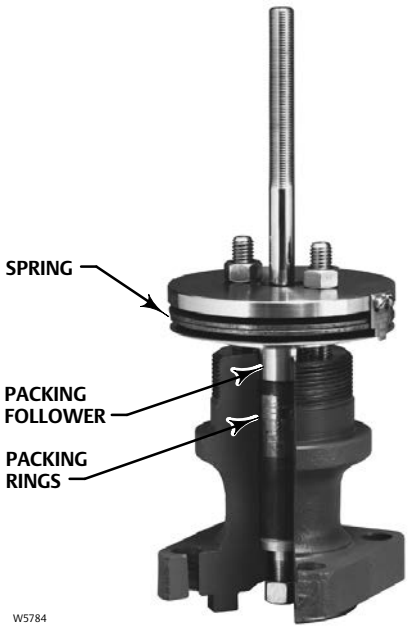
HIGH-SEAL ULF Live-Loaded Packing System

Contents

Figure 1. HIGH-SEAL ULF Live-Loaded Packing System



Introduction

Scope of Manual

This instruction manual includes installation, maintenance, and parts information for HIGH-SEAL ULF live-loaded packing systems (see figure 1). These systems are available for sliding-stem valves with 9.5, 12.7, 19.1, 25.4, 31.8 and 50.8 mm (3/8, 1/2, 3/4, 1, 1-1/4, and 2-inch) stem diameters. Refer to separate manuals for instructions covering valves and actuators. For rotary valve applications, contact your Emerson sales office or Local Business Partner or refer to your rotary valve instruction manual.

Do not install, operate, or maintain HIGH-SEAL ULF live-loaded packing systems without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. **To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all**

safety cautions and warnings. If you have any questions about these instructions, contact your Emerson sales office or Local Business Partner before proceeding.

Description

HIGH-SEAL ULF live-loaded packing systems combine the excellent sealing performance of the ENVIRO-SEAL Graphite ULF packing set with the high-performance of the HIGH-SEAL spring pack. The long-travel HIGH-SEAL Belleville springs accurately compensate for any packing consolidation or wear, keeping the packing stress nearly constant over the life of the packing set.

The HIGH-SEAL load scales ensure accurate initial packing adjustment and provide positive visual indication of the packing stress at any time. It is recommended that new packing sets be adjusted to the MAX level.

HIGH-SEAL ULF packing systems are intended for more-severe applications with pressure limits up to 290 bar (4200 psig), except for 9.5 mm (3/8 inch) stem size, which is restricted to 110 bar (1600 psig). If your application exceeds these limits, consult your Emerson sales office or Local Business Partner. For ratings on packing systems, refer to 59.1:062 Packing Selection Guidelines For Sliding Stem Valves (D101986X012). However, do not exceed the pressure/temperature limits of the valve. If the piping and valve are insulated, do not allow insulation to extend above the yoke boss surface, covering the HIGH-SEAL ULF packing arrangement. Keep the HIGH-SEAL ULF packing arrangement exposed to ambient air conditions.

Table 1. Packing Friction with HIGH-SEAL Graphite ULF Packing

VALVE STEM DIAMETER		HIGH-SEAL GRAPHITE ULF PACKING
mm	Inches	
Newtons		
9.5	3/8	935
12.7	1/2	1250
15.9	5/8	1680
19.1	3/4	2350
25.4	1	3740
31.8	1-1/4	4800
50.8	2	6000
Pounds (Force)		
9.5	3/8	210
12.7	1/2	230
15.9	5/8	380
19.1	3/4	530
25.4	1	840
31.8	1-1/4	1100
50.8	2	1350

The flange, Belleville springs, stud bolts and nuts, packing follower, and packing arrangement are an integral part of the HIGH-SEAL ULF system (see figure 6). For maximum packing life and to operate within the friction specified in table 1, do not interchange any other packing parts with the parts in the HIGH-SEAL ULF system.

⚠ WARNING

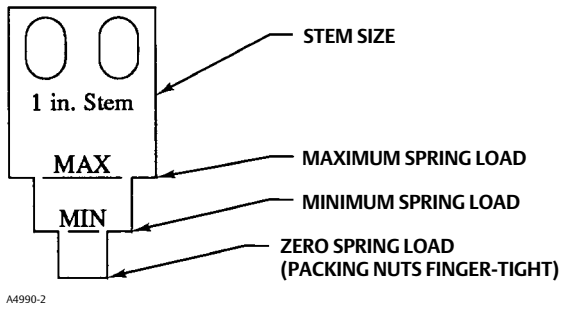
HIGH-SEAL ULF live-loaded packing systems are intended for a specific range of pressure, temperature and other service conditions. The valves for which these packing systems are available are also intended for a specific range of pressure, temperature and other service conditions. Do not expose the packing system or the valve to service conditions or variables other than those for which the packing system and valve are intended. If you are not sure what these conditions are, contact your Emerson sales office or Local Business Partner. Provide the product serial number (shown on the nameplate) and all other pertinent information. Applying different conditions could result in parts damage, malfunction of the valve or loss of control of the process, and could also result in personal injury or property damage.

Spring Selection

The Belleville springs for HIGH-SEAL ULF systems are rated by stem size (see table 1). Available materials for the Belleville springs are S17700 (17-7 PH stainless steel) and N07718.

It is important to match the appropriate load scale (see figure 2) to the stem size of the valve. Stem size is stamped on the load scale.

Figure 2. Typical Load Scale



Installation

HIGH-SEAL ULF packing systems are designed for quality performance over extended periods. This longevity allows packing maintenance to be performed as it should be, at regularly scheduled plant outages or turn-arounds.

⚠ WARNING

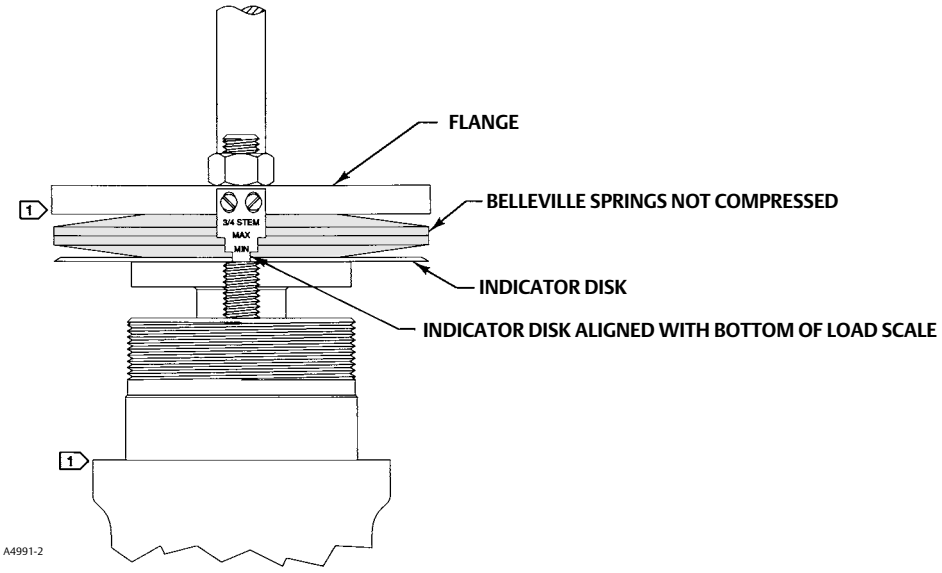
Avoid personal injury from sudden release of process pressure. Before performing any maintenance operations:

- **Do not remove the actuator from the valve while the valve is still pressurized.**
- **Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.**
- **Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.**
- **Vent the power actuator loading pressure and relieve any actuator spring precompression.**
- **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**
- **The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.**
- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

If the valve is in service, isolate the control valve from the line pressure, release pressure from both sides of the valve body, and drain the process media from both sides of the valve. If using a power actuator, also shut off all pressure lines to the power actuator and release all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment. Refer to instructions in the appropriate valve and actuator instruction manuals.

If you are installing the HIGH-SEAL ULF packing system in a valve that is still connected to an actuator, it will be necessary to disconnect the valve from the actuator to provide sufficient space to install the packing assembly. Refer to appropriate valve and actuator instruction manuals. Remove old packing parts from the packing box by using the valve instruction manual procedures.

Figure 3. HIGH-SEAL ULF Packing Assembly Showing the Load Properly Adjusted for Decompressed Springs



1 THESE TWO SURFACES MUST REMAIN PARALLEL AS YOU ALTERNATELY AND EVENLY TIGHTEN THE PACKING NUTS.

The valve stem condition is critical to packing sealing performance and life. As-new surface finish (0.1 µm [4 µin]R_a max) is recommended for best performance. Refer to the appropriate valve instruction manual for instructions on replacing the valve stem.

Check the condition of the packing bore after you have removed the packing. An easy method for cleaning debris and minor imperfections from the bore is to use a brake cylinder hone attached to an electric drill. This method will do a good job of cleaning the packing bore without changing the dimension of the bore.

Inspect the packing bore size and surface finish. If the packing bore is worn, pitted, damaged, or oversized more than 0.010 inch, replace the valve bonnet or have your Emerson Automation Solutions Service Center repair it.

Key number locations are shown in figure 6.

1. If a retrofit kit is being installed in place of the original packing, remove existing packing studs from the valve, and replace them with the longer studs (key 200).
2. Install the packing arrangement into the valve packing box.

Note

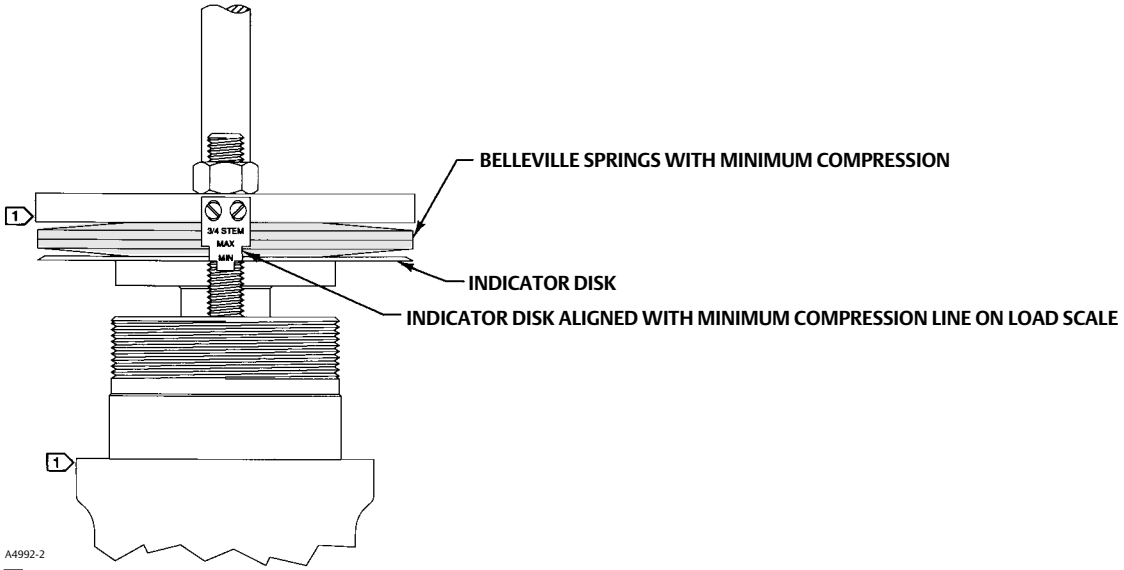
Be sure to install the packing rings in the sequence shown in figure 6. Identify parts by color or by the number stamped on the part.

- For valves with 9.5 mm (3/8 inch) valve stems, do not install the packing follower (key 203) at this time. (Note: the yoke boss will not slide over the packing follower. The packing follower must be installed while lowering the actuator yoke onto the valve.)

- For valves with 12.5 mm (1/2 inch) or larger stem diameters, install the packing follower (key 203).

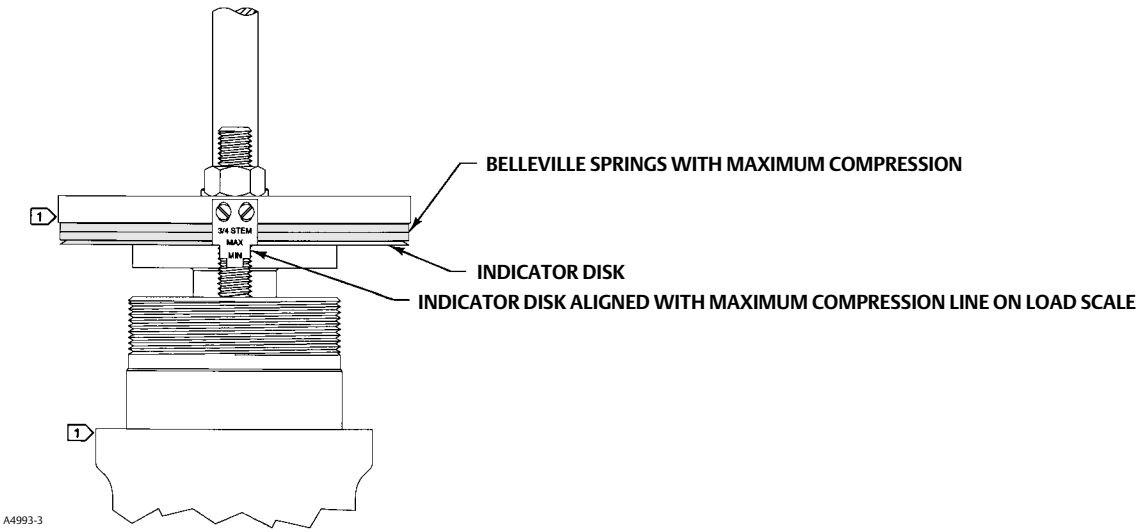
3. Refer to the appropriate valve and actuator instruction manuals when connecting the valve to the actuator. While lowering the actuator yoke onto the valve, install the packing follower [for a 9.5 mm (3/8 inch) valve stem size], indicator disk, springs, and flange (keys 203, 206, 202, and 201).

Figure 4. Load Scale Indicating Minimum Spring Compression



1 THESE TWO SURFACES MUST REMAIN PARALLEL AS YOU ALTERNATELY AND EVENLY TIGHTEN THE PACKING NUTS.

Figure 5. Load Scale Indicating Maximum Spring Compression



1 THESE TWO SURFACES MUST REMAIN PARALLEL AS YOU ALTERNATELY AND EVENLY TIGHTEN THE PACKING NUTS.

4. Place the packing follower against the packing as shown in figure 6.
5. Place the indicator disk (key 206) and the first Belleville spring (key 202) while guiding them onto the packing follower (key 203). Make certain the cone-shaped side of the Belleville spring is towards the indicator disk as shown in figure 3.
6. Place the second Belleville spring (key 202) with the coned-shaped side toward the flange (key 201); see figure 3. Position the flange on top of the spring, making sure the second spring fits into its guide in the flange.

CAUTION

Keep the packing follower and flange centered on the valve stem. If any metal part makes contact with the stem, it can cause damage to the stem surface. Vertical scratches or nicks on the stem surface can cause excessive leakage from the packing.

7. Lubricate the packing nuts with anti-seize lubricant and tighten them hand-tight.
8. The load scale (figure 2) is used to indicate compression on the Belleville springs. Position the load scale (key 205) by slightly loosening the mounting screws (key 204). Align the bottom edge of the load scale with the indicator disk and retighten the screws. Figure 3 illustrates the load scale properly adjusted before the nuts have been tightened and with the Belleville springs not compressed.
9. Tighten the packing nuts while observing the two load scales (key 205) to make sure the flange (key 201) is tightened evenly. Figure 4 indicates minimum spring compression with the indicator disk aligned with the minimum compression line on the load scale. Be sure to keep the follower centered on the stem while tightening the nuts. Tighten the nuts alternately and evenly, keeping the flange parallel with the valve (see figures 4 and 5), until the indicator disk aligns with the maximum compression line on the load scales, as shown in figure 5.
10. The packing is now properly loaded and the packing nuts do not need to be retightened unless the indicator begins to approach the minimum compression line (see figure 4). After the valve has been in service for awhile, visually check the load scale to determine loading. Under normal conditions, the packing nuts should not require retightening for the life of the packing.

Parts Ordering

Each valve assembly is assigned a serial number that can be found on the valve. This same number also appears on the actuator nameplate when the valve is shipped from the factory as part of a control valve assembly. Refer to the serial number when contacting your Emerson sales office or Local Business Partner for technical assistance. When ordering replacement parts, refer to the serial number and to the 11-character part number for each part required from the following parts list.

⚠ WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson Automation Solutions should not, under any circumstances, be used in any Fisher valve, because they may void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.

Retrofit Parts

Retrofit parts meet requirements to convert existing Fisher A, CAV4, E, EH, HP, YD, and YS valves to the HIGH-SEAL ULF packing box construction.

⚠ WARNING

Stems and packing box constructions that do not meet Emerson Automation Solutions stem finish specifications, dimensional tolerances, and design specifications may adversely alter the performance of this packing retrofit, resulting in personal injury or property damage.

HIGH-SEAL Retrofit Kits

STEM SIZE DIAMETER, mm (Inch)	YOKE BOSS DIAMETER, mm (Inch)	RETROFIT KITS	
		S17700 Springs	N07718 Springs
9.5 (3/8)	54 (2-1/8)	RPACKXRT312	RPACKXRT322
12.7 (1/2)	71 (2-13/16)	RPACKXRT332	RPACKXRT342
19.1 (3/4)	90 (3-9/16)	RPACKXRT352	RPACKXRT362
25.4 (1)	127 (5)	RPACKXRT372	RPACKXRT382
31.8 (1-1/4)	127 (5, 5H)	RPACKXRT392	RPACKXRT402
50.8 (2)	177.8 (7)	Consult your Emerson sales office or Local Business Partner(1)	

1. The 50.8 mm (2-inch) stem will typically require a longer actuator yoke to clear the HIGH-SEAL packing studs (key 200).

Parts Included in Retrofit Kits

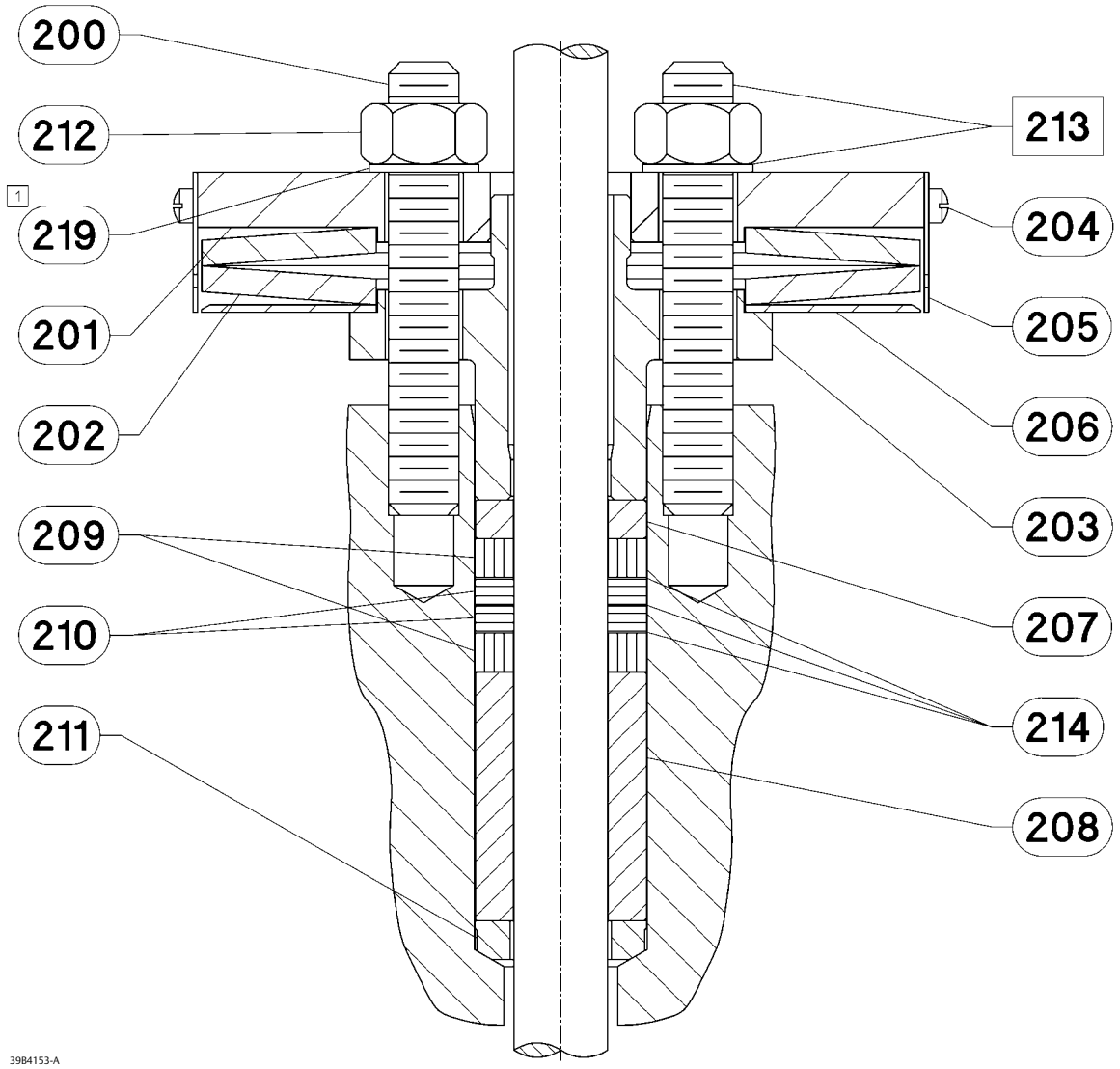
KEY NUMBER	DESCRIPTION	QUANTITY	
		For 9.5, 12.7, 19.2, 25.4, & 31.8 mm Stems (3/8, 1/2, 3/4, 1, & 1-1/4 Inch Stems)	For 50.8 mm Stems (2-Inch Stems)
		ULF	
200	Packing Stud	2	3
201	Packing Flange	1	1
202	Belleville Spring	2	2
203	Packing Follower	1	1
204	Screw	4	6
205	Load Scale	2	3
206	Indicator Disk	1	1
207	Bushing	1	1
208	Bushing	1	1
209	Packing Ring	2	2
210	Packing Ring	2	2
211	Packing Box Ring	1	1
212	Packing Nut	2	3
214	Packing Washer	3	3
219	Washer (not required on 9.5 mm [3/8 inch] stem)	2	3

Parts List

Note
Part numbers are shown for recommended spares only. For part numbers not shown, contact your Emerson sales office or Local Business Partner.

Key	Description	Part Number
200	Stud	
201	Flange	
202	Spring	See Spring Identification and Dimensions table
203	Packing Follower	
204	Screw	
205	Load Scale	
206	Indicator Disk	
207*	Bushing	See following table
208*	Bushing	See following table
209*	Packing Ring	See following table
210*	Packing Ring	See following table
211*	Packing Box Ring	See following table
212	Nut	
213	Anti-seize lubricant (not furnished with unit) (not shown)	
214*	Packing Washer	See following table
219	Washer	

Figure 6. HIGH-SEAL Graphite ULF Packing Assembly



1. FIND NUMBER 219 NOT REQUIRED WITH 3/8 INCH STEM

For 9.5, 12.7 and 19.1 mm (3/8, 1/2 and 3/4 Inch) Stems with ULF Packing

KEY NO.	QTY	DESCRIPTION	MATERIAL	PART NUMBER		
				9.5 mm (3/8 inch) Stem, 54 mm (2-1/8 inch) Yoke Boss	12.7 mm (1/2 inch) Stem, 71 mm (2-13/16 Inch) Yoke Boss	19.1 mm (3/4 Inch) Stem, 90 mm (3-9/16 Inch) Yoke Boss
207*	1	Bushing	Carbon	12B5780X012	12B5782X012	12B5784X012
208*	1	Bushing	Carbon	19B2882X012	19B2883X012	19B2889X012
209*	2	Packing ring	Carbon/graphite composite	12B5798X012	12B5799X012	12B5800X012
210*	2	Packing ring (packing ribbon)	Graphite/zinc	14B7519X012	14B7498X012	14B7520X012
211*	1	Packing box ring	S31600	12B5774X012	12B5775X012	12B5776X012
214*	3	Packing washer	PTFE	12B6936X012	12B6937X012	12B6938X012

*Recommended spare part.

Spring Identification and Dimensions

SPRING	SPRING DIMENSIONS											
	Valve Stem Diameter		Valve Stem Diameter		Valve Stem Diameter		Valve Stem Diameter		Valve Stem Diameter		Valve Stem Diameter	
	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches
	9.5	3/8	12.7	1/2	19.1	3/4	25.4	1	31.8	1-1/4	50.8	2
Inside Dia	47.6	1.875	60.3	2.375	74.6	2.938	96.8	3.813	103.2	4.063	138	5.438
Outside Dia	98.4	3.875	111.1	4.375	146.1	5.75	206.4	8.125	206.4	8.125	225	8.875
Thickness	2.4	0.094	4.0	0.156	5.2	0.203	6.7	0.266	7.1	0.281	8.3	0.328

For 25.4, 38.1, and 50.8 mm (1, 1-1/4 and 2-inch) Stems with ULF Packing

KEY NO.	QTY		DESCRIPTION	MATERIAL	PART NUMBER		
	For 25.4 & 38.1 mm (1 & 1-1/4 Inch) Stems	For 50.8 mm (2 Inch) Stems			25.4 mm (1-inch) Stem, 127 mm (5-Inch) Yoke Boss	31.8 mm (1-1/4 Inch) Stem, 127 mm (5-Inch) Yoke Boss	50.8 mm (2-Inch) Stem, 178 mm (7-Inch) Yoke Boss
207*	1	1	Bushing (black w/white color code)	Carbon	12B5786X012	12B5788X012	12B5790X012
208*	1	1	Bushing (black)	Carbon	19B2891X012	19B4141X012	19B4143X012
209*	2	2	Packing ring	Carbon/graphite composite	12B5801X012	12B5802X012	12B5803X012
210*	2	2	Packing ring (packing ribbon)	Graphite/zinc	14B7521X012	14B7522X012	17B3077X012
211*	1	1	Packing box ring	S31600	12B5777X012	12B5778X012	12B5779X012
214*	3	3	Packing washer	PTFE	12B6939X012	12B6940X012	19B4144X012

*Recommended spare part.

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