
85 Series Installation and Maintenance Guide



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1. Warranty

Spirax Sarco warrants, subject to the conditions described below, to repair and replace without charge, including labor costs, any components which fail within 1 year of product delivery to the customer. Such failure must have occurred because of defect in material or manufacturing and not as a result of product not being used in accordance with the instructions of this manual.

This warranty does not apply to products which require repair or replacement due to normal wear out or products that are subject to accident, misuse or improper maintenance.

Spirax Sarco Hiter only obligation with Warranty is to repair or replace any product that we consider defective. Spirax Sarco Hiter reserves the right to inspect the product in customer installations or request the return of the product with freight prepaid by the buyer.

Spirax Sarco Hiter may replace or repair any parts that are deemed defective without further responsibilities. All repairs or services executed by Spirax Sarco Hiter, which are not covered by this warranty, will be charged according to the current price list.

THIS IS THE ONLY SPIRAX SARCO HITER WARRANTY TERM AND ONLY HEREBY SPIRAX SARCO HITER EXPRESS.BUYER DISCLAIMS ALL OTHER WARRANTIES IMPLIED BY LAW, INCLUDING ANY MARKET WARRANTY FOR A PARTICULAR PURPOSE.

— 2. *General Safety Information* —

Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider; flammable materials, substances hazardous to health, extremes of temperature.

Hazardous environment around the product

Consider; explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk? Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure.

Consider double isolation (double block and bleed) and the locking or labeling of closed valves. Do not assume that the system has depressurized even when the pressure gauge indicates zero.

Temperature

Allow time for temperature to normalize after isolation to avoid danger of burns.

Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco Hiter replacement parts.

Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco Hiter replacement parts.

Protective clothing

Consider whether any protective clothing required by yourself and / or others in the vicinity to protect against the hazards of, for example, chemicals, high / low temperature, noise, falling objects, and dangers to eyes and face.

Permits to work

All work must be carried out or be supervised by a suitably competent person. Post 'warning notices' if necessary.

Electrical works

Before starting work study the wiring diagram and wiring instructions, and check any special requirements. Consider special emphasis on primary and phase source, local isolation of the major systems, fuse requirements, grounding, special cables, cable entries and electrical voltage selection.

Commissioning

After installation or maintenance, ensure that the system is working properly. Perform tests on all alarms and protective devices.

Storage

Equipment and materials shall be stored in a proper place and securely.

Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

3. Introduction

The 85 Series check valve, which is considered a high-quality valve, provides excellent sensitivity, fine control and easy adjustment, with very-reduced weight and size. For continued reliability and valve performance, only original spare parts from Spirax Sarco Hiter Hiter should be used for the maintenance of this product.

4. Installation

4.1 The valve is inspected and shipped in a special packing with protection covers in the body openings. However, a carefully inspection should be performed in order to ensure there is no damage an

4.2 Several valves are damaged when they are firstly in service due to the lack of a proper and complete internal cleaning of piping before the installation. Make a complete internal cleaning in the system lines and also inside the valve, aiming to remove rust, dust, welding debris and other debris.

4.3 In case of small bores valves, such as low-noise or anti-cavitation cages, it is recommended that a suitable strainer be installed upstream of the control valve in order to prevent debris from either blocking or damaging the valve internals.

4.4 Connecting pipe flanges must be perfectly aligned. Any misalignment may cause installation problems and seriously compromise the equipment performance due to abnormal stresses appearing.

4.5 Be sure the flange face has no imperfections, sharp edges or burrs.

4.6 During the installation the actuator must be positioned on the valve and in vertical position (figure1). If possible, look for a position closer the vertical one. The horizontal position should be avoided and, in some cases, there should be a support to the actuator.

4.7 Install the valve obeying the flow direction indicated by the arrow in the body.

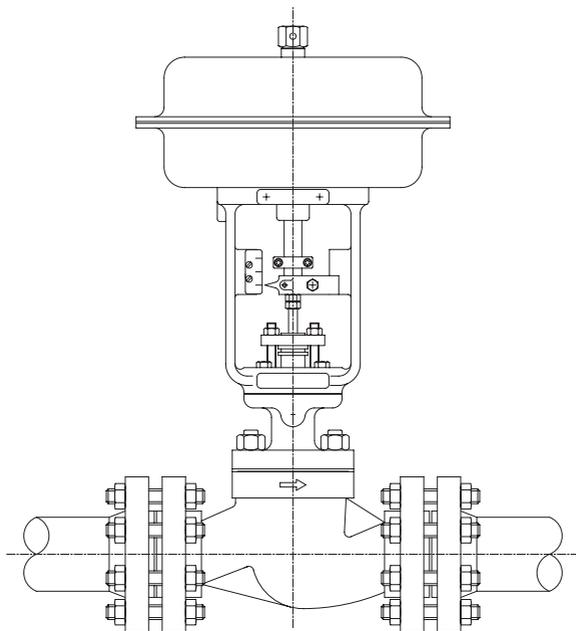


Fig. 1 - Valve installation

4.8 For flanged valves, use a proper gasket between the valves and piping flanges.

4.9 For loose flange valves, check if the two-pieces rings are installed in the body, before mounting on piping.

4.10 Insert the studs and tighten the nuts alternately in a diametrically crossed sequence. The full torque values must not be applied to one nut at a time. A crossed sequence should be repeated several times, increasing the stud-bolt torque in a gradual and uniform manner, until the recommended value is reached (table 2 – page 14).

4.11 For valves welded into piping, with internal elastomers, the removal of all inner components is recommended before welding. If the valve body material requires post-welding heat treatment, the internal parts also must be removed to avoid damage.

4.12 The straight piping length upstream the valve must be in accordance with the valve installation standards or recommendations.

4.13 For extended bonnet valves, do not insulate the bonnet. This will prevent the extended bonnet from protecting the gland packing. Only insulate the valve body.

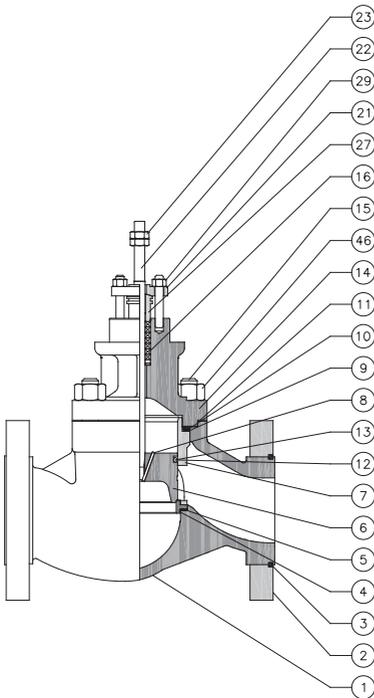


Fig. 2 - 85 Series with loose flanges

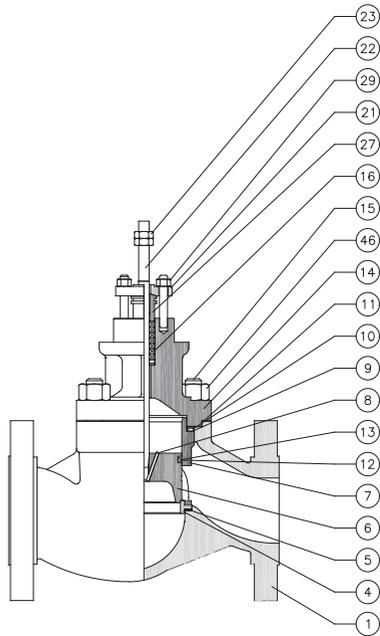


Fig. 3 - 85 Series with integral flanges

Table 1 - Parts List

Item	Description	Item	Description	Item	Description
1	Body	13 ●	Seal Ring	35	Bellows Set
2	Flange	14	Bonnet	36 ●	Bonnet Nut
3 ●	Split Ring	15	Body Stud	37	Bonnet Gasket
4 ●	Seat	16	Packing Spring (2)	38 ●	Bonnet Stud
5 ●	Seat Gasket	17 ●	Packing	39	PIN
6 ●	Plug	21	Packing Flange	40	Seat Adapter
7	Cage	22 ●	Stem	41	Adapter Gasket
8 ●	PIN	23	Stem Nut	42 ●	Cage Adapter
9 ●	Cage Gasket	27	Packing Follower	45 ●	Bush Guide
10 ●	Spiral Woung Gasket	28	Packing Stud	46	Bony Nut
11	Body Gasket	29	Packing Nut		
12	Back-up Ring (1)	34	Bellows Housing		

(1) Used only for PTFE seal ring.

(2) Used only for V-shaped PTFE packings.

● Recommended spare parts.

4.14 In continuous operation units, the installation should include isolation and by-pass systems, with of three manual valves.

4.15 Be careful to not install the valve in a system whose pressure and temperature values are not outside of the valve classes. When a valve is manufactured the internal component materials are selected for a specific service condition. So, do not apply the valve in a more critical service without firstly consulting Spirax Sarco Hiter.

4.16 The valves must be installed in an easy maintenance place, with space for the actuator removal and the internal parts disassembly.

4.17 Consult the Actuator Installation and Maintenance Manual for installation and the respective adjustments.

5. Maintenance

WARNING

For personnel safety and to avoid damage to the system, before starting the maintenance or removal from the line, ensure that the valve is correctly isolated and that all pressure has been vented from the line.

On the disassembly procedure description, our reference shall be the figures 2 and 3, except when indicated.

5.1 Disassembly

Types: 85-01, 85-11, 85-20, 85-21, 85-51, 85-61, 85-70, 85-71

5.1.1 Separate the actuator from the valve, according to the disassembly procedure described in the Actuator Installation and Maintenance Manual.

5.1.2 Remove the stem nuts (23), the packing flange nuts (21) e the packing follower (27).

5.1.3 Remove the nuts (46) and the bonnet (14). Be careful not to damage the packing (17) when the stem thread (22) passes by them.

5.1.4 Remove the plug (6) with the stem (22).

5.1.5 The 85-01, 85-11, 85-51 and 85-61 valves have a seal ring (13) in the plug (6). Depending on the construction the seal-ring types are: O-ring PTFE strip or a two-piece graphite ring.

5.1.6 If necessary, remove the stem (22) from the plug (6) and also remove the pin (8). The stem (22) should only be removed from the plug (6) in case of replacement. In case of plug (6) replacement, a new stem (22) should be installed.

WARNING

For personnel safety and to avoid damage to the system, before starting the maintenance or removal from the line, ensure that the valve is correctly isolated and that all pressure has been vented from the line.

5.1.7 Remove the body gasket (11). For reduced bore (Figure 4), remove the cage adapter (42).

5.1.8 Remove the cage (7) with the spiral wound (10) and the cage gasket (9).

5.1.9 Remove the seat (4) and the seat gasket (5). In case of soft seal (figure 5) the seat is compounded of superior seat (4.3), seat ring (4.2) and inferior seat (4.1).

5.1.10 For reduced bore (figure 4), remove the seat adapter (41) and the seat adapter gasket (40).

5.1.11 Remove the packings (17) and other bonnet internal components.

5.1.12 If the body with loose flanges removal is need, grind the punched point in the body (1) at flange back (2) and slide the flange (2) towards the body (1) to release the two-pieces rings (3).

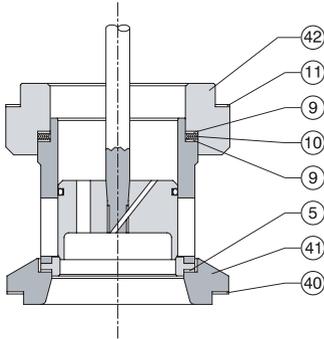


Fig. 4 - Reduced bore

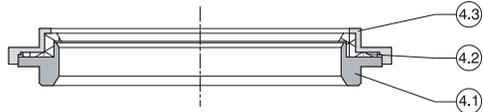


Fig. 5 - Soft seal

5.2 Bellows Seal Valves

For bellows seal valves (figure 6), replace the 3-6 steps of the above procedure for the following ones:

- Remove the nuts (36) and studs (38). Remove the bonnet (14). Be careful to not damage the packings (17) when the stem threads (22) pass by them.
- Unscrew the stem (22) of the sealing set (35).
- Remove the bonnet nuts (46) and the set compounded by the bellows housing (34) with the bellows set (35) and plug (6).
- The 85-01, 85-11, 85-51 and 85-61 valves have a seal ring (13) in the plug (6). Depending on the construction, the other seal ring types are: O-ring, PTFE strip or a two-piece graphite ring.
- If the bellows set removal is need
- If the bellows set (35) removal from the plug (6) is needed, remove the pin (8). In case of plug replacement (6), a new sealing set (35) should be installed.

WARNING

Never install a new plug (6) on a used sealing set. The plug installation requires a new bore for pin and, if the sealing set stem already has a bore, the threads shall be weakened.

In order to continue the disassembly go back to step 5.1.7 above page 8.

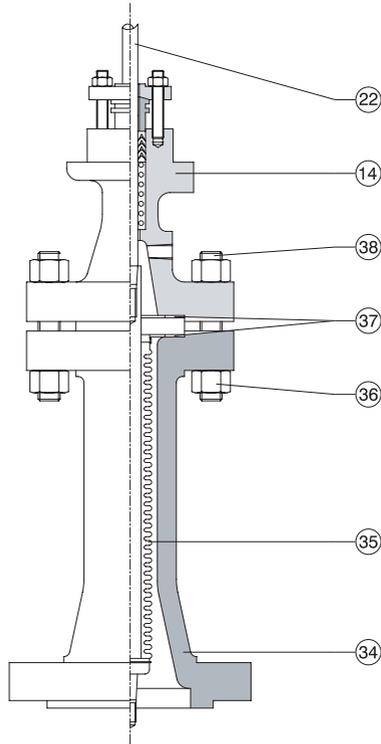


Fig. 6 - Bonnet with bellows seals

In order to continue the disassembly go back to step 5.1.7 above page 8.

Types: 85-02, 85-08, 85-12, 85-18, 85-52, 85-58, 85-62, 85-68

5.2.1 Separate the actuator from the valve, according to the disassembly procedure described in the Actuator Installation and Maintenance Manual.

5.2.2 Remove the stem nuts (23), the packing flange nuts (21) and the packing follower (27).

5.2.3 Remove the nuts (46) and the bonnet (14). Be careful not to damage the packing (17) when the stem thread (22) passes by them.

5.1.4 Pull the plug (6) out of the body, together with the stem (22), seat retainer (7) (figure 7), body gasket (11), spiral wound (10) and seat retainer gasket (9). Note: In some plug configurations, the seat and gasket retainer come out from the body with the plug and in other configurations, the plug shall pass by the seat retainer bush, leaving the retainer and the gasket stay in the valve body.

5.2.5 If necessary, remove the stem (22) from the plug (6) and also remove the pin (8). The stem (22) should only be removed from the plug (6) in case of replacement. In case of plug (6) replacement, a new stem (22) should be installed.

5.2.6 Do not remove the guide bush (45) from the seat retainer (7) (figure 7) if the replacement is not necessary. The guide bush is pressed in the seat retainer

5.2.7 Remove the seat (4) and the seat gasket (5). In case of soft seal (figure 5) the seat is compounded of superior seat (4.3), seat ring (4.2) and inferior seat (4.1) (figure 5).

5.2.8 Remove the packings (17) and other bonnet internal components.

5.2.9 If the body with loose flanges removal is needed, grind the punched point in the body (1) at flange back (2) and slide the flange (2) towards the body (1) to release the split ring (3).

5.3 Bellows Seal Valves

For those bellow seal valves (figure 6), replace steps 3-5 from the above procedure by the following steps:

- Remove the nuts (36) and the studs (38). Remove the bonnet (14). Be careful not to damage the packings (17) when the stem threads (22) pass by them.
- Unscrew the stem (22) of the sealing set (35) stem.
- Remove the nuts (46) from the housing (34) and remove the set formed by the sealing subset housing (34) with the bellows set (35) and plug (6). In some internal parts construction type this set includes the seat retainer (7) (figure 7).
- If the seat (7) retainer (figure 7) stayed in the valve body, pull it together with the body gasket (11), spiral wound (10) and seat retainer gasket (9).
- If required, separate the bellows set (35) from plug (6), remove the pin (8) and unscrew the plug (6).
- If the seat retainer leaves together with the bellows set, remove the pin (8) and unscrew the plug (6), releasing the seat retainer (7) (figure 7), body gasket (11), spiral wound (10) and seat retainer gasket (9).
- In case of the plug replacement (6), a new sealing set (35) must be installed.

WARNING

Never install a new plug (6) on a used sealing set. The plug installation requires a new bore for pin and, if the sealing set stem already has a bore, the threads shall be weakened.

To continue the disassembly, come back to step 6 above.

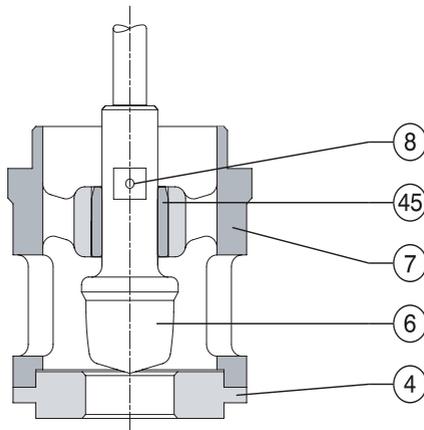


Fig. 7 - Bores - Types : 85-02, 85-08, 85-12, 85-62

5.4 Cleaning, Inspection and Repair

All valve metallic parts must be cleaned using solvent and dried with compressed air after inspection. All parts must be kept clean and very well protected up to the assembly. Corrosion inhibitor can be used to protect component parts, but the selection and use of these products must be determined by the process in which the valve will operate. If there is a damage that can not be resolved by parts replacement and/or corrective actions, the valve should be returned properly assembled to for **Spirax Sarco Hiter** general revision.

5.4.1 Inspect the sealing surfaces (seat areas). Deep scratches or other imperfections on this area may compromise the valve sealing, damaging the seat. They only can be eliminated through the surface rectifying.

5.4.2 Normally it is not possible to get total sealing in metal-to-metal sealing valves. However, the leakage caused by small grooves or imperfections of the surfaces can be reduced by lapping the plug and seat. For heavier damage, the seat must be machined or replaced with a genuine spare part available from Spirax Sarco Hiter

5.4.3 For lapping of plug and seat, a proper paste with 600 grit is the maximum recommended for use.

5.4.4 Final polishing/lapping with a proper compound/abrasive should be used for applications where shut off is critical.

5.4.5 To help the plug alignment (6) to the seat (4) and also to position the cage (7), assemble the bonnet on body and the respective gaskets. For plug with seal ring (13), it should not be installed.

5.4.7 After operation, remove the bonnet, clean the seating surfaces and make a seal testing. If need, repeat the operation.

5.5 Assembly

Types: 85-01, 85-11, 85-20, 85-21, 85-51, 85-61, 85-70; 85-71

In the assembly procedure description our references shall be the figures 2 and 3, except when adversely recommended.

5.5.1 When reassembling the valve, use only new gaskets and clean the bore surfaces which shall contact them.

5.5.2 For bore valves (figure 4), install the seat adapter gasket (40) and the seat adapter (41).

5.5.3 Install the seat gasket (5) and seat (4) or, for soft seal valve (figure 5), the inferior seat (4.1), seat ring (4.2) and superior seat (4.3).

5.5.4 Assemble the cage (7) on the body (1). Be sure the cage is properly assembled on the seat. Any cage rotary position regarding the body is acceptable.

5.5.5 Put the cage gasket (9), spiral wound (10) and body gasket (11) on the cage. For bore valve (figure 4), put the cage gasket (9), spiral wound (10) and another cage gasket (9) on the cage. Assemble the cage adapter (42) and put the body gasket (11) on the cage adapter.

5.5.6 Replace the seal ring (13), if there is visible damage. Take care not to scratch the seal ring surfaces (13) or the ring housing channel in the plug (6). If this instruction is not followed, it is impossible to attain proper sealing. For seal ring in PTFE, firstly install the metallic lamina (12). The 85-20, 85-21, 85-70 and 85-71 valves do not have seal ring.

5.5.7 In case of stem replacement, screw the new stem (16) in the plug (6) until the thread end. It should be really tightened. Make another bore for the pin (8) through the plug (6) and the stem (22) using the plug bore (6) as a guide. Install a new pin (8) and lock it.

WARNING

Never install a new plug (6) on a used stem. The plug installation requires a new bore for pin and, if the stem already has a bore, the threads shall be weakened. However a used plug may be assembled with a new stem.

5.5.8 Enter the plug set (6) and the stem (22) in the cage (7). Be careful in case of plugs with seal ring (13), once it shall be damaged if it is not in perfect alignment to the bevel at the cage (7) superior entrance.

5.5.9 Assemble the bonnet (14) on the body (1). Tight the nuts (46) using the torques showed in Table 2 as reference for cleaned threads. Tight the nuts alternately in a crossed diametrically sequence.

TABLE 2 - ORIENTATIVE TORQUE FOR ASSEMBLY

Thread (in)	MATERIAL - SCREWS / STUDS / NUTS											
	Torque for Carbon Steel						Torque for Stainless Steel					
	lbf.ft		N.m		lbf.in		lbf.ft		N.m		lbf.in	
	Min	Máx	Min	Máx	Min	Máx	Min	Máx	Min	Máx	Min	Máx
1/4"	4	5	6	7	53	65	1	1	2	2	15	16
5/16"	9	11	12	15	109	134	3	3	4	4	31	32
3/8"	16	20	22	27	193	238	5	5	6	6	55	57
7/16"	26	32	35	43	309	380	7	8	10	10	88	91
1/2"	39	48	53	66	471	580	11	12	15	16	135	139
9/16"	57	70	77	95	679	836	16	17	22	23	194	200
5/8"	78	96	106	130	937	1154	22	23	30	31	268	277
3/4"	139	171	188	232	1665	2050	40	41	54	55	476	491
7/8"	223	275	303	373	2681	3302	64	66	87	89	766	791
1"	335	413	454	559	4020	4951	96	99	130	134	1148	1186
1.1/8"	492	606	667	821	5901	7268	141	145	190	197	1686	1741
1.1/4"	691	851	937	1154	8293	10214	197	204	268	276	2369	2446
1.3/8"	938	1155	1272	1566	11255	13863	268	277	363	375	3216	3320
1.1/2"	1237	1524	1678	2066	14850	18290	354	365	479	495	4243	4381
1.5/8"	1595	1964	2162	2663	19138	23571	456	470	618	638	5468	5646
1.3/4"	2015	2482	2732	3365	24180	29782	576	594	781	806	6909	7133
1.7/8"-8UN	2503	3083	3394	4180	30038	36997	715	738	970	1001	8582	8861
2"-8UN	3064	3774	4155	5117	36772	45291	876	904	1187	1226	10506	10848
2.1/4"-8UN	3198	3939	4336	5341	38379	47270	914	943	1239	1279	10965	11322
2.3/4"-8UN	4426	5452	6001	7391	53114	65419	1265	1306	1715	1770	15175	15669
3"-8UN	7465	9199	10121	12472	89575	110389	2357	2434	3196	3300	28287	29206

Note: The values above mentioned are considering lubricated fasteners by graphite-based grease (NEVER SEEZ PURE NICKEL SPECIAL or equivalent).

TABLE 3 - ORIENTATIVE TORQUE FOR PACKINGS

Stem Ø (in)	Packing Type	Torque		
		lbf.ft	N.m	lbf.in
3/8"	PTFE (TP)	3	4	35
	Graphite (GG)	5	7	62
1/2"	PTFE (TP)	7	10	89
	Graphite (GG)	11	15	133
3/4"	PTFE (TP)	18	25	221
	Graphite (GG)	22	30	266
1"	PTFE (TP)	30	40	354
	Graphite (GG)	48	65	575
1.1/2"	PTFE (TP)	50	68	602
	Graphite (GG)	59	80	708

Note: The values above mentioned are considering lubricated fasteners by graphite-based grease (NEVER SEEZ PURE NICKEL SPECIAL or equivalent).

ATTENTION

The spiral wound (10) must be compressed so that it is possible to load and seal the seat gasket (5). The tightening feature of the spiral wound should be performed so that the tightening of one nut does not jeopardize the adjacent nuts. Thus, several tightening are needed in the sequence previously mentioned until there are no moving nuts with the recommended torque. The tightening procedure also compresses the body gasket external part (11) to seal the junction between body (1) and bonnet (14). The torque procedure must be repeated in the field when the valve reaches the operational temperature.

5.5.10 Clean carefully the stuffing box and the internal metallic components. Replace the packings and the other components.

5.2.11 Assemble the glands (27), the gland flange (21) and tighten the gland flange nuts (25) as per indicated torque values in Table 3.

5.5.12 When the assembly is over, replace the stem back nuts (23); assemble the actuator in the valve and remake the connection between the valve stem and the actuator stem. The instructions related to this step can be found in the Actuator Installation and Maintenance Manual.

5.6 Bellows Seal Valves

For those bellow seal valves (figure 6), replace steps 7-9 from the above procedure by the following steps:

- In case of the plug (6) and the sealing set (35) replacement, put a bonnet gasket (37) on the bellow housing (34). Enter the sealing set (35) in the housing (34) and thread the plug (6) in the sealing set (35) up to the thread end. It must be really tightened. Make a bore for the pin (8) through the plug (6) and the sealing set (35) using the current plug bore (6) as a guide. Install a new pin (8) and lock it.

WARNING

Never install a new plug (6) in a used stem sealing seat. The plug installation requires a new bore for pin and if the sealing set stem already has a bore, the threads will be lose. However, a used plug can be assembled on a new sealing set.

- Assemble the plug set (6), sealing set (35) and bellows housing (34) entering the plug (6) in the cage (7). Be careful in case of seal ring (13) plugs, once it shall be damaged if it is not perfectly aligned to the bevel of the cage (7) superior entrance.

- Tighten the body nuts (46) using as reference for clean threads, the torques showed in Table 1. Tighten the nuts alternately in a diametrically crossed sequence.

WARNING

The spiral wound (10) must be compressed so that it is possible to load and seal the seat gasket (5). The tightening feature of the spiral wound should be performed so that the tightening of one nut does not jeopardize the adjacent nuts. Thus, several tightening are need in the sequence previously mentioned until there are no moving nuts with the recommended torque. The tightening procedure also compresses the body gasket external part (11) to seal the junction between body (1) and bonnet (14). The torque procedure must be repeated in the field when the valve reaches the operational temperature.

- Screw the stem (22) in the sealing set (35).

- Place the bonnet gasket (37) on the bellow set (35). Assemble the bonnet (14) over the bellow housing (34). Tighten the nuts (36) and the studs (38) alternately in the adverse crossed sequence. As reference for clean threads, use the torques presented in table 1.

To continue the assembly go back to step 10 above.

Types: 85-02, 85-08, 85-12, 85-18, 85-52, 85-58, 85-62, 85-68

5.6.1 When reassembling the valve, use only new gaskets and clean the bore surfaces which shall contact them.

5.6.2 For bore valves (figure 4), install the seat adapter gasket (40) and the seat adapter (41).

5.6.3 Install the seat gasket (5) and seat (4) or, for soft seal valve (figure 5), the inferior seat (4.1), seat ring (4.2) and superior seat (4.3). (4.2) and superior seat (4.3).

5.6.4 In case of bush guide (45) replacement, press it at seat retainer (7).

5.6.5 In case of stem replacement, screw the new stem (16) in the plug (6) up to the thread end, so that it is very well tightened. Drill a new bore for the pin (8) through the plug (6) and the stem (22) using the bore existing in the plug (6) as a guide. Install a new pin (8) and lock it.

WARNING

Never install a new plug (6) in a used stem. The plug installation requires a new bore for pin and, if the stem has already a bore, the threads shall be weakened. However, a used plug can be mounted in a new stem.

5.6.6 In some configurations the plug (6) does not pass by the seat retainer (7) (figure 7). In this case pass the seat retainer (7) by the stem (22).

5.6.7 Assemble the seat retainer (7) or the set including the seat retainer (7) (figure 7) and the plug (6) with the stem (22) in the body (1). Be sure the seat retainer is properly mounted in the seat. Any rotary positional of the seat retainer regarding the body is acceptable.

5.6.8 Place the cage gasket (9), spiral wound (10) and body gasket (11) on the seat retainer. For reduced bore valve (figure 4), put the cage gasket (9), spiral wound (10) and other cage gasket (9) on the seat retainer, assemble the cage adapter (42) and put the body gasket (11) on the cage adapter.

5.6.9 Assemble the bonnet (14) in the body (1), tighten the nuts (46) using as reference, the torques showed in table 2 – page 14). Tighten the nuts alternately in a diametrically crossed sequence.

WARNING

The spiral wound (10) must be compressed so that it is possible to load and seal the seat gasket (5). The tightening feature of the spiral wound should be performed so that the tightening of one nut does not jeopardize the adjacent nuts. Thus, several tightening are need in the sequence previously mentioned until there are no moving nuts with the recommended torque. The tightening procedure also compresses the body gasket external part (11) to seal the junction between body (1) and bonnet (14). The torque procedure must be repeated in the field when the valve reaches the operational temperature.

5.6.10 Clean carefully the stuffing box and the internal metallic components. Replace the packings and the other components.

5.6.11 Assemble the packing (27), the packing flange (21) and tight the packing flange nuts (25) only the enough to eliminate the leakage.

5.6.12 When the assembly is complete, replace the stem nuts (23); assemble the actuator onto the valve and remake the connection between the valve stem and the actuator stem. The instructions related to this step can be found in the Actuator Installation and Maintenance Manual.

5.7 Bellows Seal Valves

For those bellow seal valves (figure 6), replace steps 5-9 from the above procedure by the following steps:

- In case of the plug (6) and the sealing set (35) replacement, put a bonnet gasket (37) on the bellow housing (34). Enter the sealing set (35) in the housing (34).
- In some configurations the plug (6) does not pass by the seat retainer bush (45) (figure 8). In this case, follow the procedure bellow:
- Put the plug (6) in the seat retainer guide bush (45) by the inferior side of the seat retainer (7) (figure 7).
- Place the cage gasket (9), spiral wound (10) and body gasket (11) on the seat retainer. For reduced bore valve (figure 4), put the cage gasket (9) on the seat retainer, assemble the cage adapter (42) and place the body gasket (11) on the cage adapter.
- - Screw the plug (6) in the sealing set (35) up to the end of the thread, so that it is very well tightened. Make a new bore for the pin (8) through the plug (6) and the sealing set (35) using the bore existing in the plug (6) as a guide. Install a new pin (8) and lock it.

WARNING

Never install a new plug (6) in a used stem sealing set. The plug installation requires a new bore for pin and, if the sealing set stem has already a bore, the threads will be weakened. However, a used plug can be mounted in a new sealing set.

- Assemble the set including seat retainer (7) (figure 7), plug (6), sealing set (35), bellow housing (34), gaskets and cage adapter (when applicable) on the body (1). Be sure the seat retainer is properly mounted on the seat. Any rotary position of the seat retainer regarding the body is acceptable. When the plug (6) passes by the seat retainer bush (45) (figure 7), the following procedure must be accomplished:
- Assemble the seat retainer (7) (figure 7) on the body (1). Be sure the seat retainer is properly mounted on the seat. Any rotary position of the seat retainer regarding the body is acceptable.
- Put the cage gasket (9), spiral wound (10) and body gasket (11) on the seat retainer. For reduced bore valve (Figure 4) put the cage gasket (9), spiral wound (10) and other cage gasket (9) on the seat retainer. Assemble the cage adapter (42) and put the body gasket (11) on the cage adapter.
- Screw the plug (6) in the sealing set (35) up to the thread end. Ensure it is very well tightened. Make a bore for the pin (8) through the plug (6) and the sealing set (35) using the current bore of the plug (6) as a guide. Install a new pin (8) and lock it.

WARNING

Never install a new plug (6) in a used stem sealing set. The plug installation requires a new bore for pin and, if the sealing set stem has already a bore, the threads will be loose. However, a used plug can be mounted in a new sealing set.

- Assemble the plug (6), sealing set (35) and housing (34) passing the plug (6) by the guide bush (45) (figure 7).
- Tighten the body nuts (46) using as reference, for clean threads, the torques presented in table 1 (page 6). Tighten the nuts alternately in a crossed diametrically crossed sequence.

ATTENTION

The spiral wound (10) must be compressed so that it is possible to load and seal the seat gasket (5). The tightening feature of the spiral wound should be performed so that the tightening of one nut does not jeopardize the adjacent nuts. Thus, several tightening are needed in the sequence previously mentioned until there are no moving nuts with the recommended torque. The tightening procedure also compresses the body gasket external part (11) to seal the junction between body (1) and bonnet (14). The torque procedure must be repeated in the field when the valve reaches the operational temperature.

- Screw the stem (22) in the sealing set (35).

- Place the bonnet gasket (37) on the bellow set (35). Assemble the bonnet (14) over the bellow housing (34). Tighten the nuts (36) and the studs (38) alternately in the adverse crossed sequence. As reference for clean threads, use the torques presented in table 1.

To continue the assembly go back to step 10 above.

6. Action of the Valve and Position by Failure

6.1 Due to the construction, the action of the valve and the safety position by failure in the 85 Series valves depends exclusively on the actuator. A straight action actuator shall supply a normally opened valve (air to close). An inverse action actuator shall supply a normally closed valve (air to open). For the valve action inversion, when the actuator has no wheel, an inverse assembly should be done, once the non-wheel actuators used at 85 Series are totally reversible.

6.2 The instructions for connection between the valve and the actuator are described in the Actuator Installation and Maintenance Manual.

6.3 When the assembly is over, replace the stem back nuts (23); assemble the actuator in the valve and remake the connection between the valve stem and the actuator stem. The instructions related to this step can be found in the Actuator Installation and Maintenance Manual. crossed sequence.

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