AT9000 Advanced Transmitter Model GTX
Application Guide

We create value together with customers at their site through human-centered automation.

We solve issues in a wide array of industries, from oil refining, chemical, iron and steel, pulp and paper to automobiles, electrical/electronic, semiconductor, and foods and beverages, through the provision of products, solutions, instrumentation, engineering and maintenance service to support optimal operation of the customers' facilities throughout their lifecycle. Collaborating with people involved in production, we develop advanced measurement and control technologies, and strive to realize a production site where workers can develop their own skills in safety, thus creating new value for our customers.

Using mobile terminals, gain a clear picture of what is happening on site throughout the factory.

Operate the equipment after checking instructions and guidance.

Monitor the production status throughout the factory and operate the equipment.

Gain a clear idea of how production is proceeding by using on-site indicators and recorders.
Contributing to safety plant operation

Providing the safety transmitter with high performance and high quality.

Sensor and Characterization ( )

1. Piezo resistance sensor
   The differential pressure, static pressure and temperature sensors are on one piezo resistance sensor.

2. Characterization
   To realize high accuracy and high stability, of each particular transmitter, data on differential pressure, temperature and static pressure characteristics are acquired when the instruments is manufactured and the acquired data is stored in the ROM.

Safety design
Safety design complying with the IEC61058 standard:
Certified according to Safety Integrity Level2 (SIL2).
Being used as a component of Safety Instrumented System (SIS).
Equipped with the ALARM and the contact output function (OPTIONAL).

In case of failure based on the transmitters set-point for PV, and Sensor Temperature, give the early alarming information. And the ALARM status can be displayed and confirmed on the built-in-indicator ( ).

High performance and reliability
Unique compensation system "Characterization ( )" has been improved to achieve higher performance.
Accuracy ± 0.04%F.S. and ± 0.1% of URL stability for 10 years has been achieved.
Significantly reducing calibration work after installation.

Fast response
The response time within 100 msec ( ) is realized.
Suitable for pressure control around turbine.

High turn-down ratio
Turn-down ratio of 200:1 has been realized.
Contributes to reducing the amount of inventory required for spare parts.

Proven technology
The silicon sensor chip consists of three sensors, which are temperature, differential pressure and static pressure sensor to correct non-linearity of each transmitter. This unique compensation system enables to eliminate the influence of ambient temperature and static pressure changes on transmitter output characteristics.
## Extensive Product Lineup

<table>
<thead>
<tr>
<th>Model</th>
<th>Measuring span</th>
<th>Accuracy</th>
<th>Used for</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTX15D</td>
<td>0.1 to 2 kPa</td>
<td>±0.15%</td>
<td>For steel furnace pressure control, clean room internal pressure control</td>
</tr>
<tr>
<td>GTX30D</td>
<td>0.5 to 100 kPa</td>
<td>±0.04%</td>
<td>A wide range of measurements, such as differential pressure flow measurement and level measurement</td>
</tr>
<tr>
<td>GTX31D</td>
<td>0.4 to 8 inH2O</td>
<td>±0.1%</td>
<td>High static pressure applications, such as electric power plant vapor pressure/flow measurement</td>
</tr>
<tr>
<td>GTX40D</td>
<td>5 to 100 psi</td>
<td>±0.15%</td>
<td>Monitoring/control of internal vessel pressure and internal pipe pressure</td>
</tr>
<tr>
<td>GTX41D</td>
<td>5 to 2,000 inH2O</td>
<td>±0.15%</td>
<td></td>
</tr>
<tr>
<td>GTX71D</td>
<td>36 to 2,000 inH2O</td>
<td>±0.15%</td>
<td></td>
</tr>
<tr>
<td>GTX32D</td>
<td>0.5 to 100 kPa</td>
<td>±0.04%</td>
<td></td>
</tr>
<tr>
<td>GTX42D</td>
<td>2 to 400 inH2O</td>
<td>±0.1%</td>
<td></td>
</tr>
<tr>
<td>GTX72D</td>
<td>5 to 100 psi</td>
<td>±0.15%</td>
<td></td>
</tr>
<tr>
<td>GTX80G</td>
<td>17.5 to 3500 kPa</td>
<td>±0.04%</td>
<td></td>
</tr>
<tr>
<td>GTX71G</td>
<td>7 to 14 MPa</td>
<td>±0.15%</td>
<td></td>
</tr>
<tr>
<td>GTX82G</td>
<td>7 to 42 MPa</td>
<td>±0.15%</td>
<td></td>
</tr>
</tbody>
</table>

### Flange Types

<table>
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</tr>
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<tr>
<td>GTX30A</td>
<td>4 to 104 kPa abs</td>
<td>±0.15%</td>
<td>Monitoring/remote pressure in cases where absolute pressure measurement is required</td>
</tr>
<tr>
<td>GTX60A</td>
<td>35 to 3,500 kPa abs</td>
<td>±0.2%</td>
<td></td>
</tr>
<tr>
<td>GTX35F</td>
<td>70 to 3,500 kPa</td>
<td>±0.15%</td>
<td></td>
</tr>
<tr>
<td>GTX60F</td>
<td>10 to 400 inH2O</td>
<td>±0.2%</td>
<td></td>
</tr>
<tr>
<td>GTX35R</td>
<td>10 to 2,000 psi</td>
<td>±0.2%</td>
<td></td>
</tr>
<tr>
<td>GTX40R</td>
<td>5 to 100 psi</td>
<td>±0.2%</td>
<td></td>
</tr>
<tr>
<td>GTX35U</td>
<td>2.5 to 100 kPa</td>
<td>±0.2%</td>
<td></td>
</tr>
<tr>
<td>GTX60U</td>
<td>35 to 3,500 kPa</td>
<td>±0.2%</td>
<td></td>
</tr>
<tr>
<td>GTX71U</td>
<td>0.7 to 14 MPa</td>
<td>±0.25%</td>
<td></td>
</tr>
<tr>
<td>GTX82U</td>
<td>0.7 to 42 MPa</td>
<td>±0.25%</td>
<td></td>
</tr>
<tr>
<td>GTX30S</td>
<td>4 to 104 kPa abs</td>
<td>±0.25%</td>
<td></td>
</tr>
<tr>
<td>GTX60S</td>
<td>35 to 3,500 kPa abs</td>
<td>±0.25%</td>
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</tbody>
</table>

### Remote Seal Types

<table>
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</thead>
<tbody>
<tr>
<td>GTX30S</td>
<td>4 to 104 kPa abs</td>
<td>±0.25%</td>
<td>Monitoring/control of internal vessel pressure and in cases where absolute pressure measurement is required</td>
</tr>
<tr>
<td>GTX60S</td>
<td>35 to 3,500 kPa abs</td>
<td>±0.25%</td>
<td></td>
</tr>
</tbody>
</table>

*The wetted part temperature range and ambient temperature effect are limited depending on the model and specifications. For details, please refer to the specification sheets.*
Our solutions for various applications

### Impulse-line less instrumentation

With the impulse-line less instrumentation provided using the small diameter (1/2", 3/4") process connection pressure / differential pressure remote-seal transmitter, the various problems caused by connecting impulse-line clogging, the cost of labor for maintenance work, etc. are avoided. Used especially in petroleum, petrochemical, and chemical plants, this product has an extensive record of achievement.

#### Features
- Reduces operating costs (seal liquid costs, steam tracing running costs).
- Easy installation (flange connection, fixing of stanchions for main unit).
- Reduces maintenance operations (replacement/refilling of seal liquid, steam tracing, removal of blockages from connecting pipes).
- Reduces dangerous operations (leak checking, removal of blockages from connecting pipes, replacement/refilling of seal liquid).
- Environmentally friendly (elimination of seal liquid, elimination of connecting pipes/steam tracing/seal pots, etc.).
- Greatly reduces the heating costs incurred by connecting pipes and steam tracing.

#### Model

- 1/2 inch. remote-seal transmitter
  - GTX __R
  - GTX __U

### Support for fast response applications

Remote-seal transmitter with fast response. Improves controllability on control lines and in cold areas.

#### Features
- Faster response time from the remote seal.
- Achieves responsiveness on a par with impulse-line model.
- Improved responsiveness in low temperatures. Responsiveness in low temperatures (below the freezing point) has been improved, reducing the effect of seasonal temperature changes.

#### Model

- Fast response remote-seal transmitter
  - GTX __R

### Support for level measurement with Temperature Compensation

Remote-seal transmitter’s fill fluid density compensation function achieves level measurement with only small effects from changes in ambient temperature.

#### Features
- The direct mount instrumentation provides less install cost and maintenance cost.

#### Model

- In-line pressure transmitter
  - GTX __G

### Support for level measurement in tight space

A special kit is used for the remote-seal transmitter capillary tube section, improving temperature effect and saving space.

#### Features
- Remote-seal transmitter with ambient temp. compensation

#### Model

- Remote-seal transmitter with direct mounting kit
  - GTX __R

### Support for vacuum applications

This is well suited for applications requiring high temperature and high vacuum conditions, such as reactions, distillation, drying and recovery.

#### Features
- High-temperature, high-vacuum remote-seal transmitter

#### Model

- High-temperature, High-vacuum remote-seal transmitter
  - GTX __R
  - GTX __U
  - GTX __S

### Anti-hydrogen permeation measures

We suggest this as the most effective way to deal with various modes of hydrogen permeation.

#### Features
- Improves controllability on control lines and in cold areas.

#### Model

- Anti-hydrogen permeation transmitter
  - ALL

### Anti-hydrogen embrittlement measures

With its platinum chip construction, this product is recommended to prevent hydrogen embrittlement.

#### Features
- Achieves responsiveness on a par with impulse-line model.

#### Model

- Anti-hydrogen embrittlement transmitter
  - ALL
Direct mount instrumentation

The direct mount instrumentation delivers less install cost and maintenance cost compared with impulse line instrumentation.

Features
- Reduces initial cost, impulse line instrumentation work and material costs.
- Reduces maintenance operations.
- Reduces impulse line heating costs.

Model
In-line pressure transmitter GTX _ _G

Support for Level Measurement with Temperature Compensation

As a standard feature, our differential pressure remote seal transmitters are equipped with a function that compensates for changes in the density of the fill fluid due to variations in ambient temperature. As a result, for liquid-level measurement by differential pressure remote seal transmitter, zero point shifts resulting from changes in fill fluid head pressure (P = ρgL) due to variations in ambient temperature are eliminated.

Features
- Keeps zero point shift to 1/5 or below.
- A standard feature on all remote seal transmitters.
- Ideal for design changes or use of spares, because the distance between the flanges can be optionally changed by the communicator.

Model
Remote-seal transmitter with ambient temp. compensation GTX _ _R

Support for Vacuum Applications

The pursuit of higher efficiency in plant operations in a wide range of industries—naturally petroleum/petrochemical/chemical, as well as semiconductor, pharmaceutical, etc.—has resulted in requirements for process measurement under high temperature, high vacuum conditions. In response to these stringent customer requirements, we offer our vacuum application series product line.

Supporting Technology
- Baking processes to expel gas from welded metal parts.
- High-temperature vacuum degassing processes to avoid the effect of low molecular mass impurities within seal liquids.
- Sealing processes to avoid reduction of heat resistance in seal liquids, etc.—we have developed three technologies with built-in reliability in order to thoroughly suppress unwanted effects.

Model
High-temperature, High vacuum remote-seal transmitter GTX _ _R
Remote-seal type absolute pressure transmitter GTX _ _S

Support for Level Measurement in tight space

A solution to many of the issues that affect differential pressure transmitters: dealing with the bottom flange capillary tube, reducing the space occupied by the 2” stanchion pipe, zero point shift caused by temperature differences between the high flow capillary tubes, and others.

Features
- Easy-to-use instrumentation
- Direct mount using flange adapter. No need for a 2” stanchion pipe.
- Capillary tubes are neatly held in place by tube clamps.
- Deals easily with changes in vessel spacing distance.
- Flange adapter and tube clamp can be applied to existing equipment using an adapted flange.
- Improves ambient temperature characteristics
- Capillary tubes are held firmly in place by tube clamps. Because of this, the zero point shift caused by temperature differences between the high flows capillary tubes due to changes in ambient temperature is reduced to its previous value.

Model
Remote-seal transmitter with direct mounting kit GTX _ _R

Instrumentation with Directmounting kit

Remote-seal type absolute pressure transmitter

High-temperature, High vacuum remote-seal transmitter
Remote-seal type absolute pressure transmitter

Ambient Temperature Change [degree C]

Span 25 kPa
Span 50 kPa

Zero shift [%]

L : 5m
In hydrogen-rich processes, such as in petroleum/petrochemical plants, when tantalum is used as the diaphragm material, it can become brittle from exposure to hydrogen gas. Our transmitters possess anti-hydrogen permeation technology developed through research over many years, and enjoy a long record of success in the field.

1. Hydrogen Permeation under High Temperature, High Pressure Conditions

Mechanism
Under high temperature, high pressure conditions in petroleum/petrochemical plants, mainly in lines rich in H2S and H2, hydrogen atoms dissociated from hydrogen molecules permeate the metal diaphragm and form hydrogen molecules again within the diaphragm.

Preventative Measures
Wetted surfaces of the diaphragm that include welded parts are gold plated, thereby preventing adsorption of hydrogen atoms.

2. Electrochemical Hydrogen Permeation

Mechanism
Mainly in seawater processing plants and the like, where the diaphragm material and the cover flange material are different, the combination of different metals causes a localized battery effect which results in hydrogen molecules dissociating into hydrogen atoms, permeating the flange, and forming hydrogen molecules again within the diaphragm.

Preventative Measures
To prevent the localized battery effect responsible for hydrogen formation, the following measures are used:
- The diaphragm and cover flange are made of the same material (316 SST).
- The diaphragm surface is coated with an insulating FEP.

These devices are used in various applications in combination with pressure / differential pressure transmitters.
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