

# 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.

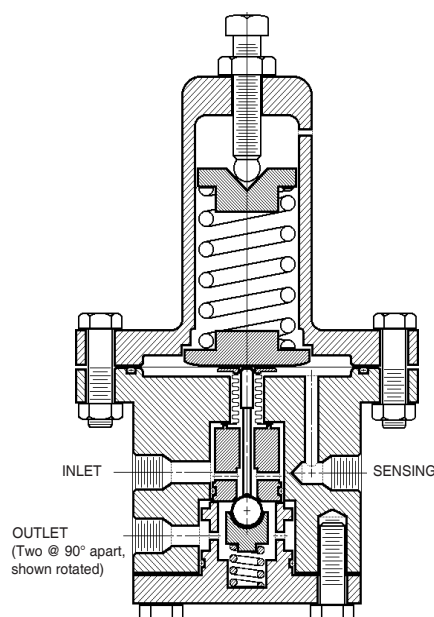


Fig. 1 – MODEL NW-SO

### APPLICATIONS:

Applied in atmospheric industrial gases - GN<sub>2</sub>, GOX, Ar, He, H<sub>2</sub>, CO<sub>2</sub> - 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.

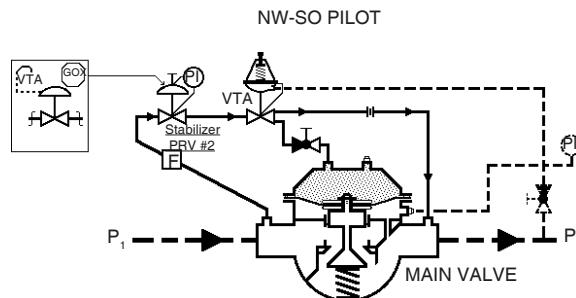


Fig. 2 – HOOKUP SCHEME P1 – REDUCING

## 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

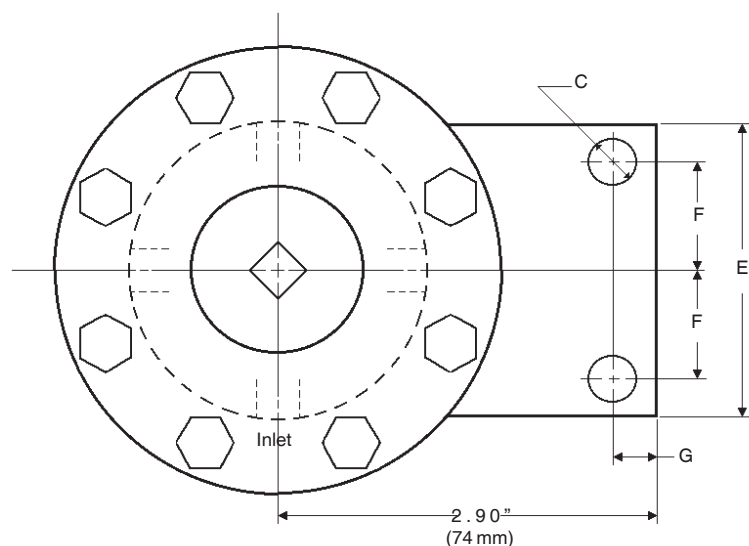
Body/Cover Dome Material	Design Pressure		Operating Temperature Range °F *	Static Seal Material	Diaphragm Material	Seat Design/Ball and Seat Material	Maximum Operation Pressures	
	Inlet Barg	Outlet Barg					Inlet psig**	Outlet psig
BRZ/BRZ	41.3	41.3	-53 to +177	FK	BeCu	Metal/SST+BRZ	10.3/17.2/20.7	19.0
			-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.

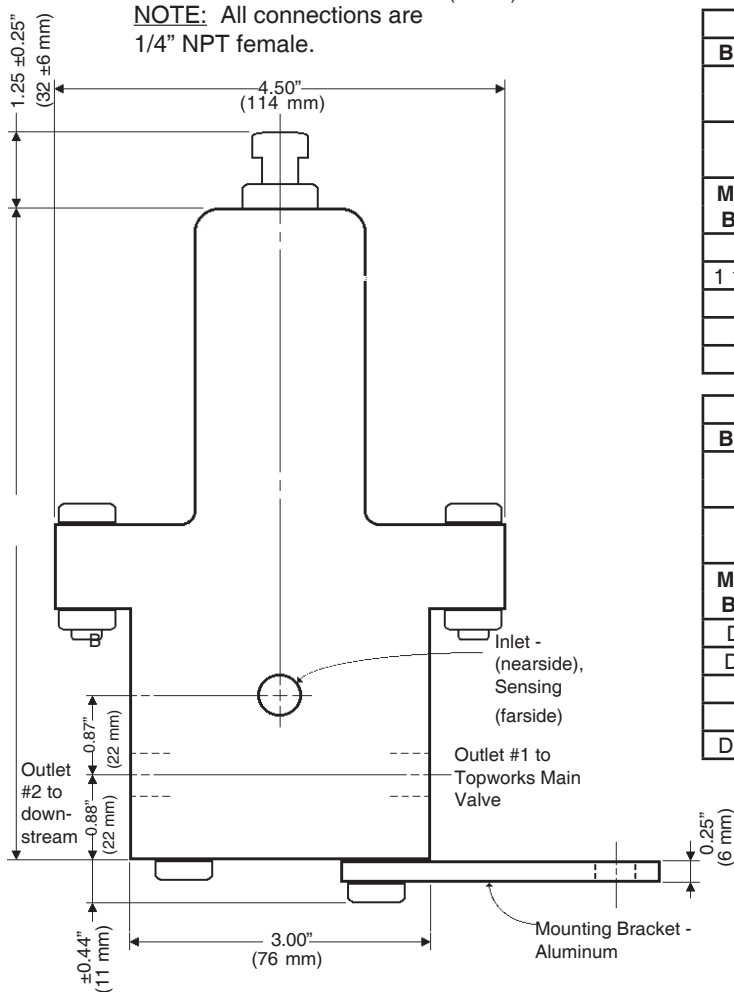
\*\* See Table 1 for Maximum Operating Pressure vs. utilized range spring.

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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

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