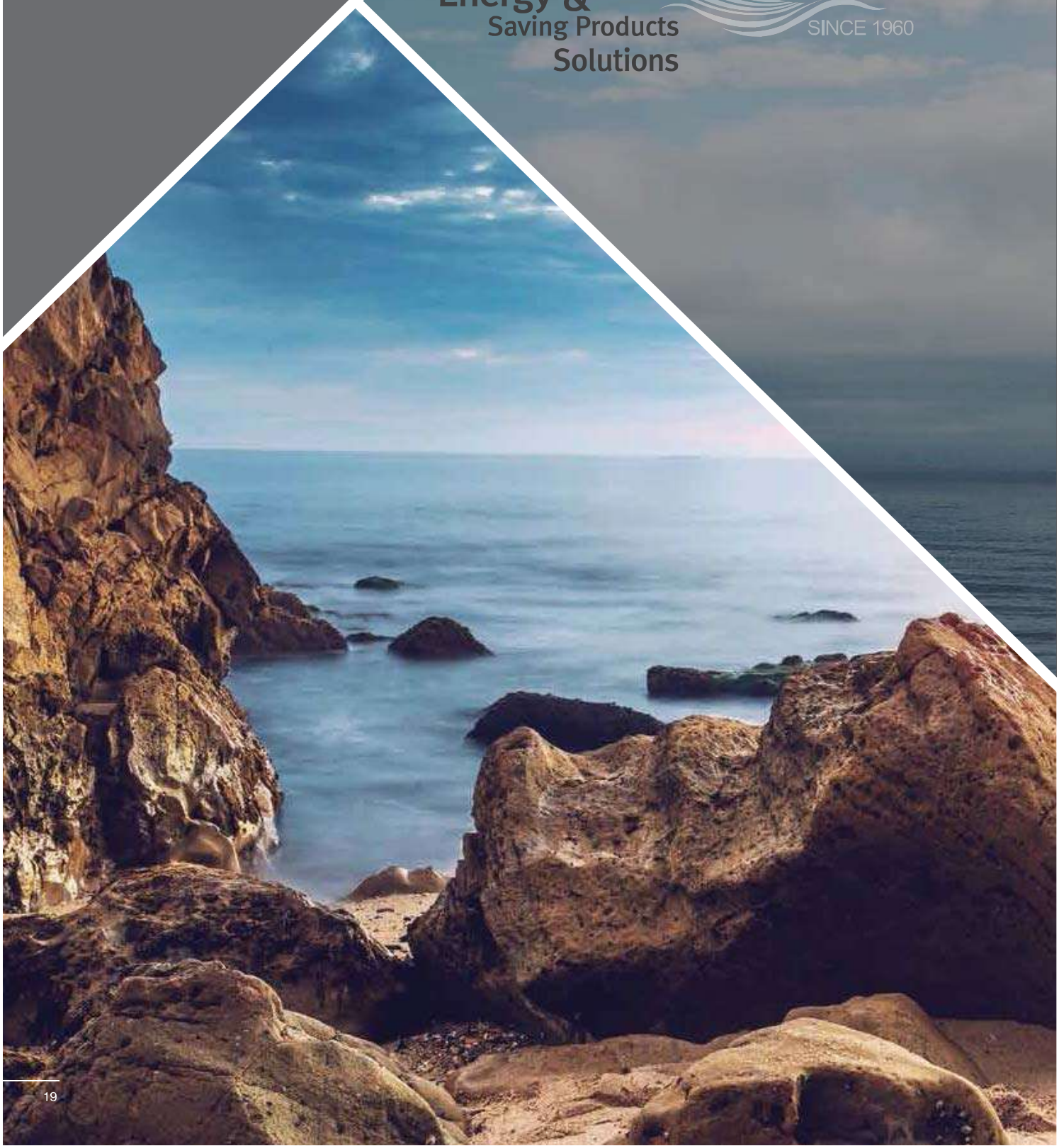
SAMYANG VALVE

Developing Energy & Saving Products Solutions

SINCE 1960



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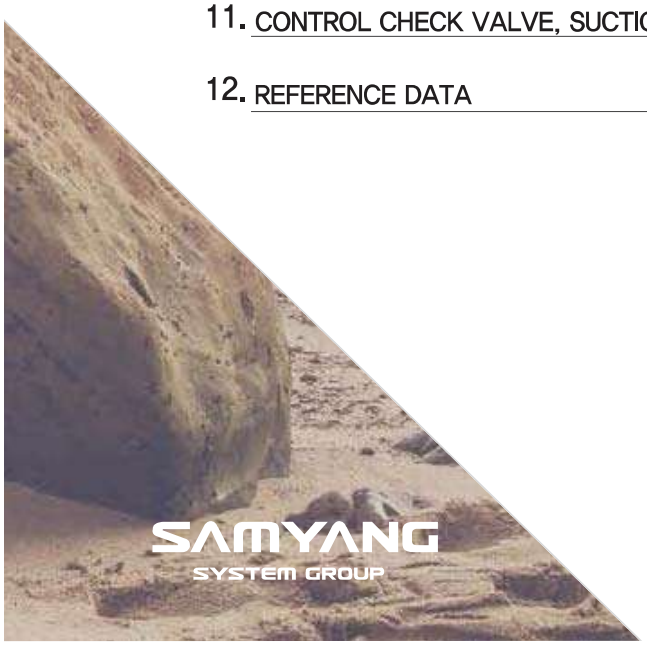


SAMYANG VALVE

Samyang manufactures all types of valves needed for the flow of fluid.

This comprehensive catalogue classifies the standard products of Samyang Valve into 11 product types. Products that are currently being developed have not been included in this catalogue. Please consult with Samyang Valve's sales representatives for inquiries on technologies or specifications not included in this catalogue.

Information in the catalogue, including structures, dimensions, and materials of products, may change without prior notice to meet the latest needs of clients and for product improvements.

PRODUCTS INDEX

SAMYANG SYSTEM GROUP SINCE 1960

01

PRESSURE REDUCING VALVE

PRESSURE REDUCING VALVE

Effectively used for construction facilities and other industries as a whole, pressure reducing valves stabilize the piping system by reducing high pressure to a set pressure. They are categorized, as per their structure, into pilot, pilot diaphragm, and direct operating types.

YPR-100
YPR-100A
YPR-1S
YPR-50
YAWM-1
YPR-2A
YPR-2AK
YAWR-1
YAWR-1K
YAWF-1
YAWF-1K
YPR-41
YPR-41K
YPR-41W

01 PRESSURE REDUCING VALVE

SAMYANG SYSTEM GROUP

Pressure Reducing Valve For Steam

Pressure Reducing Valve For Steam

Type	Size	Applicable fluid	Applicable pressure(MPa)		Structure	Materials		End connection	Page
			Primary	Secondary		Body	Disc, seat		
YPR-100	15(½")~150(6")	Steam	Maximum1.7	0.02~0.2	Pilot	GCD450	STS	KS 10K RF FLANGE	25
YPR-100A			Maximum3.0	0.14~0.69		SCPH2		KS 20K, 30K RF FLANGE	
				0.55~1.37					
YPR-1S	15(½")200~(8")		Maximum1.0	0.03~0.8		GC200	CAC406	KS 10K RF FLANGE	27
YPR-50	15(½")~25(1")		Maximum1.0	0.02~1.0	Direct operating		STS	KS PT SCREW	27

Pressure Reducing Valve For Water

Type	Size	Applicable fluid	Applicable pressure(MPa)		Structure	Materials		End connection	Page
			Primary	Secondary		Body	Disc, seat		
YPR-8Z	15(½")~20(¾")	water	Maximum 1.0	0.2~0.30	Direct operating	unconsion	EPDM/STS	Inlet : KS PT UNION Outlet : KS PT SCREW	30
				0.34~0.5					
YPR-2A YPR-2AK	15(½")~25(1")			0.05~0.35		GC200	NBR/CAC406	KS PT SCREW	31
	32(1¼")~150(6")			0.3~0.69				KS 10K FF FLANGE	
YAWR-1 YAWR-1K	200(8")~250(10")			0.05~0.34	Pilot			KS 10K RF FLANGE	33
	300(12")~400(16")			0.29~0.69					
YPR-41 YPR-41K	15(½")~150(6")	Steam water	Maximum 2.0	0.05~1.4	Direct operating	SCPH2, STS316	NBR/STS	KS 20K RF FLANGE	35

Primary Pressure Regulating Valve

Type	Size	Applicable fluid	Applicable pressure(MPa)		Structure	Materials		End connection	Page
			Primary	Secondary		Body	Disc, seat		
YPR-2W	15(½")~25(1")	water	Maximum 1.0	atm.	Direct operating	GC200	NBR/CAC406	KS PT SCREW	36
	32(1¼")~150(6")							KS 10K FF FLANGE	
YAWM-1	200(8")~400(16")				Pilot			KS 10K RF FLANGE	38
YPR-41W	15(½")~150(6")	water	Maximum 1.4	atm.	Direct operating	SCPH2, STS316	NBR/STS	KS 20K RF FLANGE	40

01

YPR-100, 100 A Type Pressure Reducing Valve For Steam

Install a water separator at the inlet of the pressure reducing valve to prevent flow of water coming in and to ensure removal of condensation water.

Features

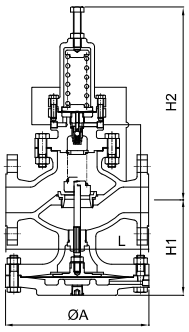
- 20:1 Maximum Pressure Turndown Ratio provides one-stage reduction without the customary costly two stage reduction.
- High Cv value and superb flow-controlling capacity allows even products that are one or two size smaller than the usual nominal diameter.
- Low pressure (0.21 Mpa) management is possible.
- Three different springs are employed based on the secondary pressure regulating range, thereby color-differentiating the pressure range based on the pipeline conditions.
- Simple structure, and major moving parts are made of durable stainless steel : removal of an adapter between the main valve and pilot valve enables easy repair and inspection.

Specifications

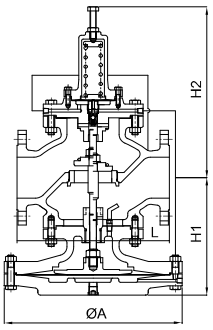
Type		YPR-100	YPR-100A
Applicable fluid		Steam	
Primary pressure		Max 1.7MPa	Max 3.0MPa
High pressure regulating range		0.02~0.2MPa (for low pressure), 0.14~0.69MPa (for medium pressure), 0.55~1.37MPa (for high pressure)	
Maximum pressure reduction ratio		14:1	
Minimum differential pressure in the inlet and outlet side of the valve		0.05MPa	
Leakage allowance		0.01% less of rated flow	
Fluid temperature		220℃ below	250℃ below
End connection		KS 10K RF FLANGE	KS 20K, 30K RF FLANGE
Material	Body	GCD450	SCPH2
	Disc, seat	STS	
	Diaphragm	Copper	
Hydraulic test pressure		2.6MPa	4.5MPa

▶ Strainer (over 80 Mesh) installation is required to ahead inlet when valve installing.
▶ Install a water separator at the inlet of the pressure reducing valve to ensure the removal of condensate.

Dimensional drawing



15-40A Type

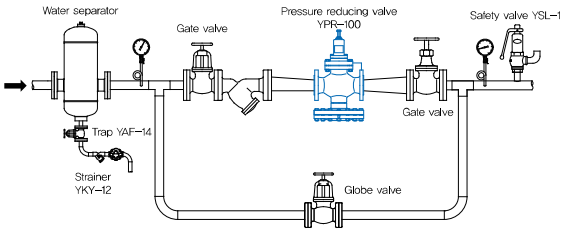


50-150A Type

Pressure regulating spring range

Yellow	0.02~0.2MPa
Red	0.14~0.69MPa
Blue	0.55~1.37MPa

Application Diagram (Example)



Dimensions

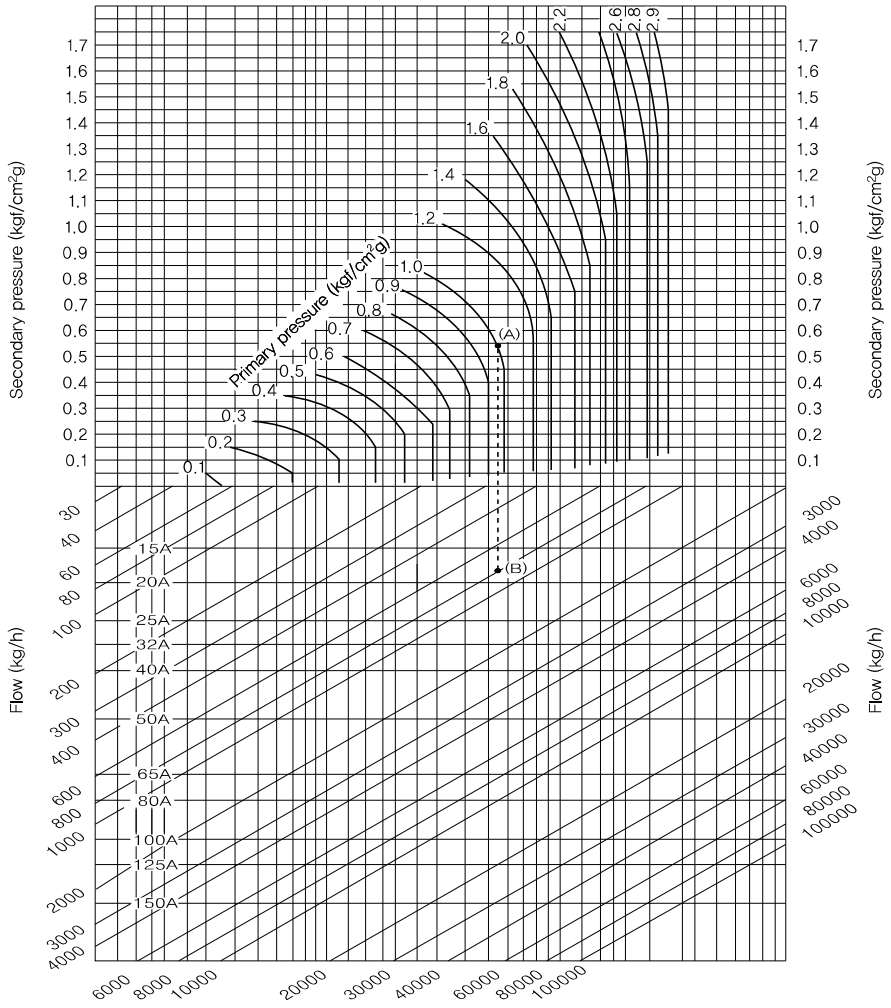
(mm)

Size	L	ø A	H1	H2	Cv	Weight (kg)
15(½")	130(130)	196	140	273	5	19.1
20(¾")	150(150)	196	135	281	7.2	20.2
25(1")	184(197)	223	150	283	10.9	20.4
32(1¼")	180(180)	223	163	293	14.3	26.4
40(1½")	222(235)	223	173	297	18.8	27.4
50(2")	254(267)	272	195	292	32	45.2
65(2½")	276(292)	348	255	327	60	76.5
80(3")	298(318)	348	260	332	78	75
100(4")	352(368)	402	285	343	120	107.4
125(5")	400	460	330	415	160	156
150(6")	451(473)	530	384	445	245	219.4

▶ Dimensions in parenthesis are for YPR-100A.

YPR–100, 100A Type Pressure Reducing Valve

Chart on selecting a size



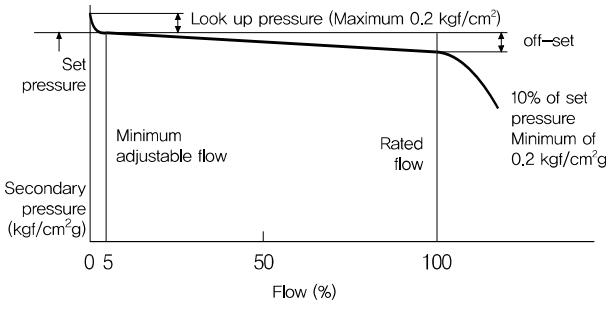
How to select the size of a valve by the chart

Example) If the primary pressure is 10 kgf/cm²g, secondary pressure is 5.5 kgf/cm²g, and flow is 800 kg/h,

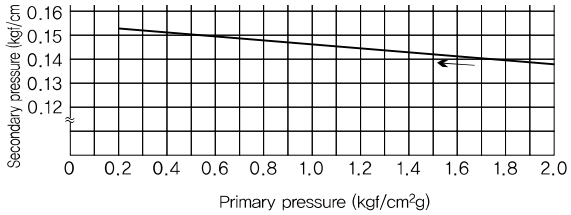
1) Determine "A," the point of intersection between the primary pressure (10 kgf/cm²g) and secondary pressure (5.5 kgf/cm²g).

2) Go down vertically from "A" to make intersection "B" with the flow (800 kg/h). Now that "B" is in between a size of 15A and 20A, a size of 20A should be selected.

● Flow characteristics chart



● Pressure characteristics chart



▶ Assuming that the secondary pressure was set to 1.4 kgf/cm2g, while the primary pressure was 17.5 kgf/cm2g, this chart shows changes in the secondary pressure when the primary pressure is adjusted to between 2 and 14 kgf/cm2g.

01

YPR-1S Type Pressure Reducing Valve For Steam

Install a water separator at the inlet of the pressure reducing valve to prevent flow of water coming in and to ensure removal of condensation water

Features

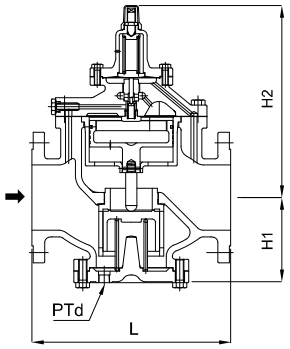
- Pilot-type pressure reducing valve for steam features a precise adjustment function.
- With only a single adjustment, a constant pressure level is maintained, thereby ensuring safety.
- Convenient piping construction, thanks to its simple structure and solidity.
- Superb performance even in places where primary steam pressure changes are severe.
- Pressure at a constant level, regardless of changes in the secondary flow.

Specifications

Applicable fluid		Steam
Primary pressure		Maximum 1.0MPa
Secondary pressure regulating range		0.03~0.5MPa (for standard pressure) 0.4~0.8MPa (for medium pressure)
Maximum pressure reduction ratio		10:1
Minimum differential pressure in the inlet and outlet side of the valve		0.07MPa
Leakage allowance		0.01% less of rated flow (ANSI b16.104 class IV)
Fluid temperature		220℃ below
End connection		KS 10K RF FLANGE
Materials	Body	GC200
	Disc, seat	CAC406 / STS
	Diaphragm	STS
Hydraulic test pressure		1.5MPa

▶ Strainer (over 80 Mesh) installation is required to ahead inlet when valve installing.
▶ Install a water separator at the inlet of the pressure reducing valve to ensure the removal of condensate.

Dimensional drawing

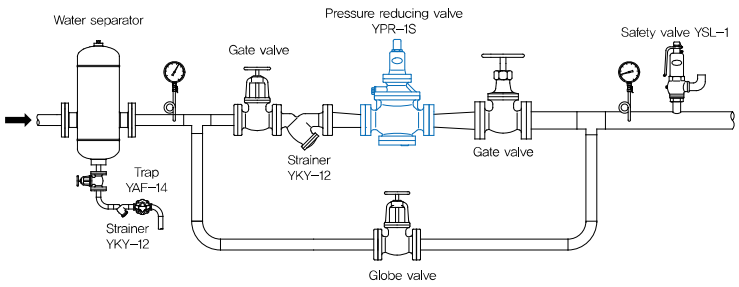


Dimensions

(mm)

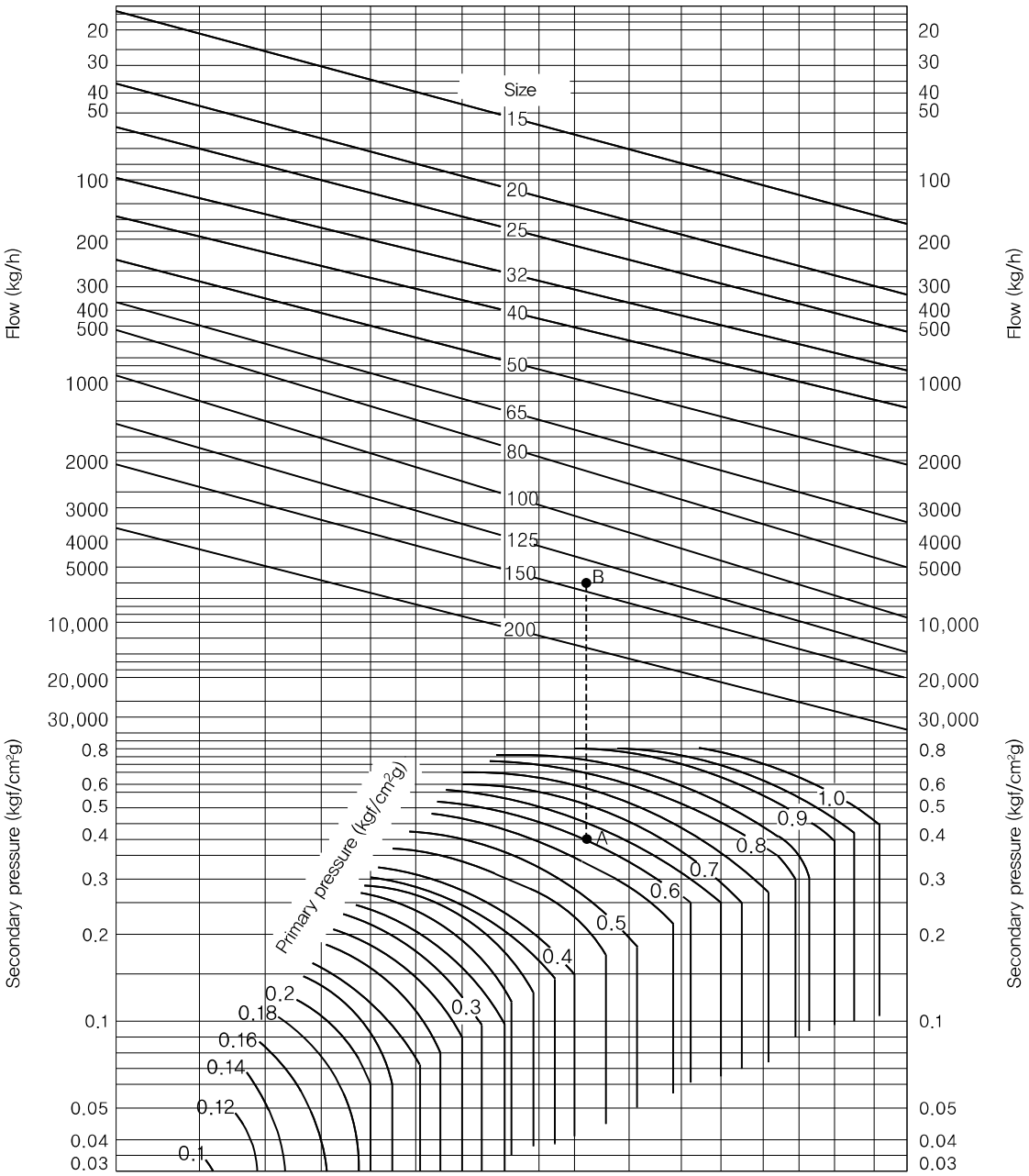
Size	L	H1	H2	d	Cv	Weight (kg)
15(½")	152	64	230	¼"	1	7.7
20(¾")	152	64	230	¼"	2.5	7.7
25(1")	170	71	255	¼"	4	10.8
32(1¼")	200	81	265	¼"	6.5	15
40(1½")	200	81	265	¼"	9	15.8
50(2")	215	86	270	¼"	16	18.8
65(2½")	245	110	285	⅜"	25	25.9
80(3")	285	130	295	⅜"	36	35.3
100(4")	320	148	308	⅜"	64	49.6
125(5")	380	173	368	⅜"	100	90.3
150(6")	420	189	378	⅜"	144	98.6
200(8")	500	229	451	⅜"	256	190.8

Application Diagram (Example)



Remove the plug from the lower pressure relief valve and use the disk trap.

YPR-1S Type Pressure Reducing Valve



How to select the size of a valve by the chart

Example) If the primary pressure is 6 kgf/cm^{2}g, secondary pressure is 4 kgf/cm^{2}g, and flow is 6,000 kg/h.

1) Determine "A," the point of intersection between the primary pressure (6 kgf/cm^{2}g) and secondary pressure (4 kgf/cm^{2}g). Go down vertically from "A" to make intersection "B" with the flow (6,000 kg/h).

2) This "B" is what determines the size of the valve. It is in between a size of 125 and 150, and therefore a size of 150 should be selected.

YPR–50 Type Pressure Reducing Valve For Steam

Install a water separator at the inlet of the pressure reducing valve to prevent flow of water coming in and to ensure removal of condensation water.

01

Features

- Direct operating pressure reducing valve for small flow for outstanding pressure control performance and wide pressure regulating range.
- Stainless steel components for corrosion resistance, long service life and durability.

Specifications

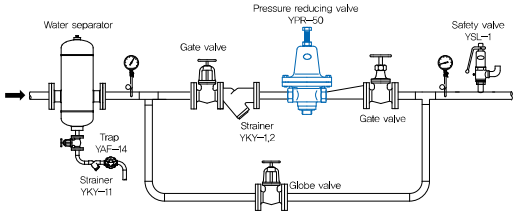
Applicable fluid		Steam
Primary pressure		Maximum 1.0MPa
Secondary pressure regulating range		0.02~0.1MPa (for low pressure), 0.1~0.2MPa (for medium pressure), 0.2~1MPa (for standard pressure)
Maximum pressure reduction ratio		10:1
Minimum differential pressure in the inlet and outlet side of the valve		0.05MPa
Fluid temperature		220℃ below
Leakage allowance		0.01%less of rated flow (ANSI b16.104 class IV)
End connection		KS PT SCREW
Materials	Body	GC200
	Disc, seat	STS
	Diaphragm	STS
Hydraulic test pressure		1.5MPa

▶ Strainer (over 80 Mesh) installation is required to ahead inlet when valve installing.
▶ Install a water separator at the inlet of the pressure reducing valve to ensure the removal of condensate.

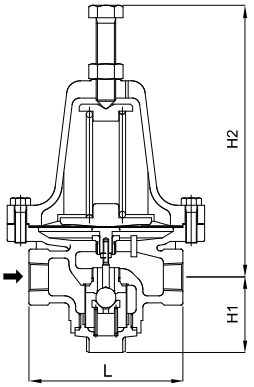
Dimensions

호칭지름	L	H1	H2	Weight (kg)
15(½")	110	54	180	4.5
20(¾")	110	54	180	4.5
25(1")	120	61	234	8.8

Application Diagram (Example)



Dimensional drawing



Capacity

(kg/h)

Primary pressure (MPa)	Secondary pressure (MPa)	Size 15(½")	20(¾")	25(1")
0.1	0.05	3.4	3.9	6.5
0.14	0.05	3	3.9	4.4
	0.09	3.7	3.4	7.4
0.21	0.1	3.7	4.2	7.1
	0.16	4.4	5	7.9
	0.2	2.3	2.8	4.2
0.27	0.14	5.6	6.8	11.2
	0.23	7	8.5	13.2
	0.3	2.8	3.9	5.4
0.34	0.04	3.4	4.4	6.2
	0.14	7	8.1	13.2
	0.27	9.1	10.1	17
0.41	0.04	3.9	5.1	7
	0.13	6.3	7.3	12
	0.27	10.6	11.6	20.3
	0.33	9.6	10.8	18.6

Primary pressure (MPa)	Secondary pressure (MPa)	Size 15(½")	20(¾")	25(1")
0.55	0.04	12.4	14.4	24
	0.06	4.2	5.4	7.6
	0.16	8.5	9.6	15.5
	0.37	13.1	15.8	24.8
0.7	0.07	4.8	5.6	9.3
	0.27	13.9	16.2	26.4
	0.45	15.8	18.4	30.7
	0.55	14.6	17	27.9
0.82	0.31	16.9	18.8	31.6
	0.48	19.4	21.9	36.4
	0.67	16.2	19.4	31.8
	0.8	7.7	8.5	13.9
1.04	0.1	9.3	11.6	17.9
	0.38	21	24.8	41.8
	0.6	25.6	29.6	50
	0.82	20.2	23.4	38.7

For heating and supplying water

YPR-8Z Type Pressure Reducing Valve to each Household

Pressure reducing valves that are used to supply water to each household are designed to resolve problems that arise from a pressure imbalance in water supplied to households. They promote user convenience by allowing easy changes of the pipeline direction in accordance with field conditions.

Features

- It prevents waste of water resources by controlling irregular pressures among households in apartment buildings.
- As a union type, the pipeline can be changed easily according to field conditions.
- No additional errors resulting from the idle rotation of the flowmeter; by preventing pressure imbalance of water flow among households and blocking countercurrents to "low pressure" households.
- Its optimal design considers the maximum concurrent usage rate by supplying sufficient flow, based on an appropriate pressure level, even at peak load.
- Built-in strainer blocks entry of foreign substances and reduces installation space.
- Identifies precise adjusted pressure level and reduces installation space.
- Improvements in cross-sections polishing on the flow path to minimize resistance loss and reduce noise.

Specifications

Type		YPR-8Z
Applicable fluid		Cold/Hot water
Primary pressure		Max 1.0Mpa
High pressure regulation		0.2~0.34MPA (for medium pressure), 0.34~0.5MPa (for High pressure)
Applicable fluid temperature		80℃ below
Maximum pressure reduction ratio		10:1
Minimum differential pressure in the inlet and outlet of the valve		0.05MPa
End connection	Inlet	KS PT UNION
	Outlet	KS PT SCREW
Material	Body	Unleaded brass
	Disc, seat	EPDM, STS
	Diaphragm	EPDM
Hydraulic pressure test		Hydraulic pressure 1.5MPa/ Pneumatic pressure 1.1MPa
Optional		Check valve

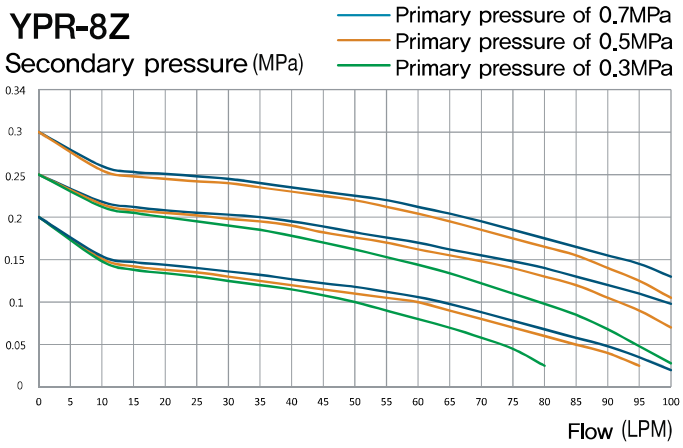
▶ Strainer (over 40 Mesh) installation is required to ahead inlet when installing valve.

Dimensions

(mm)

Size	L	H1	H2	D	Weight (kg)
15(½")	100	29	65	64	0.65
20(¾")	105	30	68	64	0.75

Flow Curve



YPR-8Z

for Water

YPR -2A/2AK (KC marked), ST Type Pressure Reducing Valve

This is a direct operating pressure reducing valve for cold and hot water that can be used for small to large flows, with a small pressure fluctuation range. Used for construction facilities, this valve is employed for pressure control of each level's water supplied by an elevated water tank of a medium or high-rise building; as well as for pressure control of feed water from a directly-coupled pump and other boiler feed water.

01

Features

- Outstanding functions for controlling the pressure of water supplied by a building's elevated water tank to each floor.
- Easy to handle : small size and light weight.
- Two ways to install : horizontally or vertically.
- A constant pressure level with only a single adjustment.
- Wide flow range ability : an outstanding level of minimum adjustable flow & adjustable and stable in a wide flow range.
- All parts can be disassembled through the top of the valve : complete repairs even in limited spaces is possible.
- Built-in spring-type orifice that prevents a water hammering action.
- Linear flow pass-through method, which removes noise during operation.

Flanged type

Screwed type

YPR-ST

Specifications

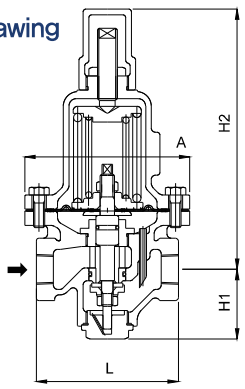
Applicable fluid		Water	
Primary pressure		Maximum 1.0MPa	
Secondary pressure regulating range		Outer spring	0.05~0.35MPa
		Inner+outer spring	0.3~0.69MPa
Maximum pressure reduction ratio		10:1	
Minimum differential pressure in the inlet and outlet side of the valve		0.05MPa	
Minimum adjustable flow		wate 2~5 ℓ/min	
Fluid temperature		Maximum 5~80℃	
End connection	size	15~25A	32~150A
	Inlet	KS PT SCREW	KS 10K FF FLANGE
	Outlet	KS PT SCREW	KS 10K FF FLANGE
Materials	Body	GC200	
	Disc, seat	NBR, CAC406	
	Diaphragm	NBR	
Hydraulic test pressure		1.5MPa	

▶ Multi-step pressure reduction is needed when the cavitation index is 0.5 or lower.
▶ Strainer (over 40 Mesh) installation is required to ahead inlet when valve installing.
▶ KC marked products are order made

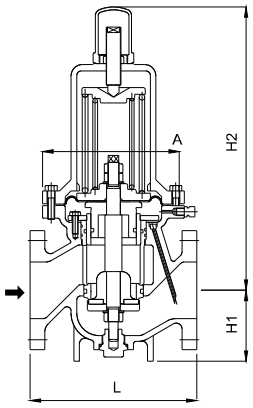
Dimensions

Size	L	A	H1	H2	Cv	Weight (kg)
15(½")	100	116	50	184	2.9	3.2
20(¾")	100	116	50	184	3.5	3.3
25(1")	120	142	68	224	6.2	6.4
32(1¼")	190	174	81	327	12.8	17.5
40(1½")	190	174	81	327	13.7	17.7
50(2")	190	174	81	327	13.8	18.8
65(2½")	250	228	100	374	40.2	37.6
80(3")	250	228	100	374	41.9	37.8
100(4")	290	250	125	490	64.7	65.5
150(6")	390	340	165	655	109.5	155.6

Dimensional drawing



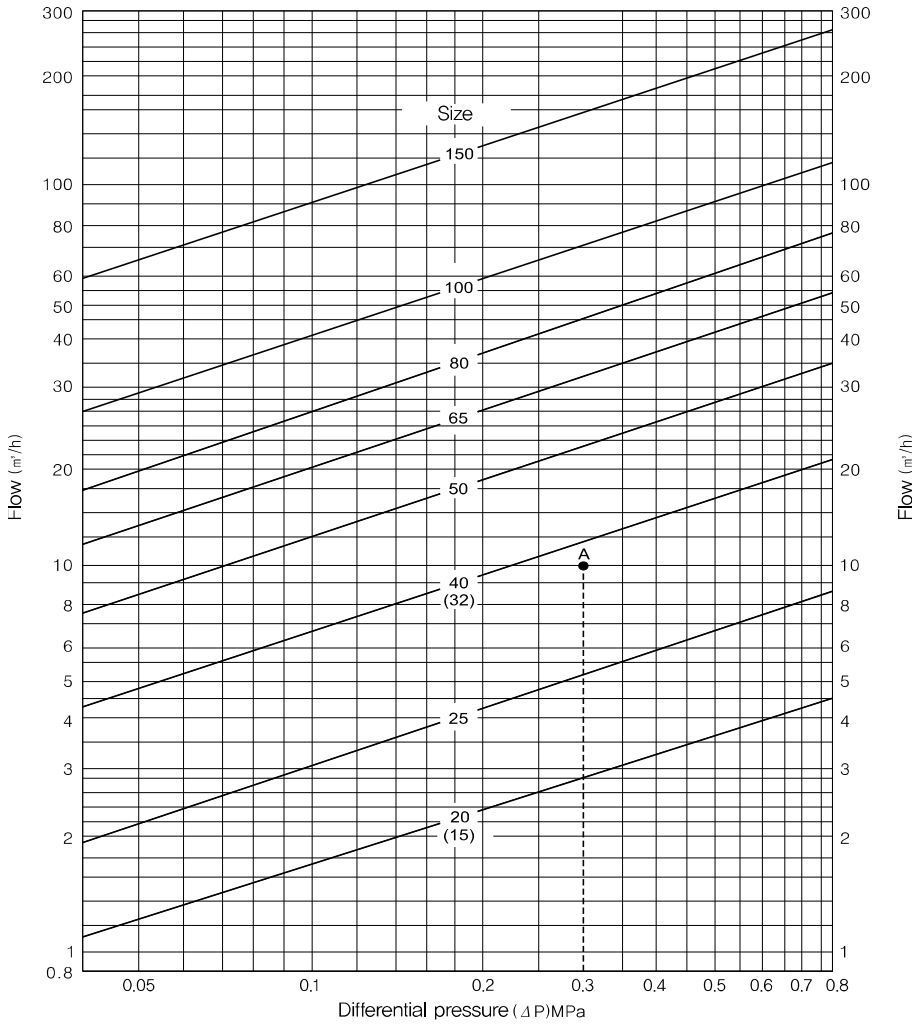
Screwed type



Flanged type

YPR –2A Type Pressure Reducing Valve

Chart on selecting a size



How to select the of a valve by the chart

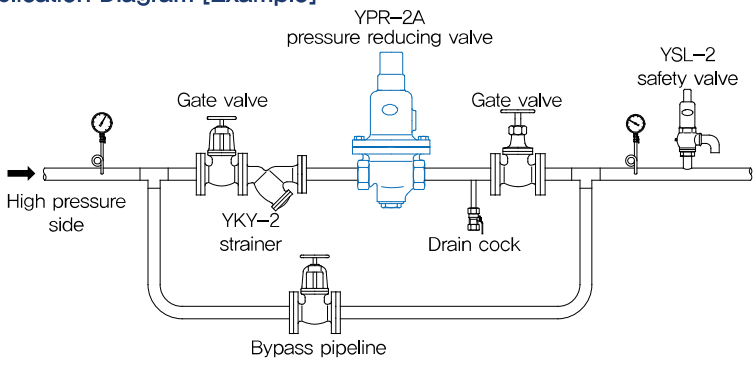
Example) If the primary pressure is 5 kgf/cm²g, secondary pressure is 2 kgf/cm²g, and flow is 10 cm³/h,

1) The differential pressure ($\Delta P = P_1 - P_2$) between the primary pressure (5 kgf/cm²g) and secondary pressure (2 kgf/cm²g) is 3 kgf/cm².

2) Determine point "A" by vertically connecting the differential pressure (3 kgf/cm²) with the flow (10 cm³/h).

3) Now that "A" is in between a size of 25 and 40, a size of 40 should be selected.

Application Diagram [Example]



for Water

YAWR –1/1K (KC marked) Type Pressure Reducing Valve

As a large capacity pressure reducing valve, this product is used for construction facilities, plants, and water–supplying lines for agricultural use. Because the pilot valve has a pressure balance structure, it maintains a constant secondary pressure level, regardless of changes in the primary pressure.

01

Features

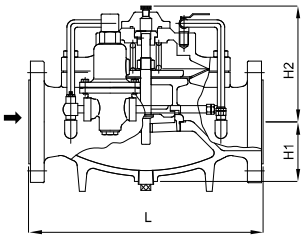
- Special seat structure : it prevents a water hammer when the valve is opened and closed.
- Reliant and easy to use by Needle valve adjustment according to field conditions
- Simple to adjust and maintain due to easy disassembling of valve body and pilot valve

Specification

Applicable fluid		Clear water, industrial water, agricultural water	
Primary pressure		Maximum 1.0MPa	
Secondary pressure regulating range		Size of 200~250	0.05~0.69MPa
		Size of 300~400	0.05~0.34MPa 0.29~0.69MPa
Maximum pressure reduction ratio		10:1	
Minimum differential pressure in the inlet and outlet side of the valve		0.05MPa	
Minimum adjustable flow		10% of rated flow	
Fluid temperature		5~80℃ below	
End connection		KS 10K RF FLANGE	
Materials	Body	GC200	
	Disc, seat	NBR / CAC406	
	Diaphragm	NBR	
Hydraulic test pressure		1.5MPa	
Optional		Pressure gauge	

▶ The primary and secondary pressure gauge is attached upon client's order.
▶ The direct operating type (YPR–2A) should be selected for control of small flow.
▶ A pipeline needs to be installed in parallel with the direct operating YPR–2A if there is a need for flow control within 10% of the rated flow.
▶ Strainer (over 40 Mesh) installation is required to ahead inlet when valve installing.
▶ KC marked products are order made

Dimensional drawing

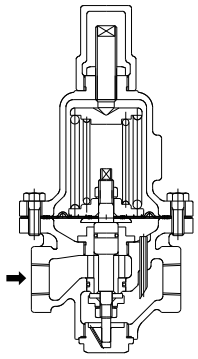


Main valve

Dimensions

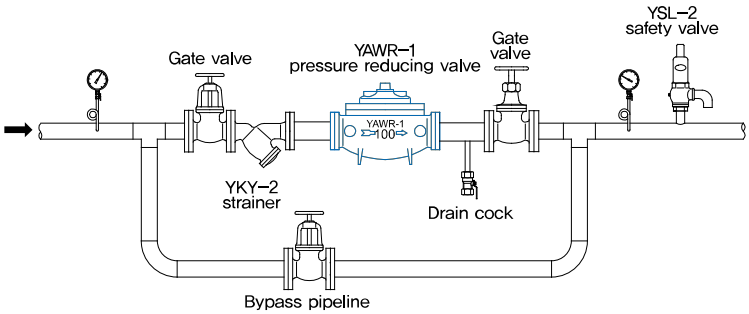
(mm)

Size	L	H1	H2	Cv	Weight (kg)
200(8")	640	210	390	640	253.2
250(10")	740	250	481	1000	440
300(12")	900	290	557	1440	516



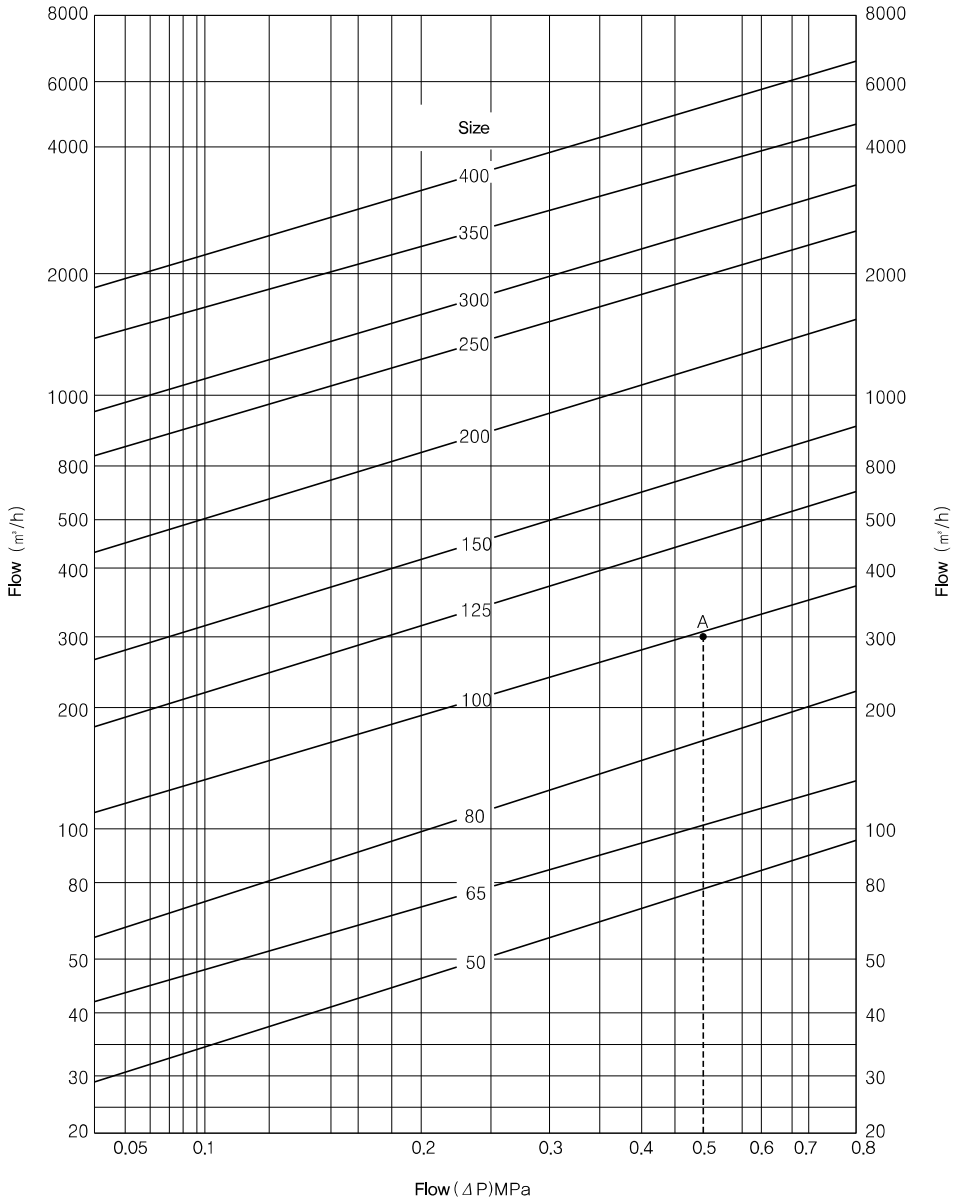
Pilot pressure reducing valve

Application Diagram [Example]



YAWR –1 Type Pressure Reducing Valve

Chart on selecting a size



How to select the size of the valve in reference to the chart

Example) If the opening pressure is 0.6MPa, and rate of flow 6,000kg/h:

1) Determine "A" where opening pressure 0.6MPa meets back pressure 0.4MPa and find "B" by going down vertically to meet the rate of flow at 6,000kg/h.

2) Its "B" that determines the size of the valve, and as it stands between a size of 125 and 150, the size of the valve should be 150.

for Water, Air & Gas

YPR-41/41K (KC marked) Type Pressure Reducing Valve

This is an air, liquid and gas pressure reducing valve that delivers constant pressure level and can be used from minimum to maximum pressure flow. The valve operates outstanding performance on mid-high level building's elevated tanks and different level of adjustable flow by pump. Also used as a pressure reducing valve for fire fighting, construction facilities and plant equipment.

01

Features

- Two ways to install : horizontally or vertically.
- A constant pressure level with only a single adjustment.
- Wide flow range ability : an outstanding level of minimum adjustable flow & adjustable and stable in a wide flow range.
- Also used as a pressure reducing valve for fire fighting equipment.

Specification

Applicable fluid		Water, vapor
Primary pressure		Maximum 2.0MPa
Secondary pressure regulating range		0.05~0.69MPa, 0.69~1.4MPa
Maximum pressure reduction ratio		10:1
Minimum differential pressure in the inlet and outlet side of the valve		0.05MPa
Fluid temperature		5 ~ 80 ℃ Below
End connection	Inlet	KS 20K RF FLANGE
	Outlet	KS 20K RF FLANGE
Materials	Body	SCPH2
	Disc, seat	NBR, STS
	Diaphragm	NBR
Hydraulic test pressure		1.5 times the water pressure of the flange applied pressure

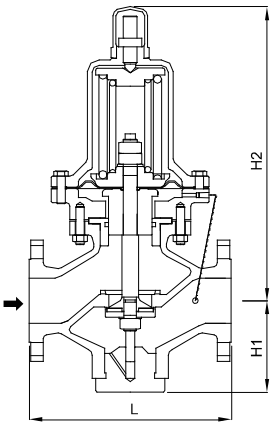
▶ We also manufacture the ANSI flange.
▶ Strainer (over 80 Mesh) installation is required to ahead inlet when valve installing.
▶ KC marked products are order made

Dimensions

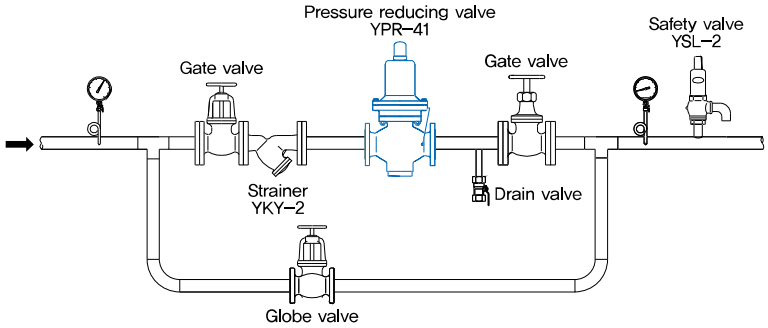
(mm)

Size	L	H1	H2	Cv	Weight (kg)
15(½")	130	062	227	3.9	8.2
20[¾"]	150	065	235	3.9	8.5
25(1")	197	072	264	5.0	10.4
32(1¼")	180	083	274	5.3	15.1
40(1½")	235	091	345	15.0	25.5
50(2")	267	107	365	18.0	27.2
65(2½")	292	132	425	31.5	47.4
80(3")	318	140	430	56.1	56.0
100(4")	368	150	535	96.9	100
125(5")	400	175	704	123.9	162
150(6")	473	210	734	190.4	225

Dimensional drawing



Application Diagram [Example]



YPR–2W Type Primary Pressure Regulating valve for Water

This is a type of relief valve and self–operating regulating valve that discharges excessive pressure resulting from load fluctuations and maintains a constant pressure level in instruments or pipelines. In case of continuous pump operation, changes are made according to fluctuations in the discharge pressure load. It is possible to install this product as a primary pressure regulating valve in the bypass circuit to relieve excessive pressure, and to adjust the discharge pressure to remain constant.

Features

- Easy to handle: small size and light weight.
- Two ways to install: horizontally or vertically.
- Stable operations: no such issues as hunching or vibration.
- Use of a disc made of special materials inside the valve: No water leakage when the valve is opened and closed.
- Piston–type balance structure: almost no change in the opening pressure resulting from back pressure fluctuations.
- The pressure tank can be used as a relief valve in a pipeline.

Specification

Applicable fluid		Water	
Primary pressure		Maximum 1.0MPa	
Primary pressure		0.05~0.70MPa	
Allowable leakage		Less than 0.01% of rated flow (ANSI b16.104 class IV)	
Descending pressure		Set pressure x within 20% (within 0.03 MPa minimum)	
Accumulation pressure		Set pressure x 10% or less (within 0.03 MPa minimum)	
Fluid temperature		5~80°C or less	
End connection	size	15~25A	32~150A
	Inlet	KS PT SCREW	KS 10K FF FLANGE
	Outlet	KS PT SCREW	KS 10K FF FLANGE
materials	Body	GC200	
	Disc, seat	NBR/CAC406	
	Diaphragm	NBR	
Hydraulic test pressure		1.1MPa	

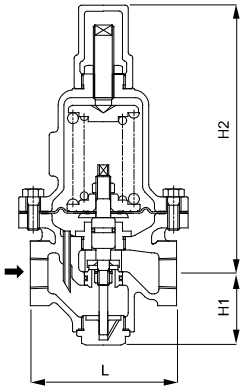
▶ Strainer (over 40 Mesh) installation is required to ahead inlet when valve installing.

Dimensions

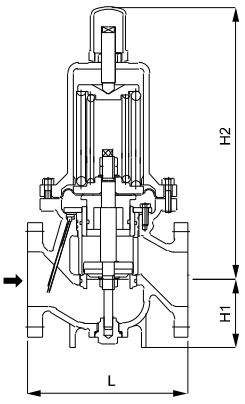
(mm)

Size	L	A	H1	H2	Cv	Weight (kg)
15(½")	100	116	50	184	2.9	3.2
20(¾")	100	116	50	184	3.5	3.3
25(1")	120	142	68	224	6.2	6.4
32(1¼")	190	174	81	327	12.8	17.5
40(1½")	190	174	81	327	13.7	17.7
50(2")	190	174	81	327	13.8	18.8
65(2½")	250	228	100	374	40.2	37.6
80(3")	250	228	100	374	41.9	37.8
100(4")	290	250	125	490	64.7	65.5
150(6")	390	340	165	655	109.5	155.6

Dimensional drawing



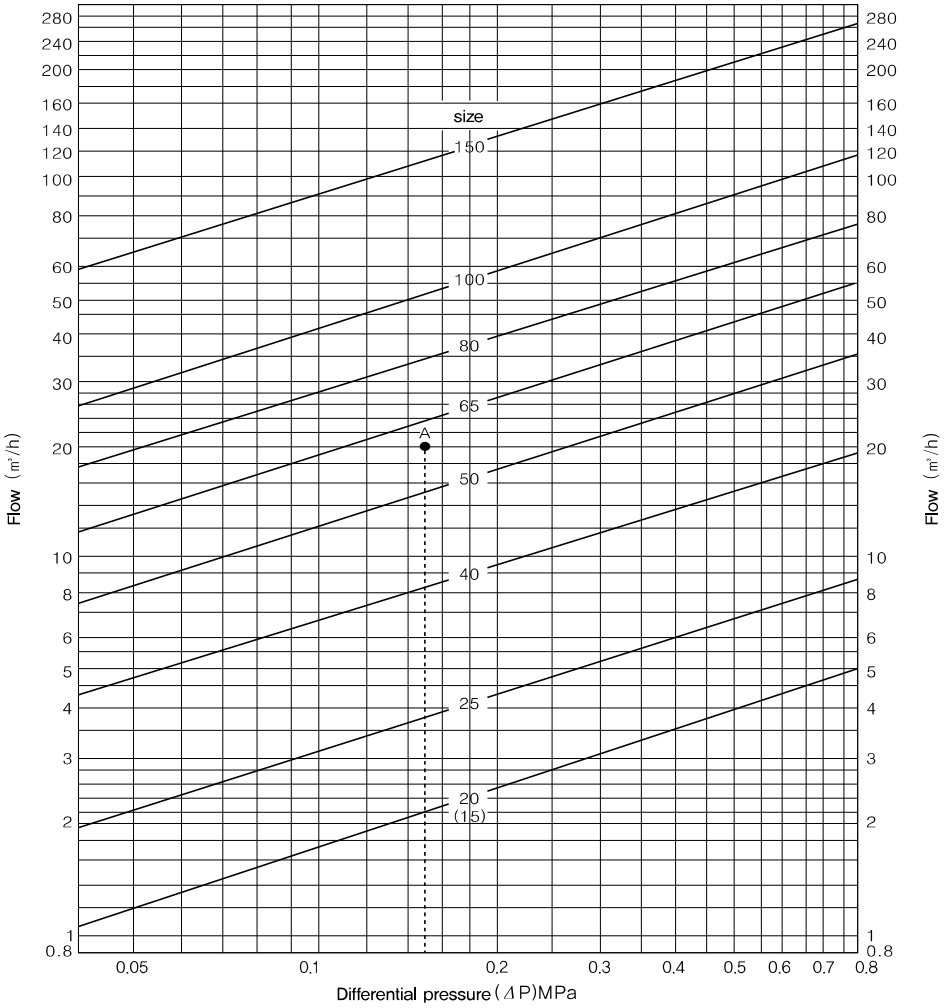
Screwed type(15A~25A)



Flanged type(32A~150A)

YPR–2W Type Primary Pressure Regulating Valve

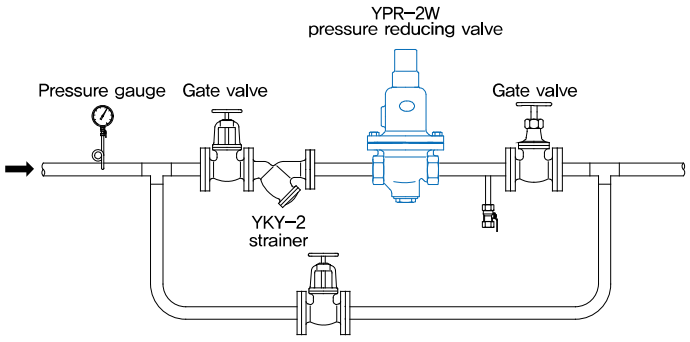
Chart on selecting a size



How to select the size of the valve in reference to the chart

Example) If the opening pressure is 6 kgf/cm²g, back pressure is 4.5 kgf/cm²g, and flow is 20 m³/h,
The differential pressure is (ΔP) 6–4.5=1.5 kgf/cm²g.
Determine "A" where a vertical line from the differential pressure (ΔP) (1.5 kgf/cm²g) meets the flow (20 m³/h).
Now that "A" is in between a size of 50 and 65, the size of the valve should be 65.

Application Diagram [Example]



YAWM-1 Type Primary Pressure Regulating Valve for Water

The type YAWM-1 primary pressure regulating valve combines a main valve and an auxiliary valve. The main valve is operated by setting the pressure of the auxiliary valve. As a bypass valve for largecapacity pumps, it discharges the increased amount of pressure resulting from load fluctuations and ensures that the discharge pressure of a pump remains constant.

Features

- Based on its auxiliary valve function, it automatically opens and closes valves with a large diameter, without external power supply.
- Pressure balance structure enables it to delicately respond to load fluctuations.
- No water leakage : the diaphragm and disc are made of NBR.
- A speed control valve (needle valve) attached : possible to adjust the opening and closing speed of the main valve.

Specification

Applicable fluid		Clear water, industrial water, agricultural water
Primary pressure		200~250mm : 0.05~0.69MPa
		300~400mm : 0.05~0.49MPa
Fluid temperature		80°C below
End connection		KS 10K RF FLANGE
materials	Body	GC200
	Disc, seat	NBR/CAC406
	Diaphragm	NBR
Hydraulic test pressure		1.5MPa
Optional		Pressure gauge

▶ Strainer (over 40 Mesh) installation is required to ahead inlet when valve installing.

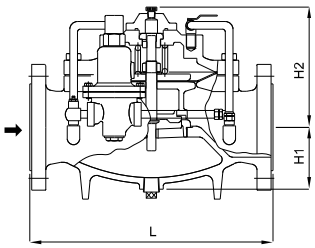
Dimensions

(mm)

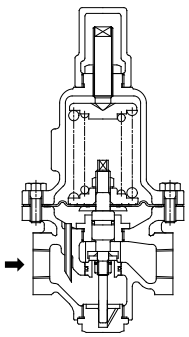
Size	L	H1	H2	Cv	Weight (kg)
200(8")	640	210	390	640	253.2
250(10")	740	250	481	1000	440
300(12")	900	290	557	1440	516

▶ Made-to-orders are available for valves with a size of 300A or larger.

Dimensional drawing



Main valve



Pilot primary pressure regulating valve

Cautions to be taken when installing and primary pressure regulating valves

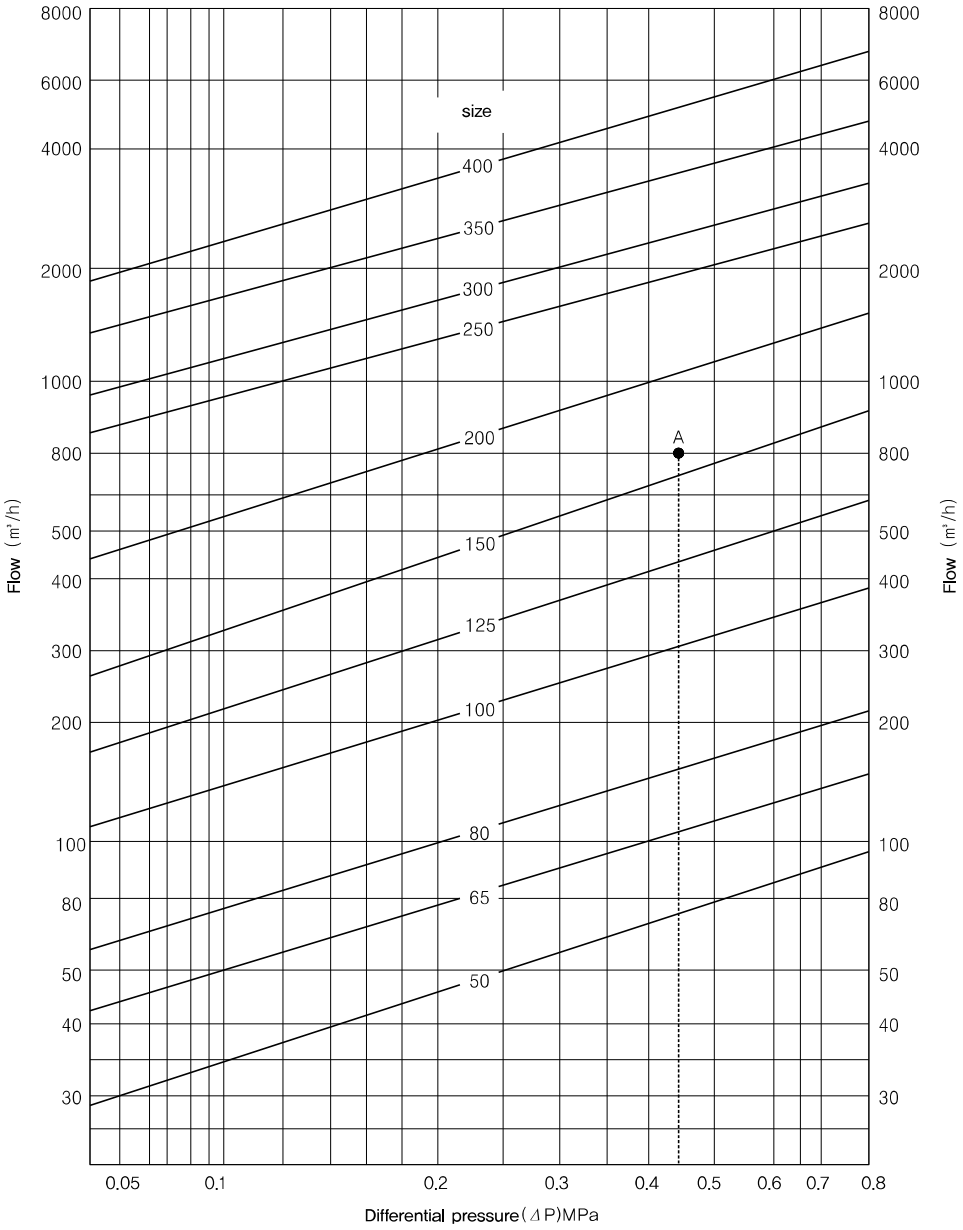
1. The control line installed outside the valve is an important part that has a direct effect on valve performance. Care should be taken so that the control line is not damaged from impact or when held by the hand in the process of moving or installing the valve.
2. Install a strainer on the inlet side to prevent valve malfunctions from foreign substances.
3. Settings for the opening/closing speed regulating device that is attached to the main body are made prior to product delivery, so the settings should not be arbitrarily changed.
4. The ball valve, installed on the main body, is for manual operations. Carry out a trial run after closing it.
5. The valve on the load device should be closed when conducting a trial run.

How to adjust the pressure of primary pressure regulating valves

1. Cut off the stop valve that is connected to the load device.
2. Open the top cap of the pilot valve installed on the main body.
3. Loosen up the fixing nut, and slowly turn the adjustment screw clockwise, while checking the pressure gauge on the valve inlet side, until the desired pressure is obtained.
4. Firmly tighten the fixing nut once the desired pressure is obtained.
5. Check, with sufficient time, if the pressure increases on the pressure gauge on the inlet side.
6. If the pressure on the pressure gauge is fixed at the designated pressure, then the valve is operating normally.

YAWM-1 Type Primary Pressure Regulating Valve

Chart on selecting a size



How to select the size of a valve by the chart

Example) If the opening pressure is 5 kgf/cm^{2}g, back pressure is 0.5 kgf/cm^{2}g, and flow is 800 m^3/h.

The differential pressure is (ΔP) 5-0.5=4.5 kgf/cm^{2}g.

Determine "A" where a vertical line from the differential pressure (ΔP) (4.5 kgf/cm^{2}g) meets the flow (800 m^3/h).

Now that "A" is in between a size of 150 and 200, the diameter of 200 should be selected

for Water, Air & Gas

YPR-41W Type Primary Pressure Regulating Valve

This is a type of relief valve and regulating valve that discharges excessive pressure resulting from load fluctuations and maintains a constant pressure level in instruments or pipelines. It is possible to install this product as a primary pressure regulating valve in the bypass circuit to relieve excessive pressure, and to adjust the discharge pressure to remain constant.

Features

- A constant pressure level with only a single adjustment.
- Stable operations: no such issues as hunching or vibration.
- Piston-type balance structure: minimal change in the opening pressure resulting from back pressure fluctuations.
- Upper part dissembles in one-way: allows for internal inspection and maintenance.
- Use of a disc made of special materials inside the valve: No water leakage when the valve is opened and closed.

Specification

Applicable fluid		Water
Primary pressure		Below 1.4MPa
Permissible leakage		0.01% below rated flow (ANSI b16.104 class IV)
High pressure regulation		0.05-1.4MPa
Maximum pressure		Within desired pressure x Within 20 % (Within 0.03 MPa minimum)
Accumulated pressure		Within desired pressure x Within 20 % (Within 0.03 MPa minimum)
Fluid temperature		Below 80°C
End connection		KS 20K RF FLANGE
Connection	Body	SCPH2
	Disc, Seat	NBR, STS
	Diaphragm	NBR
Hydraulic pressure test		Water pressure
Options		1.5 times the Flange pressure

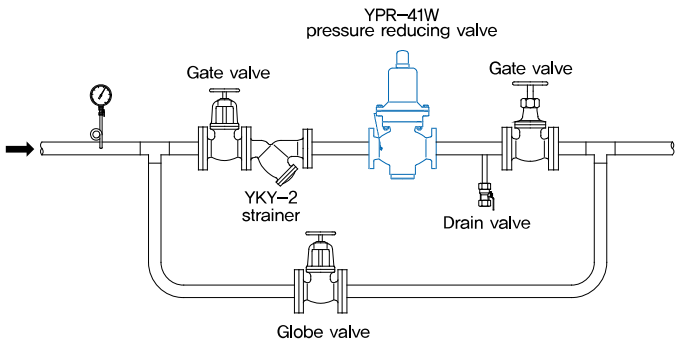
▶ Choose Pilot type valve to relief excessive pressure flow.
▶ Made - to - order for ANSI CLASS V class Permissible leakage products.
▶ Made - to - order for interior coated products.

Dimensions

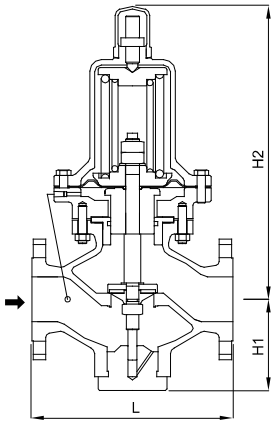
(mm)

Size	L	H1	H2	Cv	Weight (kg)
15(½")	130	062	227	3.9	8.2
20(¾")	150	065	235	3.9	8.5
25(1")	197	072	264	5.0	10.4
32(1¼")	180	083	274	5.3	15.1
40(1½")	235	091	345	15.0	25.5
50(2")	267	107	365	18.0	27.2
65(2½"}	292	132	425	31.5	47.4
80(3")	318	140	430	56.1	56.0
100(4")	368	150	535	96.9	100
125(5")	400	175	704	123.9	162
150(6")	473	210	734	190.4	225

Application Diagram [Example]



Dimensional drawing



Data / Pressure Reducing Valve

Terminologies

- Primary pressure (Set differential pressure): Inlet–side pressure within the main body of the pressure reducing valve or pressure within the pipeline on the inlet side that is close to the pressure reducing valve
- Secondary pressure (Static differential pressure): Outlet–side pressure within the main body of the pressure reducing valve or pressure within the pipeline on the outlet side that is close to the pressure reducing valve
- Offset pressure: Difference between the set pressure and secondary pressure
- Accumulation: % or measurement of steady increase in pressure
- Pressure dosimetry (Dosage differential pressure): Standard pressure to determine set pressure and Inlet pressure when constant flow reaches regulated pressure over primary pressure
- Rated flow: Maximum flow that can be guaranteed within a certain fixed off–set, while maintaining a constant primary pressure

※ ( ) applies to Pressure Differential Control Valves

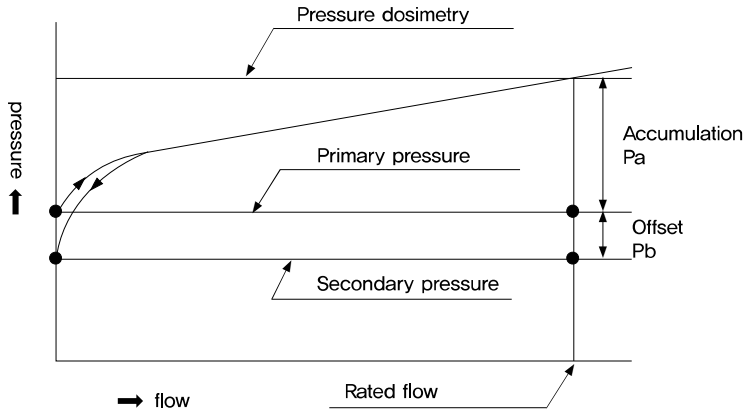
Determining primary pressure regulating valve dimensions

① Use dimension chart to select the size of the valve

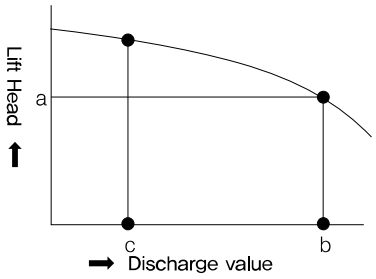
② When the primary and secondary pressures are not constant, and change within a certain range, select a size based on the primary and secondary pressures that have the minimum differential pressure.

③ If Pump relief valve is used, determine primary pressure valve rate of flow by following way: When fully closed, determine discharge value (b) for head of fluid (a) based on the regulated pressure in characteristics curves. Hence (b) becomes the rate of flow for primary pressure valve. If its not fully closed and (c) is set as operational minimum flow, (b)–(C) becomes primary pressure valve rate of flow.

Flow characteristics curve



Pump characteristics curve



Characteristics

Type	Accumulation Pa	Differential pressure Pb
Primary pressure regulating valve	Max Regulating spring range x 15%. X 20% when 0.5MPa spring dimension 100.	Set pressure x 10% (min 0.02(MPa))
Differential pressure regulating valve		Set differential pressure x 10% (min 0.02(MPa))

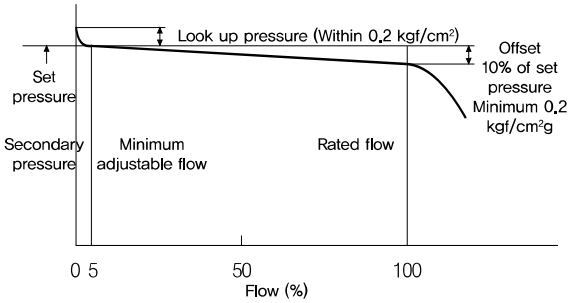
Data / Pressure Reducing Valve

Terminologies

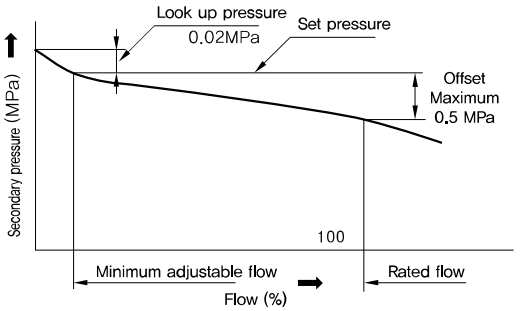
Primary pressure	Inlet-side pressure within the main body of the pressure reducing valve or pressure within the pipeline on the inlet side that is close to the pressure reducing valve
Secondary pressure	Outlet-side pressure within the main body of the pressure reducing valve or pressure within the pipeline on the outlet side that is close to the pressure reducing valve
Set pressure	Secondary pressure in terms of the minimum adjustable flow
Offset pressure	Difference between the set pressure and secondary pressure that changes when the flow is steadily increased from the minimum adjustable flow to the rated flow, while maintaining a constant primary pressure level
Look up pressure	Difference between the set pressure and the pressure that increases when the secondary valve of the pressure reducing valve is cut off
Minimum adjustable flow	Minimum flow of the pressure reducing valve in a state where a stable flow can be maintained
Rated flow	Maximum flow that can be guaranteed within a certain fixed off-set, while maintaining a constant primary pressure

Flow characteristics curve

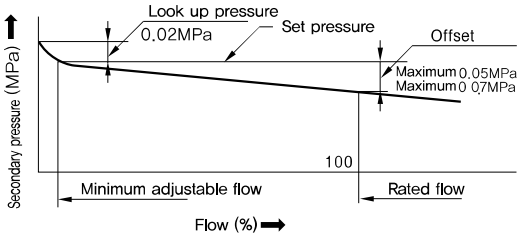
- **YPR-100, 100A (Pilot diaphragm type)**



- **YPR-1S (Pilot type)**

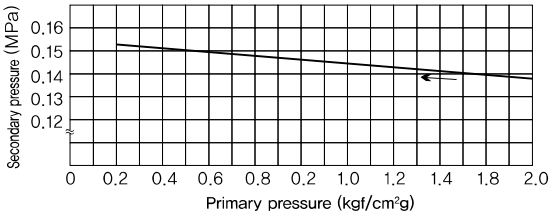


- **YPR-2A (Direct operating)**

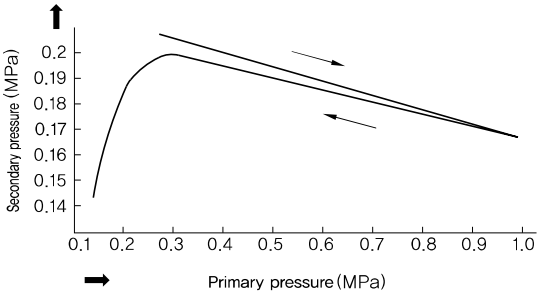


1. Regulating spring range : 0.05~0.34MPa
2. Regulating spring range : 0.29~0.69MPa

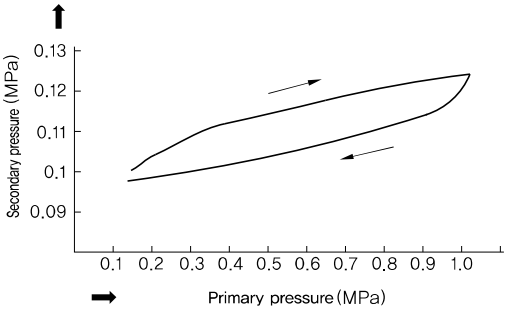
Pump characteristics curve



▶ Assuming that the primary pressure is 17.5 kgf/cm²g and the secondary pressure is set to 1.4 kgf/cm²g, this shows changes in the secondary pressure when the primary pressure is changed to between 2 and 14 kgf/cm²g.



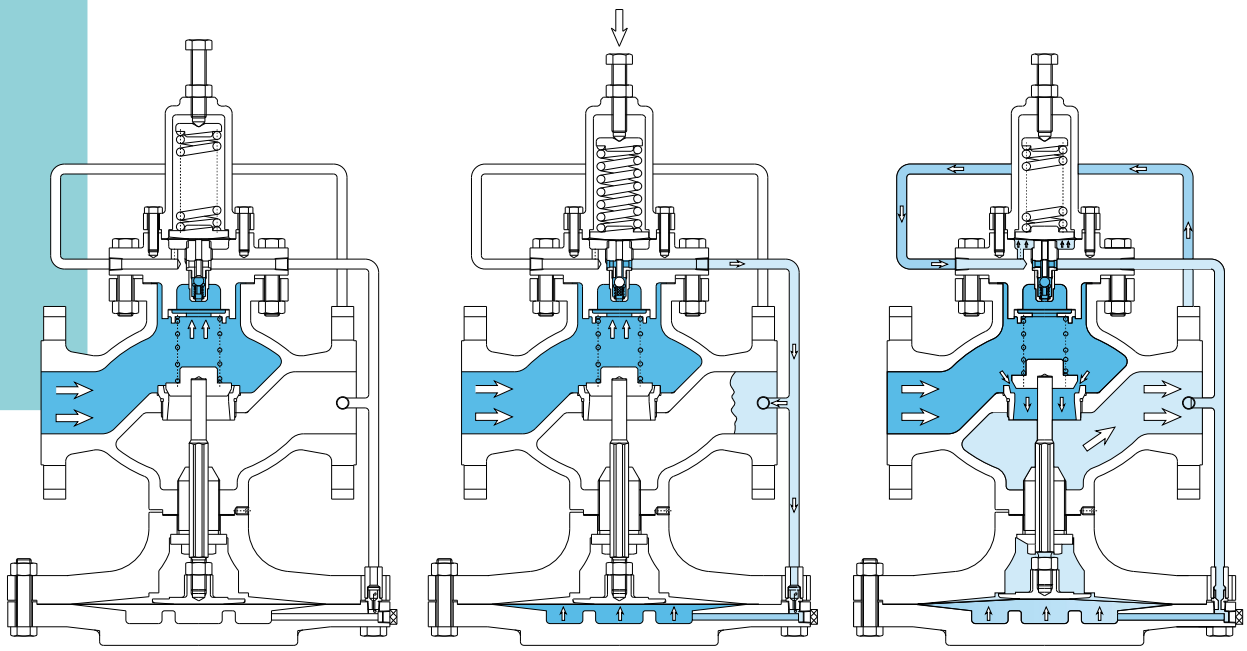
▶ Assuming that the primary pressure is 3 kgf/cm²g and the secondary pressure is set to 2 kgf/cm²g, this shows changes in the secondary pressure when the primary pressure is changed from 3 kgf/cm²g to 10 kgf/cm²g, and then inversely from 10 kgf/cm²g to 1.5 kgf/cm²g.



▶ Assuming that the primary pressure is 1.5 kgf/cm²g and the secondary pressure is set to 1 kgf/cm²g, this shows changes in the secondary pressure when the primary pressure is increased from 1.5 kgf/cm²g to 10 kgf/cm2g, and then decreased from 10 kgf/cm²g to 1.5 kgf/cm²g.

Data / Pressure Reducing Valve

How pressure reducing valves work



① The secondary pressure, which was reduced through the main valve, actuates the pilot diaphragm through the pressure sensing tube.
② This reduced secondary pressure adjusts the secondary pressure by responding to the force of the pressure regulating spring that is installed on the upper part of the pilot diaphragm.

① When the secondary pressure drops, the force of the pressure regulating spring becomes bigger than the force of the lower part of the pilot diaphragm, resulting in the diaphragm pushing downwards to open the pilot valve.
② When the pilot valve opens, the steam of the primary goes through the pressure regulating tube and reaches the lower part of the main diaphragm located at the lower end of the pressure reducing valve's body.
③ The main diaphragm overcomes the pressure of the return spring and opens the main valve. Steam is supplied to the secondary and thus the secondary pressure is adjusted.

① When the secondary pressure rises, it actuates the pilot diaphragm, thus adjusting the opening percentage of the pilot valve. The return spring pushes the main valve, and the steam of the lower part of the main diaphragm moves along the pipe and is discharged through the orifice.
② The steam pressure and pressure of the lower part of the main diaphragm adjusts the opening degree of the main valve according to load fluctuations, based on a balance maintained by the opening percentage of the pilot valve. This is how a constant secondary pressure level is maintained immediately after pressure changes or load fluctuations.

Notes for selecting a size

1. When selecting a size, make room for an additional 10 to 20% of flow, in consideration of such matters as pressure loss. There is especially a need to make substantial room when the pressure reduction ratio is high or the set pressure is 1 kgf/cm2g or less.
2. The secondary pressure of a pressure reducing valve changes according to fluctuations in the primary pressure as well as the flow. There is a need to determine a set pressure after considering the look up pressure and offset, and then select a size. (Refer to the pressure and flow characteristics curves.)
3. When the primary and secondary pressures are not constant, and change within a certain range, there is a need to select a size based on the primary and secondary pressures that have the minimum differential pressure.
4. It is only natural that the flow becomes smaller when the size is too small. There are also issues when the flow is substantially bigger than needed. Such issues include hunching, chattering, and abnormal abrasion. Also, the minimum adjustable flow of a pressure reducing valve is 5% of the rated flow. It is recommended to avoid selecting a size that is based on this flow or smaller. When there are severe changes in summer and winter, attach two pressure reducing valves, one big and one small, and use the valve appropriate for the needed flow.

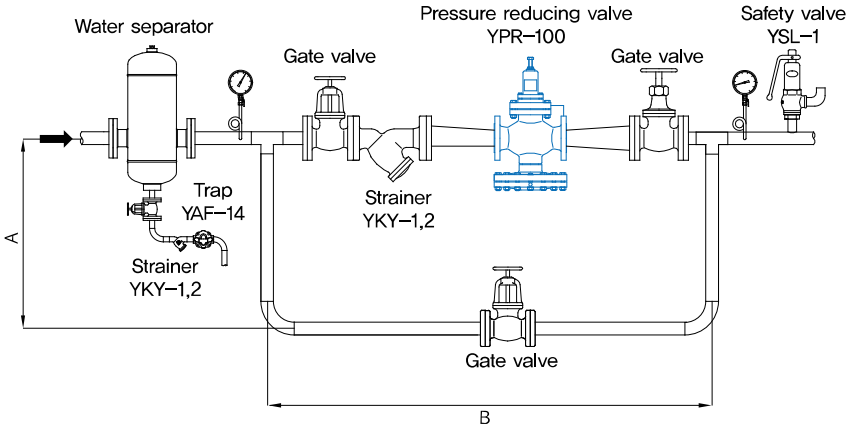
Data / Pressure Reducing Valve

Size of pipeline from a pressure reducing valve's inlet to outet

Though the size of a pressure reducing valve can be determined based on the valve's size selection chart or Cv formula, the size of the pipeline from the pressure reducing valve's inlet to outlet should be determined based on the fluid's standard flow velocity. If the size of the pipeline is too small, it is affected by the flow of the fluid, resulting in excessive pipeline pressure, or a negative effect on the pipeline. As such, there is a need to sufficiently consider the standard flow velocity when selecting the pipeline size.

⟩⟩ Standard flow velocity chart for steam

Category	Steam type Pa	Standard flow velocity Pb
Small pipeline	Saturated steam (0.2~0.5MPa)	15–20
	Saturated steam (0.5 ~ 1.5MPa)	20–30
Steam main	Saturated steam	20–30
	Superheated steam	30–40

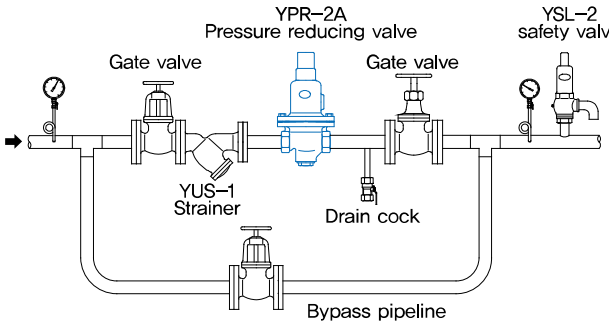


※ Install a water separator at the inlet of the pressure reducing valve to ensure the removal of condensate.

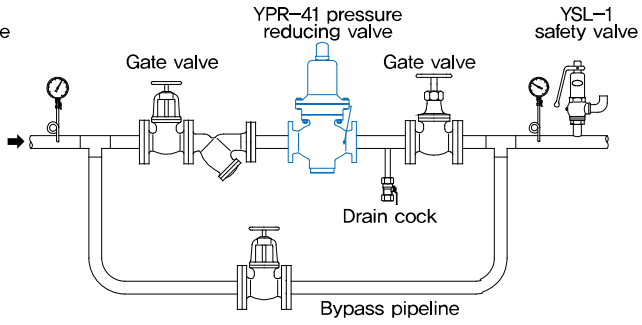
⟩⟩ Dimensions

Size of valve	Length of straight section	
	A(mm)	B(mm)
15–40	400	900
50~100	900	1,500
125–200	1,200	2,500

⟩⟩ For liquid



⟩⟩ For air



Data / Pressure Reducing Valve

Selection of a secondary safety valve of pressure reducing valve

A safety valve should be attached to the secondary of a pressure reducing valve to protect equipment from a rise in pressure resulting from a breakdown of the pressure reducing valve. (Installation of safety valves is for an alarming purpose, and is irrelevant to laws and regulations.)

1. Set pressure of safety valve

A set pressure of a safety valve should be chosen based on the following table, in consideration of the look up pressure of the pressure reducing valve and static pressure of the safety valve.

Set pressure of pressure reducing valve (MPa)	Set pressure of safety valve (MPa)
0.1 or less	Set pressure of pressure reducing valve + 0.05 or more
More than 0.1and less than 0.4	Set pressure of pressure reducing valve + 0.08 or more
0.4 or more and less than 0.6	Set pressure of pressure reducing valve + 0.1 or more
0.6 or more and 0.8 or less	Set pressure of pressure reducing valve + 0.12 or more

2. Flow table of safety valve

A safety valve that is approximately 10% of the maximum flow of the pressure reducing valve should be chosen, unless there are special instructions to do otherwise.

›› Saturated steam

(kg/h)

Size \ P(MPa)	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
15(½")	9.93	13.0	19.3	25.4	31.5	37.5	43.4	49.3	55.2	61.0	66.8
20(¾")	16.5	21.8	32.2	42.4	52.5	62.6	72.5	82.3	92.1	101	111
25(1")	28.9	38.2	56.3	74.2	91.9	109	126	143	161	178	194
40(1½")	66.5	87.4	129	169	210	250	290	329	368	407	446
50(2")	107	142	209	276	341	406	471	535	599	662	725

›› Air

(kg/h)

Size \ P(MPa)	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
15(½")	14.4	19.2	28.8	38.4	48.1	57.7	67.3	76.9	86.6	96.2	105
20(¾")	24.0	32.1	48.1	64.2	80.3	96.3	112	128	144	160	176
25(1")	42.0	56.1	84.2	112	140	168	196	224	252	280	308
40(1½")	96.3	128	192	256	321	385	449	513	577	642	706
50(2")	156	208	313	417	521	626	730	834	939	1043	1147

3. Safety valve

›› Specifications

Applicable fluid		Steam, air, liquid, vapor
Set pressure range		0.035~1.0MPa
Fluid temperature		220℃ or below
End connection		KS PT Screw
Material	Body	GC200
	Disc, seat	STS
Hydraulic test pressure		2.2MPa

›› Dimensions

(mm)

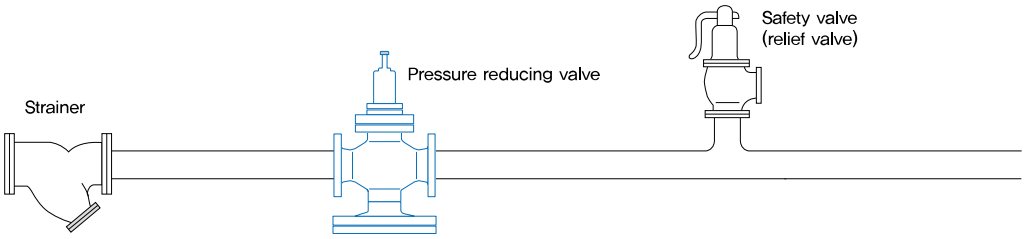
Size	L1	L2	YSL-1	YSL-2
			H1	H2
15(½")	40	41	127	112
20(¾")	50	50	137	122
25(1")	55	60	162	148
40(1½")	70	75	230	216
50(2")	80	80	245	245

▶ Refer to P68 for full scale expression.

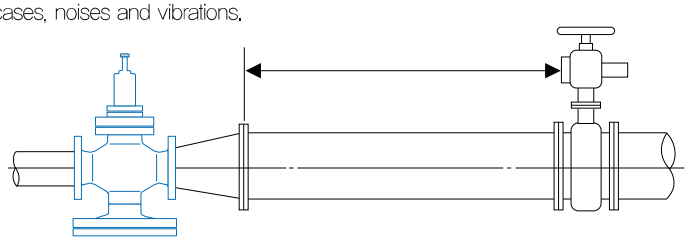
Data / Pressure Reducing Valve

Cautions for piping and usage

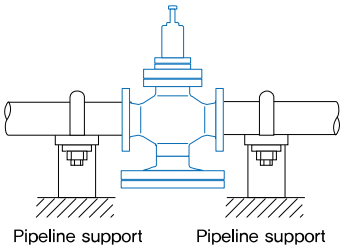
1. Vertically install the pressure reducing valve on a horizontal pipeline.
2. Install a straight pipeline at the inlet and outlet of the pressure reducing valve, as shown in the standard piping example, and also install a strainer, a safety valve, a pressure gauge, and a bypass pipeline. Install a globe valve on the inlet side. In case of leakage and repair after installment of a gate valve, the pressure reducing valve should not be disassembled.
3. A strainer and a safety valve (relief valve) manufactured by Samyang should be used.



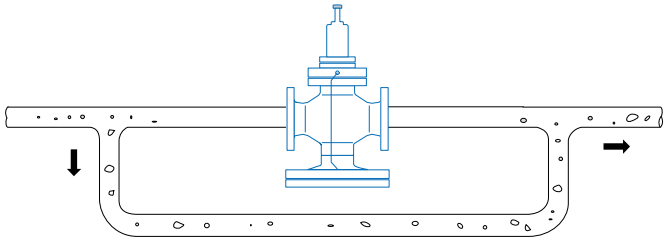
4. Length of secondary pipeline
   If an electronic valve or other valve for rapid opening and closing is installed on the secondary of a pressure reducing valve, have it located as far away from the pressure reducing valve as possible. Failure to do so may cause, in some cases, noises and vibrations.



5. Inspection and disassembling space
   To enable disassembling and inspection, secure enough space above the center of the pipeline that is at least 3 times the H2 length of the pressure reducing valve dimensions; and below the center of the pipeline that is at least 5 times the H1 length of the dimensions. (Refer to pressure reducing valve dimensions.)



6. Pipeline support
   Set or support the pipeline at the inlet and outlet of a pressure reducing valve so that the gravity or thermal stress of the pipeline is not directly inflicted upon the pressure reducing valve.
7. Pipeline cleaning
   In new pipelines, most pressure reducing valve breakdowns are caused by foreign substances. Before having steam pass through the pressure reducing valve, completely remove foreign substances within the pipeline by blowing them out through the bypass.

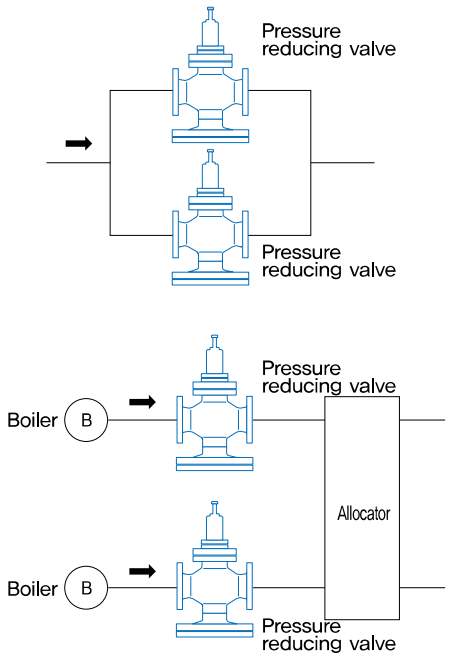


Data / Pressure Reducing Valve

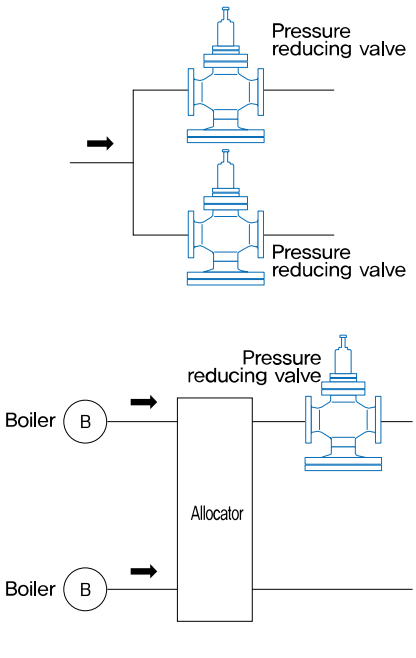
8. Parallel use

There are cases where two pressure reducing valves are used in parallel because of the lack of flow with one valve. In case of parallel use, pressure reducing valves are self-operated valves, and thus there is a difference in pressure sensitivity. This is why the set pressure needs to be different. It is also recommended that each valve be used independently as much as possible.

⟩⟩ Example of a bad case



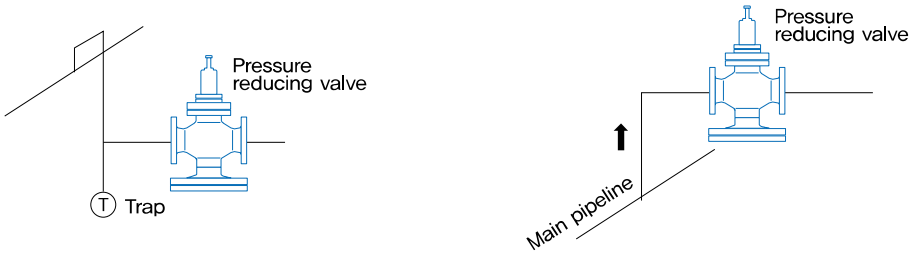
⟩⟩ Good example



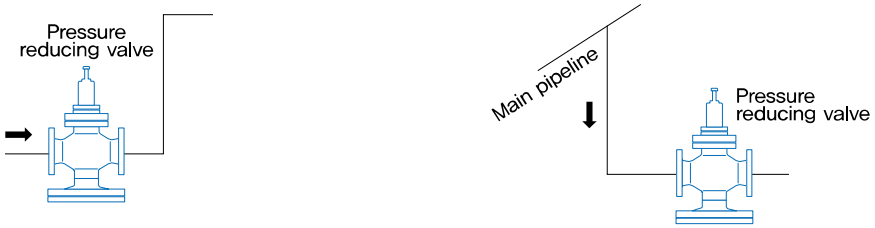
9. Measure against condensate

Hunching or vibration can occur if condensate gets into a pressure reducing valve. This is why there is a need to adopt a piping method that blocks condensate entry or to remove condensate.

⟩⟩ Good example



⟩⟩ Example of a bad case



Data / Pressure Reducing Valve

How to select a size of a pressure reducing valve the calculation formula

Fluid	Pressure condition	Formula	Symbols
Steam	When, $\Delta P < \frac{P_1}{2}$ When, $\Delta P \geq \frac{P_1}{2}$	$Cv = \frac{WK}{13.67\sqrt{\Delta P(P_1+P_2)}}$ $Cv = \frac{WK}{11.9P_1}$	W = Maximum flow (kg/h) V = Maximum flow (m3/h) P1 = Primary pressure [kgf/cm^2(abs)] P2 = Secondary pressure [kgf/cm^2(abs)] ΔP = P1 – P2kgf/cm^2 K = 1+(0.0013 x Degree of superheat ℃) Q = Maximum flow (Nm^3/h): When in standard state (15℃, 760 mmHg abs) G = Specific gravity (Air=1, Water=1) T = Temperature(℃)
Vapor	When, $\Delta P < \frac{P_1}{2}$ When, $\Delta P \geq \frac{P_1}{2}$	$Cv = \frac{Q}{287}\sqrt{\frac{G(273+t)}{\Delta P(P_1+P_2)}}$ $Cv = \frac{Q\sqrt{G(273+t)}}{249P_1}$	
Liquid		$Cv = \frac{1.167 \times V\sqrt{G}}{\sqrt{P_1-P_2}}$	

Example of calculation of Cv value [for steam]

Assuming that the primary pressure is 4.5 kgf/cm2g, secondary pressure is 2 kgf/cm2g, and saturated steam flow is 600 kg/h, the following shows how to select a size of a pressure reducing valve using the Cv calculation formula.

$P_1 = 4.5+1 = 5.5 kgf/cm^2(abs)$

$P_2 = 2+1 = 3 kgf/cm^2(abs)$

$\Delta P = 5.5-3 = 2.5 kgf/cm^2$

$\frac{P_1}{2} = 2.75 kgf/cm^2$ and $\Delta P < \frac{P_1}{2}$, use the following formula

$Cv = \frac{WK}{13.67\sqrt{\Delta P(P_1+P_2)}}$ use the formula

$\therefore Cv = \frac{600 \times 1}{13.67\sqrt{2.5(5.5+3)}}$ 9.5

(The K value is saturated steam. Its value is 1 since the degree of superheat is 0.)

The resulting Cv value of 9.5 is in between 40 and 50 in the steam category of the table below (YPR–1S). There is a need to choose 50 to ensure that there is no harmful stress on the pipeline. The same value will be obtained when using the pressure reducing valve's size selection table (Page 4) to determine a valve's size, based on the conditions above.

Caution during installation

1. Align the arrow direction of the valve's body and the fluid's direction, and thus install the valve horizontally on the pipeline.
2. Install the straight sections at the inlet and outlet of the pressure reducing valve, and install a strainer, a safety valve, a pressure gauge, and a bypass line. Install a globe valve on the inlet side. Install a gate valve on both the inlet and outlet sides, and a globe valve on the bypass line.
3. If an electronic valve or other valve for rapid opening and closing is installed on the secondary of a pressure reducing valve, have it located as far away from the pressure reducing valve as possible.
4. In new pipelines, most pressure reducing valve breakdowns are caused by foreign substances within the pipeline. Before having steam pass through the pressure reducing valve, completely remove foreign substances within the pipeline by blowing them out through the bypass.
5. Hunching or vibration can occur if condensate gets into a pressure reducing valve. This is why there is a need to install a water separator on the inlet side of the pressure reducing valve to remove condensate.

Cv chart for each type of pressure reducing valve

Category / Size	For steam			For water			For vapor
	YPR–100	YPR–1S	YPR–50	YAWR–1	YPR–2A	YPR–41	YPR–41
15(½")	5	1	0.8	–	2.9	3.9	3.9
20(¾")	7.2	2.5	0.8	–	3.5	3.9	3.9
25(1")	10.9	4	1	–	6.2	5.0	5.0
32(1¼")	14.3	6.5	–	–	12.8	5.3	5.3
40(1½")	18.8	9	–	–	13.7	15.0	15.0
50(2")	32	16	–	–	13.8	18.0	18.0
65(2½")	60	25	–	–	40.2	31.5	31.5
80(3")	78	36	–	90	41.9	56.1	56.1
100(4")	120	64	–	160	64.7	96.9	96.9
125(5")	160	100	–	250	–	123.9	123.9
150(6")	245	144	–	360	109.5	190.4	190.4
200(8")	–	256	–	640	–	–	–
250(10")	–	–	–	1000	–	–	–
300(12")	–	–	–	1440	–	–	–
350(14")	–	–	–	1960	–	–	–
400(16")	–	–	–	2560	–	–	–

Data / Pressure Reducing Valve

How pressure reducing valves work

1. Importance of pressure reducing valves

If water pressure is inappropriate in a water supply and distribution piping system, use of water becomes inconvenient and water facilities cannot be efficiently used.

- If water pressure is too high: Increased water supply, increased leakage, and abrasion of the connected sections of the water distribution piping system and reduced life span of the system
- If water pressure is too low: Short flow supply, resulting from lack of supply pressure

2. Types of pressure reducing valves

1) Direct operating type

It regulates the water pressure on the outlet side by operating the valve based on the spring's elasticity and outlet-side water pressure.

– How it works –

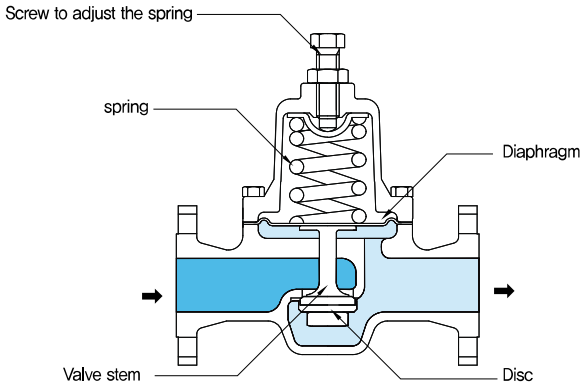
① Outlet-side water pressure 〈 Spring force
② Valve opens
③ Water on the inlet side flows to the outlet side
④ Outlet-side water pressure 〉 Spring force
(If only a small amount of water is used or is not used at all on the inlet side)
⑤ Valve closes
⑥ The balance between the outlet side and spring force maintains a certain set pressure level

2) Pilot type

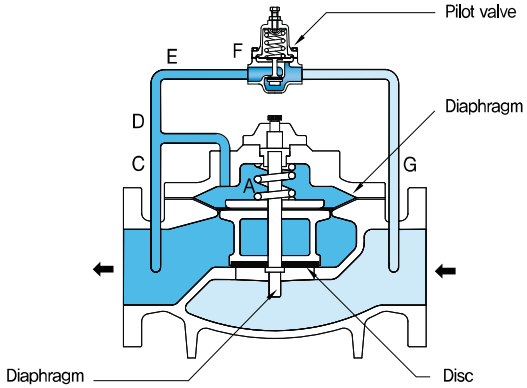
A main valve and an auxiliary valve exist as a set, and the auxiliary valve is referred to as the pilot. The auxiliary valve is a small, direct operating pressure reducing valve. The valve opens and closes based on the water pressure on the outlet side and the spring force. Water that passes through activates the main valve.

– How it works –

① Outlet-side water pressure 〈 Spring force
② The auxiliary valve opens
③ Water from the main valve passes through points D, E, and F, and flows in the direction of point G
④ Water at A, the upper part of the main valve diaphragm, flows in the direction of point D(If only a small amount of water is used or is not used at all on the inlet side)
⑤ Volume of water that was filled up at A goes down
⑥ The diaphragm moves upwards
⑦ The valve closes
⑧ Water on the inlet side flows to the outlet side
⑨ Hydro pressure on the outlet side rises
⑩ Hydro pressure on the outlet side of the pilot pushes the diaphragm in the direction of the spring, resulting in the pilot closing
⑪ Flow from point F to point G is cut off
⑫ Water on the inlet side of the main valve passes through points C and D and moves to point A
⑬ The diaphragm is pushed in the disc direction, and the valve closes
⑭ The set pressure on the outlet side is maintained through the repetition of the process above



Dimensional drawing of direct operating type pressure reducing valve



Dimensional drawing of pilot type pressure reducing valve

Data / Pressure Reducing Valve

Required information when placing an order

• Model name, Type of fluid, • Pressure conditions (Maximum pressure used, set pressure MPa), Maximum temperature used, Pipeline diameter and end connection, • Maximum flow used (LPM), • Order specifications (Valve features)

Secondary pressure adjustment method

- The secondary pressure of a pressure reducing valve is adjusted according to field conditions before the product is delivered to the customer, thereby eliminating the need for the customer to adjust the secondary pressure. However, it may be necessary to adjust the secondary pressure when there is a design or capacity change in the system.
- With regards to a pressure reducing valve for water supply, if a pressure gauge is not attached to the valve body (optional) or a pressure gauge is not installed at the outlet of the valve, the secondary pressure (set pressure) cannot be accurately adjusted. It is therefore recommended that the secondary pressure not be adjusted arbitrarily, if possible.

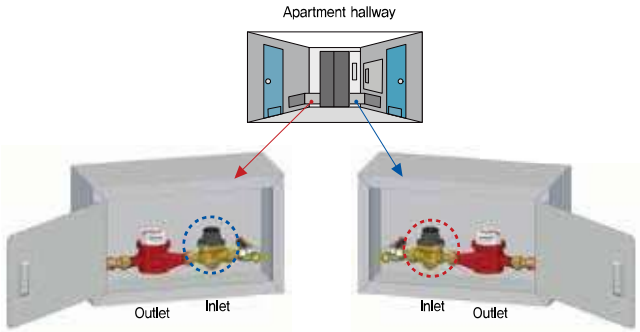
》YPR-8Z

1. Loosen the fixing nut installed on the adjustment bolt on the top.
2. Open the angle valve on the inlet side (cut-off valve) to raise the inlet-side pressure.
3. Close the water tap on the outlet side (cut-off valve). Slowly turn the adjustment bolt clockwise (counter clockwise), while looking at the outlet pressure gauge. The secondary pressure will go up (down).
4. Check if the secondary pressure (set pressure) is correct, while opening and closing the water tap on the outlet side (cut-off valve).
5. Once pressure adjustment is completed, tighten the fixing nut to prevent arbitrary adjustment of pressure by other personnel.

Installation and maintenance

The following should be paid attention to when handling the product so that it can be operated at maximum performance..

- Do not cause impact on the product.
- Take special care so that foreign substances do not get inside the product.
- Completely remove scales, sand, dregs, etc. when attaching the product to a pipeline.
- If possible, install the product at a location that allows easy maintenance and inspection.
- Regularly clean the strainer that is attached to the pressure reducing valve to prevent malfunctions due to foreign substances.
- A malfunction of the pressure reducing valve would entail a water hammer, attributable to an abnormal pressure build-up inside the pipeline, as well as damage or shortening of the life span of other instruments located at the valve outlet. This is why there is a need to periodically check to see if the secondary pressure remains constant.
- There is no need to adjust the set pressure, since it is fully checked at the plant prior to product delivery.



*Install a strainer (40MESH or more) at the front end when installing the valve.

02

SAFETY VALVE

SAFETY VALVE

Safety valves protect systems from excessive pressure usually from air or steam generators. They instantaneously release pressure when the fluid's pressure exceeds a set value

YSF-1
YSF-2
YSF-3
YSF-4
YSF-5
YSF-6
YSF-3(open)
YSL-1
YSL-2
YRV-1
YRV-2

02
SAFETY
VALVE

SAMYANG
SYSTEM GROUP

Safety Valve, Relief Valve

Full bore type

Type	Size	Applicable fluid	Applicable Pressure (MPa)	Material		End connection	Page
				Body	Disc, seat		
YSF-1	25(1")~80(3")	Steam, air	0.1~1.0	GC200	SCS13	KS 10K RF FLANGE	53
YSF-2		Liquid					
YSF-3	25(1")~200(8")	Steam, Air	0.1~3.0	SCPH2		KS 10, 20, 30K RF FLANGE	54
YSF-4		Liquid					
YSF-5	20(¾")~50(2")	Steam, Air	0.1~1.0	GC200		KS PT SCREW	55
YSF-6		Liquid					
YSF-3(open)	25(1")~200(8")	Steam	0.1~3.0	SCPH2		KS 10, 20, 30K RF FLANGE	56

Low lift type

Type	Size	Applicable fluid	Applicable Pressure (MPa)	Material		End connection	Page
				Body	Disc, seat		
YSL-1	15(½")~50(2")	Steam, air	0.034~1.0	GC200	STS304	KS PT SCREW	57
YSL-2/2K		Water					

Pump relief type

Type	Size	Applicable fluid	Applicable Pressure (MPa)	Material			End connection	Page
				Body	Disc	seat		
YRV-1	25(1")~80(3")	Water	0.1~1.0	GC200	STS 304	SCS 13	KS 10K RF FLANGE	58
YRV-2			0.1~3.0	SCPH2			KS 10, 20, 30K RF FLANGE	

※ It is made to order more than 100A. (YRV-2)

Types of caps

Lever Type		Mainly used for steam, this cap is used to check regular operation.
Cap type		Used for gas-tight on the exhaust side, this cap is a standard type for liquid and vapour.

Steam boiler

Pressure Vessel

YSF-1, 2 Type Safety Valve (Full Bore Type)

02

Features

- Simple structure and outstanding performance.
- Superb performance, followed by strict quality control procedure.
- High impact resistance and good abrasion resistance: The disc and seat are stainless steel welded with satellite.
- Test lever attached: Periodical performance inspections can be conducted
- Approved by the Korea Occupational Safety and Health Agency (KOSHA).

YSF-1 Type

YSF-2 Type

Specification

Type		YSF-1	YSF-2
Test lever		Yes	Optional
Applicable fluid		Steam, air	Liquid
Set pressure range		0.1~1.0 MPa	
Fluid temperature		220°C below	80°C below
End connection	Inlet	KS B 6216 10K RF FLANGE	
	Outlet	KS B 1511 10K FF FLANGE	
Material	Body	GC200	
	Disc, seat	SSC13 (Stellite welding)	
Hydraulic test pressure		1.5Mpa	

▶ Install a strainer (40 MESH or more) at the front end when installing the valve.

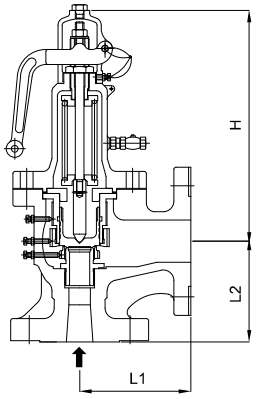
Dimensions

(mm)

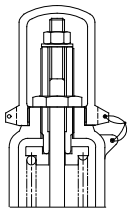
Size Inlet x Outlet	Seat diameter	Throat diameter	Throat area(㎟)	Lift	Face to Face		Height(H)		Flange thickness(t)		Blow off rate(kg/h) YSF-1		Weight (kg)	
di X do	ds	dt	A	L	L1	L2	YSF-1	YSF-2	IN	OUT	Steam	air	YSF-1	YSF-2
25(1")X40(1½")	22	19	490.9	5.0	105	95	218	214	22	20	432	3460	10.8	10.3
40(1½")X65(2½")	35	30	1590.4	7.5	125	120	297	278	24	22	1107	8857	20.1	19.2
50(2")X80(3H)	45	38	1963.5	9.5	135	129	346	346	26	22	1729	13840	26.0	25.1
65(2½")X100(4")	58	49	3318.3	12.5	155	140	404	404	28	24	2922	23389	44.4	43.1
80(3")X125(5")	71	61	5026.5	15.5	175	160	487	487	24	24	4427	35429	63.4	61.7

Dimensional drawing

size of 25~65



YSF-1 Type



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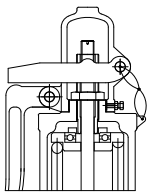


YSF-1 Type

Steam boiler

Pressure Vessel

YSF-3, 4 Type Safety Valve (Full Bore Type)

Features

- Simple structure and outstanding performance.
- Superb performance, followed by strict quality control procedure.
- High impact resistance and good abrasion resistance : The disc and seat are stainless steel welded with satellite.
- Test lever attached : Periodical performance inspections can be conducted.
- Approval from the Korea Occupational Safety and Health Agency (KOSHA).

YSF-3 Type

YSF-4 Type

Specification

Type		YSF-3	YSF-4
Test lever		Yes	Optional
Applicable fluid		Steam, air	Liquid
Set pressure range		0.1~3.0 MPa	
Fluid temperature		220℃ below	80℃ below
End connection	Inlet	INLET 10, 20, 30K RF FLANGE	
	Outlet	KS B 1511 10K FF FLANGE	
Material	Body	SCPH2	
	Disc, seat	SSC13(Stellite welding)	
Hydraulic test pressure		1.5 times of applicable flange rating	

▶ JIS and ANSI FLANGE are also made to order.

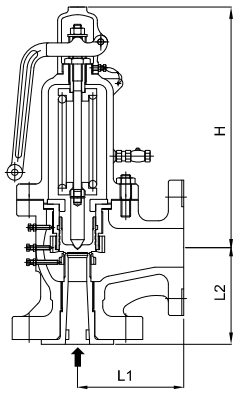
Dimensions

(mm)

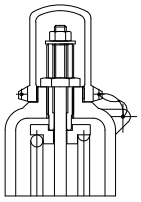
Size Inlet X Outlet	Seat diameter	Throat diameter	Throat area(㎟)	Lift	Face to Face		Height(H)		Blow off rate(kg/h) YSF-3		Weight(kg)	
di X do	ds	dt	A	ℓ	L1	L2	YSF-3	YSF-4	Steam	Air	YSF-3	YSF-4
25(1")X40(1½")	22	19	490.9	5.0	115	100	249	264	864.	9796	13.35	12.4
40(1½")X65{2½")	35	30	1256.6	7.5	130	125	340	316	2213	25078	24.2	25.2
50(2")X80(3")	45	38	1963.5	9.5	141	135	380	380	3457	39184	32.05	34.4
65(2½")X100(4")	58	49	3318.3	12.5	161	160	480	480	5843	66221	58.6	55.8
80(3")X125(5")	71	61	5026.5	15.5	179	180	535	535	8851	100312	82.7	77.2
100(4")X150(6")	88	76	7854.0	19.0	209	205	668	668	13830	156737	130	129
125(5")X200(8")	111	95	12271.8	24.0	232	240	846	828	21609	244901	273	269.5
150(6")X200(8")	134	115	17671.5	29.0	262	250	935	916	31117	352658	325	328
200(8")X250{10")	176	152	31415.9	38.0	355	300	1115	1135	55319	626947	645	633

Dimensional drawing

size of 25~100

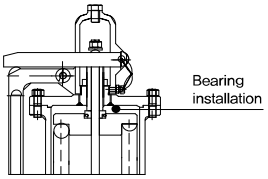


YSF-3 Type



YSF-4 Type

size of 125~200



YSF-3 Type

Steam boiler

Pressure Vessel

YSF-5, 6 Type Safety Valve (Full Bore Type)

02

YSF-5 Type

YSF-6 Type

Features

- Simple structure and outstanding performance.
- Superb performance, followed by strict quality control procedure.
- High impact resistance and good abrasion resistance: The disc and seat are stainless steel welded with satellite.
- Test lever attached: Periodical performance inspections can be conducted.
- Approved by the Korea Occupational Safety and Health Agency (KOSHA).

Specifications

Type		YSF-5	YSF-6
Test lever		Yes	Optional
Applicable fluid		Steam, air	Liquid
Set pressure range		0.1~1.0 MPa	
Fluid temperature		220℃ Below	80℃ Below
End connection	Inlet	KS PT SCREW	
	Outlet	KS PT SCREW	
Material	Body	GC200	
	Disc, seat	STS304, SCS13	
Hydraulic test pressure		SSC 13	

▶ Install a strainer (40 MESH or more) at the front end when installing the valve.

Dimensions

(mm)

Size Inlet x Outlet	Seat diameter	Throat diameter	Throat area(㎟)	Lift	Face to Face		Height (H)		Connection size	Blow off rate(kg/h) YSF-5		Weight (kg)	
di X do	ds	dt	A	L	L1	L2	YSF-5	YSF-6	OUT	증기	공기	YSF-5	YSF-6
20(¾")X25(1")	18	15	314.2	3.8	50	74	182	180	1"	277	2214	33	3.2
25(1")X32(1¼")	22	19	490.9	5.0	60	85	215	212	1¼"	432	3460	5.2	4.85
40(1½")X50(2")	35	30	1256.6	7.5	80	100	295	293	2"	1107	8857	9.6	9.2
50(2")X65(2½")	45	38	1963.5	9.5	90	115	335	332	2½"	1729	13840	16.0	16.0

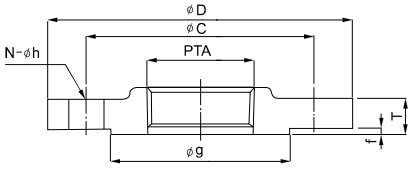
⟩⟩ Dimensions (KS B 6216 10K RF Flange)

(mm)

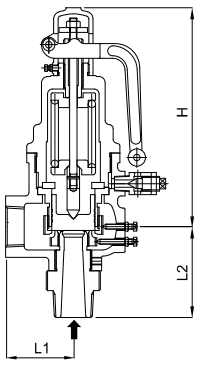
Classification / Size	PTA	ø D	ø C	Ø g	N-ø h	f	T
20(¾")	1"	125	90	67	4-19	1	18
25(1")	1¼"	135	100	76	4-19	2	20
40(1½")	2"	155	120	96	8-19	2	20
50(2")	2½"	175	140	116	8-19	2	22

For reference

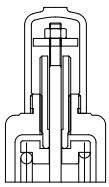
- In order to install the type YSF-5, 6 as a flange, a coupling flange is required by made-to-order.



Dimensional drawing



YSF-5 Type



YSF-6 Type

YSF-3 Type Safety Valve (Open Bonnet Type, Full Bore Type) Steam boiler

Features

- No instability in high temperatures : The maximum operating temperature of 450℃ so that YSF-3 can be used without any changes in spring characteristics commonly occur in high temperatures.
- High impact resistance and good abrasion resistance : The disc and seat are stainless steel welded with satellite.
- Simple structure reduces maintenance costs & offers outstanding performance.
- High-strength stainless steel inner core components.
- Test lever attached : Periodical performance inspections can be conducted.
- Approval from the Korea Occupational Safety and Health Agency (KOSHA).

Specifications

Type		YSF-3 (Open Bonnet)
Test lever		Yes
Applicable fluid		Steam
Set pressure range		0.1~3.0 MPa
Fluid temperature		350℃
End connection	Inlet	inlet 10, 20, 30K RF FLANGE
	Outlet	KS B 1511 10K FF FLANGE
Materials	Body	SCPH2
	Disc, seat	SCS13(Stellite welding)
Hydraulic test pressure		1.5 times of applicable flange rating

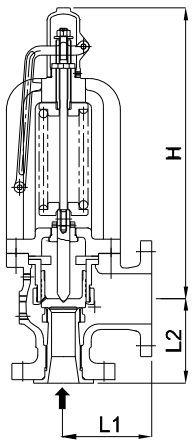
▶ The JIS and ANSI flanges are available by made-to-orders.

Dimensions

(mm)

Size Inle tX Outlet	Seat diameter	Throat diameter	Throat area(㎟)	Lift	Face to Face		Heigh(H)	Blow off rate(kg/h)	Weight(kg)
di X do	ds	dt	A	L	L1	L2	H	W	YSF-3
25(1")X40(1½")	22	19	490.9	5.0	115	100	320	864	15.2
40(1½")X65{2½")	35	30	1256.6	7.5	130	125	425	2213	28.6
50(2")X80(3")	45	38	1963.5	9.5	141	135	465	3457	42.7
65(2½")X100(4")	58	49	3318.3	12.5	161	160	560	5843	64
80(3")X125(5")	71	61	5026.5	15.5	179	180	630	8851	89
100(4")X150{6")	88	76	7854.0	19.0	209	205	795	13830	143
125(5")X200{8")	111	95	12271.8	24.0	232	240	1010	21609	290
150(6")X200{8")	134	115	17671.5	29.0	262	250	1110	31117	342
200(8")X250{10")	176	152	31415.9	38.0	355	300	1415	55319	684

Dimensional drawing



02

YSL-1, 2/2K Type Safety Valve(Low Lift Type)

The type YSL can be commonly used for various types of fluid (steam, vapor, liquid). It has a simple structure and is made of materials with a superb level of corrosion resistance. It is a safety valve that can be used for various purposes, such as a pressure vessel, safety device for various instruments and equipment, hot water boiler, water (including hot water) supplying equipment, cooling and heating facility, and safety device of pressure reducing valves.

YSL-1 Type

Features

- Simple structure and outstanding performance.
- Disc and seat are free from leakage or transformation issues, thanks to a precision machining process.
- Test lever attached : Periodical performance inspections can be conducted.
- Approval from the Korea Occupational Safety and Health Agency (KOSHA).

Specifications

Type		YSL-1	YSL-2
Test lever		Yes	No
Applicable fluid		Steam, air	water
Set pressure range		0.034~1.0 MPa	
Fluid temperature		220℃ below	80℃ below
End connection		KS PT SCREW	
Materials	Body	GC200	
	Disc, seat	STS304	
Hydraulic test pressure		1.5MPa	

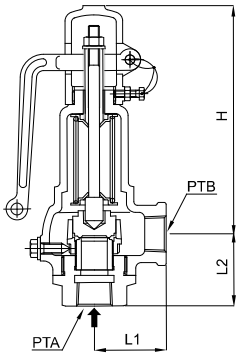
YSL-2 Type

Dimensions

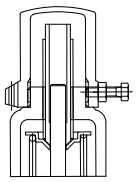
(mm)

Size Inlet x Outlet	Seat diameter	Throat diameter	Throat area(㎟)	Lift	Face to Face		Heigh(H)		Connection size		Blow off rate(kg/h)	Weigh (kg)	
di X do	ds	dt	A	L	L1	L2	YSL-1	YSL-2	IN	OUT	YSL-1	YSL-1	YSL-2
15(½")X15(½")	15	14.3	18.8	18.8	40	41	127	112	½"	½"	18.25311	1.1	1
20(¾")X20{¾")	20	19.4	31.4	31.4	50	50	137	122	¾"	¾"	30.42184	1.8	1.7
25(1")X25(1")	25	24.7	55.0	54.9	55	60	162	148	1"	1"	53.23823	2.4	2.3
40(1½")X40(1½")	40	38.4	125.7	125.6	70	75	230	216	1½"	1½"	121.6874	5.7	5.5
50(2")X50(2")	50	49.5	204.2	204.1	80	80	245	245	2"	2"	197.742	8.6	9

Dimensional drawing



YSL-1 Type



YSL-2 Type

YRV–1, 2형 Type Relief Valve(For Pump Relief)

Features

- Specifically developed for pump use : Safe operation even in case of continuous relief.
- NOTE : Possibility of hunching or a water hammer if a safety valve is used as a relief valve of a pump.

YRV–1 Type

YRV–2 Type

Specifications

Type		YRV–1	YRV–2
Applicable fluid		Water	
Set pressure range		0.1~1.0 MPa	0.1~3.0 MPa
Fluid temperature		100℃ below	
End connection	Inlet	KS B 6216 1 O K RF FLANGE	INLET 10, 20, 30K RF FLANGE
	Outlet	KS B 1511 10K FF FLANGE	
Materials	Body	GC200	SCPH2
	Disc, seat	STS304, SSC13	
Hydraulic test pressure		1.5 times of applicable flange rating	

▶ JThe JIS and ANSI flanges are available by made–to–orders.

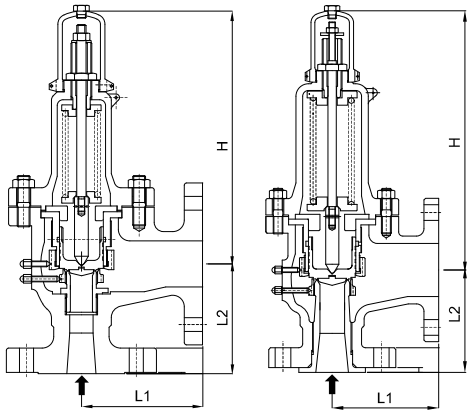
Dimensions

(mm)

Size Inlet X Outlet	Seat diameter	Throat diameter	Throat area(㎟)	Lift	Face to Face L1		Face to Face L2		Height (H)		Weight (kg)	
di X do	ds	dt	A	L	YRV–1	YRV–2	YRV–1	YRV–2	YRV–1	YRV–2	YRV–1	YRV–2
25(1“)X40(1½”)	22	19	490.9	5.0	105	115	95	100	214	264	10.3	12.4
40(1½“)X65(2½")	35	30	1256.6	7.5	125	130	120	125	278	316	19.2	24.85
50(2")X80(3")	45	38	1963.5	9.5	135	141	129	135	346	380	25.1	34.3
65(2½")X100(4")	58	49	3318.3	12.5	155	161	140	160	404	480	43.1	55.8
80(3")X125(5")	71	61	5026.5	15.5	175	179	160	180	487	535	61.7	77.2

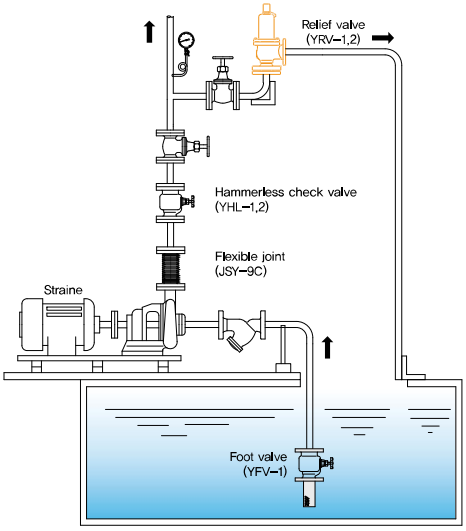
▶ Valves with a size of 100A or larger are available by made–to–orders.

Dimensional drawing



YRV-1 Type　　YRV-2

Application Diagram [Example]



Data / KS B 6216 Regulations on Safety Valves for Steam

Terminologies related to safety valves

Terminology	Definition
Safety valve	This valve automatically begins operation when the pressure on the inlet side reaches a pre–determined level. If the pressure decreases, this valve returns it to normal status. It has the ability to discharge fluid (steam or gas) based on the rated relieving capacity.
Set pressure	In the case of safety valves that require an opening pressure, this refers to the opening pressure that was determined in the design. In the case of safety valves that require a start–to–discharge pressure, this refers to the start–to–discharge pressure that was determined in the design. It is the pressure indicated on the product label.
Start–to–discharge pressure	This refers to the pressure when the safety valve begins to discharge. It is the pressure on the inlet side when an extremely small amount of fluid (steam or gas) discharge is detected on the outlet side.
Opening pressure	This refers to the inlet–side pressure when fluid is discharged as a result of operation of a safety valve. It is a pressure when the lift level becomes measurable, or a continuous discharge can be recognized.
Flow rating pressure	This pressure determines the rated relieving capacity regulated in the appendix.
Closing pressure	This is the inlet–side pressure when the safety valve has closed, resulting from the pressure dropping from the opening pressure, and the flow of the fluid has practically come to a stop, leading to a lift level of 0.
Blowdown	In terms of safety valves that require an opening pressure, this refers to the difference between the opening pressure and closing pressure. In terms of safety valves that require a start–to–discharge pressure, this refers to the difference between the start–to–discharge pressure and closing pressure.
Lift	The axial direction movement amount of a valve stem or a disc, from the valve closing location to the valve opening location during a safety valve discharge.
Rated relieving capacity	This refers to a discharge capacity that is guaranteed for each safety valve. It is determined according to regulations stipulated in 3.2.4(2) of KS B 6352 (discharge coefficient measurement method for safety valves) or in the appendix.
Certified coefficient of discharge	This is a coefficient applied to the rated relieving capacity. It is determined based on regulations set forth in 3.2.4(1) of KS B 6352 or a method that is recognized as being equivalent to the regulations.
Hole diameter of disc seat	This is the inner diameter of the interface of a disc and a disc seat (Refer to the attached chart in the appendix).
Effective discharge area	This refers to the area of the part that determines the flow passing through a safety valve. It is used for calculating the rated relieving capacity (Refer to the attached chart in the appendix).
Throat diameter	This refers to the inner diameter of the narrowest part of the nozzle extending from the fluid inlet to the disc seat surface.
Back pressure	This is the pressure on the outlet side of a safety valve. It has the following two kinds: (a) Pressure that is built on the outlet side of a safety valve as a result of exhaust–side resistance when the safety valve discharges. (b) Pressure that already exists on the exhaust side before the safety valve begins to discharge.

Data / KS B 6216 Regulations on Safety Valves for Steam

Types and performance

1. Types

Safety valves are categorized into the following types according to whether a valve has a flow-restricting fixture and sealing structure.

Type	Flow-restricting fixture	Standard flow velocity (m/s)
A	Lift type : The lift of the safety valve is 1/40 or larger and smaller than 1/4 of the disc seat hole diameter. The area of the fluid passage of the disc seat hole is the minimum when the disc is open.	Sealed
B		Open
C	Full bore type : The disc seat hole diameter is at least 1.15 times the throat diameter. The area of the fluid passage of the disc seat hole is at least 1.05 times the throat area when the disc is open. The area of the fluid passage within the pipeline and the inlet of the safety valve should be at least 1.7 times the throat area.	Sealed
D		Open

2. Opening pressure allowance

(1) The following shows the opening pressure allowance for a spring safety valve for steam.

(2) The permissible range for a spring safety valve for gas is from the set pressure to less than 1.1 times the set pressure.

Unit : kgf/cm²(MPa)

Set pressure	Allowance
Less than 5(0.5)	±0.14(0.014)
5(0.5) or higher Less than 23(2.3)	±(3% of set pressure))
23(2.3) or higher Less than 70(7.0)	±0.7(0.07)
Less than 70(7.0)	±(1% of set pressure))

▶ The opening pressure allowance of safety valves for steam, other than boilers, is ±3% (minimum value of ±0.14 kgf/cm²g) of the set pressure.

3. Blowdown

(1) The blowdown of a spring safety valve for steam should be carried out as follows, based on the opening pressure.

Unit : kgf/cm²(MPa)

Opening pressure	Blowdown
4(0.4) or less	0.3(0.03) or less
Higher than 4(0.4)	7%(4%) or less of opening pressure

▶ Notes : It is possible to decide on the value in the parenthesis, according to an agreement between relevant parties.
However, if the opening pressure of safety valves for steam that are used for once-through boilers, reheat pipes, etc. exceeds 3 kgf/cm²(MPa), it can be 10% or less of the set pressure.

(2) The blowdown pressure of the spring safety valve for gas and spring safety valve for steam that is installed on surplus pipeline is as follows, based on the opening pressure or set pressure.

Unit : kgf/cm²(MPa)

Set pressure	Blowdown	
	Without using a soft seat on disc seat surface	Using a soft seat on disc seat surface
2(0.2) or less	Maximum 0.3(0.03)	Maximum 0.5(0.05)
Higher than 2(0.2)	Maximum 15% of set pressure	Maximum 25% of set pressure

▶ Notes : A soft seat has a disc seat surface treated with a synthetic resin.

Data / KS B 6216 Regulations on Safety Valves for Steam

Calculation of discharge capacity

Calculation of discharge capacity

· KS B 6216 standard on safety valves for steam and gas

A. For steam

$W = 0.5145 \times A \times (P+1) \times K \times C \times 0.9$

Here,

W : nominal discharge capacity (kg/h)

A : Minimum steam passage area (mm^2)

In case of low lift, high lift, and warm lift types, $A = \pi DL$

In case of full bore types, $A = \frac{\pi}{4} d^2$

D : Valve seat diameter (mm)

L : Valve lift (mm)

Lift type $L = \frac{D}{40} \sim \frac{D}{15}$

D : Throat diameter (mm)

P : Flow rating pressure (kgf/cm^2g)

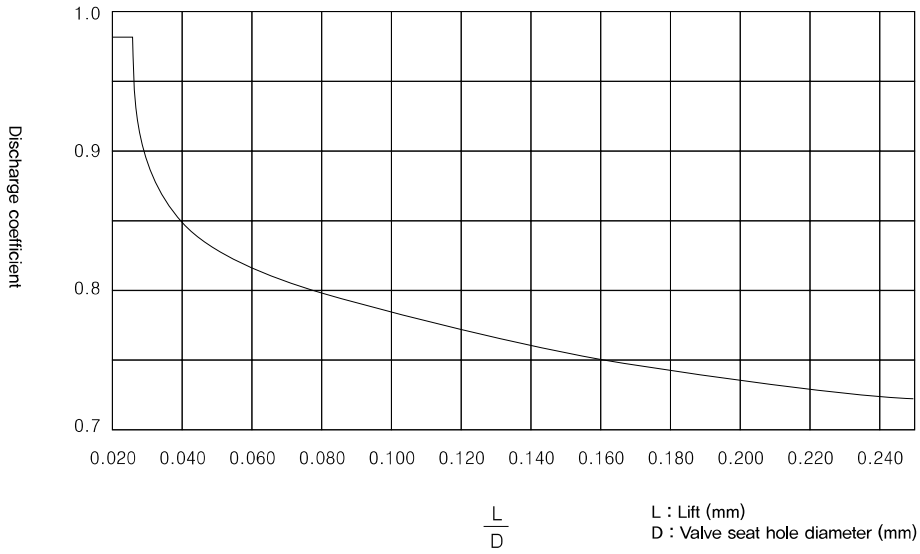
If not specifically stated otherwise, this is 1.03 times the opening pressure if the maximum pressure used exceeds 1 kgf/cm^2g. A total of 0.2 kgf/cm^2g is added to the opening pressure if the maximum pressure used is 1 kgf/cm^2g or less. If specifically stated otherwise, the corresponding value should be used.

K : Certified coefficient of discharge (Refer to Chart 1)

C : Coefficient based on steam characteristics (Refer to Chart 2)

If the certified coefficient of discharge of a safety valve is not measured, the rated relieving capacity can be calculated by using the K' value determined based on Chart 1, instead of the K value in the calculation formula above; provided that K' equals 0.864 in case of full bore type safety valves.

》Chart 1. Certified coefficient of discharge



Data / KS B 6216 Regulations on Safety Valves for Steam

Temperature / Absolute pressure kg/cm²(MPa)	saturated temperature	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
5(0.5)	1,005	0,996	0,972	0,951	0,931	0,913	0,896	0,879	0,864	0,849	0,835	0,822															
10(1.0)	0,987	0,981	0,983	0,960	0,938	0,919	0,901	0,884	0,868	0,853	0,838	0,825															
15(1.5)	0,977	0,976	0,970	0,972	0,947	0,925	0,906	0,888	0,872	0,856	0,841	0,828															
20(2.0)	0,972		0,967	0,964	0,955	0,932	0,912	0,893	0,876	0,860	0,845	0,830	0,817	0,804	0,792	569	0,780										
25(2.5)	0,969			0,961	0,961	0,937	0,918	0,898	0,880	0,863	0,848	0,833	0,819	0,806	0,793	925	0,782										
30(3.0)	0,967			0,962	0,957	0,949	0,924	0,903	0,885	0,867	0,851	0,836	0,822	0,808	0,795	85	0,783	0,763	0,748	0,742	0,730	0,721	0,712	0,703	0,695	0,687	0,679
40(4.0)	0,965				0,958	0,954	0,934	0,915	0,894	0,875	0,857	0,841	0,826	0,813	0,799	142	0,787	0,763	0,755	0,744	0,735	0,725	0,715	0,705	0,696	0,688	0,680
50(5.0)	0,966					0,955	0,953	0,927	0,904	0,884	0,865	0,848	0,832	0,817	0,803	249	0,790	0,766	0,755	0,747	0,737	0,723	0,717	0,708	0,697	0,689	0,681
60(6.0)	0,968					0,962	0,953	0,941	0,911	0,891	0,872	0,854	0,838	0,822	0,808	569	0,794	0,769	0,758	0,747	0,739	0,729	0,719	0,710	0,698	0,690	0,682
70(7.0)	0,971						0,958	0,954	0,924	0,901	0,881	0,861	0,844	0,827	0,812	925	0,798	0,772	0,761	0,749	0,739	0,731	0,721	0,708	0,702	0,691	0,683
80(8.0)	0,975						0,967	0,956	0,937	0,912	0,897	0,868	0,850	0,833	0,817	85	0,802	0,776	0,763	0,752	0,741	0,731	0,719	0,710	0,701	0,692	0,684
90(9.0)	0,980							0,962	0,957	0,926	0,909	0,876	0,856	0,838	0,822	142	0,807	0,779	0,766	0,754	0,743	0,733	0,722	0,711	0,702	0,693	0,685
100(10.0)	0,986							0,971	0,961	0,936	0,926	0,883	0,863	0,844	0,827	249	0,811	0,782	0,769	0,757	0,745	0,735	0,724	0,712	0,703	0,695	0,686
120(12.0)	0,999								0,975	0,964	0,956	0,903	0,876	0,857	0,838	569	0,818	0,789	0,775	0,762	0,750	0,739	0,728	0,718	0,706	0,697	0,688
140(14.0)	1,016								1,002	0,980	0,988	0,920	0,893	0,868	0,846	925	0,828	0,797	0,782	0,768	0,755	0,743	0,732	0,721	0,711	0,699	0,691
160(16.0)	1,036									1,000	1,004	0,942	0,907	0,883	0,858	85	0,838	0,803	0,787	0,774	0,760	0,748	0,736	0,725	0,714	0,704	0,693
180(18.0)	1,063									1,038	1,028	0,972	0,929	0,895	0,873	142	0,848	0,810	0,794	0,779	0,766	0,752	0,740	0,728	0,717	0,707	0,697
200(20.0)	1,094										1,072	1,006	0,953	0,914	0,885	249	0,861	0,818	0,801	0,786	0,770	0,757	0,744	0,732	0,720	0,710	0,700
220(22.0)	1,129											1,033	0,982	0,932	0,900	569	0,872	0,827	0,805	0,793	0,777	0,761	0,749	0,736	0,724	0,713	0,702
240(24.0)												1,059	1,016	0,958	0,915	925	0,885	0,837	0,815	0,797	0,783	0,766	0,752	0,740	0,727	0,716	0,705
260(26.0)												1,099	1,055	0,982	0,935	85	0,899	0,848	0,825	0,804	0,786	0,772	0,756	0,741	0,731	0,719	0,708
280(28.0)												1,167	1,096	1,013	0,956	142	0,913	0,853	0,834	0,811	0,793	0,776	0,762	0,747	0,735	0,720	0,710
300(30.0)													1,132	1,047	0,977	249	0,931	0,867	0,838	0,821	0,799	0,781	0,763	0,753	0,735	0,724	0,715
320(32.0)													1,169	1,089	1,009	569	0,952	0,877	0,849	0,824	0,805	0,787	0,770	0,753	0,742	0,729	0,714
340(34.0)														1,136	1,032	925	0,968	0,888	0,859	0,835	0,812	0,792	0,775	0,757	0,746	0,729	0,718
360(36.0)														1,191	1,063	85	0,989	0,899	0,869	0,842	0,818	0,798	0,780	0,761	0,761	0,734	0,723
380(38.0)															1,098	142	1,016	0,913	0,878	0,850	0,823	0,804	0,785	0,765	0,750	0,739	0,726
400(40.0)															1,137	249	1,037	0,927	0,888	0,858	0,832	0,807	0,790	0,769	0,754	0,742	0,725
420(42.0)																569	1,064	0,944	0,901	0,868	0,839	0,815	0,792	0,774	0,758	0,75	0,729
440(44.0)																925	1,092	0,954	0,914	0,876	0,846	0,821	0,800	0,779	0,762	0,748	0,731
460(46.0)																925	1,122	0,971	0,924	0,888	0,854	0,828	0,805	0,785	0,766	0,753	0,738

▶ Remarks – The intermediate value of pressure and temperature in this chart is calculated according to the rule of three.

Data / KS B 6216 Regulations on Safety Valves for Steam

Calculation of discharge capacity

B. For Gas

① In case P_2 / P_1 value is below threshold value

$$W = C \times K \times A \times P_1 \times \sqrt{\frac{M}{Z \times T}} \times 0.9$$

W : Rated relieving capacity (kg/h)

C : In case coefficient following the isentropic exponent of gas (see graph 3), it is set as C=234.

A : Effective discharge area (mm^2)

Lift type A = πDL

Full bore type A = $A = \frac{\pi}{4} d^2$

D : Valve seat diameter (mm)

L : Valve lift (mm)

Lift type $L = \frac{D}{40} \sim \frac{D}{15}$

D : Throat diameter (mm)

P_1 : It is the absolute pressure(kgf/cm^2) of the flow rating pressure.
If not specifically stated otherwise, this is 1.1 times the set pressure.

P_2 : Absolute pressure of back pressure (kgf/cm^2)

M : Molecular weight of gas (Refer to Chart 4)

Z : Compression coefficient

T : Absolute temperature of gas with regard to flow rating pressure

② In case the value of P_1 / P_2 exceeds threshold value

$$W = C \times K \times A \times P_1 \sqrt{\frac{k}{k-1}\left\{\left(\frac{P_2}{P_1}\right)^{2/k} - \left(\frac{P_2}{P_1}\right)^{\frac{k+1}{k}}\right\}} \sqrt{\frac{M}{Z \times T}} \times 0.9$$

Here,

K, W, A, P1, P2, M, Z, T follows the regulation of 1.

κ equals 1.000.

κ equals the value of isentropic exponent in P_1.

If the value in P_1 is unclear, it takes the value of standard conditions, and if this value is also unclear, κ equals 1.001.

In case the certified coefficient of discharge of the safdy valve is not measured, rated reliving capacity(Kg/h) can be calculated using K' value obtained from Chart 1 instead of k value from the calculation formula above. Provided that K' equals 0.864 in case of full bore type safety valves.

Chart 1. C' value

k	C1	k	C1	k	C'	k	C'
1.00	234	1.20	251	1.40	265	1.60	277
1.02	237	1.22	252	1.42	266	1.62	278
1.04	238	1.24	254	1.44	267	1.64	280
1.06	240	1.26	255	1.46	268	1.66	281
1.08	242	1.28	257	1.48	270	1.68	282
1.10	244	1.30	258	1.50	271	1.70	283
1.12	245	1.32	260	1.52	272	1.80	289
1.14	246	1.34	261	1.54	274	1.90	293
1.16	248	1.36	263	1.56	275	2.00	298
1.18	250	1.38	264	1.58	276	2.20	307

Data / Physical Properties

(Chart 4) Physical properties of air and gas

Type of fluid	Molecular formula	Molecular weight	Adiabatic index	Critical temperature	Critical pressure	Liquid	
						Specific gravity	Temperature
ACETYLEN	C2H2	26.04	1.26	308.7	6.24	–	–
AIR	–	28.96	1.40	132.5	3.76	–	–
AMMONIA	NH3	17.03	1.31	405.6	11.46	0.817	–79
ARGON	Ar	39.95	1.67	150.8	4.94	1.650	–233
BENZENE	C6H6	78.12	1.12	562.8	4.92	0.879	20
ISO–BUTANE	iso–C4H10	58.13	1.10	408.2	3.70	0.557	20
n–BUTANE	n–C4H10	58.13	1.09	425.5	3.74	0.579	20
CARBON DISULFIDE	CS2	76.14	1.21	549.2	7.64	1.263	20
CARBON ACID GAS	CO2	44.00	1.29	304.2	7.62	0.101	–37
CARBON MONOXIDE	CO	28.01	1.40	133.0	3.61	0.814	–194
CHLORINE	Cl2	70.91	1.36	417.2	7.82	1.560	–34
CYCLOHEXANE	C6H12	84.16	1.09	481.6	4.05	0.779	20
n–DECANE	n–C10H22	142.29	1.03	618.4	2.12	0.734	15.6
ETHANE	C2H6	30.07	1.19	305.4	4.89	0.546	–88
ETHYLALCOHOL	C2H5OH	46.07	–	516.2	6.37	0.789	20
ETHYLENE	C2H4	28.05	1.24	282.7	5.08	0.566	–102
HELIUM	n–CH3(CH2)5CH3	4.00	1.66	5.3	0.52	–	–
n–HEPTANE	n–C7H16	100.21	1.05	540.2	2.72	–	–
n–HEXANE	n–C6H14	86.18	1.06	507.7	3.03	0.659	20
HYDROCHLORIC ACID	HCl	36.46	1.41	324.7	8.43	–	–
HYDROGEN	H2	2.02	1.41	33.2	1.32	0.079	–253
SULFURETED HYDROGEN	H2S	34.08	1.321	373.6	9.15	–	–
METHANE	CH4	16.04	1.31	190.9	4.70	0.415	–164
METHYLALCOHOL	CH3OH	32.04	1.20	512.6	8.02	0.792	20
METHYL CHLORIDE	CH3Cl	50.49	1.20	416.3	6.74	0.952	0
NFTROGEN	N2	28.01	1.40	126.3	3.47	1.026	–252
NITROUS OXIDE	N2O	44.01	1.30	309.3	7.39	1.226	–89
n–NONAN	n–CH3(CH2)7CH3	128.26	1.04	594.7	2.30	0.718	20
OXYGEN	O2	32.00	1.40	154.7	5.14	1.426	–252
n–PENTANE	n–CH3(CH2)3CH3	72.15	1.07	470.1	3.35	0.631	15.6
n–PROPANE	n–CH3CH2CH3	44.11	1.13	370.0	4.26	0.585	–45
STEAM	H2O	18.02	1.33	647.1	22.14	1.000	4
SULPHUR DIOXIDE	SO2	64.06	1.29	593.6	4.22	0.906	20
TOLUENE	C6H5CH3	92.15	1.09	593.6	4.22	0.866	20
PROPYLENE	CH3CHCH2	42.08	1.15	365.1	4.59	0.609	–47
OCTANE	C8H18	114.00	1.05	–	–	–	–

Data / Discharge Capacity Table of Safety Valves (KS B 6216) for Steam

Full bore type

w = 0.5145 x A x (P+1) x K x C x 0.9 (kgf/h)

Type	P (MPa) / size(dt)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
YSF-1 YSF-3 YSF-5	20 X 25	144	216	289	362	422	515	588	661	733	813	886	959	1,032	1,105	1,185	1,258	1,330	1,403	1,476	1,556	1,629	1,702	1,775	1,848	1,928	2,000	2,073	2,146	2,219	2,299
	25 X 40	230	247	464	581	709	826	943	1,060	1,177	1,305	1,422	1,539	1,667	1,784	1,901	2,018	2,135	2,252	2,368	2,497	2,614	2,731	2,847	2,964	3,093	3,210	3,326	3,443	3,560	3,689
	40 X 65	574	865	1,157	1,448	1,768	2,060	2,351	2,642	2,933	3,254	3,545	3,836	4,128	4,419	4,739	5,031	5,322	5,613	5,905	6,225	6,516	6,807	7,099	7,390	7,710	8,002	8,293	8,584	8,876	9,196
	50 X 80	921	1,388	1,586	2,323	2,837	3,305	3,772	4,239	4,707	5,221	5,688	6,155	6,623	7,090	7,604	8,071	8,539	9,006	9,473	9,988	10,455	10,922	11,390	11,857	12,371	12,838	13,360	13,773	14,240	14,754
	65 X 100	1,532	2,309	3,086	3,863	4,718	5,495	6,272	7,049	7,826	8,681	9,458	9,458	11,012	11,7 [illegible]	12,644	13,421	14,198	14,957	15,752	16,607	17,384	18,161	18,938	19,715	20,570	21,347	22,124	22,901	23,678	24,533
	80 X 125	2,373	3,578	4,782	5,986	7,311	8,515	9,720	10,924	12,128	13,453	14,778	15,982	17,066	18,270	19,595	20,799	22,003	23,208	24,412	25,737	26,941	28,145	29,349	30,554	31,878	33,083	34,287	35,491	36,696	38,020
	100 X 150	3,684	5,554	7,423	9,292	11,349	13,218	15,087	16,957	18,826	20,833	22,752	24,621	26,491	28,360	36,416	32,286	34,155	36,024	37,984	39,950	41,820	43,689	45,558	47,428	49,484	51,353	53,223	55,092	56,961	59,018
	125 X 200	5,757	8,678	11,599	14,519	17,323	20,653	23,574	26,495	29,416	32,629	35,550	38,471	41,392	44,313	47,526	50,446	53,367	56,288	59,209	62,442	65,343	68,264	71,185	74,106	77,319	80,240	83,160	86,081	89,002	92,215
	150 X 200	8,436	12,716	16,996	21,276	25,985	30,265	34,545	38,825	43,105	47,814	52,094	56,374	60,654	64,934	69,643	73,923	78,203	82,483	86,736	91,472	95,752	100,032	104,312	108,593	113,301	117,581	121,861	126,141	130,422	135,130
	200 X 250	8,203	15,681	23,158	30,636	38,861	46,339	53,816	61,294	68,771	76,996	84,474	91,951	99,429	106,906	115,132	122,609	130,087	137,564	145,042	153,267	160,774	168,222	175,699	183,177	191,402	198,879	206,357	212,339	221,312	229,537

Low lift type

W = 0.5145 x A x (P+1) x K x C x 0.9 (kgf/h)

Model	P (MPa) / size	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1.0
YSL-1	15		17	22	26	31	35	39	44	48	53	58	62	67	71	76	80	85	90	94	98
	20	22	29	36	44	51	58	66	73	80	89	96	104	111	119	126	133	142	149	157	164
	25	38	51	63	76	89	102	115	128	141	156	169	182	195	207	220	233	249	261	274	287
	40	86	116	145	174	204	233	263	292	321	357	386	415	445	474	503	533	568	597	627	656
	50	140	188	236	284	331	379	427	474	522	579	618	675	723	770	818	866	923	971	1,018	1,066

Data / physical properties

Full bore type

W = C x K x A x P1 x (루트M계산식) / (Z x T) x 0.9 (kgf/h)

형식	P (MPa) / 호칭 지름(dt)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
YSF-1 YSF-3 YSF-5	20 X 25	212	323	435	546	668	779	891	1,002	1,113	1,235	1,347	1,458	1,569	1,680	1,802	1,914	2,025	2,136	2,247	2,370	2,481	2,592	2,703	2,814	2,931	3,048	3,159	3,270	3,381	3,504
	20 X 40	341	519	697	876	1,072	1,251	1,447	1,625	1,804	1,982	2,160	2,339	2,517	2,696	2,892	3,070	3,249	3,427	3,606	3,802	3,980	4,159	4,337	4,515	4,712	4, 的 0	5,069	5,247	5,425	5,662
	40 X 65	849	1,294	1,739	2,184	2,673	3,118	3,562	4,007	4,452	4,941	5,386	5,831	6,276	6,720	7,210	7,655	8,099	8,544	8,9 的	9,478	9,923	10,368	10,813	11,257	11,747	12,192	12,636	13,081	13,526	14,015
	50 X 80	1,362	2,076	2,790	3,503	4,288	5,002	5,716	6,429	7,143	7,928	8,642	9,355	10,069	10,738	11,568	12,281	12,995	13,709	14,422	15,207	15,921	16,635	17,348	18,062	18,847	19,561	20,274	20,988	21,702	22,487
	65 X 100	2,265	3,452	4,639	5,825	7,131	8,317	9,504	10,690	11,877	13,182	14,369	15,556	16,742	17,929	19,234	20,421	21,607	22,794	23,981	25,286	26,472	27,659	28,846	30,032	31,338	32,524	33,711	34,897	36,084	37,3 的
	80 X 125	3,511	5,350	7,189	9,028	11,051	12,890	14,729	16,568	18,407	20,430	22,269	24,108	25,947	27,785	29,808	31,647	33,486	35,325	37,164	39,187	41,026	42,865	44,704	46,543	48,566	50,405	52,244	54,803	55,922	57,945
	100 X 150	5,450	8,304	11,159	14,014	17,154	20,008	22,863	25,717	28,572	31,712	34,567	37,421	40,276	43,131	46,271	49,125	51,980	54,835	57,689	60,829	63,684	66,538	69,393	72,248	75,388	78,242	80,824	83,952	86,806	89,946
	125 X 200	8,515	12,976	17,436	21,896	26,803	31,263	35,723	40,184	44,644	49,550	54,011	58,471	62,931	67,392	72,298	76,758	81,219	85,679	90,139	95,046	99,506	103,966	108,427	112,887	117,793	122,254	126,714	135,174	135,635	140,541
	150 X 200	12,478	19,014	25,550	32,086	39,276	45,812	52,348	58,884	65,420	72,610	79,146	85,682	92,218	98,754	105,944	112,480	119,016	125,552	132,088	139,277	145,813	152,350	158,886	165,422	172,611	179,147	185,683	192,219	198,756	205,945
	200 X 250	21,799	33,217	44,636	56,054	68,615	80,033	91,451	102,87	114,288	126,849	138,267	149,686	161,104	172,522	185,083	196,501	207,920	219,338	230,757	243,317	254,735	266,154	277,572	288,991	301,551	312,969	324,388	335,806	347,225	359,785

Low lift type

W = C x K x A x P1 x (루트M계산식) / (Z x T) x 0.9 (kgf/h)

형식	P (MPa) / 호칭 지름	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1.0
YSL-1	15	17	23	29	35	41	48	54	60	66	73	79	85	91	97	103	109	116	122	128	134
	25	29	39	49	59	69	79	89	99	109	121	132	142	152	162	172	182	194	204	214	224
	35	51	68	86	103	121	139	156	174	209	213	230	248	265	283	301	318	339	357	375	392
	45	113	151	188	226	264	302	339	377	415	460	497	435	573	611	641	686	731	769	807	844
	50	184	245	306	367	429	490	551	612	674	747	808	870	931	992	1,041	1,115	1,188	1,249	1,311	1,372

Data / Physical Properties

Full bore type

$W = 5070 \times A \times K \times \sqrt{PG}$

K= 0.6, Accumulation 15%
G= 1

W: Discharge capacity (kg/h)
P : Opening pressure (MPa)
dt : Throat diameter (mm)

A : Throat area
$A = \pi dt^2 / 4$

(m3/h)

Type	P (MPa) / size(dt)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
	20 X 25	5.4	7.6	9.3	10.8	12.1	13.3	14.3	15.3	16.2	17.2																				
	25 X 40	8.6	12.2	14.9	17.2	19.5	21.3	23.0	24.5	26.0	27.5	28.9	30.1	31.3	32.5	33.7	34.8	35.9	36.9	37.9	39.0	39.9	40.8	41.7	42.6	43.6	44.4	45.2	46.0	46.8	47.7
	40 X 65	21.5	30	37	43.0	48.6	53.1	57.3	61.2	64.9	68.7	72.0	75.1	78.1	81.0	84.1	86.8	89.4	92.0	94.5	97.1	99.5	101.8	104.0	106.2	108.6	110.7	112.8	114.8	116.8	118.9
	50 X 80	34.5	48.8	59.8	69.0	77.9	85.2	91.9	98.2	104.1	110.2	115.5	120.5	125.3	130.5	134.9	139.3	143.5	147.6	151.6	155.8	159.6	163.3	166.9	170.4	172.4	177.6	180.9	184.2	187.4	190.8
	65 X 100	57.4	81.1	99.4	114.7	129.5	141.7	152.9	163.3	173.0	183.2	192.0	200.4	208.4	216.2	224.4	231.6	238.6	245.4	252.0	259.1	265.4	271.5	277.5	283.4	2 89.7	295.3	300.8	306.2	311.6	317.3
	80 X 125	88.9	125.7	154.0	177.8	200.8	219.6	236.9	253.0	268.2	283.9	297.5	310.5	323.0	335.0	347.7	358.9	369.8	380.3	390.6	401.5	411.3	420.8	430.0	439.1	448.9	457.6	466.2	474.6	482.9	419.8
	100 X 150	138.0	195.2	239.0	276.0	311.6	340.8	367.7	392.8	416.3	440.7	461.8	482.0	501.4	520.0	539.8	557.1	574.0	590.3	606.3	623.3	638.4	653.1	667.6	681.7	696.9	710.4	723.7	736.7	749.5	763.4
	125 X 200	215.3	304.9	373.5	431.2	486.9	532.6	574.5	613.7	650.5	688.6	721.6	753.1	783.4	812.5	843.4	870.5	896.8	922.4	947.3	973.9	997.5	1,025.1	1,043.0	1,065.1	1,088.8	1,110.0	1,130.7	1,151.1	1,171.1	1,192.8
	150 X 200	316.0	446.8	547.3	631.9	713.6	780.4	841.9	899.3	953.2	1,009.1	1,057.4	1,103.6	1,148.0	1,190.7	1,235.9	1,275.7	1,314.2	1,351.7	1,388.1	1,427.1	1,461.7	1,495.4	1,528.5	1,560.8	1,595.6	1,626.6	1,657.0	1,686.8	1,716.2	1,747.9
	200 X 250	552.0	780.6	956.1	1,104.0	1,246.6	1,363.3	1,470.8	1,571.0	1,665.2	1,762.9	1,847.3	1,928.0	2,005.5	2,080.1	2,159.1	2,228.6	2,295.9	2,361.4	2,425.0	2,493.2	2,553.5	2,612.5	2,670.2	2,726.7	2,787.4	2,841.6	2,894.7	2,946.9	2,998.1	3,053.5

Low lift type

$W = 5070 \times A \times K \times \sqrt{PG}$

K= 0.6, Accumulation 15%
G= 1

W: Discharge capacity (kg/h)
P : Opening pressure (MPa)
dt : Throat diameter (mm)

A : Throat area
$A = \pi dt^2 / 4$

(m3/h)

Type	P (MPa) / size	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1.0
YSL-1	15	0.37	0.53	0.64	0.74	0.83	0.91	0.98	1.05	1.12	1.19	1.24	1.30	1.35	1.40	1.45	1.5	1.55	1.59	1.64	1.68
	20	0.62	0.88	1.07	1.24	1.39	1.52	1.64	1.75	1.86	1.98	2.07	2.16	2.25	2.33	2.42	2.49	2.58	2.66	2.73	2.8
	25	1.08	1.53	1.88	2.17	2.42	2.66	2.87	3.07	3.25	3.46	3.63	3.79	3.94	4.08	4.23	4.36	4.52	4.65	4.77	4.90
	40	2.48	3.50	4.29	4.96	5.54	6.07	6.56	7.01	7.43	7.91	8.29	8.65	9.00	9.34	9.66	9.97	10.34	10.63	10.91	11.19
	50	4.03	5.69	6.97	8.05	9.00	9.86	10.65	11.39	12.08	12.86	13.47	14.06	14.63	15.17	15.70	16.21	16.80	17.27	17.73	18.19

DATA / Safety Valve

Cautionary measures

• Cautionary measures when handling safety valves

Safety valves cannot be used in good conditions unless the following cautionary measures are taken. This is because impacts can lead to changes in the precisely adjusted opening pressure.

(1) Safety valves should be protected from external impact.
(2) In order to prevent the entry of foreign substances into the inside of the valve, the cover plate should not be removed until the safety valve is installed.
(3) When installing the valve, completely remove scales, sand, dregs, etc. and do not remove the cover plate.
(4) If the opening pressure is different from the pressure gauge readings, check the pressure gauge first.
(5) Install the valve vertically, and do not remove the attached seal.

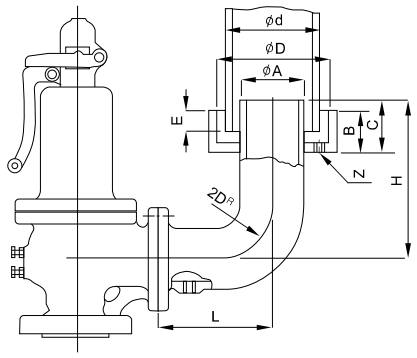
• Cautionary measure during installation

Install the safety valve vertically, in an upright position, in a pressure pipeline or coupling device. Install it as closely as possible to ensure the smooth flow of fluid between the pipeline and valve.

• Outlet pipeline

(1) A discharge pipeline should be installed, and at a safe place.
(2) The discharge pipeline should be bigger than the size on the outlet side to lower the back pressure to the same level as the atmospheric pressure. If possible, it should not be bent and should be short.
(3) The discharge pipeline should be fixed to a building or other structure so that it withstands vibration caused by outside atmospheric pressure changes or rapid flow of fluid during discharge.
(4) An appropriate bellows type expansion pipe joint should be installed on the outlet side in cases where inappropriate results might occur from heat expansion of the discharge pipeline.

※ The length of the discharge pipes should be set as follows, based on the size of the valve.



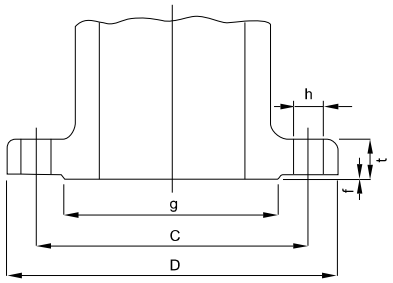
⟩⟩ Dimensions

(mm)

Size on outlet side	D	d	A	B	c	E	L	H	N
40	40	65	130	60	80	30	130	220	PT⅜"
50	50	80	150	60	90	40	150	230	PT½"
65	65	100	200	60	100	40	180	270	PT½"
80	80	125	200	70	120	50	200	310	PT½"
100	100	150	250	70	140	60	250	370	PT¾"
125	125	200	300	80	160	70	300	430	PT1"
150	150	200	300	80	180	80	350	500	PT1"
200	200	250	380	100	220	80	450	610	PT1"

Data / KS B 6216 Regulations on Full Bore Type Safety Valves

Table on standards for flanges on the inlet side of full bore type safety valves



Nominal pressure of safety valve		Size	Flange				Bolt hole			Nominal size of bolt screw
			D	t (Minimum)	f	g	C	수	h	
New type	10K	20	125	18		67	90	4	19	M16
		25	135	20	2	76	100	4	19	M16
		32	140	20	2	81	105	4	19	M16
		40	155	20	2	96	120	8	19	M16
		50	175	22	2	116	140	8	19	M16
		65	200	24	2	132	160	8	23	M20
		80	210	24	2	145	170	8	23	M20
		(90)	225	26	2	160	185	8	23	M20
		100	270	26	2	195	225	8	25	M22
		125	305	28	2	230	260	12	25	M22
		150	350	30	2	275	305	12	25	M22
		200	430	34	2	345	380	12	27	M24
	20K	20	130	20	1	70	95	4	19	M16
		25	140	22	2	80	105	4	19	M16
		32	160	22	2	90	120	4	23	M20
		40	165	22	2	105	130	8	19	M16
		50	200	26	2	130	160	8	23	M16
		65	210	28	2	140	170	8	23	M20
		80	230	30	2	150	185	8	25	M22
		(90)	240	32	2	160	195	8	25	M22
		100	275	36	2	195	230	8	25	M22
		125	325	38	2	235	275	12	27	M24
		150	370	42	2	280	320	12	27	M24
		200	450	48	2	345	390	12	33	M30 X 3
Old type	10K	20	125	22	1	70	90 0	4	19	M16
		25	130	22	1	75	95	4	19	M16
		32	140	24	2	85	105	4	19	M16
		40	155	24	2	100	120	8	19	M16
		50	165	26	2	110	130	8	19	M16
		65	200	28	2	135	160	8	23	M20
		80	210	30	2	145	170	8	23	M20
		(90)	225	30	2	160	185	8	23	M20
		100	245	32	2	180	205	8	23	M20
		(115)	270	32	2	195	225	8	25	M22
		125	280	34	2	205	235	12	25	M22
		150	325	36	2	250	280	12	25	M22
		200	385	38	2	300	335	12	27	M24
	20K	20	130	22	1	70	95	4	19	M16
		25	135	22	1	75	100	4	19	M16
		32	160	24	2	90	120	4	23	M20
		40	165	24	2	105	130	8	19	M16
		50	185	26	2	115	145	8	23	M20
		65	210	30	2	140	170	8	23	M20
		80	230	32	2	150	185	8	25	M22
		(90)	240	34	2	160	195	8	25	M22
		100	265	36	2	185	220	8	25	M22
		(115)	275	38	2	195	230	8	25	M22
		125	290	38	2	210	245	12	25	M22
		150	350	42	2	260	300	12	27	M24
		200	410	46	2	310	350	12	27	M24

▶ Notes: It is recommended that the size in the parenthesis not be used.

MEMO

03

STEAM TRAP

STEAM TRAP

YAF–14S
YAF–14F
YBT–4
YSP–1,2
YSP–5
YSP–6
TKD71
TDK45
TDK PS
TK1
TKK 2Y
TKK 2N
TKK 41
AYVAZ TKK3
YRS–3

03 STEAM TRAP

SAMYANG
SYSTEM GROUP

Steam Trap

Steam traps automatically discharge condensate only, without steam leakages, thereby minimizing thermal loss and preventing condensate disturbance, such as a water hammer.

Steam traps

Type	Size	Applicable pressure (MPa)	Structure	Materials		End connection	Page
				Body	Disc, seat		
YAF–14S	15(½")~50(2")	1.4 Below	Float type	GCD450	STS	KS PT SCREW	73
YAF–14F						KS10K RF FLANGE	
YBT–4	15(½")~25(1")	1.7 Below	Inverted bucket type			KS PT SCREW	74
YSP–1,2		0.034~1.2	Disc type	GC200			75
YSP–5		0.01~0.8 or 0.03~1.6	Disc type (Bimetallic)	STS			77
YSP–6	8(¼")~10(⅜")	0.01~1.6	Disc type				
TKD71							78
TDK45							79
TDK PS							80
TK1							81
TKK 2Y							82
TKK 2N							83
TKK 41							84
TKK3							85
YRS–3	15(½")~20(¾")	0.01~0.15 or 0.15~0.3	Thermo–wax type	C3771			86

YAF–14S, 14F Ball Float Trap Type Steam Trap

This is a lever float type steam trap that can be used where pressure is high and where a large volume of condensate is generated, such as heat exchangers, room heating and water heating facilities, and air–conditioning and heating facilities.

03

Features

- Outstanding performance in continuous discharge, regardless of load fluctuations of condensate.
- Built–in automatic Air Vent ensuring no air binding.
- Easy repair and inspections : simply remove the cover for repair and inspections. The float assembly is attached to the cover.

YAF–14S Type

YAF–14F Type

Specifications

Type		YAF–14S	YAF–14F
Size		15, 20, 25, 32, 40, 50A	
Applicable pressure		0.44, 1.0, 1.4MPa	
Applicable temperature		220℃ below	
End connection		KS PT SCREW	KS 10K RF FLANGE
Materials	Body	GCD450	
	Seat	STS	
	Float, lever	STS	
Hydraulic test pressure		1.5 times of applicable flange rating	

▶ Install a strainer (40 MESH or more) at the front end when installing the valve.

Dimensions

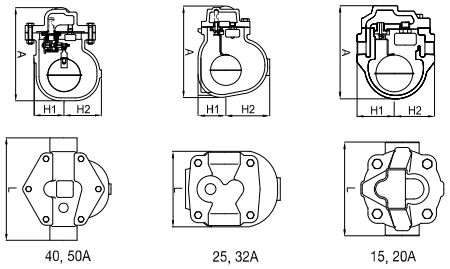
(mm)

Type	L	H1	H2	A	Weight (kg)	
					14S	14F
15(½")	122 (170)	61	61	147	3.6	5.2
20(¾")	122 (170)	61	61	147	3.5	5.2
25(1")	122 (200)	67.5	108	223	7.5	10.1
32(1¼")	160(210)	67.5	108	238	8.1	11
40(1½")	270 (270)	80.5	125.5	285	19.5	22
50(2")	300 (300)	90	142	295	25.95	30

Maximum applicable differential pressure

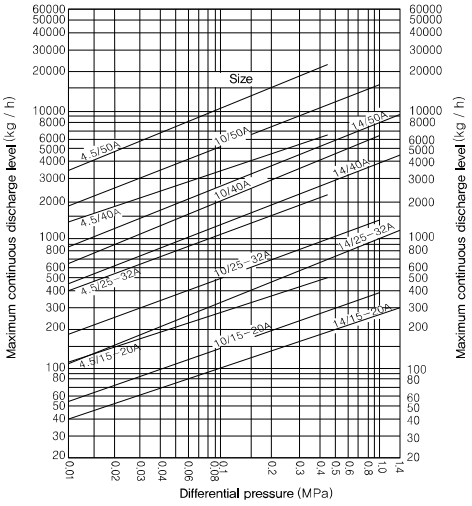
Type	Differential pressure(MPa)
YAF–14(4.5)	0.44
YAF–14(10)	1.0
YAF–14(14)	1.4

Dimensional drawing



40, 50A　25, 32A　15, 20A

Size selection chart



YBT-4 Type Bucket Trap

As an optimal trap for drain discharge for steam pipelines and headers, it has a simple structure that ensures easy maintenance.

Features

- Simple structure & extremely strong parts : durability and effective operations are guaranteed.
- No air binding : inverted structure of the bucket.
- No need to attach a separate strainer : bucket trap with built-in screen.
- Easy repair : simply remove the cover.

Specifications

Type		YBT-4
Applicable pressure		1.7MPa below
Applicable temperature		220℃ below
End connection		KS PT SCREW
Fluid temperature		GCD450
Materials	Body	STS
	Disc, seat	1.5 times of applicable flange rating
Hydraulic test pressure		1.5 times the applied pressure of the hydraulic flange

▶ Install a strainer (80 MESH or more) at the front end when installing the valve.

Dimensions

(mm)

Size	L	H1	H2	D	Weight (kg)
15A	127	78	65	½"	2.5
20A	127	78	65	¾"	2.6
25A	127	100	65	1"	3

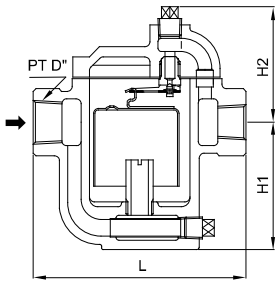
Maximum applicable differential pressure

Size	Differential pressure(MPa)
15A	0.55 / 0.86 / 1.58
20A	
25A	

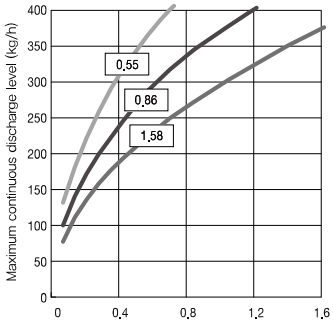
Cautions during installation

- After installing a bypass line and before operating the trap, blow out and remove foreign substances from inside the pipeline.
- The trap should be installed horizontally.
- The location of trap installation in the pipeline should be the lowest point of the facility or the end of the pipeline. If the outlet side is vertically standing, the height of the trap should be within the allowed back pressure range.

Dimensional drawing



Flow curve



YSP-1, 2 Type Disc Steam Trap(Pipeline)

As a disc type trap, it effectively uses the difference in the thermodynamic characteristics between steam and condensate. It is appropriate for places where there is a high possibility of freezing damages, including where the outlet or a steam main is exposed to the atmosphere.

03

Features

- Economical Trap (YSP-1 : no need for a separate bypass pipeline & simple handle operation blows foreign substances out and discharges condensed water.)
- No air binding during the start-up & easy repair.
- Easy installation in a pipeline : compact product & either the screwed type or flanged type can be used according to installation conditions.

YSP-1 Type

YSP-2 Type

Specification

Type		YSP-1, YSP-2
Applicable pressure		0.034~1.2MPa
Fluid temperature		220°C below
End connection		KS PT SCREW
Materials	Body	GC200
	Disc, seat	STS
Hydraulic test pressure		1.8MPa

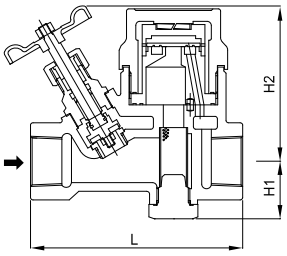
▶ Install a strainer (80 MESH or more) at the front end when installing the valve.

Dimensions

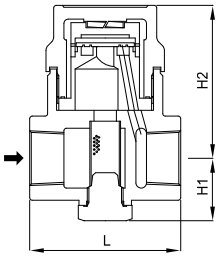
(mm)

Type	Size	L	H1	H2	Weight (kg)
YSP-1 Type	15(½")	120	33	95	2.2
	20(¾")	125	33	95	2.2
	25(1")	135	37	97	2.8
YSP-2 Type	15(½")	80	33	84	1.6
	20(¾")	84	33	84	1.6
	25(1")	88	37	87	2.2

Dimensional drawing

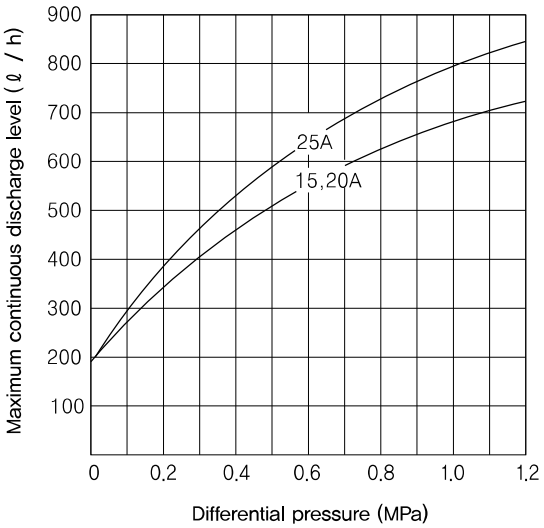


Type YSP-1
(Bypass valve attached)



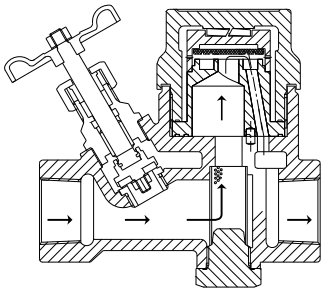
Type YSP-2

Flow curve

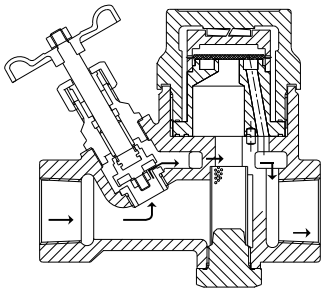


YSP-1 Type Steam Trap with Bypass

◎ Type YSP-1 Steam Trap with Bypass



When the bypass valve is closed

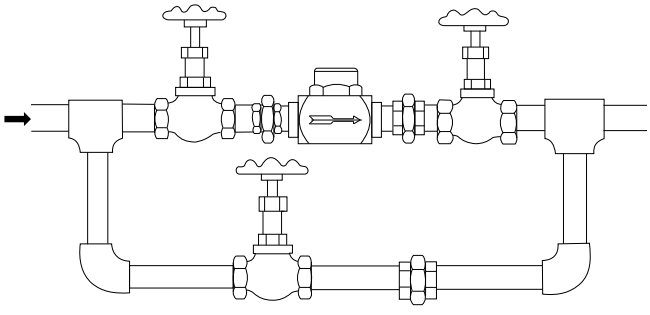


When the bypass valve is open

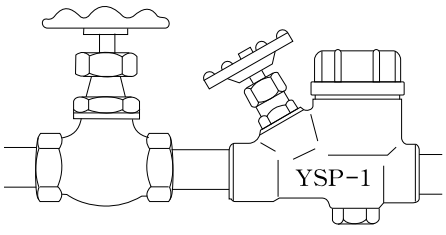
Features

- 2 different functions : (1) Trap-when the bypass valve is closed; (2) Condensed water discharge device-when the bypass valve is open.
- Built-in strainer.
- No need for a bypass pipeline.
- Simple structure : easy operation & repair.

Pipeline installation method



When a bypass steam trap is not attached



When a bypass steam trap is attached

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YSP-5 Type Steam Trap

As a disc type trap, this product guarantees perfect operations and features parts that are all made of highly durable stainless steel. Because it has a built-in bimetal, there is no air binding and no concern of freezing damages.

Features

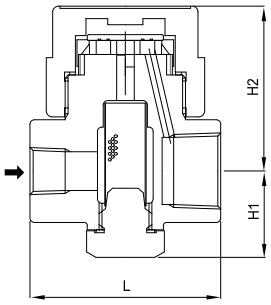
- Built-in bimetal preventing air binding.
- Built-in strainer preventing malfunctioning caused by foreign substances.
- Made of stainless steel : outstanding durability and a high degree of hardness.

Specifications

Type		YSP-5
Applicable pressure		0.01~0.8, 0.03~1.6MPa
Fluid temperature		220°C Below
End connection		KS PT SCREW
Materials	Body	STS
	Disc, seat	STS
Hydraulic test pressure		1.5 times of applicable flange rating

▶ Install a strainer (80 MESH or more) at the front end when installing the valve.

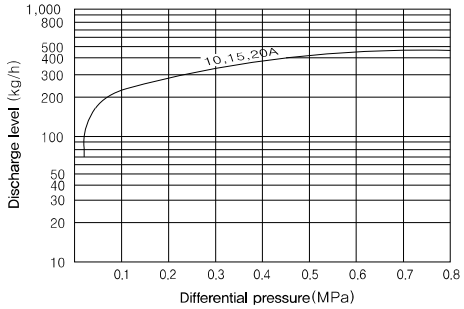
Dimensional drawing



Dimensions

(mm)

Type	Size	L	H1	H2	Weight (kg)
YSP-5 Type	15(½")	65	30	55	1.0
	20(¾")	65	30	55	1.0
	25(1")	65	30	55	1.2



YSP-6 Type Steam Trap

Features

- Compact & lightweight : easy to install.
- Superb discharge performance & a long life span.
- Made of stainless steel : a high degree of hardness & corrosion-free.

Specifications

Type		YSP-6
Applicable pressure		0.01~1.6MPa
Fluid temperature		220°C below
End connection		KS PT SCREW
Materials	Body	STS
	Disc, seat	STS
Hydraulic test pressure		2.4MPa

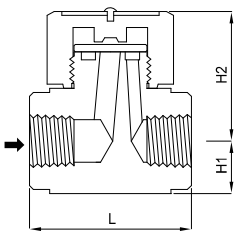
▶ Install a strainer (80 MESH or more) at the front end when installing the valve.

Dimensions

(mm)

Size	L	H1	H2	Weight (kg)
8(¼")	40	13	32	0.23
10(⅜")	40	13	32	0.23

Dimensional drawing



TDK 71 Thermodynamic Steam Trap

TDK 71 Steam Trap internal parts are made of stainless steel and body is made of stainless casting. In every condition the maximum back pressure will not exceed 80% of inlet pressure. If not the trap will not function properly. TDK 71 simply discharges in relation to condensate level. Strainer is easy to clean as it a Y-type located in lower part of body. It can be installed in both horizontally and vertically; however, it is recommended to install in horizontal pipelines.

Specifications

Type	TDK 71
Size	15A, 20A, 25A
Maximum permissible pressure	63 bar
Maximum operational pressure	42 bar
Maximum applied temperature	400℃
Connection	screwed

▶ Strainer (over 80 Mesh) installation is required to ahead inlet when installing valve.

Weight

Connections	Screwed		
Size (mm)	15A	20A	25A
Weight (kgs)	0.94	1.1	1.6

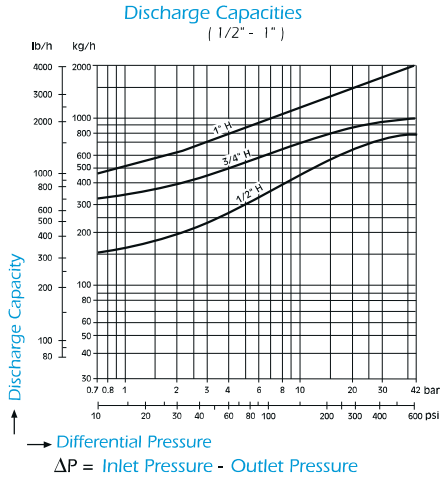
Connections

Screwed	NPT acc. to ANSI B1 20.1 BSP acc. to BS 21

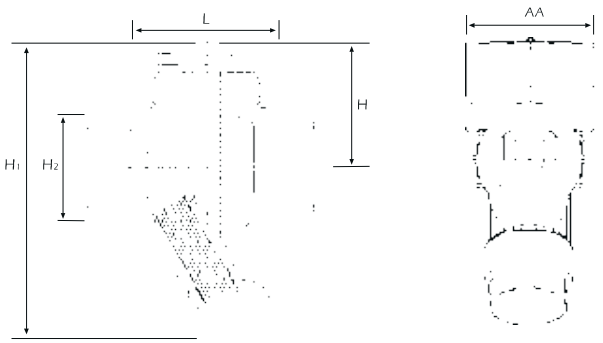
Dimensions

Cap/Size	L	H	H1	H2	AA
15A	78	41	95	33	41
20A	90	43	110	39	41
25A	95	52	124	45	55

Flow curve



Dimensional drawing



TDK 45 Steam Trap

Like any other steam traps TDK 45 has been produced in accordance to German Regulation of Boiler (TRD) / Pressure Vessel (AD) and DIN standard of design and tests. Opposite pressure will not exceed 80% of front pressure. Internal parts are made of stainless steel and body is made of forged steel. Strainer is easy to clean and maintain as it's a Y–type located in lower part of body.

Specification

Type	TDK 45
Size	15A, 20A, 25A
Maximum permissible pressure	65bar
Maximum operational pressure	40 bar
Maximum applied temperature	400℃
Differential pressure	32bar
Connection	screwed, socket weld

▶ Strainer (over 80 Mesh) installation is required to ahead inlet when installing valve.

Weight

Connections	Socket weld			Screwed		
Size(mm)	15A	20A	25A	15A	20A	25A
Weight (kgs)	1.8	1.7	1.6	1.9	1.9	1.9

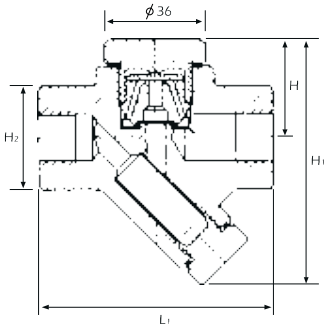
Connections

Screwed	NPT acc. to ANSI B1 20.1, BSP acc. to BS 21
Socket Weld	ANSI B 16.11

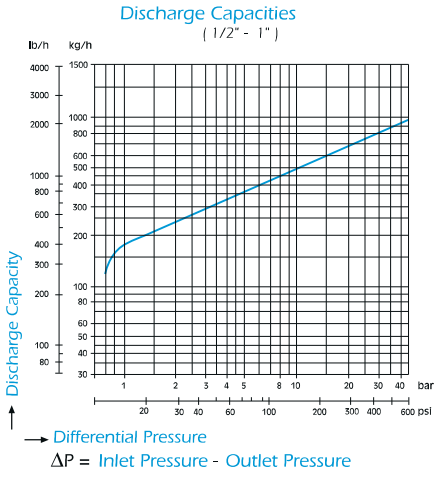
Dimensions

Cap/Size	L	L1	H	H1	H2
15A	150	95	40	100	42
20A	150	95	40	100	42
25A	160	95	40	100	42

Dimensional drawing



Flow curve



TDK PS Steam Trap

TDK PS Steam Trap internal parts are made of stainless steel and body is made of stainless casting. In every condition the maximum back pressure will not exceed 80% of inlet pressure. If not the trap will not function properly. TDK 71 simply discharges in relation to condensate level. All parts have spare parts so its easy to maintain. Strainer is easy to clean and maintain as it's a Y-type located in lower part of body. It can be installed in both horizontally and vertically; however, it is recommended to install in horizontal pipelines.

Specification

Type	TDK PS
Size	15A, 20A, 25A
Maximum permissible pressure	63bar
Maximum operational pressure	42bar
Maximum applied temperature	400℃
Connection	Screwed

▶ Install a strainer (80 MESH or more) at the front end when installing the valve.

Weight

Connections	Screwed		
Size (mm)	15A	20A	25A
Weight (kgs)	0.94	1.1	1.6

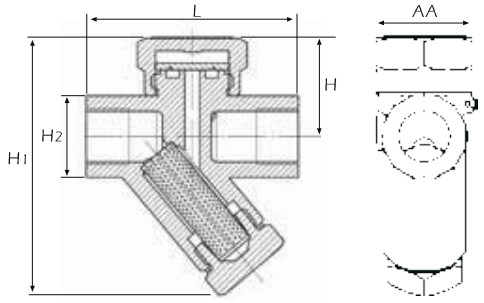
Connections

Screwed	NPT acc. to ANSI B1 20.1, BSP acc. to BS 21

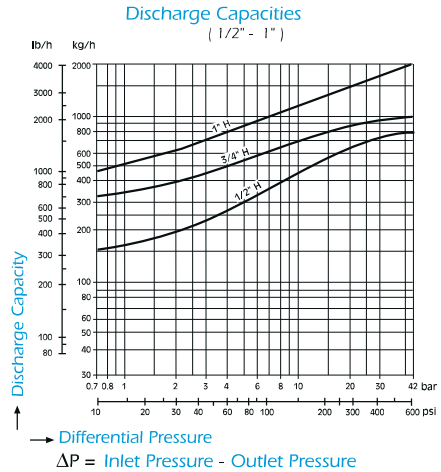
Dimensions

Cap/Size	L	H	H1	H2	AA
15A	78	36.5	94	30	35
20A	90	43	103	36.5	40
25A	95	51	115.5	43	45

Dimensional drawing



Flow curve



03

TK 1 Steam Trap

With in-built device to prevent corrosion, TK1 Steam Trap does not get effected by water hammer. It also includes strainer, check valve and auto-discharge functions. It can be installed both vertically and horizontally. It is functional in high pressure and bi-metal temperature adjustment plate can be adjusted with adjusting screw. It can also adjust condensate discharging level and temperature. This steam trap is ideal for superheated steam pipelines.

Specification

Type	TK1
Size	15A, 20A, 25A
Maximum permissible pressure	40bar
Maximum operational pressure	32bar
Maximum applied temperature	250℃
Differential pressure	22bar
Connection	screwed, socket weld

▶ Install a strainer (80 MESH or higher) at the front end when installing the valve.

Weight

Connections	Socket weld			Screwed		
Size (mm)	15A	20A	25A	15A	20A	25A
Weight (kgs)	2.4	2.4	2.3	2.5	2.5	2.4

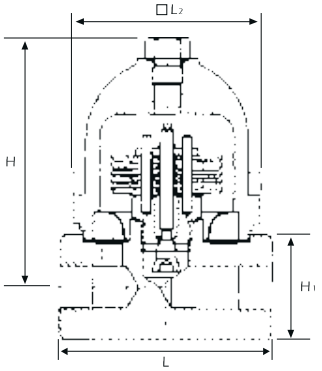
Connections

Screwed	NPT acc. to ANSI B1 20.1, BSP acc. to BS 21
Socket Weld	ANSI B 16.11

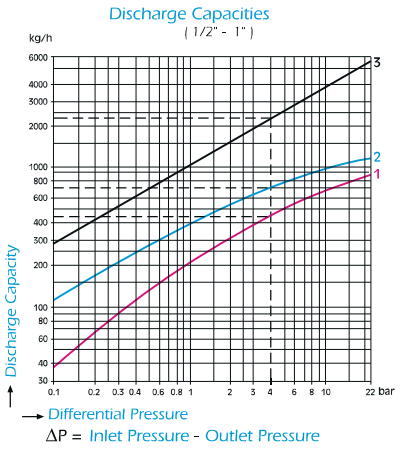
Dimension

Cap/Size	L	L1	L2	H	H1
15A	95	150	82	102	41
20A	95	150	82	102	41
25A	95	150	82	102	41

Dimensional drawing



Flow Curve



TKK 2Y Steam Trap

Like any other steam traps TDK 2Y has been produced in accordance to German Regulation of Boiler (TRD) / Pressure Vessel (AD) and DIN standard of design and tests. Steam trap with membrane capsule adjusting device can resist on corrosion and does not get effected by water hammer. TKK 2Y Steam Trap includes strainer. This type of steam trap can be operational in any locations and includes standard membrane capsule. Specially designed seat interior stainless steel ball can be operated as check valve.

Specification

Type	TKK 2Y
Size	15A, 20A, 25A
Maximum permissible pressure	40bar
Maximum operational pressure	32bar
Maximum applied temperature	250℃
Differential pressure	22bar
Connection	screwed, socket weld

▶ Install a strainer (80 MESH or higher) at the front end when installing the valve.

Weight

Connections	Socket weld			Screwed		
Size (mm)	15A	20A	25A	15A	20A	25A
Weight (kgs)	1.8	1.7	1.6	1.9	1.9	1.9

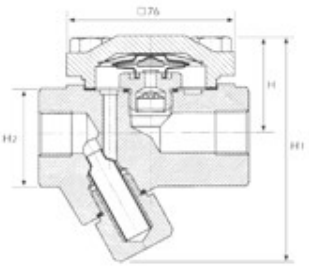
Connections

Screwed	NPT acc. to ANSI B1 20.1, BSP acc. to BS 21
Socket Weld	ANSI B 16.11

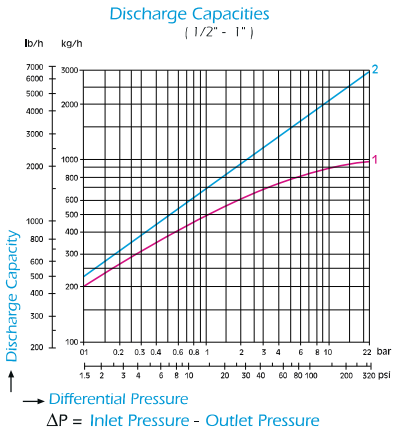
Dimension

Cap/Size	L	L1	H	H1	H2
15A	150	95	45	97	40
20A	150	95	45	97	40
25A	160	95	45	97	40

Dimensional drawing



Flow Curve



03

TKK 2N Steam Trap

Like any other steam traps TKK 2N has been produced in accordance to German Regulation of Boiler (TRD) / Pressure Vessel (AD) and DIN standard of design and tests. Steam trap with membrane capsule adjusting device can resist on corrosion and does not get effected by water hammer. TKK 2N Steam Trap includes flat strainer. This type of steam trap will operate in any location and includes standard "S" type membrane capsules.

Specification

Type	TKK 2N
Size	15A, 20A, 25A
Maximum permissible pressure	40bar
Maximum operational pressure	32bar
Maximum applied temperature	250℃
Differential pressure	22bar
Connection	screwed, socket weld

▶ Strainer (over 80 Mesh) installation is required to ahead inlet when installing valve.

Weight

Connections	Socket weld			Screwed		
Size (mm)	15A	20A	25A	15A	20A	25A
Weight (kgs)	1.6	1.5	1.4	1.7	1.7	1.7

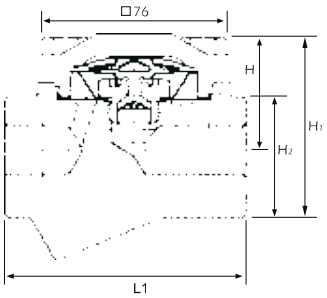
Connections

Screwed	NPT acc. to ANSI B1 20.1, BSP acc. to BS 21
Socket Weld	ANSI B 16.11

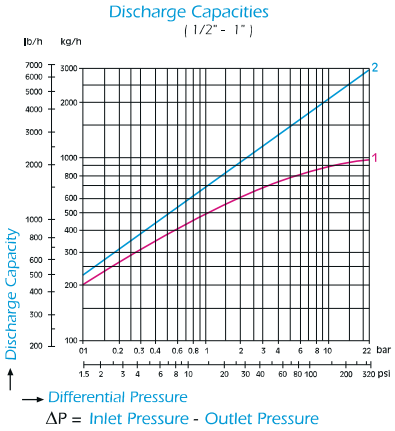
Dimensions

Cap/Size	L	L1	H	H1	H2
15A	150	95	45	67	40
20A	150	95	45	67	40
25A	150	95	45	67	40

Dimensional drawing



Flow Curve



TKK 41 Steam Trap

TKK 41 is ideal for high corrosive environment or where ammonia is discharged. TKK 41 Steam trap has been designed to be suitable for high corrosive environment. Like any other steam traps TKK 41has been produced in accordance to German Regulation of Boiler (TRD) / Pressure Vessel (AD) and DIN standard of design and tests. Steam trap with membrane capsule adjusting device can resist on corrosion and does not get effected by water hammer. TKK 41 Steam Trap includes flat strainer with body made only by stainless steel with low discharge capacity. TKK41 is impossible to maintain and repair. TKK 41 is suitable for medicine or food industry. Steam trap contains standard membrane capsules.

Specification

Type	TKK 41
Size	10A, 15A, 20A
Maximum permissible pressure	55bar
Maximum operational pressure	45bar
Maximum applied temperature	250℃
Differential pressure	21bar
Connection	screwed

▶ Install a strainer (80 MESH or higher) at the front end when installing the valve.

Weight

Connections	Screwed		
Size (mm)	10A	15A	20A
Weight (kgs)	0.3	0.3	0.3

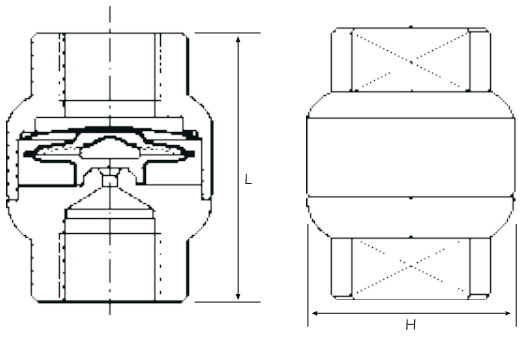
Connections

Screwed	NPT acc. to ANSI B1 20.1, BSP acc. to BS 21

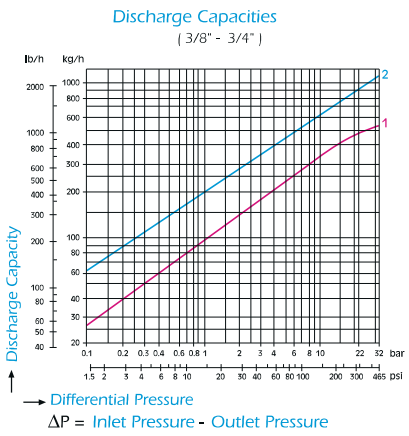
Dimensions

Cap/Size	L	H
10A	55	42
15A	55	42
20A	55	42

Dimensional drawing



Flow Curve



03

TKK 3 Steam Trap

TKK 3 is specially designed to fit where there is high condensate discharge level and high water hammer resistance. Like any other steam traps TKK 43 has been produced in accordance to German Regulation of Boiler (TRD) / Pressure Vessel (AD) and DIN standard of design and tests. Steam trap with membrane capsule adjusting device can resist on corrosion and does not get effected by water hammer. The difference between other steam trap and TKK 3 Steam trap is that it contains flat strainer and 3 thermostatic capsules. This type of steam trap operates in any locations and includes standard "S" type membrane capsules.

Specification

Type	TKK3
Size	15A, 20A, 25A
Maximum permissible pressure	40bar
Maximum operational pressure	32bar
Maximum applied temperature	250℃
Differential pressure	22bar
Connection	screwed, socket weld

▶ Strainer (over 80 Mesh) installation is required to ahead inlet when installing valve.

Weight

Connections	Socket weld			Screwed		
Size (mm)	15A	20A	25A	15A	20A	25A
Weight (kgs)	2.4	2.4	2.3	2.5	2.5	2.4

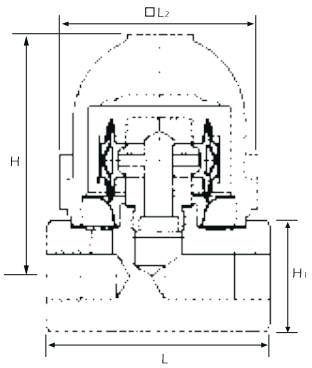
Connections

Screwed	NPT acc. to ANSI B1 20.1, BSP acc. to BS 21
Socket Weld	ANSI B 16.11

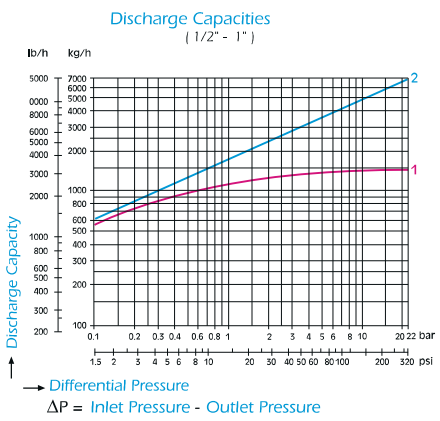
Dimensions

Cap/Size	L	L1	L2	H	H1
15A	95	150	82	93	41
20A	95	150	82	93	41
25A	95	150	82	93	41

Dimensional drawing



Flow Curve



YRS-3 Type Radiator Trap

This is a thermo-wax type radiator trap that is used for heating radiators.

Features

- No concern about freezing damages : no condensate remaining in the trap.
- No steam leakage : discharging condensate only when it is 100℃ or below.
- Quickly discharging condensate and air.
- Compact & strong : The product can be used almost permanently. If needed, just replace the element.
- Distance among surfaces and the union nipple part – Same regulations on heating radiator traps KS B 6403 are applied.

Specification

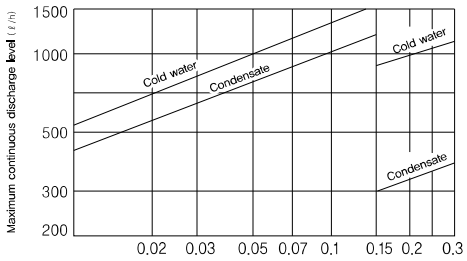
Applicable pressure		0.01~0.15	0.15~0.3MPa
Fluid temperature		100℃ below	150℃ below
End connection	Inlet	KS PT SCREW (Union nipple)	
	Outlet	KS PT SCREW	
Materials	Body	C3771	
	Disc, seat	STS	
Hydraulic test pressure		1.5 times of applicable flange rating	

Dimensions

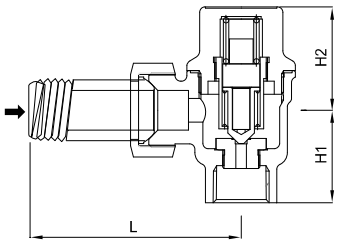
(mm)

Size	L	H1	H2	d	Weight (kg)
15(½")	80	35	40	½"	0.6
20(¾")	87	41	40	¾"	0.6

Flow Curve



Dimensional drawing



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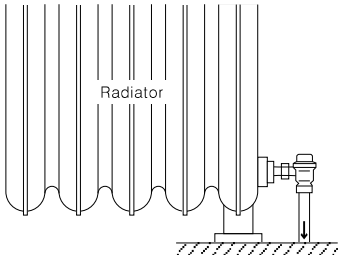
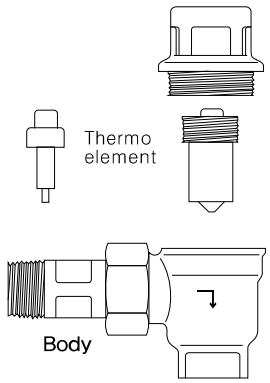


Changing the thermo element



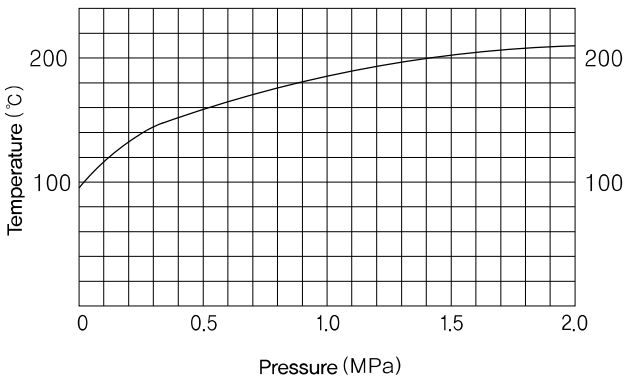
The element can be changed simply by loosening the cap.

Data / Steam Trap

Steam characteristics and terminologies

- STEAM CURVE
  Water boils at 100°C when it is heated while placed in an open container. When water inside an airtight container is heated, the pressure rises and the saturation temperature goes up as well. Diagram 1 shows the relationship between pressure and temperature.

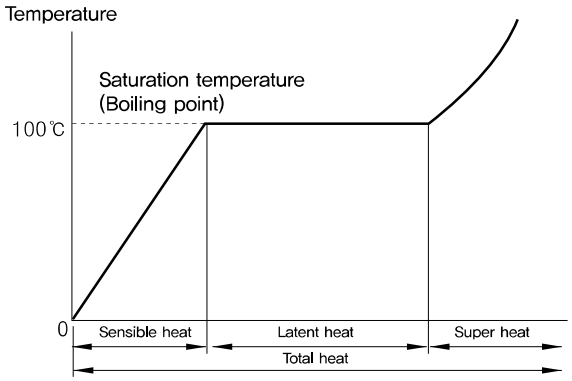
》Diagram 1. Steam curve



HEAT

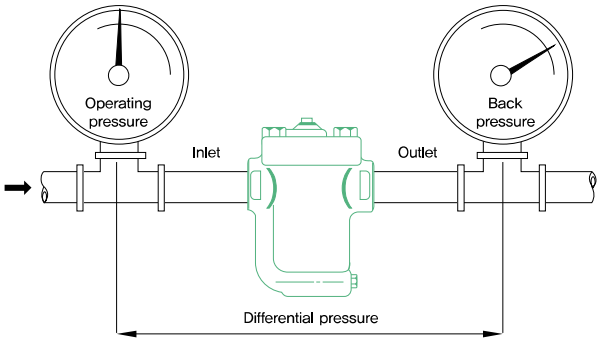
- Sensible heat: Heat required to heat a unit weight of water so that it reaches the saturation temperature, while the pressure remains constant.
- Latent heat: Heat required to convert a unit weight of saturated water in saturation temperature state into saturated steam. (Also referred to as evaporation heat.)
- Super heat: Heat required to convert a unit weight of saturated steam into super heated steam.
- Total heat: Total heat that steam has in a certain state.
- Diagram 2 shows the relationship between temperature and heat.

Diagram 2. Heat curve



Operation-related terminologies

Operating Pressure	Pressure on the inlet side of a trap
Back Pressure	Pressure on the outlet side of a trap
Differential Pressure	Difference between the operating pressure and back pressure
Operating temperature	Temperature on the inlet side of the trap under operating conditions
Maximum Operating	Temperature Maximum temperature allowed for the inlet side of a trap
Maximum Operating	Pressure Maximum pressure allowed for the inlet side of a trap



Data / Steam Trap

Types of steam traps

- Functions of a steam trap

  A steam trap should quickly discharge condensate, air, and CO^2 gas from a steam system, and should not leak live steam.

- Types of steam traps

Category	Type
Mechanical Steam Trap	1. Float Trap 2. Inverted Bucket Trap 3. Open Bucket Trap
Thermostatic Steam Trap	1. Bellows Trap 2. Thermo Wax Trap 3. Bimetallic Trap
Thermodynamic Steam Trap	1. Disc Trap

· Comparison of characteristics among different trap types

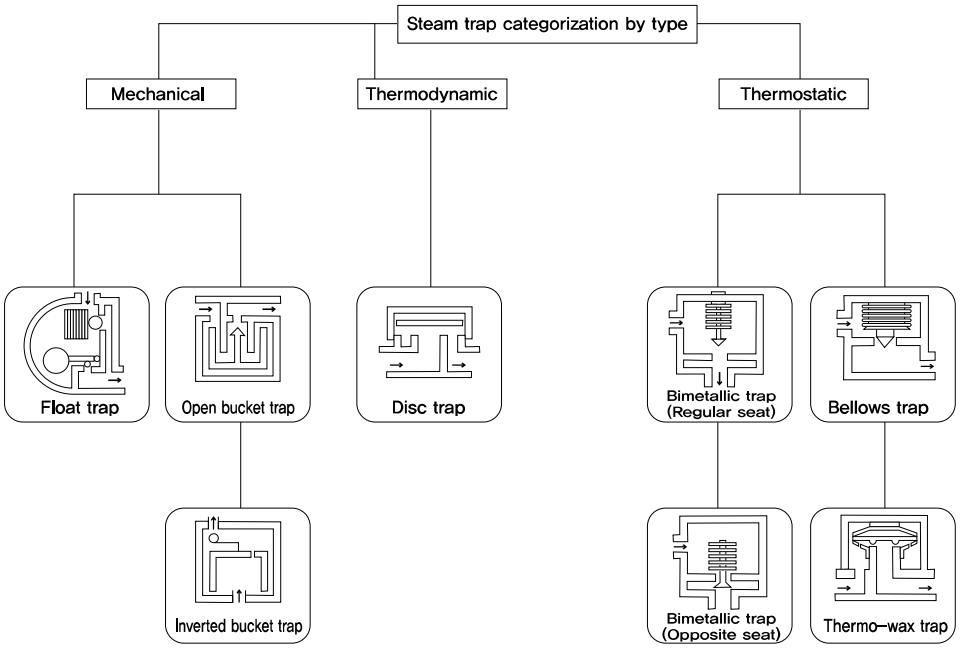
Characteristics \ Category		Inverted bucket trap YBT-2C YBT-400	Float trap YAF-14	Disc trap YSP-1,2 YSP-5, 6	Thermostatic trap YRS-3
1	Operation cycle	Intermittent operation	Continuous operation	Intermittent operation	Continuous operation
2	Energy conservation (during operation)	○	○	X	●
3	Abrasion resistance	●	●	○	●
4	Corrosion resistance	●	●	●	●
5	Fluid's impact resistance	○	X	●	●
6	Discharge of air and CO^2 at steam temperature	○	X	X	X
7	Air discharge capability at ultra low pressure(0.012MPa)	X	●	X	●
8	Air load handling capability during start-up	○	●	X	●
9	Operation based on back pressure	●	●	X	●
10	Freezing resistance	○	X	●	●
11	Operation performance in terms of small load	○	●	X	●
12	Hindrance by foreign substances	●	●	X	●
13	External size	Large	Large	Small	Small
14	Re-evaporated steam handling capability	○	X	X	●
15	Orifice closing state before operation	Open	Closed	Closed	Open
Legend		● Excellent ○ Good X Open			

Data / Steam Trap

Steam trap selection

- Selection of a type

  Steam traps have different characteristics according to their type. This is why there is a need to first decide on a specific type when selecting a steam trap. A type should be selected based on past experience. For details, review informational materials and consult with the manufacturer.



- Selection of a size

  A decision on a size of a steam trap should be made in consideration of the generated condensate amount, differential pressure, back pressure, and safety factor of steam equipment.

1) How to calculate the generated condensate amount
- Materials provided by the steam equipment manufacturer
- Calculation using a formula

$$W = \frac{Q \cdot \Delta T \cdot Cp}{L}$$

W : Generated condensate amount (kg/h)
Q : Heated liquid flow (kg/h)
Cp : Specific heat (kcal/kg℃)
L : L : Heat reduction of steam (kcal/kg)

2) Differential pressure : Difference in pressure (back pressure) between the inlet side and outlet side of a trap

3) Safety factor : Apply a safety factor to steam equipment by considering the maximum condensate load during initial operation.

⟩⟩ Safety ratio of various facilities

Steam main	3
Heat exchanger	2
Tracing line	2
Heating facility	3

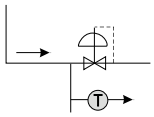
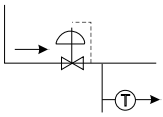
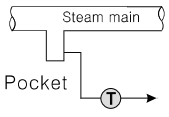
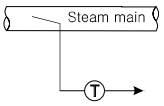
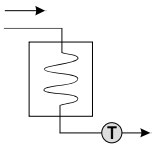
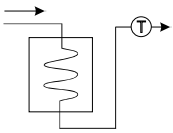
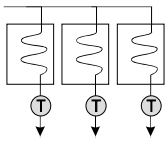
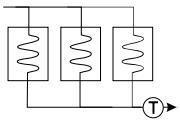
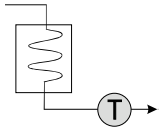
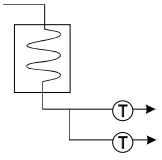
Data / Steam Trap

Cautionary measures for trap installation and examples of installation in a pipeline

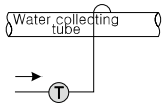
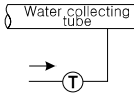
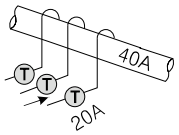
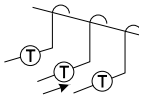
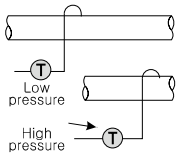
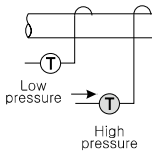
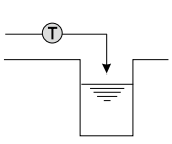
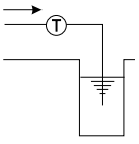
- Cautions for trap installation
  - · Remove scales, dust, etc. from the pipeline before installing a trap.
  - · Install the trap where easy maintenance and inspections can take place.
  - · Install the trap near the steam equipment.
  - · Have the pipeline inclined so that condensate flows into the trap by force of gravity.

- Application Diagram (Example)

⟩⟩ In case of inlet side

Example of a good case	Example of a bad case	Explanation
		Install the trap on the inlet side to improve the performance of an automatic valve, including a pressure reducing valve.
		In case of steam main, install the trap in the pipeline after installing a pocket.
		Install the trap at the lowest end of the steam equipment.
		If there is more than one steam equipment, install a trap for each..
		Avoid parallel pipeline installation of steam traps.

⟩⟩ In case of outlet side

Example of a good case	Example of a bad case	Explanation
		If the outlet side is vertically standing, connect the trap on the upper part of the water collecting tube.
		The pipe size of the condensate collecting tube should be bigger than the sum of the cross sections of the trap pipeline.
		Install separate water collecting tubes for steam usage areas that have a different pressure level (of at least 50%).
		The outlet side of the trap should be at a higher location than the water level of the condensate tank.

Data / Steam Trap

03

Troubleshooting

1) Bucket trap (YBT-4)

Troubles	Possible reasons	Measures
Not discharging	The running pressure is higher than the trap's applicable pressure. The orifice is clogged due to foreign substances.	Replace the trap with another one that has an appropriate pressure level. Disassemble and clean.
Small discharge volume	There is insufficient discharge capacity. The operating differential pressure is insufficient due to excessive back pressure.	Replace the trap with another one that has enough capacity. Check the pressure level on the inlet and outlet side of the trap and the piping system.
Steam leakage	There is a foreign substance in between the disc and seat. The disc and seat are worn. The bypass valve is defective.	Disassemble and clean. Change the disc and seat. Check or replace the bypass valve.

2) Float trap (YAF-14S, YAF-14F)

Troubles	Possible reasons	Measures
Not discharging	The float has been damaged. The running pressure is higher than the trap's applicable pressure.	Change the float. Replace the trap with another one that has an appropriate pressure level.
Small discharge volume	The trap does not have enough discharge capacity. The operating differential pressure is insufficient due to excessive back pressure. The strainer on the inlet side of the trap is clogged.	Replace the trap with the one that has enough capacity. Check the pressure level on the inlet and outlet side of the trap and the piping system. Disassemble and clean.
Steam leakage	There is a foreign substance in between the disc and seat. There is a foreign substance in the air vent valve or the valve has been damaged. The bypass valve is defective.	Disassemble and clean the disc and seat. Check or replace the air vent valve.

3) Disc trap (YSP-1, 2, YSP-5, 6)

Troubles	Possible reasons	Measures
Not discharging	The trap's operating differential pressure is insufficient. The back pressure is high because the outlet side is vertically standing. The trap's discharge capacity is insufficient. The strainer on the inlet side is clogged.	Check the pressure on the inlet and outlet side of the trap. Check the piping system. Replace the trap with the one that has enough capacity. Disassemble and clean.
Small discharge volume	There is a foreign substance in between the disc and seat. The disc and seat are worn. The bypass valve is defective.	Disassemble and clean. Disassemble and polish, or replace the disc and seat. Check or replace the bypass valve.
Steam leakage	The back pressure is excessive. The running pressure is lower than the trap's minimum operating pressure.	Check the piping patterns on the outlet side. Replace the trap with a more appropriate one.

MEMO

04

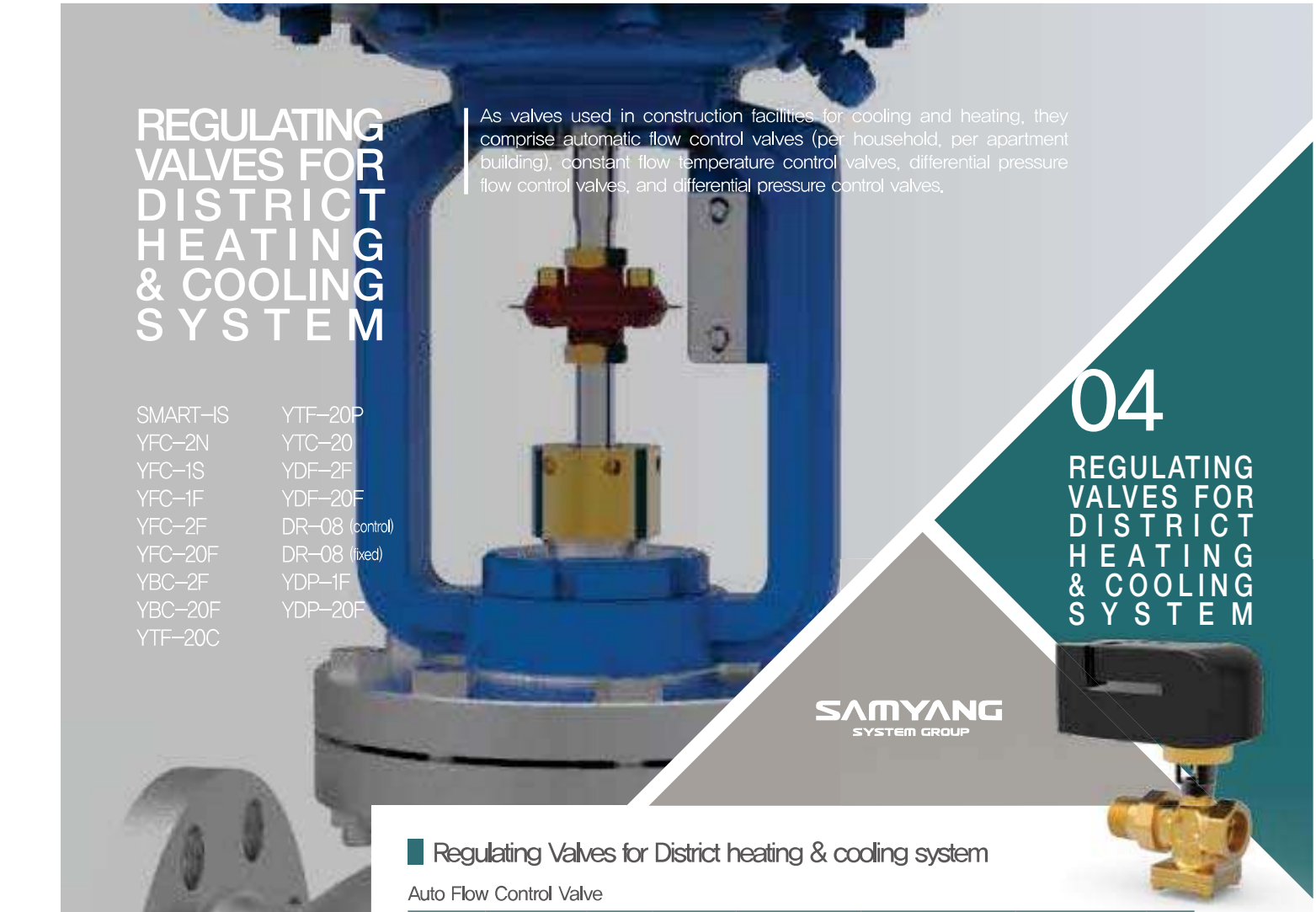
REGULATING VALVES FOR DISTRICT HEATING & COOLING SYSTEM

VALVE

REGULATING VALVES FOR DISTRICT HEATING & COOLING SYSTEM

As valves used in construction facilities for cooling and heating, they comprise automatic flow control valves (per household, per apartment building), constant flow temperature control valves, differential pressure flow control valves, and differential pressure control valves.

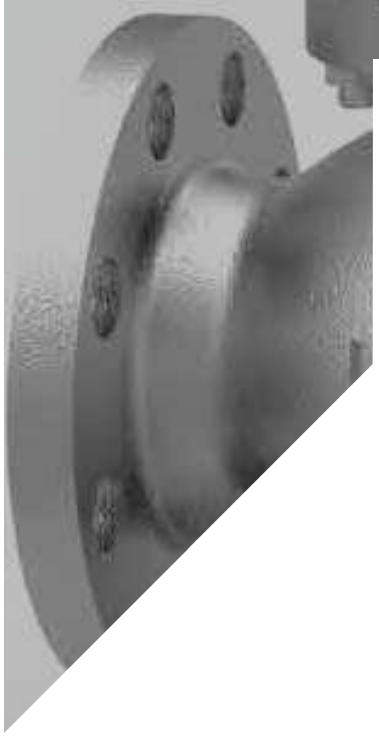
SMART-IS
YFC-2N
YFC-1S
YFC-1F
YFC-2F
YFC-20F
YBC-2F
YBC-20F
YTF-20C
YTF-20P
YTC-20
YDF-2F
YDF-20F
DR-08 (control)
DR-08 (fixed)
YDP-1F
YDP-20F



04

REGULATING VALVES FOR DISTRICT HEATING & COOLING SYSTEM

SAMYANG SYSTEM GROUP



Regulating Valves for District heating & cooling system

Auto Flow Control Valve

Type	Size	Applicable pressure (MPa)	Operating differential pressure range	Structure	Material		End connection	page
					Body	Disc, seat		
SMART-IS	15(½")~250(6")	1.0 Bleow	0.03~0.4	Auto balancing + Active dyraic	GCD450	CAC406	KS 10K RF FLANGE	95
YFC-2N	15(½")~50(2")	1.0 Bleow	0.03~0.29	Auto balancing (per household)	CAC303	C3604BE	KS PT SCREW	100
YFC-1S	32(1¼")~50(2")		0.02~0.15	Auto balancing	C3604	STS		102
YFC-1F	50(2")~200(8")		0.03~0.39		SPPS		KS 10K FF FLANGE	
			0.05~0.69					
YFC-2F			0.05~0.1		GC200		KS 10K RF FLANGE	104
YFC-20F		2.0 Bleow	0.05~0.2		SCPH2		KS 20K RF FLANGE	
YBC-2F		1.0 Bleow	~	Manual balancing	GC200		KS 10K RF FLANGE	105
YBC-20F		2.0 Bleow			SCPH2		KS 20K RF FLANGE	

Auto flow – Temperature Control valve

Type	Size	Applicable pressure (MPa)	Operating differential pressure range	Structure	Material		End connection	page
					Body	Diaphragm		
YTF-20C	15(½")~50(1")	1.0 Below	0.03~0.4	Diaphragm	CAC303	EPDM	Inlet : PT SCREW PF SCREW Outlet : PT SCREW PF SCREW	108
YTF-20P								

Differential Pressure & Flow Control Valve

Type	Size	Applicable pressure (MPa)	Operating differential pressure range	Structure	Material		End connection	page
					Body	Disc, seat		
YDF-2F	25(1")~150(6")	1.0 Below	0.01~0.15 0.02~0.21 0.15~0.29	Diaphragm Direct Type	GC200	CAC406	KS 10K RF FLANGE	111
YDF-20F		2.0 Below			SCPH2	STS	KS 20K RF FLANGE	
DR-08	20(¾")~25(1")	1.0 Below	4.9~29(kPa)		CAC303	CAC303	KS PT SCREW	113
DR-08	20(¾")~25(1")		16(kPa)					

Differential Pressure & Flow Control Valve

Type	Size	Applicable pressure (MPa)	Operating differential	Structure	Material		End connection	page
					Body	Disc, Seat		
YDP-1F	25(1")~150(6")	1.0 Below	0.05~0.1 0.05~0.2 0.1~0.29	Diaphragm Direct Type	GC200	CAC406	KS 10K RF FLANGE	115
YDP-20F		2.0 Below	0.3~0.49 0.05~0.29 0.29~0.49		SCPH2	STS	KS 20K RF FLANGE	

SMART-IS (SMIF / SMIS)

Transformed from inefficient control type dip switch, Samyang SMART-IS Valve implemented new concept of Intelligent Satz system. Intelligent Satz translates to 'intelligent operational setting' which means that the actuator itself calculates the value and controls the flow that has been set by user (no hassle for users to calculate) by so called intelligent control system. Previously when setting the rate of flow, cover of actuator must be opened (dip switch type), however with user interface installed into actuator it can set the values directly by simply changing the open rate of motor. Samyang SMART-IS, an automatic control valve has been improved for the convenience of users with less energy consumption by precise control of flow.

Features

Balancing in pipeline

• With Samyang SMART-IS, changes within fixed flow rate can be altered to required flow. By installing actuator, it can limit the operational scale of valve which means it can limit the maximum flow of rate. Also it can minimize the hassle of calculating complicated valve settings and balancing the pipeline more automatically without having to install extra balancing valve.

Accurate rate of flow by automatic balancing

• With innovative Self-monitoring system, Samyang SMART-IS auto-balances continuously so that it controls rate of flow distributing to system outlet (Cooling/heating coil, radiator, fan-coil etc.) With this function, system outlet will be receiving accurate and precise flow of rate even if pipeline has differential changes. Also maximum rate of flow can be set individually so that precise value of flow is maintained at the system outlet.

SMIF

Innovative IS (Intelligent Satz) type applied

• Previously when setting flow rates to actuator as DS (Dip switch) type, there was lot of limits in method of setting up rate of flow, range and energy efficiency. However, Samyang SMART-IS which has been invented with German GS incorporation has Intelligent Satz type that can automatically set up value of flow rate by entering values using UI (User Interface).

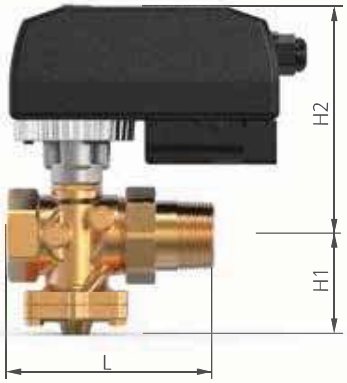
SMIS

Specification

Type			SMIS						SMF												
Size (DN)		mm	15	20	25	32	40	50	50	65 LF	65	80	100	125	150	200	250	125 HF	150 HF	200 HF	250 HF
		inch	1/2	3/4	1	1 1/4	1 1/2	2	2	2 1/2	2 1/2	3	4	5	6	8	10	5	6	8	10
Flow control range	ℓ/h	Qmin	300	300	300	300	600	900	3,000		5,000		15,000	15,000		50,000	100,000	15,000	15,000	100,000	150,000
		Qmax	1,200	1,200	2,400	3,600	6,000	7,200	20,000		30,000		55,000	90,000		200,000	300,000	120,000	150,000	300,00	500,000
	ℓ/m	Qmin	5	5	5	5	10	15	50		83		250	250		833	1,667	250	250	2,000	2,500
		Qmax	20	20	40	60	100	120	333		500		917	1,500		3,333	5,000	2,000	2,500	5,000	8,333
	GPM	Qmin	1.3	1.3	1.3	1.3	2.6	4.0	13.2		22		66	66		220	440	66	66	528	660
	(US)	Qmax	5.8	5.8	10.6	15.9	26.4	31.7	88		132		242	396		881	1321	528	660	1320	2201
Applicable pressure			1.6MPa																		
Differential pressure range			0.03MPa ~ 0.4MPa (30kPa~400kPa)															0.06~0.4MPa(60~400kPa)			
Applicable fluid			Hot/Cold water																		
Temp.(fluid temp)			5~120℃																		
Temp.(surrounding temp)			5℃ ~ 120℃																		
End connection			SCREW / UNION						FLANGE (KS : 10K / DIN : PN16) Amsi												
Material	Body		KSD 6024 CAC 303						KSD 4302 GCD 450												
	Disc		KSD 5101 C3604BE						KSD 6024 CAC 406												
	Diaphragm		EPDM																		

SMART-IS dimensions

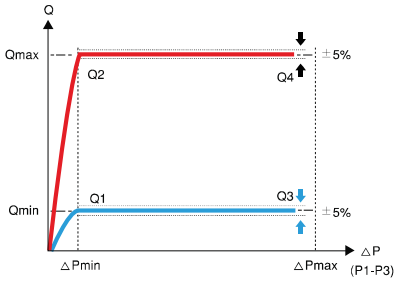
Size	50A	65A	80A	100A	125A	150A	150A(HF)	200A	250A
H1	191	185	185	260	266	266	350	393	421
H2	291	300	300	320	346	346	400	440	508
W1	161	161	161	227	219	219	219	216	283
W2	154	154	154	221	212	212	212	200	250
L	254	272	272	352	400	400	400	543	730



Size	15A	20A	25A	32A	40A	50A
H1	52	52	52	70	84	89
H2	160	160	160	166	166	170
L	104	112	126	129	156	166

SMART-IS flow characteristics

- Flow control range: within Q1~Q4
- Flow characteristics curve: Min ΔPmin ≠ set flow
- Above ΔPmin ~ below ΔPmax



SMART- IS Actuator specification

❶ DISPLAY : 4 Digit FND Display
❷ ^ : UP
❸ v : DOWN
❹ MODE : Function/Setting
(Double click for Function mode)

Operating time	Min170sec (full open ⇔ full close)
Control input	· Voltage Input (0~10VDC, 2~10VDC) · Current Input (0~20mA, 4~20mA) · On-Off Input (24V:Open, 0V:Close) · 3-Point-Floating Input (P3 24V: Open, P4 24V: Close) · PWM Control (0.1~5.0Sec, 0.1~25Sec) · Internal Input
Torque	· Open : Min. 50kgf.cm · Close : Min. 40kgf.cm
Location feedback	Relative position detection by Encoder pulse
Surrounding temperature	-20℃ ~ 65℃
Wire	18AWG
Cover material	Aluminum & Plastic
Power	24V 1A

Once power is on 0 will be displayed and value of valve will be set to 0. Do not set the buttons at this stage. If you set the button when value is 0, control will not be fully functional due to misleading rate of flow value.

※ Safety function : if it does not read 0 value and Go-0 is still displayed, press ▼ button will set value as 0.

How to set up Actuator

- Press MODE button twice to bring up setting mode
- In Setting mode, press ▲/▼ button to change the values
- Once value has been set, press MODE to change to other functions

SET	Setting	Display	Display meaning	Operating method	Notes
S-01	Input and select display method	FLo	Flow	Press ▲/▼ to select method of input and press MODE to finish.	※ Control with INT Mode flow value (if operating on body, control with flow value)
		PErc	%		※ Control with INT Mode % value (if operating on body, control with % value)
S-02	Select Input	0-10	voltage	Set to Voltage JOG	Voltage between Pn3 - Pn1: 0V~10V
		2-10	voltage	Set to Voltage JOG	Voltage between Pn3 - Pn1: 2V~10V
		0-20	voltage	Set to Voltage JOG	Electric current between Pn3 - Pn1: 0mA~20mA
		4-20	voltage	Set to Voltage JOG	Electric current between Pn3 - Pn1: 4mA~20mA
		on-F	On/OFF	24V: Open, 0V: Close	Voltage between Pn3 - Pn1: 24V: Open, 0V: Close
		rt	Manipulator	Control with R/T External connection	Setup with RT button (option)
		3-FL	3 point floating input	P3 23V: Open, 24V: Close	Voltage between Pn3 - Pn1: 24V: Open
		P-05	PWM 5Sec	Voltage between Pn3 - Pn1: 24V: Close	0.1Sec : 0%, 5 Sec : 100%
		P-25	PWM 25Sec	PWM Control (0.1~25sec)	0.1Sec : 0%, 25 Sec : 100%
		Int	Internal input	Enter from main body	Operates with main body setting (controls with Set1 setup)
S-03	Min flow setting	Display Min flow value	Display "Min" flow setting	Press ▲/▼ to select flow input and press MODE to finish	Min flow value should be less than Max flow value
S-04	Max flow setting	Display Max flow value	Display "Max" flow setting	Press ▲/▼ to select flow input and press MODE to finish	Max flow value should be larger than Min flow value
S-05	Check setting value & current value	Fd-F	Display 'Flow' Feedback value	Press ▲/▼ to select display and press MODE to finish	FND (display method)
		Fd-P	Display '%' Feedback value		
		St-F	Display "Flow" setting value		
		St-P	Display "%" setting value		
S-06	Rotation angle adjustment	Max valve Rotation angle	Max pulse value adjustment	Press ▲/▼ to select values and press MODE to finish	※ Do not alter. Correct maximum rotation angle for each valve
S-07	Rotation angle offset adjustment	0 (±10%)	Display digits	Press ▲/▼ to select values (±10.0) and press MODE to finish	Increase/decrease flow by ±10%
S-08	Select valve location when no power	CLoS	Valve is closed when no power	If no power select Open or Close as valve location	Option
		oPEn	Valve is closed when no power		
S-09	Select Flow unit	LIt	SI unit	Press ▲/▼ to select unit and press MODE to finish	SMI Sunit : ℓ /min SMIF Sunit : m^3/hour
		GAL	GPM unit		Unit : gal/min
S-10	Select Flow curve	L In	Control by input flow value	Press ▲/▼ to select curve and press MODE to finish	Linear Curve (Convert to value of 1st Graph)
		EPEr	Control by input curve		Equal Percentage Curve (Convert to value of 2nd Graph)
S-11	Min. control Volt Calibration	Min. Volt analogue value	Adjust min Volt value	Press ▲/▼ to select min. Volt value and press MODE to finish	Read min. Volt from set value
S-12	Min. control Volt Calibration	Max. Volt analog value	Adjust max Volt value	Press ▲/▼ to select max. Volt value and press MODE to finish	Read max. Volt from set value
S-13	Select speed of rotation	PE01	Speed of rotation 1rpm	3 types of selection options 1. AUTO (between 1~1.5 auto adjustment) 2. PE01 (1rpm) 3. PE15 (1.5rpm)	
		PE15	Speed of rotation 1.4rpm		
		AUTO	Rpm automatic adjustment		
S-14	Select Feedback method	0-10	Feedback method (Voltage)	From control centre/room select method of feedback signal	
		2-10			
		0-20	Feedback method (Current)		
		0-20			

- Control while operating (INT mode)
- In Setting mode, change S-02 function to INT Mode
- Input can be set up to 0~max flow or 0%~100% depending on the Set1 setup

Actuator display mode based on valve type

Type	SMIS						SMIF									
Standard (DN)	15	20	25	32	40	50	50	60 LF	65	80	100	125	150	125 HF	150 HF	200 HF	250 HF
FND	S-20		S-25	S-32	S-40	S-50	F-50	F-64	F-65	F-80	F-100	F-125	F-150	F-126	F-151	F-201	F-251
Max. Flow (ℓ /h)	1,320		2,400	3,600	6,000	72,000	20,000		30,000		55,000	90,000		120,000	150,000	120,000	150,000

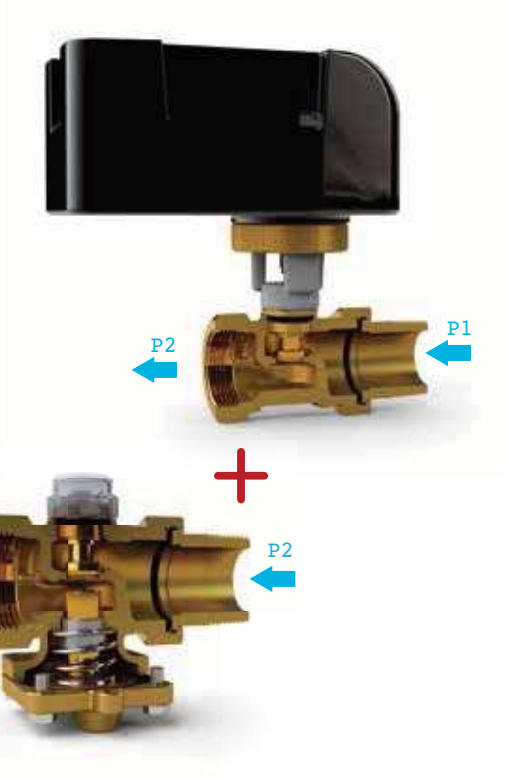
SMART-IS Operation Method

❶ Stem : Balancing Function
(Absorbing a differential pressure, Pressure control)

❷ Cone : Control Function
(Flow control)

Integrated 2 in 1

Samyang's active constant flow valve SMART-IS contains two valves in one valve which means it can control and balance at the same time. It has function of balancing valve by using spring and diaphragm to absorb differential pressure of vale inlet and outlet plus it has control valve function by using actuator to control the flow.



Intelligent Satz (IS)
Innovative control method

Samyang SMART-IS transformed from inefficient control type dip switch and has implemented new concept of Intelligent Satz system.

Intelligent Satz translates to 'intelligent operational setting' which means that the actuator itself calculates the value and controls the flow that has been set by user (no hassle for users to calculate) by so called intelligent control system.

Previously when setting the rate of flow, cover of actuator must be opened (dip switch type), however with user interface installed into actuator it can set the values directly by simply changing the open rate of motor. Samyang SMART-IS, an automatic control valve has been improved for the convenience of users with less energy consumption by precise control of flow.

YFC-SI Type Auto Flow Control Valve

This valve stabilizes the entire system and makes no changes in fixed flow due to pressure difference while in operation.

04

Features

- As a perfect balance type, it features outstanding control of the set flow in response to pressure fluctuations.
- Can be changed and adjusted on the field, and control range is wide.
- As a diaphragm type product, the range of applicable differential pressure is wide and superb in its ability to respond to rapid load fluctuations.
- Internal pressure and temperature of pipe line can be measured through cisco plug.
- An optimal design for fluid flow reduces noise and vibration

Specification

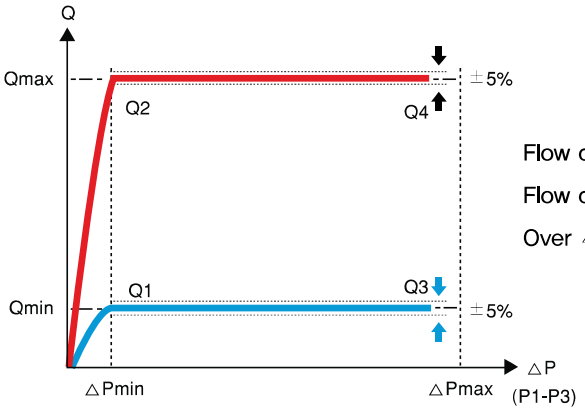
Type		YFC-SI					
Applicable size		50A ~ 150A					
Applicable fluid		Cold · Hot water					
Fluid temperature		5℃~120℃ below					
Differential pressure control range		0.03~0.39 MPa					
Differential flow rate		5% of set flow					
Material	Body	GCD450					
	Disc	Bc6					
	Diaphragm	EPDM					
End connection		KS 10K RF FLANGE					
Diameter		50A	65A	80A	100A	125A	150A
Flow control range (LPM)	Min	50	50	160	250	250	250
	Max	330	500	680	910	1350	2500
Minimum operating pressure difference		0.03MPa					

Dimensions

(mm)

Size	50A	65A	80A	100A	125A	150A
H1	219	234	239	285	310	350
H2	272	290	300	316	340	380
L	254	276	298	352	400	451

Flow Curve



Flow control range: Within Q1~Q4

Flow curve: Below △Pmin ∓Set flow

Over △Pmin~ Below △Pmax = SetFlow ±5%

YFC-2N/2NK Type Automatic Flow Control Valve (per Household)

An automatic flow control valve per household limits the maximum flow, thereby distributing an appropriate flow to each place of use. It maintains the flow balance of each place of use by automatically adjusting the flow during the instrument's constant flow rate operations, thereby stabilizing the overall system.

Features

- Perfect Pressure-Balancing Type valve: it can be used independently from pressure changes, etc.
- Diaphragm operation method, instead of the usual cartridge method : less set flow variation.
- Variable flow control function : easy to change and adjust the set flow on the field, without disassembling.
- The employment of an optimal design for fluid flow reduces noise and vibration.
- Structure that allows a constant flow is only slightly affected by foreign substances and ensures easy disassembling and maintenance.
- Easy to remove foreign substances, thanks to an embedded strainer in the valve union.
- Easy to select a piping direction since both sides of the product are set up with unions.

Specification

Type		YFC-2N (per household)
Applicable fluid		Cold/hot water
Automatic differential pressure range		0.03-0.29MPa
Flow variation		±5.0% of set flow
Permissible leakage		0.01%(ANSI 616.104Class IV)
Fluid temperature		120°C below
End connection	Body	KS PT UNION, SCREW(40A, 50A)
	seat	KS PT UNION, SCREW
Material	Body	CAC303
	Disc	C3604BE
	Diaphragm	EPDM
Hydraulic test pressure		water 1.7 MPa

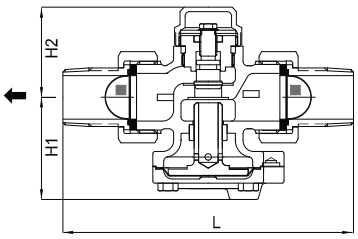
▶Made-to-orders for unions are available only for the inlet or outlet side.
▶Strainer (over 40 Mesh) installation is required to ahead inlet when valve installing.

Dimensions

(mm)

SIZE	L	H1	H2
15(½")	100	60	45
20(¾")	100	60	45
25(1")	112	60	45
32(1¼")	123	60	45
40(1½")	133	69	55
50(2")	165	83	60

Dimensional drawing

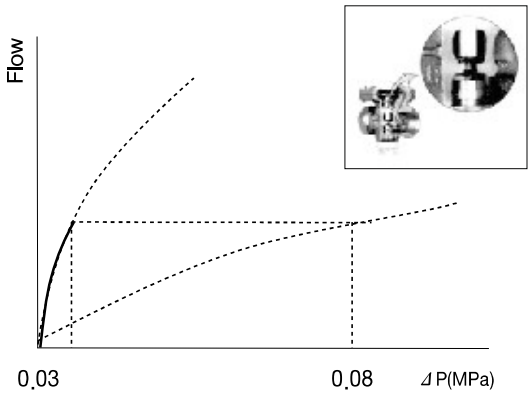


Flow setting range

SIZE	Applicable differential pressure range	Flow setting range(lpm)
15(½")	0.03~0.08	1.5~20
20(¾")		1.5~20
25(1")		1.5~30
32(1¼")	0.03~0.29	5~30
40(1½")		10~60
50(2")		16~80

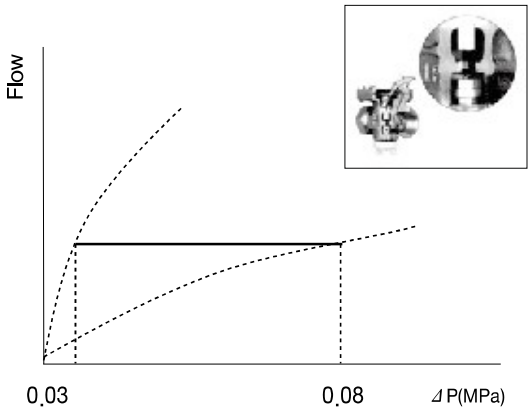
YFC-2N Type Automatic Flow Control Valve (per Household)

Control range (Constant flow control valve for household)



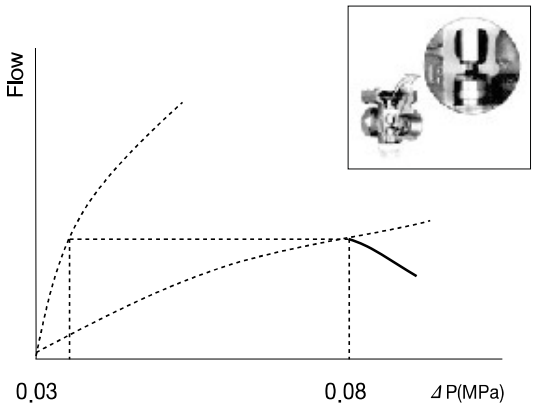
- **When it is smaller than the automatic differential pressure range of an automatic flow control valve**

  Because the differential pressure is low, the pressure level is smaller than the pressure needed to actuate an automatic flow control valve. If actuated below the 0.3 kgf/cm^2 range, the automatic flow control valve is a normal open type. This is why the flow proportionally increases to a maximum of 0.3 kgf/cm^2, which is the operating differential pressure range, according to an increase in differential pressure.



- **When it is within the automatic differential pressure range of an automatic flow control valve**

  The differential pressure within the pipeline is within the pressure range needed to actuate an automatic flow control valve. Within the range of 0.3 kgf/cm^2, a constant flow level is maintained within ±2.5~5.0% of the set flow, based on pressure balancing of the pressure regulating spring and diaphragm, according to differential pressure fluctuations.



- **When it is higher than the operating differential pressure range of an automatic flow control valve**

  As pressure (at least0.08MPa) that is higher than the operating differential pressure range is delivered to the upper part of the diaphragm, the valve slowly closes and the flow decreases according to an increase in differential pressure.

YFC-1S, 1F Type Constant Flow Control Valve

What is needed for effective and efficient use of heating energy in tandem with the diversification of buildings is enhancing thermal efficiency by automatically controlling the appropriate flow of each piping system and thus supplying precisely based on the designed flow value. Samyang's type YFC-1 is the most costeffective and practical product that features a wide array of functions as a constant flow control valve.

Features

- Free from troubles, abrasion and corrosion thanks to an extremely simple structure.
- Can be installed in any direction-horizontally, vertically, or acutely and almost no flow changes resulting from the installation direction.
- Offer a wide selection range for the set flow, and maintains an outstanding performance even in case of a water hammer, vibration, or rapid pressure changes.
- Can be easily handled and installation costs are extremely low.

YFC-1S Type

YFC-1F Type

Specification

Type		YFC-1S	YFC-1F
Size		32~50A	50~200A
Automatic differential pressure range		0.02~0.15MPa	0.03~0.7MPa
		0.03~0.4MPa	
Applicable fluid		Cold / hot water	
Fluid temperature		120℃ below	300℃ below
Flow variation		±5% of set flow	
End connection		KS PT SCREW	KS 10K FF FLANGE
Materials	Body	C3604	SPPS
	Main part	STS	
Hydraulic test pressure		1.5MPa	

▶ When using a valve, be sure to install a strainer (40MESH or more) at the front end. (60 MESH recommended)
▶ Test Cock can be attached
▶ Custom made for 20kg
▶ Install in a water pipe instead of a supply pipe.

Dimensions

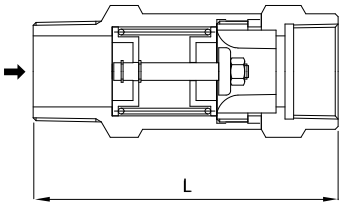
》YFC-1S

Size	L	Weight (kg)	Differential pressure range (MPa)	Flow (LPM)
32(1¼")	120	2.2	0.02~0.15 (0.03~0.39)	14~40 (20~65)
40(1½")	145	2.5		30~130 (50~130)
50(2")	164	2.9		50~250 (80~250)

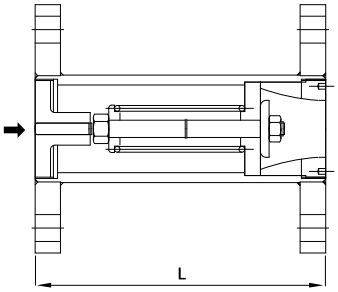
》YFC-1F

Size	L	Weight (kg)	Differential pressure range (MPa)	Flow (LPM)
50(2")	165	10	0.03~0.70	59~360
65(2½")	205	12		100~600
80(3")	225	13		150~700
100(4")	290	16.5		235~1000
125(5")	335	26		368~2300
150(6")	355	37		530~3000
200(8")	450	49		940~3950

Dimensional drawing



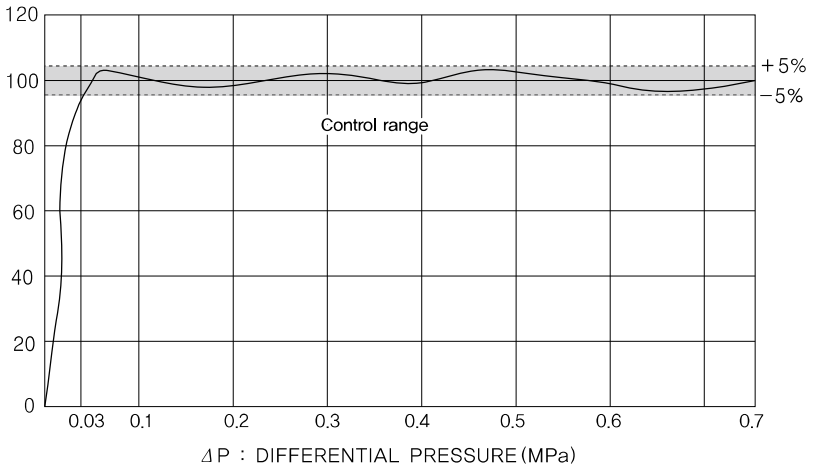
YFC-1S Type



YFC-1F Type

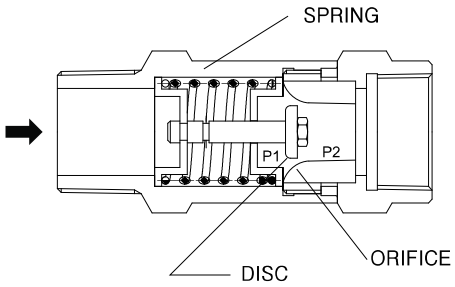
자료 / YFC-1S, 1F Type Constant Flow Control Valve

Features



As seen in the chart above, if the differential pressure (Δp) remains within the range of 0.3 to 7 kgf/cm^2, a constant flow is maintained, with flow changes that are within ±5%.

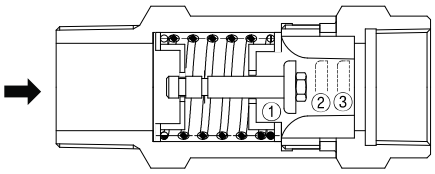
How it works



• The spring absorbs the differential pressure (Δp=P1=P2) between the front and rear of the disc that arises from the flow of fluid. The opening area of the orifice changes according to the spring's movements.

• It automatically adjusts the opening area to become smaller when the differential pressure increases as per increased flow velocity, and adjusts the opening to become bigger when the differential pressure decreases to maintain a constant flow.

How to control flow



• **Below the control range**
Because the disc is completely open by the spring, the opening area of the orifice reaches the maximum. When the valve is operated, the orifice area begins to decrease in proportion to the differential pressure, and thus the flow is controlled. (Case①)

• **Within the control range**
The opening area of the orifice is automatically adjusted according to changes in differential pressure between the front and rear of the disc. The valve precisely controls and maintains the flow within ±5% of the designed flow. (Case②)

• **Over the control range**
If the differential pressure between the front and rear of the disc increases, resulting in excess of the control range, the spring is compressed as much as possible, resulting in the opening area of the orifice reaching its minimum. The flow thus remains at a fixed position in proportion to the differential pressure. (Case③)

YFC–2F, 20F Type Automatic Flow Control Valve

This product is suitable for places that require appropriate flow distribution, based on restriction on the maximum flow, and that require automatic flow restriction during constant flow rate operation of the instrument.

Features

- As a perfect balance type, it features outstanding control of the set flow in response to pressure fluctuations.
- Can be changed and adjusted on the field, and control range is wide.
- As a diaphragm type product, the range of applicable differential pressure is wide and superb in its ability to respond to rapid load fluctuations.
- The structure as a top–bottom separable type is simple and ensures easy handling, pipeline installation.

Specification

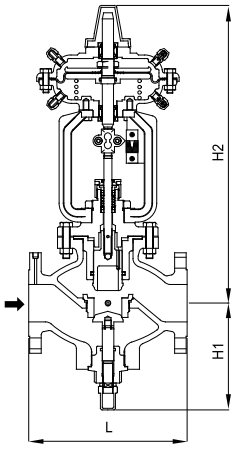
Type		YFC–2F	YFC–20F
Size		65~200A	65~200A
Applicable pressure		1.0MPa below	1.2MPa below
Automatic differential pressure range		0.03~0.3MPa	0.05~0.5MPa
Flow variation		±5% of set flow	
Range of flow control		±5% of set flow	
Applicable fluid		Cold / hot water	
Fluid temperature		120℃ below	
Materials	Body	GC200	SCPH2
	Disc, seat	STS	
	Diaphragm	EPDM	
End connection		KS 10K RF FLANGE	KS 20K RF FLANGE
Hydraulic test pressure		1.5 time of applicable flange rating	

▶ Made–to–orders are available for valves with a size of 250 or larger.
▶ When using the valve, be sure to install the shear strainer (more than 40MESH).

Dimensions

Type / Size	YFC–2F				YFC–20F			
	L	H1	H2	Weight(kg)	L	H1	H2	Weight(kg)
65(2½")	276	185	548	50	292	185	548	55
80(3")	298	190	560	55	318	190	560	61
100(4")	352	200	567	69	368	200	567	78
125(5")	400	225	590	126	400	225	590	145
150(6")	451	263	625	158	473	263	625	197
200(8")	543	357	658	202	568	357	658	251

Dimensional drawing



YBC–2F, 20F Type Manual Balancing Valve

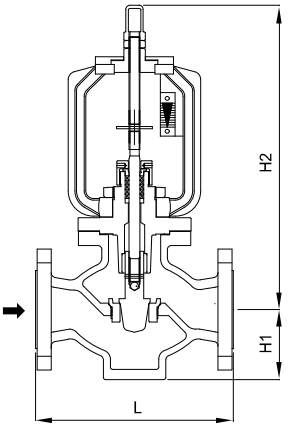
This product is suitable for places that manually restrict flow during constant flow rate operation of the instrument and that need to appropriately distribute flow based on restriction on the maximum flow.

Specification

Type		YBC–2F	YBC–20F
Applicable fluid		Cold/hot water	
Applicable temperature		120°C or below	
Applicable pressure		Maximum 1.0MPa	Maximum 2.0MPa
End connection		KS 10K RF FLANGE	KS 20K RF FLANGE
Materials	Body	GC200	SCPH2
	Disc, seat	STS	
	Diaphragm	EPDM	
Hydraulic test pressure		1.5 time of applicable flange rating	

▶ Nominal diameter 250 or more is made to order.
▶ When using the valve, be sure to install the shear strainer (more than 40MESH).

Dimensional drawing



Dimensions

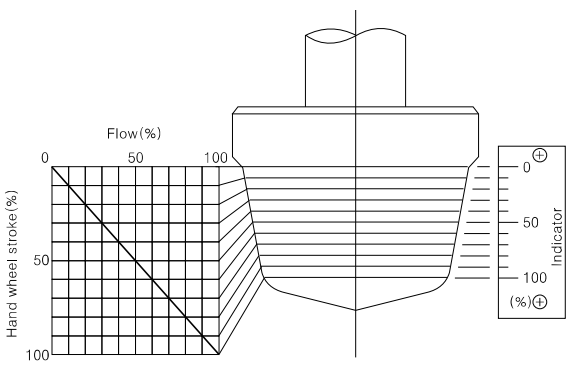
(mm)

Size	H1	H2	Cv	중량(kg)
50(2")	95	355	43	31
65(2½")	115	380	58	39
80(3")	120	400	85.5	47
100(4")	130	420	128	61
125(5")	150	562	222	118
150(6")	180	592	324	150
200(8")	255	632	555	191

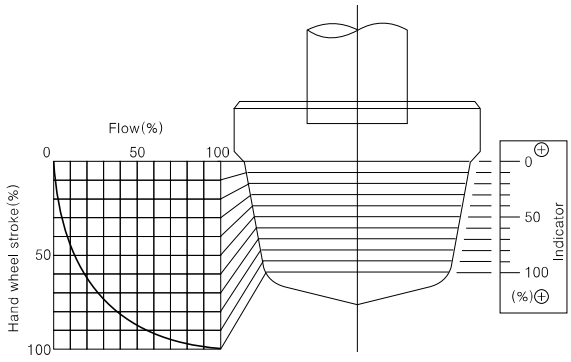
▶ The length values in parenthesis are for the type YBC–20F.

Flow characteristics curve

• Linear characteristics



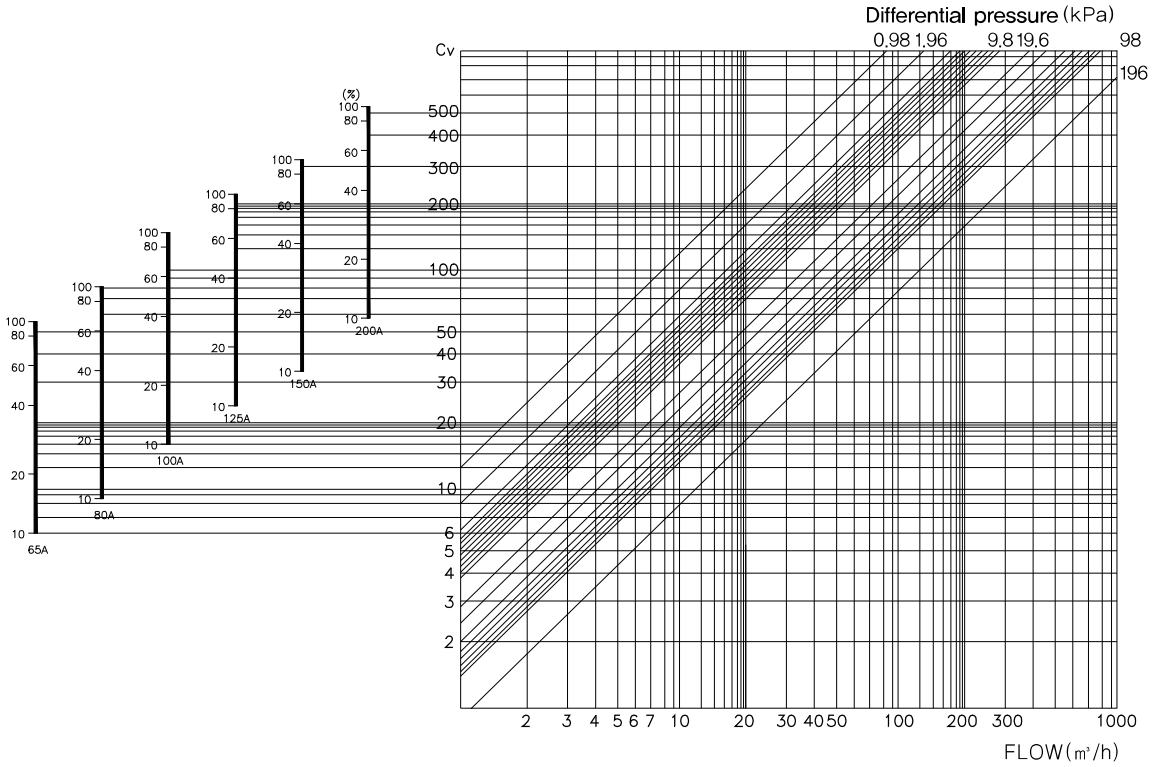
▶ If the valve stroke ratio is 50%, changes in the rated flow ratio are made as per the plug stroke ratio.



▶ Proximity to the close state entails precise throttling, while proximity to the open state entails a rapid flow increase. As such, it is also used for cases where it is forecasted that there will be substantial fluctuations in terms of pressure drop.

YBC-2F, 20F Type Manual Balancing Valve

Chart on selecting a flow and size



How to select by using a calculation formula

$W = 0.8569 \times Cv\ max \times k \times \sqrt{\Delta P}$

W = Flow (m^3/h)

Cv max = Maximum Cv value of balancing valve

K = Set graduation of indicator (%)

ΔP = Differential pressure between the valve's inlet and outlet (kgf/cm^2)

(Example) Standard = 150A, Maximum Cv value = 324

$W = 0.8569 \times 324 \times 0.4 \times \sqrt{2.9 \times 0.011} = 19.8 m^3/h$

How to set the flow using the chart

The maximum Cv value is 324 when the standard is 150A, which means that the Cv value becomes 129.6 when the indicator's adjustment is 40%. "A" is the point of intersection between this point and the line of the measured differential pressure between the valve's inlet and outlet (0.03). The flow at this point is 19.2 (m^3/h).

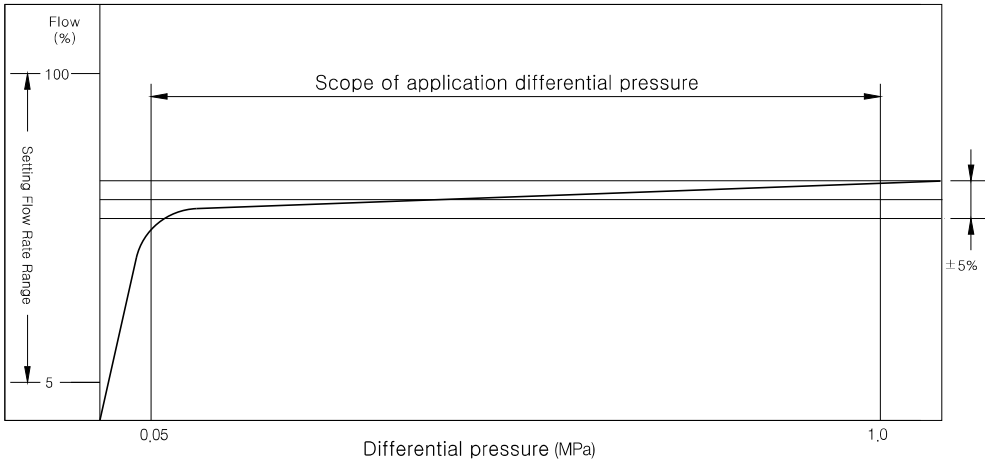
Data / YFC-2N, 2F, 20F Flow setting

YFC-2N, 2F, 20F TYPE

Type	division	Scope of application differential pressure (MPa)			Flow setting range (LPM)		
		YFC-2N	YFC-2F, YFC-20F	YFC-1F	YFC-2N	YFC-2F, YFC-20F	YFC-1F
15(½")	Per generation generation	0.03~0.08			1.5~20		
20(¾")					1.5~20		
25(1")					1.5~30		
32(1¼")	Generation by generation	0.05~0.29			5~30		
40(1½")					10~60		
50(2")				0.03~0.69	16~80		59~360
65(2½")			0.03~0.05			16~299	100~600
80(3")						22~450	150~700
100(4")						35~708	235~1000
125(5")						57~1105	368~2300
150(6")						80~1590	530~3000
200(8")						148~2525	940~3950

- Set the set flow rate and nominal diameter according to the table, and check the friction loss and maintenance cost and initial Given the cost of equipment investment, it is most economical to select between 50-70% of the maximum flow rate, It is also ideal piping.
- LINEAR PORT is built in the adjusting screw part, so if you need to increase or decrease the set flow rate during use You can adjust it.

Flow characteristic curve



SMART-CROSS(YTF-20C/20P)

The constant flow temperature control valve is installed in a pipeline in the vicinity of a Fan coil unit and hot water distributor within a household of a central and district heating system. It enhances energy efficiency by maintaining a selected temperature and controlling the flow.

- Applied to Fan coil unit of cooling/heating system, chilled beam or/and heating unit
- Distributes constant flow without effect from pressure differential changes in the system
- Easy to control flow in the building and enhances energy efficiency.
- With extra unit in the system, it will distribute constant flow.
- The initial setting does not require 0 control, and it can stroke control in set flow.
- Pressure range is controllable during changes in differential pressure.
- Excessive flow control is possible even when the system is in high pressure difference.
- The valve is economically designed to be small so that it doe not matter whether its right or left type

SMART-CROSS Application Area

- Pressure independent control valve: Fan coil unit of Heating/Cooling system, Air handling unit or/and Terminal unit
- System where it requires flow control with no effect from changes in pressure difference.
- Unit that requires external flow control.
- Any equipment that required energy saving by controlling flow 100%.

Specification

Type		FTF-20C (thermal, Electronic on/off)/YTF-20P (ratio control)						
Applicable size	mm	15A	20A	25A	25(HF)	32A	40A	50A
	inch	1/2	3/4	1	1	1 1/4	1 1/2	2
Flow control range (LPM/ LPH)	YTF-20C	2-22		LF : 2-22 MF : 5-40	10-50	10-60	20-100	30-120
	YTF-20P	2-24		LF : 2-24 MF : 5~40	10-50	10-60	20-100	30-120
Differential pressure range		0.03~0.4MPa (30~400KPa)						
Applicable fluid		Hot / Cold Water						
Temp. (Fluid temp)		5~120℃						
Temp.(surrounding temp)		-20 ~ 65℃						
End connection	Inlet	PT Screw (Internal diameter) / PF Screw (an external diameter)						
	Outlet	PT Screw (Internal diameter) / PF Screw (an external diameter)						
Material	Body	KSD 6024 CAC 303						
	Disc	KSD 5101 C3603BE						
	Diaphragm	EPDM						
Hydraulic test pressure		1.5 Mpa (1500 KPa)						

YTF-20P
(ratio control)

YTF-20C
(Motor type ON/OFF)

YTF-20C
(Thermostatic ON/OFF)

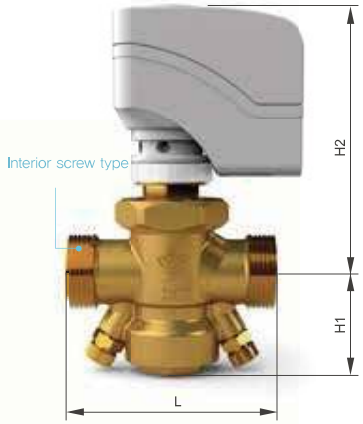
SMART- CROSS Actuator Specifications (On/OFF or 0~10V, 30 Point Floating Actuator)

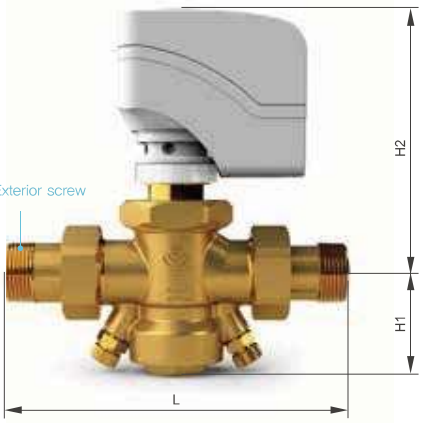
YEA-100P	
Features	Motor type operating ratio control
Input	AC/DC 24V
Control Signal	0~10VDC or 3Point, ON/OFF
Actuator Force	250N
Stroke Max.	5.5 mm
Penetration protect Leve	IP 40

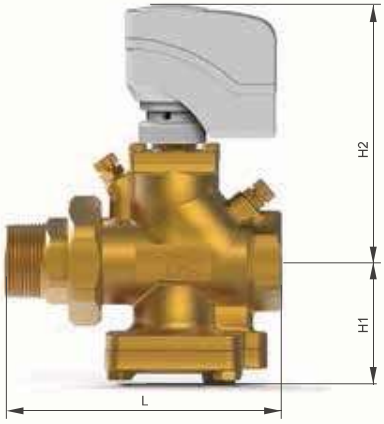
YEA-100C	
Features	Motor type ON/OFF
Input	AC 220V
Control Signal	ON/OFF
Actuator Force	100N
Stroke Max.	3 mm

YEA-100C	
Features	Electronic ON/OFF
Input	AC 220V
Control Signal	ON/OFF
Actuator Force	100N
Stroke Max.	3.5 mm

YTF–20P Dimensions







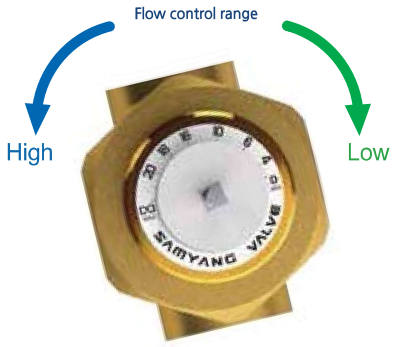
size	15A	20A	25A
H1	43.5	43.5	43.5
H2	120	120	120
L	90	94	102

size	15A	20A	25A
H1	43.5	43.5	43.5
H2	120	120	120
L	154	162	178

size	25.3A	40A	50A
H1	70	84	89
H2	143	143	159
L	148	164	187

※ When selecting union type as it contains strainer inside, removal of foreign substances is easy

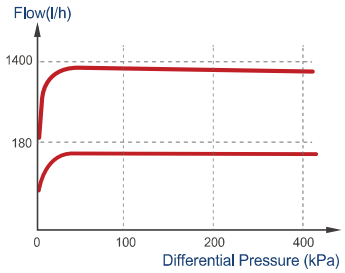
SMART–CROSS Flow characteristics



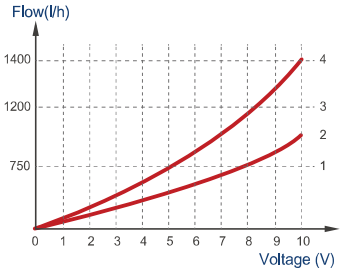
YFC–20C Indicator
(Max flow 22LPM)

Indicator	Average Flow value(LPM)	Average Flow value(%)
3.2	22.0	100
3.1	20.0	90
3.0	18.0	82
2.2	17.0	77
2.1	16.0	73
2.0	12.0	55
1.2	10.0	45
1.1	8.0	36
1.0	6.0	27
0.2	4.5	20
0.1	3.0	14

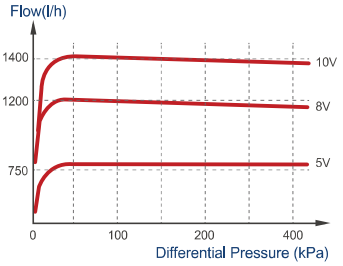
Pressure differential characteristics



Voltage Control

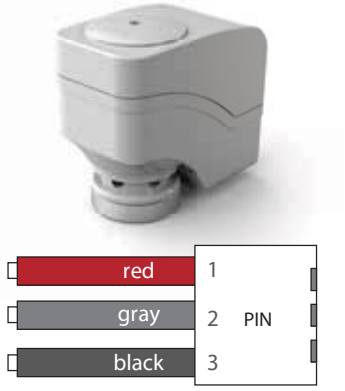


Pressure differential + Voltage control characteristics



Actuator wiring diagram

1) Proportional control

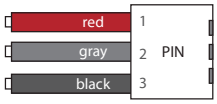


Function	NO.	1	2	3
	Color	Red	Grey	Black
Internal control		24VAC/DC		Common
Voltage control		24VAC/DC	2 ~10VDC	Common
On/Off control		24VAC/DC	24DCV(Open)	Common
			0V(Close)	
3 Point Floating control		24VAC/DC	Drive CW(Open)	Common
			24VAC/DC	

1–1) Analog voltage control

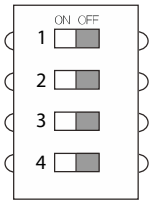
+ at 24VDC & 24VAC
Control Signal DC 0~10V, 2~10V
– at 24VDC & 24VAC

1–2) CW/CW control



+at 24VDC&24VAV
Close 24VDC
– at 24VDC&24VAC, Open 24VDC

2) Dip Switch Setup/ Switch functional descriptions



※Please reset 24volt main power when changing setting of Dip Switch

Settings	Switch Functions		normal open, normal close	3 Position (open & close)	2–10volt	0–10volt
	1	0–10volt	OFF	OFF	OFF	ON
	2	2–10volt	OFF	OFF	ON	OFF
	3	3 Position	OFF	ON	OFF	OFF
	4	CW/CCW	Normal open, normal close setting function			

3) Initial Setting

When inputting power, Valve will read initial and maximum point and set to initial point of (0). While this is in process do not touch anything otherwise it will give misleading information and will not control flow accurately.

4) Electric On/OFF

15 - 25A

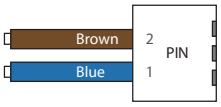
Com
Open
Close

32 - 50A

Com
Open
Close

Type	Electric type SEA–100
Product Info	Motor installed with strong torque and fast operating system. Converts between automatic/manual.
Operation method	Auto/Manual On/OFF operation Operation can be checked by increase in top
Conditions	Voltage : AC 220 V External connection : 3P

5) Thermostatic On/OFF



Main power
Working
Voltage 220V AC

Type	Thermal type new model (Y6562)
Product Info	Wax expandable type with no noise and long life expectancy
Operation method	Auto/Manual On/OFF operation Operation can be checked from the top
Conditions	Voltage : AC 220 V Operational circuit : 13mA/3W Operating time : 120~180SEC

YDF–2F, 20F Type Differential Pressure & Flow Control Valve

This valve performs the two control functions of restricting flow and maintaining a differential pressure of supply and return lines. It can be installed in a supply line or return line according to its purpose of use.

Features

- High–performing differential pressure flow control valve that is installed in a supply or return line of a load device to control the differential pressure and flow comprehensively.
- In addition to differential pressure control, it offers a wide flow control range, from small to large flows, thanks to an embedded equal % cone for flow control.
- The diaphragm is separated from the body and thus is not affected by temperature. Since it is a perfect balance type, the set differential pressure does not change due to pressure fluctuations.
- Has a solid structure, and thus offers an outstanding level of durability.
- A diaphragm method enables to be installed horizontally or vertically.
- The opening percentage of the valve can be easily checked, thanks to the attached indicator.
- Leakage from packings can be visually checked, enabling easy identification of the appropriate time for repair.

YDF–2F

YDF–20F

Specification

Type		YDF–2F	YDF–20F
Applicable pressure		Maximum 1.0MPa	Maximum 2.0MPa
Applicable fluid		Cold / hot water	
Fluid temperature		Maximum 120°C	
Differential pressure control range		0.01~0.18MPa	
		0.15~0.50MPa	
Flow control range		±5% of the constant flow rate	
End connection		KS 10K RF FLANGE	KS 20K RF FLANGE
Materials	Body	GC200	SCPH2
	Disc, seat	CAC406	STS
	Diaphragm	EPDM	
Hydraulic test pressure		1.5MPa	3.0MPa

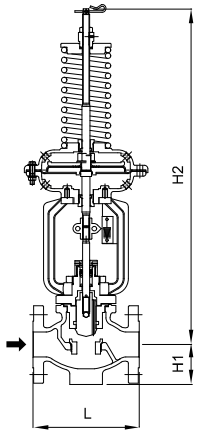
▶ The basic pressure regulating range is 0.02~0.15MPa
▶ When using the valve, install a strainer (40 MEsh or more) on the leaflet.

Dimensions

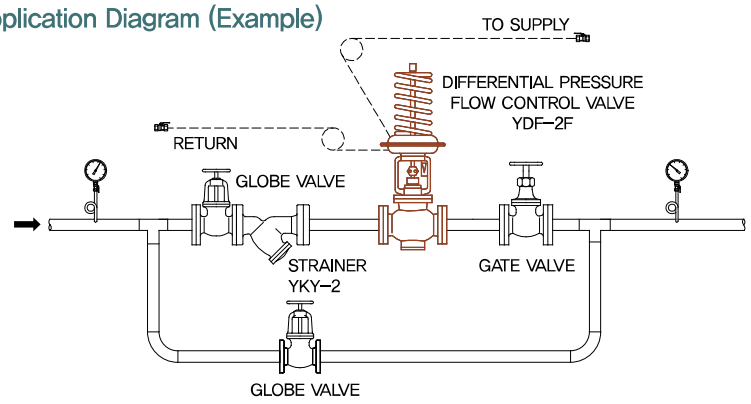
Type / Size	YDF–2F L	H1	H2	Weight (kg)	YDF–20F L	H1	H2	Weight (kg)	Cv
25A	184	62.5	640	20	197	62.5	640	21	8
32A	180	70	650	26	180	70	650	26	12.5
40A	222	80	658	28	235	80	658	30	18
50A	254	95	670	41	267	95	670	43	43
65A	276	115	720	48	292	115	720	54	64
80A	294	120	720	56	318	120	720	65	84
100A	352	130	735	72	368	130	735	66	152
125A	400	150	775	130	400	150	775	152	200
150A	451	180	800	162	473	180	800	126.2	288

▶ Made–to–orders are available for valves with a size of 200 or larger.

Dimensional drawing



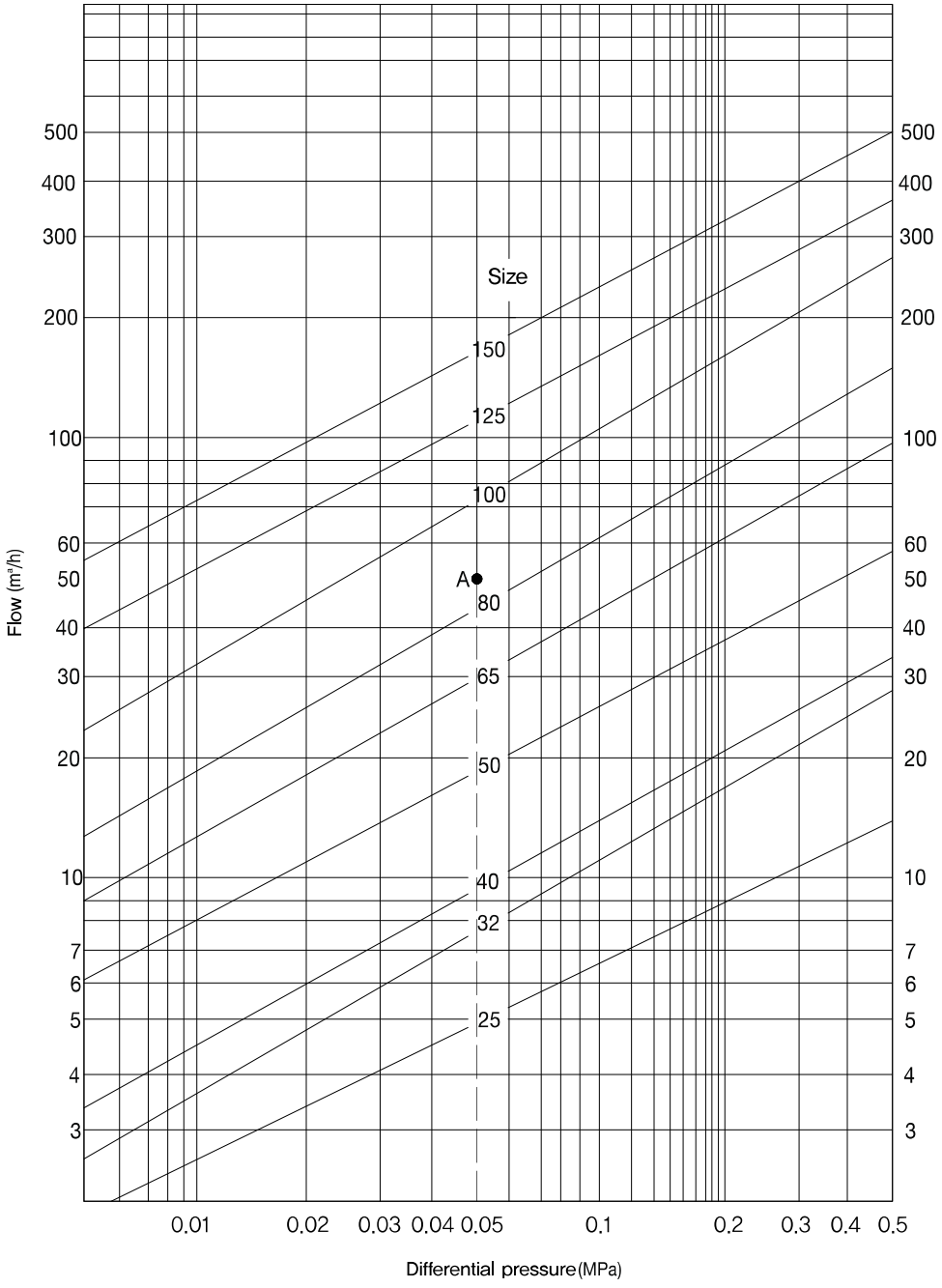
Application Diagram (Example)



※ Install the pressure tube on the side of the main pipe.

YDF-2F, 20F Type Differential Pressure Flow Control Valve

Selecion of size



$$Cv = \frac{1.167 \times Q \times \sqrt{r}}{\sqrt{\Delta P}}$$

Here, Cv : Valve flow coefficient
Q : Flow (m³/h)
r : Density (Water = 1)
ΔP : Pressure difference between the valve's inlet and outlet(MPa)

DR-08 Type Differential Pressure Control Valve

This valve is used for home heating systems of district and central heating systems. It maintains an appropriate flow for each zone (room) by detecting the pressure difference of the supply and return lines and controlling the flow when there are load fluctuations, according to the on and off state of each zone (room), in terms of the maximum flow within a household that was balanced based on the constant flow control valve of each household.

Features

- High-performing differential pressure flow control valve. Installed in a supply or return line of a load device, controls the differential pressure and flow comprehensively.
- Operates minutely and proportionally even without back-up energy supply.
- Prevents noise and excessive flow of a pipeline within a household.
- Offers superb durability with a solid structure.
- Can be applied to a wide variety of flow systems and temperature control systems.

Differential pressure control type

Differential pressure fixing type

Specification

Type		Differential pressure control type	Differential pressure fixing type
Maximum pressure		Maximum 1.0MPa	
Differential pressure control range		0.005~0.03MPa	0.016MPa
Applicable fluid		Cold / hot water	
Flow control range		CV=3.2	
Applicable temperature		110℃ below	
Materials	Body	CAC303	
	Disc, Seat	CAC303	
	Diaphragm	EPDM	

▶ When using the valve, install a strainer (40 MEsh or more) on the leaflet.
▶ 1kPa = 0.001 MPa

Dimensions

(mm)

Category	Size	L	H
DR-08 (Fixed type)	20(¾")	82	108
	25(1")	82	108
DR-08 (Variable type)	20(¾")	82	112
	25(1")	82	112

How to adjust the differential pressure

Clockwise direction :
Differential pressure increases

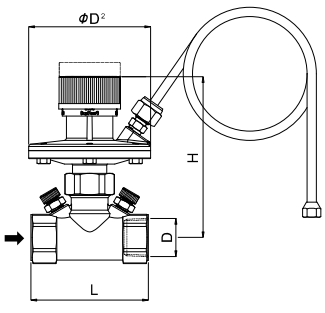
Counterclockwise direction :
Differential pressure decreases

- If there is no request to do otherwise, the differential pressure is set to 0.17 kgf/cm2 prior to product delivery.
- The following steps should be taken, in that order, when there is a need to adjust the differential pressure due to changes in field conditions.

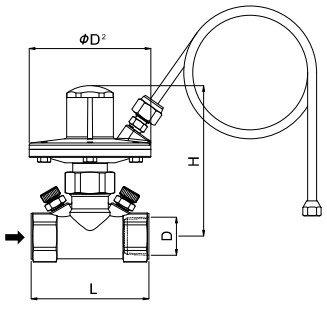
a. Open all valves in a circulating pipeline and operate the pump. Read the differential pressure of the supply side and return side.

b. Slowly turn the adjustment nut clockwise and counterclockwise, while reading the pressure on the supply side and return side, and set a desired differential pressure.

Dimensional drawing



Differential pressure control type

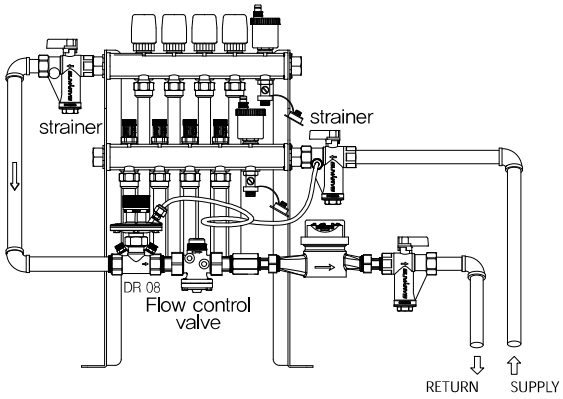


Differential pressure fixing type

DR-8 Differential Pressure Control Valve

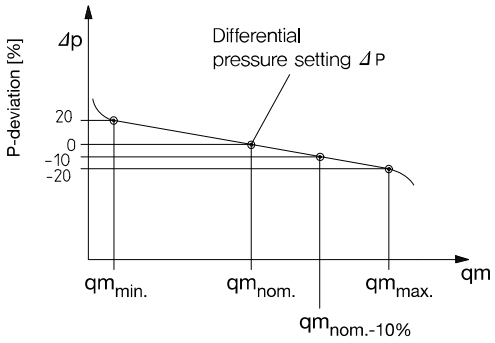
Differential pressure control valve by generation

- Example of installation in pipeline

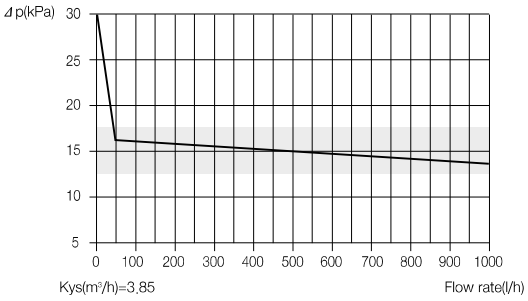


※Must be installed at the front end of flow control valve.

- Differential pressure setting error range

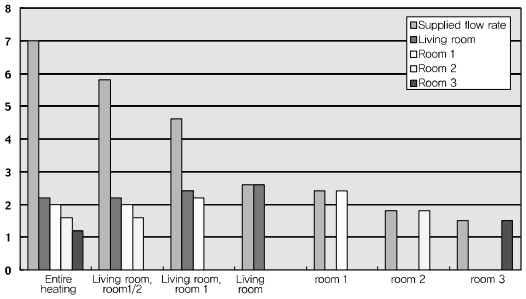


- Flow rate characteristics



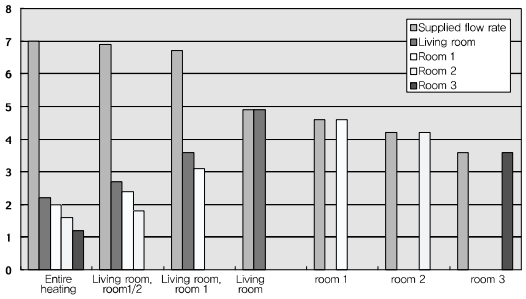
Experimentation of Differential pressure control valve by generation

- Example of differential pressure control valve being applied



Operating condition	Supply	Living room		room 1		room 2		room 3	
	flow rate (l/min)	flow rate (l/min)	Velocity of flow (m/s)	flow rate (l/min)	Velocity of flow (m/s)	flow rate (l/min)	Velocity of flow (m/s)	flow rate (l/min)	Velocity of flow (m/s)
Fully operational	7.0	2.2	0.182	2.0	0.166	1.6	0.133	1.2	0.100
Shut off Rm 3	5.8	2.2	0.182	2.0	0.166	1.6	0.133	0.0	0.000
Shut off Rm 3/Rm 2	4.6	2.4	0.199	2.2	0.182	0.0	0.000	0.0	0.000
Shut off Rm 3/Rm 2/Rm 1	2.6	2.6	0.216	0.0	0.000	0.0	0.000	0.0	0.000
Shut off Living Rm/Rm 3/Rm 2	2.4	0.0	0.000	2.4	0.199	0.0	0.000	0.0	0.000
Shut off Living Rm/Rm 1/Rm 3	1.8	0.0	0.000	0.0	0.000	1.8	0.149	0.0	0.000
Shut off Living Rm/Rm 1/Rm 2	1.5	0.0	0.000	0.0	0.000	0.0	0.000	1.5	0.124

- Example of differential pressure control valve not being applied



Operating condition	Supply	Living room		room 1		room 2		room 3	
	flow rate (l/min)	flow rate (l/min)	Velocity of flow (m/s)	flow rate (l/min)	Velocity of flow (m/s)	flow rate (l/min)	Velocity of flow (m/s)	flow rate (l/min)	Velocity of flow (m/s)
Fully operational	7.0	2.2	0.182	2.0	0.166	1.6	0.133	1.2	0.100
Shut off Rm 3	6.9	2.7	0.224	2.4	0.199	1.8	0.149	0.0	0.000
Shut off Rm 3/Rm 2	6.7	3.6	0.299	3.1	0.257	0.0	0.000	0.0	0.000
Shut off Rm 3/Rm 2/Rm 1	4.9	4.9	0.406	0.0	0.000	0.0	0.000	0.0	0.000
Shut off Living Rm/Rm 3/Rm 2	4.6	0.0	0.000	4.6	0.382	0.0	0.000	0.0	0.000
Shut off Living Rm/Rm 1/Rm 3	4.2	0.0	0.000	0.0	0.000	4.2	0.348	0.0	0.000
Shut off Living Rm/Rm 1/Rm 2	3.6	0.0	0.000	0.0	0.000	0.0	0.000	3.6	0.299

YDP–1F, 20F Type Differential Pressure Control Valve

This maintains the differential pressure of supply and return lines or the differential pressure of the inlet and outlet side of an instrument in a closed circuit.

YDP–1F

YDP–20F

Features

- As an air–to–close differential pressure valve, it has a structure where the valve opens when the primary pressure goes up. It is installed in between the supply header and return header to control the differential pressure.
- As a self–control type, it does not require auxiliary power supply.
- As a complete balancing type, almost no changes in the set differential pressure resulting from pressure fluctuations.
- Structure is relatively simple, and offers superb durability.
- Convenient piping and handling.
- Separated diaphragm from the main body, not affected by temperature, resulting in outstanding durability.

Specification

Type		YDP–1F	YDP–20F
Applicable pressure		Maximum 1.0MPa	Maximum 2.0MPa
Applicable fluid		Cold/hot water	
Fluid temperature		170℃ below	
Differential pressure control range		0.05~0.30MPa	0.05~0.30MPa
			0.30~0.50MPa
Leakage allowance		0.5% less of rated flow	
Direction of installation		Horizontally or vertically	
End connection		KS 10K RF FLANGE	KS 20K RF FLANGE
Materials	Body	GC200	SCPH2
	Disc, Seat	CAC406	STS
	Diaphragm	EPDM	
Hydraulic test pressure		water pressure 1.5MPa	water pressure 3.0MPa

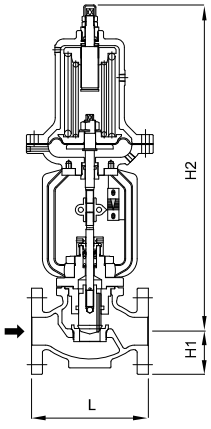
▶ When using the valve, install a strainer (40 MEsh or more) on the leaflet.
▶ 1kPa = 0.001 MPa

Dimensions

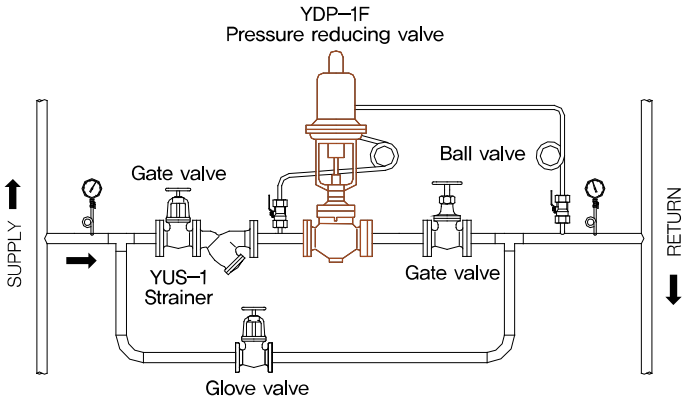
(mm)

Size	YDP–1F				YDP–20F				Cv
	L	H1	H2	Weight (kg)	L	H1	H2	Weight (kg)	
25(1")	184	62.5	559	24	197	62.5	559	24	8
32(1¼")	180	70	565	31	180	70	565	31	12.5
40(1½")	222	80	565	33	235	80	565	33	18
50(2")	254	95	586	47	267	95	586	47	43
65(2½")	276	115	610	51	292	115	610	51	64
80(3")	294	120	630	63	318	120	630	63	84
100(4")	352	130	650	77	368	130	650	77	152
125(5")	400	150	685	139	400	150	685	139	200
150(6")	451	180	715	168	473	180	715	168	288

Dimensional drawing



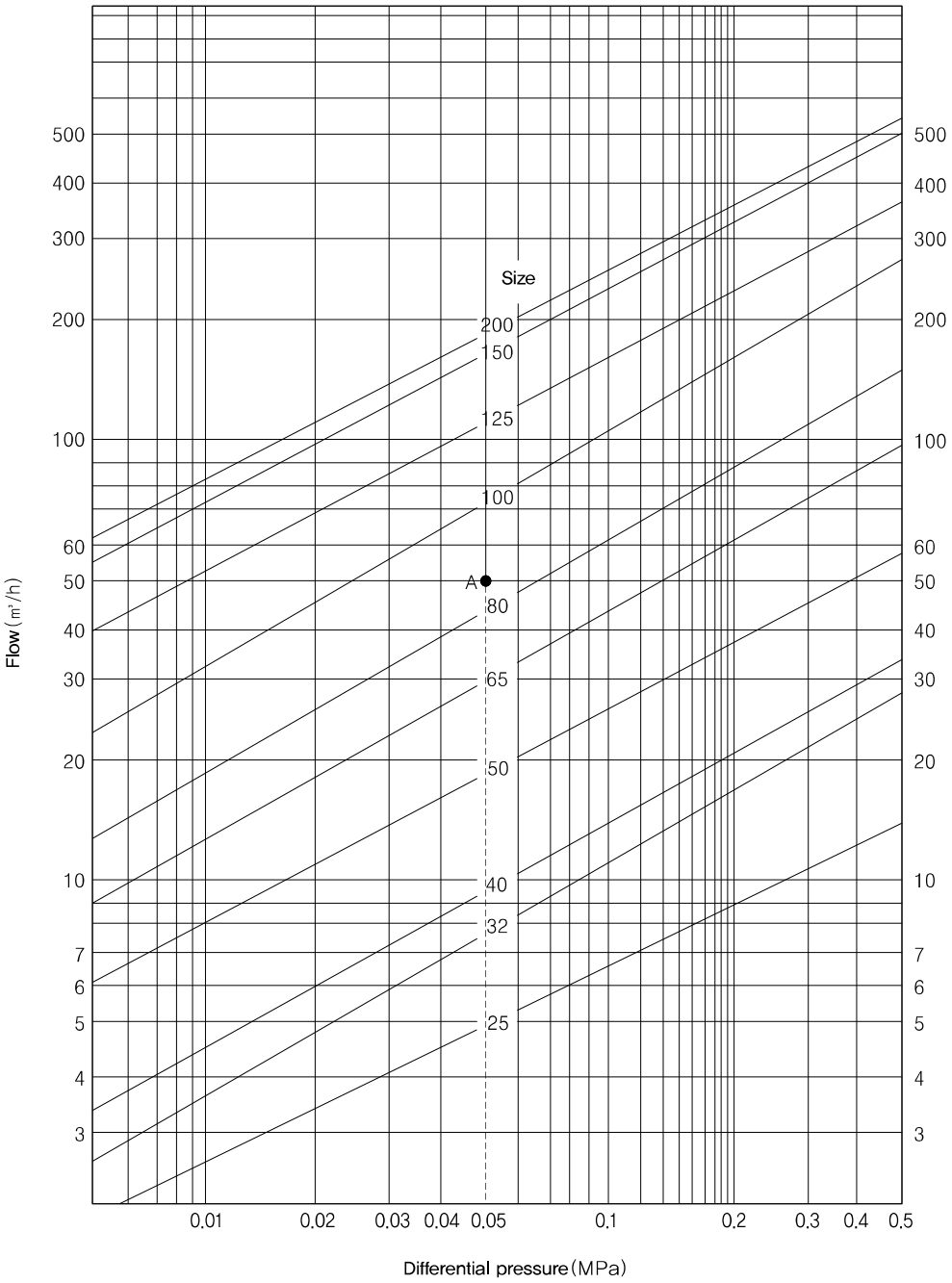
Application Diagram (Example)



※ Install the pressure tube on the side of the main pipe.

YDP–1F, 20F Type Differential Pressure Control Valve

Chart on selecting a size



How to determine the nominal diameter of a valve while viewing the diagram

EX) If the pressure on the feed side is equal to 0.35mgL of the pressure of 0.35mgh maximum capacity of 0.35mgh

1) The supply side (Ps) and the differential pressure (Ps) (Δ P) will be 0.05 MPa (Δ P = Ps–Pro–Pro–President).
2) The differential pressure rises vertically from 0.05 MPa to obtain a crossover point " A " with a 50 metre flow rate.
3) The " A " point is between 80 and 100, so you have to choose 100.

Data / Reference Data

Types and characteristics of flow control valves

1) Manual balancing valve

The valve's opening percentage is controlled manually, based on which the flow is controlled. As such, there needs to be an indication to confirm the opening percentage and an embedded linear port for an accurate flow as per the graduation. There also needs to be a locking device that can be used after adjustment.

2) Automatic constant flow control valve (Orifice Type)

Because the valve has an embedded orifice or piston–type linear port, the spring absorbs the differential pressure between the inlet and outlet of the valve, and the opening area of the orifice changes according to the spring's movements. When the differential pressure goes up and thus the flow velocity increases, the valve narrows the opening area. When the differential pressure goes down, it automatically widens the opening area, thereby ensuring that a constant flow is maintained at all times. Because there is no function to readjust the flow, the flow needs to be precisely calculated according to the circuit. If there is a need to change the flow, an internal part (orifice or spring) needs to be replaced.

3) Automatic flow control valve (Diaphragm Type)

Samyang's automatic flow control valves are diaphragm type valves. They detect load fluctuations that occur in the circuit and ensure that the adjusted flow remains constant at all times. Compared to automatic constant flow control valves, they feature a higher level of precision, more stable control, and a wider applicable differential pressure range. This is why they can be widely used for flow control in apartment buildings and industrial equipment. They also have an embedded linear port, which allows readjustment of the set flow, thereby enabling readjustments on the field. Since they have a cut–off valve function as needed, there is no need for a globe valve on the inlet side of the valve.

4) Differential pressure control valve

This type of valve is mostly used for one of two purposes. Installed between the supply header and return header, this valve maintains the system's pressure balance and guarantees the designed operation point of a pump even in case of load changes, thereby ensuring optimal energy distribution efficiency and a certain system life span.

5) Differential flow control valve

Installed in the return line of a load device, it maintains a constant flow by maintaining an appropriate differential pressure level of the load device.

How to order a valve

The following information should be described when consulting or placing an order for a valve.

Model number (type) and standard	
Type of fluid	
Set flow or set flow range (LPM, GPM, m^3/h)	
Temperature of used fluid (Max/℃)	
Operating differential pressure range (MPa)	
Differential pressure control range (MPa)	

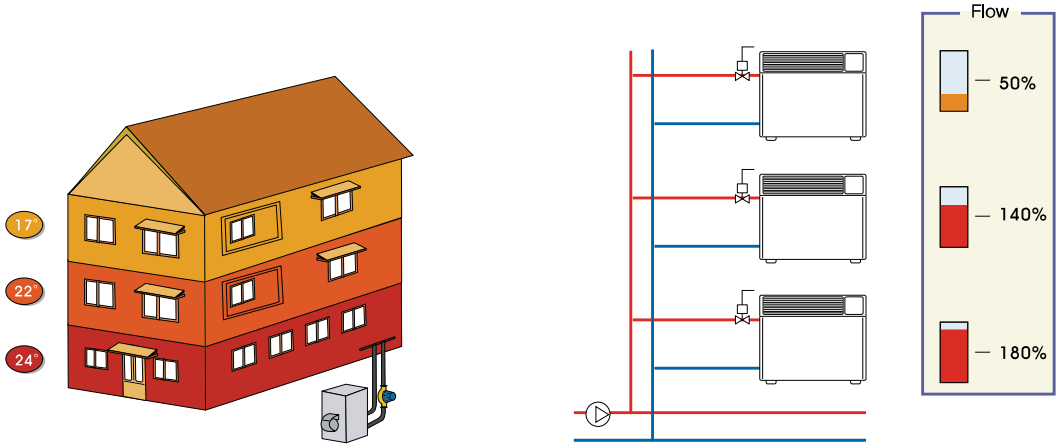
▶ For selection of valve, select it to have 30–70% of rated valve capacity.

Data / Reference Data

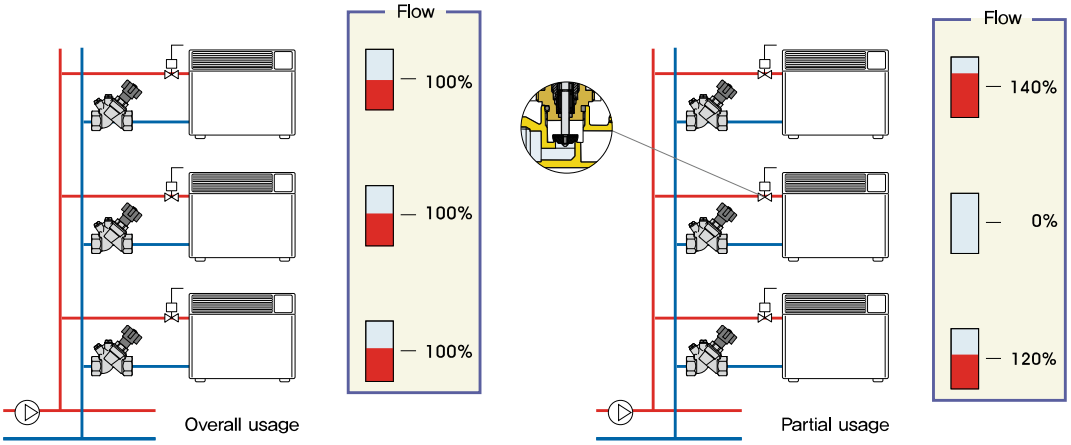
YFC-2N, 1F, 1S, YTF-20

Balacing circuit

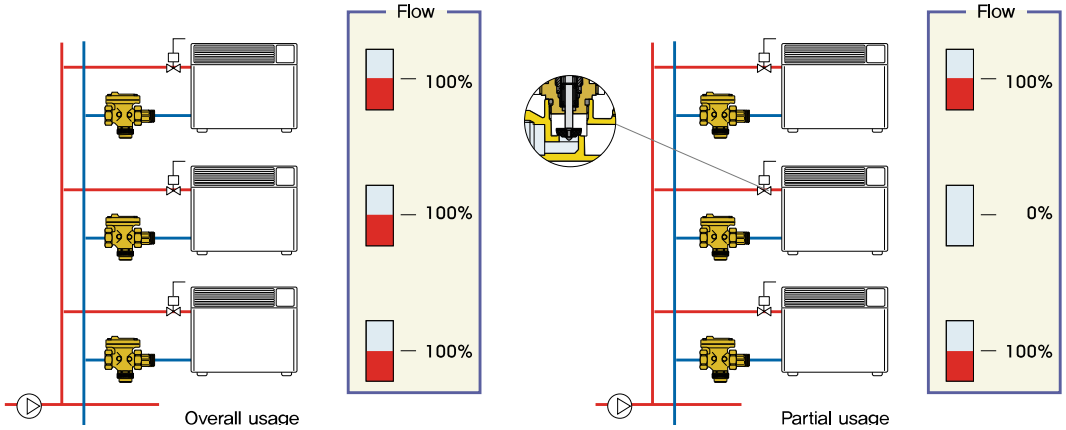
- If a balancing valve is not used : As seen below, there is a flow imbalance among households.



- If a manual balancing valve is used : As seen below, balance is maintained in case of overall usage, but there is an imbalance between the high and low floors when there are load changes.



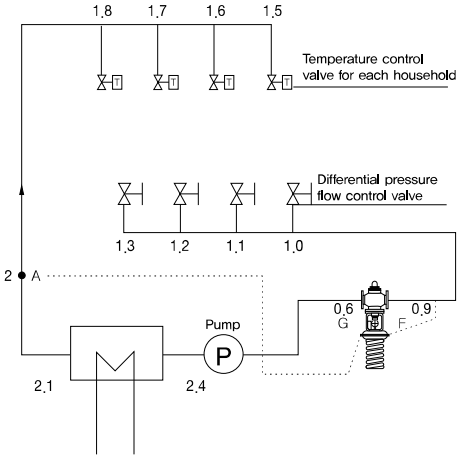
- If an automatic balancing valve is used, a constant flow is maintained in case of overall usage as well as when there are load fluctuations.



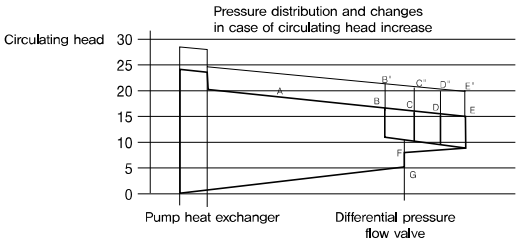
Data / Reference Data

Flow balancing technology for apartments

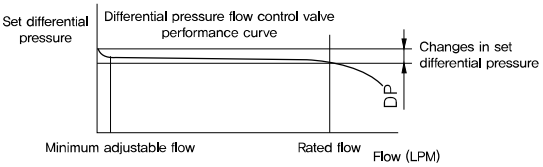
》Diagram 1



》Diagram 2



》Diagram 3



1. A system that has a differential pressure flow control valve installed

A system that has a differential pressure flow control valve installed

The pump lift is 24 m,
Flow is 400 LPM,
Pressure loss of heat exchanger is 0.3 bar,
Pressure loss of the differential pressure flow control valve is 0.3 bar, and

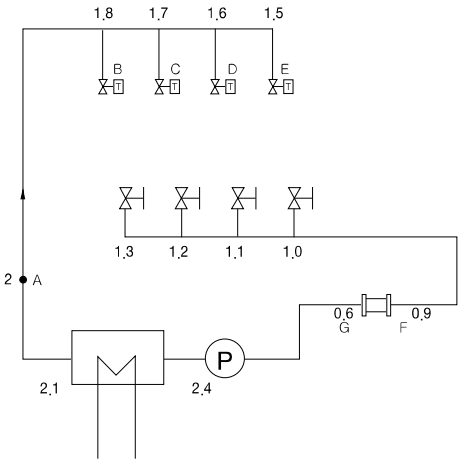
The set differential pressure is operating as the differential pressure between points A and F (2–0.9=1.1 bar); This is a case where a flow of 100 LPM has been distributed to each standing line. If the flow is cut off due to the operation of temperature control valves installed at points B, C, D, and E according to changes in outside temperature, the lift of point A rises, resulting in higher pressure. The differential pressure flow control valve detects the increased lift of point A and increases point F to the same level, thereby maintaining a differential pressure of 1.1 bar between points A and F. The pressure gradient of the entire pipeline becomes constant (refer to Diagram 2), resulting in optimal flow balancing effects despite the variable flow.

Also, a constant differential pressure is maintained at all times even in cases where only one or two apartment units require heating, thereby preventing the breakdown of the temperature control valve for each household and completely resolving noise–related problems within households.

2. A system that has a constant flow control valve (automatic balancing valve) installed

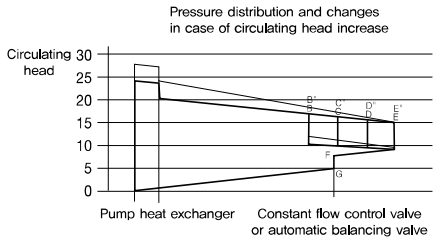
In Diagrams 4 and 5, a constant flow control valve (automatic balancing valve) is installed in the same location. If the flow becomes smaller after operation of temperature control valves at points B, C, D, and E, the constant flow control valve will operate below the control range since the flow will be smaller than the original flow of 400 LPM. As such, the pressure gradient within the pipeline will change, leading to a flow imbalance. There will be excessive flow in certain sections. This is why some adopt the solution of installing a constant flow control valve for each standing line, but this leads to the issue of imbalance among households within each standing line. This is why it is recommended that a constant flow control valve should be installed for each household. However, in case of continuous heating, where the pump needs to be operated even when the level of used flow is extremely low, the lift of the circulation pump rapidly increases. As such, there is noise since the differential pressure goes up when the constant flow control valve is operated. Moreover, rapid fluctuations in differential pressure lead to decreased control performance of each household's temperature control valve and even cause breakdown. This is why there is a need to install a differential pressure valve or differential pressure flow control valve and appropriately maintain a differential pressure of the supply and return to ensure definite balancing effects.

》Diagram 4

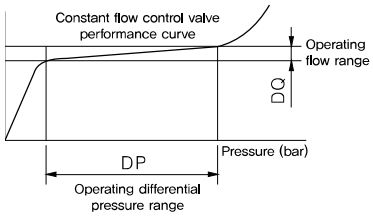


Data / Reference Data

》Diagram 5



》Diagram 6



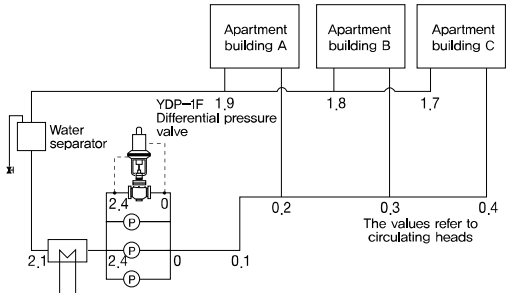
3. System flow control using differential pressure valve

As shown in Diagram 7, the method of balancing the flow with only a differential pressure valve of the machinery room is adopted for small systems, and is mostly used for single pump systems that do not have a high circulating head. The capacity is 80% or more of the pump flow. The set differential pressure is the same as the pump lift, or as the pressure loss value of the overall circulation pipelines if there is an overall pressure loss value.

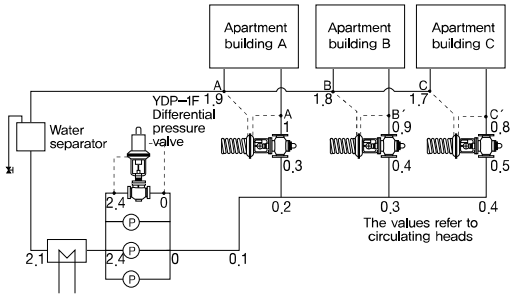
4. Systems using a differential pressure valve and a differential pressure flow control valve

A system that uses only a differential pressure valve is difficult to apply when several pumps are operated or load fluctuations are substantial. In this case, there is a need to install a differential pressure valve for pump relief purposes and set up a differential pressure flow control valve for each apartment building. This would enable to establish balance among apartment buildings as well as among different zones within an apartment building through a differential pressure flow control valve.

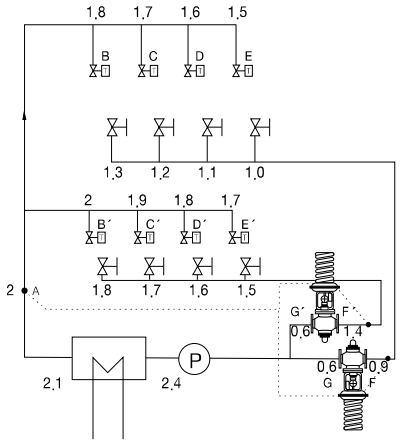
》Diagram 7



》Diagram 8



》Diagram 9



〈Valve selection〉

(1) Differential pressure valve

As a relief purpose, it determines the relief flow which is over 25 % of a pump flow since it could be selected within the scope where the pump would not get excessive loads. The set differential pressure would be the same as the pump lift or the pressure loss value of the overall circulation pipelines.

e.g.) Pump flow Qp=75ton/h

Pump lift H=24m=2.4bar

Relief flow (usually, 30~35% of pump flow) Qr=22.5T/H

$$Cv = \frac{1.167 \times Qr}{\sqrt{\Delta P}} = \frac{1.167 \times 22.5}{\sqrt{2.4}} = 16.95$$

Select the valve Cv value as YDF-1F 40A(Cv=18) which is over 16.95

Select the valve Cv value as YDF-1F 40A(Cv=18) which is over 16.95

(2) Differential pressure flow control valve

Since the valve controls the flow changes occurring due to the temperature control valve operation within an apartment, if the flow of each apartment would be 25ton/h,

Q = 25ton/h(417LPM)

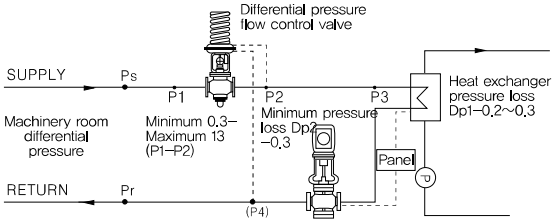
$$Cv = \frac{1.167 \times Qr}{\sqrt{\Delta P}} = \frac{1.167 \times 25}{\sqrt{0.3}} = 53.26$$

(ΔP : Here, 0.3. It is the maximum pressure loss of the valve itself and constant)

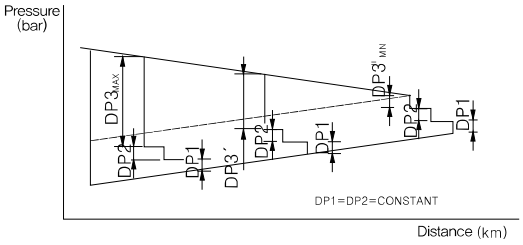
Select the valve Cv value as YDF-2F 65A(Cv=58) which is larger than 53.2. At this time, the controlling differential pressure DPs such as the points A-A', B-B', and C-C' which the differential pressure flow control valve should control are irrelevant to the valve size selection and are different a bit according to working places. When the required flow for each apartment is very huge, the differential pressure flow control valve should be enlarged. So, if the range ability would be 1/40, 1/40 of the maximum flow could not be controlled, in this case, it would be appropriate to install the differential pressure flow control valve for each zone like Picture 7.

Data / Reference Data

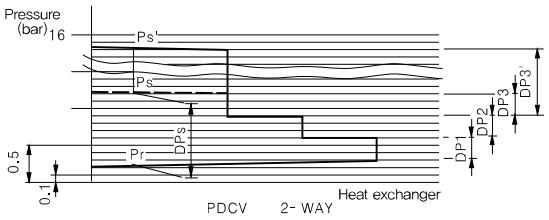
Schematic diagram of the intermediary machinery room of a district heating system's primary pipeline



Overall pressure distribution chart for district heating pipelines



Machinery room pressure drop curve



Valve selection for an intermediate machinery room for district heating

〈Terminologies〉

Ps : Pressure of high–temperature water that is supplied to the machinery room (different for each district)

Pr : Pressure returning to the power plant (from the machinery room)

P_4 = Pr, Ps = P_1

DP_1 : Pressure drop in heat exchanger

DP_2 : Pressure drop in 2–way valve

DP_3 : Pressure drop in differential pressure flow control valve (Minimum 0.3 ~ Maximum 13 bar)

The pressure distribution in Diagram 12 indicates that DP_1 and DP_2 are constant. This is why DP_3 the pressure drop in the differential pressure flow control valve is extremely high at the maximum level (approximately 13 bar) in the case of a machinery room located near the power plant. The Ps' in Diagram 11 changes in–between Ps and Ps' according to outdoor air temperature, and the maximum pressure loss (minimum differential pressure) of the differential pressure flow control valve is 0.3. As such, the pressure drop in the machinery room located the farthest away is approximately DP1+DP2+DP3min+line loss=1 bar. (Diagram 12)

1) 2–way valve selection

The 2–way valve always operates within a ΔP that is between 0.3 and 0.8 bar based on the differential pressure flow control valve, but its control performance is affected by the differential pressure flow control valve performance. The ΔP maintaining capability of the differential pressure flow control valve is determined by set differential pressure changes (DP) from the minimum controllable flow to the maximum flow. Higher performance differential pressure flow control valves have lower DPs, which means better control performance of the 2–way valve. If –2F, 20F, etc. are installed on PDCV Y, there is no operational problem even if the maximum allowable differential pressure of the 2–way valve is at least 1 bar. (3.5 bar is the practical standard of the Korea District Heating Corp.)

Calculation example〉

Ps=P_1 : 15bar

Pr=P_4 : 4bar

Q=20ton/h**(Flow calculated based on the connected thermal load)**

The following is a calculation of the required Cv value,

$$Cv = \frac{1.167 \times Q}{\sqrt{DP_3}} = \frac{1.167 \times 20}{\sqrt{0.7}} = 27.89$$

(DP_2=2–WAY valve pressure loss)

A valve whose Cv is bigger than 27.89 needs to be chosen. A safety coefficient of 0.7 is usually applied as a divider.

2) Differential pressure flow control valve selection

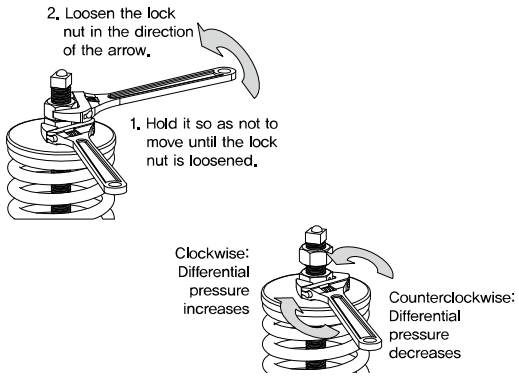
The differential pressure flow control valve performs the role of maintaining the pressure between P2 and P4 within 0.6 to 0.8 bar, and thus the set differential pressure is adjusted to 0.6 to 0.8 bar. However, the valve capacity should be chosen based on 0.7 bar pursuant to the usage facility standards of the Korea District Heating Corp. However, the P3 – pressure drop in the differential pressure flow control valve – in machinery rooms varies from 0.3 to 13 bar. This is why the valve size becomes different for the same thermal load. However, the pressure drop in the differential pressure flow control valve frequently changes according to fluctuations in outdoor air temperature, making it difficult to obtain the exact value even for a specific machinery room. This is why DP3=0.7 bar is used for calculation. Based on the example above:

$$Cv = \frac{1.167 \times Q}{\sqrt{DP_3}} = \frac{1.167 \times 20}{\sqrt{0.7}} = 27.89$$

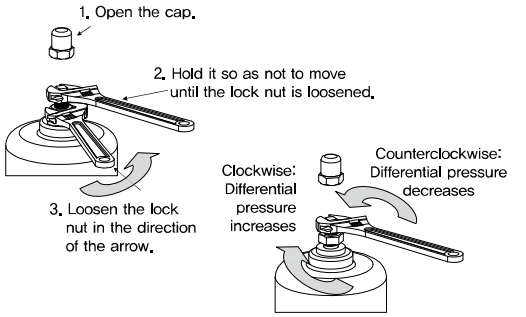
A selection should be made on a valve whose Cv value is bigger than 27.89. A safety coefficient of 0.7 is sometimes applied as a divider in consideration of control valve characteristics, depending on the load type of the system.

Data / Reference Data

How to adjust the differential pressure flow



How to adjust the differential pressure



※ If not requested otherwise, the differential pressure is set to 0.7 kgf/cm2 prior to product delivery.

- Cautions when handling the product

The following should be noted when handling the product so that it can be operated at maximum performance.

1. Do not cause impact on the product.
2. Avoid storage in humid and dusty places.
3. Pay special attention to prevent entry of foreign substances into the product.
4. When installing the product in a pipeline, completely remove scales, sand, dregs, etc. and clean the area that comes into contact with the gasket.
5. If possible, install the product where easy repair and inspections can take place.

※ The product's structure, dimensions, materials, etc. are subject to change without notice to improve its performance.

- Maintenance

》Leakage at the packing of stuffing nut boxes

1. Close after checking the gate valve. –Close the main valve.
2. Close the ball valve of the pressure–inducing pipeline.
3. Slowly loosen after checking the set spring height.
4. Detach the pressure–inducing pipeline.
5. Loosen after checking the set height of the stem screw of the indicator.
6. Slowly loosen the stuffing nut box. – Stop disassembling if water continuously flows out.
7. Check and change the packing, and assemble in reverse order.

》O–ring leakage

1. Close after checking the gate valve.
2. Close the ball valve of the pressure–inducing pipeline.
3. Slowly loosen after checking the set spring height.
4. Detach the pressure–inducing pipeline.
5. Loosen after checking the set height of the stem screw of the indicator.
6. Disassemble the actuator.
7. Polish the stem with soft sandpaper if extremely rusty.
8. Replace the o–ring, and assemble.

※ Checking for diaphragm function :
The spindle is regarded as being damaged if it does not operate when draining water with a supply air pin in a state where the supply's ball valve is closed and the return's ball valve is open.

05

LEVEL CONTROL VALVE

LEVEL CONTROL VALVE

YAW-3S
YAW-3F
YAWEL-1

05
Level Control Valve

SAMYANG
SYSTEM GROUP

Level Control Valve

Developed based on extensive experience, the water level control valves ensure easy maintenance, offer good durability, and prevent water hammers. They feature an outstanding performance and a wide array of functions that satisfy user needs.

Level control valve

Type	Size	Applicable pressure (kgf/cm2g)	Materials		End connection	Page
			Body	Disc, seat		
YAW-3S	32(1¼")~40(1½")	Max. 10	GC200	NBR, CAC406	KS PT SCREW	125
YAW-3F	50(2")~150(6")				KS 10K RF FLANGE	
YAW-ST	32(1¼")~150(6")		STS		KS PT SCREW KS 10K FF FLANGE	128
YAWEL-1	200A~300(12")		GC200		KS 10K RF FLANGE	129

YAW-3S, 3F Level Control Valve

The type YAW-3S and 3F water level control valves were developed for the exclusive purpose of controlling the water level of a wide array of water tanks. They are optimal water level control valves that have a simple structure and are small sized and lightweight, thereby ensuring easy handling and installation.

05

Features

- Embedded strainer prevents various foreign substances into the pipeline.
- No external pipeline, kept warm easily & no concerns of freezing damage.
- Large capacity make suitable for apartment water & elevated tanks.
- Large capacity make suitable for apartment water & elevated tanks.
- EM mark acquired.

YAW-3S Type

YAW-3F Type

Specitications

Type		YAW-3S	YAW-3F
Size		32A~40A	50A~150A
Applicable pressure		Maximum 1.0MPa	
Minimum differential pressure in the inlet and outlet side of the valve		0.034MPa	
Fluid temperature		5~80℃	
Function		On and off operation by a pilot solenoid valve	
Solenoid valve		AC220V, 50/60HZ	
Applicable fluid		Drinking water, fresh water, industrial water, agricultural water	
End connection		KS PT SCREW	KS 10K FF FLANGE
Materials	Body	GC200	
	Disc, seat	NBR, CAC406	
Hydraulic test pressure		1.5MPa	

▶ Install a strainer (40 MESH or more) on the leaflet during installation of the valve.

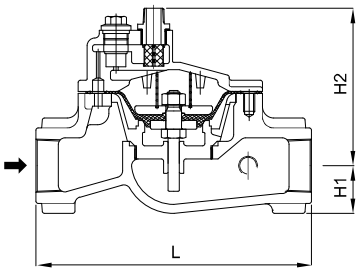
Dimensions

(mm)

Size	L	H1	H2	Cv	Weight(kg)	Notes
32A(1¼")	248	43	135	30	14	Screwed type
40A(1½")	248	43	135	35	15	
50A(2")	248	77.5	135	40	17	Flanged type
65A(2½")	270	87.5	138	62	22	
80A(3")	270	92.5	138	90	22	
100A(4")	288	105	148	140	27	
125A(5")	400	125	225	220	60	
150A(6")	400	140	225	315	69	

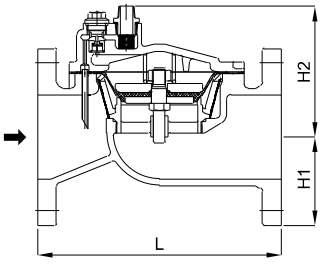
Dimensional drawing

32~40A



YAW-3S Type

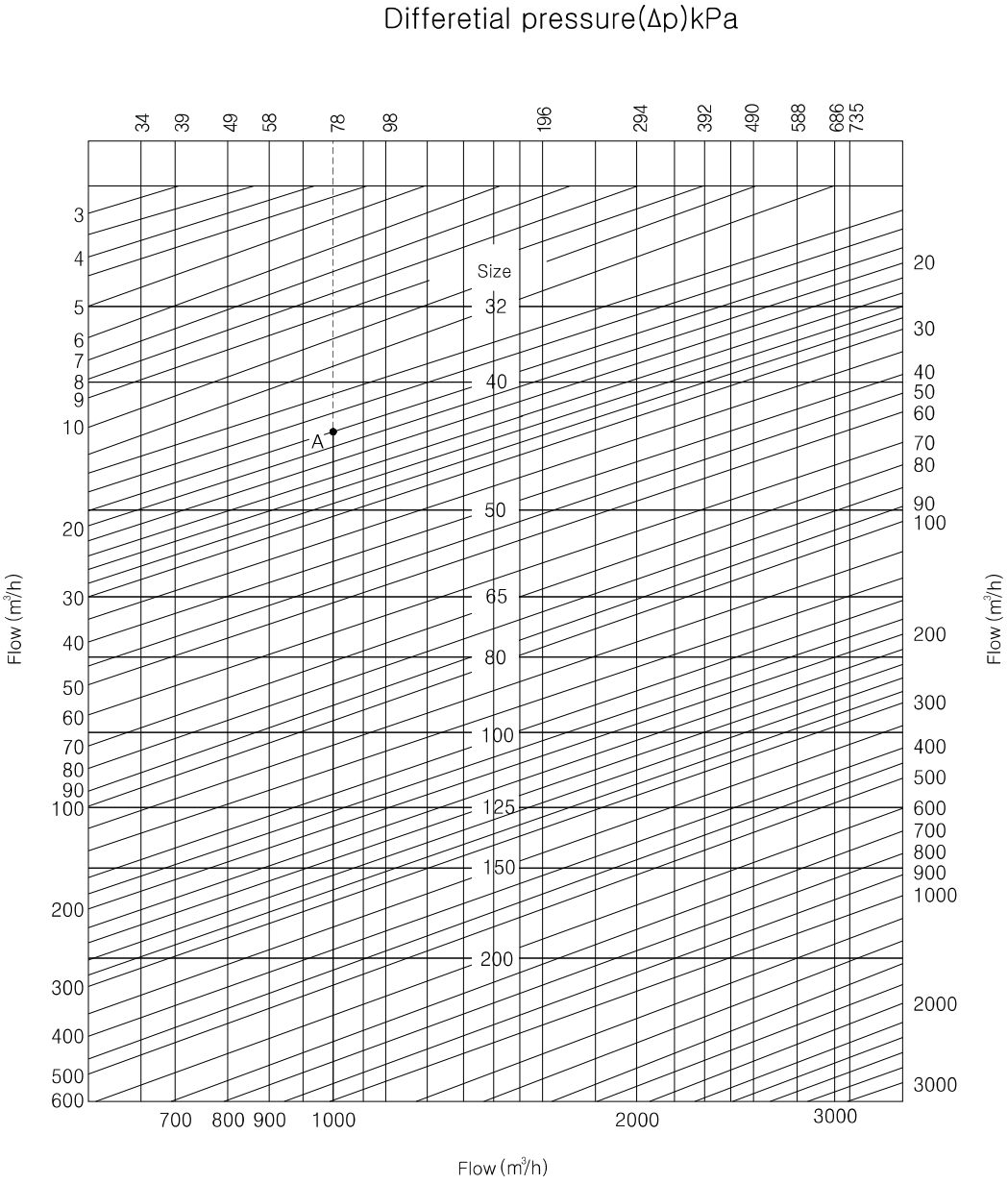
50~150A



YAW-3F Type

YAW-3S, 3F Level Control Valve

Chart on selecting a size



How to select the size of valve by the chart

Example) If the supply pressure is 3 kg/cm²g,

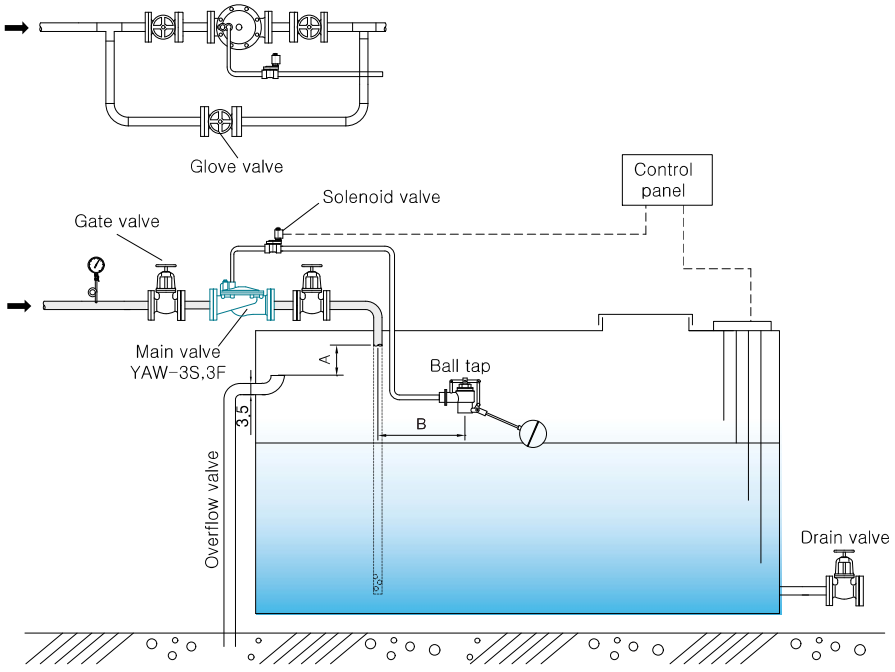
Back pressure is 2.2 kgf/cm²g,

Flow is 18 m³/h,

Then the differential pressure is 0.8 kgf/cm²g. Since ΔP is at the point of intersection between the line of 0.8 kgf/cm²g and a flow of 18 m³/h, the valve's size should be selected as 50 in order to avoid harmful stress on the pipeline.

Type YAW-3S, 3F Level Control Valve

Application Diagram (Example)



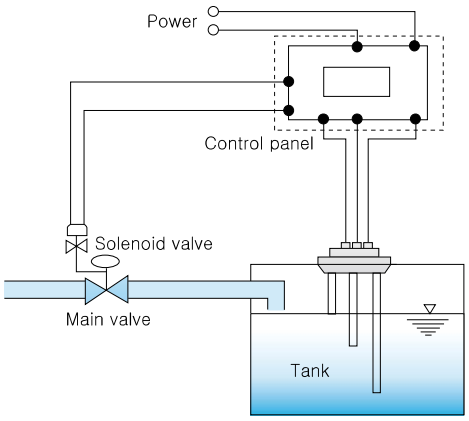
Cautions for pipeline installation

1. A bypass pipeline must be installed.
2. In case of installation in an underground water tank, install a pump or sufficiently pump out water to prevent damages caused by water overflow.
3. The distance of "A" should be at least 1.5 times (minimum 50 mm) the pipe diameter.
4. In case of installation of a ball tap, make the distance of "B" as long as possible (minimum 1 m) to prevent damage to the ball tap resulting from irregular water waves. The ball tap should be installed in close proximity to a manhole for easy repair and inspections.
5. The overflow pipeline should be connected to an underground drainage system. (Prevents damage caused by overflow.)
6. In terms of the end connection between the valve's body and ball tap, a union should be used to ensure easy disassembly and inspection

Cautions for operation

1. Between installation and operation, completely remove foreign substances within the pipeline by blowing them out through the bypass pipeline.
2. If the main valve is not operating due to a power failure or breakdown of the ball tap, use the valve by opening the ball valve and consult Samyang technicians for further instructions. (The ball valve should be closed unless there is an emergency situation.)

Diagram 2. Solenoid valve connecting circuit



YAW-ST

YAW-ST Type level control valve has been developed to control level of water for all types of water tank. With a simple and compact structure, it is easy to handle and install which makes it the best type of level control valve.

Features

- Strainers are built in to prevent the inflow of various impurities in the piping.
- Since there is no external piping, it is easy to keep warm, so there is no concern about freezing.
- Its large capacity makes it suitable for high-rise buildings, artificial reservoirs and high-priced water tanks.

YAW-ST Screwed Type

Specifications

Type		YAW-ST	
Size		32, 40A (Screw type)	50~150A (Flange type)
Applicable pressure		Below 1.0MPa	
Minimum differential pressure in the inlet and outlet side of the valve		0.03kPa	
Fluid Temperature		5~80℃	
Applicable fluid		Water	
Function		On and off operation by a pilot solenoid valve	
Power		AC220V, 50/60Hz	
End Connection		KS PT SCREW	KS 10K FF FLANGE
Materials	Body	STS	
	Disc, Seat	NBR,CAC406	
	Diaphragm	NBR	
Hydraulic test pressure		1.5MPa	

▶ Strainer (over 40 Mesh) installation is required to ahead inlet when valve installing

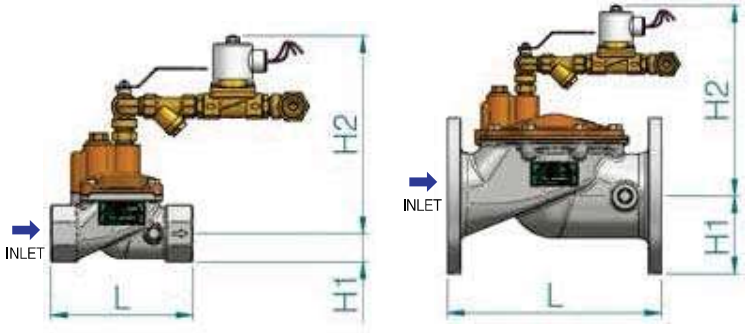
YAW-ST Flange Type

Dimensions

(mm)

Size	L	H1	H2	Cv	Notes
32A(1¼")	160	32	222	30	Screw type
40A(1½")	160	32	222	35	
50A(2")	248	77.5	244	40	Flange type
65A(2½")	270	87.5	247	62	
80A(3")	270	92.5	247	90	
100A(4")	288	105	257	140	
125A(5")	400	125	336	220	
150A(6")	400	140	336	315	

Dimensional drawing



Screwed Type(32, 40A)

Flange Type(50~150A)

Type YAWEL-1 Level Control Valve

The type YAWEL-1 is a largecapacity level control valve that supplies water by opening when the water level inside a water tank goes down to the level at which water supply is commenced. The valve closes when the water level rises to the level at which water supply is stopped. The valve thus features an outstanding performance in controlling the water level.

Features

- Automatically opened & closed, without external power supply even large-diameter.
- No leakage with special rubber diaphragm & disc.
- Attached speed control valve (needle valve) can adjust main valve's opening & closing speed.
- Ensure easy repair & inspections structure.

Specitications

Type		YAWEL-1
Applicable fluid		Fresh water, industrial water, agricultural water
Function		On and off operation by a pilot solenoid valve
Minimum differential pressure in the inlet and outlet side of the valve		Maximum 10 kgf/cm²g
Fluid temperature		5~80℃
Function		On – off operation by solenoid electronic valve
Solenoid Valve	Standard	200~350A : PT1"
	Power	AC220V, 50/60Hz
End connection		KS 10K RF FLANGE
Materials	Body	GC200
	Disc, seat	NBR, CAC406
	Diaphragm	NBR
Hydraulic test pressure		1.5MPa

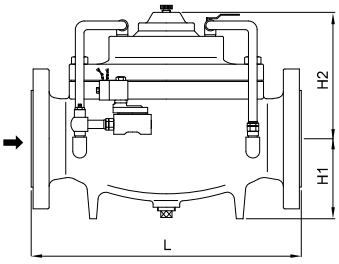
▶ Install a strainer (40 MESH or more) on the leaflet during installation of the valve.

Dimensions

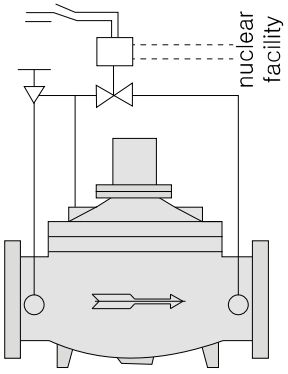
(mm)

Size	L	H1	H2	Cv	Weight(kg)
200(8")	640	210	390	640	205
250(10")	740	250	481	1000	440
300(12")	900	290	557	1440	516

Dimensions drawing

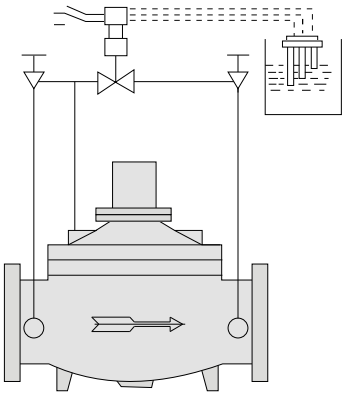


Example of appliaction



1) Automatic control and remote operation

Because it has adopted a balance structure, even a large-diameter valve can be opened and closed with simple power switching operation. It can also offer a remote control function if applied with appropriate wiring.

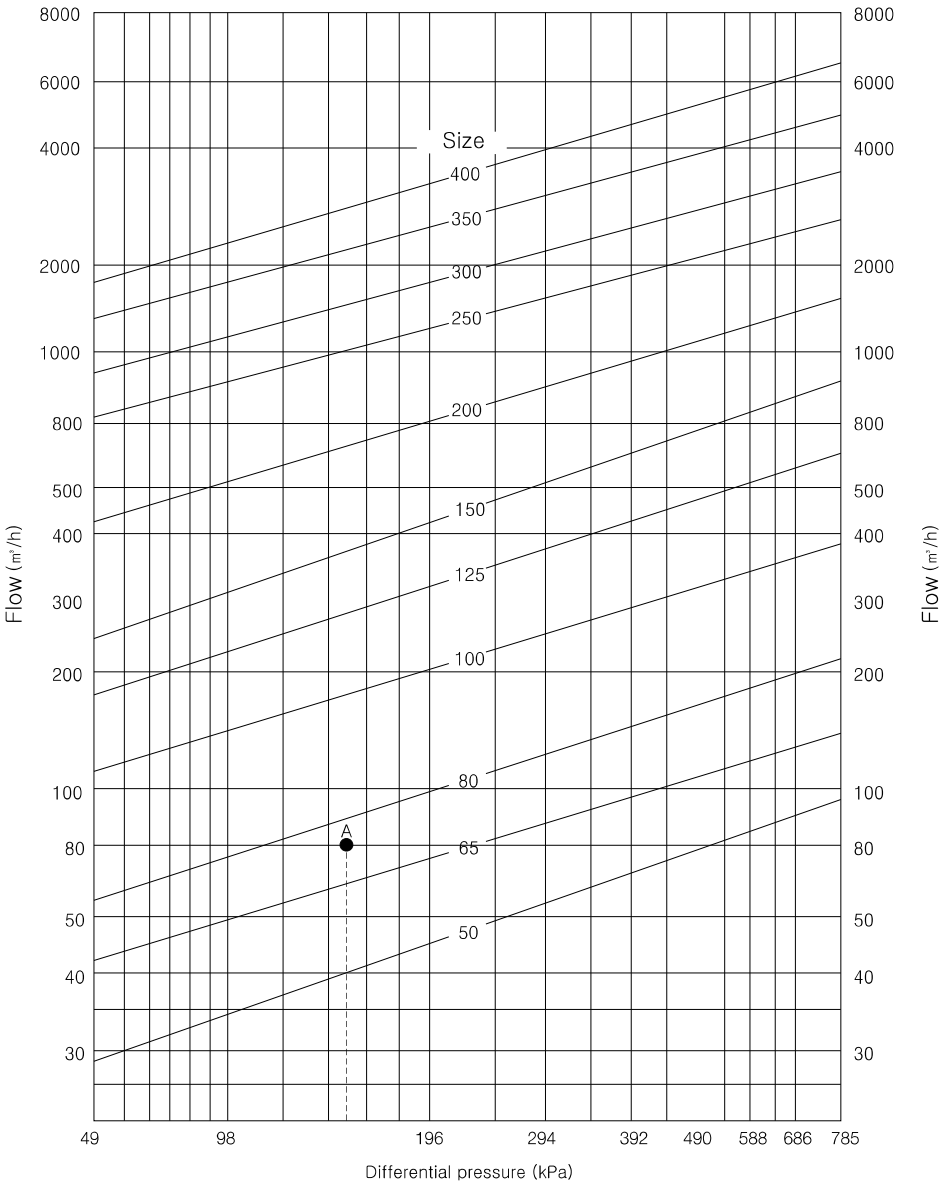


2) Level control function

The valve can be used to maintain a constant water level for water tanks, settling tanks, pressure control tanks, and swimming pools.

Type YAWEL-1 Level Control Valve

Chart on selecting a size

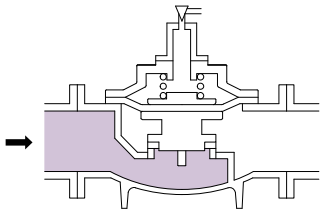


How to determine the nominal diameter of a valve while viewing the diagram

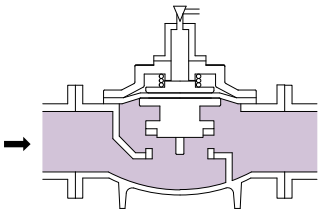
Example) If the primary pressure is 1.5 kg/cm^{2}g, secondary pressure is 0 kg/cm^{2}g, and flow is 80 m^3/h, the differential pressure ΔP is 1.5–0=1.5 (kg/cm^{2}g) since the primary pressure is 1.5 kg/cm^{2}g and secondary pressure is 0kg/cm2g. Determine "A," the point of intersection between the differential pressure (1.5 kg/cm^{2}g) and flow (80 m^3/h). Now that point A is in between a size of 65 and 80, a diameter of 80 should be selected in order to avoid harmful stress on the pipeline.

Type YAWEL-1 Level Control Valve

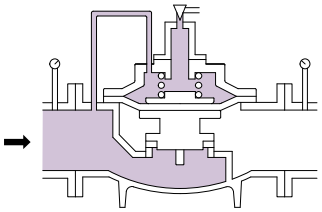
How the valve works



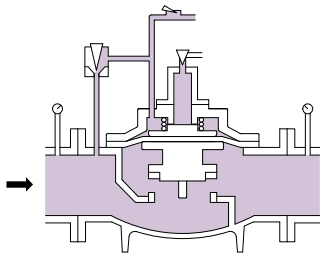
1. At first, the valve is…
The level control valve consists of a main valve and an auxiliary valve. As shown in the diagram, the valve remains closed, by the main valve's weight and the spring's force, when the fluid is not flowing.



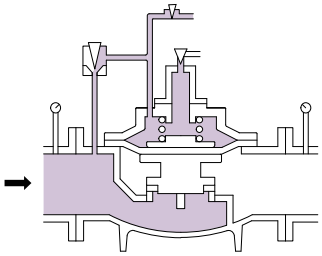
2. When the fluid flows…
When the level control valve receives pressure, the main valve disc, which was closed, is slightlyraised, resulting in the fluid passing through the inside of the valve. In other words, the pressure of the discharged fluid operates in the lower part of the diaphragm and completely opens the main valve.



3. When pressure is applied to the upper part of the diaphragm…
Once the fluid enters the upper part of the diaphragm through the copper tube that connects the inlet of the level control valve with the upper part of the diaphragm, the pressure level of the upper part and lower part of the diaphragm becomes the same. The main valve begins to close as balance is reached between the main valve's weight and the spring's force. In other words, the valve closes when pressure reaches the upper part of the diaphragm, and opens as the pressure disappears.



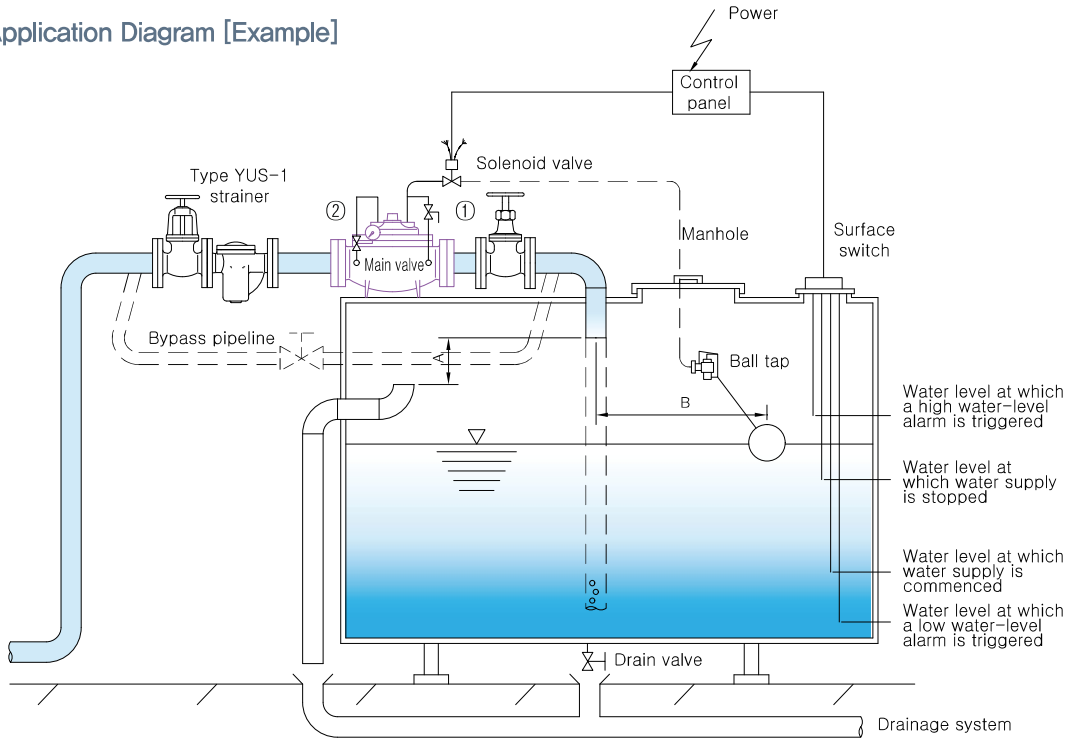
4. When the valve begins to open…
Install a speed control valve in the middle of the copper tube so that one side of the copper tube is installed to two directions. If the speed control valve is adjusted so that the volume of fluid discharged from the discharge valve is larger than the volume of fluid that passed through the speed control valve, the discharge valve remains open. Then the pressure of the upper part of diaphragm goes down and the main valve opens.



5. Whether it can be automatically opened and closed…
Once the discharge valve is closed, pressure accumulates in the upper part of the diaphragm and the main valve closes. When the discharge valve is opened by adjusting it slightly, the force applied to the top and the bottom of the diaphragm reach a balance, and the opening of the main valve is automatically controlled.

Type YAWEL-1 Level Control Valve

Application Diagram [Example]



※ Be sure to pipe the secondary side piping of the water level control valve horizontally and downward. If the water purifier valve is installed on the floor and the secondary piping becomes the upward piping, damage to the valve or water hammer may lead to the primary piping rupture.

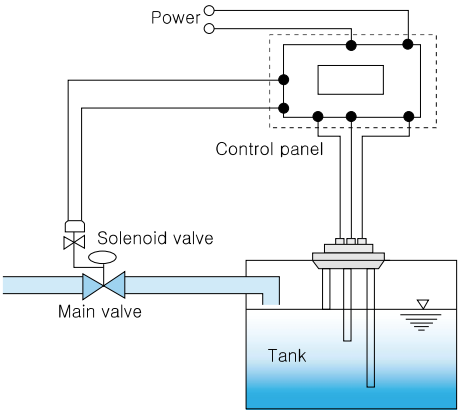
Cautions for pipeline installation

1. A bypass pipeline must be installed.
2. A strainer should be installed on the inlet side of the main valve to prevent the breakdown of the valve resulting from foreign substances.
3. The distance of "A" should be at least 1.5 times (minimum 50 mm) the pipe diameter.
4. In case of installation of a ball tap, make the distance of "B" as long as possible (minimum 1 m) to prevent damage to the ball tap resulting from irregular water waves. The ball tap should be installed in close proximity to a manhole for easy repair and inspections.
5. The overflow pipeline should be connected to an underground drainage system. (Prevents damage caused by overflow.)
6. In terms of the end connection between the valve's body and ball tap, a union should be used to ensure easy disassembly and inspection.
7. The ball tap should be installed at a level lower than the overflow pipeline and higher than the water level at which the high water-level alarm is triggered.
8. Consult with Samyang if there is a need to install the level control valve below the water level within the tank.

Cautions for operation

1. Between installation and operation, completely remove foreign substances within the pipeline by blowing them out through the bypass pipeline.
2. Since the needle valve ② was attached to adjust the opening and closing speed of the main valve, use it to adjust the opening and closing speed when there is a water hammer or pipeline vibration during operation.
3. If the main valve is not operating due to a power failure or breakdown of the ball tap, open and use the ball valve ① and consult Samyang technicians for further instructions. (The ball valve ① should be closed unless there is an emergency situation.)

Diagram 2. Solenoid valve connecting circuit



06

STRAINER / DRAIN SEPARATOR

STRAINER / DRAIN SEPARATOR

YKY-1
YKY-2
YKY-11
YKY-12
YKY-3
YKY-5B
ⓘ – Strainer
YKY-6
YBS-6
YUS-1
YSS-100
YSS-511S
YSS-511F

06
STRAINER / DRAIN SEPARATOR

SAMYANG
SYSTEM GROUP

Strainer / Drain Separator

Strainer

Type	Size	Applicable pressure (MPa)	Body materials	End connection	Page
YKY-1	15(½")~50(2")	Maximum 1.0	GC200	KS PT SCREW	135
YKY-2	20(¾")~450(18")			KS 10K RF FLANGE	
YKY-11	15(½")~50(2")		GC200	KS PT SCREW	136
YKY-12	65(2½")~200(8")			KS 10K RF FLANGE	
YKY-3	15(½")~500(20")	Maximum 2.0	GCD450, SCPH2	KS 20K RF FLANGE	137
YKY-6	15(½")~25(1")	Maximum 1.0	CAC406	KS PT SCREW	138
YKY-5B	32(1¼")~50(2")	Maximum 1.0	CAC301		
YUS-1	20(3/4")~200(12")		GC200	KS 10K RF FLANGE	139
ⓘ – Strainer	50(2")~300(12")				140

Separator

Type	Size	Applicable pressure (MPa)	Body materials	End connection	Page
YSS-100S	15(½")~50(2")	Maximum 2.0	SPPS	KS PT SCREW	141
YSS-100F	15(½")~250(10")			KS 20K RF FLANGE	
YSS-511S	20(¾")~25(1")	Maximum 1.0	CAC303	KS PT SCREW	142
YSS-511F	50(2")~150(6")	Maximum 1.0	Epoxy-coated steel	KS 10K RF FLANGE or Uelding type	142

YKY-1/2 Type Strainer

These are Y-type strainers of cast iron screw and flange type. They are compact and have a large filtering area, and thus are optimal strainers for an automatic valve line.

Specitications

Type		YKY-1	YKY-2
Applicable fluid		Steam, liquid, vapor	
Applicable pressure		Maximum 1.0MPa	
Fluid temperature		80°C below	
End connection		KS PT SCREW	KS 10K RF FLANGE
Materials	Body	GC200	
	Cover	C3771	GC200, C3771
	Screen	STS	
Hydraulic test pressure		1.5MPa	

▶ As wire screen, product which would embed max. 200MESH could be produced upon request.
▶ In terms of flanges, the designated diameter of 20-50A are using RF Type, of 65~200A are using FF Type, and of over 250A are using RF type.

YKY-1 Type

YKY-2 Type

Dimensions

〉〉 YKY-1 Type

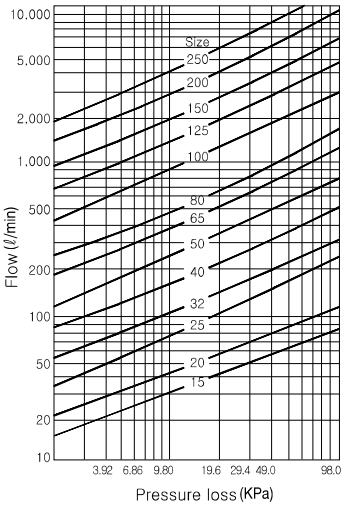
(mm)

Size	L	H	d	Weight(kg)
15(½")	80	60	–	0.5
20(¾")	95	69	–	0.7
25(1")	110	84	⅜"	1.2
32(1¼")	135	105	⅜"	2.0
40(1½")	160	123	⅜"	3.4
50(2")	185	134	⅜"	5.0

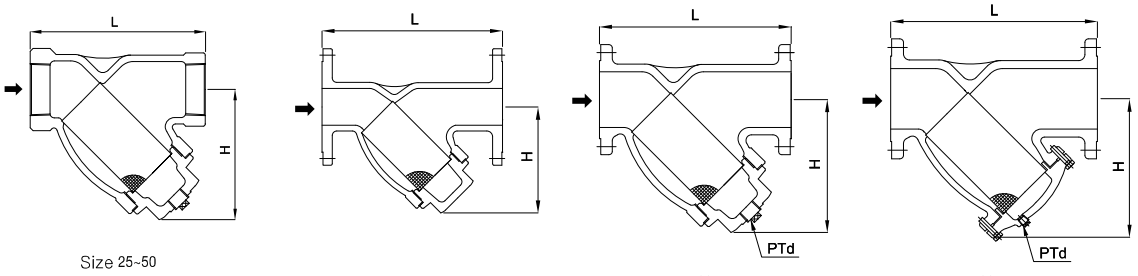
〉〉 YKY-2 Type

Size	L	H	d	Weight(kg)
20(¾")	132	69	–	2.1
25(1")	153	84	⅜"	3.8
32(1¼")	182	105	⅜"	5.3
40(1½")	207	123	⅜"	8.6
50(2")	230	142	⅜"	15.2
65(2½")	285	163	½"	16.6
80(3")	305	195	½"	27.4
100(4")	355	265	½"	42.6
125(5")	405	308	¾"	60.3
150(6")	464	368	¾"	98.5
200(8")	550	484	1"	81.6
250(10")	684	560	1"	165
300(12")	848	792	1"	288
350(14")	1040	848	1"	488
400(16")	1040	890	1"	500
450(18")	1082	960	1"	800

Pressure loss curve



Dimensions drawing



Size 25~50
YKY-11 Type

Size 20

Size 25~50
YKY-12 Type

Size 65~450

※ It is convenient to remove the plug after installation and install the ball valve.

YKY-11, 12 Type Strainer

Features

- Approved by the Korean Industrial Standard (KS B1538).
- Extremely fine meshes screen can filter all foreign substances.
- Designed to ensure easy disassembly & assembly, and has a drain plug installed.

YKY-11 Type

YKY-12 Type

Specitications

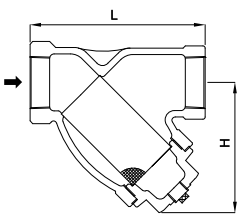
Type		YKY-11	YKY-12
Applicable fluid		Steam	
Applicable pressure		Maximum 1.0MPa	
Fluid temperature		220°C below	
End connection		KS PT SCREW	KS 10K RF FLANGE
Materials	Body	GC200	
	Cover	C3771	GC200, C3771
	Screen	STS Wire Net	
Hydraulic test pressure		1.5MPa	

Dimensions

(mm)

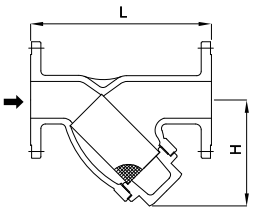
Category	Size	L	H	kg
YKY-11	15(½")	80	60	0.6
	20(¾")	95	69	0.8
	25(1")	110	84	1.2
	32(1¼")	135	105	2
	40(1½")	160	123	3
	50(2")	185	134	4.9
YKY-12	65(2½")	285	163	15
	80(3")	305	195	16
	100(4")	355	265	27
	125(5")	405	308	43
	150(6")	464	368	60
	200(8")	550	484	98

Dimensions drawing

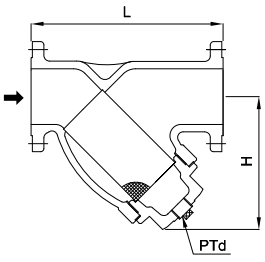


Size 25~50

YKY-11 Type

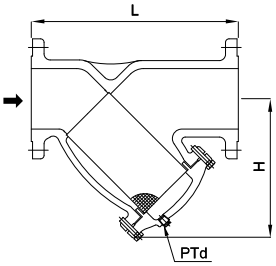


Size 20



Size 25~50

YKY-12 Type



Size 65~450

※ It is convenient to remove the plug after installation and install the ball valve.

YKY-3/3K Type Strainer

This is a Y-type strainer for high pressure. It is compact and has a large filtering area, and thus is an optimal strainer for an automatic valve line.

Specitications

Type		YKY-3
Applicable fluid		Steam, liquid, vapor
Applicable pressure		Maximum 2.0MPa
Fluid temperature		220°C below
End connection		KS 20K RF FLANGE
Materials	Body	GCD450
	Cover	GCD450
	Screen	STS
Hydraulic test pressure		3.0MPa

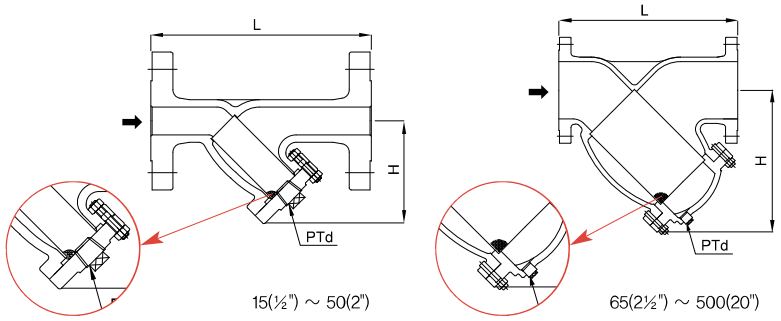
▶ Made-to-orders are available for 30kgf/cm2g.
▶ Custom made for steam.

Dimensions

(mm)

Size	L	H	d	Weight(kg)
15(½")	160	74	⅜"	2.3
20(¾")	160	75	⅜"	2.8
25(1")	190	97	⅜"	4.3
32(1¼")	220	110	⅜"	5.7
40(1 ½")	235	117	⅜"	12.4
50(2")	250	140	⅜"	15.1
65(2½")	256	180	⅜"	23.8
80(3")	300	210	⅜"	25.5
100(4")	390	270	½"	42.5
125(5")	440	310	½"	64.6
150(6")	520	370	¾"	92.3
200(8")	600	490	1"	155
250(10")	750	565	1"	260
300(12")	892	792	1"	480
350(14")	1052	848	1"	750
400(16")	1044	890	1"	700
450(18")	1087	960	1"	1360
500(20")	1252	965	1"	1450

Dimensions drawing



※ It is convenient to remove the plug after installation and install the ball valve.

YKY- 5B/5BK, 6 Type Strainer

These are Y and U-type strainers of bronze screw type. They are compact and have a large filtering area, and thus are optimal strainers for an automatic valve line.

Specitications

Type		YKY-5B	YKY-6	YBS-6(Stop compound valve))
Applicable fluid		Liquid		
Applicable pressure		Maximum 1.0MPa		
Fluid temperature		120℃ below		
End connection		KS PT SCREW		
Materials	Body	CAC406	CAC301	CAC301
	Cover	C3771	C3771	C3771
	Screen	STS		
Hydraulic test pressure		1.5MPa		

YKY-5B Type

Dimensions

⟩⟩ YKY-5B Type

(mm)

Size	L	H	D	Weight(kg)
32(1¼")	95	75	1¼"	1.9
40(1½")	120	90	1½"	2.3
50(2")	145	110	2"	3.3

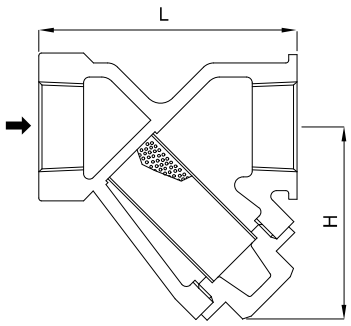
YKY-6 Type

⟩⟩ YKY-6 Type

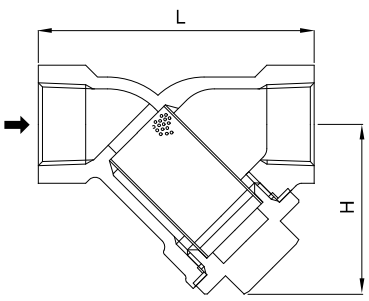
(mm)

Size	L	H	D	Weight(kg)
15(½")	58	50	½"	0.5
20(¾")	72	60	¾"	2.3
25(1")	90	73	1"	3.3

Dimensions drawing



YKY-5B Type



YKY-6 Type

※ It is convenient to remove the plug after installation and install the ball valve.

06

YUS-1 Type Strainer

This is a U-type strainer that is optimal mainly for automatic valves for liquid.

Features

- Easier disassemble screen structure from the top.
- Internal screen ensuring little input loss with sufficient opening area.

Specitications

Applicable fluid		Water, oil, air, steam
Applicable pressure		Maximum 1.0MPa
Fluid temperature		120°Cbelow
End connection		KS 10K RF FLANGE
Materials	Body	GC200
	Screen	STS
Hydraulic test pressure		1.5MPa

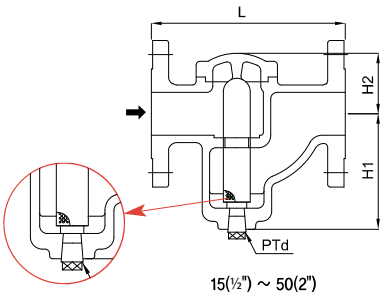
▶ Made-to-orders are available for strainers with embedded dual screens for up to 200 meshes.
▶ Made-to-orders are available for 20 kgf/cm2g.

Dimensions

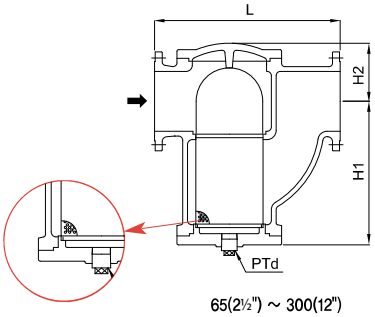
(mm)

Size	L	H1	H2	d	Weight(kg)
20(¾")	185	98	48	½"	8
25(1")	185	98	48	½"	8.2
32(1¼")	207	122	61	½"	9.4
40(1½")	207	122	61	½"	10.2
50(2")	230	135	78	½"	11.3
65(2½")	270	155	89	1"	18.5
80(3")	305	185	100	1"	21.8
100(4")	385	240	115	1"	48.5
125(5")	424	288	148	1½"	74
150(6")	526	360	165	1½"	95
200(8")	620	487	195	2"	290.8

Dimensions drawing

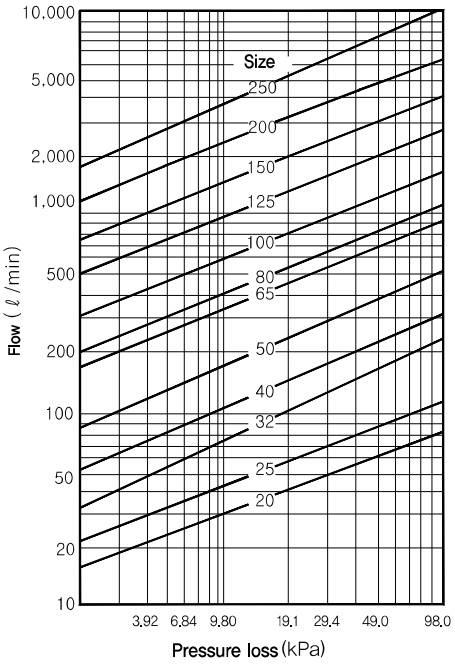


15(½") ~ 50(2")



65(2½") ~ 300(12")

Pressure loss curve



※ It is convenient to install the ball valve after removing the plug after site installation

ⓘ – Strainer

This product features an automatic contamination detection function, minimizes pressure loss, and ensures perfect screen cleaning.

Features

- It ensures easy screen cleaning.
- It has a compact design, and ensures easy installation and handling.
- It minimizes pressure loss.
- It offers a wide range of selection.

Specitications

Category		For general use
Type		ⓘ – Strainer
Designated diameter		50~300A
Applicable fluid		Steam, vapor, liquid
Maximum running temperature		220℃
Applicable pressure		1.0MPa below
End connection		KS 10K RF / FF FLANGE
Materials	Body	GC200
	Screen	STS
Screen		60mesh standard
Hydraulic test pressure		1.5MPa

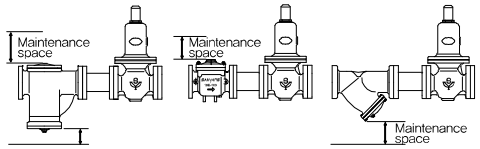
▶ Notes 1 : Strainers with a screen of 40, 80, and 100 meshes or with a punch hole only (perforation, 3 X pitch 4) are also available.
Notes 2 : Main bodies with GCD material (applicable pressure of 1.6 MPa or below) are also available.
Notes 3 : The internal inspection window, differential pressure gauge, and magnetic absorption screen are optional.
Notes 4 : Steam is custom made.

Dimensions

(mm)

Size	L	H1	H2	A	Weight(kg)
50(2")	210	66	63	112	10.8
65(2½")	250	91	84	160	16.2
80(3")	275	105	97	172	20.4
100(4")	300	131	132	204	30.6
125(5")	360	158	144	256	44.8
150(6")	400	174	170	286	66.2
200(8")	480	225	208	372	109
250(10")	600	280	250	436	194
300(12")	720	328	290	488	303

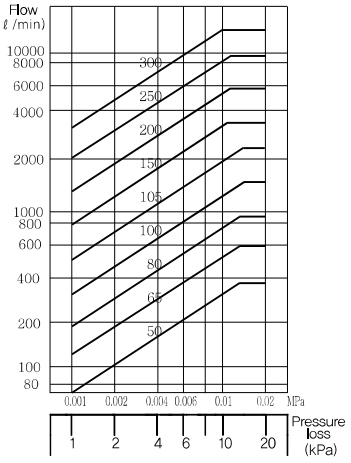
Spatial comparison



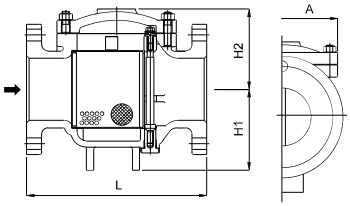
Type	YKT–2				YUS–1				YKY–3			
Size	L	H	M	H+M	L	H	M	H+M	L	H	M	H+M
80A	275	198	115	313	305	285	220	505	300	300	120	420
100A	300	263	150	413	385	355	280	635	390	386	150	536
125A	360	302	175	477	424	436	340	776	440	443	188	631
150A	400	344	195	539	526	525	410	935	520	528	225	753
200A	480	433	250	683	620	682	530	1212	600	700	300	1000

· L: Strainer width · M: Maintenance space
· H: Strainer height · H + M: Total installation space

Pressure loss curve



Dimensions drawing



06

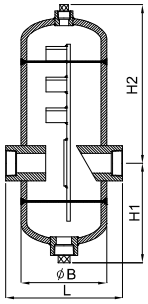
YSS-100S/F Type Drain Separator

This product ensures that there is no pressure loss within the pipeline, and is designed in a way that allows an effective water separation function even when there are flow velocity changes. It can thus be used for steam pipelines as well as compressed air pipelines.

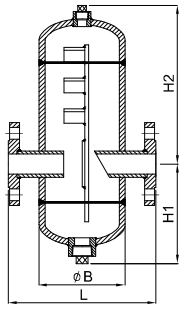
Features

- Protects process facilities & extends life span by preventing damage caused by Water Hammer in steam system.
- Shield board designed condensate which is separated steam's flow efficiently gathered at discharge point.
- Almost no pressure loss within pipeline, efficiently separates condensate even in extensive flow velocity changes.

Dimensions drawing



SCREW TYPE



FLANGE TYPE

Specitications

Applicable fluid		Steam	
Applicable pressure		Maximum 2.0MPa	
Fluid temperature		220°C below	
End connection		KS PT SCREW	KS 20K RF FLANGE
Materials	Body	SPPS	
	Screen	STS	
Hydraulic test pressure		3.0MPa	

▶ In terms of the end connection, the PT, NPT, KS, and ANSI standards can be applied.
▶ Creating an order for 10K.

Dimensions

(mm)

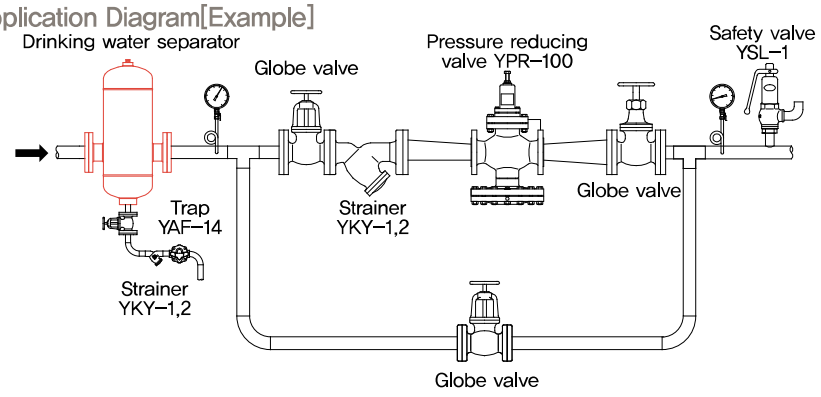
Size	L	H1	H2	ØB	Weight(kg)
15(½")	160(120)	125	175	76	4.1
20(¾")	200(136)	124	200	89	5.9
25(1")	220(162)	131	223	114	8.9
32(1¼")	240(190)	162	258	139	14.1
40(1½")	280(220)	175	320	165	18.7
50(2")	290(220)	209	352	165	21.8
65(2½")	350	246	409	216	37
80(3")	410	305	437	267	60
100(4")	468	367	463	318	85
125(5")	556	350	532	355	136
150(6")	656	375	575	406	195
200(8")	898	421	667	508	313

▶ Made-to-orders are available for water separators with a size of 250 or larger.
▶ Dimensions in parentheses are for the screwed type.

Installation and application in a steam pipeline

- The diameter of the water separator should be the same as the pipeline diameter. The separator should be installed in a horizontal pipeline.
- The condensate gathered at the discharge point of the separator should be immediately discharged. This is why there is a need to install a float steam trap on the lower part.

Application Diagram[Example]



YSS-511S/F Type Air Separator

This is used in cooling and heating systems to continuously remove air contained in fluid. All air generated by systems can be automatically removed, thanks to its superb air discharge capability. Air can be discharged even at the micro-bubble level.

Features

- Used in cooling & heating systems to continuously remove air contained in fluid.
- All air generated by systems can be automatically removed & discharged even at Microbubble level.
- Air-free water enables optimal operation & prevents noise, corrosion, partial overheating, and mechanical damage.
- Complete thermal insulation effects are achieved in cold and hot water systems with lagging material.

YSS-511S Type

Specitications

Type		YSS-511S	YSS-511F
Size		20~25A	50~150A
Applicable pressure		1.0MPa	
Applicable fluid		Cold/hot water	
Fluid temperature		120℃ below	
End connection		KS PT SCREW	KS 10K RF Flange or welding type
Materials	Body	CAC303	Epoxy-coated steel
	Internal parts	STS	STS
	Seal	EPDM	
Waterway		-	PT 1"

YSS-511F Type

Dimensions

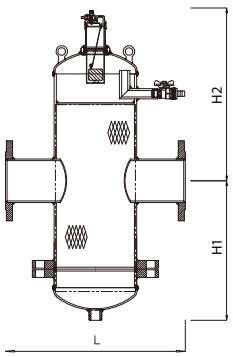
(mm)

Category	Size	L	H1	H2
YSS-511S	20(¾")	75	20	139
	25(1")	80	25	134

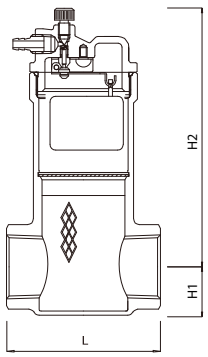
Category	Size	L	H1	H2
YSS-511F	50(2")	350	415	388
	65(2½")	350	415	388
	80(3")	466	472	447
	100(4")	470	472	447
	125(5")	635	578	553
	150(6")	635	578	553

▶ Dimensions are subject to change without prior notice for product quality improvements (performance improvements).
▶ Made-to-orders are available for 200A or larger.

Dimensions drawing



YSS-511F Type

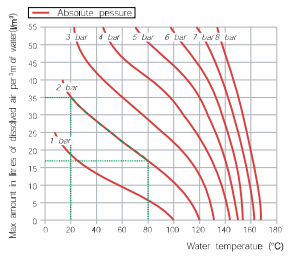


YSS-511S Type

YSS-511 Type Air Separator

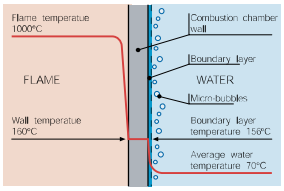
Air formation process

The amount of air included in water depends on the temperature and pressure. This is because of the Henry's law and physical phenomena related to the amount of air discharged from solution, as seen in the graph below. For example, the amount of air that is discharged when water is heated from 20°C to 80°C at the absolute pressure of 2 bar is the same as 18 l/m3 of water. The amount of air that needs to be discharged increases in tandem with a rise in temperature and a reduction in pressure. Air is generated in micro-bubble form. With cavitations in cooling and heating systems, the points at which micro bubbles are created in boilers and other instruments are set.



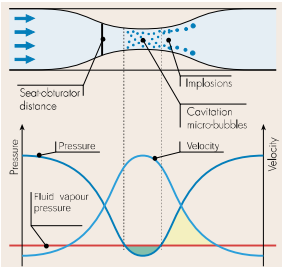
Boiler's micro bubble

Micro bubbles are continuously formed according to the temperature of fluid on the surface that is separated from the combustion chamber. Air is transported by water and is condensed at the dew point in a circuit. Air is partially reabsorbed by the cold surface.



Cavitation and micro bubble

Micro bubbles are formed where there is high flow velocity (usually at a pump impeller and a control valve seat) and when the pressure level drops. Such air and vapor micro bubbles lead to cavitation if not moved.

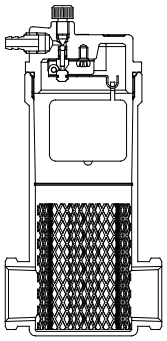


How it works

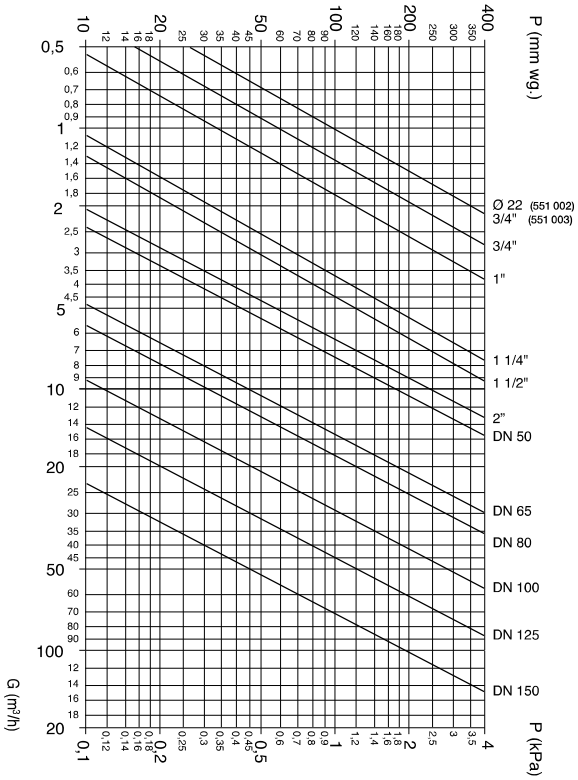
An air separator is based on a combination of various physical principles. The moving parts are composed by concentrating metal mesh nets. They allow for rotating movements, which are required to discharge micro bubbles and attach them to the surface. Bubbles have a structure that makes them combine to increase their size until they gain enough momentum to overcome adhesive force. Bubbles move toward the upper part to be discharged by automatic air vent float operation.

Composition

The air separator is designed so that maintenance for the valve can take place without having to remove the valve from the pipeline. The valve has a connector in the bottom for drain valve connection, and all parts can be disassembled. The automatic air vent on the upper part has a long chamber for float operation, and is designed in a way that ensures that water does not reach the sealing seat. In case of the screwed type, internal parts can be taken out for complete disassembly and assembly. The flanged type and welded type include a drain cock to drain excessive water of a certain water level.



Pressure loss curve



MEMO

07

Bellows Type Ex pansion Pipe Joint / Flexible T u b e

Bellows Type Expansion Pipe Joint / Flexible Tube

YBJ–1S
YBJ–1W
YBJ–2S
YBJ–2W
YBJ–3S
YBJ–3W
YBJ–4S
YBJ–4W
JSY–9B
JSY–9C

07

Bellows Type Expansion Pipe Joint / Flexible Tube

SAMYANG
SYSTEM GROUP

BellowsType Expansion Pipe Joint / Flexible Tube

BellowsType Expansion Pipe Joint

Type	Size	Applicable pressure (MPa)	Category	Expansion/contraction length (mm) Expansion length + Contraction length –	End connection	Page
YBJ–1S	25(1")~300(12")	Maximum 1.0	Single–type steel pipe	+10 –25	KS 10K RF FLANGE	147
YBJ–1W			Double–type steel pipe	+20 –50		
YBJ–2S		Maximum 2.0	Single–type steel pipe	+10 –25	KS 20K RF FLANGE	148
YBJ–2W			Double–type steel pipe	+20 –50		
YBJ–3S	25(1")~100(4")	Maximum 1.0	Single–type steel pipe	+10 –25	KS standard socket welding	149
YBJ–3W			Double–type steel pipe	+20 –50		
YBJ–4S			Single–type steel pipe	+10 –25		150
YBJ–4W			Double–type steel pipe	+20 –50		

Flexible Tube

Type	Size	Applicable pressure (MPa)	Category	End connection	Page
JSY–9B	25(1")~300(12")	Maximum 1.0, 2.0	Flexible tube	KS 10, 20K FF FLANGE	140
JSY–9C	25(1")~400(15")		Metal connector		

YBJ-1S, 1W Bellows Type Expansion Pipe Joint

㉾Mark inscription allowed product/ Korea register of ahipping model approval

The KS B 1536 bellows type expansion pipe joint is mainly used for cooling, heating, air-conditioning, and sanitary pipelines. It is an expansion pipe joint that absorbs the axial-direction expansion and contraction of a pipeline that occurs according to temperature changes.

Features

- Standards of the Korean Industrial Standard (KS B 1536), the Association of the United States Army, and the Korean Register of Shipping (KR).
- Offer strong & outstanding level of corrosion resistance & durability : Parts material come into contact with fluid are made of stainless steel and have been molded.
- Outer tube has been used to prevent damage to bellows from outside impact.
- Inner tube adoption ensures little pressure loss of fluid smooth flow & long life span.

YBJ-1S Type

YBJ-1W Type

Specitications

Type		YBJ-1S	YBJ-1W
Structure		Single type	Double type
Applicable fluid		Cold/hot water, Air, Gas, Oil	
Applicable pressure		Maximum 1.0MPa	
Fluid temperature		220℃ below	
Expansion/contraction length		35mm	70mm
End connection		KS 10K RF FLANGE	
Materials	BELLOWS, Inner tube	STS	
	Outer tube	SPP	
	FLANGE	SS400	
Hydraulic test pressure		1.5MPa	

▶ Do not couple this product with a copper pipeline.
▶ Those used for ANSI #125, #150, and steel flanges are available by made-to-orders.
▶ Over 250A is KS 10K FF FLANGE.
▶ 300A or larger are available by made-to-orders.
▶ The fixing bolt should be loosened after the hydro-pressure test.
▶ Custom made for steam.

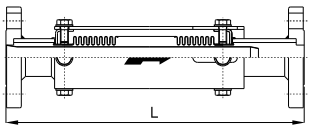
Dimensions

〉〉 YBJ-1S Type

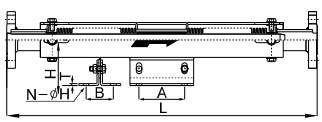
(mm)

Size	L	Expansion/contraction length		Weight(kg)
		Expansion length	Contraction length	
25(1")	365	10	25	6.4
32(1¼")	365	10	25	6.9
40(1½")	365	10	25	8.3
50(2")	365	10	25	10.9
65(2½")	415	10	25	13.4
80(3")	415	10	25	15.5
100(4")	415	10	25	21.2
125(5")	440	10	25	30.4
150(6")	440	10	25	41.4
200(8")	440	10	25	52.3
250(10")	465	10	25	60.2
300(12")	465	10	25	68.1

Dimensions drawing



YBJ-1S Type



YBJ-1W Type

〉〉 YBJ-1W Type

(mm)

Size	L	Expansion/contraction length		H	A	B	T	N	Weight(kg)
		Expansion length	Contraction length						
25(1")	680	20	50	100	100	60	4	4-Ø12	11
32(1¼")	680	20	50	120	100	70	4	4-Ø12	13
40(1½")	680	20	50	120	100	70	4	4-Ø12	15
50(2")	680	20	50	130	100	80	5	4-Ø15	19
65(2½")	780	20	50	140	120	100	5	4-Ø15	21
80(3")	780	20	50	150	120	110	5	4-Ø15	29.5
100(4")	880	20	50	170	120	130	6	4-Ø19	43
125(5")	880	20	50	200	120	150	8	4-Ø19	62.5
150(6")	930	20	50	220	160	180	10	4-Ø23	70
200(8")	930	20	50	250	160	220	14	4-Ø25	135
250(10")	980	20	50	290	180	280	14	4-Ø27	166
300(12")	980	20	50	350	200	300	18	4-Ø27	190

YBJ–2S, 2W Bellows Type Expansion Pipe Joint

Ⓚ Mark inscription allowed product/ Korea register of ahipping model approval

The KS B 1536 bellows type expansion pipe joint is mainly used for cooling, heating, air–conditioning, and sanitary pipelines. It is an expansion pipe joint that absorbs the axial–direction expansion and contraction of a pipe that occurs according to temperature changes.

Features

- Standards of the Korean Industrial Standard (KS B 1536), the Association of the United States Army, and the Korean Register of Shipping (KR).
- Offer strong & outstanding level of corrosion resistance & durability : Parts material come into contact with fluid are made of stainless steel and have been molded.
- Outer tube has been used to prevent damage to bellows from outside impact.
- Inner tube adoption ensures little pressure loss of fluid, smooth flow & long life span.

YBJ–2S Type

YBJ–2W Type

Specitications

Type		YBJ–2S	YBJ–2W
Structure		Single type	Double type
Applicable fluid		Cold/hot water, Air, Gas, Oil	
Applicable pressure		Maximum 2.0MPa	
Fluid temperature		250℃ below	
Expansion/contraction length		35mm	70mm
End connection		KS 20K RF FLANGE	
Materials	BELLOWS, Inner tube	STS	
	Outer tube	SPP	
	FLANGE	SS400	
Hydraulic test pressure		3.0MPa	

▶ Do not couple this product with a copper pipeline.
▶ Those used for ANSI #125, #150, #300, and steel flanges are available by made–to–orders.
▶ Over 250A is KS 10K FF FLANGE.
▶ 350A or larger are available by made–to–orders.
▶ The fixing bolt should be loosened after the hydro–pressure test.
▶ Custom made for steam.

Dimensions

›› YBJ–2S Type

(mm)

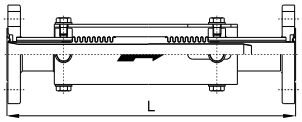
Size	L	Expansion/contraction length		Weight(kg)
		Expansion length	Contraction length	
25(1")	365	10	25	6.4
32(1¼")	365	10	25	6.9
40(1½")	365	10	25	8.3
50(2")	365	10	25	10.9
65(2½")	415	10	25	13.4
80(3")	415	10	25	15.5
100(4")	415	10	25	21.2
125(5")	440	10	25	30.4
150(6")	440	10	25	41.4
200(8")	440	10	25	52.3
250(10")	465	10	25	60.2
300(12")	465	10	25	68.1

›› YBJ–2W Type

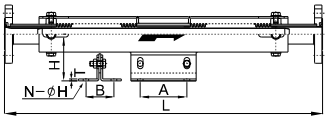
(mm)

Size	L	Expansion/contraction length		H	A	B	T	N	Weight(kg)
		Expansion length	Contraction length						
25(1")	680	20	50	100	100	60	4	4–Ø12	11
32(1¼")	680	20	50	120	100	70	4	4–Ø12	13
40(1½")	680	20	50	120	100	70	4	4–Ø12	15
50(2")	680	20	50	130	100	80	5	4–Ø15	19
65(2½")	780	20	50	140	120	100	5	4–Ø15	21
80(3")	780	20	50	150	120	110	5	4–Ø15	29.5
100(4")	880	20	50	170	120	130	6	4–Ø19	43
125(5")	880	20	50	200	120	150	8	4–Ø19	62.5
150(6")	930	20	50	220	160	180	10	4–Ø23	70
200(8")	930	20	50	250	160	220	14	4–Ø25	135
250(10")	980	20	50	290	180	280	14	4–Ø27	166
300(12")	980	20	50	350	200	300	18	4–Ø27	190

Dimensions drawing



YBJ-2S Type



YBJ-2W Type

YBJ-3S, 3W Bellows Type Expansion Pipe Joint

㉾Mark inscription allowed product/ Korea register of ahipping model approval

This is an expansion pipe joint used for cold water, hot water, or other copper pipelines.

Features

- Absorb the expansion & contraction of pipelines by temperature changes.
- Stainless steel ensuring high level of corrosion resistance leads little fluid pressure loss : Inner tube materials which come into contact with fluid are made of stainless steel.
- Outer tube has been used to prevent damage to bellows from impact.
- Internal pressure type product prevents noise.

YBJ-3S Type

YBJ-3W Type

Specitications

Type		YBJ-3S	YBJ-3W
Structure		Single type	Double type
Applicable fluid		Cold/hot water, Oil, Air	
Applicable pressure		Maximum 1.0MPa	
Fluid temperature		220°C below	
Expansion/contraction length		35mm	70mm
End connection		KS D 5578 Dimensions-based socket-welded type	
Materials	BELLOWS, Inner tube	STS	
	Outer tube	SPP	
	SOCKET	CuT	
Hydraulic test pressure		1.5MPa	

▶ The fixing bolt should be loosened after the hydro-pressure test. ▶ Custom made for steam.

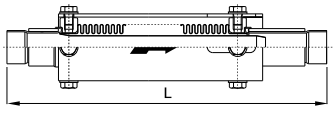
Dimensions

〉〉 YBJ-3S Type

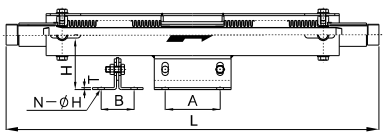
(mm)

Size	L	Expansion/contraction length		Weight(kg)
		Expansion length	Contraction length	
25(1")	365	10	25	4.1
32(1¼")	365	10	25	4.1
40(1 ½")	365	10	25	5.2
50(2")	365	10	25	7.1
65(2½")	415	10	25	8.2
80(3")	415	10	25	10.3
100(4")	415	10	25	15.7
125(5")	440	10	25	30.4
150(6")	440	10	25	41.4
200(8")	440	10	25	52.3

Dimensions drawing



YBJ-3S Type



YBJ-3W Type

〉〉 YBJ-3W Type

(mm)

Size	L	Expansion/contraction length		H	A	B	T	N-øH	Weight(kg)
		Expansion length	Contraction length						
25(1")	680	20	50	100	100	60	4	4-Ø12	8.7
32(1¼")	680	20	50	120	100	70	4	4-Ø12	10.0
40(1½")	680	20	50	120	100	70	4	4-Ø12	11.9
50(2")	680	20	50	130	100	80	5	4-Ø15	15.2
65(2½")	780	20	50	140	120	100	5	4-Ø15	15.8
80(3")	780	20	50	150	120	110	5	4-Ø15	24.3
100(4")	880	20	50	170	120	130	6	4-Ø19	37.5

YBJ–4S, 4W Bellows Type Expansion Pipe Joint

Ⓚ Mark inscription allowed product/ Korea register of ahipping model approval

This is used to absorb the axialdirection expansion and contraction of a pipeline that occurs according to temperature changes. Since it is an internal pressure type, it is buckling–free and ensures smooth expansion/contraction.

Features

- Absorb the expansion & contraction of pipelines by temperature changes.
- Outstanding level of corrosion resistance : Parts materials come into contact with fluid are made of stainless steel.
- Outer tube has been used to prevent damage to the bellows from impact..

YBJ–4S Type

YBJ–4W Type

Specitications

Type		YBJ–4S	YBJ–4W
Structure		Single type	Double type
Applicable fluid		Cold/hot water, Oil, Air, Steam	
Applicable pressure		Maximum 1.0MPa	
Fluid temperature		220℃ below	
Expansion/contraction length		35mm	70mm
End connection		KS D 3507 Dimensions–based socket–welded type	
Materials	BELLOWS, Inner tube	STS	
	Outer tube	SPP	
	SOCKET	SPP	
Hydraulic test pressure		1.5MPa	

▶ The fixing bolt should be loosened after the hydro–pressure test.

▶ Custom made for steam.

Dimensions

〉〉 YBJ–4S Type

(mm)

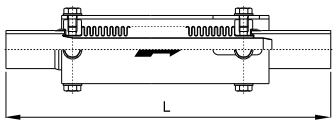
Size	L	Expansion/contraction length		Weight(kg)
		Expansion length	Contraction length	
25(1")	365	10	25	4.1
32(1¼")	365	10	25	4.1
40(1½")	365	10	25	5.2
50(2")	365	10	25	7.1
65(2½")	415	10	25	8.2
80(3")	415	10	25	10.3
100(4")	415	10	25	15.7

〉〉 YBJ–4W Type

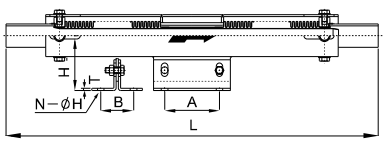
(mm)

Size	L	Expansion/contraction length		H	A	B	T	N–øH	Weight(kg)
		Expansion length	Contraction length						
25(1")	680	20	50	100	100	60	4	4–Ø12	8.7
32(1¼")	680	20	50	120	100	70	4	4–Ø12	10.0
40(1½")	680	20	50	120	100	70	4	4–Ø12	11.9
50(2")	680	20	50	130	100	80	5	4–Ø15	15.2
65(2½")	780	20	50	140	120	100	5	4–Ø15	15.8
80(3")	780	20	50	150	120	110	5	4–Ø15	24.3
100(4")	880	20	50	170	120	130	6	4–Ø19	37.5

Dimensions drawing

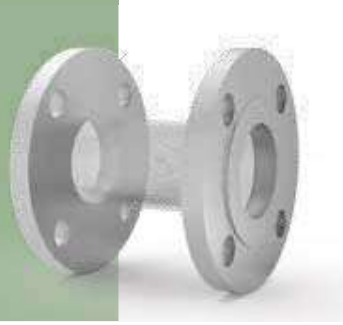


YBJ-4S Type



YBJ-4W Type

JSY-9B Flexible Tube



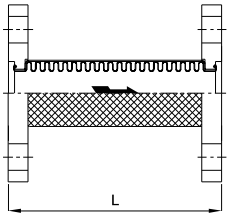
Features

- This product has a short distance among the surfaces and has a structure that allows it to absorb an extensive expansion/contraction length, making it especially ideal for pump connectors.

Specitications

Applicable fluid		Cold/hot water, Oil, Air, Steam	
Maximum running pressure		Maximum 1.0MPa	Maximum 2.0MPa
Maximum applicable temperature		220°C below	
End connection		KS 10K FF FLANGE	KS 20K FF FLANGE
Materials	BELLOWS	STS	
	FLANGE	SS400	
Hydraulic test pressure		1.5MPa	3.0MPa

Dimensions drawing



Dimensions

(mm)

Size	25(1")	32(1¼")	40(1½")	50(2")	65(2½")	80(3")
L	200	200	230	230	230	230
Weight(kg)	2.5	3.5	3.9	4.2	5.9	6.5

Size	100(4")	125(5")	150(6")	200(8")	250(10")	300(12")
L	230	280	280	300	300	300
Weight(kg)	7.2	10.5	14	17.1	26	40

JSY-9C/9CK Flexible Tube (TIE-ROD TYPE)

Features

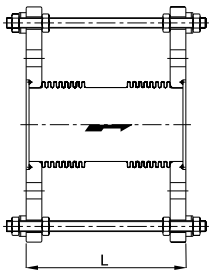
- This product has a simple structure, a short pipeline length, and absorbs a large amount of expansion/ contraction and vibration, making it ideal for classic pipelines, tank pipelines, and pump connectors.

Specitications

Applicable fluid		Cold/hot water, Oil, Air, Steam	
Maximum running pressure		Maximum 1.0MPa	Maximum 2.0MPa
Maximum applicable temperature		220°C below	250°C below
End connection		KS 10K FF FLANGE	KS 20K FF FLANGE
Materials	BELLOWS	STS	
	FLANGE	SS400	
Hydraulic test pressure		1.5MPa	3.0MPa

▶ Custom made for steam.

Dimensions drawing



Dimensions

(mm)

Size	25(1")	32(¼")	40(½")	50(2")	65(2½")	80(3")	100(4")
L	90	90	90	130	130	130	130

Size	125(5")	150(6")	200(8")	250(10")	300(12")	350(14")	400(16")
L	150	150	150	210	210	210	210

※ After installing the installation, loosen the inside nuts inside the flange.

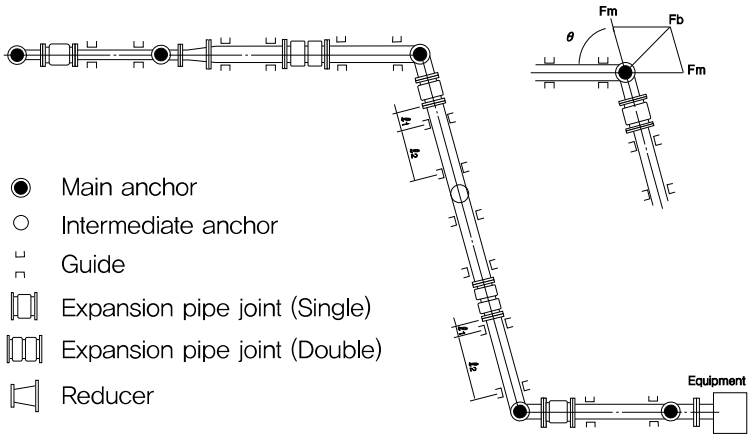
Data / Bellows Type Expansion Pipe Joint

How to select a bellows type expansion pipe joint

● Sequence of selecting an expansion pipe joint

1) Categorize the two ends of a straight pipeline, a branch pipeline, a reducer–using part, a valve installation point, and a curved section of the pipeline as main anchors.
2) Identify the pipeline length among the main anchors.
3) Calculate the expansion/contraction length for each main anchor section, based on the difference of maximum temperature of applicable fluid, air temperature during installation, and minimum ambient temperature.
4) Determine how many joints need to be installed by dividing the expansion/contraction length of each section by the allowed expansion/contraction length of the expansion pipe joint.
5) If there is a need to install two or more expansion pipe joints, first select a double type and then a single type.
6) Decide on intermediate ancho rand guides so that the expansion pipe joint can smoothly engage in axial–direction expansion/contraction operation.

● Example of pipeline installation and symbols



ℓ_1 : Distance of guide no. 1
ℓ_2 : Distance of guide no. 2

● Pipe's expansion/contraction length (based on calculation)

Basic formula $\Delta\ell = \alpha \times \Delta t \times L$
Maximum expansion length calculation formula $\Delta\ell = \alpha \times (T - t_1) \times L$
Maximum contraction length calculation formula $\Delta\ell = \alpha \times (t_1 - t_2) \times L$

$\Delta\ell$: Expansion/contraction length of pipe(mm)
α : Pipe's expansion coefficient
Steel pipe : 12.2×10^{-3}mm/m℃
Copper pipe : 17.7×10^{-3}mm/m℃
Stainless pipe : 18.4×10^{-3}mm/m℃
Δt : Temperature difference(℃)
L : L : Pipeline length(m)
T : T : Maximum applicable temperature (℃)
t_1 : t1 : Temperature during installation(℃)
t_2 : t2 : Minimum ambient temperature(℃)

※ The expansion/contraction of a pipe is heavily dependent on the temperature of the applied fluid. The pipe expands or contracts according to changes in the maximum running temperature, minimum ambient temperature, etc. based on the temperature at the point of installation.

● Deciding on the number of joints

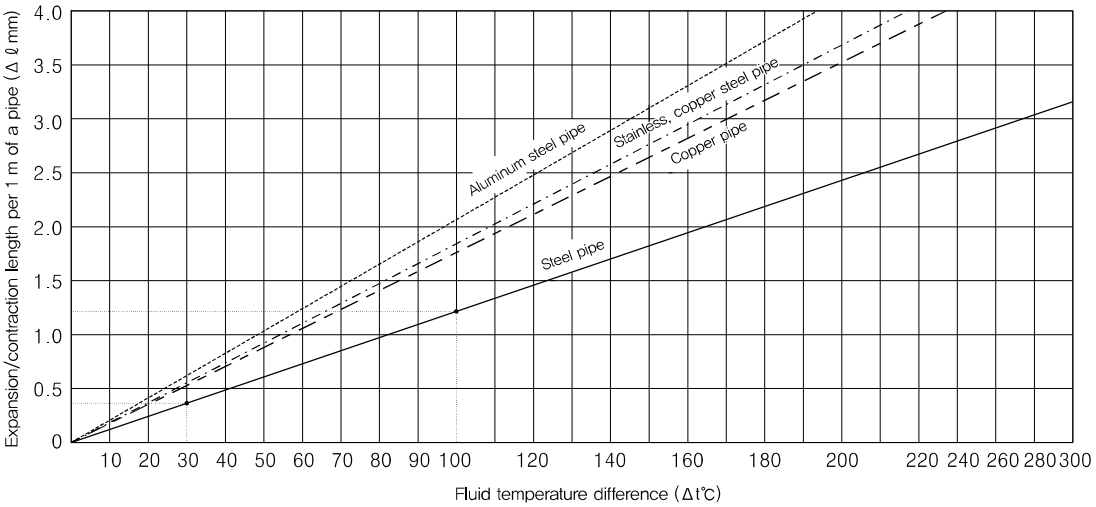
$$N = \frac{\Delta\ell}{\delta}$$

N : Installation quantity
$\Delta\ell$: Expansion or contraction length of the pipe
δ : Maximum elongation

Data / Bellows Type Expansion Pipe Joint

Pipe's expansion/contraction length according to temperature changes

▶ Diagram 1 Expansion/contraction length of a pipe (Expansion/contraction length per 1 m of a pipe)

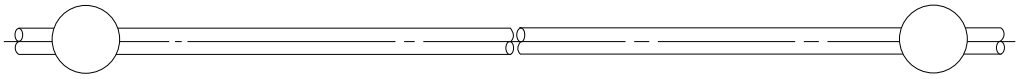


▶Table 1 Expansion/contraction length of a pipeline (Expansion/contraction length corresponding to different pipeline lengths)

Pipe type	Pipe length	Fluid temperature difference Δt℃																						Pipe length
		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	
Steel pipe	1	0.122	0.244	0.366	0.488	0.61	0.732	0.854	0.976	1.1	1.22	1.34	1.46	1.59	1.71	1.83	1.95	2.07	2.2	2.32	2.44	2.56	2.68	1
	5	0.61	1.22	1.83	2.44	3.05	3.66	4.27	4.88	5.49	6.1	6.71	7.32	7.63	8.54	9.15	9.76	10.4	11.0	11.6	12.2	12.8	13.4	5
	10	1.22	2.44	3.66	4.88	6.1	7.32	8.54	9.76	11.0	12.2	13.4	14.6	15.9	17.1	18.3	19.5	20.7	22.0	23.2	24.4	25.6	26.8	10
	15	1.83	3.66	5.49	7.32	9.15	11.0	12.8	14.6	16.5	18.3	20.1	22.0	23.8	25.6	2735	29.3	31.1	32.9	34.8	36.6	38.4	40.3	15
	20	2.44	4.88	7.32	9.76	12.2	14.6	17.1	19.5	22.0	24.4	26.8	29.3	31.7	34.2	36.6	39.0	41.5	43.9	46.4	48.8	51.2	53.7	20
	25	3.05	6.1	9.15	12.2	15.3	18.3	21.4	24.4	27.5	30.5	33.6	39.7	42.7	45.8	48.8	51.9	54.9	58.0	61.0	61.0	64.1	67.1	25
	30	3.66	7.32	11.0	14.6	18.3	2200	25.6	29.3	32.9	36.6	40.3	43.9	47.6	51.2	54.9	58.6	62.2	65.9	69.5	73.2	76.9	80.5	30
	35	4.27	8.54	12.8	17.1	21.4	25.6	29.9	34.2	38.4	42.7	47.0	51.2	55.5	59.8	64.1	68.3	72.6	76.9	81.1	85.4	89.7	93.9	35
	40	4.88	9.76	14.6	19.5	24.4	29.3	34.2	39.0	43.9	48.8	53.7	58.6	63.4	68.3	73.2	78.1	83.0	87.8	92.7	97.6	102.5	107.4	40
Copper pipe	1	0.177	0.354	0.531	0.708	0.885	1.06	1.24	1.42	1.59	1.77	1.95	2.12	2.30	2.48	2.66	2.83	3.01	3.19	3.36	3.54	3.72	3.89	1
	5	0.885	1.77	2.66	3.54	4.43	5.31	6.2	7.1	7.97	8.85	9.74	10.6	11.5	12.4	13.3	14.2	15.1	15.9	16.8	11.7	18.6	19.5	5
	10	1.77	3.54	5.31	7.1	8.85	10.6	12.4	15.9	17.7	19.5	21.2	23.0	24.8	26.6	28.3	30.1	31.9	33.6	35.4	37.2	3	38.9	10
	15	2.66	5.31	7.97	10.6	13.3	15.9	18.6	21.2	23.9	26.6	29.2	31.9	34.5	37.2	39.8	42.5	45.1	47.8	50.5	53.1	55.8	58.4	15
	20	3.54	7.1	10.6	14.2	17.7	21.2	24.8	28.3	31.9	35.4	38.9	42.5	46.0	49.6	53.1	56.6	50.2	63.7	67.3	70.8	74.3	77.9	20
	25	4.43	8.85	13.3	17.7	22.1	26.6	31.0	35.4	39.8	44.3	48.7	53.1	57.5	62.0	66.4	70.8	75.2	79.7	84.1	88.5	92.9	97.4	25
	30	5.31	10.6	15.9	21.2	26.6	31.9	37.2	42.5	47.8	53.1	58.4	63.7	69.0	74.3	79.7	85.0	90.3	65.6	100.9	6.2	111.5	116.8	30
	35	6.2	12.4	18.6	24.8	31.0	37.2	43.4	49.6	55.8	62.0	68.2	74.3	80.5	86.7	92.9	99.1	105.3	111.5	117.7	123.9	130.0	136.3	35
	40	7.1	14.2	21.2	28.3	35.4	42.5	49.6	56.6	63.7	70.8	77.9	85.0	92.0	99.1	106.2	113.3	120.4	127.4	135.5	141.6	148.7	155.8	40
Stainless steel pipe	1	0.184	0.368	0552	0.736	0.92	1.1	1.29	1.047	1.66	1.84	2.02	2.21	2.39	2.58	2.76	2.94	3.13	3.31	3.5	3.68	3.86	4.08	1
	5	0.92	1.84	2.76	3.68	4.6	5.52	6.44	7.36	8.28	9.2	10.1	11.0	12.0	12.9	13.8	14.7	15.6	16.6	17.5	18.4	19.3	20.2	5
	10	1.84	3.68	5.52	7.36	9.2	11.0	12.9	14.7	16.6	18.4	20.2	22.1	23.9	25.8	26.6	29.4	31.3	33.1	35.0	36.8	38.6	40.5	10
	15	2.76	5.52	8.28	11.0	13.8	16.6	19.3	22.1	24.8	27.6	30.4	33.1	35.9	38.6	41.4	44.2	46.9	49.7	52.4	55.2	58.0	60.7	15
	20	3.68	7.36	11.0	14.7	18.4	22.1	25.8	29.4	33.1	36.8	40.5	44.2	47.8	51.5	55.2	58.9	62.6	66.2	69.6	73.6	77.3	81.0	20
	25	4.6	9.2	13.8	18.4	23.0	27.6	32.2	36.8	41.4	46.0	50.6	55.2	59.8	64.4	69.0	73.6	78.2	82.8	87.4	92.0	96.6	101.2	25
	30	5.52	11.0	16.6	22.1	27.6	33.1	38.6	44.2	49.7	55.2	60.7	66.2	71.8	77.3	82.8	88.3	93.2	99.4	104.9	110.4	115.9	121.4	30
	35	6.44	12.9	19.3	25.8	32.2	38.6	45.1	51.5	58.0	64.4	70.8	77.3	83.7	90.2	96.6	103	109.5	115.9	122.4	128.8	135.2	141.7	35
	40	7.36	14.7	22.1	29.4	36.8	44.2	51.5	58.9	66.2	73.6	81.0	88.3	95.7	103	110.4	117.8	125.1	132.5	139.8	147.2	154.6	161.9	40

Data / Bellows Type Expansion Pipe Joint

Example of seleting a bellows type expansion pipe joint



- Pipeline length(ℓ) = 30m
- Maximum applicable temperature(t_1) = 110℃
- Temperature during installation(t_2) = –10℃
- If the ambient temperature (t3) equals 20℃ during installation

First : Calculate the pipe's expansion/contraction length.

The temperature difference of the pipe's expanding axis is $\Delta t_1 = t_1 - t_3 = 110 - 20 = 90℃$

The temperature difference of the pipe's contracting axis is $\Delta t_2 = t_3 - t_2 = 20 - (-10) = 30℃$

While referring to the pipe's expansion/contraction length (Table 1), find the point where the pipe's length is 30 m when the fluid'stemperature difference is (Δt)90℃, and make a perpendicular connection. The length of pipe expansion($\Delta \ell_1$) is 32.9 mm. Find the point where the pipe's length is 30 m when the fluid's temperature difference is (Δt)30℃, and make a perpendicular connection. The length of pipe contraction ($\Delta \ell_2$) is 11.00 mm.

Second : Once the expansion/contraction length is determined, decide on the type of the bellows type expansion pipe joint and the number of joints.

When selecting the type YBJ–1S (single), which is a product approved with a Korean Industrial Standard mark

In case of a single bellows type expansion pipe joint

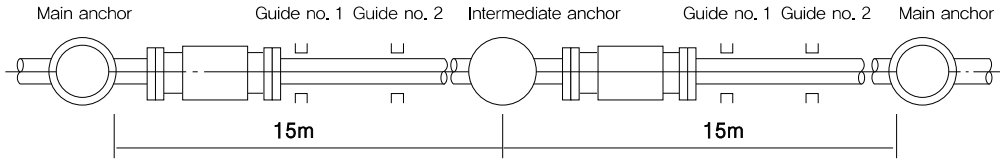
Pipe–expanding side (δ = 50mm)
Pipe–contracting side (δ = 20mm)

Therefore,

$$n = \frac{\Delta \ell_1}{\delta} = \frac{32.9}{25} = 1.32 \text{ joints}$$

$$n = \frac{\Delta \ell_2}{\delta} = \frac{11.0}{10} = 1.1 \text{ joints}$$

Since the number of joints of the side that is bigger between the pipe–expanding side and pipe–contracting side is adopted, the number of the single bellows type expansion pipe joint becomes two.



When selecting the type YBJ–2W (double), which is a product approved with a Korean Industrial Standard mark

In case of a double bellows type expansion pipe joint

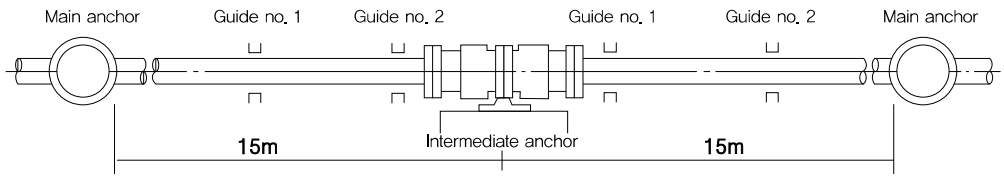
Pipe–expanding side (δ = 50mm)
Pipe–contracting side (δ = 20mm)

Therefore,

$$n = \frac{\Delta \ell_1}{\delta} = \frac{32.9}{50} = 0.61 \text{ joi}$$

$$n = \frac{\Delta \ell_2}{\delta} = \frac{11.0}{20} = 0.55 \text{ joi}$$

Since the number of joints of the side that is bigger between the pipe–expanding side and pipe–contracting side is adopted, the number of the double bellows type expansion pipe joint becomes one.

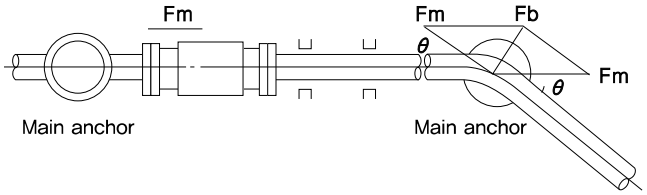


Deciding on where to install anchors and guides

▶ Installation of main anchor

o Installation location

- Install at two ends of straight pipeline section
- Install in branch pipeline
- Reducer and valve installation points



1. Load on main anchor in straight pipeline

Fm = (Ae x P) + (K x δ)

Fm = Fp + Fs

Fp = Ae + p

Fs=K x δ

Fm: Load on main anchor in straight pipeline section (kgf)
Fp : Thrust force caused by internal pressure (kgf)
Fs : Compressive load on expansion pipe joint (kgf)
Ae : Effective area of bellows (cm^2)
P : Fluid pressure (kgf/cm^2)
K : Spring constant of bellows (kgf/mm)
δ : Expansion/contraction length (mm)

2. Load on main anchor in curved pipeline

$$Fc = \frac{2A\rho V^2}{g} \times \sin\frac{\theta}{2}$$

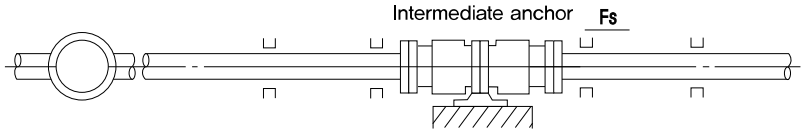
$$Fb = 2Fm \cdot \sin\frac{\theta}{2} + Fc$$

Fb : Load on main anchor in curved pipeline section (kgf)
Fc : Load caused by centrifugal force of fluid (kgf)
θ : Angle of curved pipeline section
A : Cross section of pipe (cm^2)
ρ : Fluid density (kg/cm^2)
V : Fluid speed (cm/mm)
g : Gravity acceleration (cm/mm)

▶ Installation of intermediate anchor

o Installation location

- If there are two or more expansion pipe joints between main anchors, install an intermediate anchor in the middle
- Fixing pole area of double expansion pipe joint



Fi = Fs=K x δ

Fi : Load on intermediate anchor (kgf)
Fs : Compressive load on expansion pipe joint (kgf)
K : Spring constant of bellows (kgf/mm)
δ : Expansion/contraction length (mm)

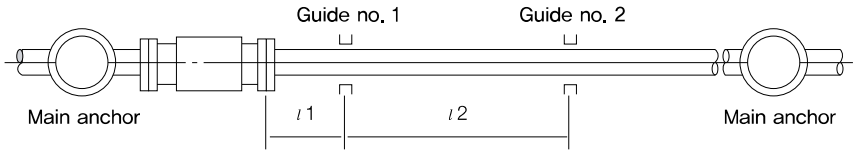
Deciding on where to install anchors and guides

- Installation of guide

  Guide no. 1 and guide no. 2 are installed to prevent buckling from pipeline expansion and bending from the pipeline's own weight. Install guide no. 1 in close proximity to the expansion pipe joint. Refer to the following formula and chart for the installation interval of guide no. 2.

$$\ell_2 = \sqrt{\frac{\pi^2 E I}{F \cdot W}}$$

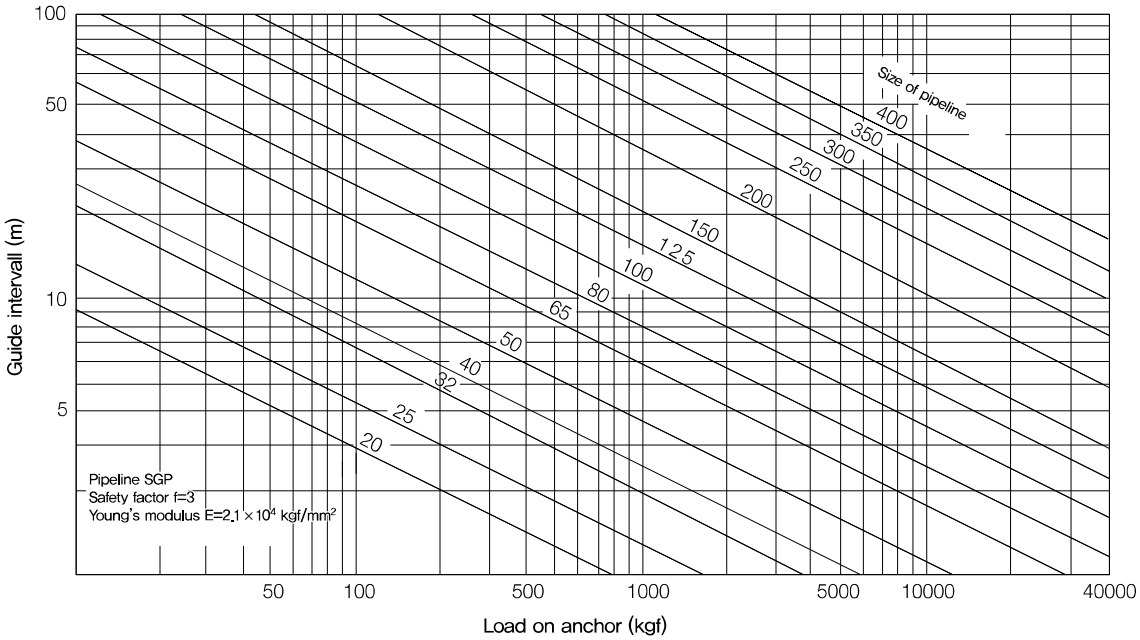
ℓ_2 : Guide no. 2 interval·····(cm)
W : Buckling load·····(kgf)
E : Young's modulus·····(kgf/cm2)
I : Moment of inertia·····(cm4)
f : Safety factor



▶ YBJ–2W Type

Category / Size	–40	50	65	80	100	125	150	200	250
Guide no. 1 : ℓ 1(m)	0.15	0.2	0.25	0.3	0.4	0.5	0.6	0.8	1.0
Guide no. 2 : ℓ 2(m)	2.5	3.0	4.0	5.0	6.0	8.0	10	12	14

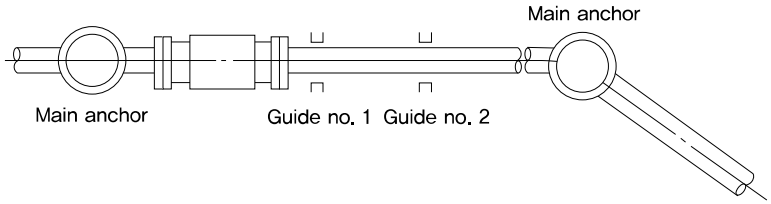
▶ Chart 2. Guide interval to prevent buckling



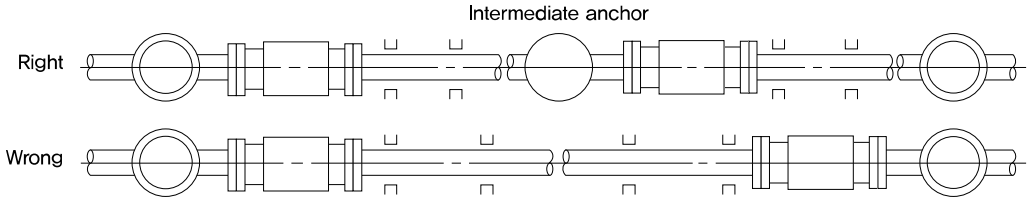
Cautions for installation

The following cautions need to be taken for installation to ensure maximum performance of the bellows type expansion pipe joint.

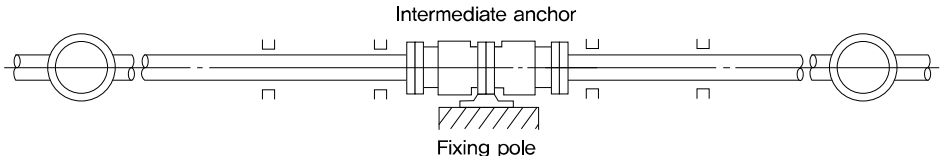
1. Fix the two ends of the straight pipeline and where the pipeline is curved.



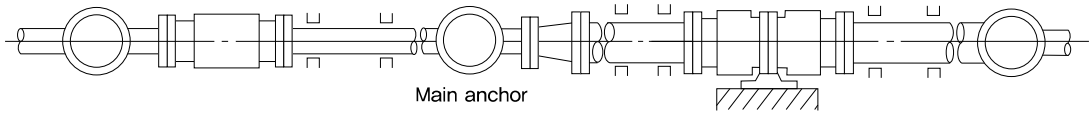
2. There are cases where several bellows type expansion pipe joints are installed consecutively when the length of the straight pipeline is long. In such cases, an intermediate anchor needs to be installed in the middle of each bellows type expansion pipe joint.



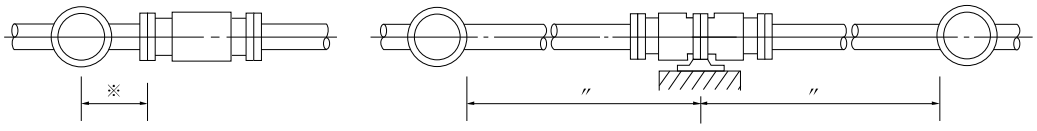
3. Points where main anchors and intermediate anchors are installed need to be sufficiently strong to withstand the loaded strength. Since the same level of load is applied to a double bellows type expansion pipe joint as an intermediate anchor, a fixing pole should be installed.



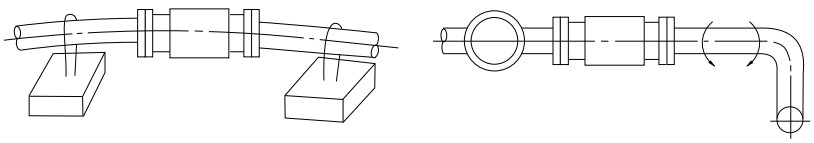
4. A main anchor should be installed when the size of a pipeline changes due to the use of an expansion pipe (reducer).



5. Install a single bellows type expansion pipe joint close to an anchor as much as possible. Install a double bellows type expansion pipe joint in the middle of two anchors.



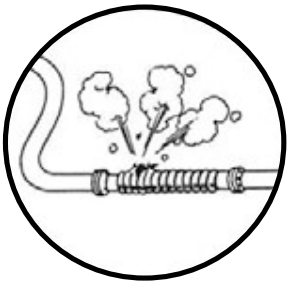
6. The weight of the pipeline coupled with a bellows type expansion pipe joint and other weight should not directly apply to the bellows type expansion pipe joint. In addition, make sure that returning force is not applied.



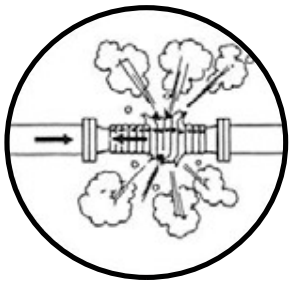
7. Remove bolts or nuts used for fixing surfaces after installation.
8. When applying thermal insulations to a bellows type expansion pipe joint, do not install a lagging material on the expansion/contraction operation part.

Cautions for handling

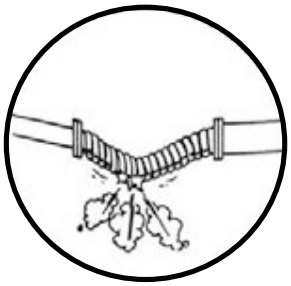
When using bellows, there is a need to install them after considering several matters from a professional point of view. There are simple precautionary measures that need to be taken when installing bellows in a pipeline. Serious accidents are caused by inattentiveness in handling bellows, rather than defects of the bellows.



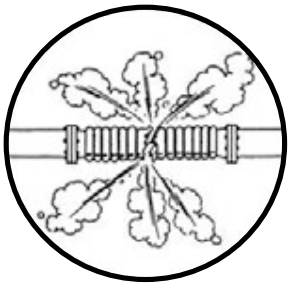
(1) Do not use the product for a long straight line (pipeline).



(2) Install the product so that the direction of the arrow indicated on the product is in line with the direction of the fluid' flow.

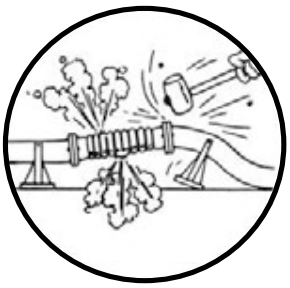


(3) Make sure that the pipeline diameter and weight, etc. is in compliance with the standard of the bellows coupling parts.

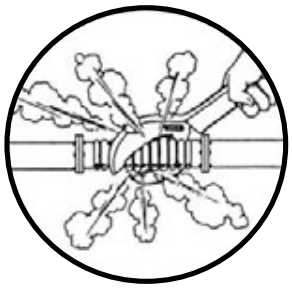


(4) Do not use out–of–spec bellows.

(5) When installing two or more bellows in a straight pipeline section, consider expansion/ contraction capacity individually.



(6) Do not cause outside impact.



(7) Do not touch the bellows wrinkles without good reason.

08

Ball, Slip Multi Joint

Ball, Slip Multi Joint

BG/BI
SIS/SID
SGS/SGD
MJ-1/MJ-2
MJ-3
BSI
UG-1

08
Ball, Slip Multi Joint

SAMYANG
SYSTEM GROUP

Ball, Slip, Multi Joint

Ball, Slip, Multi Joint

Type	Size	Applicable pressure (MPa)	Materials (Body)	Applicable fluid	Page
BG/BI series	32(1¼")~600(24")	1.0, 2.0, 3.0	CAC304, STS, SPPS, SCPH2, GCD	Sat. Steam, Superheat Steam, Oil, Water, Gas	161
SIS/SID series					162
SGS/SGD series					163
MJ-1/MJ-2 series	32(1¼")~300(12")				164
MJ-3 series	50(2")~200(12")		STS, SPPS, SCPH2 GCD		165
BSI series	32(1¼")~250(10")				166
UG-1 series	32(1¼")~600(24")				167

BG / BI Type Ball Joint

With the grand packing type, it is easy to install, and has a strong and simple internal structure. It absorbs omni-directional displacements and is applied for thermal expansion, contraction, and ground subsidence. The injection packing type absorbs omni-directional displacements and allows maintenance during operation.

Features

- Grand & injection type packing ball joint.
- Absorbs omni-directional displacements & cover extremely high-temperature fluid.
- Absorb pipeline's expansion or contraction from thermal expansion outcome.
- Protect pipelines, buildings, facilities, etc. from ground damage.
- Absorb pipeline displacements which result from ground subsidence or transformation of large storage tanks.
- Absorb vibration, distortions, etc. generated from pumps & turbines.
- Maintenance is available even during operation with full of fluid in the pipeline.

Grand Type

Injection Type

Specitications

Type		BG series	BI series
Applicable fluid		Sat. Steam, Superheat Steam, Oil, Water, Gas	
Maximum running pressure		1.0, 2.0, 3.0MPa	
Maximum applicable temperature		250°C	250°C (Special orders are available for 250°C)
Maximum displacement angle		15~30°	
Materials	Body	CAC304, STS, SPPS, SCPH2, GCD	
	Ball	STS, SC480	
	PACKING	Teflon+Grafoil (SG N0.100)	Grafoil (SI N0.700)

▶ Clients can choose materials when placing an order.

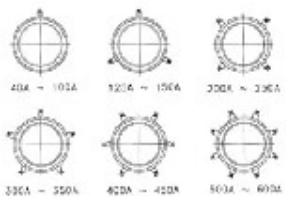
Dimensions

(mm)

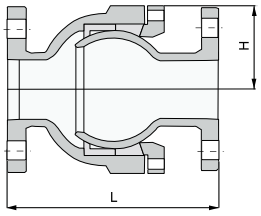
Size	L	H
32(1¼")	175	67.5
40(1½")	175	70
50(2")	190	77.5
64(2½")	190	87.5
80(3")	235	92.5
100(4")	250	105
125(5")	305	125
150(6")	355	140
200(8")	390	165
250(10")	420	200
300(12")	445	222.5
350(14")	505	245
400(16")	575	280
450(18")	615	620.0
500(20")	645	337.5
550(22")	685	372.5
600(24")	685	397.5

▶ Other pipe diameters are available by made-to-orders.

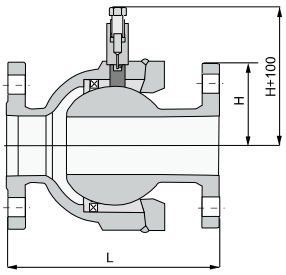
Dimensions drawing



Packing Cylinder Orientation



Grand Type



Injection Type

SI Type Slip Joint

As an injection packing type, it absorbs one-way (two-way) displacements and is applied for thermal expansion and contraction. Maintenance can be made during operation, thanks to injection packing.

Features

- Injection packing type double slip joint.
- Absorb straight line direction displacements : It can be used for extremely high-temperature fluid.
- Internal & external guide structure : It has longer life span than other conventional slip joints.
- External guide with outstanding lubrication ensures smooth slip.
- Safe packing injection is available under internal pressure.

SIS Single Type

SID Double Type

Specitications

Applicable fluid		Sat. Steam, Superheat Steam, Oil, Water, Gas
Maximum running pressure		1.0, 2.0, 3.0MPa
Maximum applicable temperature		250℃(Order over 250℃ or more)
Materials	Body	CAC304, STS, SPPS, SCPH2, GCD
	SLEEVE	CAC304, STS, SC480
	PACKING	Grafoil (SI NO.800)

▶ The live loading method and dust-cover attachment are available by made-to-orders.

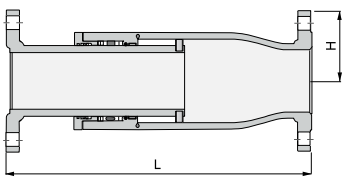
Dimensions

(mm)

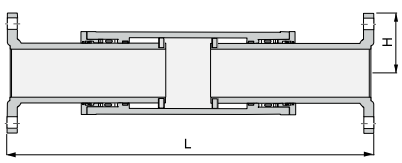
규격	L (Single)	L (Double)	H
32(1¼")	573	960	67.5
40(1½")	573	960	70
50(2")	573	960	77.5
65(2½")	592	978	87.5
80(3")	608	1,010	92.5
100(4")	639	1,023	105
125(5")	666	1,152	125
150(6")	705	1,153	140
200(8")	705	1,153	165
250(10")	771	1,234	200
300(12")	936	1,260	222.5
350(14")	954	1,296	245
400(16")	987	1,309	280
450(18")	1,159	1,349	620
500(20")	1,166	1,501	337.5
550(22")	1,219	1,519	327.5
600(24")	1,320	1,519	397.5

▶ The flanged type and the welding type have the same dimensions.
▶ The dimensions above are those for the full open state.
▶ These specifications are subject to change for product quality improvements.

Dimensions drawing

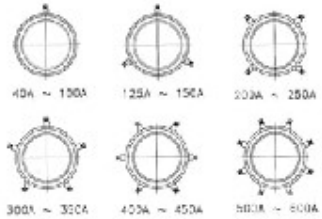


Single Type



Double Type

Dimensions drawing



Packing Cylinder Orientation

SG Type Slip Joint

As a grand packing type, this absorbs one-way direction (twoway direction) displacements, and is applied for thermal expansion and contraction. Thanks to the adoption of the live loading method, simple maintenance is ensured.

Features

- Injection packing type single slip joint.
- Absorb displacements in a straight line direction.
- Internal & external guide structure has longer life span than other conventional slip joints.
- External guide with outstanding lubrication ensures smooth slip.
- Highly resistant to pipeline vibration & distortions by adopted live loading method.

SGS Single Type

SGD Double Type

Specitications

Applicable fluid		Sat. Steam, Superheat Steam, Oil, Water, Gas
Maximum running pressure		1.0, 2.0,3.0MPa
Maximum applicable temperature		250°C (Special orders are available for 250°C)
Materials	Body	CAC304, STS, SPPS, SCPH2, GCD
	SLEEVE	CAC304, STS, SC480
	PACKING	Teflon+Grafoil (SI NO.800)

▶ The live loading method and dust-cover attachment are available by made-to-orders.

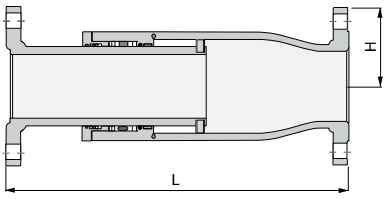
Dimensions

(mm)

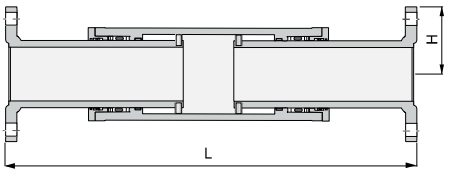
Standard	L (Single)	L (Double)	H
32(1¼")	573	960	67.5
40(1½")	573	960	70
50(2")	573	960	77.5
64(2½")	592	978	87.5
80(3")	608	1,010	92.5
100(4")	639	1,023	105
125(5")	666	1,152	125
150(6")	705	1,153	140
200(8")	705	1,153	165
250(10")	771	1,234	200
300(12")	936	1,260	222.5
350(14")	954	1,296	245
400(16")	987	1,309	280
450(18")	1,159	1,349	620
500(20")	1,166	1,501	337.5
550(22")	1,219	1,519	327.5
600(24")	1,320	1,519	397.5

▶ The flanged type and the welding type have the same dimensions.
▶ The dimensions above are those for the full open state.
▶ These specifications are subject to change for product quality improvements.

Dimensions drawing



SGS Single Type



SGD Double Type

MJ Type Ball & Slip Joint

As an injection packing type, this product absorbs omni-directional displacements, and is applied for thermal expansion, contraction, and ground subsidence. Maintenance can be made during operation, thanks to injection packing.

Features

- Multi-joint type functions combined ball & slip joint.
- Absorb pipeline expansion and contraction results from thermal expansion.
- Protect pipelines, buildings, facilities, etc. from ground damage.
- Absorb pipeline displacements result from ground subsidence or transformation of large storage tanks.
- Used for hydraulic equipment, petrochemicals, mines, agricultural sites, cable facilities, and various plants.

MJ-1 Single Type

MJ-2 Double Type

Specitications

Applicable fluid		Sat. Steam, Superheat Steam, Oil, Water, Gas
Maximum running pressure		1.0, 2.0, 3.0MPa
Maximum applicable temperature		250℃ (Special orders are available for 250℃)
Materials	Body	CAC304, STS, SPPS, SCPH2, GCD
	SLEEVE	CAC304, STS, SC480
	PACKING	Grafoil (SG NO.800)

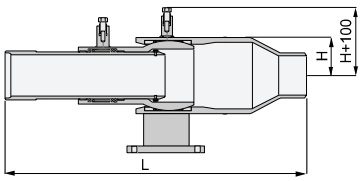
Dimensions

(mm)

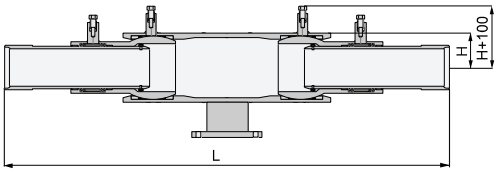
Size	L (Single)	L (Double)	H	θ°
32(1¼")	573	960	67.5	8
40(1½")	573	960	70	8
50(2")	573	960	77.5	4.3
65(2½")	592	978	87.5	4.3
80(3")	608	1,010	92.5	4.3
100(4")	639	1,023	105	4.3
125(5")	666	1,152	125	4.3
150(6")	705	1,153	140	4.3
200(8")	705	1,153	165	4.3
250(10")	771	1,234	200	4.3
300(12")	936	1,260	222.5	4.3

▶ The flanged type and the welding type have the same dimensions.
▶ The dimensions above are those for the full open state.
▶ Can be designable with Uuder-of-Sanual Type.
▶ These specifications are subject to change for product quality improvements.

Dimensions drawing

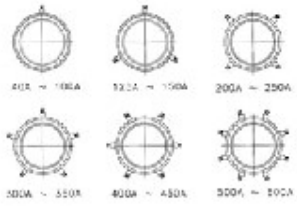


MJ-1 Single Type



MJ-2 Double Type

Dimensions drawing



Packing Cylinder Orientation

08

MJ–3 Multi Joint

As a grand packing type, this product absorbs omni–directional displacements, and is suitable for bending, expansion/contraction, rotational movements, and various fluid control facilities. It enables effective measures against external stress, such as ground subsidence and earthquakes.

Features

- Reduces installation space by combining ball and slip Joint functions.
- Absorb expansion or contraction of pipes by thermal expansion.
- Protects piping, building structures and facilities from damage caused by seismic or other ground movements.
- Absorb the displacement of the pipes caused by ground subsidence or deformation of the large reservoir.
- Use hydraulic equipment, petrochemicals, mines, agricultural sites, cable facilities, and various plants.

MJ–3 Type

Specitications

Applicable fluid		Sat. Steam, Superheat Steam, Oil, Water, Gas
Maximum running pressure		1.0, 2.0, 3.0MPa
Maximum applicable temperature		250°C
Maximum displacement angle		15–30°
Materials	Body	STS, SPPS, SCPH2, GCD
	SLEEVE	GB, STS, SC480
	PACKING	Teflon + Grafoil (SG NO.100)

▶ The live loading method and dust–cover attachment are available by made–to–orders.
▶ The injection type is available by made–to–orders.

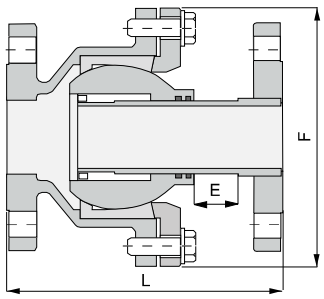
Dimensions

(mm)

Size (mm)	Flanged type			Welding type			Torque
	L(mm)	F(mm)	E (mm)	L(mm)	(mm)	E(mm)	(kgf.m)
50(2")	210	121	40	210	121	40	25
65(2½")	230	141	40	230	141	40	35
80(3")	260	159	40	260	159	40	55
100(4")	280	195	40	280	195	40	80
125(5")	300	225	45	300	225	45	135
150(6")	310	255	50	310	255	50	190
200(8")	360	323	60	360	323	60	310

▶ Separately, a separate diameter can be produced.

Dimensions drawing



Flanged Type

BSI Multi Joint

As an injection packing type, this product absorbs omni-directional displacements, and is applied for thermal expansion and contraction. Maintenance can be made during operation, thanks to injection packing.

Features

- Functions combined ball and slip joint, effectively uses both strengths.
- Absorb pipeline expansion & contraction which results from thermal expansion.
- Protect pipelines, buildings, facilities, etc. from ground damage.
- Used for hydraulic equipment, petrochemicals, mines, agricultural sites, cable facilities, and various plants.
- Absorb high-rise building's sway & building shortening.

BSI Type

Specitications

Applicable fluid		Sat. Steam, Superheat Steam, Oil, Water, Gas
Maximum running pressure		1.0, 2.0, 3.0MPa
Maximum applicable temperature		250°C (Special orders are available for 250°C or higher)
Materials	Body	STS, SPPS, SCPH2, GCD
	SLIP/BALL	STS, SC480
	PACKING	Grafoil (SI NO.800)

Dimensions

(mm)

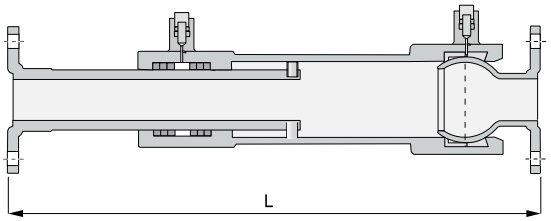
Size	L(TR100standard)
32(1¼")	600
40(1½")	600
50(2")	615
65(2½")	625
80(3")	680

(mm)

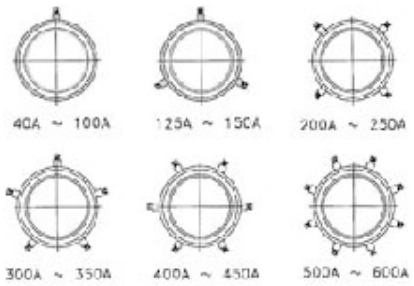
Size	L(TR100standard)
100(4")	690
125(5")	770
150(6")	830
200(8")	850
250(10")	910

▶ These specifications are subject to change for product quality improvements.
▶ Other sizes are available by made-to-orders.

Dimensions drawing



Single Type



Packing Cylinder Orientation

UG-1 Under Graund Slip Joint

As an injection packing type, this product absorbs displacements and is applied for thermal expansion and contraction. Injection packing has been applied.

Features

- Injection packing type single slip joint.
- Absorb displacements in straight line direction : It can be used for extremely high-temperature fluid.
- Internal & external guide structure has longer life span than other conventional slip joints.
- External guide with outstanding lubrication ensures smooth slip.
- Safe packing injection is available with internal pressure.
- Double-structure product ensures thermal insulation (for underground use).

UG-1 Type

Specitications

Applicable fluid		Sat. Steam, Superheat Steam, Oil, Water, Gas
Maximum running pressure		1.0, 2.0, 3.0MPa
Maximum applicable temperature		250°C (Special orders are available for 250°C)
Materials	Body	STS, SPPS, SCPH2, GCD
	SLEEVE	STS, SC480
	PACKING	Grafoil (SG NO.800)

▶ Live Loading and Dust- Cover attach to order.

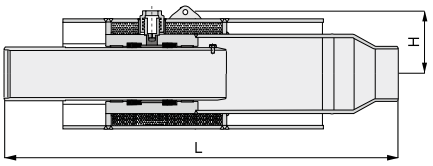
Dimensions

(mm)

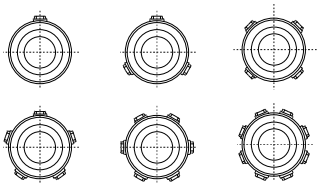
규격	L (Single)	L (Double)	H
32(1¼")	573	960	67.5 (Insulation thickness+60)
40(1½")	573	960	70 (Insulation thickness+60)
50(2")	573	960	77.5 (Insulation thickness+60)
65(2½")	592	978	87.5 (Insulation thickness+60)
80(3")	608	1,010	92.5 (Insulation thickness+60)
100(4")	639	1,023	105 (Insulation thickness+60)
125(5")	666	1,152	125 (Insulation thickness+60)
150(6")	705	1,153	140 (Insulation thickness+60)
200(8")	705	1,153	165 (Insulation thickness+60)
250(10")	771	1,234	200 (Insulation thickness+60)
300(12")	936	1,260	222.5 (Insulation thickness+60)
350(14"}	954	1,296	245 (Insulation thickness+60)
400(16")	987	1,309	280 (Insulation thickness+60)
450(18")	1,159	1,349	620 (Insulation thickness+60)
500(20")	1,166	1,501	337.5 (Insulation thickness+60)
550(22")	1,219	1,519	327.5 (Insulation thickness+60)
600(24")	1,320	1,519	397.5 (Insulation thickness+60)

▶ The flanged type and the welding type have the same dimensions.
▶ The dimensions above are those for the full open state.
▶ These specifications are subject to change for product quality improvements.

Dimensions drawing



Flanged Type



Packing Cylinder Orientation

Data / Slip Joint

Standard type and pressure balance type

In case of the standard type, the sleeve operates when a thrust is applied, resulting from the application of internal pressure (P). This thrust force is

Effective area × pressure = $\frac{\pi}{4}D^2 \times P$

The frictional resistance and thrust that is caused by this internal pressure actuates on the pipeline's surrounding. This is why there is a need for a strong anchor that can withstand this frictional resistance. This is not the case for the pressure balance type.Assuming that the external diameter of sleeve ① is d1, and that of sleeve ② is d2,

Sleeve's left direction effort = $\frac{\pi}{4}d_1^2P$

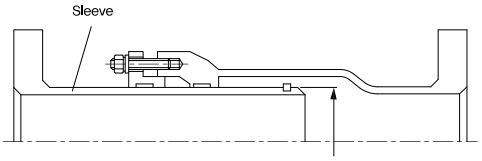
Sleeve's right direction effort = $\frac{\pi}{4}(d_2^2 - d_1^2)P$

which is, $\frac{\pi}{4}d_1^2P = \frac{\pi}{4}(d_2^2 - d_1^2)P$

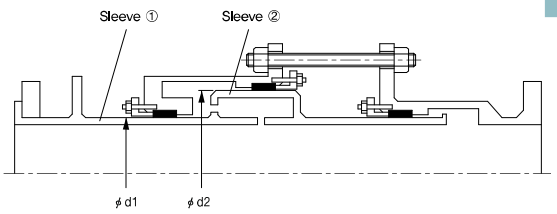
or $\frac{\pi}{4}D^2 \times P$

meaning that there is no thrust caused by internal pressure.

▶ Standard type



▶ Pressure balance type



As seen above, the pressure balance type is free from a thrust. Therefore, the load on the anchor is only the frictional resistance of the sleeve.
As such, where a strong anchor cannot be installed due to a concentration of pipelines, a large diameter, or a high pressure level, the use of a pressure balance type would lead to economic advantages, resulting from a reduction in the construction period and anchor installations.

Calculation of pipeline's expansion / contraction length

$\triangle \ell = \beta \times \triangle t \times \ell$

$\triangle \ell$ = Pipeline's expansion/contraction length(mm)
β = Pipeline's expansion coefficient
Steel pipe : 12.2 x 10–3mm/m/℃
Copper pipe : 17.7 x 10–3mm/m/℃
Stainless pipe : 18.4 x 10–3 mm/m/℃
$\triangle t$ = Temperature difference (℃)
ℓ = Pipeline length (m)

Load on anchor

Load on main anchor in straight pipeline section Fm (N) = Ae x P + u
Load on intermediate anchor in straight pipeline section Fi (N) = u
In terms of the pressure balance type, however, Fm = Fi = u
Ae = Sleeve' s internal pressure area
P = Fluid pressure MPa
u = Sleeve' s frictional resistance

Anchor installation

When using a slip joint, anchors of sufficient strength should be installed. The installation location and types of anchors are as follows:

① Main anchor (Main fixing point)

- The end part of a straight pipeline with a closing plate installed
- A curved pipeline section where the fluid's direction changes
- Where the pipeline changes with the use of a reducer and a slip joint
- Where two slip joints are installed in a pipeline
- Between a main pipeline and a branch pipeline, including a slip joint that is not fixed

② Intermediate anchor (Intermediate anchor)

- If two or more slip joints are used between two main anchors, install an intermediate anchor in the middle of each slip joint

Data / Slip Joint

Installation of guide and a pipeline weight support

1. Guide

For proper expansion/contraction of a slip joint, there is a need for guides that would smoothly deliver to anchors the strength needed for axial movements and ensure alignment between the slip joint and the pipeline center. Each guide's installation location should be based on the following interval:

The tolerance with the pipeline center is within ±2mm in case of 125A or smaller, and is within, ±3mm in case of 150A or larger. The parallelism of the pipeline should be maintained within ±0.5 °

L1 : Interval between slip joint and guide no. 1

L2 : Interval between guide no. 1 and guide no. 2

L3 : Interval between guide no. 2 and intermediate anchor

The maximum installation interval of each guide can be calculated using the following formula. The maximum value of L3 can be determined by Diagram 4.

$L1 \leqq 4D$

$L2 \leqq 14D$

$$L3 \leqq \sqrt{\frac{\pi^2 EI}{fFm}} \qquad I = \frac{\pi}{64}(D^4 - d^4)$$

L1, L2, L3 : Guide interval (maximum) (mm)

D : External diameter of pipeline (mm)

d : Inside diameter of pipeline (mm)

E : Young's modulus of the designed temperature of pipeline (N/mm^2)

Steel pipe 200℃ 191 x $103N/mm^2$

Stainless pipe 200℃ 183 x $103N/mm^2$

I : Pipeline section 2nd moment (mm^4)

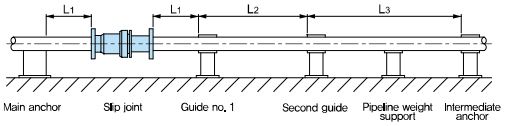
f : Safety factor (3 or more)

Fm : Load on main anchor (N)

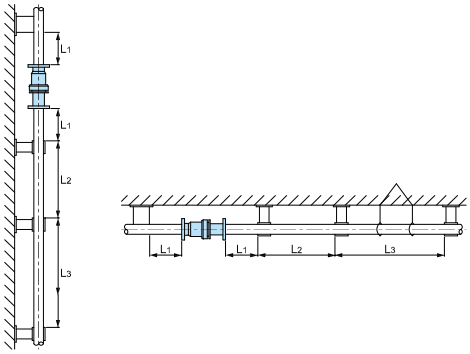
2. Pipeline weight support

There is a need for a roller support or a roller hanger guide to prevent the bending of a pipeline that results from the pipeline's weight or fluid mass.

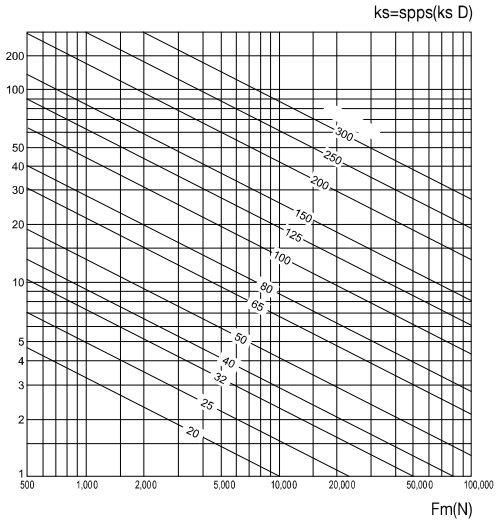
▶ Installation interval of guide



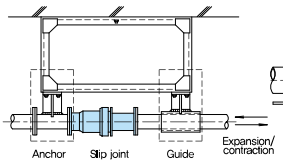
▶ Vertical pipeline



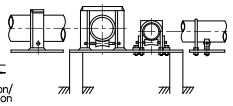
▶ Maximum interval of intermediate guide(103 mm)



▶ Anchor, guide (example)

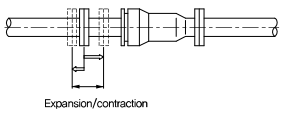


▶ Buckling prevention guide (example)

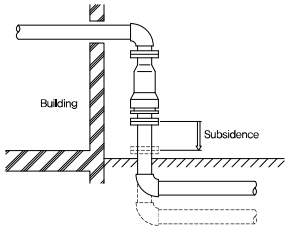


Example of use slip joint

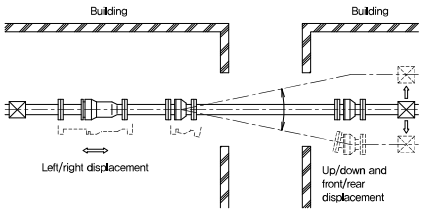
▶ Absorption of thermal expansion



▶ Measure against ground subsidence



▶ Measure against ground subsidence and earthquakes between buildings



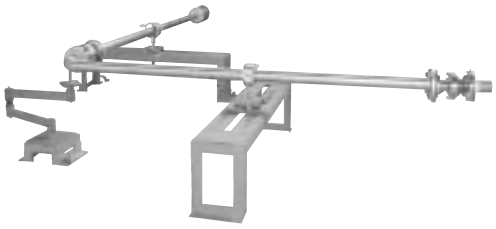
Data / Ball Joint for Seismic Isolation

Ball Joint equipment for seismic isolation(Single)

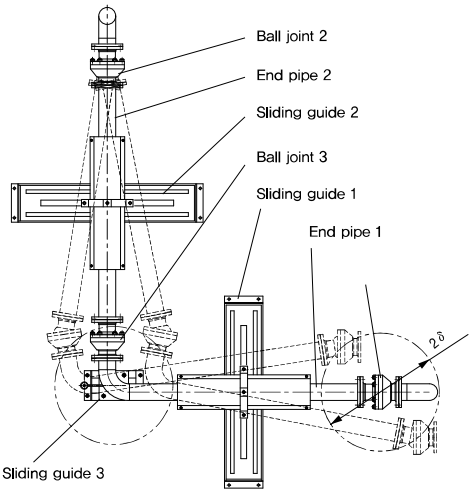
This is a seismic isolation piping system that has set up equipment for pipelines, slide guides, and supports between ball joints.

- Features
  - The use of a ball joint for seismic isolation allows a small device installation space.
  - By equipping the pipelines surrounding a ball joint, the construction period and costs are reduced.

▶ Equipping example



▶ Dimensional drawing



- Specifications

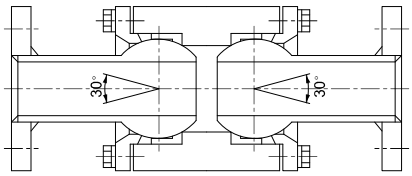
Standard	40 ~ 250
Applicable fluid	Cold/hot water, steam, air, gas, oil
Maximum running pressure	10K, 20K
Maximum displacement (δ)	400, 500, 600, 700mm

Ball Joint equipment for seismic isolation(Double)

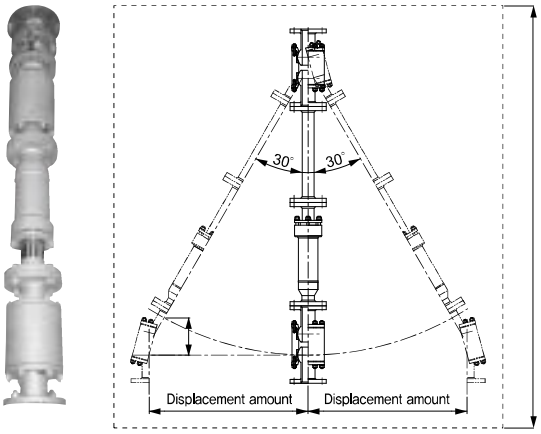
This is a double type ball joint that has two ball parts on its body.

- Features
  - Thanks to its large displacement absorption capacity, the distance between ball joints can be reduced. In addition, only a small installation space is required.
  - A seismic isolation equipment combined with a slip joint can be installed horizontally in a pipeline. It can be installed vertically and horizontally in a pipeline, even in limited space.

▶ Dimensional drawing



▶ Ball joint equipment for seismic isolation (Double)
This is a seismic isolation equipment that has been combined with a slip joint.



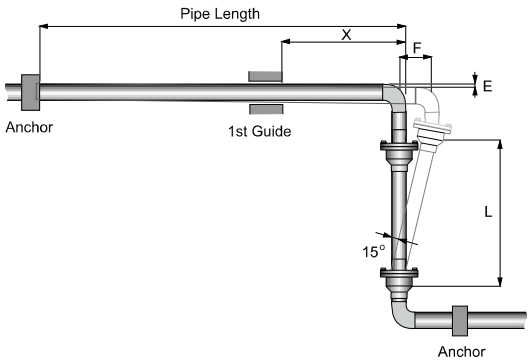
- Specifications

Standard	40~150
Applicable fluid	Cold/hot water, steam, air, gas, oil
Maximum running pressure	10K
Fluid temperature	220°C below
Maximum displacement	60°
Hydro-pressure test	15K(Water pressure)
End connection	KS 10K FF (Frange)

Data /Ball Joint Installation Location

A ball joint can be installed in all places where the extraction/contraction of a pipeline can be absorbed. In case of absorption of axial displacement, installation of a ball joint in a bent area of a pipeline or vertically ascending/descending areas is easy even with limited space.

When two ball joints are used



What is the most important here is the location of the first guide and the distance between ball joints.

1. Pipeline deflection level (E)

Because a ball joint rotates, once it begins to move as a result of expansion/contraction, a pipeline deflects in the direction of the ball joint installation point.

The deflection level is determined by the expansion/contraction length, and plays an important role in deciding the installation distance of the first guide. In general, a pipeline's deflection level (E) is calculated as follows :

$$E=L-\sqrt{L^2-\left(\frac{F}{2}\right)^2}$$

Here,
E : Pipeline deflection level (mm)
L : Distance between ball joints (mm)
F : Pipeline's expansion/contraction length (mm)

2. Determining the distance between ball joints

Ball joints should be installed based on at least a minimum distance required to absorb the expansion/contraction of a pipeline. The distance between ball joints (L) is calculated as follows :

$$L \geq \frac{F \times 1.5}{\sin\theta} = 6 \times F$$

Here,
L : Distance between ball joints
F : Pipeline's expansion/contraction length
θ : Ball joint operation angle
1.5 : Safety factor

3. Distance to guide no. 1 (X)

Because a ball joint rotates, once it begins to move as a result of expansion/contraction, a pipeline deflects in the direction of the ball joint installation point. The deflection level is determined by the expansion/contraction length, and the distance to guide no. 1 can be calculated based on the following formula :

$$X=\sqrt{\frac{3 \times Y \times E \times F}{2 \times \delta}}$$

Here,
X : Distance to guide no. 1 (mm)
Y : Young' Midulus (mm)
E : Pipeline deflection level (mm)
F : Pipeline expansion/contraction length (mm)
δ : Allowable stress of pipeline (kgf/mm^2)

Data / Ball Joint

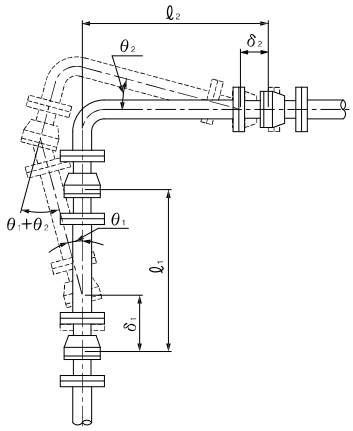
When three ball joints are used

Using a combination of three ball joints is more effective than using two ball joints. It is an extremely suitable installation method in case there is insufficient installation space or it is difficult to maintain the distance to guide no. 1 because the pipeline deflection level is substantial.

1. One–directional pipeline expansion/contraction
   Using three ball joints enables efficient absorption of flexural or bending stress. The installation distances among ball joints remain the same as those of two ball joints.

2. Two–directional pipeline expansion/contraction
   Three ball joints are also used when absorbing a pipeline's two–directional expansion/contraction. The distance between ball joints is determined based on l1=l2, using the longer expansion/contraction length between δ1 and δ2. Here, θ1+θ2 should be restricted to the allowed displacement angle (θ / 2) range.

▶ Diagram 2



Installation of anchor and guide no.1

ⓐ Anchors should be installed at the bifurcation point of a pipeline's expansion/contraction length and the two ends of the pipeline.

ⓑ Guide no. 1 should be installed as closely as possible to the ball joint. Observe the instructions on the previous page in case two ball joints are used.

ⓒ Use the following formula to calculate the load on the anchors and guide no. 1, and install them with sufficient strength to withhold the load.

$F1 = \frac{2T}{R} \times 1000$

$F2 = \frac{3EIY}{X^3}$

$F_T = \sqrt{F_1^2 + F_2^2}$

$F_Z = \sqrt{F_A^2 + F_B^2 - 2F_A F_B \cos\alpha}$

$F_Z = \sqrt{F_A^2 + F_B^2}$ (In case of $\alpha = 90°$)

F1 : Load on guide no. 1 when anchors and three ball joints are used (N) (Refer to Table 1)

F2 : Load on guide no. 1 when two ball joints are used (N) (Refer to Table 2)

F_T, F_Z : Combined load of anchors (N)

F_A : Axial load of pipeline A (N) (Refer to Diagram 7)

F_B : Axial load of pipeline B (N) (Refer to Diagram 7)

α : Reflection angle of pipelines A and B (deg.)

I : Distance between ball joints

T : Torque of ball joint (N.m)

I : Moment of inertia

$I = \frac{\pi}{64}(D^4 - d^4)$

D : External diameter of pipeline

d : Inside diameter of pipeline

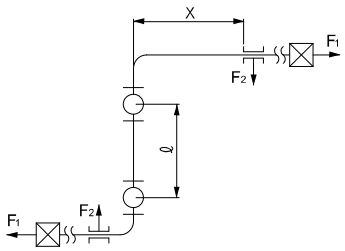
E : Young's modulus

191 x 103 N/mm² in case of a steel pipe of 200℃

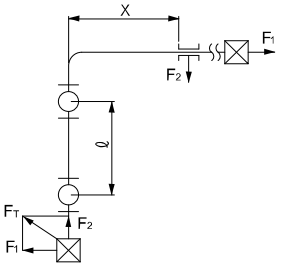
X : Distance to guide no. 1

Y : Pipeline flexure

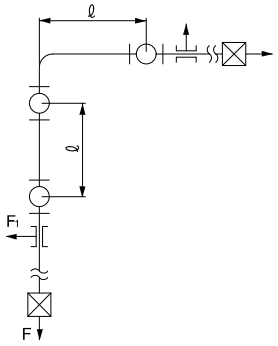
▶ Diagram 3



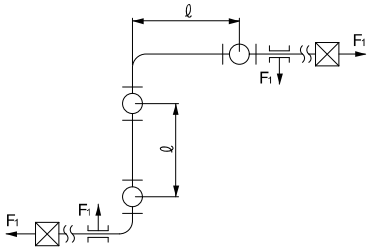
▶ Diagram 4



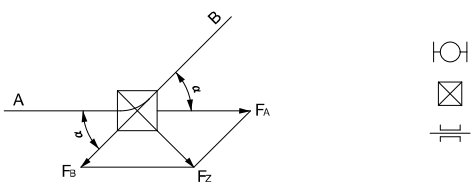
▶ Diagram 5



▶ Diagram 6



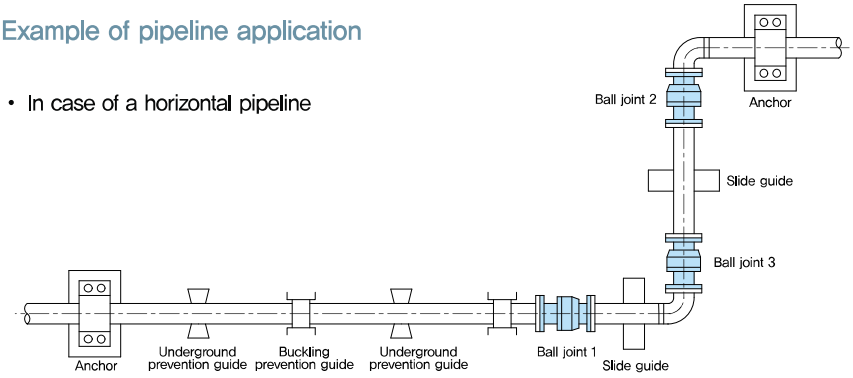
▶ Diagram 7



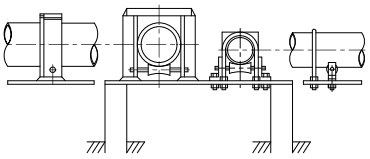
Data / Ball Joint

Example of pipeline application

• In case of a horizontal pipeline



• Example of guide for buckling prevention



• In case of a vertical pipeline

Install a slide guide in a vertical or a horizontal pipeline so that ball joint ② does not sway according to the slide direction.

Guide

1. Guide for buckling prevention

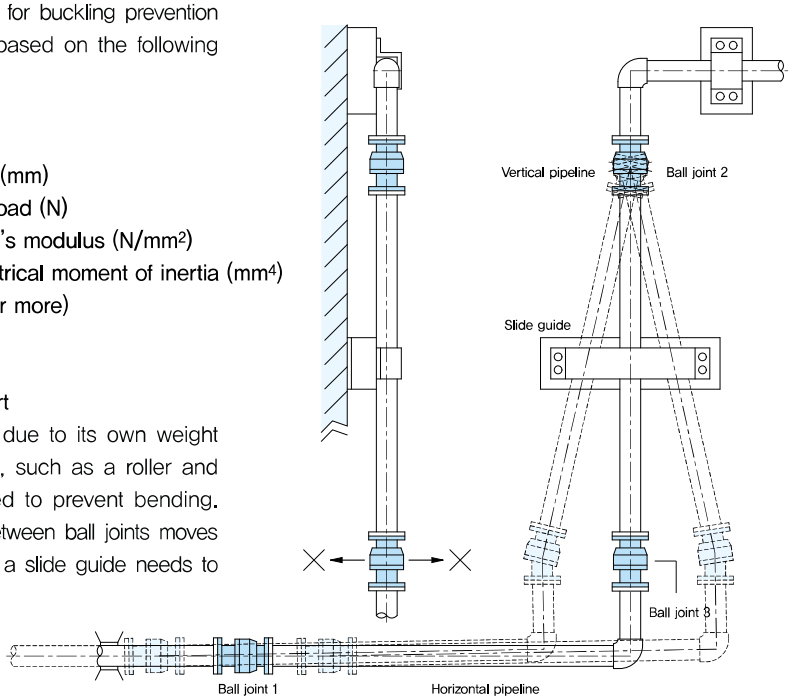
For a pipeline to expand/contract properly, guides need to be installed to prevent buckling and to provide support for pipeline weight. The installation interval for buckling prevention guides is calculated based on the following formula:

$$L = \sqrt{\frac{\pi^2 EI}{fF}}$$

L : Pipeline interval (mm)
F : Pipeline's axial load (N)
E : Pipeline's Young's modulus (N/mm^2)
I : Pipeline's geometrical moment of inertia (mm^4)
f : Safety factor (3 or more)

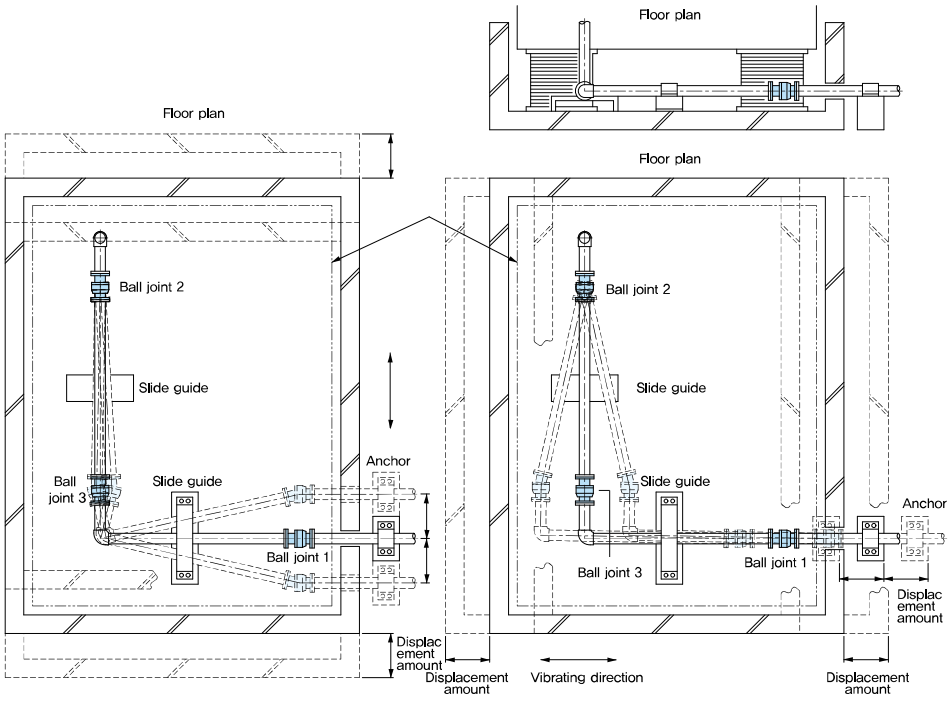
2. Pipeline weight support

A pipeline can bend due to its own weight or fluid mass. Guides, such as a roller and a hanger, are installed to prevent bending. Because a pipeline between ball joints moves in the lateral direction, a slide guide needs to be installed.



Data / Ball Joint

Example of use of three ball joints in a seismic isolation building



F1 when pressure is 10K

(N)

Pipe diameter	Distance between ball joints ℓ (mm)					
	1000	1500	2000	2500	3000	3500
50	400	270				
65	600	400				
80	800	540	400			
100	1400	940	700			
125		1200	900	720		
150		1740	1300	1040		
200		3200	2400	1920	1600	
250			4000	3200	2670	2000
300			6000	4800	4000	3000

F2 when Y equals 1mm

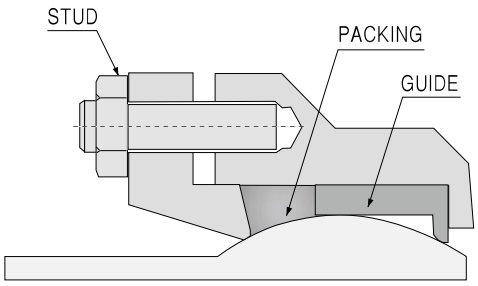
(N)

Pipe diameter	Distance of guide no. 1 x (mm)						
	1000	2000	3000	4000	5000	6000	7000
50	170	21	6.1	2.6			
65	430	54	16	6.8			
80	740	93	28	12			
100		220	65	28	14		
125		450	140	56	29		
150		810	240	110	52	30	
200			630	270	140	79	50
250			1360	580	300	170	110
300			2560	1080	560	320	210

Data / Ball Joint

Packing

- Grand Packing

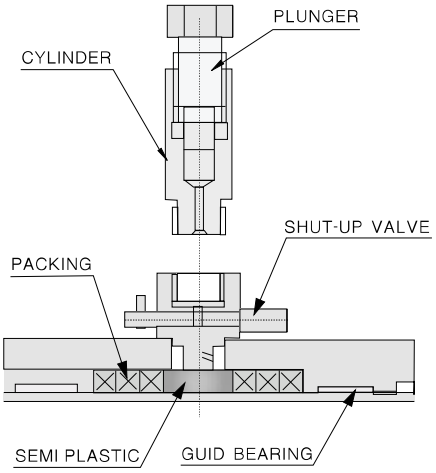


1. SG N0.100
As a packing used for air, water, and wet steam, its maximum running pressure is 20 kg/cm^2, and maximum applicable temperature is 200℃ It consists of a composition of Teflon and graphite.

2. SG N0.200
As a packing used for air, water, and wet steam, its maximum running pressure is 30 kg/cm^2, and maximum applicable temperature is 250℃ It consists of such materials as non-asbestos fiber, Teflon, and flake graphite.

3. SG N0.300
As a packing used for dried saturated steam and superheated steam, its maximum running pressure is 40 kg/cm^2, and it is mainly used for high temperatures of at least 250℃ It consists of non-asbestos fiber and flake graphite.

- Injection Packing



1.SI N0.700
As a packing used for air, water, and steam, it's maximum use pressure of 2.0MPacm^2, and could be used up to maximum use temperature of 250℃. The left and right packings are made of zeolite fiber and high-density graphite, and NO.53 Semi-Plastic is used for the inserted packing.

2. SI NO.800
As a packing used for air, water, and steam, its maximum running pressure is 20 kg/cm^2 The packings on the right and the left consist of non-asbestos fiber for high temperature and high-density graphite, and No. 55 semi-plastic is used for injection packing.

3. SI NO.900
As a packing mainly used for superheated steam, its maximum running pressure is 40 kg/cm^2, and maximum applicable temperature is 450℃. The packings on the right and the left consist of non-asbestos fiber for high temperature and high-density graphite, and No. 60 semi-plastic is used for injection packing.

What is super packing?

Super packing has been developed to ensure outstanding sealing performance and a stable life span. It is a packing that combined, based on a transparent ratio, the expansion sides with special oil and other inorganic substances. Super packing offers superb performance in its thermal resistance range from -200℃ to 450℃ as well as its internal characteristics, internal size, and internal mechanism.

Data / Ball Joint

Method based on calculation

Basic formula $\Delta \ell = \alpha \times \Delta t \times L$
Maximum expansion length calculation formula $\Delta \ell = \alpha \times (t1 - t2) \times L$
Maximum contraction length calculation formula $\Delta \ell = \alpha \times (t1 - t3) \times L$

$\Delta \ell$: Expansion/contraction length of pipe
α : Pipe's expansion coefficient
Steel pipe : 12.2 × 10−3mm/m℃
Copper pipe : 17.7 × 10−3mm/m℃
STS : 18.4 × 10−3mm/m℃

Δt : Temperature difference (℃)
L : Pipeline length (m)
t_1 : Maximum applicable temperature (℃)
t_2 : Maximum ambient temperature (℃)
t_3 : Minimum ambient temperature (℃)

※ The expansion/contraction of a pipe is heavily dependent on the temperature of the applied fluid. The pipe expands or contracts according to changes in the maximum applicable temperature, minimum ambient temperature, etc. based on the temperature at the point of installation.

Expansion/contraction length of a pipeline(Expansion/contraction length corresponding to different pipeline lengths)

(mm)

Pipe type	Pipe length	Fluid temperature difference Δt℃																						Pipe length
		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	
Steel pipe	1	0.122	0.244	0.366	0.488	0.61	0.732	0.854	0.976	1.1	1.22	1.34	1.46	1.59	1.71	1.83	1.95	2.07	2.2	2.32	2.44	2.56	2.68	1
	5	0.61	1.22	1.83	2.44	3.05	3.66	4.27	4.88	5.49	6.1	6.71	7.32	7.93	8.54	9.15	9.76	10.4	11.0	11.6	12.2	12.8	13.4	5
	10	1.22	2.44	3.66	4.88	6.1	7.32	8.54	9.76	11.0	12.2	13.4	14.6	15.9	17.1	18.3	19.5	20.7	22.0	23.2	24.4	25.6	26.8	10
	15	1.83	3.66	5.49	7.32	9.15	11.0	12.8	14.6	16.5	18.3	20.1	22.0	23.8	25.6	27.5	29.3	31.1	32.9	34.8	36.6	38.4	40.3	15
	20	2.44	4.88	7.32	9.76	12.2	14.6	17.1	19.5	22.2	24.4	26.8	29.3	31.7	34.2	36.6	39.0	41.5	43.9	46.6	48.8	51.2	53.7	20
	25	3.05	6.1	9.15	12.2	15.3	18.3	2200	25.6	29.3	32.9	36.8	40.3	43.9	47.6	51.2	54.9	58.6	62.2	65.9	69.5	73.2	76.9	25
	30	3.66	7.32	11.0	14.6	18.3	2200	25.6	29.3	32.9	36.6	40.3	43.9	47.6	51.2	54.9	68.6	62.2	65.9	69.5	73.2	76.9	80.5	30
	35	4.27	8.54	12.8	17.1	21.4	25.6	29.9	34.2	38.4	42.7	47.0	51.2	55.5	59.8	64.1	68.3	72.6	76.9	81.1	85.4	89.7	93.9	35
	40	4.88	9.76	14.6	19.5	24.4	29.3	34.2	39.0	43.9	48.8	53.7	58.6	63.4	68.3	73.1	78.1	83.0	87.8	92.7	97.6	102.5	107.4	40
Copper pipe	1	0.177	0.354	0.531	0.708	0.885	1.06	1.24	1.42	1.59	1.77	1.95	2.12	2.30	2.48	2.66	2.83	3.01	3.19	3.36	3.54	3.72	3.89	1
	5	0.885	1.77	2.66	3.54	4.43	5.31	6.2	7.1	7.97	8.85	9.74	10.6	11.5	12.4	13.3	14.1	15.1	16.8	17.7	18.6	18.6	19.5	5
	10	1.77	3.54	5.31	7.1	8.85	10.6	12.4	15.9	17.7	19.5	21.2	23.0	24.8	26.6	28.3	30.1	31.9	33.6	35.4	37.2	3	38.9	10
	15	2.66	5.31	7.97	10.6	13.3	15.9	18.6	21.2	23.9	26.6	29.2	31.9	34.5	37.2	39.8	42.5	45.1	47.8	50.5	53.1	55.8	58.4	15
	20	3.54	7.1	10.6	14.2	17.7	21.2	24.8	28.3	31.9	35.4	38.9	42.5	46.0	49.6	53.1	56.6	50.2	63.7	67.3	70.8	74.3	77.9	20
	25	4.43	8.85	13.3	17.7	22.1	26.6	31.0	35.4	39.8	44.3	48.7	53.1	57.5	62.0	66.4	70.8	75.2	79.7	84.1	88.5	92.9	97.4	25
	30	5.31	10.6	15.9	21.2	26.6	31.0	37.2	42.5	47.8	53.1	58.4	63.7	69.0	74.3	79.7	85.0	90.3	95.6	100.9	106.2	111.5	116.8	30
	35	6.2	12.4	19.3	24.8	31.0	37.2	43.4	49.6	55.8	62.0	74.3	74.3	90.2	86.7	92.9	99.1	105.3	111.5	117.7	123.9	130.0	136.3	35
	40	7.1	14.2	21.2	28.3	35.4	42.5	49.6	56.6	63.7	70.8	77.9	85.0	92.0	99.1	106.2	113.1	120.4	127.4	134.5	141.6	148.7	155.8	40
Stainless steel pipe	1	0.184	0.368	0.552	0.736	0.92	1.1	1.129	1.047	1.66	1.84	2.02	2.21	2.39	2.58	2.76	2.94	3.13	3.31	3.5	3.68	3.86	4.05	1
	5	0.92	1.84	2.76	3.68	4.6	5.52	6.44	7.36	8.28	9.2	10.1	11.0	12.0	12.9	13.8	14.7	15.6	16.6	17.5	18.4	19.3	20.2	5
	10	1.84	3.68	5.52	7.36	9.2	11.0	12.9	14.7	16.6	18.4	20.2	22.1	23.9	25.8	27.6	29.4	31.3	33.1	35.0	36.8	38.6	40.51	10
	15	2.76	5.52	8.28	11.0	13.8	16.6	19.3	22.1	24.8	27.6	30.4	33.1	35.9	38.6	41.4	44.2	26.9	29.7	52.4	55.2	58.0	60.7	15
	20	3.68	7.36	11.0	14.7	18.4	22.1	25.8	29.4	24.8	36.8	40.5	44.2	47.8	51.5	55.2	58.9	62.6	66.2	69.6	73.6	77.3	81.0	20
	25	4.6	9.2	13.8	18.4	23.0	27.6	32.2	36.8	31.0	46.0	50.6	55.2	59.8	64.4	69.0	73.6	78.2	82.8	87.4	92.0	96.6	101.2	25
	30	5.52	11.0	16.6	22.1	27.6	33.1	38.6	44.2	37.2	55.2	60.7	66.2	71.8	77.3	82.8	88.3	93.8	99.4	104.9	110.4	115.9	121.4	30
	35	6.44	12.9	19.3	25.8	32.2	38.6	45.1	51.5	51.5	64.4	70.8	77.3	83.7	90.2	96.6	103	109.5	115.9	122.4	128.8	135.5	141.7	35
	40	7.36	14.7	22.1	29.4	36.8	44.2	51.5	58.0	51.5	73.6	81.0	88.3	95.7	103	110.4	117.8	125.1	132.5	139.8	147.2	154.6	161.9	40

09

Hammerless Check Valve / Foot Valve

Hammerless Check Valve / Foot Valve

YHL–100 YHL–200
YFV–1

09

Hammerless Check Valve / Foot Valve

SAMYANG
SYSTEM GROUP

Hammerless Check Valve / Foot Valve

Used to prevent the backward flow of fluid in the pump outlet side, this valve prevents water hammers, protects pump pipelines, and functions as a bypass valve.

Hammerless check valve

Type	Size	Applicable fluid	Applicable pressure (MPa)	Materials		End connection	Page
				Body	Disc, seat		
YHL–100	40(1½")~400(16")	water	1.4 below	GC200	NBR, CAC406	KS 10K RF FLANGE	179
YHL–200			2.0 below	GCD450, SCPH2		KS 20K RF FLANGE	

Foot valve

Type	Size	Applicable fluid	Applicable pressure (MPa)	Materials		End connection	Page
				Body	Disc, seat		
YFV–1	40(1½")~250(10")	water	1.4 below	GC200	NBR, CAC406	KS 10K RF FLANGE	182

YHL–100, 200 Type Hammerless Check Valve

This product is used to prevent fluid from flowing backwards into a hammerless check valve pump outlet. It prevents water hammers, protects pump pipelines, and also functions as a bypass valve.

Features

- Water Hammer free.
  Prevent Water Hammer :The valve closes when fluid inside the pipeline becomes a speed of stoppage, based on precise movements of the spring & built–in buffer (a part inside the valve that resembles an umbrella playing an essential role in preventing Water Hammer).
- Suitable for pumps, pipelines protection & environmental preservation :Heavy noise & pressure loss, this is the most ideal valve for high–rise apartment buildings and other types of high–rise buildings, underground shopping malls, public office buildings, and other public buildings with little Water Hammer shock.
- Breakdown–free simple structure.
- One–year warranty if there is malfunction.
- Bypass valve function.
- Withdraw water inside pipeline on pump outlet side as bypass valve & replenishes guiding water when vacuum establishes on pump inlet side.

YHL–100 Type

YHL–200 Type

Specitications

Type		YHL–100	YHL–200
Maximum running pressure		Maximum 1.0MPa	Maximum 2.0MPa
Applicable fluid		Water	
Fluid temperature		5~80℃	
Leakage allowance		ANSI b16.104 Class V	
End connection		KS 10K RF FLANGE	KS 20K RF FLANGE
Materials	Body	GC200	GCD450
	Disc	NBR, CAC406	
	seat	CAC 406	
Hydraulic test pressure		2.0MPa	3.0MPa

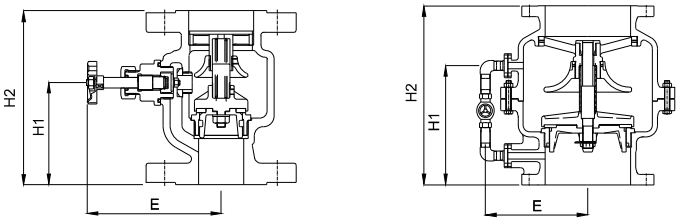
▶ Manufacturer's order for 2.0 MPa.
▶ Produce SCH2 Orders

Dimensions

(mm)

Size	E	H1	YHL–100	YHL–200	Weight (kg)
40(1½")	120	95	162		7.3
50(2")	135	100	183		9.3(15.8)
65(2½")	145	100	200	156	11.2(19)
80(3")	150	110	210		15(25.5)
100(4")	160	120	217		20(31)
125(5")	190	125	255(259)	255(259)	31(52.7)
150(6")	200	135	280(284)	280(284)	40(68)
200(8")	235	210	416(424)	416(424)	80(136)
250(10")	275	260	560(568)	560(568)	92(160)
300(12")	340	402	622		126.3(215)
350(14")	370	488	834		168(290)
400(16")	415	582	932(970)	932(970)	212.3(361)

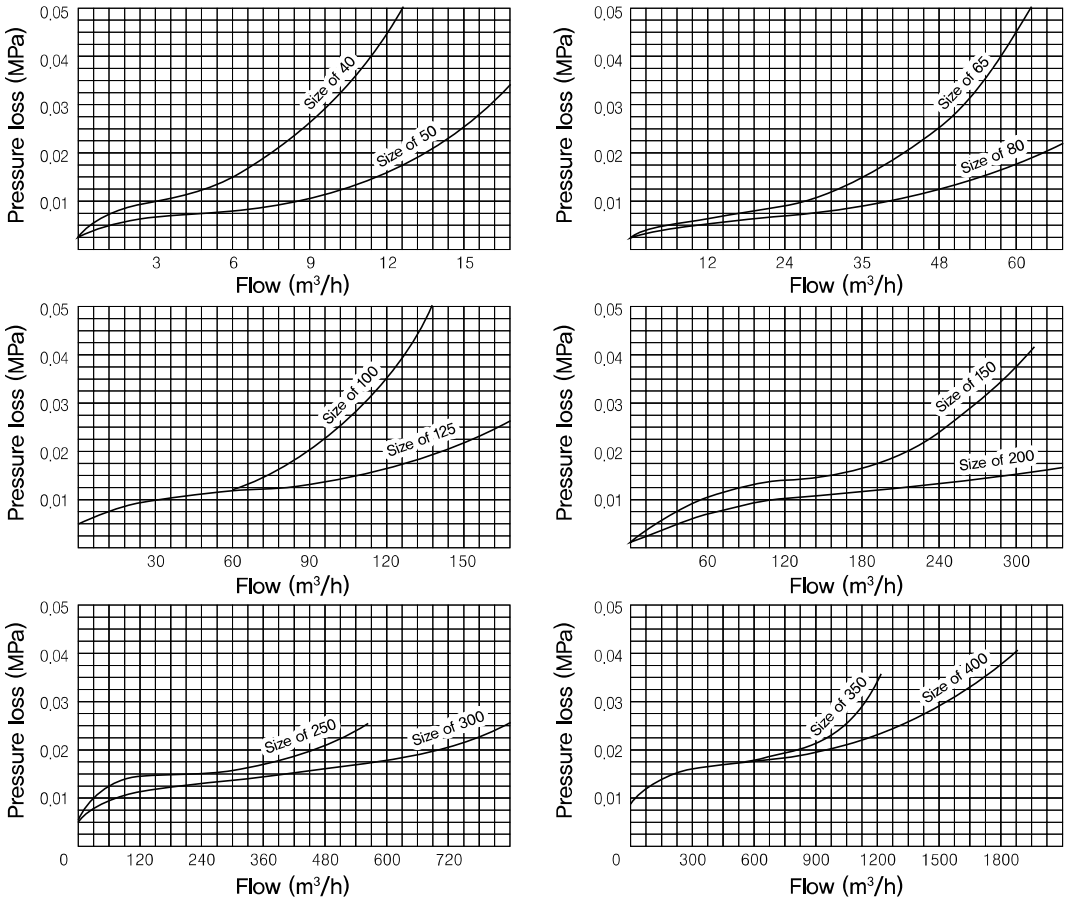
Dimensions drawing



YHL–100, 200 Types

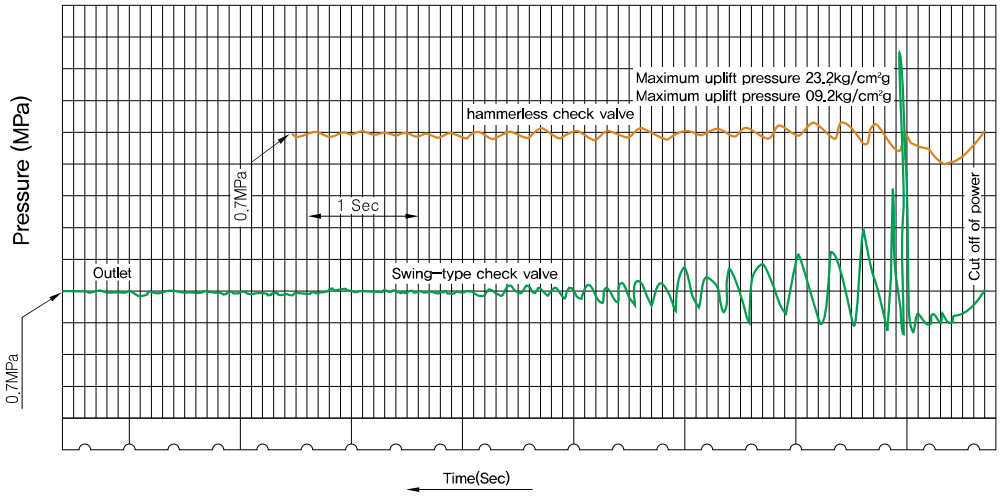
YHL–100, 200 Type Hammerless Check Valve

Pressure loss curve



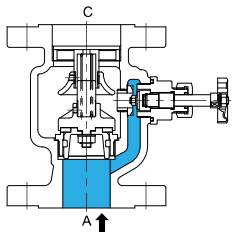
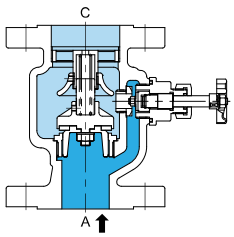
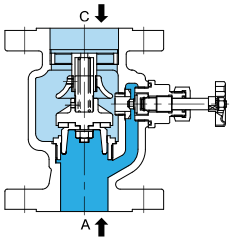
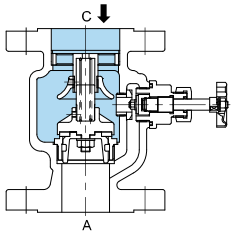
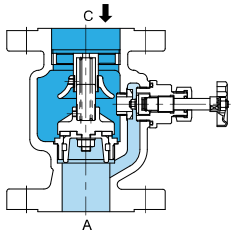
Water hammer test and pressure increase

The pressure loss and characteristics chart below makes a comparison between the characteristics of Samyang's hammerless check valve and a general swing–type check valve. When tested under the same conditions, the closing time of the hammerless check valve is shorter, and thus there is little surge in pressure.



YHL-100, 200 Type Hammerless Check Valve

How it works

	1. When the pump commences operation, the fluid's pressure arrives at side A, as seen in the diagram.
	2. The fluid, which reached A, raises the disc even at extremely little pressure (0.1 kgf/cm2g), resulting in the fluid passing through.
	3. The fluid, which reached A, raises the disc even at extremely little pressure (0.1 kgf/cm2g), resulting in the fluid passing through.
	4. When the pump stops operating, the supply pressure drops, and when the supply pressure becomes 0.1 kgf/cm2g, the valve has been closed already by the spring's force. As a result, there is no pressure shock or vibration that occurs from the commencement of the backward flow of fluid. This is why there is no water hammer.
	5. The bypass valve installed next to the valve is used to prevent freezing damages by draining water from the pipeline when the pump stops operating, and to replenish the empty pump with water when the pump starts to operate again.

Cautions for use

1. Leave the bypass valve closed during normal operation. (If the foot valve breaks down, open the valve and replenish the fluid to an appropriate level.)
2. Special attention is needed so that foreign substances, such as sand or welding particles, do not get mixed with the fluid and flow inside the pipeline.
3. If the applicable fluid is different or the valve is intended to be used for high temperatures of 60°C or more, consult with Samyang prior to placing an order.

YFV–1 Type Foot Valve

When installed on the pump inlet side of an underground water tank, this product is suitable for preventing the backward flow of fluid.

Specitications

Applicable fluid		Water
Maximum running pressure		Maximum 1.0MPa
Fluid temperature		80℃ below
Leakage allowance		ANSI b16.104 class V
End connection		KS 10K RF FLANGE
Materials	Body	GC200
	Disc, seat	NBR, CAC406
	Screen	STS
Hydraulic test pressure		1.5MPa

▶ Valves for 2.0MPa are available by made–to–orders.

Dimensions

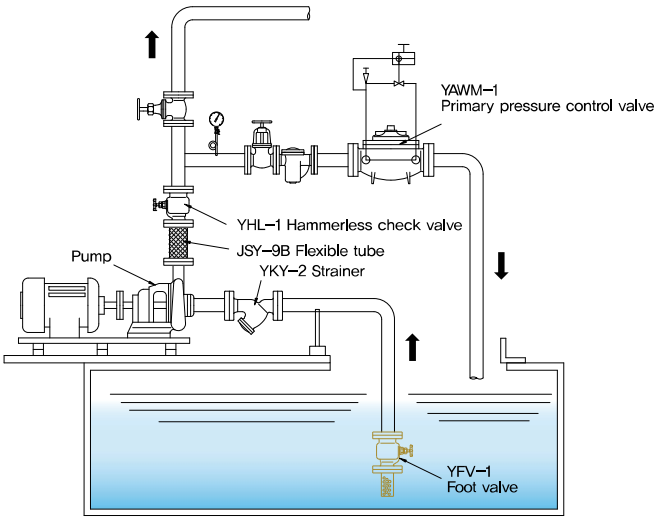
(mm)

Size	E	H1	H2	H3	Weight (kg)
40(1½")	120	95	162	324	9.2
50(2")	135	100	183	366	11.7
65(2½")	145	100	200	400	14.2
80(3")	150	110	210	420	17.8
100(4")	160	120	217	434	23.6
125(5")	190	125	255	510	36.5
150(6")	200	135	280	560	47.3
200(8")	235	210	416	832	88.5
250(10")	275	260	560	1120	106

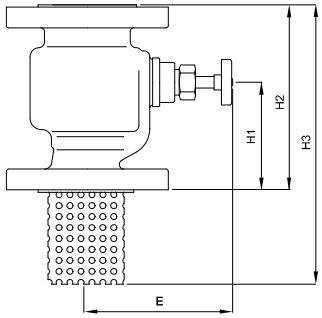
Notes for installation in a pump line

- Using the type YHL–1 hammerless check valve, instead of a swing–type valve, on the outlet side of a pump, will prevent a water hammer and protect the pump and pipeline.
- Since the disc of the hammerless check valve and the foot valve is made of NBR, a perfect sealing is maintained. In particular, there is little pressure loss, resulting in less electricity consumption.
- Install a flexible tube on the upper part of the check valve to prevent pipeline vibration resulting from pump vibration.
- The primary pressure control valve (relief valve) maintains a constant pressure level on the pump outlet side, according to the set pressure.
- Install a strainer on the inlet side of the pump to protect facilities in the pipeline and the pump.

Appliaction Diagram (Example)



Dimensions drawing



10

Air Vent Valve

Air Vent Valve

YAC-3 YAC-3M
YAC-3A YAC-4

10
Air Vent Valve

SAMYANG
SYSTEM GROUP

Air Vent Valve

Samyang's air vent valve eliminates air-related problems and prevents pipeline corrosion by automatically discharging air generated in construction facilitie's cold/hot water pipelines, water supply and water heating pipelines, as well as plant's cold/hot water pipelines and tanks. In addition, it automatically takes air in when liquid is discharged from pipelines and tanks, thereby ensuring easy discharge by preventing a creation of a vacuum.

Air Vent Valve

Type	Size	Applicable fluid	Applicable pressure (MPa)	Materials		End connection	Page
				Body	Disc, seat		
YAC-3	15(1/2")~25(1")	Water	Maximum 1.0	C3771	NBR, C3604	KS PT SCREW	185
YAC-3A	15(1/2")			CAC303	EPDM, STS		186
YAC-3M							
YAC-4	15(1/2")~25(1")			GC200			187

YAC-3 Type Air Vent

This is a compact air vent valve that is used for pipelines, hot water boilers, fan coils, and small- to medium-sized pressure tanks. The adoption of the BBC (Bubble Crush) method ensures safe operation and prevents water hammers, hunching, etc.

Features

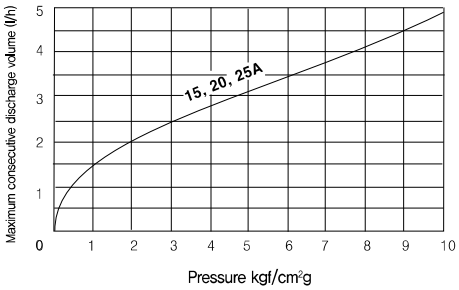
- Bubble Crush(BBC) structure prevent Water Hammers & chattering caused by float in special form distributes rising pressure & bubbles.
- Reliable operation is ensured by spring's force seat closing.
- Simple & strong structure.
- Compact & outstanding air discharge performance.
- Manual closing device installed on outlet side.
- Manufacture as air vent valve for steam.

Specitications

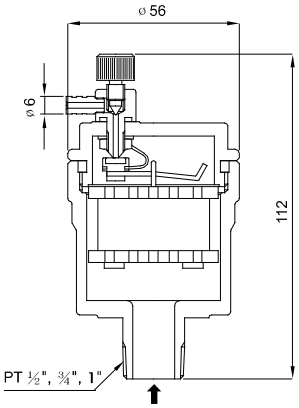
Type		YAC-3
Size		15(½"), 20(¾"), 25(1")
Applicable fluid		Cold / hot water
Applicable pressure		Maximum 1.0MPa
Fluid temperature		5~100℃
End connection		KS PT SCREW
Materials	Body	C3771
	Disc, seat	NBR, C3604
Hydraulic test pressure		1.5MPa

▶ Install a strainer (80 MESH or more) on the leaflet during installation of the valve.

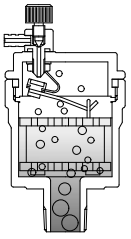
Air discharge volume curve



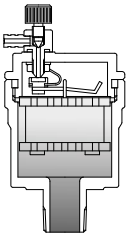
Dimensions drawing



Air discharge volume curve



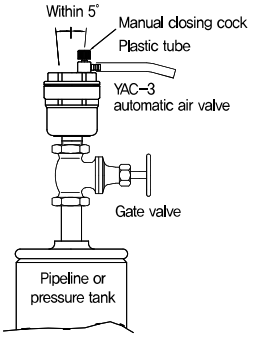
- **When discharging air**
  It discharges air that comes in when the seat is opened by the float's own weight.



- **When discharge stops**
  If the water level and float rises immediately after air discharge, the valve closes by the float's buoyancy and spring's elasticity.

Installation example and cautions during handling

- When installing the valve in a pipeline, install it within 5° of a vertical line.
- When installing the valve indoors, connect the outletside to the drainage just in case there is leakage.
- Install a manual valve on the inlet side for repair and inspections.
- Close the manual closing cock if there is a leakage.



YAC-3A, 3M Type Automatic Air Vent Valve

As an air vent valve for liquid, it automatically discharges remaining air from pipelines and air from sealed tanks, thereby allowing for smooth flow of fluid.

Features

- Low pressure also operates smoothly.
- Disk designs are designed to be free and smooth and sensitive.
- Made for easy repair and inspection.
- Stilleball installation prevents air ingress into the air.

YAC-3A Type

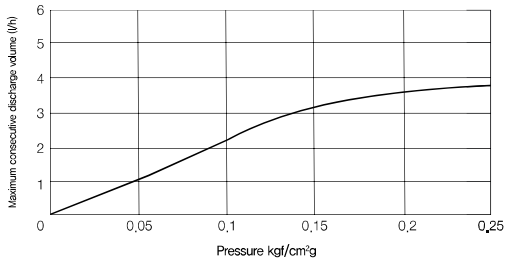
YAC-3M Type
Multi-Function Air Vend
(Air Vend + Strainer + Stone valve)

Specitications

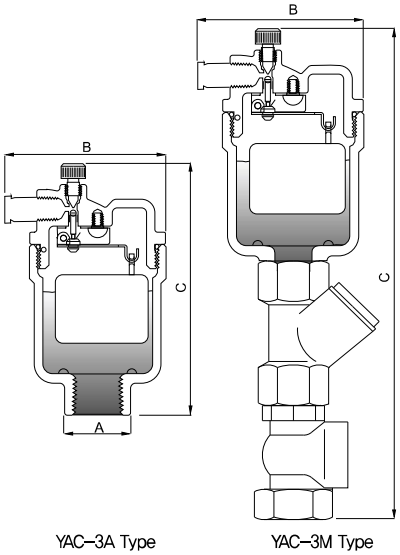
Type		YAC-3A, 3M
Size		15(½")
Applicable fluid		Cold / hot water
Applicable pressure		Maximum 1.0MPa
Fluid temperature		5~80℃
End connection		KS PTS CREW(Female)
Materials	Body	CAC303
	Disc, seat	EPDM, STS
Hydraulic test pressure		1.5MPa

▶ Install a strainer (40 MESH or more) on the leaflet during installation of the valve.

Air discharge volume curve



Dimensions drawing



YAC-3A Type YAC-3M Type

Installation method and cautionary measures

1. Install it vertically (within 5 °).
2. When installing indoors, connect the outlet side to the drainage.
3. Install a manual valve on the inlet side.
4. In case of leakage, close by using the handle.

Measures in case of leakage

1. In case of leakage, close the manual valve on the lower part of the air vent, open the cap, check if there are any foreign substances on top of the disc or seat, wash the foreign substances away, if any, and then resume normal operation.
2. When reassembling, take caution so that the float is not detached from the press part.

YAC-4 Type Air Vent

As an air vent valve for liquid, it automatically discharges remaining air from pipelines and air from sealed tanks, thereby allowing for smooth flow of fluid.

Features

- Large discharge capacity covers up to 10~20 kgf/cm2g.
- Flexible disc structure for smooth & subtle operation.
- NBR-based seat features outstanding level of air tightness.
- Easy repair & inspections manufactured.

Specitications

Type		YAC-4
Size		15(½"), 20(¾"), 25(1")
Applicable fluid		Cold / hot water
Applicable pressure		Maximum 1.0MPa
Fluid temperature		5~80℃
End connection		KS PT SCREW
Materials	Body	GC200
	Disc, seat	STS, EPDM
Hydraulic test pressure		1.5MPa

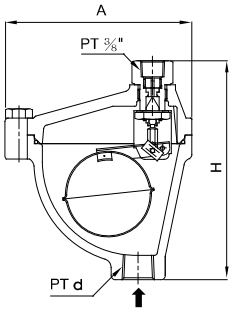
▶ Install a strainer (40 MESH or more) on the leaflet during installation of the valve.

Dimensions

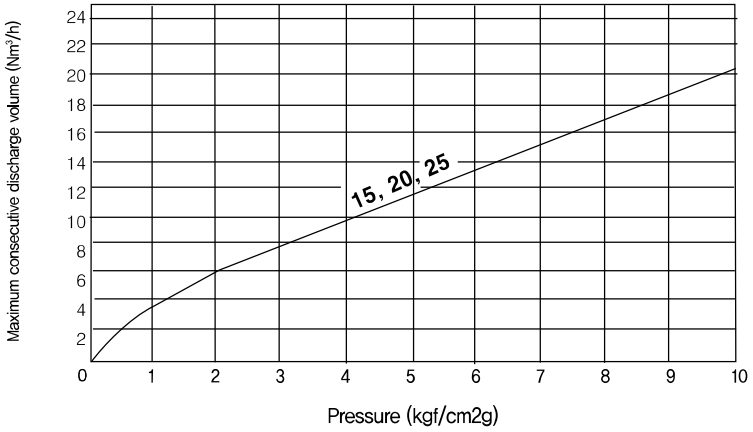
(mm)

Size	d	A	H	Weight (kg)
15(½")	½"	115	153	2.0
20(¾")	¾"	115	153	2.0
25(1")	1"	115	153	2.2

Dimensions drawing



Air discharge volume curve



MEMO

11

Intelligent Control Check Valve / Suction Diffuser

Intelligent Control Check Valve / Suction Diffuser

YCC-1, 1R
YCC-2, 2R
YCC-3, 3R

YSD-1, 1R
YSD-2, 2R
YSD-3, 3R

11 Intelligent Control Check Valve / Suction Diffuser

Control Check Valve

Control Check Valve

Type	Size	Applicable fluid	Applicable pressure (MPa)	Materials (Body)	End connection	Page
YCC-1, 1R	50(2")~450(18")	Water, liquid	1.0 below	GC200	KS 10K FF FLANGE	191
YCC-2			2.0 below	GCD450	KS 20K RF FLANGE	
YCC-3			3.0 below	SCPH2	KS 30K RF FLANGE	

Suction Diffuser

Type	Size	Applicable fluid	Applicable pressure (MPa)	Materials (Body)	End connection	Page
YSD-1, 1R	50(2")~600(24")	Water, liquid	1.0 below	GC200	KS 10K FF FLANGE	192
YSD-2, 2R			2.0 below	GCD450	KS 20K RF FLANGE	
YSD-3, 3R			3.0 below	SCPH2	KS 30K RF FLANGE	

YCC-1, 2, 3 / 1R Type Intelligent Control Check Valve

This check valve protects the pump by bypassing the discharge pressure that instantaneously rises when the pump starts. It also absorbs shock by linearly opening the water hammer cushion valve to prevent a water hammer resulting from a surge in pressure by the backward flow of water inside a standing pipeline when the pump stops. In addition, this product has a port soft sealing structure, thereby ensuring perfect air tightness at normal times.

Features

- Performs 5 different functions : check valve, balancing valve, bypass valve, and relief valve.
- No Water Hammer in the pump : The spring reacts to the Pump Discharge Pressure (PDP) so that the disc closes in time.
- No need to install a separate balancing valve & attached indicator enables easy identification : The valve can regulate the flow of fluid according to the accurately controlling valve opening degree and the attached indicator visually provides the open/closed status of the valve.
- Possible to install in any direction, horizontally or vertically : Installation space is reduced and construction is convenient.

YCC-1, 2, 3 Type

YCC-1, 2, 3R Type

Specitications

Type		YCC-1, 1R	YCC-2	YCC-3
Applicable fluid		Water, Liquid		
Applicable pressure		Maximum 1.0MPa	Maximum 2.0MPa	Maximum 3.0MPa
Fluid temperature		80℃ below	120℃ below	120℃ below
End connection		KS 10K FF FLANGED	KS 20K RF FLANGED	KS 30K RF FLANGED
Hydraulic test pressure		1.5MPa	3.0MPa	4.5MPa
Materials	Body	GC200	GCD450	SCPH2
	Seat	CAC406		
	Disc	EPDM		
	GASKET	NBR, EPDM	NBR, EPDM	NBR, EPDM

▶ Install a strainer (40 MESH or more) at the front end when installing the valve.

Categorization of types

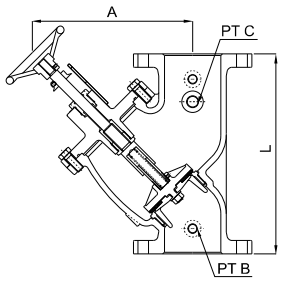
Category	Main functions
YCC-1, YCC-2, YCC-3	Check, Balancing, Stop Valve, By-pass
YCC-1R	Check, Balancing, Stop Valve, By-pass, Relief, + pressure gauge + Internal special coating

Dimensions

(mm)

SIZE	L		A	PTB	PTC
	10K	20K		By-pass	Relief Conn
50A	235	235	184	⅜	½
65A	270	270	206	⅜	½
80A	295	295	232	⅜	¾
100A	355	355	278	⅜	¾
125A	420	424	328	½	1
150A	470	474	372	½	1
200A	550	558	451	¾	1¼
250A	670	678	542	¾	1¼
300A	780	788	645	1	2
350A	890	902	720	1	2½
400A	980	1000	768	1½	3
450A	1100	1140	850	1½	3

Dimensions drawing



FLANGED END TYPE

YSD-1, 2, 3 / 1, 2, 3R Type Intelligent Suction Diffuser

Features

- Structure to verify whether internal screen need cleaning.
- Quick-changeable hinge structure enable quick cleaning of the screen.
- Built-in magnet protects the pump & pipeline from damage caused by iron content & welding slags.
- Maximized pump efficiency & little pressure loss by outlet side located vane.

YSD-1, 2, 3 Type

YSD-1, 2, 3R Type

Specitications

Type		YSD-1,1R	YSD-2, 2R	YSD-3,3R
Applicable fluid		Water, Liquid		
Applicable pressure		Maximum 1.0MPa	Maximum 2.0MPa	Maximum 3.0MPa
Fluid temperature		Maximum 80°C	Maximum 120°C	Maximum 120°C
End connection		KS 10K FF FLANGED	KS 20K RF FLANGED	KS 30K RF FLANGED
Materials	Body	GC200	GCD450	SCPH2
	스크린	STS304		
	GASKET	NBR, EPDM	EPDM	
	DRAIN PLUG	SS400, GC200		
Hydraulic test pressure		1.5MPa	3.0MPa	4.5MPa

Categorization of types

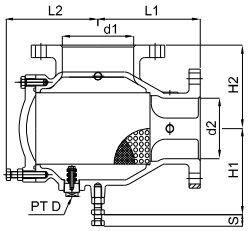
Category	Main functions
YSD-1, YSD-2, YSD-3	Suction diffuser + Built-in magnet + Pressure loss measuring device (Standard)
YSD-1R, YSD-2R, YSD-3R	Suction diffuser + Intelligent element

Dimensions

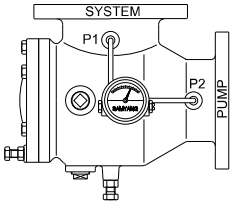
(mm)

SYSTEM(d1)	PUMP(d2)	L1	L2	H1	H2	S	PT D
50A	50A	113	78	110	78	10	3/8
65A	65A	125	89	115	121	10	3/8
80A	80A	144	109	124	140	10	1/2
	65A	144	109	124	140	10	1/2
100A	100A	180	164	150	160	12	3/4
	80A	180	164	150	160	12	3/4
	65A	180	164	150	160	12	3/4
125A	125A	215	192	175	181	12	1
	100A	180	163	150	160	12	3/4
	80A	180	163	150	160	12	3/4
	65A	180	163	150	160	12	3/4
150A	150A	250	224	205	212	14	1
	125A	215	193	175	181	12	1
	100A	215	193	175	181	12	1
200A	200A	320	285	260	274	17	1 1/4
	150A	250	223	205	216	14	1
	125A	233(235)	227	205	219	14	1
	100A	255	227	205	219	14	1
250A	250A	360	330	310	323	18	1 1/4
	200A	320	280	260	274	17	1 1/4
	150A	320	280	260	274	17	1 1/4
300A	300A	410	372	360	392	23	1 1/2
	250A	360	332	310	323	18	1 1/4
	200A	398	332	310	323	18	1 1/4
	150A	408(410)	334	306(310)	329	18	1 1/4
350A	350A	480	421	390(400)	421	23	2
	300A	410	372	360	392	23	1 1/2
	250A	360	331	310	323	18	1 1/4
400A	400A	560	484	450(460)	471	23	2
	350A	560	484	450(460)	471	23	2
	300A	520	422	390	425	23	2
	250A	536(540)	422	390(400)	425	23	2
	200A	561(565)	422	390(400)	425	23	2
450A	450A	638	550	510(520)	535	28	2
	400A	640(650)	558	510(520)	538	25	2
	350A	670(676)	558	510(520)	538	25	2
500A	500A	630(640)	557	520(530)	537	25	2
	450A	630(640)	557	520(530)	537	25	2
	400A	640(650)	557	520(530)	537	25	2
	350A	670(676)	557	520(530)	537	25	2

Dimensions drawing



FLANGED TYPE



FLANGED TYPE(STANDARD)

Data / Intelligent Control Check Valve, Suction Diffuer

Items that becom unnecessary or can be saved with control check valve installation

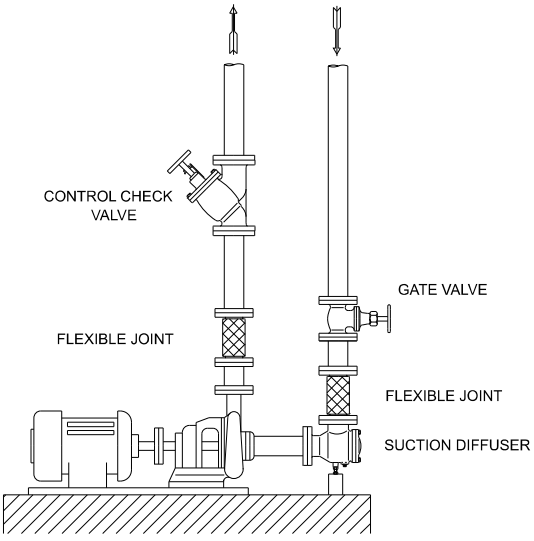
1. Check Valve
2. Gate Valve
3. Balancing Valve
4. Relief Valve
5. Flange
6. Gasket, Bolt, Nut
7. Reduced construction time
8. Reduced labor costs, etc.

Cautions for installation

1. It can be installed on a horizontal or vertical pipeline.
2. Install a flexible joint to prevent damage to the pipeline resulting from pump vibration.
3. Install after checking the direction of the fluid's flow (arrow).
4. Use a spanner or the handle to open the valve and operate the pump.
5. If there is a bypass valve attached, operate after closing the external ball valve.)

Information required when placing an order

1. MODEL
2. Type of fluid
3. Maximum running pressure (kgf/cm^{2}g)
4. Maximum temperature used (℃)
5. Pump's discharge pipeline diameter (mm)
6. Maximum flow (m^3/hr or LPM)
7. Other options



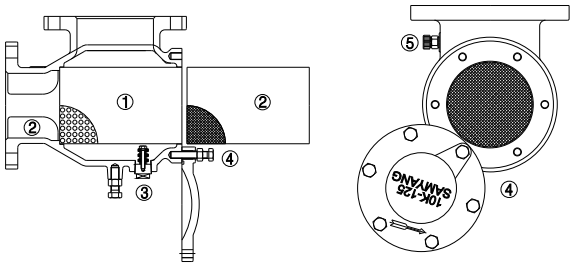
Piping method using control check valves

Items that become unnecessary or can be saved with suction diffuser installation

1. Reduced pipe on the inlet side
2. Reducing elbow
3. Strainer
4. Flange (2 each)
5. Gasket, bolt, nut
6. Pipe support
7. Reduced labor costs
8. Reduced construction time

Test operation tips

1. The valve is in a closed state when delivered to the customer.(Indicator says 0%)
2. After installation, open the valve by loosening the square part of the stem that protrudes towards the cover part or the handle towards the left (counterclockwise direction)
3. The opening degree can be checked through the indicator that is attached to the cover.
4. It is recommended to maintain the opening degree at 100%. Controlling the pump's discharge amount by adjusting the opening degree leads to pump overload. This is why the opening degree should not be adjusted unless in special cases.
5. Install a pressure gauge on the outlet side of the valve to check for leakage. (If the outlet pressure drops when the pump is not in operation or the fluid is not flowing, it means that there is leakage.)



How to clean the screen and remove the wire and wire mesh net

1. Sufficiently flush the inside of the pipeline after opening all valves.
2. Close the gate valve in front of the suction diffuser.
3. Open the drain plug ③ in the lower part of the main body to completely withdraw water and remove foreign substances.
4. Disassemble the bolts on the cover and open the cover by turning it based on the hinge ④.
5. Open the screen ① simultaneously.
6. Remove the wire mesh net ② located outside the screen.
7. Clean the screen ①, and assemble in reverse order.

MEMO

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Reference Data

Reference
Data

12
Reference
Data

SAMYANG
SYSTEM GROUP

Data / Engineering Unit Conversion Table

LENGTH

cm	m	km	in	ft	Cheok (Korea foot)
1	0.01	0.041	0.3937	0.0328	0.033
100	1	0.001	39.371	3.2809	3.3
100,000	1,000	1	39,371	3,280.9	3,300
2.54	0.02540	0.04254	1	0.08333	0.08382
30.48	0.3048	0.033048	12	1	1.0058
30.30	0.30303	0.033030	11.9303	0.9942	1

AREA

cm^2	m^2	in^2	ft^2	Cheok (Korea foot)
1	0.031	0.1550	0.001076	0.001089
1X104	1	1,550.1	10.7643	10.89
6.4514	0.036451	1	0.006944	0.007026
929	0,0929	144	1	1.0117
918.27	0.09183	142.34	0.9885	1

VOLUME

dm^3	m^3	ft^3	gal (British)	gal (U.S)	Seok	Cheok (Korea foot)
1	0.001	0.03532	0.220	0.2642	0.025544	0.03594
1,000	1	35.317	219.95	264.19	5.5435	35.937
28.315	0.02832	1	6.2279	7.4806	0.1570	1.0175
4.5465	0.024547	0.1606	1	1.2011	0.02520	0.1633
3.7852	0.023785	0.1337	0.8325	1	0.02098	0.1360
180.39	0.18039	6.3707	39.676	47.656	1	6.4827
27.826	0.02783	0.9827	6.1203	7.3514	0.15425	1

MASS

g	kg	t(tonne)	lb	ton(British)	ton(U.S)	Gwan (3.75Kg)	Geun (0.6kg)
1	0.001	0.051	0.002205	0.06984	0.051102	0.032267	0.001667
1,000	1	0.001	2.2046	0.03984	0.021102	0.2667	1.6667
1X106	1,000	1	2,204.6	0.9842	1.1023	266.67	1,666.7
453.6	0.4536	0.034536	1	0.03446	0.0351	0.121	0.760
1,016,047	1,016.05	1.01605	2,240	1	1.12	270.94	1,693.4
907.185	907.185	0.90719	2,000	0.89286	1	241.91	1,519.8
3,750	3.75	0.00375	8.2673	0.023691	0.024134	1	6.25
600	0.6	0.036	1.3228	0.035905	0.036613	0.16	1

VISCOSITY

Poise=g/cm · s (CGS unit)	centipoise. cP	kg/m · s	kg/m · h	lb/ft · s
1	100	0.1	360	0.0672
0.01	1	0.001	3.6	0.000672
10	1,000	1	3,600	0.672
0.00278	0.278	0.03278	1	0.000187
14.88	1.488	1.488	5,356.8	1

VELOCITY

m/s	m/h	km/h	ft/s	ft/min	mile/h
1	3,600	3.6	3.281	196.85	2.2370
0.032778	1	0.001	0.039114	0.05468	0.036214
0.2778	1,000	1	0.9114	54.682	0.6214
0.3048	1,097.25	1.0973	1	60	0.68182
0.025080	18.287	0.01829	0.01667	1	0.01136
0.4470	1,609.31	1.6093	1.4667	88	1

Data / Engineering Unit Conversion Table

FLOW

ℓ /s	m³/h	m³/s	gal/min (British)	gal/min (U.S)	ft³/h	ft³/s
1	3.6	0.001	13.197	15.8514	127.14	0.03532
0.2778	1	0.032778	3.6658	4.4032	35.317	0.029801
1,000	3,600	1	13,197	15,851	127,150	35.3165
0.075775	0.27279	0.0475775	1	1.2011	9.6342	0.022676
0.06309	0.2271	0.046304	0.8325	1	8.0208	0.022228
0.027865	0.02832	0.057865	0.1038	0.1247	1	0.032778
28.3153	101.935	0.02832	373.672	448.833	3,600	1

PRESSURE

kPa	MPa	kgf/cm²	lb/in²	atm	mHg	inHg	mH²O (mAq)	inH²0
(inAq)	0.001	0.03532	0.220	0.2642	0.025544	0.03594		
	0.001	0.010197	0.14504	0.009869	0.007501	0.29530	0.10197	4.01463
100	0,1	1.0197	14.50	0.9869	0.7500	29.55	10.21	401.8
98.0665	0.098067	1	14.223	0.9678	0.7355	28.96	10.01	394.0
6.8948	0.006895	0.07031	1	0.06804	0.05171	2.0355	0.7037	27.70
101.325	0.101325	1.0333	14.70	1	0.760	29.92	10.34	407.2
133.322	0.133322	1.3596	19.34	1.316	1	39.37	13.61	535.67
3.3864	0.003386	0.03453	0.4912	0.03342	0.02540	1	0.3456	13.61
9.8067	0.009807	0.09991	1.421	0.0967	0.07349	2.893	1	39.37
0.24909	0.000249	0.002538	0.03609	0.002456	0.001867	0.07349	0.0254	1

STRESS

Pa	MPa or N/mm²	kg/mm²	kgf/cm²
1	0.000001	0.06101972	0.04101972
1,000,000	1	0.101972	10.1972
9,806,650	9.80655	1	100
98,066.5	0.0980665	0.01	1

POWER

Pa	MPa or N/mm²	kg/mm²	kgf/cm²
1	0.000001	0.06101972	0.04101972
1,000,000	1	0.101972	10.1972
9,806,650	9.80655	1	100
98,066.5	0.0980665	0.01	1

WORK / ENERGY / CALORIE

J	kw · h	kgf · m	kcal
1	0.06277778	0,101972	0.000238889
3,600,000	1	367,098	860
9.80665	0.05272407	1	0.00234270
4,186.05	0.00116279	426.858	1

Comparison berween SI units and conventionally used units

Measurement	SI unit	Units jointly used with SI units	Conventionally used units	SI unit conversion rate	Notes
Plane angle	rad	0 Degree ' Minute " Second		– 1.74533 x 10^{-2}rad 2.90888 x 10^{-4}rad 4.84814 x 10^{-6}rad	1° =(π/180)rad 1'=(1/60)° 1"=(1/60)'
Mass	kg	t		– 1 x 10^{3}kg	
Density	kg/m^3	kg/ℓ t/m^3		– 1 x 10^{-3}kg/m^3 1 x 10^{-3}kg/m^3	
Force	N		dyn kgf	1 x 10^{-5}N 9.80665N	
Pressure	Pa	bar	mmAq, mmH_2O mAq, mH_2O kgf/cm^2 mmHg atm (Steam pressure)	– 1 x 10^{5}Pa 9.80665Pa 9.80665 x 10^{3}Pa 9.80665 x 10^{4}Pa 1.3322 x 10^{2}Pa 1.0135 x 10^{5}Pa	Used for fluid pressure
Viscosity	Pa · S	P		– 1 x 10^{-1}Pa · S	
Kinematic viscosity	m^2/S	St		– 1 x $10^{-4}$$m^2$/S	
Work/Calorie/ Electric energy	J		kcal kgf · m kW · h	– 4.18605kJ 9.80665J 3.6MJ	According to IT calorie, which indicates values of measurement, 1kcal IT=4.18680kJ
Temperature	K ℃				Thermodynamical temperature celsius temperature T(K)=273.15+t(℃)
Temperature unit	K ℃				Indicated as deg before
Specific heat/Entropy	J/(kg · K)		kcal/kg • ℃	– 4.18605kJ/(kg · K)	
Enthalpy/Specific latent heat	J/kg		kcal/kg	– 4.18605kJ/kg	
Stress	Pa N/m^2		kgf/m^2	9.80665Pa	

SI Unit conversion table

SI stands for the International System of Units (from the French Le Systeme International d'Unites), which was adopted during the General Conference on Weights and Measures (CGPM) in 1960.

● Main measurement units that were changed to SI units

Measurements	Changed measurement unit (symbol)	SI unit (symbol)	Unit conversion factors (note 1)
Pressure	(kgw/m^2, kgf/m^2, kg/m^2) (mHg) 주2 (mH_2O, mAq) (Torr) 주3	Pascal (Pa)	1kgf/m^2 ≒ 9.8Pa1mHg ≒ 133kPa 1mH_2O ≒ 9.8kPa ITorr = 133Pa
Force	(kgw, kgf)	(N)	1kgf ≒ 9.8N
Work	(kgw · m, kgf · m, kg · m)	(N · m)	1kgfm ≒ 9.8N • m
Stress	(kgf/m^2)	(Pa)	1kgf/m^2 ≒ 9.8Pa
Calorie	(kal) 주4	(J)	1cal ≒ 4.2J
Length	(μ)	(m)	1 μ = 1μm

● The following are main prefixes that composethe integer powers of 10 of SI units.

Factor	Prefix	Symbol
106	Mega	M
103	Kilo	k
102	Hectare	h

Factor	Prefix	Symbol
10–2	Centimeter	C
10–3	Millimeter	m
10–6	Micrometer	μ

Notes 1) The accurate figures for unit conversion are 9.8 → 9.8066, 133 → 133.322, 4.2 → 4.18605.
Notes 2) Certified for use in measuring blood pressure levels. Notes 3) Certified for use in medical–related matters.
Notes 4) Certified for use in nutrition–related matters.

Data / Saturated Steam Table

Absolute pressure of steam (a b s)		Steam temperature		Volume of 1 kg of water before evaporation	Volume of 1 kg of steam	Weight of 1 m^3 of steam	Calorie of 1 kg of steam (Kal)			Absolute pressure of steam (a b s)		Steam temperature		Volume of 1 kg of water before evaporation	Volume of 1 kg of steam	Weight of 1 m^3 of steam	Calorie of 1 kg of steam (Kal)		
(kPa)	(lb/in^2)	(℃)	(℉)				Water calorie	Latent heat	Total calorie	(kPa)	(lb/in^2)	(℃)	(℉)				Water calorie	Latent heat	Total calorie
1.96	0.28	17.2	62.9	1.0012	68.26	0.0147	17.2	587.8	605.0	1323.90	192.0	192.4	378.3	1.1451	0.1485	6.734	195.5	469.9	665.4
3.92	0.57	28.6	83.5	1.0039	35.46	0.0282	28.7	581.3	610.0	1372.93	199.1	194.1	381.4	1.1476	0.1436	6.974	197.3	468.4	665.7
5.88	0.85	35.8	96.4	1.0063	24.18	0.0414	35.8	577.3	613.1	1421.90	206.2	195.8	384.4	1.1500	0.1386	7.214	199.0	466.9	665.9
7.85	1.14	41.2	106.2	1.0083	18.44	0.0542	41.2	574.2	615.4	1470.99	213.3	197.4	378.3	1.1524	0.1342	7.454	200.7	465.5	666.2
9.80	1.42	45.5	113.9	1.0101	14.95	0.0669	45.4	571.8	617.2	1569.06	227.4	200.4	392.7	1.1572	0.1260	7.934	204.1	462.6	666.7
14.70	2.13	53.6	128.5	1.0138	10.21	0.0980	53.5	567.1	620.6	1667.13	241.7	203.4	398.1	1.1618	0.1189	8.414	207.2	459.9	667.1
19.61	2.84	59.7	136.5	1.0170	7.791	0.1284	59.6	563.5	623.1	1765.20	256.0	206.2	403.2	1.1663	0.1124	8.894	210.2	457.2	667.4
24.51	3.56	64.6	148.3	1.0197	6.319	0.1583	64.5	560.8	625.2	1863.26	270.2	208.8	407.8	1.1706	0.1067	9.375	213.1	454.6	667.7
29.41	4.27	68.7	155.7	1.0221	5.326	0.1878	68.7	558.2	626.9	1961.23	2844	211.4	412.5	1.1749	0.1015	9.857	215.9	452.1	668.0
34.32	4.98	72.3	162.1	1.0242	4.609	0.2170	72.2	556.1	628.3	2059.40	298.6	213.9	417.0	1.1791	0.0967	10.34	218.6	459.6	668.2
39.22	5.69	75.4	167.7	1.0362	4.067	0.2459	75.4	554.2	629.6	2157.46	312.8	216.2	421.2	1.1833	0.0924	10.82	221.2	447.2	668.4
44.12	6.40	78.3	172.9	1.0281	3.642	0.2746	78.3	552.5	630.8	2253.22	327.1	218.5	425.3	1.1873	0.0885	11.31	223.8	444.8	668.6
49.03	7.11	80.9	177.6	1.0298	3.300	0.3030	80.9	550.9	631.8	2353.60	341.3	220.8	429.4	1.1913	0.0848	11.79	226.2	442.6	668.8
58.83	8.53	85.5	185.9	1.0329	2.782	0.3594	85.5	548.1	633.6	2451.66	355.5	222.9	433.2	1.1953	0.0815	12.28	228.6	440.3	668.9
68.64	9.95	89.5	193.1	1.0357	2.408	0.4152	89.5	545.7	635.2	2549.73	369.7	225.0	437.0	1.1991	0.0784	12.76	230.9	438.1	669.0
78.45	11.4	93.0	199.4	1.0383	2.125	0.4705	93.0	543.5	636.5	2647.80	383.9	227.0	440.6	1.203	0.0755	13.25	233.2	435.9	669.1
88.25	12.8	96.2	205.2	1.0407	1.904	0.5253	96.2	541.5	637.7	2745.86	398.2	229.0	444.2	1.207	0.0728	13.74	235.4	433.8	669.2
98.26	14.2	99.1	210.4	1.0430	1.755	0.5797	99.2	539.6	638.8	2843.93	412.4	230.9	447.6	1.210	0.0703	14.23	237.5	431.7	669.2
117.67	17.1	104.3	219.7	1.0471	1.454	0.6875	104.4	536.3	640.7	2941.99	426.6	232.8	451.0	1.214	0.0679	14.72	239.6	429.7	669.3
137.29	19.9	108.7	227.7	1.0508	1.259	0.7942	108.9	535.5	652.4	3138.13	455.0	236.4	457.5	1.221	0.0637	15.70	243.7	425.6	669.3
156.90	22.8	112.7	234.9	1.0542	1.111	0.8999	112.9	530.8	643.7	3334.26	483.5	239.8	463.6	1.229	0.0599	16.69	247.6	421.7	669.3
176.51	25.6	116.3	241.3	1.0573	0.9952	1.005	116.6	528.4	645.0	3530.39	511.9	243.0	469.4	1.236	0.0565	17.69	251.3	417.9	669.2
186.13	28.4	119.6	247.3	1.0603	0.9018	1.109	199.6	526.3	646.2	3726.52	540.4	246.2	475.2	1.243	0.0535	18.69	254.9	414.2	669.1
245.16	35.6	126.8	260.2	1.0669	0.7317	1.367	127.2	521.4	648.6	3922.66	566.8	249.2	480.6	1.249	0.0508	19.70	258.4	410.5	669.9
294.19	42.7	132.9	271.2	1.0728	0.6168	1.621	133.4	517.2	650.6	4118.79	597.2	252.1	485.8	1.256	0.0483	20.72	261.7	407.0	669.7
343.23	49.8	138.2	280.8	1.0782	0.5337	1.874	138.8	513.4	652.2	4314.92	625.7	254.9	490.8	1.263	0.0406	21.74	265.0	403.5	668.5
392.26	56.9	142.9	289.2	1.0831	0.4708	2.124	143.7	510.0	653.7	4511.06	654.1	257.6	495.7	1.269	0.0439	22.77	268.2	400.0	668.2
444.30	64.0	147.2	297.0	1.0877	0.4214	2.373	148.1	506.8	654.9	4707.19	682.6	260.2	500.4	1.276	0.0420	23.80	271.3	396.6	667.9
490.33	71.1	151.1	304.0	1.0920	0.3816	2.620	152.1	503.9	656.0	4903.32	711.0	262.7	504.9	1.283	0.0402	24.85	274.3	393.3	667.6
539.36	78.2	154.7	310.5	1.0961	0.3489	2.877	155.8	501.2	657.0	5393.65	782.1	268.7	515.7	1.299	0.0364	27.49	218.5	385.1	666.6
588.39	85.3	158.1	316.6	1.1000	0.3213	3.112	159.3	498.6	657.9	5883.99	853.2	274.3	525.7	1.315	0.3331	30.18	288.3	377.2	666.5
637.43	92.4	161.2	322.2	1.1307	0.2980	3.356	162.6	496.1	658.7	6374.32	924.3	279.5	535.1	1.331	0.0304	32.93	294.8	369.4	664.2
686.46	99.5	164.2	327.6	1.1072	0.2778	3.600	165.7	493.8	659.5	6864.65	995.4	284.5	544.1	1.347	0.0280	35.75	301.0	361.8	662.8
735.50	106.7	167.0	332.6	1.111	0.2602	3.843	168.6	491.6	660.2	7354.98	1066.5	289.2	552.6	1.363	0.0259	38.62	307.0	354.3	661.3
784.53	113.8	169.6	337.3	1.1140	0.2448	4.086	171.3	489.5	660.8	7845.32	1137.6	293.6	560.5	1.379	0.0241	41.56	312.8	346.9	659.7
833.56	120.9	172.1	341.8	1.1172	0.2311	4.328	174.0	487.4	661.4	8335.63	1208.7	297.9	568.2	1.395	0.0224	44.58	318.4	339.6	658.0
882.60	128.0	174.5	346.1	1.1203	0.2188	4.570	176.5	485.4	661.9	8825.98	1279.8	301.9	585.4	1.412	0.0210	47.67	323.8	332.4	656.2
931.63	135.1	176.8	350.2	1.1233	0.2079	4.811	178.9	483.5	662.4	9316.31	1350.9	305.8	585.4	1.429	0.0197	50.85	329.1	325.2	654.3
980.66	142.2	179.0	354.2	1.1262	0.1979	5.052	181.3	481.6	662.9	9806.65	1422.0	309.5	589.1	1.446	0.0185	54.12	334.3	318.0	652.3
1029.90	149.3	181.2	358.2	1.1291	0.1890	5.293	183.5	479.8	663.3	11767.98	1706.4	323.1	613.6	1.518	0.0147	68.22	354.0	289.4	643.4
1078.73	156.4	183.2	361.8	1.1319	0.1807	5.533	185.6	478.1	663.7	13729.31	1990.8	335.1	653.2	1.599	0.0118	84.52	372.8	260.0	632.8
1127.76	163.5	185.2	365.4	1.1346	0.1732	5.774	187.7	476.4	664.1	15690.64	2275.2	345.8	654.4	1.693	0.0096	104.0	391.8	228.4	619.7
1176.80	170.6	187.1	368.8	1.1373	0.1663	6.014	189.8	474.7	664.5	17651.97	2559.6	355.4	671.7	1.814	0.0078	128.3	410.8	192.9	603.7
1225.83	177.8	188.9	372.0	1.1400	0.1599	6.254	191.7	473.1	664.8	19613.30	2844.0	364.1	687.4	1.990	0.0062	161.6	431.6	151.2	582.8
1274.86	184.9	190.7	375.3	1.1425	0.1540	6.494	193.6	471.5	665.1	22119.88	3208.7	374.15	705.47	3.170	0.0032	315.5	503.3	0	503.3

Data / Overheated Steam Table

Absolute pressure (kPa)		Steam temperature(℃)							
		100	150	200	250	300	350	400	450
9.80	v	17.54	19.90	22.26	24.61	26.97	29.32	31.68	34.03
(45.45)	i	641.9	664.7	687.8	711.2	734.8	783.3	758.9	808.1
49.03	v	3.486	3.967	4.442	4.916	5.388	5.860	6.332	6.803
(80.86)	i	640.7	664.0	687.3	710.8	734.6	758.7	783.2	808.0
98.0	v	1.730	1.975	2.215	2.454	2.691	2.927	3.164	3.400
(99.09)	i	639.3	663.1	686.8	710.5	734.3	758.5	783.0	807.9
196.1	v		0.6466	1.102	1.223	1.342	1.461	1.580	1.698
(119.61)	i		661.3	685.6	709.7	733.8	758.1	782.6	807.6
294.1	v		0.9788	0.7307	0.8123	0.8927	0.9724	1.052	1.131
(132.88)	i		659.4	684.5	708.9	733.2	757.6	782.3	807.3
392.2	v		0.4803	0.5450	0.6071	0.6679	0.7280	0.7878	0.8474
(142.92)	i		657.5	683.3	708.1	732.6	757.2	781.9	807.0
490.3	v			0.4336	0.4840	0.5330	0.5814	0.6294	0.6772
(151.11)	i			682.1	707.3	732.1	756.7	781.6	806.7
588.3	v			0.3592	0.4018	0.4431	0.4836	0.5238	0.5638
(158.08)	i			680.8	706.5	731.51	756.3	781.2	806.4
686.4	v			0.3060	0.3432	0.3788	0.4138	0.4484	0.4827
(164.17)	i			679.5	705.7	730.9	755.8	780.8	806.1
784.5	v			0.2662	0.2992	0.3307	0.3614	0.3918	0.4220
(169.61)	i			678.2	704.8	730.3	755.4	780.5	805.8
882.6	v			0.2351	0.2649	0.2932	0.3207	0.3478	0.3747
(174.53)	i			676.8	704.0	729.7	754.9	780.1	805.5
980.6	v			0.2103	0.2375	0.2632	0.2881	0.3126	0.3369
(179.04)	i			675.4	703.1	729.1	754.5	779.8	805.2
1176.8	v			0.1729	0.1964	0.2182	0.2392	0.2598	0.2802
(187.08)	i			672.6	701.3	727.9	753.6	779.0	804.6
1470.9	v			0.1353	0.1552	0.1732	0.1903	0.2070	0.2234
(197.37)	i			668.0	689.6	726.0	752.2	777.9	803.6
1961.3	v				0.1139	0.1282	0.1414	0.1542	0.1667
(211.39)	i				693.6	722.8	749.8	776.1	802.1
2941.9	v				0.07218	0.08291	0.09242	0.1014	0.1100
(23276)	i				682.6	715.8	744.9	772.3	799.0
392.2	v				0.05093	0.06016	0.06787	0.07491	0.08160
(249.18)	i				669.7	708.1	739.7	768.4	795.9
4903.3	v					0.04637	0.05309	0.05902	0.06457
(262.69)	i					699.6	734.1	764.3	792.7
5883.9	v					0.03706	0.04318	0.04841	0.05320
(274.28)	i					690.3	728.2	760.1	789.4
7845.3	v					0.02500	0.03068	0.03509	0.03897
(293.61)	i					667.7	715.2	751.1	782.6
9806.6	v						0.02302	0.02703	0.03041
(309.53)	i						700.4	741.4	755.5
11767.98	v							0.01030	0.01305
(364.07)	i							677.1	733.8

V=Volume of 1 kg of steam (m^3/kg), i=Calorie of 1 kg of steam (kcal/kg)

Data / Fluid Viscosity

Oil temperature and viscosity curve

$$v = \frac{\mu}{\rho}$$

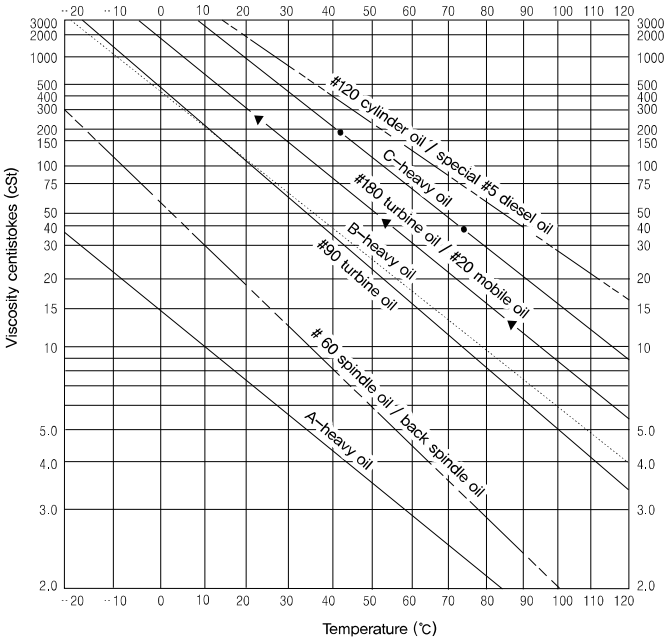
v = Viscosity (stokes : St, centistolkes : cSt)

μ : Absolute viscosity (Poise : P, centiposise : cP)

ρ : Density (g/cm^2)

1Poise = 100 centipoise

1stokes = 100 centistokes



Viscosity conversion table

Centistokes cst	Saybolt Universal Second (SSU) (Second)	Redwood (No. 1) Second R (Second)	Engler Degree E (Degree)	Centistokes (c s t)	Saybolt Universal Second (SSU) (Second)	Redwood (No. 1) Second R (Second)	Engler Degree E (Degree)
2.7	35	32.2	1.18	103	475	419	13.5
4.3	40	36.2	1.32	108	500	441	14.2
5.9	45	40.6	1.46	119	550	485	15.6
7.4	50	44.9	1.60	130	600	529	17.0
8.9	55	49.1	1.75	141	650	573	18.5
10.4	60	53.5	1.88	152	700	617	19.9
11.8	65	57.9	2.02	163	750	661	21.3
13.1	70	62.3	2.15	173	800	705	22.7
14.5	75	67.6	2.31	184	850	749	24.2
15.8	80	71.0	2.42	195	900	793	25.6
17.0	85	75.1	2.55	206	950	837	27.0
18.2	90	79.6	2.68	217	1000	882	28.4
19.4	95	84.2	2.81	260	1200	1058	34.1
20.6	100	88.4	2.95	302	1400	1234	39.8
23.0	110	97.1	3.21	347	1600	1411	45.5
25.0	120	105.9	3.49	390	1800	1587	51
27.5	130	114.8	3.77	433	2000	1763	57
29.8	140	123.6	4.04	542	2500	2204	71
32.1	150	132.4	4.32	650	3000	2646	85
34.3	160	141.1	4.59	758	3500	3087	99
36.5	170	150.0	4.88	867	4000	3526	114
38.8	180	158.8	5.15	974	4500	3967	128
41.0	190	167.5	5.44	1082	5000	4408	142
43.2	200	176.4	5.72	1150	5500	4849	156
47.5	220	194.0	6.28	1300	6000	5290	160
51.9	240	212	6.85	1400	6500	5730	185
56.5	260	229	7.38	1510	7000	6171	199
60.5	280	247	7.95	1630	7500	6612	213
64.9	300	265	8.51	1740	8000	7053	227
70.3	325	287	9.24	1850	8500	7494	242
75.8	350	309	9.95	1960	9000	7934	256
81.2	375	331	10.7	2070	9500	8375	270
86.8	400	353	11.4	2200	10000	8816	284
92.0	425	375	12.1				
97.4	450	397	12.8				

Data / Vapor Viscosity Table

Number	Vapor	X	Y	Number	Vapor	X	Y
1	Acetic acid	7.7	14.6	29	Freon-113	11.3	14.0
2	Acetone	8.9	13.0	30	Helium	10.9	20.5
3	Acetylene	9.8	14.9	31	Hexane	8.6	11.8
4	Air	11.0	20.0	32	Hydrogen	11.2	12.4
5	Ammonia	8.4	16.0	33	3H2+N2	11.2	17.2
6	Argon	10.5	22.4	34	Hydrogen bromide	8.8	20.9
7	Benzene	8.5	13.2	35	Hydrogen chloride	8.8	18.7
8	Bromine	8.9	19.2	36	Hydrogen cyanide	9.8	14.9
9	Butene	9.2	13.7	37	Hydrogen iodide	9.0	21.3
10	Butylene	8.9	13.0	38	Hydrogen sulfide	8.6	18.0
11	Carbon dioxide	9.5	18.7	39	Iodine	9.0	18.4
12	Carbon disulfide	8.0	16.0	40	Mercury	5.3	22.9
13	Carbon monoxide	11.0	20.0	41	Methane	9.9	15.5
14	Chlorine	9.0	18.4	42	Methyl alcohol	8.5	15.6
15	Chloroform	8.9	15.7	43	Nitric oxide	10.9	20.5
16	Cyanogen	9.2	15.2	44	Nitrogen	10.6	20.0
17	Cyclohexane	9.2	12.0	45	Nitrosyl chloride	8.0	17.6
18	Ethane	9.1	14.5	46	Nitrous Oxide	8.8	19.0
19	Ethyl acetate	8.5	13.2	47	Oxygen	11.0	21.3
20	Ethyl alcohol	9.2	14.2	48	Pentane	7.0	12.8
21	Ethyl chloride	8.5	15.6	49	Propane	9.7	12.9
22	Ethyl ether	8.9	13.0	50	Propyl alcohol	8.4	13.4
23	Ethylene	9.5	15.1	51	Propylene	9.0	13.8
24	Fluorine	7.3	23.8	52	Sulfur dioxide	9.6	17.0
25	Freon-11	10.6	15.1	53	Toleune	8.6	12.4
26	Freon-12	11.1	16.0	54	2,3,3-Trimethylbutane	9.5	10.5
27	Freon-21	10.8	15.3	55	Water	8.0	16.0
28	Freon-22	10.1	17.0	56	Xenon	9.3	23.0

How to find viscosity by chart

Assuming that the vapor type is 20°C air

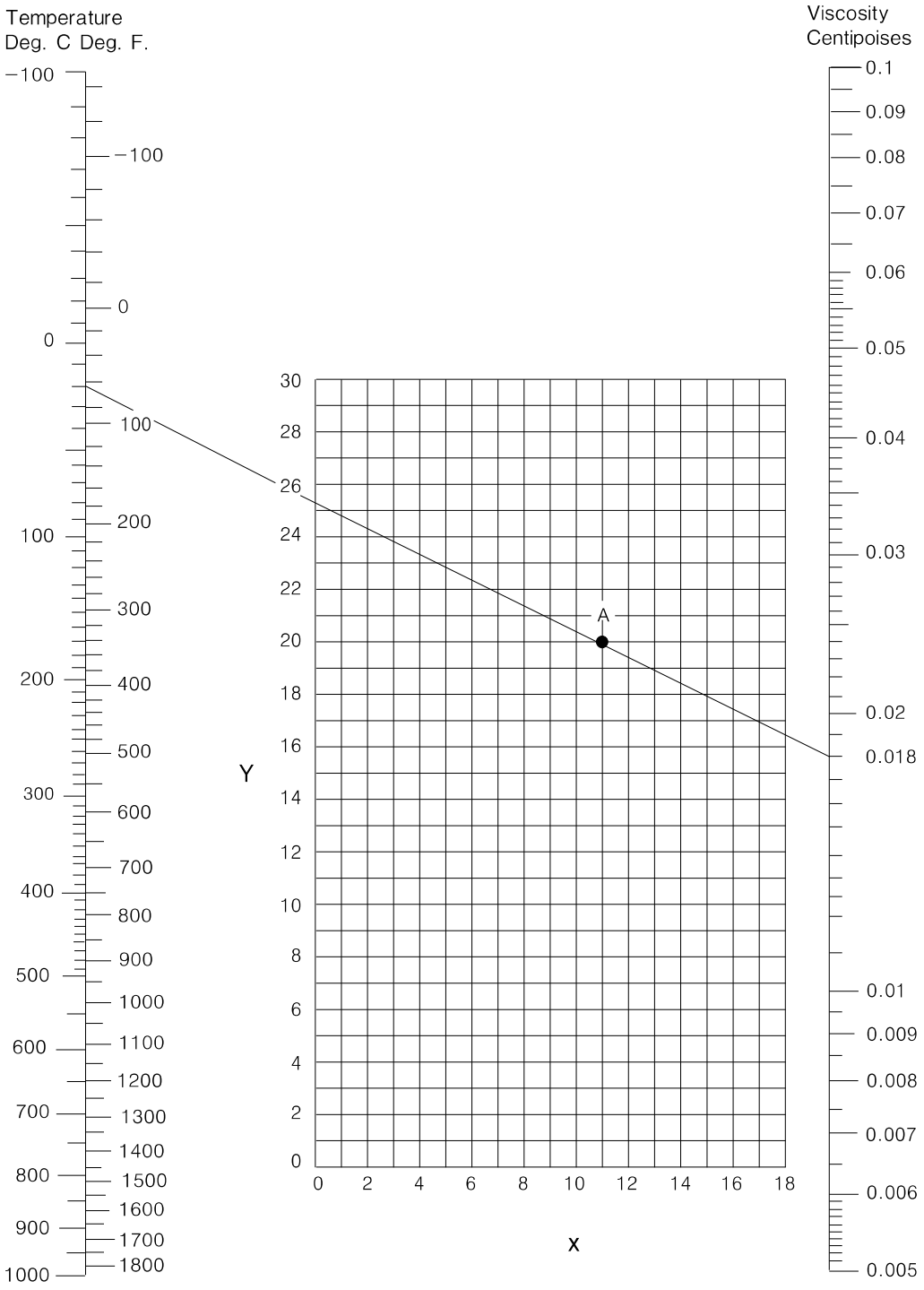
1) Find the air's coordinates in the table above. (X=11.0, Y=20.0)
2) Indicate the X and Y values on the coordinates table on the next page. (Point A)
3) Read the value of the point of intersection between the viscosity table on the right and the extended line that connects point A with the 20°C point of the temperature table on the left.
4) The viscosity of 20°C air is 0.018cP.

How to convert cP into cSt

Vapor cP / Vapor density (g/cm^3) = Vapor cSt

Example) When converting the viscosity of 20°C air (0.018cP) into cSt (air density : 1.20 X 10-3g/cm^3)

Data



Refer to the previous page for the viscosity (1 atm) and coordinates of vapor and steam.

Data / Liquid Viscosity Table

Number	Vapor	X	Y	Number	Vapor	X	Y
1	Acetaldehyde	15.2	4.8	56	Freon-22	17.2	4.7
2	Acetic acid, 100%	12.1	14.2	57	Freon-113	12.5	11.4
3	Acetic acid, 70%	9.5	17.0	58	Glycerol, 100%	2.0	30.0
4	Acetic anhydride	12.7	12.8	59	Glycerol, 50%	6.9	19.6
5	Acetone, 100%	14.5	7.2	60	Heptane	14.1	8.4
6	Acetone, 35%	7.9	15.0	61	Hexane	14.7	7.0
7	Allyl aicohol	10.2	14.3	62	Hydrochloric acid, 31.5%	13.0	16.6
8	Ammonia, 100%	12.6	2.0	63	Isobutyl alcohol	7.1	18.0
9	Ammonia, 26%	10.1	13.9	64	Isobutyl acid	12.2	14.4
10	Amyl acetate	11.8	12.5	65	Isobutyric alcohol	8.2	16.0
11	Amyl alcohol	7.5	18.4	66	Kerosene	10.2	16.9
12	Aniline	8.1	18.7	67	Linseed oil, raw	7.5	27.2
13	Anisole	12.3	13.5	68	Mercury	18.4	16.4
14	Arsenic trichloride	13.9	14.5	69	Methanol, 100%	12.4	10.5
15	Benzene	12.5	10.9	70	Methanol, 90%	12.3	11.8
16	Bimethyl oxalate	12.3	15.8	71	Methanol, 40%	7.8	15.5
17	Biphenyl	12.0	18.3	72	Methyl acetate	14.2	8.2
18	Brine, CaCl2, 25%	6.6	15.9	73	Methyl chloride	15.0	3.8
19	Brine NaCl, 25%	10.2	16.6	74	Methyl ethyl ketone	13.9	8.6
20	Bromine	14.2	13.2	75	Naphthalene	7.9	18.1
21	Bromotoluene	20.0	15.9	76	Nitric acid, 95%	12.8	13.8
22	Butyl acetate	12.3	11.0	77	Nitric acid, 60%	10.8	17.0
23	Butyl alcohol	8.6	17.2	78	Nitrobenzene	10.6	16.2
24	Butyric acid	12.1	15.3	79	Nitrotol uene	11.0	17.0
25	Carbon dioxide	11.6	0.3	80	Octane	13.7	10.0
26	Carbon disulfide	16.1	7.5	81	Octyl alcohol	6.6	21.1
27	Carbon tetrachloride	12.7	13.4	82	Pentachloroethane	10.9	17.3
28	Chlorobenzene	12.3	12.4	83	Pentane	14.9	5.2
29	Chloroform	14.4	10.2	84	Phenol	6.9	20.8
30	Chlorosulfonic acid	11.2	18.1	85	Phosphorus tribromide	13.8	16.7
31	o-Chlorotoluene	13.0	13.3	86	Phosphorus trichloride	16.2	10.9
32	m-Chlorotoluene	13.3	12.5	87	Propionic acid	12.8	13.8
33	p-Chlorotoluene	13.3	12.5	88	Propyl alcohol	9.1	16.5
34	m-resol	2.5	20.8	89	Propyl bromide	14.5	9.6
35	Cyclohexanol	2.9	24.3	90	Propyl chloride	14.4	7.5
36	Dibromoethane	12.7	15.8	91	Propyl iodide	14.1	11.6
37	Dichloroethane	13.2	12.2	92	Sodium	16.4	13.9
38	Dichloromethane	14.6	8.9	93	Sodium hydroxide, 50%	3.2	25.8
39	Diethyl oxalate	11.0	16.4	94	Stannic chloride	13.5	12.8
40	Dipropyl oxalate	10.3	17.7	95	Sulfur dioxide	15.2	7.1
41	Ethyl acetate	13.7	9.1	96	Sulfuric acid, 110%	7.2	27.4
42	Ethyl alcohol, 100%	10.5	13.8	97	Sulfuric acid, 98%	7.0	24.8
43	Ethyl alcohol, 95%	9.8	14.3	98	Sulfuric acid, 60%	10.2	21.3
44	Ethyl alcohol, 40%	6.5	16.6	99	Sulury l chloride	15.2	12.4
45	Ethyl benzene	13.2	11.5	100	Tetrachloroethane	11.9	15.7
46	Ethyl bromide	14.5	8.1	101	Tetrachloroethylene	14.2	12.7
47	Ethyl chloride	14.8	6.0	102	Titanium tetrachloride	14.4	12.3
48	Ethyl ether	14.5	5.3	103	Toluene	13.7	10.4
49	Ethyl formate	14.2	8.4	104	Trichloroethylene	14.8	10.5
50	Ethyl iodide	14.7	10.3	105	Turpentine	11.5	14.9
51	Ethylene glycol	6.0	23.6	106	Vinyl acetate	14.0	8.8
52	formic acid	10.7	15.8	107	Water	10.2	13.0
53	Freon-11	14.4	9.0	108	o-Xylene	13.5	12.1
54	Freon-12	16.8	5.6	109	m-Xylene	13.9	10.6
55	Freon-21	15.7	7.5	110	p-Xylene	13.9	10.9

How to find viscosity by chart

Assuming that the liquid type is 90°C water

1) Find the wate's coordinates in the table above. (X=10.2, Y=13.0)

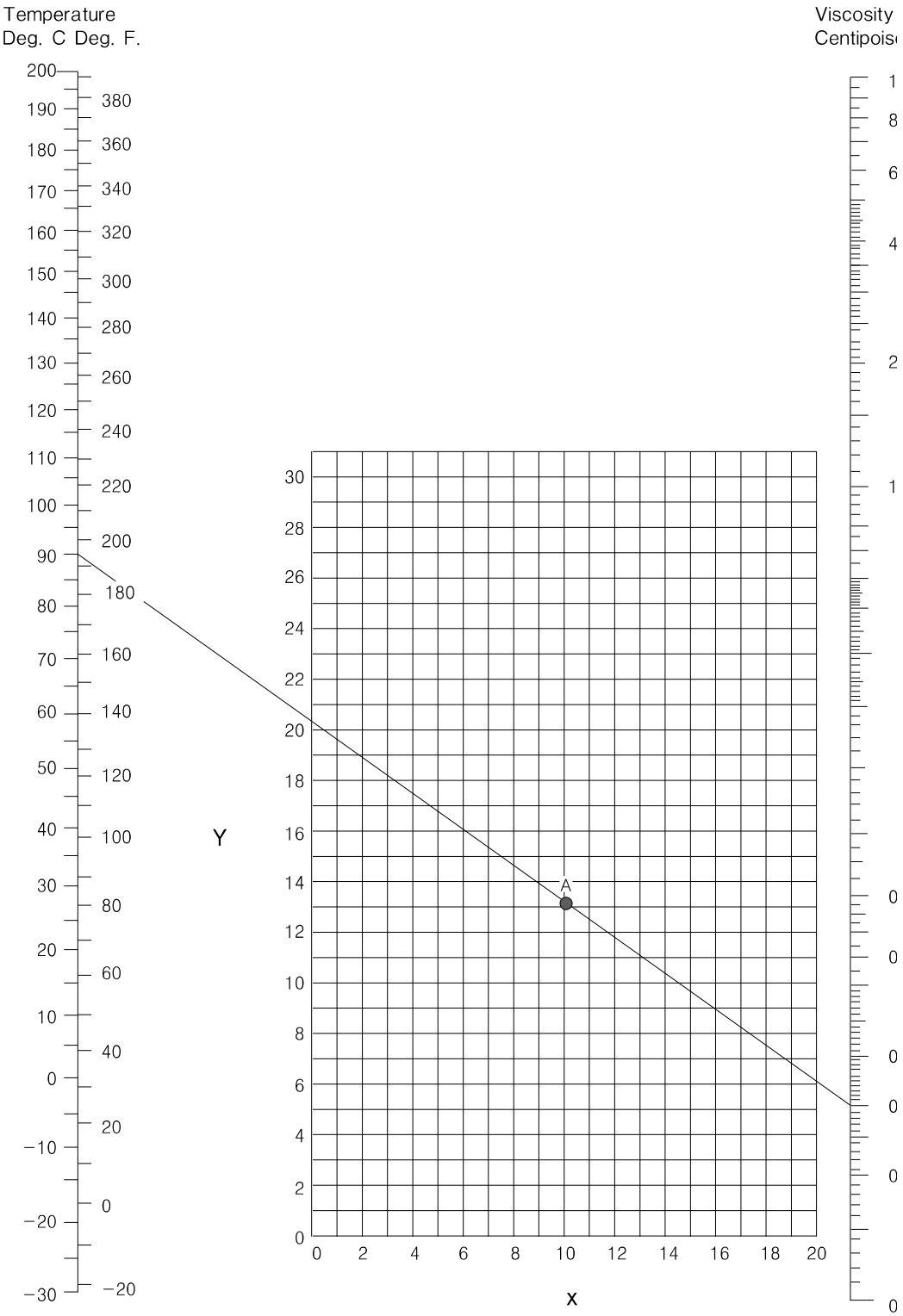
2) Indicate the X and Y values on the coordinates table on the next page. (Point A)

3) Read the value of the point of intersection between the viscosity table on the right and the extended line that connects point A with

the 90°C point of the temperature table on the left.

4) The viscosity of 90°C water is 0.3cP.

Data



Refer to the previous page for the viscosity (1 atm) and coordinates of liquid and steam.

Data / Size Selection

Method basid on Cv formula

Cv value : A valve's Cv value refers to clear water, with a temperature of 60 ° F(15.6 ° C) flowing for 1 minute, when the differential pressure between the inlet and outlet side of the valve is maintained at 1 psi (0.07 kgf/cm^3), indicated in US gal/min.

Calculation Procedure

1. Selection of a nominal diameter is usually based on the Cv method. In this case, calculate the Cv value for each of the differential pressures for maximum, normal, and minimum flows. In other words, the Cv value when there is maximum flow and minimum differential pressure becomes the maximum Cv value. The Cv value when there is minimum flow and maximum differential pressure becomes the minimum Cv value.
2. A nominal diameter is usually selected by making room for an additional 10 to 20% to the maximum Cv value. In addition, the minimum adjustable flow or rangeability (ratio of the controllable maximum flow and minimum flow) is defined according to the control valve type. As such, attention should be paid to the calculated minimum Cv value as well.

Cv value calculation formula

1. Steam

In the case of, $\triangle P < \frac{P_1}{2}$ $Cv = \frac{WK}{13.67\sqrt{\triangle P(P_1+P_2)}}$, $W = Cv \times \frac{13.67\sqrt{\triangle P(P_1+P_2)}}{K}$

In the case of, $\triangle P \geq \frac{P_1}{2}$ $Cv = \frac{WK}{11.9P_1}$, $W = Cv\frac{11.9P_1}{K}$

W = Maximum flow kg/h
P_1 = Primary pressure kgf/cm^2(abs)
P_2 = Secondary pressure kgf/cm^2(abs)
$\triangle P = P_1 - P_2$ kgf/cm^2
K = 1+(0.0013 x Degree of superheating ℃)

2. Vapor

In the case of, $\triangle P < \frac{P_1}{2}$ $Cv = \frac{Q}{287}\sqrt{\frac{G(273+t)}{\triangle P(P_1+P_2)}}$, $Q = Cv \times \frac{287}{\sqrt{\frac{G(273+t)}{\triangle P(P_1+P_2)}}}$

In the case of, $\triangle P \geq \frac{P_1}{2}$ $Cv = \frac{Q\sqrt{G(273+t)}}{249P_1}$, $Q = Cv \times \frac{249P_1}{\sqrt{G(273+t)}}$

Q = Maximum flow Nm^3/h
(In the case of 15℃ 760mmHg abs)
G = Specific gravity (Air=1)
t = Temperature ℃
P_1 = Primary pressure kgf/cm^2(abs)
P_2 = Secondary pressure kgf/cm^2(abs)
$\triangle P = P_1 - P_2$ kgf/cm^2

3. Liquid

$Cv = \frac{1.167V\sqrt{G}}{\sqrt{P1-P2}}$, $V = Cv \times \frac{\sqrt{P1-P2}}{1.167\sqrt{G}}$

V = Maximum flow m^3/h
G = Specific gravity (Water=1)
P_1 = Primary pressure kgf/cm^2(abs)
P_2 = Secondary pressure kgf/cm^2(abs)

Viscosity correction calculation formula

Carry out viscosity correction based on the following method for liquid that has a viscosity of 100 (SSU) or 20(cSt) or higher.

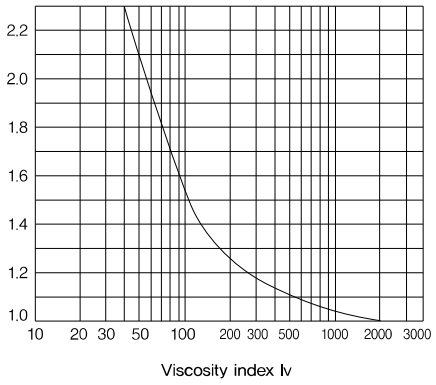
1. Use the liquid's Cv calculation formula to determine the Cv value, without considering the viscosity's effect.
2. Determine the viscosity coefficient (Iv) by the following formula.
3. Determine the correction coefficient (K) by the Viscosity Coefficient Iv–Cv Correction Coefficient K Relationship Chart.
4. Multiply the correction coefficient (K) by the Cv value that was initially calculated.
5. This value is the corrected Cv value.

$Iv = \frac{44{,}000Q}{\sqrt{Cv}\ McSt}$ or $Iv = \frac{205{,}000Q}{\sqrt{Cv}\ Mssu}$

Viscosity–corrected Cv = Cv before viscosity correction X K

Q = Maximum flow m^3/h
McSt = Viscosity cSt
Mssu = Viscosity SSU (Saybolt Universal Second)
Cv = Cv value before viscosity correction

Viscosity Index Iv–Cv Correction Coefficient K Relationship Chart



Unit flow table(Water)

P1=Primary pressure (kPa)

P2=Secondary pressure (kPa)

P2 \ P1	98.0	147.0	196.1	245.1	294.1	343.2	392.2	441.3	490.3	539.3	588.4	637.4	686.4	735.4	784.5	833.5	882.5	931.6	980.6	1078.7	1176.8	1274.8	137.29	1470.9	1569.0	1765.1	1961.3	2157.4	2353.6	2549.7	2745.8	2941.9
0(Air)	0.8568	0.049	1.211	1.354	1.484	1.603	1.713	1.817	1.916	2.009	2.098	2.184	2.267	2.346	2.423	2.498	2.570	2.641	2.709	2.842	2.968	3.089	3.206	3.318	3.427	3.635	3.832	4.019	4.197	4.369	4.534	4.693
0.2	0.7664	0.9770	1.149	1.299	1.433	1.556	1.670	1.776	1.877	1.972	2.063	2.150	2.234	2.315	2.393	2.468	2.541	2.613	2.682	2.616	2.943	3.065	3.183	3.296	3.406	3.615	3.812	4.000	4.180	4.352	4.518	4.677
0.35	0.6908	0.9189	1.100	1.256	1.394	1.520	1.637	1.745	1.847	1.944	2.036	2.125	2.209	2.291	2.370	2.446	2.520	2.592	2.561	2.796	2.924	3.047	3.165	3.279	3.389	3.599	3.798	3.987	4.167	4.339	4.505	4.665
0.5	0.6059	0.8568	1.049	1.211	1.354	1.484	1.603	1.713	1.817	1.916	2.009	2.098	2.184	2.267	2.346	2.423	2.498	2.570	2.641	2.776	2.905	3.029	3.148	3.262	3.373	3.584	3.783	3.973	4.153	4.327	4.493	4.654
1		0.6059	0.8568	1.049	1.211	1.354	1.484	1.603	1.713	1.817	1.916	2.009	2.098	2.184	2.267	2.346	2.423	2.498	2.570	2.709	2.842	2.968	3.089	3.206	3.318	3.533	3.735	3.926	4.109	4.264	4.452	4.614
1.5			0.6059	0.8568	1.049	1.211	1.354	1.484	1.603	1.713	1.817	1.916	2.009	2.098	2.184	2.184	2.346	2.423	2.498	2.641	2.776	2.905	3.029	3.148	3.262	3.480	3.685	3.879	4.064	4.241	4.411	4.574
2				0.6059	0.8568	1.049	1.211	1.354	1.484	1.603	1.713	1.817	1.916	2.009	2.098	2.098	2.267	2.346	2.423	2.570	2.709	2.842	2.968	3.089	3.206	3.427	3.635	3.832	4.019	4.197	4.369	4.534
2.5					0.6059	0.8568	1.049	1.211	1.354	1.484	1.603	1.713	1.817	1.916	2.009	2.009	2.184	2.267	2.346	2.498	2.641	2.776	2.905	3.029	3.148	3.373	3.584	3.783	3.973	4.153	4.327	4.493
3						0.6059	0.8568	1.049	1.211	1.354	1.484	1.603	1.713	1.817	1.916	1.817	2.098	2.184	2.267	2.423	2.570	2.709	2.842	2.968	3.089	3.318	3.533	3.735	3.926	4.109	4.284	4.452
4								0.6059	0.8568	1.049	1.211	1.354	1.484	1.603	1.713	1.603	1.916	2.009	2.098	2.267	2.423	2.570	2.709	2.842	2.968	3.206	3.427	3.635	3.832	4.019	4.197	4.369
5									0.6059	0.8568	1.049	1.211	1.354	1.484	1.354	1.713	1.817	1.916	2.098	2.267	2.423	2.570	2.709	2.842	3.089	3.318	3.533	3.735	3.926	4.109	4.284	
6										0.6059	0.8568	1.049	1.211	1.049	1.484	1.603	1.713	1.916	2.098	2.267	2.423	2.570	2.709	2.968	3.206	3.427	3.635	3.832	4.019	4.197		
7												0.6059	0.8568	0.6059	1.211	1.354	1.484	1.713	1.916	2.097	2.267	2.423	2.570	2.842	3.089	3.318	3.533	3.735	3.926	4.109		
8															0.8568	1.049	1.211	1.484	1.713	1.916	2.098	2.267	2.423	2.709	2.968	3.206	3.427	3.635	3.832	4.019		
9																0.6059	0.8568	1.211	1.484	1.713	1.916	2.098	2.267	2.570	2.842	3.089	3.318	3.533	3.735	3.926		
10																			0.8568	1.211	1.484	1.713	1.916	2.098	2.423	2.709	2.968	3.206	3.427	3.635	3.832	
12																				0.8568	1.211	1.484	1.713	2.098	2.423	2.709	2.968	3.206	3.427	3.635		
14																						0.8568	1.211	1.713	2.098	2.423	2.709	2.968	3.205	3.427		

Cv Value

Product name \ Type \ Size	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400
Pressure reducing valve YPR-2A	2.1	2.1	3.5	8.0	8.0	14.0	22.0	32.0	48.0	–	108.0	–	–	–	–	–
Pressure reducing valve YPR-41	2.1	2.1	3.5	5.5	8.0	14.0	22.0	32.0	48.0	75.0	108.0	–	–	–	–	–
Pressure reducing valve YAWR-1	–	–	–	–	–	–	–	90.0	160.0	250.0	360.0	640.0	1,000.0	1,440.0	1,960.0	2,560.0
Pressure reducing valve YAWF-1	–	–	–	–	–	–	–	90.0	160.0	250.0	360.0	640.0	1,000.0	1,440.0	1,960.0	2,560.0
Pressure reducing valve YAFR-1	–	–	–	–	–	–	–	90.0	160.0	250.0	360.0	640.0	1,000.0	1,440.0	1,960.0	2,560.0
Primary pressure control valve YPR-2W	2.1	2.1	3.5	8.0	8.0	14.0	22.0	32.0	48.0	–	108.0	–	–	–	–	–
Primary pressure control valve YPR-41W	2.1	2.1	3.5	5.5	8.0	14.0	22.0	32.0	48.0	75.0	108.0	–	–	–	–	–
Primary pressure control valve YAWM-1	–	–	–	–	–	–	–	90.0	160.0	250.0	360.0	640.0	1,000.0	1,440.0	1,960.0	2,560.0

[How to select a nominal diameter]

1.(Cv value to be calculated) = $\frac{\text{(Maximum designated flow)}}{\text{(unit flow)}}$

(Possible flow) = (Unit flow) x (Cv value)

2 : Correction by specific gravity (G) (Correction unit flow) = (Unit flow) × $\sqrt{\frac{1}{G}}$

[Cautions]

1. Unit flow refers to the flow per 1 Cv value under each pressure condition.

2. The pressure range and off set are different for each type.

Unit flow table (Saturated steam)

P1= ø Primary pressure (kPa)

P2=Secondary pressure (kPa)

P2 \ P1	98	147	196	215	294	343	392	441	490	539	588	637	686	735	784	833	882	931	980	1078	1176	1274	1372	1470	1569	1765	1961	2157	2353	2549
0.35	20.17	28.76	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
0.5	18.08	27.34	35.70	41.65	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
1		20.50	30.56	39.26	47.60	53.55	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
1.5			22.66	33.48	42.68	51.14	59.50	65.45	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
2				24.64	36.16	45.85	54.68	63.01	71.40	77.35	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
2.5					26.47	38.66	48.81	57.99	66.61	74.87	83.30	89.25	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
3						28.18	41.01	51.60	61.13	70.03	78.52	86.72	95.20	101.1																
3.5							29.79	43.22	54.25	64.11	73.29	82.02	90.41	98.57	107.1	113.0														
4								31.32	45.33	56.77	66.96	76.41	85.36	93.96	102.2	110.4	119.0	124.9											
4.5									32.77	47.35	59.19	69.70	79.41	88.59	97.38	105.8	114.1	122.2	130.9										
5										34.17	49.28	61.51	72.33	82.30	91.70	100.6	109.3	117.7	126.0	142.8									
5.5											35.51	51.14	63.75	74.87	85.09	94.70	103.8	112.7	121.3	137.8	154.7								
6												36.80	52.94	65.91	77.32	87.79	97.62	106.9	115.9	133.2	149.7	166.6							
6.5													38.05	54.68	68.00	79.70	90.41	100.4	109.9	128.0	145.1	161.6	178.5						
7			For low pressure											39.26	56.36	70.03	82.02	92.96	103.2	122.2	140.0	157.0	173.4	190.4						
7.5			P2 \ P1		0.4		0.6		0.8						40.43	57.99	72.01	84.26	95.44	115.7	134.4	152.0	168.9	185.3	202.3					
8			0.2		9.857		14.46		18.34							41.57	59.58	73.93	86.45	108.5	128.2	146.5	164.0	180.8	197.1					
8.5			0.4				10.58		15.46								42.68	61.13	75.80	100.2	121.3	140.5	158.6	175.9	192.7	226.1				
9																		43.76	62.64	90.67	113.5	133.9	152.8	170.7	187.9	220.8				
9.5																			44.82	79.41	104.7	126.5	146.4	165.0	182.7	216.4	249.9			
10																				65.55	94.70	118.3	139.4	158.8	177.1	211.7	244.5	273.7		
11																					68.35	98.57	123.0	144.6	164.6	201.3	235.5	268.2	297.5	
12																						71.03	102.2	127.5	149.7	189.4	225.4	259.3	291.9	321.3

Cv Value

Product name \ Size / Type		15	20	25	32	40	50	65	80	100	125	150	200
Pressure reducing valve	YPR-100	5.0	7.2	10.9	14.3	18.8	32.0	60.0	78.0	120.0	160.0	245.0	–
	YPR-1S	1.0	2.5	4.0	6.5	9.0	16.0	25.0	36.0	64.0	100.0	144.0	256.0
	YPR-50	0.8	0.8	1.0	–	–	–	–	–	–	–	–	–

[How to select a nominal diameter]

1.(Cv value to be calculated) = $\frac{\text{(Maximum designated flow)}}{\text{(unit flow)}}$ (Possible flow) = (Unit flow) x (Cv value)

2. Correction by superheated steam (Correction unit flow) = (Unit flow) × $\sqrt{\frac{29}{M}}$

[Cautions]

1. Unit flow refers to the flow per 1 Cv value under each pressure condition.

2. The pressure range and off set are different for each type.

Unit flow table(Air)

P1=Primary pressure (kPa)

P2=Secondary pressure (kPa)

P2 \ P1	9.8	19	39	58	78	98	147	196	215	294	343	392	441	490	539	588	686	784	882	980	1176	1372	1569	1765	1961	2157	2353	2549	2745	2941	3432	3922	4412	4903
0(Air)	7.683	11.12	16.42	20.94	25.09	29.04	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
0.01(100	7.306	10.86	16.25	20.80	24.94	28.94																												
0.05	5.497	9.740	15.52	20.24	24.51	28.54																												
0.1		8.041	14.52	19.48	23.88	28.00																												
0.2			12.09	17.74	22.49	26.82	36.36																											
0.35			6.217	14.39	19.96	24.74	35.27																											
0.5				9.335	16.68	22.18	33.53	43.64	50.91																									
1							25.15	37.49	48.15	58.18	65.46																							
1.5								27.80	41.06	52.35	62.73	72.73	80.00																				
2									30.22	44.36	56.23	67.06	77.29	87.28	94.55																	
2.5										32.46	47.42	59.86	71.13	81.71	91.83	101.8																
3											34.56	50.30	63.29	74.98	85.90	96.31	116.3	130.9														
4													38.41	55.60	69.63	82.13	104.7	125.4	145.4	160.0												
5															41.91	60.45	88.72	112.4	134.1	154.5	189.1											
6																	64.93	94.84	119.7	142.2	183.6	218.2										
7																		69.13	100.6	126.5	171.8	212.7	247.2									
8																			73.08	106.0	157.2	201.2	241.8	276.3								
9																				76.83	139.2	187.4	230.5	270.8	305.4							
10																					116.1	170.9	217.3	259.7	299.9	334.5	363.6					
12																						125.4	183.6	232.3	276.5	318.1	358.0	392.7	421.8			
14																							134.1	195.5	246.4	292.3	335.3	376.4	416.1	450.9			
16																								142.2	206.7	259.7	307.3	351.7	393.9	434.6	523.6	596.4		
20																									157.2	227.4	284.5	335.3	382.3	490.2	590.4	669.1	741.8
25																											122.0	215.3	283.0	417.4	531.5	636.2	735.6
30																														306.8	449.8	569.8	679.0

Cv Value

Product name \ Type \ Size		15	20	25	32	40	50	65	80	100	125	150	200
Pressure reducing valve	YPR-100	5.0	7.2	10.9	14.3	18.8	32.0	60.0	78.0	120.0	160.0	245.0	–
	YPR-1S	1.0	2.5	4.0	6.5	9.0	16.0	25.0	36.0	64.0	100.0	144.0	256.0
	YPR-50	0.8	0.8	1.0	–	–	–	–	–	–	–	–	–

[How to select a nominal diameter]

1.(Cv value to be calculated) = $\frac{\text{(Maximum designated flow)}}{\text{(unit flow)}}$ (Possible flow) = (Unit flow) x (Cv value)

2. Correction by various types of gas (Correction unit flow) = $\frac{\text{(Unit flow)}}{K}$ K = 1+(0.0013 x Degree of superheating)

[Cautions]

1. Unit flow refers to the flow per 1 Cv value under each pressure condition.

2. The pressure range and off set are different for each type.

Data / Flow Velocity within Pipeline(Water, Air)

Water / air flow velocity chart

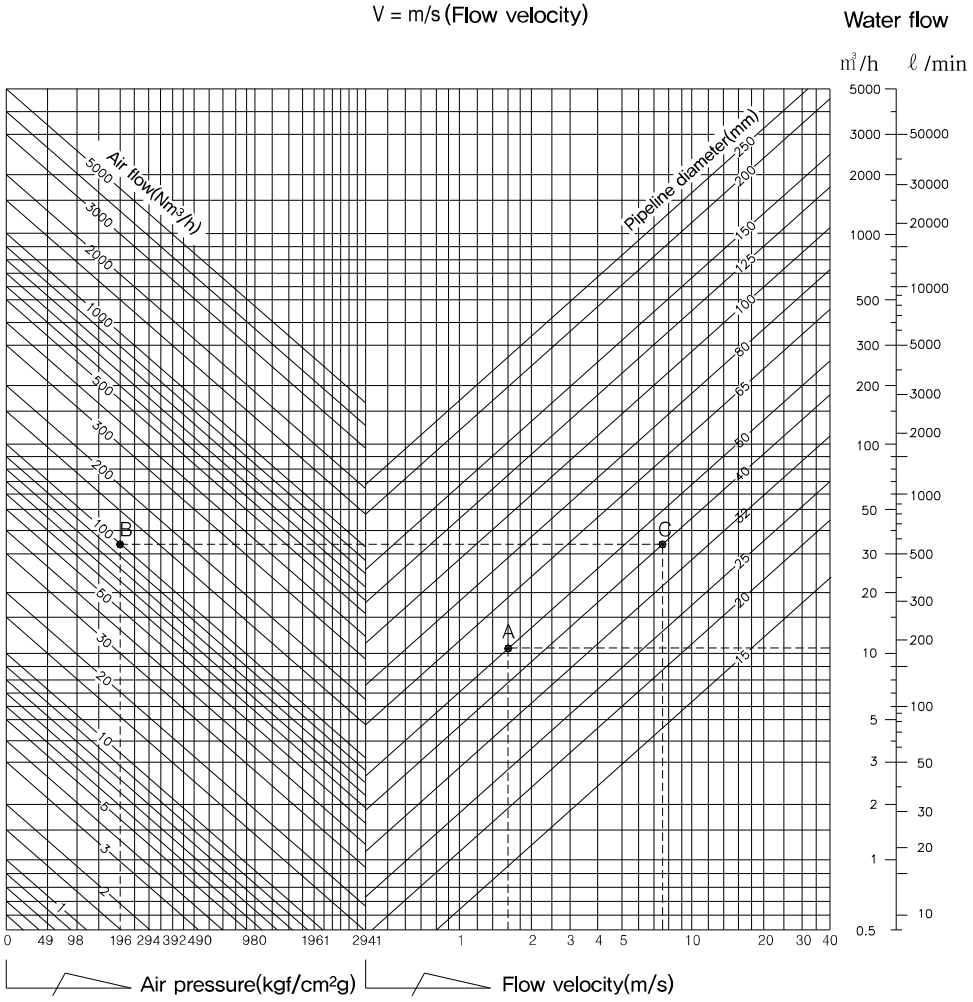
Flow calculation formula

$Q = \frac{\pi}{4} A^2 \times V \times 3600 \times 10^{-6}$

Q = m^3/h (Flow)

A = mm (Nominal diameter of pipeline)

V = m/s (Flow velocity)



How to use the chart

Example 1 : To obtain the flow velocity when the water flow is 11 m^3/h and the pipeline diameter is 50 mm, Determine A, the point of intersection between the pipeline diameter of 50 mm and a horizontal line from the flow of 11 m^3/h. Go down vertically from point A to read a flow velocity of 1.6 m/s.

Example 2 : To obtain the flow velocity when the air flow is 100Nm^3/h, pressure is 2 kgf/cm^2g, and pipeline diameter is 40 mm, Determine B, the point of intersection between the air flow of 100 Nm^3/h and air pressure of 2kgf/cm^2g. Then determine C, the point of intersection between the pipeline diameter of 40 mm with a horizontal line from point B. Go down vertically from point C to read a flow velocity of 7.5 m/s. This is the flow velocity.

Standard flow velocity by use

1. Pump
   - Suction pipe : 2.0–2.5 m/s
   - Low pressure discharge pipe : 2.5–3.0 m/s
   - High pressure discharge pipe : 3.0–3.5 m/s

2. Liquid transport pipeline
   - Water of 1–10 kgf/cm^2g : 1.5–3 m/s
   - Water of 200–300 kgf/cm^2g : 3–4 m/s
   - Other types of liquid with high viscosity, like oil : 0.5–2 m/s

3. Compressor
   - Suction pipe : 10–20 m/s
   - Low pressure discharge pipe : 20–30 m/s
   - High pressure discharge pipe : 10–15 m/s

4. Compressing gas transport pipe
   - 1~2kgf/cm^2g : 8~15m/s
   - 200~300kgf/cm^2g : 5~7m/s

Data / Flow Velocity within Pipeline(Steam)

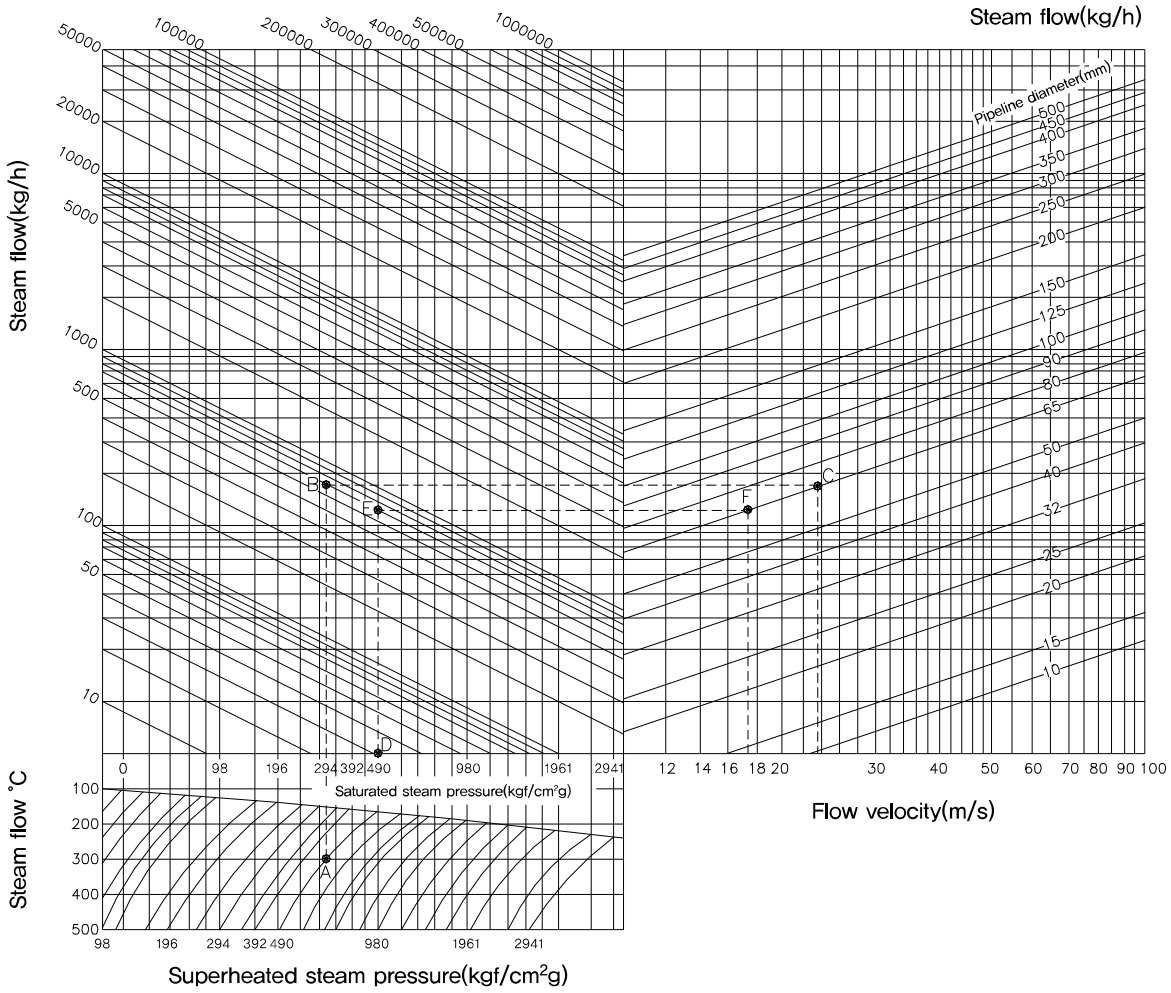
Water / steam flow velocity chart

Flow calculation formula $Q = \frac{\pi}{4} A^2 \times V \times 3600 \times 10^{-6}$

Q = m^3/h (Flow)

A = mm (Nominal diameter of pipeline)

V = m/s (Flow velocity)



How to use the chart

Example : To obtain the flow velocity when the steam pressure is 5 kgf/cm^2g, superheated steam is 300°C, flow is 700 kg/h,and pipeline diameter is 65 mm, Determine A, the point of intersection between the steam pressure of 5 kgf/cm^2g and steam temperature of 300°C; and then B, the point of intersection between the flow of 700 kg/h and a vertical line from point A. Afterwards, determine C, the point of intersection between the pipeline diameter of 65 mm and a horizontal line from point B. Go down vertically from point C, and this line will reach a flow velocity of 23.7 m/s. This is the flow velocity. When calculating the flow velocity for saturated steam under the same conditions, determine D, which is on the line of saturated steam. Use the same method to follow E and F to read a flow velocity 17.3 m/s.

Standard flow velocity by use

1. Steam engine
   - Saturated steam : 20–30 m/s
   - Superheated steam : 30–45 m/s

2. Steam transport pipe
   - Saturated steam of 2–5 kgf/cm2g : 15–20 m/s
   - Saturated steam of 5–15 kgf/cm2g : 20–30 m/

Data / Pipeline Head Loss

Pipeline lengths suitable for different valves (Table 1)

Size (mm)	Appropriate pipeline length (m)							
	90° elbow	45° elbow	90° T valve (Branch)	90° T valve (Branch)	Gate valve	Ball valve	Angle valve Foot valve	Check valve
15	0.6	0.36	0.9	0.18	0.12	4.5	2.4	1.2
20	0.75	0.45	1.2	0.24	0.15	6.0	3.6	1.6
25	0.95	0.54	1.5	0.27	0.18	7.5	4.5	2.0
32	1.2	0.72	1.8	0.36	0.24	10.5	5.4	2.5
40	1.6	0.9	2.1	0.45	0.3	13.5	7.6	3.1
50	2.1	1.2	3.0	0.6	0.39	16.5	8.4	4.0
65	2.4	1.5	3.6	0.75	0.48	19.5	10.2	4.6
80	3.0	1.8	4.5	0.90	0.63	20.0	12.0	5.7
100	4.2	2.4	6.3	1.20	0.81	37.5	16.5	7.6
125	5.1	3.0	7.5	1.50	0.99	42.0	21.0	10.
150	6.0	3.6	9.0	1.80	1.20	49.5	24.0	12.0
200	6.5	3.7	14.0	4.0	1.40	70.0	33.0	15.0
250	8.0	4.2	20.0	5.0	1.70	90.0	43.0	19.0

Pipeline friction loss

(Hazen–Williams Equation) $Q = 1.64Cd^{2.63}i^{0.54} \times 10^4$

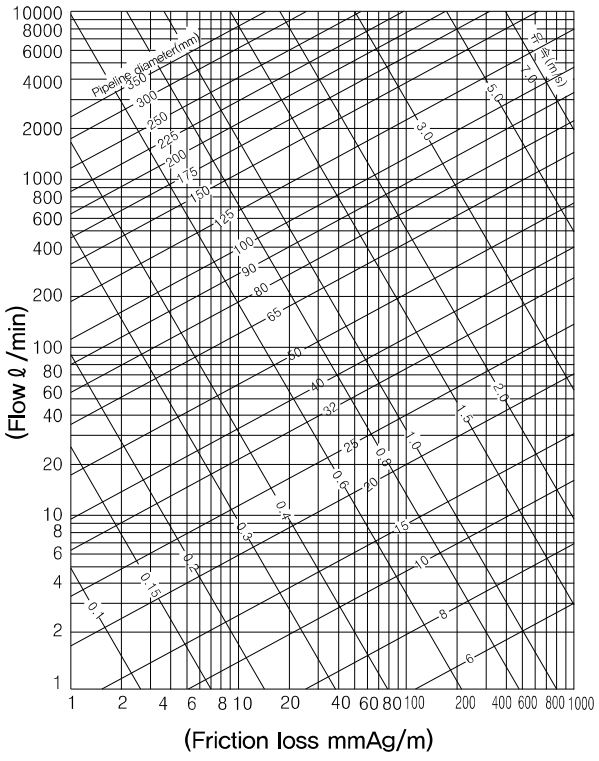
Q = Flow (ℓ /min)

C = Flow coefficient (100 in the case of an old cast iron or steel pipeline)

d = Inner diameter of pipeline(m)

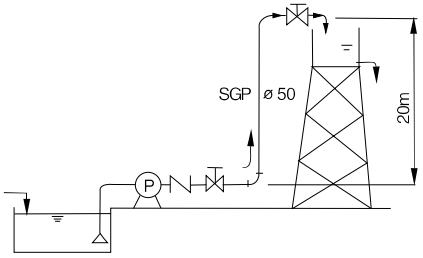
i = Pressure loss per unit length(mAq/m)

Pipeline head loss chart



Calculation example

In the case of determining all heads that are lost and the pump's lift requirement (20 m), when a steel pipeline with a nominal diameter of 50 (actual length of 36 m) pumps 150 liters of water per minute from a water tank to another water tank (actual lift of 20 m),



1. When determining the pipeline length by Table 1
   - 1 foot valve : 8.4X1=8.4
   - 1 check valve : 4.0X1=4.0
   - 2 gate valves : 0.39X2=0.78
   - 4 elbow pipes : 2.1X4=8.4

   Tota l : 21.58

2. Obtain the pipeline length by conversion.
   Converted pipeline length = 36+21.58=57.58 m

3. Based on the chart, when the nominal diameter is 50 and the flow is 150 l/min, the friction head loss is 52 mmAq/m and all head losses are 57.58X52=2.994
   16mm=3.0.
   The pump's lift requirement is 20+3.0=23 m.

Data / Generated Condensate Volume of Steam Pipeline

Generated condensate volume when steam is initially passing through or a pipeilne that has not been insulated

A : When steam is initially passing through kg/mh
B : Pipeline that has not been insulated kg/mh

Pressure (Kpa) \ Pipeline diameter (mm)		15	20	25	32	40	50	65	80	100	125	150	200	250	300
49 (110.7℃)	A	0.04	0.05	0.07	0.09	0.10	0.13	0.22	0.28	0.39	0.52	0.67	1.01	1.42	1.88
	B	0.08	0.10	0.13	0.16	0.18	0.23	0.29	0.33	0.42	0.52	0.61	0.80	0.99	1.17
98 (119.6℃)	A	0.04	0.05	0.07	0.10	0.11	0.15	0.25	0.30	0.43	0.58	0.74	1.11	1.57	2.07
	B	0.09	0.12	0.15	0.18	0.21	0.26	0.32	0.38	0.48	0.59	0.70	0.91	1.12	1.34
196 (132.9℃)	A	0.04	0.06	0.08	0.11	0.13	0.17	0.28	0.34	0.48	0.65	0.83	1.26	1.77	2.33
	B	0.11	0.14	0.18	0.22	0.25	0.31	0.39	0.46	0.58	0.71	0.84	1.10	1.35	1.61
294 (142.9℃)	A	0.05	0.06	0.09	0.12	0.14	0.18	0.30	0.37	0.52	0.71	0.90	1.37	1.93	2.55
	B	0.13	0.16	0.20	0.25	0.29	0.35	0.45	0.52	0.67	0.81	096	1.25	1.55	1.85
392 (151.1℃)	A	0.05	0.07	0.09	0.13	0.15	0.19	0.32	0.40	0.56	0.76	0.97	1.47	2.06	2.73
	B	0.14	0.18	0.22	0.28	0.32	0.39	0.50	0.58	0.74	0.90	1.07	1.40	1.72	2.05
490 (158.1℃)	A	0.05	0.07	0.10	0.13	0.16	0.20	0.34	0.42	0.59	080	1.02	1.55	2.18	2.88
	B	0.15	0.20	0.25	0.32	0.36	0.45	0.56	0.66	0.84	1.03	1.21	1.59	1.88	2.34
588 (164.2℃)	A	0.06	0.07	0.10	0.14	0.16	0.21	0.36	0.44	0.62	0.84	1.07	1.63	2.29	3.02
	B	0.16	0.21	0.26	0.33	0.37	0.46	0.58	0.68	0.87	1.06	1.26	1.65	2.03	2.43
686 (169.6℃)	A	0.06	0.07	0.11	0.14	0.17	0.22	0.37	0.46	0.65	0.87	1.11	1.69	2.38	3.14
	B	0.18	0.23	0.28	0.35	0.40	0.50	0.62	0.73	0.93	1.14	1.34	1.76	2.17	2.59
784 (174.5)	A	0.06	0.08	0.11	0.15	0.18	0.23	0.38	0.48	0.67	0.91	1.16	1.76	2.47	3.26
	B	0.19	0.24	0.30	0.37	0.42	0.53	0.66	0.77	0.99	1.21	1.28	1.87	2.31	2.76
882 (179.0℃)	A	0.06	0.08	0.12	0.15	0.18	0.24	0.40	0.49	0.70	0.94	1.20	1.82	2.56	3.39
	B	0.20	0.25	0.31	0.39	0.45	0.56	0.70	0.82	1.04	1.27	1.50	1.97	2.44	2.91
980 (183.2℃)	A	0.06	0.08	0.12	0.16	0.19	0.25	0.41	0.51	0.72	0.98	1.24	1.89	2.65	3.51
	B	0.21	0.07	0.33	0.41	0.47	0.58	0.73	0.86	1.09	1.34	1.58	2.07	2.56	3.05
1470 (200.4℃)	A	0.07	0.09	0.13	0.18	0.21	0.28	0.46	0.57	0.81	0.09	1.39	2.12	2.98	3.94
	B	0.25	0.32	0.40	0.50	0.57	0.71	0.90	1.05	1.34	1.64	1.93	2.53	3.13	3.73
1961 (213.9℃)	A	0.08	0.10	0.14	0.19	0.23	0.30	.50	0.62	0.87	1.18	1.50	2.28	3.21	4.24
	B	0.29	0.26	0.46	0.57	0.65	0.81	1.02	1.19	1.53	1.87	2.21	2.89	3.57	42.6
2941 (234.6℃)	A	0.00	0.12	0.17	0.23	0.27	0.35	0.59	0.73	1.03	1.39	1.77	2.69	3.78	5.00
	B	0.37	0.47	059	0.74	0.85	1.05	1.32	1.54	1.97	2.41	2.85	3.73	4.61	5.50

Generated condensate volume when a pipeline is insulated

Temperature (℃)	Pipeline diameter (mm)	15	20	25	32	40	50	65	80	100	125	150	200	250	300
100	Insulation thickness (mm)	15	15	15	15	15	15	15	20	20	20	20	20	20	20
	Condensate volume (kg/mh)	0.05	0.06	0.07	0.08	0.08	0.10	0.11	0.12	0.14	0.17	0.19	0.23	0.27	031
150	Insulation thickness (mm)	15	15	20	20	20	20	25	25	25	25	25	25	30	30
	Condensate volume (kg/mh)	0.09	0.10	0.11	0.12	0.13	0.14	0.17	0.18	0.20	0.23	0.26	0.32	0.37	0.42
200	Insulation thickness (mm)	20	20	20	25	25	25	25	25	30	30	30	35	35	35
	Condensate volume (kg/mh)	0.12	0.14	0.15	0.15	0.17	0.19	0.22	0.24	0.28	0.32	0.36	0.43	0.50	0.58
250	Insulation thickness (mm)	20	25	25	25	25	30	30	30	35	35	35	40	40	40
	Condensate volume (kg/mh)	0.17	1.19	0.20	0.22	0.23	0.26	0.30	0.33	0.38	0.43	0.49	0.58	0.68	0.78
300	Insulation thickness (mm)	25	25	25	30	30	30	35	35	40	40	40	45	45	45
	Condensate volume (kg/mh)	0.22	0.25	0.28	0.30	0.33	0.37	0.42	0.46	0.53	0.60	0.68	0.80	0.94	1.08

Data / Dimensions Table of Carbon Steel Pipe

The following is what is prescribed by KS D3507 and KS D3562 for carbon steel pipes used for pipelines.A carbon steel pipe for ordinary piping (SPP) is used for pipelines with a comparatively low running pressure, including pipelines forsteam, water, oil, gas, and air; and a carbon steel pipe for pressure service (SPPS) is used for pressure pipelines used at 350°C or lower.

Size		Outer diameter (mm)	SPP		SPPS											
					Nominal thickness											
					Schedule 40				Schedule 60				Schedule 80			
			Thickness (mm)	Weight without a socket (kaf/cm)	Thickness (mm)	Weight (kg/m)	Water pressure test pressure (kg/cm)		Thickness (mm)	Weight (kg/m)	Water pressure test pressure (kg/cm)		Thickness (mm)	Weight (kg/m)	Water pressure test pressure (kg/cm²)	
(A)	(B)						Type 2	Type 3			Type 2	Type 3			Type 2	Type 3
6	⅛	10.5	2.0	0.419	1.7	0.369	50	50	2.2	0.450	70	70	2.4	0.479	70	70
8	¼	13.8	2.3	0.652	2.2	0.629	50	50	2.4	0.675	70	70	3.0	0.799	70	70
10	⅜	17.3	2.3	0.851	2.3	0.851	50	50	2.8	1.00	70	70	3.2	1.11	70	70
15	½	21.7	2.8	1.31	2.8	1.31	50	50	3.2	0.46	70	70	3.7	1.64	70	70
20	¾	27.2	2.8	1.68	2.9	1.74	50	50	3.4	2.00	70	70	3.9	2.24	70	70
25	1	34.0	3.2	2.43	3.4	2.57	50	50	3.9	2.89	70	70	4.5	3.27	70	70
32	1¼	42.7	3.5	3.38	3.6	3.47	70	50	4.5	4.24	100	120	4.5	4.57	140	130
40	1½	48.6	3.5	3.89	3.7	4.10	70	50	4.5	4.89	100	120	5.1	5.47	140	130
50	2	60.5	3.8	5.31	3.9	5.44	70	50	4.9	6.72	100	120	5.5	7.46	140	130
65	2½	76.3	4.2	7.47	5.2	9.12	70	50	6.0	10.4	100	120	7.0	12.0	140	130
80	3	89.1	4.2	8.79	5.5	11.3	70	50	6.6	13.4	130	140	7.6	115.3	180	180
90	3½	101.6	4.2	10.1	5.7	13.5	100	100	7.0	16.3	140	130	8.1	18.7	180	180
100	4	114.3	4.5	12.2	6.0	16.0	100	100	7.1	18.8	140	140	8.6	22.4	180	180
125	5	139.8	4.5	15.0	6.6	21.7	100	100	8.1	26.3	140	140	9.5	30.5	180	180
150	6	165.2	5.0	19.8	7.1	28.7	100	100	9.3	35.8	140	140	11.0	14.8	180	180
200	8	216.3	5.8	30.1	8.2	42.1	100	100	10.3	52.3	130	140	12.7	63.8	170	160
250	10	267.4	6.6	42.4	9.3	59.2	100	100	12.7	79.8	130	140	15.1	93.9	170	150
300	12	318.5	6.9	53.0	10.3	78.3	100	100	14.3	107	120	130	17.4	129	160	140
350	14	355.5	7.9	67.7	11.1	94.3	70	100	15.1	127	110	130	19.0	158	160	140
400	16	406.4	7.9	77.6	12.7	123	70	100	16.7	160	110	120	21.4	203	160	140

Data / Pressure stage table of iron / steel pipe flange

KSM 1501 (Pressure stage of iron/steel pipe flange) sets forth the following regulations concerning the maximum running pressure, based on the nominal pressure, materials, and fluid state of iron/steel pipe flanges used for pipelines for steam, Air, Gas, Water, Oil, Etc.

Nominal pressure	Material(1)	Fluid state and maximum running pressure											Pressure of hydropressure test (7)
		W	G1	G2	G3	H1	H2	H3	H4	H5	H6	H7	
		220℃ 이하	220℃ 이하	300℃	350℃	400℃	425℃	450℃	475℃	490℃	500℃	510℃	
2K	GC200	0.29	0.20	–	–	–	–	–	–	–	–	–	0.39
	SS400, SF390A(4), SM20C(2), SC410	0.29	0.20	–	–	–	–	–	–	–	–	–	
5K	GC200	0.69	0.49	–	–	–	–	–	–	–	–	–	0.98
	B35–10(3), GCD370, GCD400(3)	0.69	0.59	0.49(3)	–	–	–	–	–	–	–	–	
	SS400, SF390A(4), SFVC1, SM20C(2), SC410, SCPH1	0.69	0.59	0.49	–	–	–	–	–	–	–	–	
10K	GC200	1.37	0.98	–	–	–	–	–	–	–	–	–	1.96
	B35–10(3), GCD370, GCD400(3)	1.37	1.18	0.98(4)	–	–	–	–	–	–	–	–	
	SS400, SF390A(4), SFVC1, SM20C(2), SC410, SCPH1	1.37	1.18	0.98	–	–	–	–	–	–	–	–	
16K	GC200	2.16	1.57	–	–	–	–	–	–	–	–	–	3.14
	B35–10(3), GCD370, GCD400(3)	2.16	1.96	1.73(3)	1.57(3)	–	–	–	–	–	–	–	3.43
	SF440A(4), SFVC2A, SM25C(2), SC480(5), SCPH2	2.65	2.45	2.26	2.06	1.77	1.55	–	–	–	–	–	3.92
20K	GC250	2.75	1.96(6)	–	–	–	–	–	–	–	–	–	3.92
	B35–10(3), GCD370, GCD400(3)	2.75	2.45	2.26(3)	1.93(3)	–	–	–	–	–	–	–	4.32
	SF440A(4), SFVC2A, SM25C(2), SC480(5), SCPH2	3.33	3.04	2.84	2.55	2.26	1.96	–	–	–	–	–	4.9
30K	SF440A(4), SFVC2A, SM25C(2), SC480(5), SCPH2	5.00	4.51	4.22	3.82	3.33	2.94	–	–	–	–	–	7.35
	SCPH11, SFVA F1	(5.00)	(4.51)	(4.22)	(3.82)	3.73	3.53	3.33	2.94	–	–	–	
	SCPH21, SFVA F11A	(5.00)	(4.51)	(4.22)	(3.82)	(3.73)	(3.53)	(3.33)	3.14	2.94	–	–	
40K	SF440A(4), SFVC2A, SM25C(2), SC480(5), SCPH2	(6.67)	6.08	5.59	5.10	4.51	3.92	–	–	–	–	–	9.81
	SCPH11, SFVA F1	(6.67)	(6.08)	(5.59)	(5.10)	5.00	4.71	4.41	3.92	–	–	–	
	SCPH21, SFVA F11A	(6.67)	(6.08)	(5.59)	(5.10)	(5.00)	(4.71)	(4.41)	4.12	3.92	3.73	3.53	

GC200	KS D 4301	JIS G 5501
FCMB35	KS D 4303	JIS G 5702
SS400	KS D 3503	JIS G 3101
SF390, SF440	KS D 3710	JIS G 3201
SFHV12B, SFHV23B	KS D 4123	JIS G 3213
S20C, S25C	KS D 3752	JIS G 4051
SC410, SC480	KS D 4101	JIS G 5101
SCPH1, SCPH2 SCPH11, SCPH21	KS D 4107	JIS G 5151

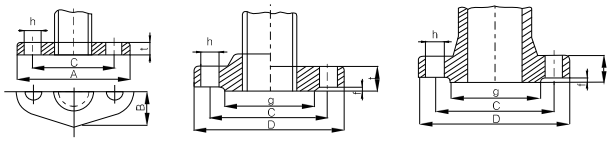
Notes
(1) Select a material from the nominal pressure step table or that satisfies the required flange performance.
(2) Apply to a maximum running temperature of 350℃
(3) There is the possibility of SCPH 11 and ½ Mo forged steel resulting in ductile fracture, and therefore should not be used at a temperature of 450 ℃ or higher.
(4) The 'pressure of hydro–pressure test' lists test pressure levels for reference in case of installation of a flange in a pipeline. Exceptions are separately regulated.

Notes
1. W is applied only to running water with almost no flow (with little pressure fluctuation) and with a temperature of 120℃ or lower.
2. G1, G2, and G3 are applied to water with pressure fluctuations or steam, gas, and oil of the corresponding temperature regulated above.
3. H1 is applied to steam, air, gas, oil, etc. of 400℃
4. If the temperature or pressure is in the middle of the table above, the maximum running pressure or temperature can be determined based on interpolation.
5. H2 through H4 are applied to steam, air, gas, oil, etc. of 425 to 510℃. They are applied when there is a need to consider a material creep because of high temperature.
6. When shock, corrosion, or other special conditions are accompanied, apply a maximum running pressure that corresponds to a higher temperature or that of a higher nominal pressure.
7. The values in parentheses are generally not used, but are specified for reference.
8. When there is a need to indicate a fluid's state using a symbol, use W through H4.

Data / Standard Dimensions of Flange

Standard dimensions of a 5kgf/cm^2 Pipe flange

(KS B 1511 - 2007)

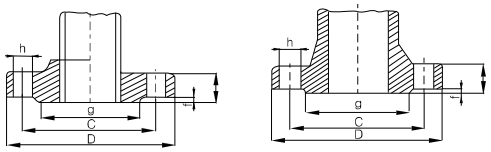


(mm)

Size	Outer diameter of applied steel pipe	Outer diameter of flange D	Dimensions of each part of flange				Bolt hole			Nominal diameter of bolt screw
			t		f	Diameter (g)	Diameter of center circle (C)	Number	Diameter (h)	
			Other than grey cast iron	Grey cast iron						
10	17.3	75(75X45)	9	12	1	39	55	4(2)	12	M10
15	21.7	80(80X50)	9	12	1	44	60	4(2)	12	M10
20	27.2	85	10	14	1	49	65	4	12	M10
25	34.0	95	10	14	1	59	75	4	12	M10
32	42.7	115	12	16	2	70	90	4	15	M12
40	48.6	120	12	16	2	75	95	4	15	M12
50	60.5	130	14	16	2	85	105	4	15	M12
65	76.3	155	14	18	2	110	130	4	15	M12
80	89.1	180	14	18	2	121	145	4	19	M16
(90)	101.6	190	14	18	2	131	155	4	19	M16
100	114.3	200	16	20	2	141	165	8	19	M16
125	139.8	235	16	20	2	176	200	8	19	M16
150	165.2	265	18	22	2	216	230	8	19	M16
(175)	190.7	300	18	22	2	232	260	8	23	M20
200	216.3	320	20	24	2	252	280	8	23	M20
(225)	241.8	345	20	24	2	277	305	12	23	M20
250	267.4	385	22	26	2	317	345	12	23	M20
300	318.5	430	22	28	3	360	390	12	23	M20
350	355.6	480	24	30	3	403	435	12	25	M22
400	406.4	540	24	30	3	463	495	16	25	M22
450	457.2	605	24	30	3	523	555	16	25	M22
500	508.0	655	24	32	3	573	605	20	25	M22

Standard dimensions of a 10kgf/cm^2 Pipe flange

(KS B 1511 - 2007)

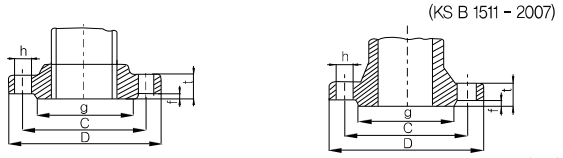


(mm)

Size	Outer diameter of applied steel pipe	Outer diameter of flange D	Dimensions of each part of flange				Bolt hole			Nominal diameter of bolt screw
			t		f	Diameter (g)	Diameter of center circle (C)	Number	Diameter (h)	
			Other than grey cast iron	Grey cast iron						
10	17.3	90	12	14	1	46	65	4	15	M12
15	21.7	95	12	16	1	51	70	4	15	M12
20	27.2	100	14	18	1	56	75	4	15	M12
25	34.0	125	14	18	1	67	90	4	19	M16
32	42.7	135	16	20	2	76	100	4	19	M16
40	48.6	140	16	20	2	81	105	4	19	M16
50	60.5	155	16	20	2	95	120	4	19	M16
65	76.3	175	18	22	2	116	140	4	19	M16
80	89.1	185	18	22	2	126	150	8	19	M16
(90)	101.6	195	18	22	2	136	160	8	19	M16
100	114.3	210	18	24	2	151	175	8	19	M16
125	139.8	250	20	24	2	182	210	8	23	M20
150	165.2	280	22	26	2	212	240	8	23	M20
(175)	190.7	305	22	26	2	237	265	12	23	M20
200	216.3	330	22	26	2	262	290	12	23	M20
(225)	241.8	350	22	28	2	282	310	12	23	M20
250	267.4	400	24	30	2	324	355	12	25	M22
300	318.5	445	24	32	3	368	400	16	25	M22
350	355.6	490	26	34	3	413	445	16	25	M22
400	406.4	560	28	36	3	475	510	16	27	M24
450	457.2	620	30	38	3	530	565	20	27	M24
500	508.0	675	30	40	3	585	620	20	27	M24

Standard dimensions of an ANSI 125 POUND cast Pipe flange

(KS B 1511 - 2007)

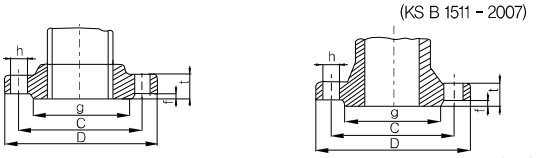


(mm)

Size	Outer diameter of applied steel pipe	Outer diameter of flange D	Dimensions of each part of flange				Bolt hole			Nominal diameter of bolt screw
			t		f	Diameter (g)	Diameter of center circle (C)	Number	Diameter (h)	
			Other than grey cast iron	Grey cast iron						
10	17.3	90	12	–	1	46	65	4	15	M12
15	21.7	95	12	–	1	51	70	4	15	M12
20	27.2	100	14	–	1	56	75	4	15	M12
25	34.0	125	14	–	1	67	90	4	19	M16
32	42.7	135	16	–	2	76	100	4	19	M16
40	48.6	140	16	–	2	81	105	4	19	M16
50	60.5	155	16	20	2	96	120	8	19	M16
65	76.3	175	18	22	2	116	140	8	19	M16
80	89.1	200	20	24	2	132	160	8	23	M20
(90)	101.6	210	20	24	2	145	170	8	23	M20
100	114.3	225	22	26	2	160	185	8	23	M20
125	139.8	270	22	26	2	195	225	8	25	M22
150	165.2	305	24	28	2	230	260	12	25	M22
200	216.3	350	26	30	2	275	305	12	25	M22
250	267.4	430	28	34	2	345	380	12	27	M24
300	318.5	480	30	36	3	395	430	16	27	M24
350	355.6	540	34	38	3	440	480	16	33	M30X3
400	406.4	605	38	42	3	495	540	16	33	M30X3
450	457.2	675	40	46	3	560	605	20	33	M30X3
500	508.0	730	42	50	3	615	660	20	33	M30X3

Standard dimensions of an ANSI 150 POUND steel Pipe flange

(KS B 1511 - 2007)



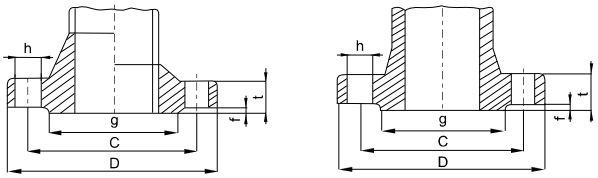
(mm)

Size	Outer diameter of applied steel pipe	Outer diameter of flange D	Dimensions of each part of flange				Bolt hole			Nominal diameter of bolt screw
			t		f	Diameter (g)	Diameter of center circle (C)	Number	Diameter (h)	
			Other than grey cast iron	Grey cast iron						
10	17.3	90	14	16	1	46	65	4	15	M12
15	21.7	95	14	16	1	51	70	4	15	M12
20	27.2	100	16	18	1	56	75	4	15	M12
25	34.0	125	16	20	1	67	90	4	19	M16
32	42.7	135	18	20	2	76	100	4	19	M16
40	48.6	140	18	22	2	81	105	4	19	M16
50	60.5	155	18	22	2	96	120	8	19	M16
65	76.3	175	20	24	2	116	140	8	19	M16
80	89.1	200	22	26	2	132	160	8	23	M20
(90)	101.6	210	24	28	2	145	170	8	23	M20
100	114.3	225	24	28	2	160	185	8	23	M20
125	139.8	270	26	30	2	195	225	8	25	M22
150	165.2	305	28	32	2	230	260	12	25	M22
200	216.3	350	30	34	2	275	305	12	25	M22
250	267.4	430	34	38	2	345	380	12	27	M24
300	318.5	480	36	40	3	395	430	16	27	M24
350	355.6	540	40	44	3	440	480	16	33	M30X3
400	406.4	605	46	50	3	495	540	16	33	M30X3
450	457.2	675	48	54	3	560	605	20	33	M30X3
500	508.0	730	50	58	3	615	660	20	33	M30X3

Data / Reference dimension of flanges

Standard dimensions of a 30Kgf/cm² Pipe flange

(KS B 1511 - 2007)

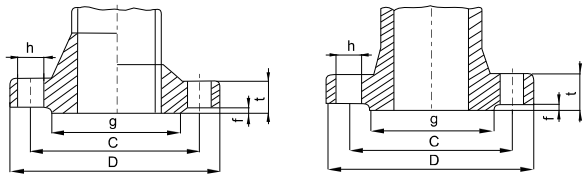


(mm)

Size	Outer diameter of applied steel pipe	Outer diameter of flange D	Dimensions of each part of flange			Bolt hole			Nominal diameter of bolt screw
			t	f	Diameter (g)	Diameter of center circle (c)	Num-be	Diameter (h)	
10	17.3	110	16	1	52	75	4	19	M16
15	21.7	115	18	1	55	80	4	19	M16
20	27.2	120	18	1	60	85	4	19	M16
25	34.0	130	20	1	70	95	4	19	M16
32	42.7	140	22	2	80	105	4	19	M16
40	48.6	160	22	2	90	120	4	23	M16
50	60.5	165	22	2	105	130	8	19	M20
65	76.3	200	26	2	130	160	8	23	M20
80	89.1	210	28	2	140	170	8	23	M20
(90)	101.6	230	30	2	150	185	8	25	M22
100	114.3	240	32	2	160	195	8	25	M22
125	139.8	275	36	2	195	230	8	25	M22
150	165.2	325	38	2	235	275	12	27	M24
200	216.3	370	42	2	280	320	12	27	M24
250	267.4	450	48	2	345	390	12	33	M30X3
300	318.5	515	52	3	405	450	16	33	M30X3
350	355.6	560	54	3	450	495	16	33	M30X3
400	406.4	630	60	3	510	560	16	39	M36X3

Standard dimensions of a 40Kgf/cm² Pipe flange

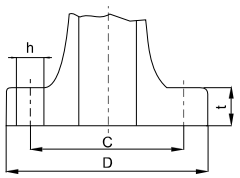
(KS B 1511 - 2007)



(mm)

Size	Outer diameter of applied steel pipe	Outer diameter of flange D	Dimensions of each part of flange			Bolt hole			Nominal diameter of bolt screw
			t	f	Diameter (g)	Diameter of center circle (c)	Num-be	Diameter (h)	
10	17.3	110	18	1	52	75	4	19	M16
15	21.7	115	20	1	55	80	4	19	M16
20	27.2	120	20	1	60	85	4	19	M16
25	34.0	130	22	1	70	95	4	19	M16
32	42.7	140	24	2	80	105	4	19	M16
40	48.6	160	24	2	90	120	4	23	M16
50	60.5	165	26	2	105	130	8	19	M20
65	76.3	200	30	2	130	160	8	23	M20
80	89.1	210	32	2	140	170	8	23	M20
(90)	101.6	230	34	2	150	185	8	25	M22
100	114.3	250	36	2	165	205	8	25	M22
125	139.8	300	40	2	200	250	8	27	M24
150	165.2	355	44	2	240	295	12	33	M30X3
200	216.3	405	50	2	290	345	12	33	M30X3
250	267.4	475	56	2	355	410	12	33	M30X3
300	318.5	540	60	3	410	470	16	39	M36X3
350	355.6	585	64	3	455	515	16	39	M36X3
400	406.4	645	70	3	515	570	16	39	M36X3

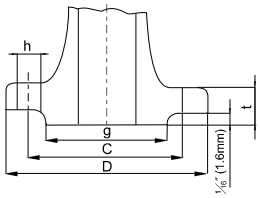
Standard dimensions of an ANSI 125 POUND cast Pipe flange



in (mm)

Size		Outer diameter of flange D	Thickness (t)	Bolt hole			Nominal diameter of bolt
(in)	(mm)			Center diameter (C)	Num-ber	Diameter (h)	
1	25	4¼(108)	11/16(11.2)	3⅛(79.5)	4	⅝(16)	½
1 ¼	32	4⅝(117)	¾(12.7)	3½(89.0)	4	⅝(16)	½
1 ½	40	5(127)	13/16(14.3)	3⅞(98.5)	4	⅝(16)	½
2	50	6(152)	⅞(15.9)	4¾(120.5)	4	¾(19)	½
2 ½	65	7(178)	1(17.5)	5½(139.5)	4	¾(19)	⅝
3	80	7½(191)	1⅛(19.1)	6(152.5)	4	¾(19)	⅝
3 ½	90	8½(216)	13/16(22.3)	7(178.0)	8	¾(19)	⅝
4	100	9(229)	1¼(23.9)	7½(190.5)	8	¾(19)	⅝
5	125	10(254)	1⅜(23.9)	8½(216.0)	8	⅞(22)	¾
6	150	11(279)	17/16(25.4)	9½(241.5)	8	⅞(22)	¾
8	200	13½(343)	1⅝(28.6)	11¾(298.5)	8	⅞(22)	¾
10	250	16(406)	1⅞(30.2)	14¼(362.0)	12	1(25)	⅞
12	300	19(483)	2(31.8)	17(432.0)	12	1(25)	⅞
14	350	21(533)	2⅛(35.0)	18¾(476.0)	12	1⅛(29)	1
16	400	23½(597)	2¼(36.6)	21¼(539.5)	12	1⅛(29)	1

Standard dimensions of an ANSI 150 POUND cast Pipe flange

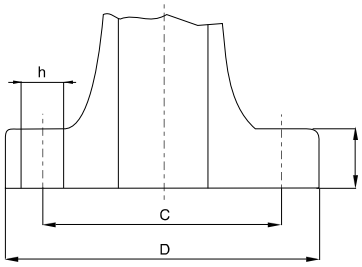


in (mm)

Size		Outer diameter of flange D	Thickness (t)	diameter (g)	Bolt hole			Nominal diameter of bolt
(in)	(mm)				Center diameter (C)	Num-ber	Diameter (h)	
½	15	3½(89)	7/16(11.2)	1⅜(35)	2⅜(60.5)	4	⅝(16)	½
¾	20	3⅞(98)	½(12.7)	111/16(43)	2¾(70.0)	4	⅝(16)	½
1	25	4¼(108)	9/16(14.3)	2(51)	3⅛(79.5)	4	⅝(16)	½
1¼	32	4⅝(117)	⅝(15.9)	2½(64)	3½(89.0)	4	⅝(16)	½
1½	40	5(127)	11/16(17.5)	2⅞(73)	3⅞(98.5)	4	⅝(16)	½
2	50	6(152)	¾(19.1)	3⅝(92)	4¾(120.5)	4	¾(19)	⅝
2½	65	7½(178)	⅞(22.3)	4⅛(105)	5½(139.5)	4	¾(19)	⅝
3	80	7½(191)	15/16(23.9)	5(127)	6(152.5)	4	¾(19)	⅝
3½	90	8½(216)	15/16(23.9)	5½(140)	7(178.0)	8	¾(19)	⅝
4	100	9(229)	15/16(23.9)	63/16(157)	7½(190.5)	8	¾(19)	⅝
5	125	10(254)	15/16(23.9)	75/16(186)	8½(216.0)	8	⅞(22)	⅝
6	150	11(279)	1(25.4)	8½(216)	9½(241.5)	8	⅞(22)	¾
8	200	13½(343)	1⅛(28.6)	10⅝(270)	11¾(298.5)	8	⅞(22)	¾
10	250	16(406)	13/16(30.2)	12¾(324)	14¼(362.0)	12	1(25)	⅞
12	300	19(483)	1¼(31.8)	15(381)	17(432.0)	12	1(25)	⅞
14	350	21(533)	1⅜(35.0)	16¼(413)	18¾(476.0)	12	1⅛(29)	1
16	400	23½(597)	17/16(36.6)	18½(470)	21¼(539.5)	16	1⅛(29)	1

Data / Standard Dimensions of Flange

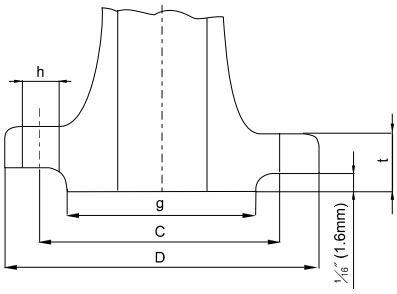
Standard dimensions of an ANSI 250 POUND cast iron Pipe flange



in (mm)

Size		Outer diameter of flange D	Thickness (t)	diameter (g)	Bolt hole			Nominal diameter of bolt
(in)	(mm)				Center diameter (C)	Num-ber	Diameter (h)	
1	25	4⅞(124)	11/16(17.5)	211/16(68.5)	3½(89)	4	¾(19)	⅝
1¼	32	5¼(133)	¾(19.1)	31/16(78.0)	3⅞(98)	4	¾(19)	⅝
1½	40	6⅛(156)	13/16(21.0)	39/16(90.5)	4½(114)	4	⅞(22)	¾
2	50	6½(165)	⅞(22.3)	43/16(106.5)	5(127)	4	¾(19)	⅝
2½	65	7½(191)	1(25.4)	415/16(125.5)	5⅞(149)	4	⅞(22)	¾
3	80	8¼(210)	1⅛(23.6)	511/16(144.5)	6⅞(168)	8	⅞(22)	¾
3½	90	9(229)	13/16(30.2)	65/16(160.5)	7¼(184)	8	⅞(22)	¾
4	150	10(254)	1¼(31.8)	615/16(176.5)	7⅞(200)	8	⅞(22)	¾
5	125	11(279)	1⅜(35.0)	85/16(211.5)	9¼(235)	8	⅞(22)	¾
6	150	12½(318)	17/16(36.6)	911/16(246.5)	10⅝(270)	8	⅞(22)	¾
8	200	15(381)	1⅝(41.3)	1111/16(303.5)	13(330)	12	1(25)	⅞
10	250	17½(445)	1⅞(47.6)	141/16(357.5)	15¼(387)	12	1⅛(29)	1
12	300	20(521)	2(50.8)	167/16(481.5)	17¾(451)	16	1¼(32)	1⅛
14	350	23(584)	2⅛(54.0)	1815/16(481.5)	20¼(514)	16	1¼(32)	1⅛
16	400	25½(648)	2¼(57.2)	211/16(535.0)	22½(572	20	1⅜(35)	1¼

Standard dimensions of an ANSI300 POUND cast iron Pipe flange



in (mm)

Size		Outer diameter of flange D	Thickness (t)	diameter (g)	Bolt hole			Nominal diameter of bolt
(in)	(mm)				Center diameter (C)	Num-ber	Diameter (h)	
½	15	3¾(59)	9/16(14.3)	1 ⅜(35)	2⅝(66.5)	4	⅝(16)	½
¾	20	4⅝(117)	⅝(15.9)	111/16(43)	3¼(82.5)	4	¾(19)	⅝
1	25	4⅞(124)	11/16(17.5)	2(51)	3½(89.0)	4	¾(19)	⅝
1¼	32	5¼(133)	¾(19.1)	2½(64)	3⅞(98.5)	4	¾(19)	⅝
1½	40	6⅛(156)	13/16(20.7)	2⅞(73)	4½(114.5)	4	⅞(22)	¾
2	50	6½(165)	⅞(22.3)	3⅝(92)	5(127.0)	8	¾(19)	⅝
2½	65	7½(191)	1(25.4)	4⅛(105)	5⅞(149.0)	8	⅞(22)	¾
3	80	8¼(210)	1⅛(28.6)	5(127)	6⅝(168.0)	8	⅞(22)	¾
3½	90	9(229)	13/16(30.2)	5½(140)	7¼(184.0)	8	⅞(22)	¾
4	100	10(254)	1¼(31.8)	63/16(157)	7⅞(200.0)	8	⅞(22)	¾
5	125	11(279)	1⅜(35.0)	75/16(186)	9¼(235.0)	8	⅞(22)	¾
6	150	12½(318)	17/16(36.6)	8½(216)	10⅝(270.0)	12	⅞(22)	¾
8	200	15(381)	1⅝(41.3)	10⅝(270)	13(330.0)	12	1(25)	⅞
10	250	17½(445)	1⅞(47.7)	12¾(324)	15¼(387.5)	16	1⅛(29)	1
12	300	20½(521)	2(50.8)	15(381)	17¾(451.0)	16	1¼(32)	1⅛
14	350	23(584)	2⅛(54.0)	16¼(413)	20¼(514.5)	20	1¼(32)	1⅛
16	400	25½(648)	2¼(57.2)	18½(470)	22½(571.5)	20	1⅜(35)	1¼

SAMYANG VALVE

Product Warranty

Samsung Valve products have been manufactured based on advanced technology, perfect quality control, and strict inspections. In order to address and prevent the recurrence of breakdowns from initial use of products and quality changes that happen during the product distribution process, we provide free-of-charge repair and tuning services.

Warranty Regulations

If a product breaks down during normal operation, we provide free repair services for 12 months from the date of purchase. Please note, however, that actual expenses are charged even during the warranty period in the following cases, based on relevant regulations.

1. Breakdown resulting from misuse or improper use, and breakdown resulting from inattentiveness in handling the product.
2. Breakdown resulting from a fire or a natural disaster.
3. Breakdown from inappropriate repair and alteration.
4. Breakdown from foreign substances in the pipeline.

SAMYANG SYSTEM GROUP

SAMYANG VALVE

#48-14 Samjeong-dong, Ojeong-gu, Bucheon-si, Gyeonggi-do, 421-808, Korea
Tel : 82-32-678-3121~3 Fax : 82-32-681-1117 www.samyangsys.com / www.samyangvalve.com

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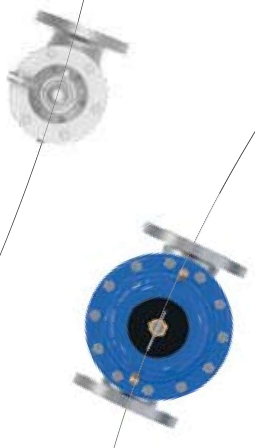
*Notes : There are cases where standards and specifications are changed for product improvements, without prior notice.

ENVIRONMENT
DESIGN
ENERGY



PRODUCT CATALOG

www.samyangsys.com
www.samyangvalve.com

SAMYANG SYSTEM GROUP

Samyang System Group
119 Ojeong-ro, Bucheon-si, Gyeonggi-do, Korea, 14446
TEL. +82-32-678-3121 FAX. +82-32-681-1117