Bulletin 71.4
D103577X012

May 2024

Type LR128 Relief Valve or Backpressure Liquid Regulator

- **Rugged design**
- **Reliable**
- **Thoroughly tested**
- **Internally actuated**
- **Compact**
- **1, 2, 3 and 4 in. / DN 25, 50, 80 and 100 body sizes**
- **Recommended for water and oil applications**
- **Full SST construction available for harsh environments**
- **API 614 Compliant**
- **Hydrogen Ready**

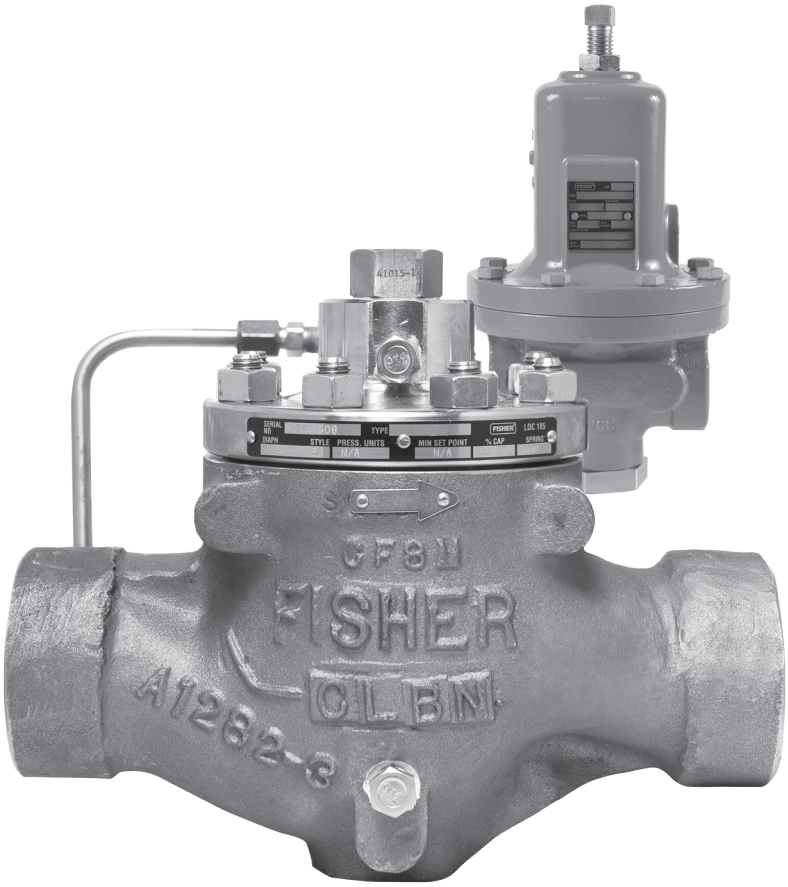

Figure 1. *Type LR128 Relief Valve or Backpressure Regulator*

Introduction

The Type LR128 pilot-operated, pressure relief valve or backpressure regulator is designed for liquid industrial/commercial applications. The Type LR128 provides smooth operation, tight shutoff and long life. Its internally actuated metal plug eliminates disadvantages associated with flexible element style regulators and the specially engineered flow path deflects debris, protecting the seat from damage and erosion. The Type LR128 is used in conjunction with a Type MR98H pilot and Type 112 restrictor. An internal inlet strainer prevents large particles from entering the main valve, limiting damage to internal parts.

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Specifications

Specifications for the Type LR128 relief valve or backpressure regulator are shown below. Other information for the mainvalve appears on the nameplate. The control spring range for the pilot is marked on the nameplate of Type MR98H pilot.

Main Valve Body Sizes, End Connection Styles and Structural Design Ratings[1][2]
See Table 1

Maximum Inlet Pressure[1]
Type LR128 Main Valve: See Table 1
Type MR98H Pilot: See Table 2
Type 112 Restrictor: 1500 psig / 103 bar

Maximum Outlet Pressure
Type LR128 Main Valve: See Table 1
Type MR98H Pilot: 450 psig / 31.0 bar

Relief Set Pressure/Backpressure Control Ranges
See Table 3

Main Valve Plug Travel
1 in. / DN 25: 0.37 in. / 9.4 mm
2 in. / DN 50: 0.68 in. / 17 mm
3 in. / DN 80: 0.98 in. / 25 mm
4 in. / DN 100: 1.19 in. / 30 mm

Main Valve Minimum Differential Pressure[1]
See Table 5

Main Valve Maximum Differential Pressure[1]
See Table 6

Temperature Capabilities[1]
See Table 10

Main Valve Flow Direction
Up through the center of the cage and down through the cage slots

Main Valve Internal Inlet Strainer Sizes
1 in. / DN 25: 12 Mesh (0.0661 in. / 1.68 mm)[3]
2, 3 and 4 in. / DN 50, 80 and 100:
10 Mesh (0.0787 in. / 2.00 mm)[3]

Flow and IEC Sizing Coefficients
Type LR128 Main Valve: See Table 7
Type MR98H Pilot: See Table 8
Type 112 Restrictor: See Table 9

Flow Capacities
See Table 13

Pressure Registration
External: 1/8 NPT

Spring Case Vent
Type Y602-12

Approximate Weights
See Table 11

Options
- Pre-piped Pilot Supply
- Travel Indicator

Construction Materials

Type LR128 Main Valve
Body: WCC Steel, CF8M or CF3M Stainless steel
Bonnet: LF2 Steel or 316/316L Stainless steel
Bonnet Bushing: 416 Hardened Stainless steel
Cage: 15-5 Stainless steel
Spring: 302 Stainless steel or 17-7 Stainless steel
Top Plug: 17-4 Stainless steel
Bottom Plug: 416 Stainless steel
Inlet Strainer: Stainless steel
Diaphragm: Nitrile (NBR) or Fluorocarbon (FKM)
O-rings: Nitrile (NBR) or Fluorocarbon (FKM)
Flanged Locknut: 17-4 Stainless steel
Backup Rings: Polytetrafluoroethylene (PTFE)
Upper Spring Seat: 416 Stainless steel
Indicator Protector and Cover: Plastic
Indicator Stem: 303 Stainless steel
Indicator Fitting: 416 Stainless steel
Travel Indicator Plug: 416 Stainless steel

Type MR98H Pilot
Body: WCC Steel or 316 Stainless steel
Spring Case: WCC Steel or 316 Stainless steel
Orifice: 416 Stainless steel
Valve Plug: 416 Stainless Steel
Guide and Pusher Post: 416 Stainless steel
Gasket: Nitrile (NBR) or Fluorocarbon (FKM)
O-rings: Nitrile (NBR) or Fluorocarbon (FKM)
Diaphragm: Neoprene (CR) or Fluorocarbon (FKM)

Mounting Parts
Pilot Mounting Pipe Nipple: Plated steel or Stainless steel
Pipe Fittings: Plated steel or Stainless steel
Tubing: Stainless steel

Type 112 Restrictor
Body: 15-5 Stainless steel
Groove Valve: 416 Stainless steel
Retainer: 416 Stainless steel
Pipe Plug: 316 Stainless steel
O-rings: Nitrile (NBR) or Fluorocarbon (FKM)

1. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation should not be exceeded.
2. Ratings and end connections other than ASME standards can usually be provided; contact your local Sales Office.
3. Nominal sieve opening.

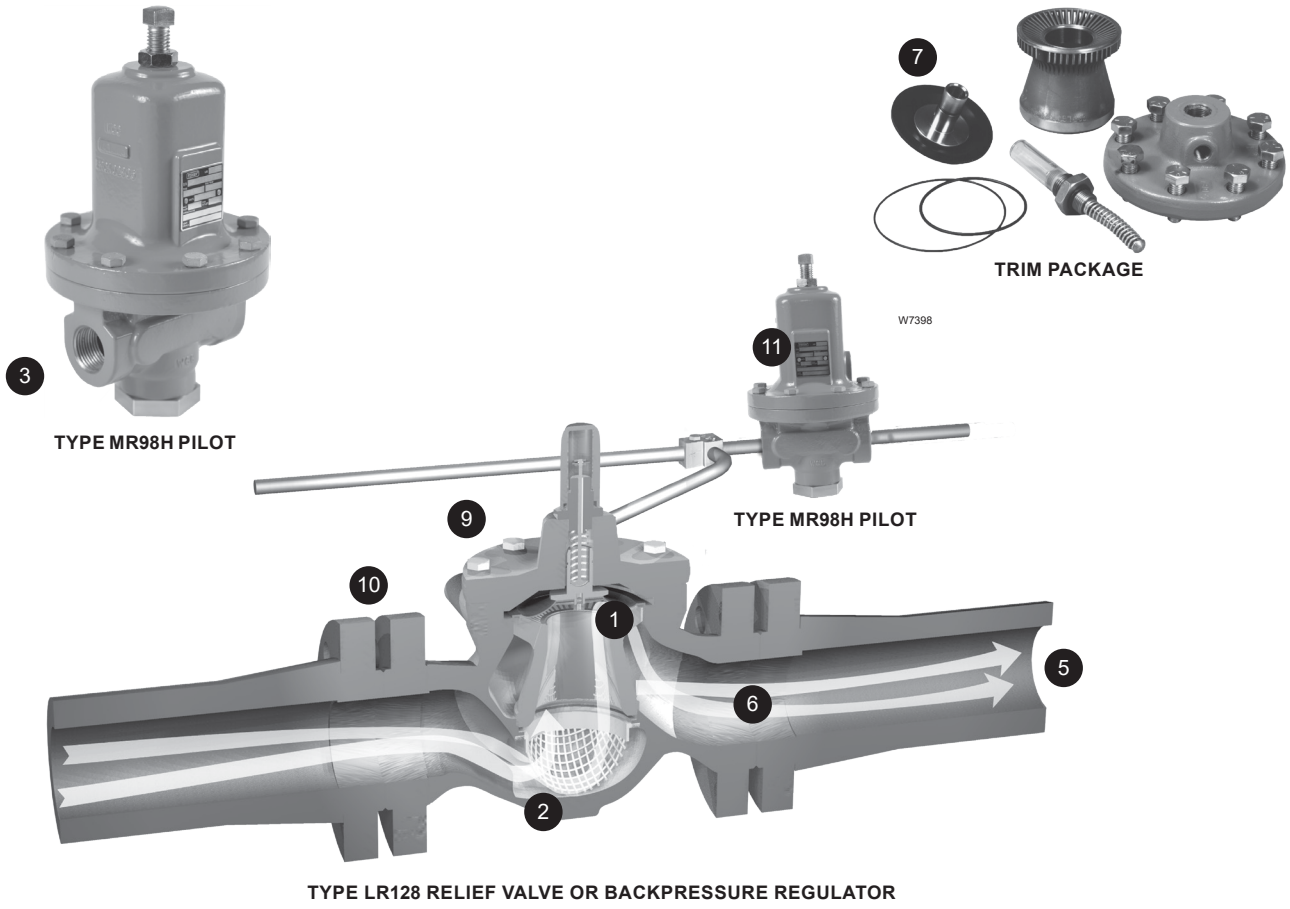

Figure 2. *Type LR128 Features and Benefits*

Features and Benefits

1. **Tight Shutoff –** The Type LR128 uses a diaphragm and metal plug, eliminating the disadvantages of flexible element style regulators. When open, the metal plug deflects particles and debris away from the diaphragm. The result is enhanced resistance to particle erosion, which provides excellent shutoff over an extended life. When closed, loading pressure and the main spring push the diaphragm onto the tapered-edged seat on the cage.
2. **Debris Protection –** The specially engineered flow path, along with the metal plug, allows flow through the regulator without seat impingement. The addition of an internal inlet strainer prevents large particles from entering the regulator, minimizing damage to internal parts.
3. **High Accuracy –** Multiple control pressure ranges offered by Type MR98H pilot and lower accuracy class inherent to pilot operated pressure regulator design provide the Type LR128 with tight and accurate control.
4. **Long Life –** The robust design of the Type LR128 with its metal plug and specially engineered flow path allows flow through the regulator without seat impingement. The diaphragm design eliminates the possibility of taking a “set”, a common problem with flexible element style regulators. To prevent damage, the diaphragm is fully supported in both the open and closed positions. These features enable the Type LR128 components to work longer with less wear and tear.
5. **Full Usable Capacity –** Fisher™ branded regulators are laboratory tested. One hundred percent of the published flow capacity can be used with confidence.
6. **Thorough Laboratory Testing –** Emerson Process Management Regulator Technologies, Inc. (Emerson) state-of-the-art flow laboratory allows thorough testing of all new designs. Tests are conducted on Fisher branded regulators for performance features such as flow, strength, shutoff and material compatibility.

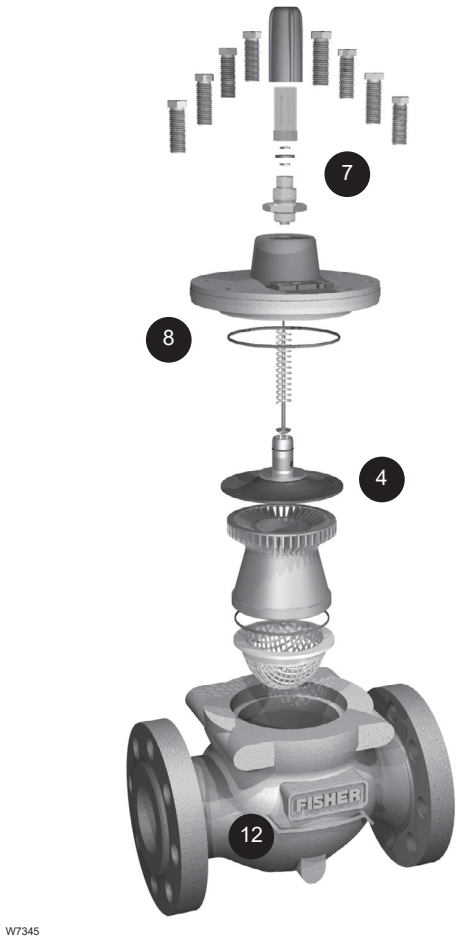

Figure 2. *Type LR128 Features and Benefits (continued)*

7 **Easy In-Line Maintenance –** Top-entry design reduces maintenance time. Trim parts can be inspected, cleaned and replaced without removing the body from the pipeline. No special alignment is required when replacing the diaphragm.

8 **O-ring Design –** The Type LR128 uses elastomer O-rings instead of gaskets, reducing maintenance and assembly time.

9 **In-Service Travel Indicator –** The optional travel indicator responds to the precise movement of the diaphragm and plug assembly and shows the actual valve position. The travel indicator makes in-service inspection and troubleshooting easy. Also, it can be used for remote alarming and monitoring stem position.

10 **Versatility –** The Type LR128 uses the E-body, making available the standard construction materials and end connections (ASME and EN) used by other E-body regulators and control valves. Type MR98H can handle set pressures up to 375 psig / 25.9 bar.

11 **Easy-to-Maintain Pilot –** The pilot is designed to allow quick and simple in-line trim inspection and parts replacement.

12 **Powder Paint Coating –** Carbon steel body is powder paint coated providing superior impact, abrasion and corrosion resistance.

13 **Hydrogen Ready –** Products have been evaluated for material compatibility, potential leakage and permeation and susceptibility to embitterment for Hydrogen applications. Based on an extensive evaluation and testing program, Type LR128 configurations are available for use in Hydrogen applications.

Table 1. *Type LR128 Main Valve Body Sizes, End Connection Styles, Structural Design Ratings and Maximum Operating Relief (Inlet) Pressure[1]*

MAIN VALVE BODY SIZE		MAIN VALVE BODY MATERIAL	END CONNECTION STYLE[2]	STRUCTURAL DESIGN RATING[3]		MAXIMUM OPERATING RELIEF (INLET) PRESSURE INCLUDING BUILD-UP[3]		MAXIMUM OPERATING OUTLET PRESSURE	
In.	DN			psig	bar	psig	bar	psig	bar
1, 2, 3 and 4	25, 50, 80 and 100	WCC Steel	NPT or SWE (1 and 2 in. only)	1500	103	450	31.0	450	31.0
			CL150 RF	290	20.0	290	20.0	290	20.0
			CL300 RF	750	51.7	450	31.0	450	31.0
			CL600 RF	1500	103				
			PN 16/25/40 RF	580	40.0				
		CF8M Stainless steel	NPT (1 and 2 in. only)	1440	99.2	450	31.0	450	31.0
			CL150 RF	275	19.0	275	19.0	275	19.0
			CL300 RF	720	49.6	450	31.0	450	31.0
			CL600 RF	1440	99.2				
			PN 16/25/40 RF	580	40.0				

1. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation should not be exceeded.
2. Ratings and end connections for other than ASME standard can usually be provided. Contact your local Sales Office for assistance.
3. Maximum cold working pressure (CWP) per ASME B16.34 or product bulletin limit, whichever is lowest. Temperature may decrease these maximum pressure.

Table 2. *Type MR98H Pilot Maximum Cold Working Pressure[1][2]*

BODY SIZE	BODY AND SPRING CASE MATERIAL	MAXIMUM INLET PRESSURE	MAXIMUM OUTLET PRESSURE
1/2 NPT	Steel Stainless steel	450 psig / 31.0 bar	450 psig / 31.0 bar

1. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation should not be exceeded.
2. Temperature and/or the body end connection may decrease these maximum pressure.

Table 3. *Relief Set Pressure or Backpressure Control Ranges*

PILOT	SET PRESSURE RANGE		SPRING WIRE DIAMETER		SPRING FREE LENGTH		SPRING MATERIAL	SPRING PART NUMBER AND COLOR
	psig	bar	In.	mm	In.	mm		
Type MR98H	35 to 75	2.4 to 5.2	0.234	5.94	2.595	65.9	Powder-coated steel	ERAA01910A0, Green
	70 to 140	4.8 to 9.7	0.283	7.19	2.44	62.0	Powder-coated steel	ERAA01911A0, Red
	130 to 200	9.0 to 13.8	0.331	8.41	2.250	57.2	Powder-coated steel	ERAA02889A0, Blue
	100 to 375	6.9 to 25.9	0.375	9.53	2.60	66	Powder-coated steel	ERCA04293A0, Unpainted
	150 to 375[1]	10.3 to 25.9[1]	0.394	10.0	5.063	129	Powder-coated steel	1N943427142, Unpainted

1. 150 to 375 psig / 10.3 to 25.9 bar spring range is only for the Type MR98HH pilot construction; consult the local Sales Office for this option.

Pilot Type Description

Type MR98H – High-pressure relief pilot for 25 to 375 psig / 1.7 to 25.9 bar set pressure. Designed to handle inlet pressure up to 450 psig / 31.0 bar.

Principle of Operation

A pressure relief valve is a throttling pressure control device that limits pressure build-up, it opens to prevent the rise of internal pressure in excess of a specified value. Fisher™ relief valves cannot be used as ASME safety relief valves.

A backpressure regulator is a device that maintains a desired upstream pressure by varying the flow in response to changes in upstream pressure. It functions the same as a relief valve, i.e., it opens on increasing upstream pressure.

Relief Valve

As long as the inlet pressure is below the set pressure, the Type MR98H pilot control spring keeps the pilot valve plug closed (Figure 3). Inlet pressure passes through the Type 112 restrictor and registers as loading pressure on top of the Type LR128 diaphragm and plug assembly. Force from the main spring,

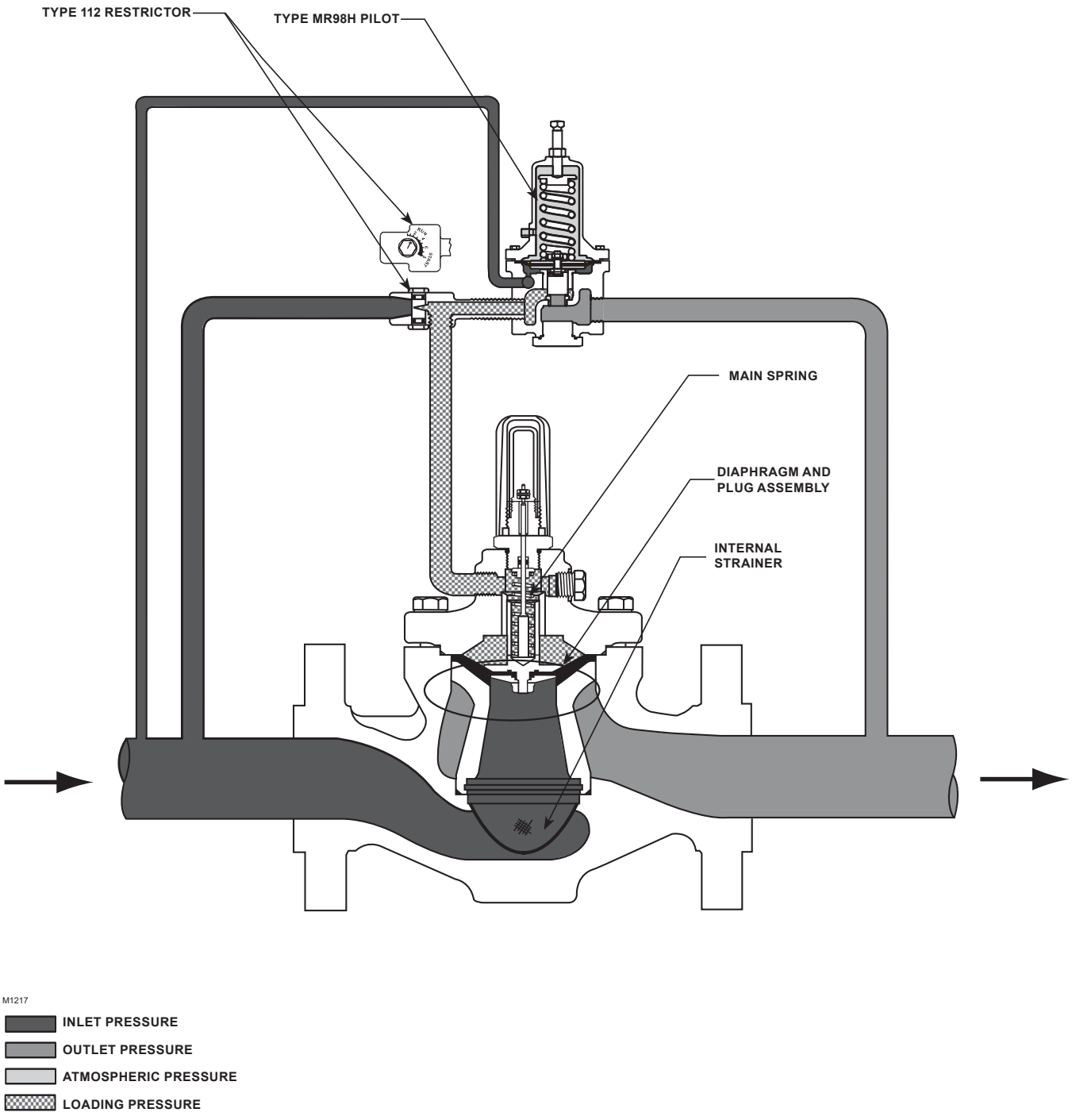

Figure 3. *Type LR128 Operational Schematic*

in addition to inlet pressure bleeding through the Type 112 restrictor, provides a downward loading pressure to keep the main valve diaphragm and plug assembly tightly shutoff.

When the inlet pressure rises above the set pressure, the pressure on the pilot diaphragm overcomes the pilot control spring and opens the pilot valve plug. The pilot then exhausts the loading pressure from the top of the main valve diaphragm and plug assembly. The inlet pressure unbalance overcomes the main spring force and opens the diaphragm and plug assembly.

The pilot continuously exhausts process fluid when the inlet pressure is above the set pressure.

As the inlet pressure drops below the set pressure, the pilot control spring closes the pilot valve plug and the exhaust to atmosphere stops. Force from the main spring, along with pilot loading pressure, pushes the diaphragm and plug assembly onto the tapered edge seat, producing tight shutoff.

Backpressure Regulator

As long as inlet pressure remains below set pressure, the Type MR98H pilot control spring keeps the pilot valve plug closed. Force from the main spring, in addition to inlet pressure bleeding through the Type 112 restrictor, provides downward loading pressure to keep the main valve diaphragm and plug assembly tightly shutoff.

When inlet pressure rises above the set pressure, pressure on the pilot diaphragm overcomes the control spring to stroke the valve plug open. The pilot then exhausts loading pressure from the top of the main valve diaphragm. Inlet pressure unbalance overcomes the main spring force to open the main valve diaphragm and plug assembly.

As inlet pressure drops below set pressure, the pilot control spring overcomes the diaphragm force to stroke the valve plug down to close. Force from the main spring, along with pilot loading pressure, pushes the diaphragm and plug assembly onto the tapered edge seat, producing tight shutoff.

Installation

The robust design of the Type LR128 allows this relief valve or backpressure regulator to be installed indoors or outdoors. Type LR128 is designed to withstand the elements. The powder paint coating protects against minor impacts, abrasions and corrosion. When installed outdoors, the Type LR128 does not require protective housing. However, the Type MR98H pilot should be oriented so that the pilot spring case vent is pointed down. Otherwise, make sure the vent is protected so that rain, moisture, insects or any debris will not accumulate inside or block the vent assembly. When installed indoors, install remote venting of the pilot spring case as required by applicable codes and regulations.

Cavitation Sizing

Note

The cavitation sizing graph in Figure 4 applies to water only. For cavitation sizing for other liquids, contact your local Sales Office.

Use Figure 4 to determine cavitation sizing of Type LR128. The Cavitation Prediction Curve depicts P1 and P2 combinations where cavitation is likely to occur. The curve shape was determined through analysis and lab confirmation on water. Determine the desired inlet pressure and outlet pressure of the system and find the intersection of those values on the graph.

Continuous Service Region – Cavitation is not expected in this region. Damage to regulator components and piping is highly unlikely as a result of cavitation.

Intermittent Service Region – Cavitation may occur. Damage to regulator components and piping is possible. This region is only suitable for intermittent service. The risk of damage increases as P2 decreases and P1 increases or down and to the right on the graph.

Note

Emerson denies responsibility for damage and voids the warranty if the product is used within the Full Cavitation Region (see Figure 4).

Full Cavitation Region – Full cavitation expected. This region is NOT recommended for service because damage to regulator components can be expected over time. Cavitation damage can be avoided by dividing the total pressure drop into separate stages that lie within the “Continuous Service Region”.

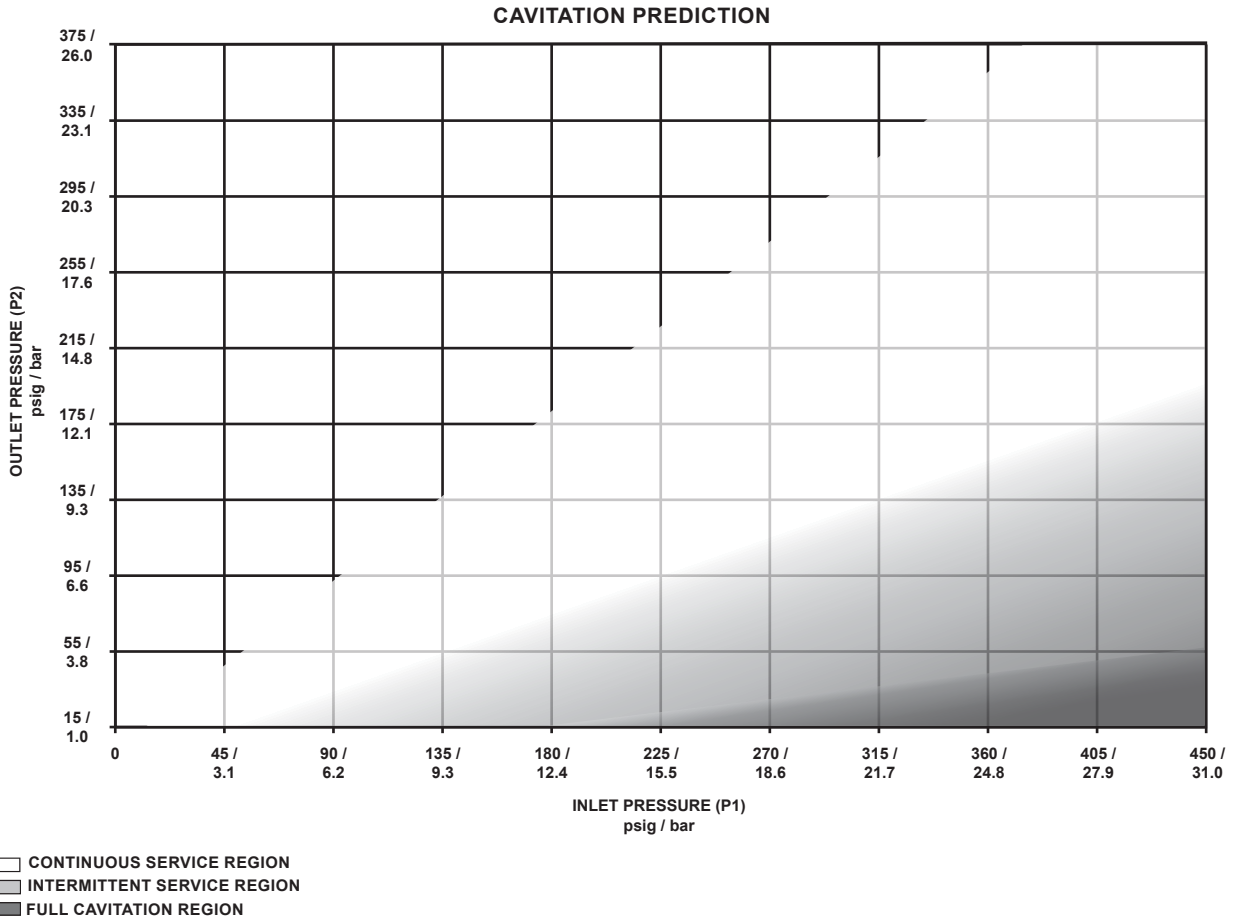

Figure 4. *Cavitation Sizing for Water*

Table 4. *Build-up Pressure Needed to Begin Opening and Fully Open Main Valve and Pressure Drop Needed to Reseat Pilot*

SPRING RANGE SPRING, PART NUMBER AND SPRING COLOR	SET PRESSURE[1]		BUILDUP OVER SET PRESSURE NEEDED TO BEGIN OPENING OF MAIN VALVE[2]		BUILDUP OVER SET PRESSURE NEEDED TO FULLY OPEN MAIN VALVE[3]		PRESSURE DROP BELOW SET PRESSURE NEEDED TO RESEAT PILOT	
	psig	bar	psig	bar	psig	bar	psig	bar
35 to 75 psig / 2.4 to 5.2 bar ERAA01910A0 (Green)	35	2.4	1	0.07	1	0.07	2	0.14
	50	3.4	1	0.07	1	0.07	2	0.14
	75	5.2	1	0.07	6	0.41	2	0.14
70 to 140 psig / 4.8 to 9.7 bar ERAA01911A0 (Red)	70	4.8	1	0.07	4	0.28	5	0.34
	100	6.9	1	0.07	10	0.69	5	0.34
	125	8.6	1	0.07	13	0.90	5	0.34
	140	9.7	1	0.07	16	1.1	5	0.34
130 to 200 psig / 9.0 to 13.8 bar ERAA02889A0 (Blue)	130	9.0	1	0.07	14	0.97	6	0.41
	150	10.3	1	0.07	14	0.97	6	0.41
	175	12.1	1	0.07	17	1.2	6	0.41
	200	13.8	1	0.07	17	1.2	6	0.41
100 to 375 psig / 6.9 to 25.9 bar ERCA04293A0 (Unpainted)	150	10.3	1	0.07	9	0.62	7	0.48
	200	13.8	1	0.07	10	0.69	7	0.48
	250	17.2	1	0.07	11	0.76	7	0.48
	300	20.7	1	0.07	15	1.03	7	0.48
	350	24.1	1	0.07	15	1.03	7	0.48
	375	25.9	1	0.07	25	1.7	7	0.48

1. Set pressure is defined as the pressure at which the pilot starts-to-discharge.
2. Crack point pressure of the main valve of the inlet pressure buildup over the set pressure at which the main valve starts audible flow.
3. Inlet pressure buildup over the set pressure for the main valve to achieve wide-open flow capacity.

Table 5. *Type LR128 Main Valve Minimum Differential Pressure*[1]

MAIN VALVE BODY SIZE		DIAPHRAGM		MINIMUM DIFFERENTIAL, PERCENT OF CAPACITY			
				For 90% Capacity		For 100% Capacity	
In.	DN	Diaphragm Code	Diaphragm Material	psid	bar d	psid	bar d
1	25	17E68 (standard)	Nitrile (NBR), Low Minimum Differential	30	2.1	30	2.1
		17E97	Nitrile (NBR), High Erosion Resistance	35	2.5	35	2.5
		17E88	Fluorocarbon (FKM), High Temperature Capability	30	2.1	30	2.1
2	50	17E68 (standard)	Nitrile (NBR), Low Minimum Differential	18	1.2	19	1.3
		17E97	Nitrile (NBR), High Erosion Resistance	24	1.7	24	1.7
		17E88	Fluorocarbon (FKM), High Temperature Capability	18	1.2	19	1.3
3	80	17E68 (standard)	Nitrile (NBR), Low Minimum Differential	21	1.5	28	1.9
		17E97	Nitrile (NBR), High Erosion Resistance	23	1.6	23	1.6
		17E88	Fluorocarbon (FKM), High Temperature Capability	21	1.5	28	1.9
4	100	17E68 (standard)	Nitrile (NBR), Low Minimum Differential	16	1.1	30	2.1
		17E97	Nitrile (NBR), High Erosion Resistance	16	1.1	34	2.3
		17E88	Fluorocarbon (FKM), High Temperature Capability	16	1.1	30	2.1

1. See Table 1 for Type LR128 main valve structural design ratings and Table 2 for Type MR98H pilot rating.

Table 6. *Type LR128 Maximum Pressure Ratings and Diaphragm Selection Information*[1]

BODY SIZE		DIAPHRAGM MATERIAL	MAXIMUM OPERATING INLET PRESSURE[3]		MAXIMUM OPERATING DIFFERENTIAL PRESSURE[3]		MAXIMUM EMERGENCY INLET AND DIFFERENTIAL PRESSURE		DIAPHRAGM STYLE
In.	DN		psig	bar	psid	bar d	psid	bar d	
1	25	17E68 Nitrile (NBR), Low temperature	450	31.0	400	27.6	450	31.0	130
		17E97 Nitrile (NBR), High-pressure and/or erosion resistance	450	31.0	450[2]	31.0[2]	450	31.0	
		17E88 Fluorocarbon (FKM), High aromatic hydrocarbon content resistance	450	31.0	450[2]	31.0[2]	450	31.0	
2	50	17E68 Nitrile (NBR), Low temperature	450	31.0	400	27.6	450	31.0	
		17E97 Nitrile (NBR), High-pressure and/or erosion resistance	450	31.0	450[2]	31.0[2]	450	31.0	
		17E88 Fluorocarbon (FKM), High aromatic hydrocarbon content resistance	450	31.0	450[2]	31.0[2]	450	31.0	
3	80	17E68 Nitrile (NBR), Low temperature	360	24.8	300	20.7	450	31.0	
		17E97 Nitrile (NBR), High-pressure and/or erosion resistance	450	31.0	450[2]	31.0[2]	450	31.0	
		17E88 Fluorocarbon (FKM), High aromatic hydrocarbon content resistance	450	31.0	450[2]	31.0[2]	450	31.0	
4	100	17E68 Nitrile (NBR), Low temperature	360	24.8	300	20.7	450	31.0	
		17E97 Nitrile (NBR), High-pressure and/or erosion resistance	450	31.0	450[2]	31.0[2]	450	31.0	
		17E88 Fluorocarbon (FKM), High aromatic hydrocarbon content resistance	450	31.0	450[2]	31.0[2]	450	31.0	

1. See Table 1 for main valve structural design ratings and Table 3 for pilot ratings.
2. For differential pressure above 400 psid / 27.6 bar d diaphragm temperatures are limited to 150°F / 66°C.
3. These are recommendations that provide the best regulator performance for a typical application. Please contact your local Sales Office for further information if a deviation from the standard recommendations are required.

Table 7. *Flow and Sizing Coefficients for Type LR128 Main Valve at 100% Capacity*

MAIN VALVE BODY SIZE		REGULATING COEFFICIENTS		WIDE-OPEN COEFFICIENTS		K_m	IEC SIZING COEFFICIENTS		
In.	DN	C_v	C_1	C_v	C_1		X_T	F_D	F_L
1	25	14.8	33.4	15.2	33.5	0.88	0.706	0.06	0.94
2	50	50.8	37.2	52.4	37.2	0.92	0.875	0.09	0.96
3	80	91.4	38.8	94.1	38.8	0.94	0.952	0.09	0.97
4	100	147	38.7	151	38.7	0.85	0.947	0.09	0.92

Table 8. *Flow and Sizing Coefficients for Type MR98H Pilot*

BODY SIZE	WIDE-OPEN COEFFICIENT		C_1	K_m	IEC SIZING COEFFICIENTS		
	C_v	C_g			X_T	F_D	F_L
1/2 in. / DN 15	3.4	120	35.3	0.88	0.787	0.78	0.94
$K_m = F_L^2$							

Table 9. *Type 112 Restrictor Flow Coefficients*

RESTRICTOR SETTING	C_v	C_1
Setting 2	0.03	35
Setting 4	0.07	
Setting 6	0.14	
Setting 8	0.17	

Table 10. *Diaphragm Material Selection Information*

CRITERIA	17E68 NITRILE (NBR) (STANDARD)	17E97 NITRILE (NBR)	17E88 FLUOROCARBON (FKM)
Liquid Temperature	-20 to 150°F / -29 to 66°C	0 to 150°F / -18 to 66°C	0 to 250°F / -18 to 121°C(1)
General Applications	Best for low pressure differential and cold temperature service applications.	Best for abrasive or erosive service applications.	Best for high temperature applications.
Heavy Particle Erosion	Fair	Excellent	Good
1. Fluorocarbon (FKM) is limited to 200°F / 93°C in hot water.			

Table 11. *Approximate Weights Including Type MR98H Pilot and Restrictor*

BODY SIZE		MAIN VALVE BODY, lbs / kg			
In.	DN	NPT or SWE	CL150 RF	CL300 RF	CL600 RF
1	25	22 / 10	24 / 11	28 / 13	32 / 15
2	50	51 / 23	54 / 24	58 / 26	65 /29
3	80	103 / 47	107 / 49	110 / 50	123 / 56
4	100	139 / 63	145 / 66	159 / 72	192 / 87

Capacity Information

Note

Flow capacities are laboratory verified; therefore, regulators may be sized for 100% flow published capacities. It is not necessary to reduce published capacities.

The capacity information on the following pages is based on percentages of pressure build-up over set pressure (10%, 20%, 30% or 40%).

Table 12 shows C_v values at different percentages of pressure build-up over set pressure and selected set pressures.

Table 13 shows the liquid flow capacities of the Type LR128 relief valve or backpressure regulator at different percentages of pressure build-up over set pressure and selected set pressure. Flows are in gallons per minute (GPM) and liters per minute (L/min) of water.

Table 12. *C_v[1] at % Offset (Pressure Build-Up Above Setpoint)*[2]

SPRING RANGE, PART NUMBER AND SPRING COLOR	SET PRESSURE		BODY SIZE															
			1 In. / DN 25				2 In. / DN 50				3 In. / DN 80				4 In. / DN 100			
	psig	bar	10%	20%	30%	40%	10%	20%	30%	40%	10%	20%	30%	40%	10%	20%	30%	40%
35 to 75 psig / 2.4 to 5.2 bar ERAA01910A0 (Green)	35	2.4	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
	50	3.4	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
	75	5.2	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
70 to 140 psig / 4.8 to 9.7 bar ERAA01911A0 (Red)	70	4.8	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
	100	6.9	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
	125	8.6	12.5	14.8	14.8	14.8	43.0	50.8	50.8	50.8	77.4	91.4	91.4	91.4	124	147	147	147
	140	9.7	13.3	14.8	14.8	14.8	51.7	50.8	50.8	50.8	87.7	91.4	91.4	91.4	141	147	147	147
130 to 200 psig / 9.0 to 13.8 bar ERAA02889A0 (Blue)	130	9.0	12.0	14.8	14.8	14.8	51.9	50.8	50.8	50.8	83.7	91.4	91.4	91.4	135	147	147	147
	150	10.3	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
	175	12.1	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
	200	13.8	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
100 to 375 psig / 6.9 to 25.9 bar ERCA04293A0 (Unpainted)	100	6.9	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
	150	10.3	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
	200	13.8	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
	250	17.2	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
	300	20.7	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
	350	24.1	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147
	375	25.9	14.8	14.8	14.8	14.8	50.8	50.8	50.8	50.8	91.4	91.4	91.4	91.4	147	147	147	147

1. Type LR128 on liquid service with 1/2 NPT Type MR98H Pilot, 100% Cage Capacity with Strainer and Type 112 Restrictor Setting of “6” for the 1 and 2 in. / DN 25 and 50 body sizes, “6” or “8” for the 3 in. / DN 80 body size and “8” for the 4 in. / DN 100 body size.
2. Values published in this table are laboratory tested and are presented based on % offset (positive control deviation only) or pressure build-up above setpoint.

Table 13. *Capacity[1], Water (GPM / L/min) for 1 and 2 in. / DN 25 and 50 Bodies at % Offset (Pressure Build-Up Above Setpoint)[2]*

SPRING RANGE, SPRING PART NUMBER AND SPRING COLOR	SET PRESSURE		BODY SIZE															
			1 In. / DN 25								2 In. / DN 50							
	psig	bar	10%		20%		30%		40%		10%		20%		30%		40%	
			GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min
35 to 75 psig / 2.4 to 5.2 bar ERAA01910A0 (Green)	35	2.4	92	348	81	307	84	318	88	333	266	1007	278	1052	290	1098	301	1139
	50	3.4	110	416	115	435	119	450	124	469	377	1427	393	1488	410	1552	425	1609
	75	5.2	134	507	140	530	146	553	152	575	461	1745	482	1824	502	1900	521	1972
70 to 140 psig / 4.8 to 9.7 bar ERAA01911A0 (Red)	70	4.8	130	492	136	515	141	534	147	556	446	1688	466	1764	485	1834	503	1904
	100	6.9	155	587	162	613	169	640	175	662	533	2017	556	2104	579	2192	601	2275
	125	8.6	147	556	181	685	189	715	196	742	504	1908	622	2354	648	2453	672	2544
	140	9.7	165	625	192	727	200	757	207	783	642	2430	658	2491	685	2593	711	2691
130 to 200 psig / 9.0 to 13.8 bar ERAA02889A0 (Blue)	130	9.0	143	541	185	700	192	727	200	757	621	2350	634	2400	660	2498	685	2593
	150	10.3	190	719	199	753	207	783	214	810	653	2472	682	2581	709	2684	736	2786
	175	12.1	205	776	214	810	223	844	232	878	705	2668	736	2786	766	2899	795	3009
	200	13.8	220	833	229	867	239	905	248	937	753	2850	787	2979	819	3100	850	3217
100 to 375 psig / 6.9 to 25.9 bar ERCA04293A0 (Unpainted)	100	6.9	155	587	162	613	169	640	175	662	533	2017	556	2104	579	2192	601	2275
	150	10.3	190	720	199	753	207	783	214	810	653	2472	682	2581	709	2684	736	2786
	200	13.8	220	833	229	867	239	905	248	939	753	2850	787	2979	819	3100	850	321
	250	17.2	245	927	256	969	267	1011	277	1048	842	3187	880	3331	916	3467	950	3596
	300	20.7	269	1018	281	1064	292	1105	303	1147	923	3494	964	3649	1003	3796	1041	3940
	350	24.1	290	1098	303	1147	316	1196	328	1241	997	3774	1041	3940	1084	4103	1125	4258
	375	25.9	301	1139	314	1188	327	1238	339	1283	1032	3906	1078	4080	1122	4247	1164	4406

1. Type LR128 on liquid service with 1/2 NPT Type MR98H Pilot, 100% Cage Capacity with Strainer and Type 112 Restrictor Setting of “6” for the 1 and 2 in. / DN 25 and 50 body sizes.
2. Values published in this table are laboratory tested and are presented based on % offset (positive control deviation only) or pressure build-up above setpoint.

- continued -

Table 13. *Capacity[1], Water (GPM / L/min) for 3 and 4 in. / DN 80 and 100 Bodies at % Offset (Pressure Build-Up Above Setpoint)[2] (continued)*

SPRINGRANGE, SPRING PART NUMBER AND SPRING COLOR	SET PRESSURE		BODY SIZE															
			3 In. / DN 80								4 In. / DN 100							
	psig	bar	10%		20%		30%		40%		10%		20%		30%		40%	
			GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min	GPM	L/min
35 to 75 psig / 2.4 to 5.2 bar ERAA01910A0 (Green)	35	2.4	479	1813	501	1896	521	1972	541	2048	771	2918	805	3047	838	3172	870	3293
	50	3.4	678	2566	708	2680	737	2790	765	2895	1090	4126	1139	4311	1185	4485	1230	4656
	75	5.2	830	3142	867	3282	903	3418	937	3547	1335	5053	1395	5280	1452	5496	1506	5700
70 to 140 psig / 4.8 to 9.7 bar ERAA01911A0 (Red)	70	4.8	802	3036	838	3172	872	3301	905	3425	1290	4883	1347	5098	1402	5307	1455	5507
	100	6.9	959	3630	1001	3789	1042	3944	1081	4092	1542	5836	1610	6094	1676	6344	1739	6582
	125	8.6	907	3433	1119	4235	1165	4410	1209	4576	1459	5522	1800	6813	1874	7093	1945	7362
	140	9.7	1088	4118	1185	4485	1233	4667	1280	4845	1750	6624	1905	7210	1983	7506	2058	7790
130 to 200 psig / 9.0 to 13.8 bar ERAA02889A0 (Blue)	130	9.0	1001	3789	1142	4322	1188	4497	1233	4667	1610	6094	1836	6949	1911	7233	1983	7506
	150	10.3	1174	4444	1226	4640	1276	4830	1325	5015	1888	7146	1972	7464	2053	7771	2130	8062
	175	12.1	1268	4799	1325	5015	1379	5220	1431	5416	2040	7721	2130	8062	2217	8391	2301	8709
	200	13.8	1356	5132	1416	5360	1474	5579	1529	5787	2180	8251	2277	8618	2370	8970	2460	9311
100 to 375 psig / 6.9 to 25.9 bar ERCA04293A0 (Unpainted)	100	6.9	959	3630	1001	3789	1042	3944	1081	4092	1542	5836	1610	6094	1676	6344	1739	6582
	150	10.3	1174	4444	1226	4640	1276	4830	1325	5015	1888	7146	1972	7464	2053	7771	2130	8062
	200	13.8	1356	5132	1416	5360	1474	5579	1529	5787	2180	8251	2277	8618	2370	8970	2460	9311
	250	17.2	1516	5738	1583	5992	1648	6238	1710	6472	2438	9228	2546	9637	2650	10,030	2750	10,409
	300	20.7	1660	6283	1734	6563	1805	6832	1873	7089	2670	10,106	2789	10,556	2903	10,988	3013	11,404
	350	24.1	1793	6787	1873	7089	1950	7381	2023	7657	2884	10,916	3013	11,404	3136	11,870	3254	12,316
	375	25.9	1856	7025	1939	7339	2018	7638	2094	7926	2986	11,302	3118	11,802	3246	12,286	3368	12,748

1. Type LR128 on liquid service with 1/2 NPT Type MR98H Pilot, 100% Cage Capacity with Strainer and Type 112 Restrictor Setting of “6” or “8” for the 3 in. / DN 80 body size and “8” for the 4 in. / DN 100 body size.
2. Values published in this table are laboratory tested and are presented based on % offset (positive control deviation only) or pressure build-up above setpoint.

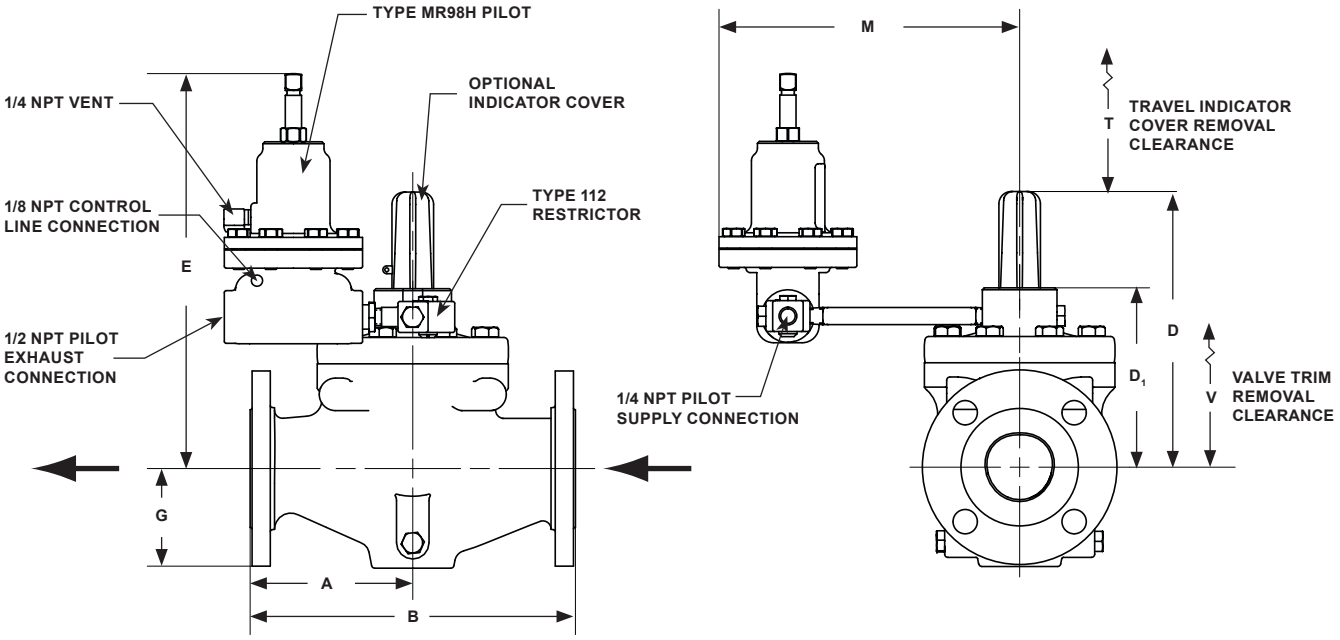

Figure 5. *Type LR128 Dimensions Schematic*

Table 14. *Type LR128 Dimensions*

BODY SIZE, In. / DN	DIMENSIONS, In. / mm													
	A			B			D	D_1	E	G	M		T	V
	CL150 RF	CL300 RF	CL600 RF	CL150 RF	CL300 RF	CL600 RF					Steel	SST		
1 / 25	3.62 / 91.9	3.88 / 98.6	4.13 / 104.9	7.25 / 184.2	7.75 / 196.9	8.25 / 209.6	7.40 / 189.0	5.40 / 137.0	11.39 / 289.3	2.40 / 60.0	8.10 / 205.8	8.10 / 205.8	2.97 / 75.4	9.40 / 238.8
2 / 50	5.0 / 127.0	5.3 / 133.4	5.6 / 143.0	10.00 / 254.0	10.50 / 266.7	11.25 / 286.0	9.00 / 229.0	6.89 / 175.0	11.65 / 295.9	3.10 / 79.0	8.18 / 207.8	9.18 / 233.2	2.00 / 51.0	11.00 / 279.4
3 / 80	5.9 / 149.3	6.3 / 158.8	6.6 / 168.3	11.75 / 298.5	12.50 / 317.5	13.25 / 336.6	13.30 / 338.0	9.33 / 236.9	13.68 / 347.5	3.80 / 97.0	8.66 / 220.0	9.66 / 245.4	3.80 / 97.0	15.00 / 381.0
4 / 100	6.9 / 176.3	7.3 / 184.2	7.8 / 196.9	13.88 / 352.6	14.50 / 368.3	15.50 / 393.7	14.70 / 373.0	10.47 / 265.9	15.24 / 387.1	5.10 / 130.0	9.52 / 241.8	9.52 / 241.8	3.80 / 97.0	17.00 / 431.8

Ordering Information

Carefully review each specification on page 2, then complete the Ordering Guide on this page. If a pilot setpoint is not requested, the regulator will be factory set at the approximate midrange. Please complete the Specification Worksheet on page 16.

Ordering Guide

Body Size (Select One)
- ☐ 1 in. / DN 25***
- ☐ 2 in. / DN 50***
- ☐ 3 in. / DN 80***
- ☐ 4 in. / DN 100***

Body Material and End Connection Style (Select One)

WCC Steel Body
- ☐ NPT (Available in 1 in. and 2 in. bodies only)***
- ☐ SWE (Available in 1 in. and 2 in. bodies only)***
- ☐ CL150 RF***
- ☐ CL300 RF***
- ☐ CL600 RF***
- ☐ PN 16/25/40 RF* _____ specify

CF8M Stainless Steel Body
- ☐ NPT (Available in 1 in. and 2 in. bodies only)***
- ☐ CL150 RF***
- ☐ CL300 RF***
- ☐ CL600 RF***
- ☐ PN 16/25/40 RF* _____ specify

Main Valve Diaphragm Material (Select One)
- ☐ 17E68 Nitrile (NBR) (low minimum differential) **(standard)***
- ☐ 17E97 Nitrile (NBR) (high erosion resistance)***
- ☐ 17E88 Fluorocarbon (FKM) (high temperature capability)*

Main Valve O-ring Material (Select One)
- ☐ Nitrile (NBR) **(standard)***
- ☐ Fluorocarbon (FKM)**

Travel Indicator (Select One)
- ☐ No **(standard)***
- ☐ Yes***

Inlet Body Tap (Select One)
- ☐ Inlet body tap only **(standard)***
- ☐ Inlet body tap with pre-piped pilot supply***
- ☐ Inlet/outlet body taps only***
- ☐ Inlet/outlet body taps with pre-piped pilot supply and pilot bleed***

Pilot Diaphragm Material (Select One)
- ☐ Neoprene (CR) **(standard)***
- ☐ Fluorocarbon (FKM)**

Pilot Seat, Gasket and O-ring Material (Select One)
- ☐ Nitrile (NBR) **(standard)***
- ☐ Fluorocarbon (FKM)***

Type MR98H Pilot Set Pressure Range (Select One)
- ☐ 35 to 75 psig / 2.4 to 5.2 bar, Green***
- ☐ 70 to 140 psig / 4.8 to 9.7 bar, Red***
- ☐ 130 to 200 psig / 9.0 to 13.8 bar, Blue***
- ☐ 100 to 375 psig / 6.9 to 25.9 bar, Unpainted***
- ☐ 150 to 375 psig[1] / 10.3 to 25.9 bar[1], Unpainted***

Main Valve Replacement Parts Kit (Optional)
- ☐ Yes, send one diaphragm cartridge and O-rings kit to match this order.

Pilot Replacement Parts Kit (Optional)
- ☐ Yes, send one replacement kit to match this order.

1. 150 to 375 psig / 10.3 to 25.9 bar spring range is only for the Type MR98HH pilot construction; consult the local Sales Office for this option.

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 Representative for Availability.
Availability of the product being ordered is determined by the component with the longest shipping time for the requested construction.	

Specification Worksheet

Application:

Specific Use _____

Line Size _____

Fluid Type and Specific Gravity _____

Temperature _____

Upstream Regulator Specifications:

Brand of upstream regulator? _____

Orifice size of the upstream regulator? _____

Wide-open coefficient of the upstream regulator? _____

Maximum Inlet Pressure (P_{1max}) _____

Downstream Pressure Setting(s) (P_2) _____

Maximum Flow (Q_{max}) _____

Relief Valve Specifications:

Relief Valve Setpoint _____

Accuracy Requirements? _____

Need for Extremely Fast Response? _____

Other Requirements: _____

_____

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