FIGURE 320A - 320AC - 321A - 321AC

3-PIECE BALL VALVE

This instruction manual includes installation, operation, and maintenance information for Figure 320A, 320AC, 321A, 321AC, 3-piece 2000CWP (1/4”–1”), 1500CWP (1-1/4”–2”), threaded end (NPT) or socket weld end (SW) ball valve.



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FIGURE 320A - 320AC - 321A - 321AC
3-PIECE BALL VALVE

INSTALLATION

WARNING:

To avoid personal injury to yourself, fellow workers, or damage to property from release of process fluid, before installation:

- Shut off all operating lines to the valve site
- Isolate the valve site completely from the process
- Release process pressure
- Drain the process fluid from the valve site

1. Before installation, please make sure the marking on valve is in accordance with the application requirement.
2. Remove the protective cover on cap from threaded ends and clean or flush the valve.
3. Before installation, inspect the pipeline and pipe threads, making sure the pipe is free of foreign material and the threads are clean, having no burrs or pits that could cause leakage.
4. Cycle the valves a couple of times before installation.
5. Ensure that piping is aligned properly so there is no tension applied to the valve when installed. Use pipe hangers or other supports as necessary.
6. For threaded end valves:
   - Use applicable sealant (e.g., PTFE tape, high-temperature pipe seal, etc.) to seal threaded ends on the pipeline.
   - If required for installation (i.e., the pipe cannot be rotated), remove the body bolts and end caps. Secure the seats and body seals with tape so they are not lost.
   - To prevent distortion or damage to the valve, do not apply torque through the valve. When tightening the valve, always use a wrench on the end nearest the pipe being tightened. It is preferred that the pipe be screwed into the valve, holding the valve stationary at the end being connected. Do not use the handle to tighten the assembly, as damage to the valve may occur.
   - If the valve was disassembled for installation, reinstall the body assembly and reinsert the body bolts. SLIGHTLY tighten all bolts, making sure the body and end caps are parallel to prevent distortion of the end caps during the final tightening phase. Using the torque values in Table B, tighten the body bolts evenly. Check the valve for proper operation. The valve should stroke smoothly and evenly with no binding (higher seating and unseating torque is normal).
7. For socket weld or buttweld end valves:
   - With the valve in the open position and pipe fully inserted into the socket weld ends, tack-weld the valve to the pipe in four equidistant points on both end caps.
   - Remove all but one of the body bolts and loosen the remaining one so that the valve body assembly can swing out of the way.
   - Secure the seats and body seals with tape so they are not lost. It is recommended to temporarily cover the body assembly during welding to protect the soft seats and seals from damage.
   - Finish welding both end caps onto the pipe.
   - After all components have cooled, clean all valve surfaces.
   - Swing the body back to the original position and reinsert the body bolts.

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- SLIGHTLY tighten all bolts, making sure the body and end caps are parallel to prevent distortion of the end caps during the final tightening phase.
- Using the torque values in Table B, tighten the body bolts evenly.
- Check the valve for proper operation. The valve should stroke smoothly and evenly with no binding (higher seating and unseating torque is normal).

8. Clean/flush the pipeline and leak test the system prior to using.

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FIGURE 320A - 320AC - 321A - 321AC
3-PIECE BALL VALVE

OPERATION

1. Flush the ball valve and pipeline thoroughly again before operation.
2. 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.
3. 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 table B are based on PTFE seats with clean water as the media.
4. Valves shall be cleaned during operation. Periodical checks are necessary in order to verify if sealing, stem, washer, packing, and other spare parts are damaged or not. If spare parts are damaged and cause malfunction, stop valve operation and replace spare parts immediately.

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FIGURE 320A - 320AC - 321A - 321AC
3-PIECE BALL VALVE

MAINTENANCE

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance frequency depends on the severity of the service conditions. This section includes instructions for packing adjustments, repacking, seat replacement, and seating adjustment.

WARNING:

To avoid personal injury to yourself, fellow workers, or damage to property from release of process fluid, before installation:

- Shut off all operating lines to the valve site
- Isolate the valve site completely from the process
- Release process pressure
- Drain the process fluid from the valve site

Retighten Packing

- Should a leakage occur at the gland packing, retighten the stem nut.
- Be careful to not tighten the stem nut too much. Normally the leakage can be stopped by simply turning the stem nut by 30° to 60°.

Replacement of Seats and Seals

Disassembly

1. Before disassembly, make sure to discharge any hazardous media from the valve inside body cavity.
2. Remove valves from pipeline.
3. Remove parts as follows:
   - Handle nut, washer, handle, stop-lock-cap, stem nut, belleville washer, gland, bushing.
4. Use pipe wrench to remove end cap, body gasket, ball seat, ball.
5. Push stem down into body cavity and remove, then remove stem seal ring and V-ring packing from the body.

CAUTION:

Use care to avoid scratching the surface of stem and packing chamber.

Reassembly

Reassembly processes are reverse sequence of disassembly.

1. Clean and inspect all parts, full replacement of all soft parts (seats and seals) are strongly recommended.
2. Tighten the body bolt and nut crosswise using the stipulated torque figure (see table A).
3. Tighten the stem nut using the table A stipulated torque figure.
4. Cycle the valve slowly with gentle back and forth motion to build gradually to full quarter turn.
5. If possible, test the valve before placing it back to line for service.

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FIGURE 320A - 320AC - 321A - 321AC
3-PIECE BALL VALVE

Table A: Torque Figure for Stem Nut Tighten & Body-Cap Tighten

Valve Size		Stem Nut Tighten				Body-Cap Tighten	
NPS	DN	in • lb	N • m	Bolt Size		in • lb	N • m
1/4	8	80 ~ 106	9 ~ 12	M6x1.0	1/4-20UNC-2A	71	8
3/8	10	80 ~ 106	9 ~ 12	M6x1.0	1/4-20UNC-2A	71	8
1/2	15	80 ~ 106	9 ~ 12	M8x1.25	5/16-18UNC-2A	71	8
3/4	20	80 ~ 106	9 ~ 12	M10x1.5	3/8-16UNC-2A	177	20
1	25	106 ~ 142	12 ~ 16	M10x1.5	3/8-16UNC-2A	177	20
1-1/4	32	106 ~ 142	12 ~ 16	M12x1.75	1/2-13UNC-2A	442	50
1-1/2	40	151 ~ 195	17 ~ 22	M12x1.75	1/2-13UNC-2A	442	50
2	50	151 ~ 195	17 ~ 22	M16x2	5/8-11UNC-2A	974	110

Table B: Torque Valve

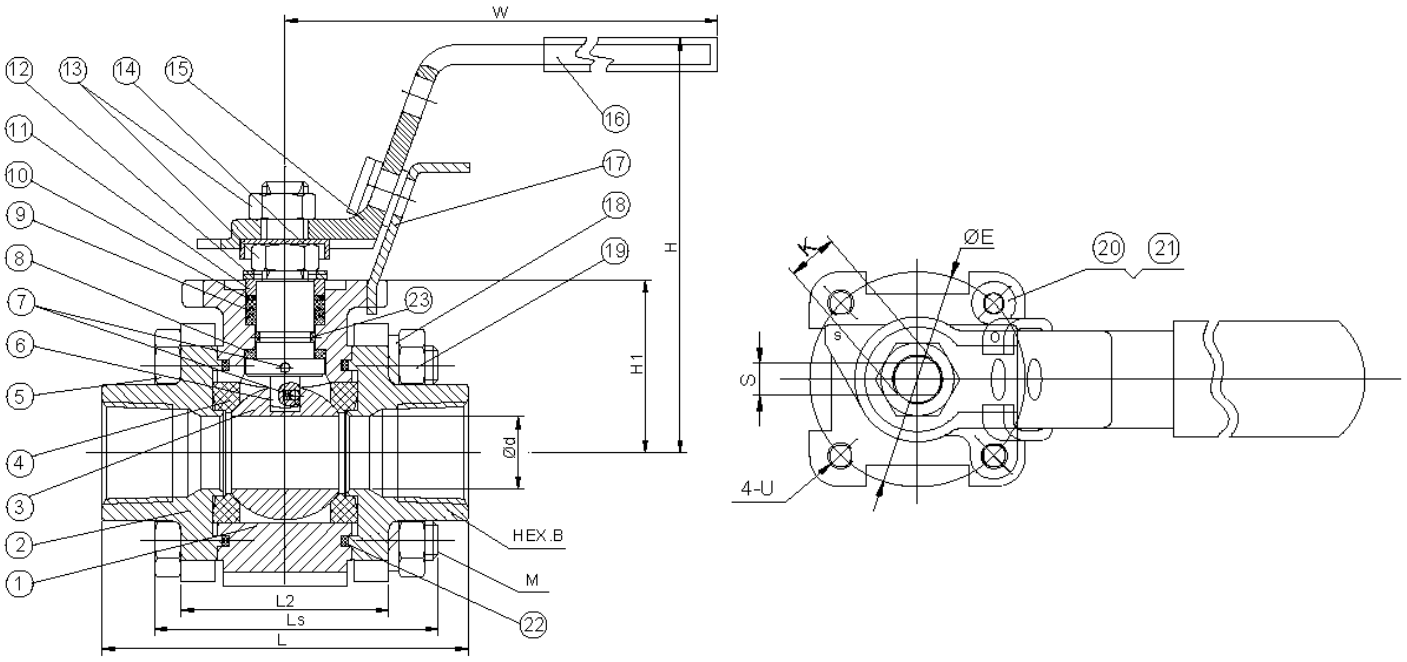
Size (NPS/ΔP)	75 PSIG		150 PSIG		300 PSIG		700 PSIG		1000 PSIG		1500 PSIG		2000 PSIG	
	5 bar		10 bar		20 bar		50 bar		63 bar		100 bar		130 bar	
	N • m	in • lb	N • m	in • lb	N • m	in • lb	N • m	in • lb	N • m	in • lb	N • m	in • lb	N • m	in • lb
1/4	5	44	5	44	5	44	5	44	5	44	5	44	5	44
3/8	5	44	5	44	5	44	5	44	5	44	5	44	5	44
1/2	5	44	5	44	5	44	5	44	5	44	5	44	6	53
3/4	6	53	6	53	6	53	6	53	6	53	6	53	7	62
1	10	88	10	88	11	97	11	97	11	97	11	97	12	194

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FIGURE 320A - 320AC - 321A - 321AC

3-PIECE BALL VALVE



Ref No.	Description		Material				Qty
			Figure 320A	Figure 320AC	Figure 321A	Figure 321AC	
1	Body		ASTM A351 Gr. CF8M Stainless		ASTM A216 Gr. WCB Carbon Steel		1
2	End Cap	NPT	ASTM A351 Gr. CF8M Stainless		ASTM A216 Gr. WCB Carbon Steel		2
		SW	ASTM A351 Gr. CF3M Stainless				
3	Ball		316SS Stainless				1
4	Seat		TFM1600+20%GF	TFM4215	TFM1600+20%GF	TFM4215	2
5	Body Bolt	1/4~1-1/4	ASTM A193-B8 Stainless				4
		1-1/2~2					8
6	Stem		316SS Stainless				1
7	Anti-Static Device		316SS Stainless				2
8	Thrust Washer		TFM4215				1
9	V-Ring Packing		PTFE	TFM1600	PTFE	TFM1600	1 Set
10	Bushing		50% Stainless + 50% PTFE				1
11	Gland		316SS Stainless				1
12	Belleville Washer		301SS Stainless				2
13	Stem Nut		ASTM A194-8 Stainless				2
14	Stop-Lock-Cap		304SS Stainless				1
15	Handle		304SS Stainless				1
16	Handle Sleeve		Vinyl Plastic				1
17	Lock Device		304SS Stainless				1
18	Bolt Washer	1/4~1-1/4	304SS Stainless				4
		1-1/2~2					8
19	Bolt Nut	1/4~1-1/4	ASTM A194-8 Stainless				4
20	Stop Bolt		ASTM A193-B8 Stainless				1
21	Stop Washer		304SS Stainless				1
22	Body Gasket		PFTE	PFTE+20%CF	PFTE	PFTE+20%CF	2
23	O-Ring		FKM				1

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FIGURE 320A - 320AC - 321A - 321AC
3-PIECE BALL VALVE

WARRANTY

Limited Warranty

Subject to the limitations expressed herein, Seller warrants that products manufactured by Seller shall be free from defects in design, material and workmanship under normal use for a period of one (1) year from installation but in no case shall the warranty period extend longer than eighteen months from the date of sale. This warranty is void for any damage caused by misuse, abuse, neglect, acts of God, or improper installation. For the purpose of this section, “Normal Use” means in strict accordance with the installation, operation and maintenance manual. The warranty for all other products is provided by the original equipment manufacturer.

Remedies

Seller shall repair or replace, at its option, any non-conforming or otherwise defective product, upon receipt of notice from Buyer during the Manufacturer’s warranty period at no additional charge. SELLER HEREBY DISCLAIMS ALL OTHER EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OR FITNESS FOR A PARTICULAR PURPOSE.

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UNDER NO CIRCUMSTANCES SHALL EITHER PARTY BE LIABLE TO THE OTHER FOR INCIDENTAL, PUNITIVE, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. BUYER HEREBY ACKNOWLEDGES AND AGREES THAT UNDER NO CIRCUMSTANCES, AND IN NO EVENT, SHALL SELLER'S LIABILITY, IF ANY, EXCEED THE NET SALES PRICE OF THE DEFECTIVE PRODUCT(S) PURCHASED DURING THE PREVIOUS CONTRACT YEAR.

Labor Allowance

Seller makes NO ADDITIONAL ALLOWANCE FOR THE LABOR OR EXPENSE OF REPAIRING OR REPLACING DEFECTIVE PRODUCTS OR WORKMANSHIP OR DAMAGE RESULTING FROM THE SAME.

Recommendations by Seller

Seller may assist Buyer in selection decisions by providing information regarding products that it manufacturers and those manufactured by others. However, Buyer acknowledges that Buyer ultimately chooses the product’s suitability for its particular use, as normally signified by the signature of Buyer’s technical representative. Any recommendations made by Seller concerning the use, design, application or operation of the products shall not be construed as representations or warranties, expressed or implied. Failure by Seller to make recommendations or give advice to Buyer shall not impose any liability upon Seller.

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