



MPTR Bellows Pump Connector/Expansion Joint OPERATION, INSTALLATION AND MAINTENANCE INSTRUCTIONS

General: The MPTR is a low corrugated bellows joint that can be used as either an expansion joint or a pump connector. The MPTR is equipped with control rods. These joints are available in 150lb and 300lb Class, each size has unique movement capabilities please consult the factory submittals for specific performance specifications.

Application:

1. MPTR joints can be used for axial, lateral, or angular movements. These joints are not suitable for applications that result in torque on the joint.
2. As an expansion joint.
 - a. When used as an expansion joint and installed between two anchors, the MPTR will require guiding and anchoring in accordance with EJMA (Expansion Joint Manufacturers Association) guidelines. See Guide Spacing below.
 - b. Install only one joint between anchors.
 - c. Location of expansion joints should be reviewed to insure proper operation.
 - d. When the MPTR is compressed, the control rods will no longer restrain the hydrostatic end load. Pipe anchors must be designed to restrain this load. See Anchor Load Calculation below.
3. As a pump connector
 - a. The MPTR can be used as a drop-in replacement for a rubber joint and will often have the same face to face as a rubber sphere. It can also replace a stainless-steel hose and braid pump connector; however, it will have a shorter face to face dimension.
 - b. Caution. For 150 lb. class joints the control rods can interfere with pump flange face in cases where the pump flange was cast for 300 lb. class but drilled for 150 lb. class.
4. When internally pressurized joints are used for applications with flow over 10 feet per second or with abrasive materials in the line, a liner should be installed to protect the bellows.
5. When specified, MPTR joints can be supplied with a liner. Liners are flow directional and must be installed in the proper orientation. Joints without a liner are uni-directional.

INSTALLATION:

1. Inspect joint for shipping damage.
2. Joint is to be installed in its neutral position. Do not compensate for flange or pipe misalignment by putting torque, compressive, or extension force on the joint.

Testing

1. Joint may be one-time pressure tested to 225 PSIG for 150 lb. class joints, or 450 PSIG for 300 lb. class joints. Do not exceed maximum pressure or temperature during operation.
2. Metraflex recommends a hydrostatic test with all air in the system removed. If an air test is performed, appropriate safety precautions must be made.
3. For expansion joint applications, do not test until joint is properly anchored and guided.

Precautions: Joint will develop hydrostatic end loads equal to pressure time effective area and must be included in anchor load calculations. The control rods will restrain the hydrostatic end load. However, once the bellows is compressed, this load will be transferred to the anchors. See Anchor Load Calculations and Guide spacing below.

Maintenance: Bellows joints must be easily accessible to allow for periodic inspection. Bellows should be inspected for any signs of damage such as dents or scores. Damaged bellows joints should be replaced immediately. Metraflex bellows joints have no serviceable parts and do not require maintenance.

Contact Metraflex or your local Metraflex Representative with ANY questions.





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Anchor Load Calculation.

$$(\text{Spring Rate} \times \text{Movement}) + (\text{Effective area} \times \text{test pressure}) + \text{Safety Factor} = \text{Anchor Load}$$

The spring rate is the force it takes to compress or extend the bellows. To calculate the spring load multiply the spring rate by the movement of the joint. These values can be found on “Bellows Data Table”

To find the hydrostatic end load multiply the effective are by the test pressure. This is the force pushing out on the anchors. The effective areas of the bellows can be be found on “Bellow Data Table”.

Bellows Data Table

Part No.	Size	Effective Area IN2	Spring Rate Lbs./IN
MPTRVS0200	2"	6.7	595
MPTRVS0250	2 1/2	9.1	498
MPTRVS0300	3	13.3	349
MPTRVS0400	4	20.5	803
MPTRVS0500	5	30.7	987
MPTRVS0600	6	41.5	1181
MPTRVS0800	8	69.1	1235
MPTRVS1000	10	105.9	1669
MPTRVS1200	12	150.8	1815
MPTRVS1400	14	182.4	3960



Guide Spacing

To prevent the pipe from exceeding its columnar strength and buckling it needs to be guided to restrain lateral forces. These forces are developed by the internal pressure of the fluid and the spring load of the bellows as discussed in "Anchor Load Calc" above.

In accordance with EJMA guidelines, the first guide should be installed 4 pipe diameters from the joint, the second guide should be installed 14 pipe diameters from the joint, additional guides should be placed based on pressure. The guide spacing values can be found on the below "Guide Spacing Table".

Pipe size	Maximum Distance To 1st Guide / Anchor	Maximum Distance To 2nd Guide	Distance Between Additional Pipe guides			
			In Feet			
			At 50 PSI	At 100 PSI	At 150 PSI	At 300 PSI
1"	4"	1' - 4"	21	15	12	10
1.25"	5"	1' - 5"	23	17	13	12
1.5"	6"	1' - 9"	28	20	17	13
2"	8"	2' - 4"	32	23	18	15
2.5"	10"	2' - 11"	35	28	22	19
3"	1' - 0"	3' - 6"	38	28	23	20
4"	1' - 4"	4' - 8"	52	38	31	22
5"	1' - 8"	5' - 8"	63	45	38	25
6"	2' - 0"	7' - 0"	68	48	40	28
8"	2' - 8"	9' - 4"	87	62	45	38
10"	3' - 4"	11' - 8"	107	75	60	48
12"	4' - 0"	14' - 0"	118	85	70	50
14"	4' - 8"	16' - 4"	122	88	72	55
16"	5' - 4"	18' - 8"	137	96	80	60
18"	6' - 0"	21' - 0"	145	105	85	65
20"	6' - 8"	23' - 4"	160	118	90	70
24"	8' - 0"	28' - 0"	181	125	105	75

Guide Spacing Table:

We recommend that the joint be placed adjacent to one anchor to eliminate the first and second guide.

