AUTROL®

HART COMMUNICATION PROTOCOL

Smart Pressure Transmitter

for Gauge and Absolute Pressure Measurement

MODEL

APT 3200

www.autrol.com

Duon System Co., Ltd.

Smart Pressure Transmitter

APT 3200

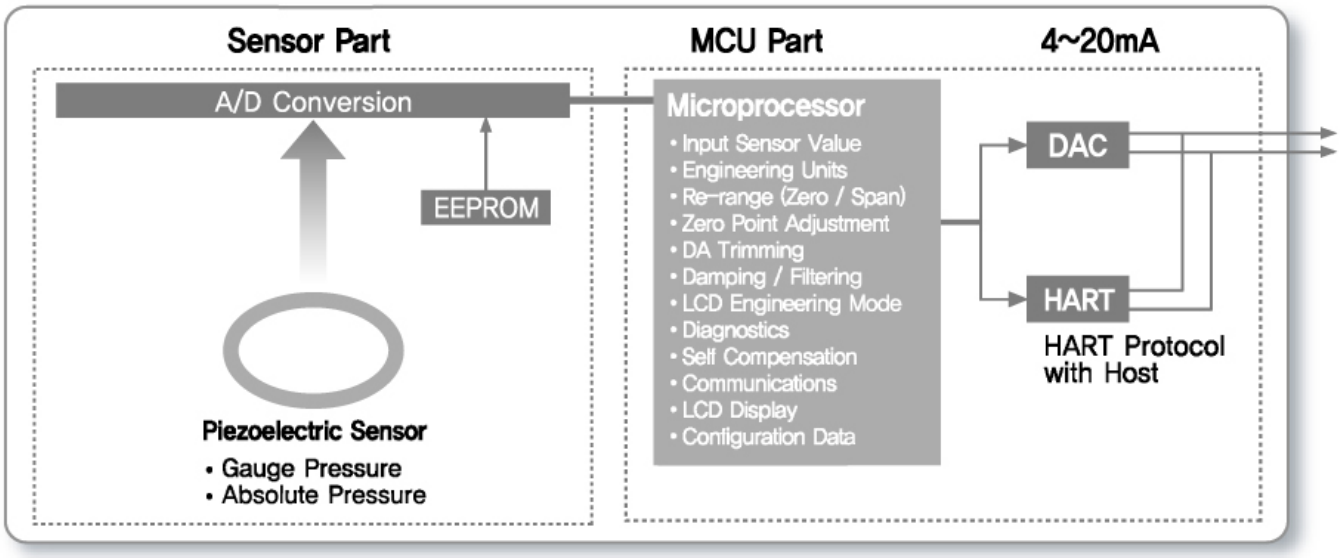
Function

- 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, ATEX, FM, GOST

Description of Product

The APT3200 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.
All Data of Sensor (Tag No., type, range etc.) is to be input, modified and stored in EEPROM.

Functional Block Diagram



* Subject to change without notice

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Features

- Superior Performance
  - High Accuracy : ±.075% of Calibrated Span (option : ±0.04% of Calibrated Span)
  - 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)

Transmitter Description

Electronics Module

The Electronics module consists of a circuit board sealed in an enclosure. There are a MCU module, an analog module, a LCD module and a terminal module in a transmitter.
The MCU module acquires the digital value from the analog module and apply correction coefficients selected from EEPROM.
The output section of the MCU module converts the digital signal to a 4~20 mA output.
The MCU module communicates with the HART-based Configurator or Control Systems such as DCS.
The power section of MCU module have a DC-to-DC Power conversion circuit and an Input/output isolation circuit.
An optional LCD module plugs into the MCU module and displays the digital output in user-configured unit.

Configuration Data Storage

The transmitters store configuration data in nonvolatile EEPROM in their electronics modules. This data is retained in the transmitter when power is interrupted, so the transmitters are functional immediately upon power-up

Sensor Inputs

The model APT3200 is available in a absolute pressure sensor of a piezo-resistive type and measures gauge and absolute pressure.
The sensor module converts the resistance to the digital value.
The MCU module calculates the process pressure based on the digital value.

The sensor modules include the following features

- 0.075% accuracy – the most accurate sensor in the industry.
- The software of the transmitter compensates for the thermal effects, improving performance.
- Precise Input Compensation during operation is achieved with temperature and pressure correction coefficients that are characterized over the range the transmitter and stored in the sensor module EEPROM memory.
- EEPROM stores sensor information and correction coefficients separately from MCU module, allowing for easy repair, reconfiguration and replacement.

Basic Setup

ATP3200 Pressure transmitter can be easily configured from any host that support the HART protocol.

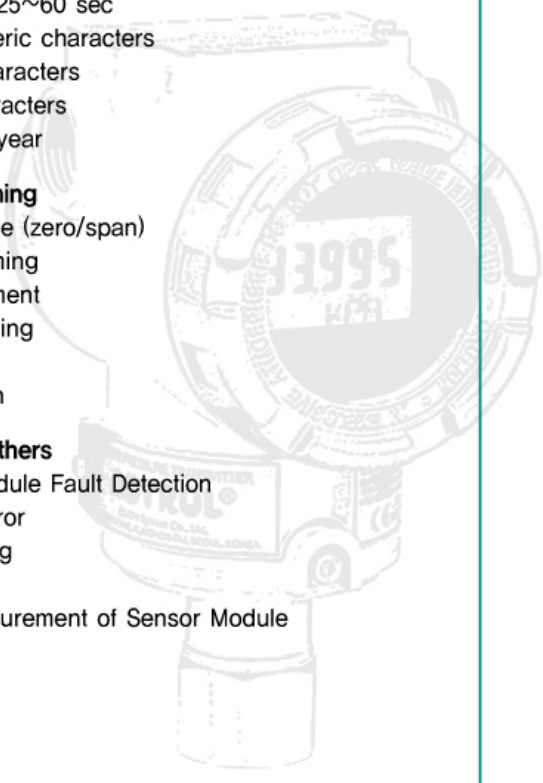
- Operational Parameters.
- 4~20mA Points (Zero/Span)
- Engineering Units
- Damping Time : 0.25~60 sec
- Tag : 8 alphanumeric characters
- Descriptor : 16 characters
- Message : 32 characters
- Date : day/month/year

Calibration and Trimming

- Lower/Upper Range (zero/span)
- Sensor Zero Trimming
- Zero Point Adjustment
- DAC Output Trimming
- Transfer Function
- Self-Compensation

Self-Diagnosis and Others

- CPU & Analog Module Fault Detection
- Communication Error
- Fail-mode Handling
- LCD Indication
- Temperature Measurement of Sensor Module



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Function

Range and Sensor Limits
• Refer to Table 1

Zero and Span Adjustment Limits
• Zero and span values can be set anywhere within the range limits stated in Table 1.
Span must be greater than or equal to the minimum span stated in Table 1

Output (Analog Current and Digital Data)
• Two wire 4~20mA user-configurable for linear. digital process value superimposed on 4~20mA signal, available to any host that conforms to the HART protocol

Power Supply & Load Requirement
• **External power supply required.**
Transmitters operate on 11.9 to 45 V dc.
* 250 ohm load-17.4 Vdc
* up to a 550 ohm load-24 Vdc
Max. Loop Resistance = (E - 11.9) / 0.022
(E = Power Supply Voltage)
• **Supply Voltage**
11.9 ~ 45 Vdc-operation
17.4 ~ 45 Vdc-HART Communications
11.9 ~ 42 Vdc-CSA Approval
• **Loop Load**
0 ~ 1500 ohm-Operation
250 ~ 550 ohm-HART Communications

EMC Conformity Standards
• EMI (Emission)-EN50081-2:1993
• EMS (Immunity)-EN50082-2:1995

Update Time and Turn-On Time
• Update Time : 0.12 seconds
• Turn-On Time : 3 seconds

Failure Mode
• Fail High : Current ≥ 21.1 mA
• Fail Low : Current ≤ 3.78 mA

Storage Temperature
• -40℃ to 85℃ (without condensing)

Process Temperature Limits
(Range codes and approval codes may effect limits)
• -40℃ to 120℃ (-40 to 248 ℉)

Isolation
Input/output isolated to 500Vrms (707 Vdc)

Overpressure Limits (silicone oil)
Model G -100 ~ 400KPA - #3
-100 ~ 4000 KPa - # 4
0 ~ 14,000KPa - # 5
0 ~ 70,000 KPa - # 6
0 ~ 80,000 KPa - # 7

Model A 0 ~ 700 KPa - #4
0 ~ 4000 KPa - # 5
0 ~ 7000 KPa - # 6

Physical Specifications

Wetted Materials
• Isolating Diaphragms - 316L SST, Monel, Tantalum, HAST-C

Non-wetted materials
• Fill Fluid - Silicone oil
• Electronics Housing - Aluminum, Flameproof and Waterproof (IP67)
• Cover O-ring - Buna-N
• Paint - Epoxy-Polyester or Polyurethane
• Mounting Bracket - 2-inch Pipe, 304 SST, Painted Carbon Steel with 304 SST U-bolt
• Nameplate - 304 SST

Process Connections
• 1/2-14 NPT Female
• 1/4-18 NPT (option)

Electrical connections
• 1/2-14 NPT conduit with M4 Screw Terminals

Weight
• 1.7 kg (excluding options)

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Function

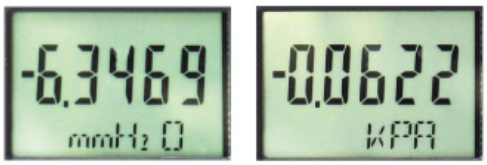
Change main parameter by Button

- Change Unit
- Change Upper range value
- Change Lower range value
- Change the Damping Second
- Select the Decimal Place
- Zero Trim
- Zero Adjustment

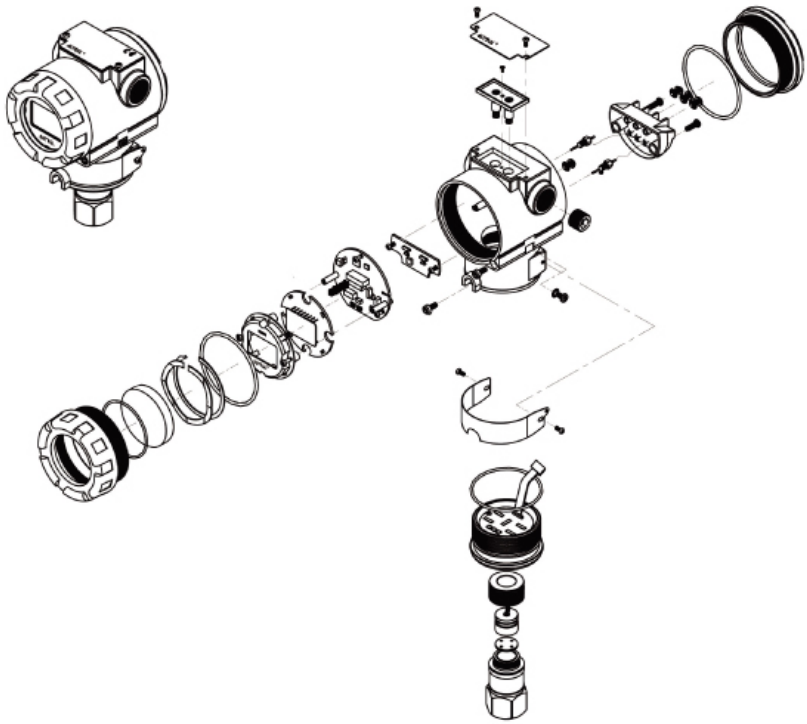
5 Digit LCD

- Express all pressure unit and flow unit.
- Use 5 digit.
- Select decimal place (0 to 4)

Moving within Menu : Zero
Moving to below Menu : Span
Moving Top Menu : Zero+Span



Exploded drawing of APT3200



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General Specifications

1. APT3200 – G/A Pressure Sensor Range (Rangeability = 100:1)

〈Table 1〉

	APT3200 – G		APT3200 – A	
	Range (KPa)	Calibrated Span (KPa)	Range (KPa)	Calibrated Span (KPa)
3	–100 ~ 150	1.5 ~ 150	NA	NA
4	–100 ~ 1,500	15 ~ 1,500	0 ~ 250	2.5 ~ 250
5	0 ~ 5,000	50 ~ 5,000	0 ~ 1,500	15 ~ 1,500
6	0 ~ 25,000	250 ~ 25,000	0 ~ 2,500	25 ~ 2,500
7	0 ~ 60,000	600 ~ 60,000	NA	NA

2. Electrical Specifications

Power supply	11. 9 ~ 45 V dc	Output Signal	4 ~ 20 ma dc / HART
HART Loop Resistance	250 ~ 550 ohm	Isolation	500 Vrms (707 Vdc)

3. Performance Specifications

Reference Accuracy	**APT3200 – G/APT 3200 – A** ± 0.075% of Span (0.1URL≤Span ≤URL) ± [0.025+0.005x(URL/Span)]% of Span (0.01URL≤Span〈0.1URL)	Ambient Temperature	–40℃ ~ +85℃
		LCD Meter Ambient Temp	–30℃ ~ + 80℃
		Humidity Limits	5% ~ 98% RH
Ambient Temp. Effect	**APT3200 – G/APT 3200 – A** ± [0.019%URL+0.125% Span] / 28℃	Process Temp. Limit	–30℃ ~ +100℃
		Power Supply Effect	± 0.005 % of Span per Volt
		Stability	**APT3200–G/APT3200 – A** ± [0.125%URL for 12 months

4. Physical Specifications

Isolating Diaphragm	316L SST	Process Connection Size	1/2 – 14 NPT Female
Electronic Housing	Aluminum(Option : SST)	Electrical Connections	1/2 – 14 NPT with M4
Housing Class	Water proof(IP67)	2" Pipe Stanchion Type Bracket	Angle or Flat type
		Weight (excluding options)	1.7 kg

5. Hazardous Location Certifications (option)

Korea Standards Approval	CSA (Canadian Standards Association) Approval
Flame proof Approval : Exd IIC T6 (KOSHA) Intrinsic Safety Approval : Exia IIC T5 (KTL)	FM Explosion proof Approval ATEX Flame proof Approval

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Ordering Information

MODEL	Code	Description			
APT3200	-G	Gauge Pressure Transmitter (reference accuracy : 0.075 % of span)			
	-A	Absolute Pressure Transmitter (reference accuracy : 0.075 % of span)			
Range		G		A	
		Range (KPa)	Min.Span (KPa)	Range (KPa)	Min. Span (KPa)
	3	-100 ~ 150	1.5	NA	NA
	4	-100 ~ 1,500	15	0 ~ 250	2.5
	5	0 ~ 5,000	50	0 ~ 1500	15
	6	0 ~ 25,000	250	0 ~ 2500	25
	7	0 ~ 60,000	600	NA	NA
	X	Special			
Mounting Flange Material		DIAPHRAGM		OTHER	
	M11	316 SST		316 SST	
	*M12	HAST-C		316 SST	
	*M13	Tantalum		316 SST	
	*M21	HAST-C		HAST - C	
Hazardous Location Certifications	K0	Maker Standard (Waterproof : IP67)		*E1	ATEX(KEMA) Flameproof
	K1	KOSHA Flame proof Approval : Exd IIC T6		*E2	ATEX(KEMA) Intrinsic Safety
	K2	KTL Intrinsic Safety Approval : Exia IIC T5		*F1	FM Explosion proof
	*F2	FM Intrinsic Safety			
Fill Fluid	1	Silicone			
	*2	Inert fill			
Process Connection	S	1/2 - 14 NPT Female (standard)			
	O	1/4 - 18 NPT Female (adapter)			
	X	Special			
Electrical Connection	1	1/2-14NPT			
	2	G1/2			
	X	Special			
Option	M1	LCD Indicator		LP	Lighting Protector
	C6	Engineering Unit		ET	External Terminal Block
	K	Oil Free Finish			
	2WF	2 way manifold Flange type			
	BA	Stainless Steel Bracket (Angle type) with SST Bolts			
	BF	Stainless Steel Bracket (Flat type) with SST Bolts			
	ST	Stainless Steel Housing			

Example : APT3200-G5-M11-K0-1-S-1-M1

Note 1 : Request to manufacturer for Draft Range, Absolute (small pressure and vacuum) and Items marked " * " before order.

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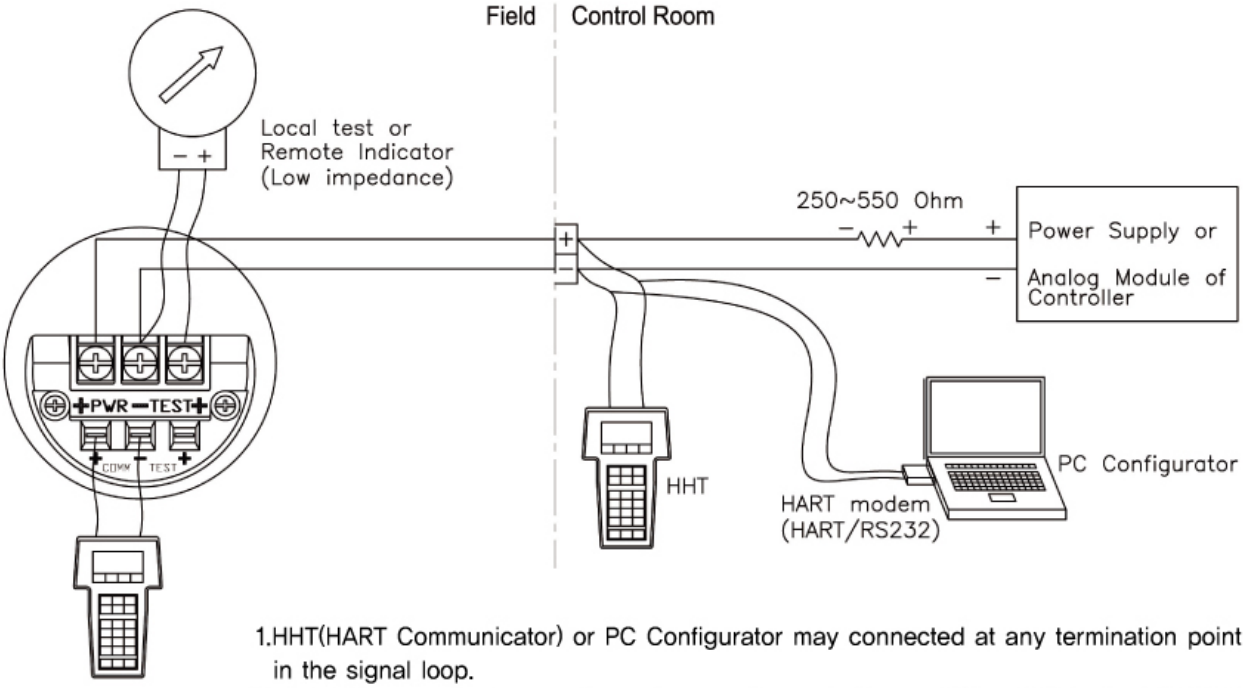
Connection Diagram of Signal, Power, HHT for Transmitter



1.HHT(HART Communicator) or PC Configurator may connected at any termination point in the signal loop.
2. HART Communication requires a loop resistance between 250 and 550 ohm @ 24 Vdc
3. Transmitter operates on 11.9 to 45.0 Vdc transmitter terminal voltage.
   [Applied Power]
   * 11.9 ~ 45.0 Vdc for General Operation
   * 17.4 ~ 45.0 Vdc for HART Communication

Dimensions of Transmitter (mm)