Type 92EZ Pressure Reducing Valve

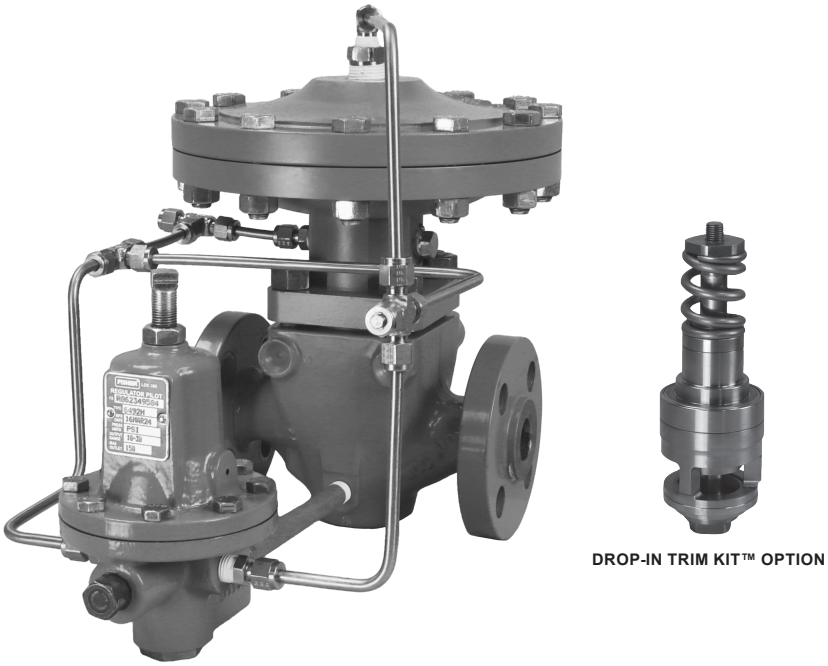


Figure 1. *Type 92EZ Pressure Reducing Valve*

- **Differentiated Stem-Seal**

  Offering best-in-class turndown at low-pressure setpoints

- **3-Minute Maintenance**

  Leveraging the Drop-In Trim Kit or gasket kit

- **Eliminates On-Site Lapping and Special Tooling**

  Leveraging the modern Top-Entry body style design

- **Fisher™ E-Body**

  Standardizing to Fisher products' reliable and familiar valve body design

- **Utilizes Type 92B Pilot**

  Ensuring pilot spring ranges and spare parts are unchanged from Type 92B

- **Field Repairable Trim Assembly**

  Allowing stocking of individual spare parts and drop-in-trim-kits to maximize parts availability

Specifications

This section lists the specifications for the Type 92EZ Pressure Reducing Valve. The following information is stamped on the nameplate of Type 92EZ: Type Number, Maximum Operating Outlet Pressure, Maximum Emergency Outlet Pressure, Maximum Inlet Pressure and Maximum Temperature.

Available Configuration
Pilot-operated globe-style pressure reducing valve with post guiding and flow-to-close valve plug action.

Body Sizes and End Connection Styles
See Table 1

Body Ratings and Maximum Inlet Pressures(1)
See Table 2

Minimum Differential Pressures Required for Full Stroke(1)
20 psig / 1.4 bar with Stainless steel spring;
10 psig / 0.69 bar with Inconel® spring

Maximum Differential Pressures(1)(2)
Low Pressure Pilot: 150 psig / 10.3 bar
High Pressure / Temperature Pilot:
250 psig / 17.2 bar

Outlet Pressure Ranges(1)
See Table 3

Flow Coefficients
See Table 4

Flow Capacities
See Tables 5, 6, 7

Pressure Registration
External

Maximum Temperature Capabilities(1)
See Table 2

Downstream Control Line Connections
NPS 1 and 1-1/2 / DN 25 and 40: 1/4 NPT
NPS 2 / DN 50: 3/8 NPT

Approximate Weights
See Table 9

Construction Materials

Main Valve

Body: Cast iron, WCC Steel, CF8M Stainless steel
Upper and Lower Casings: WCC Steel
Gaskets (Body and Bushing): Graphite, Copper or Monel®
Integral Seat Cage and Valve Plug: 416 Stainless steel
Diaphragms: 302 Stainless steel
Stem Seal: Graphite/PTFE
Valve Plug Guide Bushing: 17-4PH Stainless steel
Spring: 17-7PH Stainless steel or Inconel®
Pipe Fittings: Steel or Stainless steel

Type 92B Pilot

Body and Spring Case: Cast iron, WCC steel
Diaphragm Plate Assembly: Aluminum, Steel
Diaphragm Gasket: Cast iron: Composition; Steel: Graphite
Diaphragm, Valve Plug, and Valve Spring: Stainless steel
Valve Stem and Orifice: 416 Stainless steel
Bellows and Bellows Retainer: Bronze (standard) or 321 Stainless steel
Spring and Lower Spring Seat: Steel (standard) or Stainless steel
Upper Spring Seat: Aluminum (standard) or Carbon steel
Screen: 304 Stainless steel
Check Valve Assembly: Stainless steel or Copper

Pilot Mounting Parts

Cast Iron Body: Copper tubing and brass fittings
Steel Body: Stainless steel tubing and corrosion resistant steel fittings

1. The pressure/temperature limits in this Bulletin or any applicable standard limitation should not be exceeded.
2. A pre-pilot supply regulator option may be used for differential pressures above 250 psid / 17.2 bar d.

Table 1. *Body Sizes and End Connection Styles*

BODY SIZE(1)		END CONNECTION STYLE	
NPS	DN	Cast Iron Body	Steel or Stainless Steel Body
1, 1-1/2 and 2	25, 40 and 50	NPT, CL125 FF or CL250 RF	NPT, CL150 RF, CL300 RF or CL600 RF

Table 2. *Maximum Inlet Pressures, Outlet Pressure and Temperatures*

BODY MATERIAL	END CONNECTION	PILOT TYPE	MAXIMUM INLET PRESSURE		MAXIMUM OPERATING OUTLET PRESSURE		MAXIMUM EMERGENCY OUTLET PRESSURE		MAXIMUM TEMPERATURE		MAXIMUM DIAPHRAGM CASING PRESSURE		MAXIMUM DIFFERENTIAL PRESSURE	
			psig	barg	psig	barg	psig	barg	°F	°C	psig	barg	psig	barg
Cast iron	NPT	Low Pressure	175	12.1	25	1.72	100	6.89	406	208	150	10.3	150	10.3
		High Pressure	250	17.2	150	10.3	250	17.2	406	208	150	10.3	250	17.2
	CL125 FF	Low Pressure	125	8.62	25	1.72	100	6.89	353	178	150	10.3	125	8.62
		High Pressure	125	8.62	120	8.27	250	17.2	353	178	150	10.3	125	8.62
	CL250 RF	Low Pressure	175	12.1	25	1.72	100	6.89	406	208	150	10.3	150	10.3
		High Pressure	250	17.2	150	10.3	250	17.2	406	208	150	10.3	250	17.2
Steel	NPT	Low Pressure	175	12.1	25	1.72	100	6.89	450	232	300	20.7	150	10.3
		High Pressure	550	37.9	250	17.2	300	20.7	450	232	300	20.7	250	17.2
		High Temperature	550	37.9	250	17.2	300	20.7	650	343	300	20.7	250	17.2
	CL150 RF	Low Pressure	175	12.1	25	1.72	100	6.89	450	232	300	20.7	150	10.3
		High Pressure	185	12.8	175	12.1	185	12.8	450	232	300	20.7	185	12.8
		High Temperature	125	8.62	115	7.93	125	8.62	650	343	300	20.7	125	8.62
	CL300 RF	Low Pressure	175	12.1	25	1.72	100	6.89	450	232	300	20.7	150	10.3
		High Pressure	550	37.9	250	17.2	300	20.7	450	232	300	20.7	250	17.2
		High Temperature	550	37.9	250	17.2	300	20.7	650	343	300	20.7	250	17.2
	CL600 RF	High Pressure	550	37.9	250	17.2	300	20.7	450	232	300	20.7	250	17.2
		High Temperature	550	37.9	250	17.2	300	20.7	650	343	300	20.7	250	17.2
Stainless Steel	NPT	Low Pressure	175	12.1	25	1.72	100	6.89	450	232	300	20.7	150	10.3
		High Pressure	550	37.9	250	17.2	300	20.7	450	232	300	20.7	250	17.2
		High Temperature	550	37.9	250	17.2	300	20.7	650	343	300	20.7	250	17.2
	CL150 RF	Low Pressure	175	12.1	25	1.72	100	6.89	450	232	300	20.7	150	10.3
		High Pressure	182	12.5	172	11.9	182	12.5	450	232	300	20.7	182	12.5
		High Temperature	125	8.62	115	7.93	125	8.62	650	343	300	20.7	125	8.62
	CL300 RF	Low Pressure	175	12.1	25	1.72	100	6.89	450	232	300	20.7	150	10.3
		High Pressure	497	34.2	250	17.2	300	20.7	450	232	300	20.7	250	17.2
		High Temperature	440	30.3	250	17.2	300	20.7	650	343	300	20.7	250	17.2
	CL600 RF	High Pressure	550	37.9	250	17.2	300	20.7	450	232	300	20.7	250	17.2
		High Temperature	550	37.9	250	17.2	300	20.7	650	343	300	20.7	250	17.2

Table 3. *Outlet Pressure Ranges*

PILOT TYPE	OUTLET PRESSURE		SPRING WIRE DIAMETER		SPRING FREE LENGTH		PART NUMBER	COLOR CODE
	psig	barg	in.	mm	in.	mm		
Low Pressure	2 to 6	0.14 to 0.41	0.207	5.26	2.50	63.5	1E395627022	Yellow
	5 to 15	0.34 to 1.0	0.234	5.94	2.52	64.0	1D7455T0012	Green
	13 to 25	0.90 to 1.7	0.283	7.19	2.44	62.0	1E395727192	Red
High Pressure	15 to 30	1.0 to 2.1	0.207	5.26	2.50	63.5	1E395627022	Yellow
	25 to 75	1.7 to 5.2	0.234	5.94	2.52	64.0	1D7455T0012	Green
	70 to 150	4.8 to 10.3	0.281	7.14	2.44	62.0	1E395727192	Red
	80 to 250	5.5 to 17.2	0.375	9.53	2.50	63.5	14B9942X022	Unpainted
High Temperature	15 to 100	1.0 to 6.9	0.282	7.16	2.50	63.5	14B9943X012	Unpainted
	80 to 250	5.5 to 17.2	0.375	9.53	2.50	63.5	14B9942X022	Unpainted

Introduction

An upgrade to the Fisher Type 92B design, the Type 92EZ Steam Pressure Reducing Valve (PRV) establishes the industry benchmark for steam pressure control. Expertly engineered for precision and stability, it excels in challenging, dirty operating environments. Its durable design ensures dependable performance, offering decades of continuous operation. The Type 92EZ is applied as a main Pressure Reducing Valve in industrial process heating applications such as heat exchangers, evaporators, digesters and reactors. Commercial applications include Pressure Reducing Valves for meter runs found in district energy systems, hot water heat exchangers, absorption chillers and boiler deaerator tanks.

Features

- **Stem-Seal Design—**Differentiated U-cup seal completely isolates inlet pressure from the diaphragm, offering best-in-class stability and turndown for low pressure steam set points.
- **Top-Entry Access—**An upgrade from traditional bottom-entry access steam PRVs eliminates the need for special seat ring tools and on-site lapping, while offering market-leading ease of maintenance for all technician levels.

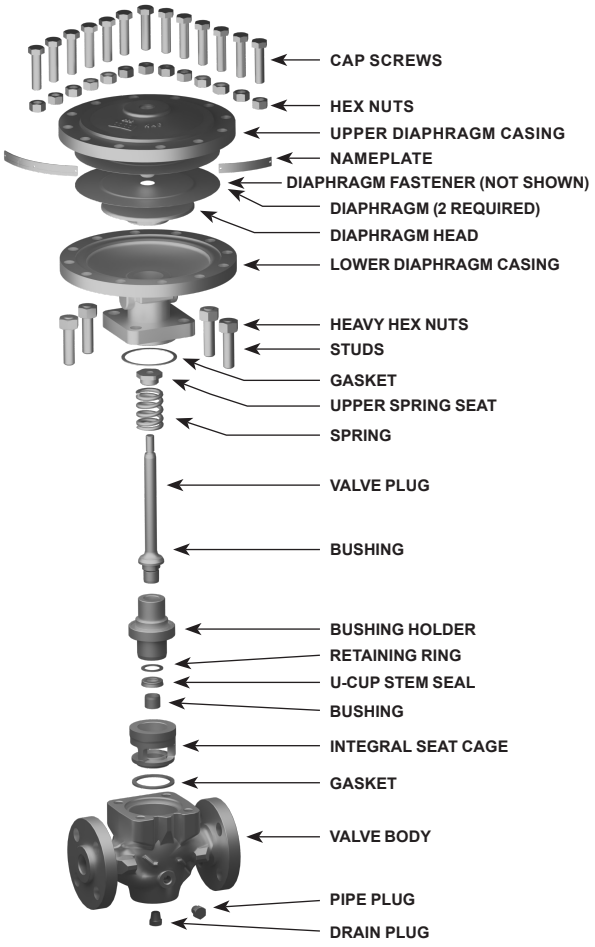


Figure 2. *Type 92EZ Pressure Reducing Valve Exploded View*

Principle of Operation

Refer to the operational schematic in Figure 3. Compression of the pilot spring pushes the diaphragm down and holds the pilot valve plug open. Outlet pressure is changed by varying the amount of pilot spring compression.

When steam enters the inlet of the valve, it also enters the pilot supply line and flows through the open pilot valve to the top of the main diaphragm. The force created by this steam pressure on the diaphragm overcomes the force of the main valve spring opening the valve plug and allowing steam to flow downstream. Downstream pressure registers under the main diaphragm through the control line and tends to balance the diaphragm. Steam from the downstream system also registers under the pilot diaphragm through line. Pressure forces the diaphragm upward, permitting the pilot valve plug to move toward the closed position. Flow of steam to the top of the main diaphragm is thereby reduced and the pressure on main diaphragm drops due to the bleed through the orifice. The main valve moves toward the closed position, allowing only enough steam flow to satisfy downstream requirements.

When steam demand increases, the downstream pressure decreases below the setting of the pilot spring. The pilot opens to increase the pressure on the main diaphragm. The main valve opens to increase the flow downstream. Conversely, if the steam demand decreases, the downstream pressure increases and the pilot reacts to decrease the pressure on top of the main diaphragm. The main valve throttles toward the closed position and the steam flow decreases. Thus, through the combination of pilot and main valve operation, control of the downstream steam pressure is maintained.

A check valve is included in the pilot to limit differential pressure on the main valve diaphragm. In the event of a large decrease in downstream pressure, the check valve opens to relieve diaphragm loading pressure to the downstream system. The check valve cartridge assembly has a factory setting to limit differential pressure across the diaphragm to approximately 40 psid / 2.8 bard. If diaphragm differential pressure exceeds 40 psid / 2.8 bard, the check valve opens to relieve diaphragm loading pressure into the downstream system, thereby preventing a high differential across the diaphragm which might otherwise cause diaphragm damage. The check valve closes and normal operation resumes when the differential pressure across the diaphragm is reduced to the proper level.

Safety Override System

Refer to Figure 4. Once placed in operation, the upstream Type 92B pilot (B) senses the intermediate pressure between both valves and the Type 6492HM (A) pilot senses pressure downstream of the second valve. As demand for flow increases, intermediate pressure will fall causing the Type 92B pilot to open. As the Type 92B pilot opens, loading pressure to the main valve increases, opening the main valve.

The Type 6492HM (A) safety override pilot remains open because its setpoint is above the setpoint of the downstream valve. In the unlikely event that the downstream valve fails open, downstream pressure will rise above the downstream valve's setpoint. This pressure is sensed by the Type 6492HM (A) safety override pilot. As downstream pressure increases the Type 6492HM (A) safety override pilot closes, reducing loading pressure to the upstream main valve, which positions the main valve to maintain desired downstream override pressure.

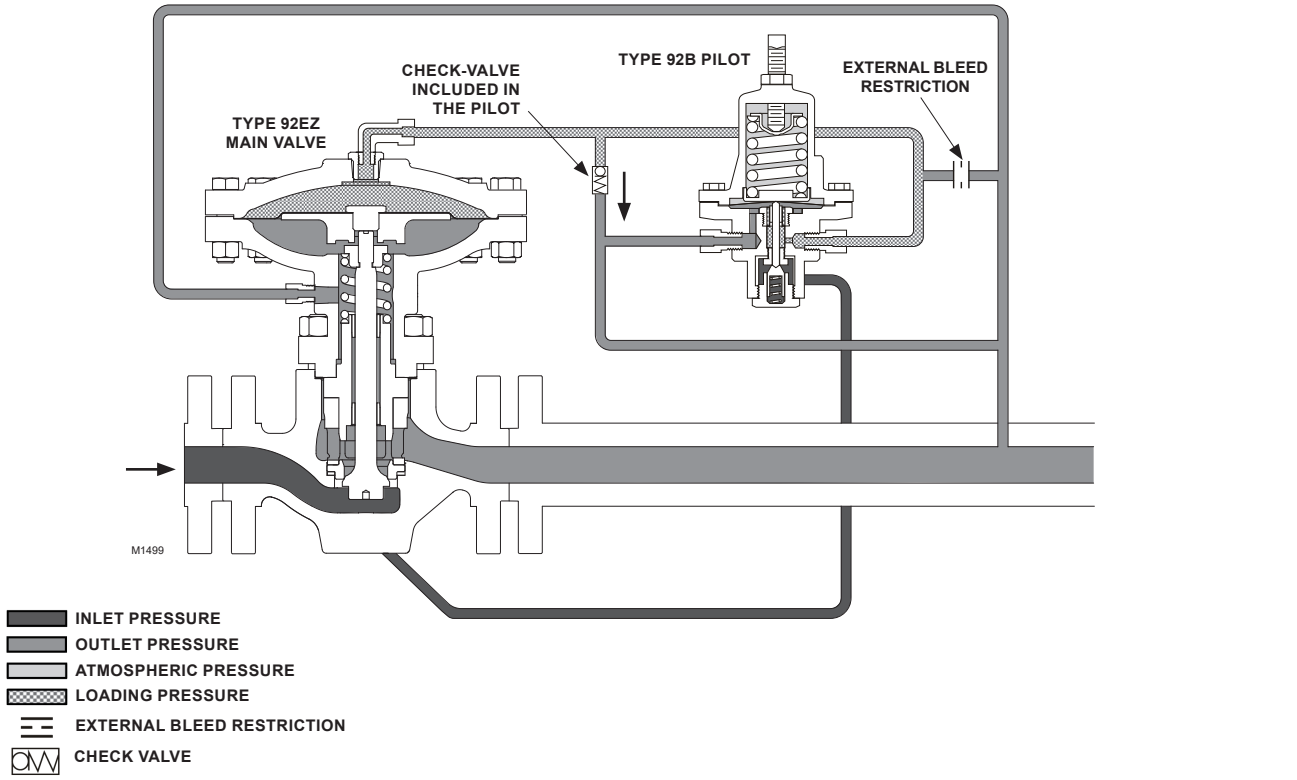


Figure 3. *Type 92EZ Operational Schematic*

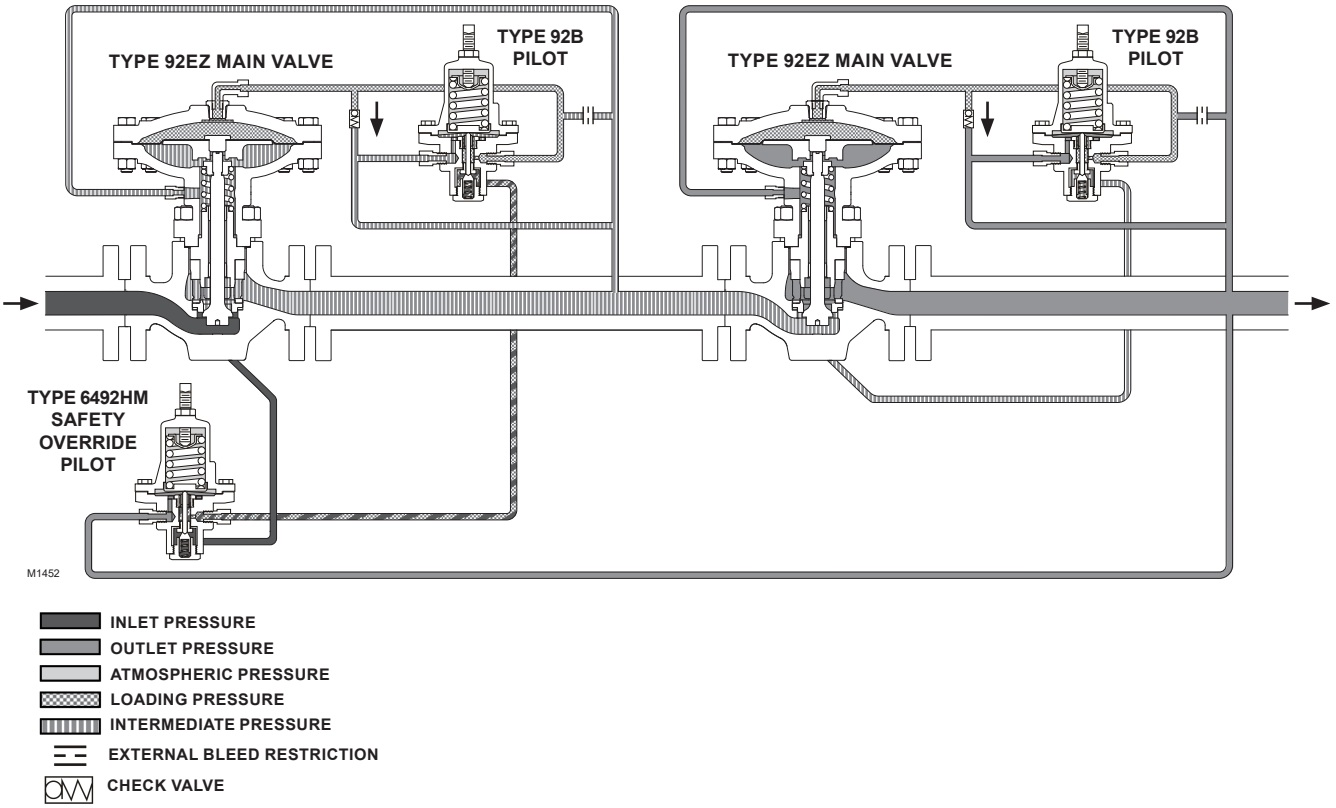
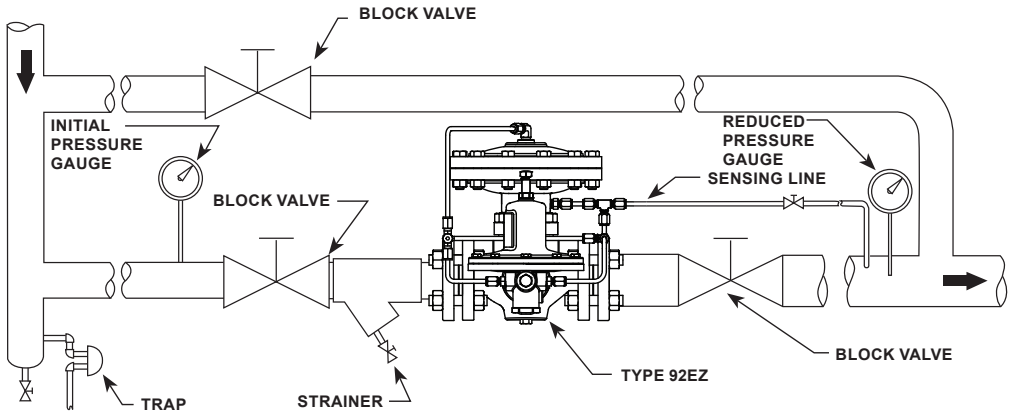
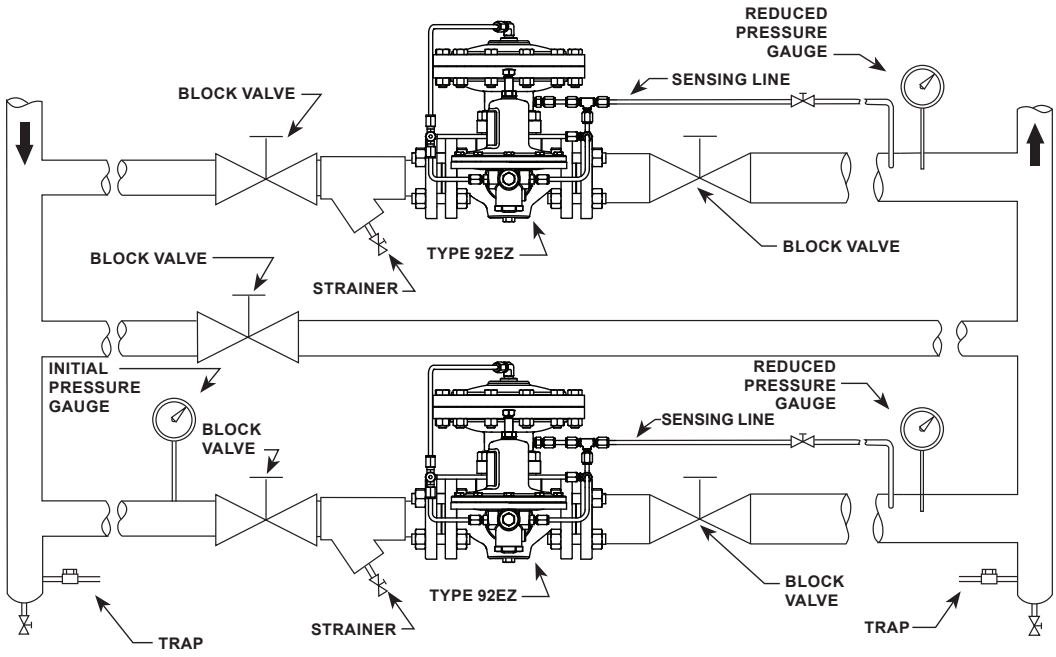


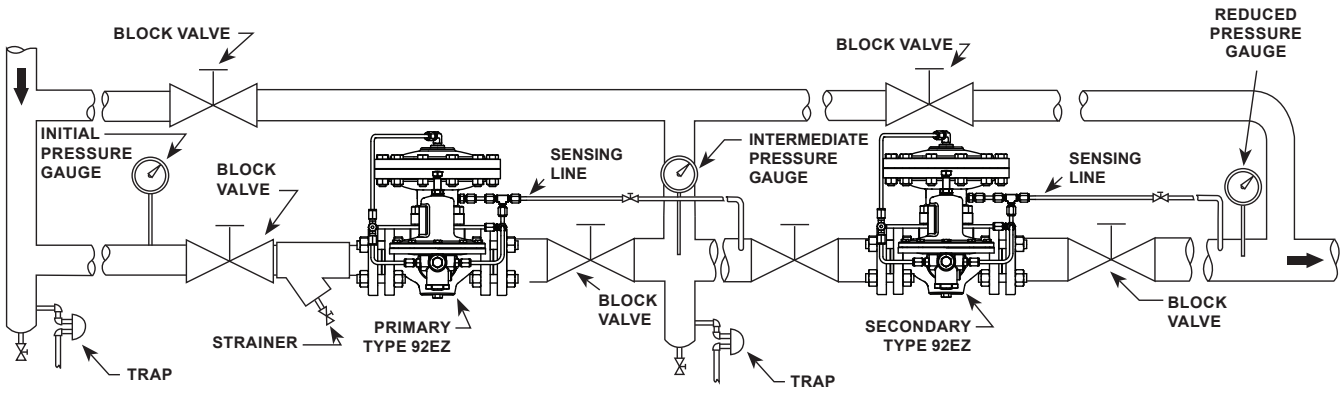
Figure 4. *Safety Override System Schematic*



TYPE 92EZ SINGLE-STAGE INSTALLATION



TYPE 92EZ SINGLE-STAGE PARALLEL INSTALLATION



TYPE 92EZ TWO-STAGE INSTALLATION

Figure 5. *Type 92EZ Typical Installations*

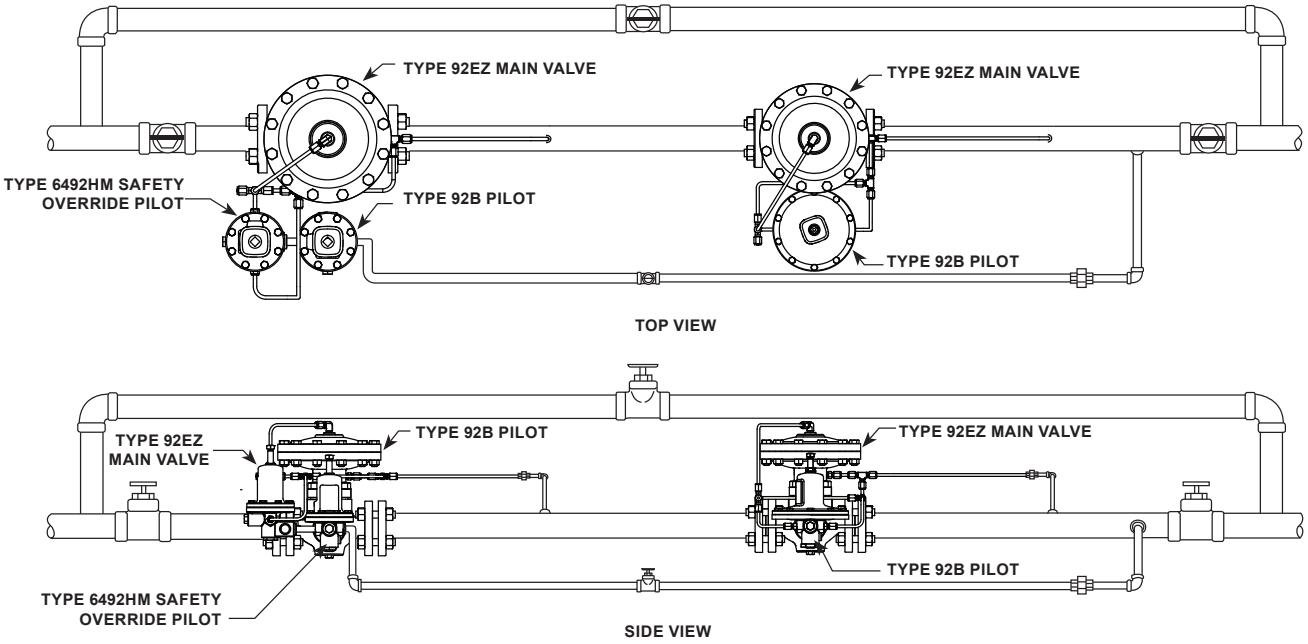


Figure 6. *Safety Override System Installation*

In the event that the upstream valve fails, the downstream valve will prevent downstream pressure from rising above safe operating levels.

It is recommended to install some type of warning system, such as a sentinel relief valve, to warn the operator that a valve has failed in the system. This will prevent prolonged operation with one valve, which could cause valve trim wear and noise associated with operation at high differential pressures.

Installation

Installation of the Type 92EZ is dependent on the application. As a minimum, a typical steam pressure reducing station must include a 3-valve bypass, inlet drip leg, inlet strainer (and steam separator if required) and relief valve per ASME Section VIII code. A safety override pressure reducing station can be installed in the event a relief valve is not practical as per ASME B16.122.14 standards, subject to local codes and regulations.

Positioning and Mounting

The Type 92EZ regulators are intended to be installed with their diaphragm case above the pipeline so that condensate will not collect in the cases. In order to obtain the performance given in this bulletin, connect the downstream end of the control line into a straight run of pipe. The connection should be located at least 6 pipe diameters from the valve body outlet in an unswaged pipeline or 10 pipe diameters from the swage in a swaged pipeline.

The Type 92B pilot should also be installed with the adjusting screw pointing up and the control line should be sloped with a downward pitch to ensure drainage of condensate. The body should be installed so the flow is in the same direction as the arrow on the body.

Note that the Type 92B pilot may be installed on either side of the body.

Overpressure Protection and Relief Valve Sizing

Overpressure protection is required when piping and components downstream of a steam regulating valve have a maximum allowable working pressure (MAWP) that is lower than the upstream supply pressure to the regulating valve. In some cases, the regulating valve itself may have a lower outlet pressure rating than its inlet pressure rating, which will require overpressure protection.

Governing codes and standards define the type and design of overpressure protection. When full flow relief valves are specified, they must relieve a maximum specified flow at a pressure not to exceed that specified by applicable codes. In North America, the governing code for most steam regulating valve installations is ASME Boiler Code, Section VIII, which may be amended by local codes or variances.

Table 4. *Main Valve Coefficients*

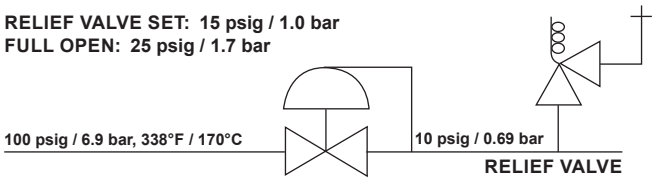
BODY SIZE		FLOW COEFFICIENTS						C_1
		Regulating Coefficients			Wide-Open Coefficients			
NPS	DN	C_g	C_v	C_s	C_g	C_v	C_s	
1	25	415.2	11.7	20.8	427.7	12.1	21.4	35.3
1-1/2	40	768.0	20.1	38.4	791.0	20.7	39.6	38.2
2	50	1291.0	34.8	64.5	1329.7	35.8	66.5	37.1

The issue in sizing stream relief valves is quantifying its maximum flow rate. Maximum flow conditions may occur under many conditions, so the entire steam system must be analyzed to make sure the maximum relief valve flow is accurate. Failure to do so may cause overpressure.

In applications where it is determined that the steam regulating valve creates maximum flow to the relief valve, several issues must be resolved prior to quantifying the flow to the relief valve.

1. There must be general agreement on the failure mode of the regulating valve. The Emerson Process Management Regulator Technologies, Inc. (Emerson) provides wide-open regulating coefficients to assist with sizing steam relief valves. The coefficients assume that the valve plug is at maximum travel and still in its normal orientation. Contact your local Sales Office prior to relief valve sizing in the event that there is disagreement with the mode of failure.
2. Maximum steam flow must be calculated at the pressure obtained at the relief valve's full-open condition. This pressure is typically larger than a relief valve's set pressure. This pressure must be used as the outlet pressure of the steam regulating valve when calculating the maximum flow through the regulating valve.
3. Maximum steam flow should be calculated from the manufacturer's recommended procedure. The Emerson recommends using either the Fisher™ steam sizing equation or IEC sizing procedure.

Example:



NPS 2 / DN 50 TYPE 92EZ

Determine the maximum valve flow capacity at wide-open failure.

$$Q_{max(lb/hr)} = \left[\left(\frac{C_S P_1}{1 + 0.00065\, T_{sh}}\right)\right] \text{SIN} \left[\left(\frac{3417}{C_1}\right)\sqrt{\frac{\Delta P}{P_1}}\right] \text{DEG}$$

where:

Q = Steam flow rate, lb/hr
P_1 = Absolute inlet pressure, psia (P1 gauge + 14.7)
C_s = Wide-open gas sizing coefficient, see Table 5
C_1 = Flow coefficient, see Table 4
T_{sh} = Degrees of steam superheat at inlet, °F
ΔP = Pressure drop across regulator, psia

Example Calculation:

$$Q_{max(lb/hr)} = \left[\left(\frac{66.5 \times 114.7}{1 + 0.00065 \times 0}\right)\right] \text{SIN} \left[\left(\frac{3417}{37.1}\right)\sqrt{\frac{75}{114.7}}\right] \text{DEG}$$

Q_{max} = 7349 lb/hr / 3333 kg/hr

where:

C_S = 66.5 ΔP = 75 psia / 5.2 bar
C_1 = 37.1 T_{sh} = 0°F
P_1 = 114.7 psia / 7.9 bar

Table 5. *Capacities for Low Pressure Pilot*

INLET PRESSURE		OUTLET PRESSURE		CAPACITIES OF SATURATED STEAM BASED ON 10 PERCENT DROOP (FOR TEMPERATURES BELOW 450°F / 232°C)					
				BODY SIZE					
				NPS 1 / DN 25		NPS 1-1/2 / DN 40		NPS 2 / DN 50	
psig	barg	psig	barg	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
25	1.7	5	0.34	877	398	1068	485	1796	815
		10	0.69	887	403	1027	466	1755	797
		15	1.03	852	387	971	441	1626	738
50	3.4	5	0.34	1368	621	1854	841	2994	1359
		10	0.69	1387	630	2047	929	3312	1503
		20	1.38	1415	642	2031	922	3336	1514
75	5.2	5	0.34	1766	802	2462	1117	4159	1887
		10	0.69	1951	885	2777	1260	4707	2136
		20	1.38	1969	894	2930	1330	4812	2183
100	6.9	5	0.34	2004	910	2985	1354	5136	2330
		10	0.69	2257	1024	3389	1538	5889	2672
		20	1.38	2477	1124	3697	1677	6170	2799
125	8.6	5	0.34	1970	894	3415	1550	6150	2790
		10	0.69	2514	1141	3884	1762	7287	3306
		20	1.38	3017	1369	4558	2068	7525	3414
150	10.3	5	0.34	2288	1038	3980	1805	7221	3275
		10	0.69	2949	1337	4555	2066	8575	3889
		20	1.38	3548	1609	5391	2445	8942	4055

Table 6. *Capacities for High Pressure Pilot*

INLET PRESSURE		OUTLET PRESSURE		CAPACITIES OF SATURATED STEAM BASED ON 10 PERCENT DROOP (FOR TEMPERATURES BELOW 450°F / 232°C)					
				BODY SIZE					
				NPS 1 / DN 25		NPS 1-1/2 / DN 40		NPS 2 / DN 50	
psig	barg	psig	barg	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
50	3.4	30	2.1	1270	577	1796	815	2857	1296
		40	2.8	1101	500	1563	709	2447	1110
75	5.2	30	2.1	1930	876	2865	1300	5003	2270
		40	2.8	1938	880	2717	1233	4481	2033
		50	3.4	1959	889	2607	1183	4224	1916
		60	4.1	1783	809	2342	1063	3764	1708
100	6.9	40	2.8	2412	1095	3606	1636	5938	2694
		60	4.1	2391	1085	3338	1515	5526	2507
		80	5.5	2250	1021	2829	1284	5019	2277
125	8.6	40	2.8	3067	1392	4452	2020	7472	3390
		60	4.1	3115	1413	4357	1977	7316	3319
		80	5.5	3023	1372	4092	1857	6973	3163
		100	6.9	2765	1255	3591	1629	6114	2774
150	10.3	20	1.4	3497	1587	5439	2468	8862	4020
		40	2.8	3597	1632	5259	2386	8935	4053
		60	4.1	3649	1656	5218	2367	8929	4051
		80	5.5	3600	1633	5061	2296	8689	3942
		100	6.9	3414	1549	4658	2113	7965	3613
		120	8.3	3221	1462	4246	1926	7225	3278
200	13.8	20	1.4	3886	1763	6941	3149	11,588	5257
		40	2.8	4761	2160	6887	3124	11,634	5278
		60	4.1	4798	2177	6971	3162	11,776	5342
		80	5.5	4698	2131	6869	3116	11,622	5272
		100	6.9	4590	2082	6606	2997	11,178	5071
		120	8.3	4477	2031	6336	2874	10,722	4864
		150	10.3	4299	1950	5921	2686	10,018	4545
250	17.2	20	1.4	4119	1869	7952	3607	13,529	6137
		40	2.8	5149	2336	8202	3721	14,270	6473
		60	4.1	5562	2523	8449	3833	14,437	6549
		80	5.5	5892	2673	8501	3856	14,493	6574
		100	6.9	5902	2678	8390	3806	14,283	6479
		120	8.3	5909	2681	8276	3754	14,064	6380
		150	10.3	5914	2683	8096	3673	13,721	6224
		200	13.8	5401	2450	6942	3149	11,909	5402
300	20.7	20	1.4	4115	1867	9300	4219	14,565	6607
		40	2.8	5498	2494	8240	3738	17,012	7717
		60	4.1	6355	2883	8476	3845	17,086	7751
		80	5.5	6980	3167	10,130	4595	17,292	7844
		100	6.9	6966	3160	10,102	4583	17,265	7832
		120	8.3	6954	3155	10,072	4569	17,232	7817
		150	10.3	6930	3144	10,020	4546	17,172	7790
		200	13.8	6362	2886	8579	3892	14,637	6640
		250	17.2	6102	2768	7843	3558	13,612	6175
350	24.1	100	6.9	7963	3612	11,710	5312	19,975	9061
		150	10.3	7915	3591	11,839	5371	20,289	9203
		200	13.8	8006	3632	10,863	4928	18812	8533
		250	17.2	7982	3621	10,433	4733	18243	8275
400	27.6	150	10.3	2412	1095	3606	1636	5938	2694
		200	13.8	2391	1085	3338	1515	5526	2507
		250	17.2	2250	1021	2829	1284	5019	2277
450	31.0	200	13.8	9815	4453	14,745	6689	24,289	11,018
		250	17.2	10,135	4598	14,471	6564	24,969	11,326

Table 7. *Capacities for High Temperature Pilot*

INLET PRESSURE		OUTLET PRESSURE		CAPACITIES OF SATURATED STEAM BASED ON 10 PERCENT DROOP (FOR TEMPERATURES BELOW 450°F / 232°C)					
				BODY SIZE					
				NPS 1 / DN 25		NPS 1-1/2 / DN 40		NPS 2 / DN 50	
psig	barg	psig	barg	lb/hr	kg/hr	lb/hr	kg/hr	lb/hr	kg/hr
150	10.3	20	1.4	1234	560	1201	545	2319	1052
		40	2.8	1825	828	1717	779	3596	1632
		60	4.1	2434	1105	2239	1016	4896	2221
		80	5.5	3052	1385	2768	1256	6213	2819
		100	6.9	3677	1668	3303	1499	7545	3423
		120	8.3	3233	1467	3402	1544	6697	3038
200	13.8	20	1.4	1296	588	835	379	2203	1000
		40	2.8	2163	982	1165	529	3194	1449
		60	4.1	3048	1383	1501	681	4207	1909
		80	5.5	3951	1793	1840	835	5231	2373
		100	6.9	4866	2208	2182	990	6266	2843
		120	8.3	4380	1987	3803	1726	7881	3575
		150	10.3	4473	2029	5155	2339	9955	4516
250	17.2	20	1.4	1122	509	490	222	1747	793
		40	2.8	2132	968	992	450	2715	1232
		60	4.1	3149	1429	1500	681	3699	1678
		80	5.5	4187	1900	2014	914	4698	2131
		100	6.9	5241	2378	2533	1149	5706	2589
		120	8.3	4101	1861	3861	1752	6524	2960
		150	10.3	4564	2071	4776	2167	8436	3827
		200	13.8	5341	2423	6322	2868	11,667	5293
300	20.7	20	1.4	868	394	473	215	1519	690
		40	2.8	1659	753	1138	517	2433	1104
		60	4.1	2452	1113	1809	821	3356	1523
		80	5.5	3253	1476	2489	1129	4293	1948
		100	6.9	4069	1846	3174	1440	5239	2377
		120	8.3	4017	1823	3840	1742	9469	4296
		150	10.3	4524	2053	4601	2087	10,389	4713
		200	13.8	5379	2440	5884	2669	11,933	5413
		250	17.2	6242	2832	7183	3259	13,490	6119
350	24.1	100	6.9	4128	1873	3689	1674	12,006	5446
		150	10.3	5411	2455	5572	2528	13,905	6308
		200	13.8	6716	3047	7483	3395	15,822	7177
		250	17.2	8036	3646	9418	4272	17,755	8054
400	27.6	150	10.3	5907	2680	4846	2199	10,703	4855
		200	13.8	7582	3440	6291	2854	12,322	5590
		250	17.2	9280	4210	7752	3517	13,955	6330
450	31.0	200	13.8	7922	3594	5765	2615	11,410	5176
		250	17.2	9626	4367	7027	3188	13,242	6007

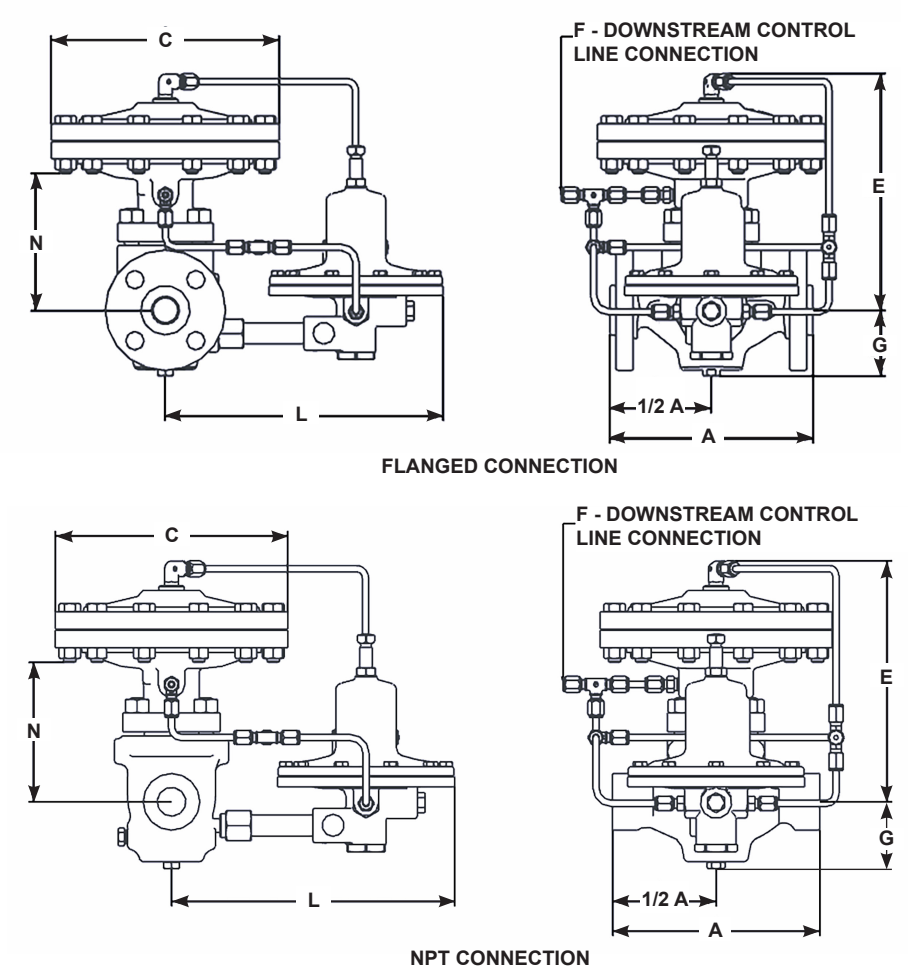


Figure 7. *Dimensional Drawings*

Table 8. *Type 92EZ Dimensions*

BODY SIZE		DIMENSIONS																					
		A								C		E		F (NPT)	G		N		L			
NPS	DN	NPT		CL125 FF and CL150 RF		CL250 RF and CL300 RF		CL600 RF											Low Pressure Pilot		High Pressure/ High Temp Pilot	
		In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm		In.	mm	In.	mm	In.	mm	In.	mm
1	25	8.25	210	7.25	184	7.75	197	8.25	210	9.25	235	9.60	244	1/4	2.65	67	5.55	141	11.40	290	10.25	260
1-1/2	40	9.88	251	8.75	222	9.25	235	9.88	251	10.38	264	10.25	260	1/4	3.08	78	5.67	144	11.40	290	10.25	260
2	50	11.25	286	10.00	254	10.50	267	11.25	286	11.88	302	12.06	306	1/4	3.33	85	7.33	186	11.40	290	10.25	260

Table 9. *Approximate Weights*

BODY SIZE, NPS / DN	ACTUATOR ASSEMBLY		CAST IRON				STEEL			
			THREADED BODY (HP PILOT / LP PILOT)		FLANGED BODY (HP PILOT / LP PILOT)		THREADED BODY (HP PILOT / LP PILOT)		FLANGED BODY[1] (HP PILOT / LP PILOT)	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
1 / 25	31	14	59 / 64	27 / 29	63 / 68	29 / 31	70 / 75	32 / 34	87 / 92	39 / 42
1-1/2 / 40	43	20	77 / 82	35 / 37	81 / 86	37 / 39	94 / 99	43 / 45	107 / 112	49 / 51
2 / 50	57	26	114 / 119	52 / 54	119 / 124	54 / 56	126 / 131	57 / 59	141 / 146	64 / 66

1. Steel/Stainless steel flanged body weights are averaged between weights of CL150 RF, CL300 RF and CL600 RF units.

Table 10. *Pilot-Operated Steam Regulator Troubleshooting Diagnostic Matrix*

SYMPTOM	PROBLEM	CAUSE	MAINTENANCE STEP	SOLUTION	RECOMMENDATIONS
Fail to Close (Downstream pressure not shutting off per ANSI Class IV)	Main valve leak through seat and plug	Debris caught between seat ring or orifice and plug	Step 7 or Step 11	Blow off debris with compressed air. Clean, lap, and reinstall if not damaged	Ensure pilot strainer has no damage. Install filter or strainer upstream. Upgrade material for higher temperatures.
	Pilot leak through orifice and plug		Step 21		
	Main valve plug seized open	Condensate buildup resulting in sludge or scale accumulation and hydraulic locking	Step 7 or Step 11	Clean, lap, and reinstall if not damaged	Install steam trap upstream.
	Pilot plug seized open		Step 30		
	Pilot diaphragm ruptured (steam exhausting from spring case)	Failure to remove condensate resulting in erosion and flashing	Step 25	Replace pilot diaphragm	Ensure proper control line placement(1) Install steam trap upstream of pilot
	Pilot bellows damaged		Step 30	Replace pilot bellows	
	Control line disconnected	Control line break, improper start-up	Step 4	Reinstall control line	
	Clogged external restrictor	Debris caught in pipe cross from steam flow	Step 1	Clean and reinstall restrictor	Ensure pilot strainer has no damage.
Fail to Open (Downstream pressure well under setpoint)	Main valve diaphragm ruptured (steam exhausting from actuator)	Condensate buildup resulting in erosion and flashing or used for batch processes or applications with high cycles	Step 15	Replace if damaged	Install steam trap upstream.Check for instability or upgrade to piston-style design.
	Main valve plug seized close	Failure to remove condensate resulting in sludge or scale accumulation and hydraulic locking	Step 7 or Step 11	Clean, lap, and reinstall if not damaged. Replace if damaged	Install filter or strainer upstream. Install steam trap upstream.
	Pilot plug seized close		Step 21		
	Pilot strainer clogged				
	Restrictor damaged	Erosion from debris	Step 1		
	Flow demand not met at setpoint	Valve undersized or lighter control spring available	Step 25	Increase inlet pressure or replace with lighter control spring	Use low differential Inconel® main spring Validate capacity with Bulletin data sheet
Instability or Cycling (vibration, hunting)	Improper control line placement	Turbulent sensing region	Step 4	Reinstall control line	Ensure proper control line placement(1)
	Sluggish or slow response	Control line smaller than control line port or pilot strainer clogged	Step 4 or Step 21	Reinstall control line or clean and reinstall pilot strainer	Ensure proper control line placement(1) or install filter or strainer upstream
	Large pressure swings at opening and closing	Insufficient piping volume	Step 2	Install pre-pilot supply to raise maximum differential pressure rating	Increase piping volume between downstream isolation valve or safety device
	Cavitation or flashing	High differential pressure	Step 2	Install pre-pilot supply to raise maximum differential pressure rating	Lower differential pressure Use tandem safety installation
	Pilot vent plugged	Clogged by rain or foreign object	Step 29	Clean and reinstall	Ensure pilot vent pointed downwards

1. The control line should be located in a straight run of pipe, no smaller than the control line port of the pilot, sloped to drain condensate, and at least 6 pipe diameters downstream from any areas of turbulence such as elbows, pipe swages, meters or block valves. Turbulence near the sensing port of the regulator leads to rapid fluctuations in sensed inlet pressure, leading to instability.

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Ordering Information

Use the Specifications section on page 2 and carefully review the description to the right of each specification. Use this information to complete the

Ordering Guide

Main Valve Body Size and Material (Select One)

Cast iron
- ☐ NPS 1 / DN 25
- ☐ NPS 1-1/2 / DN 40
- ☐ NPS 2 / DN 50

Steel
- ☐ NPS 1 / DN 25
- ☐ NPS 1-1/2 / DN 40
- ☐ NPS 2 / DN 50

Stainless Steel
- ☐ NPS 1 / DN 25
- ☐ NPS 1-1/2 / DN 40
- ☐ NPS 2 / DN 50

End Connection Style (Select One)

Cast iron
- ☐ NPT
- ☐ CL125 FF Flanged
- ☐ CL250 RF Flanged

Steel
- ☐ NPT
- ☐ CL150 RF Flanged
- ☐ CL300 RF Flanged
- ☐ CL600 RF Flanged

Stainless Steel
- ☐ NPT
- ☐ CL150 RF Flanged
- ☐ CL300 RF Flanged
- ☐ CL600 RF Flanged

Main Valve Spring (Select One)

- ☐ 17-7PH Stainless steel **(standard)*****
- ☐ Inconel® (optional)**

Main Valve Trim Material

- ☐ Stainless steel **(standard)*****
- ☐ Stellite-coated SST (optional)*

Pilot Material (Select One)

- ☐ Cast iron
- ☐ Steel

Pilot Type and Spring Range (Select One)

Low Pressure

- ☐ 2 to 6 psig / 0.14 to 0.41 bar, Yellow
- ☐ 5 to 15 psig / 0.34 to 1.0 bar, Green
- ☐ 13 to 25 psig / 0.90 to 1.7 bar, Red

High Pressure

- ☐ 15 to 30 psig / 1.0 to 2.1 barg, Yellow
- ☐ 25 to 75 psig / 1.7 to 5.2 barg, Green
- ☐ 70 to 150 psig / 4.8 to 10.3 barg, Red
- ☐ 80 to 250 psig / 5.5 to 17.2 barg, Unpainted

High Temperature

- ☐ 15 to 100 psig / 1.0 to 2.1 bar, Unpainted
- ☐ 80 to 250 psig / 5.5 to 17.2 bar, Unpainted

Pilot Mounting Position

Facing Inlet Side of Main Valve with Diaphragm Case Up, Pilot is Mounted:

- ☐ On left side with pilot adjusting screw pointed up

Options (Select One)
- ☐ Standard Adjusting Screw **(standard)*****
- ☐ Sealed Adjusting Screw (optional)*
- ☐ Handwheel (optional)*

Pre-Pilot Supply Regulator (Optional)

Type MR95H Pre-Pilot Supply Spring Range

- ☐ 15 to 30 psig / 1.0 to 2.1 barg, Yellow
- ☐ 25 to 75 psig / 1.7 to 5.2 barg, Green
- ☐ 70 to 150 psig / 4.8 to 10.3 barg, Red

Type MR95HT Pre-Pilot Supply Spring Range

- ☐ 15 to 100 psig / 1.0 to 6.9 bar, Unpainted
- ☐ 80 to 250 psig / 5.5 to 17.2 bar, Unpainted

Ordering Guide (continued)

Safety Override System (Optional)

Type 6492HM Pilot Spring Range
- ☐ 10 to 30 psig / 0.69 to 2.1 bar, Yellow
- ☐ 25 to 75 psig / 1.7 to 5.2 bar, Green
- ☐ 70 to 150 psig / 4.8 to 10.3 bar, Black

Type 6492HTM Pilot Spring Range
- ☐ 15 to 100 psig / 1.0 to 6.9 bar, Unpainted
- ☐ 80 to 250 psig / 5.5 to 17.2 bar, Unpainted

Repair Kit (Optional)

Cast Iron (406°F / 208°C) or Steel (450°F / 232°C)
- ☐ R92EZX000A0 (NPS 1 / DN 25)
- ☐ R92EZX000A1 (NPS 1-1/2 / DN 40)
- ☐ R92EZX000A2 (NPS 2 / DN 50)

Steel (650°F / 343°C)
- ☐ R92EZX000A3 (NPS 1 / DN 25)
- ☐ R92EZX000A4 (NPS 1-1/2 / DN 40)
- ☐ R92EZX000A5 (NPS 2 / DN 50)

Stainless Steel (450°F / 232°C)
- ☐ R92EZX000A6 (NPS 1 / DN 25)
- ☐ R92EZX000A7 (NPS 1-1/2 / DN 40)
- ☐ R92EZX000A8 (NPS 2 / DN 50)

Stainless Steel (650°F / 343°C)
- ☐ R92EZX000A9 (NPS 1 / DN 25)
- ☐ R92EZX000B0 (NPS 1-1/2 / DN 40)
- ☐ R92EZX000B1 (NPS 2 / DN 50)

Gasket Kit (Optional)

Cast Iron (406°F / 208°C) or Steel (450°F / 232°C)
- ☐ R92EZX100A0 (NPS 1 / DN 25)
- ☐ R92EZX100A1 (NPS 1-1/2 / DN 40)
- ☐ R92EZX100A2 (NPS 2 / DN 50)

Steel (650°F / 343°C)
- ☐ R92EZX100A3 (NPS 1 / DN 25)
- ☐ R92EZX100A4 (NPS 1-1/2 / DN 40)
- ☐ R92EZX100A5 (NPS 2 / DN 50)

Stainless Steel (450°F / 232°C)
- ☐ R92EZX100A6 (NPS 1 / DN 25)
- ☐ R92EZX100A7 (NPS 1-1/2 / DN 40)
- ☐ R92EZX100A8 (NPS 2 / DN 50)

Stainless Steel (650°F / 343°C)
- ☐ R92EZX100A9 (NPS 1 / DN 25)
- ☐ R92EZX100B0 (NPS 1-1/2 / DN 40)
- ☐ R92EZX100B1 (NPS 2 / DN 50)

Drop-In-Trim Kit (Optional)

Cast Iron (406°F / 208°C) or Steel (450°F / 232°C)
- ☐ R92EZX200A0 (NPS 1 / DN 25)
- ☐ R92EZX200A1 (NPS 1-1/2 / DN 40)
- ☐ R92EZX200A2 (NPS 2 / DN 50)

Steel (650°F / 343°C)
- ☐ R92EZX200A3 (NPS 1 / DN 25)
- ☐ R92EZX200A4 (NPS 1-1/2 / DN 40)
- ☐ R92EZX200A5 (NPS 2 / DN 50)

Stainless Steel (450°F / 232°C)
- ☐ R92EZX200A6 (NPS 1 / DN 25)
- ☐ R92EZX200A7 (NPS 1-1/2 / DN 40)
- ☐ R92EZX200A8 (NPS 2 / DN 50)

Stainless Steel (650°F / 343°C)
- ☐ R92EZX200A9 (NPS 1 / DN 25)
- ☐ R92EZX200B0 (NPS 1-1/2 / DN 40)
- ☐ R92EZX200B1 (NPS 2 / DN 50)

Ordering Guide (continued)

Regulators Quick Order Guide	
* * *	Readily Available for Shipment
* *	Allow Additional Time for Shipment
*	Special Order, Constructed from Non-Stocked Parts. Consult your local Sales Office for Availability.
Availability of the product being ordered is determined by the component with the longest shipping time for the requested construction.	

Steam Specification Worksheet

Application:

Tag Number: _____

Valve Type: ☐ Direct-Operated ☐ Pilot-Operated ☐ Pressure Loaded ☐ Differential

Body Material: ☐ Steel ☐ Iron ☐ Stainless steel

Inlet/Outlet End Connection Style:

☐ CL125 FF Flange ☐ CL150 RF Flange
☐ CL250 RF Flange ☐ CL300 RF Flange
☐ NPT ☐ CL600 RF Flange

Inlet/Outlet Pipe Size: _____ in. / mm

Steam Conditions:

	Maximum	Normal	Minimum
Inlet Pressure (psig / bar)			
Inlet Temperature (°F / °C)			
Outlet Pressure (psig / bar)			
Flow (lb/h or kg/h)			

Performance Required:

Accuracy Requirements: ☐ ≤ 10% ☐ ≤ 20% ☐ ≤ 30% ☐ ≤ 40%

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