Masoneilan® 2700 Series

Specification Data
CW6000
Rev A 01/90

Pneumatic Pressure Controllers

DRESSER

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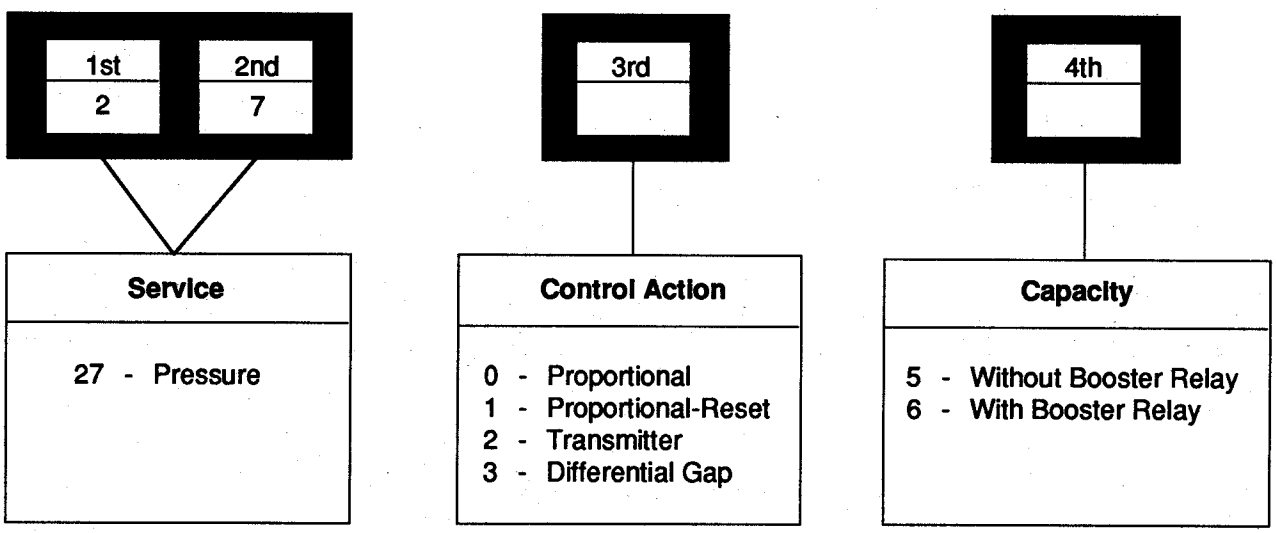
Foreword

2700 Series Pressure Controllers are highly-reliable pneumatic instruments. They are designed to provide low cost control for applications where narrow-to-intermediate proportional band is adequate. The controller offers a choice of proportional, proportional-reset, or differential gap control. 3-15 psig and 6-30 psig output ranges are available.

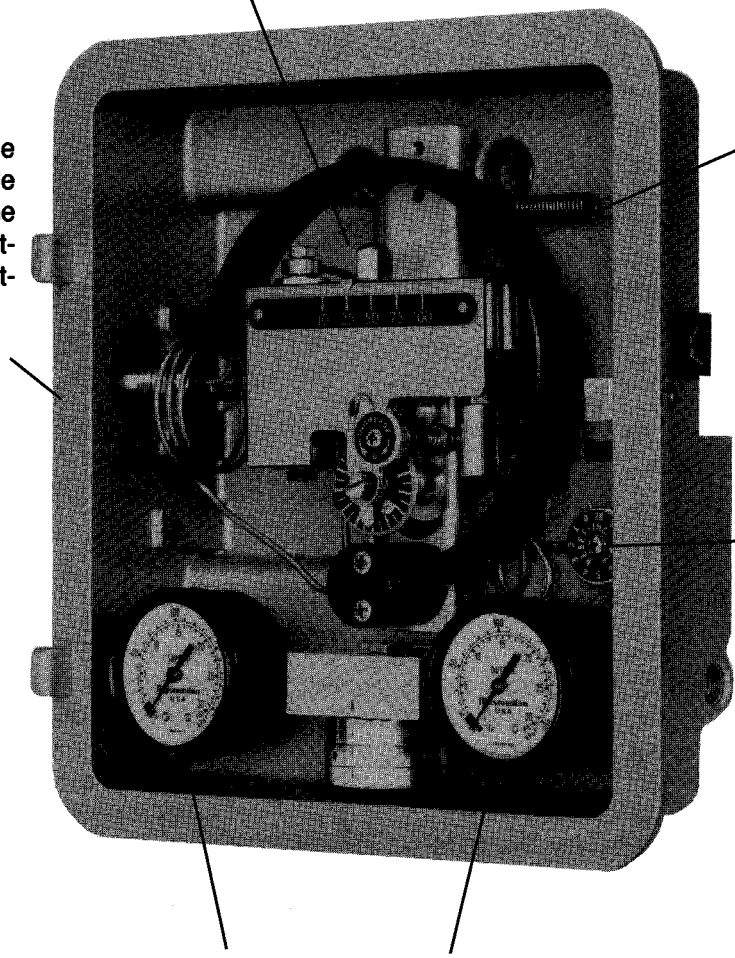
The following pages provide the necessary technical information required to specify the 2700 Series Controller. For additional information contact your local Masoneilan representative.

Numbering System



2700 Series Controller

Proportional Band Adjustment
Select the proportional band width which gives optimal process control. Proportional band is adjustable from 3% to 50% of the element range on proportional controllers, and from 10% to 100% on proportional-reset controllers.



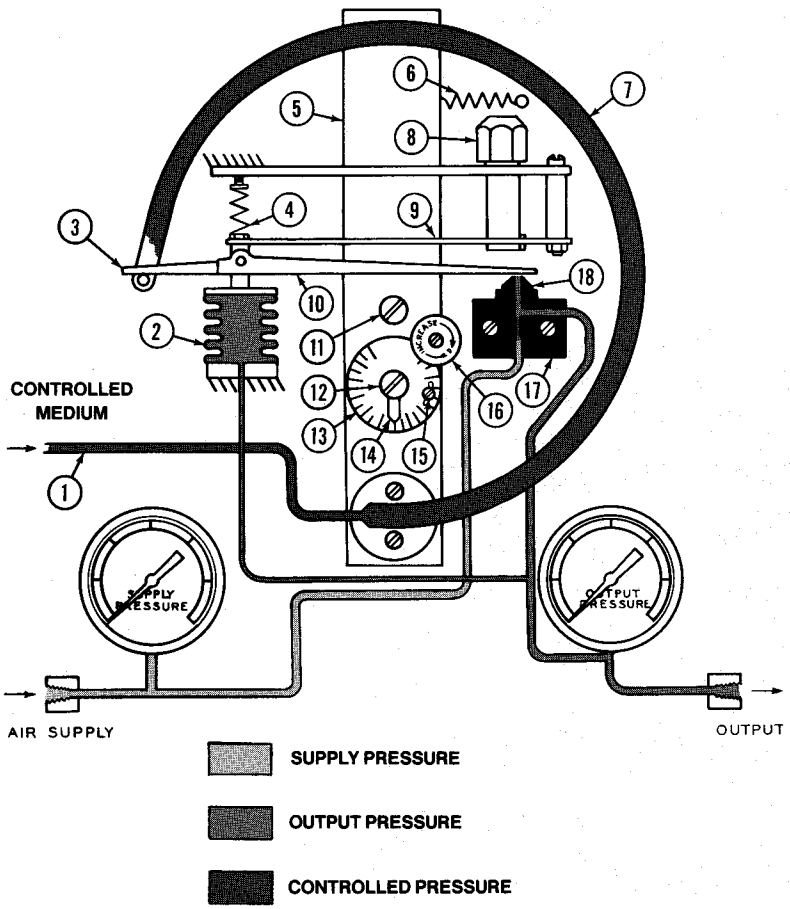
Rugged Housing
The case and cover are made of cast aluminum to provide lightness and durability. The units are waterproof and suitable for either indoor or outdoor use.

Bourdon Tube
Used for spans from 60 psig up to 3000 psig. Available in bronze, 316 St. St. and 403 St. St. Brass and 316 St. St. bellows pressure elements are available for spans down to 3 psig or for vacuum service.

Reset Adjustment
Reset control is added to proportional action to eliminate "offset" between variable and set point. As long as any deviation exists, corrective reset action will operate to return the variable to the set point.

Supply and Output Gauges
Easy to read and features dual scales--English units (psig) and S.I. (kPa).

Proportional Mechanism



1. Bourdon Connection Tubing
2. Proportional Bellows
3. Over range Lever
4. Alignment Spring
5. Bourdon Plate
6. Bourdon Plate Tension Spring
7. Bourdon Tube
8. Proportional Band Adjustment Knob
9. Proportional Leaf Spring
10. Flapper
11. Bourdon Plate Post
12. Index Post Screw
13. Set Point Scale
14. Index
15. Set Point Scale Alignment Screw
16. Set Point Adjustment Knob
17. Nozzle Block
18. Nozzle

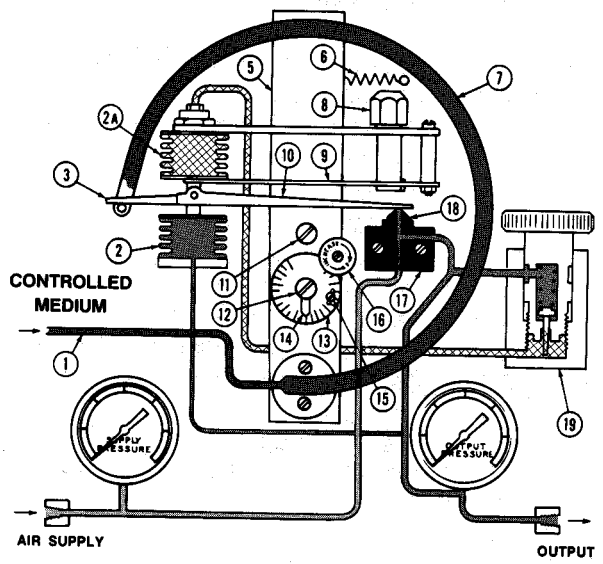
Proportional Mechanism

The pneumatic proportioning mechanism includes the nozzle block and proportional unit. The nozzle block (17) contains a metering orifice which meters the air supply to the nozzle (18) and output system. When the nozzle is uncovered, the pressure in the output system falls to zero. Whenever the output pressure is in equilibrium, a balance is established between the air passing through the metering orifice and that which escapes through the nozzle.

The proportional bellows (2) is fixed at one end and is directly connected to the output pressure from the nozzle block. The free end of the bellows is fastened to the proportional leaf spring (9). The flapper (10) rotates freely on the bearing mounted on the movable end of the proportional bellows. With the bourdon tube mounted for direct action, an increase in controlled pressure causes the free end of the bourdon tube to rotate the flapper clock-wise about the bearing, tending to lower the flapper to cover the nozzle and increase output pressure. The resultant increase in the proportional bellows pressure tends to raise the flapper bearing, causing the flapper to uncover the nozzle and decrease output pressure. In normal operation, the reaction of the proportional bellows to changes in output pressure maintains the flapper in a position to throttle a steady output pressure.

Adjusting the proportional band adjustment knob (8) along the proportional leaf spring (9) varies the effective spring length. This varies the amount of force necessary for the proportional bellows to produce a given movement of the flapper bearing and hence changes the relative effect of primary and feedback options on the flapper. With the adjustment knob in the extreme left hand position (narrow proportional band) feedback will have minimum effect. With the adjustment knob in the extreme right hand position (wide proportional band) feedback will have maximum effect.

Proportional-Reset Mechanism



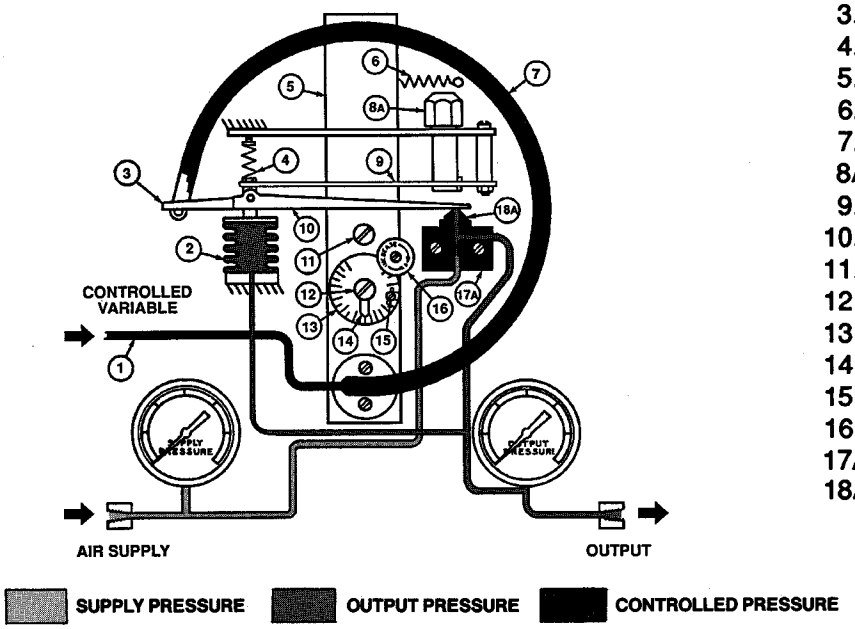
1. Bourdon Connection Tubing
2. Proportional Bellows
2A. Reset Bellows
3. Over Range Lever
5. Bourdon Plate
6. Bourdon Plate Tension Spring
7. Bourdon Tube
8. Proportional Band Adjustment Knob
9. Proportional Leaf Spring
10. Flapper
11. Bourdon Plate Post
12. Index Post Screw
13. Set Point Scale
14. Index
15. Set Point Scale Alignment Screw
16. Set Point Adjustment Knob
17. Nozzle Block
18. Nozzle
19. Resistance Unit/Capacity Tank

Proportional-Reset Mechanism

The construction of this unit differs from the proportional unit in that a reset bellows (2A) replaces the alignment spring. Also a resistance/capacity tank (19) is added to the air circuit.

When the controlled pressure is at the set point under equilibrium condition, the pressures in the reset and proportional bellows are equal. A departure from the set point causes the proportioning mechanism to act exactly as in a proportional controller except that a differential is created between the pressures in the two bellows. If the process load stabilizes at a new value, the pressures in the two bellows gradually equalize by flow of air through the resistance unit and the required output pressure for a new valve plug position is obtained at the original set point. Reset rate (i.e. the number of times that the effect of proportional action with a given deviation is repeated per minute by the reset action) depends upon the particular process and is varied by changing the value of the resistance between the reset and proportional bellows.

Differential Gap Mechanism



1. Bourdon Connection Tubing
2. Proportional Bellows
3. Over Range Lever
4. Alignment Spring
5. Bourdon Plate
6. Bourdon Plate Tension Spring
7. Bourdon Tube
8A. Differential Gap Adjustment Knob
9. Proportional Leaf Spring
10. Flapper
11. Bourdon Plate Post
12. Index Post Screw
13. Set Point Scale
14. Index
15. Set Point Scale Alignment Screw
16. Set Point Adjustment Knob
17A. Pilot Block
18A. Exhaust Block

Differential Gap Mechanism
This controller is identical with the proportional controller except that the standard nozzle block is replaced by a block which contains a three-way valve. Because of the construction of this pilot (17A), the location of the primary element is reversed, i.e. normal mounting of primary element for direct action in a proportional controller produces reverse action in the differential gap controller.

When the bourdon tube causes the flapper to move downward, the flapper actuates the three-way valve to decrease output pressure. The resultant reaction of the proportional bellows causes the flapper to actuate the three-way valve an additional amount, reducing output to zero. The controlled pressure must accordingly change a certain amount in the opposite direction before causing the three-way valve to increase output pressure.

The difference between the controlled pressure at which the output is zero and at which it is maximum, is termed the "differential gap". The magnitude of the differential gap is determined by the proportional band adjustment setting. The set point establishes the midposition of the differential gap.

Specifications

Pressure Elements
Large (5" diameter) bourdon tubes are utilized for pressure ranges up to 3000 psig; bronze tubes for ranges between 60 and 1000 psig, 316 stainless steel tubes for 60 through 2000 psig ranges, and 403 stainless steel for 3000 psig ranges. All bourdon tubes will withstand 25% over pressure without damage.

Brass or 316 stainless steel bellows elements are available for ranges up to 30 psig. Brass bellows will withstand 50 psig maximum. Stainless steel bellows will withstand 125 psig maximum.

When brass or bronze elements are specified, connecting tubing and controlled pressure coupling are copper and brass respectively. 316 stainless steel and alloy steel elements have 316 stainless steel tubing and pressure coupling.

Supply Pressure - 20 psi for 3-15 psi output
35 psi for 6-30 psi output

Model Numbers

Control Action	Case Mounting	Pressure
Proportional	Surface, Valve or Flush	2705
Proportional-Reset	Surface, Valve or Flush	2715
Transmitter	Surface, Valve or Flush	272
Differential-gap	Surface, Valve or Flush	2735

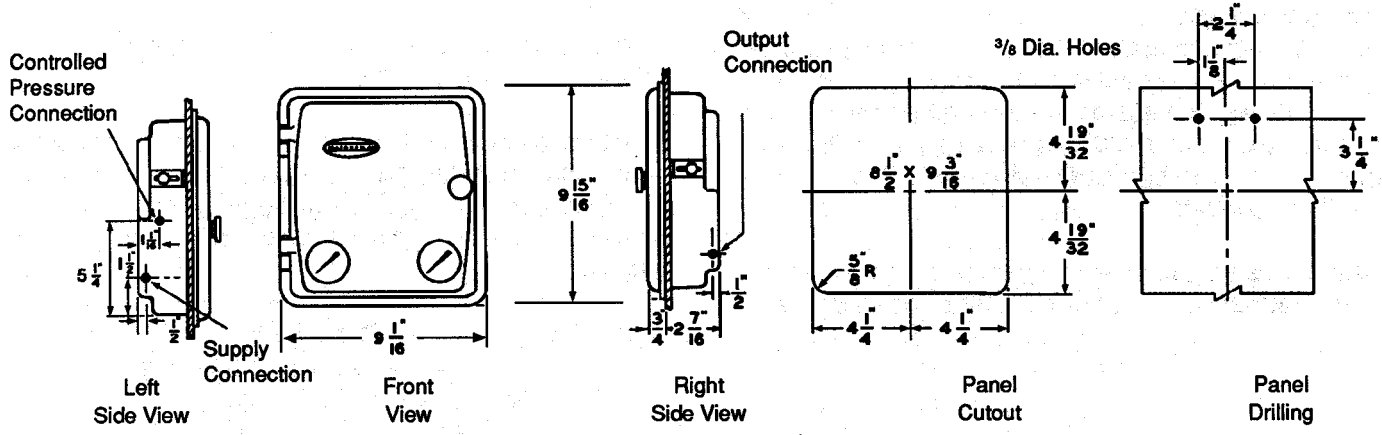
Note: When Booster Relay is included last digit becomes 6.

Standard Ranges - 2700 Series Pressure Controllers

Pressure Element and Material				Range	
Bronze	Brass	316 St. St.	403 St. St.		
	Bellows	-		-10" Hg. Vac. to 5 psig	(-35 to 35 kPa)
-	Bellows	Bellows	-	20" Hg. Vac. to 10 psig	(-70 to 70 kPa)
-	Bellows	Bellows	-	30" Hg. Vac. to 15 psig	(-100 to 100 kPa)
-	Bellows	-	-	0 to 3 psig	(0 to 20 kPa)
-	Bellows	-	-	0 to 5 psig	(0 to 35 kPa)
-	Bellows	-	-	0 to 10 psig	(0 to 70 kPa)
-	Bellows	Bellows	-	0 to 15 psig	(0 to 100 kPa)
-	Bellows	Bellows	-	0 to 20 psig	(0 to 140 kPa)
-	Bellows	Bellows	-	0 to 30 psig	(0 to 200 kPa)
Bourdon	-	Bourdon	-	0 to 60 psig	(0 to 400 kPa)
Bourdon	-	Bourdon	-	0 to 100 psig	(0 to 700 kPa)
Bourdon	-	Bourdon	-	0 to 200 psig	(0 to 1400 kPa)
Bourdon	-	Bourdon	-	0 to 400 psig	(0 to 2750 kPa)
Bourdon	-	Bourdon	-	0 to 600 psig	(0 to 4000 kPa)
Bourdon	-	Bourdon	-	0 to 800 psig	(0 to 5500 kPa)
Bourdon	-	Bourdon	-	0 to 1000 psig	(0 to 7000 kPa)
-	-	Bourdon	-	0 to 1500 psig	(0 to 10000 kPa)
-	-	Bourdon	-	0 to 2000 psig	(0 to 14000 kPa)
-	-	-	Bourdon	0 to 3000 psig	(0 to 20000 kPa)

Metric equivalents for above ranges are available.

Flush Mounting and Surface Mounting



All Connections are 1/4 - 18 NPT

Ordering Information

2700 Series

1. Select the control action required: proportional, proportional with reset, differential gap or transmitter. (Pages 4, 5, 6)
2. Determine whether or not a booster relay is required, and select the appropriate model number. (Page 2)
3. All of the following, in addition to the model number, must be specified:
   a. action: direct or reverse
   b. output ranges: 3-15 psig or 6-30 psig (or 0-18 psig for differential gap)
   c. standard pressure range (page 7)

Additional Masoneilan Control Equipment

80-4	Filter-Regulator
496	Rotary Switch Series Micro Switches (Limit switches)
I/PEX 9000	Solid State Electropneumatic Transducers
12800	Pneumatic Liquid Level Instruments
12120	Electronic Liquid Level Instruments