

**BARTON®**

# Pneumatic Transmitters and Controllers

## *Models 274A, 335A, 335P, 335T, and 338E*

The Barton® pneumatic instrument product line consists of Pneumatic Transmitters and Indicating or Recording Controllers. All are designed to meet the most stringent and demanding requirements for Oil & Gas Production, U.S. Navy Shipboard, and Process Plant applications.

The heart of the DP-driven instruments is the rugged Barton® Differential Pressure Unit (DPU) – featuring a time-proven liquid-filled bellows and torque tube design. Recording and Controlling models are also available with Pressure or Temperature actuators.

### Pneumatic Transmitters

(Standard DP and Linear-with-Flow)

- Models 274A - DP Transmitters
  - Actuated by Barton's® M199
  - Rugged, Weatherproof, Non-corrosive Case
  - Continuous Purging (pilot valve and nozzle exhaust inside)
  - Operation Span Continuously Adjustable (100 - 20%)
  - Adjustable Suppression (up to 80% of range)
  - Large Valve Relays (no need for secondary booster)
  - Span Continuously Adjustable (down to 20% of range)
  - Air Consumption (at balance condition) 0.05 scfm max.

### Actuating Units

- Barton® Pneumatic Transmitters are actuated by the M199 Differential Pressure Unit (DPU) which is also available in a NACE certified version.

### Cases

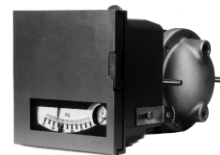
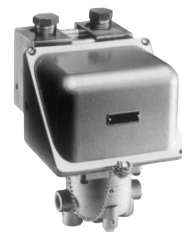
- Barton® Pneumatic Transmitters are housed in a rugged, weatherproof case especially suited for use in corrosive fume environments. Since the pilot valve and nozzle exhaust inside the case, continuous purging is achieved.

### Transmitting Unit

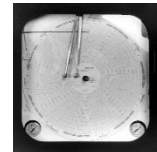
- Changes in DP are transmitted mechanically to the flapper, which covers a small constant-feed nozzle. Any change in the position of the flapper will instantly change the nozzle pressure, which in turn controls the action of the 2-valve balanced relay to increase or decrease the output air pressure.



**M274A**



**M335A**



**M338E**

A calibrated bellows assembly actuated by the output pressure serves to reposition the flapper mechanism and restore a state of equilibrium - in this manner, output air pressure varies in direct relation to the differential pressure applied to the instrument, or in direct proportion to the flow-rate. The relay is not affected by changes in output pressure and this makes it possible to maintain practically constant nozzle pressure at any output pressure.

### Operating Span/Suppression

(Linear-with-DP units only)

- The operating span is continuously adjustable from 100-20% of the DP range. Thus a unit with a differential pressure range of 0-100" w.c. can be adjusted to provide a 3-15 PSI (207 mbar-1 bar) output signal (direct or reverse) for any span from 0-20" w.c. to 0-100" w.c. (0-50 mbar to 0-248 mbar) range. The operating span can be shifted anywhere within the range of the differential pressure unit to introduce suppression up to 80% of the range.

## Specifications

- Model 274A
  - Sensitivity: 0.05% of DP range
  - Operating Span: Continuously adjustable down to 20% of standard DP range
  - Max. Suppression: Continuously adjustable up to 80% of full DP range
  - Air Consumption: 0.05 scfm maximum
  - Linearity of output signal to input differential: DP span to 150 PSI (10.3 bar) (15 PSI/1 bar for M274A), +/- 0.5% of full range output pressure
  - DP span above 150 PSI (10.3 bar) (15 PSI/1 bar for M274A), +/- 0.75% of full range output pressure

## Pneumatic Controllers

(Indicating and Recording)

- Barton® Pneumatic Controllers are available in indicating or recording models for control of DP, pressure, or temperature variables.

## Cases

- Barton® Pneumatic Controllers are housed in a rugged, weatherproof case, finished with a black epoxy resin paint – designed for hostile outdoor environments. Optional stainless steel case and door versions are available for recorder models.

## Indicating Controllers

- Models 335A - Indicating DP
  - Barton® Pneumatic Indicating Controllers are actuated by the Barton® M199 DPU. They can measure, indicate, and control DP flow, or liquid level.

- Models 335P/335T - Indicating Pressure/Temperature
  - Barton® Pressure and Temperature Indicating Controllers are actuated by a wide selection of capsular bellows or helical bourbon tube static pressure elements, and liquid or mercury-filled temperature systems to indicate, measure, and control a variety of pressure or temperature processes.

## Recording Controllers

- Models 338E - Recording DP
  - Barton® Pneumatic Recording Controllers measure, record, and control DP, flow, and liquid level. The controlled variable is recorded on a standard 12-in. circular chart. The setpoint is indicated by a red pointer on the chart. An additional pen may be added to record two additional pressures or temperatures. These instruments are actuated by the Barton® M199 (338E) DPU.

## Control Actions

(All Controllers)

- Gain (proportional) from 1 to 400% (direct or reverse) (P)
- Gain (proportional) plus Integral, adjustable from 0.02 to 70 repeats per minute (P+I)
- Gain (proportional) plus Integral plus Derivative, adjustable from 0 to 20 minutes (P+I+D)
- Differential Gap (direct or inverse), adjustable from 2 to 80% (Differential Gap is not available in recorders)

## Control Modes

(All Controllers)

- Gain Control (proportional)
  - Increases or decreases the output air pressure in proportion to the deviation of the measured value from the control point.
- Integral Control
  - Continuously adjusts the output air pressure to eliminate "offset" and maintain the process at the desired control point.
- Derivative Control
  - Acts to augment corrective action at a rate proportional to the speed with which the measured value is moving away from the control point. This type of action is used to minimize the magnitude of "offsets" as quickly as possible.
- Differential Gap Snap-Acting
  - Causes the air output pressure to change from 0 to 20 PSI (0 to 1.4 bar) or vice versa, at the edges of a span (differential gap). Within the span the output air pressure does not change until the other edge of the differential gap is reached.
- Direct or Reverse Controller Action
  - May be selected for any mode of control. Direct-acting controllers increase output pressure for an increase in the controlled variable. Reverse-acting controllers decrease output pressure for an increase in the controlled variable.

## Specifications

- Performance
  - Pilot Capacity (non-bleed relay): 3.0 SCFM with less than 0.1 SCFM bleed rate @ 9 PSI output

- Air Output: 3-15 PSIG (207 mbar - 1 bar) 6-30 PSIG optional (414 mbar - 2.1 bar)
- Temperature Limits
  - (Ambient): -40°F/°C to +180°F (+82°C)
  - Accuracy of Indication: (335A/335P/335T/336C): +/- 1.0%
  - Accuracy of DP Recording (M338E): 0-20-in. w.c. to 0-349-in. w.c. (0-50 mbar to 0-867 mbar) +/- 0.5% of full scale DP, 0-350-in. w.c. to 0-50 PSI (0-869 mbar to 0-3.4 bar) +/- 0.75% of full scale DP
  - Accuracy of Temperature Recording (M341E): up to +300°F (+150°C) +/- 1.0% of full scale
  - Accuracy of Pressure Recording (M340E) (typical w/Ni-Span-C): Helical & Bellows Elements +/- 1.0% of full scale
- Actuator
  - Model 335A (Indicating): M199 DPU
  - Model 335P (Indicating): Pressure Elements
  - Model 335T (Indicating): Thermal Elements
  - Model 338E (Recording): M199 DPU
  - Model 341E (Temperature Recording): Thermal Elements
  - Model 340E (Pressure Recording): Pressure Elements
- Temperature Elements
  - Type: Precision wound spiral, mercury-filled, case-compensated
  - Bulb: Stainless Steel, flexible neck
  - Capillary: Stainless Steel, stainless armor
- Socket: 4 to 6-in.
- Ranges: 0-100°F (40°C) 0-120°F (50°C) 0-150°F (65°C) 0-200°F (95°C) 0-300°F (150°C)
- Pressure Elements
  - Type: Precision wound helical or capsular bellows
  - Ranges: 0-30-in. Hg vacuum to 0-30,000 PSI (0-14.7 PSI/1 bar to 0-2,068 bar)
  - Receiver Element: 3-15 PSI (207 mbar to 1 bar)
- Materials
  - Helical: Ni-Span-C, SST, or Monel (6,000 PSI/414 bar maximum)
  - Bellows: Stainless Steel

### Optional Accessories

- The 2-Way Auto-Manual Bypass (indicating or recording controllers) provides the operator with a convenient means for shutting off controller air to a valve and for manually positioning the valve. The two positions offered in the bypass are: MANUAL and AUTOMATIC. Bumpless transfer can be achieved.
- The 4-Way Auto-Manual Bypass (recording controllers only) is a separately mounted sub-panel used for shutting off the controllers and for manually positioning the valve. The four positions offered are: SERVICE, TEST, MANUAL, and AUTOMATIC.

### Ordering

When ordering, please specify the following items:

#### Transmitters:

- All Models

- Model Number
- Air Supply: 20 PSI (1.4 bar) output 3-15 PSI (207 mbar - 1 bar)
- Air Connections: 1/4-in. NPT
- Mounting: Pipe or Wall
- DPU Models
  - Housing Pressure Rating (SWP)
  - Housing and Bellows Materials
  - Process Material Contacting Bellows
  - Differential Pressure Range

#### Controllers:

- All Models
  - Model Number
  - Controller Action: Gain (direct or reverse), Gain+Integral, Gain+Integral+Derivative, Differential Gap (direct or reverse)
  - Mounting: Pipe or Wall
  - Options: Remote Set Chassis, 2-way auto/manual bypass, and 4-way auto/manual bypass
- DPU Models
  - Housing Pressure Rating (SWP)
  - Housing and Bellows Materials
  - Process Material Contacting Bellows
  - Differential Pressure Range
- Indicator Models
  - Scale Type: square root, uniform, etc.; graduations
- Recorder Models
  - Pressure Elements: Range, Material
  - Pens: Disposable or bucket
  - Chart Drive: Type and rotation
  - Thermal Systems: Range, capillary length, Class, Socket [length below threads]
  - Charts: (In-stock std.) 0-100/-150/-200/-250/-300/-500, marked for 24 hr. rotation.; special order available, with min. quantity of 5 boxes)

## Weights

Model	Approximate Gross Weight (lbs/kg)						
	Material/Safe Working Pressure (PSI)						
	Aluminum	Forged Steel			Forged SST		
	1000	2500	4500	6000	1000	3000	6000
<b>Transmitters</b>							
274A	30 (14)	51 (23)	52 (24)	54 (24)	42 (19)	52 (24)	54 (24)
<b>Controllers</b>							
335A	30 (14)	51 (23)	52 (24)	54 (24)	42 (19)	52 (24)	54 (24)
338E	47 (21)	68 (31)	69 (31)	71 (32)	59 (27)	69 (31)	71 (32)

**WARRANTY-LIMITATION OF LIABILITY:** Seller warrants only title to the product, supplies, and materials and that, except to software, the same are free from defects in workmanship and materials for a period of one (1) year from the date of delivery. Seller does not warranty that software is free from error or that software will run in an uninterrupted fashion. Seller provides all software "as is". THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE WHICH EXTEND BEYOND THOSE STATED IN THE IMMEDIATELY PRECEDING SENTENCE. Seller's liability and Buyer's exclusive remedy in any case of action (whether in contract, tort, breach of warranty or otherwise) arising out of the sale or use of any product, software, supplies, or materials is expressly limited to the replacement of such products, software, supplies, or materials on their return to Seller or, at Seller's option, to the allowance to the customer of credit for the cost of such items. In no event shall Seller be liable for special, incidental, indirect, punitive or consequential damages. Seller does not warranty in any way products, software, supplies, and materials not manufactured by Seller, and such will be sold only with the warranties that are given by the manufacturer thereof. Seller will pass only through to its purchaser of such items the warranty granted to it by the manufacturer.

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