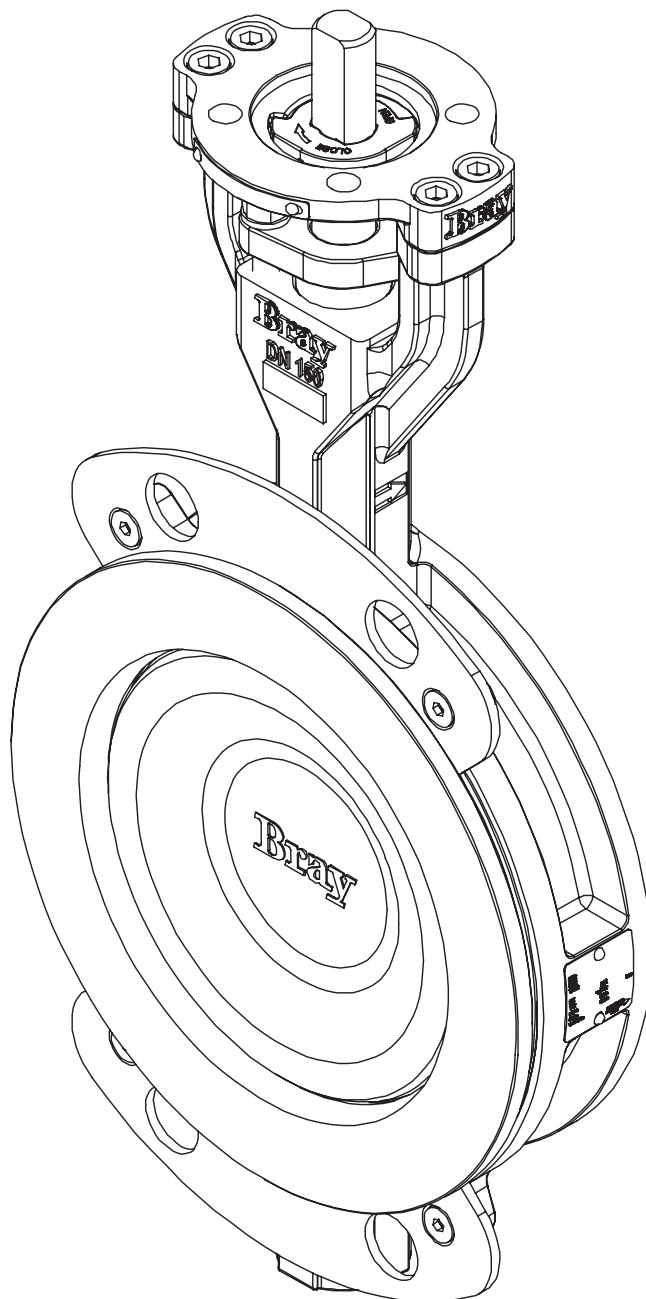


BRAY/MCCANNALOK EN

HIGH PERFORMANCE BUTTERFLY VALVE

Installation, Operation and Maintenance Manual



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READ AND FOLLOW THESE INSTRUCTIONS SAVE THESE INSTRUCTIONS

1.0 DEFINITION OF TERMS

 WARNING	indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	Used without the safety alert symbol indicates a potential situation which, if not avoided, may result in an undesirable result or state, including property damage.

2.0 INTRODUCTION

2.1 The Bray/McCannalok EN high performance butterfly valve combines the advantages of trunnion-type ball valves with the easy operation, light weight, and low cost of butterfly valves. One basic design is suitable for a wide range of services, including oxygen, chlorine, sour gas, vacuum, and steam applications.

2.3 Additional information about Bray/McCannalok EN butterfly valves - including application data, engineering specifications, and actuator selection is available from your Bray distributor or sales representative.

2.2 FEATURES INCLUDE:

- 2.2.1** Bubble tight shutoff provided throughout a wide range of operating conditions.
- 2.2.2** Suitable for both modulating and on/off services, the Bray/McCannalok EN butterfly valve is easily automated with your choice of manual operators, electric and pneumatic actuators, positioners, and controls.
- 2.2.3** External travel stop for preventing over-travel of disc in opening and closing.
- 2.2.4** Uninterrupted gasket sealing faces.
- 2.2.5** Extended neck body for providing pipe insulation clearance of 60mm.
- 2.2.6** Blind bottom body design up to DN 300.
- 2.2.7** Bearing seal for protecting bearings from particle ingress.

3.0 VALVE IDENTIFICATION

3.1 All Bray/McCannalok EN valves are provided with an identification tag with the following data printed on it:



- > **P/N:** Full part number of the valve assembly
- > **S/N:** Unique serial number of valve
- > **TAG:** Valve or instrument tag number provided by customer
- > **DN:** Valve size e.g. DN 150
- > **PN:** Pressure rating of mating flange
- > **TS:** Maximum permissible temperature in degree Celsius (°C)
- > **PS:** Maximum permissible pressure in bar(g) at room temperature.
- > **BODY:** Material grade of body/seat retainer e.g. 1.4408, 1.0619 etc.
- > **DISC:** Material grade of disc e.g. 1.4408
- > **STEM:** Material grade of stem e.g. 1.4542
- > **SEAT:** Material of seat e.g. R-PTFE
- > **SEAL:** Material of stem seal e.g. PTFE
- > **YEAR MFD:** Month and year of manufacture MM/YY

3.2 The valves are also provided with a tag plate on the actuator mounting flange with the following data printed on it:



- > **F<XX>:** Actuator mounting flange size as per ISO 5211 e.g. F07
- > **<Y>:** Breakaway torque in Nm at a differential pressure of 3.5 bar (air or nitrogen)
- > **<Z>:** Maximum allowable stem torque in Nm



4.0 INSTALLATION

4.1 The Bray/McCannalok EN valve is designed to be mounted between EN, DIN and JIS flanges. When the valve is open, the disc will extend into the pipe on both sides of the valve – further on the body side than the seat retainer side of the valve. Piping must be large enough to allow the disc to clear the pipe. **Table 1** shows the minimum pipe ID allowable.

Table 1: MINIMUM INSIDE DIAMETER OF PIPE WITH THE RECOMMENDED CLEARANCE

Valve Size	Minimum Pipe ID (mm)			
	PN 10	PN 16	PN 25	PN 40
DN 65	60.0	60.0	60.0	60.0
DN 80	74.5	74.5	74.5	74.5
DN 100	96.0	96.0	96.0	96.0
DN 125	124.5	124.5	124.5	124.5
DN 150	152.5	152.5	147.5	147.5
DN 200	203.0	203.0	196.5	196.5
DN 250	253.5	253.5	244.0	244.0
DN 300	303.5	303.5	290.5	290.5
DN 350	333.0	333.0	333.0	333.0
DN 400	376.5	376.5	376.5	376.5

 **CAUTION**

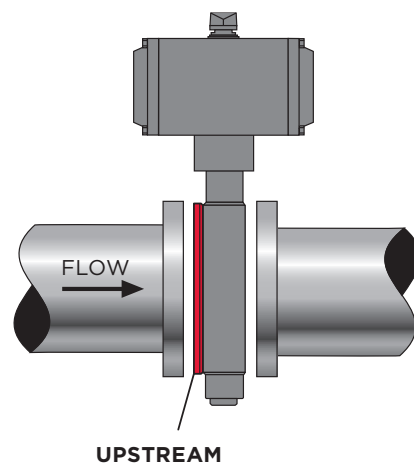
If handle or actuator has been removed do not rotate disc beyond full open or closed position – this could cause damage to sealing surfaces.

NOTE: Bray/McCannalok EN valves are equipped with external travel stops to prevent disc over-travel. The valve is opened by turning counter clockwise, closed by turning clockwise. The double “D” flats or keyway at the top of the stem is parallel to the disc edge.

NOTICE

For maximum service life, install the valve with the seat retainer upstream. Positive shutoff will be obtained with the valve in either position; however, installation with the seat retainer upstream will give longer service life, especially in erosive services.

- 4.2** With the disc in closed position, carefully center valve between flanges. Guide holes (wafer-type valve) or tapped holes (lug-type valves) to match pipe flanges and assist in positive alignment.
- 4.3** Flange gaskets are not generally included in the scope of supply of Bray/McCannalok EN valves. Flange gaskets should conform to EN1514-1 flat seal with form IBC or form FF.
- 4.4** The standard lug-type valve can be used in end of line service (downstream dismantling) only in one direction. The seat retainer side of the valve should be mounted upstream.



5.0 MAINTENANCE

- 5.1** Reasonable precautions should be taken before beginning work on the valve. Protective clothing, as required by the specific line fluid, should be worn.

WARNING

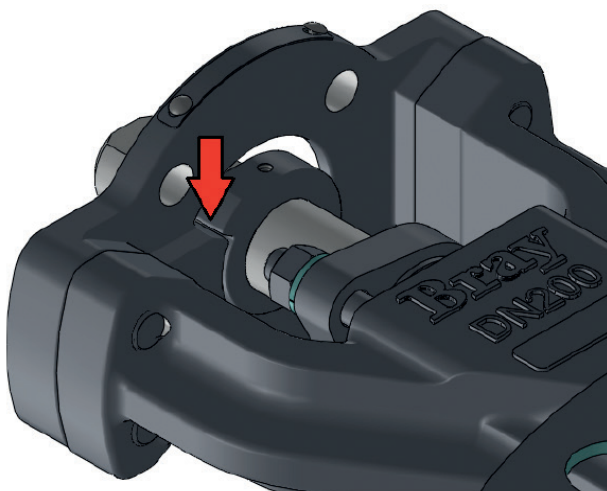
Before removing handle or the actuator from the valve, or before removing seat retainer from a valve in dead end service, close the valve and depressurise the line.

- 5.2** The eccentric design of the Bray/McCannalok EN may allow line pressure to open the valve if the handle/actuator is not in place while the valve is under pressure.

WARNING

Do not pressurise the line without an operator mounted on the valve.

- 5.3** The Bray/McCannalok EN valve must be in the closed position to be removed from the line.
- 5.4** External travel stop is not for disc positioning. Travel stop prevents over-travel of disc in opening and closing. If the disc movement is restricted by the travel stop, the disc has overtravelled.



WARNING

The stem is coupled to the external travel stop by which the disc over travel is prevented
The external travel stop may hit or come very close to the top plate surfaces at the end of open and closed positions. The impact of this force can be quite high depending on the actuator speed of operation. Keep hand or fingers away from the travel stop while the valve is in operation.

- 5.5** Begin all work on a valve that has been removed from the line by cleaning the valve, removing any grit or scale.

CAUTION

If handle or actuator has been removed do not rotate disc beyond full open or closed position - this could cause damage to sealing surfaces.

- 5.6** Replacement seats, seals and other parts are available from authorised distributors. Contact your distributor or sales representative for details of price and delivery.
- 5.7** When using a pipe whose ID is smaller than the recommended minimum inside diameter of pipe with adequate clearance, a chamfer of 45° should be provided on the end of the pipe so that it clears the disc.

6.0 STEM SEAL REPLACEMENT

NOTICE

Note assembly positions before removal.

- 6.1** Refer **Figure 1** (p.11) and **Figure 2** (p.12) for parts identification.
- 6.2** If required, remove operator.
Remove TOP PLATE SCREWS (220).
Remove TOP PLATE (210).
- 6.3** Remove TRAVEL STOP SCREW (240) and TRAVEL STOP (230).
- 6.4** Remove KEY (250) if applicable.
- 6.5** Remove GLAND NUTS (170) and LOCK WASHERS (180). Remove GLAND RETAINER (140), RETAINING RING (150) and GLAND RING (130).

NOTE: For valve sizes DN 350 through DN 400, remove the DISC SPRINGS (260) along with GLAND RING (130)

- 6.6** Hook out STEM SEALS (120). Do not remove WASHER (110), unless further valve disassembly is required.



CAUTION

During removal of the stem seals, care should be taken not to scratch stem or stuffing box bore.

- 6.7** Examine stuffing box bore and stem, clean as necessary to remove any corrosion or foreign matter before installing new seals.
- 6.8** Install new seals in stuffing box one at a time, TFE (white) seals first, with the carbon fiber ring at the top if applicable. Stagger seal ring joints 180° apart when installing. Tap each ring to bottom and compress the ring before installing next ring. Refer **Table 2** for total quantity of seal rings in each valve.

Table 2: TOTAL NUMBER OF STEM SEALS

Valve Size	PN 10	PN 16	PN 25	PN 40
DN 65	4	4	4	4
DN 80	4	4	4	4
DN 100	4	4	4	4
DN 125	4	4	4	4
DN 150	4	4	4	4
DN 200	5	5	5	5
DN 250	5	5	5	5
DN 300	5	5	5	5
DN 350	6	6	6	6
DN 400	6	6	6	6

- 6.9** Slide GLAND RING (130) over STEM (22) on top of STEM SEALS (120). Install RETAINING RING (150).
Slide GLAND RETAINER (140) over stem and onto GLAND STUDS (160).
Place LOCK WASHERS (180) and GLAND NUTS (170) on GLAND STUDS (160) and tighten finger tight. Tighten GLAND NUTS (170) evenly and alternately to the proper torque value given in **Table 3**.

Table 3: GLAND NUT TIGHTENING TORQUES

Valve Size	Tightening Torque (N-m)			
	Series 4D/4E	Series 4F/4G	Series 4H/4J	Series 4K/4L
	PN 10	PN 16	PN 25	PN 40
DN 65	7	7	7	7
DN 80	7	7	7	7
DN 100	7	7	7	7
DN 125	9	9	9	9
DN 150	9	9	11	11
DN 200	10	10	15	15
DN 250	16	16	18	18
DN 300	18	18	23	23
DN 350	29	29	29	29
DN 400	49	49	49	49

- 6.10** Install KEY (250) on STEM (22) if applicable.
- 6.11** Slide TRAVEL STOP (230) over STEM (22) and tighten TRAVEL STOP SCREW (240).
- 6.12** Install TOP PLATE (210) while ensuring the TRAVEL STOP (230) orientation is correct.
- 6.13** Tighten the TOP PLATE SCREWS (220) to torque value given in **Table 4**.
- 6.14** Remount operator.
- 6.15** Operate valve open and close several times to check for binding and to set the stem seals. Loosen GLAND NUTS (170) and then proceed to retighten to the torque valves stated in **Table 3**.

Table 4: TOP PLATE SCREW TIGHTENING TORQUE

Valve Size	Tightening Torque (Nm)							
	Series 4D/4E		Series 4F/4G		Series 4H/4J		Series 4K/4L	
	PN 10		PN 16		PN 25		PN 40	
	Screw	Torque	Screw	Torque	Screw	Torque	Screw	Torque
DN 65	M8	15	M8	15	M8	15	M8	15
DN 80	M8	15	M8	15	M8	15	M8	15
DN 100	M8	15	M8	15	M8	15	M8	15
DN 125	M8	15	M8	15	M10	30	M10	30
DN 150	M8	15	M8	15	M10	30	M10	30
DN 200	M10	30	M10	30	M12	50	M12	50
DN 250	M12	50	M12	50	M12	50	M12	50
DN 300	M12	50	M12	50	M20	245	M20	245
DN 350	M20	245	M20	245	M20	245	M20	245
DN 400	M20	245	M20	245	M20	245	M20	245

7.0 SEAT REPLACEMENT



WARNING

Do not pressurise the line without an operator mounted on the valve.

- 7.1** Refer **Figure 1** (p.11) and **Figure 2** (p.12) for parts identification.
- 7.2** With the DISC (21) in the closed position, remove the valve from the line
- 7.3** Lay the valve down with the DISC (21) in the closed position and the seat retainer side facing up.
- 7.4** Remove the RETAINER PLATE SCREWS (60), RETAINER PLATES (50), SEAT RETAINER (40), and SEAT (30).
- 7.5** Carefully clean the seat area in the BODY (10)). Remove foreign material, dirt, etc. Check disc seating area for nicks or scratches.
- 7.6** With the DISC (21) is in the CLOSED position, place the new SEAT (30) on DISC (21), carefully centering it in the recess in the BODY (10).
- 7.7** Carefully place the SEAT RETAINER (40) in position on top of SEAT (30).
- 7.8** Slide in the RETAINER PLATES (50) into the groove on the SEAT RETAINER (40) and align the countersunk holes to the tapped holes on the BODY (10).
- 7.9** Lightly grease the threads and install the RETAINER PLATE SCREWS (60).

8.0 DISC AND STEM REPLACEMENT

WARNING

Before removing handle or the actuator from the valve, or before removing seat retainer from a valve in dead end service, close the valve and depressurise the line. Do not pressurise the line without an operator mounted on the valve.

8.1 Refer **Figure 1** (p.11) and **Figure 2** (p.12) for parts identification.

NOTICE

Stem and disc are supplied as a matched set with taper pins and are to be replaced as a set.

8.2 Remove handle assembly/gear box/actuator. Remove TOP PLATE SCREWS (220). Remove TOP PLATE (210).

8.3 Remove TRAVEL STOP SCREW (240) and TRAVEL STOP (230).

8.4 Remove KEY (250) if applicable.

NOTICE

Note assembly positions before removal.

8.5 Remove GLAND NUTS (170) and LOCK WASHERS (180). Remove GLAND RETAINER (140), RETAINING RING (150) and GLAND RING (130).

NOTE: For valve sizes DN 350 through DN 400, remove the DISC SPRINGS (260) along with GLAND RING (130)

8.6 Hook out STEM SEALS (120).

CAUTION

When removing stem seals, care should be taken not to scratch stem or stuffing box bore.

8.7 Remove the RETAINER PLATE SCREWS (60), RETAINER PLATES (50), SEAT RETAINER (40), and SEAT (30).

8.8 Turn DISC (21) to the full open position and drill out tack welds on large end of TAPER PINS (23). Drill sizes to remove tack welds are given in **Table 5**.

CAUTION

Take care to support valve so that disc surfaces are not scratched.

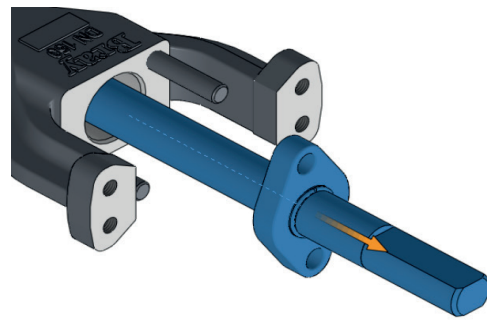
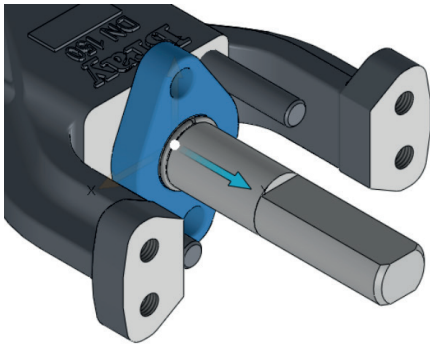
Table 5: DRILL SIZE TO REMOVE TACK WELD

Valve	Drill Size (mm)	
	Series 4D/4E/4F/4G PN 10/PN 16	Series 4H/4J/4K/4L PN 25/PN 40
DN 65	4	4
DN 80	4	4
DN 100	4	4
DN 125	4.5	4.5
DN 150	4.5	5
DN 200	5.5	6.5
DN 250	6.5	8
DN 300	8.5	12.5
DN 350	12	12
DN 400	12	12

NOTE: Use center-punch to dimple center of tack welds prior to drilling.

8.9 Place valve in flat position, with flat face of disc up. Support disc and body on wooden blocks to protect disc and body surfaces. Disc will rest in partially open position.

8.10 Knock out TAPER PINS (23) using a rod or punch on small end of pin (opposite tack weld). It may be necessary to lift body and rotate disc slightly to do this. Make sure disc is resting on wood block since it will swing freely on stem with pins removed. When TAPER PINS (23) are removed, lay body down so disc and body are evenly supported on flat surface.



Valve sizes DN 200 through DN 300 has an M6 tapped hole on the top face of the stem which can be used to attach an eye bolt to pull out the stem.

- 8.11** Valve sizes DN 65 to DN 300 has a blind bottom body. So the STEM (22) needs to be pulled out from the top side of the valve. After long or severe service this may take considerable force. Be careful not to damage bearings, spacers or body.

NOTE: To make stem disassembly easier, the GLAND RETAINER (140) can be inserted in reverse direction over the stem with the counter bore facing towards the top face of the STEM (22) and placing the RETAINING RING (150) or SPLIT RINGS between the stem and gland retainer. The gland retainer can then be pulled outwards which will transfer the force to the stem through the retaining ring.

- 8.12** For Valve sizes DN 350 to DN 400 perform the following steps.

- 8.12.1** Remove the BOTTOM PLATE NUTS (320), BOTTOM PLATE (300), WAVE SPRING (280), DISC SUPPORT (270) and GASKET (290) from the bottom side of BODY (10).
- 8.12.2** Using a brass bar or drift punch, knock STEM (22) loose and pull from BODY (10). After long or severe service this may take considerable force.

 **CAUTION**

When removing stem seals, care should be taken not to scratch stem or stuffing box bore.

- 8.13** DISC SPACERS (70) are used at top and bottom of DISC (21) to properly position disc in BODY (10). Proper spacers were selected at initial assembly and rarely require replacement. The location of these spacers should be noted, and the spacers marked at disassembly so that they are reinstalled in the same positions, top and bottom.
- 8.14** Separate BODY (10) from DISC (21), and remove WASHER (110) from packing bore.
- 8.15** Removed from body, note position and mark to reinstall in same location. If bearing liner is worn through to the shell, or severe damage is evident they should be replaced. Replacement is rarely needed.
- 8.16** Clean BODY (10) thoroughly to remove all dirt, foreign matter, rust, etc.
- 8.17** Place the BODY (10) flat, seat retainer side up, and support it on wooden blocks sufficiently above the work surface as to facilitate insertion of the DISC (21) in open position.
- 8.18** Install the DISC SPACERS (70) in to the body stem bore making sure that spacers are returned to original locations as marked in step 8.13
- 8.19** Lower the disc into position, aligning the bores in BODY (10) and DISC (21).
- 8.20** Insert new STEM (22) in BODY (10) with large end of the taper pin holes toward the top.
- 8.21** Align taper pin holes in disc and stem, and install TAPER PINS (23). Drive pins in tightly with rod or punch, and tack weld each pin to DISC (21) at large end of pin.

8.22 For Valve sizes DN 350 to DN 400 perform the following steps.

8.22.1 Install new GASKET (290) in to the groove on the bottom face of BODY (10).

8.22.2 Install DISC SUPPORT (270), WAVE SPRING (280) and BOTTOM PLATE (300)

8.22.3 Tighten BOTTOM PLATE NUTS (320) to torque mentioned in **Table 6. Table 6: BOTTOM PLATE TIGHTENING TORQUE**

Tightening Torque (Nm)				
Valve Size	Series 4D/4E	Series 4F/4G	Series 4H/4J	Series 4K/4L
	PN 10	PN 16	PN 25	PN 40
DN 350	11	11	11	11
DN 400	16	16	16	16

8.23 Install new STEM SEALS (120), following instructions in section 6.0 STEM SEAL REPLACEMENT

8.24 Install new SEAT (30), following instructions in section 7.0 SEAT REPLACEMENT

8.25 Remount handle operator, and operate valve several times to verify proper operation. Examine disc and seat for any damage before reinstalling in line.

9.0 FIELD ADJUSTMENTS

9.1 Stem Seal Leakage – Should leakage occur at the stem seals, it may be stopped by retightening the GLAND NUTS (170) to the values specified in **Table 3**.

NOTE: If the leakage cannot be stopped by this action, the stem seals require replacement.

NOTICE

Do not overtighten gland nuts, as this may cause increased operating torque and improper valve operation or closure.

9.2 Adjusting Valve Closure – Valves with gear actuators or electric/pneumatic actuators may require adjustment of the travel stops in the actuator to properly close valve for tight shut-off. The following procedure should be followed to set travel or limit stops. (It is recommended that the valve must be removed from line for this procedure and actuator mounting).

9.2.1 Using a straight-edge and Vernier or depth caliper, measure the distances from the face of the SEAT RETAINER (40) to the DISC (21) (valve closed) face at the 3 o'clock and 9 o'clock positions (stem is at 12 o'clock position). The measurements must agree within 1.5mm..

9.2.2 If they do not agree, DISC (21) must be rotated in the direction of the larger dimension. If the 3 o'clock dimension is larger, the disc is not fully closed, and must be rotated in the “close” direction more. If 9 o'clock dimension is larger, disc is over-closed, and must be opened slightly.

9.2.3 he valve DISC (21) is at the full open position when the disc is perpendicular to the BODY (10). Set the “open” actuator stop for this position.

9.2.4 On gear operators, loosen and adjust the closing stop screw to permit proper disc positioning. Adjust and lock down when disc closure is within measured tolerance in Step 9.2.1. Open and close valve; recheck measurements before reinstalling in line.

NOTICE

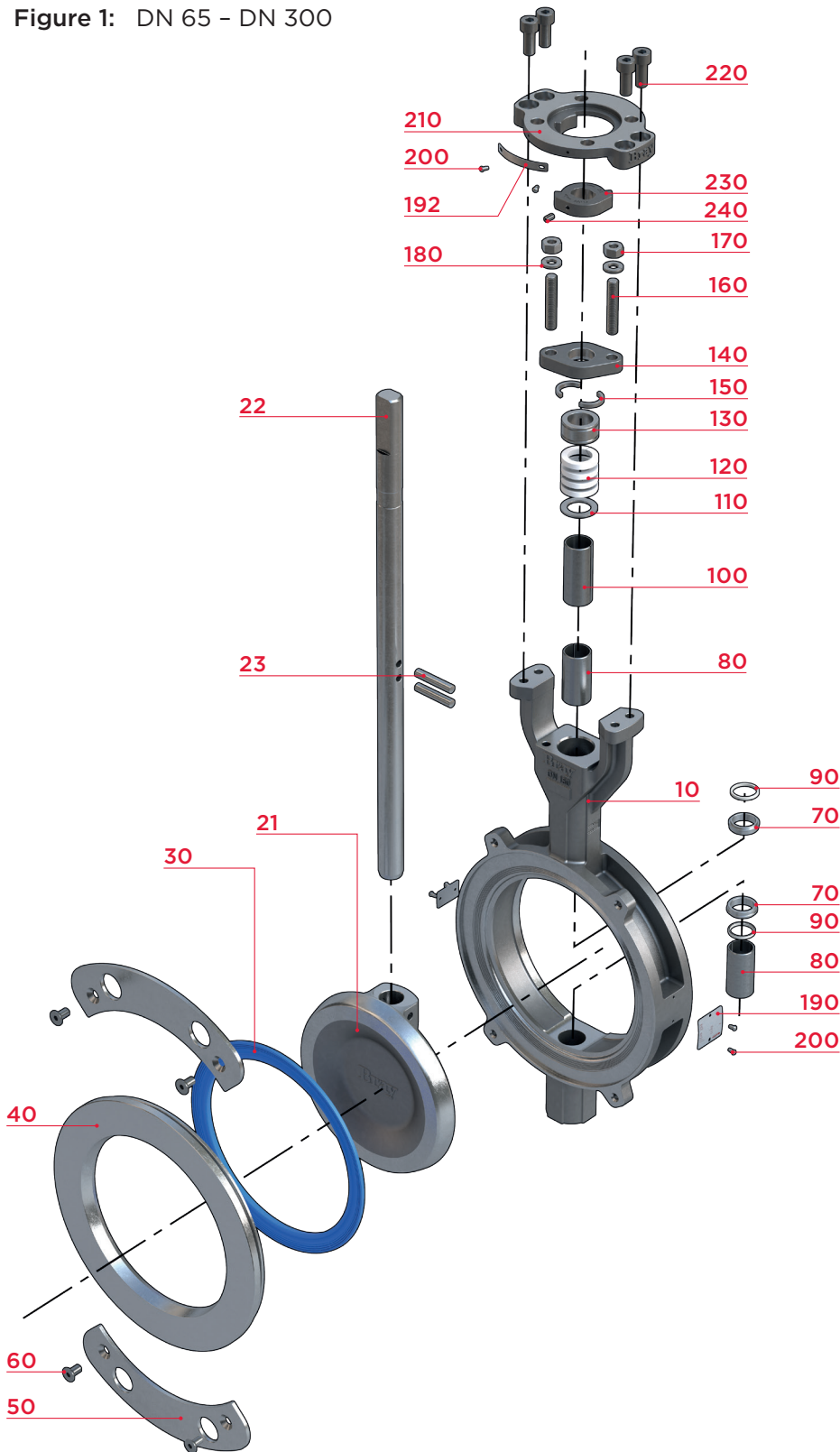
The setting of the actuation device's close travel stop is important. The valve has an external travel stop to ensure valve disc cannot be over closed or opened. To ensure that the valve travel stop is not damaged, the actuator close travel stop bolt must be at a position just before valve disc contacts it's travel limiter.

9.2.5 For other power actuators, consult the manufacturer's instructions for setting travel stops, as these vary with actuator model and type.

9.2.6 If removing the valve from the line is not practical, as a crude remedy the disc can be placed into a position in the seat at which the leakage stops and travel stops are adjusted to this position.

10.0 FIGURES

Figure 1: DN 65 - DN 300



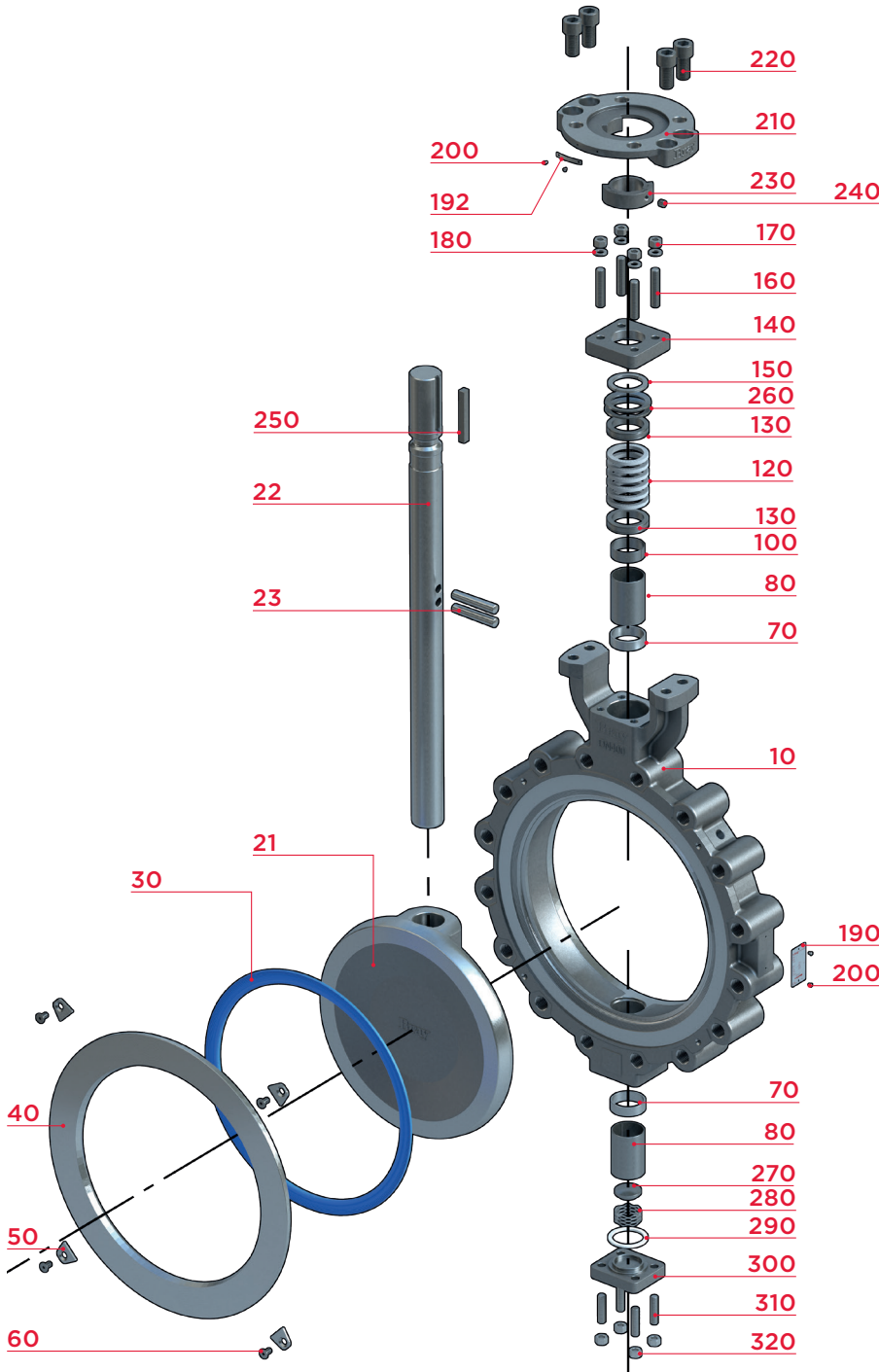
Item	Qty.	Description
10	1	Body
21	1	Disc
22	1	Stem
23	2	Pin, Disc-Stem
30	1	Seat
40	1	Seat Retainer
50	2	Retainer Plate
60	4	Retainer Plate Screw
70	2	Disc Spacer
80	2	Bearing
90 ¹⁾	2	Bearing Seal
100	1	Packing Spacer
110	1	Washer
120	1	Stem Seal
130	1	Gland Ring
140	1	Gland Retainer
150	1	Split Ring
160	2	Gland Stud

Item	Qty.	Description
170	2	Gland Nut
180	2	Gland Washer
190	1	Identification Tag
192	1	Torque Tag
200	6	Drive Screw
210	1	Top Plate
220	4	Top Plate Screw
230	1	Travel Stop
240	1	Travel Stop Screw

1) Bearing Seal is available as an option

10.0 FIGURES

Figure 2: DN 350 - DN 400

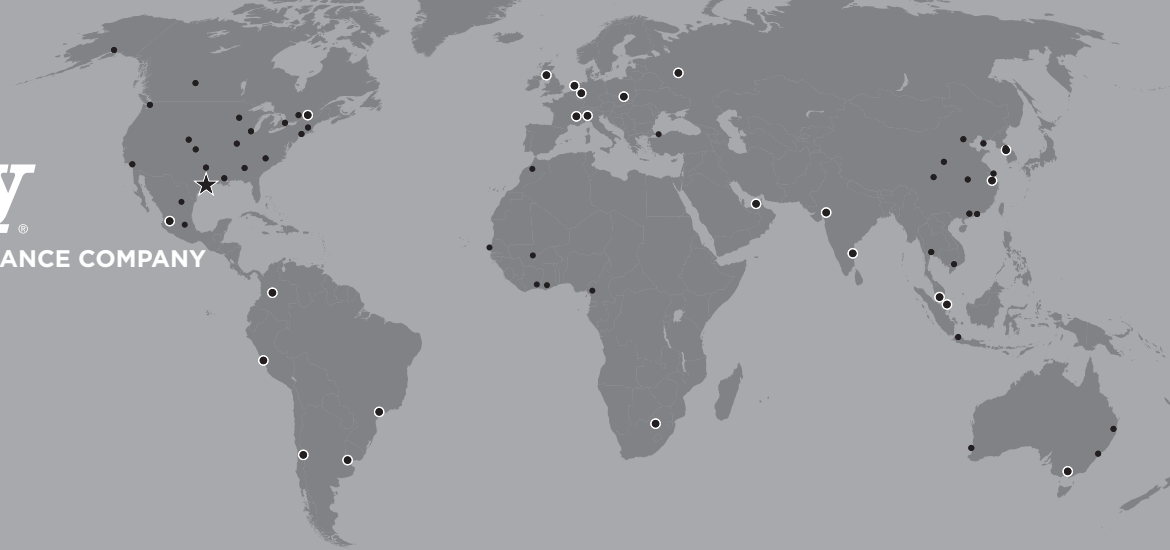


Item	Qty.	Description
10	1	Body
21	1	Disc
22	1	Stem
23	2	Pin, Disc-Stem
30	1	Seat
40	1	Seat Retainer
50	4	Retainer Plate
60	4	Retainer Plate Screw
70	2	Disc Spacer
80	2	Bearing
90 ¹	2	Bearing Seal
100	1	Packing Spacer
110	1	Washer
120	1	Stem Seal
130	2	Gland Ring
140	1	Gland Retainer
150	1	Split Ring
160	4	Gland Stud
170	4	Gland Nut
180	4	Gland Washer
190	1	Identification Tag
192	1	Torque Tag
200	4	Drive Screw
210	1	Top Plate
220	4	Top Plate Screw
230	1	Travel Stop
240	1	Travel Stop Screw
250	1	Key
260	2	Disc Spring
270	1	Disc Support
280	1	Wave Spring
290	1	Gasket
300	1	Bottom Plate
310	4	Bottom Plate Stud
320	4	Bottom Plate Nut

1) Bearing Seal is available as an option



THE HIGH PERFORMANCE COMPANY



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