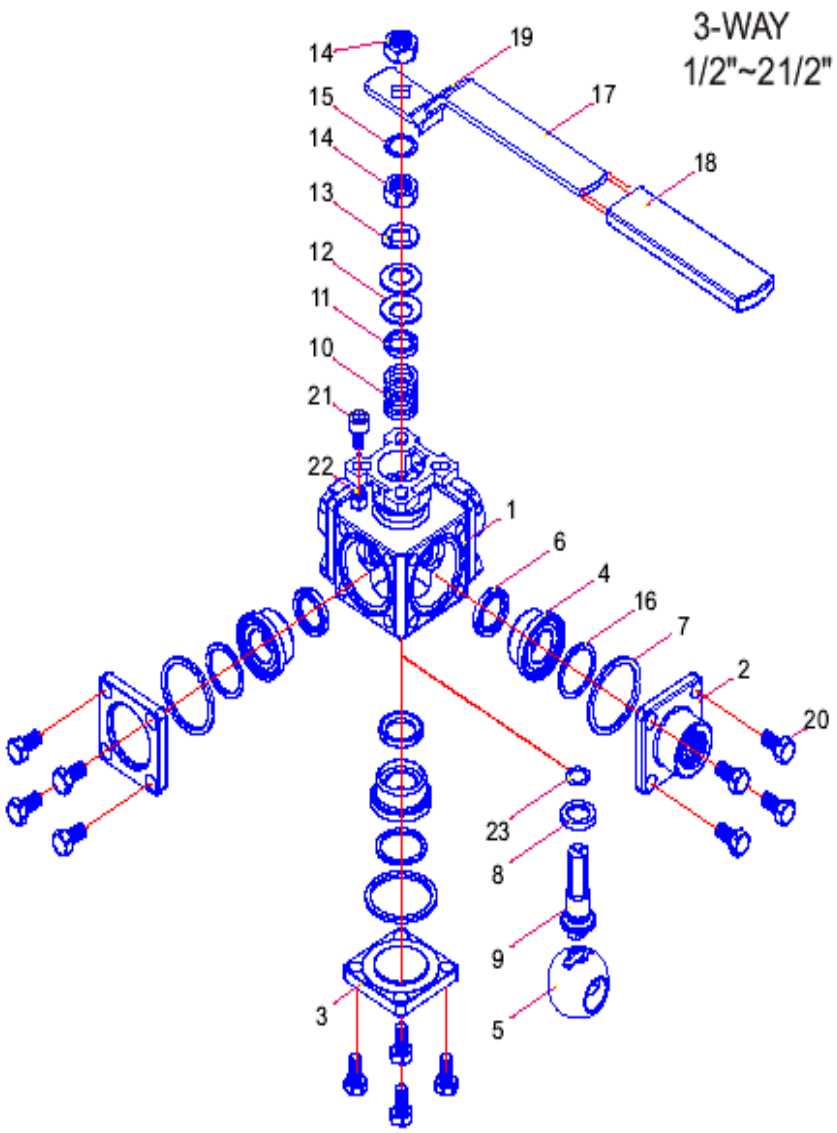
INSTALLATION & MAINTENANCE MANUAL

SERIES 33 3-WAY/4-WAY/5-WAY MULTI-PORT BALL VALVES

NO.	PART NAME	QTY	MATERIAL
1	BODY	1	CF8M
2	END CAP-A	3	CF8M
3	END CAP-B	2	CF8M
4	SEAT RETAINER	5	CF8M
5	BALL	1	SS316
6	SEAT	5	PTFE/RTFE
7	JOINT GASKET	5	PTFE
8	STEM SEAL	1	PTFE/RTFE
9	STEM	1	SS316
10	GLAND PACKING	1SET	25%GLASS FIBER FILLED+PTFE
11	GLAND BUSH	1	SS304
12	BELLEVILLE WASHER	2	SS301
13	STOP WASHER	1	SS304
14	STEM NUT	2	SS304
15	STEM WASHER	1	SS304
16	RETAINER SEAL	5	PTFE
17	HANDLE	1	SS304
18	HANDLE SLEEVE	1	VINYL
19	LOCKING DEVICE	1	SS304
20	BOLT NUT	20	SS304
21	PIN NUT	1	SS304
22	STOP PIN	1	SS304
23	O-RING	1	VITON



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TEFLON PARTS - Each set includes

1. Seat x 5 pcs.
2. Joint Gasket x 5 pcs.
3. Retainer Seal x 5 pcs.
4. Thrust Washer x 1 pc.
5. O-Ring x 1 pc
6. Gland Packing 1/4" ~ 1 1/4" x 3 pcs,
   1 1/2" ~ 4" x 4 pcs.

Pressure of Series 33-10 / 33-20 / 33-30

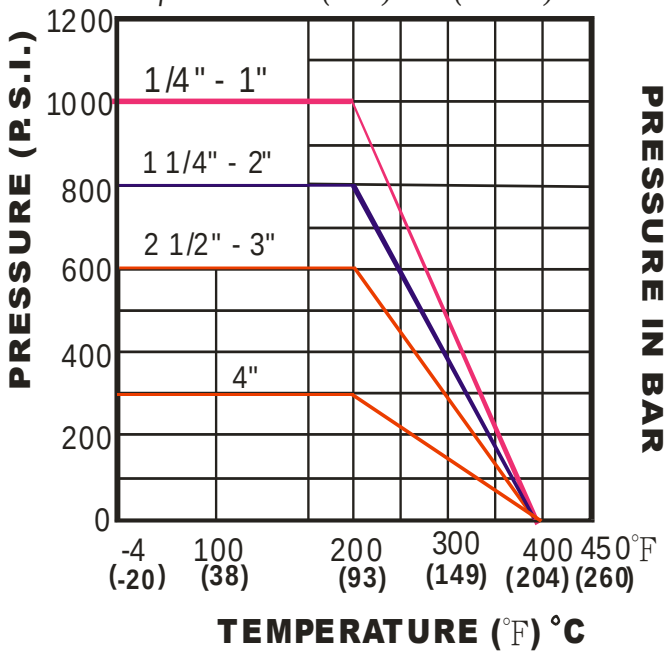
1/4” ~ 1”	1000 psi
1.1/4” ~ 2”	800 psi
2.1/2” ~ 3”	600 psi
4”	300 psi

33-10 Threaded Ball Valve
33-20 Socket Welded Ball Valve
33-30 Butt Welded Ball Valve

Seat : RPTFE

Pressure Vs. Temperature Chart

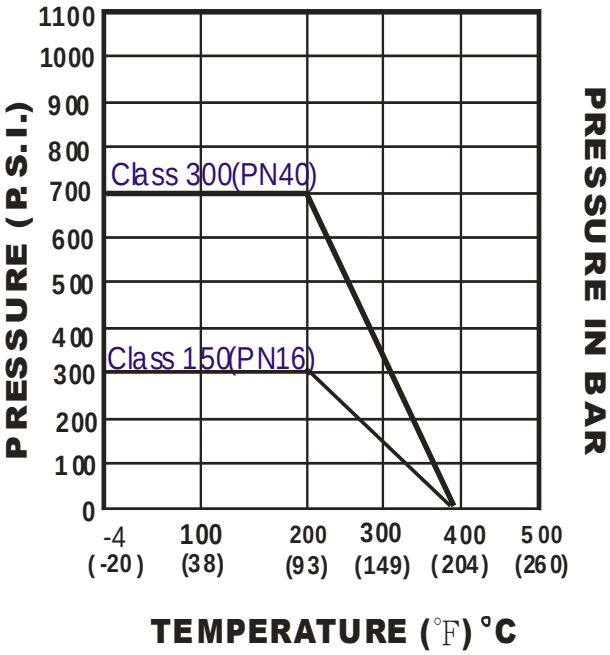
for Valve 1/4" (DN8) to 4"(DN100)



33-40/50 ANSI # 150/# 300
33-60/70 PN10/16/25/40
Flange Ball Valve

Seat : RPTFE

Pressure Vs. Temperature Chart



BRIEF INTRODUCTION

Mars Multi-Port ball valves have been designed and engineered to provide long lasting and trouble free service when used in accordance with the instructions and specifications mentioned herein.

INSTALLATION

Mars Series 33 3-Way/4-Way/5-Way ball valves, **the end cap doesn't have a insert into Valve body**, which allow easy replacement of gasket, seal, and seats without special tools, and the valve body can be easily removed from pipeline for repairing when needed.

1. Use-Long Life
   1.1 Life of valve can be maximized if the valve is used within the rated range, in accordance with pressure/temperature and corrosion data chart.

2. Manual Operation

   Mars Multi-Port Ball Valves are allowed for 0 - 90 - 180 - 360 degree by turning the handle based on different flow paths.

   Flow path is clearly marked on the top of stem..

3. Automation Operation

   Direct Mount of Pneumatic or Electric Actuator to Valves, No Brackets and Couplings are required

4. General Information for On-Site Installation

   The valve can be mounted in any position on the pipe line

   To prevent damage to the seats and ball surface, the pipeline must be flushed, free of dirt, burrs, and welding residues before installing the valve.

5. Installation of threaded end valves

   Use conventional sealant, such as hemp core, Teflon tape, etc. on the threads.

   Apply pipe wrench on the end cap of the ball valve only, tightening by using the valve body or handle can seriously damage the valve.

6. Installation of weld end valves

Tack weld the valve on the pipe in 4 points on all end caps.

Complete the full welding of end caps.

To prevent the body seal from damaging, the heat in the end cap sealing area to be controlled under 205℃ (400℉) during the welding process.

When cooled down, clean all end caps and body surface

Tighten body bolts evenly,

Make sure that maximum tightening torque is observed per bolting torque data.

Check properly operation of the valve.

7. Installation of Flanged End Valves

When installing, user must supply flange gasket suitable for the service intended,

Make sure valve is horizontally mounted on pipe line to avoid flange ends to be deformed because of non-horizontal mounting.

Tighten flange bolts or studs evenly.

Make sure that maximum tightening torque is observed per bolting torque data

LEAKING

1) Stem leaking

Tighten stem nut.

If valve is still leaking after tightening of stem nut, change stem packing set. (Part No. 10)

2. Leaking at Body Seal

Tighten Body bolts & bolts nuts (please refer to Table A)

If valve is still leaking after tightening of body bolts & nuts, change body seal (parts no. 7 & 16)

3. Seat Leaking

Make sure the valve is at the position of close.

If valve is still leaking, change Seat (part No. 6)

MAINTENANCE

When rebuilding, a standard repair kit designated for each size and style valve is available, each repair kit to contain all the soft parts.

When ordering, be sure to specify size, valve code, valve seat, seal and stem packing materials. Optional components such as ball, stem and handle are also available.

1. Before disassembly, be sure to discharge the hazardous media that might be entrapped inside valve cavity.

2. Take out bolts (# 20) on the 3 end caps (#.2)

3. Take out body (# 1), please make sure Seat Retainer (#4) or other parts will not be falling down.

4. Take out bolts (#20) on blind end caps (#3) from body (1).

5. Take out Seat Retainer (#4), Joint Gasket (#7), Retainer Seal (#16) & seat (6) from body.

6. Take out Ball (#5) from body. Please make sure the ball will not be falling down & put the ball at clean & safe place.

7. Loosen Handle Nut (#14), take off Handle (#17), stem washer (#15), stop washer (#13). Loosen stem nut (#14), take out Belleville washer (#12), gland bush (#11) & gland packing (#10).

8. Clean and inspect all components to be sure that they are free from foreign matter and pit marks, paying particular attention to the areas that must maintain a seal. Areas such as finished diameter on stem, inside pipe end surface, ball and stuffing box should be free from scratches and pitting.

9. Take out stem (9).

10. Take out O-ring (#23) & stem seal (#8).

11. Stem needs to be cleaned, inspected and replaced if necessary,

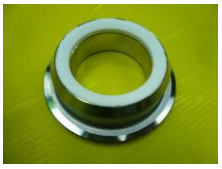
12. Put O-ring (#23) & stem seal (#8) on stem (#9).
Daub Lubricant (LE4025 or similar) on O-ring.
Put stem (#9) into body.

13. When stem has been put into body, the stem is higher than ISO top,
Put a hollow tooling on the Table, put the body upside down,
the stem can be extended on the hole of tooling of bottom.
The rib of body should be forward to the person who is assembling.

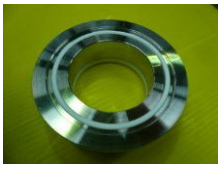
Rib of body

14. Reassemble ball (#5) into valve body.
The port of ball should be same direction as stem.

15. Put new seats (#6) on Seat Retainer (#4).



16. Put Retainer Seal (#16) into Seat Retainer (#4).



17. Assemble the Seat Retainer (#4) {which has been assembled
with seat (#6) & Retainer seal (#16)} into bottom of body.
Put a Joint Gasket (#7).on Seat Retainer.

18. Mount bottom end on body.

19. Tighten bolts by alternating equal adjustment
to secure bottom end caps. Un-even force applied to body will
cause the seat compression either too tight or too loose.
Please don't tighten the bolts completed at this moment.

20. Turn the body 90 degree. The rib of body forward to
the bottom.

21. Mount the another seat Retainer (#4) {which has been
Assembled with Seat (#6) & Retainer Seal (#16)} into
Bind end cap. Put a Joint Gasket (#7) on Seat retainer.

22. Mount blind end cap on body.

23. Tighten bolts or nuts by alternating equal adjustment to secure bottom end caps. Un-even force applied to body would cause the seat compression either too tight or too loose. Please don't tighten the bolts completed at this moment.

24. Put Gland packing (#10).

25. Make sure the Gland packing would be sit on the groove of packing of body.

26. Assemble Gland Bush (#11).

27. Assemble Belleville Washer (#12).

28. Assemble Stop Washer (#13).

29. Mount stem Nut (#14).

30. Tighten stem Nut (#14), please refer to the Torque Figure (Table B) to tighten the stem nut.

31. Press stop washer (#13) on the Stem Nut (#14).

32. Put stem washer (#15) on stem, Mount handle (#17) on stem

33. Tighten Handle nut (#14).

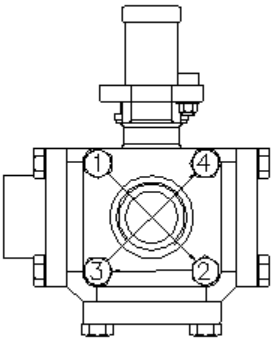
34. Assemble Seat (#6), Seat Retainer (#4),
    Retainer seal (#16) into body.
    Mount the other 3 end caps (#2).
    Put the 3 Joint Gasket (#7) between end cap & body.

35. Be careful to mount the valve on pipe line.
    Please Make sure the valve or other parts would not be falling down.

36. Tighten body bolts (#20) on body.

37. Check and inspect the indicator on top of stem is same as the port of ball & end cap.

38. Tighten the body bolts completed. (Please refer to Table A for the torque figure of tightening)
    a) Tighten the bolts of bottom end cap.
    b) Tighten the bolts of Blind end cap.
    c) Tighten the bolts of end cap on the opposite side of Blind end cap.
    d) Tighten the bolts of one of the rest 2 end caps.
    e) Tighten the last end cap.



Install cap end nuts and tighten in the "star" pattern to the proper torque. Extreme care must be exercised during adjustment of cap end nuts to make sure that complete engagement of the studs with body flange is maintained. There should be at least one stud thread exposed on each side.

39. Clockwise turn handle 45 degree.

40. Counter-clockwise turn handle 90 degree.

41..Clockwise turn handle 90 Degree.
Repeat the 90 degree turn 2 ~ 3 times.
Mount stop pin. (#22)
Turn the ball to the correct position.

Operate the valve slowly, with a gentle back and forth motion, to build gradually to the full quarter turn. By opening slowly, the seat lips will assume a permanent seal shape against the ball. A fast turning motion, at this point, may cut the seats before they have a chance to form the proper seal.

42. If possible test valve, prior to placing valve back into line position. If not properly secured, the valve can separate from the pressure source, resulting in possible injury. Always join the valve to companion flanges of same pressure rating as valve and secure with a full set of flange bolts.

Breakaway Torque for sizing actuator
Valve with Grease
Test Pressure: 0 bars
(R-PTFE SEATS)

Valve Size		Break Away Torque	
Inch	**DN**	**In/Lb**	**Nm**
1/4"	**8**	**75**	**8**
3/8"	**10**	**75**	**8**
1/2"	**15**	**75**	**8**
3/4"	**20**	**150**	**17**
1"	**25**	**325**	**36**
11/4"	**32**	**370**	**42**
11/2"	**40**	**600**	**68**
2"	**50**	**840**	**94**
21/2"	**65**	**1100**	**125**
3"	**80**	**1750**	**198**
4"	**100**	**2250**	**250**

1) **30% safety factor included.**
2) **If valve is dry assembled, the torque figure is 30% higher**

Media and Service Factors:

Media Factors	Multiplier
Clean, particle free, non-lubricating (water, alcohol, etc)	1.00
Clean, particle free, non-lubricating (oils, hydraulic fluid, etc)	0.80
Slurries or heavily corroded and contaminated systems	2.00
Gas or saturated steam, clean and wet	1.00
Gas or superheated steam, clean and dry	1.30
Gas, dirty unfiltered e.g. natural gas, Chlorine	1.50

Service Factors	Multiplier
Simple On and Off Operations	1.00
Throttling	1.20
Positioner Control	1.50
Once per day Operations	1.20
Once every two days or a "Plant Critical" Operation	1.50

Torque Determination:

Basic Torque * Media Factor * Service Factor = Sizing Torque

Table A

Torque figure to tighten body bolts		
SIZE	Bolts	Torque figure / kgf.cm
1/4"	M6x12	150~210
3/8"	M6x12	150~210
1/2"	M6x12	150~210
3/4"	M6x16	170~230
1"	M8x20	230~320
1-1/4"	M8x20	230~320
1-1/2"	M10x25	400~520
2"	M12x25	550~700
2-1/2"	M14x30	900~1050
3"	M16x30	1200~1350
4"	M20x35	1450~1600

Table B

Torque figure to tighten Stem Nut		
SIZE	Stem has O-Ring Kgf-cm	Stem W/O O-Ring Kgf-cm
1/4"	80	90
3/8"	80	90
1/2"	80	90
3/4"	110	140
1"	110	140
1-1/4"	160	190
1-1/2"	190	220
2"	190	220
2-1/2"	190	220
3"	270	320
4"	270	320