Model 700
Industrial Gas Detection Sensor
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 determine 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 variable 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 application that require monitoring of oxygen toxic and flammable gases.
Model 700
Anatomy of a Model 700

- **Junction Box**
- **RS-485 Modbus serial output**
- **Viewing Lens and Display**
  - Scrolling alpha-numeric LED display
  - Displays reading, status, and supports user interface
- **Plug-in Replaceable Gas Sensors**
  - Catalytic Bead, IR, Solid State H₂S, Electrochemical, O₂, PID
- **Harsh Environment Splashguard**
- **Integral Calibration Port**
- **Surge Protection Termination Module**
  - Power 11.5 - 28 VDC
  - 4-20 mA output
- **3/4” NPT Thread**
- **Fully Encapsulated Circuitry**
  - Eliminates failures due to water ingress, corrosion, and vibration
- **Microprocessor Controlled Circuitry**
  - With advanced level of I/O protection
- **Internal Magnetic Programming**
  - Non-intrusive and simplified operator interface via handheld magnet.
- **Electropolished 316SS sensor housing**
- **Corrosion-Resistant Lower Housing**
  - Electropolished 316 SS threaded housing for quick release.
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

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

- INPUT VOLTAGE RANGE
- OPERATING TEMPERATURE RANGE
- DETECTOR SIGNAL AMPLITUDE
- OUTPUT SIGNAL LOOP INTEGRITY
- AUTOSPAN REMINDER
- RS-485 Output & mA Output

Auto Zero/Auto Span Sequence

- AUTO ZERO
  - ZERO COMPLETE
  - AUTO SPAN
  - APPLY 50% LEL
  - SPAN OK
  - SENSOR LIFE 100%
  - REMOVE GAS
  - SPAN COMPLETE
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**

- **Model 612-N1**
  - 4-20 mA output
  - Remote sensor separation
  - Local relays

- **Model X40**
  - RS-485 output
  - Detcon alarm station
  - Local relays

- **Model MCX-32**
  - Distributed I/O controller
  - RS-232, RS-485, Ethernet
  - HMI
  - Detcon alarm station
  - Local relays

- **Remote Control Alarm Relay Module**
- **Hart RAM Module**
- **Hart Bridge Module**
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: Class I, Division 1, Groups B, C, D
  - II 2G Ex d IIB + H2
  - DM - 700 Toxics: Class I, Division 1, Groups B, C, D
  - II 2G Ex d 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.
### Combustible Gas Sensor (matched pair catalytic bead)

<table>
<thead>
<tr>
<th>Model #</th>
<th>Gas/Symbol</th>
<th>Range*</th>
<th>Temperature</th>
<th>Warranty**</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP-700</td>
<td>Combustible Gas</td>
<td>0-100% LEL</td>
<td>-40ºC to +70ºC</td>
<td>2 Years</td>
</tr>
</tbody>
</table>

### Hydrogen Sulfide Gas Sensor (solid state metal oxide semiconductor)

<table>
<thead>
<tr>
<th>Model #</th>
<th>Gas/Symbol</th>
<th>Range*</th>
<th>Temperature</th>
<th>Warranty**</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP-700</td>
<td>Hydrogen Sulfide/H2S</td>
<td>0-100 ppm</td>
<td>-40ºC to +70ºC</td>
<td>10 Year conditional</td>
</tr>
</tbody>
</table>

### Oxygen Gas Sensor (galvanic metal air battery)

<table>
<thead>
<tr>
<th>Model #</th>
<th>Gas/Symbol</th>
<th>Range*</th>
<th>Temperature</th>
<th>Warranty**</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM-700-O2</td>
<td>Oxygen/O2</td>
<td>0-25%</td>
<td>-20ºC to +50ºC</td>
<td>2 Years</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Model #</th>
<th>Gas/Symbol</th>
<th>Range*</th>
<th>Temperature</th>
<th>Warranty**</th>
</tr>
</thead>
<tbody>
<tr>
<td>IR-700-CH</td>
<td>Combustible Hydrocarbons</td>
<td>0-100% LEL</td>
<td>-40ºC to +70ºC</td>
<td>5 Years Pro-Rated</td>
</tr>
<tr>
<td>IR-700-CO2</td>
<td>Carbon Dioxide/CO2</td>
<td>0-3%</td>
<td>-40ºC to +70ºC</td>
<td>5 Years Pro-Rated</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Model #</th>
<th>Gas/Symbol</th>
<th>Range*</th>
<th>Temperature</th>
<th>Warranty**</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI-700-VOC</td>
<td>Volatile Organic Compounds</td>
<td>0-10 ppm</td>
<td>-20ºC to +50ºC</td>
<td>1 Year</td>
</tr>
<tr>
<td>PI-701-VOC</td>
<td>Volatile Organic Compounds</td>
<td>0-1,000 ppm</td>
<td>-20ºC to +50ºC</td>
<td>1 Year</td>
</tr>
</tbody>
</table>

### Toxic Gas Sensors (electrochemical fuel cell)

<table>
<thead>
<tr>
<th>Model #</th>
<th>Gas/Symbol</th>
<th>Range*</th>
<th>Temperature</th>
<th>Warranty**</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM-700-C2H2</td>
<td>Acetylene/C2H2</td>
<td>0-100 ppm</td>
<td>-20ºC to +50ºC</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-NH3</td>
<td>Ammonia/NH3</td>
<td>0-100 ppm</td>
<td>-20ºC to +40ºC</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-AsH3</td>
<td>Arsine/AsH3</td>
<td>0-1 ppm</td>
<td>-20ºC to +40ºC</td>
<td>1 1/2 Years</td>
</tr>
<tr>
<td>DM-700-Br2</td>
<td>Bromine/Br2</td>
<td>0-5 ppm</td>
<td>-20ºC to +50ºC</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-C4H6</td>
<td>Butadiene/C4H6</td>
<td>0-100 ppm</td>
<td>-20ºC to +50ºC</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-C2H4</td>
<td>Ethylene/C2H4</td>
<td>0-100 ppm</td>
<td>-20ºC to +50ºC</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-C2H4O</td>
<td>Ethylene Oxide/C2H4O</td>
<td>0-100 ppm</td>
<td>-20ºC to +50ºC</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-C2H5OH</td>
<td>Ethanol/C2H5OH</td>
<td>0-100 ppm</td>
<td>-20ºC to +50ºC</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-C2H5SH</td>
<td>Ethyl Mercaptan/C2H5SH</td>
<td>0-100 ppm</td>
<td>-40ºC to +50ºC</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-C2H4</td>
<td>Ethylene/C2H4</td>
<td>0-100 ppm</td>
<td>-20ºC to +50ºC</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-C2H4O</td>
<td>Ethylene Oxide/C2H4O</td>
<td>0-100 ppm</td>
<td>-20ºC to +50ºC</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-Cl2</td>
<td>Chlorine/Cl2</td>
<td>0-10 ppm</td>
<td>-20ºC to +50ºC</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-ClO2</td>
<td>Chlorine Dioxide/ClO2</td>
<td>0-1 ppm</td>
<td>-20ºC to +50ºC</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-B2H6</td>
<td>Diborane/B2H6</td>
<td>0-5 ppm</td>
<td>-20ºC to +40ºC</td>
<td>1 1/2 Years</td>
</tr>
<tr>
<td>DM-700-GeH4</td>
<td>Germane/GeH4</td>
<td>0-2 ppm</td>
<td>-20ºC to +40ºC</td>
<td>1 1/2 Years</td>
</tr>
</tbody>
</table>
## Model 700

### Ordering Information

<table>
<thead>
<tr>
<th>Model #</th>
<th>Gas/Symbol</th>
<th>Range*</th>
<th>Temperature</th>
<th>Warranty**</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM-700-H2</td>
<td>Hydrogen/H2</td>
<td>0-100 ppm</td>
<td>-20°C to + 50°C</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-701-H2</td>
<td>Hydrogen/H2</td>
<td>LEL</td>
<td>-40°C to + 40°C</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-702-H2</td>
<td>Hydrogen/H2</td>
<td>0-1%</td>
<td>-40°C to + 40°C</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-HBr</td>
<td>Hydrogen Bromide/HBr</td>
<td>0-30 ppm</td>
<td>-20°C to + 40°C</td>
<td>1 1/2 Years</td>
</tr>
<tr>
<td>DM-700-HCL</td>
<td>Hydrogen Chloride/HCl</td>
<td>0-30 ppm</td>
<td>-20°C to + 40°C</td>
<td>1 1/2 Years</td>
</tr>
<tr>
<td>DM-700-HCN</td>
<td>Hydrogen Cyanide/HCN</td>
<td>0-30 ppm</td>
<td>-40°C to + 40°C</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-HF</td>
<td>Hydrogen Fluoride/HF</td>
<td>0-10 ppm</td>
<td>-20°C to + 35°C</td>
<td>1 Year</td>
</tr>
<tr>
<td>DM-700-H2S</td>
<td>Hydrogen Sulfide/H2S</td>
<td>0-100 ppm</td>
<td>-40°C to + 50°C</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-CH3OH</td>
<td>Methyl Mercaptan/CH3OH</td>
<td>0-100 ppm</td>
<td>-20°C to + 50°C</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-NO</td>
<td>Nitric Oxide/NO</td>
<td>0-100 ppm</td>
<td>-20°C to + 50°C</td>
<td>3 Years</td>
</tr>
<tr>
<td>DM-700-NO2</td>
<td>Nitrogen Dioxide/NO2</td>
<td>0-10 ppm</td>
<td>-20°C to + 50°C</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-O3</td>
<td>Ozone/O3</td>
<td>0-1 ppm</td>
<td>-10°C to + 40°C</td>
<td>2 Years</td>
</tr>
<tr>
<td>DM-700-PH3</td>
<td>Phosphine/PH3</td>
<td>0-5 ppm</td>
<td>-20°C to + 40°C</td>
<td>1 1/2 Years</td>
</tr>
<tr>
<td>DM-700-SiH4</td>
<td>Silane/SiH4</td>
<td>0-50 ppm</td>
<td>-20°C to + 40°C</td>
<td>1 1/2 Years</td>
</tr>
<tr>
<td>DM-700-SO2</td>
<td>Sulfur Dioxide/SO2</td>
<td>0-20 ppm</td>
<td>-20°C to + 50°C</td>
<td>2 Years</td>
</tr>
</tbody>
</table>

### 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.