November 2009

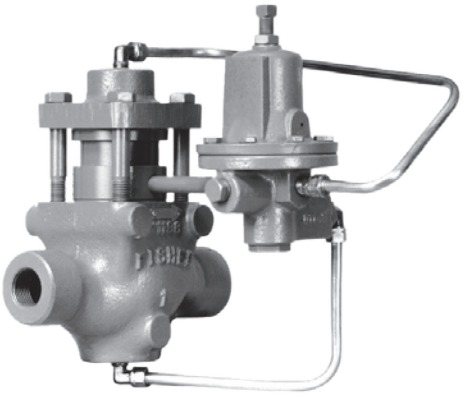
Type 92W Liquid Regulator

Introduction

The Type 92W pressure-reducing regulator for liquid service includes either a Type 6492H or a Type 6492L pilot (Figure 1). This reliable, dependable regulator uses time-proven design concepts.

Features

- **Good Shutoff for Low Downstream Build-up—** Type 92W main valve and Types 6492H and 6492L pilots use machine-lapped seating surfaces, a time-proven design which minimizes seat leakage when the downstream demand is zero and the regulator is shutoff.
- **Resistance to Piping Stresses—**Steel constructions are available to help resist piping stresses.
- **Ease of Installation—**Compact construction reduces installation space requirements. Supply pressure to the pilot is supplied from the inlet side of the main valve through factory-piped tubing; with a standard pilot, this means no separate pilot supply pressure is required.
- **Increased Sensitivity to Downstream Pressure Changes—**Friction-reducing bellows seal on the pilot stem and large pilot diaphragm areas yield good sensitivity.
- **Ease of Pilot Maintenance—**Pilot valve plug and seat can be removed for inspection or maintenance without disassembling piping connections and without removing the diaphragm. Pilot inlet screen is easily removed with the seating parts for inspection and cleaning. Diaphragm can be removed without disturbing the seating parts.
- **Application Flexibility—**Pilot with optional tapped spring case is available for use either with an air loading regulator for remote adjustment of outlet pressure setting or, when all compression is removed from the pilot control spring, with a solenoid or switching valve for on-off service.



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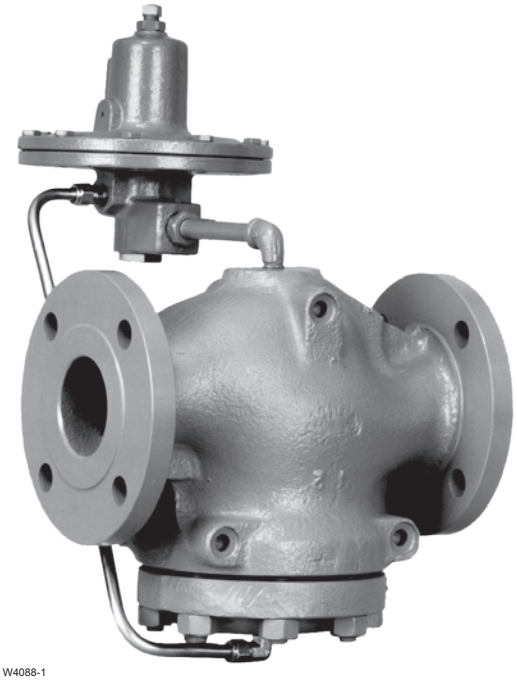
1 NPT STEEL MAIN VALVE WITH TYPE 6492H PILOT



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NPS 3 (DN 80) FLANGED CAST IRON MAIN VALVE WITH TYPE 6492L PILOT

Figure 1. *Typical Constructions*

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Specifications

Body Sizes and End Connection Styles

BODY SIZE, NPS (DN)	END CONNECTION STYLE AND RATING(1)	
	Cast Iron Body	Steel Body
1, 1-1/2, and 2	NPT	NPT
1, 1-1/2, 2, 2-1/2, 3, and 4 (25, 40, 50, 65, 80, and 100)	ANSI CL125 FF and CL250 RF Flanged	ANSI CL150 RF, CL300 RF, and CL600 RF Flanged

Maximum Inlet and Pilot Supply Pressure(1)
Cast Iron Main Valve and Pilot: 250 psig (17,2 bar) or body rating limit, whichever is lower
Steel Main Valve and Pilot: 300 psig (20,7 bar) or body rating limit, whichever is lower

Maximum Differential Pressure(1)
150 psig (10,3 bar) or body rating limit, whichever is lower

Minimum Differential Pressure(1)
20 psig (1,4 bar)

Outlet (Control) Pressure Ranges
See Table 1

Maximum Outlet Pressures(1)
See Table 2

Maximum Allowable Loading Pressure For Pilot With Tapped Spring Case
Combination of pilot control spring setting and spring case loading pressure cannot exceed: 150 psig (10,3 bar) for Type 6492H pilots or 25 psig (1,7 bar) for Type 6492L pilots

Droop
10% of outlet pressure setting

Typical Regulating Capacities
See Table 3 and Capacity Information section

Main Valve Port Diameters and Flow Coefficients

BODY SIZE, NPS (DN)	PORT DIAMETER, INCHES (mm)	Regulating C_v	Wide-Open C_v	K_m
1 (25)	7/8 (22)	10	11	0.62
1-1/2 (40)	1-1/8 (29)	20	22	
2 (50)	1-29/64 (37)	35	39	
2-1/2 (65)	1-5/8 (41)	48	53	0.71
3 (80)	2-1/16 (52)	66	73	
4 (100)	2-3/8 (60)	78	86	

Maximum Material Temperature Capabilities(1)
Cast Iron Main Valve and Pilot: 406°F (208°C)
Steel Main Valve and Pilot: 500°F (260°C)

Pressure Registration
External through downstream control line

Downstream Control Line Connection
NPS 1, 1-1/2, and 2 (DN 25, 40, and 50)
Main Valve Sizes: 1/4 NPT in main valve cylinder spacer
NPS 2-1/2, 3, and 4 (DN 65, 80, and 100)
Main Valve Sizes: 1/4 NPT in pilot body

Pilot Spring Case Vent
Standard: 1/8-inch (3,2 mm) drilled hole
Optional: 1/4 NPT internal tapping for pressure loading or on-off service

Approximate Weights

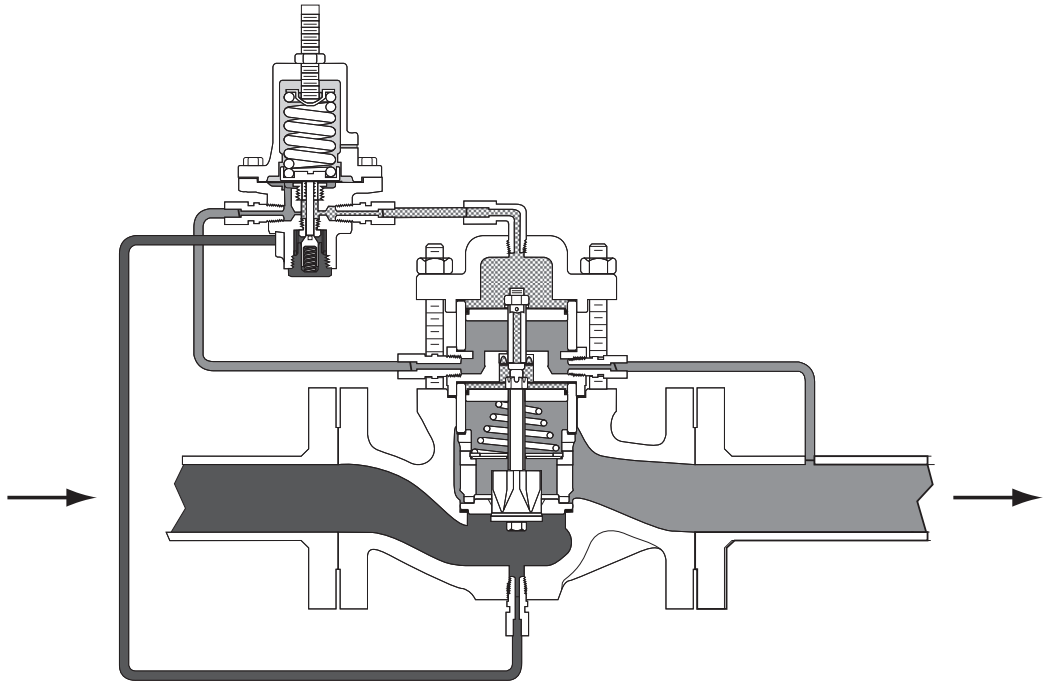
BODY SIZE, NPS (DN)	END CONNECTION	APPROXIMATE WEIGHT, POUNDS (kg)
1 (25)	NPT or Flanged	32 (15)
1-1/2 (40)	NPT or Flanged	44 (20)
2 (50)	NPT	55 (25)
	Flanged	67 (30)
2-1/2 (65)	Flanged	90 (41)
3 (80)	Flanged	115 (52)
4 (100)	Flanged	165 (75)

Construction Materials

Main Valve
Body and Body Flange: Cast iron or steel
Valve Plug: Heat-treated 17-4PH Stainless steel
Cage: Cast iron
Spiral Wound Gasket: 316L Stainless steel and Graphite
Spring, Lower Stem, Retaining Ring, Bolting, and Cylinder Spacer: Steel or Plated steel
Body and Cylinder Gaskets: Copper
Pistons, Seat Ring, and Cylinders: Heat-treated 416 Stainless steel
Piston Ring(s): Polytetrafluoroethylene (PTFE)
Piston Ring Retainer(s): 302 Stainless steel
Stem Seal: PTFE/Glass

Pilot
Body and Spring Case: Cast iron or Steel
Seat Ring and Stem: Heat-treated 416 Stainless steel
Bellows and Bellows Retainer: Brass
Plug, Plug Guide, Plug Spring, Diaphragms, Bleed Restriction, and Inlet Screen: Stainless steel
Diaphragm Gasket: Composition
Control Spring, Upper Spring Seat, Adjusting Screw, Bolting, Pipe Plug, Reducing Brushing, and Diaphragm Plate (if used): Steel
Tubing: Copper
Fittings: Brass
Pipe Plug: Steel

1. Pressure/temperature limits in this Bulletin, and any applicable code or standard limitations, must not be exceeded.



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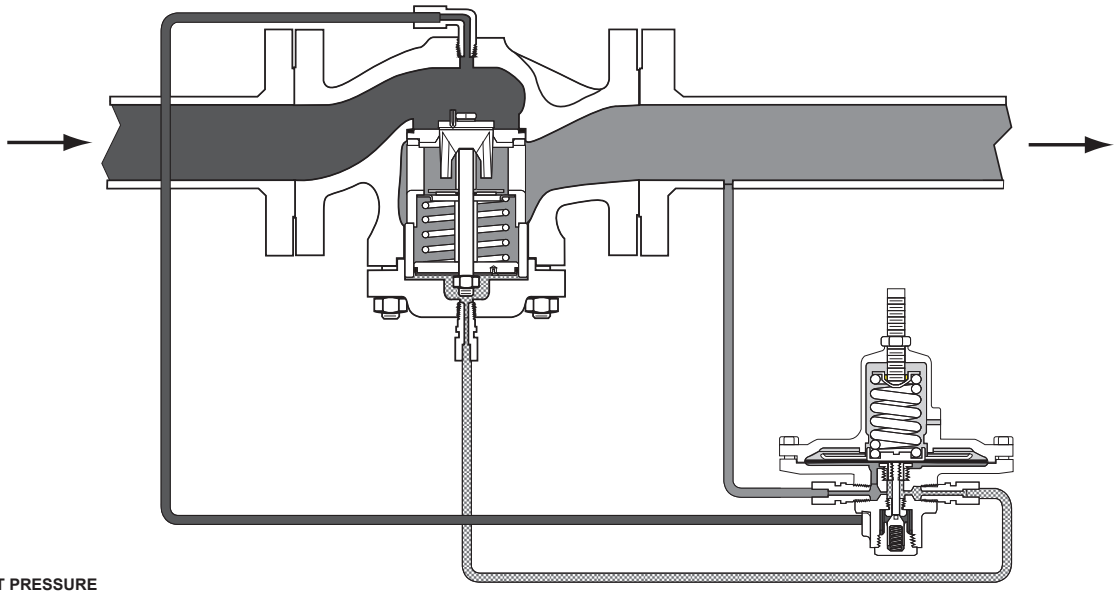
INLET PRESSURE
OUTLET PRESSURE
ATMOSPHERIC PRESSURE
LOADING PRESSURE

NPS 1, 1-1/2, OR 2 MAIN VALVE WITH TYPE 6492H PILOT



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INLET PRESSURE
OUTLET PRESSURE
ATMOSPHERIC PRESSURE
LOADING PRESSURE

NPS 2-1/2, 3, OR 4 (DN 65, 80, OR 100) MAIN VALVE WITH TYPE 6492L PILOT

Figure 2. *Operational Schematics for Standard-Pilot Constructions*

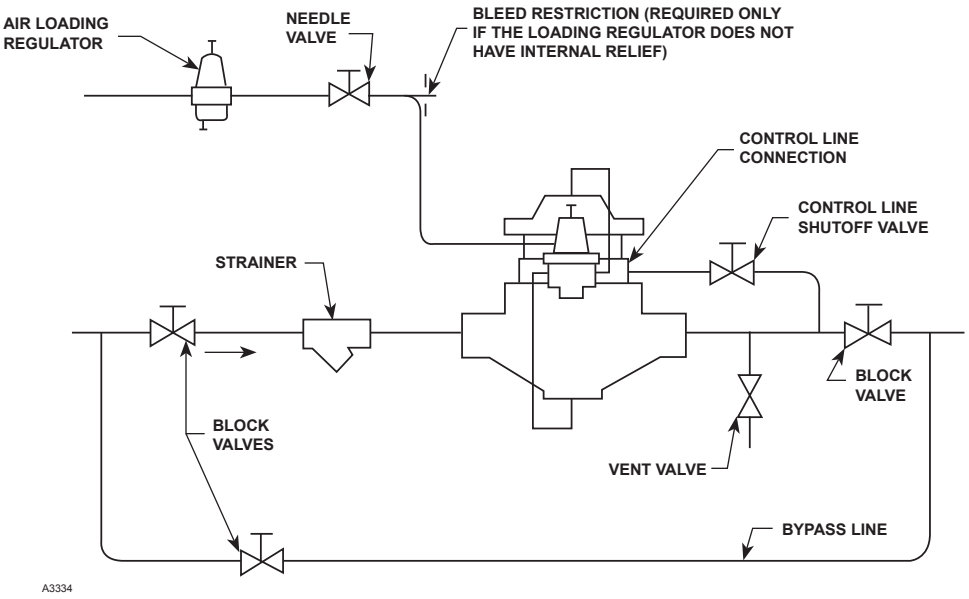


Figure 3. *Typical Pressure-Loaded Pilot Installation*

Principle of Operation

Pilot supply pressure is piped from the main valve inlet (Figure 2) to the pilot inlet connection. Downstream pressure registers on the main valve pistons through the downstream control line and then on the pilot diaphragm.

When increased downstream demand lowers the downstream pressure to a value below the setting of the pilot control spring, this spring forces the pilot valve plug open to increase the loading pressure on the main valve pistons. At the same time, the increased demand lowers the downstream pressure on the main valve piston(s). This opens the main valve plug, increasing flow to the downstream system to satisfy the increased demand and to restore downstream pressure to the setting of the pilot control spring.

Decreased downstream demand increases the downstream pressure registered on the pilot diaphragm. The increased pressure overcomes the force of the pilot control spring and allows the pilot valve plug spring to close the pilot valve plug. As the pilot valve plug closes, excess loading pressure bleeds to the downstream system through the pilot bleed restriction. At the same time, decreased downstream demand increases the downstream pressure registered on the main valve piston(s). This allows the main valve spring to close the main valve plug, reducing flow to the downstream system in response to the decreased demand.

With a pilot for pressure-loaded service (Figure 3), the operation is the same as for a standard pilot except that the pilot control spring force on the pilot valve plug is aided by pneumatic pressure from the loading device. With a pilot for on-off service, the only force acting on top of the pilot diaphragm is pneumatic pressure provided by the solenoid or switching valve.

Table 1. *Outlet (Control) Pressure Ranges*

OUTLET (CONTROL) PRESSURE RANGE, PSIG (bar)		PILOT SPRING PART NUMBER	PILOT SPRING COLOR CODE
Type 6492L Pilot	Type 6492H Pilot		
2 to 6 (0,14 to 0,41)	10 to 30 (0,69 to 2,1)	1E395627022	Yellow
5 to 15 (0,34 to 1,0)	25 to 75 (1,7 to 5,2)	1D745527142	Green
13 to 25 (0,90 to 1,7)	70 to 150 (4,8 to 10,3)	1E395727192	Red

Table 2. *Maximum Outlet Pressures*

PILOT TYPE	MAXIMUM OPERATING OUTLET PRESSURE	MAXIMUM EMERGENCY OUTLET PRESSURE (IF EXCEEDED, PRESSURE VESSEL INTEGRITY MAY NOT BE RETAINED AND PERSONAL INJURY OR PROPERTY DAMAGE COULD RESULT)	
		Cast iron Main Valve and Pilot Body	Steel Main Valve and Pilot Body
With Type 6492H Pilot	150 psig (10,3 bar)	250 psig (17,2 bar) or main valve body rating limit, whichever is lower	300 psig (20,7 bar) or main valve body rating limit, whichever is lower
With Type 6492L Pilot	25 psig (1,7 bar)	100 psig (6,9 bar)	100 psig (6,9 bar)

Table 3. *Flow Capacities in U.S. Gallons per Minute (l/min)[1] of Water*

OUTLET PRESSURE SETTING (STANDARD PILOT) OR COMBINATION OF SETTING PLUS LOADING PRESSURE (OPTIONAL PILOT)[2], PSIG (bar)	PILOT TYPE NUMBER	INLET PRESSURE[2], PSIG (bar)	MAIN VALVE BODY SIZE, NPS (DN)					
			1 (25)		1-1/2 (40)		2 (50)	
			Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
10 (0,69)	6492H or 6492L	30 (2,1)	2.2 (8,33)	45 (170)	4.5 (17,0)	89 (337)	8.9 (33,7)	160 (606)
		60 (4,1)	3.5 (13,2)	67 (254)	7.1 (26,9)	140 (530)	14 (53,0)	230 (871)
		160 (11,0)	6.1 (23,1)	100 (379)	12 (45,4)	210 (795)	24 (90,8)	360 (1363)
20 (1,4)	6492H or 6492L	40 (2,8)	2.2 (8,33)	45 (170)	4.5 (17,0)	89 (337)	8.9 (33,7)	160 (606)
		70 (4,8)	2.5 (9,46)	67 (254)	7.1 (26,9)	130 (492)	14 (53,0)	230 (871)
		170 (11,7)	6.1 (23,1)	110 (416)	12 (45,4)	210 (795)	24 (90,8)	370 (1400)
50 (3,4)	6492H	70 (4,8)	2.2 (8,33)	45 (170)	4.5 (17,0)	89 (337)	8.9 (33,7)	160 (606)
		100 (6,9)	3.5 (13,2)	67 (254)	7.1 (26,9)	130 (492)	14 (53,0)	230 (871)
		130 (9,0)	4.5 (17,0)	89 (337)	8.9 (33,7)	180 (681)	18 (68,1)	310 (1173)
		150 (10,3)	5.0 (18,9)	100 (379)	10 (37,9)	200 (757)	20 (75,7)	350 (1325)
		200 (13,8)	6.1 (23,1)	110 (416)	12 (45,4)	230 (871)	24 (90,8)	400 (1514)
80 (5,5)		100 (6,9)	2.2 (8,33)	45 (170)	4.5 (17,0)	89 (337)	8.9 (33,7)	160 (606)
		130 (9,0)	3.5 (13,2)	67 (254)	7.1 (26,9)	130 (492)	14 (53,0)	230 (871)
		160 (11,0)	4.5 (17,0)	89 (337)	8.9 (33,7)	180 (681)	18 (68,1)	310 (1173)
		200 (13,8)	5.5 (20,8)	110 (416)	11 (41,6)	220 (833)	22 (83,3)	380 (1438)
		230 (15,9)	6.1 (23,1)	120 (454)	12 (45,4)	240 (908)	24 (90,8)	430 (1628)
100 (6,9)		120 (8,3)	2.2 (8,33)	45 (170)	4.5 (17,0)	89 (337)	8.9 (33,7)	160 (606)
		150 (10,3)	3.5 (13,2)	67 (254)	7.1 (26,9)	130 (492)	14 (53,0)	230 (871)
		200 (13,8)	5.0 (18,9)	100 (379)	10 (37,9)	200 (757)	20 (75,7)	350 (1325)
		250 (17,2)	6.1 (23,1)	120 (454)	12 (45,4)	240 (908)	24 (90,8)	430 (1628)
150 (10,3)		170 (11,7)	2.2 (8,33)	45 (170)	4.5 (17,0)	89 (337)	8.9 (33,7)	160 (606)
		200 (13,8)	3.5 (13,2)	67 (254)	7.1 (26,9)	130 (492)	14 (53,0)	230 (871)
		250 (17,2)	5.0 (18,9)	100 (379)	10 (37,9)	200 (757)	20 (75,7)	350 (1325)
		300 (20,7)	6.1 (23,1)	120 (454)	12 (45,4)	240 (908)	24 (90,8)	430 (1628)

1. If capacities are desired on m^3/hr, multiply U.S. GPM by 0.2271.
2. Values shown do not consider the maximum effective pressure drop. The maximum effective pressure drop should be checked for each set of specific application conditions, where $\Delta P_{eff} = K_m P_{1abs}$. Choked flow will occur if the maximum effective pressure drop is exceeded.

- continued -

Table 3. *Flow Capacities in U.S. Gallons per Minute (l/min)[1] of Water (continued)*

OUTLET PRESSURE SETTING (STANDARD PILOT) OR COMBINATION OF SETTING PLUS LOADING PRESSURE (OPTIONAL PILOT)[2], PSIG (bar)	PILOT TYPE NUMBER	INLET PRESSURE[2], PSIG (bar)	MAIN VALVE BODY SIZE, NPS (DN)					
			2-1/2 (65)		3 (80)		4 (100)	
			Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
10 (0,69)	6492H or 6492L	30 (2,1)	11 (41,6)	210 (795)	16 (60,6)	300 (1136)	- - - -	- - - -
		60 (4,1)	18 (68,1)	340 (1287)	25 (94,6)	470 (1779)	28 (106)	550 (2082)
		160 (11,0)	31 (117)	530 (2006)	43 (163)	730 (2763)	49 (185)	860 (3255)
20 (1,4)	6492H or 6492L	40 (2,8)	11 (41,6)	210 (795)	16 (60,6)	300 (1136)	18 (68,1)	350 (1325)
		70 (4,8)	18 (68,1)	340 (1287)	25 (94,6)	470 (1779)	28 (106)	550 (2082)
		170 (11,7)	31 (117)	550 (2082)	43 (163)	750 (2839)	49 (185)	890 (3369)
50 (3,4)	6492H	70 (4,8)	11 (41,6)	210 (795)	16 (60,6)	300 (1136)	18 (68,1)	350 (1325)
		100 (6,9)	18 (68,1)	340 (1287)	25 (94,6)	470 (1779)	28 (106)	550 (2082)
		130 (9,0)	22 (83,3)	430 (1628)	31 (117)	590 (2233)	36 (136)	700 (2650)
		150 (10,3)	25 (94,6)	480 (1817)	35 (132)	660 (2498)	40 (151)	780 (2952)
		200 (13,8)	31 (117)	590 (2233)	43 (163)	810 (3066)	49 (185)	960 (3634)
80 (5,5)		100 (6,9)	11 (41,6)	210 (795)	16 (60,6)	300 (1136)	18 (68,1)	350 (1325)
		130 (9,0)	18 (68,1)	340 (1287)	25 (94,6)	470 (1779)	28 (106)	550 (2082)
		160 (11,0)	22 (83,3)	430 (1628)	31 (117)	590 (2233)	36 (136)	700 (2650)
		200 (13,8)	27 (102)	230 (871)	38 (144)	720 (2725)	44 (167)	850 (3217)
		230 (15,9)	31 (117)	590 (2233)	43 (163)	810 (3066)	49 (185)	960 (3634)
100 (6,9)		120 (8,3)	11 (41,6)	210 (795)	16 (60,6)	300 (1136)	18 (68,1)	350 (1325)
		150 (10,3)	18 (68,1)	340 (1287)	25 (94,6)	470 (1779)	28 (106)	550 (2082)
		200 (13,8)	25 (94,6)	480 (1817)	35 (132)	660 (2498)	40 (151)	780 (2952)
		250 (17,2)	31 (117)	590 (2233)	43 (163)	810 (3066)	49 (185)	960 (3634)
150 (10,3)		170 (11,7)	11 (41,6)	210 (795)	16 (60,6)	300 (1136)	18 (68,1)	350 (1325)
		200 (13,8)	18 (68,1)	340 (1287)	25 (94,6)	470 (1779)	28 (106)	550 (2082)
		250 (17,2)	25 (94,6)	480 (1817)	35 (132)	660 (2498)	40 (151)	780 (2952)
		300 (20,7)	31 (117)	590 (2233)	43 (163)	810 (3066)	49 (185)	960 (3634)

1. If capacities are desired on m^3/hr, multiply U.S. GPM by 0.2271.
2. Values shown do not consider the maximum effective pressure drop. The maximum effective pressure drop should be checked for each set of specific application conditions, where $\Delta P_{eff} = K_m P_{1abs}$. Choked flow will occur if the maximum effective pressure drop is exceeded.

Installation

The Type 92W regulator should be installed and used in accordance with governmental codes and regulations. Although this regulator minimizes leakage under shutoff conditions, downstream overpressure protection must be provided by the user. The pressure and temperature limitations in the specifications table must be observed and the downstream equipment protected.

A Type 92W regulator may be installed in any orientation, but to obtain maximum flow capacities in some instances, outlet piping will have to be swaged up above the given body size. Liquid pressure control systems should be designed using good engineering practices to eliminate quick starting or stopping of the flow stream, which can produce water hammer.

A downstream control line is required but is not furnished with the Type 92W regulator. Additionally, an adjustable loading pressure regulator and loading pressure piping are required for pressure-loading pilot regulators, while an on-off or solenoid valve is required for on-off pilot regulators.

Capacity Information

Table 3 gives maximum and minimum regulating capacities in U.S. gallons per minute of water (multiply by 0.2271 to convert to cubic meters per hour of water).To determine regulating capacities at pressure settings not given in Table 3 or to determine wide-open capacities for relief sizing at any inlet pressure, use the Catalog 10 liquid sizing procedures in conjunction with the appropriate liquid sizing coefficients (C_v and K_m). Convert to cubic meters per hour according to the preceding paragraph if necessary.

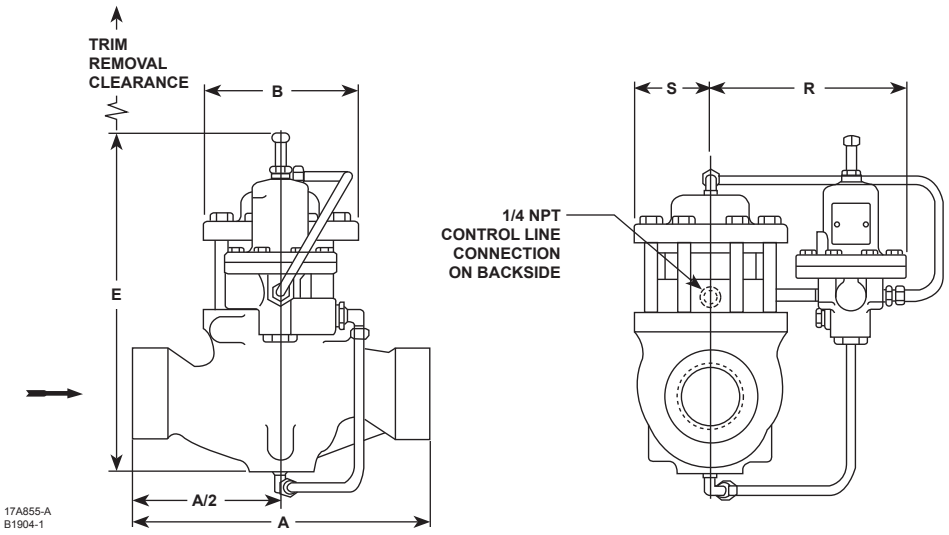
Ordering Information

When ordering, specify:

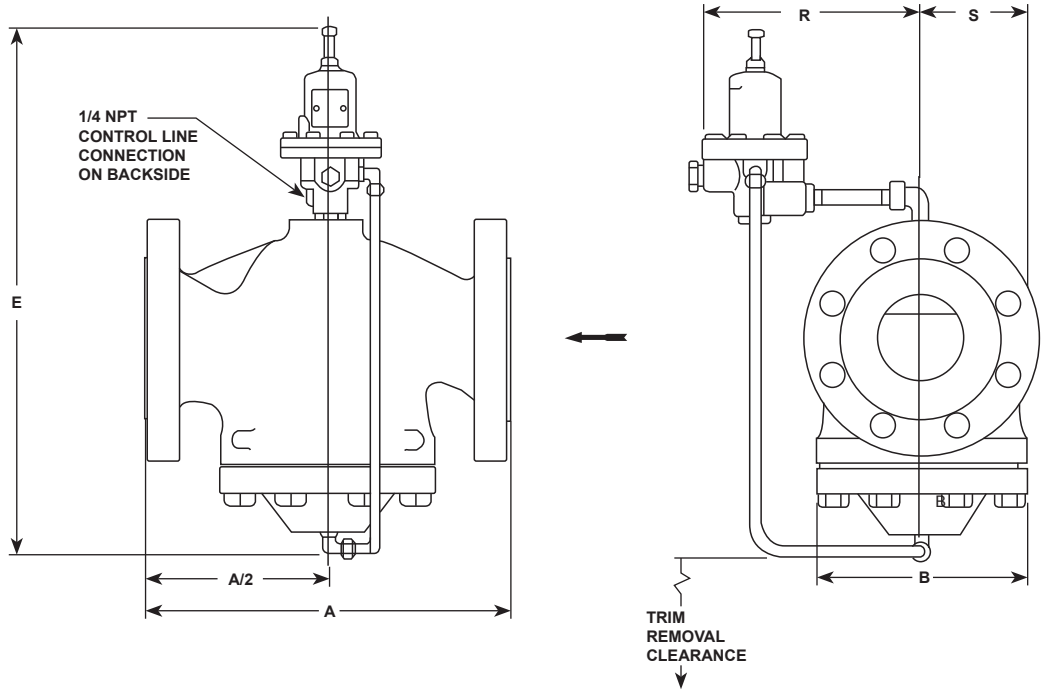
- Temperature range
- Inlet pressure range (maximum, normal, minimum)
- Outlet pressure setting
- Flow rate range (maximum, normal, minimum)
- Body size

Refer to the Specifications on page 2. Review the descriptions to the right of each specification, and specify the desired choice wherever there is a selection to be made. If not otherwise specified, the pilot control spring is factory-set at the approximate mid-range.

Be sure to specify the type of regulator desired (standard pilot or pilot with optional tapped spring case). Refer to separate bulletins for information on loading regulators for use with pressure-loaded pilots.



NPS 1, 1-1/2, OR 2 MAIN VALVE BODY



NPS 2-1/2, 3, OR 4 (DN 65, 80, OR 100) MAIN VALVE BODY

DIMENSIONS, INCHES (mm)										
MAIN VALVE BODY SIZE, NPS (DN)	A				B	E (MAXIMUM)	R		S	TRIM REMOVAL CLEARANCE
	NPT	CL125 FF or CL150 RF Flanged	CL250 RF or CL300 RF Flanged	CL600 RF Flanged			Type 6492H Pilot	Type 6492L Pilot		
1 (25)	8.25 (210)	7.25 (184)	7.75 (197)	8.25 (210)	3.88 (98,6)	11.69 (297)	8.50 (216)	9.88 (251)	1.94 (49,3)	
1-1/2 (40)	9.88 (251)	8.75 (222)	9.25 (235)	9.88 (251)	5.38 (137)	12.19 (310)	8.81 (224)	10.19 (259)	2.69 (68,3)	2.75 (69,8)
2 (50)	11.25 (286)	10.00 (254)	10.50 (267)	11.25 (286)	5.88 (149)	13.00 (330)	9.06 (230)	10.44 (265)	2.94 (74,7)	
2-1/2 (65)	- - - -	10.88 (276)	11.50 (292)	12.25 (311)	6.56 (167)	17.19 (437)	8.75 (222)	10.12 (257)	3.28 (83,3)	3.12 (79,2)
3 (80)	- - - -	11.75 (298)	12.50 (317)	13.25 (337)	7.38 (187)	18.25 (464)	8.75 (222)	10.12 (257)	3.69 (93,7)	3.12 (79,2)
4 (100)	- - - -	13.88 (353)	14.50 (368)	15.50 (394)	8.62 (219)	20.44 (519)	10.38 (264)	11.75 (298)	4.31 (109)	5.00 (127)

Figure 4. *Dimensions*

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