





GLOBAL LEADER IN FLEXIBLE TECHNOLOGY

 **GLOBALIZATION** We will transcend the Korean market and become a globally renowned company.

 **LEADER** We will become the best leading company with an enterprising spirit and no fear of failure.

 **TECHNOLOGY** We will become an innovative company specialized in using our unrivaled technological capacities.

 **FLEXIBILITY** We will make the best products with flexible thinking and responses.

Government / Public Institution Designation Status / Certifications

Ministry Commerce and Industry	National Institute of Technology and Quality	Korea Electric Power Corporation	POSCO	Affiliated organizations	Certifications
Shipbuilding equipment integration business	KS mark licensed factory of an approved company for heat-using equipment types	Designated company for the localization of generator materials	Designated company for the localization of steel equipment and materials	Korea Metal Industry Cooperative, Korea Industrial Standards Association	ISO9001(DNV) BV-GL-DNV classification U-STAMPKEPIC

INTRODUCTION




SJM has been leading the domestic bellows industry with a sustained commitment towards developing innovative technology since its foundation in 1975.

Using solutions for thermal expansion, vibration, noise, airtightness, etc. of piping systems developed in-house thanks to sustained research and development efforts, SJM supplies the following products to specialized fields of industry and construction: flexible coupling for automobile exhaust pipes; precision bellows for precision instruments such as semiconductor medical equipment and aircraft; construction expansion joints used for HVAC of large-scale residential facilities and high-rise buildings; industrial expansion joint for shipbuilding, petro-chemical applications, power generation, LNG, etc. In addition, based on overseas networks established in Europe, Americas, China, Southeast Asia, and Africa, we are providing prompt service for customer satisfaction.




Based on SJM's 100% in-house technology and management method based on accumulated knowledge and experience, we are moving forward vigorously to the future by building a global management and network, and we will do our role and calling in new Bellows application field technology with young talent in the future.



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CEO
Kim Hwi-joong



Established
1975.03.20



KOSPI listed company

HISTORY

SJM, which has continued to develop since its inception in 1975, has led the domestic BELOWS industry.

70'S

- 1975.** 03.20 Established Sungjin Machinery Co., Ltd.
- 1975.** 07.01 Commenced first localized production of bellows.
- 1976.** 05.19 Developed and commenced production of piping expansion joints (bellows type expansion joint).
- 1977.** 04.30 Successfully tested pipe expansion joints for shipbuilding equipment.
- 1979.** 11.01 Opened a new factory and relocated to the Banwol Industrial Complex.

80'S

- 1980.** 06.30 Obtained approval for manufacturing expansion joints for ships from the US, British, and Norwegian Registers.
- 1981.** 04.01 Selected as a major technology company by the Industrial Promotion Administration.
- 1982.** 06.17 Acquired KS mark for the expansion joint.
- 1985.** 09.01 Established a joint venture with Calsonic, Japan / CKI
- 1990.** 06.20 Successfully localized expansion joints (Q-class) for nuclear power points for the first time in Korea.

90'S

- 1991.** 08.16 Established a joint venture in Malaysia SJM FLEX(M) SDN, BHD.
- 1992.** 04.01 Developed and commenced supply of a new product for pressurized water suppliers (Water Power).
- 1995.** 12.26 Opened the technology research center.
- 1996.** 11.08 Renamed the company to SJM Co., Ltd.
- 1996.** 12.20 Obtained an ISO-9001 certification.
- 1997.** 02.12 Listed on the stock exchange.
- 1997.** 06.26 Established a subsidiary in Germany / SJM. GmbH.
- 1997.** 08.13 Established a subsidiary in South Africa / SJM FLEX SA(Pty) LTD
- 1997.** 10.16 Acquired Seohwa Information Communication Co., Ltd.
- 1997.** 11.26 Obtained a QS-9000 certification.
- 2001.** 06.05 Established a subsidiary in the US / SJM NA Inc.

2000'S

- 2002.** 01.17 Obtained the U-Stamp certification from the American Society of Mechanical Engineers (ASME).
- 2002.** 08.16 Successfully localized expansion joints for LNG carriers.
- 2003.** 07.15 Obtained KEPIC certification for nuclear technology standards.
- 2004.** 01.16 Opened the dedicated technology research building.
- 2004.** 11.26 Awarded the 20 Million Dollar Export Tower.
- 2005.** 02.26 Obtained an ISO/TS 16949 certification.
- 2006.** 03.28 Established a subsidiary in China.
- 2010.** 05 New SJM corporation established (division of personnel)
- 2011.** 04 Established SJM Freewell.
- 2012.** 02 Established a local corporation in China.
- 2015.** 03 Established a branch office in Shanghai / SHANGHAI SJM.
- 2015.** 03 Established an independent subsidiary in Mexico / SJM FLEX DE MEXICO.
- 2015.** 05 Established a subsidiary in Japan / SJM JAPAN OFFICE.
- 2018.** 02 Obtained a IATF 16949 certification.
- 2019.** 05 Established a subsidiary in Morocco / SJMFLEX MOROCCO SARL AU
- 2021.** 01 Signed an Memorandum of Understanding with MH
- 2021.** 05 Established a joint venture with MH / SJMH EV

EXPANSION JOINT & PUMP CONNECTOR



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TECHNOLOGY**

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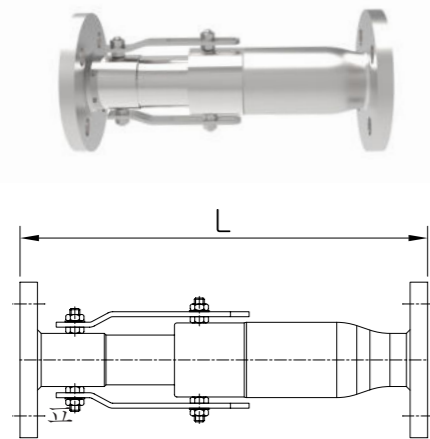
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EXPANSION JOINT SJS · SJD

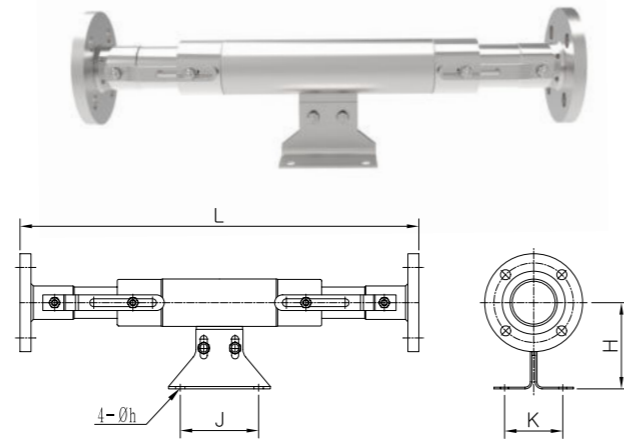
SLIP JOINT

A slip joint simultaneously absorbs pipe displacement caused by heat, and pipe displacement caused by the shortening of a building. A slip joint is used for the piping in air conditioning units (cold and hot water piping, fan coil piping), sanitation and water supply systems (water supply, hot water supply, hot water recirculation), and fire extinguishing systems installed in buildings. In particular, a slip joint is suited for pipes with a small diameter, such as copper pipes and stainless-steel pipes for general piping (KS D 3595, aka Su pipes), and pipes that are on the thinner side. When a pipe expands, the friction force caused by the slip joint's packing agent is low, preventing the pipe from bending.

Single Type



Double Type



Single Detail

(Unit : mm)

Double Detail

(Unit : mm)

N.D	Expansion / Overall (L)	
	50TR	100TR
20A	320	430
25A	320	430
32A	320	430
40A	330	440
50A	330	440
65A	340	450
80A	360	470
100A	450	560
125A	475	585
150A	525	635
200A	560	670
250A	615	725
300A	730	840
350A	765	875

N.D	Expansion / Overall (L)		Size			
	50TR (50+50)	100TR (100+100)	H	J	K	h
20A	570	790	100	100	60	12
25A	570	790	100	100	60	12
32A	570	790	120	100	70	12
40A	570	790	120	100	70	12
50A	580	800	130	100	80	15
65A	585	805	140	120	100	15
80A	595	815	150	120	110	15
100A	750	970	170	120	130	19
125A	775	995	200	120	150	19
150A	850	1,070	220	160	180	23
200A	935	1,155	250	160	220	25
250A	985	1,205	300	180	280	27
300A	1,000	1,220	350	200	300	27
350A	1,015	1,235	450	250	350	33

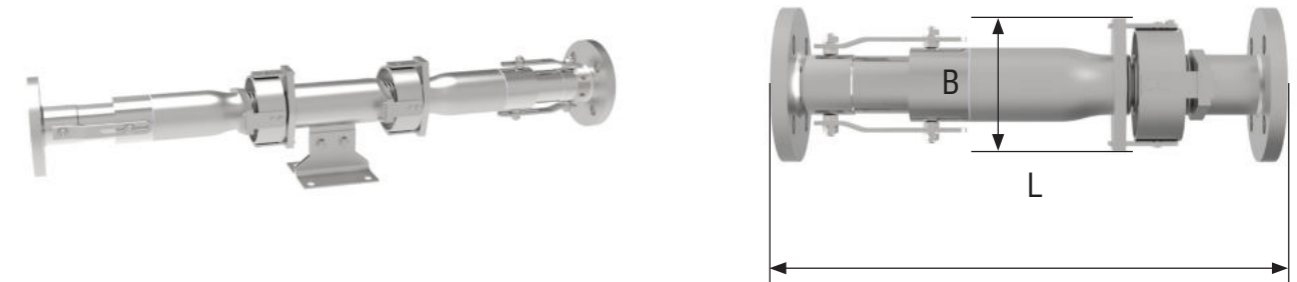
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EXPANSION JOINT MJS · MJD

MULTI JOINT

A multi joint is a composite product featuring a slip joint and a gimbal bellows. It simultaneously absorbs the pipe displacement from expansion caused by heat, shortening of a building, turbulence, and pipe displacement caused by an earthquake. A multi joint is used for the piping in air conditioning units (cold and hot water piping, fan coil piping), sanitation and water supply systems (water supply, hot water supply, hot water recirculation), and fire extinguishing systems installed in buildings. In particular, a multi joint is suited for pipes with a small diameter, such as copper pipes and stainless-steel pipes for general piping (KS D 3595, aka Su pipes), and pipes that are on the thinner side. When a pipe expands, the friction force caused by the slip joint's packing agent is low, preventing the pipe from bending.

Product Image



Product Detail

(Unit : mm)

N.D	100TR		
	L	B	θ°
20A	670	160	5° / 10°
25A	670	160	5° / 10°
32A	670	160	5° / 10°
40A	700	160	5° / 10°
50A	720	175	5° / 10°
65A	770	200	5° / 10°
80A	770	210	5° / 10°
100A	840	225	5° / 10°
125A	890	290	5° / 10°
150A	890	315	5° / 10°
200A	1020	360	5° / 10°
250A	1075	515	5° / 10°
300A	1280	590	5° / 10°

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Durability Test



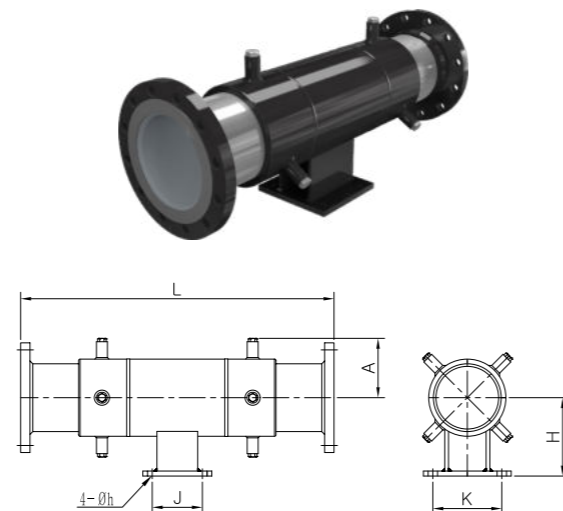
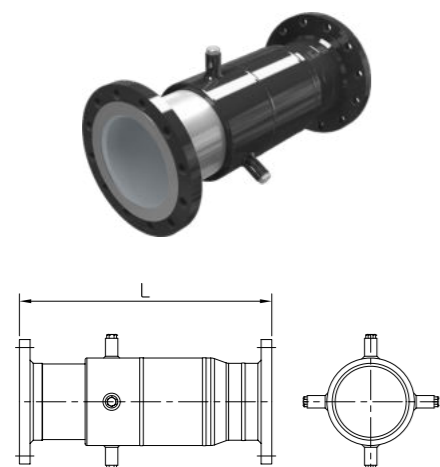
EXPANSION JOINT IJS · IJD

INJECTION SLIP JOINT

An injection slip joint simultaneously absorbs pipe displacement caused by heat, and pipe displacement caused by the shortening of a building. An injection slip joint is used for fire extinguishing pipes, steam pipes, and medium-temperature water supply pipes installed in buildings. An injection slip joint has a smaller diameter, like a copper pipe or stainless-steel pipe for general piping (KS D 3595, aka Su pipe), since the friction force is greater than the internal pressure slip joint when expanding in the axial direction. An injection slip joint is also not suitable for thin pipes.

Single Type

Double Type



Single Detail

(Unit : mm)

Double Detail

(Unit : mm)

N.D	Expansion / Overall (L)	
	100TR	200TR
ISJD-20	585	785
ISJD-25	585	785
ISJD-32	585	785
ISJD-40	585	785
ISJD-50	585	785
ISJD-65	610	810
ISJD-80	620	820
ISJD-100	655	855
ISJD-125	677	877
ISJD-150	720	877
ISJD-200	725	925
ISJD-250	780	980
ISJD-300	935	1135
ISJD-350	935	1155

N.D	Expansion / Overall (L)		Size				
	200TR (100+100)	400TR (200+200TR)	A	H	J	K	h
ISJD-20	1010	1260	40	100	110	110	12
ISJD-25	1010	1260	40	100	110	110	12
ISJD-32	1010	1260	40	100	110	110	12
ISJD-40	1060	1310	40	110	110	110	12
ISJD-50	1060	1310	50.5	110	110	110	15
ISJD-65	1100	1350	60	120	100	100	15
ISJD-80	1100	1350	63.5	132	130	120	15
ISJD-100	1140	1390	75	140	130	130	19
ISJD-125	1140	1390	88.5	150	160	160	19
ISJD-150	1230	1480	108.5	160	160	160	23
ISJD-200	1330	1580	136	185	200	200	25
ISJD-250	1330	1580	161.5	305	210	250	27
ISJD-300	1370	1620	202.5	330	230	300	27
ISJD-350	1380	1630	203	350	240	320	33

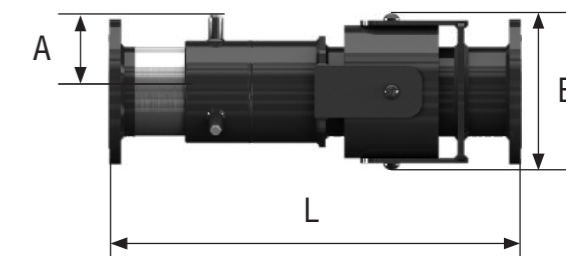
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EXPANSION JOINT IMS · IMD

INJECTION MULTI JOINT

An injection multi joint is a composite product featuring an injection slip joint and a gimbal bellows. It simultaneously absorbs the pipe displacement from expansion caused by heat, shortening of a building, turbulence, and pipe displacement caused by an earthquake. An injection slip joint is used for fire extinguishing pipes, steam pipes, and medium-temperature water supply pipes installed in buildings. An injection slip joint has a smaller diameter, like a copper pipe or stainless-steel pipe for general piping (KS D 3595, aka Su pipe), since the friction force is greater than the internal pressure slip joint when expanding in the axial direction. An injection slip joint is also not suitable for thin pipes.

Product Image



Product Detail

(Unit : mm)

Durability Test

N.D	100TR			θ°
	L	A	B	
20A	790	110	130	10°
25A	790	110	130	10°
32A	790	110	140	10°
40A	790	110	145	10°
50A	790	120	150	10°
65A	825	120	185	10°
80A	825	135	210	10°
100A	870	145	235	10°
125A	870	160	280	10°
150A	965	180	315	10°
200A	1000	200	410	10°
250A	1100	230	500	10°
300A	1250	275	590	10°



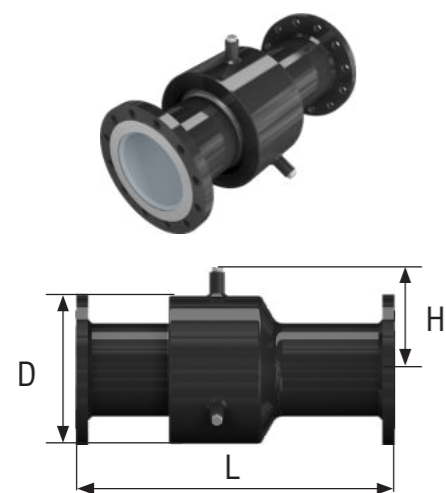
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EXPANSION JOINT IBJ

INJECTION BALL JOINT

An injection ball joint is mainly used for horizontal piping, including in a blueprint. It absorbs the expansion of a pipe in the direction perpendicular to the axis. An injection ball joint has little repulsive power because it bends when expanding. Also, since the product itself absorbs the pressure thrust generated in the pipe, when installing an anchor, only the flexural torque value and the guide friction force of the pipe need to be considered for the acting force on the anchor. Here, the acting force on the anchor is small. As such, the safety of the building can be secured, and construction cost can be drastically reduced by simplifying the structure of the anchor.

Product Image



Recharge Fitting Orientation

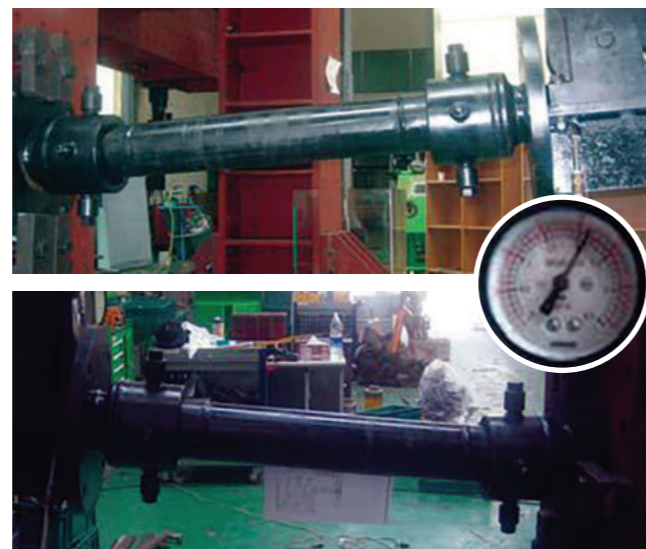
SIZE			
	20A ~ 100A	125A ~ 150A	200A ~ 250A
SIZE			
	300A ~ 350A	400A ~ 450A	500A ~ 700A

Product Detail

(Unit : mm)

N.D	L	H	D	ø°
20A	160	110.5	87	30
25A	160	110.5	87	30
32A	160	117.5	101	30
40A	160	117.5	101	30
50A	175	123	112	30
65A	175	123	112	30
80A	220	139.5	145	15
100A	235	152	170	15
125A	290	177	220	15
150A	340	193.5	253	15
200A	375	218.5	303	15
250A	375	243.5	353	15
300A	420	270	406	15

Durability Test



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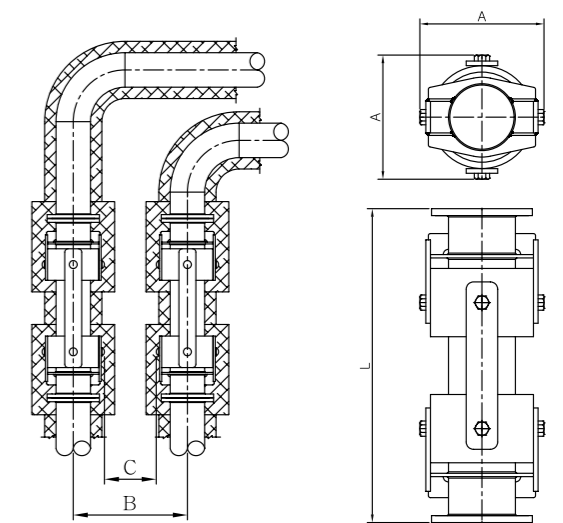
EXPANSION JOINT CBHS · CBHD

CB JOINT "H" TYPE

Product Image



Dimensions



Product Detail

(Unit : mm)

N.D	Pressure (Kg/cm ²)	Overall length(mm)		Movement		A (mm)	Separation distance(mm)		Force acting on an anchor (kg)
		CBHS	CBHD	Single type(θ)	Double type(mm)		B(Min.)	C(Min.)	
20A	10	330	700	5	50	105	305	200	7
	20	330	900	5	100				6
25A	10	330	700	5	50	105	305	200	7
	20	330	900	5	100				6
32A	10	350	700	5	50	125	320	200	7
	20	350	900	5	100				6
40A	10	350	700	5	50	135	335	200	14
	20	350	900	5	100				12
40A	10	350	700	5	50	135	335	200	14
	20	350	900	5	100				12

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EXPANSION JOINT CBUDSS

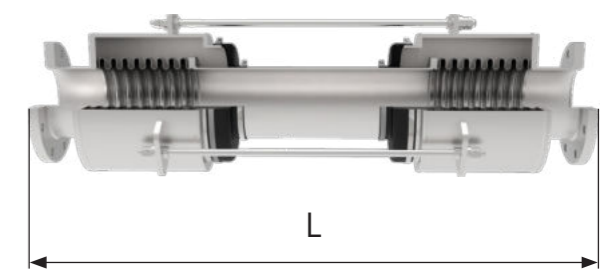
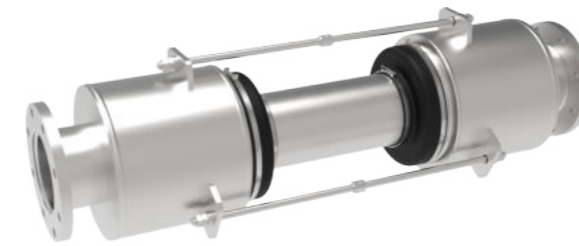
UNDER GROUND JOINT

N.D	Pressure (Kg/cm ²)	Overall length(mm)		Movement		A (mm)	Separation distance(mm)		Force acting on an anchor (kg)
		CBHS	CBHD	Single type(θ)	Double type(mm)		B(Min.)	C(Min.)	
50A	10	355	700	5	50	150	350	200	20
			900		100				16
50A	20	355	700	5	50	150	350	200	14
			900		100				12
65A	10	365	700	5	50	175	375	200	15
			900		100				12
65A	20	365	700	5	50	175	375	200	22
			900		100				18
80A	10	375	700	5	50	200	400	200	47
			900		100				35
80A	20	375	700	5	50	200	400	200	62
			900		100				45
100A	10	395	960	5	50	212	425	200	18
			1210		100				17
100A	20	395	960	5	50	225	425	200	24
			1210		100				22
125A	10	530	1035	5	50	280	485	200	26
			1300		100				24
125A	20	530	1035	5	50	290	485	200	63
			1300		100				58
150A	10	540	1050	5	50	320	530	200	76
			1350		100				61
150A	20	540	1050	5	50	330	530	200	112
			1350		100				90
200A	10	610	1100	5	50	385	610	200	178
			1400		100				146
200A	20	610	1100	5	50	410	610	200	329
			1400		100				271
250A	10	695	1150	5	50	470	700	200	290
			1450		100				232
250A	20	695	1150	5	50	510	700	200	486
			1450		100				388
300A	10	710	1310	5	50	565	795	200	417
			1610		100				382
300A	20	900	1500	5	50	595	795	200	945
			1800		100				866
350A	10	710	1310	5	50	605	850	200	505
			1610		100				463
350A	20	900	1550	5	50	645	850	200	1168
			1850		100				1070
400A	10	980	1580	5	50	667	925	200	665
			1880		100				610
400A	20	980	1580	5	50	720	925	200	1489
			1880		100				1365
450A	10	1050	1650	5	50	767	1030	200	755
			1950		100				725
450A	20	1050	1650	5	50	830	1030	200	1727
			1950		100				1658
500A	10	1050	1650	5	50	832	1100	200	650
			1950		100				912
500A	20	1050	1650	5	50	900	1100	200	2212
			1950		100				2124

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An under ground joint absorbs expansion caused by subsidence between structures, subsidence between roads and pipes, and subsidence between different buildings.

Product Image

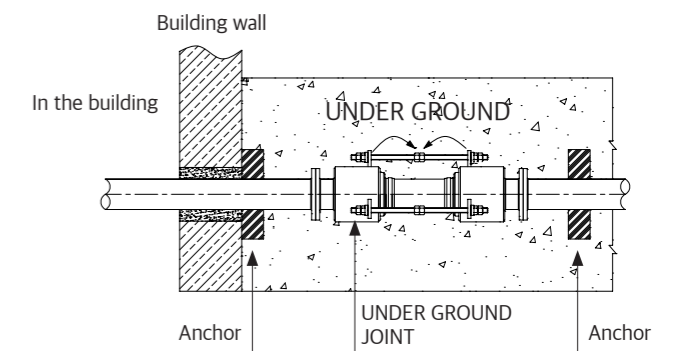


Product Detail

(Unit : mm)

N.D	L
25A	1100
32A	1100
40A	1100
50A	1100
65A	1100
80A	1250
100A	1250
125A	1250
150A	1250
200A	1350
250A	1350
300A	1350

Under Ground Joint



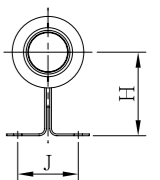
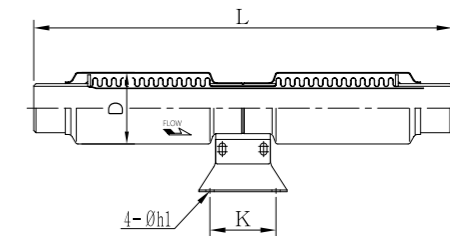
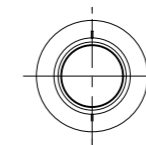
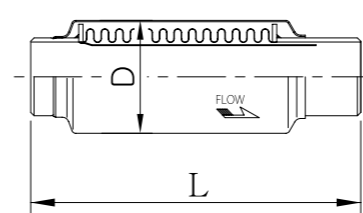
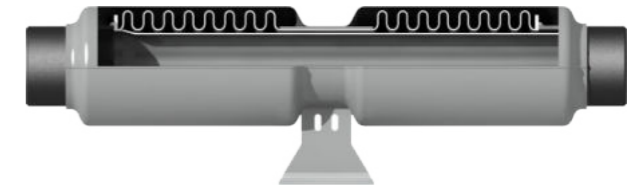
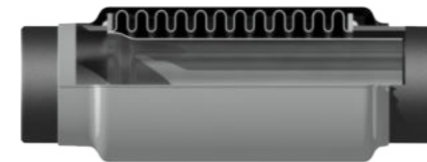
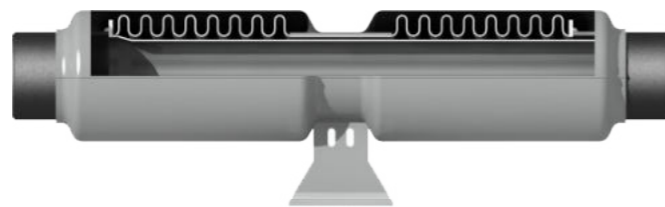
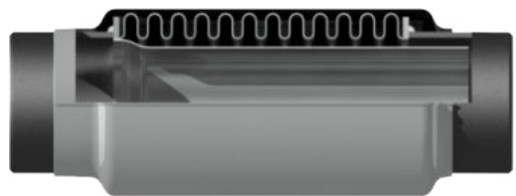
- ※ Install the product, then loosen the inner nut of the tie rod.
- ※ Overall length (L) may vary depending on the extent of expansion.
- ※ Specifications of 350A or more can be made to order.
- ※ The above length is based on a LATERAL 50mm specification.

EXPANSION JOINT WELDED TYPE

For carbon steel piping

Single Type

Double Type



Single Type

Double Type

Specification

(Unit : mm)

TYPE	Single		Double	
	Model No.	JBS - 10W	JBS - 20W	JBD - 10W
Max. pressure(Kgf/cm ²)	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]
Max. temperature(°C)	Max.220			
Connection type	Butt - Weid			
Material	Bellows(STS304), Sleeve(STS304), Pipe(Carbon steel)			
Applicable fluid	Steam, Air, Gases, Water & Oils			
Max. movement(mm)	Max.40(-30, +10)		Max.80(-60, +20)	
Application Code & standard	KS B 1536	MFG.STD	KS B 1536	MFG.STD

Single Detail

(Unit : mm)

N.D	L	D	Weight (kg)	
			10K	20K
20A	365	49.6	3.5	3.5
25A	365	54	3.3	3.5
32A	365	60.5	4.2	4.4
40A	365	70	4.5	4.7
50A	365	90	5.7	5.9
65A	415	102	8	8.8
80A	415	130	9.5	13.6
100A	415	155	13	16.5
125A	440	190	18	19.7
150A	440	228	23	33.7
200A	440	318.5	39.6	61.2
250A	465	355.6	56.9	89.2
300A	465	457.2	63	118.3
350A	465	457.2	84	158.8
400A	490	508	104.4	201.3
450A	490	558.8	128.2	255.9
500A	490	609.6	146.5	300.4

Double Detail

(Unit : mm)

N.D	L	D	H	J	K	h1	Weight (kg)	
							10k	20k
20A	680	49.6	100	60	100	12	5.5	5.8
25A	680	54	100	60	100	12	5.5	5.8
32A	680	60.5	120	70	100	12	6.5	6.9
40A	680	70	120	70	100	12	7.4	8.0
50A	680	90	130	80	100	15	9	9.4
65A	780	102	140	100	120	15	12.5	13.6
80A	780	130	150	110	120	15	15.7	19.8
100A	880	155	170	130	120	19	23.2	26.8
125A	880	190	200	150	120	19	28.8	36.8
150A	930	228	220	180	160	23	38.5	62.8
200A	930	318.5	250	220	160	25	74.1	98.2
250A	980	355.6	300	280	180	27	100.2	153.8
300A	980	457.2	350	300	200	27	112	204.0
350A	1030	457.2	450	350	250	33	150	264.7
400A	1030	508	500	400	300	33	174.2	330.0
450A	1080	558.8	550	450	350	39	217	420.9
500A	1080	609.6	600	500	400	39	270	484.0

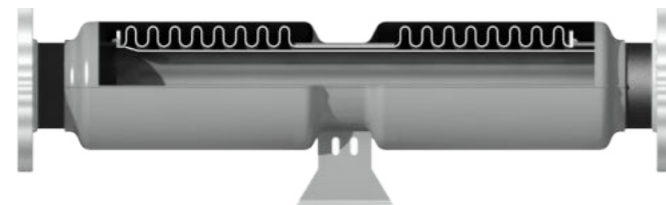
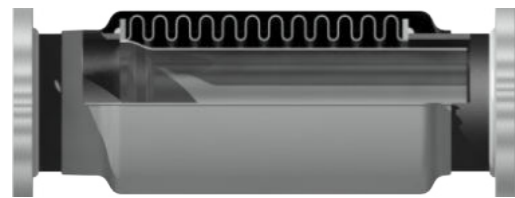
※ To adjust the height (H), please contact SJM.

EXPANSION JOINT FLANGED TYPE

For carbon steel piping

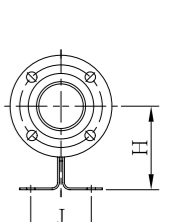
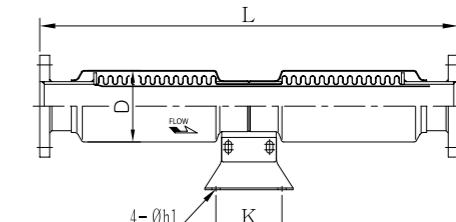
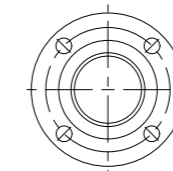
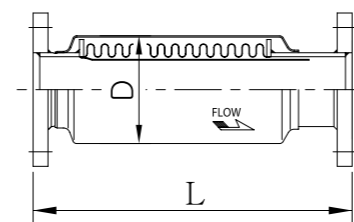
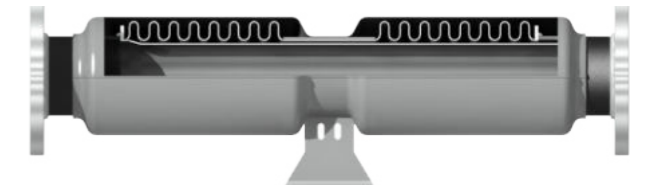
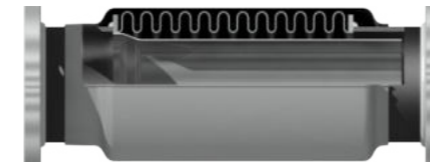
Single Type

Double Type



Dimensions

JBS-10F, JBS-20F Single Type | JBD-10F, JBD-20F Double Type



Single Type

Double Type

Specification

(Unit : mm)

TYPE	Single		Double	
	Model No.	JBS - 10F	JBS - 20F	JBD - 10F
Max. pressure(Kgf/cm ²)	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]
Max. temperature(°C)	Max.220			
Connection type	Flanged			
Material	Bellows(STS304), Sleeve(STS304), Pipe & Flange(Carbon steel)			
Applicable fluid	Steam, Air, Gases, Water & Oils			
Max. movement(mm)	Max.40(-30, +10)		Max.80(-60, +20)	
Application Code & standard	KS B 1536	MFG.STD	KS B 1536	MFG.STD

Single Detail

(Unit : mm)

N.D	L	D	Weight (kg)	
			10K	20K
20A	365	49.6	3.5	3.6
25A	365	54	3.5	3.6
32A	365	60.5	4.4	4.6
40A	365	70	4.7	5.0
50A	365	90	5.9	6.0
65A	415	102	8.2	9.1
80A	415	130	9.8	13.9
100A	415	155	13.2	16.8
125A	440	190	18.4	20.0
150A	440	228	23.4	34.0
200A	440	318.5	39.8	59.6
250A	465	355.6	57.1	88.8
300A	465	457.2	71.6	108.4
350A	465	457.2	85.4	147.4
400A	490	508	114.4	187.4
450A	490	558.8	131.0	238.4
500A	490	609.6	147.2	280.4

Double Detail

(Unit : mm)

N.D	L	D	H	J	K	h1	Weight (kg)	
							10k	20k
20A	680	49.6	100	60	100	12	5.7	6.0
25A	680	54	100	60	100	12	5.7	6.0
32A	680	60.5	120	70	100	12	6.7	7.0
40A	680	70	120	70	100	12	7.6	8.2
50A	680	90	130	80	100	15	9.2	9.6
65A	780	102	140	100	120	15	12.7	13.8
80A	780	130	150	110	120	15	15.9	20.0
100A	880	155	170	130	120	19	23.4	27.0
125A	880	190	200	150	120	19	29.0	37.0
150A	930	228	220	180	160	23	40.0	53.0
200A	930	318.5	250	220	160	25	74.3	98.1
250A	980	355.6	300	280	180	27	100.4	153.3
300A	980	457.2	350	300	200	27	113.6	185.4
350A	1030	457.2	450	350	250	33	151.4	238.4
400A	1030	508	500	400	300	33	179.4	300.4
450A	1080	558.8	550	450	350	39	218.0	282.4
500A	1080	609.6	600	500	400	39	255.2	440.4

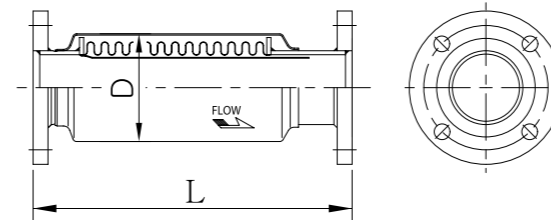
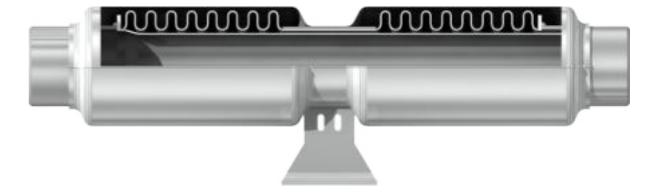
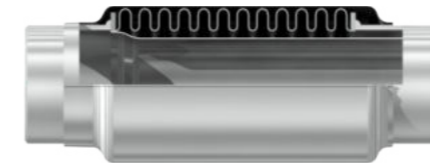
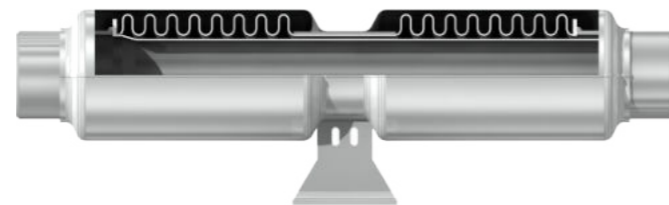
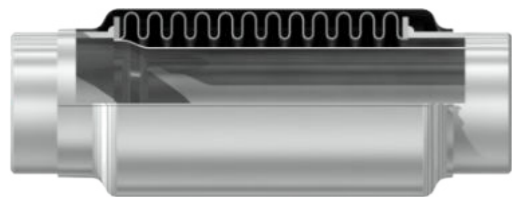
※ To adjust the height (H), please contact SJM.

EXPANSION JOINT WELDED TYPE

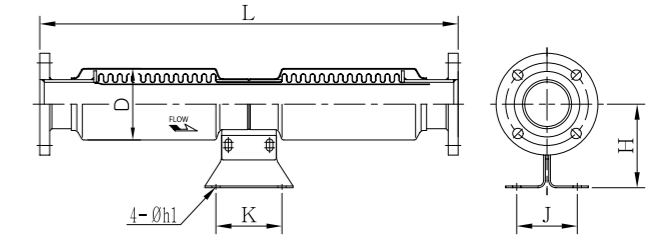
For stainless steel piping

Single Type

Double Type



Single Type



Double Type

Specification

(Unit : mm)

TYPE	Single		Double	
	Model No.	JBSTS - 10W	JBSTS- 20W	JBSTD-10W
Max. pressure(Kgf/cm ²)	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]
Max. temperature(°C)	Max.220			
Connection type	Butt - Weid			
Material	Bellows(STS304), Sleeve(STS304), Pipe(Stainless steel)			
Applicable fluid	Steam, Air, Gases, Water & Oils			
Max. movement(mm)	Max.40(-30, +10)		Max.80(-60, +20)	
Application Code & standard	KS B 1536	MFG.STD	KS B 1536	MFG.STD

Single Detail

(Unit : mm)

N.D	L	D	Weight (kg)	
			10K	20K
20A	365	49.6	1.0	1.1
25A	365	54	1.0	1.1
32A	365	60.5	1.2	1.4
40A	365	70	1.3	1.5
50A	365	90	1.8	2.2
65A	415	102	2.5	3.8
80A	415	130	4.3	5.4
100A	415	155	6.8	7.3
125A	440	190	8.5	8.8
150A	440	228	11.4	14.5
200A	440	318.5	25.4	32.5
250A	465	355.6	32.4	41.6
300A	465	457.2	35.0	62.0
350A	465	457.2	47.0	79.0
400A	490	508	54.0	91.0
450A	490	558.8	61.0	110.0
500A	490	609.6	70.0	125.0

Double Detail

(Unit : mm)

N.D	L	D	H	J	K	h1	Weight (kg)	
							10k	20k
20A	680	49.6	100	60	100	12	2.8	3.3
25A	680	54	100	60	100	12	2.8	3.3
32A	680	60.5	120	70	100	12	3.3	3.7
40A	680	70	120	70	100	12	3.7	4.3
50A	680	90	130	80	100	15	4.5	5.5
65A	780	102	140	100	120	15	7.0	8.4
80A	780	130	150	110	120	15	10.5	12.6
100A	880	155	170	130	120	19	16.6	17.6
125A	880	190	200	150	120	19	18.7	23.8
150A	930	228	220	180	160	23	25.0	32.8
200A	930	318.5	250	220	160	25	59.7	71.1
250A	980	355.6	300	280	180	27	75.8	106.2
300A	980	457.2	350	300	200	27	84.0	148.0
350A	1030	457.2	450	350	250	33	115.0	185.0
400A	1030	508	500	400	300	33	123.0	220.0
450A	1080	558.8	550	450	350	39	150.0	275.0
500A	1080	609.6	600	500	400	39	194.0	309.0

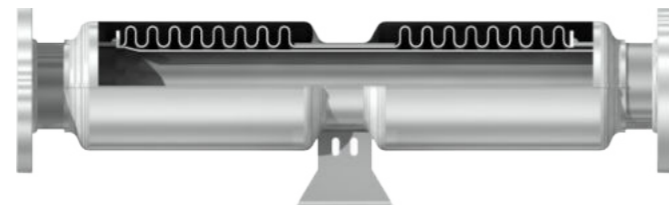
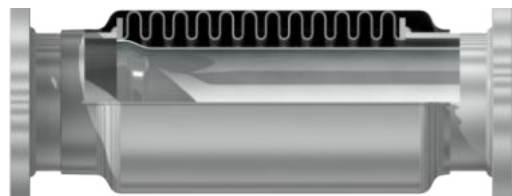
※ To adjust the height (H), please contact SJM.

EXPANSION JOINT FLANGED TYPE

For stainless steel piping

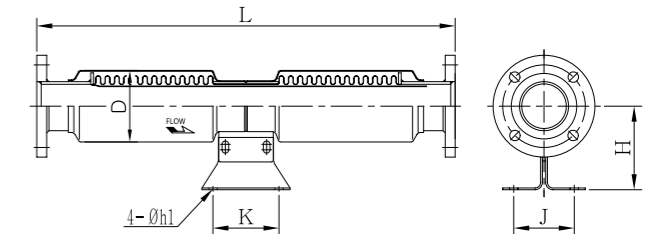
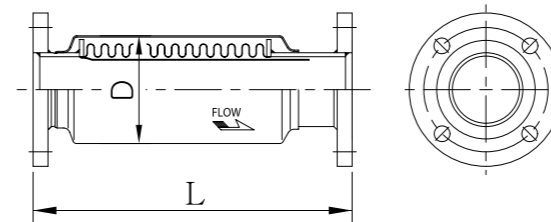
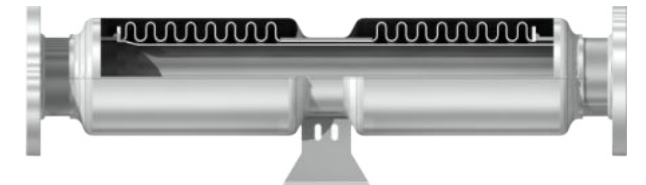
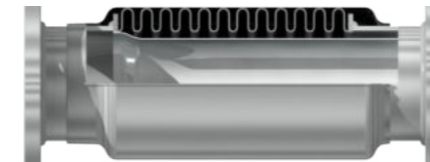
Single Type

Double Type



Dimensions

JBSTS-10F, JBSTS-20F Single Type | JBSTD-10F, JBSTD-20F Double Type



Single Type

Double Type

Specification

(Unit : mm)

TYPE	Single		Double	
	Model No.	JBSTS - 10F	JBSTS- 20F	JBSTD-10W
Max. pressure(Kgf/cm ²)	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]
Max. temperature(°C)	Max.220			
Connection type	Flanged			
Material	Bellows(STS304), Sleeve(STS304), Pipe(Stainless steel)			
Applicable fluid	Steam, Air, Gases, Water & Oils			
Max. movement(mm)	Max.40(-30, +10)		Max.80(-60, +20)	
Application Code & standard	KS B 1536	MFG.STD	KS B 1536	MFG.STD

Single Detail

(Unit : mm)

N.D	L	D	Weight (kg)	
			10K	20K
20A	365	49.6	3.3	3.5
25A	365	54	3.3	3.5
32A	365	60.5	4.2	4.4
40A	365	70	4.5	4.7
50A	365	90	5.7	5.9
65A	415	102	8.0	8.8
80A	415	130	9.5	13.6
100A	415	155	13.0	16.5
125A	440	190	18.0	19.7
150A	440	228	23.0	33.7
200A	440	318.5	39.6	61.2
250A	465	355.6	56.9	89.2
300A	465	457.2	63.0	118.3
350A	465	457.2	84.0	158.8
400A	490	508	104.4	201.3
450A	490	558.8	128.2	255.9
500A	490	609.6	146.5	300.4

Double Detail

(Unit : mm)

N.D	L	D	H	J	K	h1	Weight (kg)	
							10k	20k
20A	680	49.6	100	60	100	12	5.5	5.8
25A	680	54	100	60	100	12	5.5	5.8
32A	680	60.5	120	70	100	12	6.5	6.9
40A	680	70	120	70	100	12	7.4	8.0
50A	680	90	130	80	100	15	9.0	9.4
65A	780	102	140	100	120	15	12.5	13.6
80A	780	130	150	110	120	15	15.7	19.8
100A	880	155	170	130	120	19	23.2	26.8
125A	880	190	200	150	120	19	28.8	36.8
150A	930	228	220	180	160	23	38.5	62.8
200A	930	318.5	250	220	160	25	74.1	98.2
250A	980	355.6	300	280	180	27	100.2	153.8
300A	980	457.2	350	300	200	27	112.0	204.0
350A	1030	457.2	450	350	250	33	150.0	264.7
400A	1030	508	500	400	300	33	174.2	330.0
450A	1080	558.8	550	450	350	39	217.0	420.9
500A	1080	609.6	600	500	400	39	270.0	484.0

※ To adjust the height (H), please contact SJM.

EXPANSION JOINT SOCKET TYPE

For stainless steel piping

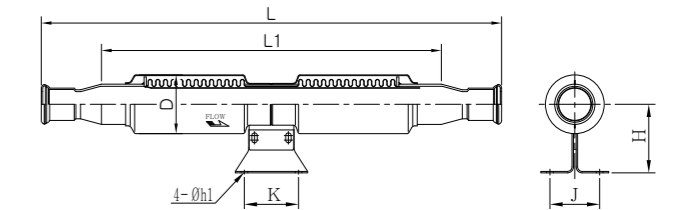
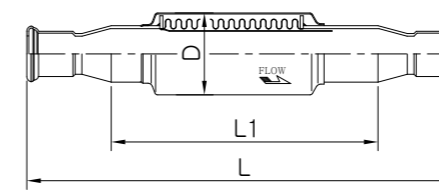
Single Type

Double Type



Dimensions

JBSTS-10SR, JBSTS-20SR Single Type | JBSTD-10SR, JBSTD-20SR Double Type



Single Type

Double Type

Specification

(Unit : mm)

TYPE	Single		Double	
	Model No.	JBSTS - 10SR	JBSTS- 20SR	JBSTD-10W
Max. pressure(Kgf/cm ²)	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]
Max. temperature(°C)	Max.220			
Connection type	Socket Type			
Material	Bellows(STS304), Sleeve(STS304), Pipe(Stainless steel)			
Applicable fluid	Steam, Air, Gases, Water & Oils			
Max. movement(mm)	Max.40(-30, +10)		Max.80(-60, +20)	
Application Code & standard	KS B 1536	MFG.STD	KS B 1536	MFG.STD

Single Detail

(Unit : mm)

N.D	L	L1	D	Weight (kg)	
				10K	20K
20A	443	365	49.6	1.0	1.1
25A	454	365	54	1.0	1.1
32A	484	365	60.5	1.2	1.4
40A	490	365	70	1.3	1.5
50A	512	365	90	1.8	2.2
65A	598	415	102	2.5	3.8
80A	607	415	130	4.3	5.4
100A	611	415	155	6.8	7.3

Double Detail

(Unit : mm)

N.D	L	L1	D	H	J	K	h1	Weight (kg)	
								10k	20k
20A	758	680	49.6	100	60	100	12	2.8	3.3
25A	769	680	54	100	60	100	12	2.8	3.3
32A	799	680	60.5	120	70	100	12	3.3	3.7
40A	805	680	70	120	70	100	12	3.7	4.3
50A	827	680	90	130	80	100	15	4.5	5.5
65A	963	780	102	140	100	120	15	7.0	8.4
80A	972	780	130	150	110	120	15	10.5	12.6
100A	1076	880	155	170	130	120	19	16.6	17.6

※ To adjust the height (H), please contact SJM.

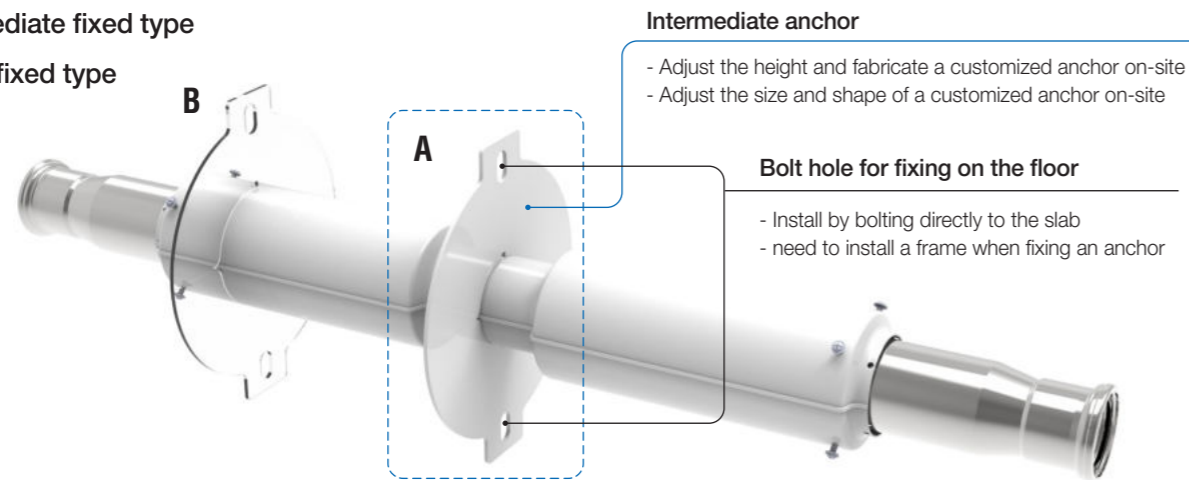
EXPANSION JOINT BOTTOM FIXED SOCKET TYPE

For stainless steel piping

Product Image

A : Intermediate fixed type

B : Upper fixed type



※ The height of the centerline of the upper fixed type can be changed according to the needs of the consumer.

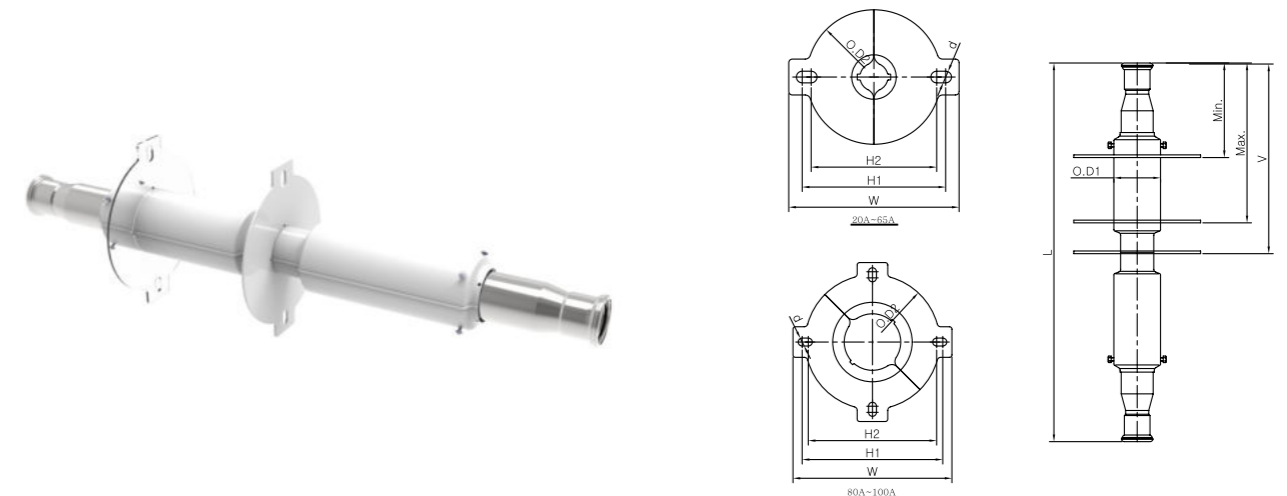
Specification

(Unit : mm)

Model No.	JBSTD-10SR (CA)	JBSTD-20SR (CA)
Max. pressure(Kgf/cm ²)	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]
Max. temperature(°C)	220°C	
Max. movement(mm)	Max.80(-60, +20)	
Connection type	Socket Type	
Material	Bellows(STS304), Sleeve(STS304), Pipe(Stainless steel)	
Applicable fluid	Steam, Air, Gases, Water & Oils	
Application Code & standard	KS B 1536	MFG.STD

Dimensions

JBSTD-10SR(CA) | JBSTD-20SR(CA)



Bottom Fixed Socket Type

Product Detail

(Unit : mm)

N.D	O.D1	O.D2	L	W	H1	H2	d	Min.	Max.	V
20A	49.6	150	758	190	160	140	13	200	340	420
25A	54	150	769	190	160	140	13	200	340	386.5
32A	60.5	150	799	190	160	140	13	200	340	401.5
40A	70	175	805	215	185	165	13	200	340	404.5
50A	90	200	827	240	210	190	13	200	340	416.5
65A	102	200	963	240	210	190	13	200	340	484.5
80A	130	210	972	250	220	200	13	200	340	489
100A	155	235	1076	275	245	225	13	250	450	541

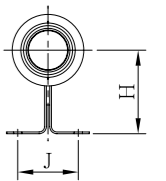
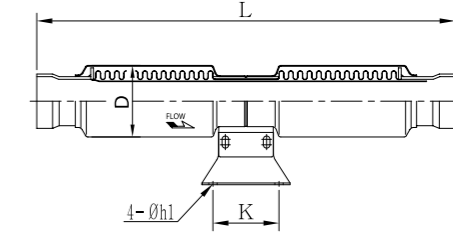
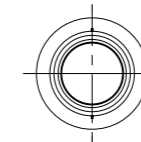
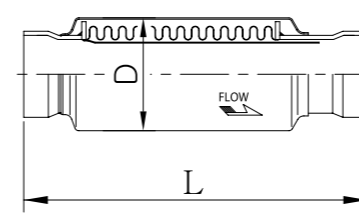
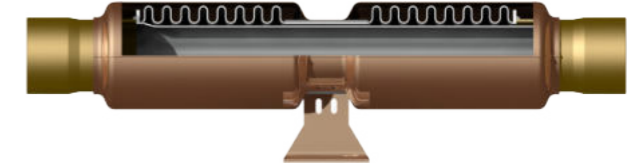
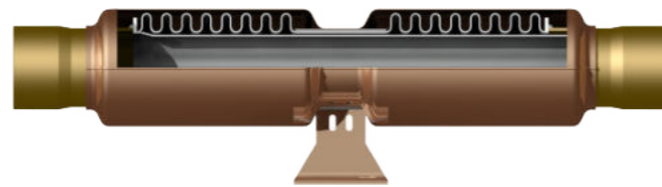
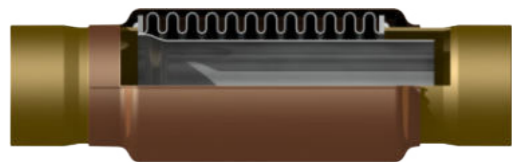
※ Caution: 1) When installing the product, check the direction of the fluid flow prior to installation.
2) For an upper fixed type, please order the supply/return line separately.

EXPANSION JOINT SOCKET-BRAZING TYPE

For copper piping

Single Type

Double Type



Single Type

Double Type

Specification

(Unit : mm)

TYPE	Single		Double	
	Model No.	JBCUS - 10S	JBCUS - 20S	JBCUD - 10S
Max. pressure(Kgf/cm ²)	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]
Max. temperature(°C)	Max.220			
Connection type	Socket - brazing			
Material	Bellows(STS304), Sleeve(STS304), Socket(Copper)			
Applicable fluid	Steam, Air, Gases, Water & Oils			
Max. movement(mm)	Max.35(-25, +10)		Max.70(-50, +20)	
Application Code & standard	KS B 1536	MFG.STD	KS B 1536	MFG.STD

Single Detail

(Unit : mm)

N.D	L	D	Weight (kg)	
			10K	20K
20A	365	49.6	0.9	0.9
25A	365	54	0.9	0.9
32A	365	60.5	0.9	0.9
40A	365	70	1.0	1.0
50A	365	90	1.4	1.4
65A	415	102	2.0	2.0
80A	415	130	2.7	2.7
100A	415	155	4.5	4.5
125A	440	190	5.7	5.7
150A	440	228	10.3	-
200A	440	318.5	22.9	-
250A	465	355.6	29.2	-

Double Detail

(Unit : mm)

N.D	L	D	H	J	K	h1	Weight (kg)	
							10k	20k
20A	680	49.6	100	60	100	12	2.4	2.4
25A	680	54	100	60	100	12	2.4	2.4
32A	680	60.5	120	70	100	12	2.6	2.6
40A	680	70	120	70	100	12	3.0	3.0
50A	680	90	130	80	100	15	3.4	3.4
65A	780	102	140	100	120	15	5.7	5.7
80A	780	130	150	110	120	15	7.0	7.0
100A	880	155	170	130	120	19	12.5	12.5
125A	880	190	200	150	120	19	15.5	15.5
150A	930	228	220	180	160	23	22.5	-
200A	930	318.5	250	220	160	25	53.7	-
250A	980	355.6	300	280	180	27	68.2	-

※ To adjust the height (H), please contact SJM.

PUMP CONNECTOR TIED PUMP CONNECTOR

TPC

Product Image



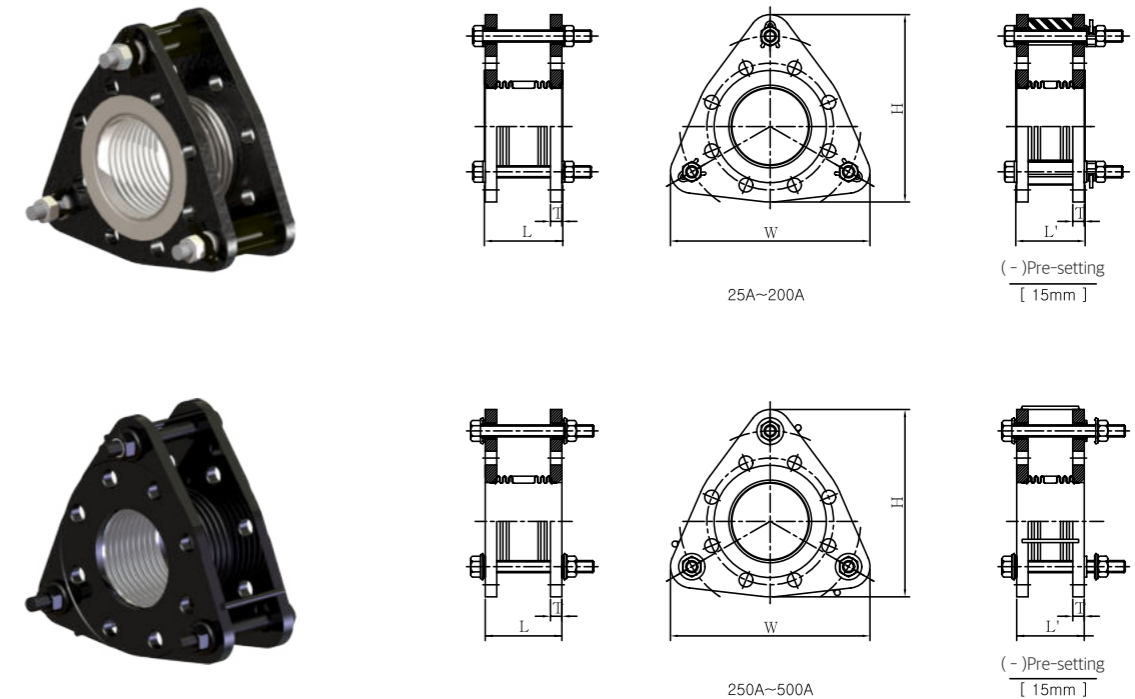
Specification

(Unit : mm)

Model No.	TPC-10K	TPC-20K
Max. pressure(Kgf/cm ²)	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]
Max. temperature(°C)	MAX.220	
Connection type	Flanged	
Material	Bellows(STS304), Flange (Carbon steel or Stainless Steel), Tie Rod (Carbon steel or Stainless Steel)	
Applicable fluid	Steam, Air, Gases, Water & Oils	
Max. movement(mm)	Axial : Max.18(-15, +3), Lateral : 3	
Application Code & standard	MFG.STD	MFG.STD

Dimensions

TPC-10K | TPC-20K



TPC-10K / TPC-20 Detail

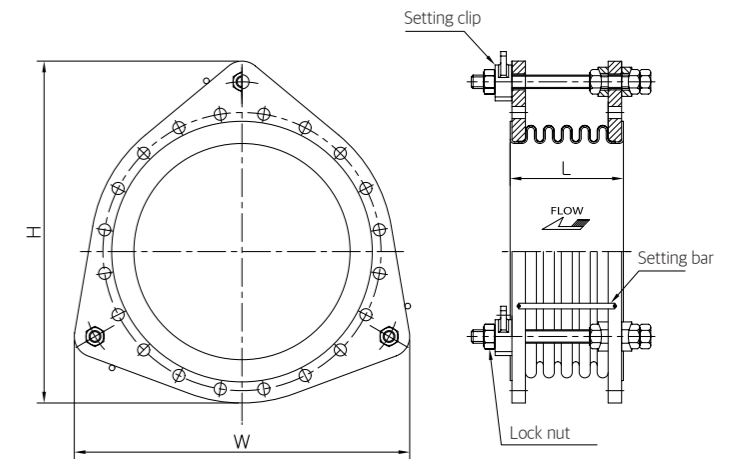
(Unit : mm)

N.D	L	L'	T	W	H	Movement						Weight (kg)						
						Axial				Lateral								
						Extension		Compression										
25A	90	90	75	75	16	16	197	197	178	178	3	3	15	15	3	3	6.4	6.4
32A	90	95	75	80	16	16	206	206	186	185	3	3	15	15	3	3	6.8	7.6
40A	90	95	75	80	16	19	210	206	189	185	3	3	15	15	3	3	7.2	8.2
50A	125	130	110	115	16	19	249	248	225	224	3	3	15	15	3	3	9.5	10.5
65A	125	130	110	115	16	19	266	265	240	239	3	3	15	15	3	3	10.5	12.2
80A	125	135	110	120	16	22	275	287	247	260	3	3	15	15	3	3	11.3	13.9
100A	125	145	110	130	16	25	296	308	271	285	3	3	15	15	3	3	12.7	20.5
125A	130	145	115	130	19	25	331	347	311	330	3	3	15	15	3	3	17.0	25.8
150A	150	170	135	155	19	28	357	385	341	370	3	3	15	15	3	3	19.3	32.9
200A	150	170	135	155	19	30	400	416	391	410	3	3	15	15	3	3	23.6	40.0
250A	200	218	185	203	25	35	503	549	484	525	3	3	15	15	3	3	50	83
300A	200	222	185	207	25	35	542	592	529	575	3	3	15	15	3	3	53	90
350A	200	230	185	215	25	40	581	644	574	635	3	3	15	15	3	3	58	119
400A	200	236	185	221	28	45	642	701	644	700	3	3	15	15	3	3	77	157
450A	200	250	185	235	28	50	723	761	719	770	3	3	15	15	3	3	92	201
500A	215	253	200	238	30	55	779	813	778	828	3	3	15	15	3	3	112	224

PUMP CONNECTOR P.T.F.E-TIED PUMP CONNECTOR

P-TPC

Product Image



SJM-P-TPC 10K

Specification

(Unit : mm)

Model No.	SJM-P-TPC
Max. pressure(Kgf/cm ²)	Max.10 [1.0 MPa]
Max. temperature(°C)	Max.150
Connection type	Flanged
Material	Bellows(STS304 + Teflon), Flange(STS304)
Applicable fluid	Corrosive fluid, Water & Oils
Max. movement(mm)	Axial : Max.18(-15, +3), Lateral : 3
Application Code & standard	MFG.STD

Product Detail

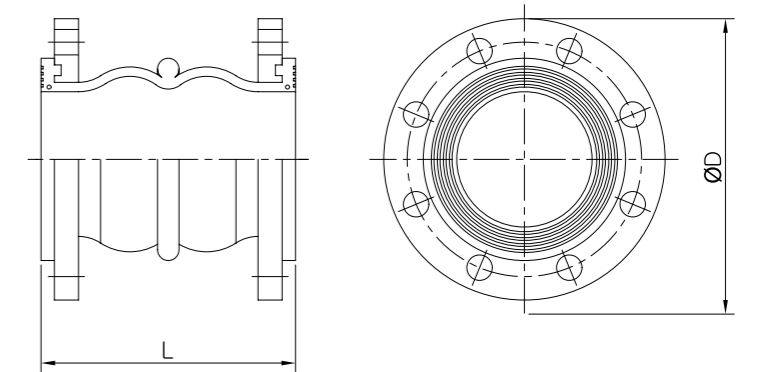
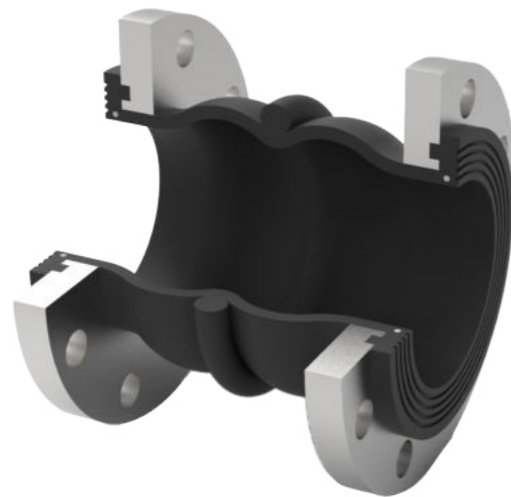
(Unit : mm)

N.D	L	T	W	H	For vertical installation			For horizontal installation			Weight (kg)
					Axial		Lateral	Axial		Lateral	
					Extension	Compression		Extension	Compression		
40A	145	16	185	206	15	3	3	3	3	15	7.5
50A	145	16	225	250	15	3	3	3	3	15	9.7
65A	170	18	240	267	15	3	3	3	3	15	12.7
80A	160	18	250	276	15	3	3	3	3	15	13.3
100A	175	18	272	297	15	3	3	3	3	15	15.4
125A	200	20	312	332	15	3	3	3	3	15	22.2
150A	190	22	358	370	15	3	3	3	3	15	25.4
200A	230	22	392	402	15	3	3	3	3	15	32.8
250A	245	24	484	503	15	3	3	3	3	15	55.9
300A	230	24	529	542	15	3	3	3	3	15	61.8
350A	270	26	574	581	15	3	3	3	3	15	65.9
400A	275	28	644	642	15	3	3	3	3	15	86.3
450A	320	30	719	723	15	3	3	3	3	15	106
500A	295	30	778	779	15	3	3	3	3	15	121
600A	345	32	898	883	15	3	3	3	3	15	181.4
700A	370	34	1023	1008	15	3	3	3	3	15	250
800A	380	36	1138	1107	15	3	3	3	3	15	315.6
900A	435	38	1238	1194	15	3	3	3	3	15	387.6

PUMP CONNECTOR RUBBER PUMP CONNECTOR

SRJ

Product Image



SRJ-10K | SRJ-20K

Specification

(Unit : mm)

Model No.	SRJ-10K	SRJ-20K
Max. pressure(Kgf/cm ²)	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]
Max. temperature(°C)	Max.80	
Connection type	Flanged	
Material	Bellows(EPDM), Flange(Carbon steel)	
Applicable fluid	Air, Water & Oils	
Max. movement(mm)	Refer to table	
Application Code & standard	MFG.STD	MFG.STD

SRJ-10K Detail

(Unit : mm)

N.D	L	D	Movement				Weight (kg)
			Axial		Lateral	각변위 (deg.)	
			Extension	Compression			
32A	180	135	15	40	15	20	3.1
40A	180	140	15	40	15	30	3.4
50A	180	155	15	40	22	30	4.1
65A	180	175	15	40	22	30	5.8
80A	180	185	20	40	22	30	5.9
100A	180	810	20	40	22	29	7.7
125A	180	250	20	40	22	24	11.7
150A	180	280	20	40	22	20	15.2
200A	220	330	20	40	22	15	18.7
250A	220	400	25	40	32	13	30.5
300A	220	445	25	40	32	11	34.2
350A	220	490	25	40	30	11	44.9

SRJ-20K Detail

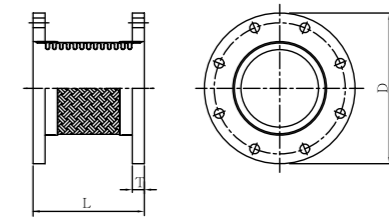
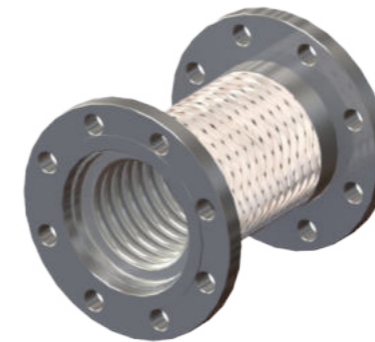
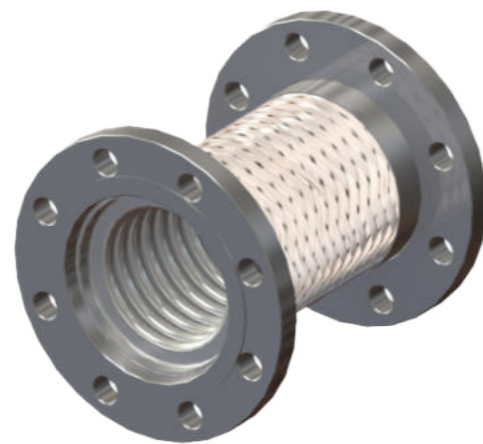
(Unit : mm)

N.D	L	D	Movement				Weight (kg)
			Axial		Lateral	각변위 (deg.)	
			Extension	Compression			
32A	180	135	15	40	15	20	3.4
40A	180	140	15	40	15	30	3.7
50A	180	155	15	40	22	30	4.3
65A	180	175	15	40	22	30	5.8
80A	180	185	20	40	22	30	8.5
100A	180	810	20	40	22	29	11.6
125A	180	250	20	40	22	24	18.8
150A	180	280	20	40	22	20	23.8
200A	220	330	20	40	22	15	30.3
250A	220	400	25	40	32	13	51.9
300A	220	445	25	40	32	11	62.0
350A	220	490	25	40	30	11	86.9

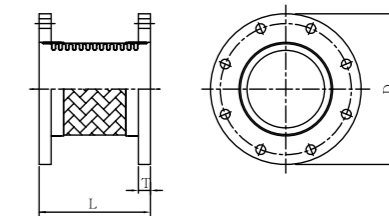
PUMP CONNECTOR FLEXIBLE HOSE PUMP CONNECTOR

FJP

Product Image



25A~150A



200A~350A

Specification

(Unit : mm)

Model No.	FJP-10K	FJP-20K
Max. pressure(Kgf/cm ²)	Max.10 [1.0 MPa]	Max.20 [2.0 MPa]
Max. temperature(°C)	Max.220	
Connection type	Flanged	
Material	Bellows & Braid(STS304), Flange(Carbon steel)	
Applicable fluid	Steam, Air, Gases, Water & Oils	
Max. movement(mm)	Axial : Max.6(-3 , +3), Lateral : 3	
Braid type	25A 150A(Wire Braid) / 200A 이상(Ribbon Braid)	
Application Code & standard	MFG.STD	MFG.STD

※ Specifications of 400A to 500A can be made and sold to order

Dimensions

FJP-10K | FJP-20K

FJP-10K Detail

(Unit : mm)

N.D	L	D	T	Movement			Weight (kg)
				Axial		Lateral	
				Extension	Compression		
25A	200	125	14	3	3	3	2.7
32A	200	135	16	3	3	3	3.4
40A	220	140	16	3	3	3	3.5
50A	220	155	16	3	3	3	4.2
65A	220	175	18	3	3	3	4.4
80A	240	185	18	3	3	3	6.1
100A	240	210	18	3	3	3	7.6
125A	280	250	20	3	3	3	10.5
150A	280	280	22	3	3	3	13.8
200A	300	330	22	3	3	3	15.2
250A	300	400	24	3	3	3	24.5
300A	300	445	24	3	3	3	42.0
350A	300	490	26	3	3	3	55.0

FJP-20K Detail

(Unit : mm)

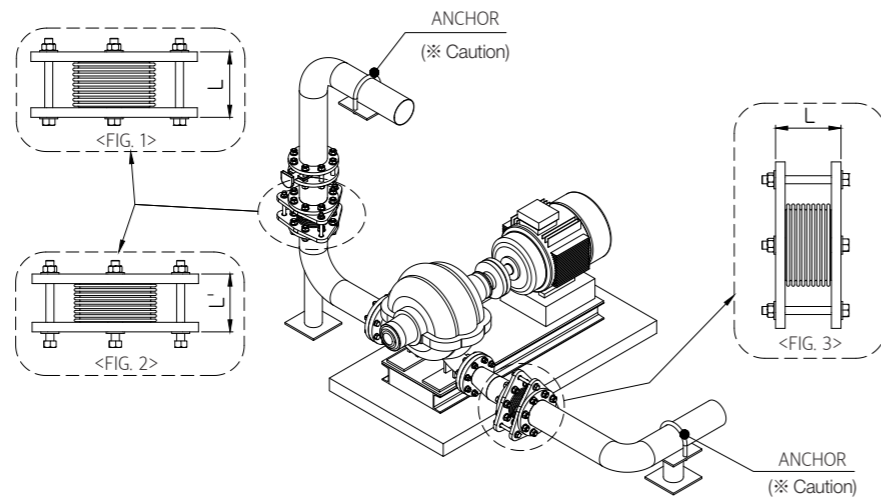
N.D	L	D	T	Movement			Weight (kg)
				Axial		Lateral	
				Extension	Compression		
25A	200	125	16	3	3	3	6.2
32A	200	135	18	3	3	3	7.0
40A	220	140	18	3	3	3	7.2
50A	220	155	18	3	3	3	8.0
65A	220	175	20	3	3	3	8.2
80A	240	200	22	3	3	3	11.8
100A	240	225	24	3	3	3	15.6
125A	280	270	26	3	3	3	23.6
150A	280	305	28	3	3	3	30.0
200A	300	350	30	3	3	3	30.4
250A	300	430	34	3	3	3	54.8
300A	300	480	36	3	3	3	64.8
350A	300	540	40	3	3	3	91.7

TECHNICAL DATA

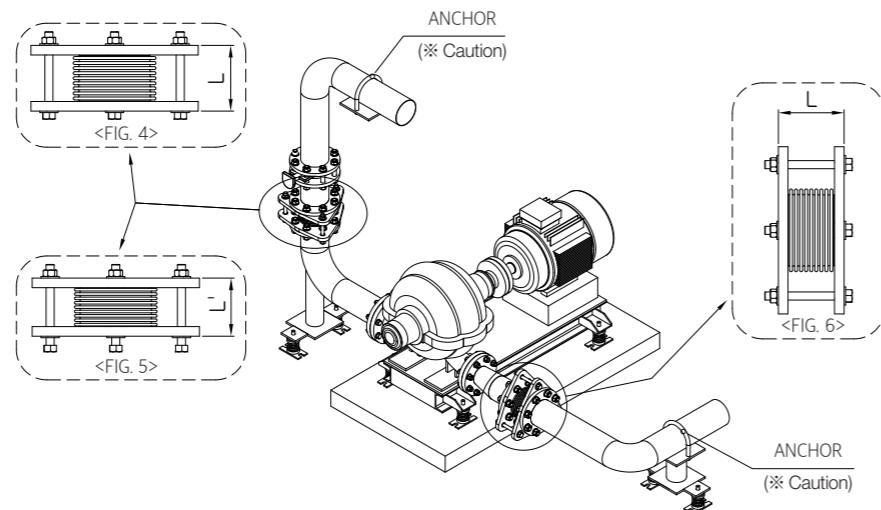
PUMP SYSTEM INSTALLATION

Pump system

1 For soild foundation type



2 For vibration mount or spring type



※ Caution
 1) If the anchor is not installed according to the proper installation instructions, the product may expand or deform.
 2) If it is difficult to install an anchor due to limiting conditions on-site, please consult with the manufacturer.

TPC 10K - Force acting on an anchor

(Unit : Kgf)

Model-No.	ITEMS	N.D									
		25A	32A	40A	50A	65A	80A	100A	125A	150A	
SJM-TPC 10K	SPRING FORCE (operating at 3mm)	F_s	22	27	27	38	39	38	40	82	82
	Acting force when operating under maximum pressure (maximum pressure 10K)	F_p	135	216	216	428	428	557	956	1500	2149
	Total acting force (F _s + F _p)	F_m	157	243	243	466	466	595	996	1582	2230
	Acting force during a pressure test (test pressure 15K)	F_t	202	323	323	642	642	835	1434	2250	3223

Model-No.	ITEMS	N.D									
		200A	250A	300A	350A	400A	450A	500A	600A	700A	
SJM-TPC 10K	SPRING FORCE (operating at 3mm)	F_s	62	81	91	84	95	108	137	317	443
	Acting force when operating under maximum pressure (maximum pressure 10K)	F_p	3698	6114	8574	10968	14106	17930	22045	31410	42776
	Total acting force (F _s + F _p)	F_m	3760	6195	8664	11053	14202	18038	22182	31727	43219
	Acting force during a pressure test (test pressure 15K)	F_t	5548	9170	12861	16452	21159	26895	33068	47116	64164

TPC 20K - Force acting on an anchor

(Unit : Kgf)

Model-No.	ITEMS	N.D									
		25A	32A	40A	SOA	65A	80A	100A	125A	150A	
SJM-TPC 20K	SPRING FORCE (operating at 3mm)	F_s	22	27	27	38	39	38	59	122	122
	Acting force when operating under maximum pressure (maximum pressure 10K)	F_p	269	431	431	856	856	1114	1921	2983	4277
	Total acting force (F _s + F _p)	F_m	292	459	458	893	894	1151	1981	3104	4398
	Acting force during a pressure test (test pressure 15K)	F_t	404	647	647	1283	1283	1670	2882	4474	6415

Model-No.	ITEMS	N.D									
		200A	250A	300A	350A	400A	450A	500A	600A	700A	
SJM-TPC 20K	SPRING FORCE (operating at 3mm)	F_s	92	121	135	167	190	214	272	6234	5416
	Acting force when operating under maximum pressure (maximum pressure 10K)	F_p	7369	12183	17096	21819	28080	35710	43891	62424	84489
	Total acting force (F _s + F _p)	F_m	7462	12305	17231	21987	28269	35924	44163	68658	89905
	Acting force during a pressure test (test pressure 15K)	F_t	11054	18275	25643	32729	42119	53565	65836	93636	126734

PTPC 10K - Force acting on an anchor

(Unit : Kgf)

Model-No.	ITEMS	N.D									
		40A	50A	65A	80A	100A	125A	150A	200A	250A	
SJM-P-TPC 10K	SPRING FORCE (operating at 3mm)	F_s	56	60	191	106	133	145	129	154	130
	Acting force when operating under maximum pressure (maximum pressure 10K)	F_p	305	415	648	896	1373	1834	2483	4220	6415
	Total acting force (F _s + F _p)	F_m	360	475	839	1002	1506	1979	2612	4374	6545
	Acting force during a pressure test (test pressure 15K)	F_t	457	623	971	1344	2059	2751	3724	6330	9623

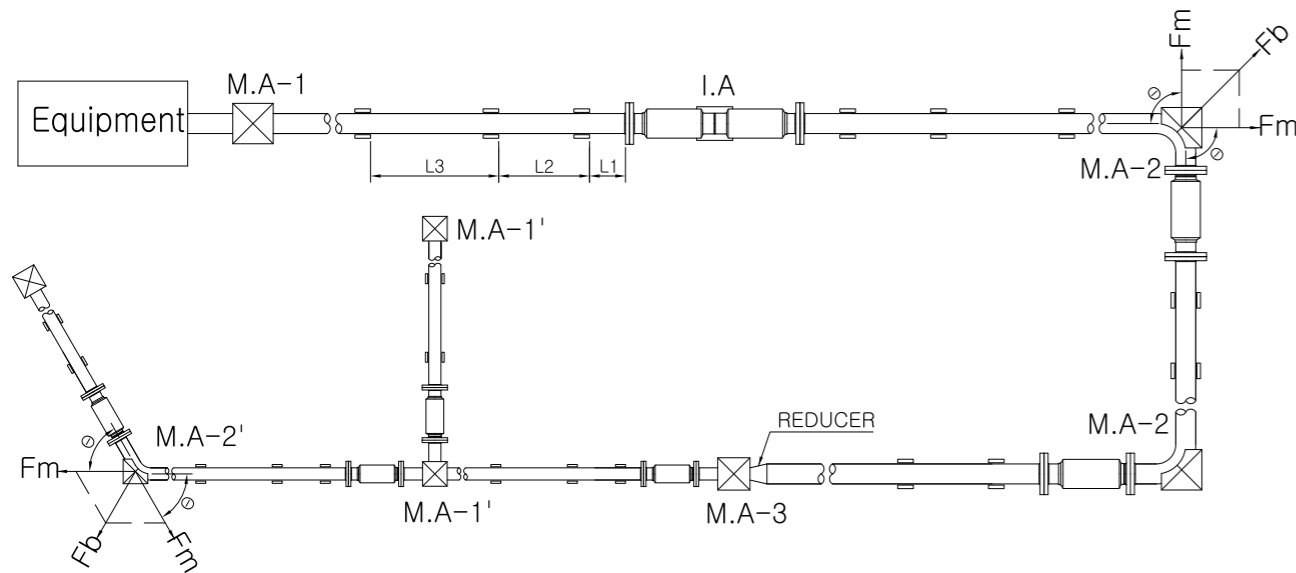
Model-No.	ITEMS	N.D									
		300A	350A	400A	450A	500A	600A	700A	800A	900A	
SJM-P-TPC 10K	SPRING FORCE (operating at 3mm)	F_s	149	202	186	212	180	275	343	294	472
	Acting force when operating under maximum pressure (maximum pressure 10K)	F_p	9154	10834	14414	16997	21763	31232	41854	58212	69901
	Total acting force (F _s + F _p)	F_m	9304	11036	14601	17209	21943	31507	42197	58506	70373
	Acting force during a pressure test (test pressure 15K)	F_t	13731	16250	21621	25495	32645	46848	62781	87318	104851

TECHNICAL DATA

ANCHOR

Main anchor and intermediate anchor

The most important thing when installing an expansion joint in a piping line is to install an anchor that is strong enough to withstand the spring force and pressure thrust generated by the operating pressure inside the pipe. An anchor is necessary to prevent the extension of the expansion joint caused by the pressure thrust of the pipe, and to divide the expanding sections of the pipe according to the expansion length of the expansion joint. The installation location and type of anchor are as follows:



Main Anchor		Intermediate Anchor	
M.A-1	<ul style="list-style-type: none"> A straight pipe closed off with a Cap, Valve, Plate, etc. at the end When a valve is installed between two expansion joints 	I.A	<ul style="list-style-type: none"> When two or more expansion joints are installed between the main anchors When installing a double type expansion joint
M.A-2	<ul style="list-style-type: none"> A curved pipe where the direction of fluid flow changes 		
M.A-3	<ul style="list-style-type: none"> When a reducer is installed between two expansion joints 		

Force acting on a main anchor & intermediate anchor

Example) Acting force on the main anchor and intermediate anchor of a Welded Type (JBS-10W) 50A pipe for a steel pipe (uni-directional) 10K

F_{MA}	: Force acting on an anchor (pipe axis direction)	[Kgf]	V	: Acceleration of the fluid	[mm/sec]
F_m	: Force acting on an anchor (pipe axis direction)	[Kgf]	g	: Acceleration of gravity	[mm/sec ²]
F_v	: Force generated by the flow of fluid	[Kgf]	θ	: 90	[deg.]
θ	: Bending angle of a curved pipe	[deg.]	F_p, F_{p1}	: 311	[Kgf]
F_p, F_{p1}	: Acting force while operating under maximum pressure (at 50A)	[Kgf]	F_{p2}	: 185	[Kgf]
F_{p2}	: Acting force while operating under maximum pressure (at 40A)	[Kgf]	F_s, F_{s1}	: 127.5	[Kgf]
F_s, F_{s1}	: Spring force (at 50A)	[Kgf]	F_{s2}	: 75	[Kgf]
F_{s2}	: Spring force (at 40A)	[Kgf]	A	: 3110	[mm ²]
A	: Effective area of the bellows	[mm ²]	ρ	: 0.000001(5°C Water 기준)	[Kgf / mm ²]
ρ	: Density of the fluid	[Kgf / mm ²]	V	: 2000	[mm/sec]
			g	: 9.8	[mm/sec ²]

1 Main Anchor

1. Main anchor of a straight pipe (MA-1)
 $F_{MA} = F_p = F_s = 311 + 127.5 = 438.5 \text{ Kgf}$

2. Main anchor of a curved pipe (MA-2)
 $F_{MA} = F_b = F_v = 1240.3 + 1795.2 = 3035.5 \text{ Kgf}$
 $F_b = 2 \cdot F_m \cdot \sin(\theta/2) = 2 \cdot 438.5 \cdot \sin(90/2) = 1240.3 \text{ Kgf}$
 $F_m = F_p = F_s = 311 + 127.5 = 438.5 \text{ Kgf}$
 $F_v = (2 \cdot A \cdot P \cdot V^2) \cdot \sin(\theta/2)$
 $= \{(2 \cdot 3110 \cdot 0.000001 \cdot 2000^2)/g\} \cdot \sin(90/2) = 1795.2 \text{ kgf}$

3. Main anchor including a reducer (MA-3)
 ※ Pipes featuring a reducer are reduced from 50A to 40A.
 $F_{MA} = F_{p1} + F_{s1} - F_{p2} + F_{s2}$
 $= 311 + 127.5 - 185 - 75 = 178.5 \text{ kgf}$

2 Intermediate Anchor

1. Intermediate anchor of an expansion joint (IA)
 $F_{MA} = F_s = 127.5 \text{ kgf}$

※ MA-1', MA-2' should be calculated by applying the F_p , F_s , and A values of a 40A piping.
 ※ The friction force acting on the pipe is not considered when calculating the force acting on the anchor above. To acquire a more accurate calculation, add the friction force to the calculated acting force.

※ Caution: consider the acting force on the anchor point when installing the anchor. Failure to do so may result in damage to the anchor and separation of the expansion joint.

TECHNICAL DATA GUIDE

Calculating the guide installation distance

Example) Distance of a guide installed for a Welded Type (JBS-10W) 50A pipe for a steel pipe (Single Type) 10K

L1 ≤ 4D	D : 0.0605	[m]
L2 ≤ 14D	E : 18840(At 220°C)	[Kgf/mm ²]
L1 : Distance of the first guide L1 ≤ 4D	I : 264442.2	[mm ²]
L2 : Distance of the second guide L1 ≤ 14D	Fp : 311	[Kgf]
L3 : Maximum guide distance	Fs : 127.5	[Kgf]

$L3 = 1.571 \sqrt{\frac{E \times I}{Fp + Fs}} \times 10^{-3}$	L1 = 4 X 0.0605 = 0.24 [m]
	L2 = 14 X 0.0605 = 0.85 [m]
	L3 = 1.571 $\sqrt{\frac{E \times I}{Fp + Fs}} \times 10^{-3}$ = 5.3 [m]

D : Outer diameter of the pipe	[mm]
E : Modulus of elasticity of the pipe material	[Kgf/mm ²]
I : Moment of inertia of the pipe section	[mm ²]
Fp : Acting force at maximum operating pressure	[Kgf]
Fs : Spring force	[Kgf]

Guide installation distance by pipe material (SLIP / BALL)

(Unit : m)

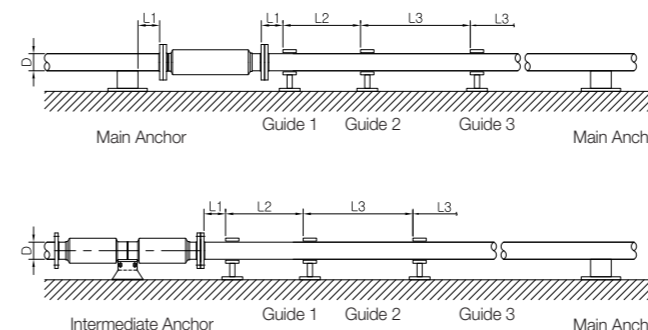
N.D	Carbon steel pipe						Stainless steel pipe						Copper pipe						Su pipe					
	10Kg/cm ²			20Kg/cm ²			10Kg/cm ²			20Kg/cm ²			10Kg/cm ²			20Kg/cm ²			10Kg/cm ²			20Kg/cm ²		
	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
25A	0.14	0.48	3.27	0.14	0.48	2.35	0.14	0.48	3.07	0.14	0.48	2.23	0.11	0.40	1.37	0.11	0.40	1.06	0.11	0.40	1.58	0.11	0.40	1.22
32A	0.17	0.60	3.99	0.17	0.60	2.93	0.17	0.60	3.73	0.17	0.60	2.71	0.14	0.49	1.59	0.14	0.49	1.19	0.14	0.49	1.83	0.14	0.49	1.37
40A	0.19	0.68	4.63	0.19	0.68	3.44	0.19	0.68	4.32	0.19	0.68	3.14	0.17	0.58	1.97	0.17	0.58	1.46	0.17	0.58	2.38	0.17	0.58	1.77
50A	0.24	0.85	5.30	0.24	0.85	3.85	0.24	0.85	4.70	0.24	0.85	3.65	0.22	0.76	2.65	0.22	0.76	1.94	0.22	0.76	2.41	0.22	0.76	1.76
65A	0.31	1.07	6.60	0.31	1.07	5.40	0.31	1.07	6.01	0.31	1.07	4.55	0.27	0.93	3.13	0.27	0.93	2.28	0.27	0.93	2.99	0.27	0.93	2.19
80A	0.36	1.25	7.72	0.36	1.25	6.42	0.36	1.25	7.13	0.36	1.25	5.83	0.32	1.11	3.85	0.32	1.11	2.79	0.32	1.11	3.51	0.32	1.11	4.00
100A	0.46	1.60	9.82	0.46	1.60	8.26	0.46	1.60	8.84	0.46	1.60	7.20	0.42	1.47	5.29	0.42	1.47	3.80	0.42	1.47	4.61	0.42	1.47	4.75
125A	0.56	1.96	12.20	0.56	1.96	10.44	0.56	1.96	11.26	0.56	1.96	8.69	0.52	1.82	6.42	0.52	1.82	4.61	0.52	1.82	5.36	0.52	1.82	5.28
150A	0.66	2.31	15.62	0.66	2.31	13.18	0.66	2.31	14.26	0.66	2.31	9.94	0.62	2.18	7.43	0.62	2.18	5.31	0.62	2.18	6.11	0.62	2.18	6.86
200A	0.87	3.03	21.05	0.87	3.03	17.48	0.87	3.03	18.86	0.87	3.03	12.66	0.83	2.89	10.27	0.83	2.89	7.31	0.83	2.89	8.11	0.83	2.89	7.83
250A	1.07	3.74	27.62	1.07	3.74	22.91	1.07	3.74	24.71	1.07	3.74	15.71	1.03	3.60	13.06	1.03	3.60	9.27	1.03	3.60	10.42	1.03	3.60	8.81
300A	1.27	4.46	34.29	1.27	4.46	28.73	1.27	4.46	31.02	1.27	4.46	18.62	-	-	-	-	-	-	-	-	-	-	-	-
350A	1.42	4.98	38.05	1.42	4.98	32.44	1.42	4.98	35.33	1.42	4.98	20.59	-	-	-	-	-	-	-	-	-	-	-	-
400A	1.63	5.69	43.12	1.63	5.69	36.68	1.63	5.69	40.07	1.63	5.69	23.50	-	-	-	-	-	-	-	-	-	-	-	-
450A	1.83	6.41	48.28	1.83	6.41	41.83	1.83	6.41	45.78	1.83	6.41	26.34	-	-	-	-	-	-	-	-	-	-	-	-
500A	2.03	7.11	53.43	2.03	7.11	46.88	2.03	7.11	51.38	2.03	7.11	29.22	-	-	-	-	-	-	-	-	-	-	-	-

Guide installation distance by pipe material (CB JOINT)

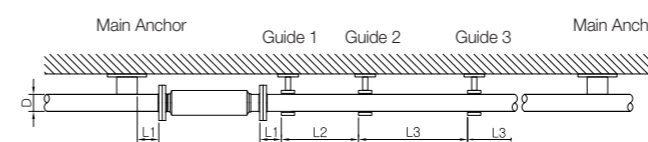
(Unit : m)

N.D	Carbon steel pipe						Stainless steel pipe						Copper pipe						Su pipe					
	10Kg/cm ²			20Kg/cm ²			10Kg/cm ²			20Kg/cm ²			10Kg/cm ²			20Kg/cm ²			10Kg/cm ²			20Kg/cm ²		
	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
25A	0.14	0.48	2.09	0.14	0.48	1.60	0.14	0.48	1.96	0.14	0.48	1.50	0.11	0.40	0.91	0.11	0.40	0.74	0.11	0.40	1.05	0.11	0.40	0.85
32A	0.17	0.60	2.79	0.17	0.60	2.10	0.17	0.60	2.52	0.17	0.60	1.93	0.14	0.49	1.20	0.14	0.49	0.90	0.14	0.49	1.38	0.14	0.49	1.03
40A	0.19	0.68	3.18	0.19	0.68	2.41	0.19	0.68	2.86	0.19	0.68	2.18	0.17	0.58	1.44	0.17	0.58	1.08	0.17	0.58	1.75	0.17	0.58	1.30
50A	0.24	0.85	4.19	0.24	0.85	3.10	0.24	0.85	3.63	0.24	0.85	2.92	0.22	0.76	2.17	0.22	0.76	1.61	0.22	0.76	1.97	0.22	0.76	1.46
65A	0.31	1.07	5.03	0.31	1.07	4.07	0.31	1.07	4.28	0.31	1.07	3.40	0.27	0.93	2.87	0.27	0.93	2.10	0.27	0.93	2.75	0.27	0.93	2.01
80A	0.36	1.25	5.44	0.36	1.25	4.58	0.36	1.25	4.62	0.36	1.25	3.94	0.32	1.11	3.16	0.32	1.11	2.78	0.32	1.11	4.53	0.32	1.11	3.99
100A	0.46	1.60	6.83	0.46	1.60	5.75	0.46	1.60	5.60	0.46	1.60	4.75	0.42	1.47	4.08	0.42	1.47	3.05	0.42	1.47	5.09	0.42	1.47	3.81
125A	0.56	1.96	7.66	0.56	1.96	6.72	0.56	1.96	6.64	0.56	1.96	5.86	0.52	1.82	5.12	0.52	1.82	3.77	0.52	1.82	5.86	0.52	1.82	4.32
150A	0.66	2.31	8.96	0.66	2.31	7.72	0.66	2.31	7.38	0.66	2.31	6.50	0.62	2.18	5.38	0.62	2.18	3.97	0.62	2.18	6.96	0.62	2.18	5.13
200A	0.87	3.03	12.20	0.87	3.03	10.44	0.87	3.03	10.10	0.87	3.03	9.25	0.83	2.89	8.11	0.83	2.89	6.02	0.83	2.89	8.69	0.83	2.89	6.44
250A	1.07	3.74	15.10	1.07	3.74	12.89	1.07	3.74	11.74	1.07	3.74	10.77	1.03	3.60	10.76	1.03	3.60	7.85	1.03	3.60	10.22	1.03	3.60	7.46
300A	1.27	4.46	17.36	1.27	4.46	15.16	1.27	4.46	13.96	1.27	4.46	12.07	-	-	-	-	-	-	-	-	-	-	-	-
350A	1.42	4.98	20.05	1.42	4.98	17.00	1.42	4.98	15.55	1.42	4.98	14.39	-	-	-	-	-	-	-	-	-	-	-	-
400A	1.63	5.69	21.66	1.63	5.69	19.54	1.63	5.69	16.78	1.63	5.69	15.54	-	-	-	-	-	-	-	-	-	-	-	-
450A	1.83	6.41	23.28	1.83	6.41	22.16	1.83	6.41	18.01	1.83	6.41	17.61	-	-	-	-	-	-	-	-	-	-	-	-
500A	2.03	7.11	25.03	2.03	7.11	24.44	2.03	7.11	20.77	2.03	7.11	18.91	-	-	-	-	-	-	-	-	-	-	-	-

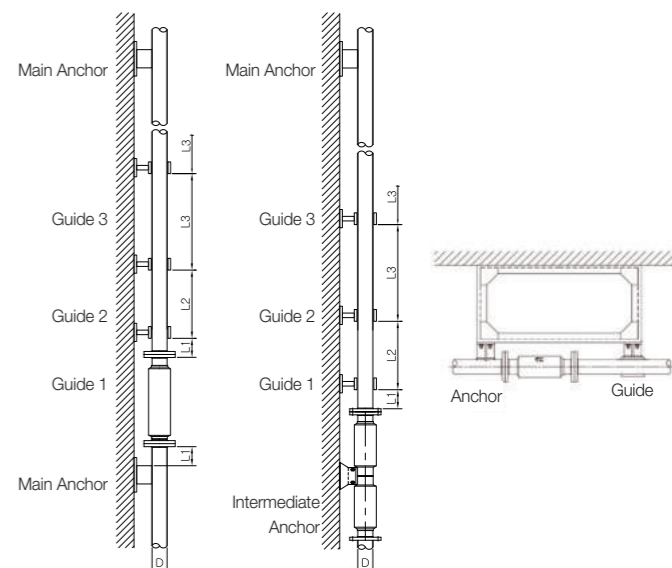
Horizontal piping



Horizontal piping



Vertical piping / anchor and guide(example)



※ Caution: Comply with the guide installation distance specified in the instruction's manual. Failure to comply may result in bending of the pipe and displacement of the expansion joint.

※ Install the guide to ensure that the axis line of the expansion joint and the pipe are aligned.

TECHNICAL DATA

THERMAL EXPANSION

Linear expansion length of the pipe and specifications of the expansion joint

1 Linear expansion length of the pipe

(Base TEMP. : 21°C. Unit : mm/m)

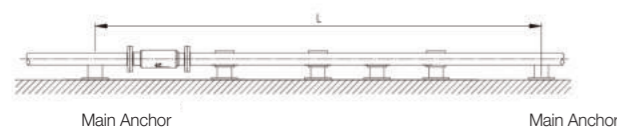
Temp. (°C)	Material			Temp. (°C)	Material			Temp. (°C)	Material		
	Carbon steel pipe	Stainless steel pipe	Copper pipe		Carbon steel pipe	Stainless steel pipe	Copper pipe		Carbon steel pipe	Stainless steel pipe	Copper pipe
-40	-0.65	-0.95	-1.08	80	0.67	0.99	1.06	200	2.19	3.09	3.29
-30	-0.55	-0.79	-0.99	90	0.79	1.16	1.24	210	2.33	3.27	3.48
-20	-0.43	-0.63	-0.71	100	0.91	1.33	1.42	220	2.46	3.45	3.67
-10	-0.33	-0.48	-0.51	110	1.04	1.50	1.60	230	2.60	3.63	3.87
0	-0.22	-0.32	-0.35	120	1.15	1.67	1.79	240	2.74	3.81	4.06
10	-0.12	-0.17	-0.18	130	1.28	1.85	1.97	250	2.88	3.99	4.25
20	-0.01	-0.02	-0.02	140	1.40	2.02	2.16	260	3.02	4.17	4.44
30	0.10	0.15	0.16	150	1.53	2.19	2.35	270	3.16	4.36	4.63
40	0.22	0.32	0.34	160	1.68	2.37	2.54	280	3.31	4.54	4.83
50	0.33	0.49	0.52	170	1.80	2.55	2.73	290	3.46	4.72	5.03
60	0.45	0.66	0.70	180	1.93	2.73	2.91	300	3.60	4.91	5.23
70	0.56	0.82	0.88	190	2.06	2.91	3.11				

2 Specification of the expansion joint

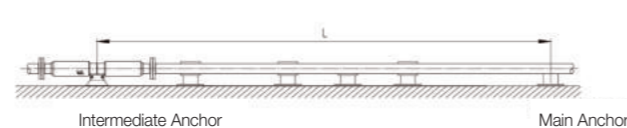
Material	Type	Model	Movement	
			Extension	Compression
Carbon steel pipe	Single	JBS	10mm	30mm
	Double	JBD	20mm	60mm
Stainless steel	Single	JBSTS	10mm	30mm
	Double	JBSTD	20mm	60mm
Copper pipe	Single	JBCUS	10mm	25mm
	Double	JBCUD	20mm	50mm

Specification of the expansion joint

1 Single



2 Double



Calculating pipe expansion caused by heat

1 Calculating piping expansion length

When the pipe length (L) between the anchors of the steel pipe is 30M, the maximum temperature is 60°C, the installation temperature is 10°C, and the minimum temperature is -10°C, the expansion length is calculated as follows:

$$\begin{aligned} -\lambda &= L \times \beta \\ -\lambda 1(\text{At } 60^\circ\text{C}) &= 30 \times 0.45 = 13.5\text{mm} \\ -\lambda 2(\text{At } 10^\circ\text{C}) &= 30 \times (-0.12) = -3.6\text{mm} \\ -\lambda 3(\text{At } -10^\circ\text{C}) &= 30 \times (0.33) = -9.9\text{mm} \end{aligned}$$

L : Pipe length between anchors (m)
 λ : Expansion length (mm)
 β : Expansion length of the pipe per 1m (refer to the linear expansion length of the pipe)
 E_c : Contraction length of the expansion joint (refer to the specifications of the expansion joint)
 E_e : Elongation length of the expansion joint (refer to the specifications of the expansion joint)

$$\begin{aligned} * \lambda (\text{Extension}) &= \lambda 1 - \lambda 2 = 13.5 - (-3.6) \\ &= 17.1\text{mm (absolute value)} < 24\text{mm } [30\text{mm } (E_c) \times 0.8 \text{ (safety factor)}] \end{aligned}$$

$$\begin{aligned} * \lambda (\text{Compression}) &= \lambda 3 - \lambda 2 = (-9.9) - (-3.6) \\ &= 6.3\text{mm (absolute value)} < 8\text{mm } [10\text{mm } (E_e) \times 0.8 \text{ (safety factor)}] \end{aligned}$$

2 Calculating the piping length (L) between anchors that can expand and absorb per 1 expansion joint

When the steel pipe has a maximum temperature of 60°C, installation temperature of 10°C, and minimum temperature of -10°C, the distance between anchors that can expand and absorb per 1 expansion joint is calculated as follows:

$$\begin{aligned} -\beta 1(\text{At } 60^\circ\text{C}) &= 0.45\text{mm} & \dots & E_e = 10\text{mm} \\ -\beta 2(\text{At } 10^\circ\text{C}) &= -0.12\text{mm} & \dots & E_c = 30\text{mm} \\ -\beta 3(\text{At } -10^\circ\text{C}) &= -0.33\text{mm} \end{aligned}$$

L : Pipe length between anchors (m)
 β : Expansion length of the pipe per 1m (refer to the linear expansion length of the pipe)
 E_c : Contraction length of the expansion joint (refer to the specifications of the expansion joint)
 E_e : Elongation length of the expansion joint (refer to the specifications of the expansion joint)

$$\begin{aligned} * \beta (\text{Extension}) &= \beta 1 - \beta 2 = 0.45 - (-0.12) \\ &= 0.57\text{mm/M(Absolute value)} \end{aligned}$$

$$\begin{aligned} * \beta (\text{Compression}) &= \beta 3 - \beta 2 = (-0.33) - (-0.12) \\ &= 0.21\text{mm/M(Absolute value)} \end{aligned}$$

- Expansion and absorption length (M) per expansion joint (Single Type) 1eaType) 1ea

$$* L (\text{Extension}) = \frac{E_e \times 0.8(\text{Safety factor})}{\beta (\text{Compression})} = \frac{10 \times 0.8}{0.21} = 38\text{m}$$

$$* L (\text{Compression}) = \frac{E_c \times 0.8(\text{Safety factor})}{\beta (\text{Extension})} = \frac{30 \times 0.8}{0.57} = 42.1\text{m}$$

※ According to the above calculation results, 1EA must be installed for every 38M for a company expansion joint (Single type) product, and 1EA must be installed for every 76M for a company expansion joint (Double Type).

※ Caution: The above calculation results may change depending on the design conditions. As such, please apply the correct design conditions at all times.

Thermal expansion according to pipe length and Temperature (Base TEMP. : 21°C. Unit : mm/m)

1 Carbon steel

Pipe length (m)	Temperature(°C)																							
	-10	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220
1	-0.33	-0.22	-0.12	-0.01	0.10	0.22	0.33	0.45	0.56	0.67	0.79	0.91	1.04	1.15	1.28	1.40	1.53	1.68	1.80	1.93	2.06	2.19	2.33	2.46
5	-1.65	-1.10	-0.60	-0.05	0.50	1.10	1.65	2.25	2.80	3.35	3.95	4.55	5.20	5.75	6.40	7.00	7.65	8.40	9.00	9.65	10.30	10.92	11.65	12.30
10	-3.30	-2.20	-1.20	-0.10	1.00	2.20	3.30	4.50	5.60	6.70	7.90	9.10	10.40	11.50	12.80	14.00	15.30	16.80	18.00	19.30	20.60	21.90	23.30	24.60
15	-4.95	-3.30	-1.80	-0.15	1.50	3.30	4.95	6.75	8.40	10.05	11.85	13.65	15.60	17.25	19.20	21.00	22.95	25.20	27.00	28.95	30.90	32.85	34.95	36.90
20	-6.60	-4.40	-2.40	-0.20	2.00	4.40	6.60	9.00	11.20	13.40	15.80	18.20	20.80	23.00	25.60	28.00	30.60	33.60	36.00	38.60	41.20	43.80	46.60	49.20
25	-8.25	-5.50	-3.00	-0.25	2.50	5.50	8.25	11.25	14.00	16.75	19.75	22.75	26.00	28.75	32.00	35.00	38.25	42.00	45.00	48.25	51.50	54.75	58.25	61.50
30	-9.90	-6.60	-3.60	-0.30	3.00	6.60	9.90	13.50	16.80	20.10	23.70	27.30	31.20	34.50	38.40	42.00	45.90	50.40	54.00	57.90	61.80	65.70	69.90	73.80
35	-11.55	-7.70	-4.20	-0.35	3.50	7.70	11.55	15.75	19.60	23.45	27.65	31.85	36.40	40.25	44.80	49.00	53.55	58.80	63.00	67.55	72.10	76.65	81.55	86.10
40	-13.20	-8.80	-4.80	-0.40	4.00	8.80	13.20	18.00	22.40	26.80	31.60	36.40	41.60	46.00	51.20	56.00	61.20	67.20	72.00	77.20	82.40	87.60	93.20	98.40
45	-14.85	-9.90	-5.40	-0.45	4.50	9.90	14.85	20.25	25.20	30.15	35.55	40.95	46.80	51.75	57.60	63.00	68.85	75.60	81.00	86.85	92.70	98.55	104.85	110.70
50	-16.50	-11.00	-6.00	-0.50	5.00	11.00	16.50	22.50	28.00	33.50	39.50	45.50	52.00	57.50	64.00	70.00	76.50	84.00	90.00	96.50	103.00	109.50	116.50	123.00
55	-18.15	-12.10	-6.60	-0.55	5.50	12.10	18.15	24.75	30.80	36.85	43.45	50.05	57.20	63.25	70.40	77.00	84.15	92.40	99.00	106.15	113.30	120.45	128.15	135.30
60	-19.80	-13.20	-7.20	-0.60	6.00	13.20	19.80	27.00	33.60	40.20	47.40	54.60	62.40	69.00	76.80	84.00	91.80	100.80	108.00	115.80	123.60	131.40	139.80	147.60
65	-21.45	-14.30	-7.80	-0.65	6.50	14.30	21.45	29.25	36.40	43.55	51.35	59.15	67.60	74.75	83.20	91.00	99.45	109.20	117.00	125.45	133.90	142.35	151.45	159.90
70	-23.10	-15.40	-8.40	-0.70	7.00	15.40	23.10	31.50	39.20	46.90	55.30	63.70	72.80	80.50	89.60	98.00	107.10	117.60	126.00	135.10	144.20	153.30	163.10	172.20
75	-24.75	-16.50	-9.00	-0.75	7.50	16.50	24.75	33.75	42.00	50.25	59.25	68.25	78.00	86.25	96.00	105.00	114.75	126.00	135.00	144.75	154.50	164.25	174.75	184.50
80	-26.40	-17.60	-9.60	-0.80	8.00	17.60	26.40	36.00	44.80	53.60	63.20	72.80	83.20	92.00	102.40	112.00	122.40	134.40	144.00	154.40	164.80	175.20	186.40	196.80

2 Stainless steel

Pipe length (m)	Temperature(°C)																							
	-10	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220
1	-0.48	-0.32	-0.17	-0.02	0.15	0.32	0.49	0.66	0.82	0.99	1.16	1.33	1.50	1.67	1.85	2.02	2.19	2.37	2.55	2.73	2.91	3.09	3.27	3.45
5	-2.40	-1.60	-0.85	-0.10	0.75	1.60	2.45	3.30	4.10	4.95	5.80	6.65	7.50	8.35	9.25	10.10	10.95	11.85	12.75	13.65	14.55	15.45	16.35	17.25
10	-4.80	-3.20	-1.70	-0.20	1.50	3.20	4.90	6.60	8.20	9.90	11.60	13.30	15.00	16.70	18.50	20.20	21.90	23.70	25.50	27.30	29.10	30.90	32.70	34.50
15	-7.20	-4.80	-2.55	-0.30	2.25	4.80	7.35	9.90	12.30	14.85	17.40	19.95	22.50	25.05	27.75	30.30	32.85	35.55	38.25	40.95	43.65	46.35	49.05	51.75
20	-9.60	-6.40	-3.40	-0.40	3.00	6.40	9.80	13.20	16.40	19.80	23.20	26.60	30.00	33.40	37.00	40.40	43.80	47.40	51.00	54.60	58.20	61.80	65.40	69.00
25	-12.00	-8.00	-4.25	-0.50	3.75	8.00	12.25	16.50	20.50	24.75	29.00	33.25	37.50	41.75	46.25	50.50	54.75	59.25	63.75	68.25	72.75	77.25	81.75	86.25
30	-14.40	-9.60	-5.10	-0.60	4.50	9.60	14.70	19.80	24.60	29.70	34.80	39.90	45.00	50.10	55.50	60.60	65.70	71.10	76.50	81.90	87.30	92.70	98.10	103.50
35	-16.80	-11.20	-5.95	-0.70	5.25	11.20	17.15	23.10	28.70	34.65	40.60	46.55	52.50	58.45	64.75	70.70	76.65	82.95	89.25	95.55	101.85	108.15	114.45	120.75
40	-19.20	-12.80	-6.80	-0.80	6.00	12.80	19.60	26.40	32.80	39.60	46.40	53.20	60.00	66.80	74.00	80.80	87.60	94.80	102.00	109.20	116.40	123.60	130.80	138.00
45	-21.60	-14.40	-7.65	-0.90	6.75	14.40	22.05	29.70	36.90	44.55	52.20	59.85	67.50	75.15	83.25	90.90	98.55	106.65	114.75	122.85	130.95	139.05	147.15	155.25
50	-24.00	-16.00	-8.50	-1.00	7.50	16.00	24.50	33.00	41.00	49.50	58.00	66.50	75.00	83.50	92.50	101.00	109.50	118.50	127.50	136.50	145.50	154.50	163.50	172.50
55	-26.40	-17.60	-9.35	-1.10	8.25	17.60	26.95	36.30	45.10	54.45	63.80	73.15	82.50	91.85	101.75	111.10	120.45	130.35	140.25	150.15	160.05	169.95	179.85	189.75
60	-28.80	-19.20	-10.20	-1.20	9.00	19.20	29.40	39.60	49.20	59.40	69.60	79.80	90.00	100.20	111.00	121.20	13.40	142.20	153.00	163.80	164.60	185.40	196.20	207.00
65	-31.20	-20.80	-11.05	-1.30	9.75	20.80	31.85	42.90	53.30	64.35	75.40	86.45	97.50	108.55	120.25	131.30	142.35	154.05	165.75	177.45	189.15	200.85	212.55	224.25
70	-33.60	-22.40	-11.90	-1.40	10.50	22.40	34.30	46.20	57.40	69.30	81.20	93.10	105.00	116.90	129.50	141.40	153.30	165.90	178.50	191.10	203.70	216.30	228.90	241.50
75	-36.00	-24.00	-12.75	-1.50	11.25	24.00	36.75	49.50	61.50	74.25	87.00	99.75	112.50	125.25	138.75	151.50	164.25	177.75	191.25	204.75	218.25	231.75	245.25	258.75
80	-38.40	-25.60	-13.60	-1.60	12.00	25.60	39.20	52.80	65.60	79.20	92.80	106.40	120.00	133.60	148.00	162.40	176.80	191.20	205.60	220.00	234.40	248.80	263.20	277.60

3 Cooper

Pipe length (m)	Temperature(°C)																							
	-10	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220
1	-0.51	-0.35	-0.18	-0.02	0.16	0.34	0.52	0.70	0.88	1.06	1.24	1.42	1.60	1.79	1.97	2.16	2.35	2.54	2.73	2.91	3.11	3.29	3.48	3.67
5	-2.55	-1.75	-0.90	-0.10	0.80	1.70	2.60	3.50	4.40	5.30	6.20	7.10	8.00	8.95	9.84	10.80	11.75	12.70	13.65	14.55	15.55	16.45	17.40	18.35
10	-5.10	-3.50	-1.80	-0.20	1.60	3.40	5.20	7.00	8.80	10.60	12.40	14.250	16.00	17.90	19.70	21.60	23.50	25.40	27.30	29.10	31.00	32.90	34.80	36.70
15	-7.65	-5.25	-2.70	-0.30	2.40	5.10	7.80	10.50	13.20	15.90	18.60	21.30	24.00	26.85	29.55	32.40	35.25	38.10	40.95	43.65	46.65	49.35	52.20	55.05
20	-10.20	-7.00	-3.60	-0.40	3.20	6.80	10.40	14.00	17.60	21.20	24.80	28.40	32.00	35.80	39.40	43.20	47.00	50.80	54.60	58.20	62.20	65.80	69.60	73.40
25	-12.75	-8.78	-4.50	-0.50	4.00	8.50	13.00	17.50	22.00	26.50	31.00	35.50	40.00	44.75	49.25	54.00	58.75	63.50	68.25	72.75	77.75	82.25	87.00	91.745
30	-15.30	-10.50	-5.40	-0.60	4.80	10.20	15.60	21.00	26.40	31.80	37.20	42.60	48.00	53.70	59.10	64.80	70.50	76.20	81.90	87.30	93.30	98.70	104.40	110.10
35	-17.85	-12.25	-6.30	-0.70	5.60	11.90	18.20	24.50	30.80	37.10	43.40	49.70	56.00	62.65	68.95	75.60	82.25	88.90	95.55	101.85	108.85	115.15	121.80	128.45
40	-20.40	-14.00	-7.20	-0.80	6.40	13.60	20.80	28.00	35.20	42.40	49.60	56.80	64.00	71.60	78.80	86.40	94.00	101.60	109.20	116.40	124.40	131.60	139.20	146.80
45	-22.95	-15.75	-8.10	-0.90	7.20	15.30	23.40	31.50	39.60	47.70	55.80	63.90	72.00	80.55	88.65	97.20	105.75	114.30	122.85	130.95	139.95	148.05	156.60	165.15
50	-25.00	-17.50	-9.00	-1.00	8.00	17.00	26.00	35.00	44.00	53.00	62.00	71.00	80.00	89.50	98.50	108.00	117.50	127.00	136.50	145.50	155.50	164.50	174.00	183.50
55	-28.05	-19.25	-9.90	-1.10	8.80	18.70	28.60	38																

TECHNICAL DATA

ANCHOR FORCE

Technical data
Expansion joint

Force acting on an anchor

(Unit : Kgf)

Model-No.	ITEMS		N.D							
			20A	25A	32A	40A	50A	65A	80A	100A
JBS / D-10K JBSTS / D-10K JBCUS / D-10K	SPRING FORCE (operating at 30mm)	F_s	69.9	69.9	84.3	75	127.5	128.1	302.1	567.6
	Acting force when operating under maximum pressure (maximum pressure 10kgf/cm ²)	F_p	93	93	141	185	311	460	709	1215
	Total acting force(F _s + F _p)	F_m	162.9	162.9	225.3	260	438.5	588.1	1011.1	1782.6
	Acting force during a pressure test (test pressure 15kgf/cm ²)	F_t	139.5	139.5	211.5	277.5	466.5	690	1063.5	1822.5
JBS / D-20K JBSTS / D-20K JBCUS / D-20K	SPRING FORCE (operating at 30mm)	F_s	139.8	139.8	168.6	150	255	255.9	604.2	1135.2
	Acting force when operating under maximum pressure (maximum pressure 20kgf/cm ²)	F_p	186	186	282	370	622	920	1418	2430
	Total acting force(F _s + F _p)	F_m	325.8	325.8	450.6	520	877	1175.9	2022.2	3565.2
	Acting force during a pressure test (test pressure 35kgf/cm ²)	F_t	279	279	423	555	933	1380	2127	3645

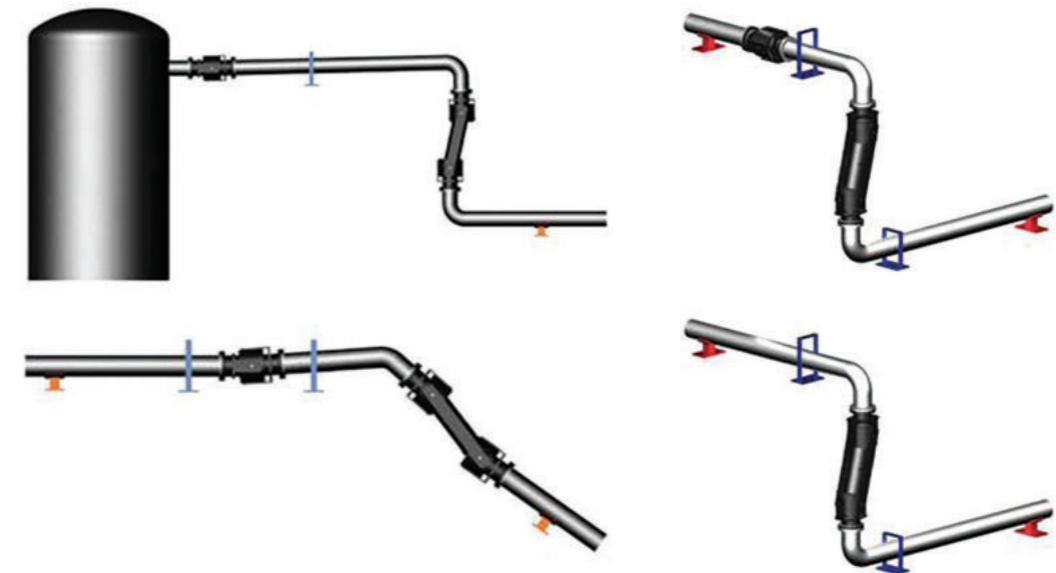
Model-No.	ITEMS		N.D								
			125A	150A	200A	250A	300A	350A	400A	450A	500A
JBS / D-10K JBSTS / D-10K JBCUS / D-10K	SPRING FORCE (operating at 30mm)	F_s	818.4	1162.5	1200	1671.6	2006.6	2356	2520	2723	2918
	Acting force when operating under maximum pressure (maximum pressure 10kgf/cm ²)	F_p	1877	2671	4277	6605	9544	11437	14563	18368	22112
	Total acting force(F _s + F _p)	F_m	2695.4	3833.5	4527	8276.6	11550.6	13793	17083	21091	25030
	Acting force during a pressure test (test pressure 15kgf/cm ²)	F_t	2815.5	4006.5	6340.5	9907.5	14316	17155.5	21844.5	27552	33168
JBS / D-20K JBSTS / D-20K JBCUS / D-20K	SPRING FORCE (operating at 30mm)	F_s	1636.8	2324.7	1799.7	2445.6	3638.2	4283.9	4564.6	4914	5253.6
	Acting force when operating under maximum pressure (maximum pressure 20kgf/cm ²)	F_p	3754	5342	8454	12670	18631	22373	28560	36101	43526
	Total acting force(F _s + F _p)	F_m	5390.8	7666.7	10253.7	15115.6	22269.2	26656.9	33124.6	41015	48779.6
	Acting force during a pressure test (test pressure 35kgf/cm ²)	F_t	5631	8013	12681	19005	27946.5	33559.5	42840	54151.5	65289

TECHNICAL DATA

APPLICATION AND FEATURES

CB JOINT

Apply a CB Joint "H" Typed



Features of a CB Joint "H" Typed

A CB Joint "H" Typed features 2 bellows, a middle pipe, and 2 gimbals.

The most notable feature of a CB Joint "H" Typed is that it can completely control the pressure thrust of the pipe itself.

As shown in the picture above, expansion in the axial direction of the pipe caused by thermal expansion is converted into a direction perpendicular to the axis through a gimbal to absorb the expansion length.

When installing high-pressure pipes, large-diameter pipes, and multiple pipes of existing products, the anchor point must be capable of withstanding all pressure thrust.

It may cause problems with the installation of anchors and the safety of the building.

Unlike competitor products, SJM products are bi-directional pipes, and can be installed immediately without any additional welding or installation in the field.

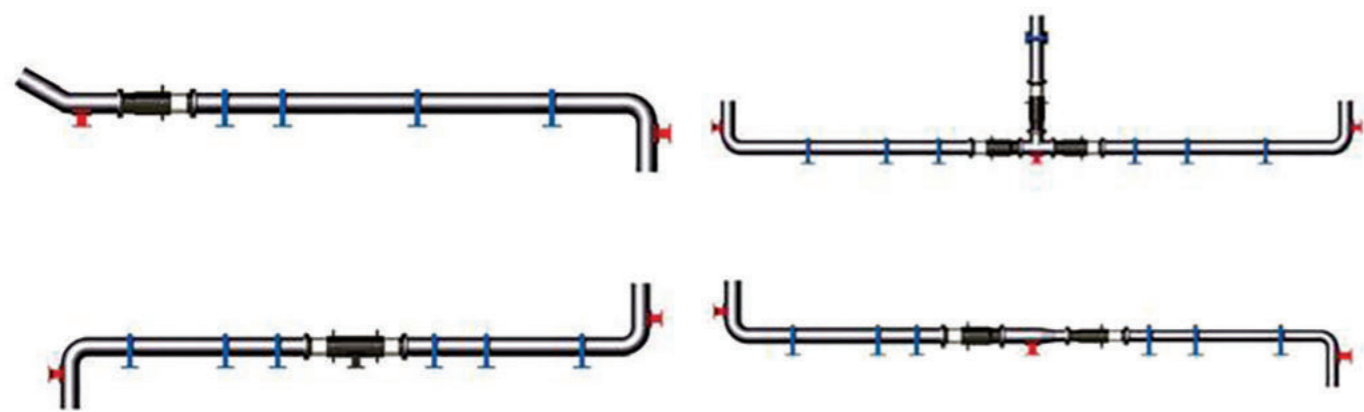
Since SJM products do not require additional installation on-site, they are effective in reducing labor and material costs.

※ The above information is subject to change without prior notice to the customer in the event of product updates.

TECHNICAL DATA APPLICATION

INJECTION SLIP JOINT

Application of injection slip joint



Friction force of injection slip joint

Pipe Size D	Expansion Joint		Guid Friction	
	Turst Friction	Packing Friction	FP-kg/10m	
	A-cm ²	Fc-kg	Water	Steam
25A	12.4	710	12	8
32A	12.4	710	12	8
40A	16.5	1140	12	8
50A	25.8	1420	12	8
65A	38.1	1700	18	13
80A	57.4	1990	24	16
100A	96.8	2270	34	23
125A	149.3	2840	50	32
150A	209.7	3410	67	41
200A	360.6	4540	104	60
250A	558.5	5670	156	85
300A	793.5	6810	210	105
350A	954.8	7940	240	113
400A	1258.1	9080	300	133
450A	1593.2	10210	365	150
500A	1974.2	11340	430	170
600A	2858.1	12700	640	215

Anchor

Main
Anchor Force = Ft + Fc + FP
Intermediate
Anchor Force = Fc + Fp

1. Pressure thrust(Ft) $Ft = P \times A$
2. Joint friction(Fc) $Fc = K \times D$
3. Support friction $(Fp) = (TO \times dl) = Fp \times L / 10$

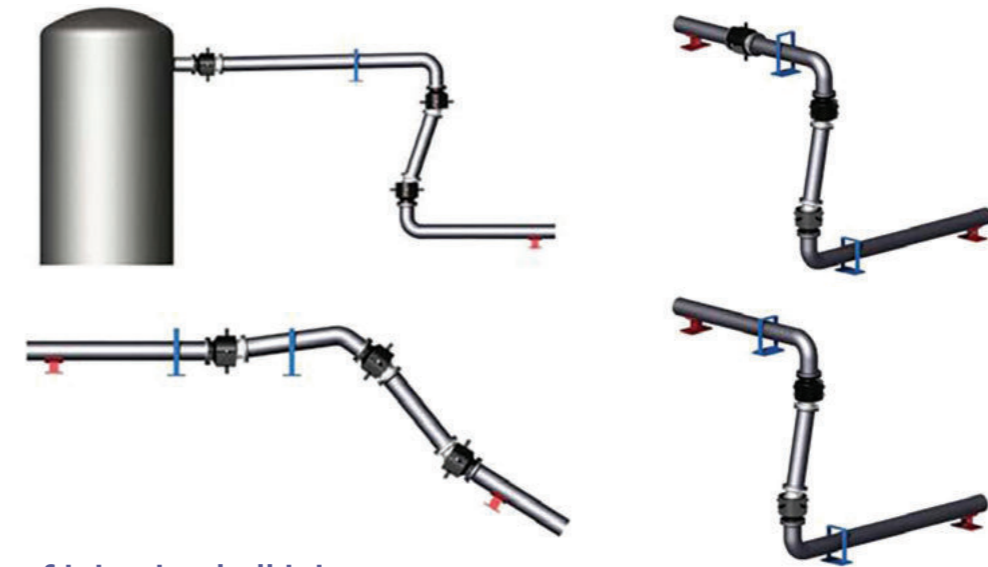
Symbols

P = Design Pressure(kg/cm²)
A = Effective area(cm²)
D = Pipe size(mm)
L = Pipe 총길이(cm)
K = Packing값(Graphite 상수)(1000lbs/m)

TECHNICAL DATA APPLICATION

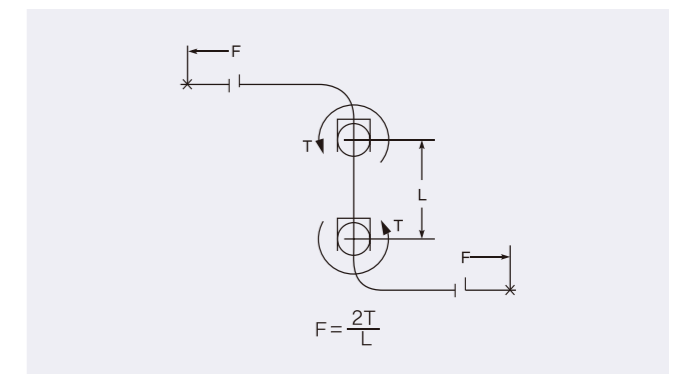
INJECTION BALL JOINT

Application of injection ball joint



Torque of injection ball joint

Pipe Size D	Pressure	Torque
	kg/cm ²	kg · m
60A	10	48
	20	56
80A	10	76
	20	90
100A	10	164
	20	174
125A	10	243
	20	257
150A	10	294
	20	334
200A	10	387
	20	441
250A	10	657
	20	856
300A	10	861
	20	1014
350A	10	1250
	20	1417
400A	10	2223
	20	2528
450A	10	2917
	20	3375
500A	10	3888
	20	4514
600A	10	6389
	20	7223
700A	10	11945
	20	13612



F = Force applied on the anchor (kg)
T = Ball joint torque value (kg, m)
L = Distance between ball joints (m)

When using a metal compression seal, compared to other compression seals, the refractive torque value remains constant even when used for a long time.

※ The above information is subject to change without prior notice to the customer in the event of product updates.

TECHNICAL DATA

CALCULATION METHOD

INJECTION BALL JOINT

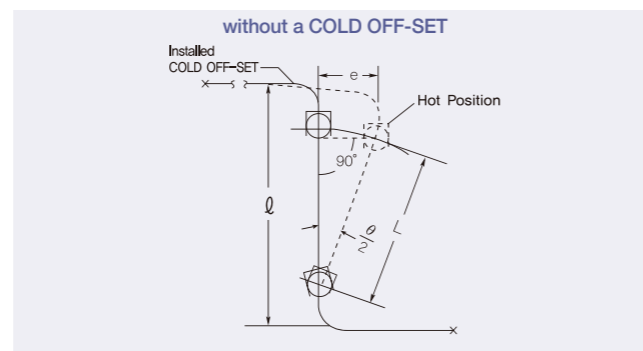
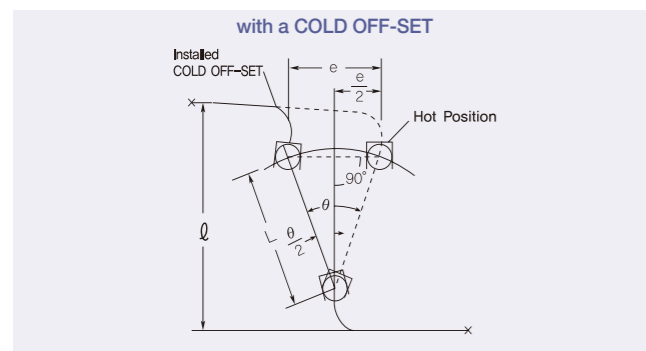
Calculating the distance L between the ball joint centers

When calculating the distance L between the centers of ball joints, in the following cases, calculate the distance at 80% of the maximum angular displacement to ensure safety:

1. When the location of an anchor is changed due to construction problems encountered while installing pipes
2. When the temperature is slightly higher during operation than the designed temperature
3. When considering the misalignment of the pipes and errors in manufacturing the ball joints during installation

Thus, when applying a safety factor of 20%, the maximum angular displacement of the ball joint are as follows:

BALL JOINT SIZE	100% θ	80% θ	$\theta / 2$
32A ~ 65A	30°	24°	±12°
Over 80A	15°	12°	±6°



When two ball joints are installed, L and e are (unit: mm):

With a COLD OFF-SET

$$\sin \frac{\theta}{2} = \frac{e/2}{L} \quad \text{or} \quad L = \frac{e/2}{\sin \theta/2}$$

1. 80A or more: $\theta/2 = \pm 6^\circ$, $\sin 6^\circ = 0.1045$
with a COLD OFF-SET : 4.78e
without a COLD OFF-SET : 9.56e

2. 32A ~ 65A : $\theta/2 = \pm 12^\circ$, $\sin 12^\circ = 0.2079$
with a COLD OFF-SET : 2.41e
without a COLD OFF-SET : 4.82e

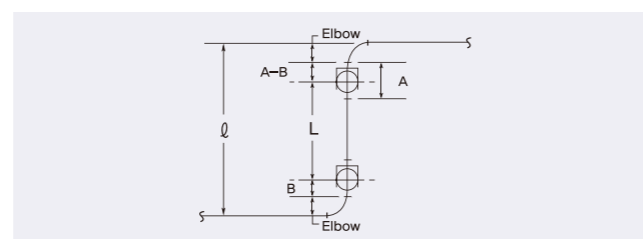
- Using the distance L within the allowable space to the maximum possible, the stress of the equipment or anchor can be reduced.

NOTE

1. When using 3 ball joints, please consult SJM.

Without a COLD OFF-SET

$$\sin \frac{\theta}{2} = \frac{e}{L} \quad \text{or} \quad L = \frac{e}{\sin \theta/2}$$



When the distance L is confirmed, the distance ℓ is calculated as follows:

$$\ell = L + A + 2 \text{ elbow lengths}$$

A is the total length of the ball joint.

When the distance ℓ is confirmed, the distance L is calculated as follows:

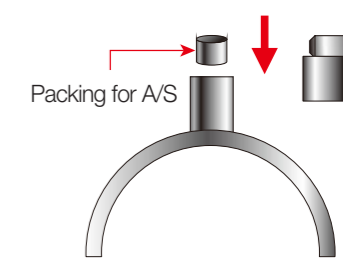
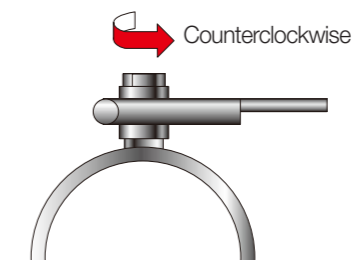
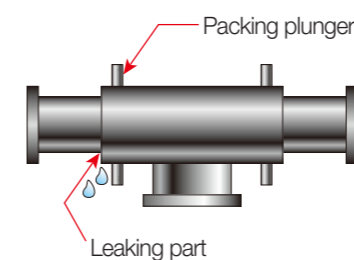
$$L = \ell - (A - 2 \text{ elbow lengths})$$

TECHNICAL DATA

PACKING INJECTION METHOD

INJECTION SLIP / MULTI / BALL JOINT

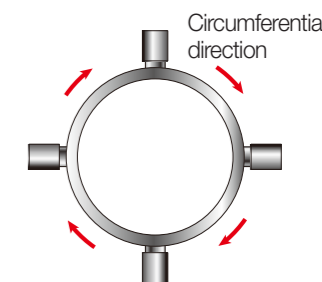
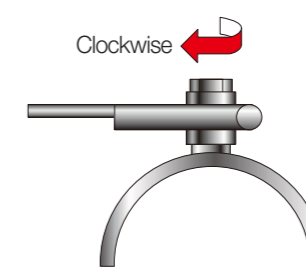
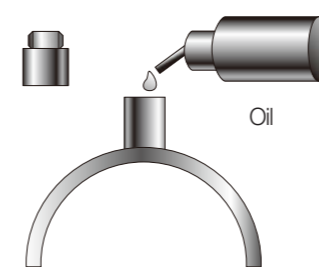
Repairing instructions for a leaking Joint



1 Check for leaks in the product.

2 Remove the packing plunger in a counter-clockwise direction closest to the leak.

3 After removing the packing plunger, insert a replacement packing into the hole.



4 Apply oil on the threads of the removed packing plunger, then reassemble the packing plunger.

5 Repeat the above procedure described in step 3 in a circumferential direction until the product stops leaking.

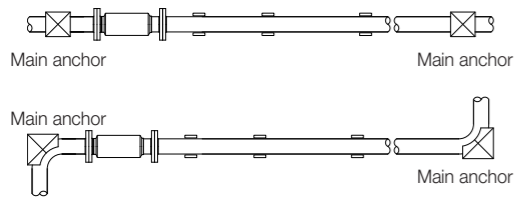
6 Tighten the packing plunger clockwise until it touches the floor.

※ There is no separate re-injection cycle for replacement packing. The packing should be replaced only when a joint starts leaking.

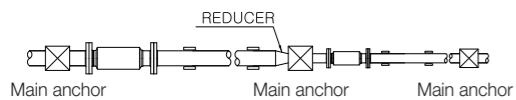
TECHNICAL DATA INSTALLATION & CAUTION

Expansion joint

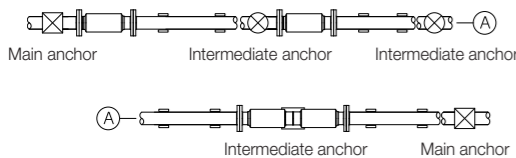
- 1 Install an anchor at both ends of the straight pipe or at the curved section of the pipe.



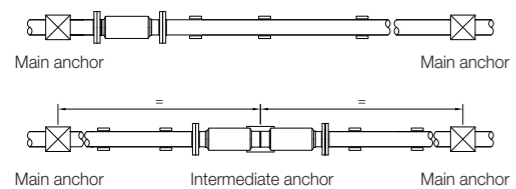
- 2 If the pipe diameter is changed due to the use of a reducer between the two expansion joints, install an anchor.



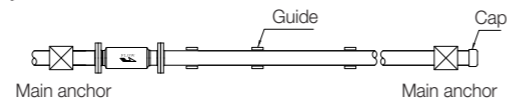
- 3 When installing multiple expansion joints in a row on a long straight pipe, install an intermediate anchor between each expansion joint.



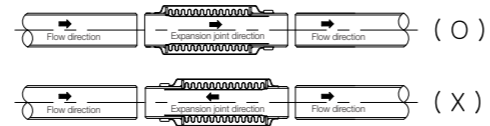
- 4 Install a Single Type expansion joint as close to the anchor as possible, and a Double Type expansion joint between two anchors.



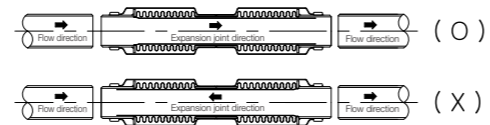
- 5 Once the main anchor and guide are installed, conduct a hydraulic test.



- 6 Install in a manner that the direction of the arrow marked on the expansion joint matches the direction of fluid flow inside the pipe.

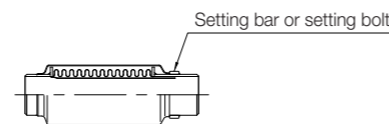


Single type

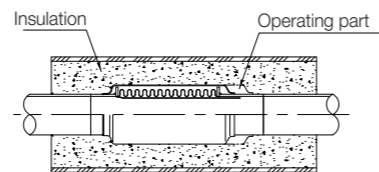


Double type

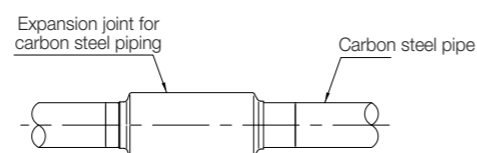
- 7 Remove the set bar or set bolt after conducting a hydraulic test. (The set bar or set bolt cannot withstand the pressure thrust generated during the hydraulic test.)



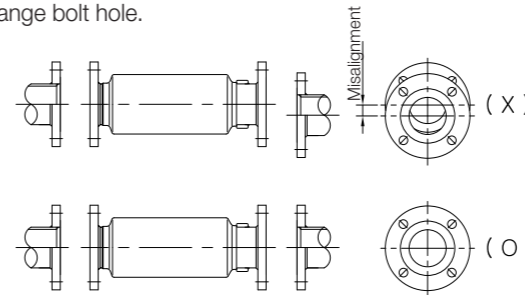
- 8 When insulating expansion joints, install them in a manner that the insulating material does not interfere with the expansion.



- 9 Use an expansion joint suitable for the particular material of the pipe.

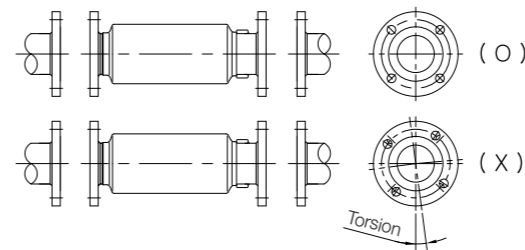


- 10 Install according to the straightness of the pipe shaft and the flange bolt hole.



* Pipe center deviation: ±2mm (20A~125A), ±3mm (150A~)

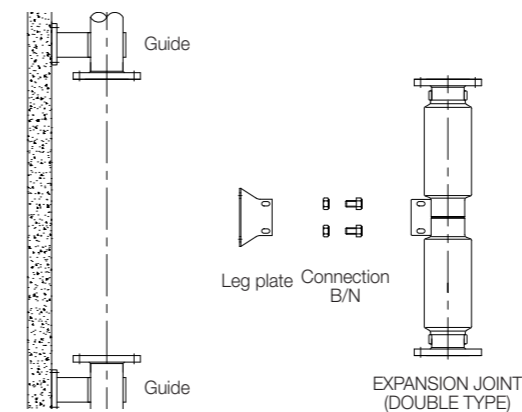
- If the axis of each expansion joint is not correctly aligned, the expansion joints may develop an eccentricity, resulting in a reduction in lifespan or an increase in noise.



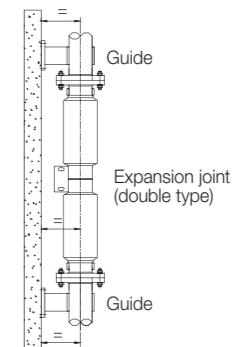
- If the flange bolt hole is not correctly aligned, the expansion joint may become distorted, and the lifespan may be significantly reduced.

- 11 When installing an intermediate anchor of a Double Type expansion joint, the height of the leg plate must be adjusted to match the straightness of the pipe axis

A. Install the upper and lower pipes in a manner that their axes are aligned.

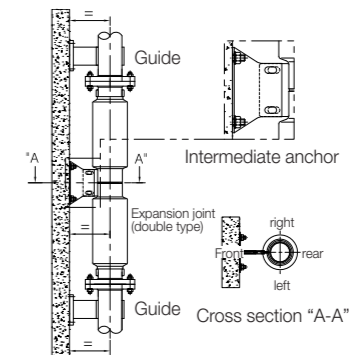


- B. Connect the expansion joints.



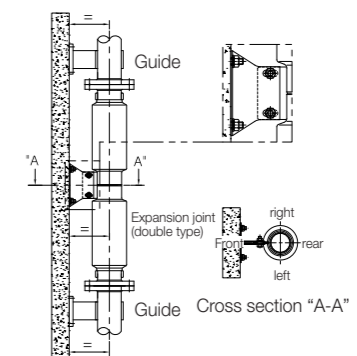
Caution) Do not apply excessive force to the expansion joint when the pipes on either side are not aligned properly. It may cause product defects or shorten the lifespan of the expansion joints.

- C. Anchor the leg plate to the wall or structure.



Caution) When fixing the leg plate to a wall or structure, keep the middle part of the expansion joint in the state described in step B. In particular, fix it naturally without pushing or pulling it in the front-to-back or left-to-right (cross-section "A-A") direction.

- D. Fix the leg plate and the expansion joint.



Caution) When fixing the leg plate and the expansion joint, install it naturally without pushing or pulling the middle part of the expansion joint in a front-to-back or left-to-right (cross-section "A-A") direction described in step C.

Warning) Do not connect welding wires to piping lines with expansion joints, as it may create sparks on the bellows inside.

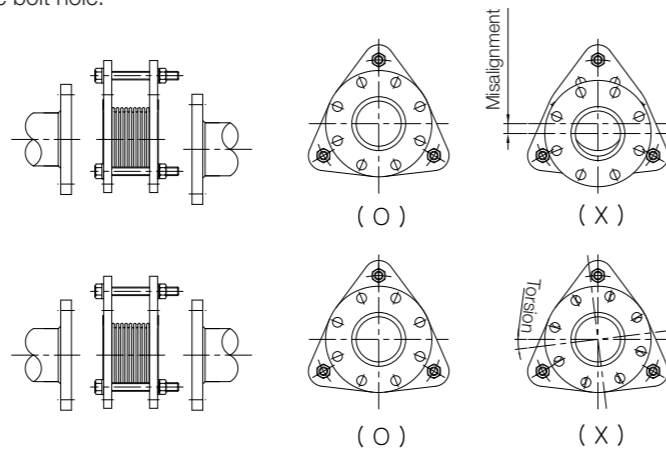
Warning) If a spark occurs, it may cause leakage of the expansion joint.

TECHNICAL DATA INSTALLATION & CAUTION

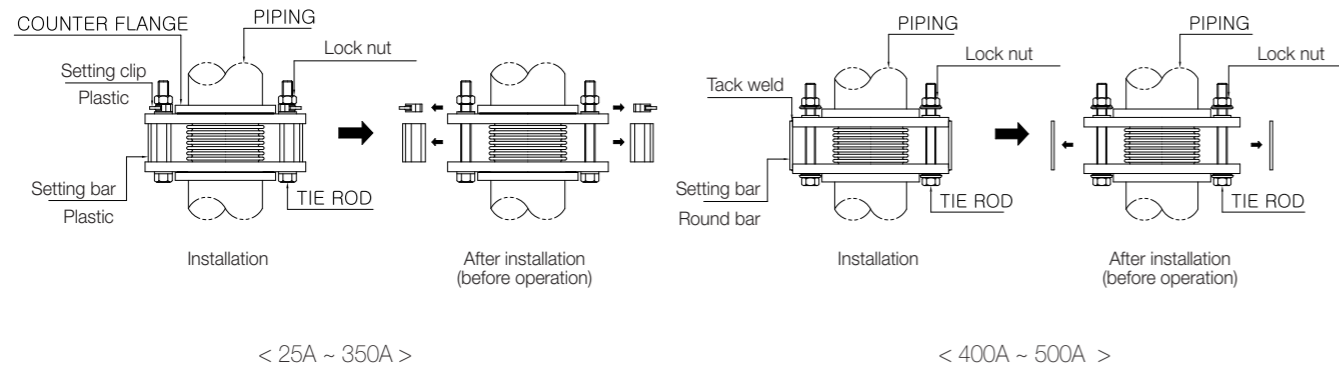
TPC

1 Install according to the straightness of the pipe shaft and the flange bolt hole.

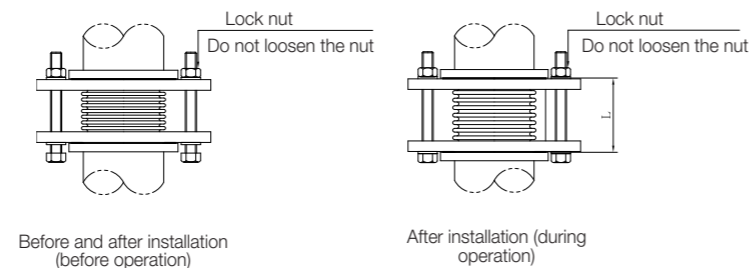
- If the pump connector is installed before the pipe axes are aligned, the pump connector may develop an eccentricity, which may shorten its lifespan.
- If the flange bolt hole is not correctly aligned, the pump connector may become distorted, and the lifespan may be significantly reduced.



2 After installing the TPC product, remove the setting clip and setting bar before operating the system.



3 After installing the TPC product, do not loosen the tie rod nut (to prevent any loosening of the tie rod nut during operation).



TECHNICAL DATA INSTALLATION & CAUTION

SRJ

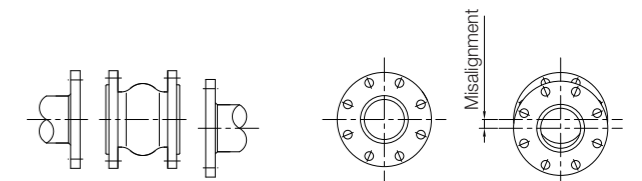
1 Keep the contact surface of the other side of the flange clean, and remove any burr or sharp sections.

2 Install the flange fastening bolt head in a manner that it is located at the rubber flange insert.

When using a STUD bolt, install it in a manner that the sharp section of the bolt does not come into contact with the rubber during installation and operation.

8 Install according to the straightness of the pipe shaft and the flange bolt hole.

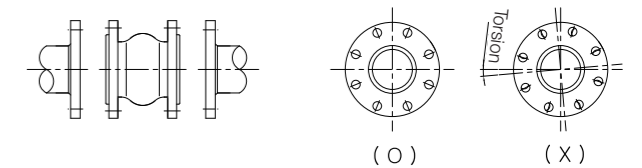
- If the axis of each pump connector is not correctly aligned, the pump connectors may develop an eccentricity, resulting in a reduction in lifespan.



- If the flange bolt hole is not correctly aligned, the pump connector may become distorted, and the lifespan may be significantly reduced.

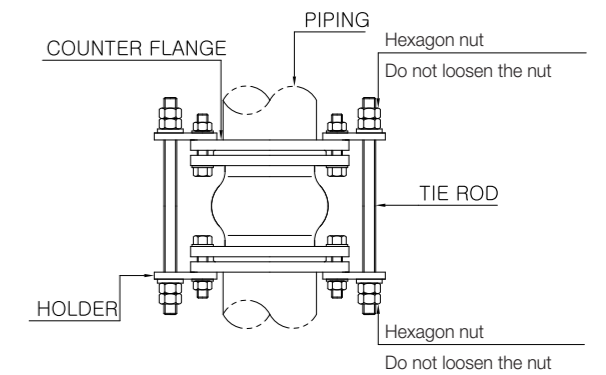
3 Tighten the flange fastening bolts evenly and tightly.

4 When fastening the flange fastening bolts, fasten the bolts facing each other in the correct order.



5 Re-examine the flange fastening bolts within 1 week of operating the system to make sure they are secure. Thereafter, conduct regular inspections.

9 After installing the SRJ product, do not loosen the tie rod nut (hexagon) before/during operating the system.



Before and after installing the product (before and during operation)

6 If the flange is leaking, tighten the flange fastening bolt.

7 Do not arbitrarily adjust the length between product sides before and after installation.