

# AUTROL®

**HART**  
COMMUNICATION PROTOCOL

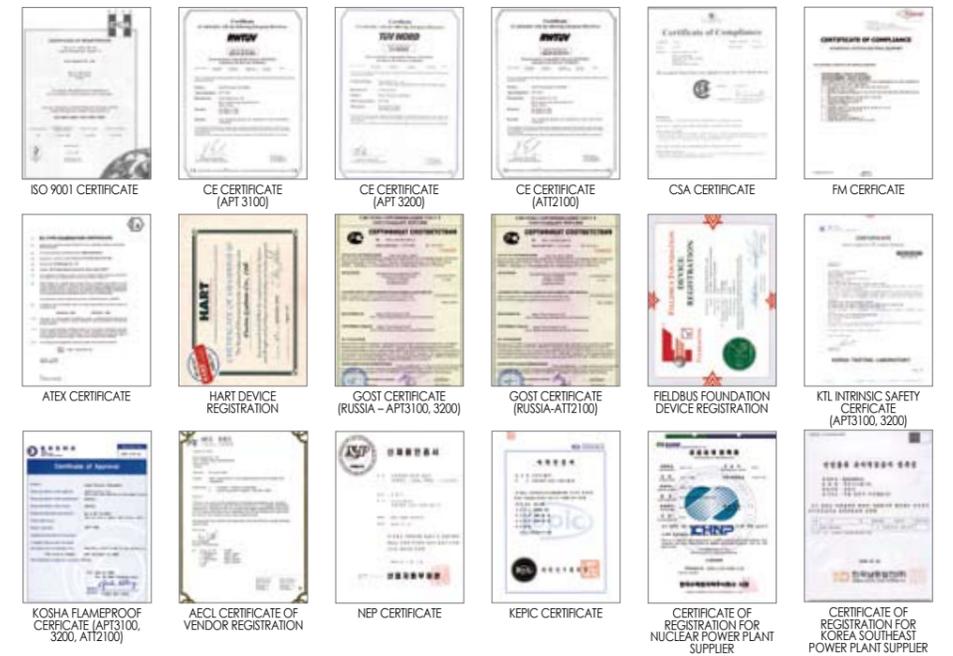


# Smart Pressure / Temperature Transmitter

# CEO Greeting



## Quality Certification



## Dear customers,

Since it was established in May 1989, our company has focused on development of DCS market, a core of instrument industry, and we have performed successfully about 70 projects in various fields like Electricity Generation, desulfuration, petrochemistry, steel, food & beverage, water controlling, semi-conductor, glass, subway, etc.

However, we could not forget our dream to develop our own technologies and products that can represent Korea in the world. And, since we started the research with passion on 1995, we were finally successful to develop a transmitter with brand of **AUTROL®** with achieving CE Mark in 2001.

**AUTROL®**, were developed with our own technologies and now it is an obvious proud of Korea instrumental industry in the world. **AUTROL®** supporting Hart Protocol, has achieved several countries' quality certificates like NEP, EM, KOSHA, KTL, ATEX, FM, CSA, KEPIC, GOST, etc. with several patents in Korea and overseas based on a relative error 0.075%. And now **AUTROL®** entered into the second takeoff stage.

In the meantime, I and Duon System family will not satisfy by ourselves for the past results and your applause, but we promise that we will do our best to be a leader in the world general instrument industry based on more active investment on R&D and customer satisfaction.

Duon System Co.,Ltd.  
 CEO **Kim Young-Soo** 

## Major Customers



# Autrol Smart Process Instrumentation Series

# APT3100

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

**APT3100**



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

**APT3100L**



Smart Transmitter with Diaphragm Seal for Pressure Measurement

**APT3200**



Smart Pressure Transmitter for Gauge / Absolute Pressure Measurement

**APT3200L**



Smart 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



### Function

- Flexible Sensor Input: DP, GP, AP, HP
- Various Output: 4 ~ 20mA, Digital Signals
- Setting Various Parameters: 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: Express all pressure unit and flow unit, Use 5 digit for measured value.

### 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)

### Description

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

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

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 $\leq$ Span $\leq$ URL) $\pm [0.025 + 0.005 \times (\text{URL}/\text{Span})]\%$ of Span (0.01URL $\leq$ Span $<$ 0.1URL)	Ambient Temperature	-40 ~ +85 °C
Ambient Temp. Effect	$\pm [0.019\% \text{URL} + 0.125\% \text{Span}] / 28^\circ\text{C}$	LCD Meter Ambient Temp.	-30 ~ +80 °C
		Humidity Limits	5% ~ 100% RH
		Process Temperature Limits	-40 °C ~ +120 °C

## SMART TRANSMITTER FOR PRESSURE MEASUREMENT

**APT3100-D/G/A/H**



### TYPE and SPECIFICATION

- **APT3100-D**  
Differential Pressure Measurement  
Calibrated Span: Min 0.075 Kpa  
Max 41370 Kpa
- **APT3100-G**  
Gauge Pressure Measurement  
Range: Lower Limit -100 Kpa  
Upper Limit 41370 Kpa
- **APT 3100-A**  
Absolute Pressure Measurement  
Range: 0 Kpa to 2000 Kpa
- **APT 3100-H**  
HighLine Pressure Measurement  
Static Pressure: 31.02 Mpa / 4500 psi

**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

\* 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
- Setting Various Parameters: 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, KTL, CSA,FM, ATEX, GOST
- 5 Digit LCD: Express all pressure unit and flow unit, Use 5 digit for measured value.

### Features

- **Superior Performance**
  - High Reference Accuracy
  - Long-Term Stability
- **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)

# Smart Transmitter for Gauge / Absolute Pressure Measurement

## APT3200



### Function

- Flexible Sensor Input: GP, AP, Vacuum
- Various Output: 4 ~20mA , Digital Signals
- Setting Various Parameters: 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: Express all pressure unit and flow unit, Use 5 digit for measured value

### Features

- **Superior Performance**
  - High Accuracy:  $\pm 0.075\%$  of Calibrated Span (\*Specialy  $\pm 0.04\%$ )
  - Long-Term Stability
  - High Rangeability (100:1)
- **Flexibility**
  - Measuring GP,AP
  - 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)

\* Please contact us before order for detailed certificate

## 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 PRESSURE MEASUREMENT

APT3200-G



### TYPE and SPECIFICATION

- **APT3200-G**  
Gauge Pressure Transmitter
- **Range(Model G)**

Range Code #4	-100 ~ 1,000 Kpa
#5	0 ~ 5,000 Kpa
#6	0 ~ 20,000 Kpa
#7	0 ~ 60,000 Kpa

APT3200-A



### TYPE and SPECIFICATION

- **APT3200-A**  
Absolute Pressure Transmitter
- **Range(Model A)**

Range Code #4	0 ~ 200 Kpa
#5	0 ~ 1,000 Kpa
#6	0 ~ 2,000 Kpa

# AUTROL® Smart Transmitter with Diaphragm Seal for Pressure Measurement

## APT3200L

### Function

- Flexible Sensor Input: GP, AP, Vacuum
- Various Output: 4 ~20mA , Digital Signals
- Setting Various Parameters: 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: Express all pressure unit and flow unit, Use 5 digit for measured value.

### 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)

\* 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 As Order Basis
- For Paper, Beverage, Glass, Paper, 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, communication with HART protocol. The application is very various, as measuring pressure, flow and level by application method.

### 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 10minutes 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: Express all pressure unit and flow unit, Use 5 digit for measured value.

### 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 / RFI Test

### TYPE and SPECIFICATION

- **APT3700N-D** Differential Pressure Measurement  
Calibrated Span: Min 0.075 Kpa Max 41370 Kpa
- **APT3700N-G** Gauge Pressure Measurement  
Range: Lower Limit -95 Kpa Upper Limit 41370 Kpa
- **APT 3700N-A** Absolute Pressure Measurement  
Range: 0 Kpa to 2000 Kpa
- **APT 3100N-H** HighLine Pressure Measurement  
Static Pressure: 31.02 Mpa / 4500 psi



## ATT2100



### Description of Product (ATT2100 / ATT2200)

The ATT2100, 2200 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, 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, 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 ~ 75mV
  - Ohm : 0 ~ 430 Ω
  - 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 necessary 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



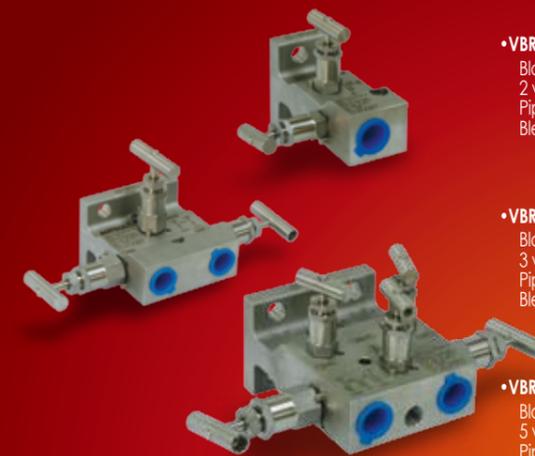
**DIN Rail Type**

\* Please contact us before order for detailed certificate

## 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 @ 100 psig (68 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® Sereis  
AUTROL®  
Transmitter  
Configurator V2



HART Modem

### OTHER AVAILABLE HART HAND HELD COMMUNICATOR

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

# Company History

- 1989** • Incorporated as Korea WAD System
- 1990** • Registered Trade Business License at Korea International Trade Association / Joined technical partnership with WESTINGHOUSE, USA / Registered to factory office at Korea Industrial Export Association
- 1991** • Registered to qualified Bidder for Foreign Materials of Public Procurement Service
- 1992** • Registered to qualified Bidder for Domestic Materials of Public Procurement Service / Registered to qualified Bidder to KEPCO (Korea Electric Power Corporation)
- 1996** • Designated as a manufacturing company for power generating components of KEPCO
- 1998** • Registered R&D Center at the Korean Government / Registered HART Communication Foundation
- 1999** • Renamed DUON SYSTEM CO., LTD. / Supplied power generating components of KEPCO
- 2000** • Appointed as Venture Estimation Excellent Company by Medium and Small Enterprises Promotion Public Corporation and Small Business Administration
- 2001** • Main Business Center and Factory moved to the current place, (60-31, Gumcheon-gu, Gasan-dong, Seoul, Korea) / Excellent Technology Company designated by Industrial Bank of Korea
- 2002** • Eamed CE Mark in EMC from RWTUV KZ-01-E-01301, KZ-01-E-01311)  
Qualified NT (Transmitter : Agency for Technology and Standards of Ministry of Commerce, Industry and Energy)
- 2003** • The prime minister commendation at a National Small & Medium Business Association Conference Awarded at the first of Safety Instruments Examination (APT-3100: Korea Occupational Safety & Health Agency) Obtained ISO 9001 2000 Version (for Transmitter Division /EAQA)  
Registered a patent (The Korean Intellectual Property Office, Registration # 0397425 : Look Up Table Automatic Generation Device & Controlling Method)  
APT-3200 Manufacturing Approval (2003.12.20~2008.10.19 / Korea Occupational Safety & Health Agency)  
APT-3200 Manufacturing Approval (2004.02.05~2009.02.04 / Intrinsically safe / KTL)
- 2004** • Certificated of KEPIC-EN (Duon System APT-3200)  
Certificated as the 2nd stage of maturity of Productivity
- 2005** • Management System (Ministry of Commerce, Industry and Energy)  
NEP New Product Certificate (2003.12.20~2008.10.19 / Ministry of Commerce, Industry and Energy)
- 2006** • Certificated of ATEX (APT-3100)  
Certificated of FM (APT-3100)
- 2008** • Certificated of GOST (APT-3100, APT-3200, ATT-2100)

