



SMART TRANSMITTERS : Differential | Gauge | Absolute | Temperature | Flow | Level

## Introduction



Autrol America Inc., (AAI) is a global leader in "smart" pressure, differential pressure & temperature transmitters. AAI offers a full range of Autrol smart transmitters for high accuracy process temperature, Gauge, Absolute, Vacuum and Differential pressure, DP flow & tank level measurements.

Autrol Smart Transmitters from AAI are "intelligent" microprocessor-based "smart" transmitters that feature 2-wire loop powered 4 to 20mA analog current outputs & "digital" HART communication(s) for online pressure, differential pressure & temperature measurements in Water & Wastewater, Chemicals & Petrochemical, Oil & Gas, Pulp & Paper, Food & Beverage, Pharmaceutical, Energy & Power, Biofuels & Alternate Fuel processes.

The ATT2100, APT3100 and APT3200 series of smart transmitters have excellent stability, high accuracy and include features that facilitate easy installation, start up and minimum maintenance thereby lowering process downtime and overall cost of ownership in the long run. Autrol transmitters are equipments with analog (4/20mA- 2 wire) and digital (HART or Foundation Fieldbus) communication protocols for seamless integration with a host Control System such as DCS, PLC, SCADA, AMS, PDM and/or Hand Held Communicator(HHC). Using Digital HART Protocol, one can easily acquire process measured variables, configure and modify its various Parameters like Range, Tag Name, Damping, Transfer Function, Trimming etc. These transmitters are equipped with an automatic temperature compensation function integrated into its advanced signal processing circuitry to ensure high reliability performance and stability.



Salient features include:-

**1. TRUE SMART :** The heart of Autrol smart transmitter is a microprocessor - based high performance module. In addition, each transmitter is ambient temperature characterized using state-of-art technologies to ensure maximum transmitter accuracy and minimized drift over a wide range of operating temperatures.

For integrated sensor models such as the APT3100 series transmitters the characteristics data of its sensor are stored in an internal non-volatile EEPROM to minimize measuring error. On non sensor transmitter models such as the ATT2100 temperature transmitters, it has a linearization table built in wherein the user can modify various necessary values in field per the added temperature sensor (RTD or T/C) characteristics to get better accuracy from the overall measurement system. Its integral microprocessor module then automatically converts the required value referring to the customized linearization table.

All transmitters include advanced self diagnostic functions for detecting any malfunctions of the sensor and/or fault of the A/D converter, internal memory and microprocessor. All diagnostic/error status is transmitted to a connected Master by analog current signal (fail mode current 3.75mA or 22mA) or digital HART (or FF) communication.

The transmitters has Last Value Status ( L V S ) function for safety of instrumentation. When the sensor input is out of specification, the output is fixed to the previous value and automatically updated to the current value when normal is restored. On the other had If abnormal status of sensor is and not reset during the defined interval, the fault is recognized as a sensor failure & reported accordingly for corrective action.

**2. OPEN ARCHITECTURE :** Using a Device Master ( AMS, PMD etc) or a hand-held terminal, PC configuration program or HART Compatible DCS, PLC or SCADA the user can change, modify and review parameters of smart transmitter through HART communication. These functions provide convenience to users for routine transmitter calibration and maintenance.

**3. FIELD PROGRAMMABLE :** All Autrol transmitters have a fully programmable front panel from which users can directly input values (e.g. range, zero/span, sensor type, thermocouples, RTD and mV , perform basic bench calibration, zero trimming etc) to reduce cost of installation and commissioning eliminating need of a additional configuration tools. This allows for lower overheads and operating costs.

## Approvals



# Autrol Smart Process Instrumentation Series

**APT3100**



Smart Pressure Transmitter for Differential / Gauge / Absolute / Flow / HighLine Pressure Measurement

**APT3100L**



Smart Transmitter with Diaphragm Seal for level or flow measurements

**APT3200**



Smart Pressure Transmitter for Gauge / Absolute Pressure Measurement

**APT3200L**



Smart Gauge Pressure Transmitter with Diaphragm Seal

**APT3700N**



Smart Pressure Transmitter for Nuclear Service (Differential / Gauge / Absolute)

**ATT2100**



Smart Transmitter for Temperature Measurement

**ATT2200**



Smart Transmitter for Temperature Measurement (DIN Rail Type)

**MANIFOLD**



Gauge Root, and 2W/3W/5W Manifold Valve

## Description

The Smart Transmitter Series of **AUTROL®** Duon System is a microprocessor-based smart transmitter that features 2-wire digital communication with 4 to 20mA current loop and remote digital HART communication. These smart transmitters have excellent stability, high accuracy, convenient installation and easy maintenance. It can communicate with various Control Systems (such as DCS, PLC, PC and 275 or 375 Communicator) through Digital HART Protocol to acquire process measured variable, configure/ modify various parameters. It has automatic temperature compensation function to ensure high reliability, stability and performance corresponding to change of ambient temperature.

## Electrical / Performance Specifications (\* Please Refer to Individual Specifications)

Power Supply	11.9 ~ 45 Vdc	Output Signal	4 ~ 20 mA dc / HART
HART Loop Resistance	250 ~ 550 ohm	Isolation	500 Vrms (707 Vdc)
Reference Accuracy (For APT3100 Series)	$\pm 0.075\%$ of Span (0.1URL ≤ Span ≤ URL) $\pm [0.025 + 0.005 \times (\text{URL}/\text{Span})]\%$ of Span (0.01URL ≤ Span < 0.1URL)	Ambient Temperature	-45** ~ +85 °C
		LCD Meter Ambient Temp.	-30 ~ +80° C
		Humidity Limits	5% ~ 100 % RH
Ambient Temp. Effect	$\pm [0.019\% \text{URL} + 0.125\% \text{Span}] / 28^\circ\text{C}$	Process Temperature Limits	-45** ~ + 120°C

\*\* Lower temperature restrictions may apply based on local approval agencies for hazardous area installations. Please check relevant approval certification for applicable operating limits.



# Smart Transmitter for Differential / Gauge / Absolute / HighLine Pressure Measurement

## APT3100



### Function

- Flexible Sensor Input: DP, GP, AP, HP, F
- Various Output: 4 ~ 20mA, Digital Signals
- Internal magnetic push buttons for configuration of : Zero/Span, Trim, Unit, Fail-mode, etc.
- Self Diagnostic Function: Sensor, Memory A/D Converter, Power, etc.
- Digital Communication with HART protocol
- Explosion-proof Approval & Intrinsic Safety Approval : KOSHA, KTL, CSA, FM, ATEX, GOST
- 5 Digit LCD: Programmable pressure and engineering units flow level, etc auto ranging or user defined resolution,

### Features

- **Superior Performance**
- High Reference Accuracy:  $\pm 0.075\%$  of Calibrated Span (\*Specially  $\pm 0.04\%$ )
- Long-Term Stability
- High Rangeability (100 : 1)
- **Flexibility**
- Data Configuration with HART Configurator
- Zero Point Adjustment
- **Reliability**
- Continuous Self-Diagnostic Function
- Automatic Ambient Temperature Compensation
- Fail-mode Process Function
- EEPROM Write Protection
- CE EMC Conformity Standards (EN50081-2, EN50082-2)
- Linear or Square root outputs (user programmable)

## Smart Transmitter For Pressure Measurement

### APT3100-D/G/A/H/F



- **APT3100-D**  
Differential Pressure Measurement  
Calibrated Span: Min 0.30 H<sub>2</sub>O  
Max 1000 psiD  
Static Pressure: 13.79 MPa / 2000 psig
- **APT3100-G**  
Gauge Pressure Measurement  
Range: Lower Limit :- 0.20psig  
Upper Limit :- 6000psig
- **APT 3100-A**  
Absolute Pressure Measurement  
Range: 0 psiA to 362.5 psiA
- **APT 3100-H**  
HighLine Pressure Measurement  
Static Pressure: 31.02 Mpa / 4500 psi
- **APT 3100-F**  
Flow Transmitter  
Measures and expresses Flow rate  
Secondary Pulse output for use with a user defined pulse / volume factor for driving an external counter / totalizer

### APT3100-MP



### Type and Specification

- **APT3100-MP**  
Multi-Planar Pressure Transmitter
- For Differential / Gauge / Absolute Pressure Measurement
- Easy installation regardless fluid line conditions
- Vertically Installed without adaptor or various types of brackets regardless of the position of each fluid inflow line
- Direct replacement for coplanar style design

\* Please Refer to Individual Specification For Detail



# Smart Pressure Transmitter with Diaphragm Seal

## APT3100L



### Function

- Flexible Sensor input: Measuring hydrostatic pressure head and transmitting liquid level
- Various output: 4~20mA(Analog), Digital Signals
- Automatic Compensation of Ambient Temperature
- Integral Magnetic push buttons for configuration of: Zero/Span, Fail-mode, Unit, Trim, etc.
- Self Diagnostic Function: Sensor, A/D Converter, Memory, Power, etc
- Digital Communication with HART protocol
- Explosion-proof Approval & Intrinsic Safety Approval: KOSHA, ITEL, CSA, FM, ATEX, GOST
- 5 Digit LCD: Programmable pressure and engineering units flow level etc, auto ranging or user defined resolution.

### Features

- **Superior Performance**
  - High Reference Accuracy
  - Long-Term Stability
- **Flexibility**
  - Data Configuration with HART Configuration
  - Zero Point Adjustment
- **Reliability**
  - Continuous Self-Diagnostic Function
  - Automatic Ambient Temperature Compensation
  - Fail-mode Process Function
  - EEPROM Write Protection
  - CE EMC Conformity Standards (EN50081-2, EN50082-2)
  - Linear or Square root outputs (user programmable)

## Smart Transmitter with Diaphragm Seal

### APT3100-L Direct Mount Type



#### Type and Specification

- Flush Diaphragm Seal and Direct Mount Type Transmitter
- Extended Diaphragm Seal and Direct Mount Type Transmitter

### APT3100-L Capillary Type (Two Remote)



- Flush Diaphragm Seal and Capillary Type Transmitter (Two remote Seal)
- Extended Diaphragm Seal and Capillary Type Transmitter (Two remote Seal)

### APT3100-L Capillary Type (One Remote)



- Flush Diaphragm Seal and Capillary Type Transmitter (One remote Seal)
- Extended Diaphragm Seal and Capillary Type Transmitter (One remote Seal)

# Smart Transmitter for Gauge / Absolute Pressure Measurement

## APT3200



### Function

- Flexible Sensor Input: GP, AP, Vacuum
- Various Output: 4 ~ 20mA, Digital Signals
- Internal magnetic push buttons for configuration of : Zero/Span, Trim, Unit, Fail-mode, etc.
- Self Diagnostic Function : Sensor, Memory A/D Converter, Power, etc
- Digital Communication with HART protocol
- Explosion-proof Approval & Intrinsic Safety Approval: KOSHA, KTL, CSA, FM, ATEX, GOST
- 5 Digit LCD: Programmable pressure and engineering units flow level, etc auto ranging or user defined resolution.

### Features

- **Superior Performance**
  - High Accuracy:  $\pm 0.075\%$  of Calibrated Span
  - Long-Term Stability
  - High Rangeability (100:1)
- **Flexibility**
  - Measuring GP, AP
  - Data Configuration with HART Configuration
- **Reliability**
  - Continuous Self-Diagnostic Function
  - Automatic Ambient Temperature Compensation
  - Fail-mode Process Function
  - EEPROM Write Protection
  - CE EMC Conformity Standards (EN50081-2; EN50082-2)
  - Linear or Square root outputs (user programmable)

\* Please contact us before order for detailed certificate

## Smart Transmitter for Pressure Measurement

### APT3200-G



### Type and Specification

- **APT3200-G**  
Gauge Pressure Transmitter
- **Range(Model G)**  
Range Code #3 (-14.5 to 21.7 psig)  
#4 (-14.5 to 217.5 psig)  
#5 (0 to 725 psig)  
#6 (0 to 3625 psig)  
#7 (0 to 8702 psig)

### APT3200-A



### Type And Specification

- **APT3200-A**  
Absolute Pressure Transmitter
- **Range(Model A)**  
Range Code #3 (0 to 36.2 psia)  
#4 (0 to 217.5 psia)  
#5 (0 to 362.5 psia)



# Smart Transmitter with Diaphragm Seal for Pressure Measurement

## APT3200L

### Function

- Flexible Sensor Input: GP, AP, Vacuum
- Various Output: 4~20mA, Digital Signals
- Integral Magnetic push buttons for configuration of: Zero/Span, Trim, Unit, Fail-mode, etc
- Self Diagnostic Function: Sensor, Memory A/D Converter, Power, etc
- Digital Communication with HART protocol
- Explosion-proof Approval & Intrinsic Safety Approval: KOSHA, KTL, CSA, FM, ATEX, GOST
- 5 Digit LCD: Programmable pressure and engineering units flow level etc; auto ranging or user defined resolution.

### Features

- **Superior Performance**
  - High Accuracy
  - Long-Term Stability
- **Flexibility**
  - Data Configuration with HART configurator
- **Reliability**
  - Continuous Self-Diagnostic Function
  - Automatic Ambient Temperature Compensation
  - Fail-mode Process Function
  - EEPROM Write Protection
  - CE EMC Conformity Standards (EN50081-2, EN50082-2)
  - Linear or Square root outputs (user programmable)

\* Please contact us before order for detailed certificate



## Smart Transmitter with Diaphragm Seal

APT3200-L Direct Mount



APT3200-L Capillary Type



APT3200-L Triclamp Type



### TYPE and SPECIFICATION

- |   |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li>• Flush Diaphragm Seal and Direct Mount Type Transmitter</li> <li>• Please Refer to Individual Specification For Detail</li> </ul> | <ul style="list-style-type: none"> <li>• Flush Diaphragm Seal and Capillary Type Transmitter</li> <li>• Please Refer to Individual Specification For Detail</li> </ul> | <ul style="list-style-type: none"> <li>• Flush Diaphragm Seal with Triclamp Type Transmitter</li> <li>• Please contact us before order for detailed specification</li> </ul> |
|---|--|--|

### SPECIAL PERFORMANCE TYPE

- Available for Special Performance Type Transmitters on order basis
- For Paper, Beverage, Glass, Desulfuration, Petrochemistry Industry



# Smart Transmitter for Nuclear Service

## APT3700N - For Nuclear Service

### Description of Product

The APT3700N Smart Pressure Transmitter is a micro-processor based high performance transmitter, which has flexible pressure calibration and output, automatic compensation of ambient temperature and process variable, configuration of various parameters and communication with HART protocol.

### Performance Specifications

- **Quality Assurance Program**

In accordance with KEPIC-QAP & KEPIC-EN

- **Nuclear Cleaning**

To 1 ppm chloride content

- **Hydrostatic**

All Transmitters are tested for a minimum of 10 minutes at 1.5 times the design pressure with no detectable leakage.

- **Seismic**

Accuracy within  $\pm 0.25\%$  of upper range limit during and after seismic disturbance of 1 SSE and 5 OBE.

- **Class 1E safety related Applications**

Seismic test: IEEE Std 344-1987 at 5 OBE and 1 SSE response spectrum

Environment test: IEEE Std 323-1983 ( Thermal, Radiation, Functional Aging )

EMI / RFI Test: MIL-STD-461D & 462D, RG 1.180, IEC61000-4-2 ( EMC, ESD, EFT/Burst, Surge)



### Function

- Flexible Sensor Input: DP, GP, AP, Vacuum
- Various Output: 4 ~ 20mA, Digital Signals
- Self Diagnostic Function: Sensor, Memory A/D Converter, Power, etc
- Qualified per IEEE Std 344-1987 and IEEE Std 323-1983, Regulatory Guide 1.180
- 5 Digit LCD: Programmable pressure and engineering units flow level etc., auto ranging or user defined resolution.

### Features

- **Superior Performance**
  - High Reference Accuracy:  $\pm 0.075\%$  of Calibrated Span
  - Long-Term Stability:  $\pm 0.25\%$  URL per 24 months
  - High Rangeability ( 100 : 1 )
- **Flexibility**
  - Data Configuration with HART Configurator
  - Zero Point Adjustment & Suppression
- **Reliability**
  - Continuous Self-Diagnostic Function
  - Automatic Ambient Temperature Compensation
  - Fail-mode Process Function
  - EEPROM Write Protection
- **Equipment Qualifications**
  - Environmental Qualification
  - Series Qualification and EMI / REI Test
  - Linear or Square root outputs (user programmable)

### TYPE and SPECIFICATION

- **APT3700N-D** Differential Pressure Measurement  
Range : - 0.21psi to 1000psi    Static Pressure : 13.79 MPa/2000psi
- **APT3700N-G** Gauge Pressure Measurement  
Range : - 14.7psi to 6000psi    Static Pressure : 13.79 MPa/2000psi
- **APT 3700N-A** Absolute Pressure Measurement  
Range : - 0psi to 290psi
- **APT 3100N-H** HighLine Pressure Measurement  
Range : - 5.4psi to 6000psi    Static Pressure : 31.02 MPa/4500psi

# Smart Temperature Transmitter

## ATT2100

### Description of Product (ATT2100 / ATT2200)

The ATT2100, ATT2200 Smart Temperature Transmitter is a microprocessor-based high performance transmitter, which has flexible sensor input and output, automatic compensation of ambient temperature and process parameters, configuration of various parameters, and communication with HART protocol. All Data of Sensor (Tag No., type, range etc.) is to be input, modified and stored in EEPROM.



### Features (ATT2100 / ATT2200)

- **Superior Performance**
  - Excellent Accuracy
  - Long-Term Stability
- **Flexibility**
  - Selection of various T/C, RTD, mV, Ohm
  - Data Configuration with HART configurator
- **Reliability**
  - Automatic Compensation; Linearization of sensor input, Ambient temperature compensation
  - Continuous Self Diagnostic
  - Fail-mode Process function
  - EEPROM Write Protection
  - I/O Isolation : Grounded Thermocouple
  - CE EMC Conformity Standards (EN50081-2, EN50082-2)

## ATT2200

### Sensor Inputs (ATT2100 / ATT2200)

#### • Sensor Inputs

The model ATT 2100, ATT 2200 is compatible with a various of temperature sensors, including 2W, 3W, 4Wire RTDs, thermocouples, and other resistance and millivolt inputs (see individual specification).

#### < Input Sensor Types >

- RTD: 2W, 3W, 4Wire
- Thermocouple: B, E, J, K, N, R, S, T type
- mV: (-10 to 75mV)
- Ohm: (0 to 430 ohm)
- Dual Sensor Input (option)

### Function (ATT2100 / ATT2200)

- Flexible Sensor input: RTD, T/C, mV, Ohm
- Various output: 4 ~ 20mA (Analog), Digital Signals
- Automatic Compensation by Linearization table in which user can modify the various values
- Automatic Compensation of Ambient Temperature
- Setting Various Parameters: Zero/Span, Unit, Fail-mode, Trim, etc.
- Self Diagnostic Function: Sensor, A/D Converter, Memory, Power, etc.
- Digital Communication with HART protocol
- Flameproof Approval and Intrinsic Safety Approval (ATT2100): KOSHA, KTL, CSA, ATEX



DIN Rail Type



# Manifold Valve and Hand Held Communicator

## Manifold

### Instrument Manifolds

#### Flange Type Manifold V/V



- **VBR56-2V-8N-F/R**

Block and Bleed  
2 valve Remote Mount Manifold  
Pipe to pipe female NPT  
Bleed port female NPT

- **VBR56-3V-8N-F/R**

Block and Equalizer  
3 valve Remote Mount Manifold  
Pipe to pipe female NPT  
Bleed port female NPT

- **VBR56-5V-8N-F/R**

Block, Equalizer and Bleed  
5 valve Remote Mount Manifold  
Pipe to pipe female NPT  
Bleed port female NPT

#### Remote Type Manifold V/V



\* Every Manifold & Gauge Root Valve is tested with the nitrogen @ 1000 psig (69 bar) for leakage at the seat to a maximum allowable leak rate of 0.1 scc/min

## AUTROL HAND HELD COMMUNICATOR

### ACONF-312 UMPC COMMUNICATOR



OS : WIN XP

AUTROL ACONF-321 UMPC



AUTROL STT20 SOFTWARE FOR UMPC

AUTROL<sup>®</sup> Series

AUTROL<sup>®</sup>  
Transmitter  
Configurator V2



HART MODEM

### OTHER AVAILABLE HART HAND HELD COMMUNICATOR

• 275 Field communicator, 375 Field communicator, MFC 4100 HART communicator



AUTROL



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