ✓ to navigate to the Sensor Selection screen. To select a new mV sensor, use the ◀ ▶ switches to scroll through the list. Use ✓ to select a sensor or ✗ to discard the sensor selection, retaining the previously selected sensor, and return to the previous menu.

## Set mA Sensor Type

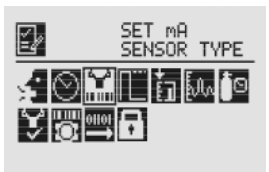



Figure 75. Set mA Sensor Type screen

Set mA Sensor Type identifies the type of mA sensor attached to the transmitter. The available mA sensor choices are “Excel/Optima” and “Other mA Sensor.”


Figure 76. mA Available Sensor list

To select a new mA sensor, use the ◀ ▶ switches to move through the list. Use ✓ to make the selection or ✗ to discard the selection, retain the previously selected sensor, and return to the previous menu.

**NOTE**

**Note:** This configuration option is not available for XNX transmitters with EC sensors.

## Gas Selection

Gas Selection sets the target gas for sensors capable of detecting multiple gases. The available gases for each of the capable sensors is determined by the device connected to the transmitter.

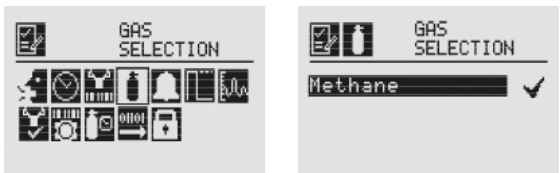



Figure 77. Gas Selection menu

After selecting Gas Selection, the initial screen displays the current target gas. Select ✓ to display the list of available gases for the configured sensor. Use the ◀ ▶ switches to scroll through the list. A sample of the list is shown in Figures 80 and 81.


Figure 78. Available Target Gas list

Use ✓ to select the new gas or ✗ to discard the selection, retain the previously selected gas, and return to the previous menu. When a new gas is selected, these screens are displayed:


Figure 79. Select New Target Gas screens

## NOTE

**Note:** The gas selections available will vary with different types of sensors. Gases listed with a "-2" suffix are compliant with 60079-20-1 LEL levels.

## WARNING

**Warning:** When selecting a new target gas for units with a Searchpoint Optima Plus, the sensor must be recalibrated.

These are the transmitter's selectable gases:

- Butane ($C_4H_{10}$)
- Carbon Dioxide ($CO_2$)
- Ethanol ($C_2H_5OH$)
- Ethylene ($C_2H_4$)
- Hexane ($C_6H_{14}$)
- Hydrogen ($H_2$)
- Methane ($CH_4$)
- Methanol ($CH_3OH$)
- Propane ($C_3H_8$)
- Star 1 through Star 8[1]

## WARNING

**Warning:** Do not use the transmitter in oxygen-enriched atmospheres. Concentrations displayed will be adversely affected by oxygen depletion.

**Warning:** High off-scale readings may indicate an explosive concentration of gas.

## Changing the Gas or Units Name

If “Other mA Sensor” has been selected as the sensor type, the existing gas and units can be renamed. From the Gas Selection menu, select ✓ to open the Gas Name menu. Select ✓ again to open the Gas Name editing display. The first letter of the current selection will be highlighted (Figure 80).


Figure 80. Gas Name screen / Gas Name editing screen

Use the ◄ ► switches to cycle through the 76 options (26 capital letters, 26 lower case letters, 10 numbers, 13 typographic characters, and a space). When the first character of the new gas name has been reached, select ✓ to advance to the second character. Repeat this procedure with each character until the new gas name is displayed. In this example, “mA Sensor” has been changed to “Flow Sensor” (Figure 83). The name can be up to 15 characters long. Select ✓ to return to the Gas Name screen. The new name will be displayed in reverse (light characters on a dark background). Select the ► switch twice to display the Accept Settings screen. Select ✓ to accept the new gas name. A “Settings Accepted” screen will be displayed briefly, followed by the Gas Selection menu.

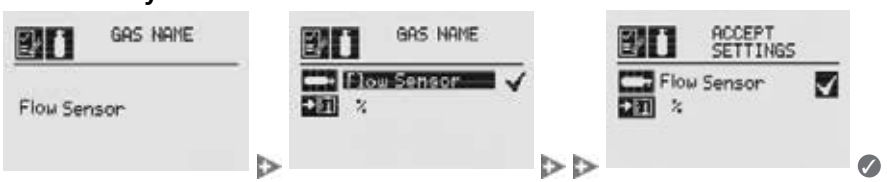



Figure 81. Accepting the New Gas Name screens

Follow the same procedure to rename the units (“%” in the illustrations). The units name can be up to 5 characters long.

## Gas Selections and Alarm Limits Based on mV Sensor Type

These tables show the tranmsitter’s programmable alarm limits.

**Note: -2 Gas Selection %LEL values are per IEC 60079-20-1:2010**

| Alarm Limits (% Vol) | MPD-IC1 (5%V) |
|---|---|
| | Carbon Dioxide |
| Lower | 0.5 |
| Upper | 5.0 |

| | MPD-IV1 (5%V/V, 100%LEL) | | |
|---|---|---|---|
| | Methane | Methane-1 | Methane-2 |
| Lower Alarm Limit | 0.5% Vol | 10% LEL | 10% LEL |
| Upper Alarm Limit | 5.0% Vol | 60% LEL | 60% LEL |
| % Volume Reference | n/a | 5.0 | 4.4 |

| | MPD-IF1 (100%LEL) | |
|---|---|---|
| | Propane-1 | Propane-2 |
| Lower Alarm Limit (% LEL) | 10 | 10 |
| Upper Alarm Limit (% LEL) | 60 | 60 |
| % Volume Reference | 2.0 | 1.7 |

| | MPD-CB1 (100% LEL) | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hydrogen | Methane-1 | Methane-2 | Methanol | Ethelyne-1 | Ethelyne-2 | Ethanol-1 | Ethanol-2 | Propane-1 | Propane-2 | Butane-1 | Butane-2 | Hexane-1 | Hexane-2 | Star 1 | Star 2 | Star 3 | Star 4 | Star 5 | Star 6 | Star 7 | Star 8 |
| Lower Alarm Limit (% LEL) | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 20 | 20 | 20 | 10 | 10 | 10 | 10 | 10 |
| Upper Alarm Limit (% LEL) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| % Volume Reference | 4.0 | 5.0 | 4.4 | 5.5 | 2.7 | 2.3 | 3.3 | 3.1 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.0 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

| | 705-STD (100% LEL) | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hydrogen | Methane-1 | Methane-2 | Methanol | Ethelyne-1 | Ethelyne-2 | Ethanol-1 | Ethanol-2 | Propane-1 | Propane-2 | Butane-1 | Butane-2 | Hexane-1 | Hexane-2 | Star 1 | Star 2 | Star 3 | Star 4 | Star 5 | Star 6 | Star 7 | Star 8 |
| Lower Alarm Limit (% LEL) | 20 | 20 | 20 | 25 | 25 | 30 | 30 | 30 | 25 | 30 | 30 | 30 | 50 | 50 | 50 | 30 | 25 | 20 | 20 | 20 | 15 | 15 |
| Upper Alarm Limit (% LEL) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| % Volume Reference | 4.0 | 5.0 | 4.4 | 5.5 | 2.7 | 2.3 | 3.3 | 3.1 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.0 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

| | 705-HT (100% LEL) | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hydrogen | Methane-1 | Methane-2 | Methanol | Ethelyne-1 | Ethelyne-2 | Ethanol-1 | Ethanol-2 | Propane-1 | Propane-2 | Butane-1 | Butane-2 | Hexane-1 | Hexane-2 | Star 1 | Star 2 | Star 3 | Star 4 | Star 5 | Star 6 | Star 7 | Star 8 |
| Lower Alarm Limit (% LEL) | 20 | 15 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 50 | 30 | 25 | 20 | 20 | 20 | 15 | 15 |
| Upper Alarm Limit (% LEL) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| % Volume Reference | 4.0 | 5.0 | 4.4 | 5.5 | 2.7 | 2.3 | 3.3 | 3.1 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.0 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

| | 705-HT (20% LEL), SP-HT (20% LEL) | | |
|---|---|---|---|
| | Hydrogen | Methane-1 | Methane-2 |
| Lower Alarm Limit (% LEL) | 5.0 | 5.0 | 5.0 |
| Upper Alarm Limit (% LEL) | 20 | 20 | 20 |
| % Volume Reference | 4.0 | 5.0 | 4.4 |

| | SP-STD (100% LEL) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hydrogen | Methane-1 | Methane-2 | Methanol | Ethelyne-1 | Ethelyne-2 | Ethanol-1 | Ethanol-2 | Propane-1 | Propane-2 | Butane-1 | Butane-2 | Hexane-1 | Hexane-2 | Star 1 | Star 2 | Star 3 | Star 4 | Star 5 | Star 6 | Star 7 | Star 8 |
| Lower Alarm Limit (% LEL) | 20 | 15 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 50 | 30 | 25 | 20 | 20 | 20 | 15 | 15 |
| Upper Alarm Limit (% LEL) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| % Volume Reference | 4.0 | 5.0 | 4.4 | 5.5 | 2.7 | 2.3 | 3.3 | 3.1 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.0 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

| | SP-HT (100% LEL) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hydrogen | Methane-1 | Methane-2 | Methanol | Ethelyne-1 | Ethelyne-2 | Ethanol-1 | Ethanol-2 | Propane-1 | Propane-2 | Butane-1 | Butane-2 | Hexane-1 | Hexane-2 | Star 1 | Star 2 | Star 3 | Star 4 | Star 5 | Star 6 | Star 7 | Star 8 |
| Lower Alarm Limit (% LEL) | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 20 | 20 | 20 | 10 | 10 | 10 | 10 | 10 |
| Upper Alarm Limit (% LEL) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| % Volume Reference | 4.0 | 5.0 | 4.4 | 5.5 | 2.7 | 2.3 | 3.3 | 3.1 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.0 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

| | SP-PPM (10% LEL) | | | |
|---|---|---|---|---|
| | Hydrogen | Methane-1 | Methane-2 | FLM |
| Lower Alarm Limit (% LEL) | 2.0 | 2.0 | 2.0 | 2.0 |
| Upper Alarm Limit (% LEL) | 10 | 10 | 10 | 10 |
| % Volume Reference | 4.0 | 5.0 | 4.4 | N/A |

| | SP-PPM | |
|---|---|---|
| | Hydrogen | Methane |
| Lower Alarm Limit (% LEL) | 1000 ppm | 1000 ppm |
| Upper Alarm Limit (% LEL) | 5000 ppm | 5000 ppm |
| % Volume Reference | n/a | n/a |

| | SP-HT-NH3 |
|---|---|
| | Ammonia |
| Lower Alarm Limit (% LEL) | 3000 ppm |
| Upper Alarm Limit (% LEL) | 30000 ppm |
| % Volume Reference | n/a |

## Range and Alarms

**WARNING**

**Warning:** XNX Universal Transmitters carrying UL/CSA approvals that are configured for devices measuring %LEL will not allow adjustments to the full scale value. The range is fixed at 100%.

The Range & Alarms option applies only to units with certifications other than UL/CSA.


Figure 82. Range & Alarms menu

### *Set Range (full-scale)*

Range is sensor dependent. The Set Range option allows the full-scale range to be set for the sensor which is attached to the transmitter. The full-scale range is based on the capability of the sensor. The selectable range for EC sensors is defined in the Selectable Range column of the table in EC Replacement Sensors. The selectable range for catalytic bead sensors is defined in the Selectable Range column of the table in Catalytic Bead and IR Replacement Sensor Cartridges.

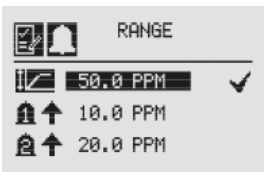



Figure 83. Range Option screen

When the Range option is highlighted, use the ◀ ▶ switches to decrease or increase the value. Use ✓ to accept the displayed value and move to the next field. When all fields have been updated, use the ▶ switch to highlight ✓ on the right side of the display. Use ✓ to accept the changes.

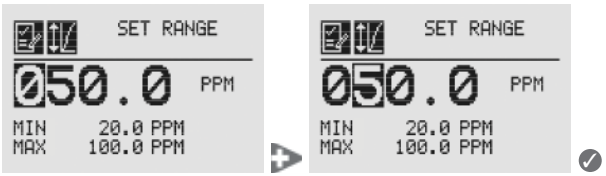



Figure 84. Setting the range value

When complete, the display will return to the Range Option screen.

### *Set Alarm Values*

Set Alarm Values allows the values for Alarm Direction and Alarm Limits for both Alarm 1 and Alarm 2 to be set.

**CAUTION**

**Caution:** Alarm 1 and Alarm 2 values must be less than the upper limit value.

Use Alarm Direction to establish whether the alarm is to be triggered by rising or falling gas concentrations. Alarms for most target gases are triggered by rising concentration levels but certain gases; e.g., oxygen, can be measured for depletion levels. When the transmitter is configured with mV or OPTIMA sensors and the meaurement units are LEL, the alarm level setting is limited to 60%LEL.

If the concentration of the target gas remains above the alarm values for 3 seconds or more, an alarm will be triggered.

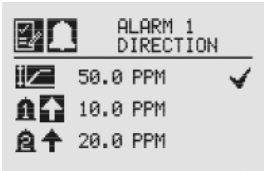



Figure 85. Alarm Direction screen

The icons next to the bell images indicate whether the alarm has been triggered by rising (▲) or falling (▼) gas concentrations. Use the ◀ ▶ switches to highlight the appropriate trigger. Use ✓ to make the selection or ✗ to discard it.


Figure 86. Setting alarm rising/falling

The Alarm Limits selection sets the alarm trigger level for both alarms.

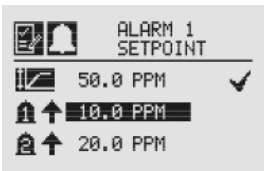



Figure 87. Alarm Limits screen

Use ◀ ▶ to set the desired alarm limit and ✓ select it. Repeat for each alarm.

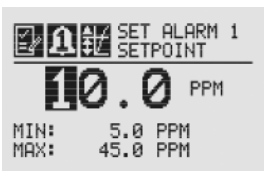



Figure 88. Setting an alarm setpoint

When complete, the display will return to the main Range & Alarm screen. When all settings have been made, use ◀ ▶ to move to the ✓ on the display to Accept Settings.

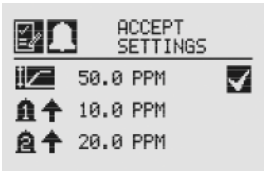



Figure 89. Accept Settings screen

When the settings have been saved, the following screen will appear on the display.


Figure 90. Settings Accepted screen

See Specifications for detailed EC cell information.

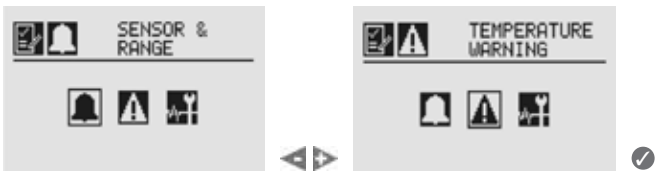
*Set Temperature Warning*

**WARNING**

**Warning:** There is a potential loss of sensitivity when the sensor is exposed to the extreme low and/or high temperature. Please check each sensor's recommended operating temperature and sensitivity loss before disabling temperature warning.

The Set Temperature Warning option allows the temperature warning to be enabled or disabled. By default, this option is enabled.

**In the Range & Alarms menu, use the ◀ ▶ controls to select Temperature Warning menu. Select ✓ to enter the menu.**




**When entering Set Temperature Warning menu, a message will be displayed either "DISABLE WARNING?" or "ENABLE WARNING?" per the current setting. User will select disable or enable temperature warning.**


Question message when current setting is "ENABLE"

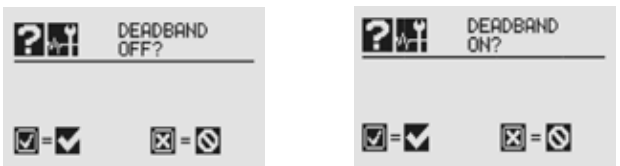
Question message when current setting is "DISABLE"

*Set Deadband*

**The Set Deadband menu allows enabling and disabling of the reading deadband. The deadband is a range of value where the gas reading is displayed as zero.**

**In the Range & Alarms menu, use the ◀ ▶ controls to select Set Deadband menu. Select ✓ to enter the menu.**


**When entering Set Deadband menu, a message will be displayed either "DEADBAND OFF" or "DEADBAND ON" per the current setting. User will select deadband off or on.**




Question message when current setting is "DEADBAND ON"

Question message when current setting is "DEADBAND OFF"

***Note:*** When deadband is off and the gas reading is between 0 and negative fault, XNX mA output will be ranged between 4 mA and 2.4 mA.

*Selecting the Numeric Format*

If "Other mA Sensor" has been selected as the sensor type, the transmitter's output can be displayed in one of three numeric formats. From the Ranges & Alarms menu, select the ✓ switch to open the Range menu (Figure 91). Select the ✓ switch again to display the Range Lower Limit menu. Select the ▶ switch twice to open the first Numeric Format menu.

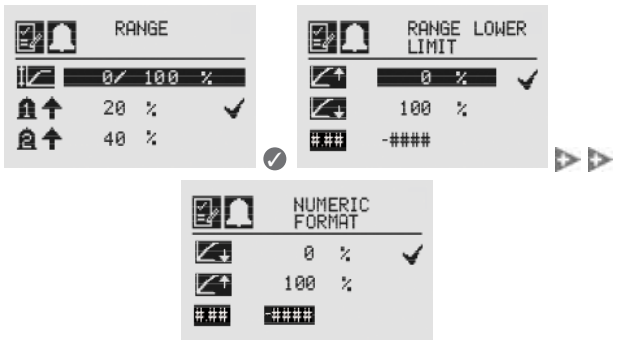



Figure 91. Navigating to the first Numeric Format menu

Select the ✓ switch to open the second Numeric Format menu, which displays the formats available for numerical display (see Figure 92).

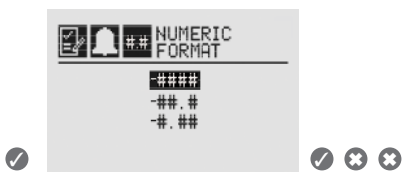



Figure 92. Navigating to the second Numeric Format menu

Select ◀ or ▶ to cycle through the three options. When the desired format is highlighted, select the ✓ switch to make the selection the default display format. Select ✗ twice to return to the Ranges & Alarms menu.

## Latching/Non-Latching Alarms

**⚠WARNING**

**Warning:** There is a potential loss of sensitivity during exposure to high concentrations of $H_2S$. Under these conditions, set the control unit to latch at overrange. In standalone configuration, set alarms to latching. When resetting the overrange or alarm, verify correct operation of the transmitter.

Latching / Non-Latching is used to control whether Alarms 1 and 2 and faults will latch alarms.


Figure 93. Alarm Latching/Non-Latching screen

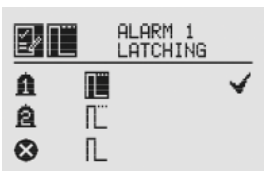



Figure 94. Alarm Latching screen

Select the ⎍ or ⎍ icon beside the alarm limit to display the Alarm Latching/Unlatching screen. Alarm latching determines whether alarms that are triggered are automatically reset when the condition dissipates (latching off ⎍) or remain active until an operator resets them manually (latching on ⎍). Highlight the desired latching option with the ◀ ▶ switches. Use ✓ to accept it.


Figure 95. Setting Alarm Latching/Unlatching screen

Use the same procedure to set the desired values for Alarm 2 and Faults. When all settings have been made, use ◀ ▶ to navigate to the ✓ on the display. Use ✓ to accept settings.

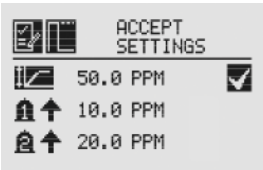



Figure 96. Accept Settings screen

When the settings have been saved, the following screen is displayed.


Figure 97. Settings Accepted screen

**NOTE**

**Note:** When non-latching is selected, external alarm latching is recommended.

## Set Units

The Set Units menu allows the units of measurement displayed on the transmitter main menu to be set. This option also sets the units transmitted via HART, Modbus, or FOUNDATION Fieldbus sensors attached to the transmitter, reporting concentrations in PPM or %VOL (except oxygen).


Figure 98. Set Units menu

To change the units, use the ◀ ▶ switches to highlight the units icon. Use ✓ to select it. The transmitter's display will change to the Display Unit Selection screen which shows the available choices for the sensor type installed. Use the ◀ ▶ switches to highlight the desired unit of measurement. Use ✓ to select it or ✗ to discard the selection.


Figure 99. Display Unit Selection screen

**CAUTION**

**Caution:** When changing units of measure, check alarm level settings for the proper units and change as necessary.

Once the units of measurement have been set, use the ◀ ▶ switches to navigate to the '✓' to accept the values.

## mA Levels

This option allows the user to select mA output levels for inhibit, fault, and overrange. Beam block and low signal apply to Searchline (see the table in the next column).

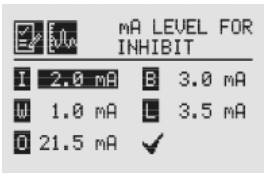

Figure 100. mA Levels menu

Using the ◀ ▶ switches, move to the mA output to be changed and use ● to select it.


Figure 101. Set mA Levels for Warning screens

Use the ◀ ▶ switches to decrease or increase the value until the desired value appears. Use ● to select the value and move to the next setting. Repeat for each setting to be changed.

The default values and available output ranges for Inhibit, Warning, Overrange, Beam Blocked, and Low Signal are shown in the following table. See Warnings and Faults for more information.




| Signal | | Output (mA) | | |
|---|---|---|---|---|
| | | Default | Min | Max |
| I | Inhibit | 2.0 | 1.0 | 3.5 |
| W | Warning | 3.0 | 1.0 | 3.5 |
| O | Overrange | 21.0 | 20 | 22 |
| B | Beam Blocked | 1.0 | 1.0 | 4.0 |
| L | Low Signal | 1.0 | 1.0 | 4.0 |

Figure 102. Set mA Levels for Inhibit screen

After all changes have been made, use the ◀ ▶ switches to move to the '✓' and use ● on the front panel to accept and save the settings. If '✓' is not selected, none of the changes will be saved.

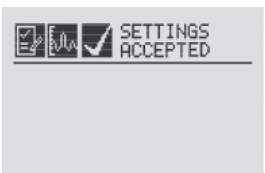



Figure 103. mA Settings Saved screen

## Calibration Interval

Calibration Interval allows a desired interval for sensor calibration to be set for sensors attached to the transmitter. The transmitter will generate a warning when the interval is reached.


Figure 104. Calibration Interval menu

Calibration Interval will not appear when an IR personality board is attached and the mA sensor type is set as 'Other mA Sensor'.

The default calibration values for the “Calibration Required” diagnostic vary based on sensor type. This value can be reprogrammed in accordance with site requirements to ensure the highest level of safety. Before commissioning, verify the correct operation of each sensor using calibration with a certified gas of known concentration.

Although the calibration interval can be set to any value between 0 and 360 days, Honeywell Analytics recommends that the interval for electrochemical and catalytic sensors be set to 180 days (or fewer, in accordance with customer site procedures) to assure the highest level of safety.

Use the ◀ ▶ switches to highlight the current interval and use ✓ to select it.


Figure 105. Edit Interval and Setting Interval Value screens

Use the ◀ ▶ switches to move to the desired position. Use ✓ to select it. Use the ◀ ▶ switches to decrease or increase the value until the desired value is reached. (The minimum number of days is 0; the maximum number is defined by the sensor type.) Use ✓ to select the value and move to the next field. Repeat for each field. When all of the fields have been updated, use the ◀ ▶ switches to highlight the ‘✓’ on the right side of the display. Use ✓ on the front panel to save the settings.

**⚠CAUTION**

**Caution:** Setting the calibration interval to zero turns off the calibration notification. This can seriously affect sensor performance.


Figure 106. Saving New Interval and New Interval Accepted screens

## Accept New Sensor Type

When replacing EC cells or mV sensors, use Accept New Sensor Type to load default parameters into the transmitter for calibration and sensor life. Accept New Sensor Type is also used when replacing an EC cell with another EC cell for a different target gas. (See Replacing with a Different Cartridge Type).

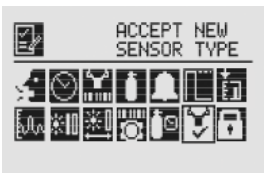



Figure 107. Accept New Sensor Type menu

When changing the target gas by inserting a new sensor, the transmitter will prompt the user for a confirmation of the change before adjusting to the properties of the new sensor.

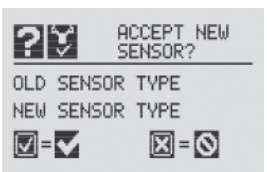



Figure 108. Select New Sensor screen

In the display of the transmitter, the old sensor type and the new sensor type will be displayed. Use ✓ to accept the new sensor or ✗ to reject it.

## Beam Block Options

The Beam Block Options menu is available only if the transmitter is connected to a Searchline Excel receiver.

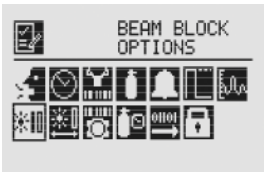



Figure 109. Beam Block menu

If the infrared beam from the Searchline Excel transmitter is blocked or inhibited in such a way that the intensity of the beam drops to a level below the readable threshold set by the receiver, a warning will be generated by the transmitter. The Beam Block Options menu allows the user to define the maximum period of time the infrared beam can be blocked and the percentage of signal loss before generating a warning through the transmitter.

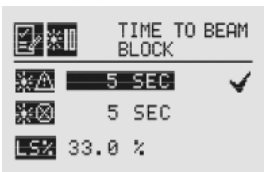



Figure 110. Beam Block Warning Time screen

Use the ◀ ▶ switches to move to the desired beam block time option and use ✓ to select it. Use the ◀ ▶ switches to decrease or increase the value until the desired value appears. Use ✓ to select the value and move to the next setting.

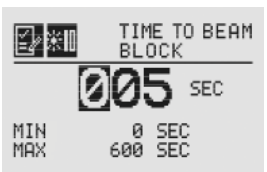



Figure 111. Setting Beam Block Warning Time screen

When the beam is blocked longer than the value set in Time to Beam Block, a fault is generated by the transmitter.

Set Time to Fault sets the minimum time the beam is blocked before generating a fault.

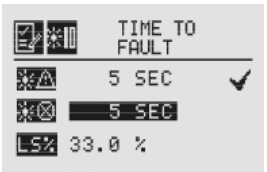



Figure 112. Beam Block Fault Time screen

Use the ◀ ▶ switches to move to the desired beam block time option and use ✓ to select it. Use the ◀ ▶ switches to decrease or increase the value until the desired value appears. Use ✓ to select the value and move to the next setting.

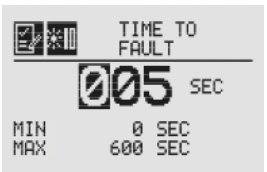



Figure 113. Setting Beam Block Fault Time screen

When the beam is blocked longer than the value set in Time to Fault, a fault is generated by the transmitter.

Low Signal Percentage sets the minimum percentage value of a beam that is not blocked. When the percentage decreases below the defined percentage, a fault is generated.

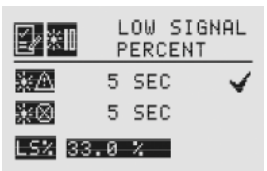



Figure 114. Low Signal Percentage screen

Use the ◀ ▶ switches to move to the desired Low Signal Percentage and use ✓ to select it. Use the ◀ ▶ switches to decrease or increase the value until the desired value appears. Use ✓ to select the value and move to the next setting.

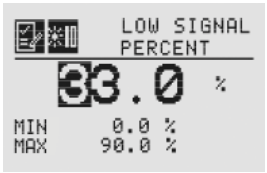



Figure 115. Setting the Low Signal Percentage

Once the values for Beam Block Warning, Beam Block Fault and Low Signal Percentage have been set, use the ▶ switch to highlight the '✓' on the right side of the display. Then use ✓ to accept the changes to the transmitter. If '✓' is not highlighted, none of the changes will be saved.

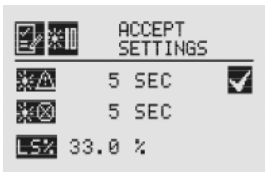



Figure 116. Accept Beam Block Changes screen



Figure 117. Beam Block Changes Accepted screen

## Path Length

The distance (in meters) between the transmitter and the receiver is set through the Path Length menu. This menu is available only if the transmitter is connected to a Searchline Excel sensor.


Figure 118. Path Length menu

Setting the Path Length or distance between the transmitter and receiver of the Searchline Excel lets the devices determine the optimum settings for the beam strength for the application.

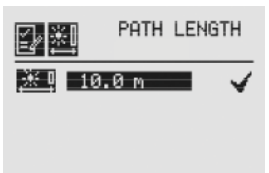



Figure 119. Current Path Length Setting screen

Use the ◀ ▶ switches to move to the desired Path Length setting and use ✓ to select it. Use the ◀ ▶ switches to decrease or increase the value until the desired value appears. Use ✓ to select the value and move to the next setting.

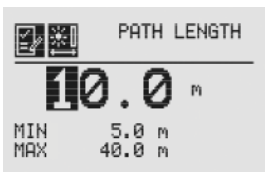



Figure 120. Setting Path Length screen

Once the values for Path Length have been set, use the ▷ switch to highlight the '✓' on the right side of the display. Use the ✓ to accept the changes.


Figure 121. Accepting Path Length Changes


Figure 122. Path Length Changes Accepted screen

## Unit ID

The Unit ID option allows a unique unit ID of up to 18 characters to be set for each transmitter. This character string can be broadcast over any of the supported communication options, providing a means to create a unique identification for each transmitter for accurate reporting. Available characters are A-Z, a-z, 0-9 and special characters ? ! * % ( ) : & / , # + -


Figure 123. Unit ID menu

**⚠ NOTE**

**Note:** The XNX Unit ID is not the same as the HART tag in XNX applications using HART protocol.

### *Edit ID*

Each transmitter is assigned a default Unit ID at the factory. The Edit ID menu allows the assigned ID to be modified.


Figure 124. Edit Unit ID screen

From the Edit ID Screen, use the ◁ ▷ switches and ✓ to select Edit ID. The current Unit ID is displayed. When editing an existing ID, the list of available characters begins at the value displayed.

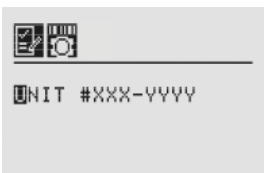



Figure 125. Editing the Unit ID

Use the ✓ switch to highlight the first character to be changed. Use the ◁ ▷ switches to decrease or increase the value until the desired value appears. Use ✓ to accept the new value and move to the next character. Repeat for each character to be changed. The Unit ID can be up to18 characters long.

*Clear ID*

This option clears the current set Unit ID.

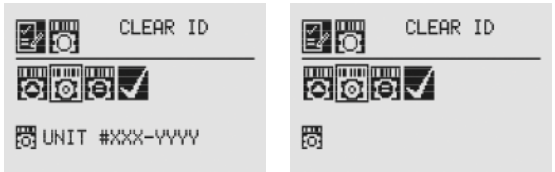



Figure 126. Clear Unit ID and Cleared Unit ID screens

Set ID to Default

The Set ID to Default option returns the Unit ID to the factory default.

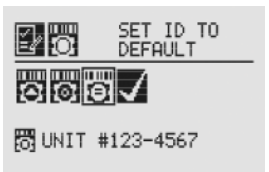



Figure 127. Set ID to Default screen

Once all changes have been made, Accept Settings must be selected before exiting the Unit ID menu. When all changes are saved, the transmitter will display the Settings Accepted screen.

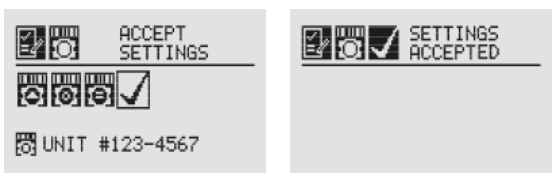



Figure 128. Accept Settings and Accepted screens

## Relay Options

The Relay Options menu allows the relays for both alarm levels to be configured. This menu is available only if the transmitter is equipped with the optional relays.


Figure 129. Relay Options screen

XNX relays can be set to Energized or De-energized. The default is De-energized. The two states for each relay are represented by the symbols for energized and for de-energized.

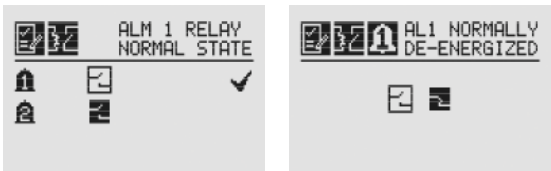



Figure 130. Alarm 1 Relay Current State and Setting New State screens

Use the switches to move to the desired alarm and use to select it. Use the switches to change the state of the relay. Use to accept the new state. Once the transmitter has accepted the new information, a Settings Accepted screen appears.

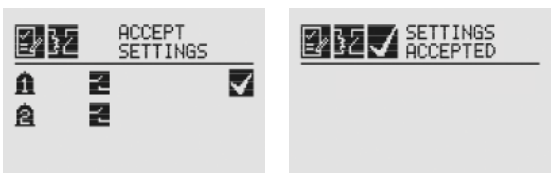



Figure 131. Accept New Alarm Relay Settings and new Settings Accepted screens

## Fieldbus Options

The Fieldbus Options menu allows configuration of the HART address or the optional Modbus fieldbus address and baud rate.


Figure 132. Fieldbus Options screen

Select the Fieldbus Options icon to activate the HART/Modbus screens to allow selection of the protocols to be configured or changed. If the transmitter is configured without HART or Modbus, only the installed options will be visible.

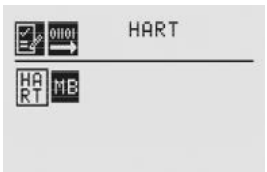



Figure 133. HART Options screen

The HART menu provides the ability to select the HART mode. From the HART screen, use the ◀ ▶ switches to highlight the HART option, then select ✓. This displays the HART address screen where the device address and whether the HART protocol is active in the unit can be set. To set the address, use the ◀ ▶ switches to highlight the number in the top line (between 0 and 63) and use ✓ to select it. Use the ◀ ▶ switches to decrease or increaset the value until the desired value appears. Use ✓ to select the value and move to the next setting.


Figure 134. HART Address and Address Value screens

Use the ◀ ▶ switches to move to the HART option and use ✓ to select it. Use the ◀ ▶ switches to scroll through the options until the desired option is highlighted. Use ✓ to accept the new state. See Local HART Interface and HART Protocol for more information on available HART modes.


Figure 135. HART Mode screens

Once the values for the HART address and Mode have been set, use the ◀ ▶ switches to navigate to the '✓' then select it to save the changes to the transmitter.


Figure 136. HART Settings Accepted screen

When the Modbus option is available, use the ◀ ▶ switches to move to the Modbus icon and use ✓ to select it. The Modbus option allows the address and communication baud rate to be set.

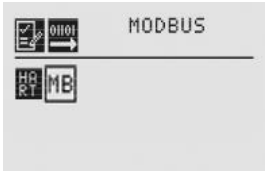



Figure 137. Modbus Options screen

From the Set Fieldbus Address screen, select ✓. To set the Fieldbus address, use the ◄ ► switches to move to the desired position and use ✓ to select it. Use the ◄ ► switches to decrease or increase the value until the desired value appears. Use ✓ to select the value and moves to the next setting.


Figure 138. Set Fieldbus Address and Address Value screens

The communications baud rate can be set from this screen. Use the ◄ ► switches to highlight the proper baud rate and select ✓.

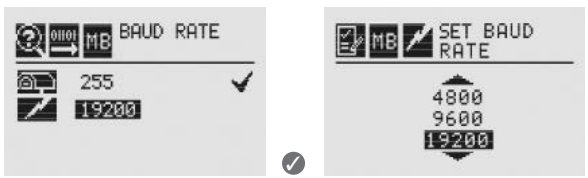



Figure 139. Set Baud Rate screens

Once the values for the Fieldbus address have been set, use the ◄ ► switches to navigate to the '✓' then select it to save the changes.


Figure 140. Accept Settings and Fieldbus Address Settings Accepted screens

## Configure Security

Configure Security is used to set or reset the level 1 and level 2 passcodes that control access to the configuration menus of the transmitter.


Figure 141. Configure Security screens

### Easy Reset from Main Status

The Easy Reset from Main Status option controls the ability to reset faults, warnings, and alarms from the General Status screen (see The General Status Screen).

Use the ◄ ► switches and ✓ to select the lock icon. The Lock/Unlock screen will be displayed. Choose 'Lock' to prevent reset without password access. The 'Unlock' choice allows resets without requiring login or a passcode.


Figure 142. Lock/Unlock screen

*Level 1 and Level 2 Passcodes*

Level 1 and 2 passcode screens give the administrator the ability to assign new passcodes for either or both access levels.

From the Configure Security Screen, use the ◀ ▶ switches to highlight Passcode 1. Use ✓ to choose the first digit and the ◀ ▶ switches to decrease or increase the values. Use ✓ to accept the new value and move to the next digit. Repeat until all four digits have been selected. Follow the same procedure to change the Level 2 passcode.

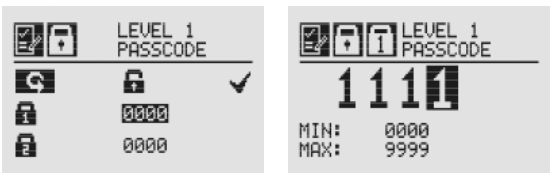



Figure 143. Setting the Level 1 passcode

Use the ◀ ▶ switches to move to “Accept Settings” on the display. Choose ✓ to save the settings to the transmitter.

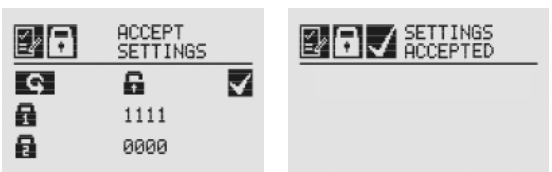



Figure 144. Accept Settings and Security Settings Accepted screens

# Verifying the Configuration

## Test Menu

The test menu icons are shown in this table:

| Symbol | Description | Symbol | Description |
|---|---|---|---|
| | Inhibit | | Force Relay |
| | Force mA Output | | Alarm/Fault Simulation |

**⚠WARNING**

**Warning:** Keep the passwords in a secure area to prevent unauthorized access to the transmitter. If the passwords are lost, resetting the transmitter will require a service technician.

## Inhibit

**⚠WARNING**

**Warning:** When the transmitter is placed in Inhibit Mode, alarms are silenced. This will prevent an actual gas event from being reported. Inhibit Mode must be limited to testing and maintenance only. Exit Inhibit Mode after testing or maintenance activities.


Figure 145. Inhibit screen

The Inhibit mode is designed to prevent alarms from being triggered during testing or maintenance.


Figure 146. Inhibit menu

Use the ◀ ▶ switches to inhibit alarms by selecting Inhibit On with the ✓. The confirmation screen appears.


Figure 147. Confirm Inhibit On screen

Select ✓ to place the transmitter alarms into inhibit mode. Select ✖ will cancel the choice and leave the alarms in normal operating mode.


Figure 148. Confirm Inhibit Off screen

To return from Inhibit mode to to the normal monitoring mode, select Inhibit Off with the ✓. A confirmation screen appears.

Select ✓ to remove the transmitter from Inhibit mode. Select ‘X” to cancel the choice and leave the alarms in Inhibit mode.

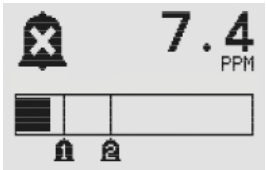



Figure 149. Inhibit Status screen

When the transmitter is in Inhibit mode, the General Status display will display the inhibit icon.

### *Force mA Output*

**⚠CAUTION**

**Caution:** The mA output set in this menu will revert to the normal operating values when exiting the Test Menu. For more information on setting the mA output levels for normal operation, see mA Levels.

Force mA Output allows peripheral devices driven by mA output from the transmitter to be tested. Based on the mA output values set in the mA Levels option (see mA Levels), the operator chooses the mA level to output to the device.


Figure 150. Force mA Output screen

The New mA Output screen shows the current mA output in the left column. The output can be controlled by changing the value in the column on the right.

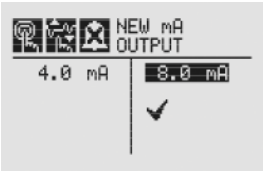



Figure 151. New mA Output screen

Once the new value is input, use the ◀ ▶ switches to move to the '✓' and use the ✓ magnetic switch on the front panel to set the mA output.

## Force Relays

**⚠CAUTION**

**Caution:** Any relay conditions set in this menu will revert to the normal operating values when exiting the Test Menu. For more information on setting the relay options for normal operation, see Relay Options.

The Force Relay menu allows peripheral devices driven by relays from the transmitter to be tested. Depending on the relay options set in the Relay Options menu (see the Relay Options section), the relay will be open or closed.

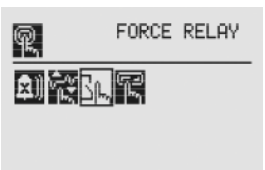



Figure 152. Force Relays screen

The Relay State screen shows the current relay configuration in the left column. The output can be controlled by changing the value in the column on the right.

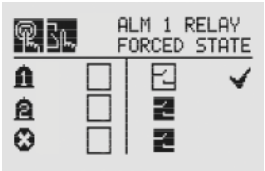



Figure 153. Relay State screen

Once the new value is input, use the ◀ ▶ switches to move to the '✓' and use the ✓ magnetic switch on the front panel to change the condition of the relay.

## Alarm/Fault Simulation

Alarm and Fault simulation work in tandem with the previous sections (Force mA Output and Force Relays) to allow testing of the transmitter and the peripheral warning and safety devices. Figure 156 shows the menu choices for selecting an alarm or fault simulation.


Figure 154. Alarm/Fault Simulation screen

Selecting an alarm level to simulate activates a confirmation screen.

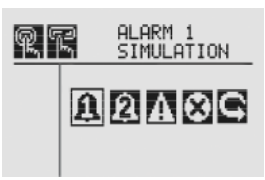



Figure 155. Alarm/Fault Simulation menu

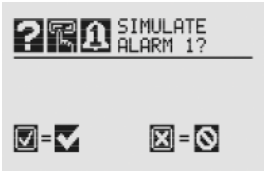



Figure 156. Confirmation screen

Selecting ✓ will simulate the alarm from the transmitter. If the ✗ is selected, the simulation will be aborted.

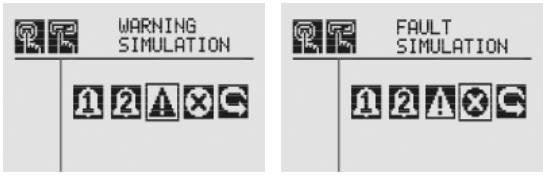



Figure 157. Warning and Fault Simulation screens

To simulate a Warning or Fault from the transmitter, select the appropriate icon from the menu.


Figure 158. Fault Simulation Confirmation screen

A confirmation screen will appear. Select ✓ to simulate the warning or fault from the transmitter. If the ✗ is selected, the simulation will be aborted. Use Alarm/Fault Reset to reset alarms, faults, or warnings generated by the simulation.

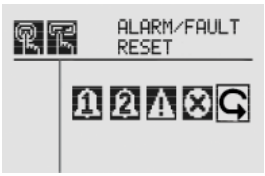



Figure 159. Alarm/Fault Reset screen

This confirmation screen will appear.


Figure 160. Alarm/Fault Reset screen

Select ✓ to reset the alarms, faults, or warnings generated by the simulation. If the ✗ is selected, the simulation continues.

**⚠CAUTION**

**Caution:** Relays and LEDs will return to their initial states after simulations are completed unless faults and alarms are set to latching by the user.

**⚠WARNING**

**Warning:** After changing parameters with a handheld device, verify that the parameter settings are correct at the transmitter.

## Information Menu

The Information Menu Displays the current status information for these parmeters:

| Symbol | Description |
|---|---|
| | Show Alarm/Fault Status |
| | Show Date/Time |
| | Show Transmitter Data |
| | Show Transmitter Status |
| | Show Sensor Data |
| | Show Sensor Status |

| Symbol | Description |
|---|---|
| | Show Gas Data |
| | Show Range/Alarm Settings |
| | Show mA Level Settings |
| | Show Relay Settings |
| 01101 | Show Fieldbus Settings |
| | Show Event History |

## Alarm/Fault Status


Figure 161. Alarm/Fault Status screen

Select Alarm/Fault Status to display the Alarm/Fault Status screen allowing faults and alarms to be reset.


Figure 162. Alarm/Fault Status screen

The '✓' will be highlighted. Select ✓ to reset all faults and alarms generated by the transmitter then return to the Alarm/Fault Status screen. Select the ✗ switch to return to the Alarm/Fault Status screen without resetting faults or alarms.

### *Date & Time*

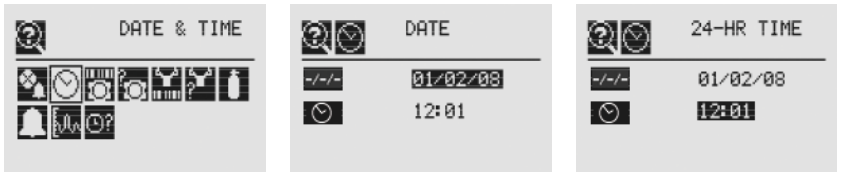



Figure 163. Date/Time screens

The Date and Time screens display the date and time in the formats currently set on the transmitter. See Set Date and Time.

## Transmitter Data

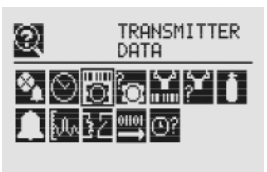



Figure 164. Transmitter Data screen

Using the ◀ ▶ switches, the Transmitter Data displays the ID, part number, serial number, and version number of the firmware.

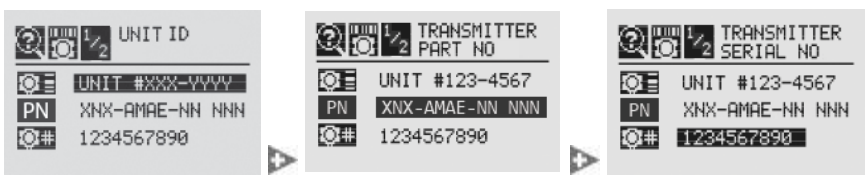



Figure 165. Transmitter ID, Part Number and Serial Number screens

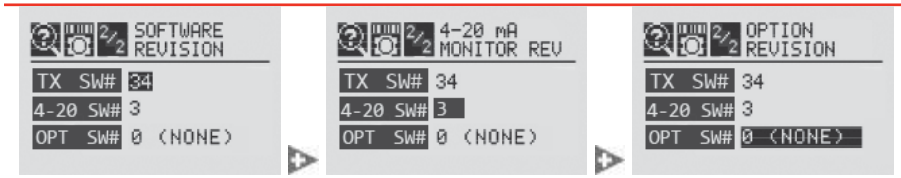



Figure 166. Transmitter Software, 4-20 Monitor and Option Version screens

Transmitter Data is also used to update the configuration of the transmitter when an option board is added or changed. To add the new option, use the ◀ ▶ switches to navigate to the Option Revision screen, then swipe the ✓ magnetic switch on the front panel to display the Accept New Option Screen. The screen will show the current option (if any) and the newly installed option. Use the ◀ ▶ switches to highlight the option then swipe the ✓ magnetic switch on the front panel to accept the change. The transmitter will update the part number of the unit. The new option will then be operational.

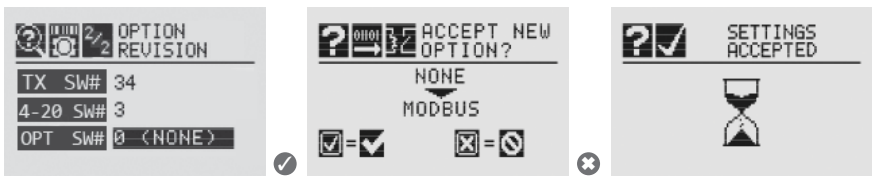



Figure 167. Updating the Transmitter for Option Boards Added or Changed screens

## Transmitter Status

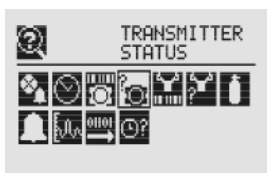



Figure 168. Transmitter Status screen

Transmitter Status displays information about the transmitter including temperature, 4-20 mA output value, and supply voltage.

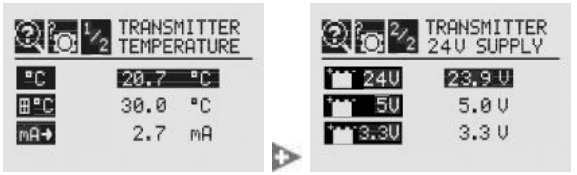



Figure 169. Transmitter Temperature and Supply Voltage screens

## Sensor Data

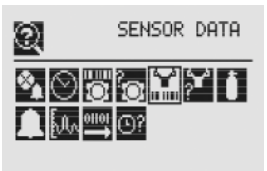



Figure 170. Sensor Data screen

Sensor Data displays information about the transmitter including sensor type and sensor software revision.

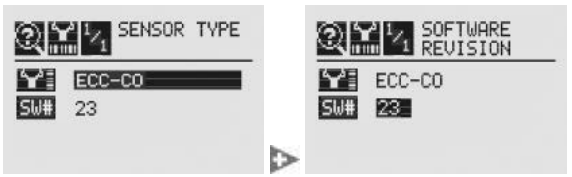



Figure 171. Sensor Type and Software screens

## Sensor Status

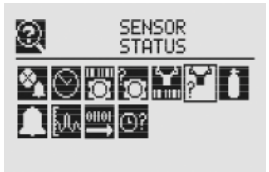



Figure 172. Sensor Status screen

Sensor Status displays the temperature of the sensor attached to the transmitter. When equipped with an EC or mV sensor, sensor life is also displayed.

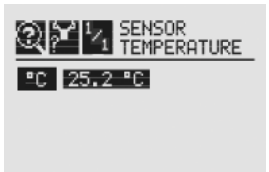



Figure 173. Sensor Temperature screen

## Gas Data

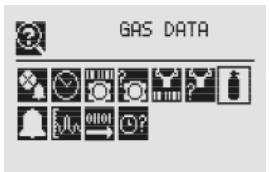



Figure 174. Gas Settings screen

Gas Data displays the current detectable gas as configured for the attached sensor.

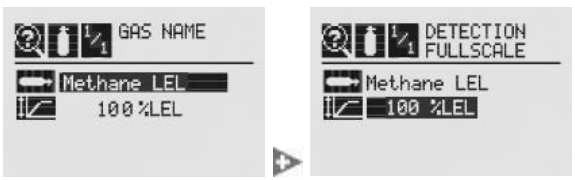



Figure 175. Gas Abbreviation and Full Scale screens

## Range/Alarm Settings


Figure 176. Range/Alarm Settings screen

Range/Alarm Settings displays the currently configured alarm information.

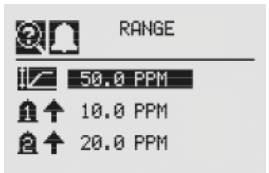



Figure 177. Alarm Display Rang screen

## mA Level Settings


Figure 178. mA Level Settings screen

The mA Level Settings section shows the current values for mA output for Inhibit, Warning, and Overrange output.

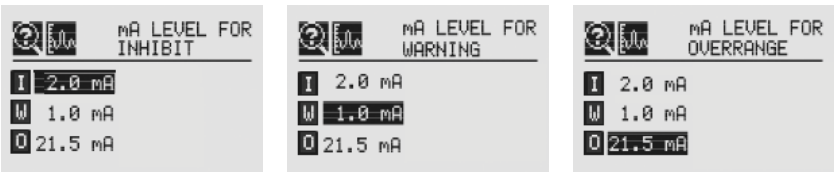



Figure 179. mA Output Inhibit, Warning and Overrange screens.

## Fieldbus Settings

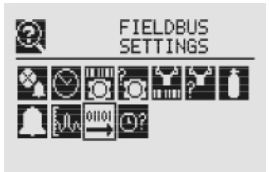



Figure 180. Fieldbus Settings screen

Fieldbus Settings displays the current configuration of both HART and Modbus. To change the settings see Fieldbus Options. HART displays the current HART address assigned to the transmitter.


Figure 181. HART Configuration Settings screens

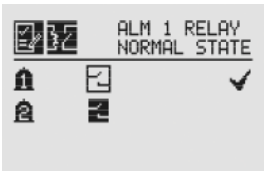
Modbus displays the current address and communication data rate assigned to the transmitter.


Figure 182. Modbus Configuration Display screen

## Relay Data

The Relay Menu is enabled only if the transmitter is equipped with the optional relays.


Figure 183. Relay Data screen



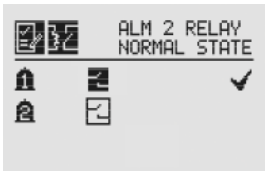




Figure 184. Relay State screens

Relay Data displays the current setting of the optional relays on the transmitter. To change the relay settings, see Relay Options.

## ◷? Event History

The Event History screen lists all events that are activated by the transmitter's settings. Five types of events are recorded: reset messages, alarm messages, warning messages, fault messages, and informational messages. The events are listed in chronological order beginning with the latest.

Events can be displayed through five browsing modes:

- all events in order of occurrence
- all events by hour
- all events by day
- only the alarm events, in order of occurrence
- only the fault events, in order of occurrence

The Event History screen groups events into chronological order (beginning from the unit's installation). Events can also be viewed by hour or by date.

Events listed in *hour* order are grouped without regard to date. For example, all events that have occurred between noon and 1:00 o'clock since the transmitter's installation can be isolated. To view all events in hour order:

1. Use the magnetic wand to filter the display by hour.
2. Navigate through the displayed times.

To isolate all of the events from a specific *day*:

1. Use the magnetic wand to filter the display by day.
2. Navigate through the displayed days.
3. Filter the list by all events. This will display all events that occurred on that day.

When the transmitter is configured with the Searchline Excel or Searchpoint Optima, the data reported in the event will be the fault code from the Searchline Excel or Searchpoint Optima.

The transmitter records up to 1280 events in a circular buffer. When event 1281 is recorded, the oldest event will be deleted from the list.

## NOTE

**Note:** The leading zeros of faults and warnings are not displayed in the event list; i.e., Fault 011 is displayed as Fault 11.


Figure 185. Event History screen

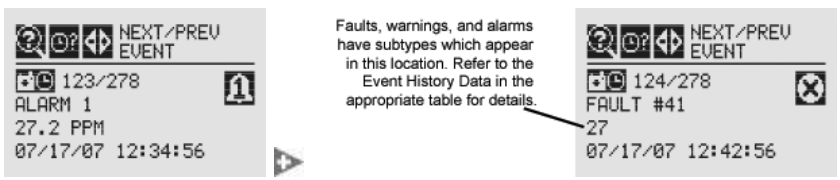



Figure 186. Chronological Event list

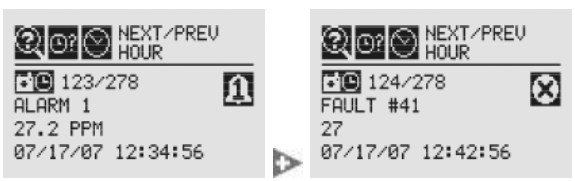



Figure 187. Chronological Event list by hour

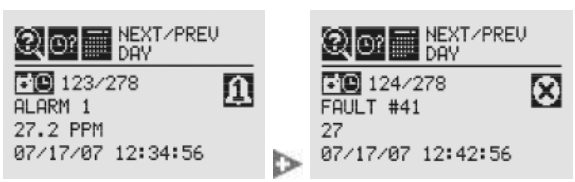



Figure 188. Chronological Event List by Day

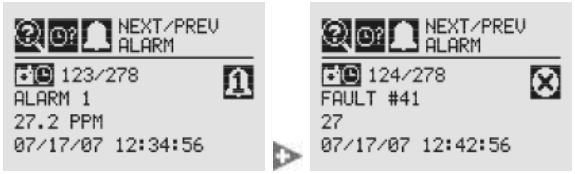



Figure 189. Chronological Alarm List

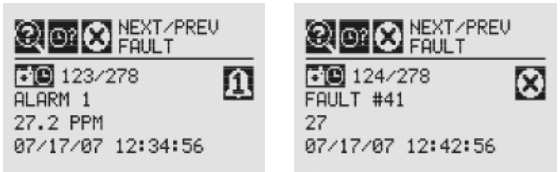



Figure 190. Chronological Fault list

# Calibration

## Gas Calibration Menu

Each of the sensor technologies supported by the transmitter uses unique calibration procedures. The description provided illustrates the transmitter interface with the sensor. The description does not replace the procedures found in each sensor's operating manual.

The Gas Calibration menu is used for Zero and Span calibration as well as functional testing (bump testing). The Gas Calibration menu is accessed from the Main Menu.

This table shows the Gas Calibration menu icons:

| Symbol | Description |
|---|---|
| | Gas Calibration |
| | Bump Test |
| | Calibrate mA Output |
| | Soft Reset |
| | Align Excel |


Figure 191. Gas Calibration Menu

For calibrating sticky gases ($Cl_2$, $ClO_2$, HF, HCl, HCN, $F_2$ and $O_3$), use Tox Kit part number XNXTOXKIT2.

*Default Calibration Values*

**WARNING**

**Warning:** Do not use the transmitter in oxygen-enriched atmospheres. Concentrations displayed will be adversely affected by oxygen depletion.

**Warning:** Take appropriate precautions when using toxic, flammable, or pressurized cylinders.

**CAUTION**

**Caution:** The calibration procedure must be performed only by qualified personnel.

The default calibration values for the "Calibration Required" diagnostic vary based on sensor type. This value can be reprogrammed in accordance with site requirements to ensure the highest level of safety. Before commissioning, verify the correct operation of each sensor by calibration with a certified test gas of known concentration. See Specifications for calibration gas specifications.

**CAUTION**

**Caution:** Recalibrate if the temperature of local environment has varied by more than ±15°C from the temperature of calibration.

**WARNING**

**Warning:** Honeywell recommends periodic bump tests (every 30 days or in accordance with customer site procedures) to the sensor to insure proper operation and compliance with the functional safety rating of the installation.

## Zero and Span Calibration for EC/mV Sensors and Searchpoint Optima

**⚠CAUTION**

**Caution:** Before initial calibration, allow the sensor to stabilize for 30 minutes after applying power. When in zero and span calibration modes, the current output from the sensor is inhibited (default 2mA) to avoid false alarms.

For sticky gases (HCl, HF, $Cl_2$, $ClO_2$, HCN, $F_2$ and $O_3$), use PTFE tubing with short pieces of Tygon tube for the final connection (due to the inflexibility of PTFE). This minimizes adhesion of the gas to the tube surface and allows more accurate measurement. Use a one-inch section of Tygon tubing as a union sleeve to join the calibration cup's fitting and the PTFE tubing. Push the PTFE tubing against the fitting so they make secure contact as shown in the illustration. Gas should not be able to contact the Tygon sleeve. Attach the PTFE tubing to the regulator in the same manner.

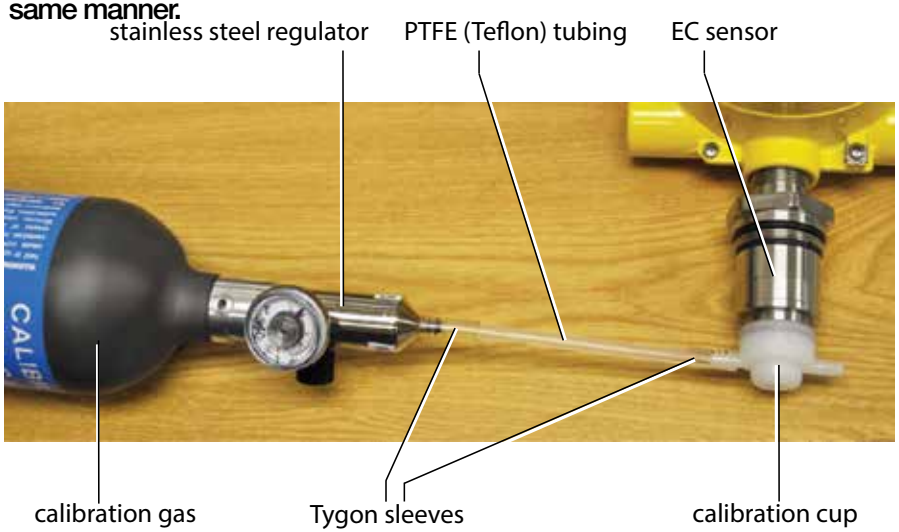



Figure 192. Joining the PTFE tubing with Tygon tubing

To calibrate the sensor, use an appropriate span gas cylinder, tubing, magnet, and calibration gas flow housing. Set the flow regulator to 300-375 ml/min for XNX EC sensors or 300-700 ml/min for XNX mV sensors. Use a compressed gas cylinder (20.9%Vol oxygen) to perform the zero calibration if the sensor is located in an area containing any residual amount of the target gas. If no residual gas is present, background air can be used to perform the zero calibration. Contact a Honeywell Analytics representative for details about suitable calibration kits. To calibrate the sensor, follow the steps in Calibration Procedure.

**⚠ NOTE**

**Note:** The oxygen sensor does not require a zeroing procedure. Background air (20.9%Vol oxygen) can be used to span the oxygen sensor in place of a compressed air cylinder (20.9%Vol oxygen). See the Sensor Data section for other sensors.

**Note:** EN performance standards require 10 minutes stabilization time for application of zero and span gas for performance-approved EC, mV, and IR sensors prior to calibration.

### *Calibration Procedure*

This section outlines the steps for calibrating the transmitter's attached sensors.

**⚠ NOTE**

**Note:** Perform the zero calibration before the span calibration.

1. If using a compressed gas cylinder, push the calibration gas flow housing onto the bottom of the sensor and apply the gas.
2. Access the Gas Calibration Menu. This menu is for both zero and span calibrations.


Figure 193. Gas Calibration Menu

**NOTE**

**Note:** The Gas Calibration menu is for both zero calibration and span calibration.

*Zero Calibration*


Figure 194. Zero Calibration Screen

As the sensor detects the gas and the concentration increases, the values displayed will reflect the changing concentration. When the concentration values are stable (about 3 minutes), select ✓ to allow the transmitter to calculate the zero adjustment. Selecting ✗ will return to the Gas Calibration menu.


Figure 195. Zero Calibration in Progress

3. If the zero calibration is successful, the transmitter will display the Zero Passed screen.

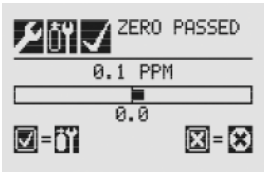



Figure 196. Zero Calibration Passed

*Span Calibration*

If a span calibration is not required, select the ✗ to skip the span calibration and return to the Calibration menu.

4. When the zero calibration is completed (or skipped), the Span Concentration screen appears. The gas concentration for the span gas calibration can be changed. If the span calibration is skipped, the Gas Calibration screen displays.

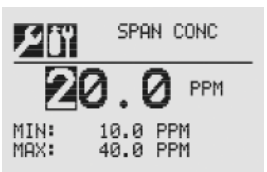



Figure 197. Span Gas Concentration Screen

5. Enter the concentration of the span gas by selecting ✓ to choose the first digit. Use the ◀▶ switches to decrease or increase the values. Use ✓ to accept the new value and move to the next digit. Continue until all digits have been selected.

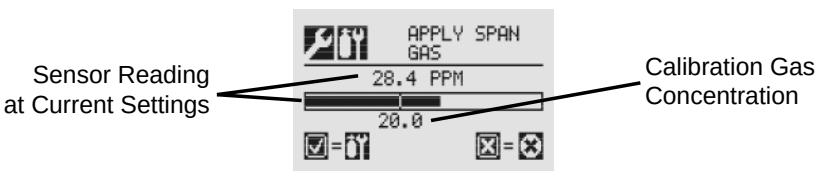



Figure 198. Span Calibration Screen

6. Apply the span gas. As the sensor detects the gas and the concentration increases, the values displayed will reflect the changing concentration. When the concentration values are stable, select ✓ to perform the span. The Span Calibration process also determines whether the sensor is within the proper range to accurately detect the target gas.
7. Selecting ✗ will cancel the span calibration and return to the Gas Calibration menu.
8. When the sensor has completed the calibration and the span algorithms have determined that it is within range, the Span Passed screen will appear.

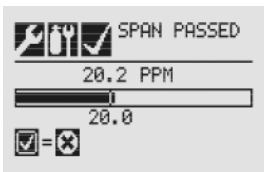



Figure 199. Span Passed Screen

If the calibration is not successful, the Span Failed screen will display. Selecting ✓ will return to the Span Concentration screen to begin the span calibration again. Selecting ✗ will exit Span Calibration and return to the Gas Calibration Menu.

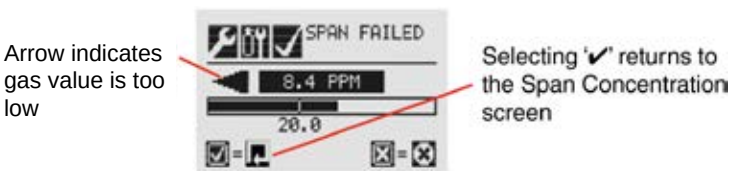



Figure 200. Span Calibration Failed

Once the zero gas and span calibrations are completed successfully, the user will be prompted to:

- exit with inhibit off
- exit with inhibit on, or
- not exit.


Figure 201. Span Calibration Failed

**⚠WARNING**

**Warning:** When the transmitter is placed in Inhibit Mode, alarms are silenced. This will prevent an actual gas event from being reported. Inhibit Mode must be limited to testing and maintenance only. Exit Inhibit Mode after testing or maintenance activities.

## Using the Calibration Cup

Refer to Figure 202 to attach the calibration cup:

1. Snap the calibration cup into the weather protector. The two protrusions on the cup fit into recesses in the weather protector.
2. Attach the hose from the gas cylinder to the calibration cup. Note that the cup's flow is unidirectional. There is an arrow on the bottom showing flow direction
3. Adjust the calibration flow rate[1].

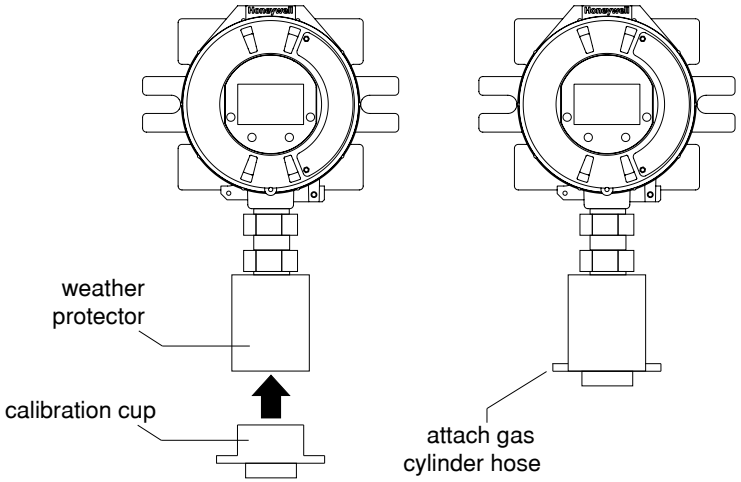



Figure 202. Attaching the Calibration Cup

1 300-375 ml/min for XNX EC sensors, 300-700 ml/min for XNX mV sensors, unless otherwise directed.

## Zero and Span Calibration of EC Sensors

**⚠CAUTION**

**Caution:** Before initial calibration, allow the sensor to stabilize for 30 minutes after applying power. When in zero and span calibration modes, the current output from the sensor is inhibited (default 2mA) to avoid false alarms.

**Caution:** Recalibrate if the temperature of local environment has varied by more than ±15°C from the temperature of calibration.

### Hydrogen Sulfide

Hydrogen Sulfide sensors can be affected by extreme humidity changes. A sudden increase in ambient humidity can result in a short-term positive drift in the instrument's reading. A sudden decrease in ambient humidity can result in a short-term negative drift in the instrument's reading. These are most likely to be noticed during calibration with dry or cylinder gas.

When calibrating hydrogen sulfide cartridges, follow the procedure in Calibration Procedure. To zero the sensor, use a compressed gas cylinder of 20.9%Vol oxygen (not nitrogen). Do not use background air. If a span calibration is to be performed, apply the span calibration gas immediately after the zeroing procedure. Do not allow the sensor to return to ambient air conditions.

**⚠WARNING**

**Warning:** Long-term exposure (>20 minutes) to concentrations exceediing the full-scale range of the $H_2S$ sensor Type 2 can cause it to lose sensitivity. The measured value may then decrease even though high levels of toxic gas are still present. If such conditions can occur, set the control unit to latch at overrange. In standalone operation, set alarms to latching. When resetting the overrange or alarm, verify the correct operation of the transmitter. Before re-calibrating the transmitter, verify the absence of gas.

### Hydrogen Cyanide

The span calibration can be performed using HCN from a cylinder at a suitable concentration. Adjust the span calibration set point in the instrument to match that of the concentration actually applied. Pay special attention to the following points:

1. Use the official calibration adaptor (S3KCAL) when applying cylinder gas to the sensor.
2. PTFE tubing should be used to minimise the effects of coating and gas absorption during the procedure.
3. Tubing lengths should be kept as short as possible.
4. Calibration gas should be flowed for a minimum of 5 minutes through the system before performing a span calibration.
5. A flow rate of 300 to 375 ml/min should be maintained throughout the calibration procedure.

### Fluorine

The calibration is performed using 2 ppm (nominal) chlorine (Cl2). Honeywell Analytics strongly recommends that a suitable Cl2 generator be used for this operation. Adjust the span calibration set point in the instrument to match that of the concentration actually applied. Pay special attention to the following points:

1. Use the official calibration adaptor (S3KCAL) when applying cylinder gas to the sensor.
2. PTFE tubing should be used to minimise the effects of coating and gas absorption during the procedure.
3. Tubing lengths should be kept as short as possible.
4. Calibration gas should be flowed for a minimum of 5 minutes through the system before performing a span calibration.
5. A flow rate of 300 to 375 ml/min should be maintained throughout the calibration procedure.

### Ethylene Oxide

**⚠CAUTION**

**Caution:** Operation of the EtO sensor in a constant background of ethylene may result in baseline drift. under these conditions, the response of the sensor should be checked and calibrated more frequently.

**⚠CAUTION**

**Caution:** Exposure of the EtO sensor to high concentrations of ethylene may reduce cell life. After such an exposure, check and if necessary replace the sensor.

To maximize the accuracy of the calibration, please follow the special process for calibration of EtO cartridges as follow:

### Transportation and Installation

**⚠ NOTE**

**Note:** Ethylene oxide sensors are supplied on a transportation board in order to keep the cell biased at the correct level. Once removed from the transportation board the sensor should be fitted to the detector as soon as possible.

If the sensor is not fitted to the transportation board or a powered detector, its bias will decay and the sensor will take up to 24 hours to recover. During this period the sensor will not function as a gas detector, reporting a gas reading above full scale.

When calibrating ethylene oxide sensors, the following should be taken into account:

1. Use the official calibration adaptor (S3KCAL) when applying cylinder gas to the sensor.
2. PTFE tubing should be used to minimise the effects of coating and gas absorption during the procedure.
3. Tubing lengths should be kept as short as possible.
4. Calibration gas should be flowed for a minimum of 5 minutes through the system before performing a span calibration.

5. A flow rate of 300 to 375 ml/min should be maintained throughout the calibration procedure.

**Zero Only Calibration**

If the sensor is to be zero calibrated only (no span calibration), the calibration should be performed in clean ambient air or clean air (not nitrogen) humidified to approximately ambient humidity levels.

**Full Calibration**

If performing a full calibration (zero and span) the following procedure should be used:

1. Apply clean, dry air (not nitrogen) to the sensor for 5 minutes. Do not use background air.
2. Zero the sensor in accordance with the detector's instructions to confirm the zero calibration.
3. Apply the span calibration gas to the sensor immediately after the zeroing procedure. Do not allow the sensor to return to ambient air conditions between steps 2 and 3.
4. Apply the span gas to the sensor for five minutes before commencing the span calibration in accordance with the detector's instructions to confirm the span calibration.
5. After the span calibration, the sensor should be allowed to recover in clean ambient air, or clean air humidified to approximately ambient humidity levels for fifteen minutes and then should be zero calibrated under these conditions. Note that this does not affect the span sensitivity of the instrument.

**Ozone**

The calibration is performed using 0.2 ppm ozone ($O_3$). Honeywell Analytics strongly recommends that a suitable $O_3$ generator be used for this operation such as the ACD Genie $O_3$. This device generates ozone at the target concentration of 0.2 ppm and maintains a regular flow rate throughout the calibration. During the calibration, please pay attention to the following points:

1. PTFE tubing should be used to minimise the effects of coating and gas absorption during the procedure.
2. Tubing lengths should be kept as short as possible.
3. The flow rate of the ADC Genie $O_3$ generator depends on the concentration set and cannot be adjusted by the user. At a concentration of 0.2 ppm, the flow rate will be 1 lpm.
4. Calibration gas should be flowed for a minimum of 5 minutes through the system before performing a span calibration.
5. Refer to the manufacturer's operating instructions supplied for full details on the operation of the $O_3$ generator.

### 705/705HT Calibration

For complete calibration and configuration information, see the *Type 705 Operating Instructions* (Honeywell part number 00705M5002).

### Sensepoint/Sensepoint HT Calibration

For complete calibration and configuration information, see the *Sieger Sensepoint Technical Handbook* (Honeywell part number 2106M0502).

### Searchpoint Optima Plus Calibration

Complete calibration and configuration information can be found in the Searchpoint Optima Plus Operating Instructions (Honeywell part number 2108M0905). If properly installed and maintained, the Searchpoint Optima Plus sensor will not require routine calibration. This is due to the inherent stability of the IR absorption process and the unit's fully compensated optical configuration.

1. From the Calibration menu, select the Gas Calibration option.


Figure 203. Calibration menu


Figure 204. Gas Calibration menu

2. Perform a zero calibration. When concentration values are stable, select ✓ for XNX to calculate the zero adjustment


Figure 205. Apply Zero Gas screen

3. Select ✕ to return to the Gas Calibration menu. If the zero calibration was successful, the transmitter will display the Zero Passed screen


Figure 206. Zero Calibration screens

4. Begin the span calibration by entering the concentration value of the calibration gas: Select ✓ to choose the first digit. Use +/- to increase or decrease values. Select ✓ to accept the value and move to the next digit. Use the calibration cover (Honeywell part number 2108B0272) to perform a span calibration at a flow regulator of 1 LPM. (If a span calibration is not required, select ✕ to return to the calibration menu.)

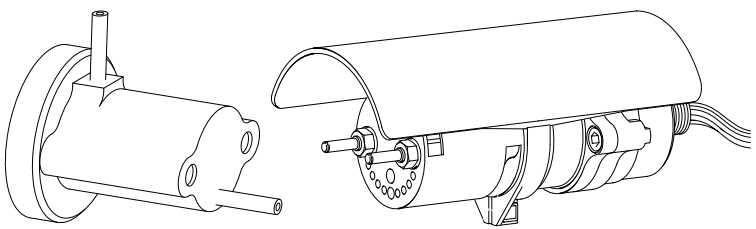


Figure 207. Searchpoint Optima Plus

5. Continue until all three digits have been entered.

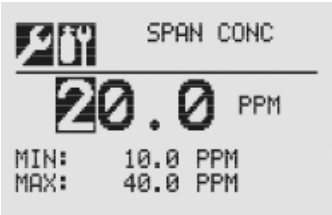



Figure 208. Span Concentration screen

6. Apply the span gas. When concentration values are stable, select ✓ to calculate the span adjustment. This process also determines if the sensor is within range to accurately detect the target gas.

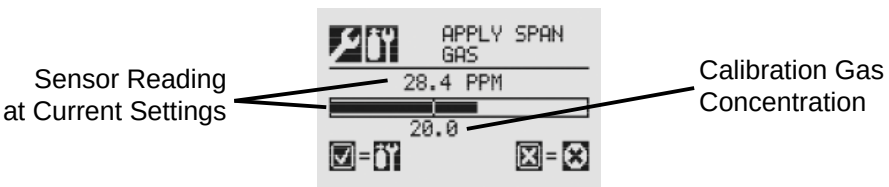



Figure 209. Span adjustment calculation

7. Select ✗ to return to the Gas Calibration menu. If the calibration is not successful, the Span Failed screen will be displayed.

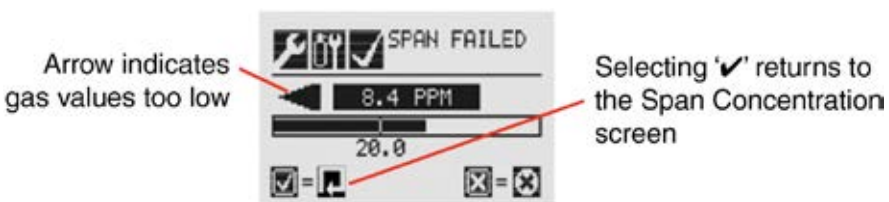



Figure 210. Span Failed screen

Select ✓ to return to the Span Concentration screen to repeat the span calibration.

Select ✗ to exit Span Calibration and return to main Calibrate screen. If Span Calibration is exited, the previous calibration values will be used. Select ✓ to return to the Span Concentration screen.

If the calibration is successful, the Span Passed screen will be displayed.

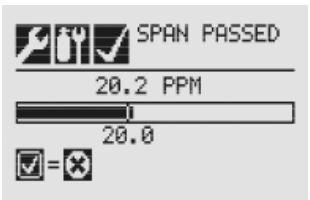



Figure 211. Span Passed screen

8. Exit the Calibration Menu. After the zero and span calibrations have been successfully completed, the user will be prompted to:
   - Exit and turn alarm and fault inhibit off,
   - Exit and leave the transmitter in inhibit mode. or
   - Not exit


Figure 212. Calibration exit options

**⚠WARNING**

**Warning:** When the transmitter is placed in Inhibit Mode, alarms are silenced. This will prevent an actual gas event from being reported. Inhibit Mode must be limited to testing and maintenance only. Exit Inhibit Mode after testing or maintenance activities.

## Zero and Span Calibration for MPD Sensors

**⚠CAUTION**

**Caution:** Extended or frequent exposure to elevated concentrations of combustible gases may affect sensor sensitivity. Verify sensor performance by frequent calibration.

**Caution:** Before initial calibration, allow the sensor to stabilize for 30 minutes after applying power. When in zero and span calibration modes, the current output from the sensor is inhibited (default 2mA) to avoid false alarms.

The Gas Calibration menu is for both zero and span calibrations. This section describes how to calibrate MPD flammable sensors fitted to the transmitter. The calibration adjustments are made on the transmitters display. Gassing is performed at the sensor, which may be locally or remotely located.

The following equipment is required:

- Flow housing (Honeywell part number 1226A0411)
- Test gas
- Regulator

**⚠ NOTE**

**Note:** Use the zero gas and span gas at about the same humidity levels to avoid erroneous cell responses.

1. If there is a weatherproof cap on the MPD, remove it.
2. Fit the flow housing onto the MPD.

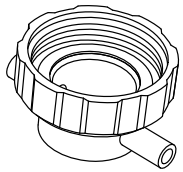


Figure 213. Flow housing

Figure 214 shows the flow housing accessory fitted to the MPD.

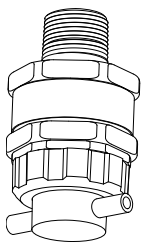


Figure 214. MPD with Flow Housing

3. Connect the flow housing (using either gas pipe) to the regulated cylinder containing a known concentration of the target gas at approximately the sensor alarm point, e.g., 50% LEL methane in air.

**⚠WARNING**

**Warning:** As some test gases are hazardous, exhaust the flow housing outlet to a safe area.

4. Follow the procedure in the Zero and Span Calibration for EC Sensors, mV Sensors, and Searchpoint Optima section for both zero and span calibrations.
5. Apply the target gas to the sensor. Pass the gas through the flow housing at a rate of 300-700 ml/min.
6. Calibrate sensors at concentrations representative of those to be measured. When feasible, calibrate the sensor with the target gas it is to detect.
7. Ensure that the sensor and the vicinity around it is clear of all traces of the calibration gas before continuing. This is to avoid triggering spurious alarms. If the calibration fails at any point, discard the cartridge and replace it with a new one (see the MPD Sensor Cartridge Replacement section) .
8. Remove the test equipment, refit the weatherproof cap to the sensor (if it was previously removed for the test), and return the system to normal operation.

*MPD Flammable Sensor Operational Life*

The pellistors used in flammable gas sensors can suffer from a loss of sensitivity when in the presence of poisons or inhibitors, e.g., silicones, sulfides, chlorine, lead, or halogenated hydrocarbons. The pellistors are poison-resistant to maximize the operational life of the flammable sensor. The typical operating life of the pellistor sensor used in the MPD-CB1 is 60 months.

## Cross-calibration Procedure for MPD-CB1

**⚠CAUTION**

**Caution:** When a user calibrates a sensor using a different gas, the responsibility for identifying and recording the calibration rests with the user. Refer to local regulations where appropriate.

When the MPD-CB1 Combustible LEL sensor is to be calibrated with a gas which is different from the gas or vapor to be detected, follow this cross-calibration procedure:

These star rating tables list the gases according to the reaction they produce at a given detector.

| Gas | Star Rating |
|---|---|
| Acetone | 4* |
| Ammonia | 7* |
| Benzene | 3* |
| Butanone | 3* |
| Butane | 4* |
| Butyl acetate | 1* |
| Butyl acrylate | 1* |
| Cyclohexane | 3* |
| Cyclohexanone | 1* |
| Diethyl ether | 4* |

| Gas | Star Rating |
|---|---|
| Ethane | 6* |
| Ethanol | 5* |
| Ethyl acetate | 3* |
| Ethylene | 5* |
| Heptane | 3* |
| Hexane | 3* |
| Hydrogen | 6* |
| Methane | 6* |
| Methanol | 5* |
| MIBK | 3* |

| Gas | Star Rating |
|---|---|
| Nonane | 2* |
| Octane | 3* |
| Pentane | 4* |
| Propane | 5* |
| Propan-2-ol | 4* |
| Styrene | 2* |
| Tetra hydrafuran | 4* |
| Toluene | 3* |
| Triethylamine | 3* |
| Xylene | 2* |

An eight-star (8*) gas produces the highest output, while a one-star (1*) gas produces the lowest. (These are not applicable at ppm levels.)

*To cross-calibrate the MPD-CB1 combustible gas sensor:*

1. Obtain the star rating for both the test gas and the gas to be detected from the Gas Star Ratings table on the previous page.
2. Set the gas selection to the star rating which is the same star rating of the gas being detected.
3. These values may then be used in the following table to obtain the required meter setting when a 50% LEL test gas is applied to the detector.

| Test Gas Meter Settings[1] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Star Rating of Calibration Gas | Star Rating of Gas to be Detected | | | | | | | |
| | 8* | 7* | 6* | 5* | 4* | 3* | 2* | 1* |
| 8* | 50 | 62 | 76 | 95 | - | | - | - |
| 7* | 40 | 50 | 61 | 76 | 95 | - | | - |
| 6* | 33 | 41 | 50 | 62 | 78 | 95 | - | |
| 5* | 26 | 33 | 40 | 50 | 63 | 79 | 95 | - |
| 4* | - | 26 | 32 | 40 | 50 | 63 | 80 | 95 |
| 3* | - | - | 26 | 32 | 40 | 50 | 64 | 81 |
| 2* | - | - | - | 25 | 31 | 39 | 50 | 64 |
| 1* | - | - | - | - | 25 | 31 | 39 | 50 |

[1] Use these settings only with 50% LEL calibration gas concentration.

4. If a sensor is to be used to detect a gas other than that for which it was calibrated, the required correction factor can be obtained from the following multiplier factors table. Multiply the meter reading by this number to obtain the true gas concentration.

| Multiplier Factors | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sensor calibrated to detect | Sensor used to detect | | | | | | | |
| | 8* | 7* | 6* | 5* | 4* | 3* | 2* | 1* |
| 8* | 1.00 | 1.24 | 1.52 | 1.89 | 2.37 | 2.98 | 3.78 | 4.83 |
| 7* | 0.81 | 1.00 | 1.23 | 1.53 | 1.92 | 2.40 | 3.05 | 3.90 |
| 6* | 0.66 | 0.81 | 1.00 | 1.24 | 1.56 | 1.96 | 2.49 | 3.17 |
| 5* | 0.53 | 0.66 | 0.80 | 1.00 | 1.25 | 1.58 | 2.00 | 2.55 |
| 4* | 0.42 | 0.52 | 0.64 | 0.80 | 1.00 | 1.26 | 1.60 | 2.03 |
| 3* | 0.34 | 0.42 | 0.51 | 0.64 | 0.80 | 1.00 | 1.27 | 1.62 |
| 2* | 0.26 | 0.33 | 0.40 | 0.50 | 0.63 | 0.79 | 1.00 | 1.28 |
| 1* | 0.21 | 0.26 | 0.32 | 0.39 | 0.49 | 0.62 | 0.78 | 1.00 |

Since combustible sensors require oxygen for correct operation, use a mixture of gas in air for calibration. Assuming average sensor performance, the sensitivity information in these tables is normally accurate to ±20%.

*Example:*

If the target gas to be detected is butane and the calibration gas available is methane (50% LEL):

1. Look up the star rating for each gas in the first table:

   Butane 4* and Methane 6*.

2. Check the meter settings for 50% LEL calibration gas in the second table: 78.
3. Set the meter to 78% to give an accurate reading for butane using 50% LEL with methane as the calibration gas.

**NOTE**

**Note:** Calibrate the sensor at the approximate alarm levels to allow for non-linearity of the sensors at gas concentrations above 80% LEL.

## EC Sensor Operational Life

The typical life of a toxic gas sensor depends on the application, frequency, and amount of gas exposure. Under normal conditions (3 month visual inspection and 6 month test/recalibration), the toxic sensor has an expected life equal to or greater than these lifetimes:

- 12 months for ammonia, hydrogen chloride, and hydrogen fluoride sensors (see further ammonia information below).
- 18 months for fluorine and ozone sensors.
- 24 months for chlorine dioxide, oxygen, and other toxic sensors.

See the Maintenance section for sensor replacement procedures.

**CAUTION**

**Caution:** Oxygen deficient atmospheres (less than 6%V/V) may result in inaccurate readings and substandard performance.

Ammonia electrochemical cells are reliable and suitable for applications where no background concentration of ammonia exists. Under these conditions the cells are expected to operate for 12 to 24 months. These ammonia cells are of the consumptive type. Their operating life can be adversely affected by continuous or excessive exposure to ammonia, or by prolonged exposure to extremes of temperature and/or humidity.

To ensure continued detection availability, bump test the sensors regularly and implement an appropriate cell replacement program.

## Functional Gas Testing (Bump Testing)

**WARNING**

**Warning:** Honeywell Analytics recommends bump testing of $ClO_2$, $Cl_2$, HF, HCl, HCN, $F_2$ and $O_3$ sensors frequently and in accordance with customer site procedures to ensure proper operation and compliance with the functional safety rating of the installation.

**Warning:** Take appropriate precautions with cylinders of flammable or toxic gases. The calibration procedure must be performed only by Honeywell-trained personnel.

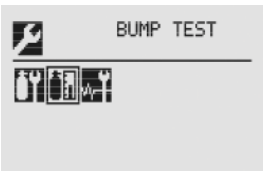



Figure 215. Bump Test Menu

**WARNING**

**Warning:** Exposure to desensitizing or contaminating substances or concentrations causing operation of any alarm may affect sensor sensitivity. Following such events, verify sensor performance by performing a bump test.

Test the sensor frequently to ensure that the system is operating properly. Different sensor types may require more frequent maintenance, depending on the environmental conditions and the gases present. The weatherproof cover has a spigot for attaching tubing from a gas cylinder. This may be used to bump test the sensor. However, environmental conditions may make this unsuitable for some gas types or applications. It is the responsibility of the user to ensure suitability of this method for each application.

1. When bump test gas is applied to the sensor, the bump test screen displays the current reading of the sensor and the peak reading that occurred during the bump test.

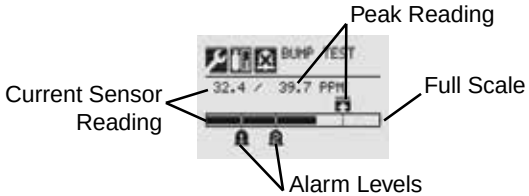



Figure 216. Bump Test Screen

2. If the difference between the reading and the applied gas concentration is outside the acceptable limits for the application, follow the procedures for zeroing and calibrating the sensor (see the Zero and Span Calibration for EC/mV Sensors section).
3. If the reading is still inaccurate, replace the sensor (see the MPD Sensor Cartridge Replacement section or EC Sensor Cell Replacement section as appropriate).

Once the bump test is completed successfully, the transmitter will exit the calibration procedure. Before returning to the Gas Calibration menu, the user will be prompted to exit and turn alarm and fault inhibit off, exit and leave the transmitter in inhibit mode, or not exit.

**⚠CAUTION**

**Caution:** Exiting before the gas level has fallen below the level of Alarm 1 will cause the transmitter to go into alarm.


Figure 217. Exiting the calibration procedure

## Calibrate mA Output

Use Calibrate mA Output to adjust the milliamp output to provide the correct output levels at peripheral devices connected to the transmitter.

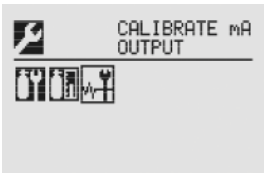



Figure 218 Calibrate mA Output Menu

To adjust the 4mA output, use the ◀▶ switches to increase or decrease the output, then use ✓ to accept the new value and move to the 20mA setting or ✗ to discard the selection and return to the previous menu.

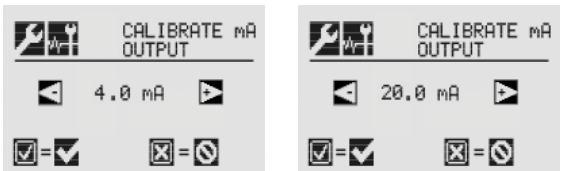



Figure 219. Calibrate mA Output Screens

During installation, an mA meter must be connected in series with the 4-20 mA loop as shown below.

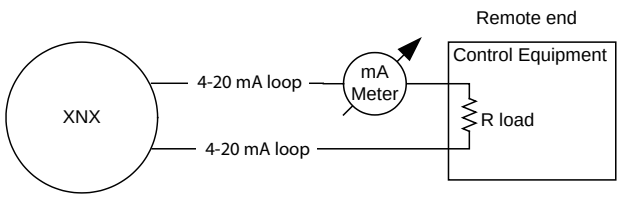



Figure 220. 4-20 mA loop with mA meter

## ⚠ NOTE

**Note:** Calibrated mA output is required for proper operation of internal diagnostics.

An F165 fault will be reported if the 4-20 mA calibration fails.

### ⌖ Align Excel (Searchline Excel)

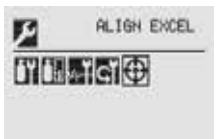



Figure 221. Align Excel Menu

For detailed information on aligning the Searchline Excel, see the *Searchline Excel Technical Manua*l (Honeywell part number 2104M0506).

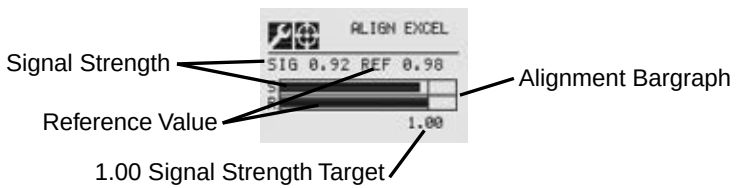



Figure 222. Align Excel Screen

Align the unit using the information found in the Searchline Excel manual. As the alignment is performed, the transmitter display will indicate the signal strength in the form of a bar graph. Align the Excel until the signal strength bar graph reaches or exceeds 1.00 as shown on the display.

### Soft Reset

**(Searchline Excel and Searchpoint Optima Plus only)**

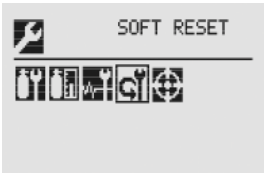



Figure 223. Soft Reset Menu

For transmitters connected to a Searchline Excel or Searchpoint Optima Plus sensor, the Soft Reset sends these infrared devices a signal to restart the sensor.

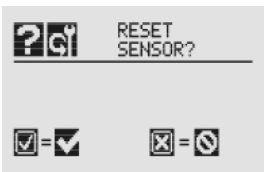



Figure 224. Soft Reset Sensor Screen

# Maintenance

**⚠WARNING**

**Warning:** When servicing or replacing sensors, reduce the risk of ignition in hazardous atmospheres by declassifying the area or disconnecting the equipment from the supply circuit before opening the sensor enclosure. Keep the assembly tightly closed during operation.

**Warning:** Take care when handling sensors as they may contain corrosive solutions. Do not tamper or in any way disassemble the sensor cell. Do not expose to temperatures outside the recommended range. Do not expose the sensor to organic solvents or flammable liquids.

**Warning:** At the end of their working lives, sensors must be disposed of in an environmentally safe manner, in accordance with local waste management requirements and environmental legislation. Alternatively, sensors may be securely packaged, clearly marked for environmental disposal, and returned to Honeywell Analytics. Do not incinerate sensors as they may emit toxic fumes.

**Warning:** Verify all outputs, including display, after installation, after service events, and periodically to ensure the safety and integrity of the system..

**⚠CAUTION**

**Caution:** The following procedure must be followed carefully and performed only by suitably trained personnel. A fault condition will be signaled by the sensor if it is removed with the unit under power.

**⚠ NOTE**

**Note:** If the power-on-self-test was skipped during maintenance activities, restart the transmitter.

## MPD Sensor Cartridge Replacement

Using Figure 225 as a guide, follow this procedure:

1. Verify that the label on the new sensor is the correct gas type.
2. Remove power from the transmitter.
3. Unscrew the weatherproof cover (if equipped), loosen the retainer locking screw, and unscrew the sensor retainer.
4. Remove the old sensor cartridge by pulling without twisting.
5. Slide the replacement  into the MPD body. Align the tab with the alignment slot, then press the sensor cartridge firmly to seat it into the body.
6. Refit the sensor retainer, tighten the locking screw, and refit the weatherproof cover (if equipped).
7. Recalibrate the MPD sensor following the procedure in the Calibration Procedure section.

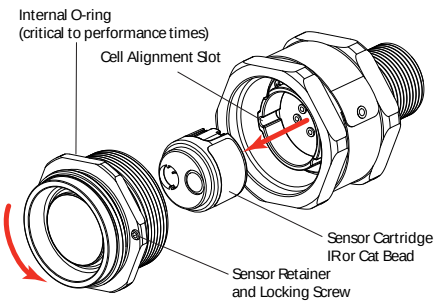



Figure 225. Removing the plug-in sensor

## EC Sensor Cartridge and Cell Replacement

**⚠CAUTION**

**Caution:** For toxic ells, remove the shorting clip from the bottom of the cell prior to installation. No shorting clip is provided with oxygen cells..

The serviceable sensor allows replacement of the cell inside the sensor. The cell must be replaced with one of the same type as the original.

When replacing oxygen ($O_2$) sensor cells, the initial warm-up time is between 10 and 15 minutes. This warm-up is required only after sensor cell replacement.

*Replacing the Sensor Cell*

To replace the cell follow this procedure:

1. Unscrew the weatherproof cover, loosen the sensor retainer locking screw, and unscrew the sensor retainer.
2. Remove the old sensor by pulling without twisting.
3. Unscrew the sensor cap.
4. Remove the old cell by pulling without twisting.
5. Verify that the new cell is the same type as the old one.
6. Plug the new cell into the sensor. Align the sensor pins with the connector holes in the PCB.
7. Refit the sensor into the transmitter ensuring that the pins are fully aligned before gently pushing it fully home.
8. Sensor warm-up will begin and the display will alternate between two screens: “Fault 151” and “WARM.”

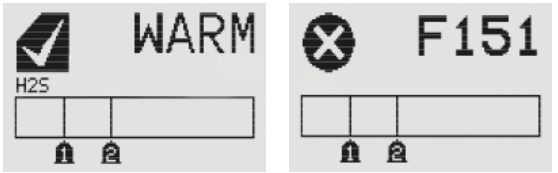



Figure 226. Sensor screens during warmup

9. Follow the procedure to accept the new sensor in the Accept New Sensor Type section.
10. Recalibrate the sensor following the procedures in the Zero and Span Calibration for EC/mV Sensors, and Searchpoint Optima section.

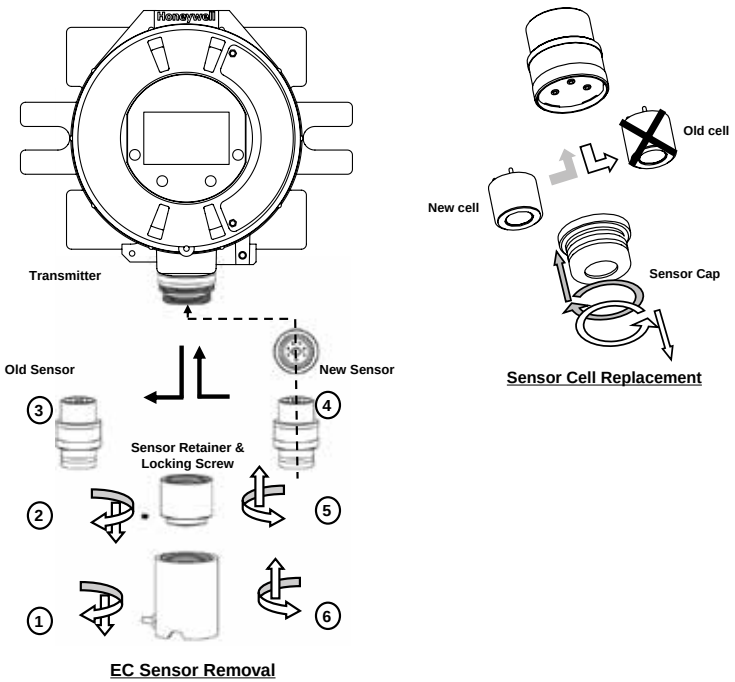



Figure 227. XNX EC sensor and cell replacement

*Replacing with a Different Sensor Type*

When replacing an EC cartridge with one of a different target gas, proceed as described in the previous section.

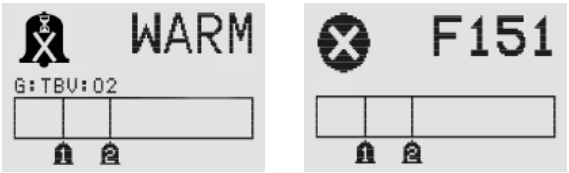



Figure 228. Sensor screens during warmup

Note that the XNX Transmitter will display the Fault F151 screen and the message “G:TBV:xxx”, where “xxx” is the target gas of the new cartridge. Enter the menu system and select Accept New Sensor Type and then calibrate the sensor as described in the Calibration Prodedure section.

# Warnings and Faults

## Warning Messages

| Warning | Description | Applicable Sensors | Latching / Non-Latching | Frequency of Diagnostic | Event History Data | Action For Resolution |
|---|---|---|---|---|---|---|
| W001 | XNX® 24 VDC Supply Bad | All | Non-latching | 2 seconds | XNX supply voltage x1000 | Check wire of 24V power supply to XNX as well as power supply operation. |
| W002 | XNX Temperature Error | All | Non-latching | 2 seconds | XNX temperature (Celsius) | Check location for heat sources. Fit with sunshade or other protection. Change location of XNX. Check temperature in Info->Transmitter Status to ensure temperature is being measured properly. |
| W003 | Simulated Warning/Fault | All | Non-latching | Enabled by user | 0 | Performing an alarm/fault reset will clear all simulation. |
| W005 | Sensor Temperature Error | Optima | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check location for heat sources. Fit with sunshade or other protection. Change location of XNX. Check temperature in Info->Sensor Status to ensure temperature is being measured properly. |
| | Sensor Temperature Error | Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check location for heat sources. Fit with sunshade or other protection. Change location of XNX. Check temperature in Info->Sensor Status to ensure temperature is being measured properly. |
| | Sensor Temperature Error | ECC | Non-latching | 2 seconds | Sensor temperature (Celsius) | Check location for heat sources. Fit with sunshade or other protection. Change location of XNX. Check temperature in Info->Sensor Status to ensure temperature is being measured properly. |
| W006 | Negative Drift | ECC, mV | Non-latching | 2 seconds | Raw gas concentration of sensor | Check sensor location for external interference. Perform zero calibration. If problem persists after zero calibration and no interference exists, replace sensor. |
| | Negative Drift | Optima, Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code | Check sensor location for external interference. Perform zero calibration. If problem persists after zero calibration and no interference exists, replace sensor. |
| W007 | Calibration Required | All | Non-latching | 2 seconds | Number of days remaining until calibration expires, negative = number of days expired | Time since the last span calibration has exceeded a defined limit. Performing a successful span calibration will clear the condition. The limit is the user-defined calibration interval. W007 can be disabled by setting the calibration interval to 0. |

| Warning | Description | Applicable Sensors | Latching / Non-Latching | Frequency of Diagnostic | Event History Data | Action For Resolution |
|---|---|---|---|---|---|---|
| W009 | Sensor 24 VDC Supply Bad | Optima, Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check wire of 24V power supply to XNX as well as power supply operation. Also check wiring between XNX and Optima/Excel. |
| W010 | Sensor Path Obscured | Optima | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check location for external interference. Check sensor for dirty windows. |
| | Beam Block | Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check location for external interference or obstructions in the IR path. Check sensor for dirty windows. Check Excel alignment. |
| W011 | Sensor Internal Lamp Issue | Optima | Latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Remove and return to Honeywell for repair. |
| W012 | Excessive Float | Optima, Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check sensor location for external interference, check sensor for operation and re-zero where appropriate. |
| W013 | Sensor Loop Failure, (Sensor is losing/ has lost mA output signal. These are detected by Optima and Excel. | Optima, Excel | Latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check that supply voltage is stable. Check wiring between Optima/ Excel and XNX. Check loop impedance of wiring. Check that switches S3 and S4 are set correctly. If the switch settings need to be changed, power down the transmitter before changing the switch settings. Once the problem has been resolved, a Soft Reset must be performed for the Calibration menu to clear W013. |
| W014 | Sensor Real Time Clock issue | Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic controlled by sensor | Sensor fault or warning code (Note 4) | Reset “date and time” in Excel, re-cycle Excel power and confirm “date and time.” If not retained, remove and return to Honeywell for repair. |

| Warning | Description | Applicable Sensors | Latching / Non-Latching | Frequency of Diagnostic | Event History Data | Action For Resolution |
|---|---|---|---|---|---|---|
| W015 | Sensor Internal Failure | Optima, Excel | Latching and Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Remove and return to Honeywell for repair. |
| | Sensor has an internal software error | Excel | Latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Cycle Excel power and confirm “fault cleared.” If not, replace sensor. |
| W016 | Sensor Installation Not Complete | Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check Excel alignment. Perform a zero calibration. |
| W018 | General Diagnostics | Optima, Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check sensor connections, check sensor operation, fit replacement sensor, replace personalty board. |
| W019 | Sensor Internal 5V Power Supply Defect | Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Remove and return to Honeywell for repair. |
| W020 | Forced mA Timeout | All | Latching | 1 second | Forced mA | Indicates that a forced mA condition was left on for more than 15 minutes. No action required as mA operation will be returned to normal automatically. |
| W021 | Forced Relay Timeout | All | Latching | 1 second | Forced relay status, 1=Alarm1 on, 2=Alarm2 on, 4=Fault on | Indicates that a forced relay condition was left on for more than 15 minutes. No action required as relay operation will be returned to normal automatically. |
| W022 | mV Sensor Calibration Needed | mV | Latching | When user changes sensor type or gas | 1=new sensor, 2=changed personality, 3=changed gas | Generated after accepting a new mV sensor or changing the mV sensor type or changing the mV gas selection. This is a warning to user that a span calibration should be performed. If a span calibration is not performed, the default calibration values will be used. |

| Warning | Description | Applicable Sensors | Latching / Non-Latching | Frequency of Diagnostic | Event History Data | Action For Resolution |
|---|---|---|---|---|---|---|
| W023 | Low Optical Sample Signal | Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check location for external interference or obstructions in the IR path. Check sensor for dirty windows. Check Excel alignment. Check Beam Block Low Signal Percentage setting in the transmitter. |
| W024 | Reflex Failure Warning | ECC | Latching | Dependent on sensor, typically 8 hours; Once fault is detected: every 15 minutes | 0 | ECC sensor is nearing end of life. Replace sensor. |
| W025 | Safety variable fail warning | All | Latching | 2 seconds | Note 3 | Contact Honeywell Analytics Service Department. |

## Notes

### *Note 3:*

| Subtypes | Decimal | Description |
|---|---|---|
| Fault 2 Event Bits | 1 | CRC error in safety critical RAM block |
| | 2 | Error reloading safety critical RAM block from EEPROM |
| | 4 | Error loading data from Personality board |
| | 8 | Excel signal level has been below the low signal level threshold for at least 24 hours |
| | 16 | Excel beam blocked |
| | 32 | Personality board error code > 0 |
| | 64 | Option board error code > 0 |
| | 128 | IR mA input > 1 mA and < 3.4 mA |
| | 256 | IR mA input < 1.0 mA |
| | 512 | IR forced 10 mA not within +/-1 mA |
| | 1024 | gains from PGA don't match local copy |
| | 2048 | error reading or writing EEPROM |
| | 4096 | ECC reflex failure |
| | 8192 | RAM test failure |
| | 16384 | Program memory CRC failure |
| | 32768 | Op code test failure |
| Fault 3 Event Bits | 1 | Interrupt integrity test failure |

### *Note 4:*

Optima and Excel fault and warning codes are displayed in the Event History data field.

## Fault Messages

| Fault | Description | Applicable Sensors | Latching / Non-Latching | Frequency of Diagnostic | Event History Data | Action For Resolution |
|---|---|---|---|---|---|---|
| F101 | Unexpected Sensor Reset | All | Non-latching | ECC & mV: main loop x2; Optima & Excel: 2 seconds | Note 2. Optima or Excel: Sensor fault or warning code (Note 4) | If repeated, check supply voltage, check cable loop impedance, check terminal connections |
| F103 | XNX Temperature Error | All | Non-latching | 2 seconds | XNX temperature (Celsius) | Check location for heat sources. Fit with sunshade or other protection. Change the transmitter's location. Check temperature in Info->Transmitter Status to ensure temperature is being measured properly. |
| F104 | XNX 24 VDC Supply Bad | All | Non-latching | 2 seconds | XNX supply voltage x1000 | Check the wire of the 24V power supply to the transmitter and the power supply operation. |
| F105 | 3.3VDC Supply Bad on XNX, personality board, or option board | All | Non-latching | 2 seconds | 1=XNX, 2=Personality board, 3=Option board | Check Transmitter Status |
| F106 | XNX Real Time Clock Failure | All | Non-latching | 2 seconds | Total seconds since Jan 1, 1970 | Either clock was incorrectly set or the battery for the clock has failed. Note: the clock will stop running on January 1, 2036. |
| F107 | XNX Internal Failure (RAM, ROM, EEPROM, Opcode) | All | Non-latching except for EEPROM error | At power up and 8 hours | Note 3 | Contact Honeywell Analytics' Service Department. |
| F108 | XNX mA Output Loop Failure | All | Latching | 2 seconds | mA output error (measured mA - set mA) | Check wiring of mA output from XNX. Check that switches S1 and S2 are set correctly. Note that if F108 is not resolved quickly, an F149 (Internal Communication Failure - mA) will also be generated. When the cause of F108 is resolved, both the F108 and F149 will be cleared. |
| F109 | Simulated Warning/Fault | All | Non-latching | Enabled by user | 0 | Performing an alarm/fault reset will clear all simulation. |
| F110 | Sensor software mismatch | Optima | Latching | Only checked at power up | Sensor firmware version x10 | Contact Honeywell Analytics' Service Department. |
| F111 | Negative Drift | ECC, mV | Non-latching | 2 seconds | Raw gas concentration of sensor | Check sensor location for external interference. Perform zero calibration. If problem persists after zero calibration and no interference exists, replace sensor. |
| | Negative Drift; may indicate a failed IR sensor | Optima, Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code | Check sensor location for external interference. Perform zero calibration. If problem persists after zero calibration and no interference exists, replace sensor. |

| Fault | Description | Applicable Sensors | Latching / Non-Latching | Frequency of Diagnostic | Event History Data | Action For Resolution |
|---|---|---|---|---|---|---|
| F112 | Sensor 24 VDC Supply Bad | Optima, Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check the wire of the 24V power supply to the transmitter and the power supply operation. Also check the wiring between the transmitter and the Optima/Excel. |
| F113 | Sensor Internal 5V Power Supply Defect | Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Remove and return to Honeywell for repair. |
| F114 | Sensor Internal Lamp Issue | Optima | Latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Remove and return to Honeywell for repair. |
| F116 | Sensor Internal Failure | Optima, Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Remove and return to Honeywell for repair. |
| F117 | Sensor Loop Failure, (Sensor is losing/has lost mA output signal. These are detected by Optima and Excel, F161 is detected by XNX and will usually occur before F117.) | Optima, Excel | Latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check that supply voltage is stable. Check wiring between Optima/Excel and the transmitter. Check loop impedance of wiring. Check that switches S3 and S4 are set correctly. If the switch settings need to be changed, power down the transmitter before changing the switch settings. Once the problem has been resolved, a Soft Reset must be performed for the Calibration menu to clear F117. |
| F118 | Sensor Real Time Clock issue | Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic controlled by sensor | Sensor fault or warning code (Note 4) | Reset “date and time” in Excel, recycle Excel power, and confirm “date and time. If not retained, remove and return to Honeywell for repair. |

| Fault | Description | Applicable Sensors | Latching / Non-Latching | Frequency of Diagnostic | Event History Data | Action For Resolution |
|---|---|---|---|---|---|---|
| F119 | Cartridge Internal Electrical Failure | ECC, mV | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Note 5 | Check cartridge connections, check sensor operation, fit replacement cartridge, replace personality board. |
| F120 | No Sensor | ECC, mV, Optima, Excel | Non-latching | 2 seconds | Note 2 | Indicates a loss of communication with the sensor. Check that the sensor type indicated in the part number matches the installed hardware. Check the wiring between ECC sensors or Optima/Excel and the transmitter. |
| F121 | Wrong Cartridge, error loading sensor parameters | All | Non-latching | At power up and when cartridge is changed | 0 | Contact Honeywell Analytics' Service Department. |
| F122 | General Diagnostics | Optima, Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check sensor connections, check sensor operation, fit replacement sensor, replace personalty board. |
| F123 | Sensor Temperature Error | Optima | Non-latching | | Sensor fault or warning code (Note 4) | Check location for heat sources. Fit with sunshade or other protection. Change location of the transmitter. Check temperature in Info->Sensor Status to ensure temperature is being measured properly. |
| | Sensor Temperature Error | Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check location for heat sources. Fit with sunshade or other protection. Change location of the transmitter. Check temperature in Info->Sensor Status to ensure temperature is being measured properly. |
| | Sensor Temperature Error | ECC | Non-latching | 2 seconds | Sensor temperature (Celsius) | Check location for heat sources. Fit with sunshade or other protection. Change location of XNX. Check temperature in Info->Sensor Status to ensure temperature is being measured properly. |
| F125 | Calibration Required | All | Non-latching | 2 seconds | Number of days remaining until calibration expires, negative = number of days expired | Time since the last span calibration has exceeded a defined limit. Performing a successful span calibration will clear the condition. The limit is the maximum calibration interval. |

| Fault | Description | Applicable Sensors | Latching / Non-Latching | Frequency of Diagnostic | Event History Data | Action For Resolution |
|---|---|---|---|---|---|---|
| F126 | Sensor Path Obscured | Optima | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check location for external interference. Check sensor for dirty windows. |
| F127 | Beam Block | Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check location for external interference or obstructions in the IR path. Check sensor for dirty windows. Check Excel alignment. |
| F128 | Sensor Installation Not Complete | Excel | Non-latching | XNX polls sensor every 2 seconds, diagnostic frequency controlled by sensor | Sensor fault or warning code (Note 4) | Check Excel alignment. Perform a zero calibration. |
| F130 | Option Communication Failure | All | Non-latching | 2 seconds | Option module ID: 0=None, 1=Foundation™ Fieldbus, 2=Modbus®, 3=Relay | Check that installed option matches the option indicated in the transmitter part number. If the option has been changed, the new option must be set up in Information->Transmitter Data as described in the manual. |
| F133 | Not used | | | | | |
| F143 | Stabilization Timeout | All | Latching | 2 seconds | Warm up time (seconds x100) | Cycle power, contact Honeywell Analytics' Service Department if problem persists. |
| F145 | Reflex Failure | ECC | Non-latching | Dependent on sensor, typically 8 hours; Once fault is detected: every 15 minutes | nA/mV | ECC sensor is no longer functioning properly. Replace sensor. |
| F146 | Unknown Sensor Failure | Optima, Excel | Non-latching | 2 seconds | Sensor fault or warning code (Note 4) | Contact Honeywell Analytics' Service Department. |
| F148 | Internal option board hardware failure | All | Non-latching | 2 seconds | Option board error status (Note 6) | Contact Honeywell Analytics' Service Department. |

| Fault | Description | Appli-cable Sensors | Latching / Non-Latching | Frequency of Diagnostic | Event History Data | Action For Resolution |
|---|---|---|---|---|---|---|
| F149 | Internal 4-20 mA monitoring circuit communication failure | All | Non-latching | 3.366 seconds | 0 | Contact Honeywell Analytics' Service Department. |
| F150 | mA Output Monitor Communications Watchdog Error | All | Non-latching | 138 us | Communication error count | Contact Honeywell Analytics' Service Department. |
| F151 | Sensor Module Type Changed | ECC | Non-latching | 2 seconds | Module type: 0=None, 1=ECC, 2=mV, 3=Excel, 4=Optima, 5=Generic mA | For ECC: Perform Accept New Sensor function, if problem persists contact Honeywell Analytics' Service Department. For others, contact Honeywell Analytics' Service Department. |
| F152 | Option Module Configuration Error | All | Latching | Only at powerup or every 125 ms when no option board detected | Option module ID: 0=None, 1=Founda-tion Fieldbus, 2=Mod-bus, 3=Relay | Confirm option properly installed, reconfigure unit. |
| F153 | Signal/Data mis-match error on IR personality | Optima, Excel | Non-latching | 2 seconds | Digital sensor reading | Check wiring to Optima/Excel. In particular, check the white wire be-tween XnX and Optima/Excel. Note: power must be cycled to reset F153 after correcting the cause. |
| F154 | mA Input Diagnos-tic Failure | Optima, Excel | Latching | 5 minutes after power up and then every 8 hours | Input mA | Contact Honeywell Analytics' Service Department. |
| F155 | Generic mA Sensor Type Error | Generic mA | Non-latching | 2 seconds | Input mA | Indicates that mA input from sensor is less than 3 mA. Check wiring between XNX and sensor. Also check the switches S3 and S4 are set correctly. If the switch settings need to be change, power down the transmitter before changing the switch settings. If wiring and switches are okay, replace sensor. |
| F156 | mV Current Control Failure | mV | Non-latching | Main loop x16 | constant current A/D input mV | Check that correct mV sensor type is selected. Check wiring between XNX and sensor. If sensor type and wiring are okay, replace sensor. |
| F157 | Sensor Drift Fault | ECC, mV | Non-latching | 2 seconds | Current baseline | Perform zero calibration. If problem persists, replace sensor. |
| F158 | Sensor/Personal-ity Part Number mismatch | All | Non-latching | "ECC & mV: main loop x2; Optima & Excel: 2 seconds" | Entire personality part # | Check that installed option matches the option indicated in the transmit-ter part number, check wiring to Optima/Excel. |

| Fault | Description | Applicable Sensors | Latching / Non-Latching | Frequency of Diagnostic | Event History Data | Action For Resolution |
|---|---|---|---|---|---|---|
| F159 | Option Part Number Mismatch | All | Non-latching | Only at powerup or every 125 ms when no option board detected | Entire option part # | Check that installed option matches the option indicated in the XNX part number, check wiring to Optima/Excel. |
| F160 | Hardware Diagnostic Failure | ECC, mV | Non-latching | Main loop x2 | Gain1 high byte, Gain2 low byte | Replace defective EC cartridge or mV personality board. |
| F161 | mA Input Indicates Fault | Optima, Excel | Non-latching | 1 second | Input mA | Indicates mA input from Optima/Excel is below 1 mA, indicating a fault in the sensor. Any other fault will also trigger this fault, so check for additional faults in event history to determine specific issue. If no other faults indicated, check wiring between Optima/Excel and XNX. Also check that switches S3 and S4 are set correctly. |
| F162 | Error reloading safety critical RAM block | All | Non-latching | 2 seconds | Note 3 | Contact Honeywell Analytics' Service Department. |
| F163 | Interrupt integrity fault | All | Non-latching | Main loop | Note 3 | XNX will reset if more than 600,000 successive errors occur. |
| F164 | mV Sensor failure | mV | Latching | 1 second | mV bridge voltage or bridge current that caused fault | Indicates that the sensor was changed or is bad. If the fault will not clear, replace the sensor. |

| Fault | Description | Appli-cable Sensors | Latching / Non-Latching | Frequency of Diagnostic | Event History Data | Action For Resolution |
|---|---|---|---|---|---|---|
| F165 | mA Calibration failure | all | Latching | 2 seconds | DAC: Digital to Analog Converter (4-20 mA output)<br><br>ADC: Analog to Digital Converter (4-20 mA internal feedback)<br><br>0 OK<br>1 DAC 4 mA point is too low<br>2 DAC 4 mA point is too high<br>4 DAC 20 mA point is too low<br>8 DAC 20 mA point is too high<br>16 ADC 4 mA point is too low<br>32 ADC 4 mA point is too high<br>64 ADC 20 mA point is too low<br>128 ADC 20 mA point is too high | Indicates that 4-20 mA calibration failed and discarded. Events history parameter indicates which calibration point has failed. If 4-20 mA calibration fails with F165, no changes take place so the 4-20 mA calibration output stays as it was. Check 4-20 mA loop resistance. Repeat 4-20 mA calibration. The fault clears itself after a successful 4-20 mA calibration. |

## Notes

*Note 2:*

| Spi Event Bits | |
|---|---|
| **Decimal** | **Description** |
| 1 | SPI1 Starting TX |
| 2 | SPI1 transmitting |
| 4 | falling clock edge, 0 = rising edge |
| 8 | SPI1 port open, 0 = closed |
| 16 | SPI1 no response |
| 32 | SPI1 ECC no response |
| 64 | SPI1 missing data |
| 128 | Not used |
| 256 | SPI3 Starting TX |
| 512 | SPI3 transmitting |
| 1024 | falling clock edge, 0 = rising edge |
| 2048 | SPI3 port open, 0 = closed |
| 4096 | Not used |
| 8192 | |
| 16384 | |
| 32768 | SPI2 Starting TX |

*Note 3:*

| Subtypes | Decimal | Description |
|---|---|---|
| **Fault 2 Event Bits** | 1 | CRC error in safety critical RAM block |
| | 2 | Error reloading safety critical RAM block from EEPROM |
| | 4 | Error loading data from Personality board |
| | 8 | Excel signal level has been below the low signal level threshold for at least 24 hours |
| | 16 | Excel beam blocked |
| | 32 | Personality board error code > 0 |
| | 64 | Option board error code > 0 |
| | 128 | IR mA input > 1 mA and < 3.4 mA |
| | 256 | IR mA input < 1.0 mA |
| | 512 | IR forced 10 mA not within +/-1 mA |
| | 1024 | gains from PGA don't match local copy |
| | 2048 | error reading or writing EEPROM |
| | 4096 | ECC reflex failure |
| | 8192 | RAM test failure |
| | 16384 | Program memory CRC failure |
| | 32768 | Op code test failure |
| **Fault 3 Event Bits** | 1 | Interrupt integrity test failure |

### *Note 4:*

Optima and Excel fault and warning codes are displayed in the Event History data field.

### *Note 5:*

| Subtypes | Decimal | Description |
|---|---|---|
| **ECC Fault Subtypes** | 1 | I2C error reading or writing EEPROM |
| | 2 | GALPAT RAM test failure |
| | 4 | Program memory CRC failure |
| | 8 | Opcode test failure |
| | 16 | Can't adjust PGA or EEPROM value doesn't match digital pot |
| | 32 | Reserved |
| | 64 | Reserved |
| | 128 | GALPAT RAM test failure in common area |
| **mV Fault Subtypes** | 1 | I2C error reading or writing EEPROM |
| | 2 | GALPAT RAM test failure |
| | 4 | Program memory CRC failure |
| | 8 | Opcode test failure |
| | 16 | Can't adjust PGA or EEPROM value doesn't match digital pot |
| | 32 | RAM safety variable failure |
| | 64 | Interrupts integrity failure |
| | 128 | Stack overflow/underflow failure |

### *Note 6:*

| Relay Option Board Error Status | | |
|---|---|---|
| | **Decimal** | **Description** |
| **Relay Option Board Error Status** | 1 | Didn't receive STX or ETX |
| | 2 | Received undefined command |
| | 4 | Exceeded maximum data bytes |
| | 8 | Write collision or buffer overrun |
| | 16 | CRC error in SPI packet |
| | 32 | Stack overflow or underflow |
| | 64 | Program memory CRC error |
| | 128 | Galpat RAM test failure |

## Informational Messages

| Number | Description | Contents of Data Field |
|---|---|---|
| I001 | Unused | |
| I002 | Force Relay Mode Started | Bitpattern for relays. (E.G. 7.0 ==All) |
| I003 | Force Relay Mode Ended. | N/A |
| I004 | Force mA Mode Started | Force current. (E.G. 20.0) |
| I005 | Force mA Mode Ended | N/A |
| I006 | Short-Term Inhibit Started | N/A |
| I007 | Short-Term Inhibit Ended | N/A |
| I008 | Long-Term Inhibit Started | N/A |
| I009 | Long-Term Inhibit Ended | N/A |
| I010 | mA Output Recalibrated | N/A |
| I011 | Bump Test Started | N/A |
| I012 | Bump Test Timed Out | N/A |
| I013 | Bump Test Completed Concentration < Al1 | Peak concentration observed |
| I014 | Bump Test Completed<br>Al1 < Concentration < Al2 | Peak concentration observed |
| I015 | Bump Test Completed. Al2 < Concentration | Peak concentration observed |
| I016 | Zero Calibration Successful | N/A |
| I017 | Zero Calibration Failed | Error code |
| I018 | Calibrate Span Successful 1 of 2 | Percent change in span factor from previous |
| I019 | Calibrate Span Successful 2 of 2 | Absolute span factor |
| I020 | Calibrate Span Failed | Error code |
| I021 | Calibrate Span Timeout | N/A |
| I022 | Password Changed | 1,2 or 3 (access level) |
| I023 | Performing Soft Reset | N/A |
| I024 | Alarms Configured Latching | N/A |
| I025 | Alarms Configured Non-Latching | N/A |
| I026 | Alarm Relays Configured Normally Energized | N/A |
| I027 | Alarm Relays Configured Normally De-Energized. | N/A |
| I028 | Fieldbus Address Changed | New address (e.g. 15) |
| I029 | Fieldbus Speed Changed | New speed (e.g. 19200) |
| I030 | Sensor Type Changed | iCurrentCalGlobalID |
| I031 | Gas Selection Changed | iCurrentCalGlobalID |
| I032 | Time For Beam Block Fault Changed | iBlockFltTime |
| I033 | Time For Fault Detection Changed | iOtherFltTime |
| I034 | Level For Low Signal Fault Changed | fLowSignalLevel |
| I035 | Invalid Path Length Written | fPathLen |
| I036 | Path Length Changed | fPathLen |
| I037 | mA for Inhibit Changed | f_mA_Flt_Step[0] |
| I038 | mA for Warning Changed | f_mA_Flt_Step[1] |
| I039 | mA for Overrange Changed | f_mA_Flt_Step[2] |
| I040 | mA for Fault Changed | f_mA_Flt_Step[3] |
| I041 | mA for Low Signal Changed | f_mA_Flt_Step[4] |
| I042 | mA for Blocked Beam Changed | f_mA_Flt_Step[5] |
| I043 | Concentration for mA Full Scale Changed | fDisplayRange |
| I044 | Instrument Id Changed | N/A |
| I045 | Measuring Units Changed | iMeasurementUnits |
| I046 | Alarm 1 Reconfigured for Increasing Concentrations | N/A |
| I047 | Alarm 1 Reconfigured for Depleting Concentrations | N/A |
| I048 | Alarm 2 Reconfigured for Increasing Concentrations | N/A |
| I049 | Alarm 2 Reconfigured for Depleting Concentrations | N/A |
| I050 | Alarm 1 Value Changed | fAlarmThres[0] |
| I051 | Alarm 2 Value Changed | fAlarmThres[1] |
| I052 | Clock Set | N/A |

| Number | Description | Contents of Data Field |
|---|---|---|
| **I053** | Date Format Changed | iDateFormat |
| **I054** | Sensor Boots | N/A |
| **I055** | Unused | |
| **I056** | Sensor RTC Adjusted | Error in seconds or +/-999 if large |
| **I057** | Fault Set Latching | |
| **I058** | Fault Set Non-Latching | |
| **I059** | LCD Heater On | |
| **I060** | LCD Heater Off | |
| **I061** | Personality Power Up | Sensor type |
| **I062** | Option Power Up | Option type |
| **I063** | Loaded Same Cell | |
| **I064** | Loaded Changed Cell | |
| **I065** | Loaded Changed Gas | |
| **I066** | Option Type Changed | |
| **I067** | HART® Address Changed | |
| **I068** | HART Mode Changed | |
| **I069** | Excel alignment started | |
| **I070** | Excel alignment completed | |

# Specifications

# Product Specifications

| | | | |
|---|---|---|---|
| **Electrical** | | | |
| **Operating Voltage** | EC/mV: 16V to 32V (24V nominal) ** Startup/Normal values **<br>IR: 18V to 32V (24V nominal) ** Startup/Normal values ** | | |
| **Power Consumption** | **Configuration** | **Max Power** | **Inrush** |
| | XNX EC | 6.2 w | <1A, <10ms@24VDC |
| | XNX mV | 6.5 w | <750mA <2ms@24VDC |
| | XNX IR (Optima) | 9.7w | <1A, <10ms@24VDC |
| | XNX IR (Excel) | 13.2w | <1A, <10ms@24VDC |
| **Termination** | Crimp style pluggable with retaining screws, 12-28 AWG (2.5 to 0.5mm$^2$) with Shorting Jumpers: 14-28 AWG (2.0 to 0.5mm$^2$)<br>**NOTE:**<br>To maintain EMC integrity, wiring must be shielded by either an integral shield or run through conduit or pipe. Shield must provide 90% coverage. | | |
| **Signal** | Standard | HART over 3-wire 4-20 mA (sink, source, or isolated) | |
| | Optional | Modbus over RS-485 | |
| | 20 mA | HART over 3-wire 4-20mA (sink, source, or isolated) compliant with NAMUR NE43 | |
| **Cable Ports** | 5 – (2 right, 2 left, 1 bottom) Available in ¾" NPT, or M25 | | |
| **Recommended Cable** | See the Distance Considerations for Installation section. | | |
| **Unpowered battery life** | (Real Time Clock) 3 years at rated storage temperature | | |
| **Construction** | | | |
| **Material** | Marine grade aluminum alloy or SS316. 5-coat painted finish. | | |
| **Dimensions** | 159 x 197 x 113.8 mm / 6.138 x 7.75 x 4.48 inches | | |
| **Weight** | 2.27 kg (5 lb) Aluminum<br>5 kg (11 lb) Stainless | | |
| **Mounting** | | | |
| **XNX® Enclosure** | Integral Mounting Lugs for Wall- or Optional Pipe-Mount, Optional Wall/ Ceiling Bracket | | |
| **User Interface** | | | |
| **Standard** | Custom Backlit LCD, magnetic wand operation of local user interface | | |
| **Optional** | HART Handheld with IS Port | | |
| **Environmental - Transmitter Operating** | | | |
| **IP Rating** | IP66 | | |
| **Temperature*** | Transmitter: -40°C to +65°C (-40°F to +149°F) | | |
| | MPD**-CB1: -40°C to +65°C (-40°F to +149°F) | | |
| | MPD**-I**: -20°C to +50°C (-4°F to +122°F) | | |
| **Humidity** | 0 to 99% RH non-condensing | | |
| **Pressure** | 80 kPa to 120 kPa | | |
| **Air Speed** | 0-6 m/sec | | |
| *Operating temperatures will be limited by the sensors. See EC Sensor Performance Data, Factory Mutual Verified; EC Sensor Performance Data, DEKRA EXAM Verified; and Other EC Sensors for more information. | | | |
| **Environmental - Transmitter Storage** | | | |
| **Temperature** | -40°C to +65°C / -40°F to +149°F | | |
| **Humidity** | 0 to 99% RH non-condensing | | |

| Hazardous Area Approvals (See Certifications by Part Number Series for other [pending] approvals) |
|---|
| XNX-UT**-*****<br>UL and CSA Listed (see notes below)<br>Class I, Div. 1 Group A, B, C & D; Class I, Zone 1 Group IIC<br>UL Listed<br>Class II, Div. 1 Groups F & G, Class II, Zone 20 & 21<br>FM Approvals Listed<br>AEx db IIC T6 Gb -40 ºC ≤Tamb ≤65 ºC<br>AEx db [ia] IIC T6 Gb -40 ºC ≤Tamb ≤65 ºC (XNX UT*E-***** & XNX-UT*-*H****)<br>XNX-AM**-*****<br>UL/Demko 09 ATEX 0809943X / IECEx UL 09.0010X<br>II 2 G Ex db IIC T6…T4 Gb<br>II 2 (1) G Ex db [ia IIC Ga] IIC T6…T4 Gb<br>II 2 (1) D Ex tb [ia IIIC Ga] IIIC T85°C Db<br>II 2 D Ex tb IIIC T85°C Db<br>IP66, -40°C ≤ Tamb ≤+65°C<br>XNX-BT**-*****<br>UL Listed<br>Class I, Div. 1 Groups A, B, C & D Class I, Zone 1 Groups IIC<br>Class II, Div. 1 Groups F & G, Class II, Zone 20 & 21<br>INMETRO DNV 18.0166X<br>Ex db IIC T6…T4 Gb<br>Ex db [ia Ga] IIC T6…T4 Gb<br>Ex tb [ia Da] IIIC T85°C Db<br>Ex tb IIIC T85°C Db<br>IP66, -40°C ≤ Tamb ≤ +65°C<br>FM Approvals Listed<br>AEx db IIC T6 Gb -40 ºC ≤Tamb ≤65 ºC<br>AEx db [ia] IIC T6 Gb -40 º≤ Tamb ≤65 ºC (XNX BT*E-***** & XNX-BT*-*H****)<br>NOTES:<br>1. The temperature class (T6) is limited to T4 when the MPD sensor is attached locally to the transmitter.<br>2. XNX EC cartridges and Remote Mount Kit have been evaluated by Underwriters Laboratories (UL) to Canadian National Standards.<br>3. CSA Listing is only to Class I, Division 1 does not include Class II, Div.1 approval<br>4. Peer to peer and multi-drop network (daisy chained) HART, Modbus®, and FOUNDATION™ Fieldbus configurations have not been evaluated by CSA to the requirements of CSA 22:2 No. 152 for Combustible Gas Detection and may be used only for diagnostics and data collection.<br>5. Refer to the control drawing 1226E0402 for the detail Explosion-proof specification. |
| **Performance Approvals** |
| See Certifications by Part Number Series for other approvals |

| Communication Options | |
|---|---|
| **Relays** | Type: 3 form “C” SPCO contacts for alarm and fault indication.<br>Rating: 250 VAC, 5A/24 VDC, 5A (2 Alarm, 1 Fault)<br>A remote reset is provided to silence alarms. (The FOUNDATION Fieldbus, relay, and Modbus options are mutually exclusive.) |
| **Modbus** | Modbus/RTU over RS-485 physical layer. Interface isolated; includes switchable 120 Ohm termination resistor.<br>Baud rates: 1200 to 38,400; 19,200 default.<br>(The FOUNDATION Fieldbus, relay, and Modbus options are mutually exclusive.) |
| **FOUNDATION Fieldbus** | H1 Physical Layer.<br>31.25 kbit/s Manchester encoded signal.<br>AMIS-49200 Fieldbus MAU (media access unit).<br>SPC4-2 Fieldbus Controller.<br>The FOUNDATION Fieldbus, relay, and Modbus options are mutually exclusive. |

## SENSOR DATA

### Operating and Storage Conditions for Performance Tested EC Cartridges

| Gas | | Cartridge Part Number | Operating Pressure | Operating Air Speed | Warm-up Time (minimum) | Storage Conditions* | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Temperature | Pressure | Humidity | Time** |
| $O_2$ | Oxygen | XNXXSO1SS<br>XNXXSO1FM | 80 kPa ~ 120 kPa | 0 ~ 6 m/sec | 60 sec. | 0 to 20°C, 32 to 68°F | 80 to 120 KPa | 5 to 95% RH | 6 months |
| $H_2S$ | Hydrogen Sulfide | XNXXSH1SS<br>XNXXSH1FM | 80 kPa ~ 120 kPa | 0 ~ 6 m/sec | 60 sec. | 0 to 20°C, 32 to 68°F | 70 to 110 KPa | 30 to 70% RH | 6 months |
| $H_2S$ (High) | Hydrogen Sulfide | XNXXSH2SS | 80 kPa ~ 120 kPa | 0 ~ 6 m/sec | 60 sec. | 0 to 20°C, 32 to 68°F | 70 to 110 KPa | 30 to 70% RH | 6 months |
| CO | Carbon Monoxide | XNXXSC1SS<br>XNXXSC1FM | 80 kPa ~ 120 kPa | 0 ~ 6 m/sec | 60 sec. | 0 to 20°C, 32 to 68°F | 70 to 110 KPa | 30 to 70% RH | 6 months |

*Store in sealed packages **Check cartridge certificates

# Detectable Gases and Performance

Gas detection performance is dependent upon temperature and humidity. The data in this table is based on 68°F (20°C) and 50% relative humidity. Response times are longer when operating in colder temperatures.

| Gas | Selectable Full Scale Range | Default Range | Steps | Selectable Cal Gas Range | Default Cal Point | Response Time (T90) secs | Accuracy (ppm or % of applied gas) | Drift over time | Operating Temperature[1] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Min | Max |
| Oxygen | 25.0% / Vol only | 25.0% Vol | n/a | 20.9%/Vol (Fixed) | 20.9% / Vol | 15 | +/-0.5% O2 | <4% / yr | -40°F (-40°C) | 131°F (55°C) |
| Hydrogen Sulfide | 10.0 to 50.0 ppm | 15.0 ppm | 0.1 ppm | 30 to 70% of selected full scale range | 10 ppm | 30 | +/-0.3 or +/-20% | <0.5 ppm/yr | -40°F (-40°C) | 131°F (55°C) |
| Hydrogen Sulfide | 50 to 500 ppm | 100 ppm | 10 ppm | | 50 ppm | 30 | +/-2 or +/-20% | <0.5 ppm/yr | -4°F (-20°C) | 131°F (55°C) |
| Carbon Monoxide | 100 to 1,000 ppm | 300 ppm | 100 ppm | | 100 ppm | 30 | +/-2 or +/-20% | <2 ppm/yr | -40°F (-40°C) | 131°F (55°C) |
| Sulfur Dioxide | 5.0 to 20.0 ppm | 15.0 ppm | 5.0 ppm | | 5.0 ppm | 40 | +/-0.3 or +/-20% | <2% / mo | -40°F (-40°C) | 131°F (55°C) |
| Ammonia | 50 to 200 ppm | 200 ppm | 50 ppm | | 100 ppm | 180 | +/-10 or +/-20% | <5% / 6 mo | -4°F (-20°C) | 122°F (50°C)[2] |
| Ammonia | 200 to 1,000 ppm | 1,000 ppm | 50 ppm | | 300 ppm | 180 | +/-15 or +/-20% | <5% / 6 mo | -4°F (-20°C) | 104°F (40°C) |
| Chlorine | 5.0 to 20.0 ppm | 5.0 ppm | 5.0 ppm | | 2.0 ppm | 90 | +/-0.3 or +/-20% | <2 ppm / yr | 14°F (-10°C) | 131°F (55°C) |
| Chlorine Dioxide | 1.00 ppm only | 1.00 ppm | n/a | | 0.5 ppm | 120 | +/-30% | <5% / yr | -4°F (-20°C) | 131°F (55°C) |
| Nitric Oxide | 100 ppm only | 100 ppm | n/a | | 50 ppm | 50 | +/-3 or +/-20% | <2% / mo | -4°F (-20°C) | 131°F (55°C) |
| Nitrogen Dioxide | 5.0 to 50.0 ppm | 10 ppm | 5.0 ppm | | 5 ppm | 60 | +/-3 or +/-20% | <2% / mo | -4°F (-20°C) | 131°F (55°C) |
| Hydrogen | 1,000 ppm only | 1,000 ppm | n/a | | 500 ppm | 90 | +/-10 or +/-25% | <2% / mo | -4°F (-20°C) | 131°F (55°C) |
| Hydrogen | 9,999 ppm only | 9,999 ppm | n/a | | 5000 ppm | 90 | +/-25 or +/-30% | <10% / 6 mo | -4°F (-20°C) | 131°F (55°C) |
| Hydrogen Chloride | 10.0 to 20.0 ppm | 10 ppm | 1.0 ppm | | 5.0 ppm | 180 | +/-3 or +/-20% | <20% / yr | -4°F (-20°C) | 131°F (55°C) |
| Hydrogen Fluoride | 10.0 to 12.0 ppm | 12.0 ppm | 0.1 ppm | | 5.0 ppm | 300 | +/-30% | <20% / yr | -4°F (-20°C) | 131°F (55°C) |
| Phosphine | 1.2 ppm only | 1.2 ppm | n/a | | 0.5 ppm | 33 | +/-0.03 or +/-20% | <10% / yr | -4°F (-20°C) | 131°F (55°C) |
| Hydrogen cyanide | 30.0 ppm only | 30.0 ppm | n/a | | 10.0 ppm | <200 | <±0.4 ppm | <2% / mo | -4°F (-20°C) | 131°F (55°C) |
| Fluorine | 4 ppm only | 4.00 ppm | n/a | | 2.0 ppm | <30 | <±0.03 ppm | <2 ppm / yr | -4°F (-20°C) | 131°F (55°C) |
| Ozone | 0.400 ppm only | 0.400 ppm | n/a | | 0.200 ppm | <60[3] | <±0.003 ppm | <5% / mo | -4°F (-20°C) | 131°F (55°C) |
| EtO | 20.0 to 50.0 ppm | 25.0 ppm | 5.0 ppm | | 10.0 ppm | <125[3] | <±0.3 ppm | < 5% / yr | -4°F (-20°C) | 131°F (55°C) |

1 When operating in Hazardous Area applications the detector must not be operated outside the certified temperature range. See Certification details for UL and ATEX/IECEx certified temperature ranges.
2 +131F/+55C intermittent
3 Data from temperature test

# EC Sensor Performance Data, Factory Mutual Verified

*(see Certifications by Part Number Series)*

| Gas | | Cartridge Part Number | Selectable Full Scale Range (Display and 4-20mA Full Scale) | Default Range | Range Increments | Lower Alarm Limit | Lower Detection Limit | Lower Explosive Limit (% Vol) | Zero Deviation | Selectable Cal Gas Range | Default Cal Point | Response Time T50 (sec) | Response Time T90 (sec) | Accuracy | Operating Temperature | | Operating Humidity | | EC Sensor Expected LIfe (months) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | Min | Max | Min | Max | |
| $O_2$ | Oxygen | XNXXSO1FM | n/a | 23.0% Vol | n/a | 5.0%Vol | 5% Vol | n/a | n/a | 20.9 %Vol (fixed) | 20.9 %Vol | T20 <10 | <30 | <+/-0.5 %Vol | -30°C / -34°F | 55°C /131°F | 15% RH | 90% RH | 24 |
| $H_2S$ | Hydrogen Sulfide | XNXXSH1FM | 10.0 to 50.0 ppm | 15.0 ppm | 0.1 ppm | 5.0 ppm | 1.5 ppm | n/a | -2.5 ppm | 30 to 70% of the selected full scale range | 10 ppm | <20 | <30 | 2 ppm or 10% of reading, whichever is greater | -40°C / -40°F | 55°C / 131°F | 15% RH | 90% RH | 12 |
| CO | Carbon Monoxide | XNXXSC1FM[1] | 100 to 1000 ppm | 300 ppm | 100 ppm | 30 ppm | 15 ppm | na/ | -25 ppm | | 100 ppm | <15 | <30 | See footnote 1 | -40°C / -40°F | 55°C / 131°F | 15% RH | 90% RH | TBD |

Footnotes:

1. XNXXSC1FM accuracy over temperature <±10% of reading 20°C/68°F to 55°C/131°F, <±20% of reading 20°C/68°F to -10°C/14°F, <±30% of reading -10°C/14F to -20°C/-4°F. Recalibration is recommended if the temperature of the local environment has varied by more than -30°C.

Notes:

- Performance figures are measured by test units calibrated at 50% of full scale, at ambient conditions of 20°C, 50% RH, with the EC weatherproof cover attached
- IP rating of FM Cartridges is IP63.
- Barometric pressure effects on the $O_2$ sensor: The output from the $O_2$ sensor has pressure effects of <0.1% change of output per % change in pressure. When the barometric pressure changes by ±20% the output from the $O_2$ sensor changes <±0.4%Vol. However, the oxygen sensor shows transient behavior when subjected to a rapid change in ambient pressure due to either weather or altitude. For example, a 10KPa instantaneous positive pressure step change may cause an overscale alarm condition for a period of about 12 seconds.
- Operating the EC sensor at extended temperature ranges for a prolonged time period exceeding 12 hours my cause deterioration in the sensor performance and shorten sensor life. Extended temperature range for XNX EC sensors is -40°C ot -20°C.
- Response times may increase at lower temperatures.
- FM performance verification is limited to the requirements of the standards identified in Table 6.3 for each cartridge.
- Contact Honeywell Analytics for additional data or details.

# EC Sensor Performance Data, DEKRA EXAM Verified

*(see Certifications by Part Number Series)*

| Gas | | Cartridge Part Number | Selectable Full Scale Range (Display and 4-20mA Full Scale) | Default Range | Range Increments | Lower Alarm Limit | Lower Detection Limit | Zero Variation | Selectable Cal Gas Range | Default Cal Point | Response Time (T50) (sec) | T90 Response T10 Recovery Time (sec) | Accuracy[1] | Operating Temperature | | Operating Humidity | | EC Sensor Expected LIfe (months) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Min | Max | Min | Max | |
| $O_2$ | Oxygen | XNXXSO1SS | n/a | 25.0 %Vol | n/a | 5.0%Vol | 3.5 %Vol | n/a | 20.9 %Vol (fixed) | 20.9 %Vol | T20 <10 | <30 | <+/-0.6 %Vol | -30°C / -34°F | 55°C /131°F | 15% RH | 90% RH | 24 |
| $H_2S$ | Hydrogen Sulfide | XNXXSH1SS | 10.0 to 50.0 ppm | 15.0 ppm | 0.1ppm | 3.0 ppm | 1.0 ppm | 2.0 ppm | 30 to 70% of the selected full scale range | 10 ppm | <20 | <30 | <+/-0.3 ppm | -40°C / -40°F | 55°C / 131°F | 15% RH | 90% RH | 12 |
| $H_2S$ (High) | Hydrogen Sulfide | XNXXSH2SS | 50 to 500 ppm | 100 ppm | 10 ppm | 5 ppm | 1 ppm | 2 ppm | | 50 ppm | <20 | <30 | <+/-5 ppm | -40°C / -40°F | 55°C / 131°F | 15% RH | 90% RH | 12 |
| CO | Carbon Monoxide | XNXXSC1SS | 100 to 500 ppm | 300 ppm | 100 ppm | 15 ppm | 5 ppm | 10 ppm | | 100 ppm | <15 | <30 | <+/-2 ppm | -40°C / -40°F | 55°C / 131°F | 15% RH | 90% RH | 24 |

Footnote:

1. Accuracy of reading at default Alarm 1 concentration (typically 10% FS or defined minimum alarm level setting, whichever is greater) when operated at default full scale.

Notes:

- Sensor drift between LDL and negative drift fault limits (typcially > negative zero variation) appear as 0 on the display and outputs of the device.
- Long-term drift: XNXXSC1SS <5%/year, XNXXSO1SS <4%/year, XNXXSH1SS and XNXXSH2SS <2%/month.
- Performance figures are measured by test units calibrated at 50% of full scale, at ambient conditions of 20°C, 50% RH, with the EC weatherproof cover attached.
- Operating the EC sensor at extended temperature ranges for a prolonged time period exceeding 12 hours may cause deterioration in sensor performance and shorten sensor life. Extended temperature ranges for XNX EC sensor cartridges are -40°C to -20°C.
- Barometric pressure effects on the $O_2$ sensor: The output from the $O_2$ sensor has pressure effects of <0.1% change of output per % change in pressure. When the barometric pressure changes by ±20%, the output from the $O_2$ sensor changes <±0.4%Vol. However, the oxygen sensor shows transient behavior when subjected to a rapid change in ambient pressure due to either weather or altitude. For example, a 10KPa instantaneous positive pressure step change may cause an overscale alarm condition for a period of about 12 seconds.
- Response times may increase at lower temperatures.
- Contact Honeywell Analytics for any additional data or details.

# Other EC Sensors

| Gas | | Cartridge Part Number | Selectable Full Scale Range (Display and 4-20mA Full Scale) | Default Range | Range Incre-ments | Lower Alarm Limit | Lower Detection Limit | Zero Deviation | Selectable Cal Gas Range | Default Cal Point | Response Time T50 (sec) | Response Time T90 (sec) | Accuracy[1] | Typical Accuracy @ Lowest Alarm Level | Operating Temperature | | Operating Humidity | | EC Sensor Expected LIfe (months) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | Min | Max | Min | Max | |
| HCl | Hydrogen chloride | XNXXSR1SS | 10.0 to 20.0 ppm | 10.0 ppm | 1.0 ppm | 2.0 ppm | 0.6 ppm | -1.0 ppm | 30 to 70% of the selected full scale range | 5.0 ppm | <45[2, 3] | <150[2, 3] | <+/-1.0 ppm or 20% of applied gas[2, 3] | <+/-1.0 @ 3 ppm | -20°C/-4°F | 40°C/104°F | 15% RH | 90% RH | 12 |
| $H_2S$ (Low) | Hydrogen sulfide | XNXXSH3SS | n/a | 15.0 ppm | n/a | 3.0 ppm | 1.0 ppm | -2.5 ppm | | 10 ppm | <20 | <40 | <+/-0.3 ppm | <+/-0.3 @ 3 ppm | -40°C / -40°F | 55°C / 131°F | 15% RH | 90% RH | 12 |
| $SO_2$ | Sulfur dioxide | XNXXSS1SS | 5.0 to 20.0 ppm | 15.0 ppm | 5.0 ppm | 2.0 ppm | 0.6 ppm | -1.0 ppm | | 5.0 ppm | <15 | <30 | <+/-0.3 ppm | <+/-0.3 @ 2 ppm | -40°C / -40°F | 55°C / 131°F | 15% RH | 90% RH | 24 |
| $SO_2$ (High) | Sulfur dioxide | XNXXSS2SS | 20.0 to 50.0 ppm | 50.0 ppm | 10.0 ppm | 5.0 ppm | 1.5 ppm | -2.5 ppm | | 25 ppm | <15 | <30 | <+/-0.6 ppm | <+/-0.6 @ 5 ppm | -40°C / -40°F | 55°C / 131°F | 15% RH | 90% RH | 24 |
| $NH_3$ | Ammonia | XNXXSA1SS | 50 to 200 ppm | 200 ppm | 50 ppm | 20 ppm | 6 ppm | -10 ppm | | 100 ppm | <60 | <180 | <+/-4 ppm | <+/-4 @ 20 ppm | -20°C / -4°F | 40°C / 104°F | 15% RH | 90% RH | 12 |
| $NH_3$ (High) | Ammonia | XNXXSA2SS | 200 to 1000 ppm | 1,000 ppm | 50 ppm | 100 ppm | 30 ppm | -50 ppm | | 300 ppm | <60 | <180 | <+/-20 ppm | <+/-20 @ 100 ppm | -20°C / -4°F | 40°C / 104°F | 15% RH | 90% RH | 12 |
| $Cl_2$[2] | Chlorine | XNXXSL2SS | n/a | 5.00 ppm | n/a | 0.50 ppm | 0.15 ppm | -0.25 ppm | | 2.0 ppm | <20 | <60 | <+/-0.2 ppm | <+/-0.20 @ 0.50 ppm | -10°C / 14°F | 55°C / 131°F | 15% RH | 90% RH | 24 |
| $Cl_2$ (High)[2] | Chlorine | XNXXSL1SS | 5.0 to 20.0 ppm | 5.0 ppm | 5.0 ppm | 1.0 ppm | 0.6 ppm | -1.0 ppm | | 2.0 ppm | <20 | <30 | <+/-0.2 ppm | <+/-0.2 @ 1 ppm | -10°C / 14°F | 55°C / 131°F | 15% RH | 90% RH | 24 |
| $ClO_2$[2] | Chlorine dioxide | XNXXSX1SS | n/a | 1.00 ppm | n/a | 0.10 ppm | 0.03 ppm | -0.05 ppm | | 0.5 ppm | <30 | <120 | <+/-30% | <+/-0.03 @ 0.1 ppm | -20°C / -4°F | 55°C / 131°F | 15% RH | 90% RH | 24 |
| NO | Nitrogen monoxide | XNXXSM1SS | n/a | 100 ppm | n/a | 10 ppm | 3 ppm | -5 ppm | | 50 ppm | <15 | <30 | <+/-2 ppm | <+/-2.0 @ 10 ppm | -20°C / -4°F | 55°C / 131°F | 15% RH | 90% RH | 24 |
| $NO_2$ | Nitrogen dioxide | XNXXSN1SS | 5.0 to 50.0 ppm | 10.0 ppm | 5.0 ppm | 5.0 ppm | 1.5 ppm | -2.5 ppm | | 5 ppm | <15 | <30 | <+/-0.2 ppm | <+/-0.2 @ 5 ppm | -20°C / -4°F | 55°C / 131°F | 15% RH | 90% RH | 24 |
| $H_2$ | Hydrogen | XNXXSG1SS | n/a | 1,000 ppm | n/a | 100 ppm | 30 ppm | -50 ppm | | 500 ppm | <60 | <90[2] | <+/-8 ppm | <+/-8 @ 100 ppm | -20°C / -4°F | 55°C / 131°F | 15% RH | 90% RH | 24 |
| $H_2$ (High) | Hydrogen | XNXXSG2SS | n/a | 10,000 ppm | n/a | 1000 ppm | 300 ppm | -500 ppm | | 5000 ppm | <15 | <30 | <+/-150 ppm | <+/-150 @ 1000 ppm | -20°C / -4°F | 55°C / 131°F | 15% RH | 90% RH | 24 |
| HF[2] | Hydrogen fluoride | XNXXSF1SS | 10.0 to 12.0 ppm | 12.0 ppm | 0.1 ppm | 1.5 ppm | 0.4 ppm | -0.6 ppm | | 5.0 ppm | 120 | <240 | <+/-0.5 ppm | <+/-0.5 @ 1.5 ppm | -20°C / -4°F | 55°C / 131°F | 20% RH | 75% RH | 12 |
| $PH_3$ | Phosphine | XNXXSP1SS | n/a | 1.20 ppm | n/a | 0.15 ppm | 0.04 ppm | -0.06 ppm | | 0.5ppm | <15 | <30 | <+/- 0.02 ppm | <+/-0.02 @ 0.15 ppm | -20°C / -4°F | 40°C / 104°F | 10% RH | 90% RH | 24 |
| HCN | Hydrogen cyanide | XNXXSY1SS | n/a | 30.0 ppm | n/a | 2.4 ppm | 1.0 ppm | -2.5 ppm | | 10.0 ppm | <35 | <200 | <±0.4 ppm | 0.4 ppm | -20°C / -4°F | 55°C / 131°F | 15% RH | 90% RH | 24 |
| $F_2$ | Fluorine | XNXXSU1SS | n/a | 4.00 ppm | n/a | 0.50 ppm | 0.36 ppm | -0.72 ppm | | 2.0 ppm | <5 | <30 | <±0.03 ppm | 0.3 ppm | -20°C / -4°F | 55°C / 131°F | 15% RH | 90% RH | 18 |
| $O_3$ | Ozone | XNXXSZ1SS | n/a | 0.400 ppm | n/a | 0.048 ppm | 0.032 ppm | -0.080 ppm | | 0.200 ppm | <15[4] | <60[4] | <±0.003 ppm | 0.003 ppm[5] | -20°C / -4°F | 55°C / 131°F | 15% RH | 90% RH | 18 |
| EtO | Ethylene oxide | XNXXSE1SS | 20.0 to 50.0 ppm | 25.0 ppm | 5.0 ppm | 3.0 ppm | 1.0 ppm | -2.5 ppm | | 10.0 ppm | <40[4] | <125[4] | <±0.3 ppm | 0.3 ppm[5] | -20°C / -4°F | 55°C / 131°F | 15% RH | 90% RH | 24 |

See footnotes and notes on the following page.

## Footnotes (see table on previous page):

1. Accuracy of reading at default Alarm 1 concentration (typically 10%FS or defined minimum alarm level setting, whichever greater) when operated at default full scale.
2. System conditioning may be required to achieve stated results. Contact Honeywell Analytics for details.
3. Measured using calibration flow housing at calibration flow rate (300-375 ml/min) with dry gas.
4. Data from temperature test.
5. Data from LDL or linearity test.

## Notes (see table on previous page):

- Data taken at ambient conditions of 20°C, 50% RH.
- Data represents typical values of freshly calibrated sensors without optional accessories attached.
- Performance figures are measured by test units calibrated at 50% of full scale.
- Standard temperature range for EC Sensors is -20°C to +55°C; ATEX, IECEx.
- Extended temperature ranges for the EC Sensors are -40°C to -20°C
- Accuracy between the temperatures of -40°C and -20°C is ±30% at the applied gas concentration.
- Operating the EC Sensors at extended temperature ranges for a prolonged time period exceeding 12 hours may cause deterioration in sensor performance and shorter sensor life.
- Barometric pressure effects on the $O_2$ sensor: The output from the $O_2$ sensor has pressure effects of <0.1% change of output per % change in pressure. When the barometric pressure changes by ±20% the output from the $O_2$ sensor changes <±0.4%Vol. However, the oxygen sensor shows transient behavior when subjected to a rapid change in ambient pressure due to either weather or altitude. For example, a 10KPa instantaneous positive pressure step change may cause an overscale alarm condition for a period of about 12 seconds.
- Recalibration is recommended if the temperature of local environment has varied by more than ±15°C from the temperature of calibration.
- Response times may increase at lower temperatures.
- Contact Honeywell Analytics for any additional data or details.

## EC Sensor Cross-sensitivity

| Gas type | Part Number | Gas Type Applied | Concentration | Unit | Reading | Unit |
|---|---|---|---|---|---|---|
| $O_2$ | XNXXS01SS<br>XNXXS01FM | Carbon Dioxide | 5 | %vol | 0.1 | %vol (change $O_2$ reading) per %vol $CO_2$ |
| HCl | XNXXSR1SS | Carbon monoxide | 2000 | ppm | 0 | ppm HCl |
| | | Hydrogen | 20000 | | 0 | |
| | | Chlorine | 5 | | 5.6 | |
| | | Nitrogen dioxide | 5 | | 0.9 | |
| | | Propan-2-ol | 500 | | 0 | |
| | | Methanol | 500 | | 0 | |
| | | Hydrogen fluoride | 5 | | 6.7 | |
| | | Hydrogen suflfide | 25 | | -3.6 | |
| | | Sulphur dioxide | 50 | | 22.4 | |
| | | Arsine | 1 | | 0 | |
| | | Phosphine | 1 | | -0.14 | |
| | | Diborane | 1 | | -1.3 | |
| $H_2S$ (Low Range) | XNXXSH3SS | Ammonia | 50 | ppm | 0 | ppm $H_2S$ |
| | | Carbon Monoxide | 100 | | <2 | ppm $H_2S$ |
| | | Carbon Dioxide | 5000 | | 0 | ppm $H_2S$ |
| | | Chlorine | 0.5 | | 0 | ppm $H_2S$ |
| | | Ethylene | 100 | | 0 | ppm $H_2S$ |
| | | Hydrogen | 100 | | 0 | ppm $H_2S$ |
| | | Hydrogen Sulfide | 10 | | 10 | ppm $H_2S$ |
| | | Nitrogen Monoxide | 25 | | 0 | ppm $H_2S$ |
| | | Nitrogen Dioxide | 3 | | 0 | ppm $H_2S$ |
| | | Sulfur Dioxide | 2 | | 0 | ppm $H_2S$ |

| Gas type | Part Number | Gas Type Applied | Concentration | Unit | Reading | Unit |
|---|---|---|---|---|---|---|
| $H_2S$ | XNXXSH1SS XNXXSH1FM | Ammonia | 50 | ppm | 0 | ppm $H_2S$ |
| | | Carbon Monoxide | 100 | | <2 | ppm $H_2S$ |
| | | Carbon Dioxide | 5000 | | 0 | ppm $H_2S$ |
| | | Chlorine | 0.5 | | 0 | ppm $H_2S$ |
| | | Ethylene | 100 | | 0 | ppm $H_2S$ |
| | | Hydrogen | 100 | | 0 | ppm $H_2S$ |
| | | Hydrogen Sulfide | 10 | | 10 | ppm $H_2S$ |
| | | Nitrogen Monoxide | 25 | | 0 | ppm $H_2S$ |
| | | Nitrogen Dioxide | 3 | | 0 | ppm $H_2S$ |
| | | Sulfur Dioxide | 2 | | 0 | ppm $H_2S$ |
| $H_2S$ (High Range) | XNXXSH2SS | Ammonia | 50 | ppm | 0 | ppm $H_2S$ |
| | | Carbon Monoxide | 100 | | <2 | ppm $H_2S$ |
| | | Carbon Dioxide | 5000 | | 0 | ppm $H_2S$ |
| | | Chlorine | 0.5 | | 0 | ppm $H_2S$ |
| | | Ethylene | 100 | | 0 | ppm $H_2S$ |
| | | Hydrogen | 100 | | 0 | ppm $H_2S$ |
| | | Hydrogen Sulfide | 10 | | 10 | ppm $H_2S$ |
| | | Nitrogen Monoxide | 25 | | 0 | ppm $H_2S$ |
| | | Nitrogen Dioxide | 3 | | 0 | ppm $H_2S$ |
| | | Sulfur Dioxide | 2 | | 0 | ppm $H_2S$ |

| Gas type | Part Number | Gas Type Applied | Concentration | Unit | Reading | Unit |
|---|---|---|---|---|---|---|
| CO | XNXXSC1SS<br>XNXXSC1FM | Acetone | 1000 | ppm | 0 | ppm CO |
| | | Acetylene | 40 | | 80 | ppm CO |
| | | Ammonia | 100 | | 0 | ppm CO |
| | | Carbon Monoxide | 100 | | 100 | ppm CO |
| | | Chlorine | 2 | | 0 | ppm CO |
| | | Ethanol | 2000 | | 3 | ppm CO |
| | | Ethylene | 100 | | 85 | ppm CO |
| | | Hydrogen | 100 | | 20 | ppm CO |
| | | Hydrogen Sulfide | 25 | | 0 | ppm CO |
| | | Iso-Propanol | 200 | | 0 | ppm CO |
| | | Nitrogen Monoxide | 50 | | 8 | ppm CO |
| | | Nitrogen Dioxide | 800 | | 20 | ppm CO |
| | | Sulfur Dioxide | 50 | | 0.5 | ppm CO |
| $SO_2$ | XNXXSS1SS | Carbon Monoxide | 300 | ppm | <3 | ppm $SO_2$ |
| | | Hydrogen Sulfide | 15 | | 0 | ppm $SO_2$ |
| | | Nitrogen Monoxide | 35 | | 0 | ppm $SO_2$ |
| | | Nitrogen Dioxide | 5 | | ~-5 | ppm $SO_2$ |
| $SO_2$ | XNXXSS2SS | Carbon Monoxide | 300 | ppm | <3 | ppm $SO_2$ |
| | | Hydrogen Sulfide | 15 | | 0 | ppm $SO_2$ |
| | | Nitrogen Monoxide | 35 | | 0 | ppm $SO_2$ |
| | | Nitrogen Dioxide | 5 | | ~-5 | ppm $SO_2$ |
| $NH_3$ | XNXXSA1SS | Alcohols | 1000 | ppm | 0 | ppm $NH_3$ |
| | | Carbon Dioxide | 5000 | | 0 | ppm $NH_3$ |
| | | Carbon Monoxide | 100 | | 0 | ppm $NH_3$ |
| | | Hydrocarbons | | % range | 0 | ppm $NH_3$ |
| | | Hydrogen | 10000 | ppm | 0 | ppm $NH_3$ |
| | | Hydrogen Sulfide | 20 | | 2 | ppm $NH_3$ |

| Gas type | Part Number | Gas Type Applied | Concentration | Unit | Reading | Unit |
|---|---|---|---|---|---|---|
| $NH_3$ (High Range) | XNXXSA2SS | Alcohols | 1000 | ppm | 0 | ppm $NH_3$ |
| | | Carbon Monoxide | 100 | | 0 | ppm $NH_3$ |
| | | Chlorine | 5 | | 0 | ppm $NH_3$ |
| | | Nitrogen Dioxide | 10 | | 0 | ppm $NH_3$ |
| | | Sulfur Dioxide | 20 | | -40 | ppm $NH_3$ |
| | | Hydrogen | 3000 | | 0 | ppm $NH_3$ |
| | | Hydrogen Sulfide | 20 | | 20 | ppm $NH_3$ |
| $Cl_2$ | XNXXSL2SS | Carbon Dioxide | 20000 | ppm | 0 | ppm $Cl_2$ |
| | | Hydrogen Chloride | 9 | | 1.25 | ppm $Cl_2$ |
| | | Hydrogen Sulfide | 25 | | -16.3 | ppm $Cl_2$ |
| | | Nitrogen Dioxide | 50 | | 1.25 (transient) | ppm $Cl_2$ |
| | | Sulfur Dioxide | 50 | | 9.1 | ppm $Cl_2$ |
| $Cl_2$ (High Range) | XNXXSL1SS | Carbon Dioxide | 20000 | ppm | 0 | ppm $Cl_2$ |
| | | Hydrogen Chloride | 9 | | 1.25 | ppm $Cl_2$ |
| | | Hydrogen Sulfide | 25 | | -16.3 | ppm $Cl_2$ |
| | | Nitrogen Dioxide | 50 | | 1.25 (transient) | ppm $Cl_2$ |
| | | Sulfur Dioxide | 50 | | 9.1 | ppm $Cl_2$ |
| $ClO_2$ | XNXXSX1SS | Refer To Cl2 | Refer to $Cl_2$ | Refer to $Cl_2$ | Refer to $Cl_2$ | Refer to $Cl_2$ |
| NO | XNXXSM1SS | Carbon Monoxide | 300 | ppm | 0 | ppm NO |
| | | Sulfur Dioxide | 5 | | 0 | ppm NO |
| | | Nitrogen Dioxide | 5 | | <1.5 | ppm NO |
| | | Hydrogen Sulfide | 15 | | ~1.5 | ppm NO |
| $NO_2$ | XNXXSN1SS | Carbon Monoxide | 300 | ppm | 0 | ppm $NO_2$ |
| | | Hydrogen Sulfide | 15 | | ~ -1.2 | ppm $NO_2$ |
| | | Sulfur Dioxide | 5 | | 0 | ppm $NO_2$ |
| | | Nitrogen Monoxide | 35 | | 0 | ppm $NO_2$ |
| | | Chlorine | 1 | | ~1 | ppm $NO_2$ |

| Gas type | Part Number | Gas Type Applied | Concentration | Unit | Reading | Unit |
|---|---|---|---|---|---|---|
| $H_2$ | XNXXSG1SS | Carbon Monoxide | 300 | ppm | ≤ 60 | ppm $H_2$ |
| | | Hydrogen Sulfide | 15 | | <3 | ppm $H_2$ |
| | | Sulfur Dioxide | 5 | | 0 | ppm $H_2$ |
| | | Nitrogen Monoxide | 35 | | »10 | ppm $H_2$ |
| | | Nitrogen Dioxide | 5 | | 0 | ppm $H_2$ |
| | | Chlorine | 1 | | 0 | ppm $H_2$ |
| | | Hydrogen Cyanide | 10 | | »3 | ppm $H_2$ |
| | | Hydrogen Chloride | 5 | | 0 | ppm $H_2$ |
| | | Ethylene | 100 | | »80 | ppm $H_2$ |
| $H_2$ (High Range) | XNXXSG2SS | Ammonia | 100 | ppm | 0 | ppm $H_2$ |
| | | Arsine | 0.2 | ppm | 0 | ppm $H_2$ |
| | | Carbon Dioxide | 1000 | ppm | 0 | ppm $H_2$ |
| | | Carbon Monoxide | 100 | ppm | 150 | ppm $H_2$ |
| | | Chlorine | 1 | ppm | 0 | ppm $H_2$ |
| | | Ethylene | 500 | ppm | yes; n/d | ppm $H_2$ |
| | | Hydrogen Cyanide | 20 | ppm | 0 | ppm $H_2$ |
| | | Hydrogen Sulfide | 20 | ppm | 4 | ppm $H_2$ |
| | | Iso-Propanol | 1100 | ppm | yes; n/d | ppm $H_2$ |
| | | Methane | 1 | % | 0 | ppm $H_2$ |
| | | Nitrogen Dioxide | 10 | ppm | -40 | ppm $H_2$ |
| | | Ozone | 0.25 | ppm | 0 | ppm $H_2$ |
| | | Sulfur Dioxide | 5 | ppm | 0 | ppm $H_2$ |

| Gas type | Part Number | Gas Type Applied | Concentration | Unit | Reading | Unit |
|---|---|---|---|---|---|---|
| HF | XNXXSF1SS | Carbon Monoxide | 2000 | ppm | 0 | ppm HF |
| | | Hydrogen | 20000 | ppm | 0 | ppm HF |
| | | Chlorine | 5 | ppm | 5.8 | ppm HF |
| | | Nitrogen Dioxide | 5 | ppm | 0.65 | ppm HF |
| | | Iso-Propanol | 500 | ppm | 0 | ppm HF |
| | | Methanol | 500 | ppm | 0 | ppm HF |
| | | Hydrogen Fluoride | 5 | ppm | 5 | ppm HF |
| | | Hydrogen Sulfide | 25 | ppm | -3.6 | ppm HF |
| | | Sulfur Dioxide | 50 | ppm | 28.3 | ppm HF |
| | | Arsine | 1 | ppm | 0 | ppm HF |
| | | Phosphine | 1 | ppm | -0.14 | ppm HF |
| | | Diborane | 1 | ppm | -1.3 | ppm HF |
| $PH_3$ | XNXXSP1SS | Carbon Monoxide | 2000 | ppm | <10 | ppm $PH_3$ |
| | | Hydrogen | 5000 | ppm | <10 | ppm $PH_3$ |
| | | Chlorine | 1 | ppm | -70 | ppm $PH_3$ |
| | | Nitrogen Dioxide | 8 | ppm | -860 | ppm $PH_3$ |
| | | Ethanol | 2000 | ppm | <10 | ppm $PH_3$ |
| | | Iso-Propanol | 1000 | ppm | <10 | ppm $PH_3$ |
| | | Hydrogen Chloride | 10 | ppm | <10 | ppm $PH_3$ |
| | | Hydrogen Fluoride | 10 | ppm | <10 | ppm $PH_3$ |
| | | Hydrogen Sulfide | 0.5 | ppm | 70 | ppm $PH_3$ |
| | | Ammonia | 100 | ppm | 1050 (transient) | ppm $PH_3$ |
| | | Sulfur Dioxide | 50 | ppm | 550 (transient) | ppm $PH_3$ |
| | | Silane | 1 | ppm | 364 | ppm $PH_3$ |
| | | Arsine | 1 | ppm | 680 | ppm $PH_3$ |
| | | Diborane | 1 | ppm | 454 | ppm $PH_3$ |
| | | Germane | 1 | ppm | 454 | ppm $PH_3$ |

| Gas Type | Part Number | Gas Type Applied | Concentration | Unit | Reading | Unit |
|---|---|---|---|---|---|---|
| HCN | XNXXSY1SS | Carbon Monoxide | 300 | ppm | <15 | ppm HCN |
| | | Hydrogen Sulfide | 15 | ppm | ~90 | ppm HCN |
| | | Sulphur Dioxide | 20 | ppm | 40 < x$ < 75 | ppm HCN |
| | | Nitric Oxide | 35 | ppm | -28 < x$ < 0 | ppm HCN |
| | | Nitrogen Dioxide | 5 | ppm | -20 < x$ < -10 | ppm HCN |
| | | Ethylene | 100 | ppm | <25 | ppm HCN |
| $F_2$ | XNXXSU1SS | Carbon Dioxide | 20000 | ppm | 0 | ppm $F_2$ |
| | | Hydrogen Chloride | 9 | ppm | 1.25 | ppm $F_2$ |
| | | Hydrogen Sulfide | 25 | ppm | -16.3 | ppm $F_2$ |
| | | Nitrogen Dioxide | 50 | ppm | 1.25 (transient) | ppm $F_2$ |
| | | Sulphur Dioxide | 50 | ppm | 9.1 | ppm $F_2$ |
| EtO | XNXXSE1SS | Ethanol | - | - | ~55 | % of EtO |
| | | Toluene | - | - | ~20 | % of EtO |
| | | Methyl-ethyl-ketone | - | - | ~10 | % of EtO |
| | | Carbon Monoxide | - | - | ~40 | % of EtO |
| $O_3$ | XNXXSZ1SS | Bromine, Iodine | - | - | yes; n/d | ppm $O_3$ |
| | | Carbon Dioxide | 5000 | ppm | 0 | ppm $O_3$ |
| | | Carbon Monoxide | 100 | ppm | 0 | ppm $O_3$ |
| | | Chlorine | 1 | ppm | 1.2 | ppm $O_3$ |
| | | Chlorine Dioxide | 1 | ppm | 1.5 | ppm $O_3$ |
| | | Hydrazine | 3 | ppm | -3 | ppm $O_3$ |
| | | Hydrogen | 3000 | ppm | 0 | ppm $O_3$ |
| | | Hydrogen Sulfide | 20 | ppm | -1.6 [1)] | ppm $O_3$ |
| | | Nitrogen | 100 | % | 0 | ppm $O_3$ |
| | | Nitrogen Dioxide | 10 | ppm | 6 | ppm $O_3$ |

## Notes

- The figures of cross-sensitivity are typical values and art not to be used as a basis for cross-calibration.
- Do not scale cross-sensitivities (they may not be linear).
- For some cross-interferents breakthrough may occur if gas is applied a longer time period.
- There are many gases and vapors that can poison electrochemical cells. It is difficult to give a complete and exclusive list of all species which will have an effect on the sensors. However, these are some common substances which must be avoided:
- Airborne greases - These may block gas access into the sensors and therefore reduce sensitivity.
- Silicone compounds - These are often found in sprays, aerosols, lubricants, polishes, adhesives, sealants, zebra strip, cleaning agents, and floor waxes. These compounds tend to reduce the sensitivity of the sensors and generally will have a permanent effect.
- Solvents and organic vapors - Many organic vapors will damage the sensors. Some common ones are IPA, toluene, xylene, other benzene derivatives, petrol, and diesel. It is difficult to give a full list of organic vapors, as there are so many of them. Generally, any organic vapor must be avoided.

# MPD Sensor Performance Data

| Sensor Type | Gas | Typical Response Time (T50) sec | Typical Response Time (T90) sec | Maximum Range | Accuracy (% of full scale or % of applied gas) | Drift Over Time | Operating Humidity | Operating Temperature | | Operating Pressure | Operating Air Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Min | Max | | |
| MPD-IC1 | Carbon Dioxide | <30 | <70 | 5.00 %Vol | ±5%FS or ±15% | < 3%/yr | 0-95% RH non-condensing | -20°C / -4°F | +50°C / 122°F | 80kPa ~ 110kPa | 0 ~ 6m/sec |
| MPD-IV1 | Methane | <15 | <30 | 5.00 %Vol | ±5%FS or ±15% | < 3%/yr | | -20°C / -4°F | +50°C / 122°F | 80kPa ~ 110kPa | 0 ~ 6m/sec |
| MPD-IF1 | Propane | <15 | <30 | 100 %LEL | ±5%FS or ±15% | < 3%/yr | | -20°C / -4°F | +50°C / 122°F | 80kPa ~ 110kPa | 0 ~ 6m/sec |
| MPD-CB1 | Propane | <15 | <30 | 100 %LEL | ±5%FS or ±15% | < 3%/yr | | -40°C / -40°F | +65°C / 149°F | 80kPa ~ 120kPa | 0 ~ 6m/sec |
| | Methane | <10 | <30 | | | | | | | | |
| | Hydrogen | <10 | <30 | | | | | | | | |
| | Butane-2 | <15 | <40 | | | | | | | | |
| | Nonane | <20 | <50 | | | | | | | | |

## Notes

- Response times may vary depending upon molecular weight, size, and structure.
- CSA approved hydrogen sensors are MPDUT-CB1 and 705 STD.
- DEKRA EXAM approved sensors are MPDAM CB1, SP-HT and SP-PPM(10%L)
- Data taken at 20-25°C. Contact Honeywell Analytics for additional data or details.
- Response times may increase at lower temperatures.
- Data represents typical values without optional accessories attached.
- System conditioning may be required to achieve stated results. Contact Honeywell Analytics for details.
- Performance figures are measured using a sample humidity of 50% RH.
- Performance figures are measured between 40 and 60% of full scale.
- Performance figures are measured by test units calibrated at 50% of full scale.
- Use of the weatherproof cap will increase response times.
- FM 6340 performance approval based on MPD-IC1 with SPXCDWP T50<60 T90<150.
- Use of the weatherproof cap will increase response times.
- FM 6340 performance approval based on MPD-IC1 with SPXCDWP T50<60 T90<150.

# EN60079-29-1 Performance Approved Gases for mV Sensor Types

| Sensor Type | EN60079-29-1 Reference | Verified Gas Selections | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hydrogen | Methane-2 | Propane-2 | Butane-2 | Star 2 | Star 4 |
| MPD AMCB1 | Standard Test Gas | | ● | ● | | | |
| | Other Gases | ● | | | ● | n-nonane | |
| SP-HT | Standard Test Gas | | ● | ● | | | |
| | Other Gases | ● | | | ● | | n-nonane |
| Max Zero Deviation (see note 1) | | -7% LEL | | | | -9% LEL | -7% LEL |
| LDL (see note 2) | | 3% LEL | | | | 5% LEL | 3% LEL |
| SP-PPM (10%L) | | 10% LEL | | | | | |

## Notes

1. Readings < 0% LEL are not displayed or indicated on the 20 mA output. Values exceeding the zero deviation limit will result in F111 faults.
2. Readings < LDL are shown as 0% on the display and 20 mA output.

# Other Sensor Performance Data

Performance data for other supported sensors is available in their respective technical manuals.

# Certifications by Part Number Series

Contact Honeywell Analytics for information about XNX® Universal Transmitter approvals not shown in this section.

## XNX Certifications XNX-UT Series

| XNX Part Number Series | | | XNX Transmitter IR Personality | | | XNX Transmitter mV Personality | | | | | | | | XNX Transmitter EC Personality | | | | | | Options | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | XNX-UTSI-***** XNX-UTAI-***** | | | XNX-UTSV-***** / XNX-UTAV-***** | | | | | | | | XNX-UTSE-***** / XNX-UTAE-***** | | | | | | | | | |
| | | | With Generic 20 mA Input | With Optima Plus | With Searchline Excel | MPD-UTCB1 (Cat Bead) | MPD-UTIV1 (IR Methane) | MPD-UTIF1 (IR Flam) | MPD-UTIC1 (IR $CO_2$) | with 705 | with Sensepoint | with Sensepoint PPM | with Sensepoint HT | With XNXXSO1FM $O_2$ Cartrdige | With XNXXSH1FM $H_2S$ Cartridge | With XNXXSC1FM CO Cartridge | $SO_2$, $NH_3$, $Cl_2$, $ClO_2$, NO, $NO_2$, $H_2$ PPM, HCL, HF, $PH_3$ | HCN, $F_2$, $O_3$, EtO | Modbus® | Relays | Local HART® | FOUNDATION™ Fieldbus |
| UL Listed For Hazardous Locations | | UL 1203 | T | T | T | T | T | T | T | T | N/A | N/A | N/A | T | T | T | T | T | T | T | T | T |
| | | UL 913-7th Edition | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | T | T | T | T | T | N/A | N/A | T | N/A |
| | | ISA 60079-29-1 | N/A | T | N/A | T | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| CSA | Hazardous Location | CAN/CSA C22.2 No. 30 M-1986 | T | T | T | T | N/A | N/A | T | T | N/A | N/A | N/A | T | T | T | T | T | T | T | T | N/A |
| | | CAN/CSA C22.2 No. 157-92 (Applies to Local HART Option and/or EC Adaptors) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | T | T | T | T | T | N/A | N/A | T | N/A |
| | Performance | CSA C22.2 No. 152 | N/A | T | N/A | T | N/A | N/A | N/A | T | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | T | T | T | T |
| FM Listed | US Toxic Performance | Standard referenced in notes 1, 2, 3 | N/A | N/A | N/A | N/A | N/A | N/A | 3 | N/A | N/A | N/A | N/A | 1 | 2 | 3 | N/A | N/A | T | T | T | T |
| | Flammable Performance | FM 6310 / 6320 | N/A | T | N/A | T | N/A | N/A | N/A | T | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | T | T | T | T |
| | | FM 6325 | N/A | N/A | T | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | T | T | T | T |
| | Toxic Gas Detector | FM 6340 | N/A | N/A | N/A | N/A | N/A | N/A | T | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | T | T | T | T |

**T = 3/4 NPT threaded Transmitters & Adapters**
**N/A = Not Applicable**

**1. ANSI/ISA 92.04.01, Part 1 2007**
**2. ISA 92.0.01, Part 3 1998**
**3. FM 6340**

## Notes

Special notes for ISA 60079-29-1:2013 approval:

- This approval covers XNX in combination with Searchpoint Optima Plus and MPD catalytic sensors only.
- This approval allows direct fitment of the Searchpoint Optima Plus or MPD catalytic sensors to the XNX with a load 250 ohm minimum resistance. This approval does not cover the remote-mounting of the sensor from the XNX.
- XNX shall be installed such that the MPD sensor faces downwards. When using the Searchpoint Optima Plus sensor this must be mounted so that the sensor is horizontal.
- For the ISA 60079-29-1 assessment, only the 4 to 20 mA output is considered as the safety function. None of the other outputs of the XNX are considered as the safety function during this assessment.
- For the compliance to this approval, the adjustable alarm set point shall not exceed 60 %LEL and the highest alarm shall be configured as a latching alarm.

## XNX Certifications by XNX-AM Series

| XNX Part Number Series | | XNX Transmitter IR Personality | | | XNX Transmitter mV Personality | | | | | | | | XNX Transmitter EC Personality | | | | | | | Options | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | XNX-AMSI-***** XNX-AMAI-***** | | | XNX-AMSV-***** / XNX-AMAV-***** | | | | | | | | XNX-AMSE-***** / XNX-AMAE-***** | | | | | | | | | | |
| | | With Generic 20 mA Input | With Optima Plus | With Searchline Excel | MPD-AMCB1 (Cat Bead) | MPD-AMIV1 (IR Methane) | MPD-AMIF1 (IR Flam) | MPD-AMIC1 (IR $CO_2$) | With 705 HT | With Sensepoint | With Sensepoint PPM | With Sensepoint HT | With Oxygen Cartridge | With $H_2S$ Low Cartridge | With $H_2S$ Med Cartridge | With $H_2S$ High Cartridge | With CO Cartridge | $SO_2$, $NH_3$, $Cl_2$, $ClO_2$, NO, $NO_2$, $H_2$, PPM HCL, HCN, HF, $O_3$, $PH_3$ | HCN, $F_2$, $O_3$, EtO | Modbus | Relays | Local HART | FOUNDATION Fieldbus |
| Electromagnetic & Safety; CE Mark EMC Compliance | EMC Directive 2014/30/EU | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M |
| | EN 50270:2015 | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B |
| | ATEX Directive 2014/34/EU | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M |
| Hazardous Location --- ATEX/DEMKO IECEx | EN IEC 60079-0:2018 | M | M | M | M | M | M | M | N/A | M | M | M | M | M | M | M | M | M | M | M | M | M | M |
| | EN 60079-1:2014 | M | M | M | M | M | M | M | N/A | M | M | M | M | M | M | M | M | M | M | M | M | M | M |
| | EN 60079-11:2012 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | M | M | M | M | M | M | M | N/A | N/A | M | N/A |
| | IEC 60079-31 2nd Ed | M | M | M | M | M | M | M | N/A | N/A | N/A | M | M | M | M | M | M | M | M | M | M | M | M |
| | IEC 60079-0 7th Ed | M | M | M | M | M | M | M | N/A | M | M | M | M | M | M | M | M | M | M | M | M | M | M |
| | IEC 60079-1 6th Ed | M | M | M | M | M | M | M | N/A | M | M | M | M | M | M | M | M | M | M | M | M | M | M |
| | EN 60079-11:2012 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | M | M | M | M | M | M | M | N/A | N/A | M | M |
| | EN 60079-31:2014 | M | M | M | M | M | M | M | N/A | N/A | N/A | M | M | M | M | M | M | M | M | M | M | M | M |

B = Both 3/4 NPT and M25
M = M25 threaded Transmitters & Adapters
$M_1$ = When used with S3KRMK in a Zone 0 location
N/A = Not Applicable

## XNX Certifications XNX-AM Series

| XNX Part Number Series | | XNX Transmitter IR Personality | | | XNX Transmitter mV Personality | | | | | | | | XNX Transmitter EC Personality | | | | | | Options | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | XNX-AMSI-***** XNX-AMAI-***** | | | XNX-AMSV-***** / XNX-AMAV-***** | | | | | | | | XNX-AMSE-***** / XNX-AMAE-***** | | | | | | | | | |
| | | With Generic 20 mA Input | With Optima Plus | With Searchline Excel | MPD-AMCB1 (Cat Bead)* | MPD-AMIV1 (IR Methane) | MPD-AMIF1 (IR Flam) | MPD-AMIC1 (IR $CO_2$) | With 705 HT | With Sensepoint | With Sensepoint PPM | With Sensepoint HT* | With XNXXSO1SS $O_2$ Cartrdige | With XNXXSH1SS $H_2S$ Cartridge | With XNXXSH2SS $H_2S$ Cartridge | With XNXXSC1SS CO Cartridge | $SO_2$, $NH_3$, $Cl_2$, $ClO_2$, NO, $NO_2$, $H_2$ PPM HCL, HCN, HF, $O_3$, $PH_3$ | HCN, $F_2$, $O_3$, EtO | Modbus | Relays | Local HART | FOUNDATION Fieldbus |
| Performance* EXAM DEKRA GmbH | IEC 60079-29-1:2007*** EN 60079-29-1:2007*** | N/A | M | N/A | M | N/A | N/A | N/A | N/A | N/A | N/A | M | N/A | N/A | N/A | N/A | N/A | N/A | N/A | M | M | N/A |
| | EN 45544:1999 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | M | M | M | N/A | N/A | N/A | M | M | N/A |
| | EN 50104:2010** | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | M | N/A | N/A | N/A | N/A | N/A | N/A | M | M | N/A |
| | EN 50271:2010 | N/A | M | N/A | M | N/A | N/A | N/A | N/A | N/A | N/A | M | M | M | M | M | N/A | N/A | N/A | M | M | N/A |
| TÜV Rhineland | IEC61508**** | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | N/A | N/A | N/A | N/A |
| | EN 50402**** | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | N/A | N/A | N/A | N/A |

Delays resulting from transmission errors between sensor and transmitter extend response times T90 by more than one-third. The period until fault indication is 10 seconds.
M = M25 threaded Transmitters & Adapters
B = Both XNX-UT**-***** 3/4"NPT and XNX-AM**-***** transmitters
N/A = Not Applicable
* Tested components: handheld in point-to-point mode, weatherproof cap (not used for calibration), calibration mask.

** Tested applications: oxygen deficiency and oxygen enrichment

*** Tested gases: methane-2, butane-2, propane-2, hydrogen, n-nonane

**** Refer to XNX transmitter safety manual (1998-0808) for detail information about functional safety

## XNX Certifications - MPD-BT**.***** Part Number Series

| XNX Part Number Series | | XNX Transmitter IR Personality | | | XNX Transmitter mV Personality | | | | | XNX Transmitter EC Personality | | | | | Options | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | XNX-BTSI-*****<br>XNX-BTAI-***** | | | XNX-BTSV-*****<br>XNX-BTAV-***** | | | | | XNX-BTSE-*****<br>XNX-BTAE-***** | | | | | | | | |
| | | With Generic 20 mA Input | With Optima Plus | With Searchline Excel | MPD-BTCB1 (Cat Bead) | MPD-BTIV1 (IR Methane) | MPD-BTIF1 (IR Flam) | MPD-BTIC1 (IR CO2 ) | with 705 HT | With XNXXSO1FM $O_2$ Cartrdige | With XNXXSH1FM $H_2S$ Cartridge | With XNXXSC1FM CO Cartridge | $SO_2$, $NH_3$, $CL_2$, $ClO_2$, NO, $NO_2$ , $H_2$ PPM HCL, HCN, HF, $O_3$, $PH_3$ | HCN, $F_2$, $O_3$, EtO | Modbus | Relays | Local HART | FOUNDATION Field Bus |
| UL Listed | UL 1203 | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T | T |
| | UL 913-7th Edition Applies to Local HART Option) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | T | T | T | T | T | N/A | N/A | T | N/A |
| INMETRO<br>TÜV Rheinland | ABNT NBR IEC 60079-0:2013 | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B |
| | ABNT NBR IEC 60079-1:2016 | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B |
| | ABNT NBR IEC 60079-11:2013 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | B | B | B | B | B | N/A | N/A | B | N/A |
| | ABNT NBR IEC 60079-31:2014 | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B |
| FM Listed | Standard referenced in notes 1, 2, 3 | N/A | N/A | N/A | N/A | N/A | N/A | 3 | N/A | 1 | 2 | 3 | N/A | N/A | T | T | T | T |
| | FM 6310 / 6320 | N/A | T | N/A | T | N/A | N/A | N/A | T | N/A | N/A | N/A | N/A | N/A | T | T | T | T |
| | FM 6325 | N/A | N/A | T | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | T | T | T | T |
| | FM 6340 | N/A | N/A | N/A | N/A | N/A | N/A | T | N/A | N/A | N/A | N/A | N/A | N/A | T | T | T | T |

**T = 3/4 NPT threaded Transmitters & Adapters**
**N/A = Not Applicable**
**B = Both 3/4" NPT and M25"**

**1. ANSI/ISA 92.04.01, Part 1 2007**
**2. ISA 92.0.01, Part 3 1998**
**3. FM 6340**

## Certification Labels

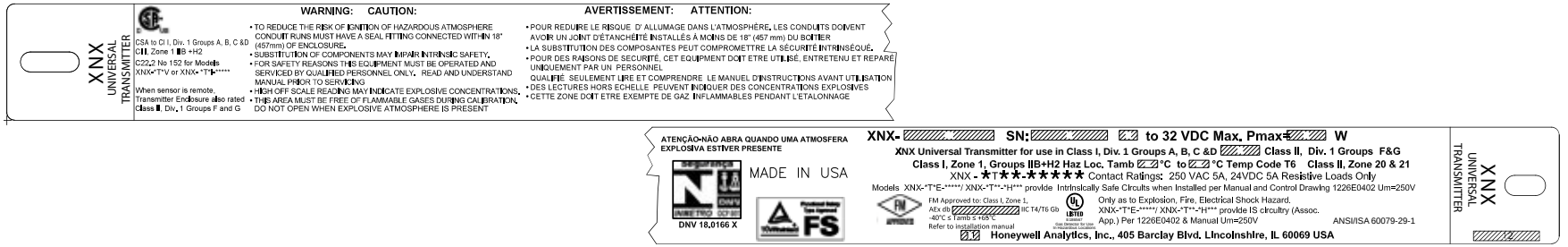



Figure 229. XNX-UT**-***** configuration

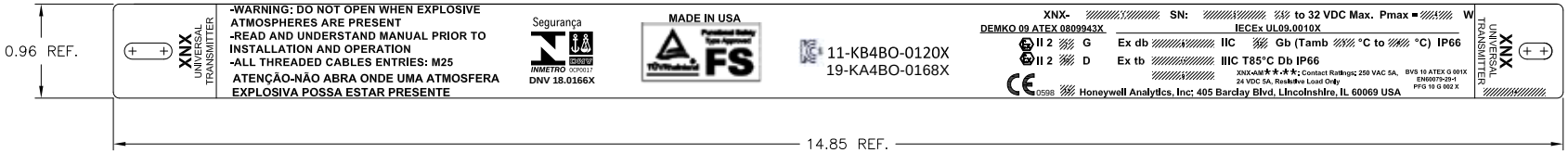
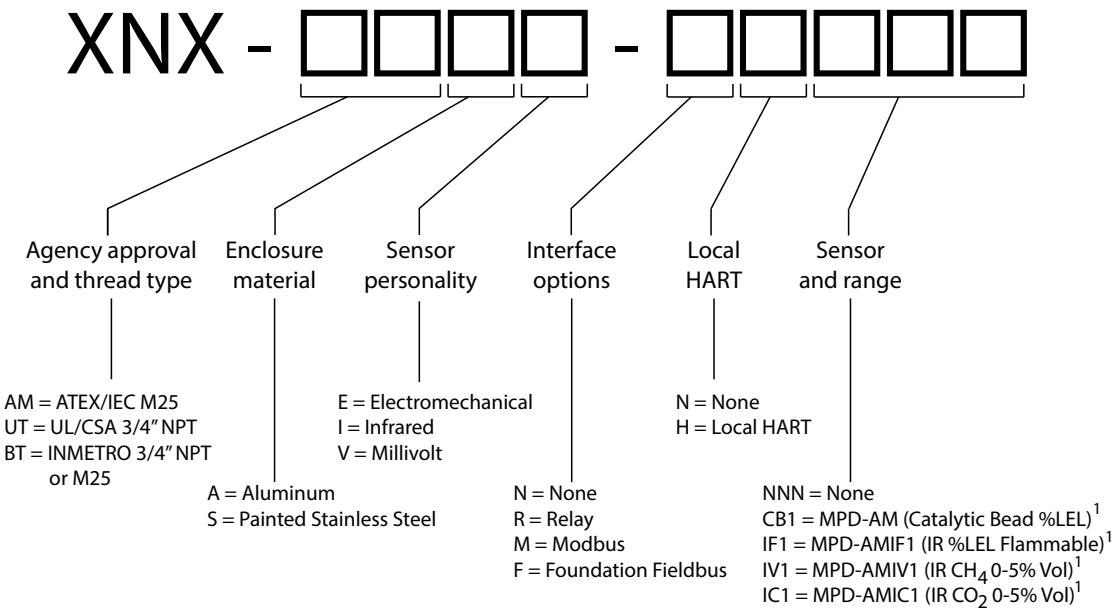



Figure 230. XNX-AM**-***** configuration

## Product Identification

The part numbering system encodes all possible XNX configurations. The first four digits describe the enclosure and the sensor. The last five describe the options (the three-digit sensor and range field is reserved for millivolt units). Agency approvals of MPD sensors vary depending on sensor type and part number. Verify that the approvals of both the transmitter and the MPD sensor meet the requirements of the installation.




1 Indicates agency approval and port thread specification

## EC Replacement Sensors

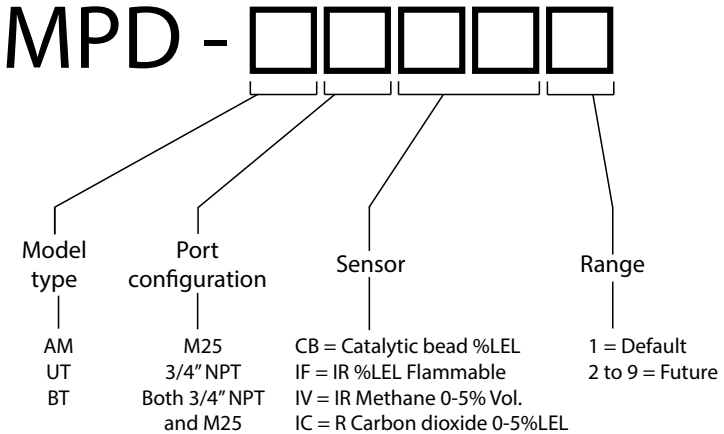
| XNX ID | Target Gas | | Cartridge Part Number | Maximum Range | Selectable Range | Increment | Default Range | Cal Gas Range | Cal Gas Part Number | Cal Gas Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | $O_2$ | Oxygen | XNXXS01SS | 25.0 %Vol | N/A | N/A | 25.0 %Vol | 20.9 %Vol | N/A | N/A |
| | | | XNXXSO1FM | 23.0% Vol | | | 23.0% Vol | | | |
| 2 | $H_2S$ | Hydrogen Sulfide (Low Range) | XNXXSH3SS | 15.0 ppm | N/A | N/A | 15.0 ppm | 5.0 to 10.0 ppm | GFV263 | 10 ppm $H_2S$ |
| 3 | $H_2S$ | Hydrogen Sulfide | XNXXSH1SS<br>XNXXSH1FM | 50.0 ppm | 10.0 to 50.0 ppm | 0.1 ppm | 15.0 ppm | 3 to 35 ppm | GFV258 | 25 ppm $H_2S$ |
| 4 | $H_2S$ | Hydrogen Sulfide (High Range) | XNXXSH2SS | 500 ppm | 50 to 500 ppm | 10 ppm | 100 ppm | 15 to 350 ppm | GFV421 | 50 ppm $H_2S$ |
| 5 | CO | Carbon Monoxide | XNXXSC1SS | 1,000 ppm | 100 to 500 ppm | 100 ppm | 300 ppm | 30 to 200 ppm | GFV295 | 100 ppm CO |
| | | | XNXXSC1FM | | 100 to 1,000 ppm | | | | | |
| 6 | $SO_2$ | Sulfur Dioxide | XNXXSS1SS | 20.0 ppm | 5.0 to 20.0 ppm | 5.0 ppm | 15.0 ppm | 2 to 14 ppm | Contact HA | 7.5 ppm $SO_2$ |
| 7 | $SO_2$ | Sulfur Dioxide (High Range) | XNXXSS2SS | 50.0 ppm | 20.0 to 50.0 ppm | 10 ppm | 50.0 ppm | 6 to 35 ppm | GFV441 | 25 ppm $SO_2$ |
| 8 | $NH_3$ | Ammonia | XNXXSA1SS | 200 ppm | 50 to 200 ppm | 50 ppm | 200 ppm | 150 to 140 ppm | Contact HA | 100 ppm $NH_3$ |
| 9 | $NH_3$ | Ammonia (High Range) | XNXXSA2SS | 1000 ppm | 200 to 1,000 ppm | 50 ppm | 1,000 ppm | 60 to 700 ppm | Contact HA | 300 ppm $NH_3$ |
| 10 | $Cl_2$ | Chlorine | XNXXSL2SS | 5.00 ppm | N/A | N/A | 5.00 ppm | 2 to 3 ppm | GFV251 | 2 ppm $Cl_2$ |
| 11 | $Cl_2$ | Chlorine (High Range) | XNXXSL1SS | 20.0 ppm | 5.0 to 20.0 ppm | 5.0 ppm | 5.0 ppm | 2 to 14 ppm | GFV251 | 2 ppm $Cl_2$ |
| 12 | $ClO_2$ | Chlorine Dioxide | XNXXSX1SS | 1.00 ppm | N/A | N/A | 1.00 ppm | 0.3 to 0.7 ppm | Gas Generator | 0.5 ppm |
| 13 | NO | Nitrogen Monoxide | XNXXSM1SS | 100 ppm | N/A | N/A | 100 ppm | 30 to 70 ppm | GFV216 | 50 ppm NO |
| 14 | $NO_2$ | Nitrogen Dioxide | XNXXSN1SS | 50.0 ppm | 5.0 to 50.0 ppm | 5.0 ppm | 10.0 ppm | 2 to 35 ppm | GFV435 | 5 ppm $NO_2$ |
| 15 | $H_2$ | Hydrogen | XNXXSG1SS | 1000 ppm | N/A | N/A | 1,000 ppm | 300 to 700 ppm | GFV364 | 500 ppm $H_2$ |
| 16 | $H_2$ | Hydrogen (High Range) | XNXXSG2SS | 10,000 ppm | N/A | N/A | 10,000 ppm | 3,000 to 7,000 ppm | Contact HA | 5000 ppm $H_2$ |
| 17 | HCl | Hydrogen Chloride | XNXXSR1SS | 20.0 ppm | 10.0 to 20.0 ppm | 1.0 ppm | 10.0 ppm | 4 to 12 ppm | Contact HA | 5 ppm HCl |
| 18 | HCN | Hydrogen Cyanide | XNXXSY1SS | 30.0 ppm | N/A | N/A | 30.0 ppm | 9.0 to 21.0 ppm | Contact HA | 10.0 ppm HCN in $N_2$ |
| 19 | HF | Hydrogen Fluoride | XNXXSF1SS | 12.0 ppm | 10.0 to 12.0 ppm | 0.1 ppm | 12.0 ppm | 4 to 8 ppm | Contact HA | 5 ppm HF |
| 20 | $O_3$ | Ozone | XNXXSZ1SS | 0.400 ppm | N/A | N/A | 0.400 ppm | 0.120 to 0.280 ppm | Contact HA | 0.200 ppm |
| 21 | $PH_3$ | Phosphine | XNXXSP1SS | 1.20 ppm | N/A | N/A | 1.20 ppm | 0.5 to 0.7 ppm | GFV405 | 0.5 ppm $PH_3$ |
| 22 | $F_2$ | Fluorine | XNXXSU1SS | 4.0 ppm | N/A | N/A | 4.0 ppm | 1.2 to 2.8 ppm | Gas Generator | 2.0 ppm $Cl_2$ in $N_2$ |
| 23 | EtO | Ethylene Oxide | XNXXSE1SS | 50.0 ppm | 20.0 to 50.0 ppm | 5.0 ppm | 25.0 ppm | 6.0 to 35.0 ppm | Contact HA | 10.0 ppm EtO in $N_2$ |

## EC Replacement Cells

| Replacement Cell Part Number | Target Gas | | Cartridge Part Number |
|---|---|---|---|
| S3KO1SS | $O_2$ | Oxygen | XNXXS01SS<br>XNXXSO1FM |
| S3KH1SS | $H_2S$ | Hydrogen Sulfide (Low Range) | XNXXSH3SS |
| S3KH1SS S3KH1SS | $H_2S$ | Hydrogen Sulfide | XNXXSH1SS<br>XNXXSH1FM |
| S3KH2SS | $H_2S$ | Hydrogen Sulfide (High Range) | XNXXSH2SS |
| S3KC1SS | CO | Carbon Monoxide | XNXXSC1SS<br>XNXXSC1FM |
| S3KS1SS | $SO_2$ | Sulfur Dioxide | XNXXSS1SS |
| S3KS1SS | $SO_2$ | Sulfur Dioxide (High Range) | XNXXSS2SS |
| S3KA1SS | $NH_3$ | Ammonia | XNXXSA1SS |
| S3KA2SS | $NH_3$ | Ammonia (High Range) | XNXXSA2SS |
| S3KL1SS | $Cl_2$ | Chlorine | XNXXSL2SS |
| S3KL1SS | $Cl_2$ | Chlorine (High Range) | XNXXSL1SS |
| S3KX1SS | $ClO_2$ | Chlorine Dioxide | XNXXSX1SS |
| S3KM1SS | NO | Nitrogen Monoxide | XNXXSM1SS |
| S3KN1SS | $NO_2$ | Nitrogen Dioxide | XNXXSN1SS |
| S3KG1SS | $H_2$ | Hydrogen (Low Range) | XNXXSG1SS |
| S3KG2SS | $H_2$ | Hydrogen (High Range) | XNXXSG2SS |
| S3KR1SS | HCl | Hydrogen Chloride | XNXXSR1SS |
| S3KY1SS | HCN | Hydrogen Cyanide | XNXXSY1SS |
| S3KF1SS | HF | Hydrogen Fluoride | XNXXSF1SS |
| S3KZ1SS | $O_3$ | Ozone | XNXXSZ1SS |
| S3KP1SS | $PH_3$ | Phosphine | XNXXSP1SS |
| S3KU1SS | $F_2$ | Fluorine | XNXXSU1SS |
| S3KE1SS | EtO | Ethylene Oxide | XNXXSE1SS |

## MPD (Multi Purpose Detector)

Similar to the transmitter, the MPD part numbering system defines the agency approval and thread type (i.e., port configuration). The only material selection is stainless steel. Four sensor types are available. Agency approvals are specific to these four sensor types (see Sensor Data). Ensure that the approval of the sensor type meets the requirements of the installation.



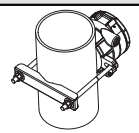
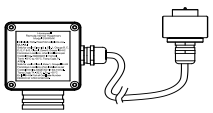
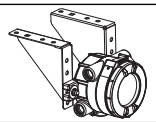
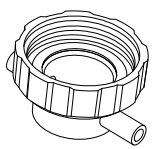

*Catalytic Bead and IR Replacement Sensor Cartridges*

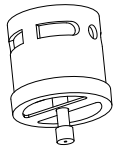
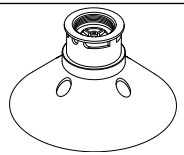
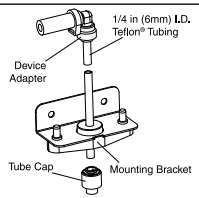
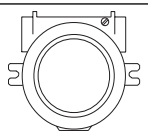
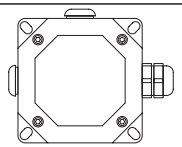
| Sensor Type[1,2] | Target Gas | Cartridge Part Number | Operating Pressure Range (kPa) | Operating Humidity Range (% RH non-condensing) | Air Speed (m/s) | Maximum Range | Selectable Range[3] | Increment | Default Range | Cal Gas Range | Cal Gas Part Number | Cal Gas Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MPD-IC1 | Carbon Dioxide | 1226-0301 | 80 - 110 | see footnote 4 | 0 - 6 | 5.00 %Vol | 1.00 to 5.00 %Vol | 1.00 %Vol | 5.00 %Vol | 1.50 to 3.5 %Vol | Contact HA | 2.5 %VOL $CO_2$ in Air |
| MPD-IV1 | Methane | 1226-0299 | 80 - 110 | 0 - 95 | 0 - 6 | 5.00 %Vol | 1.00 to 5.00 %Vol | 1.00 %Vol | 5.00 %Vol | 1.50 to 3.5 %Vol | GFV352 | 2.5 %VOL $CH_4$ in Air |
| | Methane | 1226-0299 | 80 - 110 | 0 - 95 | 0 - 6 | 100 %LEL | 1.00 to 5.00 %Vol | 1.00 %Vol | 5.00 %Vol | 1.50 to 3.5 %Vol | GFV352 | 2.5 %VOL $CH_4$ in Air |
| MPD-IF1 | Flammables | 1226-0300 | 80 - 110 | 0 - 95 | 0 - 6 | 100 %LEL | 20 to 100 %LEL[3] | 10 %LEL | 100 %LEL | 30 to 70 %LEL | GFV406 | 1 %VOL $C_3H_8$ in Air |
| MPD-CB1 | Flammables | 1226A0359 | 80 - 120 | see footnote 5 | 0 - 6 | 100 %LEL | 20 to 100 %LEL[3] | 10 %LEL | 100 %LEL | 30 to 70 %LEL | GFV352 | 50 %LEL $CH_4$ in Air |

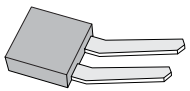
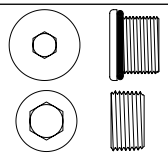
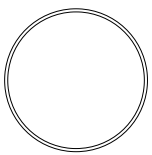
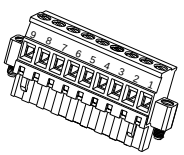
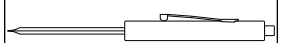
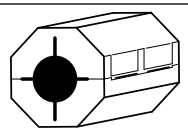
1. Agency approved hydrogen sensors are MPD-CB1 and 705 STD.
2. When ordering replacement MPD sensor cartridges, the replacement cartridge must be the same type as factory configured. Substituting a different cartridge will void agency certification.
3. On XNX %LEL units carrying UL/CSA certifications, the range is fixed at 100%LEL and is not adjustable.
4. Humidity: 5% to 95% RH non-condensing
5. Humidity: 0 to 99% RH non-condensing

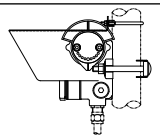
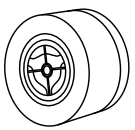
## Accessories/Spares

See publication 1998-0807 *XNX Universal Transmitter Parts List* for a description of the parts and accessories shipped with the transmitter.

| Accessory | | Part Number | Description |
|---|---|---|---|
|  | Pipe Mount Kit | 1226A0358 | For use on pipes from 2-6 inches (50-150mm) in diameter. The kit includes a pipe mount bracket, 2 carriage bolts, nuts and lock washers. |
|  | Remote EC Sensor Mounting Kit | S3KRMK<br>S3KRMK45<br>S3KRMK75 | The remote sensor mounting kits (S3KRMK45 and S3KRMK75) allows the XNX EC sensors to be remotely mounted via an IS cable kit from the transmitter. A choice of cable lengths are available - 50 feet (15 meters), 148 feet (45 meters) or 246 feet (75 meters) and all are supplied with cable glands and remote terminal box. The cable can be cut to the required length and terminated at the remote terminal box. (It cannot be extended or spliced.) |
|  | Ceiling Mount Bracket Kit | 1226A0355 | The optional Ceiling Mount Bracket Kit allows the XNX to be mounted to the ceiling. The kit includes two stainless steel ceiling mount brackets and the necessary bolts and nuts. |
|  | Duct Mount Kit | S3KDMK | The duct mounting kit (S3KDMK) can be used with the EC sensor to allow detection of O2, CO, H2 and H2S gases in ducts. |
| | MPD Interface Adaptor | 1226A0382 | When combined with the MPD Interface Adapter (1226A0382), the duct mounting kit can accommodate the MPD to detect flammable gases in a duct application. The duct mount kit includes the adapter, gasket and required fasteners. The MPD Interface Adapter includes only the adapter and requires the S3KDMK duct mount kit. |
|  | Calibration Gas Flow Adaptor | S3KCAL | EC |
| | | 1226A0411 | MPD |
| | | 00780-A-0035 | Sensepoint HT |
| | | 00780-A-0035 | 705 |
|  | Calibration Cup | S3KCAL | XNX EC - The calibration cup is used to apply calibration test gas to the sensor. It push fits onto the bottom of the sensor and can be fitted without removing the weatherproof cover. |

| Accessory | | Part Number | Description | |
|---|---|---|---|---|
|  | Weatherproof Cap | Included | XNX EC | The weatherproof cap protects the XNX sensors from harsh weather. |
| | | 02000-A-1640 | MPD | |
| | | 00780-A-0076 | Sensepoint | |
| | | 02000-A-1635 | 705 | |
| | | SPXCDWP (included) | MPD-*TCB1 | |
|  | Extreme Weather Protector | SPXCDWP | Sensor XNX-EC or MPD; the Extreme Weather Protector protects the sensor from environmental conditions in outdoor exposure applications. | |
|  | Collecting Cone | S3KCC | XNX EC | The collecting cone improves detection of lighter-than-air gases such as hydrogen and methane. |
| | | 02000-A-1642 | MPD | |
| | | 02000-A-1642 | Sensepoint | |
| | | 02000-A-1642 | 705 | |
|  | Remote Gassing Kit | 1226A0354 | The Remote Gassing Kit enables gas to be applied remotely for performing functional response checks. The kit Includes: 50’ Teflon® tubing, the mounting bracket, thetube cap, and device adaptors in 1/4” and 1/8” ID to attach to the bump test ports on the device’s weatherproof cap. | |
|  | Remote MPD Mounting | 2441-0022 | UL/CSA Aluminum Junction Box | |
|  | | 00780-A-0100 | ATEX/IEC Junction Box (3) M20, (1) M25 entries. “Ex e” ATEX and IECEx Approval | |

| Accessory | | Part Number | Description |
|---|---|---|---|
|  | Terminal Block/ Shorting Jumpers | Contact HA | Terminal block jumpers provide an electrical connection without connection to the Personality Board. Install the jumpers between pins 1 and 2 and between pins 3 and 4 to support multi-node wiring. |
|  | Stopping Plugs | 1226-0257 | M25 Plug w/protective cap and O-ring. (Certified for use with XNX Universal Transmitter only) |
| | | 1226-0258 | 3/4 NPT w/protective cap. (Certified for use with XNX Universal Transmitter only) |
|  | Replacement Cover O-ring | 0235-1266 | Replacement O-ring for the XNX front cover |
|  | Pluggable Terminal Blocks | 1226A0302 | Terminal Block Ass'y 6-Pin XNX EC |
| | | 1226A0304 | Terminal Block Ass'y 9-Pin XNX mV |
| | | 1226A0305 | IR Terminal Block Kit Includes: 9-Pin and 2-Pin Terminal Blocks |
| | | 1226A0306 | Relay Terminal Block Kit Includes: 9-Pin and 2-Pin Terminal Blocks |
| | | 1226A0307 | Terminal Block Ass'y 10-Pin XNX Modbus |
| | | 1226A0303 | Terminal Block Ass'y 6-Pin FFB |
|  | Magnetic Wand/ Screwdriver | 1226-0254 | Replacement wand for front panel access |
|   | Small Screwdriver | 1226-0408 | Replacement screwdriver for use on Terminal Block TB2 and TB4 (IR Personality and Relay Option) |
|  | Ferrite Bead | 0060-1051 | Bead Ferrite MV XNX |

| Accessory | | Part Number | Description |
|---|---|---|---|
|  | FOUNDATION Field-bus Ground Cable | 0310-0041 | Cable Ground FOUNDATION Fieldbus XNX |
|  | Sunshade | 94000-A-1006 | For use in high heat and/or direct sunlight environments. The sunshade can be mounted to 2-inch pipe or to a wall with suitable 6mm fasteners. |
|  | Weather Housing | 02000-A-1635 | For use with Sensepoint EC sensor products |
| | Weather Housing | 02000-A-1640 | For use with Sensepoint combustible sensor products |

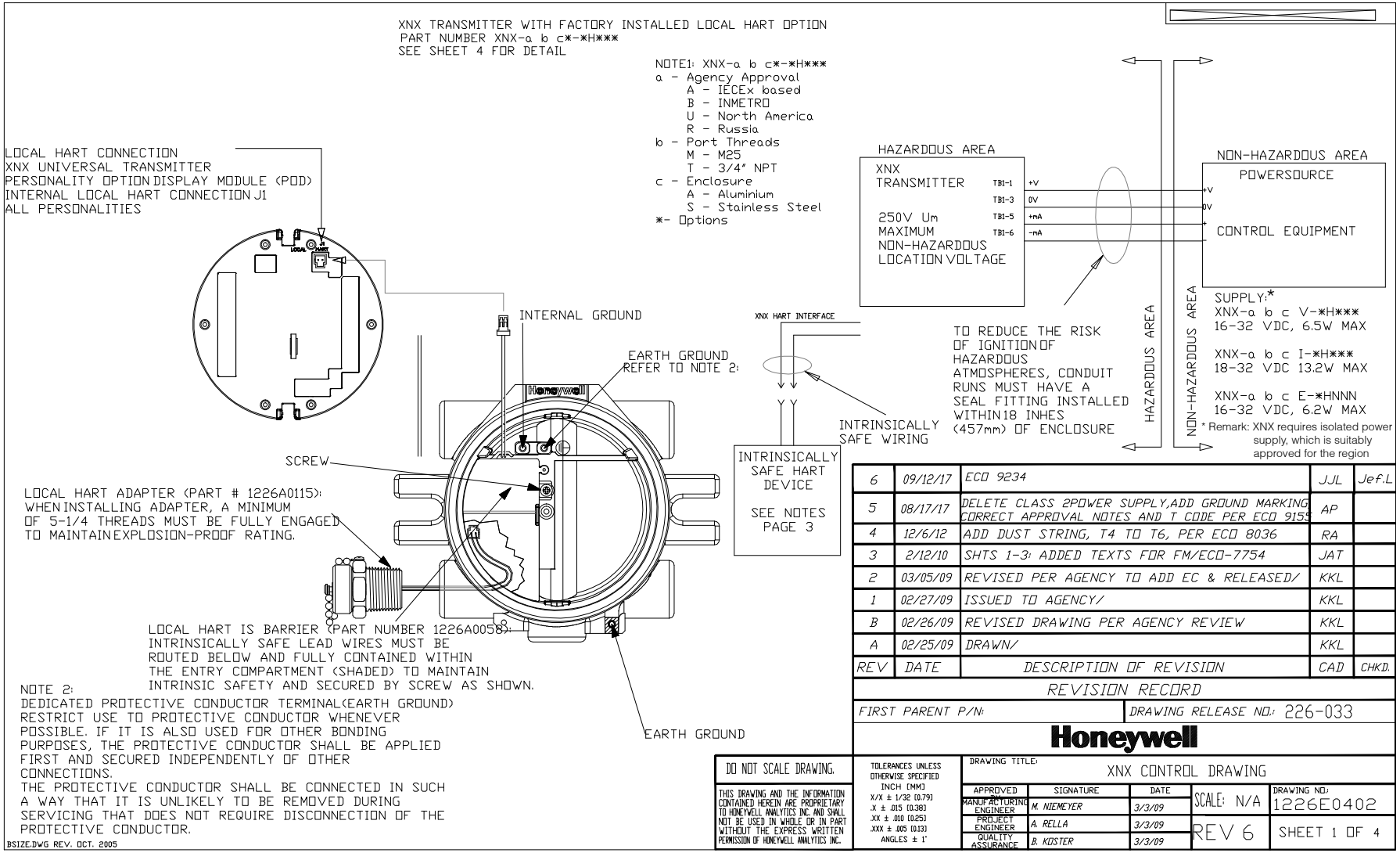
## EC Declaration of Conformity

The latest issue of EC Declaration of Conformity can be downloaded from Honeywell Analytics website. Please visit the XNX product page at the address below and navigate to the Additional Docs section.

https://www.honeywellanalytics.com/en-gb/products/XNX-Universal-Transmitter

# Control Drawings

# XNX UL/CSA/FM/ATEX/IECEx/INMETRO/RUSSIA




| REV | DATE | DESCRIPTION OF REVISION | CAD | CHKD. |
|---|---|---|---|---|
| 6 | 09/12/17 | ECO 9234 | JJL | Jef.L |
| 5 | 08/17/17 | DELETE CLASS 2POWER SUPPLY,ADD GROUND MARKING CORRECT APPROVAL NOTES AND T CODE PER ECO 9155 | AP | |
| 4 | 12/6/12 | ADD DUST STRING, T4 TO T6, PER ECO 8036 | RA | |
| 3 | 2/12/10 | SHTS 1-3: ADDED TEXTS FOR FM/ECO-7754 | JAT | |
| 2 | 03/05/09 | REVISED PER AGENCY TO ADD EC & RELEASED/ | KKL | |
| 1 | 02/27/09 | ISSUED TO AGENCY/ | KKL | |
| B | 02/26/09 | REVISED DRAWING PER AGENCY REVIEW | KKL | |
| A | 02/25/09 | DRAWN/ | KKL | |

REVISION RECORD

FIRST PARENT P/N:

DRAWING RELEASE NO.: 226-033

Honeywell



TOLERANCES UNLESS OTHERWISE SPECIFIED
INCH [MM]
X/X ± 1/32 [0.79]
.X ± .015 [0.38]
.XX ± .010 [0.25]
.XXX ± .005 [0.13]
ANGLES ± 1°

DRAWING TITLE: XNX CONTROL DRAWING

| | APPROVED | SIGNATURE | DATE |
|---|---|---|---|
| MANUFACTURING ENGINEER | M. NIEMEYER | | 3/3/09 |
| PROJECT ENGINEER | A. RELLA | | 3/3/09 |
| QUALITY ASSURANCE | B. KOSTER | | 3/3/09 |

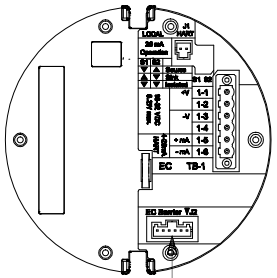
SCALE: N/A

DRAWING NO.: 1226E0402

REV 6

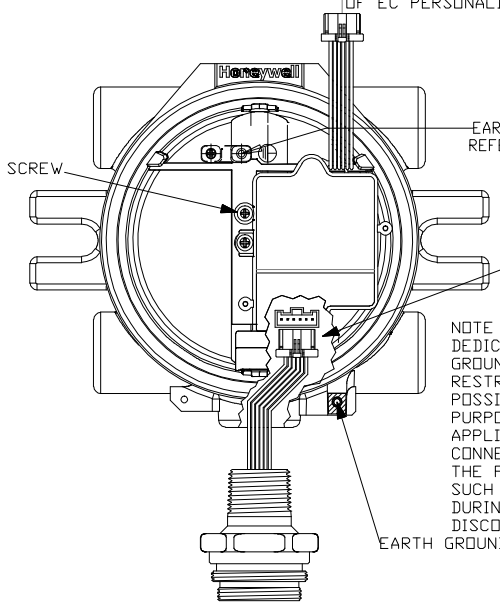
SHEET 1 OF 4

EC ADAPTER/IS
BARRIER CONNECTIONS



XNX TRANSMITTER WITH FACTORY INSTALLED LOCAL EC OPTION
PART NUMBER XNX-a b c E-**NNN
SEE SHEET 4 FOR DETAIL
NOTE1: XNX-a b c*-*H***
a - Agency Approval
A - IECEx based
B - INMETRO
U - North America
R - Russia
b - Port Threads
M - M25
T - 3/4" NPT
c - Enclosure
A - Aluminium
S - Stainless Steel
*-Options

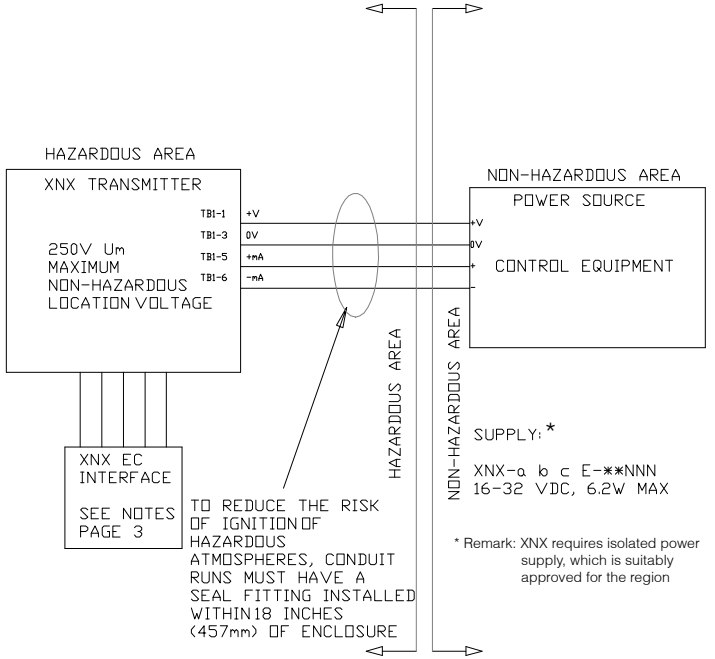
BARRIER CONNECTS TO J2
OF EC PERSONALITY PCB




EC SENSOR ADAPTER

EC IS BARRIER
(PART NUMBER 1226A0057):
INTRINSICALLY SAFE LEAD WIRES MUST BE ROUTED
BELOW AND FULLY CONTAINED WITHIN
THE ENTRY COMPARTMENT (SHADED) TO MAINTAIN
INTRINSIC SAFETY AND SECURED BY SCREW AS SHOWN.

NOTE 2:
DEDICATED PROTECTIVE CONDUCTOR TERMINAL(EARTH
GROUND)
RESTRICT USE TO PROTECTIVE CONDUCTOR WHENEVER
POSSIBLE. IF IT IS ALSO USED FOR OTHER BONDING
PURPOSES, THE PROTECTIVE CONDUCTOR SHALL BE
APPLIED FIRST AND SECURED INDEPENDENTLY OF OTHER
CONNECTIONS.
THE PROTECTIVE CONDUCTOR SHALL BE CONNECTED IN
SUCH A WAY THAT IT IS UNLIKELY TO BE REMOVED
DURING SERVICING THAT DOES NOT REQUIRE
DISCONNECTION OF THE PROTECTIVE CONDUCTOR.




| REV | DATE | DESCRIPTION OF REVISION | CAD | CHKD. |
|---|---|---|---|---|
| - | --/--/-- | SEE SHEET 1/ | --- | |

REVISION RECORD

FIRST PARENT P/N:

DRAWING RELEASE NO:

Honeywell

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TOLERANCES UNLESS OTHERWISE SPECIFIED
INCH [MM]
X/X ± 1/32 [0.79]
.X ± .015 [0.38]
.XX ± .010 [0.25]
.XXX ± .005 [0.13]
ANGLES ± 1°

DRAWING TITLE: XNX CONTROL DRAWING

| APPROVED | SIGNATURE | DATE |
|---|---|---|
| MANUFACTURING ENGINEER | M. NIEMEYER | 3/3/09 |
| PROJECT ENGINEER | A. RELLA | 3/3/09 |
| QUALITY ASSURANCE | B. KOSTER | 3/3/09 |

SCALE: N/A

DRAWING NO: 1226E0402

REV 6

SHEET 2 OF 4

BSIZE.DWG REV. OCT. 2005

## XNX TRANSMITTER WITH FACTORY INSTALLED LOCAL HART OPTION

1. ENTITY PARAMETERS OF XNX UNIVERSAL TRANSMITTER LOCAL HART INTERFACE

| OUTPUT | INPUT |
|---|---|
| Uo = 24.16V | Ui = 21.85V |
| Io = 139mA | Ii = 120mA |
| Po = 0.82W | Pi = 1.0W |
| Lo = 1.4mH | Li = 0.0mH |
| Co = 0.122uF | Ci = 0.0uF |

2. THE LOCAL HART DEVICE CONNECTED MUST BE THIRD PARTY LISTED AS INTRINSICALLY SAFE FOR THE APPLICATION, AND HAVE INTRINSICALLY SAFE ENTITY PARAMETERS CONFORMING WITH TABLE 1 BELOW.

TABLE 1

| IS HART DEVICE | | XNX HART INTERFACE |
|---|---|---|
| INPUT | | OUTPUT |
| V max (or Ui) | ≥ | Voc or Vt (or Uo) |
| I max (or Ii) | ≥ | Isc or It (or Io) |
| P max, Pi | ≥ | Po |
| Ci + Ccable | ≤ | Ca (or Co) |
| Li + Lcable | ≤ | La (or Lo) |
| OUTPUT | | INPUT |
| Voc or Vt (or Uo) | ≤ | V max (or Ui) |
| Isc or It (or Io) | ≤ | I max (or Ii) |
| Po | ≤ | P max, Pi |
| Ca (or Co) | ≥ | Ci + Ccable |
| La (or Lo) | ≥ | Li + Lcable |

## XNX UNIVERSAL TRANSMITTER WITH EC PERSONALITY

1. ENTITY PARAMETERS OF XNX UNIVERSAL TRANSMITTER EC ADAPTER

| OUTPUT | | INPUT |
|---|---|---|
| Voc or Vt (or Uo) = 5.88 V | ≤ | V max (or Ui) |
| Isc or It (or Io) = 84 mA | ≤ | I max (or Ii) |
| Po = 123 mW | ≤ | P max, Pi |
| Ca (or Co) = 10uF | ≥ | Ci + Ccable |
| La (or Lo) = 1 mH | ≥ | Li + Lcable |

BSIZE.DWG REV. OCT. 2005

## XNX UNIVERSAL TRANSMITTER WITH EC PERSONALITY AND/OR LOCAL HART

1. THE OUTPUT CURRENT OF THE LOCAL HART AND EC IS BARRIERS ARE LIMITED BY A RESISTOR SUCH THAT THE OUTPUT VOLTAGE-CURRENT PLOT IS A STRAIGHT LINE DRAWN BETWEEN OPEN-CIRCUIT VOLTAGE AND SHORT-CIRCUIT CURRENT.
2. THE ASSOCIATED APPARATUS MAY ALSO BE CONNECTED TO SIMPLE APPARATUS AS DEFINED IN ARTICLE 504.2 AND INSTALLED AND TEMPERATURE CLASSIFIED IN ACCORDANCE WITH ARTICLE 504.10(B) OF THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70), OR OTHER LOCAL CODES, AS APPLICABLE.
3. CAPACITANCE AND INDUCTANCE OF THE FIELD WIRING FROM THE INTRINSICALLY SAFE EQUIPMENT TO THE ASSOCIATED APPARATUS SHALL BE CALCULATED AND MUST BE INCLUDED IN THE SYSTEM CALCULATIONS AS SHOWN IN TABLE 1. CABLE CAPACITANCE, Ccable, PLUS INTRINSICALLY SAFE EQUIPMENT CAPACITANCE, Ci MUST BE LESS THAN THE MARKED CAPACITANCE, Ca (OR Co), SHOWN ON ANY ASSOCIATED APPARATUS USED. THE SAME APPLIES FOR INDUCTANCE (Lcable, Li AND La OR Lo, RESPECTIVELY). WHERE THE CABLE CAPACITANCE AND INDUCTANCE PER FOOT ARE NOT KNOWN, THE FOLLOWING VALUES SHALL BE USED: Ccable = 60 PF/FT., Lcable = 0.2 µH/FT.
4. THE ASSOCIATED APPARATUS MUST BE CONNECTED TO A SUITABLE GROUND ELECTRODE PER THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70), THE CANADIAN ELECTRICAL CODE, OR OTHER LOCAL INSTALLATION CODES, AS APPLICABLE. THE RESISTANCE OF THE GROUND PATH MUST BE LESS THAN 1 OHM.
5. INTRINSICALLY SAFE CIRCUITS MUST BE WIRED AND SEPARATED IN ACCORDANCE WITH ARTICLE 504.20 OF THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70), THE CANADIAN ELECTRICAL CODE, OR OTHER LOCAL CODES, AS APPLICABLE. REFER TO ARTICLE 504.30(B) OF THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) AND INSTRUMENT SOCIETY OF AMERICA RECOMMENDED PRACTICE ISA RP12.6 FOR INSTALLING INTRINSICALLY SAFE EQUIPMENT.
6. THIS ASSOCIATED APPARATUS HAS NOT BEEN EVALUATED FOR USE IN COMBINATION WITH AN OTHER ASSOCIATED APPARATUS.
7. CONTROL EQUIPMENT MUST NOT USE OR GENERATE MORE THAN 250 V RMS OR DC WITH RESPECT TO EARTH.
8. FOR AEx ia COMPLIANCE, THE ASSOCIATED APPARATUS MUST BE INSTALLED IN ACCORDANCE WITH NFPA 70, ARTICLE 505.

| REV | DATE | DESCRIPTION OF REVISION | CAD | CHK'D. |
|---|---|---|---|---|
| - | --/--/-- | SEE SHEET 1/ | --- | |

REVISION RECORD

FIRST PARENT P/N: | DRAWING RELEASE NO.: -

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TOLERANCES UNLESS OTHERWISE SPECIFIED
INCH [MM]
X/X ± 1/32 [0.79]
.X ± .015 [0.38]
.XX ± .010 [0.25]
.XXX ± .005 [0.13]
ANGLES ± 1°

DRAWING TITLE: XNX CONTROL DRAWING

| | APPROVED | SIGNATURE | DATE |
|---|---|---|---|
| MANUFACTURING ENGINEER | M. NIEMEYER | | 3/3/09 |
| PROJECT ENGINEER | A. RELLA | | 3/3/09 |
| QUALITY ASSURANCE | B. KOSTER | | 3/3/09 |

SCALE: N/A | REV 6 | DRAWING NO.: 1226E0402 | SHEET 3 OF 4

| Suitable and provides intrinsically safe circuit for use in: | | | | | | |
|---|---|---|---|---|---|---|
| | | UL USA/Canada | CSA USA/Canada | FM USA | IECEx & ATEX & KTL & INMETRO | Russia |
| Division Ratings | Class I, Div 1 | Groups A, B, C & D | Groups B, C & D | NO | N/A | N/A |
| | Class II, Div 1 | Groups F & G | Groups F & G<br>When MPD remote mounted | | | |
| Zone Ratings | | Class I, Zone 1, Group IIC, T6 | Class I, Zone 1, Group IIB + H2, T6 | Class I, Zone 1,<br>AEx db [ia] IIC Gb<br>See Note 8 | Ex db IIC T4/T6 Gb<br>Ex db [ia IIC Ga] IIC T4/T6 Gb | 1Ex db IIC T4/T6X<br>1Ex db [ia IIC] IIC T4/T6X |
| | | Class II, Zone20 & 21 | NO | NO | Ex tb IIIC T85°C Db<br>Ex tb [ia IIIC Da] IIIC T85°C Db | Ex tb IIIC T85°CX<br>Ex tb [ia IIIC] IIIC T85X |
| Ambient Temperature Range | | - 40°C to +65°C (-40°F to +149°F) when contain Hart I.S. barrier or EC I.S. barrier,<br>Otherwise - 55°C to +65°C (-67°F to +149°F)<br>NEMA 4X & IP66 | | Ta = - 40°C to +65°C | - 40°C to +65°C<br>IP66 | - 60°C to +65°C<br>IP66 |
| T Code | | T6 - Default * | T4 | T6 - Default * | | |
| | | * The rating of the XNX will default the lowest T-Code of any accessory connected to it within the hazardous area. Some common accessories have T codes as follows (examples only – follow certification label on accessory):<br><br>Communication Devices (ia) – connected to HART intrinsically safe barrier in XNX:<br>HART Handheld by Emerson Model 475 Field Communicator – T4<br>HART Handheld by Honeywell Model MCT404 – T4<br><br>Sensors or Sensing Accessories (ia) – connected to EC intrinsically safe barrier in XNX:<br>EC Sensor – T4<br><br>Sensors or Sensing Accessories directly connected to XNX:<br>MPD – T6<br>Optima Plus – T86°C (-40 to +55°C), T96°C (-40 to +65°C)<br>Excel – T6 (-40 to +55°C), T5 (-40°C to +65°C) | | | | |

| REV | DATE | DESCRIPTION OF REVISION | CAD | CHKD. |
|---|---|---|---|---|
| - | --/--/-- | SEE SHEET 1/ | --- | |

REVISION RECORD

FIRST PARENT P/N: | DRAWING RELEASE NO.: -

Honeywell

DO NOT SCALE DRAWING.



TOLERANCES UNLESS OTHERWISE SPECIFIED
INCH [MM]
X/X ± 1/32 [0.79]
.X ± .015 [0.38]
.XX ± .010 [0.25]
.XXX ± .005 [0.13]
ANGLES ± 1°

DRAWING TITLE: XNX CONTROL DRAWING

| | APPROVED | SIGNATURE | DATE |
|---|---|---|---|
| MANUFACTURING ENGINEER | M. NIEMEYER | | 3/3/09 |
| PROJECT ENGINEER | A. RELLA | | 3/3/09 |
| QUALITY ASSURANCE | B. KOSTER | | 3/3/09 |

SCALE: N/A | DRAWING NO.: 1226E0402

REV 6 | SHEET 4 OF 4

BSIZE.DWG REV. OCT. 2005

# Remote Sensor Mount

3000E3159 sht. 1

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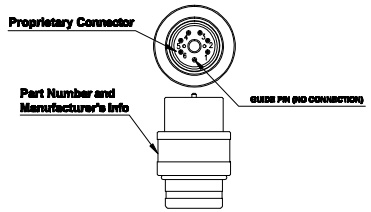
Honeywell

**Toxic/Oxygen Sensor Cartridge**



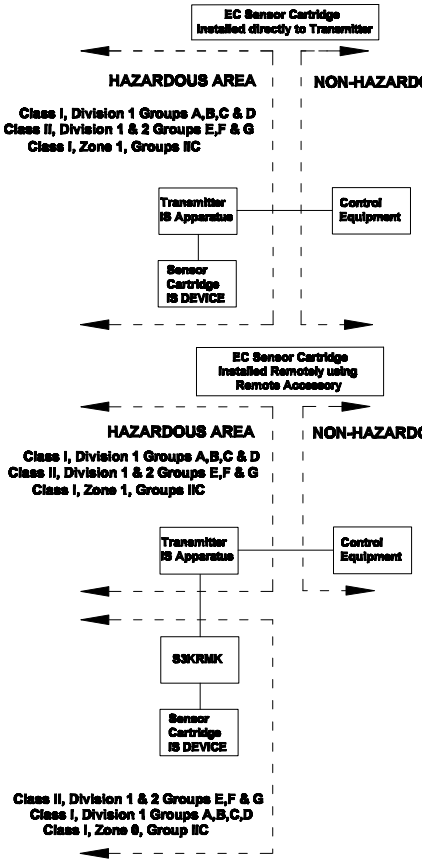

Notes:

1. Intrinsically Safe Device Entity Parameters
   Entity Parameters for Toxic/Oxygen Sensor Cartridge Only
   Ui=5.85V; Ii=0.124A; Pi=0.183W; Li=0uH Ci=5uf
   Vmax Imax Pmax Li=Lcable Ci+Ccable
   Entity Parameters for Cartridge and Remote Accessory with Cable
   Ui=5.85V; Ii=0.124A; Pi=0.183W; Li=50.292uH Ci=5.015uf
   Vmax Imax Pmax Li=_Lcable Ci+Ccable
2. Associated apparatus output current must be limited by a resistor such that the output voltage-current plot is a straight line drawn between open-circuit voltage and short-circuit current.
   TABLE 1:

| I.S. Equipment | | Associated Apparatus |
|---|---|---|
| V max (or Ui) | ≥ | Voc or Vt (or Uo) |
| I max (or Ii) | ≥ | Isc or It (or Io) |
| P max (or Pi) | ≥ | Po |
| Ci + Ccable | ≥ | Ca (or Co) |
| Li + Lcable | ≥ | La (or Lo) |

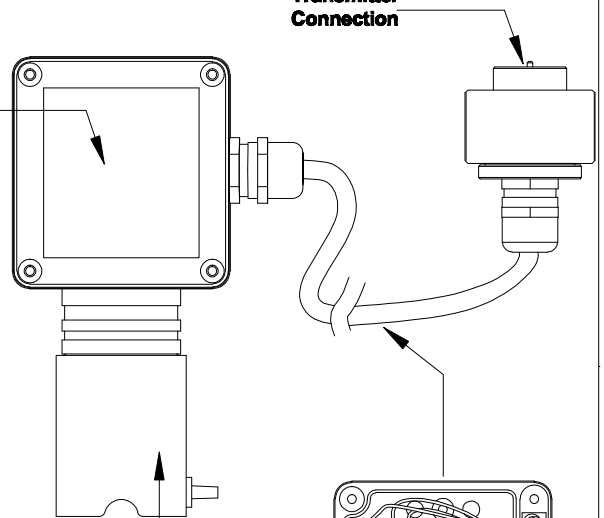
3. Selected associated apparatus must be third party listed as providing intrinsically safe circuits for the application, and have Voc or Vt not exceeding Vmax (or Uo not exceeding Ui), Isc or It not exceeding Imax (or Io not exceeding Ii), and the Po of the associated apparatus must be less than or equal to the Pmax or Pi of the intrinsically safe equipment, as shown in Table above.
4. Control equipment must not use or generate more than 250V rms or dc with respect to earth.
5. Associated apparatus may be in a Division 2 or Zone 2 location if so approved.
6. Associated apparatus must be installed in accordance with its manufacturer's control drawing and Article 504 of the National Electrical Code (ANSI/NFPA 70) for installation in the United States, or Section 18 of the Canadian Electrical Code for installations in Canada.
7. When required by the manufacturer's control drawing, the associated apparatus must be connected to a suitable ground electrode per the National Electrical Code (ANSI/NFPA 70), the Canadian Electrical Code, or other local installation codes, as applicable. The resistance of the ground path must be less than 1 ohm.
8. Refer to following table for Specific Part Numbers in this listing.
9. XNXCSC1PM, XNXCSH1PM and XNXCSO1PM shall be installed in accordance with XNX Control Drawing 1226E0402

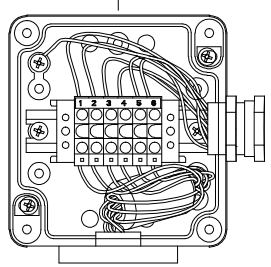
| Gas Type | Sensor Part No. | Gas Type | Sensor Part No. | Gas Type | Sensor Part No. |
|---|---|---|---|---|---|
| H2S(L) | S3XCSH1SS or XNXCSH1SS, XNXCSH1PM | O2 | S3XCSO1SS or XNXCSO1SS, XNXCSO1PM | CO | S3XCSC1SS or XNXCSC1SS, XNXCSC1PM, S3XCSC3SS, XNXCSC3SS |
| H2S(H) | S3XCSH2SS or XNXCSH2SS | NH3(L) | S3XCSA1SS or XNXCSA1SS | | |
| H2S(LL) | S3XCSH3SS or XNXCSH3SS | NH3(H) | S3XCSA2SS or XNXCSA2SS | H2(L) | S3XCSG1SS or XNXCSG1SS |
| HF | S3XCSF1SS or XNXCSF1SS | Cl2(H) | S3XCSL1SS or XNXCSL1SS | H2(H) | S3XCSG2SS or XNXCSG2SS |
| NO | S3XCSN1SS or XNXCSN1SS | Cl2(L) | S3XCSL2SS or XNXCSL2SS | HCl | S3XCSR1SS or XNXCSR1SS |
| SO2(L) | S3XCSS1SS or XNXCSS1SS | ClO2 | S3XCSX1SS or XNXCSX1SS | HCN | S3XCSY1SS or XNXCSY1SS |
| SO2(H) | S3XCSS2SS or XNXCSS2SS | NO2 | S3XCSN1SS or XNXCSN1SS | O3 | S3XCSZ1SS or XNXCSZ1SS |
| F2 | S3XCSU1SS or XNXCSU1SS | ETO | S3XCSE1SS or XNXCSE1SS | PH3 | S3XCSP1SS or XNXCSP1SS |




**Remote Sensor Accessory**
**Honeywell Part Number S3KRMK, S3KRMK45, S3KRMK75**

| Connections: | |
|---|---|
| PIN # | Color |
| 1 | Yellow |
| 2 | Green |
| 3 | Blue |
| 4 | White |
| 5 | Red |
| 6 | Black |




Notes:
1. The Remote Sensor Accessory is provided with a permanently connected 250 foot (76.2m) cable which is the maximun allowable length. Lengthening or splicing of the cable will void Intrinsic Safety Approval.
2. Cable Type: 6 Connector (3 twisted pairs) 24AWG, Instrument Cable Braid Shield, PVC Jacket 80C 300v AWM 2464

THIS ITEM FORMS PART OF A CERTIFIED PRODUCT
NO MODIFICATION PERMITTED WITHOUT REFERENCE TO CERTIFICATION DEPARTMENT



TOLERANCES TO BE AS SPECIFIED BELOW UNLESS OTHERWISE STATED.
DIMENSIONS: 2 DP ± 0.10 mm; 1 DP ± 0.25 mm; NONE ± 0.40 mm; ANGULAR ± 1/2°
HOLES: ø 0 to 8 +0.08 −0.0; ø 8 to 14 +0.1 −0.0; ø 14 to 25 +0.12 −0.0

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED, AND APPLY AFTER PLATING

THIS DRAWING IS TO BS 8888

REMOVE ALL BURRS AND SHARP EDGES

SURFACE TEXTURE VALUES ARE IN um Ra AND TO BS 1134

FINISH

MATERIAL

| | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|
| ISSUE | | | | | | |
| DATE | 12/JUN/18 | 23/JAN/18 | 15/DEC/15 | 22/MAY/15 | 26/OCT/11 | 16/NOV/09 |
| CHANGE | ADDED P/N | CHANGED NOTES | CHANGED NOTES | CHANGED NOTES | CHANGED NOTES | NEW DRAWING |
| APPROVED BY | JEFFREY LEE | JEFFREY LEE | JEFFREY LEE | JEFFREY LEE | JEFFREY LEE | J.Y.JIN |

SCALE 1/1

DR'N BEN 16/NOV/09

TITLE XNX_ECC_CARTRIDGE_CONTROL_DRAWING

3000E3159

SHT. 1 OF 1

A2

Honeywell

# HART Protocol

# HART Interface

The XNX Universal Transmitter is registered with the HART Communication Foundation.

**NOTE**

**Note:** The procedures in this section must be performed only by qualified service personnel.

All XNX transitters can communicate using the HART protocol (defined at www.fieldcommgroup.org by the HART Communication Foundation). HART is unique among fieldbuses in that the digital signal is superimposed on a traditional 4-20 mA current loop. This provides the reliability of analog signaling with the advanced diagnostic capability of a digital device.

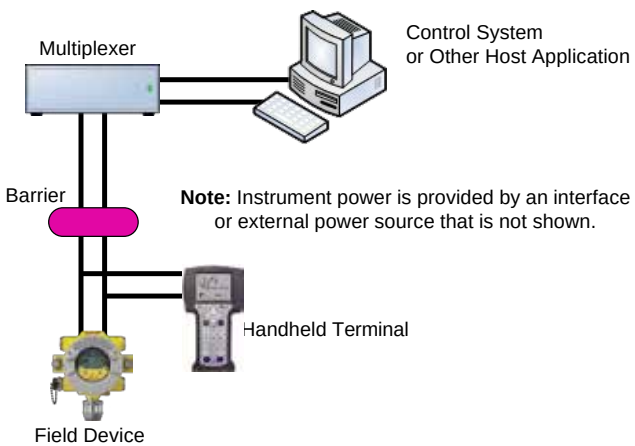



Figure 231. HART point-to-point mode

HART devices are usually connected as point-to-point networks. The analog output of the transmitter can also be disabled to facilitate construction of multidrop, all-digital HART networks.If HART is not needed, the unit can be used as a 4-20 mA transmitter. Since the transmitter is a slave, the internal modem will remain silent if no master signal is present. Additionally the HART signal is at too high a frequency (1200 Hz) to interfere with analog control equipment. Another novel feature of HART networks is that two masters can be present. The primary master is usually a distributed control system (DCS), programmable logic controller (PLC), or a personal computer (PC). The secondary master can be a handheld terminal. The transmitter has been tested with the handheld Emerson field communicator.

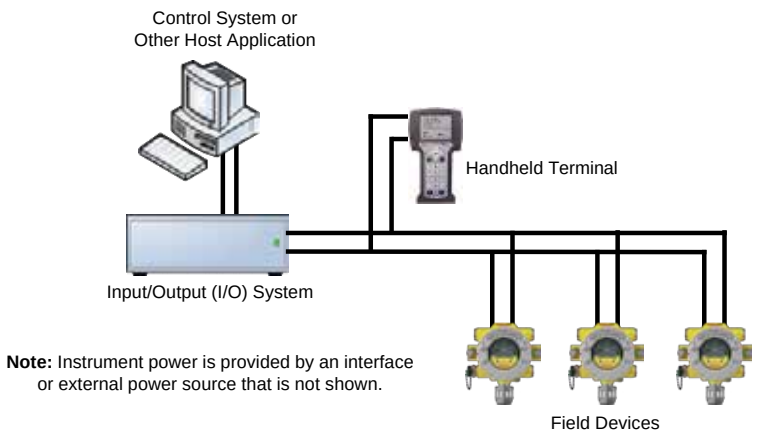



Figure 232. HART multi-point mode

The XNX device descriptor (DD) file provides HART users with data on the capabilities and features of the transmitter. Select HART enabled devices are able to interface with XNX transmitters when

connected via HART communication. A copy of the file is included on the Documentation CD or can be downloaded from the HART(R) Foundation website. This DD file can be installed on HART-enabled Emerson field communicators using the Emerson Easy Upgrade Utility. The DD files are compatible with the software integral to the transmitter. Older transmitters using earlier versions of software require previous versions of the DD files. Contact your local Honeywell representative with any questions regarding software compatibility.

During manufacturing, Honeywell configures the 8-digit HART tag to the XNX serial number. This can be used to confirm correct wiring from the transmitter to the control system. If desired, the HART tag can be modified. The fixed XNX serial number can also be read over HART.

For convenience, the transmitter presents the HART signal on two interfaces. The 1200 Hz AC signal is capacitively coupled to the main mA current analog output. This may be monitored at the control system or at any point along the 20 mA loop. Additionally, the optional local HART interface (Honeywell part number XNX-HIF) permits temporary connection of a HART terminal to the transmitter. This local HART port is transformer-coupled to the main mA current output. This port is intrinsically safe and polarity insensitive. See the Local HART Interface section for more information.

The internal HART modem functions as a high-impedance current source. Thus transferring the HART signal requires a certain minimum loop resistance between the slave and a low-impedance power supply.

Normally, this resistance is supplied by the control system and need not be explicitly added. However, special treatment is needed when the mA current output is not used and the local HART interface is needed. An installer might choose to communicate using relays, Modbus, or FOUNDATION Fieldbus instead. In that case, the supplied 510 ohm resistor must be fitted to create an “artificial” mA current loop. Connect the resistor between TB-1 terminal 1-3 and terminal 1-6. Additionally, place S1 and S2 in source configuration. This is shown schematically in the HART “source” wiring illustration.

The digital HART interface provides all of the capabilities of the local user interface. The transmitter has been designed to use the portable Emerson field communicator with DevCom2000 software for Microsoft Windows® and Emerson AMS Intelligent Device Manager. Using HART, a service person can display information, test, calibrate, and configure. An outline of the HART menus is provided in the Handheld Online Menus section.

### ATEX Conditions for Safe Use of Intrinsically Safe HART Handheld Devices

For installations in which both the Ci and Ii of the intrinsically safe apparatus exceeds 1% of the Co and Io parameters of the associated apparatus (excluding the cable), 50% of Co and Io parameters are applicable and shall not be exceeded, i.e., the Ci of the device plus the C of the cable must be less than or equal to 50% of the Co of the associated apparatus, and the Ii of the device plus the I of the cable must be less than or equal to 50% of the Io of the associated apparatus.

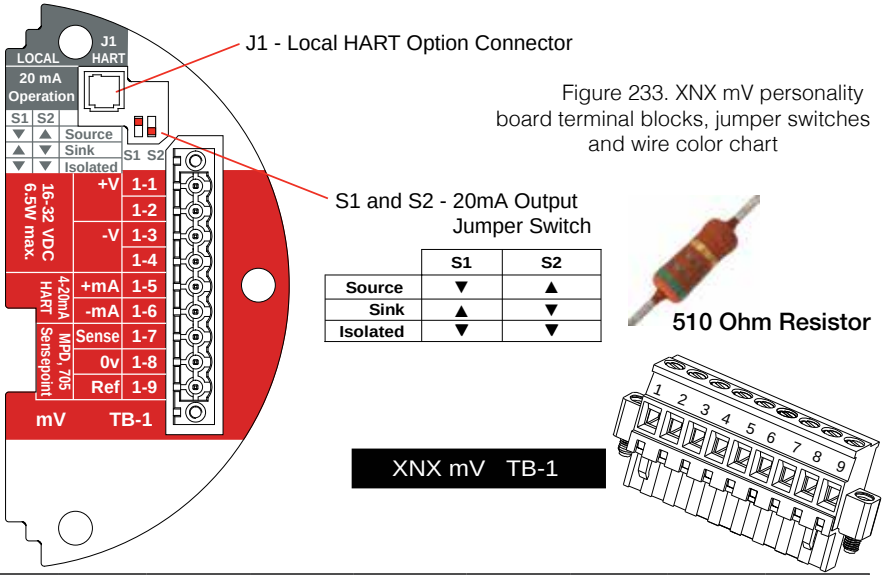



Figure 233. XNX mV personality board terminal blocks, jumper switches and wire color chart

| | S1 | S2 |
|---|---|---|
| Source | ▼ | ▲ |
| Sink | ▲ | ▼ |
| Isolated | ▼ | ▼ |



510 Ohm Resistor

XNX mV TB-1



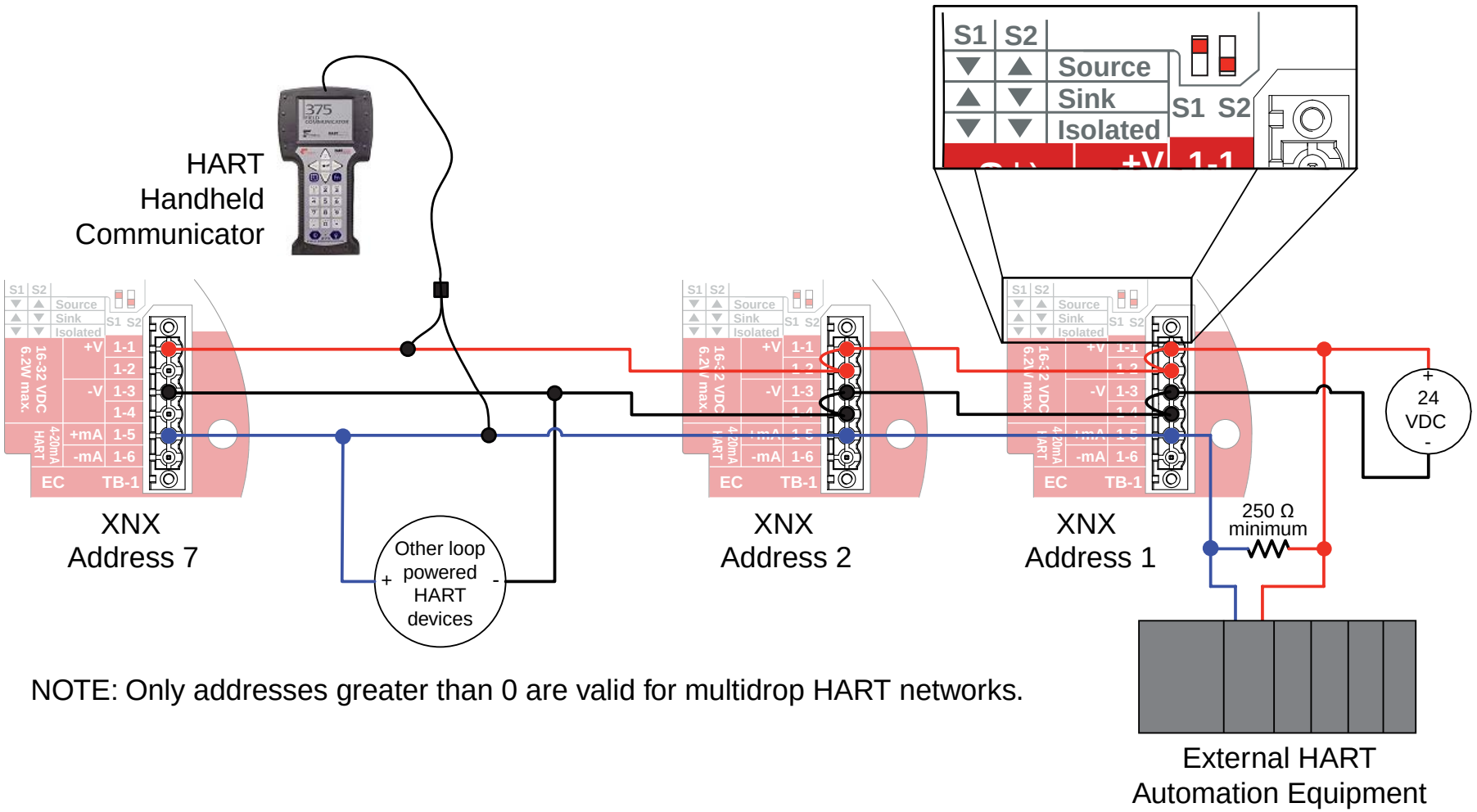

| mV Sensor Type | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Catalytic Bead | | | | MPD w/IR | | |
| | | MPD | 705 705HT | S'point S'point HT | S'point PPM | IR 5% $CO_2$ | IR 5% $CH_4$ | IR Flam |
| TB-1 | Desc. | Wire Color from Sensor | | | | | | |
| 1 | 24v | See 4-20 mA Output, Common Connections, and Power Settings | | | | | | |
| 2 | | | | | | | | |
| 3 | Gnd | | | | | | | |
| 4 | | | | | | | | |
| 5 | 20mA + | | | | | | | |
| 6 | 20mA - | | | | | | | |
| 7 | Sense | Brown | | | Red | Brown | | |
| 8 | 0v | White | | | Green | White | | |
| 9 | Ref | Blue | | | Blue | Blue | | |
| | | | | Internal Ground | | | | |

**⚠WARNING**

**Warning:** Power off the transmitter before changing S3 or S4. Failure to do this will permanently damage the transmitter. Both switches must be set in either Source or Sink prior to applying power.

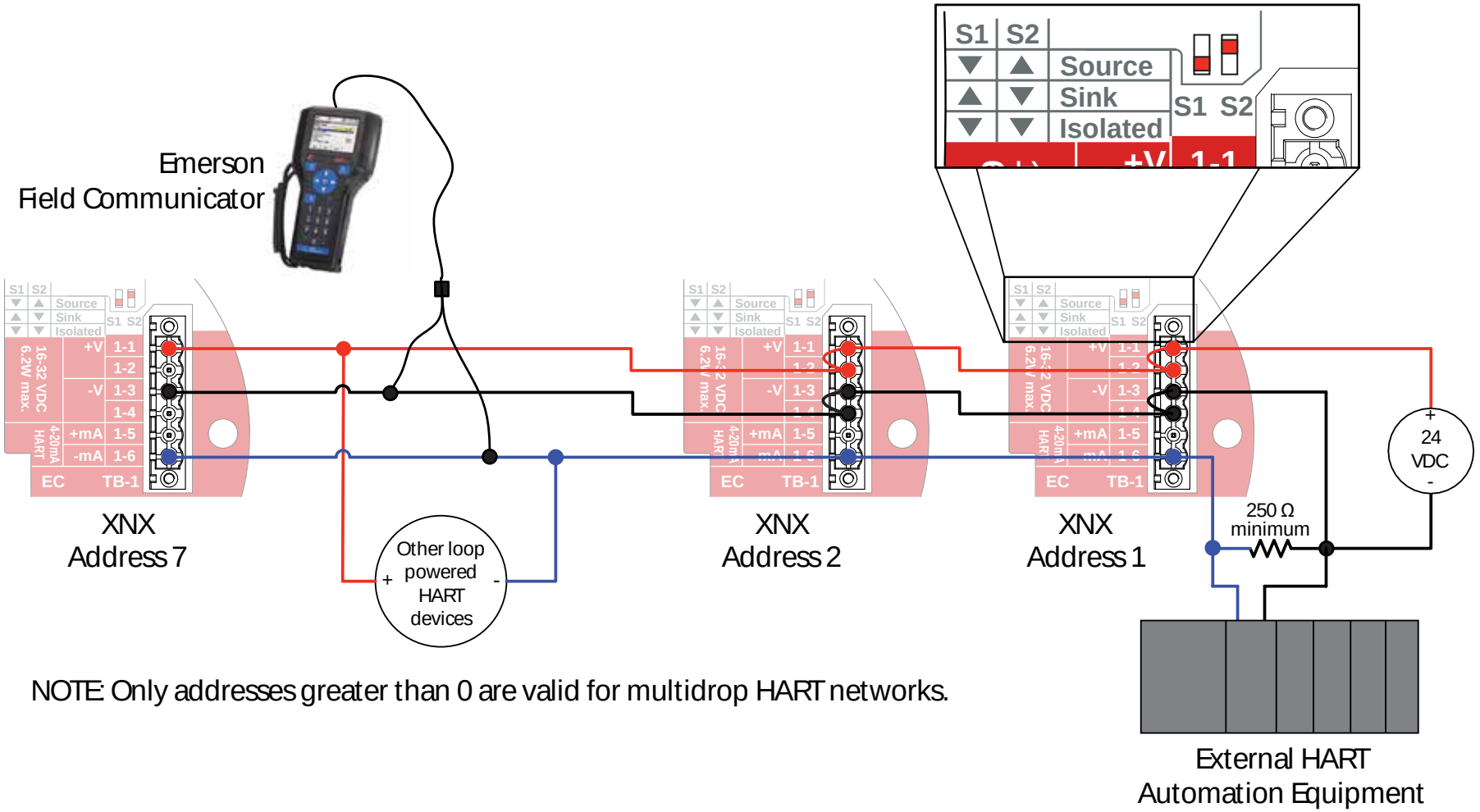
## HART Sink, Source, and Isolated Wiring

The following figures illustrate the proper HART Multidrop wiring for the transmitter.



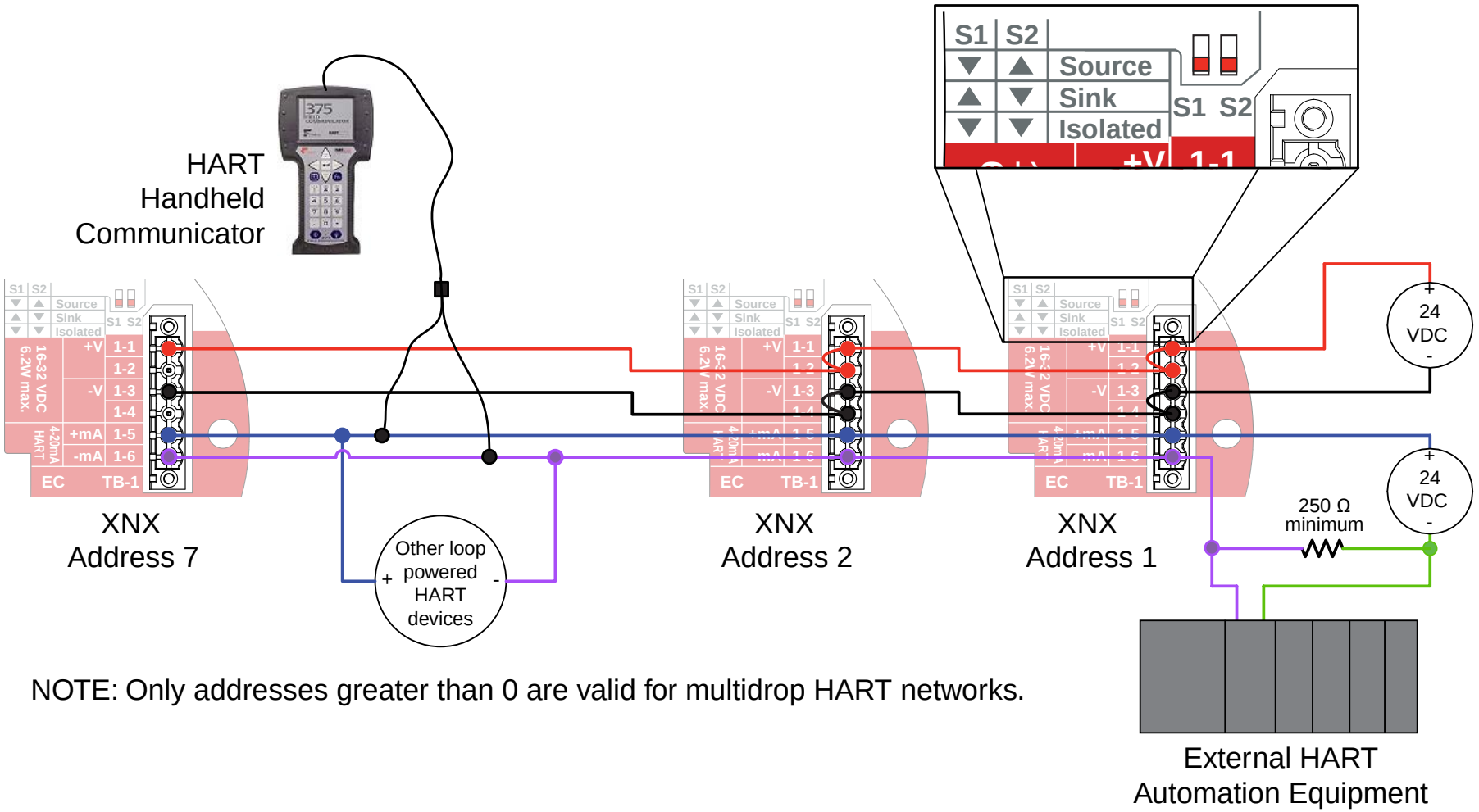

NOTE: Only addresses greater than 0 are valid for multidrop HART networks.

Figure 234. Multidrop HART network wiring - sink




NOTE: Only addresses greater than 0 are valid for multidrop HART networks.

Figure 235. Multidrop HART network wiring - source




NOTE: Only addresses greater than 0 are valid for multidrop HART networks.

Figure 236. Multidrop HART network wiring - isolated

## DevComm PC-based HART Interface

The XNX-HART interface facilitates remote access to all features of the local user interface including displaying status, testing, calibrating, and configuring. A device descriptor (DD) file is available to adapt standard tools for use with the transmitter.

**⚠WARNING**

**Warning:** After changing parameters with a handheld device, verify that the parameter settings are correct at the transmitter.

The following screens show some of the features of these two interfaces for the transmitter.

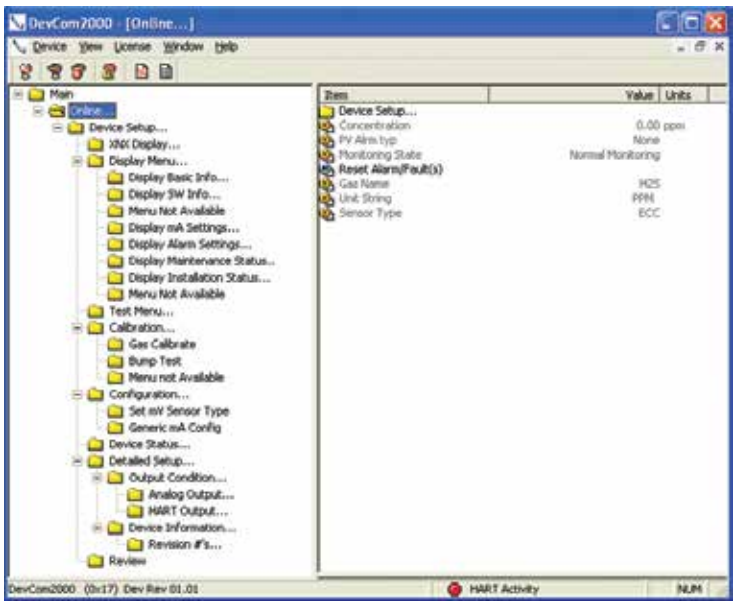



Figure 237. Presentation of XNX data by DevComm2000


Figure 238. XNX data displayed on an Emerson field communicator

Security level 1 is required to select the display language and to adjust the date and time. All other configuration options require security level 2 access.

Functions in the Configure Menu and the security levels required to change them are explained in this table.

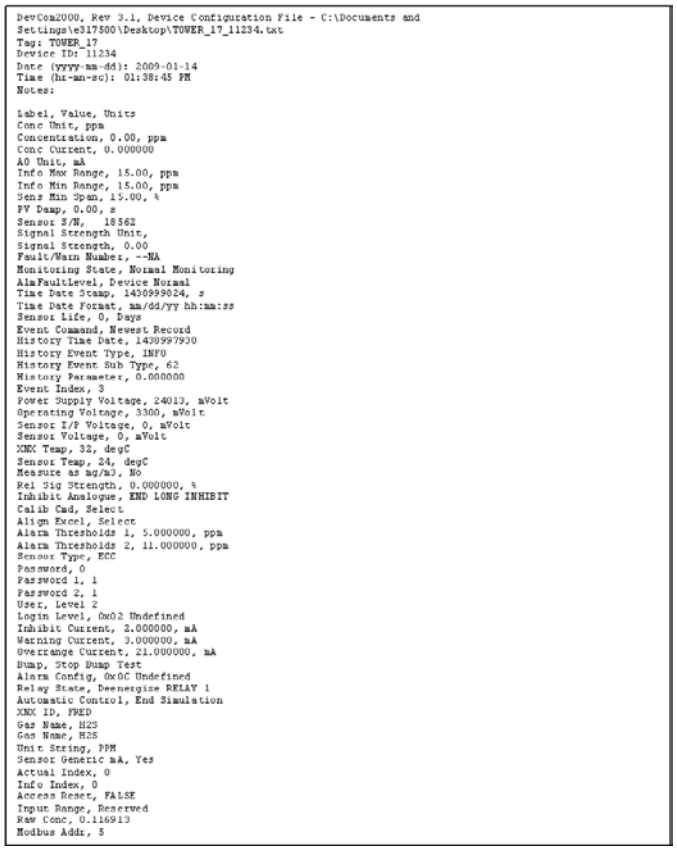
| Symbol | Description | Security Level |
|---|---|---|
| | Select Language | 1 |
| | Set Date & Time | 1 |
| | Set mV Sensor Type | 2 |
| | Set mA Sensor Type | 2 |
| | Gas Selection | 2 |
| | Range & Alarms | 2 |
| | Latching/Non-latching | 2 |
| | Set Units | 2 |
| | mA Levels | 2 |

| Symbol | Description | Security Level |
|---|---|---|
| | Calibration Interval | 2 |
| | Accept New Sensor Type | 2 |
| | Beam Block Options | 2 |
| | Path Length | 2 |
| | Unit ID | 2 |
| | Relay Options | 2 |
| | Fieldbus Options | 2 |
| | Configure Security | 2 |
| | | |

# Functions

## Configuration Summary

All of the HART status information can be extracted from the transmitter as a PDF or text file. This includes voltages, signal strengths, and configuration settings. An example summary is shown below.



```
DevCom2000, Rev 3.1, Device Configuration File - C:\Documents and
Settings\e317500\Desktop\TOWER_17_11234.txt
Tag: TOWER_17
Device ID: 11234
Date (yyyy-mm-dd): 2009-01-14
Time (hr-mn-sc): 01:38:45 PM
Notes:

Label, Value, Units
Conc Unit, ppm
Concentration, 0.00, ppm
Conc Current, 0.000000
AO Unit, mA
Info Max Range, 15.00, ppm
Info Min Range, 15.00, ppm
Sens Min Span, 15.00, %
PV Damp, 0.00, s
Sensor S/N,    18562
Signal Strength Unit,
Signal Strength, 0.00
Fault/Warn Number, --NA
Monitoring State, Normal Monitoring
AlmFaultLevel, Device Normal
Time Date Stamp, 1430999024, s
Time Date Format, mm/dd/yy hh:mm:ss
Sensor Life, 0, Days
Event Command, Newest Record
History Time Date, 1430997930
History Event Type, INFO
History Event Sub Type, 62
History Parameter, 0.000000
Event Index, 3
Power Supply Voltage, 24013, mVolt
Operating Voltage, 3300, mVolt
Sensor I/P Voltage, 0, mVolt
Sensor Voltage, 0, mVolt
XNX Temp, 32, degC
Sensor Temp, 24, degC
Measure as mg/m3, No
Rel Sig Strength, 0.000000, %
Inhibit Analogue, END LONG INHIBIT
Calib Cmd, Select
Align Excel, Select
Alarm Thresholds 1, 5.000000, ppm
Alarm Thresholds 2, 11.000000, ppm
Sensor Type, ECC
Password, 0
Password 1, 1
Password 2, 1
User, Level 2
Login Level, 0x02 Undefined
Inhibit Current, 2.000000, mA
Warning Current, 3.000000, mA
Overrange Current, 21.000000, mA
Bump, Stop Bump Test
Alarm Config, 0x0C Undefined
Relay State, Deenergize RELAY 1
Automatic Control, End Simulation
XNX ID, FRED
Gas Name, H2S
Gas Name, H2S
Unit String, PPM
Sensor Generic mA, Yes
Actual Index, 0
Info Index, 0
Access Reset, FALSE
Input Range, Reserved
Raw Conc, 0.116913
Modbus Addr, 5
```

Figure 239. HART status information

## Information Screens

All of the information in the Configuration Summary can be viewed live on various informational displays. For example, alarm settings are shown in this figure.

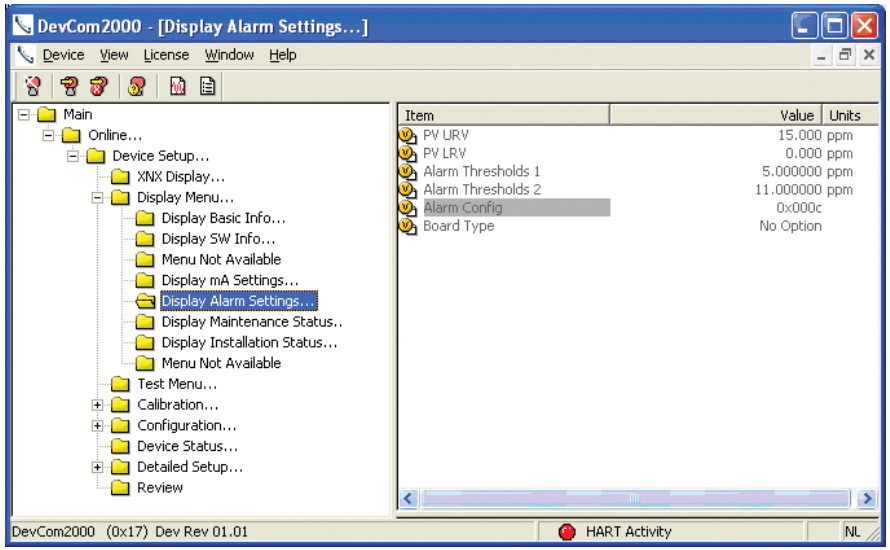



Figure 240. Typical alarm settings display

## Event History

The transmitter maintains a record of alarms, warnings, and faults. Additionally, over sixty types of informational events are defined to record important transactions such as recalibrations or configuration changes. One-thousand records are maintained and every event has a timestamp.

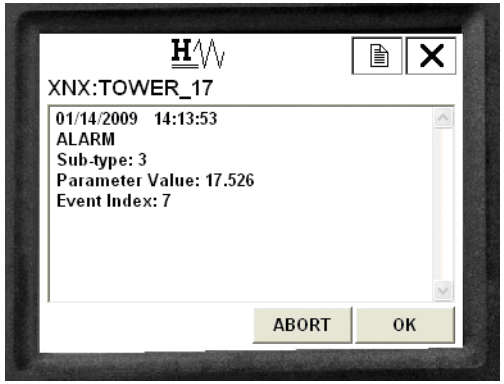



Figure 241 HART event history display

## Test

The test menu provides methods for inhibiting the output, exercising the analog output, or simulating alarms or faults. These methods simplify common tasks by providing a simple user interface.

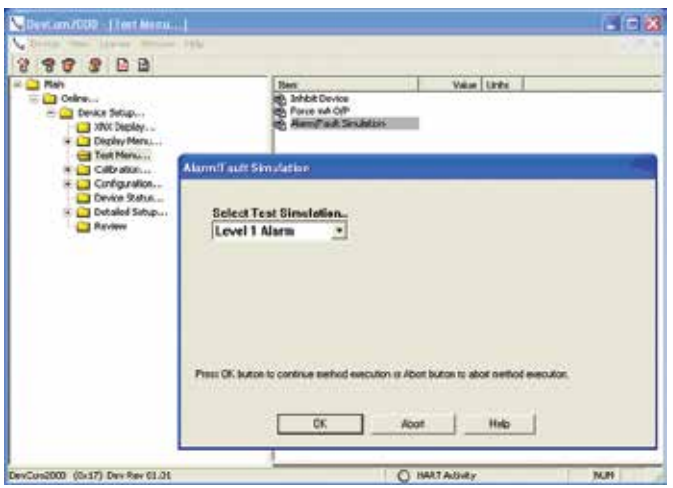



Figure 242. Alarm simulation

## Calibration

The Calibration menu permits zero or span calibrations and bump testing. Additionally, when fitted with a Searchline Excel sensor, the Calibration menu displays the optical signal strength for mechanical alignment. The gas calibrate operation is shown below.

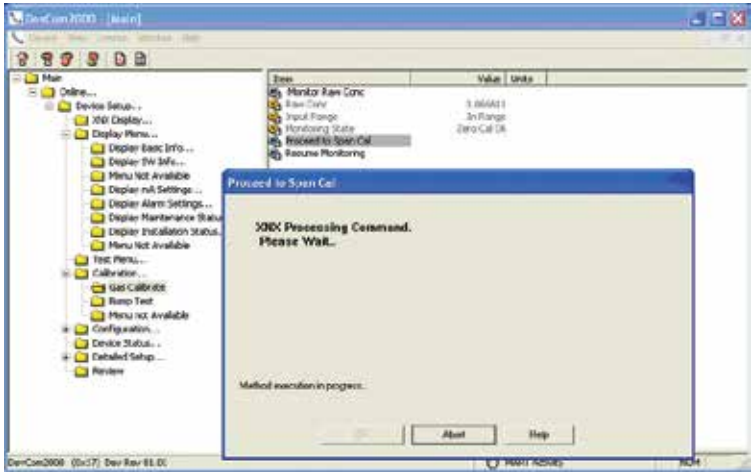



Figure 243. Gas calibrate method

**⚠CAUTION**

**Caution:** Do not back out of a menu selection while a calibration is in progress.

## Configuration

All user settings of the transmitter can be made either at the local user interface or over HART. The configuration menu facilitates convenient setup of alarm levels as shown in Figure 244. Methods are also provided to set time, units, and other parameters.

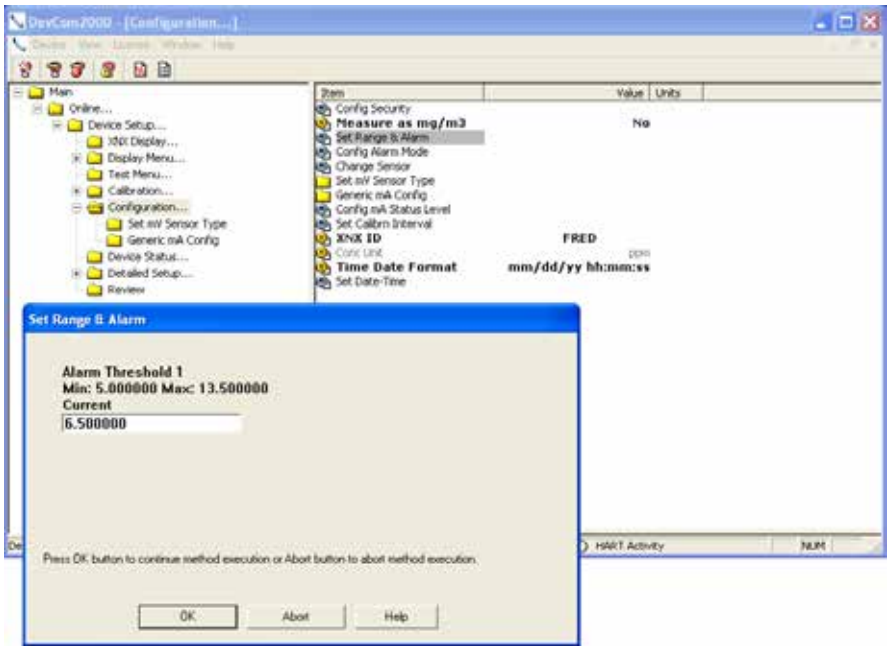



Figure 244. Set range and alarm

## Handheld Online Menus

**When HART communication is established with the transmitter, the root menu is displayed. This outline shows the submenus:**

I. Device setup
- A. User login
  1. Logout [level 0]
  2. Login [level 123]
  3. Exit
- B. XNX display
  1. Concentration (e.g., 0.00%LEL)
  2. PV Alrm Typ (e.g., None)
  3. Fault/Warn number (e.g., F)
  4. Monitoring state (e.g., Normal monitoring)
  5. Time Date format (e.g., mm/dd/yy hh:mm:ss)
  6. Time Date stamp (e.g., 091808 11:57:57)
  7. Gas Name (e.g., Methane LEL)
- C. Display menu
  1. Reset alarm faults
  2. Event history
  3. Display basic info…
     a. Gas name (e.g., Methane LEL)
     b. XNX ID (e.g., South tower)
  4. Display SW info…
     a. Dev id (e.g., 1081234)
     b. Fld dev rev (e.g., 1)
     c. Sensor s/w ver (e.g., 48)
     d. Sensor s/n (e.g. 0)
     e. as name (e.g., Methane LEL)
     f. XNX ID (e.g., South tower)
  5. Display optical performance
     a. Signal strength (e.g., 0.96)
     b. Ref Sig Strength (e.g., 1.12)
     c. Sam Sig Strength (e.g., 1.06)
     d. Baseline (e.g., 0.92)
     e. Dynamic Reserve (e.g., 96%)
     f. Window temp (e.g., 28 degC)
  6. Display mA settings
     a. Overrange current mA (e.g., 21)
     b. Warning current (e.g., 3)
     c. Inhibit current (e.g., 2 mA)
  7. Display alarm settings
     a. PV URV (e.g., 100.000% LEL)
     b. PV URV (e.g., 0.000% LEL)
     c. Alarm thresholds 1 (e.g., 20% LEL)
     d. Alarm thresholds 2 (e.g., 40% LEL)
     e. Alarm config (e.g., 0x0C)
     f. Board type (e.g., Modbus/RTU Interf…)
  8. Display menu status
     a. Sensor type (e.g., ECC)
     b. Sensor life (e.g., 0 hours)
  9. Display installation status
     a. Power supply volt… (e.g., 19403 mVolt)
     b. Operating voltage (e.g., 3297 mVolt)
     c. Sensor IP voltage (e.g., 0 mVolt)
     d. Sensor voltage (e.g., 0 mVolt)
     e. XNX temp (e.g., 33 degC)
     f. Sensor temp (e.g., 41 degC)
     g. Loop current (e.g., 4.00 mA)
- D. Test menu
  1. Inhibit long-term
  2. Force mA OP
  3. Alarm/fault simulation

E. Calibration
1. Gas calibrn
2. Bump test
3. Calibrate mA offset
4. Soft reset
5. Align Excel

F. Configuration
1. Config security
2. Measure as mg/m3
3. Set range & alarm
4. Config alarm mode
5. Fieldbus option
6. Set mV sensor type
7. Gas selection
8. Config mA status l…
9. Set Calibrn interval
   XNX ID (e.g., South tower)
   Conc unit (%LEL)
   Time date format (mmddyy hh:mm:ss)
   Set date-time

G. Device status

H. Detailed setup
1. Output condition…
2. Device information…

I. Review
1. Manufacturer (Honeywell)
2. Model (XNX)
3. Sensor type (e.g., Optima)
4. PV (%LEL)
5. Info min range (e.g., 100.00% LEL)
6. Info max range (e.g., 100.00% LEL)
7. PV % range (e.g., 0.00%)
8. PV Xfer fnctn (e.g., linear)
9. PV (e.g., 4.000 mA)
   PV alrm typ (e.g., none)
   Tag (e.g., S. tower)
   Long tag
   Descriptor (e.g., South tower)
   Message (e.g., Cracking tower)
   Final asmbly num (e.g., 0)
   Dev id (e.g., 1081234)
   Universal rev (e.g., 6)
   Fld dev rev (e.g., 1)
   Software rev (e.g., 38)
   Poll addr (e.g., 0)
   Loop curnt mode (e.g., Enabled)
   Cfg chng count (e.g., 6)
   Num req preams (e.g., 9)
   Num resp preams (e.g., 7)

II. Concentration

III. PV Alrm Typ

IV. Monitoring State

V. Reset Alarm Fault(s)

VI. Gas Name

VII.Sensor Type

# Modbus Protocol

## Modbus and the XNX transmitter

The transmitter can be fitted with the optional Modbus interface card (Honeywll part number XNX-MB). Authoritative information on the Modbus protocol can be found at www.modbus.org. The transmitter supports Modbus/RTU over an RS-485 physical layer. The interface is isolated and includes a switchable 120 ohm termination resistor. Baud rates from 1200 to 38,400 are supported with 19,200 as the default (8 data bits, even parity, 1 stop bit).

Most of the operations that are possible with the HART and local user interfaces can also be performed using the Modbus interface. This includes test, calibration and configuration operations. This section describes only how to monitor the transmitter status using Modbus.

Perform the zero calibration before the span calibration. Follow the zero and span calibration procedure in the Zero and Span Calibration for EC/mV Sensors and Searchpoint Optima section.

Some of the relevant Modbus holding registers are listed in the following table. In most installations, the transmitter reads only the first five registers (four data). The assignment of the first eight registers (or six data) is identical to the Honeywell Analytics XCD gas sensor.

Building an effective Modbus automatic gas detection system requires checking for faults (using iFaultWarnNumber or iAlmFltLev) and checking iMonitoringState to confirm that the transmitter is not inhibited or in calibration. The pseudo code example in Figure 245 suggests computation that would be made in external automation equipment.

See Modbus in the Installation and Operation section for information on installing the optional Modbus hardware. See Fieldbus Options for information on setting the Modbus baud rate and address using the local user interface. See the HART Sink, Source, and Isolated Wiring section for information on setting the Modbus parameters using the HART interface.

```
if(
       ((fCurrentConc < TLV) or (iAlmFltLev &  3 == 0))
// low concentration
       and
       ((iFaultWarnNumber < 1000) or (iAlmFltLev & 64 == 0))
// no fault
       and
     ((iMonitoringState == 1) or (iMonitoringState == 7))
// not inhibited
     and
     (
        (Transport layer SW indicates good Comm.)
         or
        (iHeartBeat changes every 5 seconds)
     )               // Modbus link healthy
  ) Then the area is safe.
```

Figure 245. Modbus Pseudo Code Example

Modbus connections are shown in the following figure.

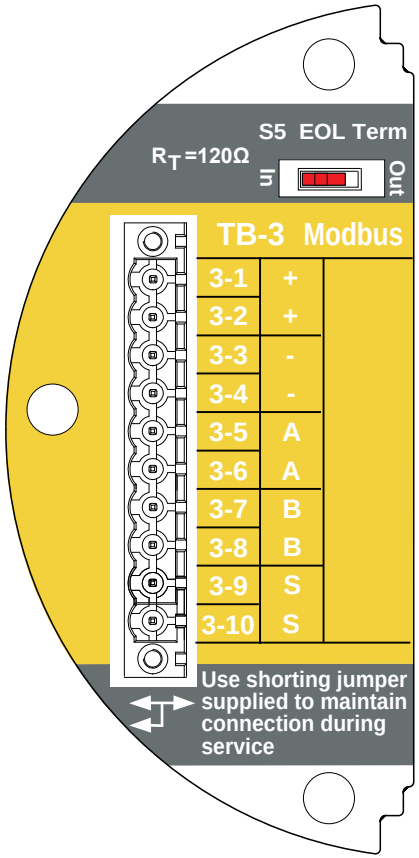



Figure 246. Modbus connections

# Modbus Registers

| Modbus Holding Register Address | Datatype | Variable Name | Description |
|---|---|---|---|
| 40001 | Int16 | ID | MSB always 0x24 to facilitate automatic identification. LSB repeat of Modbus address. |
| 40002 | Int16 | ID | Identical to 40001 |
| 40003 to 40004 | Float32 | fCurrentConc | The reported gas concentration in current measurement units. For example, methane at 50% LEL would be reported as 50.0 here. This concentration is forced to zero during inhibit mode. |
| 40005 | int16 | iFaultWarnNumber | This is the integer representation of the fault status. If any fault exists this will take a value in the range 1000 to 1999. Otherwise, if any warning exists, this will take a value in the range 1 to 999. Normally, this has the value zero. For example, if the transmitter's temperature is out of range, this will take the value 1103. |
| 40006 | int8 | iAlmFltLev | This register contains 4 meaningful bits regarding the presence of alarms or faults. The bit assignments are as follows: Bit 0: AL1 active Bit 1: AL2 active Bit 4: Warning active Bit 6: Fault Active All others: For future expansion |

| Modbus Holding Register Address | Datatype | Variable Name | Description |
|---|---|---|---|
| 40007 | uint8 | iMonitoringState | This has the following meanings:<br>0 reserved<br>1 normal monitoring<br>2 in warm-up<br>3 long-term inhibit<br>4 alarm simulation<br>5 fault simulation<br>6 Loop current stimulated<br>7 in warning MFlt<br>8 in Instrument Flt<br>9 in beam block<br>10 in bump test<br>11 short-term inhibit<br>12 performing zero calibration<br>13 performing span calibration<br>14 in pre-zero calibration<br>15 in pre-span calibration<br>16 in post-zero calibration, successful<br>17 in post-span calibration, successful<br>18 in post-zero calibration, failed<br>19 in post-span calibration, failed<br>20 in align Excel mode<br>21-255 for future expansion |
| 40008 | int16 | iHeartBeat | This Heartbeat is provided to facilitate detection of communications problems in programming environments where the transport-layer communication error information is unavailable. This increments approximately every 5 seconds.<br>It is the responsibility of the system integrator to notify plant personnel if a Modbus master fails to communicate with the transmitter. This register can facilitate this notification. |
| 40009 to 40010 | float32 | fSensorLifeDays | This indicates the time remaining before the ECC sensor must be calibrated or replaced. |

| Modbus Holding Register Address | Datatype | Variable Name | Description |
|---|---|---|---|
| 40011 | int8 | iMeasurementUnits | The meaning of this datum is as enumerated below:<br>0 Default<br>1 mg/m3<br>2 g/m3<br>3 %vol<br>4 ppm<br>5 %LEL<br>6 UEG<br>7 Ratio<br>8 %LEL*M<br>9 ppm*m<br>10 EG*m<br>11 %vol * meter<br>12 to 255 for future expansion |
| 40012 to 40014 | string[5] | strGenericUnits | User-defined 5 character string description for installed generic mA sensor |
| 40015 | int8 | iWinTemp | If a Searchline Excel is fitted, this is the temperature of the window. Otherwise, this is the temperature of the window. |
| 40016 | int8 | iTransTemp | Temperature of the transmitter in Celcius. |
| 40017 | int8 | iSensorTemp | Temperature of the sensor (Optima, Excel, ECC, etc) |
| 40018 to 40026 | string[18] | strTransmitterID | User-configured transmitter name. |
| 40027 to 40035 | string[18] | sDateTime | Format is “mm/dd/yy hh:mm:ss”. Month and day inverted if so configured. |
| 40036 | int8 | iSensorType | The meaning of this datum is as enumerated below<br>1 mV Bridge<br>2 Electrochemical Cell with toxic cartridge<br>3 Electrochemical Cell with O2 cartridge<br>4 Optima<br>5 Excel<br>7 generic mA input<br>Others for future expansion |
| 40037 | float32 | f_mA_Out | The current produced by the transmitter in milliamperes. |
| 40038 | int16 | iTransVoltage24000 | The voltage supplied to the transmitter at the nominal 24.0 volt input, in millivolts. |

| Modbus Holding Register Address | Datatype | Variable Name | Description |
|---|---|---|---|
| 40039 | int16 | iTransVoltage_3300 | The voltage on a nominal 3.3 volt supply in the transmitter, in millivolts. |
| 40041 | int16 | iOptional3300 | The voltage on a nominal 3.3 volt supply in the transmitter option board, in millivolts. |
| 40042 | int16 | iPersonality3300 | The voltage on a nominal 3.3 volt supply in the transmitter personality board, in millivolts. |
| 40043 | int16 | iPersonality5000 | The voltage on a nominal 5.0 volt supply in the transmitter personality board, in millivolts. |
| 40044 | int16 | iSensVoltage24000 | The voltage supplied to an Optima or Excel sensor at the nominal 24.0 volt input, in millivolts. |
| 40045 | int16 | iSensVoltage_5000 | The voltage on a nominal 5.0 volt supply in Optima or Excel, in millivolts. |
| 40046 to 40079 | Contact HA for details. | | |
| 40080 to 40081 | int32 | iTransSn | Serial number of XNX. |
| 40082 to 40083 | int32 | iSensSn | Serial number of Optima, Excel, or ECC cartridge. |
| 40084 | int8 | iSensSwVer | Integer representation of software version in external sensor or mV personality module |
| 40085 | int8 | iTransSwVer | Software version of XNX. |
| 40086 to 40155 | Contact Honeywell Analytics for details. | | |

# Warranty

# Warranty Statement

All products are designed and manufactured to the latest internationally recognized standards by Honeywell Analytics under a Quality Management System that is certified to ISO 9001.

The XNX® Universal Transmitter is warranted by Honeywell Analytics (herein referred to as 'HA') to be free from defects in material or workmanship under normal use and service for:

| Device | Warranty Terms |
|---|---|
| **XNX Universal Transmitter** (excludes consumables) | **36 months** from date of shipment to buyer |
| **XNX Electrochemical Sensors** (Part Number XNX-XS****)<br>**Multi-Purpose Detector (MPD)** | **12 months** from date of commissioning by an approved Honeywell Analytics representative<br>or<br>**18 months** from date of shipment from Honeywell Analytics, whichever is sooner |

Service in the field or at the customer's premises is not covered under these warranty terms. Time and travel expenses for on-site warranty services will be charged at Honeywell Analytics' normal billing rates. Contact your Honeywell Analytics Service Representative for information on Service Contracts.

## Warranty Conditions

1. The Honeywell Analytics (HA) Limited Product Warranty only extends to the sale of new and unused products to the original buyer where purchased from HA or from a HA authorized distributor, dealer or representative. Not covered are: consumable items such as dry-cell batteries, filters and fuses or routine replacement parts due to the normal wear and tear of the product; any product which in HA's opinion has been altered, neglected, misused or damaged by accident or abnormal conditions of operation, handling, use or severe sensor poisoning; defects attributable to improper installation, repair by an unauthorized person or the use of unauthorized accessories/parts on the product
2. Any claim under the HA Product Warranty must be made within the warranty period and as soon as reasonably possible after a defect is discovered. If a Warranty claim is being sought it is the responsibility of the buyer to obtain a Service Event number (SE#) from HA and if practical return the product clearly marked with the SE# and a full description of the fault.
3. HA, at its sole discretion, may elect to send replacement goods to buyer prior to receipt of the defective goods. Buyer agrees to return defective goods with in 30 days or to pay for the replacement goods.
4. Buyer is responsible for transportation costs from the buyer's location to HA. HA is responsible for transportation costs from HA's location to the buyer.
5. If in the case of a fixed installation or when it is not practical to return the product, the buyer should submit a claim to HA Service Department. A service engineer will attend on site on a day rate basis. Where a valid warranty claim is identified, the faulty product will be repaired or replaced free of charge. A warranty claim will be accepted if all conditions contained within this Warranty are met.
6. When, in the opinion of HA, a warranty claim is valid, HA will repair or replace the defective product free of charge and send it or any replacement back to the buyer. If, in the opinion of HA the warranty claim is not valid, HA will, at the option of the buyer, return the unit unaltered at the buyer's expense, repair the unit at the then prevailing rates, replace the unit with an appropriate replacement item at the then prevailing price, or discard the unit. HA reserves the right to charge for any attendance by its service engineer at the usual rates in force at the time the claim was received.
7. In no event shall HA's liability exceed the original purchase price paid by the buyer for the product.

## Consumer Claims

If you purchased your HA product as a consumer, the above warranty conditions do not affect your rights under any applicable consumer protection legislation.

Honeywell Analytics reserves the right to change this policy at any time. Contact Honeywell Analytics for current warranty information.

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