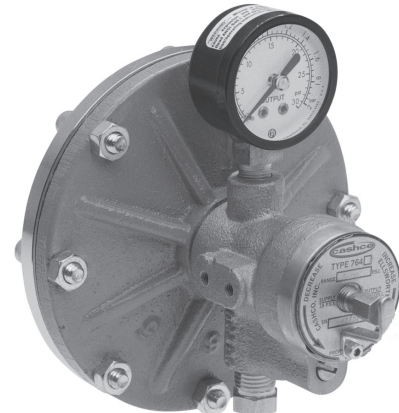




ISO Registered Company

MODEL 764P/PD

PRESSURE CONTROLLERS



MODEL 764P

OVERVIEW

The Models 764P and 764PD are pneumatic pressure controllers. They measure the controlled or differential pressure and develop an output signal that varies linearly with changes in the controlled pressure. The 764P controls pressure between 30" Hg vacuum and 2500 psig (760 mm Hg Vac. and 172.4 Barg) using six ranges. The 764PD variation controls differential pressures between 1 and 150 psid (.07 and 10.3 Bard) using three ranges.

FEATURES

- Adjustments:** Proportional band and setpoint.
- Diaphragm Seals:** Available for corrosive fluids.
- Field Reversible:** Easily changed from direct acting to reverse acting.
- Small Size:** Easily supported at process piping connection.
- Gauge:** 1-1/2" (38 mm) output signal gauge.



END CONNECTIONS

1/4" (DN8) NPT



COMMON APPLICATIONS

AIR, INERT GASES, LIQUIDS, STEAM



DESIGN PRESSURE

CONTROLS DIFFERENTIAL PRESSURES BETWEEN 1-150 psig (0.07-10.3 Barg)

Алматы (7273)495-231
 Ангарск (3955)60-70-56
 Архангельск (8182)63-90-72
 Астрахань (8512)99-46-04
 Барнаул (3852)73-04-60
 Белгород (4722)40-23-64
 Благовещенск (4162)22-76-07
 Брянск (4832)59-03-52
 Владивосток (423)249-28-31
 Владикавказ (8672)28-90-48
 Владимир (4922)49-43-18
 Волгоград (844)278-03-48
 Вологда (8172)26-41-59
 Воронеж (473)204-51-73
 Екатеринбург (343)384-55-89

Иваново (4932)77-34-06
 Ижевск (3412)26-03-58
 Иркутск (395)279-98-46
 Казань (843)206-01-48
 Калининград (4012)72-03-81
 Калуга (4842)92-23-67
 Кемерово (3842)65-04-62
 Киров (8332)68-02-04
 Коломна (4966)23-41-49
 Кострома (4942)77-07-48
 Краснодар (861)203-40-90
 Красноярск (391)204-63-61
 Курск (4712)77-13-04
 Курган (3522)50-90-47
 Липецк (4742)52-20-81

Магнитогорск (3519)55-03-13
 Москва (495)268-04-70
 Мурманск (8152)59-64-93
 Набережные Челны (8552)20-53-41
 Нижний Новгород (831)429-08-12
 Новокузнецк (3843)20-46-81
 Ноябрьск (3496)41-32-12
 Новосибирск (383)227-86-73
 Омск (3812)21-46-40
 Орел (4862)44-53-42
 Оренбург (3532)37-68-04
 Пенза (8412)22-31-16
 Петрозаводск (8142)55-98-37
 Псков (8112)59-10-37
 Пермь (342)205-81-47

Ростов-на-Дону (863)308-18-15
 Рязань (4912)46-61-64
 Самара (846)206-03-16
 Санкт-Петербург (812)309-46-40
 Саратов (845)249-38-78
 Севастополь (8692)22-31-93
 Саранск (8342)22-96-24
 Симферополь (3652)67-13-56
 Смоленск (4812)29-41-54
 Сочи (862)225-72-31
 Ставрополь (8652)20-65-13
 Сургут (3462)77-98-35
 Сыктывкар (8212)25-95-17
 Тамбов (4752)50-40-97
 Тверь (4822)63-31-35

Тольятти (8482)63-91-07
 Томск (3822)98-41-53
 Тула (4872)33-79-87
 Тюмень (3452)66-21-18
 Ульяновск (8422)24-23-59
 Улан-Удэ (3012)59-97-51
 Уфа (347)229-48-12
 Хабаровск (4212)92-98-04
 Чебоксары (8352)28-53-07
 Челябинск (351)202-03-61
 Череповец (8202)49-02-64
 Чита (3022)38-34-83
 Якутск (4112)23-90-97
 Ярославль (4852)69-52-93

Россия +7(495)268-04-70

Казахстан +7(7172)727-132

Киргизия +996(312)96-26-47

SPECIFICATIONS

Control Ranges: Model 764P
 2"-30" Hg Vac. (50-760mm Hg Vac.)
 1-30 psig (.07-2.1 Barg)
 20-100 psig (1.4-6.9 Barg)
 50-150 psig (3.5-10.3 Barg)
 90-500 psig (6.2-34.5 Barg)
 450-2500 psig (31.0-172.4 Barg)

Model 764PD
 1-30 psid (.07-2.1 Bard)
 20-100 psid (1.4-6.9 Bard)
 50-150 psid (3.5-10.3 Bard)

Sensing Diaphragm: Beryllium copper, ASTM B194.
 Alloy 25 – half hard is standard.

 316 SST wetted parts – uses a 316 SST cover, or covers, on the beryllium copper diaphragm.

Vent Screen: Brass, 1/8" NPT (764P only).

Diaphragm Casing Materials:

Ductile Iron – ASTM A395
 316 SST – ASTM A479.

The non-pressurized lower diaphragm case of the 764P is iron on all units, except the 2500 psig (172 Barg) units use steel.

For process fluid wetted parts, see Table 1 for Model 764P. See Table 2 for Model 764PD.

Maximum Static Pressure:

See Tables 1 and 2.

Ambient Temperature Range:

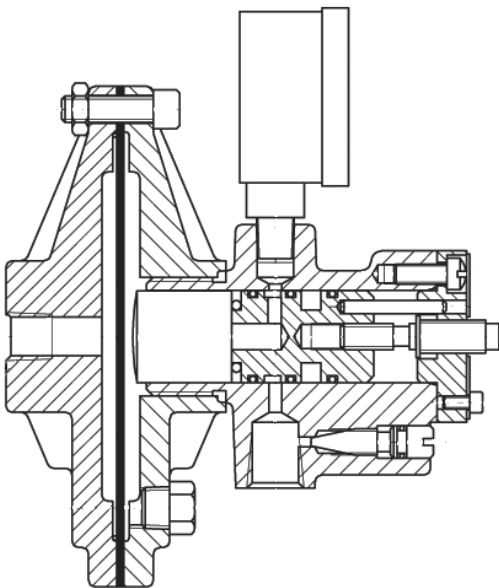
-20° to +180°F (-28.5° to +82.5°C).
 Steam service requires a pigtail siphon in the sensing line to keep the diaphragm's O-ring seal cool.

Sensing Temperature Range:

Buna-N: -20 to 212°F (-28.5° to 100°C)
 FKM: -20 to 400°F (-28.5° to 204.4°C)
 Note: Some options and materials may further alter temperature limits.

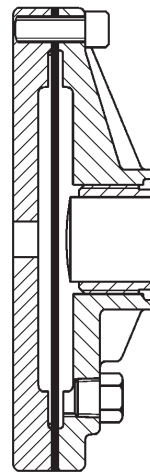
Figure 1

MODEL 764P

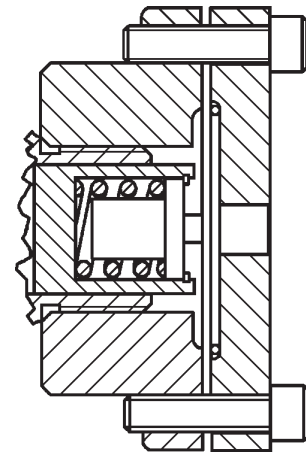


**764P 20-100 psig
(2"-30" Hg Vac.,**

1-30 psig and 50-150 psig are similar)



**Diaphragm Sub-Assembly
for 90-500 psig**



**Diaphragm Sub-Assembly
for 450-2500 psig**

**TABLE 1
MODEL 764P PROCESS FLUID WETTED PARTS**

Pressure Range		Diaphragm	Diaphragm Case	O-Ring Seal	Max. Static Pressure	
"Hg Vac./psig	(mm Hg Vac./Barg)				psig	(Barg)
2"-30" Hg Vac. or 1-30	(50-760mm Hg Vac) or (.07-2.1)	Beryllium Copper	Ductile Iron	Buna-N	250	(17.2)
		316 SST Cover	316 SST	TFE		
20 - 100 or 50 - 150	(1.4 - 6.9) or (3.5 - 10.3)	Beryllium Copper	Ductile Iron	Buna-N	300	(20.7)
		316 SST Cover	316 SST	TFE		
90 - 500	(6.2 - 34.5)	316 SST Cover	316 SST	TFE	750	(51.7)
450 - 2500	(31.0 - 172.4)	316 SST Cover	316 SST	TFE	2750	(190)

Control Housing Sub-Assembly: Brass housing, Buna-N O-ring seals, SST adjusting screws, etc.

Output Signal: 3–15 psig (0.2–1.03 Barg).
6–30 psig (0.4–2.1 Barg).

Supply Pressure: 18–20 psig (1.2–1.4 Barg) for 3-15 psig output; 32–35 psig (2.2–2.4 Barg) for 6-30 psig output.

Output Signal Gauge: 0–30 psig (0–2.1 Barg) range for 3–15 psig output signal; 0–60 psig (0–4.1 Barg) for 6–30 psig output signal.

Diaphragm Casing Connections: 764P and 764PD – Upper case (center) – 1/4" NPT, lower case – 1/8" NPT.

Supply and Output Signal Connections: 1/4" NPT female pipe connections.

Sensitivity: Better than 0.05% of sensing diaphragm span.

Repeatability: Sensing ±0.2% of sensing diaphragm span.

Diaphragm Span:

Pressure Range		Span	
"HgVac/ psig	(mm HgVac Barg)	psig	(Barg)
2" – 30"Hg	(50 – 760mm Hg)	30	(2.1)
1 – 30	(.07 – 2.1)	30	(2.1)
20 – 100	(1.4 – 6.9)	100	(6.9)
50 – 150	(3.5 – 10.3)	100	(6.9)
90 – 500	(6.2 – 34.5)	500	(34.5)
450 – 2500	(31.0 – 172.4)	2500	(172.4)

Proportional Band:

Adjustable 3–20% of sensing diaphragm span with 18–20 psig (1.2–1.4 Barg) supply. Proportional band doubles for 6-30 psig (0.4-2.1 Barg) output signal with 35 psig (2.4 Barg) supply pressure.

Steady State Air Consumption:

Output Signal					
3-15 psig (0.2-1.03 Barg)			6-30 psig (0.4-2.1 Barg)		
Flow Rate *		Prop. Band %	Flow Rate *		Prop. Band %
SCFH	(M ³ /Hr)		SCFH	(M ³ /Hr)	
4.2	(0.12)	3	4.2	0.12	6
50	(1.41)	20	80	2.27	40

* Mid-span at proper supply pressure.

Figure 2
MODEL 764PD

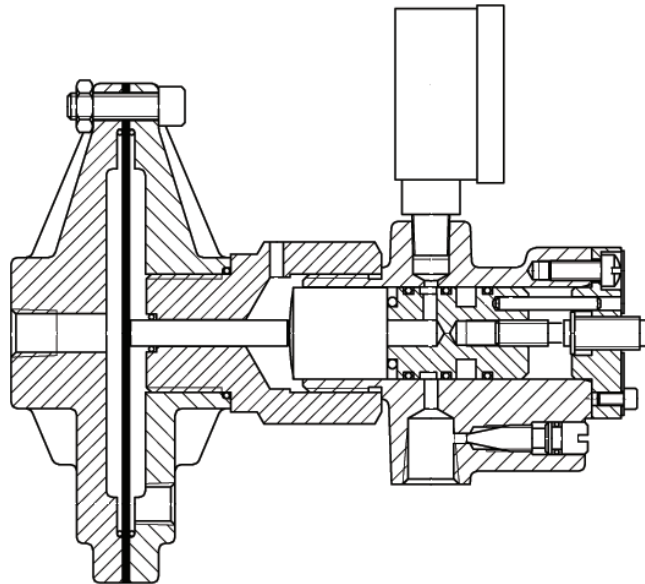


TABLE 2
MODEL 764PD PROCESS FLUID WETTED PARTS

Differential Pressure Range		Diaphragm	Diaphragm Cases	Diaphragm Case Adapter & Pusher Post	O-Ring Seals	Max. Static Pressure	
psid	(Bard)					psid	(Bard)
1 – 30	(.07 – 2.1)	Beryllium Copper	Ductile Iron	316 SST	Buna-N & FKM	250	(17.2)
20 – 100	(1.4 – 6.9)	Beryllium Copper	Ductile Iron	316 SST	Buna-N & FKM	300	(20.7)
50 – 150	(3.5 – 10.3)	Beryllium Copper	Ductile Iron	316 SST	Buna-N & FKM	300	(20.7)
1 – 30	(.07 – 2.1)	316 SST Cover	316 SST	316 SST	TFE & FKM	250	(17.2)
20 – 100	(1.4 – 6.9)	316 SST Cover	316 SST	316 SST	TFE & FKM	300	(20.7)
50 – 150	(3.5 – 10.3)	316 SST Cover	316 SST	316 SST	TFE & FKM	300	(20.7)

FKM = Fluorocarbon Elastomer

OPTIONS

Option -29: Tapped Connection. 1/4" NPT female connection on center of diaphragm case. **NOTE: This feature has been updated and is now included with standard construction.**

Option-37: Sanitary Pressure Controller. See Bulletin 764P-37-TB for technical specifications.

Option -55: SPECIAL CLEANING. Cleaned and packaged per Cashco Specifications #S-1134. Process side only. Suitable for oxygen service. Not available for Opt. -37.

Option -75: Diaphragm Seals. An Ashcroft Type 300 diaphragm seal is available with the 764P to protect the sensing diaphragm from corrosive fluid attack. The diaphragm seal is close mounted to the 764P with a 1/4" steel pipe nipple. The process connection on the diaphragm seal is 1/2" female NPT. (See Ashcroft Bulletin DS-1 for complete technical information.)

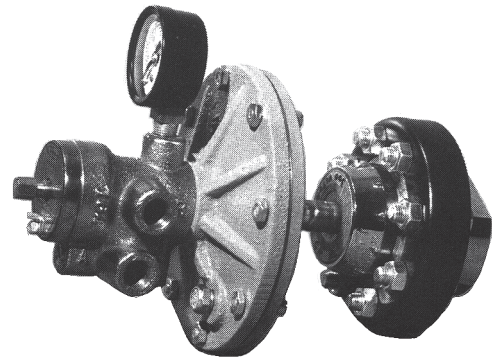


Figure 3
764P-75 with Diaphragm Seal

TABLE 3
DIAPHRAGM SEAL –
PROCESS PRESSURE/TEMPERATURE

Diaphragm Seal Mat'l.	Fill Liquid	Pressure		Temperature	
		psig	(Barg)	°F	(°C)
TFE	Glyc.	2500	(172.4)	0 – +400	(-17 to +204.8)
	Sil.			-40 – +400	(-40 to +204.8)
	H.C.			-40 – +300	(-40 to +149.2)
Fluorocarbon Elastomer	Glyc.	500	(34.5)	0 – +400	(-17 to +204.8)
	Sil.			-40 – +400	(-40 to +204.8)
	H.C.			-40 – +300	(-40 to +149.2)

Materials

Upper Housing: Steel.
 Lower Housing: 316SST, Carpenter 20, Monel 400 or Hastelloy C.
 Clamps & Bolts: Steel.
 Diaphragm Seal: TFE or Fluorocarbon Elastomer.
 Fill Liquid: Glycerine, Silicone or Halocarbon.

ACCESSORIES

Volume Booster: 1:1 ratio for improving the stroking speed of diaphragm motor valves when no positioner is used. Incorporates a stabilizing bypass needle valve between input and output (Moore Products – Model 61H).

Air Filter Regulator: Model 5200P Airtset can be mounted to a control valve actuator. A 1-1/2" (38 mm) supply pressure gauge is included.

PRINCIPLE OF OPERATION

The 764 controllers employ laminar flow to produce the 3–15 psig (nominal 0.2–1.0 Barg) output signal. Laminar flow eliminates the need for range springs, levers, pivots and other parts that produce friction and lost motion.

The sensing diaphragm in the 764P and 764PD, has a high spring rate and any change in the sensed pressure produces a minute diaphragm movement which strokes the sensor plate. The sensor plate, in turn, throttles the flow of instrument air through the sensor to develop the 3–15 psig (0.2–1.0 Barg) output signal.

On direct acting controllers (see Figure 4) the supply air enters PORT A and passes through the proportional band restriction. With an increase in the controlled pressure the flow through the sensor is reduced which increases the output signal. The proportional band restriction regulates the flow rate of supply air into Port A. PORT B is the exhaust port.

On reverse acting controllers (see Figure 5) the supply enters PORT B (not Port A). With an increase in the controlled pressure the supply air flowing through the sensor decreases, which reduces the output signal. The proportional band restriction regulates the flow of exhaust through Port A.

Closing the proportional band adjusting screw reduces the proportional band. Opening the screw increases the proportional band.

The set point adjustment positions the sensor so the diaphragm must deflect its maximum for its highest controlled pressure and hardly deflects for the lowest controlled pressure.

Using a 764P/PD controller to produce a 6–30 psig (0.4–2.1 Barg) output signal operates similarly, but at higher air consumption levels.

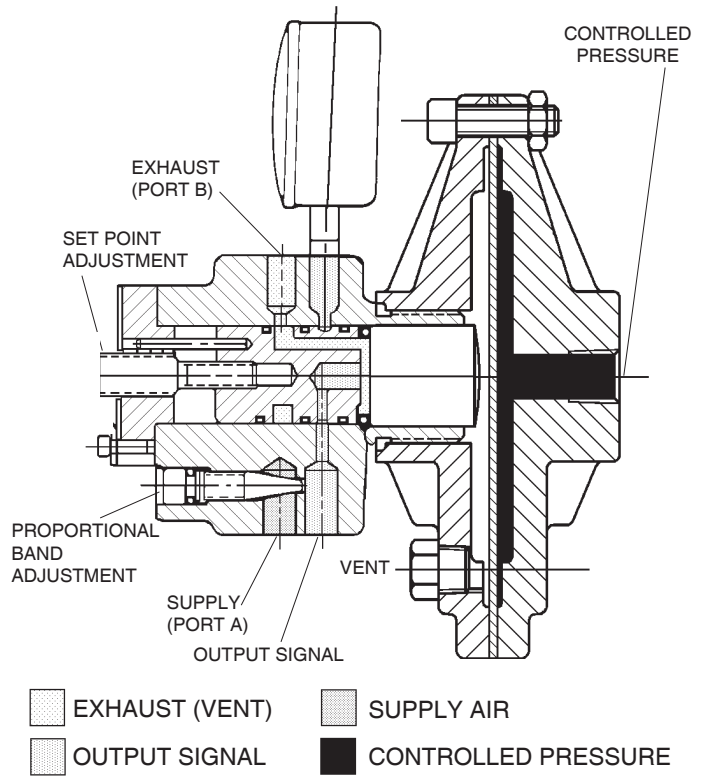


Figure 4
Direct Action 764P

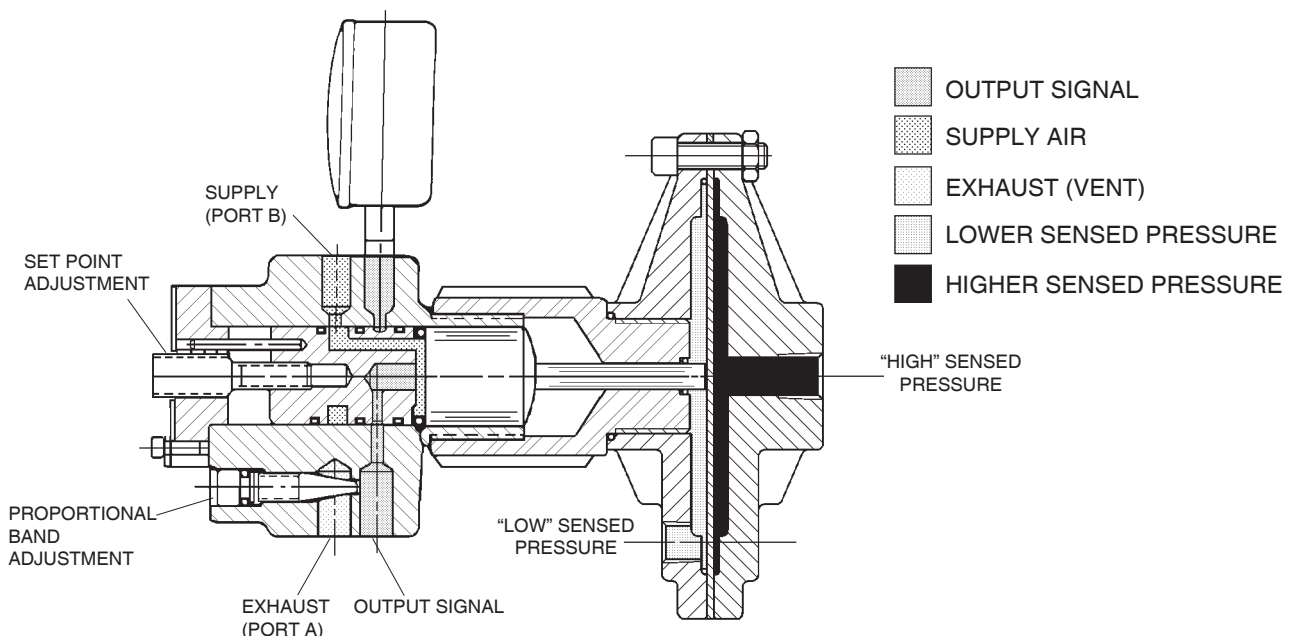
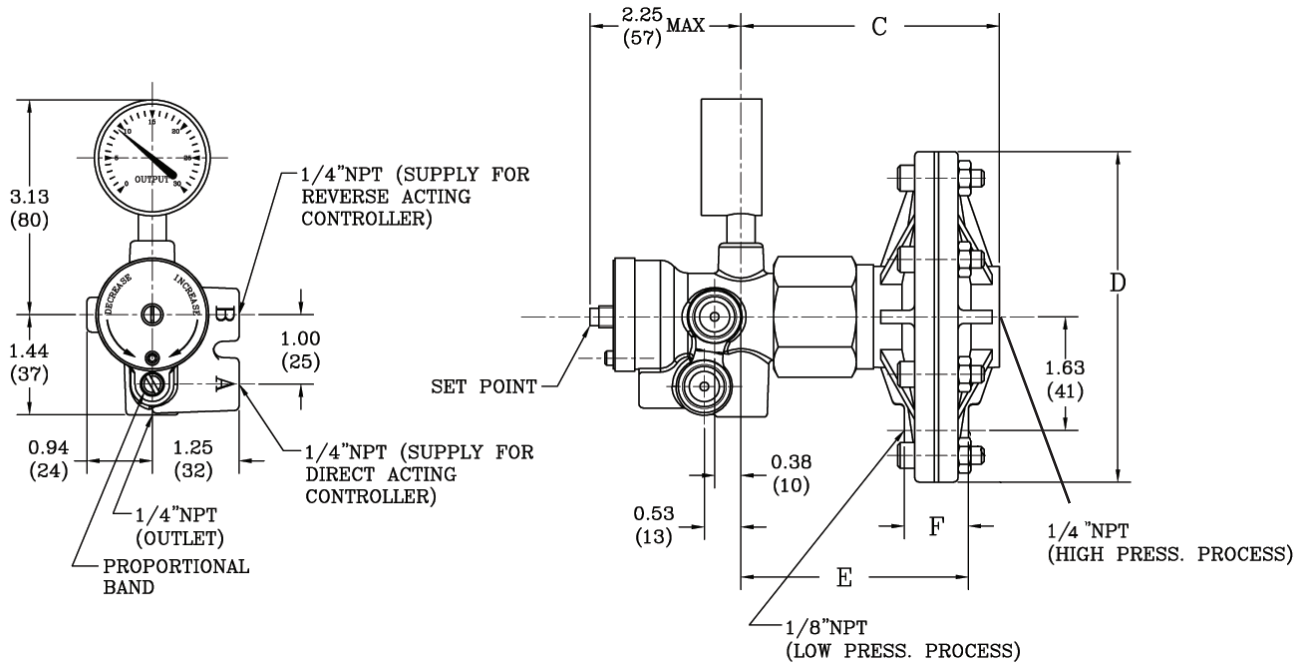


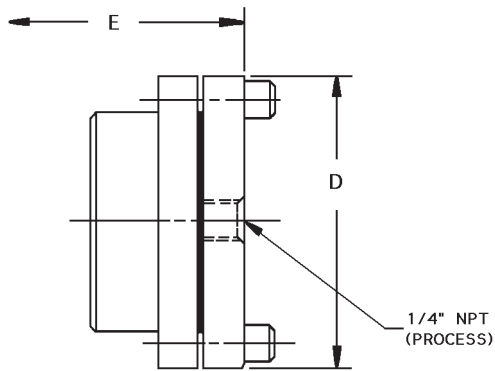
Figure 5
Reverse Action 764PD

DIMENSIONS & WEIGHTS

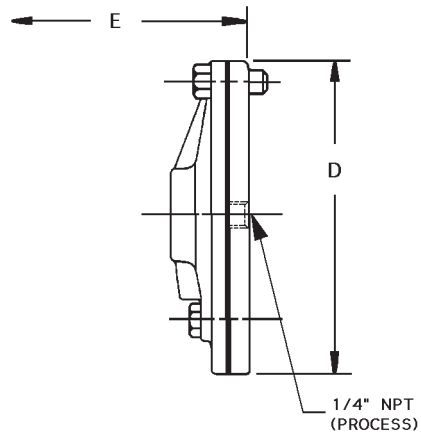


764P and 764PD

**REPRESENTATIVE OF 764PD WITH IRON CASE
(764P Similar)**



**REPRESENTATIVE OF 764P
450–2500 psig**



764P - SST CASE

DIMENSION	764P								764PD			
	Iron Case		SST Case		SST Case		SST Case		Iron Case		SST Case	
	2–30" Hg Vac 1–30, 20–100, 50–150 psig		2–30" Hg Vac 1–30, 20–100, 50–150 psig		90–500 psig		450–2500 psig		1–30, 20–100, 50–150 psid		1–30, 20–100, 50–150 psid	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
C	2.28	58	NA	NA	NA	NA	NA	NA	3.72	94	NA	NA
D	4.75	121	4.75	121	3.75	95	3	76	4.75	121	4.75	121
E	1.84	47	1.75	44	1.75	44	2.03	52	3.28	83	3.19	81
F	NA	NA	NA	NA	NA	NA	NA	NA	.88	22	.69	17
WEIGHT	5.25 lbs. 2.38 kg.								5.93 lbs. 2.69 kg.			

The diaphragm casing assembly screws onto the pilot housing assembly and the 1/8" NPT tapped hole for the 764PD "Low" process connection will probably be located at positions other than shown in these views.

MODELS 764P / PD PRODUCT CODER 02/07/20

An "X" in POS 12 followed by a 5-digit control number overrides remaining selections.

POS 1 & 2	POS 3	—	POS 5	POS 6	POS 7	7	—	POS 10	POS 11	POS 12	0	0	0	0	0	B
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POSITIONS 1 & 2 - MODEL TYPE	
Description	CODE
Model "764P" Pneumatic Controller *	CA
Model "764PD" Pneu. Press. Diff. Controller	CC
* Use Code "CA" for Opt-37 (Ref to 764P-37-TB for Specifications)	

POSITION 3 - OUTPUT	
Signal Output	CODE
3-15 psig	1
* Variable Output	2
6-30 psig	3
* Used with 1000HP "Accelerator"	

POSITION 5 - MATERIALS				
Const. Design	(Wetted) Casing	Diaphragm Material	Applic. Ranges	CODE
764P	Ductile Iron	Be Cu	30" Vac. thru 150 psig	A
	316 SST	Be Cu with 316 SST Cover	30" Vac. thru 500 psig	B *
		Be Cu with 316 SST Cover	450 thru 2500 psig	C
764PD	Ductile Iron	BeCu Diaph	All	A
	316 SST	Be Cu with 316 SST Cover	All	D
* Standard Material Selection for Opt-37				

POSITION 6 - CONTROL RANGES		
Pressure Range	Applicable Wetted Construction	CODE
764P		
2" to 30" Hg Vac.	All	1
1-30 psig *	All	2
20-100 psig *	All	3
50-150 psig *	All	4
90-500 psig	316 SST	5
450-2500 psig	316 SST	6
764PD		
1-30 psid	All	A
20-100 psid	All	B
50-150 psid	All	C
* Only Selections for Opt-37. See Position 10.		

POSITION 7 - SPECIAL CLEAN	
Special Clean per Spec #S1134 Opt.-55	CODE
No	0
Yes - SST Casing 764P (Process Side Only) 764PD (High Process Side Only) Not available for Opt-37	1

POSITION 10 - CONNECTIONS			
764P			
Process Connection	Applicable Press. Range	Opt.	CODE
Std. - 1/4" NPT, Center of Upper Diaph Casing	All	Std.	A
1" Tri-Clamp (Sanitary)	0-30, 20-100, 50-150	-37 *	S
764PD			
Std. - 1/4" NPT, Center of Upper Diaph Casing	All	Std.	2
* Special Cleaned per #S-1576.			

POSITION 11 - DIAPHRAGM SEAL FOR 764P ONLY (OPT-75)					
None					CODE
					0
Teflon Diaphragm Seal					
Fill Liquid	Applic. Ranges (psig)	Diaph. Seal Lower Housing Material			
		316 SST	Carp. 20	Mon. 400	Hast. C.
		CODE	CODE	CODE	CODE
Glycerin	1-2500	1	4	7	A
Silicone	1-2500	2	5	8	B
Halocarbon	1-2500	3	6	9	C
Fluorocarbon Elastomer Diaphragm Seal					
Fill Liquid	Applic. Ranges (psig)	Diaph. Seal Lower Housing Material			
		316 SST	Carp. 20	Mon. 400	Hast. C
		CODE	CODE	CODE	CODE
Glycerin	1-500	D	G	K	N
Silicone	1-500	E	H	L	P
Halocarbon	1-500	F	J	M	R

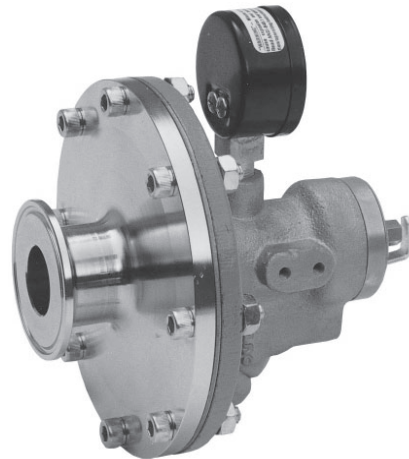
POSITION 12 - AIRSET *	
Description	CODE
No Airset	0
5200P Airset (Filter Regulator) 0-30 psig range (w/gauge)	A
5200P Airset (Filter Regulator) 0-60 psig range (w/gauge)	B
For Special Construction Contact Cashco for Special Code	X
* Choose "0" when 764P or 764PD Controller and Airset are ordered with a Control Valve.	



ISO Registered Company

MODEL 764P-37

SANITARY PRESSURE CONTROLLER



MODEL 764P-37

OVERVIEW

The Model 764P-37 Controller includes a SST sensing head with a 1" Tri-Clamp® process connection. It is designed for use in clean steam and other sanitary biotechnological process piping systems. The Model 764P-37 measures the controlled pressure and develops a pneumatic output signal that varies linearly as the controlled pressure changes. Controls process pressures between 1-30, 20-100, and 30-150 psig.

FEATURES

- Adjustments:** Proportional band and setpoint.
- Field Reversible:** Easily changed from direct acting to reverse acting.
- Small Size:** Easily supported by process piping.
- Gauge:** 1-1/2" (38mm) output signal gauge.
- Wetted Materials Construction:** 316 SST. Standard Unit is cleaned to Spec. #S-1576, Process side only.



END CONNECTIONS

1" (DN25) SANITARY TRI-CLAMP



COMMON APPLICATIONS

CLEAN STEAM, BIOTECHNOLOGICAL PROCESS PIPING SYSTEMS



DESIGN PRESSURE

CONTROLS PRESSURES BETWEEN 1-30 psig (0.07-2.1 Barg), 20-100 psig (1.4-6.9 Barg), & 30-150 psig (2.1-10.3 Barg)

SPECIFICATIONS

Sensing Diaphragm: 316 SST wetted parts.

Diaphragm Casing Materials: Ductile Iron — ASTM A395
316 SST — ASTM A479.

Diaphragm O-ring Seal: TFE.

Control Ranges & Maximum Static Pressure:

Control Range		Maximum Static Pressure	
psig	(Barg)	psig	(Barg)
1-30	(.07-2.1)	250	(17.2)
20-100	(1.4-6.9)	300	(20.7)
50-150	(3.5-10.3)	300	(17.2)

Ambient Temp Range: -20° to 180°F (-28.5° to 82.5°C).

Sensing Temp Range: Buna-N: -20 to 212°F (-28.5° to 100°C)
FKM: -20 to 400°F (-28.5° to 204.4°C)
Note: Some options and materials may further alter temperature limits.

Control Housing Sub-Assembly: Brass housing, FKM Seals
SST adjusting screw.

Output Signal: 3-15 psig (0.2-1.03 Barg).

Supply Pressure: 18-20 psig (1.2-1.4 Barg).

Output Signal Gauge: 0-30 psig (0-2.1 Barg).

Proportional Band: Adjustable 3-30% of sensing diaphragm span with 18-20 psig (1.2-1.4 Barg) supply.

Steady State Air Consumption:

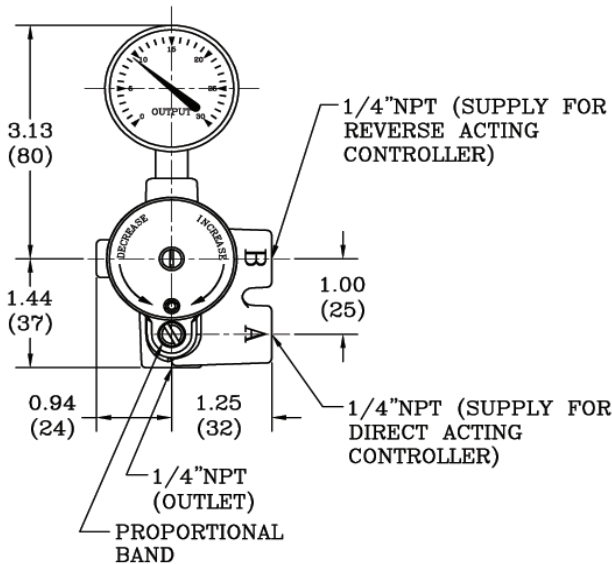
Flow Rate*		Prop. Band
SCFH	M ³ /Hr @ MSC	%
4.2	(0.12)	3
50	(1.21)	20

*Mid-span at proper supply pressure.

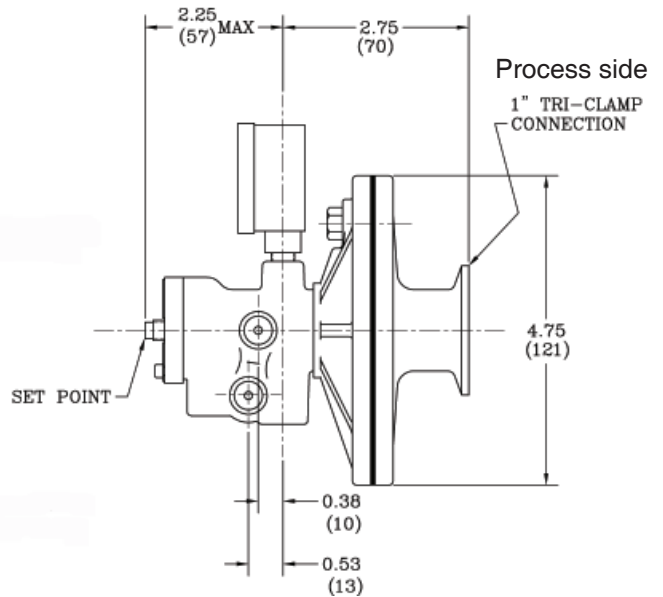
Supply and Output Signal Connections: 1/4" NPT female pipe connections.

Sensitivity: Better than 0.05% of sensing diaphragm span.

Repeatability: ±0.2% of sensing diaphragm span.



Dimensions: in (mm)
Shipping Weight: 5 lbs. (2.27 kg.)



MODEL NW-PL- _ _ _ _

PRESSURE-LOADED PILOT REGULATOR

OVERVIEW:

Model NW-PL is a pressure-loaded, flow-to-open, direct-action, loading-type pilot regulator. Used in gaseous service only for pressure reducing or backpressure applications. Pressure-loading design increases sensitivity by eliminating the resultant “droop effect” range spring. May be loaded with process or auxiliary gas. A Type MA6 with 1:1 loading-to-output ratio is standard; an alternate Type MD6 with 1:3 ratio is available for higher outlet pressures with lower auxiliary loading pressures, and a high sensitivity Type MA7 with 1:1 ratio is available for close accuracy of setpoint at lower outlet pressures.

FEATURES:

- FTO internal path for stability.
- 1:1 or 1:3 ratio loading.
- Pressure-loaded for high sensitivity.
- Bellows-stem seal for “non-sticking”.
- Bronze or SST material.
- Std. metal seat or composition soft seat.

PRINCIPLE OF OPERATION:

Unit operates by force-balance principle; setpoint loading pressure (P_{sp}) on top of diaphragm and controlled/sensed pressure will come into balance.

REDUCING –

P2 Low: P_{sp} will push diaphragm down, opening pilot plug/port to increase pressure to one outlet port tubed to main valve topworks, opening main valve port to increase P_2 pressure.

P2 High: P_2 will push diaphragm up, closing pilot plug/port. Topworks loading gas will then backflow from the main valve back to and thru the pilot’s second outlet port to the downstream, closing main valve.

BACKPRESSURE – (requires auxiliary pressure supply)

P1 Low: P_{sp} will push diaphragm down, opening pilot plug/port to increase pressure to one outlet port tubed to main valve topworks, closing main valve port.

P1 High: P_1 will push diaphragm up, closing pilot plug/port. Topworks auxiliary loading gas will then backflow from the main valve back to and thru the pilot’s second outlet port to vent-to-atmosphere, opening main valve port.

Maximum inlet-to-outlet pressure drop is 40 psid (2.7 Bard); higher system pressure drops will require a Stabilizer PRV to reduce pressure of pilot inlet port. Exceeding 40 psid (2.7 Bard) drop will allow pressure to overcome the lower plug spring and “push” the plug open, rendering the unit inoperable until the pilot’s $\Delta P \leq 40$ psid (2.7 Bard) is again reached.

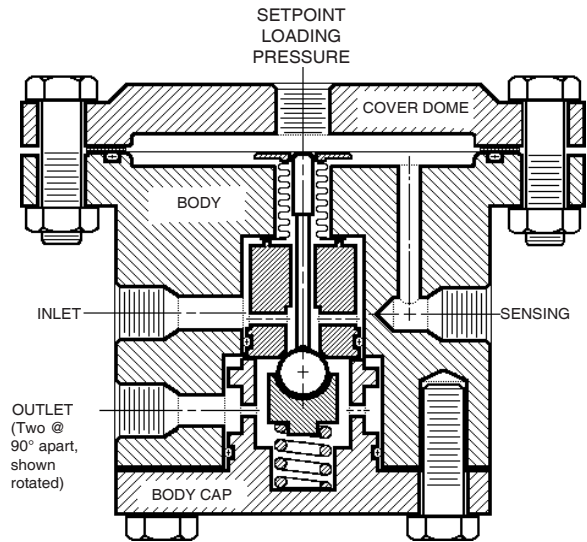


Fig. 1 – MODEL NW-PL-MA6

APPLICATIONS:

Applied in atmospheric industrial gases - GN₂, GOX, Ar, He, H₂, CO₂ - as well as a natural gas and other process gases. Gases can be corrosive, non-corrosive, combustible, non-combustible, toxic, or non-toxic.

Not for liquid or flashing service. May be used in gaseous cryogenic service with proper materials; consult factory.

Applied where inlet pressure varies significantly, offsetting inverse sympathetic ratio (ISR) effects.

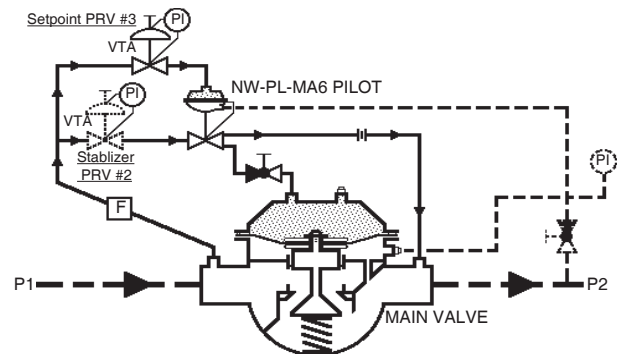


Fig. 2 – HOOKUP SCHEME P5 – REDUCING

STANDARD / GENERAL SPECIFICATIONS

Body Size / End Connections

1/4" NPT (all ports).

Inlet Operating Pressure Range

See Table 1 for Design Pressure vs. Temp. Ratings.

	Types MA6 & MD6	Type MA7
BRZ:	20 – 300 psig (1.4 – 20.7 Barg)	10 – 100 psig (0.7 – 6.9 Barg)
SST:	20 – 450 psig (1.4 – 31.0 Barg)	10 – 100 psig (0.7 – 6.9 Barg)

Outlet Operating Pressure Range

See Table 1 for Design Pressure vs. Temp. Ratings.

	Types MA6 & MD6	Type MA7
BRZ:	0.5 – 275 psig (0.03 – 19.0 Barg)	3" W.C. – 50 psig (75mm H ₂ O – 3.4 Barg)
SST:	0.5 – 425 psig (0.03 – 29.3 Barg)	3" W.C. – 50 psig (75mm H ₂ O – 3.4 Barg)

Max. Psp Loading Pressure (Operating)

	Type MA6	Type MD6	Type MA7
BRZ:	1:1 Ratio 275 psig (19.0 Barg)	1:3 Ratio 110 psig* (7.6 Barg)	1:1 Ratio 50 psig (3.4 Barg)
SST:	1:1 Ratio 425 psig (29.3 Barg)	1:3 Ratio 170 psig* (11.7 Barg)	1:1 Ratio 50 psig (3.4 Barg)

Max. Pressure Drop

40 psid (2.7 Bard).

Temperature Range

See Table 1 for Design Pressure vs. Temp. Ratings.

–65° to +350° F (–53° to +177° C)
(Function of internal materials).

***General Note:** A 1:3 ratio pilot Type MD6 operates at an actual ratio of 1:2.5; example, 50 psig (3.4 Barg) loading pressure generates 125 psig (8.6 Barg) setpoint pressure with sufficient inlet supply pressure.

Sensitivity

Type MA6 & MD6:	±0.25 psi (±0.17 mBar)
Type MA7:	±0.05 psi (±3 mBar)

MATERIAL SPECIFICATIONS

Body / Cover Dome / Lower Chamber / Body Cap

BRZ/BRZ/BRZ/BRZ: ASTM B16, Alloy C36000

SST/SST/SST/SST: ASTM A479, Gr. 316L (Barstock).

(NOTE: Lower Chamber for Types MD6 and MA7 only.)

Internal Trim

Trim Part	Basic Construction Material	
	BRZ	SST
Diaphragm	BeCu	17-7 PH
Bellows	Copper	Enc Coated Copper
Stem	Nitronics 60 (SST)	
Seat	Brass	316L SST
Lower Plug Spring	302 SST	
Ball/Plug	Metal	316 SST
	Soft	V-TFE, PolyAll
Ball/Plug Holder	Brass	316L
Static Seals	FK or HK	
Pusher Plate	Brass	316L
Bolting	302 SST	

OPTION SPECIFICATIONS

OPT-55: **SPECIAL CLEANING - GOX.** Standard for BRZ/BRZ/BRZ pressure boundary construction; must be specified for SST/SST/SST construction. Cleaning, assembly and packaging per Cashco Spec No. S-1134, making unit suitable for Oxygen service. (**NOTE:** Main valve, tubing, and other accessories must also be cleaned to this specification).

PA =	PolyAll (polyurethane)
BeCu =	Beryllium Copper
FK =	Fluorosilicone
HK =	Fluorocarbon elastomer
V-TFE =	Virgin tetrafluoroethylene
TFE =	Tetrafluoroethylene

TABLE 1
MAXIMUM DESIGN PRESSURE vs. TEMPERATURE
MAXIMUM OPERATING PRESSURES, TEMPERATURES,
and PRESSURE DROPS

Config. Type	Body/Cover Dome Material	Design Pressure		Operating Temperature Range °F*	Static Seal Material	Diaphragm Material	Seat Design/Ball & Seat Material	Ø Maximum Operating Pressures	
		Inlet psig	Outlet psig					Inlet psig	Outlet psig
MA6 MD6	BRZ/BRZ	600	600	-65 to +350	FK	BeCu	Metal/SST+BRZ	300	275
				0 to 250	HK	HK	Comp/PA+BRZ	50	15
				-40 to +180	FK	BeCu	Comp/PA+BRZ	50	15
	SST/SST	600	600	0 to 350	HK	17-7PH SST	Metal/SST+SST	450	425
				0 to 250	HK	HK	Comp/PA+SST	50	15
				0 to 350	HK	HK+TFE	V-TFE+SST	450	425
MA7	BRZ/BRZ	150	150	-65 to +350	FK	BeCu	Metal/SST+BRZ	100	50
				0 to 250	HK	HK	Comp/PA+BRZ	50	15
				0 to 350	HK	17-7 PH SST	Metal/SST+SST	100	50
	SST/SST	600	600	0 to 250	HK	HK	Comp/PA+SST	50	15
				0 to 350	HK	HK+TFE	V-TFE+SST	100	50

Config. Type	Body/Cover Dome Material	Design Pressure		Operating Temperature Range °C*	Static Seal Material	Diaphragm Material	Seat Design/Ball & Seat Material	Ø Maximum Operating Pressures	
		Inlet Barg	Outlet Barg					Inlet Barg	Outlet Barg
MA6 MD6	BRZ/BRZ	41.4	41.4	-53 to +177	FK	BeCu	Metal/SST+BRZ	20.7	19.0
				-17 to +121	HK	HK	Comp/PA+BRZ	4.4	1.0
				-40 to +82	FK	BeCu	Comp/PA+BRZ	4.4	1.0
	SST/SST	41.4	41.4	-17 to +177	HK	17-7PH SST	Metal/SST+SST	31.0	29.3
				-17 to +121	HK	HK	Comp/PA+SST	4.4	1.0
				-17 to +177	HK	HK+TFE	V-TFE+SST	31.0	29.3
MA7	BRZ/BRZ	10.3	10.3	-53 to +177	FK	BeCu	Metal/SST+BRZ	6.9	4.4
				-17 to +121	HK	HK	Comp/PA+BRZ	4.4	1.0
				-17 to +177	HK	17-7 PH SST	Metal/SST+SST	6.9	4.4
	SST/SST	41.4	41.4	-17 to +121	HK	HK	Comp/PA+SST	4.4	1.0
				-17 to +177	HK	HK+TFE	V-TFE+SST	6.9	4.4

* When process operating temperature is 15°F ΔT (8° C) below minimum operating temperature, HEX coils are recommended. When process temperature is 20°F ΔT (11°C) above maximum operating temperature, HEX coils are recommended.

Ø Exceeding these limits may cause internal damage and render the pilot valve inoperable.

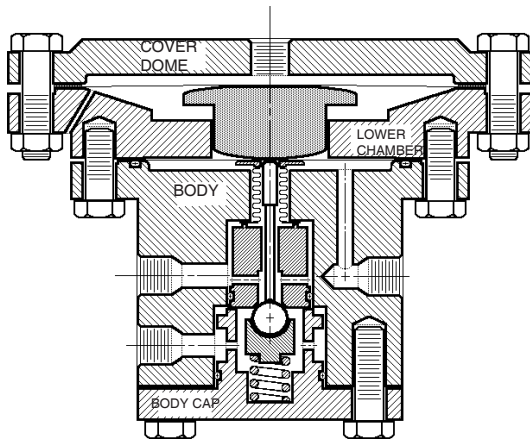


Fig. 3 – MODEL NW-PL-MD6

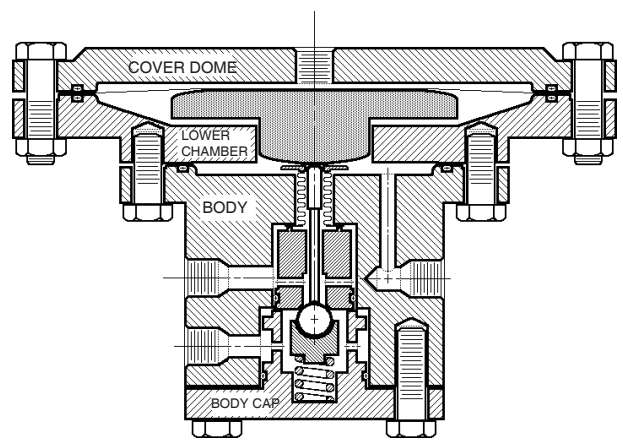
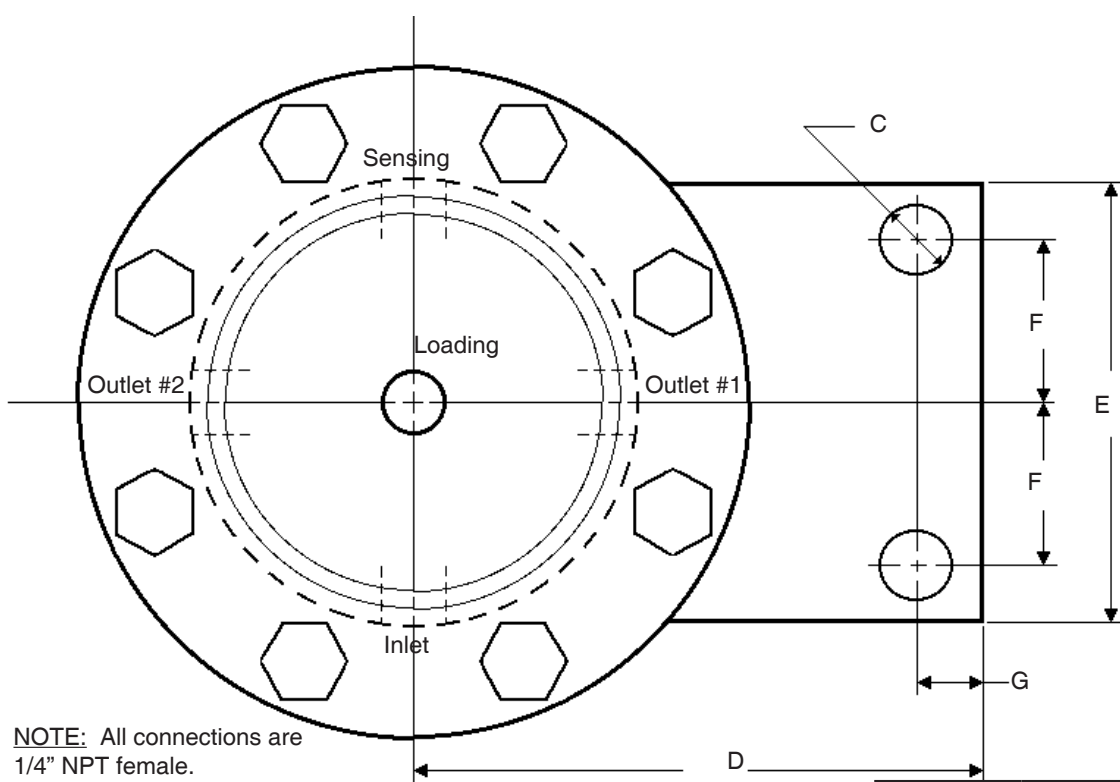
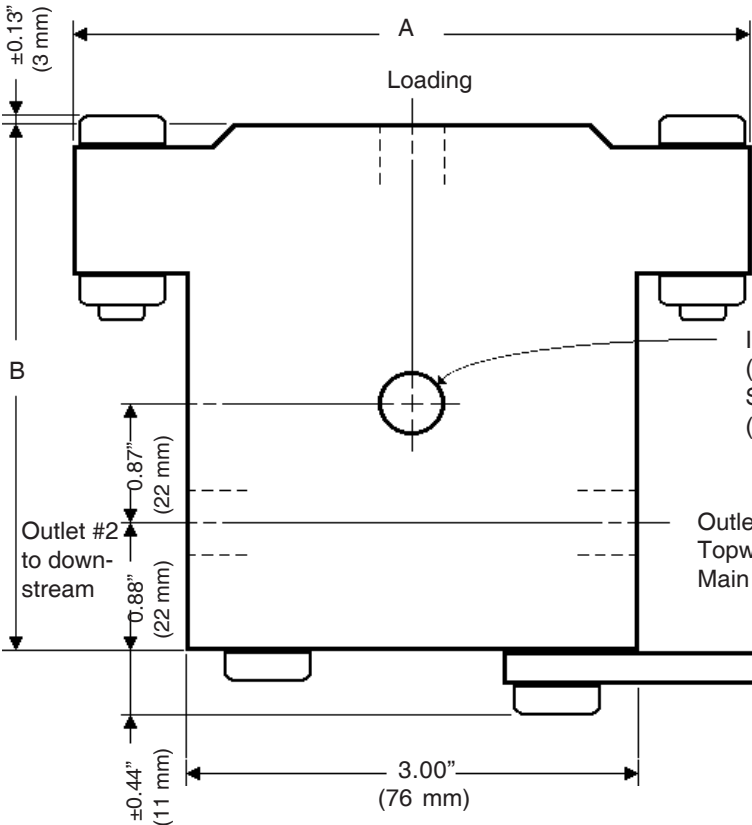


Fig. 4 – MODEL NW-PL-MA7

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NOTE: All connections are 1/4" NPT female.



DIMENSIONS - inches & lbs.

Type	A	B	Est. Weight		
MA6	4.50	3.56	10		
MD6	5.75	4.28	15		
MA7	7.00	4.48	20		
Main Valve Body Size	C	D	E	F	G
1/2"-1"	0.41	2.90	2.75	0.99	0.50
1 1/4"-1 1/2"	0.41	2.90	3.20	1.16	0.50
2"	0.41	2.90	3.10	1.11	0.50
2 1/2"	0.50	2.90	3.25	1.16	0.56
3", 4"	0.50	2.90	3.50	1.29	0.56

DIMENSIONS - mm & kg.

Type	A	B	Est. Weight		
MA6	114	90	4.5		
MD6	146	108	6.8		
MA7	178	114	9.1		
Main Valve Body Size	C	D	E	F	G
DN 15-25	10	74	70	25	13
DN 32, 40	10	74	81	29	13
DN 50	10	74	79	28	13
DN 65	13	74	83	29	14
DN 80, 100	13	74	89	33	14

Mounting Bracket - Aluminum

MODEL NW-SO

SPRING-OPERATED PILOT REGULATOR

OVERVIEW:

Model NW-SO is a spring-operated, flow-to-open, direct-action, loading-type pilot regulator. Used in gaseous service only for pressure reducing or backpressure applications. Multiple range springs cover controlled pressure range from 0.5 - 200 psig (0.03 - 13.8 Barg).

FEATURES:

- FTO internal path for stability.
- Good sensitivity.
- Bellows-stem seal for “non-sticking”.
- Bronze or SST material.
- Std. metal seat or composition soft seat.

PRINCIPLE OF OPERATION:

Unit operates by force-balance principle; setpoint loading pressure (P_{sp}) on top of diaphragm and controlled/sensed pressure will come into balance.

REDUCING –

P2 Low: P_{sp} will push diaphragm down, opening pilot plug/port to increase pressure to one outlet port tubed to main valve topworks, opening main valve port to increase P_2 pressure.

P2 High: P_2 will push diaphragm up, closing pilot plug/port. Topworks loading gas will then backflow from the main valve back to and thru the pilot’s second outlet port to the downstream, closing main valve.

BACKPRESSURE – (requires auxiliary pressure supply)

P1 Low: P_{sp} will push diaphragm down, opening pilot plug/port to increase pressure to one outlet port tubed to main valve topworks, closing main valve port.

P1 High: P_1 will push diaphragm up, closing pilot plug/port. Topworks auxiliary loading gas will then backflow from the main valve back to and thru the pilot’s second outlet port to vent-to-atmosphere, opening main valve port.

Maximum inlet-to-outlet pressure drop is 40 psid (2.7 Bard); higher system pressure drops will require a Stabilizer PRV to reduce pressure of pilot inlet port. Exceeding 40 psid (2.7 Bard) drop will allow pressure to overcome the lower plug spring and “push” the plug open, rendering the unit inoperable until the pilot’s $\Delta P \leq 40$ psid (2.7 Bard) is again reached.

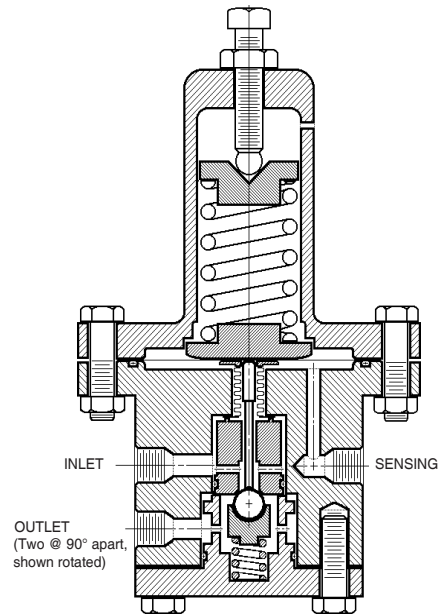


Fig. 1 – MODEL NW-SO

APPLICATIONS:

Applied in atmospheric industrial gases - GN₂, GOX, Ar, He, H₂, CO₂ - as well as a natural gas and other process gases. Gases can be corrosive, non-corrosive, combustible, non-combustible, toxic, or non-toxic.

Not for liquid or flashing service. May be used in gaseous cryogenic service with proper materials; consult factory.

Applied where inlet pressure varies significantly, offsetting inverse sympathetic ratio (ISR) effects.

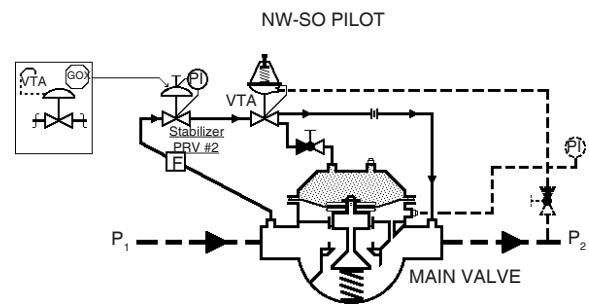


Fig. 2 – HOOKUP SCHEME P1 – REDUCING

STANDARD / GENERAL SPECIFICATIONS

Body Size / End Connections

1/4" NPT (all ports).

Maximum Operating Pressures/Spring Ranges

See Table 2 for Design Pressure vs. Temp. Ratings.

Table 1

Max Inlet Pressure				Spring Ranges	
BRZ		SST			
psig	(Barg)	psig	(Barg)	psig	(Barg)
150	(10.3)	150	(10.3)	0.5-10	(0.03-0.7)
250	(17.2)	250	(17.2)	4-20	(0.28-1.4)
				5-50	(0.34-3.4)
300	(31.0)	450	(31.0)	10-200	(0.7-13.8)

Max. Pressure Drop

40 psid (2.7 Bard).

Temperature Range

See Table 2 for Design Pressure vs. Temp. Ratings.

-65° to +350° F (-53° to +177° C)
(Function of internal materials).

Sensitivity

± 0.5 psi (±0.035 mBar)

MATERIAL SPECIFICATIONS

Body / Spring Chamber/Body Cap

BRZ/BRZ/BRZ: ASTM B16, Alloy C36000
Spring Chamber Casting B-61 C83600

SST/SST/SST: ASTM A479, Gr. 316L
(Barstock).

Internal Trim & Misc.

Trim Part	Basic Construction Material	
	BRZ	SST
Diaphragm	BeCu	17-7 PH
Bellows	Copper	ENC Coated Copper
Stem	Nitronics 60 (SST)	
Seat	Brass	316L SST
Lower Plug Spring	302 SST	
Ball/Plug	Metal	316 SST
	Soft	V-TFE, PolyALL
Ball/Plug Holder	Brass	316L
Static Seals	FK or HK	
Pusher Plate	Brass	316L
Bolting	302 SST	
Misc.	BRZ	SST
Press. Plate	BRZ	SST
Spg. Button	BRZ	SST
Rg. Spring	BRZ	SST
Adj. Screw	BRZ	SST
Ball	BRZ	SST

OPTION SPECIFICATIONS

OPT-55: SPECIAL CLEANING - GOX. Standard for BRZ/BRZ/BRZ pressure boundary construction; must be specified for SST/SST/SST construction. Cleaning, assembly and packaging per Cashco Spec No. S-1134, making unit suitable for Oxygen service. (**NOTE:** Main valve, tubing, and other accessories must also be cleaned to this specification).

PA = PolyAll (polyurethane)
BeCu = Beryllium Copper
FK = Fluorosilicone
HK = Fluorocarbon elastomer
V-TFE = Virgin tetraflouroethylene
TFE = Tetraflouroethylene

TABLE 2
MAXIMUM DESIGN PRESSURE vs. TEMPERATURE
MAXIMUM OPERATING PRESSURES, TEMPERATURES,
and PRESSURE DROPS

Body/Cover Dome Material	Design Pressure		Operating Temperature Range °F *	Static Seal Material	Diaphragm Material	Seat Design/Ball and Seat Material	Maximum Operation Pressures	
	Inlet psig	Outlet psig					Inlet psig**	Outlet psig
BRZ/BRZ	600	600	-65 to +350	FK	BeCu	Metal/SST+BRZ	150/250/300	275
			0 to 250	HK	HK	Comp/PA+SST	50	15
SST/SST	600	600	0 to 350	HK	17-7 PH SST	Metal/SST+SST	150/250/450	425
			0 to 250	HK	HK	Comp/PA+SST	50	15
			0 to 350	HK	HK + TFE	V-TFE+SST	150/250/450	425

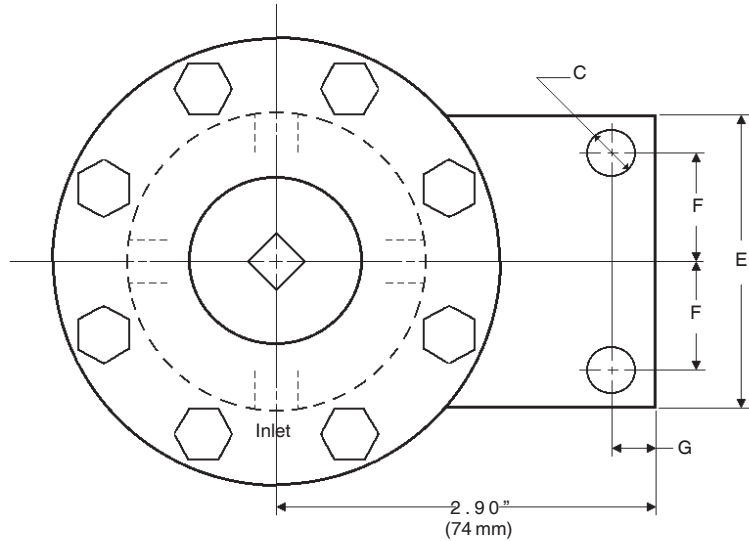
Body/Cover Dome Material	Design Pressure		Operating Temperature Range °F *	Static Seal Material	Diaphragm Material	Seat Design/Ball and Seat Material	Maximum Operation Pressures	
	Inlet Barg	Outlet Barg					Inlet psig**	Outlet psig
BRZ/BRZ	41.3	41.3	-53 to +177	FK	BeCu	Metal/SST+BRZ	10.3/17.2/20.7	19.0
			-17 to +121	HK	HK	Comp/PA+SST	4.4	1.0
SST/SST	41.3	41.3	-17 to +177	HK	17-7 PH SST	Metal/SST+SST	10.3/17.2/20.7	29.3
			-17 to +121	HK	HK	Comp/PA+SST	4.4	1.0
			-17 to +177	HK	HK + TFE	V-TFE+SST	103./17.2/31.0	29.3

* When process operating temperature is 15° F ΔT (8° C) below minimum operating temperature, HEX coils are recommended. When process temperature is 20° F ΔT (11° C) above maximum operating temperature, HEX coils are recommended.

√ Exceeding these limits may cause internal damage and render the pilot valve inoperable.

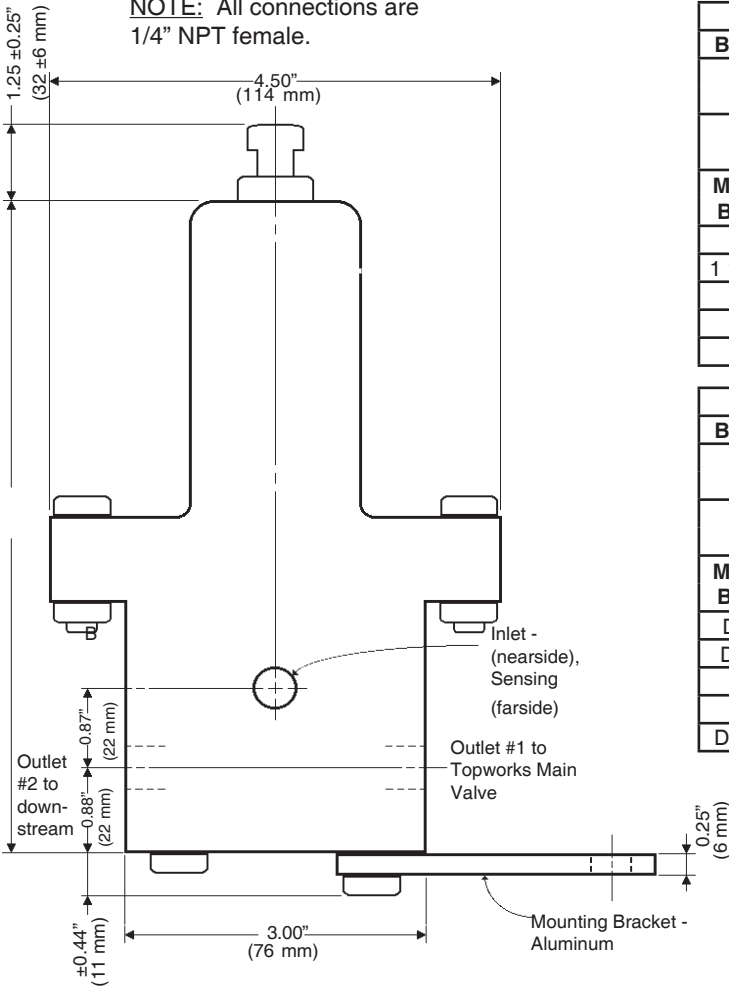
** See Table 1 for Maximum Operating Pressure vs. utilized range spring.

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A Model NW-SO is typically installed "upside down" when mounted on main valves.

NOTE: All connections are 1/4" NPT female.



DIMENSIONS - inches & lbs.				
Body Mat'l	Spring Range - psig	B	Est. Weight - lbs.	
BRZ	0.5-10; 4-20	6.22	14	
	5-50; 10-200	6.85	15	
SST	0.5-10; 4-20	6.51	15	
	5-50; 10-200	7.34	20	
Main Valve Body Size	DIMENSIONS			
	C	E	F	G
1/2"-1"	0.41	2.75	0.99	0.50
1 1/4"-1 1/2"	0.41	3.20	1.16	0.50
2"	0.41	3.10	1.11	0.50
2 1/2"	0.50	3.25	1.16	0.56
3", 4"	0.50	3.50	1.29	0.56

DIMENSIONS - mm & kg.				
Body Mat'l	Spring Range - psig	B	Est. Weight - lbs.	
BRZ	0.03-0.7; 0.27-1.4	158	6.4	
	0.34-3.4; 0.7-13.8	174	6.8	
SST	0.03-0.7; 0.27-1.4	165	6.8	
	0.34-3.4; 0.7-13.8	186	9.1	
Main Valve Body Size	DIMENSIONS			
	C	E	F	G
DN 15-25	10	70	25	13
DN 32, 40	10	81	29	13
DN 50	10	79	28	13
DN 65	13	83	29	14
DN 80, 100	13	89	33	14



ISO Registered Company

TECHNICAL BULLETIN

764T-TB

02-20



MODEL 764T

MODEL 764T

TEMPERATURE CONTROLLER

OVERVIEW

The Model 764T is a pneumatic temperature controller. It measures the temperature of the fluid with a bimetallic bulb and develops a 3-15 psig (0.2-1.0 Barg) output signal that varies linearly with any change in temperature. The 764T controls temperatures between -70° and +580°F (-60° and +305°C) using six control ranges.

FEATURES

- Adjustments:** Proportional band and setpoint.
- Field Reversible:** Easily changed from direct acting to reverse acting.
- Two Bulb Materials:** 316SST or brass thermal bulbs.
- Gauge:** 1-1/2" (38 mm) output signal gauge.



CONNECTIONS

1/2" NPT (DN15), 3/4" NPT (DN20)



COMMON APPLICATIONS

BLEACHERS, COOKERS, DRYERS, EVAPORATORS, HEATERS, HEAT EXCHANGERS, & MORE.



TEMPERATURE RANGES

6 CONTROL RANGES FROM -70°F to +580°F (-60°C to +305°C)

SPECIFICATIONS

Control Ranges:

Temperature Ranges	
°F	°C
-70 to +100	-60 to +35
50 to 220	10 to 105
180 to 350	80 to 175

See Option 764T-63 for higher temperature ranges.

Thermal Bulb Materials:

Brass - ASTM B16 and B135 w/Invar Rod
316 SST - ASTM A479 w/Invar rod.

Thermal Bulb Connection:

1/2" NPT.

Maximum Operating Pressure:

3000 psig (207 Barg) at 350°F (177°C) for brass and SST thermal bulbs.

Maximum Emergency Temperature:

450°F (232°C) with standard construction.
850°F (454°C) with Option 764T-63.

Control Housing Sub-Assembly:

Brass housing, Buna-N O-ring seals, SST adjusting screws, etc.

Output Range:

3-15 psig (0.2-1.0 Barg).

Supply Pressure:

18-20 psig (1.2 -1.4 Barg).

Output Signal Gauge:

0-30 psig (0-2.1 Barg) range.

Ambient Temperature Range:

-20° to +180°F (-28° to +82°C).

Proportional Band:

Adjustable between 6° and 32°F (3 and 18°C) with 18-20 psig (1.2-1.4 Barg).

Sensitivity:

Better than 0.2°F (.1°C).

Repeatability:

±0.8°F (±.45°C).

Steady State Air Consumption:

Flow Rate*		Prop. Band	
SCFH	(M ³ /Hr. @ Msc)	°F	(°C)
4.2	(0.12)	6	(3)
50	(1.41)	32	(18)

*Mid-span at proper supply.

Air Connections:

1/4" NPT female pipe connections.

Typical Installations:

See Figures 3, 4, and 5.

OPTIONS

Option-63:

HIGHTEMPERATUREEXTENSION. 316SST thermal bulb for temperatures above 350°F (175°C). See Figure 1.

Temperature Ranges	
°F	°C
380 to 540	190 to 280
400 to 560	205 to 295
430 to 580	220 to 305

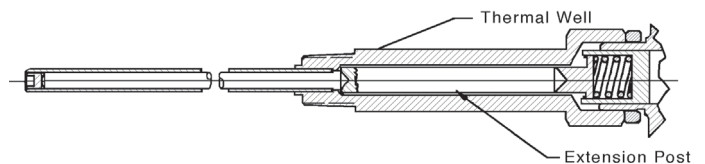


Figure 1

High Temperature Thermal Bulb (Opt. 63).

Option-64:

THERMALWELL. Brass or 316SST thermal well for use with 316SST thermal bulbs, both standard and high temperature (Option 764T-63). 3/4" NPT connection to process piping. Maximum static pressure 1000 psig (68 Barg) at 400°F (204°C) for brass and 6200 psig (427.6 Barg) at 580°F (305°C) for 316SST thermal well.

ACCESSORIES

Volume Booster:

1:1 ratio for improving the stroking speed of diaphragm motor valves when no positioner is used. Incorporates a stabilizing bypass needle valve between input and output (Moore Products - Model 61H).

Air Filter Regulator:

Model 5200P. 1/4" NPT male connections with 1-1/2" (38 mm) supply pressure gauge.

PRINCIPLE OF OPERATION

The 764T controller employs laminar flow to develop the 3-15 psig (2.07-1.03 Barg) output signal. Laminar flow eliminates the need for range springs, levers, pivots and other parts that produce friction and lost motion.

A bimetallic thermal bulb is used to measure temperature. It is immersed in the fluid whose temperature variation changes the length of the outer tube more than it changes the length of the Invar rod. This difference produces a minute movement of the end of the Invar rod that contacts the sensor plate. The sensor plate, in turn throttles the flow of instrument air through the sensor to develop the 3-15 psig (2.07-1.03 Barg) output signal.

On direct acting controllers, see Figure 2, the supply enters PORT B. With an increase in the sensed temperature the supply air flowing through the sensor orifice increases,

which elevates the output signal. The proportional band restriction regulates the flow of exhaust through PORT A.

On reverse acting controllers the supply enters PORT A and passes through the proportional band restriction. With an increase in the sensed temperature the flow through the sensor orifice is increased, which reduces the output signal. PORT B is the exhaust port.

Closing the proportional band adjusting screw reduces the proportional band. Opening the screw increases the proportional band.

The setpoint adjustment moves the sensor closer to, or further away from, the sensor plate to change the controlled temperature. Rotate adjusting screw clockwise to increase temperature set point, counter-clockwise to decrease set point.

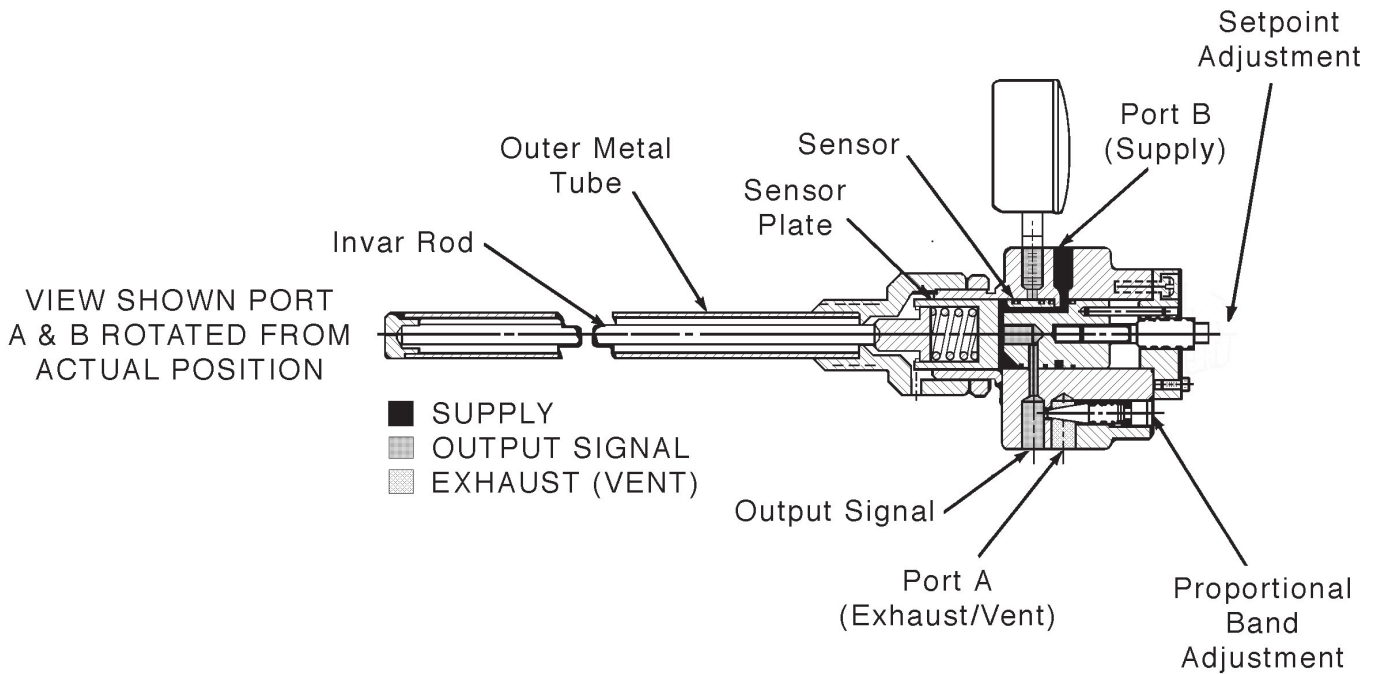


Figure 2
Direct Action 764T

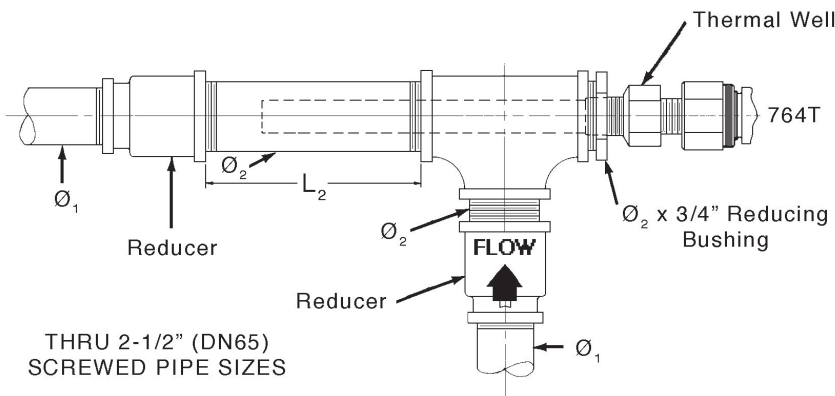
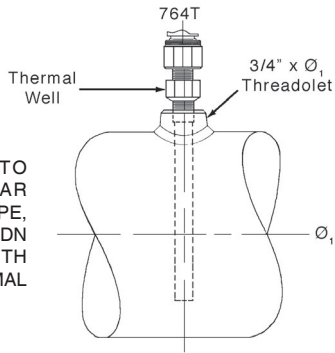


Figure 3

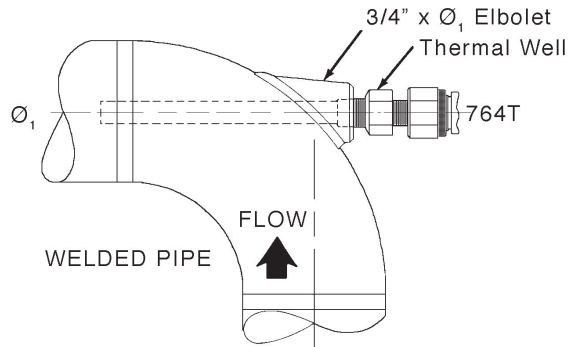
\varnothing_1		\varnothing_2		Nipple Length L_2	
Inch	(DN)	Inch	(DN)	Inch	(mm)
1/2"	(15)	1"	(25)	6"	(152)
3/4"	(20)	1-1/4"	(32)		
1"	(25)	1-1/4"	(32)		
1-1/4"	(32)	1-1/2"	(40)		
1-1/2"	(40)	2"	(50)		
2"	(50)	2"	(50)	NR	NR
2-1/2"	(65)	2-1/2"	(65)		
NR = Not Required.					

FOR INSERTION INTO PIPE PERPENDICULAR TO CENTER LINE OF PIPE, PIPE SIZE MUST BE 8" (DN 200) OR LARGER, WITH OR WITHOUT A THERMAL WELL.



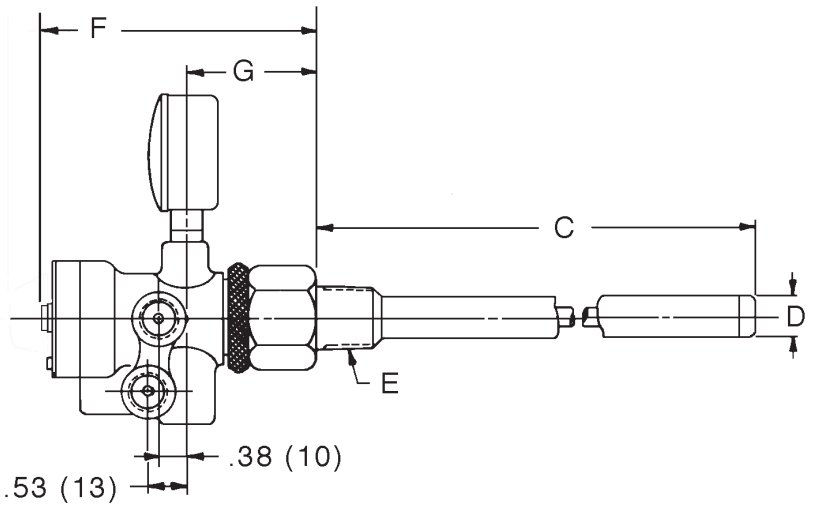
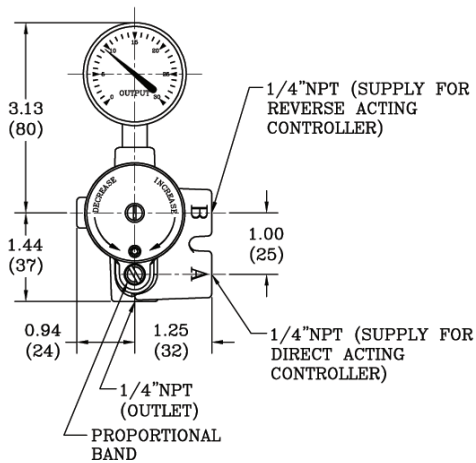
PIPE 8" (DN 200) Ø & LARGER

Figure 4



REQ'D: 2-1/2" (DN 65) THRU 6" (DN 150)
OPTIONAL: 8" (DN 200) OR LARGER

Figure 5



Dimension	Brass Thermal Bulb		SST Thermal Bulb		764T-63 High Temp. Thermal Bulb		764T-63+64 High Temp. & Thermal Well		764T-64 Thermal Well	
	Inches	(mm)	Inches	(mm)	Inches	(mm)	Inches	(mm)	Inches	(mm)
C	7.75	(196)	8.88	(226)	8.88	(226)	8.50	(216)	8.50	(216)
D	0.56	(14)	0.37	(9)	0.37	(9)	0.77	(20)	0.77	(20)
E	1/2 NPT Male		1/2 NPT Male		1/2 NPT Male		3/4 NPT Male		3/4 NPT Male	
F (MAX)	4.13	(105)	4.13	(105)	7.63	(194)	8.75	(222)	5.25	(133)
G	1.81	(46)	1.81	(46)	5.31	(135)	6.44	(164)	2.94	(75)

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PRODUCT CODER 02/07/20

An "X" in POS 12 followed by a 5-digit control number overrides remaining selections.

CB **1** — **POS 5** **POS 6 & 7** **7** — **0** **POS 11** **POS 12** **00000A**

POSITION 5 - TEMPERATURE RANGE			
Std. Temp Range - BR or SST Bulb	CODE	High Temp Range - SST Bulb (-63 Opt)	CODE
-70° to +100F	1	380° to 540°F	4
50° to 220°F	2	400° to 560°F	5
180° to 350°F	3	430° to 580°F	6
10° to 105°C	A	190° to 280°C	E
-60° to +35°C	B	205° to 295°C	F
80° to 175°C	C	220° to 305°C	G

POSITION 6 & 7 - MATERIALS				
Applicable Temp Ranges (°F)	Thermal Bulb Material	Thermal Well (-64 Opt)		
		None	Brass	316 SST
		CODE	CODE	CODE
Standard (-70° to +350°)	Brass	B0	--	--
	316 SST	S0	SB	SW
Hi-Temp (-63 Opt) (380° to 580°)	Brass	--	--	--
	316 SST	H0	--	HW

POSITION 11 - ACCESSORIES	
Unmounted Airset (Shipped Loose)	
Description	CODE
No Airset	0
5200P Airset (Filter Regulator) 0-30 psig range (w/gauge)	A

POSITION 12 - OPTIONS	
Construction	CODE
Standard Construction	0
For Special Construction Contact Cashco for Special Code	X

*** For information on ATEX see pages 14 & 15 on the IOM.**



ISO Registered Company

MODEL 135

PNEUMATIC CONTROLLER FOR LOW TEMPERATURE SHUTOFF

OVERVIEW

The Model 135 thermal probe is a pneumatic controller with an integral, rigid insertion bulb used to protect downstream piping systems and equipment from experiencing temperature excursions below desired minimum operating temperature due to equipment malfunction or customer overdraw of system capacity.

As thermal probe outer sheath is exposed to lower temperatures, it contracts in length. The internal Invar plunger remains unchanged in length, pushing a ball/plug away from its seat, allowing the inlet gas pressure to be "vented". This is NOT a SAFETY DEVICE

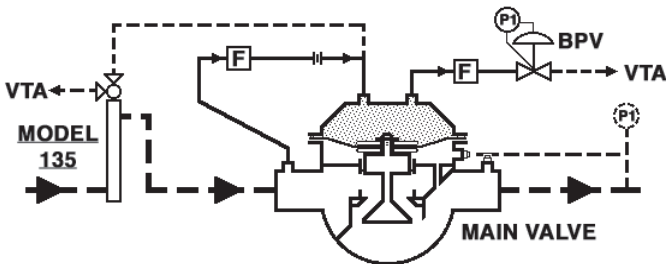
FEATURES

- High static pressure capability.
- BRZ/BR construction; SST construction.
- 8°F ΔT span.
- Std. Opt-55; Cleaned and packaged for GOX service
- Std. Opt-56; Cleaned and packaged for non-oxygen service.

APPLICATIONS

Primarily utilized with a pressure loaded reducing regulator with fail-close action upon loss of loading pressure. Used with any compatible fluid that can be vented to atmosphere in an environmentally acceptable method.

HOOKUP SCHEME T1

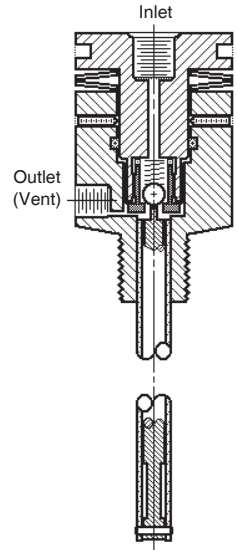


Use 1/4" tubing (ID of 0.180" or greater) when probe is installed within 18 feet of regulator.

Use 3/8" tubing (ID of 0.277" or greater) when probe is installed within 150 feet of regulator.



MODEL 135



CONNECTIONS

1/2" NPT (DN15), O-RING (OPT-64)



COMMON APPLICATIONS

VAPORIZERS



TEMPERATURE SET POINTS

+50°F, +30°F, +25°F, +15°F, +10°F, 0°F, -10°F, -15°F, -20°F, -30°F, -40°F, -50°F

TECHNICAL SPECIFICATIONS

Control Head Inlet Pressure Range: 0 – 600 psig.

Thermal Element Pressure Range: BRZ/BR – Full vac. to 720 psig
 SST – Full vac. to 3000 psig
NOTE: SST in O2 service velocities at point of installment should be limited to the recommendations of CGA G-4.4 Figure 2, when probe is made of stainless steel, to minimize risk of ignition made by sparking debris.

Exposed Fluid Temperature Range: -320°F to +400°F

Ambient Temperature Range: -60°F to +140°F

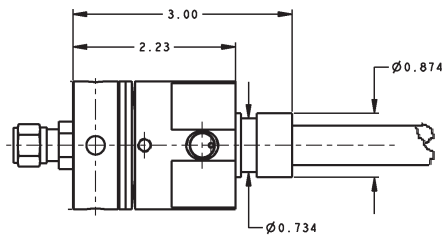
Temperature Set Points Range Between: -50°F to +50°F

Temperature Span: Begins venting at 8°F above Temperature Set Point (TSP).
 "Full Venting " at TSP.

PART	MATERIALS	
	MODEL 135-B	MODEL 135-S
Control Head	Brass ASTM B16 C36000	316L SST ASTM A479
Thermal Element	Brass ASTM B16 C36000	316L SST ASTM A479
Plunger	Invar	Invar
Trim	Brass, SST, Cu	SST, Cu
O-Ring	FK; Fluorosilicone	FK
Belleville Washers	SST	SST
Set Screws	SST	SST
Screen	Monel	Monel
Spring	SST	SST
Brazing Material	Ag	Ag

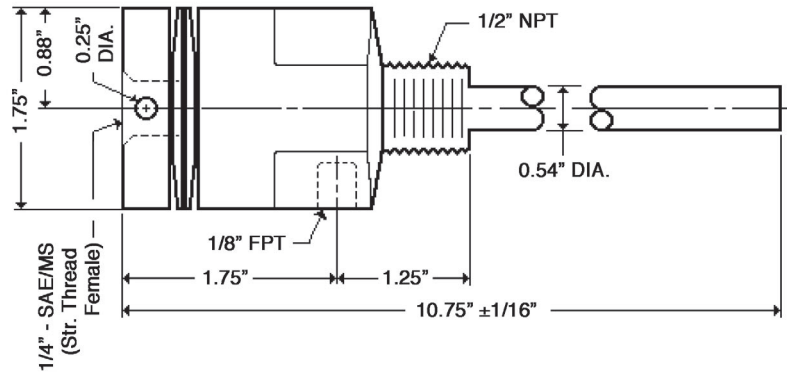
OPTION SPECIFICATIONS

OPT - 64: O-RING INSERTION SEAL. NPT threaded insertion connection replaced with o-ring seal for quick installation/removal. Use requires that a thermal well be supplied by customer.



DIMENSIONS & WEIGHTS

EST. SHIP WT: 2.5 LBS.



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PRODUCT CODER 02/07/20

MODEL 135-B LOW TEMPERATURE SHUTOFF

35 B — POS 5 BR 7 — POS 10 0000000 MB

MODEL 135-S LOW TEMPERATURE SHUTOFF

35 S — POS 5 SS 7 — POS 10 0000000 POS 17 B

POSITION 5 - INSERTION CONNECTION.	
INSERT. CONN.	CODE
STD - 1/2" NPT	1
O-RING - OPT-64	2

POSITION 10 - TEMPERATURE SET POINT			
TEMPERATURE - °F	CODE	TEMPERATURE - °F	CODE
+50	1	-10	7
+30	2	-15	8
+25	3	-20	9
+15	4	-30	A
+10	5	-40	B
0	6	-50	C

POSITION 17 - SERVICE OPTIONS		
Descripton	Option	CODE
Oxygen Cleaning Per Cashco Specification S-1134	-55	M
Non-Oxygen Cleaning Per Cashco Specification S-1542	-56	N

Valve Positioners and Volume Boosters

Series 73 Built-In Valve Positioner

Introduction

Features & Benefits

- ▶ Single-axis, force-balance principle of operation, ensures accurate and stable positioning
- ▶ Feedback circuits direct the actuator's position, ensuring adherence to the control instrument signal
- ▶ Range spring capability accommodates a wide variety of valve strokes and instrument spans

Description

The Moore Series 73 Built-in Valve Positioners use the full force of their air supply to drive and maintain the piston or diaphragm in a pneumatic actuator to position a valve to what is required by a control instrument, regardless of the presence of forces that change valve position.

This line of compact instruments incorporates a single-axis, force-balance principle of operation to ensure accurate and stable control valve positioning. In all cases, including bottom-loading applications, a Model 73 Built-In Valve Positioner is mounted directly on the topwork of the valve, with no external levers or other exposed mechanisms.

Each positioner receives a signal from a control instrument, and using an air supply as high as 100 psig, the positioner strokes the valve actuator to the required position.

Like all valve positioners, the Model 73 Built-In Valve Positioners have feedback circuits designed to measure the position of the actuator's piston or diaphragm. The positioner then supplies or exhausts air to bring the actuator within the required range for its corresponding control instrument.

The position of the piston or diaphragm in the valve actuator is sensed by the amount of compressive force exerted by a range spring on the valve positioner's diaphragm assembly. By selecting the appropriate range spring from the wide selection available almost any combination of valve stroke (from 1/4" to 4") and instrument span (from 2 to 24 psi) can be obtained.

Specifications

Functional Specifications

Input Range

3-15, 3-9, 9-15, 6-30, 3-27 psig

Valve Travel

Minimum: 1/4"

Maximum: 4"

Supply Pressure

Minimum: 3 psi above required actuator pressure

Maximum: 100 psig



Air Consumption

(In balance condition with 20 psig supply and 9 psig dead-ended output)

- 73N_F: 0.25 scfm
- 73N_B: 0.6 scfm

Overrange Limit

150 psig to any connection

Response Level

(output sensitivity to input pressure changes)

- 73N_F: 0.1% of input span
- 73N_B: 0.25% of input span

Functional Mechanical

Materials of Construction

Aluminum, brass, stainless steel, Neoprene®, and/or Buna-N

Model Selection

Model	Type of Application
73N12F	Top-loading, direct-acting, input spans of 2 to 12 psi
73N24F	Top-loading, direct-acting, input spans over 12 to 24 psi
73N-FR	Top-loading, reverse-acting
73N-B	Bottom-loading, direct-acting
73N-B1	Bottom on actuators w/actuator range spring

Valve Positioners and Volume Boosters

Series 73 Built-In Valve Positioner

Technical data

Spring Table

Instrument Input Pressure Span (PSI)

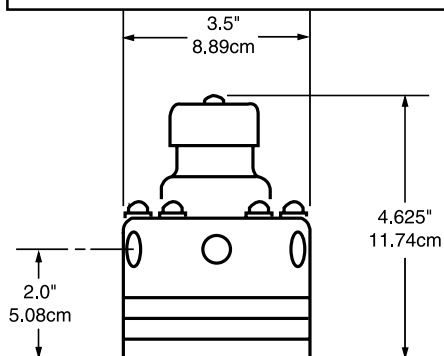
Valve Stroke Inches	4	5	6	8	10	12	16	20	24
- Item No. of Range Spring Series 12395 Series ±10% Stroke Range Tolerance) Example: 12395-1212									
1/4	1212	1012	812	612	512	412	624	524	424
5/16	1612	1212	1012	712	612	512	824	624	524
3/8	1812	1412	1212	1012	712	612	1024	724	624
7/16	2012	1812	1412	1012	812	712	1024	824	724
1/2	2412	2012	1612	1212	1012	812	1224	1024	824
9/16	2812	2012	1812	1412	1012	1012	1424	1024	
5/8	3212	2412	2012	1612	1212	1012	1624	1224	1024
3/4	3612	2812	2412	1812	1412	1212		1464	1224
7/8	4412	3612	2812	2012	1812	1412	2024	1624	1424
1	4812	4012	3212	2412	2012	1612	2424	2024	1624
1-1/8	5612	4412	3612	2812	2012	1812		2024	
1-1/4	6412	4812	4012	3212	2412	2012	2824	2424	2024
1-1/2	80	6412*	4812	3612	2812	2412	4024	2824	2424
1-5/8	80	6412*	4812	4012	3212	2612	4024	3224	
1-3/4	80	6412*	5612	4412	3612	2812	4024	3224	2824
2	100	80	6412*	4812	4012	3212	4824	4024	3224
2-1/4	100	80	80	5612	4412	3612		4024	
2-1/2	126	100	80	6412*	4812	4012		4824	4024
2-3/4	126	100	80	6412*	4812	4412		4824	4824
3		126	100	80	6412*	4812			4824
3-1/2						5612			
4						6412*			
- Item No. of Range Spring Series 4090 Series (±10% Stroke Range Tolerance) Example: 4090-80									

- 1) The maximum zero pressure for Model 73N12F is 9 psig when the 12388 or 12395 series range spring is used. The maximum is 20 psig when the 4090 series range spring is used.
- 2) The maximum zero pressure for Model 73N24F is 15 psig for instrument pressure spans of 16 psi or greater, and 28 psig when used for spans of 12 psi or less.
- 3) The maximum instrument pressure for Model 73N-FR is 15 psig for instrument pressure spans of 12 psi or less, and 27 psi for spans of 16 psi or greater.

LIMITATIONS ON USE OF RANGE SPRING SERIES 4090

Range Spring 4090-	Max. Nom. Stroke (Inches)	Max. Nom. Span (psi)	Max. Inst. Air Press. (psi)
80	3	8	8.0
100	3	6	6.5
126	3	5	5.0

Mounting Dimensions



Spring Selection

1. Find the valve stroke nearest the desired valve stroke.
 2. Find the instrument input pressure span nearest the desired instrument input pressure span.
 3. Select the proper range spring at the intersection of the valve stroke and the instrument input pressure span columns.
- For additional information on range spring selection, request AD73.

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