

Introduction

This Installation Guide provides instructions for installation, startup and adjustment. To receive a copy of the instruction manual, contact your local Sales Office or view a copy at www.fisher.com. For further information refer to MR98 Series Backpressure Regulators, Relief and Differential Relief valves Instruction Manual, D103588X012.

PED/PE(S)R Category

This product may be used as a safety accessory with pressure equipment in the following categories. It may also be used outside of these Directives using Sound Engineering Practice (SEP) per table below. For information on the current PED/PE(S)R revision, see Bulletin: [D103053X012](#).

| TYPE | PRODUCT SIZE | BODY MATERIAL | CATEGORY |
|----------------------|-------------------------------------|---------------------------|----------|
| All | 1/4 NPT, DN 15 to 25 / 1/2 to 1 in. | All available materials | SEP |
| MR98H/MR98HD/MR98HDP | DN 40 and 50 / 1-1/2 and 2 in. | Steel and Stainless Steel | II |

Specifications

Available Constructions

Type MR98L: Backpressure regulator/relief valve for spring settings range from 0.14 to 2.6 bar / 2 to 38 psig, available for 1/4 NPT to DN 25 / 1 in. body sizes only

Type MR98H: Backpressure regulator/relief valve for spring settings range from 0.34 to 13.8 bar / 5 to 200 psig

Type MR98HH: Backpressure regulator/relief valve for spring settings range from 10.3 to 25.9 bar / 150 to 375 psig

Type MR98LD: Differential pressure relief valve for differential set pressures range from 0.14 to 2.6 bar / 2 to 38 psi with maximum inlet/outlet pressure up to 10.3 bar / 150 psi, available for 1/4 NPT to DN 25 / 1 in. body sizes only

Available Constructions (continued)

Type MR98HD: Differential pressure relief valve for differential set pressures from 0.34 to 13.8 bar / 5 to 200 psi with maximum inlet/outlet pressure up to 20.7 bar / 300 psi

Type MR98HDP: Differential pressure relief valve for differential set pressures range from 0.34 to 13.8 bar / 5 to 200 psi with maximum inlet/outlet pressure up to 41.4 bar / 600 psi

Type MR98HHD: Differential pressure relief valve for differential set pressures range from 10.3 to 25.9 bar / 150 to 375 psi with maximum inlet/outlet pressure up to 27.6 bar / 400 psi

Body and Orifice Sizes

1/4 NPT body: 7.22 mm / 0.284 in. orifice

DN 15 / 1/2 in. body:
10.56 mm / 0.416 in. orifice

DN 20 and 25 / 3/4 and 1 in. bodies:
16.02 mm / 0.631 in. orifice

DN 40 and 50 / 1-1/2 and 2 in. bodies:
29 mm / 1.142 in. orifice

End Connection Styles

NPT, SWE and Welded and Integral CL150 RF, CL300 RF and PN 16/25/40 RF; all sizes are fabricated with slip-on flanges (for welded end connections) and are EN flanged 356 mm / 14 in. face-to-face

Set Pressure Ranges⁽¹⁾

See Table 1

Maximum Cold Working Pressures of Body Size and Materials⁽¹⁾

See Table 2

Maximum Inlet, Outlet and Spring Case Pressure Ratings⁽¹⁾

See Table 2

1. The pressure/temperature limits in this Installation Guide and any applicable standard or code limitation should not be exceeded.

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Specifications (continued)

Temperature Capabilities of Body Materials⁽¹⁾⁽²⁾⁽⁴⁾

| BODY MATERIAL | TEMPERATURE RANGE |
|---|-----------------------------|
| Gray Cast Iron | -29 to 208°C / -20 to 406°F |
| WCC Steel ⁽⁴⁾ | -29 to 232°C / -20 to 450°F |
| LCC Steel ⁽⁴⁾ | -40 to 232°C / -40 to 450°F |
| Stainless Steel ⁽⁴⁾ , Monel [®] or Hastelloy [®] C | -40 to 232°C / -40 to 450°F |

Temperature Capabilities of Trim Materials⁽¹⁾⁽²⁾

| TRIM MATERIAL | PART | | | | TEMPERATURE RANGE | |
|--|------|-----------|--------|---------------------|---------------------------|-------------------------|
| | Seat | Diaphragm | O-ring | Diaphragm Protector | °C | °F |
| Nitrile (NBR) | ✓ | | ✓ | | -40 to 82 | -40 to 180 |
| Neoprene (CR) | | ✓ | | | -40 to 82 | -40 to 180 |
| Fluorocarbon (FKM) ⁽³⁾ | ✓ | ✓ | ✓ | | -18 to 149 ⁽⁵⁾ | 0 to 300 ⁽⁵⁾ |
| Ethylenepropylene (EPDM) | ✓ | ✓ | ✓ | | -7 to 135 | 20 to 275 |
| Sanitary Ethylenepropylene (EPDM) ⁽¹⁾ | ✓ | ✓ | ✓ | | -7 to 135 | 20 to 275 |
| Perfluoroelastomer (FFKM) | ✓ | | ✓ | | -18 to 218 | 0 to 425 |
| Polytetrafluoroethylene (PTFE) | | | | ✓ | -40 to 204 | -40 to 400 |
| Metal | ✓ | ✓ | | | -40 to 450 | -40 to 232 |

1. Sanitary EPDM elastomers meet FDA, USP Class VI and ADI Free requirements.

Flow Coefficients

| BODY SIZE | | C _v | C _g | C _i |
|-----------|-------------|----------------|----------------|----------------|
| DN | In. | | | |
| ---- | 1/4 NPT | 1.4 | 48 | 34.3 |
| 15 | 1/2 | 3.4 | 120 | 35.3 |
| 20 and 25 | 3/4 and 1 | 6.5 | 250 | 38.5 |
| 40 and 50 | 1-1/2 and 2 | 20.0 | 780 | 39.0 |

IEC Sizing Coefficients

| BODY SIZE | | X _r | F _d | F _L | K _m |
|-----------|-------------|----------------|----------------|----------------|----------------|
| DN | In. | | | | |
| ---- | 1/4 NPT | 0.743 | 0.74 | 0.95 | 0.90 |
| 15 | 1/2 | 0.787 | 0.78 | 0.94 | 0.88 |
| 20 and 25 | 3/4 and 1 | 0.935 | 0.70 | 0.91 | 0.83 |
| 40 and 50 | 1-1/2 and 2 | 0.961 | 0.69 | 0.94 | 0.88 |

Pressure Registration

Internal or External

Shutoff Classification Per ANSI/FCI 70-3-2004

Metal Seats: Class IV

PTFE: Class IV

Elastomer Seats: Class VI or better

Table 1. MR98 Series Body Sizes and Pressure Ranges

| TYPE | BODY SIZE | | CONTROL PRESSURE RANGE ⁽¹⁾ | |
|----------------------------|---------------|-------------------------|---------------------------------------|------------|
| | DN | In. | bar | psig |
| MR98L and MR98LD | 15, 20 and 25 | 1/4 NPT, 1/2, 3/4 and 1 | 0.14 to 0.48 | 2 to 7 |
| | | | 0.41 to 0.97 | 6 to 14 |
| | | | 0.83 to 1.7 | 12 to 25 |
| | | | 1.4 to 2.6 | 20 to 38 |
| MR98H, MR98HD and MRR98HDP | 15, 20 and 25 | 1/4 NPT, 1/2, 3/4 and 1 | 1.0 to 2.4 | 15 to 35 |
| | | | 1.7 to 5.2 | 25 to 75 |
| | | | 4.8 to 9.7 | 70 to 140 |
| | | | 9.0 to 13.8 | 130 to 200 |
| | 40 and 50 | 1-1/2 and 2 | 0.34 to 2.4 | 5 to 35 |
| | | | 1.4 to 4.5 | 20 to 65 |
| | | | 3.4 to 6.9 | 50 to 100 |
| | | | 5.2 to 11.7 | 75 to 170 |
| MR98HH and MR98HHD | 15, 20 and 25 | 1/4 NPT, 1/2, 3/4 and 1 | 10.3 to 25.9 | 150 to 375 |

1. All springs may be backed off to 0 bar / 0 psig. However, highest capacities and best performances are obtained by using these springs in their recommended ranges.

Monel[®] is a mark owned by Special Metals Corporation.

Hastelloy[®] C is a mark owned by Haynes International, Inc.

1. The pressure/temperature limits in this Installation Guide and any applicable standard or code limitation should not be exceeded.

2. Pressure and/or the body end connection may decrease these maximum temperatures.

3. Not for use on steam service.

4. Meets API 614 Requirements (with Stainless steel trim).

5. Limited to 93°C / 200°F for hot water.

Table 2. Maximum Cold Working Pressures of Body Size and Materials⁽¹⁾⁽²⁾

| REGULATOR TYPE | BODY SIZE | | BODY AND SPRING CASE MATERIAL | MAXIMUM INLET PRESSURE ⁽³⁾ | | MAXIMUM OUTLET PRESSURE | | MAXIMUM SPRING CASE PRESSURE | |
|-----------------------------------|-------------------------------|----------------------------------|---|---------------------------------------|------|-------------------------|------|------------------------------|------|
| | DN | In. | | bar | psig | bar | psig | bar | psig |
| MR98L/ MR98LD | ---- 15, 20, 25 | 1/4 1/2, 3/4, 1 | Gray Cast Iron | 4.1 | 60 | 4.1 | 60 | 3.4 | 50 |
| | | | Steel ⁽⁴⁾ ; Stainless Steel ⁽⁴⁾ ; Monel ⁽⁵⁾ ; Hastelloy [®] C ⁽⁵⁾ | 10.3 | 150 | 10.3 | 150 | 8.6 | 125 |
| MR98H/ MR98HD | ---- 15, 20, 25, 40, 50 | 1/4, 1/2, 3/4, 1, 1-1/2, 2 | Gray Cast Iron | 20.7 | 300 | 20.7 | 300 | 17.2 | 250 |
| | | | Steel ⁽⁴⁾ ; Stainless Steel ⁽⁴⁾ ; Monel ⁽⁵⁾ ; Hastelloy [®] C ⁽⁵⁾ ; Aluminum-Bronze ⁽⁵⁾ | 20.7 | 300 | 20.7 | 300 | 20.7 | 300 |
| MR98HDP ⁽⁶⁾ | ---- 15, 20, 25, 40, 50 | 1/4, 1/2, 3/4, 1, 1-1/2, 2 | Steel ⁽⁴⁾ | 41.4 | 600 | 41.4 | 600 | 41.4 | 600 |
| | | | Stainless Steel ⁽⁴⁾ ; Monel ⁽⁵⁾ ; Hastelloy [®] C ⁽⁵⁾ ; Aluminum-Bronze ⁽⁵⁾ | 37.9 | 550 | 37.9 | 550 | 37.9 | 550 |
| MR98HH/ MR98HHD ⁽⁶⁾ | ---- 15, 20, 25 | 1/4, 1/2, 3/4, 1 | Steel ⁽⁴⁾ ; Stainless Steel ⁽⁴⁾ ; Monel ⁽⁵⁾ ; Hastelloy [®] C ⁽⁵⁾ ; Aluminum-Bronze ⁽⁵⁾ | 27.6 | 400 | 27.6 | 400 | 27.6 | 400 |

1. The pressure/temperature limits in this Installation Guide and any applicable standard limitation should not be exceeded.
2. Temperature, trim material and/or the body end connection may decrease these maximum pressures.
3. Maximum inlet pressure equals set pressure plus build-up.
4. Steel and stainless steel body and spring case constructions meet API 614 requirements with SST trim.
5. Not available for 1/4 NPT body size.
6. Maximum differential pressure between inlet pressure and loading pressure should never exceed 20.7 bar / 300 psig.

Installation



WARNING

Only qualified personnel shall install or service a relief valve or backpressure regulator. Relief valve or backpressure regulator should be installed, operated and maintained in accordance with international and applicable codes and regulations and Emerson Process Management Regulator Technologies, Inc. instructions.

If using a relief valve or backpressure regulator on a hazardous or flammable fluid service, personal injury and property damage could occur due to fire or explosion of vented fluid that may have accumulated. To prevent such injury or damage, provide piping or tubing to vent the fluid to a safe, well-ventilated area or containment vessel. Also, when venting a hazardous fluid, the piping or tubing should be located far enough away from any buildings or windows so to not create a further hazard and the vent opening should be protected against anything that could clog it.

Personal injury, equipment damage or leakage due to escaping fluid or bursting of pressure-containing parts may result if this relief valve or

backpressure regulator is overpressured or is installed where service conditions could exceed the limits given in the Specifications section or where conditions exceed any ratings of the adjacent piping or piping connections.

To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices (as required by the appropriate code, regulation or standard) to prevent service conditions from exceeding limits.

Additionally, physical damage to the relief valve or backpressure regulator could result in personal injury and property damage due to escaping fluid. To avoid such injury and damage, install the relief valve or backpressure regulator in a safe location.

Clean out all pipelines before installation of the relief valve or backpressure regulator and check to be sure the relief valve or backpressure regulator has not been damaged or has collected foreign material during shipping. For NPT bodies, apply pipe compound to the external pipe threads. For flanged bodies, use suitable line gaskets and approved piping and bolting practices. Install the relief valve or backpressure regulator in any position desired, unless otherwise specified, but be sure flow through the body is in the direction indicated by the arrow on the body.

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Note

It is important that the relief valve or backpressure regulator be installed so that the vent hole in the spring case is unobstructed at all times. For outdoor installations, the relief valve or backpressure regulator should be located away from vehicular traffic and positioned so that water, ice and other foreign materials cannot enter the spring case through the vent. Avoid placing the relief valve or backpressure regulator beneath eaves or downspouts and be sure it is above the probable snow level.

Overpressure Protection

Maximum inlet pressure depend upon body materials and temperatures. See Specifications section or the maximum inlet pressure of the valve and the maximum spring case loading pressures stamped on the nameplate of Types MR98LD, MR98HD, MR98HDP and MR98HHD. The valve should be inspected for damage after any overpressure condition. **Fisher™ relief valve or backpressure regulators are NOT ASME safety relief valves.**

Parts List

Key Description

| | |
|-----|---|
| 1 | Body |
| 2 | Spring Case |
| 3* | Orifice |
| 4* | Valve Plug |
| 5 | Bottom Plug |
| 7 | Valve Plug Guide |
| 8 | Lower Spring Seat |
| 9 | Upper Spring Seat |
| 10 | Pusher Post |
| 11 | Control Spring |
| 12* | Diaphragm (2 required for metal, FKM and EPDM diaphragms) |
| 13 | Nameplate |
| 14 | Diaphragm Protector (not shown) |
| 15 | Adjusting Screw |
| 16 | Cap Screws |
| | Types MR98L and MR98LD |
| | 1/4 NPT; DN 15 / 1/2 in. bodies - 10 required |
| | DN 20 and 25 / 3/4 and 1 in. bodies - 12 required |
| | Types MR98H, MR98HD, MR98HH, MR98HDP and MR98HHD |
| | 1/4 NPT body - 6 required |
| | DN 15 to 50 / 1/2 to 2 in. bodies - 8 required |
| 17 | Jam Nut |
| 18 | Drive Screw (4 required) |
| 19* | Diaphragm Gasket (2 required for pressure loaded spring case) |
| 21 | Diaphragm Head |
| 22 | Adjusting Screw Assembly |
| 23 | Handwheel (not shown) |
| 24 | Machine Screw |
| 25 | O-ring Retainer |
| 25 | Seat Retainer |
| 28 | Lockwasher |
| 29* | Gasket |
| 31 | Locknut |
| 32 | Stuffing Box |

*Recommended Spare Part

Startup

The relief valve or backpressure regulator is factory set at approximately the midpoint of the spring range or the pressure requested, so an initial adjustment may be required to give the desired results. With proper installation completed and relief valves properly adjusted, slowly open the upstream and downstream shutoff valves (if applicable).

Adjustment

To change the control pressure, remove closing cap or loosen the jam nut and turn the adjusting screw clockwise to increase control pressure or counterclockwise to decrease pressure. Monitor the control pressure with a test gauge during the adjustment. Replace closing cap or tighten the jam nut to maintain the desired setting.

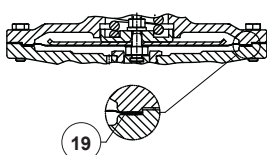
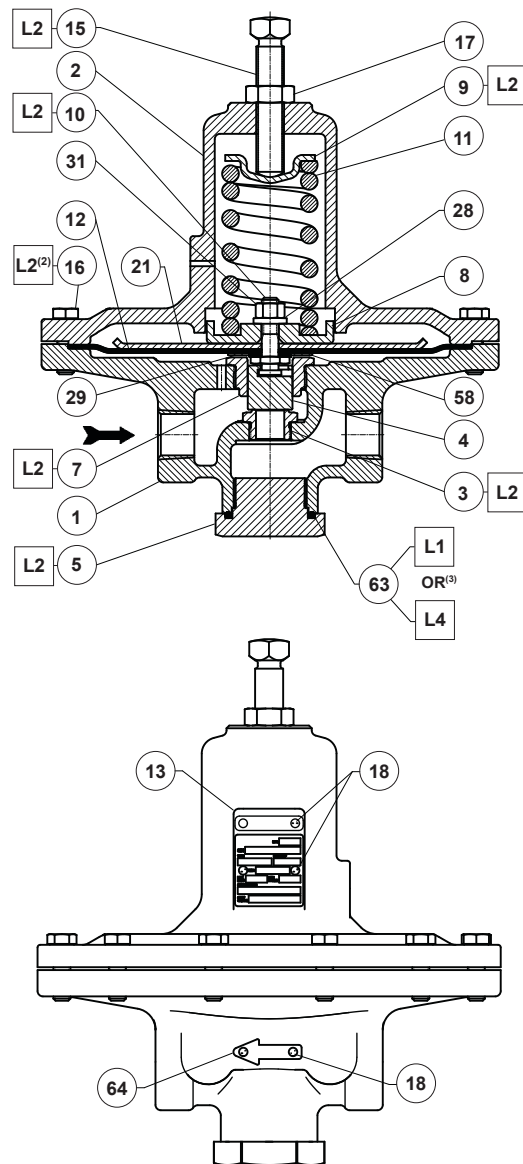
Taking Out of Service (Shutdown)



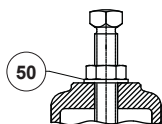
To avoid personal injury resulting from sudden release of pressure, isolate the relief valve or backpressure regulator from all pressure before attempting disassembly.

Key Description

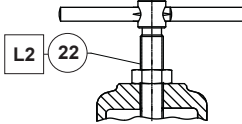
| | |
|-----|-----------------------------|
| 33 | Adjusting Screw |
| 34 | Packing Follower |
| 35 | Stuffing Box Nut |
| 36 | Packing V-Ring (3 required) |
| 37* | Stuff Box Gasket |
| 38 | Handwheel / Handle |
| 39 | Internal Adaptor |
| 40 | External Adaptor |
| 41 | Machine Screw |
| 41 | Jam Nut |
| 42 | Spring |
| 43 | Washer |
| 44 | Washer |
| 45* | O-ring |
| 47 | NACE Tag (not shown) |
| 48 | Tag Wire (not shown) |
| 49 | Lockwasher (not shown) |
| 50* | Sealing Washer |
| 51 | Vent (not shown) |
| 52 | Plug |
| 53* | Valve Plug O-ring |
| 57 | Jam Nut (not shown) |
| 58 | Washer |
| 59* | O-ring |
| 59* | L-ring |
| 62 | Adaptor (not shown) |
| 63* | Bottom Plug Seal |
| 64 | Flow Arrow |
| 65 | Pipe Plug (not shown) |
| 66 | Pressure Gauge (not shown) |
| 68 | Restriction (not shown) |
| 69 | ATEX Tag (not shown) |
| 70 | PED Tag (not shown) |



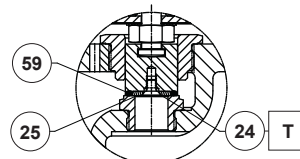
METAL DIAPHRAGM OPTION



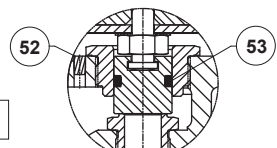
SEALED ADJUSTING SCREW OPTION



TEE-HANDLE OPTION



COMPOSITE SEAT OPTION



CONTROL LINE OPTION

GF04917

□ APPLY⁽¹⁾:

T = THREAD LOCKER

L1 = GENERAL PURPOSE PTFE OR LITHIUM GREASE FOR O-RINGS

L2 = ANTI-SEIZE COMPOUND

L4 = GRAPHITE SEALANT FOR GRAPHITE RING

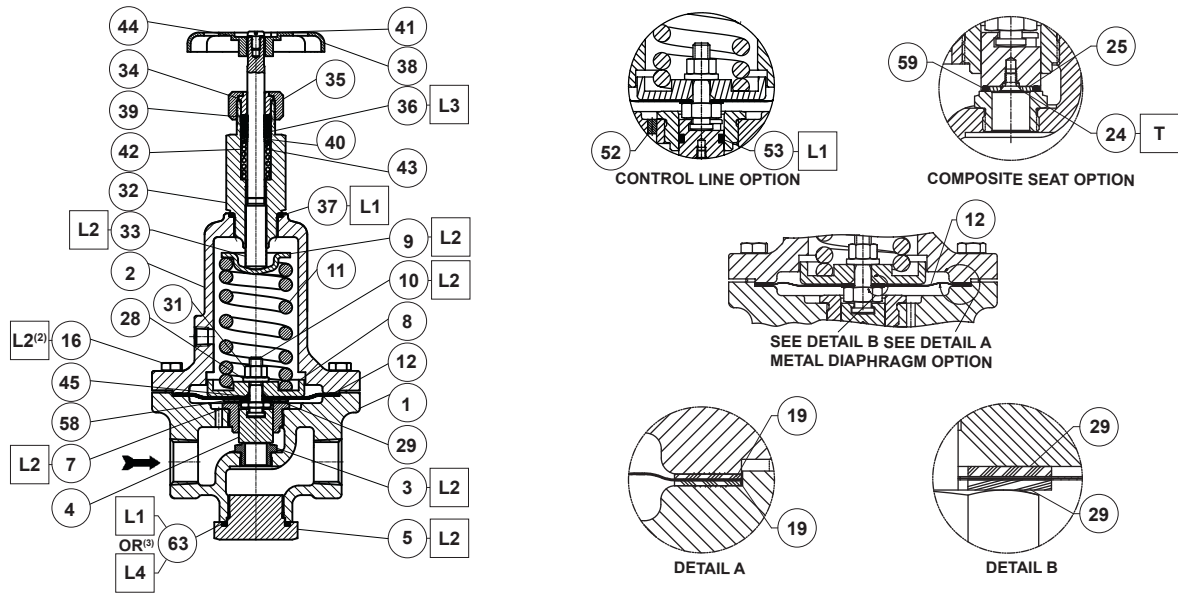
1. Lubricants and sealants must be selected such that they meet the temperature requirements.

2. Apply L2 (anti-seize compound) on key 16 for Stainless Steel bolts.

3. Apply L4 (graphite sealant) instead of L1 (general purpose PTFE or lithium grease) on key 63 for graphite ring.

Figure 1. Type MR98L Assembly

MR98 Series



GF04920

APPLY⁽¹⁾:

- T = THREAD LOCKER
- L1 = GENERAL PURPOSE PTFE OR LITHIUM GREASE FOR O-RINGS
- L2 = ANTI-SEIZE COMPOUND
- L3 = SILICONE GREASE
- L4 = GRAPHITE SEALANT FOR GRAPHITE RING

1. Lubricants and sealants must be selected such that they meet the temperature requirements.
2. Apply L2 (anti-seize compound) on key 16 for Stainless Steel bolts.
3. Apply L4 (graphite sealant) instead of L1 (general purpose PTFE or lithium grease) on key 63 for graphite ring.

Figure 2. Type MR98HD Assembly with 1/4 NPT, DN 15 to 25 / 1/2 to 1 In. Bodies

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For further information on the current PED/PE(S)R revision see Bulletin: [D103053X012](#) or scan the QR code.

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