

Model 700

Industrial Gas Detection Sensor



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 hand-held 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

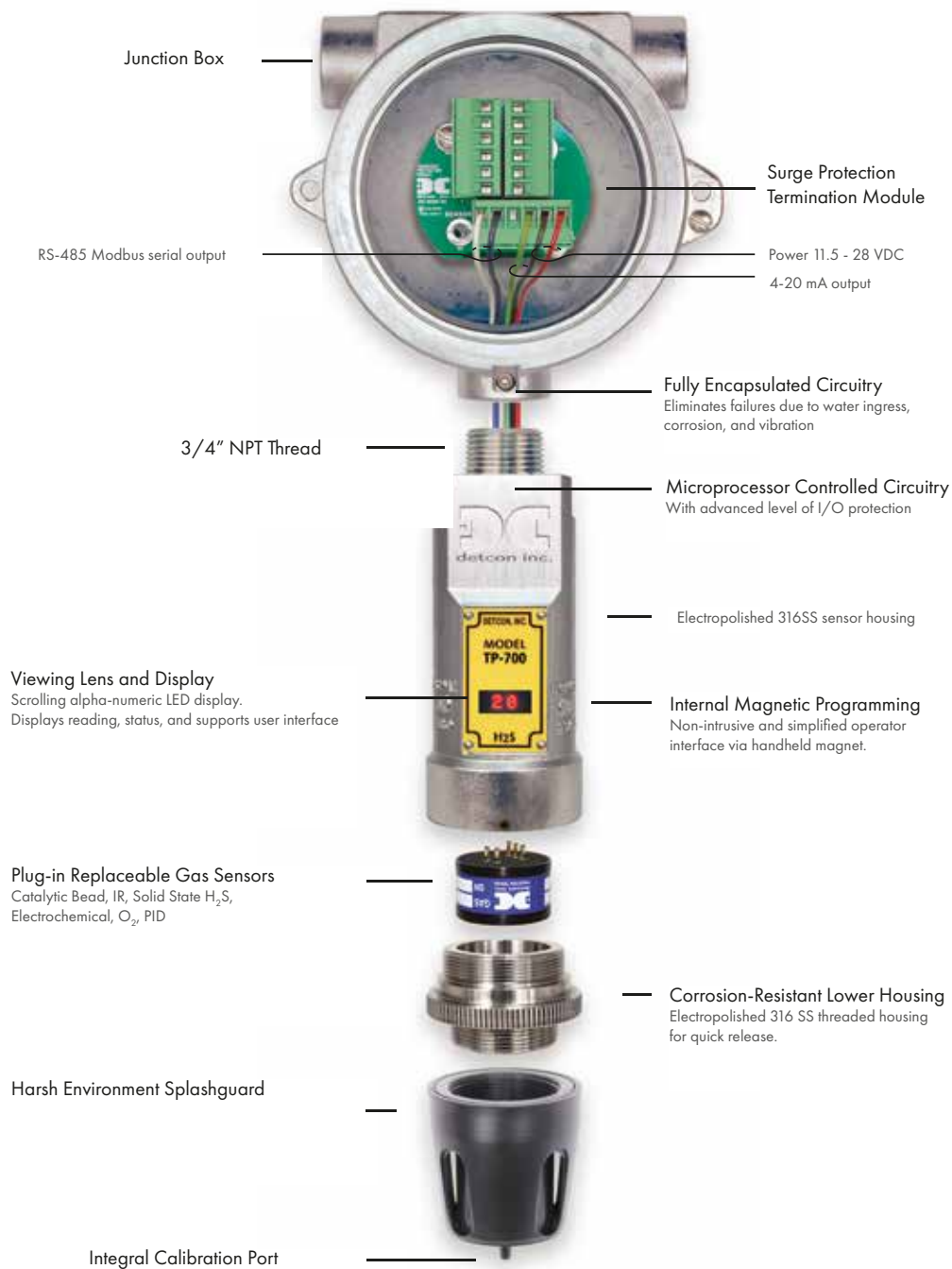
CO2 Sensors



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

Model 700

Anatomy of a Model 700



Model 700

Technology Features

Environmentally Bulletproof

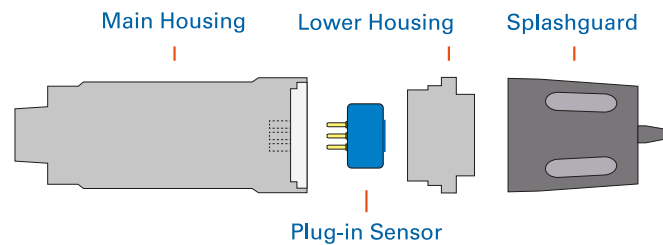
- Electropolished 316SS Construction
- 100% Encapsulated Circuitry
- Bullet-Proof I/O Protection
 - Over-voltage
 - Miswiring
 - EMI/RFI Immunity
- Water-Resistant, Corrosion-Resistant, Vibration-Resistant

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



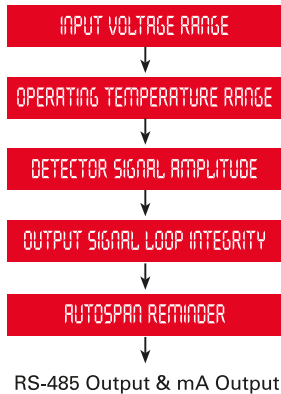
Failsafe User-Friendly Interface

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

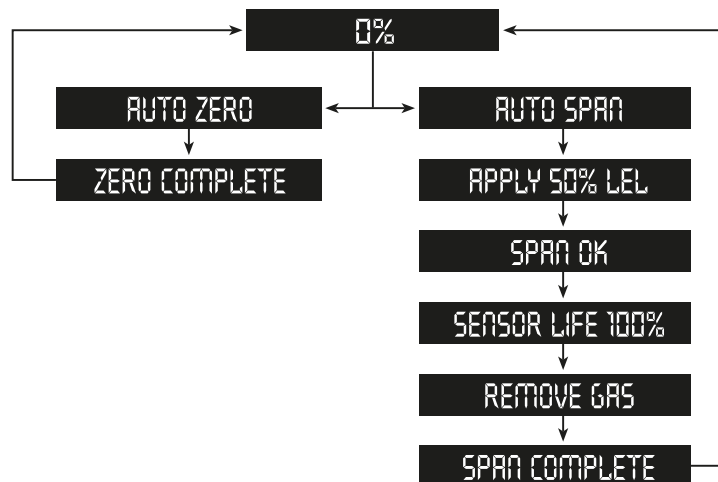
Scrolling Full Message/Text Display



Pre-emptive Fault Diagnostics

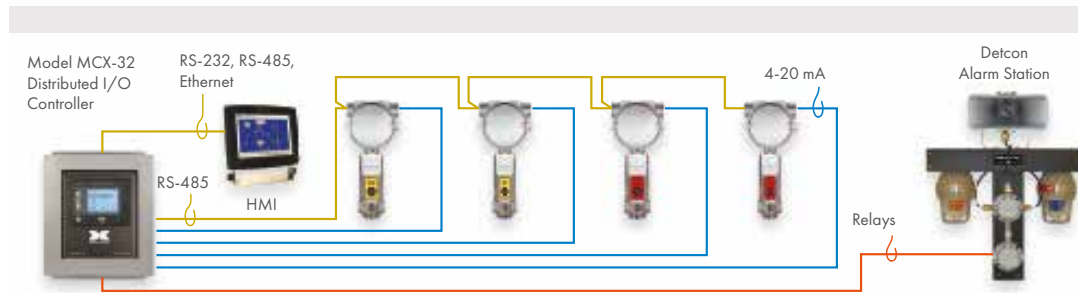
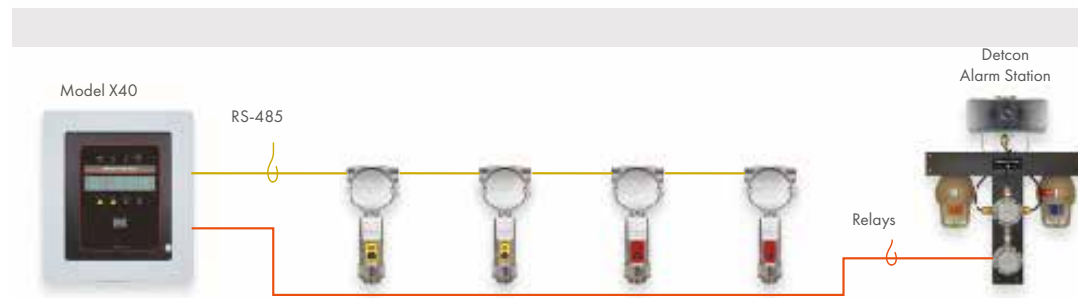
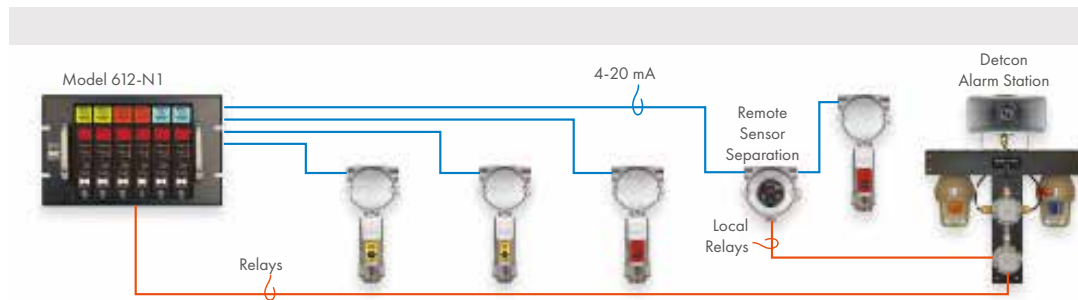


Auto Zero/Auto Span Sequence



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 Wired-HART 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



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

Teledyne 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. Teledyne 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 Teledyne Gas & Flame Detection. Factory located in the Woodlands, Texas, USA.

Model 700

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 Compunds | 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 |

Model 700

Ordering Information

Toxic Gas Sensors (electrochemical fuel cell)

| Model # | Gas/Symbol | Range* | Temperature | Warranty** |
|--------------|------------------------|-----------|-----------------|-------------|
| 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.

Teledyne Gas & Flame Detection quality assurance programmes demand the continuous assessment and improvement of all our products. Information in this leaflet could thus change without notification and does not constitute a product specification. For more information, please contact us or your company representative



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