



Gas & Flame Detection

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3M™ Detcon™ Model 700

Industrial Gas Detection Sensor



3M™ Detcon™ Model 700

Description

Model 700 industrial gas detection sensors are a new generation of intelligent sensor modules that incorporate and integrate several leading edge improvements. The sensors are specifically designed for harsh and extreme locations. This new and superior level of environmental durability in sensor design includes an electropolished 316 stainless steel housing, multi-layered transient spike protection circuitry and 100% encapsulated electronics. The sensor electronics are completely protected and immune to water ingress and corrosion. The gas detector sensor elements are all plug-in components and can easily be replaced in the field. Operator interface is non-intrusive via a small handheld magnet. Configuration and routine calibration is intuitive and menu driven with fully scripted instructions. Sensor status is displayed on a built-in alphanumeric LED display. Model 700 intelligent sensor modules feature dual redundant outputs, a linear 4 - 20 milliamp analog signal and a Modbus RS-485 serial output.

It is becoming increasingly important that safety systems meet the Safety Integrity Level (SIL) requirements of IEC 61511. The SIL rating can only be determined by considering the complete safety system. The Model 700 sensor modules are designed with this in mind and feature a new and unmatched level of pre-emptive fault diagnostics. Application variables like input voltage range, operating temperature range, maintenance schedule, detector reliability and output integrity are all monitored and reported via the 4 - 20 mA and RS - 485 serial output. As a component of a SIL rated system, the Safe Failure Fraction (SFF) of Model 700 sensors are designed to meet the requirements for any SIL 2 rated system.

Model Series 700 sensors utilize six distinctive gas detection technologies to satisfy a wide range of industrial applications that require monitoring of oxygen, toxic and flammable gases.

Sensors for Hydrogen Sulfide



CHEMFET MOS Solid State Technology
Harsh and Extreme Locations
Wide Temperature & Humidity Range
10-year Sensor Warranty



Electrochemical Technology
Quick Response Time
Long Term Calibration Stability
Low Power Consumption

Sensors for Combustible Gas



Catalytic Technology
Non-selective Combustible Gas Detector
3 to 5 Year Life Expectancy
Rugged Construction



Infrared Technology
Combustible Hydrocarbon Gas Detector
5-Year Warranty
Miniature Plug-in Optical Detector

Sensors for Toxic Gases



Electrochemical Technology
Quick Response Time
Long Term Calibration Stability
Low Power Consumption



Photo Ionization
Universal Non-Selective VOC Sensor
Miniature Plug-in Detector

Oxygen Sensors



Electrochemical Technology
Quick Response Time
Embedded Temperature Compensation
2-year Sensor Warranty

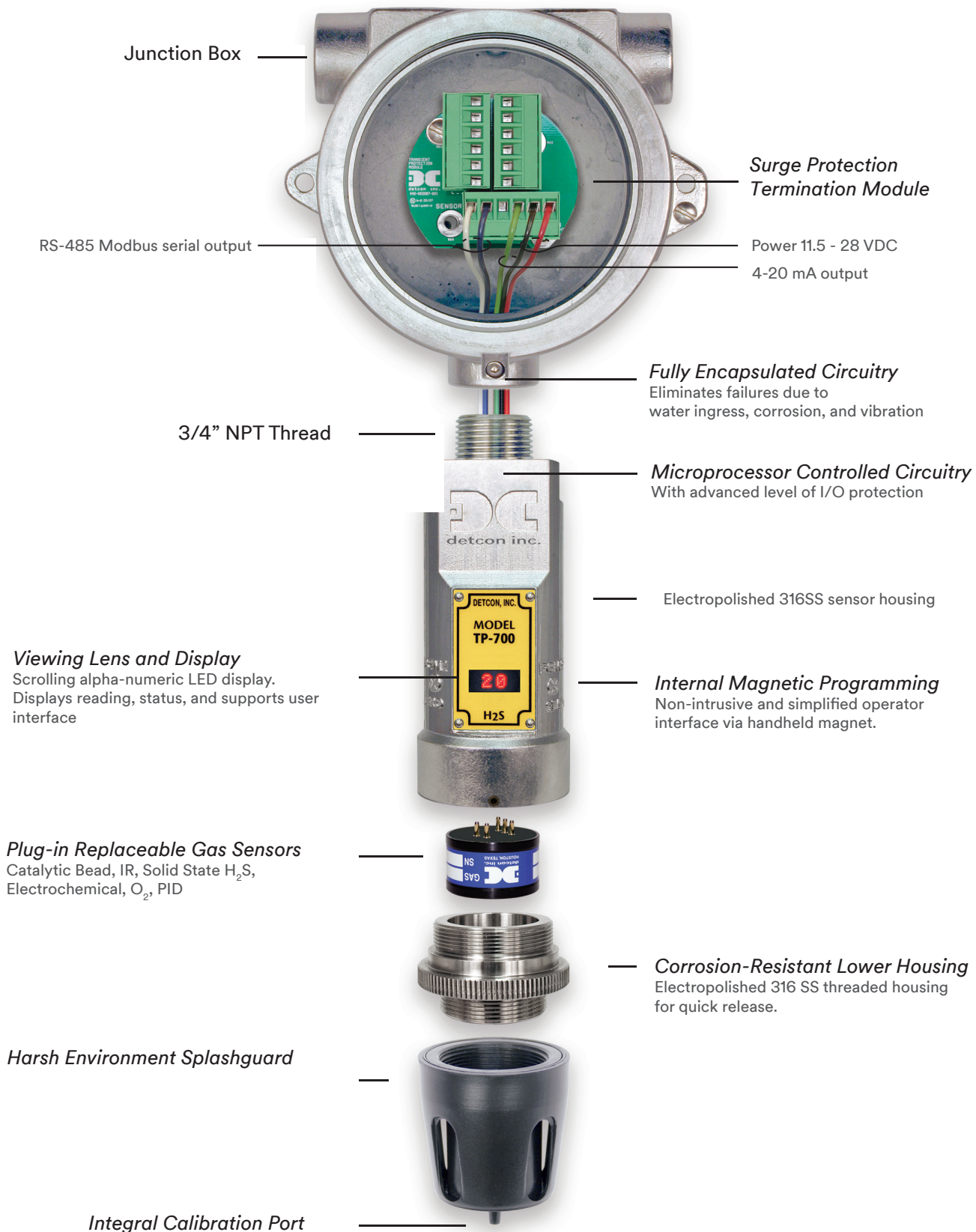
CO2 Sensors



Infrared Technology
CO2 Gas Detector
5-Year Warranty
Miniature Plug-in Optical Detector

3M™ Detcon™ Model 700

Anatomy of a Model 700



3M™ Detcon™ Model 700

Technology Features

Environmentally Bulletproof

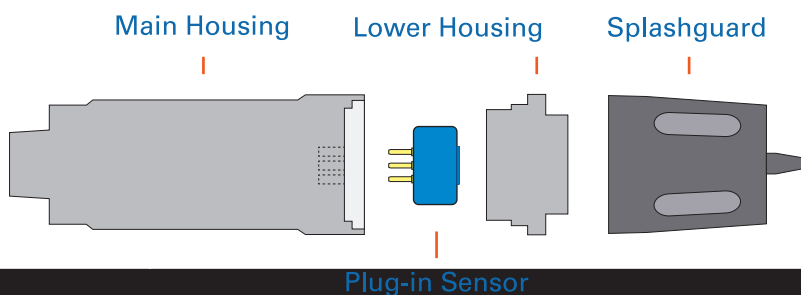
- Electropolished 316SS Construction
- 100% Encapsulated Circuitry
- Bullet-Proof I/O Protection
 - Over-voltage
 - Miswiring
 - EMI/RFI Immunity
- Water-Resistant, Corrosion-Resistant, Vibration-Resistant

Gold Plated
Mating Pins



Modular and Serviceable

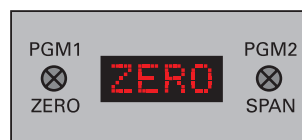
- Modular Design
- Plug and Play Components
- Minimal Spare Parts
 - Universal Design Concept
- Quick Thread Release
 - For Sensor Replacement
- Integral Calibration Port



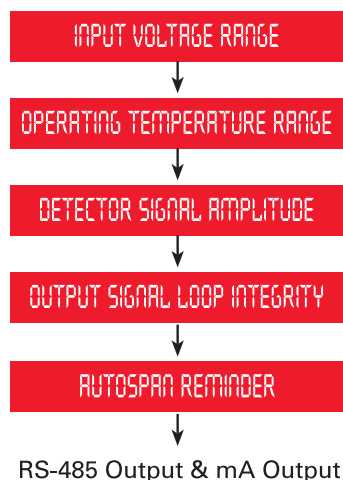
Failsafe User-Friendly Interface

- LED Display
 - With Antiglare Cover
- Full Text Display Method
- Non-intrusive Interface

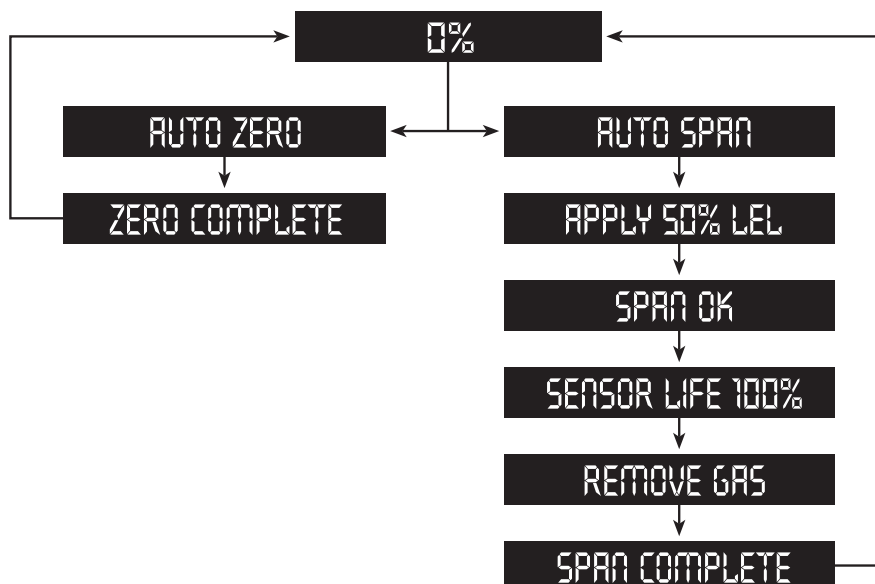
Scrolling Full Message/Text Display



Pre-emptive Fault Diagnostics



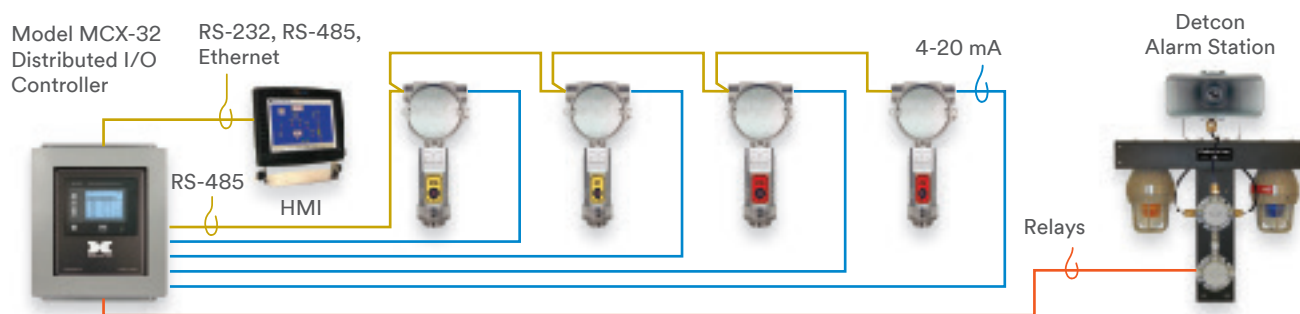
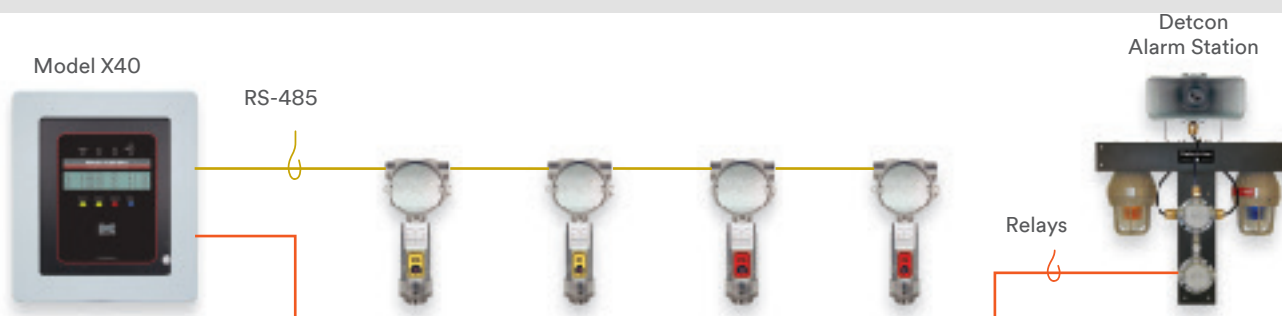
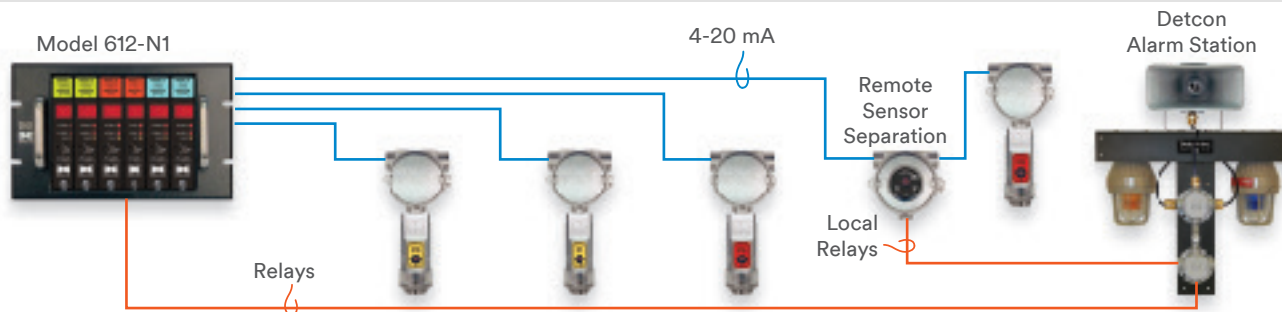
Auto Zero/Auto Span Sequence



3M™ Detcon™ Model 700

Technology Features

Model 700 gas detectors provide the end-user with a wide variety of output & integration options. The standard intelligent sensor module features an industry standard 4 - 20 mA output and a RS - 485 MODBUS RTU interface. These outputs can be used simultaneously. Additional integration options include a Remote sensor, and WiredHART communications. Shown below are some typical system integration approaches:



Wide Range DCS/DAS and Integration Options

Remote Control
Alarm Relay
Module

Hart RAM
Module

Hart Bridge
Module



3M™ Detcon™ Model 700

Specifications

Common Specifications

Input Voltage

11.5 - 28 VDC standard

Power Consumption

<2 watts typical

Outputs

Linear 4 - 20 mA DC

RS - 485 Modbus™ -RTU

Electrical Classification

Explosion Proof

FP - 700, TP - 700, IR - 700 - LEL, IR - 700 - CO2

Class I, Division 1, Groups B, C, D

II 2G Ex d IIB + H2

DM - 700 Toxics, DM - 700 - O2, PI - 700:

Class I, Division 1, Groups B, C, D

II 2G Ex d ib IIB+H2

Safety Approvals

cCSAus

ATEX

INMETRO

CNEX

PESO

ABS

Dimensions

7" High x 2 1/8" Diameter (sensor only)

Weight

2 Lbs

Functional Safety Rating

IEC 61508 SIL2 Certified (IR, TP, FP, DM)

Exida assessed SIL2 (FMEDA)

Performance Approvals

IR - 700, FP - 700 to ISA 12.13.01:2013, CSA #152

TP - 700, DM - 700 to ISA 92.00.01:1998

Technology Specifications

Accuracy/Repeatability

FP - 700: ±3% 0-50% LEL; ±5% 50-100%

TP - 700: ±10% of reading or ±2 ppm (greater of)

DM - 700 - O2: ±2% full scale

IR - 700 - CH: ±3% 0-50% LEL; ±5% 50-100% LEL

IR - 700 - CO2: ±5% full scale

PI - 700: ±10% of reading; ±2.5% of range (greater of)

DM - 700 (toxics): Contact factory for specific gases

Operating Humidity Range (Continuous)

FP - 700: 0-99% RH non-condensing

TP - 700: 15-100% RH non-condensing

DM - 700 - O2: 0-99% RH non-condensing

IR - 700 - CH: 0-99% RH non-condensing

IR - 700 - CO2: 0-99% RH non-condensing

PI - 700: 0-100% non-condensing

DM - 700 (toxics): typically 10-90% RH contact factory for specific gases

Warranty

3M Gas & Flame Detection warrants each new Model 700 Intelligent Transmitter Module to be free from defects in material and workmanship under intended normal use for a period of two years from the date of shipment to the original purchaser. 3M Gas & Flame Detection warrants each new plug-in replaceable sensor to be free from defects in material and workmanship under intended normal use for the period described in the table on the left. All warranties are FOB the 3M Gas & Flame Detection factory located in the Woodlands, Texas, USA.

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Ordering Information

Combustible Gas Sensor (matched pair catalytic bead)

Model #	Gas/Symbol	Range*	Temperature	Warranty**
FP-700	Combustible Gas	0-100% LEL	-40°C to + 70°C	2 Years

Hydrogen Sulfide Gas Sensor (solid state metal oxide semiconductor)

Model #	Gas/Symbol	Range*	Temperature	Warranty**
TP-700	Hydrogen Sulfide/H ₂ S	0-100 ppm	-40°C to + 70°C	10 Year conditional

Oxygen Gas Sensor (galvanic metal air battery)

Model #	Gas/Symbol	Range*	Temperature	Warranty**
DM-700-O ₂	Oxygen/O ₂	0-25%	-20°C to + 50°C	2 Years

Combustible Hydrocarbon & Carbon Dioxide Gas Sensors (non-dispersive infrared optical - PID)

Model #	Gas/Symbol	Range*	Temperature	Warranty**
IR-700-CH	Combustible Hydrocarbons	0-100% LEL	-40°C to + 70°C	5 Years Pro-Rated
IR-700-CO ₂	Carbon Dioxide/ CO ₂	0-3%	-40°C to + 70°C	5 Years Pro-Rated

VOLATILE ORGANIC COMPOUND (VOC) GAS SENSORS (photo ionization detector - PID)

Model #	Gas/Symbol	Range*	Temperature	Warranty**
PI-700-VOC	Volatile Organic Compounds	0-10 ppm	-20°C to + 50°C	1 Year
PI-701-VOC	Volatile Organic Compounds	0-1,000 ppm	-20°C to + 50°C	1 Year

Toxic Gas Sensors (electrochemical fuel cell)

Model #	Gas/Symbol	Range*	Temperature	Warranty**
DM-700-C ₂ H ₂	Acetylene/C ₂ H ₂	0-100 ppm	-20°C to + 50°C	2 Years
DM-700-NH ₃	Ammonia/NH ₃	0-100 ppm	-20°C to + 40°C	2 Years
DM-700-AsH ₃	Arsina/AsH ₃	0-1 ppm	-20°C to + 40°C	1 1/2 Years
DM-700-Br ₂	Bromine/Br ₂	0-5 ppm	-20°C to + 50°C	2 Years
DM-700-C ₄ H ₆	Butadiene/C ₄ H ₆	0-100 ppm	-20°C to + 50°C	2 Years
DM-700-CO	Carbon Monoxide/CO	0-100 ppm	-40°C to + 50°C	3 Years
DM-700-Cl ₂	Chlorine/Cl ₂	0-10 ppm	-20°C to + 50°C	2 Years
DM-701-ClO ₂	Chlorine Dioxide/ClO ₂	0-1 ppm	-20°C to + 50°C	2 Years
DM-700-B ₂ H ₆	Diborane/B ₂ H ₆	0-5 ppm	-20°C to + 40°C	1 1/2 Years
DM-700-C ₂ H ₅ OH	Ethanol/C ₂ H ₅ OH	0-100 ppm	-20°C to + 50°C	2 Years
DM-700-C ₂ H ₅ SH	Ethyl Mercaptan/C ₂ H ₅ SH	0-100 ppm	-40°C to + 50°C	2 Years
DM-700-C ₂ H ₄	Ethylene/C ₂ H ₄	0-100 ppm	-20°C to + 50°C	2 Years
DM-700-C ₂ H ₄ O	Ethylene Oxide/C ₂ H ₄ O	0-100 ppm	-20°C to + 50°C	2 Years
DM-700-F ₂	Fluorine/F ₂	0-1 ppm	-10°C to + 40°C	1 1/2 Years
DM-700-CH ₂ O	Formaldehyde/CH ₂ O	0-100 ppm	-20°C to + 50°C	2 Years
DM-700-GeH ₄	Germane/GeH ₄	0-2 ppm	-20°C to + 40°C	1 1/2 Years

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Ordering Information

Toxic Gas Sensors (electrochemical fuel cell)				
Model #	Gas/Symbol	Range*	Temperature	Warranty**
DM-700-N2H4	Hydrazine/N2H4	0-1 ppm	-10°C to + 40°C	1 Year
DM-700-H2	Hydrogen/H2	0-100 ppm	-20°C to + 50°C	2 Years
DM-701-H2	Hydrogen/H2	LEL	-40°C to + 40°C	2 Years
DM-702-H2	Hydrogen/H2	0-1%	-40°C to + 40°C	2 Years
DM-700-HBr	Hydrogen Bromide/HBr	0-30 ppm	-20°C to + 40°C	1 1/2 Years
DM-700-HCL	Hydrogen Chloride/HCl	0-30 ppm	-20°C to + 40°C	1 1/2 Years
DM-700-HCN	Hydrogen Cyanide/HCN	0-30 ppm	-40°C to + 40°C	2 Years
DM-700-HF	Hydrogen Fluoride/HF	0-10 ppm	-20°C to + 35°C	1 Year
DM-700-H2S	Hydrogen Sulfide/H2S	0-100 ppm	-40°C to + 50°C	2 Years
DM-700-CH3OH	Methanol/CH3OH	0-100 ppm	-20°C to + 50°C	2 Years
DM-700-CH3SH	Methyl Mercaptan/CH3SH	0-100 ppm	-40°C to + 50°C	2 Years
DM-700-NO	Nitric Oxide/NO	0-100 ppm	-20°C to + 50°C	3 Years
DM-700-NO2	Nitrogen Dioxide/NO2	0-10 ppm	-20°C to + 50°C	2 Years
DM-700-O3	Ozone/O3	0-1 ppm	-10°C to + 40°C	2 Years
DM-700-PH3	Phosphine/PH3	0-5 ppm	-20°C to + 40°C	1 1/2 Years
DM-700-SiH4	Silane/SiH4	0-50 ppm	-20°C to + 40°C	1 1/2 Years
DM-700-SO2	Sulfur Dioxide/SO2	0-20 ppm	-20°C to + 50°C	2 Years

Accessories	
Description	
Remote Control/Alarm Relay Module in NEMA 7 Junction Box (Aluminum or Stainless Steel)	
Hart RAM in NEMA 7 Junction Box (Aluminum or Stainless Steel)	
Hart Bridge Module in NEMA 7 Junction Box (Aluminum or Stainless Steel)	
Wireless Interface Module in NEMA 7 Junction Box (Aluminum or Stainless Steel)	

**Standard Range - contact factory for other ranges. **Replacable plug-in sensor.
Contact the factory for other gases not on this list. Cross sensitivity data available on request.*

