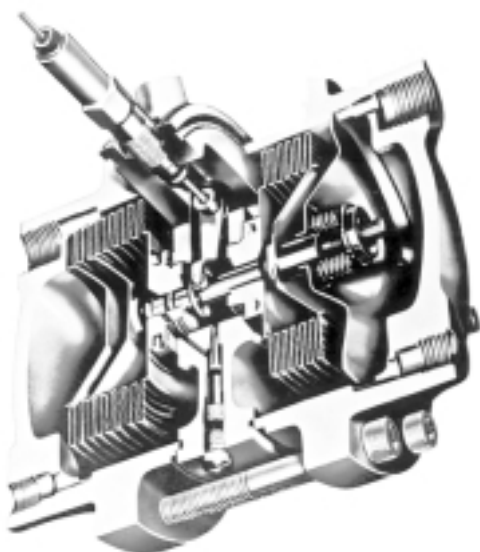




DPU Products

Barton®

Differential Pressure Units

Models 199 & 199N

Overview

Barton Differential Pressure Units (DPUs) serve as actuating units for a wide variety of instruments. All models feature Barton's rupture-proof bellows.

Description

Each DPU consists of a Bellows Unit Assembly (BUA) and removable pressure housings. Within the BUA, flexible bellows are secured to a centerplate. In dual-bellows models, the movable bellows are rigidly connected by a dual valve stem that passes through the centerplate. Valve seats, in the centerplate passage, form a seal with the valves. Contacting the valve stem in the centerplate is a drive arm pivoted on the end of a sealed torque tube. The bellows is filled with a clean, noncorrosive, low-freezing point liquid. A range spring assembly provides tension against applied pressures.

In operation, pressure is applied to both sides of the bellows. Any difference in pressure causes the bellows to move until the spring effect (range springs) balances out the force. The linear motion of the bellows (proportional to the DP) is transmitted as a rotary motion through the torque tube.

In dual-bellows units, if the bellows are subjected to a DP greater than the unit's DP rating, a valve closes and "traps" the fill liquid in the bellows — fully supporting the bellows and preventing rupture. Since opposing valves are used, full protection is provided in either direction.

Common Components

- **Bellows Construction** — Individual diaphragms, stamped and formed from selected materials (see individual DPU specifications), are assembled using highly specialized techniques, the results — exacting linearity characteristics, a long cycle life, and freedom from effects of work hardening commonly encountered with the hydraulically formed or mechanically rolled types.
- **Torque tube** — eliminates the possibility of leakage and need for lubrication. The needle bearing (inboard end) and ball bearing (on follower drive arm) operate with a minimum of friction — resulting in high sensitivity over the life of the unit.

The torque tube assembly consists of a tube, shaft, and supporting members. The outboard end of the torque tube is attached to the centerplate. The shaft passes through the center of the tube and is welded to the inboard end.

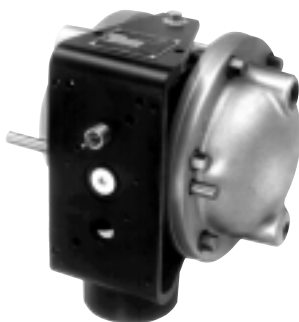
Since its outer end is attached to the centerplate, the tube must twist when subjected to torque. The shaft, freely supported at its outer end and attached to the tube and drive arm at its inner end, rotates through the same angle as the drive arm — the mechanical output of the DPU.
- **Range springs** — determine the DP range of the unit, based upon their number and strength. They have extremely low hysteresis and exceptional temperature stability.

The M199 has an external range spring assembly that is field replaceable.

Model 199

Dual Bellows

The 199 is designed to measure differential pressures under the most severe operating conditions. The unit incorporates Barton's rupture-proof bellows. Ease of installation, stable calibration, and minimal maintenance are inherent qualities of the M199 DPU.



The 199 is composed of a Bellows Unit Assembly (BUA) and a pair of pressure housings that enclose opposite sides of the BUA. The BUA consists of a pair of bellows, centerplate, overrange valves, temperature compensator, torque tube assembly, dampener valve, and range spring assembly.

- **Temperature Compensator** — An auxiliary free-floating bellows, attached to HP bellows, automatically protects unit from zero/calibration drift caused by ambient temperature changes.
- **Pulsation Dampener** — Internal dampening is accomplished by restricting the flow of liquid through its normal channel (the annular passage in the centerplate) and causing it to follow an alternate route controlled by an adjustable needle valve. Response time for the unit depends upon the range and fill liquid, but is typically adjustable between a few seconds and several minutes for full scale travel of the bellows.
- **Mounting** — The M199 is supplied with a 2-inch pipe-mount bracket. The bracket is provided with four 1/2-20 U.N.C.-2B holes for use in attaching the DPU to the instrument being actuated. The unit can also be wall mounted.

Model 199N

Dual Bellows NACE Unit

The 199N is a 199 DPU specifically designed to meet NACE requirements for H z S service. It can measure DP up to 2,000 PSI (138 bar) without damage to the unit due to overpressure.

For DP up to 15 PSI (1 bar), a 3-3/4" diameter bellows is used; above 15 PSI (1 bar), a 2-1/8" diameter bellows is used.

All other features and functions are the same as the standard M199 DPU.



Specifications

Materials:

Housing/Centerplate	Forged Steel AISI C1018
Bolts	AISI 4140, per ASTM A.320-L7
Housing O-rings	Viton
Bellows	316L SST
Range Springs	Inconel or Elgiloy
Torque Tube Material	Monel

Performance:

Safe Working Pressure	2,000 PSI (138 bar) Maximum
All other specifications are the same as the M199 DPU.	

Available 199N NACE Instruments

Indicators	M200N
Switches	M289N, M291N
Recorders	M202N
Pneumatic Controllers	M335N, M338N
Pneumatic Transmitters	M274N, M285N

199 DPU Specifications

MODEL 199	BODY	AVAILABLE DIFFERENTIAL PRESSURE RANGES			
SWP - psi (bar)	Housing Material	Stainless Steel Bellows		Inconel Bellows	
		2-1/8" (55 mm) O.D.	3-3/4" (95 mm) O.D.	2-1/8" (55 mm) O.D.	3-3/4" (95 mm) O.D.
1,000 (69)	Cast Aluminum 356T6 Forged Stainless Steel 316	0-15 psi (0-1 bar) to 0-100 psi (0-6.9 bar)	0-10" w.c. (0-25 mbar) to 0-400" w.c. (0-993 mbar)	0-15 psi (0-1 bar) to 0-100 psi (0-6.9 bar)	0-10" w.c. (0-25 mbar) to 0-400" w.c. (0-993 mbar)
2,500 (172)	Forged Steel A.I.S.I. C1018				
3,000 (207)	Forged Stainless Steel 316				
4,500 (310)	Forged Alloy Steel 4142				
6,000 (414)	Forged Alloy Steel 4142 Forged Stainless Steel 17-4 PH				
Net Volume (cu. in.)	L.P. Head	35" (575 cc)	30" (490 cc)	35" (575 cc)	30" (490 cc)
	H.P. Head	31" (510 cc)	26" (425 cc)	31" (510 cc)	26" (425 cc)
Displacement in cu. in. for full-scale travel		0.5" (8.2 cc)	1.5" (25 cc)	0.5" (8.2 cc)	1.5" (25 cc)
PERFORMANCE SPECIFICATIONS					
Torque Tube Rotation (full scale D.P.)			8° ±10%		
Torque Tube Material			Beryllium Copper (BeCu) or K-Monel		
Temperature Limits			-40° F/° C to +180° F (+82° C)		
Maximum Non-Linearity					
0-10" w.c. to 0-400" w.c. (0-25 mbar to 0-993 mbar)			±0.5% of full scale w/appropriate linkage		
0--401" w.c. to 0-100 psi (0-996 mbar to 0-6.9 bar)			±0.75% of full scale w/appropriate linkage		
Repeatability			0.20% of full scale D.P.		

NOTES: Zero center or split ranges available on special order [e.g., a 0-50" w.c. (0-124 mbar) range may be ordered 25-0-25" w.c. (62-0-62 mbar) or 10-0-40" w.c. (25-0-99 mbar)]. Intermediate differential pressure ranges available from 0-20" w.c. to 0-100 psi (0-50 mbar to 0-6.9 bar). Other sizes and types of connection (welding stubs, MS, A.N.D., etc.) available upon request. Standard pressure connections are 1/2" (top) and 1/4" (bottom) NPT. Range springs are not interchangeable between the different size bellows, the Inconel bellows, or the 10" w.c. (25 mbar) range. Can be specified to meet NACE MR0175-2002. Metric conversions are approximate. Outline dimension drawings available upon request.

External Sensors

External Sensors - For applications requiring external sealed sensors, such as: corrosive, high temp., and dangerous fluids.

Bellows Fill Fluids

- Mineral Oil (Standard M-Fill)
- Ethylene Glycol/Water
- Distilled Water
- Silicone
- Fluorolube for O 2 Service
- Others available (Contact NuFlo)

Weights

DPU Model	APPROXIMATE GROSS WEIGHT (lbs/kg)						
	Material/Safe Working Pressure (PSI)						
	Aluminum	Forged Steel			Forged SST		
	1000	2500	4500	6000	1000	3000	6000
199	23 (10)	39 (17.7)	40 (18.1)	45 (20.4)	30 (13.6)	40 (18.1)	45 (20.4)

Ordering Information

When ordering, please specify the following items:

- Quantity
- Model Number
- Housing Pressure Rating (SWP)
- Housing and Bellows Materials
- Process Material Contacting Bellows
- Differential Pressure Range
- Mounting (pipe, wall, flush panel)



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For representation in your area:

Barton®

Chart Recorders

Models 202E, 202ES, 202ER, 202N, 242E, 242ES, and J8A



OVERVIEW

Barton Chart Recorders are the industry standard for accurate, reliable measurement and recording of pressure, differential pressure, and temperature in a wide variety of applications. In addition, DP models utilize Barton's rupture-proof bellows DPU as the actuating unit — with features like overrange protection and pulsation dampening (on some models).

Common Components

Case — is made of rugged, lightweight die-cast aluminum that features a built-in rain-shield. It is finished in polyurethane electrostatic powder paint that has a high resistance to weathering, scratches, and industrial fumes. aircraft-type door hinge (made of 302 SST) provides excellent resistance to salt spray and H₂S. A closed neoprene gasket, non-absorbent to fluids and resistant to oils and most solvents, provides the seal between the door and the case.

Chart Drive — available in battery and spring-wound versions with a wide variety of chart speeds (24 hr/7day is standard). All chart drives, with simple positive chart lock hub, are interchangeable.

Charts — are made from moisture-resistant, 7-point paper with high-grade copper engravings that eliminate eccentric and elliptical errors. All models, except J8A, utilize 12-inch circular charts that are interchangeable with Graphic Controls or Bristol charts. The J8A utilizes compact 8-inch charts.

An optional modified pen mount allows use of Foxboro-type charts on 12-inch models.

Recording Mechanism — All parts are stainless steel for long life. The pen mount is exceptionally rugged and pen shafts are fitted with ball pivots to minimize friction. All links are adjustable, with micrometer adjustments for accurate calibration. A cam screw allows rotation of the pen mounting for accurate tracking of pens on the chart time arc. All adjustments have screwdriver slots to simplify calibration.

Disposable pens with clear body for checking ink level are standard. Optional box (fountain) ink systems are available.

Pressure Elements — used in Models 202E, 242E, and J8A are precision wound helical-type available in a variety of materials — pressure ranges from 0-30" mercury vacuum (0-14.7 PSI/1 bar) to 0-10,000 PSI (0-689 bar), except M242E and J8A which have upper range of 0-30,000 PSI (0-2,068 bar). The Model 202N uses a K-Monel element — pressure ranges from 0-50" w.c. (0-124 mbar) to 0-2,000 PSI (0-138 bar). Connections available in 1/4" or 1/2" NPT for ranges less than 10,000 PSI (689 bar) and 9/16 Aminco (1/4" ODT) for ranges greater than 10,000 PSI (689 bar).

Thermal Systems — consist of a bourdon tube, a capillary (w/SST armor), and a bulb (w/bendable extension). All parts are SST. Systems available in Class V (mercury fill w/11/16" O.D. bulb) or Class I (hydrocarbon fill w/3/8" O.D. bulb). Invar available in Class V only. Std. temperature ranges are: 0°F to +[100, 150, 200, or 300]°F (-18°C to +[38, 66, 93, or 149]°C).

Class VA (self/full compensation):

-40°F/°C to +1200°F (+649°C)[self] or +600°F (+316°C)[fully]

Class VB (Case compensated): -40°F/°C to +600°F (+316°C)

Class IA (full) & **IB** (self): -200 to +500°F (-129 to +260°C)

Accuracy: ±1.0% of F.S.

Hardware (std.): 10-foot capillary w/4-inch socket

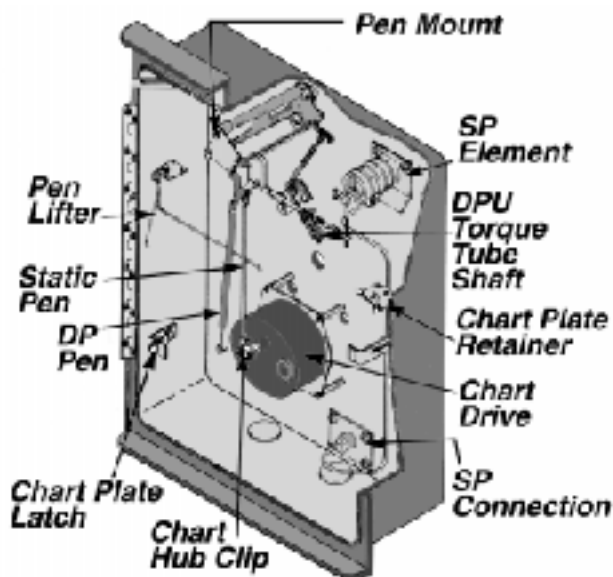
MODELS 202E/202ER (DP)

The 202E is a 12-inch chart recorder that has been widely used in gas transmission and distribution fields — accurate calibration, even under extreme variations in static pressure and ambient temperatures.

The 202E is available in 1 to 4 pen configurations (DP+3 additional pens). The additional pens can be used to record temperature and supplemental pressure data.

The unit is actuated by a Barton Model 199 DPU, with standard and NACE units available (up to 6,000 PSI/414 bar SWP) — see DPU bulletin #21700 for details. Static pressure and temperature pens are actuated by precision wound elements (see page 1).

Main Components



Specifications

Safe Working Pressure up to 6,000 PSI (414 bar)
DP Ranges 0-10" w.c. to 0-100 PSID
(0-25 mbar to 0-6.9 bar)
Accuracy $\pm 0.5\%$ F.S.
Temperature Limits $-40^{\circ}\text{F}/^{\circ}\text{C}$ to $+180^{\circ}\text{F}$ ($+82^{\circ}\text{C}$)

Special Application Models

Model 202ER — a reverse-acting version that sets zero on outer perimeter of the chart for more accurate integration.

MODEL 202N (DP) (NACE)

The 202N is a 12-inch chart recorder designed to measure flow, static pressure, and temperature in sour gas applications. The 202N meets all NACE requirements for H₂S environments, per MR-01-75 (1991 Revision) — SWP up to 2,000 PSI (138 bar).

For ranges between 2,000 PSI (138 bar) and 6,000 PSI (414 bar), see optional NACE version of M202E.

The 202N is actuated by Barton's M199 NACE DPU — see DPU PB for details. Static pressure measurements are provided by precision wound K-Monel helical-type elements.

All other features and benefits are the same as the 202E.

Specifications

Safe Working Pressure up to 2,000 PSI (138 bar)
DP Ranges 0-10" w.c. to 0-100 PSID
(0-25 mbar to 0-6.9 bar)
Accuracy $\pm 0.5\%$ F.S.
Temperature Limits $-40^{\circ}\text{F}/^{\circ}\text{C}$ to $+180^{\circ}\text{F}$ ($+82^{\circ}\text{C}$)

MODEL 242E (Temp./Pressure)

The 242E is a 12-inch chart Temperature and Pressure Recorder-Receiver designed for general pressure applications. When functioning as a recorder-receiver, it uses a bellows-type element for pneumatic transmitter or controller input.

Receiver Bellows

Our receiver bellows are made from either phosphor bronze or 316 stainless steel. Phosphor bronze units are assembled and oven-bronzed; SST units are welded. They can receive pneumatic output signals of 3-15 PSI (207 mbar-1 bar) and 6-30 PSI (414 mbar - 2 bar).

Specifications

Safe Working Pressure up to 30,000 PSI
(2,068 bar)
Accuracy $\pm 1.0\%$ F.S.
Temperature Limits $-40^{\circ}\text{F}/^{\circ}\text{C}$ to $+180^{\circ}\text{F}$ ($+82^{\circ}\text{C}$)

MODEL J8A (Temp./Pressure)

The J8A is a compact **8-inch** chart Temperature and Pressure Recorder designed for general pressure applications. Available as a single or dual pen unit, it can use any combination of pressure measuring helical elements or temperature measuring thermal systems. The unit has a quoted accuracy of $\pm 1/2\%$ F.S..



Pressure Elements — same as those supplied for 12-inch recorders, with pressure ranges from 0-30" Hg to 30,000 PSI (0-14.7 PSI/1 bar to 2,068 bar).

Case — a smaller version of the M202E case, the J8 case is 3/16-inch thick, with a closed cell neoprene gasket. The standard door comes with an 8-inch square piece of double strength glass (optional Plexiglas (Lexan) or 16-gauge steel plate for solid door applications). Overall dimensions of std. unit are: 15"h x 11-1/8"w x 5-5/16"d (381 x 283 x 135 mm), with recess mount cut-out dimensions of 13-7/8" x 10-3/8" (352 x 264 mm).

Specifications

RATINGS (non-intrinsically safe values)

Voltage (at terminals) 14 to 35 VDC

Power Supply Voltage:

Current Unit 24 to 35 VDC

Voltage Unit 2.5 volts above max. output
or 5.5 volts VDC min.,
whichever is greater
(w/35 VDC max.)

Output Signal 4-20 mA

External Load Resistance 0-500 Ohms

Motion Input Rotary, 22.5°

ENVIRONMENTAL

Operating Temperature -40°F/°C to +180°F (+82°C)

Storage Temperature -40°F/°C to +200°F (+93°C)

Humidity 0 to 95% R.H.
@+104°F (+40°C)

PERFORMANCE

Accuracy Actual Chart Reading
 $\pm 0.5\%$ F.S. (± 0.08 mA)

Supply Variation
(Current Output only) $\pm 0.25\%$ /volt change

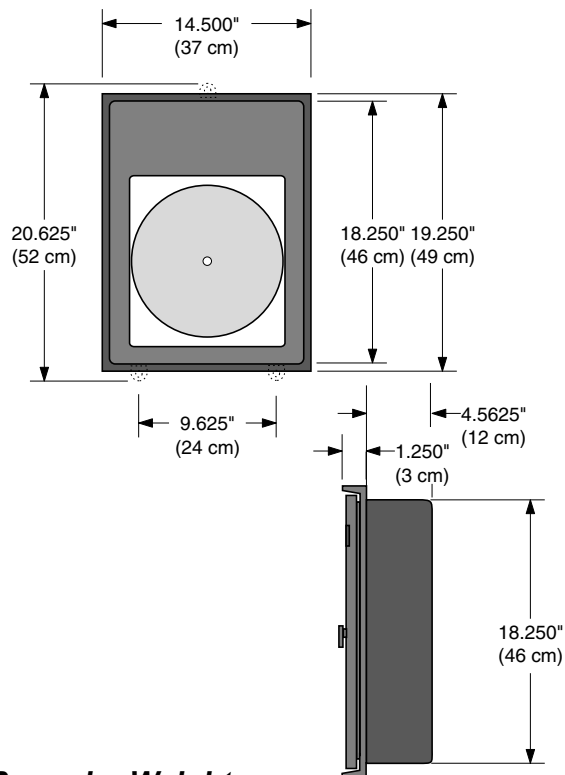
Load Resistance Effect $\pm 0.05\%$ /100 Ohm change

Temperature Coefficient $\pm 0.01\%$ /°F

Maximum Turndown 2:1 (zero-based)

Recorder Dimensions

Overall case dimensions for Models 202, 242, and 208:



Recorder Weights

IND. MODEL	APPROXIMATE GROSS WEIGHT in lbs (kg)						
	Material/Safe Working Pressure (PSI)						
	Aluminum	orged Steel			Forged SS		
	1000	2500	4500	6000	1000	3000	6000
202E/ER/N	47 (21)	68 (31)	69 (31)	71 (32)	59 (27)	69 (31)	71 (32)

The M242E gross weight is approx. 25 lbs (11 kg). For SST "S" versions, add 10 lbs (6 kg) to standard weights.

Mounting Options

- Panel
- Wall
- Pipe mount, slip-on, non-thread (1-1/2" or 2" std. pipe)
- Portable Stand, w/handle (J8A only)
- Wall Shock-Mounting Kit (J8A only)

Ordering

When ordering and DPU, please specify the following items:

- Model Number
- Housing Pressure Rating (SWP) (DPU Models)
- Housing and Bellows Materials (DPU Models)
- Process Material Contacting Bellows (DPU Models)
- Differential Pressure Range (DPU Models)
- Pressure Elements (Range, Material)
- Pens (disposable or bucket)
- Chart Drive (type and rotation)
- Thermal Systems (range, capillary length, Class, Socket [length below threads])
- Mounting (pipe, wall, flush panel, potable stand [J8A only] or shock mount [J8A only])
- 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)



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For representation in your area:

Barton®

Differential Pressure Switches

Models 289A & 291B

Overview

Barton DP switches are available in a wide variety of safe working pressures and differential pressure ranges. Widely used in applications that require measurement of differential pressure, flowrate, and liquid level, they provide accuracy, narrow deadband, and repeatability of switch action at set point.



General Features

- **SWP to 10,000 PSI** (689 bar)
- **Barton DPU Sensor/Actuator**
- **NEMA-4/IP65 and Explosionproof Cases**
- **Wide Selection of DP Ranges**
(including absolute, zero-center, and split ranges)
- **Pulsation Dampening** (selected models)

Actuating Units

The indicator is actuated by a rupture-proof bellows differential pressure unit (DPU) with integral temperature compensation.

The M199 DPU features dual, liquid-filled, bellows designed to withstand repeated overranges equal to the safe working pressure of the housings without a change in calibration.

Indicating Mechanism

The indicating pointer traverses a 270 degree arc, providing excellent readability. It is driven by a precision-jeweled rotary movement that multiplies rotation of the torque tube through a gear and pinion to the pointer. The movement employs a thermally stable Ni-Span-C hair spring.

The movement has a micrometer screw for convenient range adjustments. Zero/range adjustments can be made without removing the scale plate or pointer. Linearity adjustments are readily accessible after removal of the scale plate.

Switch Contacts

Barton switches are available in configurations with 1 to 4 adjustable snap-action type SPDT switches, with DPDT and hermetically-sealed switches available as specials on selected models. Switches can be set for high or low, or both high and low on units with two or more contacts.

Chosen for their reliability under severe shock and vibration conditions, the contacts are adjustable from 5 to 95% of full scale range, and are set with a control screw located flush with the scaleplate. Contacts can be set to open or close (by reversing wires at terminal) with increasing or decreasing differential pressure – providing maximum flexibility.

Relays

Some models can be ordered with one or two relays mounted inside the case. The addition of a relay allows greater flexibility of switching action and increased current handling capacity without the need for external mounting or wiring – important in applications that require explosionproof housings.

Cases

Barton switches are available in indicating and blind case versions. The standard case is die-cast aluminum with a special baked epoxy black finish, which is NEMA-4/IP65 rated. Optional "S" version 316 Stainless Steel case is available for offshore/corrosive environments.

The optional explosionproof case is rated for use in Class I, Div. 1, Groups B, C, & D areas.

Scales

All indicating scales can be graduated uniformly for measurement of differential pressure or liquid level, or square root for direct reading of flowrate. Special scales can be furnished for indicating liquid level in horizontal or non-uniform tanks.

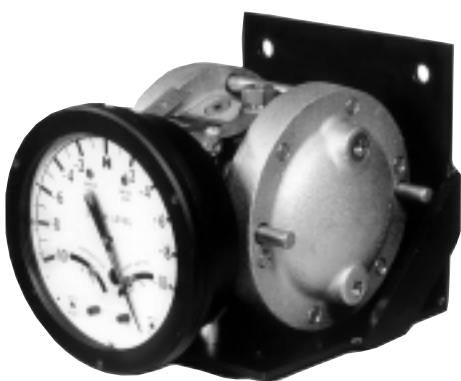
M199 DPU Actuated Units

Model 289A/289AS/289N*

A 6-inch (152 mm) indicating switch that features a NEMA-4 case, operating pressure ratings up to 6,000 PSI (414 bar) and a differential pressure range from 0-10" w.c. to 0-100 PSID (0-25 mbar to 0-6.9 bar).

Model 291B/291N*

An explosionproof version of the M289A, it is housed in a CSA certified case rated for Class I, Div. 1, Groups B, C, & D areas. See M291B case photo (below).



Specifications

M199 DPU

Housings (Material/SWP):

Forged Steel 2500, 4500, & 6,000 PSI (172, 310, & 414 bar)

316 SST 1,000, 3,000, & 6,000 PSI (69, 207, & 414 bar)

Aluminum 1,000 PSI (69 bar)

Bellows Material 316 SST & Inconel

DP Ranges 0-10" w.c. to 0-100 PSID (0-25 mbar to 0-6.9 bar)

SWITCH

Indication Accuracy :

SPDT 0-10" w.c. to 0-349" w.c. $\pm 1.0\%$ F.S.
(0-25 mbar to 0-867 mbar $\pm 1.0\%$ F.S.)
0-350" w.c. to 0-100 PSID $\pm 1.25\%$ F.S.
(0-869 mbar to 0-6.9 bar $\pm 1.25\%$ F.S.)

DPDT Add 1% to SPDT values

Point of Actuation Accuracy Add 1/2% to SPDT values

Repeatability 0.25%

Switch Deadband

SPDT $\pm 5.0\%$ max. F.S. DP

DPDT $\pm 6.0\%$ max. F.S. DP

Temperature Limits -40° F (-40° C) to +180° F (+82° C)

Weights

(includes DPU)

SW Model	APPROXIMATE GROSS WEIGHT (lbs/kg)						
	Material/Safe Working Pressure (PSI)						
	Aluminum	Forged Steel			Forged SST		
	1000	2500	4500	6000	1000	3000	6000
289A/AS	27 (12)	48 (22)	49 (22)	51 (23)	39 (18)	49 (22)	51 (23)
291B	34 (15)	55 (25)	56 (25)	58 (26)	46 (21)	56 (25)	58 (26)
321	25 (11)	46 (21)	47 (21)	49 (22)	37 (11)	47 (21)	49 (22)

Ordering Information

When ordering, specify the following items:

- Quantity
- Model Number
- Housing Pressure Rating (SWP)
- Housing Material
- Bellows Material
- Material Contacting Bellows
- Differential Pressure Range
- Number of Switches (3 max.)
- Switch Type (SPDT or DPDT)
- Switch Setpoints (5-95%)
- Optional Relays (1 or 2)
- Type of Scale (uniform, square root)
- Scale Graduations



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For representation in your area:

Barton®

Differential Pressure Indicators

Model 200A

OVERVIEW

Barton indicators are available in a broad selection of dial sizes for a variety of safe working pressures and differential pressure ranges. They are widely used for the measurement of differential pressure, flowrate, and liquid level applications.

FEATURES

- **Multiple Dial Sizes**
- **Barton DPU Sensor/Actuator**
- **NEMA-4/IP65 Cases**
- **Wide Selection of DP Ranges** (including absolute, zero-center, and split ranges)
- **Pulsation Dampening**

Actuating Units

The indicator is actuated by a rupture-proof bellows differential pressure unit (DPU) with integral temperature compensation.

The M199DPU features dual, liquid-filled, bellows designed to withstand repeated overranges equal to the safe working pressure of the housings without a change in calibration.



M199 DPU

Indicating Mechanism

The indicating pointer traverses a 270 degree arc, providing excellent readability. It is driven by a precision-jeweled rotary movement that multiplies rotation of the torque tube through a gear and pinion to the pointer. The movement employs a thermally stable Ni-Span-C hair spring.

The movement has a micrometer screw for convenient range adjustments. Zero/range adjustments can be made without removing the scale plate or pointer. Linearity adjustments are readily accessible after removal of the scale plate.

Cases

Barton indicators is available in 3-1/2", 4", 4-1/2", and 6" (76, 89, 114, and 152 mm) dial size. The standard case is die-cast aluminum with a special baked epoxy black finish, which is NEMA-4/IP65 rated. Optional "S" version 316 Stainless Steel case is available in the 4-1/2" (114 mm) and 6" (152 mm) versions for offshore/corrosive environments.

Scales

All indicating scales can be graduated uniformly for measurement of differential pressure or liquid level, or square root for direct reading of flow rate. Special scales can be furnished for indicating liquid level in horizontal or non-uniform tanks.

M199 DPU ACTUATED UNITS

Model 200A/200AS/200N*

A 6-inch (152 mm) indicator that features a built-in adjustable pulsation dampener for direct control of response time.

*Note: For NACE applications, M200N uses a M199N DPU. See DPU bulletin #21700.

Specifications

M199 DPU

Housings (Mat'l/SWP):

Forged Steel 2500, 4500, & 6,000 PSI
(172, 310, & 414 bar)

316 SST 1,000, 3,000, & 6,000 PSI
(69, 207, & 414 bar)

Aluminum 1,000 PSI (69 bar)

Bellows Material 316 SST & Inconel

DP Ranges 0-10" w.c. to 0-100 PSID
(0-25 mbar to 0-6.9 bar)

200A/200AS INDICATOR

Accuracy (DP Range):

0-10" w.c. to 0-349" w.c.

(0-25 mbar to 0-867 mbar) ... $\pm 0.5\%$ F.S.

0-350" w.c. to 0-100 PSID

(0-869 mbar to 0-6.9 bar) $\pm 0.75\%$ F.S.

Repeatability 0.25%

Temperature Limits: -40°F/C to +180°F (+82°C)

Ordering

When ordering, please specify the following items:

- Quantity
- Model Number
- Housing Pressure Rating (SWP)
- Housing Material
- Bellows Material
- Material Contacting Bellows
- Differential Pressure Range
- Type of Scale (uniform, square root)
- Scale Graduations
- Mounting (pipe, wall, flush panel)

Weights (includes DPU)

		APPROXIMATE GROSS WEIGHT in lbs (kg)						
		Material/Safe Working Pressure (PSI)						
		Aluminum	Forged Steel			Forged SST		
IND. MODEL		1000	2500	4500	6000	1000	3000	6000
200A/AS		25 (11)	46 (21)	47 (21)	49 (22)	37 (17)	47 (21)	49 (22)

Note: NACE Model (M200N) weight is the same as M200A.



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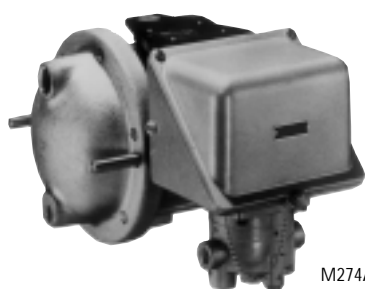
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For representation in your area:

Barton®

Pneumatic Transmitters & Controllers

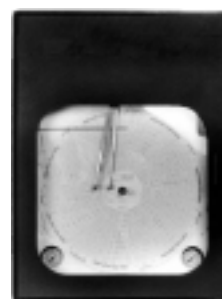
Models 274A, 285B, 335A, 335P, 335T, 338E, 340E, and 341E



M274A



M335A



M338E

Overview

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.



Models 285B - Linear-with-Flow Transmitters

- Actuated by Barton's M199 (285B)
- Extracts the Square Root of DP and provides Pneumatic Signal Output proportional to Rate-of-Flow
- No External Regulator or Relay needed
- Continuous/smooth response over entire range from 3-15 PSI (207 mbar to 1 bar)
- Exceptionally low air consumption



Actuating Units

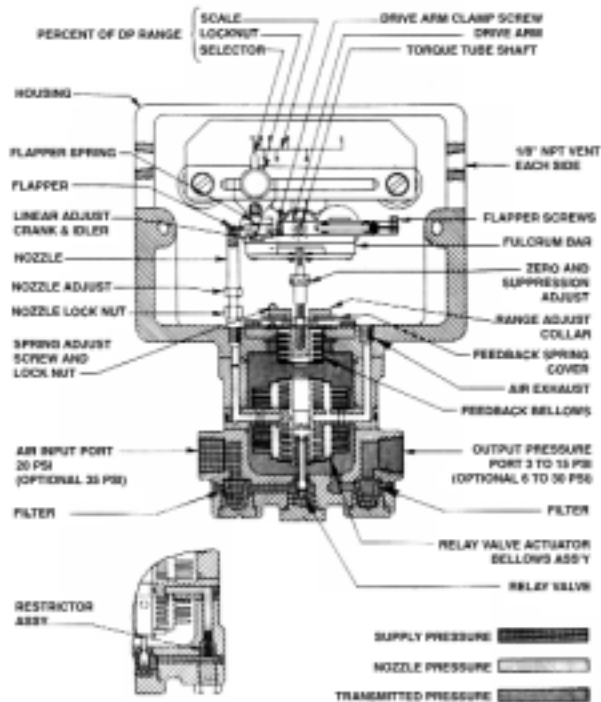
Barton Pneumatic Transmitters are actuated by the M199 Differential Pressure Unit (DPU) which is also available in a NACE certified version.

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. 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

Model 285B

Accuracy:

30 to 100% Flow (9 to 100% DP)	0.5% of full range output
20 to 30% Flow (4 to 9% DP)	1.0% of full range output pressure
10 to 20% Flow (1 to 4% DP)	2.5% of full range output pressure

Air Consumption at balance condition
(20 PSI/1.4 bar supply) 0.05 scfm maximum

Sensitivity	0.05% of DP range
Operating Span	Calibrated to DP range

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 bourdon 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-inch 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.

Models 340E/341E - Recording Temperature/Pressure

These recording controllers are designed for general pressure applications and are actuated by a precision-wound, helical element. Units available in ranges from 0-50 to 0-30,000 PSI (0-3.4 bar to 0-2,068 bar).

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%

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" w.c. to 0-349" w.c. (0-50 mbar to 0-867 mbar)	±0.5% of full scale DP
0-350" w.c. to 0-50 PSI (0-869 mbar to 0-3.4 bar)	±0.75% of full scale DP
Accuracy of Temp. 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 inches
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" 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.

Weights

APPROXIMATE GROSS WEIGHT in lbs (kg)							
Material/Safe Working Pressure (PSI)							
MODEL	Aluminum	Forged Steel			Forged SST		
	1000	2500	4500	6000	1000	3000	6000
TRANSMITTERS							
274A/285B	30 (14)	51 (23)	52 (24)	54 (24)	42 (19)	52 (24)	54 (24)
CONTROLLERS							
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)

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" 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)



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