

D. GIMBAL TYPE EXPANSION JOINT

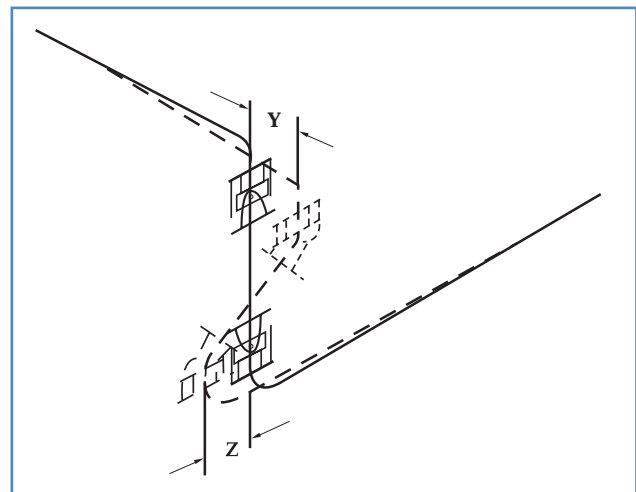
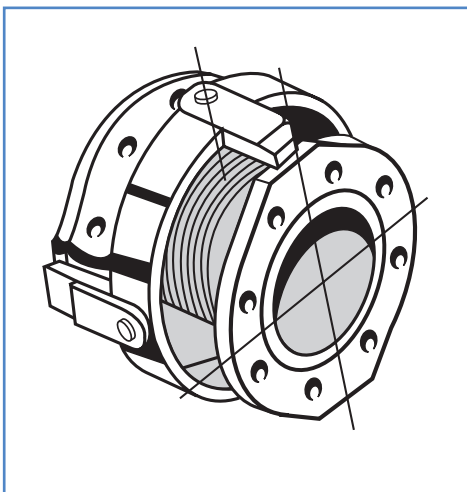
This type of expansion joint has similar structure with a hinged expansion joints and is designed to permit angular rotation in any plane by the use of two pairs of hinges affixed to a common floating gimbal ring. Normally, the thermal growth from two different directions on two planes are absorbed by two pair of this type expansion joints, that is, the double gimbal type expansion joint.

In disigning, the thrust of the expansion joint, which is developed from internal pressure and extraneous force, should be carefully considered to be retained by the hardware, including gimbal ring, hinges and pins.

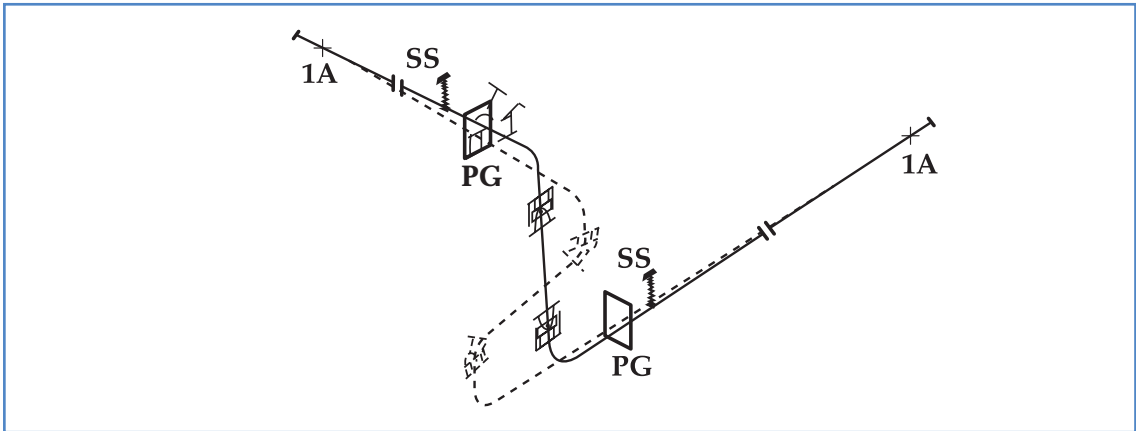
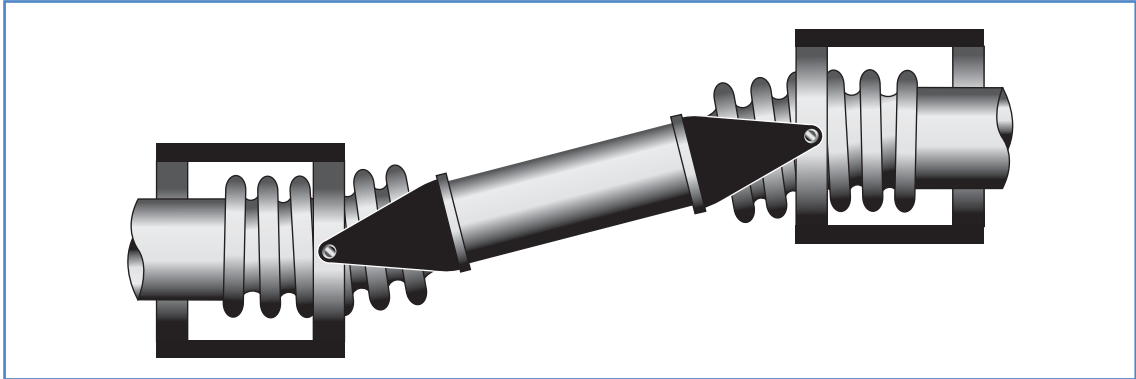
MEGAFLEXON Double Gimbal Expansion Joint are similar to the hinged universal except that the two joints are gimbal type. The advantage of this arrangement is the ability to absorb a large lateral movement in any plane at each end. Because the gimbals are attached to each end of the bellows, the thermal expansion of the intermediate pipe will not be absorbed by the universal but must be accepted by the adjacent piping.

■ service pressure : 1-20kgf/cm²

Single Gimbal Ttpe



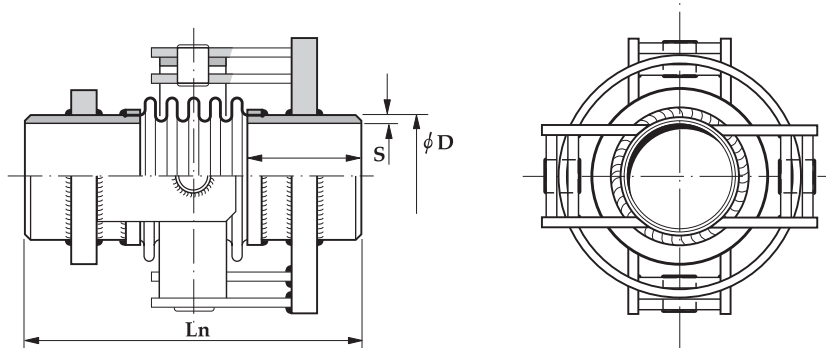
Dual Gimbal Type Expansion Joint



DN	No of Convolution	Single Type		Dual Type Overall Length (mm)						
		Face To Face Length (mm)	Angular Rotation (Deg.)	Lateral deflection (Y) (mm)						
				1000	1500	2000	2500	3000	3500	4000
200	3+3	310	4.3	52	90	128	153	203	240	278
250		320	5.3	63	109	155	201	248	295	341
300		365	6.0	66	118	170	222	274	326	377
350		380	5.5	59	107	155	203	251	298	346
400		405	4.6	48	88	117	169	210	250	290
450		425	4.2	42	78	115	151	187	224	260
500		445	4.0		74	108	142	178	213	247
600		510	3.6		63	95	126	159	190	222
700		550	3.1		52	79	107	135	162	189
800		550	2.9			70	95	119	143	167
900		550	2.5			64	85	107	129	150
1000		650	2.3			53	73	94	113	133

Product that aren't described above table will be manufactured case by case up to 5000A.

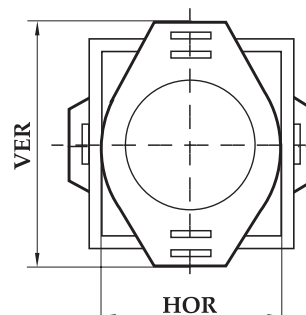
Gimbal expansion joints with gimbal unit and welding ends



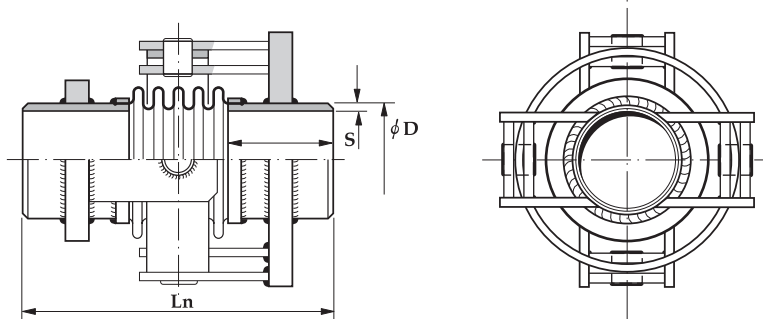
■ Design Pressure

150Lbf/in²

DN	TYPE	Movement	L _n	Springrate	Welding ends			Dimensions		Bellows		Bellow-areas	Weight Approx
		+/-ANG		ANG	φ D	L2	S	HOR	VER	Di	Do		
		(deg)	(mm)	[kgf.mm/deg]	(mm)	[mm]	[mm]	[mm]	[mm]	(mm)	(mm)	(mm ²)	(kg)
40	MGWS-0040-015-10	15	300	106.12	48.3	110	2.6	140	110	40.5	57.7	1893	2.9
40	MGWS-0040-020-10	20	375	49.48	48.3	110	2.6	140	110	40.5	57.7	1893	3.4
50	MGWS-0050-015-10	15	300	181.63	60.3	110	2.9	150	120	52.5	69.7	2932	3.4
50	MGWS-0050-020-10	20	375	84.79	60.3	110	2.9	150	120	52.5	69.7	2932	3.7
65	MGWS-0065-015-10	15	295	239.48	76.1	110	2.9	170	140	68.3	87.5	4766	4.2
65	MGWS-0065-020-10	20	370	111.73	76.1	110	2.9	170	140	68.3	87.5	4766	4.7
80	MGWS-0080-015-10	15	320	480.10	88.9	110	3.2	180	150	79.1	100.9	6362	5.0
80	MGWS-0080-020-10	20	415	224.08	88.9	110	3.2	180	150	79.1	100.9	6362	5.8
100	MGWS-0100-015-10	15	315	753.57	114.3	110	3.6	210	180	104.6	130.2	10825	6.2
100	MGWS-0100-020-10	20	405	351.63	114.3	110	3.6	210	180	104.6	130.2	10825	7.1
125	MGWS-0125-015-10	15	310	1075.20	139.7	110	4.0	280	240	130.2	157.8	16286	11.9
125	MGWS-0125-020-10	20	405	501.73	139.7	110	4.0	280	240	130.2	157.8	16286	14.2
150	MGWS-0150-015-10	15	315	1803.67	168.3	110	4.5	315	265	155.0	186.6	22912	17.1
150	MGWS-0150-020-10	20	405	819.79	168.3	110	4.5	315	265	155.0	186.6	22912	19.3
175	MGWS-0175-014-10	14	315	2624.79	193.7	110	5.6	350	300	180.6	212.2	30295	20.0
175	MGWS-0175-020-10	20	405	1193.06	193.7	110	5.6	350	300	180.6	212.2	30295	22.3
200	MGWS-0200-014-10	14	315	3094.897	219.1	110	5.6	390	340	206.1	239.7	39022	22.3
200	MGWS-0200-020-10	20	405	1406.83	219.1	110	5.6	390	340	206.1	239.7	39022	24.7
250	MGWS-0250-010-10	10	335	5787.24	273.0	120	6.3	455	395	260.0	293.6	60176	35.1
250	MGWS-0250-020-10	20	455	2225.91	273.0	120	6.3	455	395	260.0	293.6	60176	38.7
300	MGWS-0300-009-10	9	340	12199.28	323.9	120	8.0	560	480	311.1	347.5	85167	68.8
300	MGWS-0300-020-10	20	500	4038.87	323.9	120	8.0	560	480	311.1	347.5	85167	83.4



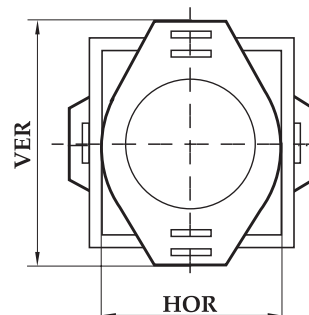
Gimbal expansion joints with gimbal unit and welding ends



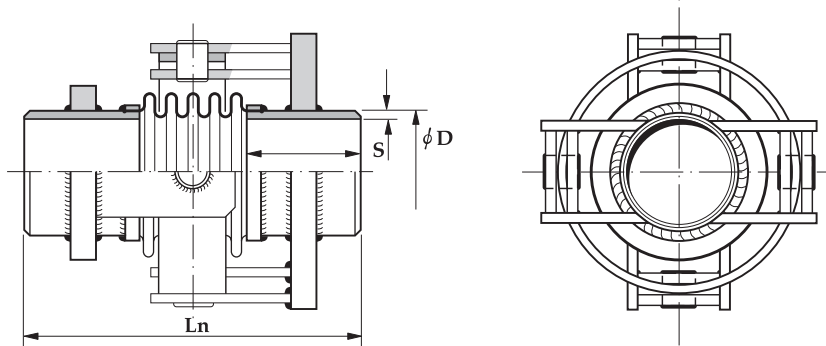
■ Design Pressure

150Lbf/in²

DN	TYPE	Movement	Ln	Springrate	Welding ends			Dimensions		Bellows		Bellow-areas	Weight Approx
		+/-ANG		ANG	φ D	L2	S	HOR	VER	Di	Do		
		(deg)	(mm)	[kgf.mm/deg]	[mm]	[mm]	[mm]	[mm]	[mm]	(mm)	(mm)	(mm ²)	(kg)
350	MGWS-0350-008-10	8	340	15961.42	355.6	120	8.0	590	510	342.8	379.2	102354	74.1
350	MGWS-0350-020-10	20	500	5320.51	355.6	120	8.0	590	510	342.8	379.2	102354	89.2
400	MGWS-0400-010-10	10	365	15584.28	406.4	120	8.0	645	565	389.9	437.1	134289	84.2
400	MGWS-0400-020-10	20	530	5993.97	406.4	120	8.0	645	565	389.9	437.1	134289	102.7
450	MGWS-0450-008-10	8	395	27408.46	457.2	135	8.0	710	620	440.5	489.5	169823	112.7
450	MGWS-0450-015-10	15	520	12458.36	457.2	135	8.0	710	620	440.5	489.5	169823	129.6
500	MGWS-0500-011-10	11	435	32153.77	508.0	135	8.0	755	665	485.4	536.4	205004	123.9
500	MGWS-0500-020-10	20	595	14615.40	508.0	135	8.0	755	665	485.4	536.4	205004	142.8
550	MGWS-0550-010-10	10	435	42034.18	559.0	135	10.0	805	715	536.4	587.4	247975	134.9
550	MGWS-0550-014-10	14	540	23299.48	559.0	135	10.0	805	715	536.4	587.4	247975	145.2
600	MGWS-0600-007-10	7	405	85920	609.9	135	10.0	885	785	585.6	645.6	297637	173.1
600	MGWS-0600-020-10	20	610	28640	609.9	135	10.0	885	785	585.6	645.6	297637	202.3
700	MGWS-0700-006-10	6	410	114728.06	711.0	135	10.0	1035	915	687.5	756.5	409415	257.9
700	MGWS-0700-019-10	19	615	38242.65	711.0	135	10.0	1035	915	687.5	756.5	409415	302.0
800	MGWS-0800-005-10	5	440	163319.38	813.0	150	10.0	1150	1020	789.5	858.5	533267	345.7
800	MGWS-0800-016-10	16	645	54439.79	813.0	150	10.0	1150	1020	789.5	858.5	533267	393.6
900	MGWS-0900-004-10	4	440	225555.81	914.0	150	10.0	1250	1120	890.5	959.5	672006	383.9
900	MGWS-0900-015-10	15	645	75185.30	914.0	150	10.0	1250	1120	890.5	959.5	672006	438.2
1000	MGWS-1000-004-10	4	440	303678.06	1016.0	150	10.0	1365	1225	992.5	1061.5	828382	483.2
1000	MGWS-1000-013-10	13	645	101226.02	1016.0	150	10.0	1365	1225	992.5	1061.5	828382	544.5



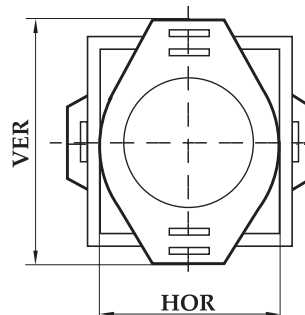
Gimbal expansion joints with gimbal unit and welding ends



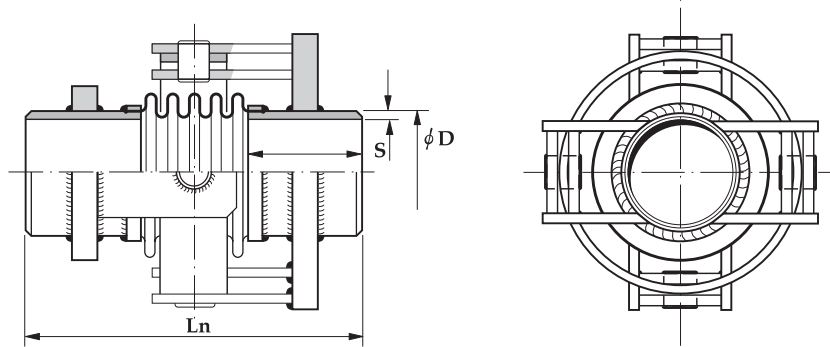
■ Design Pressure

300Lbf/in²

DN	TYPE	Movement	Ln	Springrate	Weldingends			Dimensions		Bellows		Bellow-areas	Weight Approx
		+/-ANG		ANG	φ D	L2	S	HOR	VER	Di	Do		
		(deg)	(mm)	[kgf.mm/deg]	[mm]	[mm]	[mm]	[mm]	[mm]	(mm)	(mm)	(mm ²)	(kg)
40	MGWS-0040-020-20	20	280	148.57	48.3	130	2.6	110	140	40.5	57.7	1893	3.8
40	MGWS-0040-030-20	30	315	82.55	48.3	130	2.6	110	140	40.5	57.7	1893	4.1
50	MGWS-0050-018-20	18	280	417.75	60.3	130	2.9	120	150	52.5	70.3	2961	4.7
50	MGWS-0050-030-20	30	365	160.71	60.3	130	2.9	120	150	52.5	70.3	2961	5.7
65	MGWS-0065-018-20	18	280	534.38	76.1	130	2.9	140	170	68.3	88.1	4803	5.3
65	MGWS-0065-030-20	30	340	242.85	76.1	130	2.9	140	170	68.3	88.1	4803	6.1
80	MGWS-0080-015-20	15	290	868.36	88.9	130	3.2	180	230	79.1	100.7	6348	15.9
80	MGWS-0080-030-20	30	365	394.69	88.9	130	3.2	180	230	79.1	100.7	6348	18.5
100	MGWS-0100-015-20	15	295	1650.71	114.3	130	3.6	210	260	104.6	131.0	10899	18.0
100	MGWS-0100-030-20	30	370	750.30	114.3	130	3.6	210	260	104.6	131.0	10899	20.9
125	MGWS-0125-012-20	12	295	2825.30	139.7	135	4.0	235	285	130.2	156.6	16151	19.8
125	MGWS-0125-030-20	30	395	1086.63	139.7	135	4.0	235	285	130.2	156.6	16151	23.9
150	MGWS-0150-015-20	15	345	4707.65	168.3	135	4.5	265	325	155.0	186.2	22859	29.3
150	MGWS-0150-030-20	30	450	2139.79	168.3	135	4.5	265	325	155.0	186.2	22859	34.1
175	MGWS-0175-014-20	14	345	6714.69	193.7	135	5.6	300	360	180.6	211.8	30233	33.0
175	MGWS-0175-030-20	30	450	3052.14	193.7	135	5.6	300	360	180.6	211.8	30233	38.0
200	MGWS-0200-015-20	15	350	8426.73	219.1	140	6.3	370	450	206.2	242.2	39479	72.1
200	MGWS-0200-030-20	30	460	3830.30	219.1	140	6.3	370	450	206.2	242.2	39479	85.1



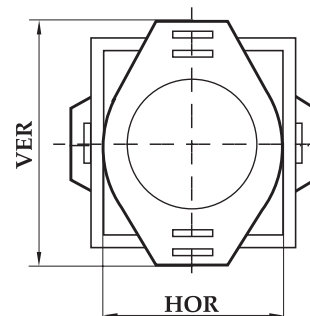
Gimbal expansion joints with gimbal unit and welding ends



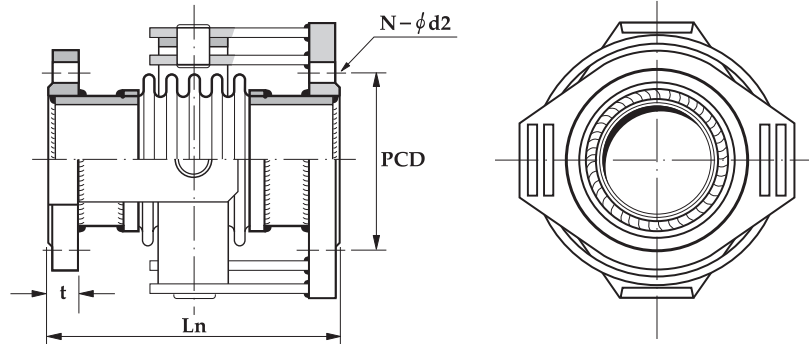
■ Design Pressure

300Lbf/in²

DN	TYPE	Movement	Ln	Springrate	Weldingends			Dimensions		Bellows		Bellow-areas	Weight Approx
		+/-ANG		ANG	φ D	L2	S	HOR	VER	Di	Do		
		(deg)	(mm)	[kgf.mm/deg]	[mm]	[mm]	[mm]	[mm]	[mm]	(mm)	(mm)	(mm ²)	(kg)
250	MGWS-0250-012-20	12	380	14962.75	273.0	160	7.1	425	515	260.3	296.3	60830	96.7
250	MGWS-0250-025-20	25	490	6801.22	273.0	160	7.1	425	515	260.3	296.3	60830	110.5
300	MGWS-0300-008-20	8	380	30607.85	323.9	180	8.0	480	570	311.2	349.2	85634	106.8
300	MGWS-0300-015-20	15	450	17004.38	323.9	180	8.0	480	570	311.2	349.2	85634	116.2
350	MGWS-0350-007-20	7	380	39959.79	355.6	185	8.0	510	610	343.0	381.0	102922	130.9
350	MGWS-0350-013-20	13	450	22199.89	355.6	185	8.0	510	610	343.0	381.0	102922	140.6
400	MGWS-0400-010-20	10	415	45668.67	406.4	220	10.0	600	720	393.9	443.9	137819	212.7
400	MGWS-0400-019-20	19	510	24775.71	406.4	220	10.0	600	720	393.9	443.9	137819	235.4
450	MGWS-0450-009-20	9	450	64981.22	457.2	220	10.0	655	785	441.5	494.5	172021	265.9
450	MGWS-0450-017-20	17	550	36100.71	457.2	220	10.0	655	785	441.5	494.5	172021	292.1
500	MGWS-0500-012-20	12	490	81412.75	508.0	220	10.0	700	830	486.5	541.5	207499	290.5
500	MGWS-0500-017-20	17	550	58151.93	508.0	220	10.0	700	830	486.5	541.5	207499	306.2
550	MGWS-0550-011-20	11	490	104057.14	559.0	225	10.0	755	885	537.8	592.8	250985	325.4
550	MGWS-0550-015-20	15	550	74326.53	559.0	225	10.0	755	885	537.8	592.8	250985	343.2
600	MGWS-0600-012-20	12	535	130934.89	609.6	225	11.0	810	950	586.6	651.6	301031	426.4
600	MGWS-0600-018-20	18	615	93524.89	609.6	225	11.0	810	950	586.6	651.6	301031	454.6



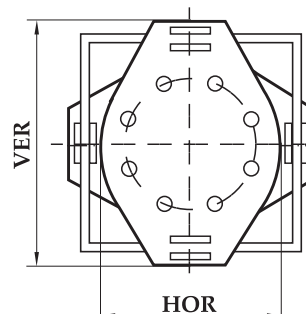
Gimbal expansion joints with gimbal unit and Fixed Flange ends



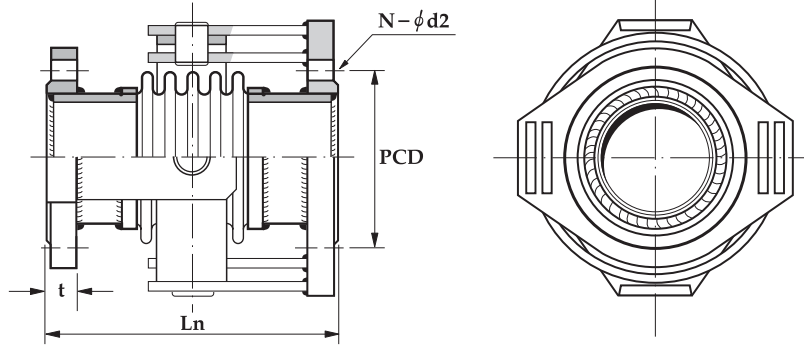
■ Design Pressure

150Lbf/in²

DN	TYPE	Movement	Ln	Spring rates	Flanges acc. to ANSI B 16.5				Dimensions		Bellows		Bellows areas	Weight Approx
		+/-ANG		ANG	t	PCD	N	φ d2	HOR	VER	Di	Do		
		(deg)	(mm)	[kgf.mm/deg]	[mm]	[mm]	[EA]	[mm]	[mm]	[mm]	(mm)	(mm)	(mm ²)	(kg)
40	MGFS-0040-015-10	15	95	106.12	17.5	98.4	4	16	150	215	40.5	57.7	1893	3.9
40	MGFS-0040-020-10	20	170	49.48	17.5	98.4	4	16	150	215	40.5	57.7	1893	4.3
50	MGFS-0050-015-10	15	95	181.63	19.5	120.6	4	20	165	230	52.5	69.7	2932	4.4
50	MGFS-0050-020-10	20	170	84.79	19.5	120.6	4	20	165	230	52.5	69.7	2932	4.7
65	MGFS-0065-015-10	15	90	239.48	22.5	139.7	4	20	185	250	68.3	87.5	4766	5.4
65	MGFS-0065-020-10	20	165	111.73	22.5	139.7	4	20	185	250	68.3	87.5	4766	5.9
80	MGFS-0080-015-10	15	115	480.10	24	152.4	4	20	200	265	79.1	100.9	6362	6.0
80	MGFS-0080-020-10	20	210	224.08	24	152.4	4	20	200	265	79.1	100.9	6362	6.8
100	MGFS-0100-015-10	15	110	753.57	24	190.5	8	20	220	285	104.6	130.2	10825	7.3
100	MGFS-0100-020-10	20	200	351.63	24	190.5	8	20	220	285	104.6	130.2	10825	8.1
125	MGFS-0125-015-10	15	115	1075.20	24	215.9	8	23	250	365	130.2	157.8	16286	20.8
125	MGFS-0125-020-10	20	210	501.73	24	215.9	8	23	250	365	130.2	157.8	16286	19.8
150	MGFS-0150-015-10	15	120	1803.67	25.5	241.3	8	23	285	400	155.0	186.6	22912	23.7
150	MGFS-0150-020-10	20	210	819.79	25.5	241.3	8	23	285	400	155.0	186.6	22912	25.9
200	MGFS-0200-014-10	14	130	3094.89	29.0	298.4	8	23	340	475	206.1	239.7	39022	36.2
200	MGFS-0200-020-10	20	220	1406.83	29.0	298.4	8	23	340	475	206.1	239.7	39022	38.6
250	MGFS-0250-010-10	10	130	5787.24	30.5	361.9	12	26	395	530	260.0	293.6	60176	45.2
250	MGFS-0250-020-10	20	250	2225.91	30.5	361.9	12	26	395	530	260.0	293.6	60176	48.8



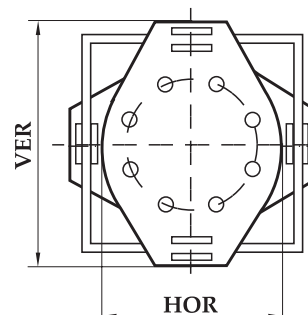
Gimbal expansion joints with gimbal unit and fixed flange ends



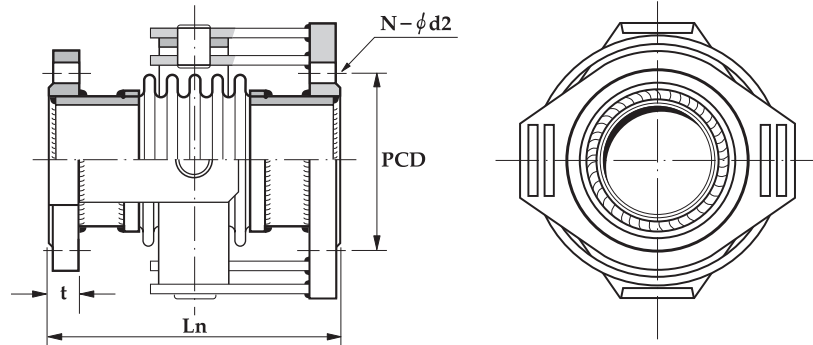
■ Design Pressure

150Lbf/in²

DN	TYPE	Movement	Ln	Springrate	Flanges acc.to ANSI B 16.5				Dimensions		Bellows		Bellow-areas	Weight
		+/-ANG		ANG	t	PCD	N	φ d2	HOR	VER	Di	Do		
		(deg)	(mm)	[kgf.mm/deg]	[mm]	[mm]	[EA]	[mm]	[mm]	[mm]	(mm)	(mm)	(mm ²)	(kg)
300	MGFS-0300-009-10	9	145	12199.28	32	431.8	12	26	445	630	311.1	347.5	85167	88.7
300	MGFS-0300-020-10	20	305	4066.42	32	431.8	12	26	445	630	311.1	347.5	85167	103.4
350	MGFS-0350-008-10	8	145	15961.42	35	476.2	12	29	505	690	342.8	379.2	102354	106.7
350	MGFS-0350-020-10	20	305	5320.51	35	476.2	12	29	505	690	342.8	379.2	102354	121.8
400	MGFS-0400-010-10	10	180	15584.28	37	539.7	16	29	565	760	389.9	437.1	134289	144.5
400	MGFS-0400-020-10	20	345	5993.97	37	539.7	16	29	565	760	389.9	437.1	134289	163.0
450	MGFS-0450-008-10	8	180	27408.46	40	577.8	16	32	615	810	440.5	489.5	169823	167.1
450	MGFS-0450-015-10	15	305	12458.36	43	577.8	16	32	615	810	440.5	489.5	169823	184.1
500	MGFS-0500-011-10	11	220	32153.77	43	635	20	32	670	865	485.4	536.4	205004	190.9
500	MGFS-0500-020-10	20	380	14615.40	43	635	20	32	670	865	485.4	536.4	205004	209.9
600	MGFS-0600-007-10	7	200	85920	43	749.3	20	35	780	985	585.6	645.6	297637	268.4
600	MGFS-0600-020-10	20	405	28640	43	749.3	20	35	780	985	585.6	645.6	297637	297.5
700	MGFS-0700-006-10	6	215	114728.06	71	863.6	24	35	895	1140	687.5	756.5	409415	439.2
700	MGFS-0700-019-10	19	420	38242.65	71	863.6	24	35	895	1140	687.5	756.5	409415	483.3
800	MGFS-0800-005-10	5	225	16329.59	81	978	28	41	1015	1280	789.5	858.5	533267	579.7
800	MGFS-0800-016-10	16	430	54439.79	81	978	28	41	1015	1280	789.5	858.5	533267	627.5
900	MGFS-0900-004-10	4	235	225555.81	90	1085	32	41	1115	1390	890.5	959.5	672006	726.1
900	MGFS-0900-015-10	15	440	75185.30	90	1085	32	41	1115	1390	890.5	959.5	672006	780.4
1000	MGFS-1000-004-10	4	245	303678.06	90	1200	36	41	1230	1515	992.5	1061.5	828382	913.6
1000	MGFS-1000-013-10	13	450	101226.02	90	1200	36	41	1230	1515	992.5	1061.5	828382	974.9



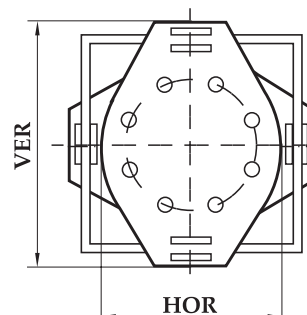
Gimbal expansion joints with gimbal unit and fixed flange ends



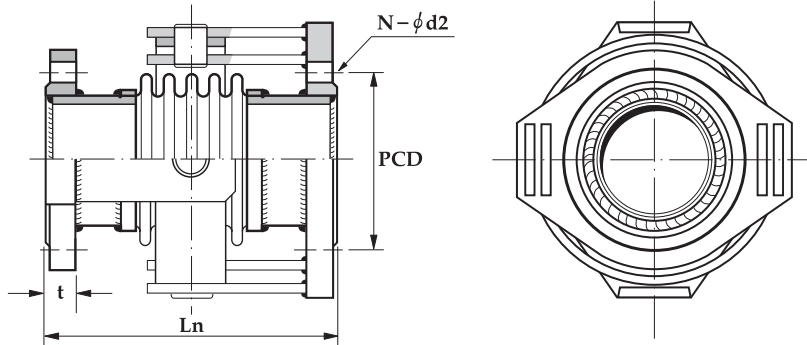
■ Design Pressure

300Lbf/in²

DN	TYPE	Movement	Ln	Springrate	Flanges acc.to ANSI B 16.5			Dimensions		Bellows		Bellow-areas	Weight Approx	
		+/-ANG		ANG	t	PCD	N	φ d2	HOR	VER	Di			Do
		(deg)	(mm)	[kgf.mm/deg]	[mm]	[mm]	[EA]	[mm]	[mm]	[mm]	(mm)	(mm)	(mm ²)	(kg)
40	MGFS-0040-015-20	15	95	148.57	21	114.3	4	23	150	215	40.5	57.7	1893	3.9
40	MGFS-0040-020-20	20	110	82.55	21	114.3	4	23	150	215	40.5	57.7	1893	4.0
50	MGFS-0050-015-20	15	100	417.75	22.5	127	8	20	165	230	52.5	70.3	2961	4.8
50	MGFS-0050-020-20	20	160	160.71	22.5	127	8	20	165	230	52.5	70.3	2961	5.4
65	MGFS-0065-015-20	15	105	534.38	25.5	149.2	8	23	185	260	68.3	88.1	4803	7.8
65	MGFS-0065-020-20	20	145	242.85	25.5	149.2	8	23	185	260	68.3	88.1	4803	8.2
80	MGFS-0080-015-20	15	120	868.36	29.0	168.3	8	23	200	315	79.1	100.7	6348	14.9
80	MGFS-0080-020-20	20	170	394.69	29.0	168.3	8	23	200	315	79.1	100.7	6348	15.8
100	MGFS-0100-015-20	15	125	1650.71	32.0	200	8	23	235	360	104.6	131.0	10899	22.1
100	MGFS-0100-020-20	20	185	750.30	32.0	200	8	23	235	360	104.6	131.0	10899	23.7
125	MGFS-0125-012-20	12	125	2825.30	35.0	234.9	8	23	270	395	130.2	156.6	16151	27.0
125	MGFS-0125-020-20	20	210	1086.63	35.0	234.9	8	23	270	395	130.2	156.6	16151	29.3
150	MGFS-0150-015-20	15	160	4707.65	37.0	269.9	12	23	300	425	155.0	186.2	22859	32.6
150	MGFS-0150-020-20	20	245	2139.79	37.0	269.9	12	23	300	425	155.0	186.2	22859	35.4



Gimbal expansion joints with gimbal unit and fixed flange ends



Design Pressure

300Lbf/in²

DN	TYPE	Movement	Ln	Springrate	Flanges acc.to ANSI B 16.5				Dimensions		Bellows		Bellow-areas	Weight Approx
		+/-ANG		ANG	t	PCD	N	φ d2	HOR	VER	Di	Do		
		(deg)	(mm)	[kgf.mm/deg]	[mm]	[mm]	[EA]	[mm]	[mm]	[mm]	(mm)	(mm)	(mm ²)	(kg)
200	MGFS-0200-015-20	15	270	8426.73	41.5	330.2	12	26	360	555	206.2	242.2	39479	93.3
200	MGFS-0200-020-20	20	275	3830.30	41.5	330.2	12	26	360	555	206.2	242.2	39479	96.2
250	MGFS-0250-012-20	12	285	14962.75	48.0	387.3	16	29	425	620	260.3	296.3	60830	115.2
250	MGFS-0250-020-20	20	275	6801.22	48.0	387.3	16	29	425	620	260.3	296.3	60830	118.2
300	MGFS-0300-008-20	8	295	30607.85	51.0	450.8	16	32	485	690	311.2	349.2	85634	144.7
300	MGFS-0300-015-20	15	245	17004.38	51.0	450.8	16	32	485	690	311.2	349.2	85634	145.2
350	MGFS-0350-007-20	7	310	39959.79	54.0	514.3	20	32	555	770	343.0	381.0	102922	193.8
350	MGFS-0350-013-20	13	255	22199.89	54.0	514.3	20	32	555	770	343.0	381.0	102922	194.3
400	MGFS-0400-010-20	10	365	45668.67	57.5	571.5	20	35	620	885	393.9	443.9	137819	312.6
400	MGFS-0400-019-20	19	325	24775.71	57.5	571.5	20	35	620	885	393.9	443.9	137819	316.6
500	MGFS-0500-012-20	12	440	81412.75	63.5	685.8	24	35	730	1005	486.5	541.5	207499	416.6
500	MGFS-0500-017-20	17	345	58151.93	63.5	685.8	24	35	730	1005	486.5	541.5	207499	414.7
600	MGFS-0600-012-20	12	485	130934.89	70.0	812.8	24	42	845	1120	586.6	651.6	301031	582.0
600	MGFS-0600-018-20	18	420	93524.89	70.0	812.8	24	42	845	1120	586.6	651.6	301031	585.4

