

FIGURE 310/311A AND 310/311AM SERIES BALL VALVES



3-PC CASTING, BALL VALVE

1. SCOPE

These instructions apply to 3-pcs body, full port, 1000 CWP, screwed and socket weld, ball valve (310A, NPS1/4–NPS3), and directly mounted ISO 5211 ball valve (310AM–NPS 1/4–NPS4).

2. WARNING (OPERATION LIMITATION)



Temperature and Pressure Limit

- The normal maximum operating pressure at maximum or minimum operating temperature is shown on nameplate.
- The operating temperature is within -29°C–200°C for RTFE seat and sealing. Other seat and sealing operating temperature shall be checked with FNW.
- The nominal pressure rating describes body maximum working pressure in cold working temperature, e.g. 1000 CWP describes body maximum working pressure at -29°C–200°C. The working temperature may differ when using different seat (4), stem packing (10) and body gasket (7) material.

Fluids Limit

- With soft-seat, fluids containing particles or coagulable are not acceptable. Please refer to anti-corrosion table and choose different anti-corrosive materials for body and sealing.

Throttling Operation Damage

- Do not leave the ball partly open (throttling operation), where the pressure drop and/or flow rate can damage the seat and/or ball.

3. STORAGE PROCEDURE

- Valves should be stored in a clean, weather-tight (dry), well-ventilated, and fire-resistant facility that is protected against dirt, dust and water intrusion.
- Protective plastic cover on the valve ends should not be removed.
- Valve assemblies with electrical components, pneumatic tubing, positioners, actuators and other accessories should be protected from impact.
- Never lift or move the valve assembly by using the actuator, positioner, extensions or other valve options. It is recommended to use adequate lifting equipment around the valve.
- Periodical checks at least every 6 months have to be carried out in the storage area. Valves must be operated for 3 full cycles for each periodical check.
- The transportation of all packed material must be carried out safely and following the local safety regulations.

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4. INSTALLATION

- Before installation, please make sure the marking on valve is in accordance with the application requirement.
- Remove the protective plastic cap on each end of the valve, and clean or flush the valves.
- Prior to mounting, flush and/or clean the pipeline to remove all accumulated extraneous matters that will damage the seats and ball surface.
- Installation of threaded ends.
 - Use conventional sealant (e.g. PTFE tape) to seal threaded ends on the pipeline.
 - Apply pipe wrench on the hexagon end of valve only while tightening. Tightening by using the valve body or handle can seriously damage the valve.
- Installation of socket-weld ends.
 - Tack-weld the valve on the pipe in four points on both end caps with the ball valve in open position.
 - Remove all body bolts except one. Loosen the remaining bolt and swing the valve body out.
 - Secure seats from falling with tape. Note: Tape must be removed before placing the valve in service.
 - Finish welding both end caps on the pipe.
 - When cooled down, clean both end caps and body surface.
 - Swing the body back to the original position, replace the bolts, and tighten slightly. This operation is very important to keep body and end caps perfectly parallel, thus preventing distortion of the end caps.
 - Tighten body bolts evenly. Make sure that maximum tightening torque is observed per bolting torque data.
 - Check proper operation of the valve.
- After installation, make sure there is no stress left on the pipeline.

5. OPERATION

- Prior to operation, make sure to clean and flush the whole pipeline completely.
- The operation of the valve consists of turning the stem (by manual or automated means) 1/4 turn (90°) clockwise to close and 1/4 turn counter-clockwise to open.
- When the handle (if used) and/or stem flats or groove are in line with the pipeline, the valve is open.
- The 310AM series ball valve can be operated manually by using the handle or automated by mounting an actuator to the ISO 5211 mounting pad. (Please refer to our specification sheets for ISO mounting dimensions).
- Operating torque requirements will vary depending on the length of time between cycles, media in the system, line pressure and type of valve seat. The figures in the following table B are based on RPTFE seats with clean water as the media.
- Valves shall be inspected periodically to verify proper function. If stem seal or body leaks are observed, stop operation and refer to maintenance section.

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6. MAINTENANCE

A long and maintenance-free valve life can be maintained under normal working conditions and in accordance with pressure/temperature and corrosion data chart.

Warning



- Ball valves can trap pressurized fluid in ball cavity when in closed position.
- Prior to maintenance, relieve the line pressure and put ball in open position first. Ball valves can trap pressurized fluids in the valve cavity in closed position. If the fluid is toxic, harmful, high pressure or otherwise dangerous, please follow all applicable safety measures before performing any work.
- A manual wrench should be used to initially loosen the nuts. Do not use a pneumatic gun as this can cause thread galling and potentially seize the bolt and nut. A pneumatic gun could be used to finish removal after the nut is loose.

Re-Tighten Packing

- For maximum stem packing life, proper packing adjustment procedure must be followed:
- Should a leakage occur at the gland packing, re-tighten the stem nut (14) for 310AM or gland for 310A.
- Take care that the stem nut (14) or gland (12) is not tightened too much. Normally the leakage can be stopped by simply turning the stem nut (14) or gland (12) by 30°–60°.

Replacement of Seats and Seals

Disassembly

- Before disassembly, make sure to discharge any hazardous media from the valve inside the body cavity.
- Remove all body bolts (23) except one. Loosen the remaining bolt, swing the valve body (1) out, and place valve in the closed position.
- Remove body gasket (7), ball seat (4), and ball (3). Inspect the ball closely for scratches; if any, the ball should be replaced.
- Whenever the stem seals needs to be replaced, remove parts of upper assembly in the following order: Handle nut (17), handle (18), thrust washer (8), stop-lock-cap (15), stem nut (14), Belleville washer (13), gland (12), bushing (11). Push stem (5) down into the body cavity and remove. Next, remove the stem O-ring (9) and packing (10) from the body (1).



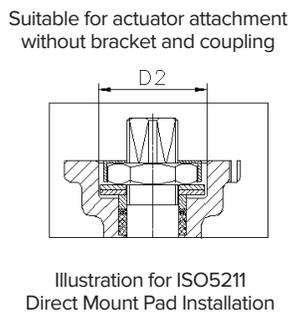
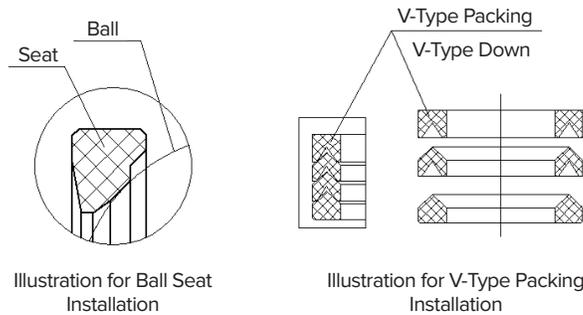
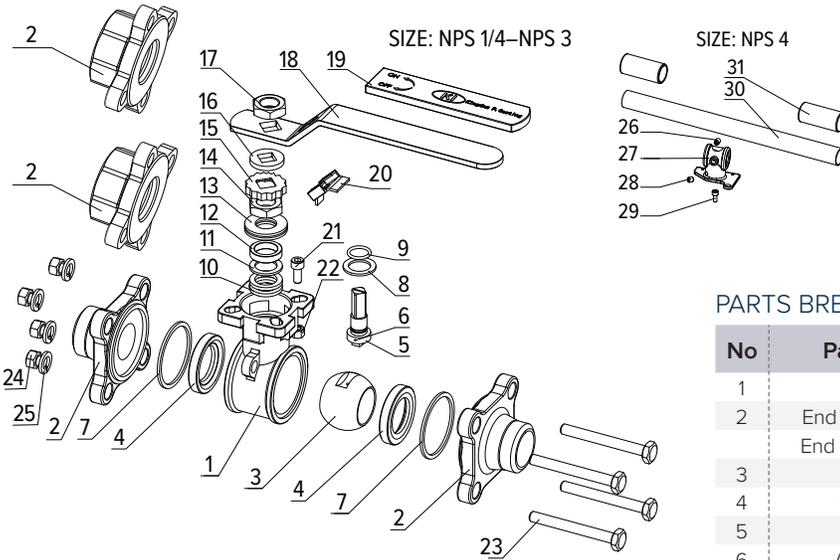
CAUTION:

Do not scratch the surface of ball (3), stem (5), packing (10) or sealing parts during disassembly.

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PARTS BREAKOUT

No	Part Name	Materials	
1	Body	CF8M	WCB
2	End Cap (Thread)	CF8M	WCB
	End Cap (BW/SW)	CF3M	WCB
3	Ball	316	316
4	Ball Seat	RTFE	RTFE
5	Stem	316	316
6	Anti-Static	316	316
7	Body Gasket	PTFE	PTFE
8	Thrust Washer	PTFE	PTFE
9	O-Ring	FKM	FKM
10	Packing	PTFE	PTFE
11	Bushing	50%SS+50%PTFE/304	50%SS+50%PTFE/304
12	Gland	316	316
13	Belleville Washer	301	301
14	Stem Nut	A194-8 (304)	A194-8 (304)
15	Stop-lock-Cap	304	304
16	Handle Gland	304	304
17	Handle Nut NPS 1/4-NPS 3	A194-8 (304)	A194-8 (304)
18	Handle NPS 1/4-NPS 3	304	304
19	Handle Sleeve NPS 1/4-NPS 3	Vinyl Plastic	Vinyl Plastic
20	Lock Device NPS 1/4-NPS 3	304	304
21	Stop Bolt	A2-70	A2-70
22	Stop Nut	A2-70	A2-70
23	Bolting	A193-BB/A2-70	A193-BB/A2-70
24	Bolt Nut	A194-8/A2-70	A194-8/A2-70
25	Bolt Washer	304	304
26	Set Screw NPS 4	A2-70	A2-70
27	Handle Adapter NPS 4	A351-CF8	A351-CF8
28	Set Screw NPS 4	A2-70	A2-70
29	Bolting NPS 4	A2-70	A2-70
30	Pipe Handle NPS 4	A53+Plated Zn	A53+Plated Zn
31	Handle Sleeve NPS 4	Vinyl Plastic	Vinyl Plastic

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Reassembly

- Clean and inspect all parts. Reassembly process is reverse sequence of disassembly.
- Reassemble the ball valve with new seats, gaskets and packing.
- Follow the installation of weld ends procedures in section 4, and swing the body back to original position. Tighten body bolts evenly per Torque Data Table A.
- Tighten the stem nut (14) using Table A stipulated torque figure.
- If possible, test the valve, then cycle valve several times before resuming service.

Note:

- Before installation, confirm again that valve is suitable for application.
- To prevent excessive wear and tear to the valve stem and seals, be very careful to lock in the gland bolts to ensure a proper seal and maximize the valve performance over time.
- Valves are packaged using recyclable cartons and boxes. Refer to local regulations for recycling and/or disposal options.
- When the ball valve is in the close position with pressurized fluid in the valve body, release the pipeline pressure and keep the valve in the open position before maintenance.
- Normal valve operation is at less than 85 dBA.
- For valve or valve component disposal or recycling, refer to local rules and regulations.

TABLE A: TORQUE FIGURE FOR STEM NUT TIGHTEN & BODY-CAP TIGHTEN

Valve Size NPS	Stem Nut Tighten				Bolt-Cap Tighten		
	310A Series		310AM Series		Bolt Size	in•lb	N•m
in•lb	N•m	in•lb	N•m				
1/4	265	30	80–106	9–12	1/4-20UNC-2A	62–89	7–10
3/8	265	30	80–106	9–12	1/4-20UNC-2A	62–89	7–10
1/2	265	30	80–106	9–12	1/4-20UNC-2A	62–89	7–10
3/4	353	40	80–106	9–12	5/16-18UNC-2A	142–186	16–21
1	574	65	106–142	12–16	5/16-18UNC-2A	142–186	16–21
1-1/4	574	65	106–142	12–16	3/8-16UNC-2A	248–310	28–35
1-1/2	971	110	151–195	17–22	3/8-16UNC-2A	248–310	28–35
2	971	110	151–195	17–22	3/8-16UNC-2A	248–310	28–35
2-1/2	971	110	221–283	25–32	9/16-12UNC-2A	443–665	50–75
3	971	110	221–283	25–32	9/16-12UNC-2A	443–665	50–75
4	—	—	372–443	42–50	5/8-11UNC-2A	709–1019	80–115

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TABLE B: TORQUE VALUE (ΔP = difference-pressure and unit: in-lb/N·m)

Size/ ΔP		75 psig		150 psig		300 psig		700 psig		1000 psig	
		5 bar		10 bar		20 bar		50 bar		63 bar	
NPS	DN	N·m	in·lb	N·m	in·lb	N·m	in·lb	N·m	in·lb	N·m	in·lb
1/4 & 3/8	8 & 10	6	51	6	51	6	51	6	51	6	51
1/2	15	6	51	6	51	6	51	6	51	6	51
3/4	20	7	61	7	61	7	61	7	61	7	61
1	25	12	102	12	102	13	112	13	112	13	112
1-1/4	32	15	132	15	132	17	153	20	173	22	193
1-1/2	40	22	193	22	193	25	224	28	244	30	265
2	50	29	254	33	295	37	326	40	356	44	387
2-1/2	65	46	407	52	458	56	499	62	550	68	600
3	80	75	662	83	733	93	824	104	916	116	1028
4	100	115	1018	127	1120	140	1242	155	1374	170	1506

Published torques are for RTFE seats in clean liquid service. For actuator sizing, a minimum 30% safety factor is recommended.

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