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APPROVAL REPORT

XNX SERIES GAS DETECTORS FOR HAZARDOUS (CLASSIFIED) LOCATIONS

Prepared for:

**Honeywell Analytics Inc.
405 Barclay Ave.
Lincolnshire, IL 60069**

**Project ID: 3035953
Class Number: 6340-FMU**

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Authorized by:



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**XNX Series Gas Detectors
For
Hazardous (Classified) Locations
from
Honeywell Analytics Inc.
405 Barclay Ave.
Lincolnshire, IL 60069**

I INTRODUCTION

1.1 Honeywell Analytics Inc. requested an examination of the apparatus listed in Section 1.4 for compliance with the standards within Section 1.3.

1.2 This Report may be freely reproduced only in its entirety and without modification.

1.3 Standards

Title	Author – Number	Date
Electrical Equipment for use in Hazardous (Classified) Locations, General Requirements	FM 3600	1998
Performance Requirements for Combustible Open Path Gas Monitors	6325	2005
Approval Standard for Low concentration (PPM) Gas Detectors (Draft)	FM Approvals – 6340	2002
Degrees of Protection Provided by Enclosures (IP Code)	ANSI/IEC 60529	2004
Performance Requirements for Combustible Gas Detectors	ANSI/ISA-12.13.01-2000	2000
Performance Requirements for Toxic Gas-Detection Instruments: Hydrogen Sulfide	ISA-92.0.01, Part I-1998	1998
Performance Requirements for Instruments Used to Detect Oxygen-Deficient/Oxygen-Enriched Atmospheres	ANSI/ISA-92.04.01, Part I-2007	2007
Explosive atmospheres – Part 0: Equipment – General Requirements	ANSI/ISA-60079-0 (12.00.01)-2009	2009
Electrical Apparatus for Use in Class I, Zone 0, 1 & 2 Hazardous (Classified) Locations: Type of Protection – Flameproof “d”	ANSI/ISA-60079-1 (12.22.01)-2005	2005
Explosive atmospheres – Part 11: Equipment protection by intrinsic safety “i”	ANSI/ISA-60079-11:2011	2011

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- 1.4 Listing:** The equipment examined herein is listed in the Approval Guide, an online resource of FM Approvals, in Fire Protection, under the heading, Gas Detection Instruments, as follows:

COMBUSTIBLE AND TOXIC GAS DETECTOR CONTROL UNITS, Fixed

Stationary Single Channel 4-20 mA Stand alone Combustible or Toxic Gas Detector Control Unit. The XNX Universal Transmitter is suitable for installation in Class I, Zone 1, AEx d [ia IIC] IIB+H₂ T4 Ta = -40°C to +65°C locations when installed per control drawing 1226E0402. The XNX Universal Transmitter can connect to any FM Approved combustible point gas detector heads which monitor 0-100% LEL gas-in-air atmospheres and combustible open path gas detectors which monitor LEL•meter gas concentrations. The XNX Universal Transmitter connects to any FM Approved toxic gas detector heads which monitor toxic (ppm) gas-in-air atmospheres. The XNX Universal Transmitter connects to any FM Approved oxygen depletion detector heads which monitors up to 21% O₂ gas-in-air atmospheres. The XNX Universal Transmitter communicates to the detector head via a proprietary protocol. The XNX Universal Transmitter provides either a 4-20mA signal or 4-20 mA with HART signal proportional to the gas detector head's measuring range of gas of interest. The XNX Universal Transmitter uses HART over 3-wire 4-20mA as the standard communications protocol. Additional optional communication interfaces are relay communication, Modbus, or Foundation Fieldbus. There are two alarm relays and 1 fault relay rated 250 VAC, 5A/24 VDC, 5A. The apparatus complies with ANSI/ISA-12.13.01-2000: Performance Requirements for Combustible Gas Detectors; ISA-92.0.01-1998 for Hydrogen Sulfide Toxic Gas Detectors; ISA-92.04.01-2007 for Oxygen-Deficient/Oxygen-Enriched Atmospheres; FM6325: Performance Requirements for Combustible Open Path Gas Monitors and FM6340 for Carbon Monoxide Gas Detectors.

Accessories: Calibration Gas Flow Adapter p/n: S3KCAL, Magnet Wand/Screwdriver p/n: 1226-0254

XNX UTab-cde, XNX Universal Transmitter

a = Material: A or S

b = Sensor: E, V or I

c = Communication: N or H

d = Output: N, R, M or F

e = MPD: NNN or CB1

Specifications - The manufacturer's specifications are as follow:

Storage Temperature:	-40°C to +65°C
Operating Temperature:	-40°C to +65°C
Relative Humidity:	15 to 90% RH, non-condensing
Supply Parameters:	16-32 Vdc, (24 Vdc nominal); 18-32 Vdc with Optima or Excel
Measurement Signal:	4-20 mA
Calibration:	Magnet (Local) or HART (optional)

Special Condition of Use –

- 1. The sintered flame arrestor of the MPD Sensor assembly meets the impact test requirements according to the low level risk of mechanical danger. Therefore, when the MPD Sensor is included, the XNX Universal Transmitter must be located and installed such that the risk of impact is reduced.*
- 2. Certification does not cover Daisy chained XNX combustible gas transmitters, HART, MODBUS or Foundation Fieldbus used for combustible gas performance. The HART, MODBUS or Foundation Fieldbus may only be used for data collection or record keeping with regard to combustible gas detection.*

TOXIC GAS DETECTORS, Fixed

Stationary Single Channel 4-20 mA Toxic Gas and Oxygen Detector. The XNX Series Toxic gas and Oxygen Detector consists of a XNX Universal Transmitter with an XNX toxic gas or oxygen sensor cartridge. The XNX toxic gas or oxygen sensor cartridge is an electrochemical (EC) Gas Detector Head housed within a stainless steel enclosure. The XNX EC sensor includes ¾" NPT threads for connection to the XNX Universal Transmitter. The XNX EC sensor includes a weatherproof cap as part of the EC sensor assembly. The XNX EC sensor cartridge mounts either directly to the XNX Universal Transmitter by ¾ inch NPT threads or remotely up to 50 feet (15 meters). Remote connection requires remote sensor mounting kit p/n S3KRMK. The XNX Universal Transmitter with integral EC sensor and HART adapter is flameproof with intrinsically safe outputs for installation in Class I, Zone 1, AEx d [ia IIC] IIB+H₂ T4 with Ta limited to the operating temperature range of the attached sensor (refer to specifications below), IP63, when installed per control drawing 1226E0402. The XNX Universal Transmitter with a remote EC sensor and HART adapter is flameproof with intrinsically safe outputs for installation in Class I, Zone 1, AEx d [ia IIC] IIB+H₂ T4 Ta = -40°C to +65°C, IP66, when installed per control drawing 1226E0402. The XNX Universal Transmitter uses HART over 3-wire 4-20mA as the standard communications protocol. Additional optional communication interfaces are relay communication, Modbus, or Foundation Fieldbus. There are two alarm relays and 1 fault relay rated 250 VAC, 5A/24 VDC, 5A. The XNX Universal Transmitter with EC sensor monitors either hydrogen sulfide or carbon monoxide toxic gas-in-air atmospheres or oxygen in air atmospheres (oxygen depletion). The EC sensors are intrinsically safe for installation in Class I, Zone 1, AEx ia IIC T4 when installed per control drawing 3000E3159. The apparatus complies with ISA-92.0.01-1998 for Hydrogen Sulfide Toxic Gas Detectors; ISA-92.04.01-2007 for Oxygen-Deficient/Oxygen-Enriched Atmospheres; and FM6340 for Carbon Monoxide Gas Detectors with manufacturer's operating temperature specifications as follows:

EC Sensor:	Accuracy from +20°C to +55°C	Accuracy from -10°C to +20°C	Accuracy from -10°C to -20°C
Carbon Monoxide	< ± 10% of Reading	< ± 20% of Reading	< ± 30% of Reading

Accessories:

Calibration Gas Flow Adapter p/n: S3KCAL, Magnet Wand/Screwdriver p/n: 1226-0254

XNX UTaE-bcNNN, XNX Universal

a = Material: A or S

b = Communication: N or H

c = Output: N, R, M or F

Sensors: XNXXSC1FM, XNXXSO1FM and XNXXSH1FM

Specifications - The manufacturer's specifications are as follow:

Storage Temperature:	0°C to +20°C
Operating Temperature:	-40°C to +55°C (H ₂ S)
Operating Temperature:	-30°C to +55°C (O ₂)
Operating temperature:	-20°C to +55°C (CO)
Relative Humidity:	15 to 90% RH, non-condensing
Supply Parameters:	16-32 Vdc, (24 Vdc nominal), 6.2 Watts max.
Measurement Signal:	4-20 mA
Calibration:	Magnet (local) or HART (optional)

COMBUSTIBLE GAS DETECTORS, Fixed

Stationary Single Channel 4-20 mA Combustible Gas Detector. The XNX Series combustible Gas Detector consists of a XNX Universal Transmitter with an XNX combustible gas sensor cartridge. The XNX combustible gas sensor cartridge is a catalytic bead Gas Detector Head housed within a stainless steel enclosure. The XNX combustible gas sensor includes ¾" NPT threads for connection to the XNX Universal Transmitter. The XNX combustible gas sensor is Model MPD-UTCB1 sensor for 0-100% LEL of Methane gas-in-air or Hydrogen gas-in-air with Calibration Cap P/N 1226A0411, with or without p/n 02000-A-1640 Weatherproof cap. The XNX combustible gas sensor cartridge mounts either directly to the XNX Universal Transmitter by ¾ inch NPT threads or remotely up to 260 feet (80 meters) using 16 AWG wire. Remote connection requires remote sensor junction box. The CSA certified model 705 sensor is not FM Approved for Hazardous (Classified) Locations and therefore cannot be used with the FM Approved XNX Universal Transmitter. The XNX Universal Transmitter with integral combustible sensor and HART adapter is flameproof with intrinsically safe outputs for installation in Class I, Zone 1, AEx d [ia IIC] IIB+H₂ T4 Ta = -40°C to +65°C when installed per control drawing 1226E0402. The XNX Universal Transmitter uses HART over 3-wire 4-20mA as the standard communications protocol. Additional optional communication interfaces are relay communication, Modbus, or Foundation Fieldbus. There are two alarm relays and 1 fault relay rated 250 VAC, 5A/24 VDC, 5A.

Accessories:

Magnet Wand/Screwdriver p/n: 1226-0254

XNX UTaV-bcd, XNX Universal Transmitter

a = Material: A or S

b = Communication: N or H

c = Output: N, R, M or F

d = MPD: NNN or CB1

Specifications - The manufacturer's specifications are as follow:

Storage Temperature:	-40°C to +65°C
Operating Temperature:	-40°C to +65°C
Relative Humidity:	15 to 90% RH, non-condensing
Supply Parameters:	16-32 Vdc, (24 Vdc nominal), 6.5 Watts max.
Measurement Signal:	4-20 mA
Calibration:	Magnet (local) or HART (optional)

Special Condition of Use –

1. *The sintered flame arrestor of the MPD Sensor assembly meets the impact test requirements according to the low level risk of mechanical danger. Therefore, when the MPD Sensor is included, the XNX Universal Transmitter must be located and installed such that the risk of impact is reduced.*
3. *Certification does not cover Daisy chained XNX combustible gas transmitters, HART, MODBUS or Foundation Fieldbus used for combustible gas performance. The HART, MODBUS or Foundation Fieldbus may only be used for data collection or record keeping with regard to combustible gas detection.*

1.5 XNX Description

- 1.5.1 General** – The Model XNX gas detector (XNX transmitter used with sensor cartridges) is a stationary stand alone device providing a 4-20mA signal correlating to the detected gas level. The XNX transmitter is a flameproof enclosure constructed of either aluminum or 316 stainless steel, with 5 openings, each of which may be fitted with a ¾ inch NPT plug when not in use. The XNX transmitter has a thread on cover with a glass window through which a display is used for monitoring, configuring and calibrating the device. The XNX transmitter may also contain a HART barrier and/or an EC I.S. barrier providing intrinsically safe circuits. The HART barrier circuit exits the enclosure through a two pin connector. The EC I.S. Barrier circuit exits the enclosure through a five pin connector. The XNX Universal Control Unit when connected to a Honeywell Analytics gas detector with Honeywell's proprietary communications protocol will automatically detect the type and range of the connected device. When used as a standalone control unit, the XNX can receive input from a sensor that provides a conditioned output (i.e. 4-20 mA) or an unconditioned output. The XNX Ir personality can be manually programmed for a generic mA input as follows:

Under GAS NAME the user can reprogram the default description (16 Characters max).

IN "SET UNITS", the user can program up to a 5 character (A-Z,a-z,0-9, ?,!,*, %,(),,;, &/,.,,.,#,+,-, ..) string (for example %LEL).

IN RANGE & ALRMS there is a Submode called NUMERIC FORMAT with 3 selections #####, ##.#, #.## which set the resolution of the Display.

- 1.5.2 Sensor, combustible (MPD)** - The XNX transmitter may include an integral flameproof MPD (Multi Purpose Detector) which has a catalytic bead sensor for the measurement of flammable gasses. The MPD sensor is constructed of 316 stainless steel and is supplied with ¾ inch NPT threads for connection to the XNX transmitter. The MPD can also be remotely mounted using a remote sensor junction box.
- 1.5.3 Sensor, toxic (EC)** - The XNX transmitter may include an integral intrinsically safe EC (electrochemical) sensor for the detection of toxic gases. A ¾ inch NPT stainless steel EC adapter is fitted into the bottom port of the XNX housing providing an intrinsically safe output connector to the EC Cartridge. The EC Cartridge, stainless steel body with pin connector, is plugged into the adapter and secured by a separate internally threaded collar and secured using a set screw. The S3KRMK allows the sensor to be remote mounted, utilizing the same connection to the transmitter, with a 15 meter (maximum) cable terminated to a junction box with an adapter that can receive the EC Cartridge which is secured identically to that of the transmitter.

II INTRINSIC SAFETY EXAMINATION

- 2.1 Scope of Examination** – The scope of the examination is limited to:

- 2.1.1** Examination of Type XNX Universal Transmitter as having intrinsically safe connections for Class I, Zone 0, [AEx ia] IIC, and for use in Class I, Zone 1, AEx d [ia IIC] IIB+H₂ hazardous (Classified) locations.
- 2.1.2** Examination of Type EC Sensor Series as intrinsically safe for Class I, Zone 0, AEx ia IIC T4, Ta ≤ -40°C ≤ 65°C hazardous (Classified) locations.

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- 2.2 Examination was conducted and verified the compliance of the listed equipment with the appropriate standards, as Intrinsically Safe connections for use in the hazardous locations as specified in Section I. The following IECEx Test Reports were reviewed as part of this examination and found to be satisfactory: US/UL/ExTR09.0011/00, US/UL/ExTR09.0011/01, US/UL/ExTR09.0011/02 (XNX Universal Transmitter) and US/UL/ExTR07.0009/00, US/UL/ExTR08.0017/00, US/UL/ExTR08.0017/01, US/UL/ExTR08.0017/02, US/UL/ExTR08.0017/03, US/UL/ExTR08.0017/04, (EC Sensor).

All documents and correspondence applicable to this program are on file at FM Approvals. The manufacturer has made available installation and operation instructions and is available which adequately describe each major assembly, initial installation, testing and troubleshooting techniques.

III FLAMEPROOF EXAMINATION

3.1 DESCRIPTION

- 3.1.1 The flameproof construction of the XNX Universal Transmitter consists of an enclosure configured with threaded adapters and/or a sensor.
- 3.1.2 The enclosure consists of a thread-on window cover and base with o-ring for added ingress protection. The enclosure cover and base is constructed of aluminum alloy or stainless steel. The enclosure base contains five threaded entries available as all ¾ inch NPT. The window cover assembly consists of the cover and tempered viewing glass cemented in place and secured with a threaded retaining ring. An additional o-ring is located between the glass and cover, before the cemented joint. A tool-secured set-screw is provided for securing the enclosure cover and base and ¾ inch NPT blanking plugs are provided for unused entries.
- 3.1.3 The ECC and HART adapters are designed to thread into the ¾ inch NPT entries on the XNX Universal Transmitter enclosure. Each assembly consists of wires passing through two layers of cement material in a stainless steel body and terminated with either an ECC connector or HART terminal. The interior walls of the bodies are either notched or threaded for additional cement retention.
- 3.1.4 Like the adapters, the MPD Sensor is intended to be threaded into the ¾ inch NPT entries on the XNX Universal Transmitter enclosure. The assembly consists of wires passing through two layers of cement material in a two-piece sensor body and terminated on a small sensor circuit board. The sensor body consists of a thread-on cover and base manufactured of stainless steel. The cover contains a sintered stainless steel flame arrestor press-fit into place. The interior wall of the sensor body is notched for additional cement retention.

3.2 EXAMINATION AND TESTS

The MPD Sensor is certified as flameproof, Ex d IIB+H₂ Gb Ta = -40°C to +65°C, IP66 under certificate number IECEx UL 09.0012U. The XNX Universal Transmitter (examined with ECC and HART adapters and MPD Sensor) is certified as flameproof and intrinsically safe, Ex d [ia IIC Ga] IIB+H₂ T4 Gb Ta = -40°C to +65°C, IP66 under certificate number IECEx UL 09.0010X. A review of the supporting IECEx Test Reports, US/UL/ExTR09.0011/00, US/UL/ExTR09.0011/01, US/UL/ExTR09.0011/02 (XNX Universal Transmitter) and US/UL/ExTR09.0013/00 (MPD

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Sensor), found that the testing and examination of the XNX Universal Transmitter to be satisfactory for FM Approval as flameproof for Class I, Zone 1, AEx d IIB+H₂ T4 Ta = -40°C to +65°C, IP66. It is noted that the IECEx examinations and certifications included M25 threads on the enclosure, adapters and sensor. The XNX Universal Transmitter enclosure, adapters and sensor will be configured with ¾ inch NPT threads only for FM Approval. All other aspects of the design of the enclosure, adapters and sensor are identical to those examined for IECEx certification. All documents and correspondence applicable to this program are on file at FM Approvals.

IV TOXIC AND OXYGEN DEPLETION PERFORMANCE EVALUATION

4.1 Performance Testing – Representative samples of the XNX transmitter with EC toxic and oxygen depletion sensor cartridges were examined by FM Approvals to determine the operational acceptability. The examination included gas detection performance tests as well as a review of the manufacturer's documentation and the unit's physical construction. The test results are summarized in the following sections.

4.1.1 Operation Evaluation - All tests were performed at an ambient temperature, 20 to 30°C, having a relative humidity in the range of 30-70% RH, unless otherwise specified. Temperature measurements were recorded after three successive observations taken at 5 minute intervals indicating no changes. Room air circulation was relatively still, not more than 1 m/sec, unless otherwise indicated. The 4-20mA measurements were converted to appropriate concentrations using the following formulas:

Toxic Gas Detectors

Measurement (PPM) = $[(I_{\text{measured}} - 4)/16] \times 100\%$ Full Scale, where I_{measured} is the measured 4-20mA current.

Oxygen Depletion Gas Detector

Measurement (%O₂) = $[(I_{\text{measured}} - 4)/16] \times 21$, where I_{measured} is the measured 4-20mA current.

The firmware installed at the time of testing is identified in the following table:

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XNX TRANSMITTER								
PCB Assembly				Programmed Device & Software Version				
HA Part No	Rev	Description	BOM Line No	HA Part No	PN Rev	Description	C'Sum	Device Info
1226A0022	14	XNX Main PCB Assembly						
			69	1226A0289	7		MPLAB CRC BEA5	U8 dsPIC33FJ256GP710
				1226L0289	7	XNX Main Application FW VERSION 110	CRC-32 747C9A43	
			79	1226A0290	3		MPLAB CRC 00FD84E0	U19 PIC12F875-I/SN
				1226L0290	2	XNX 4-20 mA Monitoring Software FW VERSION 3	CRC-32 04CF9C02	
			89	1226A0291	3		8-bits CRC 09FD44E0	U12 AT24C1024BN-SH25-B
				1226L0291	3	XNX Fortition Language Data File FW VERSION 0.57	CRC-32 95C82623	
1226A0026 1226A0474	11 2	XNX m/V Personality PCB Assembly						
			80	1226A0292	4		MPLAB CRC 9A7D	U5 PIC18LC771-I/SS
				1226L0292	3	XNX m/V Personality Module Software FW VERSION 103	CRC-32 96B0A5C	
			81	1226A0293	7		8-bits CRC 00D2A0D0	U8 AT24C0128N-SH
				1226L0293	7	XNX m/V Personality Module Gas Parameter Table FW VERSION 6	CRC-32 FC74F765	
1226A0032	5	XNX Relay PCB Assembly						
			20	1226A0294	3		MPLAB CRC 44AB	U3 PIC18F65J19-IPT
				1226L0294	3	XNX Relay Module Software FW VERSION 102	CRC-32 C6A0D45A	
EMERSON 475 HART FILES TESTED				Part Number	Rev	Description		
				1226L0470	2	XNX DEVICE DESCRIPTOR SOURCE CODE FILE FW VERSION 2		
				1226L0471	2	XNX COMPILED DEVICE DESCRIPTOR FILE FW VERSION 2		
				1226L0472	2	XNX TOKENIZED FILE (E475) HHD FW VERSION 2		

4.1.2 Unpowered Preconditioning Storage - Samples of the Gas Detectors and sensor assemblies, used in subsequent tests, was exposed to the storage temperatures specified, as follows:

- 40°C for 24 hours
- Ambient temperature for 24 hours
- +65°C for 24 hours
- Ambient temperature for 24 hours

In addition, the oxygen sensors were subjected to a vacuum of ½ atm for 2 hours, followed by ambient exposure for 24 hours.

4.1.3 Vibration - The samples of the Gas Detectors used in subsequent tests, were vibrated while powered, vertically with a frequency range of 10 to 30 Hz at a total excursion of 1.0 mm and 31 Hz to 100 Hz at a 2 g peak acceleration for one hour in each of three mutually perpendicular axes. During and after the test, there was no loss of function and no false indications of malfunctions. There was no visible damage to the instrument or any hidden damage which would manifest itself in loss of function and no loose components which could cause an electrical hazard.

4.1.4 Initial Calibration – The sensor was calibrated in accordance with the manufacturer's instruction manual. Calibration was satisfactory with the calibration apparatus. Readings were compared to the tests conducted with the apparatus used for subsequent measurements and the results did not differ by more than ±10%. This is satisfactory.

4.1.5 Accuracy - Accuracy testing was performed on the samples of the Gas Detectors and sensor assemblies. Gas concentrations of 0%, 20 - 30%, 40 - 60% and 70 - 90% full scale were applied to the toxics sensors. Gas concentrations of 0 - 5%, 20 - 30%, 40 - 60% and 70 - 90% of range were applied to the oxygen sensor. The gas was applied in a manner to simulate the instrument's actual diffusion method of monitoring. In all cases, the instrument's measurement indications were satisfactory since they were within the requirements of the applicable standard which is ±2 PPM or ±10% of reading (whichever is greater) for H2S, ±0.5% of gas concentration for oxygen, and < ±10% of reading (manufacturer's specification) for CO, as shown by the table below.

Gas Type	Range	Accuracy
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Gas Type	Range	Accuracy
Hydrogen Sulfide (H ₂ S)	10-50 ppm	±2 PPM or ±10% of reading (whichever is greater)
Carbon Monoxide (CO)	100–1000 ppm	< ±10% of reading
Oxygen depletion (O ₂)	5 – 21%	±0.5%

4.1.6 Repeatability - The detector heads were exposed to clean air and mixtures of test gas in clean air by the intended method of gas monitoring or alternate gas presentation method verified by the tester. Compositions of the mixture shall be 70 to 90 percent of range. The test gas was applied three times to the instrument, allowing a maximum of 180 seconds between exposures. In each case, the concentration indicated by the meter or output signal did not vary from the average indication by more than 10 percent of reading for H₂S, by more than 5% for CO, and by more than 0.5% for oxygen.

4.1.7 Step Change Response and Recovery - The gas detectors and sensor assemblies were subjected to step change response tests. Response times were verified by suddenly exposing the gas detectors and sensor assemblies to 95 - 100% full scale gas concentrations for H₂S and CO and to 0 – 5% oxygen for the O₂. The gas detector indications increased to 90% of the final value within time specified below. Then the applied gas was removed and the recovery time was measured. In all cases, the instrument's response and recovery times were satisfactory since they were within the maximum allowable time as stated within the Standards.

Gas Type	Range	Response Time			Recovery Time		
		T20	T50	T90	T20	T50	T10
H2S and CO Requirement (seconds)		≤10	≤30	n/a	n/a	≤45	≤90
Hydrogen Sulfide (H2S)	10-50 ppm	7.3	10.3	31.1	-	10.8	27.9
Carbon Monoxide (CO)	100-1000 ppm	4.3	9.2	13.5	-	6.8	11.7
Oxygen Requirement		18% within 5 secs			19% within 30 secs		
Oxygen (depletion) (O2)	0 -21%	1.7			9.4		

4.1.8 Supply Voltage Variation and power supply interruptions - While applying test gas to the gas detectors and sensor assemblies, the units were subjected to a step-change in supply voltage from 24 Vdc (nominal) to 16 Vdc and from 26 Vdc to 32 Vdc. The power supply was returned to 24 Vdc (normal). The variation in the instruments indication from actual concentration during the voltage variations did not exceed ±10% of reading. Then the detectors were subjected to five momentary power interruptions, ranging from approximately 0.1 seconds to 5 seconds, with the detector head exposed to clean air. Following each interruption, the instrument was allowed sufficient time (<150 seconds) to return to normal operating conditions. There was no incorrect instrument functions when the primary power was interrupted (applied or removed), with the detector exposed to both clean air and test gas of a concentration.

4.1.9 Temperature (Hydrogen Sulfide and Oxygen) - The gas detectors and sensor assemblies were exposed to the initial calibration gas concentration with all parts of the system at ambient conditions. The gas sensor cartridges were then exposed to the initial calibration gas concentration while at the temperature extremes required by the Standards and by the temperatures claimed by the manufacturer, as stated in the table below. The instrument's measurement indications did not vary by more than 7% of the reading at the temperature extremes from that observed at ambient

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conditions for H₂S, and did not vary by more than 0.6% for O₂. This is satisfactory since they were within the requirements of the applicable Standards.

Gas Type	Range	Temp. °C Range Required by Standard	Temp. °C Range Claimed by Manufacturer
Hydrogen Sulfide (H ₂ S)	10 – 50 ppm	-10 to +50	-40 to +55
Oxygen (depletion) (O ₂)	5 – 21%	-10 to +50	-30 to +55

- 4.1.9.1 Temperature (Carbon Monoxide (per FM6340))** - The gas detectors and sensor assemblies were exposed to the initial calibration gas concentration with all parts of the system at ambient conditions. The gas sensor cartridges were then exposed to the initial calibration gas concentration while at the temperature extremes claimed by the manufacturer, as stated in the table below. The instrument's measurement indications did not vary by more than 26% at -20°C and 6% at +55°C from that observed at ambient conditions. This is satisfactory since they were within the manufacturer's specifications as follows:

EC Sensor:	Accuracy from +20°C to +55°C	Accuracy from -10°C to +20°C	Accuracy from -10°C to -20°C
Carbon Monoxide	< ± 10% of Reading	< ± 20% of Reading	< ± 30% of Reading

Gas Type	Range	Temp. °C Range Required by Standard	Temp. °C Range Claimed by Manufacturer
Carbon Monoxide (CO)	100 – 1000 ppm	Mfr's Specification	-20 to +55

- 4.1.10 Humidity Variation** - After calibrating the sensors with the initial calibration test gas, the sensors were exposed to the humidity variation tests. The sensors were exposed to 0% RH for two hours and then to the initial test gas. The sensors were then exposed to 50% RH for two hours and then to the initial test gas. The sensors were then exposed to 99% RH for two hours and then to the initial test gas. The instrument's measurement indications were satisfactory since they did not vary from that observed during the humidity exposure by more than ±10% at the humidity extremes from the results at 50% RH for H₂S and CO. The oxygen sensor results were satisfactory as they did not vary from that observed during the humidity exposure by more than ±0.5% O₂ at the humidity extremes from the results at 50% RH.
- 4.1.11 Air Velocity Variation** – The sensors were calibrated while exposed to the static mixture of the calibration concentration. The sensors were then exposed to the same mixture in motion so as to impinge on the gas detection sensor at a velocity of 5±0.5 m/sec. The instrument's measurement indications while subjected to the mixture in motion were satisfactory since they did not vary by more than ±10% for H₂S and CO, and 0.5% for O₂, from that observed during exposure to the static mixture. This is satisfactory as it is less than the maximum allowable deviation of ±10% of the applied gas concentration.
- 4.1.12 Electromagnetic Interference (EMI)** – The sensors were subjected to EMI frequencies in the range of 150 to 170MHz and 450 to 470 MHz from frequency modulated portable radios with

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power outputs of 5 Watts. The distance from the radio to the gas detection system was 1.0 m at any orientation. The instruments did not produce measurement changes greater than $\pm 10\%$ (for H₂S and CO), 0.5% (for O₂) of the applied gas concentration or result in any instrument malfunctions. Test results were satisfactory.

4.1.13 Long-term stability (O₂) – The sensor was subjected to clean air at ambient temperature and humidity for a period of 21 days. The sensor was then exposed to a test gas of 17% oxygen. The result was satisfactory as the indicated concentration after stabilization did not deviate from the actual applied concentration by more than 0.5% oxygen.

4.1.14 Long-term stability (H₂S) – The sensor was initially calibrated with the standard test gas and then subjected to clean air at ambient temperature and humidity for a period of 21 days. The sensor was then exposed to the standard test gas and the reading deviated from the initial reading by 6%. The result was satisfactory as the indicated concentration after stabilization did not deviate by more than $\pm 10\%$ of the initial reading. The indications reached T₃₅ within 10 seconds and T₆₂ within 15 seconds. The results were satisfactory as they were less than allowed time as follows: the detector output must reach the T₂₀ limit within 10 seconds and reach the T₅₀ limit within 30 seconds. The sensor was then exposed to 2 PPM for 14 days. The gas was then removed for 5 minutes and the sensor was then exposed to the standard test gas. The reading deviated from the initial reading by 9.8%. The result was satisfactory as the indicated concentration after stabilization did not deviate by more than $\pm 10\%$ of the initial reading. The indications reached T₃₆ within 5 seconds and T₅₉ within 10 seconds. The results were satisfactory as they were less than allowed time as follows: the detector output must reach the T₂₀ limit within 10 seconds reach the T₅₀ limit within 30 seconds. Next the sensor was exposed to clean air at ambient temperature and humidity for a period of 7 days. The sensor was then exposed to the standard test gas. The reading deviated from the previous reading by 6%. The result was satisfactory as the indicated concentration after stabilization did not deviate by more than $\pm 10\%$ of the previous reading. The sample was calibrated and exposed to 10 PPM for 8 hours. The results were satisfactory as the indication did not vary by more than 0.1 PPM, which is within the maximum allowable tolerance of ± 2 PPM or $\pm 10\%$ of the applied gas concentration, whichever is greater. The final step was to repeat the accuracy test indicated in section 4.1.5. In all cases, the instrument's measurement indications were satisfactory since they were within the required tolerance for each concentration. This is satisfactory.

4.1.15 Long-term stability (CO) – The sensor was initially calibrated with the standard test gas and then subjected to clean air at ambient temperature and humidity for a period of 21 days. The sensor was then exposed to the standard test gas. The result was satisfactory as the indicated concentration after stabilization did not deviate from the actual applied concentration by more than ± 5 PPM or $\pm 10\%$ of the applied gas concentration, whichever is greater. The sensor was then exposed to 5 ± 2 PPM for 14 days. The gas was then removed for 5 minutes and the sensor was then exposed to the standard test gas. The result was satisfactory as the indicated concentration after stabilization did not deviate from the actual applied concentration by more than ± 5 PPM or $\pm 10\%$ of the applied gas concentration, whichever is greater. Next the sensor was exposed to clean air at ambient temperature and humidity for a period of 7 days. The sensor was then exposed to the standard test gas. The results were satisfactory as the indication was 447 PPM, which is less than the maximum allowable deviation of ± 5 PPM or $\pm 10\%$ of the applied gas concentration, whichever is greater. The sample was calibrated and exposed to 34.7 PPM for 8 hours. The results were satisfactory as the indication did not vary by more than 3.1 PPM, which is within the maximum allowable tolerance of ± 5 PPM. The final step was to repeat the accuracy test indicated in section 4.1.5. In all cases, the instrument's measurement indications were satisfactory since they were within the required tolerance for each concentration. This is satisfactory.

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- 4.1.16 Exposure to high level of oxygen** - The detector head of the instrument was subjected to a step change in gas concentration from clean air to 75% oxygen. Exposure continued for five minutes. Following removal of the test gas, the detector head was exposed to clean air. The indication recovered to less than 23% oxygen within 1 minute. Between 30 and 35 minutes after the removal of the 75% oxygen, the detector was then exposed to a test gas of no greater than 20.5% oxygen. Following the exposure, the reading did not deviate from the actual applied concentration by more than 0.5% oxygen. This is satisfactory. The final step was to repeat the accuracy test indicated in section 4.1.5. In all cases, the instrument's measurement indications were satisfactory since they were within the required tolerance for each concentration. This is satisfactory.
- 4.1.17 Exposure to high-concentration gas (CO and H2S)** - The detector heads of the instruments were subjected to a step change in gas concentration from clean air to 4000 ppm test gas for CO and 1000 ppm test gas for H2S. Exposure continued for five minutes. Following removal of the test gas, the detector head was exposed to clean air. The output signals recovered to less than 35 ppm for CO and less than 10 ppm for H2S within 10 minutes. Then the detectors were exposed to clean air for 30 to 45 minutes for CO and 60-75 minutes for H2S. Following the exposure, test gas was applied and the reading did not vary by more than 10% of applied concentration. This is satisfactory. The final step was to repeat the accuracy test indicated in section 4.1.5. In all cases, the instrument's measurement indications were satisfactory since they were within the required tolerance for each concentration. This is satisfactory.
- 4.1.18 Environmental Rating IP63** – The O2, CO and H2S detector heads were tested with the standard test gas under normal ambient conditions and then subjected to the IP6X dust exposure test while powered. The samples were suspended in a circulating dust atmosphere of 200 mesh talc as required for category 2 enclosures. The test lasted at least eight hours. At the conclusion of the test, the samples were removed from the test chamber. The detector heads were exposed to the standard test gas and the readings did not deviate from the initial readings by more the $\pm 10\%$ of the applied gas and did not exceed T_{90} by more than twice the initial reading. This is satisfactory. Subsequent to the dust test, the samples were exposed to the IPX3 water spray test. The samples were subjected to a spray of water from an IP spray nozzle, with the spray delivered at a rate of 10 liters per minute. The water was directed at the sample at an angle of 60° from vertical from a distance of 300 to 500 mm (11.8 to 19.6 inches) for 5 minutes. Following the water spray, the detector heads were exposed to the standard test gas and the readings did not deviate from the initial readings by more the $\pm 10\%$ of the applied gas and did not exceed T_{90} by more than twice the initial reading.

V COMBUSTIBLE GAS DETECTOR PERFORMANCE EVALUATION

- 5.1 Combustible Gas Detector Performance (Point Detector)** – Representative samples of the XNX transmitter with combustible sensors detailed below were examined by CSA International and forwarded to FM Approvals under the reciprocal test data agreement to determine the operational acceptability. The examination included gas detection performance tests as well as a review of the manufacturer's documentation and the unit's physical construction. The results have been reviewed and found to be satisfactory. The test results are summarized in the following sections.

Model	Type	Gas-in-air	Range	Power	Operating Temperature	Communications	Accessories
Searchpoint	Infrared	CH ₄	0–100% LEL	18 – 32 Vdc	-40°C to +65°C	4-20 mA	Weather

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Model	Type	Gas-in -air	Range	Power	Operating Temperature	Communications	Accessories
Optima Plus				(24Vdc Nominal)		HART (optional) MODBUS (optional)	Protector 2108D0276 Gassing Cover 2108D0258 Calibration Cap 2108D0272
MPD-UTCB1	Catalytic bead	CH ₄	0–100% LEL	16 – 32 Vdc (24Vdc Nominal)	-40°C to +65°C	4-20 mA HART (optional) MODBUS (optional)	Weatherguard 02000-A-1640 Calibration Cap 02000-A-1645
MPD-UTCB1	Catalytic bead	H ₂	0–100% LEL	16 – 32 Vdc (24Vdc Nominal)	-40°C to +65°C	4-20 mA HART (optional) MODBUS (optional)	Weatherguard 02000-A-1640 Calibration Cap 02000-A-1645

5.1.1 Performance Testing - A sample XNX Transmitter with Models Searchpoint Optima Plus and MPD gas sensors was tested at CSA International. All data received by CSA International is on file at FM Approvals along with other documents and correspondence applicable to this program. Tests conducted for each model are identified in the following table.

Test	Searchpoint Optima Plus	MPD-UTCB1 - Methane	MPD-UTCB1 - Hydrogen
Preconditioning	X	X	X
Vibration		X	
Initial Calibration	X	X	X
Step Change Response	X	X	X
Flooding	X	X	X
Supply Voltage Variation	X	X	
Temperature Variation		X	
Humidity Variation		X	
Air Velocity Variation		X	
Accuracy	X	X	X
EMI		X	
Long Term Stability		X	
Trouble Signals	X	X	

5.1.1.1 Operation Evaluation - All tests were performed at an ambient temperature, 20 to 30°C, having a relative humidity in the range of 30-60% RH, unless otherwise specified. Room air circulation was relatively still, not more than 1 m/sec, unless otherwise indicated. Unless otherwise specified, Methane was used as the representative combustible gas. The instruments' display was recorded during tests. All tests for the MPD sensor were conducted using the worse case of maximum separation or minimum line resistance as required by the standard. Testing for the Searchpoint was conducted with nominal line resistance.

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5.1.1.2 Unpowered Preconditioning Storage - Samples of the transmitter and sensors used in subsequent tests, were exposed to the storage temperatures specified, as follows:

- a. -40°C for 24 hours
- b. Ambient temperature for 24 hours
- c. +55°C for 24 hours
- d. Ambient temperature for 24 hours

5.1.1.3 Vibration – The XNX transmitter with model MPD-UTCB1 gas sensor, used in subsequent tests, were vibrated while powered, vertically with a frequency range of 10 to 30 Hz at a total excursion of 0.5 mm for one hour in each of three mutually perpendicular axes. During and after the test, there was no loss of function and no false indications of malfunctions. There was no visible damage to the instrument or any hidden damage which would manifest itself in loss of function and no loose components which could cause an electrical hazard. This is satisfactory.

5.1.1.4 Initial Calibration - The XNX transmitter with Searchpoint Optima Plus sensor was calibrated using methane gas in accordance with the manufacturer's instruction manual. In addition, the calibration test was repeated with the model MPD-UTCB1 gas sensor using methane. An accuracy test, with satisfactory results, was performed following the calibration. The calibration test was repeated with the model MPD-UTCB1 gas sensor using hydrogen. An accuracy test, with satisfactory results, was performed following the calibration.

5.1.1.5 Accuracy- Subsequent to calibration, accuracy testing was performed on the XNX transmitter with Searchpoint Optima Plus sensor attached. Methane gas concentrations of 9 - 11%, 24 - 26%, 49 - 51%, 74 - 76% and 98 - 100% full scale gas concentration were applied to the gas sensor. The methane gas was applied in a manner to simulate the instrument's actual method of monitoring. In all cases, the instrument's measurement indications were satisfactory since they were within $\pm 3\%$ full scale gas concentration or $\pm 10\%$ of applied gas concentration, whichever is greater. In addition, the accuracy test was conducted with the model MPD-UTCB1 gas sensor using methane and then hydrogen. Methane, and then hydrogen gas concentrations of 9 - 11%, 24 - 26%, 49 - 51%, 74 - 76% and 98 - 100% full scale gas concentration were applied to the gas sensor. The gas was applied in a manner to simulate the instrument's actual diffusion method of monitoring. In all cases, the instrument's measurement indications were satisfactory since they were within $\pm 3\%$ full scale gas concentration or $\pm 10\%$ of applied gas concentration, whichever is greater.

5.1.1.6 Temperature Variation – Temperature testing was performed on the XNX transmitter with the model MPD-UTCB1 gas sensor attached. The sensor was exposed to the initial calibration gas concentration with all parts of the system at ambient conditions. The sensor was then exposed to the initial calibration gas concentration while the transmitter and sensor were at the low operating temperature of -40°C and then at the high temperature of +75°C. The instrument's measurement indications did not vary by more than 3%LEL from that observed at ambient conditions. This is satisfactory as it is less than the maximum allowable deviation of $\pm 5\%$ of the measuring range or $\pm 10\%$ of the indication, whichever is greater.

5.1.1.7 Step Change Response – Response time testing was performed on the XNX transmitter with Searchpoint Optima Plus sensor attached and the XNX transmitter with the model MPD-UTCB1 gas sensor attached. Response times were verified by suddenly exposing the gas sensor to a gas concentration of 100% LEL methane for each sensor and included exposure to 100% LEL hydrogen for the model MPD-UTCB1 sensor. All tests were at a flow rate not greater than 1 m/sec. The XNX transmitter with Searchpoint Optima Plus sensor indication increased to 60%

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LEL within 8 seconds after exposure to methane. The XNX transmitter with the model MPD-UTCB1 gas sensor indication increased to 60% LEL within 7 seconds and 4 seconds after exposure to methane and hydrogen, respectively. In all cases, this is satisfactory as the results exceed the minimum required step change response of 60% of the applied concentration within 12 seconds.

Model	Gas	Range	Accuracy (whichever is greater)	Response Time (T90)
MPD	Methane	0 – 100% LEL	±3% of full scale or ±10% of applied gas	11 seconds
MPD	Hydrogen	0 – 100% LEL	±3% of full scale or ±10% of applied gas	25 seconds

5.1.1.8 Humidity Variation – The model MPD-UTCB1 gas sensor was exposed to the humidity variation tests. The sensor was exposed to the initial calibration gas mixture at a relative humidity of 50% for two hours. The sensor was then exposed to the initial calibration gas mixture at a relative humidity of 90% for two hours. The sensor was then exposed to initial calibration gas mixture at a relative humidity of 10% for two hours. In each case, the instrument's measurement indications were satisfactory since they did not vary from that observed during the 50% humidity exposure by more than 4% LEL, which is less than the maximum allowable deviation of ±10% of the full-scale concentration.

5.1.1.9 Air Velocity Variation – The model MPD-UTCB1 gas sensor was calibrated while exposed to the static mixture of the calibration concentration. The sensor was then exposed to the same mixture in motion so as to impinge on the gas detection sensor at a velocity of 5±0.5 m/sec. The instrument's measurement indications while subjected to the mixture in motion were satisfactory since they did not vary by more than +10% or -5% in the orientation that caused the greatest deviation from that observed during exposure to the static mixture.

5.1.1.10 Supply Voltage Variation – The alarm for the XNX transmitter with Searchpoint Optima Plus sensor attached was set at 10%LEL. While applying 50% LEL test gas to the sensor, the unit was subjected to a step-change in supply voltage from normal voltage of 24 Vdc to the minimum voltage of 18 Vdc and from 18 Vdc to maximum voltage of 32 Vdc. The power supply was returned to normal. The variation in the instruments indication from the initial reading at 24 Vdc and during the voltage variations did not exceed ±1% of full scale gas concentration, which is less than the maximum allowable deviation of ±2% of the full scale concentration. While applying clean air to the sensor, the unit was subjected to a supply voltage of 32 Vdc followed by a voltage of 18 Vdc. While applying 90% full scale gas concentration to the sensor, the unit was subjected to a supply voltage of 32 Vdc followed by a voltage of 18 Vdc. As a result of the tests there was no malfunction of the instrument or actuation of the alarms. This is satisfactory. The XNX transmitter with the model MPD-UTCB1 gas sensor attached with alarms set to 15%LEL was subjected to a step-change in supply voltage from normal voltage of 24 Vdc to the minimum voltage of 16 Vdc and from 16 Vdc to maximum voltage of 32 Vdc. The power supply was returned to normal. The variation in the instruments indication from the initial reading at 24 Vdc and during the voltage variations did not exceed ±1% of full scale gas concentration, which is less than the maximum allowable deviation of ±2% of the full scale concentration. While applying clean air to the sensor, the unit was subjected to a supply voltage of 32 Vdc followed by a voltage of 16 Vdc. While applying 90% full scale gas concentration to the sensor, the unit was subjected to a supply voltage of 32 Vdc followed by a voltage of 16 Vdc. As a result of the tests there was no malfunction of the instrument or actuation of the alarms. This is satisfactory.

5.1.1.11 Trouble and Fault Signals – The XNX transmitter with Searchpoint Optima Plus sensor or

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MPD-UTCB1 sensor can indicate trouble signals which correspond to a trouble relay change of state, that includes loss of signal and opening and shorting of the field wiring as well as negative drift equivalent to 10% below normal range. This is satisfactory.

5.1.1.12 Electromagnetic Interference (EMI) – The XNX transmitter with the model MPD-UTCB1 gas sensor attached was subjected to EMI frequencies in the range of 150 to 170MHz and 450 to 470 MHz from frequency modulated portable radios with power outputs of 5 Watts. The distance from the radio to the gas detection system was 1.0 m at any orientation. The instrument did not produce measurement changes greater than $\pm 10\%$ of the applied gas concentration or result in any instrument malfunctions. Test results were satisfactory.

5.1.1.13 Long-term stability – The XNX transmitter with the model MPD-UTCB1 gas sensor attached was subjected to clean air at ambient temperature and humidity for a period of six continuous days. At the beginning of the seventh day the gas sensor was exposed to the initial calibration gas for a period of 24 hours. The results were satisfactory as the indicated concentrations did not deviate from the actual calibration gas concentration by more than $\pm 10\%$ of full scale. At the end of the seventh day the calibration gas was removed and the sensor was subjected to clean air at ambient temperature and humidity for a period of six continuous days. At the beginning of the 14th day the gas sensor was exposed to the initial calibration gas for a period of 24 hours. The results were satisfactory as the indicated concentrations did not deviate from the actual calibration gas concentration by more than $\pm 10\%$ of full scale. At the end of the 14th day the calibration gas was removed and the sensor was subjected to clean air at ambient temperature and humidity for a period of six continuous days. At the beginning of the 21st day the gas sensor was exposed to the initial calibration gas for a period of 24 hours. The results were satisfactory as the indicated concentrations did not deviate from the actual calibration gas concentration by more than $\pm 10\%$ of full scale. At the end of the 21st day the calibration gas was removed and the sensor was subjected to clean air at ambient temperature and humidity for a period of six continuous days. At the beginning of the 28th day the gas sensor was exposed to the initial calibration gas for a period of 24 hours. The results were satisfactory as the indicated concentrations did not deviate from the actual calibration gas concentration by more than $\pm 10\%$ of full scale. At the end of the 14th and 28th day the calibration gas was removed and the sensor was zeroed and re-calibrated. The final step was to repeat the accuracy test. In all cases, the instrument's measurement indications were satisfactory since they were within $\pm 4\%$ full scale gas concentration or $\pm 12\%$ of applied gas concentration, whichever is greater. This is satisfactory.

5.1.1.14 Flooding with undiluted Gas – The XNX transmitter with Searchpoint Optima Plus sensor attached and the XNX transmitter with the model MPD-UTCB1 gas sensor attached was subjected to a step change in gas concentration from 0% (clean air) to 100% gas-by-volume. Response times were verified by suddenly exposing the gas sensor to a gas concentration of 100% LEL methane for each sensor and included exposure to 100% LEL hydrogen for the model MPD-UTCB1 sensor. The XNX transmitter with Searchpoint Optima Plus sensor indication increased to 60% LEL within 6.3 seconds after exposure to methane. The XNX transmitter with the model MPD-UTCB1 gas sensor indication increased to 60% LEL within 2.4 seconds and 1.5 seconds after exposure to methane and hydrogen, respectively. In all cases, this is satisfactory as the results exceed the minimum required step change response of 60% of the applied concentration within 10 seconds of exposure to the 100% gas-by-volume. All alarms actuated during the tests. This is satisfactory.

5.2 Combustible Gas Detector Performance (Open Path) – The XNX Universal Control Unit was tested with the Honeywell Analytics SEARCHLINE EXCEL Open Path combustible gas detector to validate the automatic full range value and units of measurement. The

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SEARCHLINE EXCEL Open Path combustible gas detector was satisfactorily tested to the applicable requirements of FM6325.

- 5.2.1 Initial Calibration** - The XNX Universal Control Unit was tested with the Honeywell Analytics SEARCHLINE EXCEL Open Path combustible gas detector only allows for a zero calibration in the field. The SEARCHLINE EXCEL was zero calibrated using clean air in accordance with the manufacturer's instruction manual. An accuracy test, with satisfactory results, was performed following the calibration.
- 5.2.2 Accuracy-** Subsequent to calibration, accuracy testing was performed on the The XNX Universal Control Unit was tested with the Honeywell Analytics SEARCHLINE EXCEL Open Path combustible gas detector attached. Simulated methane gas concentrations using optical filters in the range of 25%, 50%, 75% and 100% full scale gas concentration were applied to the gas sensor. The methane gas was applied in a manner to simulate the instrument's actual method of monitoring. In all cases, the instrument's measurement indications were satisfactory since they were within $\pm 5\%$ full scale gas concentration or $\pm 10\%$ of applied gas concentration, whichever is greater.
- 5.2.3 Trouble Signals** – The XNX transmitter with Searchpoint Optima Plus sensor can indicate trouble signals which correspond to a trouble relay change of state, that includes loss of power, loss of continuity in any one or more conductors to the receiver, beam blockage, low signal, and negative drift equivalent to 10% below normal range. This is satisfactory.
- 5.2.4 Time of Response and Recovery** – Response time testing was performed on the XNX Universal Control Unit with the Honeywell Analytics SEARCHLINE EXCEL Open Path combustible gas detector attached. Response time was verified by suddenly exposing the gas sensor to a simulated mid-range concentration using an optical filter. The XNX Universal Control Unit with the Honeywell Analytics SEARCHLINE EXCEL indication increased to t_{90} within 5 seconds after exposure to methane. This is satisfactory as it is within the requirements of the standard. For the recovery test, the sequence was repeated except that the mid-range concentration test filter was removed and the unit was exposed to clean air. The XNX Universal Control Unit with the Honeywell Analytics SEARCHLINE EXCEL indication decreased to t_{10} within 5 seconds after exposure to clean air. This is satisfactory as it is within the requirements of the standard.

VI REMARKS

- 6.1** Installations shall comply with the relevant requirements of the latest edition of the National Electrical Code (ANSI/NFPA 70).
- 6.2** Installations shall comply with the latest edition the manufacturer's instruction manual.
- 6.3** This report verifies the subject gas monitoring equipment operates as specified and provides an electronic signal indicative of the sampled gas concentrations. This report does not include or imply Approval of apparatus to which the subject instruments may be connected and which processes the electronic signal for eventual use. In order to maintain the Approval of the system, the control instrument, to which the subject instrument is connected, shall be FM Approved to process the specified electronic signal and provide the appropriate indication.
- 6.4** On 100% of production, the manufacturer shall inspect the protective grounding system in the XNX Universal Transmitter Gas Detection System.

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6.5 Repair of equipment shall only occur at facilities audited by FM Approvals.

VII FACILITIES AND PROCEDURES AUDIT

The manufacturing site in Lincolnshire, IL is subject to follow-up audit inspections. The facilities and quality control procedures in place have been found to be satisfactory to manufacture product identical to that examined and tested as described in this report. In addition, the manufacturing site for the EC cartridge subassembly, located at Jianhui Plastic & Electronic Industry (Shenzhen) Co Ltd is subject to follow-up audit inspections. The facilities and quality control procedures in place have been found to be satisfactory to manufacture product identical to that examined and tested as described in this report. The final assembly of the EC cartridge sensor is at Honeywell Analytics, Poole, Dorset, UK and is presently under an audit program. The audit program at Poole must remain in place as part of the Approval under this report.

VIII MANUFACTURERS RESPONSIBILITIES

Documentation considered critical to this Approval is on file at FM Approvals and listed in the Documentation File, Section X of this report. No changes of any nature shall be implemented unless notice of the proposed change has been given and written authorization obtained from FM Approvals. The Approved Product Revision Report, Form 797, shall be forwarded to FM Approvals as notice of proposed changes.

The manufacturer shall make available to users of the subject equipment the relevant installation manuals. The manufacturer shall make additional copies available upon request.

IX MARKING

The following information appears on the XNX identified in Section 1.4 and meets Standard requirements:

- Manufacturer's name and manufacturing location.
- Part number and model code
- Maximum input and output ratings
- Maximum ambient temperature
- Control Drawing Reference
- The FM Approvals mark of Approval

X DOCUMENTATION

The following drawings are on file at FM Approvals under Project 3035953.

Drawing Name	Rev	Description
1226-0051	2	HART Transformer Assembly
1226-0052	2	EC I.S. Transformer Assembly

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Drawing Name	Rev	Description
1226-0077	2	WARNING LABEL COVER
1226-0360	2	MPD LABEL - UL - ENGRAVING
1226-0362	3	XNX LABEL -UL- ENGRAVING
1226-0401	4	LABEL, XNX UNIVERSAL TRANSMITTER
1226-0443	3	MPD LABEL - CB1 (3/4"NPT)
1226A0022	14	XNX MAIN PCB ASSEMBLY BOM
1226A0022	14	XNX MAIN PCB ASSEMBLY
1226A0024	5	XNX ECC PERSONALITY PCB ASSEMBLY BOM
1226A0024	5	ECC PERSONALITY PCB ASSEMBLY
1226A0026	11	XNX mV PERSONALITY PCB ASSEMBLY BOM
1226A0026	11	mV Personality PCB ASSEMBLY
1226A0028	5	XNX IR PERSONALITY PCB ASSEMBLY BOM
1226A0028	5	IR Personality PCB ASSEMBLY
1226A0032	5	XNX RELAY PCB ASSEMBLY BOM
1226A0032	5	RELAY PCB ASSEMBLY
1226A0034	4	XNX FNDTN FIELD BUS PCB ASSEMBLY
1226A0034	4	FFB PCB ASSEMBLY
1226A0036	4	XNX MODBUS PCB ASSEMBLY
1226A0036	4	MODBUS PCB ASSEMBLY
1226A0038	7	XNX ECC XPIS PCB ASSEMBLY
1226A0038	7	EC IS BARRIER, PCB ASSEMBLY
1226A0040	7	HART XPIS PCB ASSEMBLY
1226A0040	7	EC IS BARRIER, PCB ASSEMBLY
1226A0110	1	PCB CONNECTOR ASSEMBLY
1226A0138	2	XNX LCD HEATER PCB ASSEMBLY BOM
1226A0138	2	XNX LCD HEATER PCB ASSEMBLY
1226A0359	2	XNX CAT-BEAD MODULE ASSEMBLY
1226A0474	2	mV Personality PCB ASSEMBLY BOM
1226A0474	2	mV Personality PCB ASSEMBLY
1226C0022	6	XNX MAIN PCB SCHEMATIC
1226C0024	4	XNX ECC PERSONALITY SCHEMATIC
1226C0028	5	XNX IR PERSONALITY PCB SCHEMATIC
1226C0032	2	XNX RELAY OPTION SCHEMATIC
1226C0034	4	FFB PCB SCHEMATIC
1226C0036	2	MODBUS PCB SCHEMATIC
1226C0038	4	EC IS BARRIER SCHEMATIC
1226C0040	3	XNX HART IS BARRIER SCHEMATIC
1226C0138	1	XNX LCD HEATER SCHEMATIC
1226C0474	1	XNX mV PERSONALITY SCHEMATIC
1226E0037	2	EC IS BARRIER, PCB SCHEDULE DWG
1226E0039	2	HART IS BARRIER, PCB SCHEDULE DWG

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Drawing Name	Rev	Description
1226E0090	3	HART ADAPTER 3/4"NPT, SCH DWG
1226E0091	2	AL BASE 3/4"NPT, SCH DWG
1226E0092	2	SS BASE 3/4"NPT, SCHEDULE DWG
1226E0095	1	MPD Adapter 3/4" NPT, SCH DWG 1
1226E0096	2	FLAME ARRESTOR, SS SCH DWG
1226E0097	1	FLAME ARRESTOR HOLDER – SCH DWG 1
1226E0098	1	FLAME ARRESTOR ASSEMBLY, SCHEDULE DWG
1226E0100	1	ECC ADAPTER 3/4"NPT,SCH DWG
1226E0104	2	HART IS BARRIER, POTTED ASY, SCH DWG
1226E0105	1	EC IS BARRIER, POTTED ASY, SCH DWG
1226E0116	1	PLUG, 3/4 NPT SCH DWG
1226E0260	1	MPD ASY 3/4"NPT, SCH DWG
1226E0351	2	MPD AGENCY ASSEMBLY DRAWING
1226E0376	1	Base MPD Adapter 1
1226E0377	1	GLASS WINDOW, SCH DWG
1226E0380	1	NUT, AL SCH DWG
1226E0381	1	NUT, SS SCH DWG
1226E0397	2	AL COVER ASY, SCH DWG - ATEX
1226E0398	2	SS COVER ASY, SCH DWG - ATEX
1226E0402	3	XNX CONTROL DRAWING
1226G0150	3	XNX INTERCONNECT DIAGRAM
1226G0442	2	XNX ASSEMBLY AGENCY DWG REF.
122C0026	3	XNX mV PERSONALITY SCHEMATIC
1998-0744	10	XNX Quick Start Guide
1998-0745	7	Multi-Purpose Detector (MPD) Operating Manual
1998M0738	10	XNX universal Transmitter Technical Manual
2010E0005	B	XNXXSC1FM, PERFORMANCE CERTIFICATION DRAWING
2010E0006	B	XNXXSH1FM, PERFORMANCE CERTIFICATION DRAWING
2010E0007	B	XNXXS01FM, PERFORMANCE CERTIFICATION DRAWING
3000A1638	2	ECC Sensor Connector Cartridge Assy
3000A3029	4	BASIC UNIT REMOTE SENSOR ASSY
3000B1261(S3KCAL)	1	Calibration gas flow housing
3000D0001	1	CALIBRATION CAP
3000D0042	1	WEATHER PROOF
3000D0064	2	CALIBRATION CAP O-RING
3000D0604	11	CARTRIDGE LABEL
3000E3003	12	REMOTE SENSOR ACCESSORY LABEL
3000E3058	7	UL ECC SENSOR CARTRIDGE ASSY
3000E3131	4	ECC TOXIC SENSOR PCB ASSY(R27)

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Drawing Name	Rev	Description
3000E3133	2	ECC O2 SENSOR PCB ASSY BOM
3000E3134	2	ECC SENSOR MAIN PCB ASSY
3000E3141	4	UL CIRCUIT DIAGRAM ECC TOXIC SENSOR
3000E3143	3	UL CIRCUIT DIAGRAM ECC O2 SENSOR
3000E3144	3	UL CIRCUIT DIAGRAM ECC SENSOR MAIN PCB
3000E3145	1	UL CIRCUIT DIAGRAM ECC SENSOR CON PCB
3000E3151	1	UL GERBER DRAWING ECC TOXIC SENSOR
3000E3153	2	UL GERBER DRAWING ECC O2 SENSOR
3000E3154	3	UL GERBER DRAWING ECC SENSOR MAIN PCB
3000E3159	2	XNX ECC CARTRIDGE CONTROL DRAWING
MPD-UTCB1	5	XNX MPD UL 3/4"NPT CAT BEAD
3000E3162	1	CARBON MONOXIDE CARTRIDGE WARNING TAG
3000E3163	1	OXYGEN CARTRIDGE WARNING TAG
3000E3164	1	HYDROGEN SULFIDE CARTRIDGE WARNING TAG

XI CONCLUSION

The equipment described in section 1.5 meets FM Approvals requirements. Since a duly signed Master Agreement is on file for this manufacturer, Approval is effective the date of this report.

EXAMINATION / TESTING BY: S. Henney, M. Mitchell, S. Petit-Maitre

PROJECT DATA RECORD: 3035953

ATTACHMENTS: 1226E0402 (XNX Control Drawing), 1226-0401 (Label, XNX Universal Transmitter), 1226-0443 (MPD Label - CB1 (3/4"NPT)), 3000E3159 (XNX EC Cartridge Control Drawing), 3000D0604 (Cartridge Label)



Stephen Henney
Advanced Engineer
Electrical



Patrick J. Byrne
Technical Team Manager
Electrical

FM APPROVALS
Project ID: 3035953



Sleamms Petit-Maitre
Engineer
Hazardous Locations



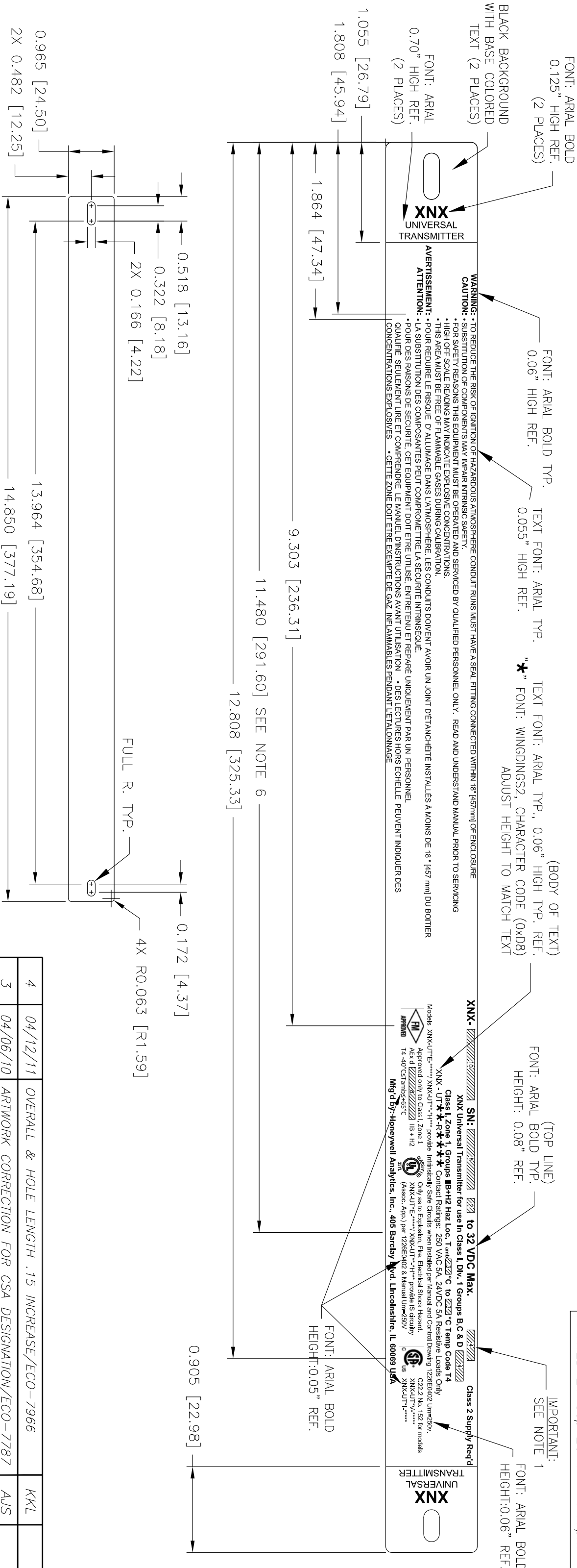
Tim Adam
Technical Team Manager
Hazardous Locations



Marlon Mitchell
Engineer
Hazardous Locations



Andrew Lozinski
Technical Team Manager
Hazardous Locations

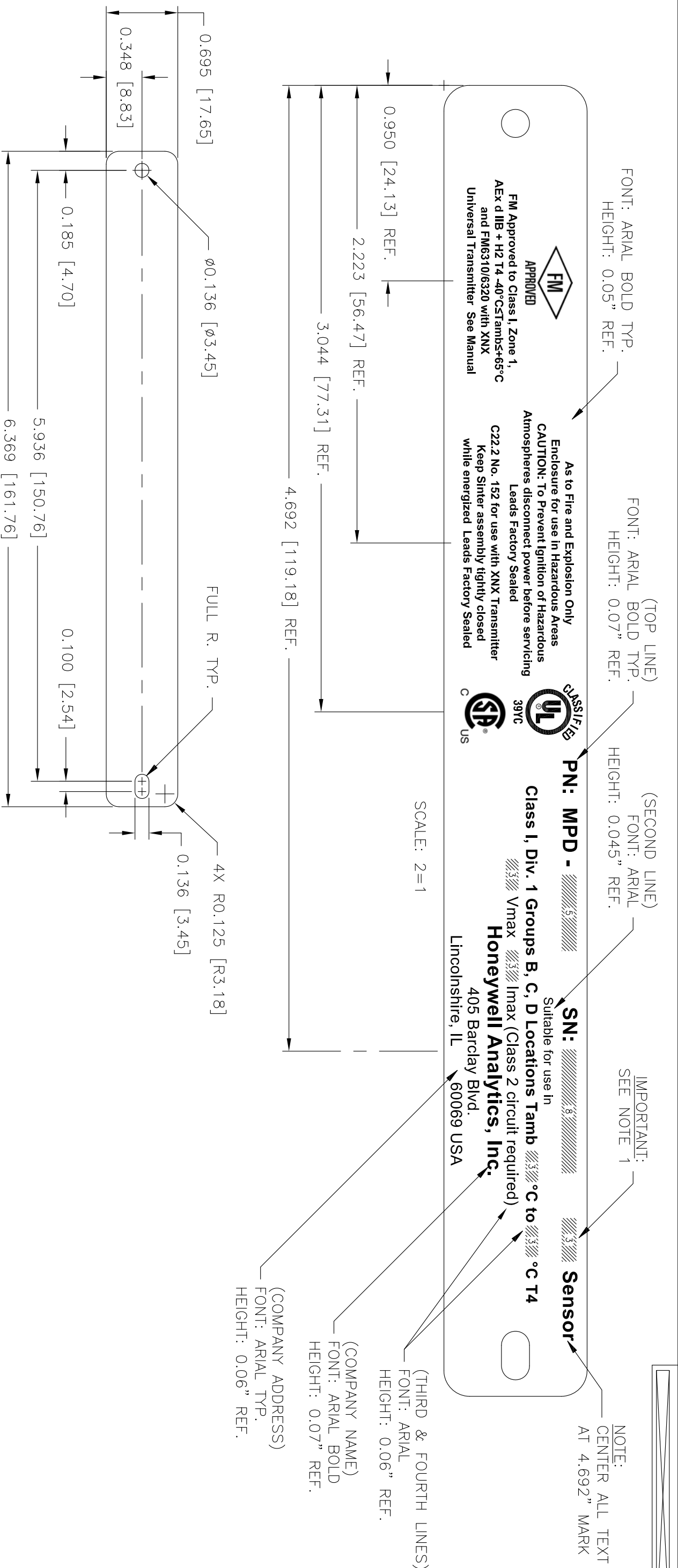


1. HATCHED AREAS INDICATED FOR FACTORY ENGRAVING OF DATA, SPECIFIC AGENCY MARKS AND ARE FOR LAYOUT PURPOSES ONLY. VALUES SHOWN IDENTIFY NUMBER OF CHARACTERS TO BE ENGRAVED IN EACH AREA.
2. FINISHED PART TO BE FREE OF SHARP EDGES AND BURRS.
3. PARTS TO BE ADEQUATELY PACKAGED TO PREVENT DAMAGE DURING SHIPMENT.
4. UNLESS SPECIFIED OTHERWISE, TOLERANCE FOR ALL DIMENSIONS: ± 0.015 [0.38].
5. SUPPLIER MUST SUBMIT ARTWORK TO HONEYWELL ANALYTICS, INC. FOR APPROVAL PRIOR TO PRODUCTION. TEXT SHOWN FOR CONTENT ONLY.
6. CENTER LINES 1-5 AND BOTTOM LINE TO THIS DIMENSION.

MATERIAL:

1. 0.021 [0.53] $\pm$ 0.003 [0.07] THICK SS-304 W/MILL FINISH.
2. CHEMICALLY-ETCH LEGENDS 0.006/0.008 [0.15/0.2] DP.
3. LEGENDS EPOXY-FILLED BLACK UNLESS SPECIFIED OTHERWISE.

DO NOT SCALE DRAWING.		TOLERANCES UNLESS OTHERWISE SPECIFIED			
THIS DRAWING AND THE INFORMATION CONTAINED HEREIN ARE PROPRIETARY TO HONEWELL ANALYTICS INC. AND SHALL NOT BE USED IN WHOLE OR IN PART WITHOUT THE EXPRESS WRITTEN PERMISSION OF HONEWELL ANALYTICS INC..		INCH [MM]			
		X/Y ± 1/32 [0.79]			
		.X ± .015 [0.38]			
		.XX ± .010 [0.25]			
		.XXX ± .005 [0.13]			
ANGLES ± 1°					
DRAWING TITLE:					
LABEL, XNX UNIVERSAL TRANSMITTER					
APPROVED BY	SIGNATURE	DATE	SCALE: N/A	DRAWING NO.: 1226-0401	
MANUFACTURING ENGINEER	M. NIEMEYER	3/4/09			
PROJECT ENGINEER	K. LEIS	3/4/09			
QUALITY ASSURANCE	D. HUDSON	3/4/09	REV 4	SHEET 1 OF 1	



- NOTES:
1. HATCHED AREAS INDICATE FACTORY ENGRAVED DATA AND ARE FOR LAYOUT PURPOSES ONLY. VALUES SHOWN IDENTIFY NUMBER OF CHARACTERS TO BE ENGRAVED IN EACH AREA.
 2. FINISHED PART TO BE FREE OF SHARP EDGES AND BURRS.
 3. PARTS TO BE ADEQUATELY PACKAGED TO PREVENT DAMAGE DURING SHIPMENT.
 4. UNLESS SPECIFIED OTHERWISE, TOLERANCE FOR ALL DIMENSIONS: ± 0.015 [0.38].
 5. SUPPLIER MUST SUBMIT ARTWORK TO HONEYWELL ANALYTICS, INC. FOR APPROVAL PRIOR TO PRODUCTION.

MATERIAL:

1. 0.021 [0.53] $\pm$ 0.003 [0.07] THICK SS-304 W/MILL FINISH.
2. CHEMICALLY-ETCH LEGENDS 0.006/0.008 [0.15/0.2] DP.
3. LEGENDS EPOXY-FILLED BLACK.

3		04/22/10		REVISED UL TEXT PER ECO 7795		AJS		
2		02/16/10		REVISED PER AGENCY/ ECO 7754		KKL		
1		01/29/10		DRAWN FROM 1226-0085/		JAT		
REV		DATE		DESCRIPTION OF REVISION		CAD		CHKD.
REVISION RECORD								
FIRST PARENT P/N:				DRAWING RELEASE NO.:				
Honeywell								
DRAWING TITLE: MPD LABEL - CB1 (3/4"NPT)								
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°								
APPROVED BY		SIGNATURE		DATE		DRAWING NO.:		
MANUFACTURING ENGINEER		M. NIEMEYER				SCALE: N/A		
PROJECT ENGINEER		J. TIWET		01/11/10		1226-0443		
QUALITY ASSURANCE		R. GORNY		01/11/10		REV 3		
						SHEET 1 OF 1		
DO NOT SCALE DRAWING.								
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XNX TRANSMITTER WITH FACTORY INSTALLED LOCAL HART OPTION
 PART NUMBER XNX-UT**-*H***

NOTE: ASTERISK (*) MAY BE REPLACED WITH ANY CHARACTER AND STILL BE APPLICABLE TO THIS DRAWING.

SUITABLE AND PROVIDES INTRINSICALLY SAFE CIRCUIT FOR USE IN

CLASS I, DIVISION 1, GROUPS B, C & D;

CLASS I, ZONE 1, GROUP IIB+H2; TEMP. CODE T4

AMBIENT TEMPERATURE RANGE

–40°C TO +65°C

[40°F TO 149°F]

FM APPROVED TO

CLASS I, ZONE 1, AEx d [Ia IIC]

IIB + H2 T4 –40°C≤Tamb≤+65°C

SEE NOTE 8

NON-HAZARDOUS AREA

HAZARDOUS AREA
CLASS I, DIVISION 1, GROUPS B, C, D
CLASS I, ZONE 1, GROUP IIB+H2 T4

XNX TRANSMITTER

250V U_m
MAXIMUM
NON-HAZARDOUS
LOCATION VOLTAGE

TB1-1 +V
TB1-3 0V
TB1-5 +mA
TB1-6 –mA

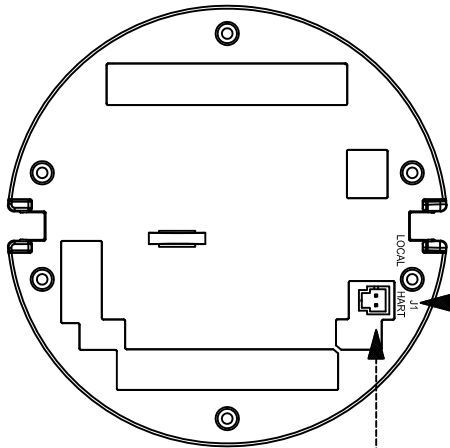
CLASS 2 POWER SOURCE
+V
0V
CONTROL EQUIPMENT

TO REDUCE THE RISK
OF IGNITION OF
HAZARDOUS

ATMOSPHERES, CONDUIT
RUNS MUST HAVE A
SEAL FITTING INSTALLED
WITHIN 18 INCHES
(457mm) OF
ENCLOSURE

SUPPLY:
XNX-UT*V-*****
16–32 VDC, 6.5W MAX
XNX-UT*I-*****
18–32 VDC 13.2W MAX
XNX-UT*E-*****
16–32 VDC, 6.2W MAX

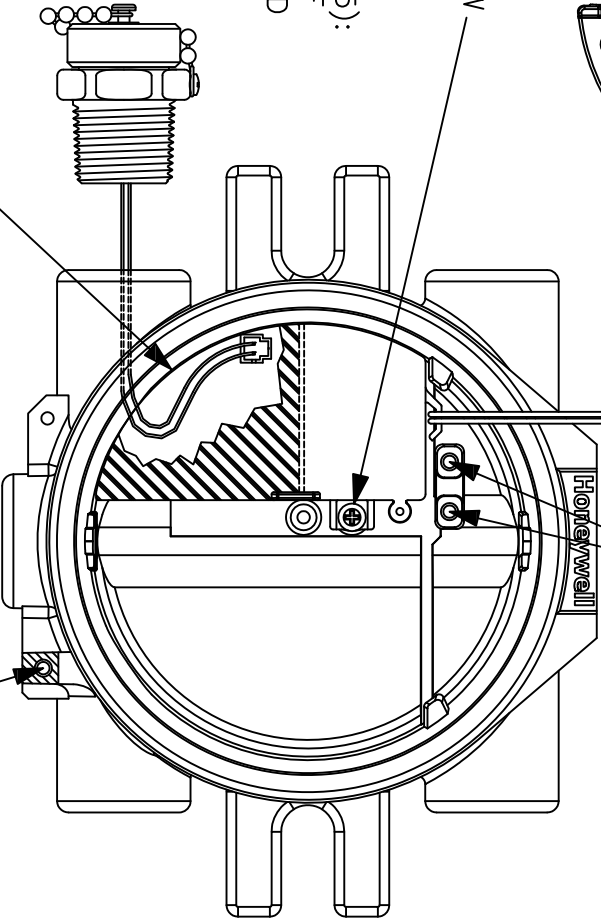
LOCAL HART CONNECTION
XNX UNIVERSAL TRANSMITTER
PERSONALITY OPTION DISPLAY MODULE (POD)
INTERNAL LOCAL HART CONNECTION J1
ALL PERSONALITIES



EARTH GROUND

SCREW

LOCAL HART ADAPTER (PART # 1226A0115):
WHEN INSTALLING ADAPTER, A MINIMUM OF
5–1/4 THREADS MUST BE FULLY ENGAGED
TO MAINTAIN EXPLOSION-PROOF RATING.



LOCAL HART IS BARRIER (PART NUMBER 1226A0058):
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.

EARTH GROUND

DO NOT SCALE DRAWING.

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NOT BE USED IN WHOLE OR IN PART
WITHOUT THE EXPRESS WRITTEN
PERMISSION OF HONEYWELL ANALYTICS INC..

DRAWING TITLE: XNX CONTROL 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°

APPROVED BY
MANUFACTURING
ENGINEER
PROJECT
ENGINEER
QUALITY
ASSURANCE

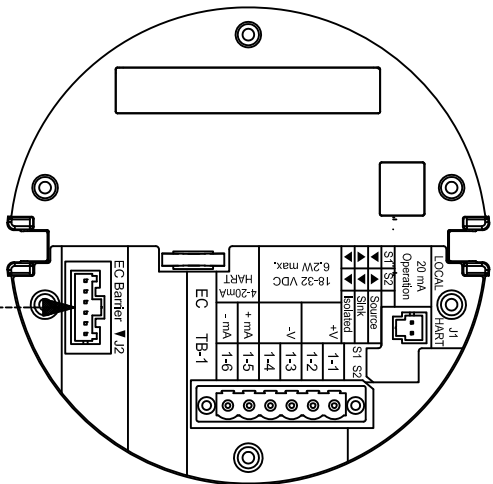
SIGNATURE
M. NIEMEYER
K. LEIS
B. KOSTER

DATE
3/3/09
3/3/09
3/3/09

SCALE: N/A
REV 3
DRAWING NO.: 1226EO402
SHEET 1 OF 3

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	
REV	DATE	DESCRIPTION OF REVISION	CAD	CHKD.
REVISION RECORD				
FIRST PARENT P/N:			DRAWING RELEASE NO.: 226-033	

EC ADAPTER/IS
BARRIER CONNECTIONS

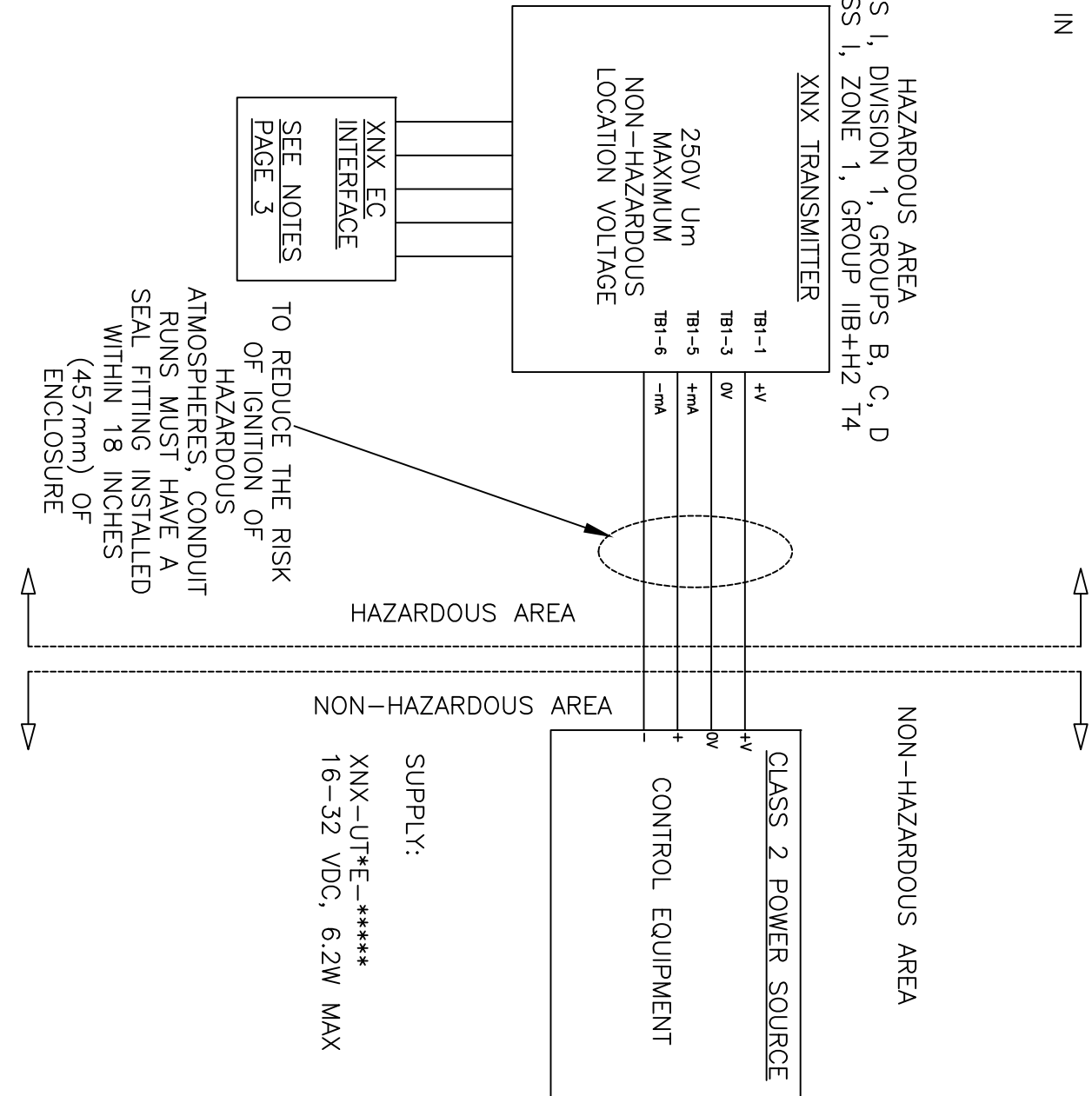


XNX UNIVERSAL TRANSMITTER WITH EC PERSONALITY
PART NUMBER XNX-UT*-**NNN
NOTE: ASTERISK (*) MAY BE REPLACED WITH ANY CHARACTER AND STILL BE APPLICABLE TO THIS DRAWING.

SUITABLE AND PROVIDES INTRINSICALLY SAFE CIRCUIT FOR USE IN
CLASS I, DIVISION 1, GROUPS B, C & D;
CLASS I, ZONE 1, GROUP IIB+H2; TEMP. CODE T4
AMBIENT TEMPERATURE RANGE
-40°C TO +65°C
[40°F TO 149°F]

FM APPROVED TO
CLASS I, ZONE 1, AEx d [Ia IIC]
IIB + H2 T4 -40°C≤Tamb≤+65°C
SEE NOTE 8

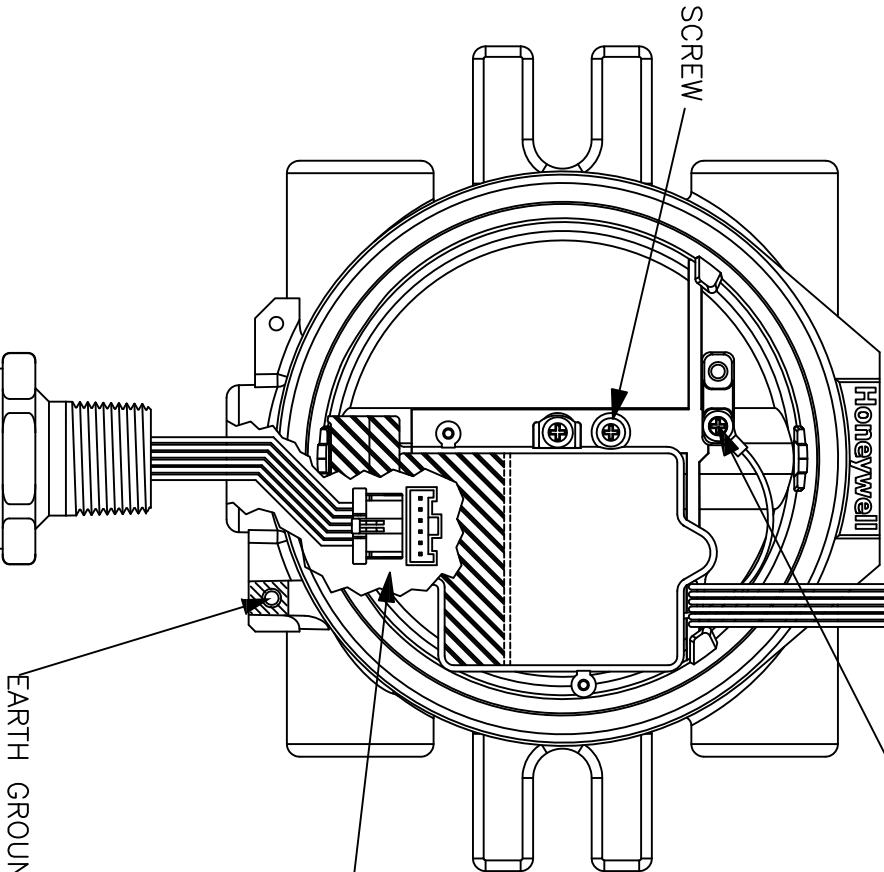
HAZARDOUS AREA
CLASS I, DIVISION 1, GROUPS B, C, D
CLASS I, ZONE 1, GROUP IIB+H2 T4



EARTH WIRE (GREEN/YELLOW):
EARTH WIRE MUST BE CONNECTED
TO EARTH GROUND TO MAINTAIN
INTRINSIC SAFETY.

BARRIER CONNECTS TO J2
OF EC PERSONALITY PCB

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.



EARTH GROUND

EC SENSOR ADAPTER

DO NOT SCALE DRAWING.

THIS DRAWING AND THE INFORMATION
CONTAINED HEREIN ARE PROPRIETARY
TO HONEYWELL ANALYTICS INC. AND SHALL
NOT BE USED IN WHOLE OR IN PART
WITHOUT THE EXPRESS WRITTEN
PERMISSION OF HONEYWELL ANALYTICS INC..

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 BY	SIGNATURE	DATE	
MANUFACTURING ENGINEER	M. NIEMEYER	3/3/09	
PROJECT ENGINEER	K. LEIS	3/3/09	
QUALITY ASSURANCE	B. KOSTER	3/3/09	

Honeywell

FIRST PARENT P/N:

DRAWING RELEASE NO.: —

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

REVISION RECORD

SEE NOTES
PAGE 3

TO REDUCE THE RISK
OF IGNITION OF
HAZARDOUS
ATMOSPHERES, CONDUIT
RUNS MUST HAVE A
SEAL FITTING INSTALLED
WITHIN 18 INCHES
(457mm) OF
ENCLOSURE

SUPPLY:
XNX-UT*E-*****
16-32 VDC, 6.2W MAX

XXNX TRANSMITTER WITH FACTORY INSTALLED LOCAL HART OPTION

1. ENTITY PARAMETERS OF XNX UNIVERSAL TRANSMITTER LOCAL HART INTERFACE

OUTPUT	INPUT
$U_o = 24.15V$	$U_i = 21.85V$
$I_o = 136mA$	$I_i = 120mA$
$P_o = 0.82W$	$P_i = 1.0W$
$L_o = 1.4mH$	$L_i = 0.0mH$
$C_o = 0.122\mu F$	$C_i = 0.0\mu F$

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

<u>IS HART DEVICE</u>		<u>KNX HART INTERFACE</u>	
<u>INPUT</u>		<u>OUTPUT</u>	
V max (or U _I)	≠	Voc or V _t (or U ₀)	
I max (or I _I)	≠	Isc or It (or I ₀)	
P max, P _I	≠	P ₀	
C _I + Ccable	≠	Ca (or Co)	
L _I + Lcable	≠	La (or Lo)	
<u>OUTPUT</u>		<u>INPUT</u>	
Voc or V _t (or U ₀)	≠	V max (or U _I)	
Isc or It (or I ₀)	≠	I max (or I _I)	
P ₀	≠	P max, P _I	
Ca (or Co)	≠	C _I + Ccable	
La (or Lo)	≠	L _I + Lcable	

XNX UNIVERSAL TRANSMITTER WITH EC PERSONALITY

1. ENTITY PARAMETERS OF XNX UNIVERSAL TRANSMITTER EC ADAPTER

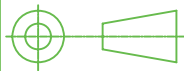
OUTPUT	INPUT
Voc or Vt (or Uo) = 5.88 V	V max (or U1)
Isc or It (or Io) = 84 mA	I max (or It)
Po = 123 mW	P max, Pi
Ca (or Co) = 10uF	Ci + Ccable
La (or Lo) = 1 mH	Li + Lcable
≥	≥

XNX UNIVERSAL TRANSMITTER WITH EC PERSONALITY AND/OR LOCAL HART

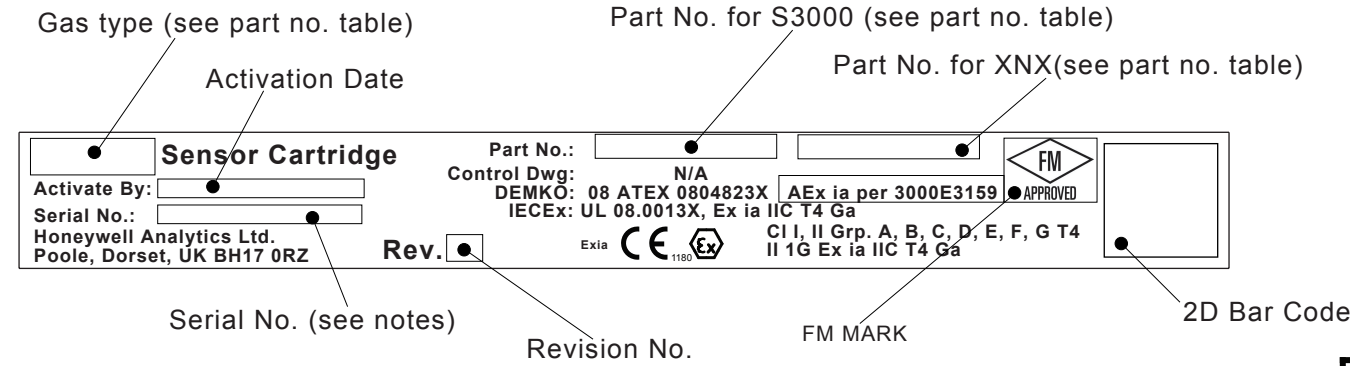
1. THE OUTPUT CURRENT OF THE LOCAL HART AND EC IS BARRIERS ARE LIMITED BY A RESISTOR SUCH THAT THE OUTPUT VOLTAGE-CURRENT PLOT IS A STRAIGHT LINE DRAWN BETWEEN OPEN-CIRCUIT VOLTAGE AND SHORT-CIRCUIT CURRENT.
2. THE ASSOCIATED APPARATUS MAY ALSO BE CONNECTED TO SIMPLE APPARATUS AS DEFINED IN ARTICLE 504.2 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, C_{cable} , PLUS INTRINSICALLY SAFE EQUIPMENT CAPACITANCE, C_i MUST BE LESS THAN THE MARKED CAPACITANCE, C_a (OR C_o), SHOWN ON ANY ASSOCIATED APPARATUS USED. THE SAME APPLIES FOR INDUCTANCE (L_{cable} , L_i AND L_o OR L_o , RESPECTIVELY). WHERE THE CABLE CAPACITANCE AND INDUCTANCE PER FOOT ARE NOT KNOWN, THE FOLLOWING VALUES SHALL BE USED:
 $C_{cable} = 60 \text{ PF/FT.}$, $L_{cable} = 0.2 \mu\text{H/FT.}$
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 ANOTHER 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.

BSIZE.DWG REV. OCT. 2005

--/--/--		SEE SHEET 1/		---		
REV	DATE	DESCRIPTION OF REVISION			CAD	CHKD.
REVISION RECORD						
FIRST PARENT P/N:		DRAWING RELEASE NO.: —				
Honeywell						
DRAWING TITLE:		XNX CONTROL DRAWING				
TOLERANCES UNLESS OTHERWISE SPECIFIED		APPROVED BY		SIGNATURE		DATE
INCH [MM]		MANUFACTURING ENGINEER		M. NIEMEYER		3/3/09
X/X ± 1/32 [0.79]		PROJECT ENGINEER		K. LEIS		3/3/09
.X ± .015 [0.38]		QUALITY ASSURANCE		B. KOSTER		3/3/09
.XX ± .010 [0.25]		REV		3		SHEET 3 OF 3
.XXX ± .005 [0.13]		SCALE: N/A		1226E0402		
ANGLES ± 1°		DO NOT SCALE DRAWING.		THIS DRAWING AND THE INFORMATION CONTAINED HEREIN ARE PROPRIETARY TO HONEYWELL ANALYTICS INC. AND SHALL NOT BE USED IN WHOLE OR IN PART WITHOUT THE EXPRESS WRITTEN PERMISSION OF HONEYWELL ANALYTICS INC..		

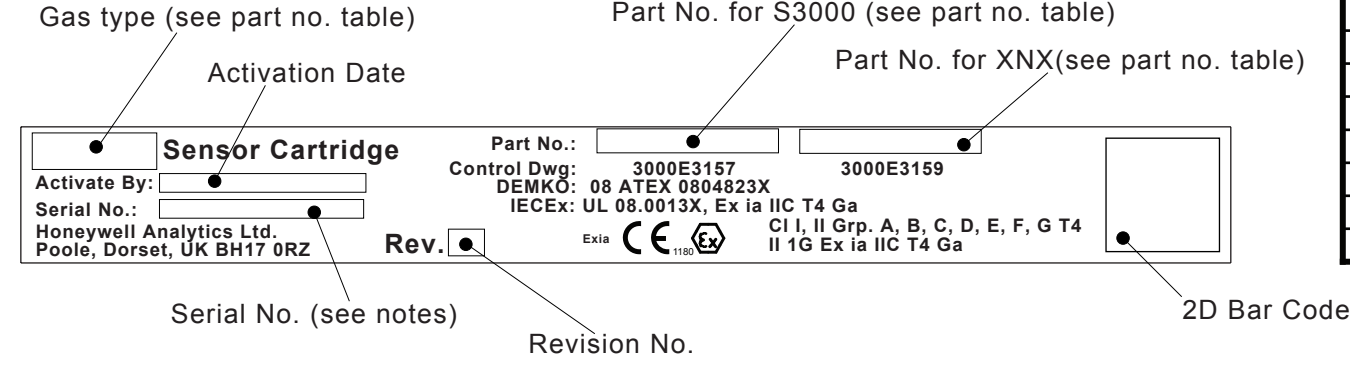


1. Label for XNXXSH1FM, XNXXSC1FM and XNXXSO1FM



- NOTES
- 1. Borders shown identify fields for variables and are not printed.
 - 2. Serial No. Format:
S/N: SIIPPPYYWWNNN
Sequence number
Week of MFG
Year of MFG
Part Code
Issue State
SUPPLIER CODE

2. Label for others



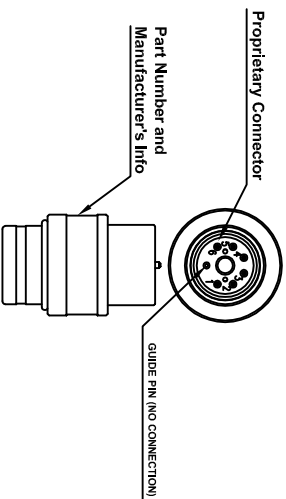
3. Part No. Table:

Gas Type	Part No. for S3000	Part No. for XNX	Gas Type	Part No. for S3000	Part No. for XNX
O2	S3KXSO1SS N/A	XNXXSO1SS XNXXSO1FM	CO	S3KXSC1SS N/A	XNXXSC1SS XNXXSC1FM
H2S(L)	S3KXSH1SS N/A	XNXXSH1SS XNXXSH1FM	NO	S3KXSM1SS	XNXXSM1SS
H2S(H)	S3KXSH2SS	XNXXSH2SS	NO2	S3KXSN1SS	XNXXSN1SS
H2S(LL)	-----	XNXXSH3SS	H2(L)	S3KXSG1SS	XNXXSG1SS
CIO2	S3KXSX1SS	XNXXSX1SS	H2(H)	S3KXSG2SS	XNXXSG2SS
SO2(L)	S3KXSS1SS	XNXXSS1SS	HCl	S3KXSR1SS	XNXXSR1SS
SO2(H)	-----	XNXXSS2SS	HCN	S3KXSY1SS	XNXXSY1SS
NH3(L)	S3KXSA1SS	XNXXSA1SS	HF	S3KXSF1SS	XNXXSF1SS
NH3(H)	S3KXSA2SS	XNXXSA2SS	O3	S3KXSZ1SS	XNXXSZ1SS
CI2(H)	S3KXSL1SS	XNXXSL1SS	PH3	S3KXSP1SS	XNXXSP1SS
CI2(L)	-----	XNXXSL2SS			

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

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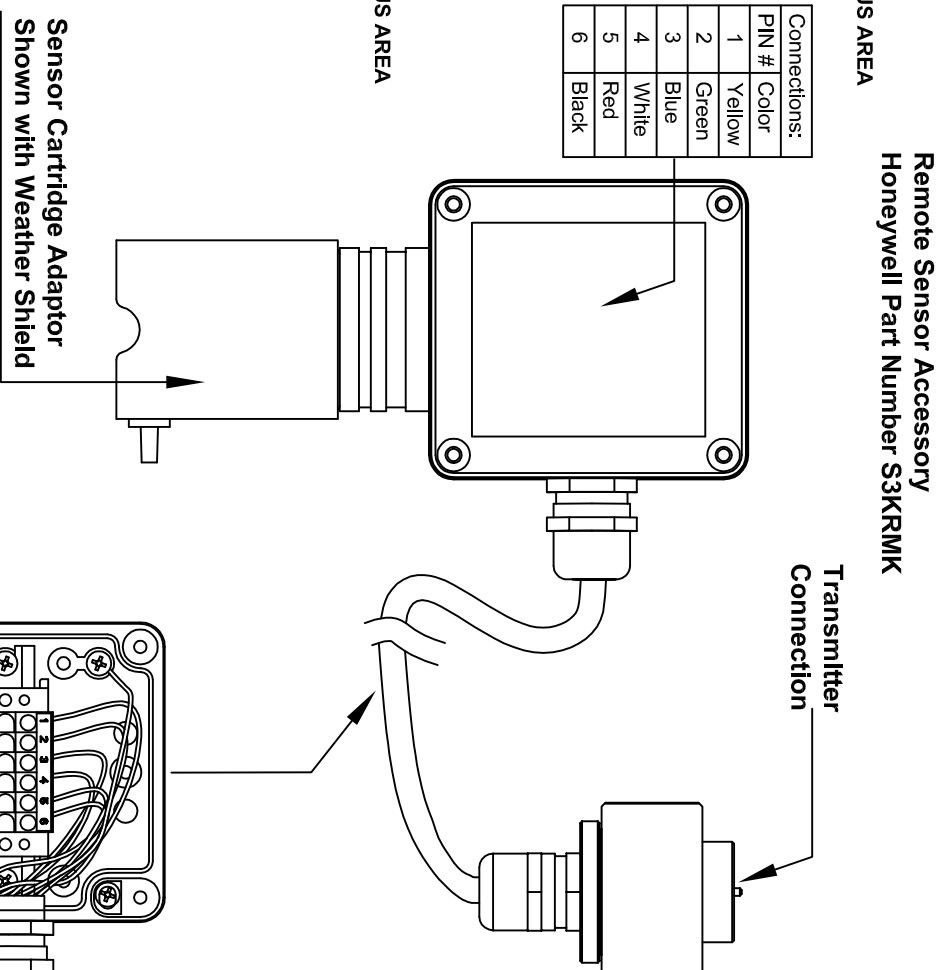
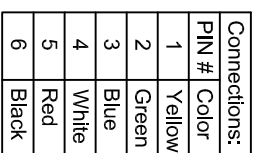
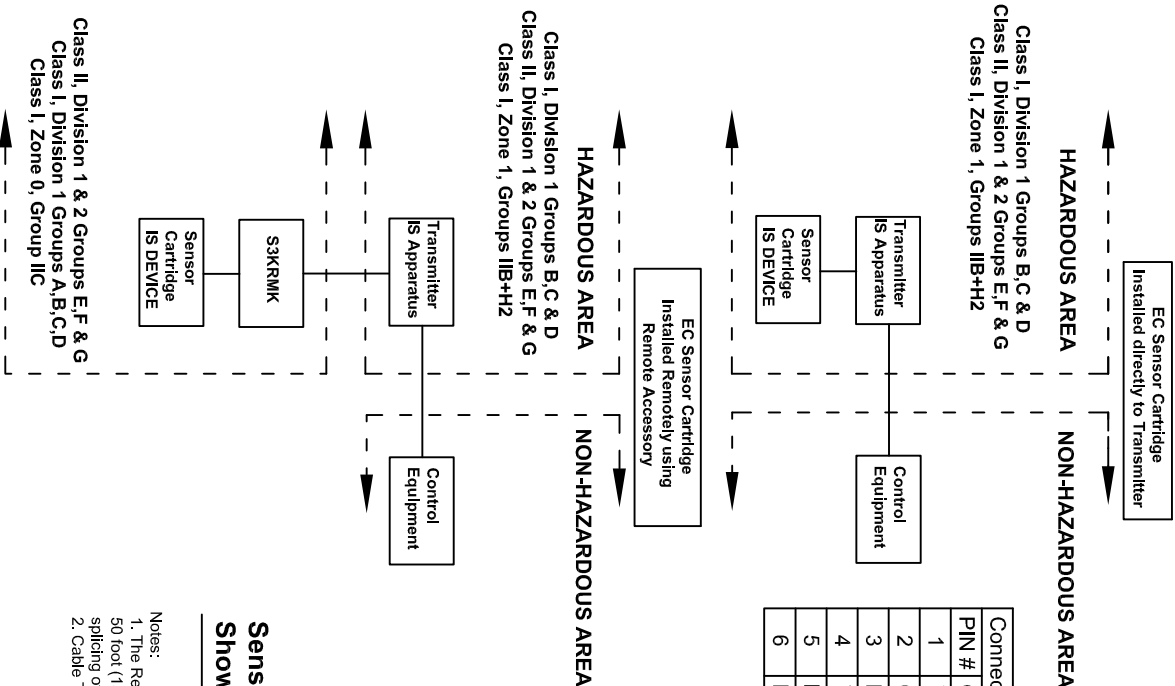
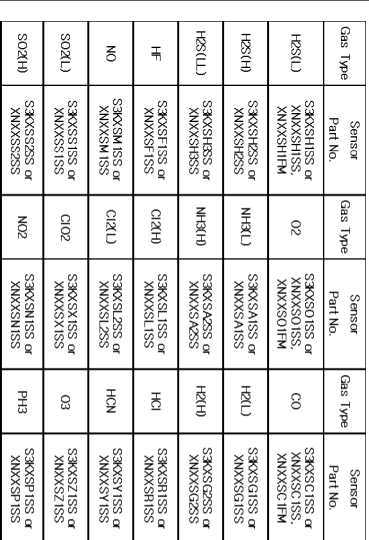
FINISH				MATERIAL							SCALE	DR'N BEN	
											NTS	31 /AUG/ 07	
10	9	8	7	6	5	4	3	2	11	ISSUE	Cartridge Label		
11/NOV/10	07/SEP/10	30/DEC/09	23/NOV/09	11/FEB/09	06/JAN/09	05/JAN/09	05/AUG/08	16/JUL/08	07/MAR/11	DATE			
Change sentence	Revise Cert. Code	Separate Label	Add XNX Part no	Change Control DWG	Add Notes	Change Layout	Delete XNX P/N	Change sentence	Add Cert. Code	CHANGE			
J.Y.JIN	J.Y.JIN	J.Y.JIN	J.Y.JIN	J.Y.JIN	J.Y.JIN	J.Y.JIN	J.Y.JIN	J.Y.JIN	J.Y.JIN	ACTIONED BY	3000D0604 SHT. 1 OF 1		



Notes:

- TABLE 1:
- | | |
|--|------------|
| 1. Intrinsically Safe Device Entry Parameters | |
| Entry Parameters for Toxic/Oxygen Sensor Cartridge Only | |
| Uf=5.88V; Ii=0.124A; P=0.183W; LI=0.04H | CI=5uf |
| Vmax Imax Pmax LI=L-cable | CI=Cable |
| Entry Parameters for Cartridge and Remote Accessory with Cable | |
| Uf=5.88V; Ii=0.124A; P=0.183W; LI=0.04H | CI=5.003uf |
| Vmax Imax Pmax LI=L-cable | CI=Cable |
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.

3. Selected associated apparatus must be third party listed as providing intrinsically safe circuits for the application, and have Voc or Vi not exceeding Vmax (or Vd not exceeding VU) or I 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 P 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 506 of the National Electrical Code (ANSI/NFPA 70) or installation in the United States, or Section 16 of the Canadian Electrical Code or 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.
8. The resistance of the ground path must be less than 1 ohm.
9. Refer to following table for Specific Part Numbers in this listing.



Notes:

1. The Remote Sensor Accessory is provided with a permanently connected 50 foot (15.24m) cable which is the maximum allowable length. Lengthening or splicing of the cable will void Intrinsic Safety Approval.
2. Cable Type: 6 Connector (3 twisted pairs) 24AWG, Instrument Cable Braided Shield, PVC Jacket 800C 300V AWM 2464