

VENTILATION EQUIPMENT

Breather Valve
Flame Arrester
Gas Seal Unit
Keeper Breather
Emergency Vent
Gauge Hatch Cover



Kaneko Sangyo's Ventilation Equipment

We have been producing breather valves and ignition prevention devices for storage tanks over a number of years, winning customer favor in various fields.

Our ventilation equipment features:

Breathing function . . . Breather valve

Ignition prevention . . . Flame Arrester

Nitrogen sealing . . . Gas seal unit

Emergency pressure release . . . Emergency vent

and can provide all functions for tank breathing.

Our products constantly continue to evolve based on our multilateral research not only on product capability and performance but also on weight saving, delivery time shortening, pipework reduction, etc.

We will contribute to safe operation of our customers' facilities and continue to produce highly convenient products for cost cuts and shortening of work period for new construction and reconstruction of facilities.

KGFseries



KGNseries



KNseries



FRseries



KFseries



GU - 10



GU - 25



KNseries
P03

FRseries
P09

KFseries
P10

GUseries
P13

KGNseries
P15

KGFseries
P18

Tank Breathing Function



Ignition Prevention Function



Nitrogen Sealing Function



Emergency Pressure Release



Measurement of Tank Contents



KEseries
P25

Gaugeseries
HatchP25

What is a Breather Valve?

A breather valve is a breathing device designed to ensure safe operation of a fixed- roof storage tank by discharging pressure from the internal gaseous layer or sucking air or seal gas to control fluctuations of tank pressure caused by charge or discharge of tank contents or by changes in atmospheric temperature or pressure.

Breather valves are frequently used in cases where exhaust vapors from the tank are explosion-hazardous or odorous. Particularly when a toxic fluid is stored, a breather valve equipped with an exhaust vent is occasionally used to prevent internal vapors from being exhausted into the atmosphere. .

In recent years, cases have been increasing in which the internal gaseous layer of the tank is sealed with nitrogen gas to protect the quality of tank contents or prevent explosion and firing of flammable contents. Therefore, there has been an increasing tendency to use breather valves with exhaust vent together with our gas seal units.

Features of KN-Type Breather Valves

KN-type breather valves are mostly composed of four components as shown below. Breather valves are available in eight patterns of functional variations by the combination of air intake, atmospheric exhaust, intake vent and exhaust vent. The KN -type breather valves can satisfy these eight patterns by combining the four components accordingly.



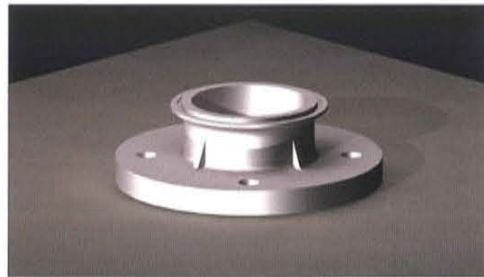
Pressure Body



Vent Body



T-type Body



Flange

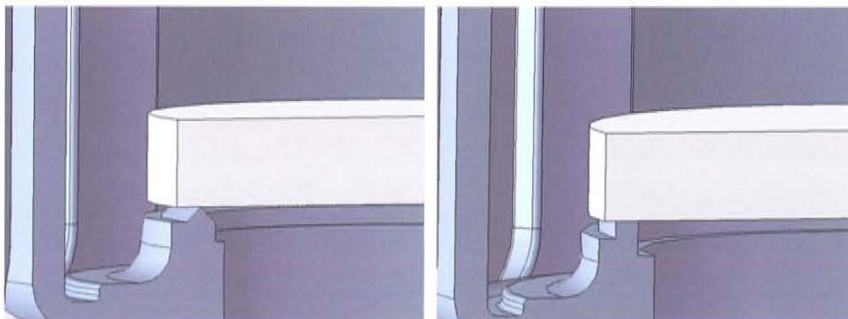
Five Merits of KN-Type

Standard Edge Seat!

Breather valves have a metal touch structure (both disc and seat are made of stainless steel) as standard. With the conventional K-type in which the body side seat is made as a flat seat, there have been cases in which tank vapors or water adheres to the seat, resulting in changing pressure/vacuum settings or leading to valve sticking, depending on the vapor viscosity. In such cases, we have made it a point to use an angular edge type of seat structure

We have adopted an edge seat as standard for the KN-type. Herewith, the occurrence of the above-mentioned viscosity trouble has been decreased.

* Non-occurrence of valve sticking under all conditions is not ensured.



Comparison between Flat Seat and Edge Seat

Short Time to Delivery

The KN-type breather valves make eight patterns of functional variations implementable by combining four components as described above. Therefore, four components prepared in advance can be assembled into a product at the customer's request, instead of product fabrication after receipt of order as in the past, so products can be delivered in a relatively short time.

Easy Maintenance

In the KN series, the pressure- and vacuum-side discs are designed to be eccentric. Therefore, these discs are separately removable.

Particularly in the case of the vent pipe type, maintenance can be done without removing the product from the pipe.

Easy Functional Change after Start of Operation

When a product used as an atmospheric exhaust type needs to have its vacuum side or pressure side connected by piping for quality improvement of tank contents, for environmental protection at the time of vapor exhaust or for other reasons, this can be done by replacing only the relevant components without the need for replacing the entire product.



Flexible Correction of Pipe Distortion, Etc.

Each component is attached by clamping and can be turned 360 degrees. Pipe arrangement on the tank top, pipe bending in the horizontal direction and flange bolt-hole distortion can be flexibly corrected at the clamped parts.

* In the case of the pressure side flange, note that flange rotation is limited in connection with the vacuum function section.



Other Variations

KC Series

- Breather valves having a built-in flame arrester.
- The flame arrester function is integrated into the breather valve, so the product weight can be saved substantially.
- Suited for pressure regulation of a large oil storage tank.
- * The function is only type 1 (air intake and atmospheric exhaust).

KNW Series

- Breather valves for cold climates designed for use with storage tanks in the Tohoku District, Hokkaido and other cold districts.
- In order to prevent malfunctioning due to freezing of the disc that is the life of a breather valve, both the disc and the seat are specially treated with a synthetic resin.
- Long-term research and development in a constant temperature room (minimum ambient temperature: -30°C) and verification tests in cold climates are underway.

KP Series

- A resin type not using any metal for gas contact parts, suited for storage of strongly acidic and strongly alkaline liquids that corrode metals.

KS Series

- Sanitary breather valves (available for electrolytic polishing and buffing).
- Products developed so as to be able to prevent a liquid from paddling inside the valve body and therefore suited for pressure regulation of storage tanks in the food, medicine, etc. processes.
- Made of cast stainless steel, size 40A as standard, flange or ferrule connection as standard.

KJ Series

- A steam area should be provided on the periphery of the valve body and supplied with steam so that the inside of the body can be always kept warm. This series is suited for storing high-viscosity fluids required to be kept warm at all times.



KC Series



KP Series



KS Series



KJ Series

Explanation of
Model Number

KN1 - 40JF - BB - BS

① ② ③ ④ ⑤ ⑥

① Function (breather valve)	② Bore	③ Connection standard	④ Body material	⑤ Trim material	⑥ Option
1 : Air intake and atmospheric exhaust	40 : 40A (1-1/2")	JF : JIS 10K FF	B : SCS13A	B : SUS304	BS : Bird screen
2 : Intake vent and atmospheric exhaust	50 : 50A (2")	JR : JIS 10K RF	C : SCS14	C : SUS316	
3 : Air intake and exhaust vent	80 : 80A (3")	AF : ANSI 1150 FF	D : SCS16	D : SUS316L	
4 : Intake and exhaust vents	100 : 100A (4")	AR : ANSI 1150 RF			
5 : Atmospheric exhaust without intake	150 : 150A (6")	PF : JPI 150 FF			
6 : Exhaust vent without intake		PR : JPI 150 RF			
7 : Air intake without exhaust					
8 : Intake vent without exhaust					

Standard Specifications

1. Pressure/vacuum settings

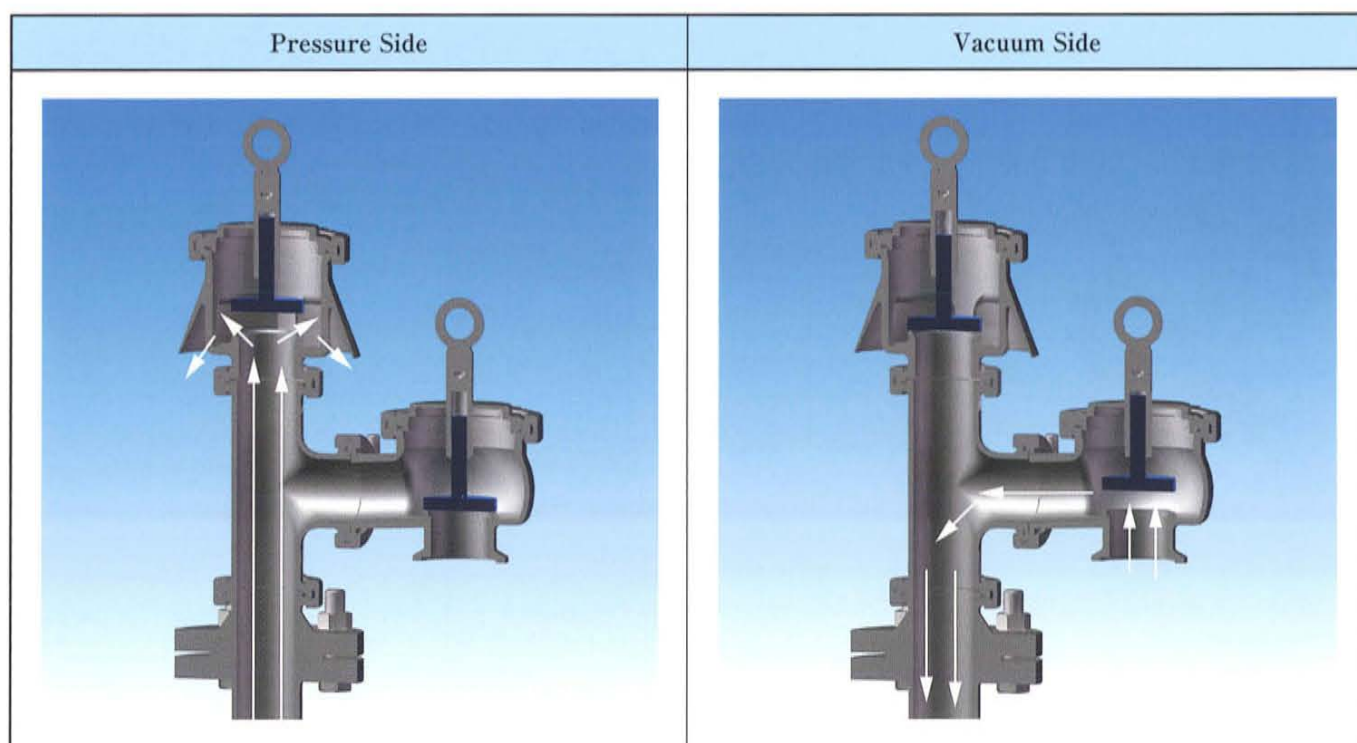
Pressure setting : + 0.2 to + 3.0kPa

Vacuum setting : - 0.2 to - 3.0kPa

* For information on pressure/vacuum settings exceeding the above ranges, please contact us.

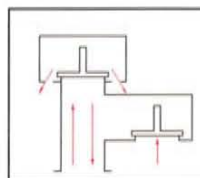
2. Connection standard

JIS 10K, JPI 150, ANSI 150

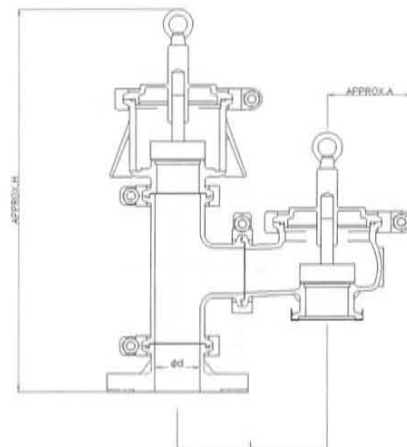


KN1 Series (Breather Valves)

Standard breather valves. This series can be used to exhaust tank vapors to the atmosphere and suck air directly into the tank.

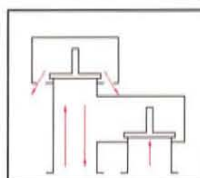


Model No.	H	L	A	W(kg)
KN1-40□□-□□	420	165	93	13
KN1-50□□-□□	420	165	93	14
KN1-80□□-□□	517	270	129	37
KN1-100□□-□□	517	270	129	40
KN1-150□□-□□	739	365	199	115

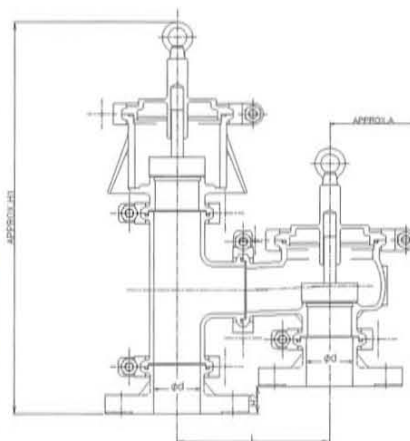


KN2 Series (Breather Valves with Intake Vent)

Breather valves whose vacuum side can be connected by piping. This series can be used to seal nitrogen etc. into the gaseous layer in the tank.

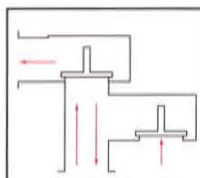


Model No.	H1	L	A	B	W(kg)
KN2-40□□-□□	420	165	93	29	16
KN2-50□□-□□	420	165	93	29	17
KN2-80□□-□□	517	270	129	8.5	43
KN2-100□□-□□	517	270	129	8.5	46
KN2-150□□-□□	739	365	199	30	127

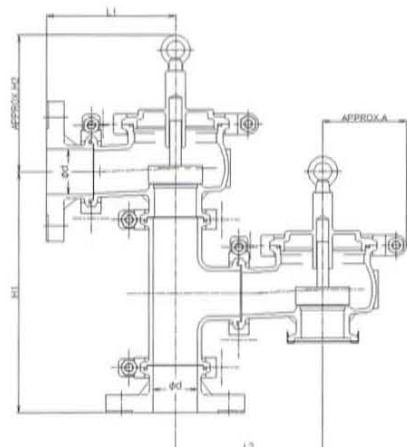


KN3 Series (Breather Valves with Exhaust Vent)

Breather valves whose pressure side can be connected by piping. This series can be used in cases where vapors are odorous or flammable.

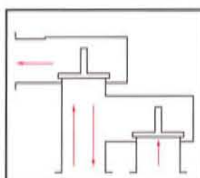


Model No.	H1	H2	L1	L2	A	W(kg)
KN3-40□□-□□	262	157	144	165	93	14
KN3-50□□-□□	267	152	144	165	93	15
KN3-80□□-□□	315	206	220	270	129	42
KN3-100□□-□□	325	196	220	270	129	45
KN3-150□□-□□	500	239	275	365	199	115

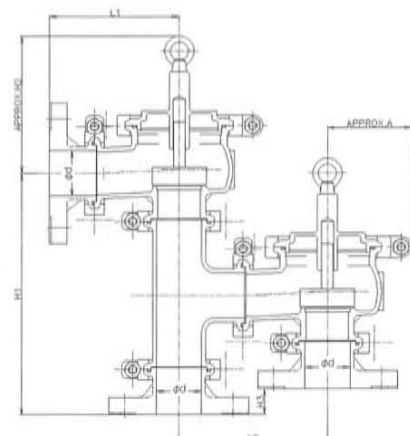


KN4 Series (Breather Valves with Intake and Exhaust Vents)

Breather valves whose pressure and vacuum sides can be connected by piping. This series has the features of both the KN2 Series and the KN3 Series.



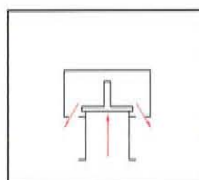
Model No.	H1	H2	L1	L2	A	B	W(kg)
KN4-40□□-□□	262	157	144	165	93	29	17
KN4-50□□-□□	267	152	144	165	93	29	18
KN4-80□□-□□	315	206	220	270	129	8.5	48
KN4-100□□-□□	325	196	220	270	129	8.5	51
KN4-150□□-□□	500	239	275	365	199	30	128



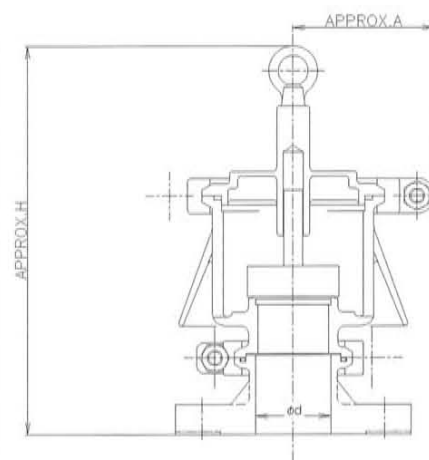
KN5 Series (Pressure Relief Valves)

Pressure relief valves of the atmospheric exhaust type.

* Without the intake function.



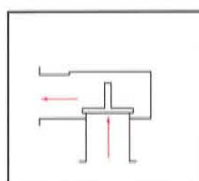
Model No.	H	A	W(kg)
KN5-40□□-□□	256	93	7
KN5-50□□-□□	256	93	8
KN5-80□□-□□	342	129	19
KN5-100□□-□□	342	129	22
KN5-150□□-□□	439	199	59



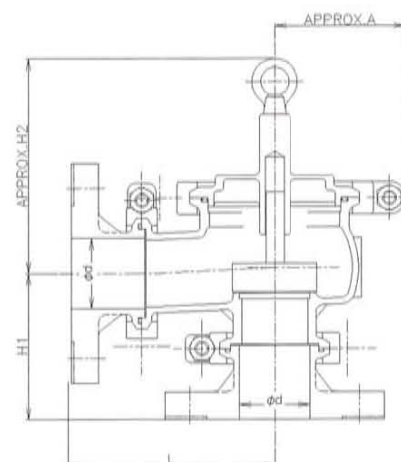
KN6 Series (Pressure Relief Valves with Exhaust Vent)

Pressure relief valves that can be connected by exhaust piping.

* Without the intake function.



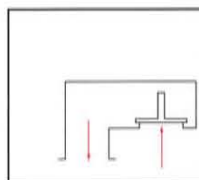
Model No.	H1	H2	L	A	W(kg)
KN6-40□□-□□	98	157	144	93	9
KN6-50□□-□□	103	152	144	93	10
KN6-80□□-□□	140	206	220	129	23
KN6-100□□-□□	150	196	220	129	26
KN6-150□□-□□	200	239	275	199	59



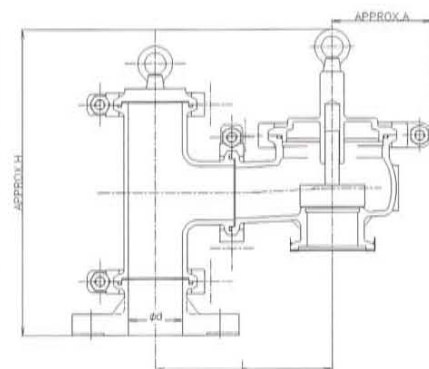
KN7 Series (Vacuum Relief Valves)

Vacuum relief valves of the air intake type.

* Without the exhaust function.



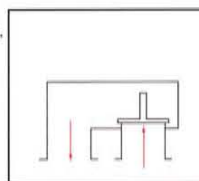
Model No.	H	L	A	W(kg)
KN7-40□□-□□	285	165	93	10
KN7-50□□-□□	285	165	93	11
KN7-80□□-□□	355	270	129	26
KN7-100□□-□□	355	270	129	29
KN7-150□□-□□	469	365	199	75



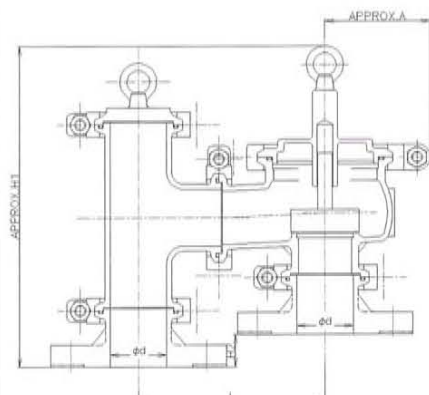
KN8 Series (Vacuum Relief Valves with Intake Vent)

Vacuum relief valves whose vacuum side can be connected by piping.

* Without the exhaust function.



Model No.	H	L	A	B	W(kg)
KN8-40□□-□□	285	165	93	29	13
KN8-50□□-□□	285	165	93	29	14
KN8-80□□-□□	355	270	129	8.5	32
KN8-100□□-□□	355	270	129	8.5	35
KN8-150□□-□□	469	365	199	30	87



What is a Flame Arrester?

A flame arrester is a device that is installed to the ventilation equipment of a flammable fluid storage tank to prevent the tank contents from being ignited by the flames entering through the ventilation equipment in the event of a fire around the tank or to quench the flames of a fire occurring in, and burning back through, the piping.

* For details of flame arresters, refer to the Flame Arrester Catalog No. 226a.

FR-Type Flame Arresters

An FR-type flame arrester is a Lost Wax's product intended to be integrated with a KN-type breather valve or a KGN-type keeper breather.

Referring to flame quenching elements, not only the conventional wire mesh type but also the crimped ribbon type is available.

Explanation of Model Number

FR - 40JF - BB - 3

① ② ③ ④ ⑤

① Bore	② Connection standard	③ Body material	④ Trim material	⑤ Flame quenching element
40 : 40A (1-1/2")	JF : JIS 10K FF	B : SCS13A	B : SUS304	3 : 30 mesh
50 : 50A (2")	JR : JIS 10K RF	C : SCS14	C : SUS316	4 : 40 mesh
80 : 80A (3")	AF : ANSI 1150 FF	D : SCS16	D : SUS316L	A : Crimped ribbon
100 : 100A (4")	AR : ANSI 1150 RF			
150 : 150A (6")	PF : JPI 150 FF			
	PR : JPI 150 RF			

Flame Quenching Elements (Internal Assemblies)

Flame quenching elements are selectable from the two types shown below.

In Japan, the wire mesh type is mainstream. The crimped ribbon type having a higher quenching effect is mainstream in some of the overseas countries.



Wire Mesh Type



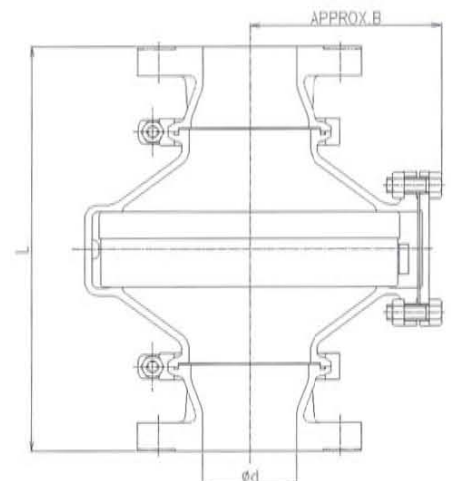
Crimped Ribbon Type

FR Series

Standard flame arresters installed to the ventilation equipment of a flammable fluid storage tank.



Model No.	L	B	W(kg)
FR-40□□-□□-□	245	104	14
FR-50□□-□□-□	245	104	14
FR-80□□-□□-□	334	160	28
FR-100□□-□□-□	334	160	32
FR-150□□-□□-□	422	210	58



KF-Type Breather Valves

A KF-type breather valve is a product composed of a KN-type breather valve and an FR-type flame arrester integrated by clamp connection.

* For information on the functions of breather valves, purpose of flame arresters, etc., refer to the respective pages.

Breather valves **P03**
Flame arresters **P09**

Explanation of Model Number

KF1 - 40JF - BB - 3 - BS

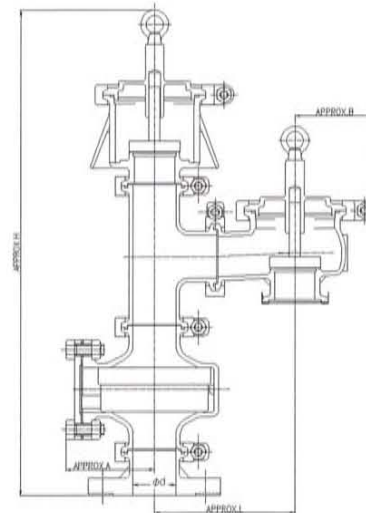
- | | | | | | |
|-----------------------------------------|-------------------|------------------------------|------------------------|------------------------|----------------------------------|
| ① Function (breather valve) | ② Bore | ③ Connection standard | ④ Body material | ⑤ Trim material | ⑥ Flame quenching element |
| 1 : Air intake and atmospheric exhaust | 40 : 40A (1-1/2") | JF : JIS 10K FF | B : SCS13A | B : SUS304 | 3 : 30 mesh |
| 2 : Intake vent and atmospheric exhaust | 50 : 50A (2") | JR : JIS 10K RF | C : SCS14 | C : SUS316 | 4 : 40 mesh |
| 3 : Air intake and exhaust vent | 80 : 80A (3") | AF : ANSI 1150 FF | D : SCS16 | D : SUS316L | A : Crimped ribbon |
| 4 : Intake and exhaust vents | 100 : 100A (4") | AR : ANSI 1150 RF | | | |
| 5 : Atmospheric exhaust without intake | 150 : 150A (6") | PF : JPI 150 FF | | | |
| 6 : Exhaust vent without intake | | PR : JPI 150 RF | | | |
| 7 : Air intake without exhaust | | | | | |
| 8 : Intake vent without exhaust | | | | | |

⑦ Option
BS : Bird screen

KF1 Series (Breather Valves)



Model No.	H	L	A	B	W (kg)
KF1-40□□-□□-□	565	165	104	93	21
KF1-50□□-□□-□	565	165	104	93	22
KF1-80□□-□□-□	715	270	160	129	54
KF1-100□□-□□-□	715	270	160	129	57
KF1-150□□-□□-□	1001	365	210	199	153

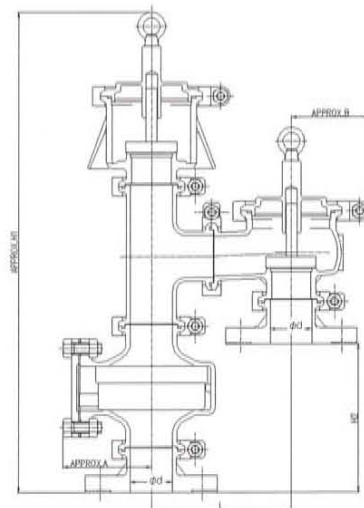


KF2 Series (Breather Valves with Intake Vent)



Model No.	H1	H2	L
KF2-40□□-□□-□	565	174	165
KF2-50□□-□□-□	565	174	165
KF2-80□□-□□-□	715	202	270
KF2-100□□-□□-□	715	202	270
KF2-150□□-□□-□	1001	292	365

A	B	W (kg)
104	93	24
104	93	25
160	129	60
160	129	63
210	199	166

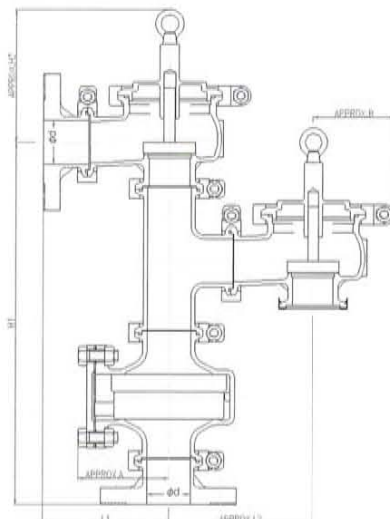


KF3 Series (Breather Valves with Exhaust Vent)



Model No.	H1	H2	L1	L2
KF3-40□□-□□-□	407	157	144	165
KF3-50□□-□□-□	412	152	144	165
KF3-80□□-□□-□	509	206	220	270
KF3-100□□-□□-□	519	196	220	270
KF3-150□□-□□-□	762	239	275	365

A	B	W(kg)
104	93	22
104	93	23
160	129	59
160	129	62
210	199	154

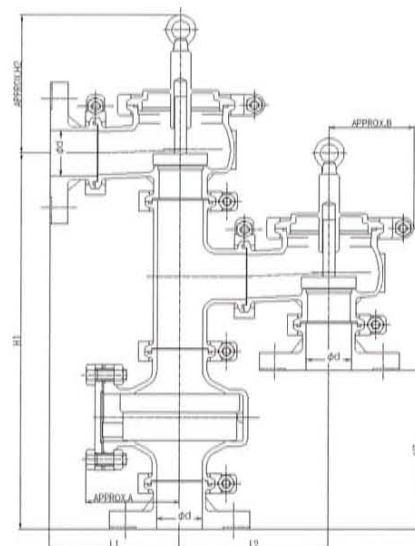


KF4 Series (Breather Valves with Intake and Exhaust Vents)



Model No.	H1	H2	H3	L1
KF4-40□□-□□-□	407	152	174	144
KF4-50□□-□□-□	412	157	174	144
KF4-80□□-□□-□	509	206	202	220
KF4-100□□-□□-□	519	196	202	220
KF4-150□□-□□-□	762	239	292	275

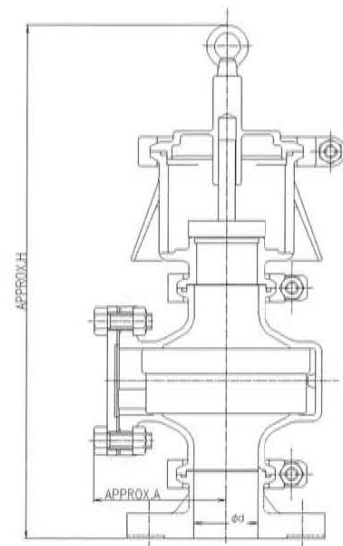
L2	A	B	W(kg)
165	104	93	25
165	104	93	26
270	160	129	65
270	160	129	68
365	210	199	166



KF5 Series (Pressure Relief Valves)



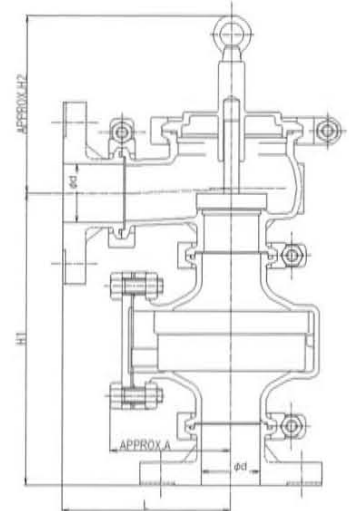
Model No.	H	A	W(kg)
KF5-40□□-□□-□	400	104	15
KF5-50□□-□□-□	400	104	16
KF5-80□□-□□-□	535	160	36
KF5-100□□-□□-□	535	160	39
KF5-150□□-□□-□	702	210	97



KF6 Series (Pressure Relief Valves with Exhaust Vent)



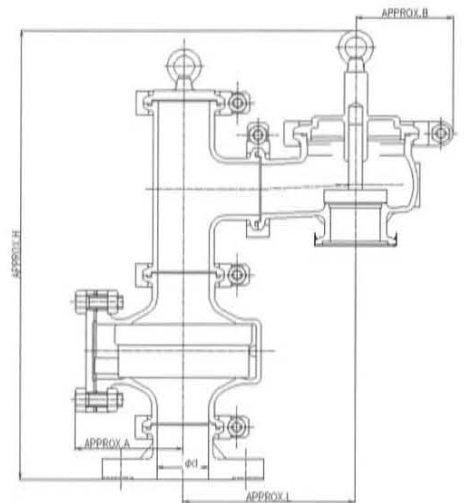
Model No.	H1	H2	L	A	W(kg)
KF6-40□□-□□-□	243	157	144	104	16
KF6-50□□-□□-□	248	152	144	104	17
KF6-80□□-□□-□	334	206	220	160	40
KF6-100□□-□□-□	344	196	220	160	43
KF6-150□□-□□-□	462	251	275	210	98



KF7 Series (Vacuum Relief Valves)



Model No.	H	L	A	B	W(kg)
KF7-40□□-□□-□	429	165	104	93	18
KF7-50□□-□□-□	429	165	104	93	19
KF7-80□□-□□-□	548	270	160	129	43
KF7-100□□-□□-□	548	270	160	129	46
KF7-150□□-□□-□	732	365	210	199	113

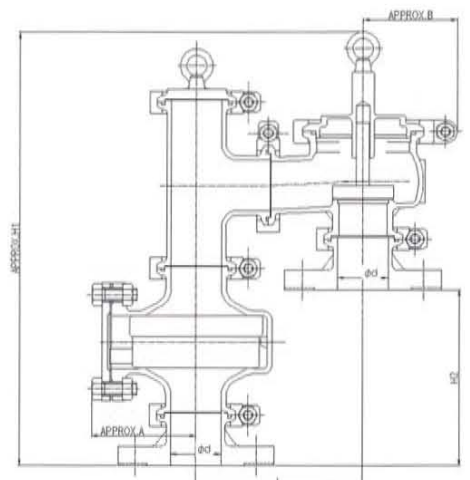


KF8 Series (Vacuum Relief Valves with Intake Vent)



Model No.	H1	H2	L
KF8-40□□-□□-□	429	174	165
KF8-50□□-□□-□	429	174	165
KF8-80□□-□□-□	548	202	270
KF8-100□□-□□-□	548	202	270
KF8-150□□-□□-□	732	292	365

A	B	W(kg)
104	93	21
104	93	22
160	129	49
160	129	52
210	199	126



What is a Gas Seal Unit?

Purpose of Use

When liquids and powder such as ultrapure water indispensable for the semiconductor industry and medicine production, chemical products, chemicals, petroleum products and foodstuff (wine, sake, grain, juice, etc.) are stored in a tank, a method of sealing an inert gas (usually nitrogen) into the tank is used to prevent these materials from deteriorating on contact with the air. The gas in the gaseous layer of a tank that contains flammables may have become explosive. In order to reduce the risk of explosion, an inert gas is sealed into the gaseous layer as a method for making it devoid of oxygen, in some cases.

Features

Nitrogen gas is usually used as a seal gas. Being costly, nitrogen gas is required not to flow out needlessly. If the nitrogen sealing device is slow to react to the pressure drop in the tank, the tank pressure becomes lower than the atmospheric pressure upon discharge of the tank contents, causing the tank to suck air from other intake device. As a result, the effect of nitrogen sealing will deteriorate. This gas seal unit can solve these problems as it is excellent in responsiveness and stable in set pressure.

- High pressure responsivity:
 - Maximum primary pressure 0.7 MPa
- Micro pressure control responsivity:
 - GU-10 series Minimum set pressure 0.1 kPa
 - GU-25 series Minimum set pressure 0.05 kPa
- High sensitivity: Highly responsive and capable of high-precision pressure control.
- Economical installation cost:
 - Extra piping is unnecessary owing to unitization.

GU-10 Series

The GU-10 series can deal with a maximum flow rate up to 200 Nm³/h despite the compact shape called "small gas seal."

Explanation of Model Number	GU - 10 - <u>B</u><u>B</u><u>A</u> - H ① ② ③
-----------------------------	--------------------------------------------------------------

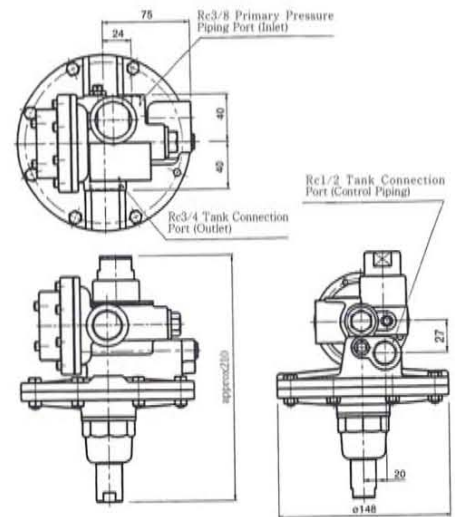
- | | | |
|---------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------|
| ① Body material
B : SCS13A
C : SCS14
D : SCS16 | ② Trim material
B : SUS304
C : SUS316
D : SUS316L | ③ Rubber material (gas contact part/others)
A : FKM / NBR
E : Kalrez / NBR |
|---------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------|



Photo GU-10

Standard Specifications

1. Nominal pipe size
 - Primary side: Rc3/8
 - Secondary side: Rc3/4
 - Control piping: Rc1/2
 - * Suitable for flange connection at each part.
2. Primary pressure 0.1 to 0.7 MPa
 - * The unit does not operate normally when the primary pressure becomes less than 0.1 MPa during operation.
3. Set pressure 0.1 to 3 kPa
 - * The set pressure remains unchanged when the primary pressure varies from 0.1 to 0.7 MPa, but it changes when the primary pressure becomes less than 0.4 MPa.
 - * As the main valve operates on a pilot system, a completely sealed tank stabilizes when the internal pressure exceeds the set pressure by 0.05 to 0.1 kPa.
4. Flow capacity Refer to the Flow Capacity Curves shown below.
 - * For information on the ventilation rate varying with liquid discharge and temperature change, refer to the Method of Calculating Tank Ventilation Rate shown below (page 21).
 - * Supplying a gas volume in excess of the flow capacity of the exhaust ventilation device installed to the storage tank is dangerous, so flow control is performed so that the exhaust capability is not exceeded.
 - Required flow capacity ≤ Flow capacity of gas seal unit < Regulated flow capacity



Principal Dimensions of SU-10

Instructions for Handling

1. The entrance of foreign matter from the primary piping may cause a malfunction, so flush this piping fully before installation and attach a strainer of 80 mesh or smaller to it.
2. Narrowing or lengthening the control piping may cause delay in operating time or pulsation and make normal control impossible. The control piping should be 15A in size and 3 m or less in length. With pipe sizes less than 15A, the unit may fail to operate.
3. The tank connection port for the secondary piping should be located in the same direction as, and more than 1 m (0.5 m for the GU-10 series) apart from, the control piping to decrease the impact on the control pressure.

Note: In the case of GU-25-BBE-00, the primary atmospheric pressure is 0.1 to 0.4 MPa.

GU-25 Series

The GU-25 series can deal with a maximum flow of 1,250 Nm³/h as is called "large gas seal."

Explanation of Model Number

GU - 25 - BBA - 00

①
②
③
④

- | | | |
|-----------------|-----------------|---------------------------------------------|
| ① Body material | ② Trim material | ③ Rubber material (gas contact part/others) |
| B : SCS13A | B : SUS304 | A : FKM / NBR |
| C : SCS14 | C : SUS316 | E : Kalrez / NBR |
| D : SCS16 | D : SUS316L | |

④ Correction mark

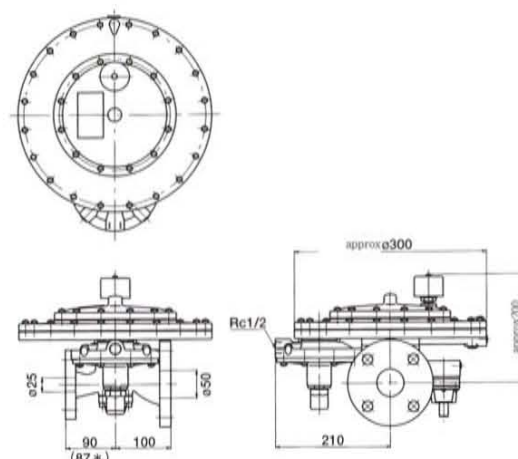
- 0 : Primary pressure 0.1 to 0.4 MPa Standard flow capacity
- 1 : Primary pressure 0.1 to 0.4 MPa Large flow capacity
- 5 : Primary pressure 0.41 to 0.7 MPa Standard flow capacity
- 6 : Primary pressure 0.41 to 0.7 MPa Large flow capacity



Photo GU-25

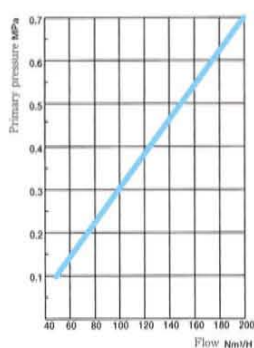
Standard Specifications

- Nominal pipe size
Primary side : 25A flange type
Secondary side : 50A flange type
Control piping : Rc1/2.
- Primary pressure
0.1 to 0.7 MPa
* The unit does not operate normally when the primary pressure becomes less than 0.1 MPa during operation. When this possibility exists, please contact us.
- Set pressure
0.05 to 3 kPa
* The set pressure remains unchanged when the primary pressure varies.
* As the main valve operates on a pilot system, a completely sealed tank stabilizes when the internal pressure exceeds the set pressure by 0.05 to 0.1 kPa.
- Flow capacity
Refer to the Flow Capacity Curves shown below.

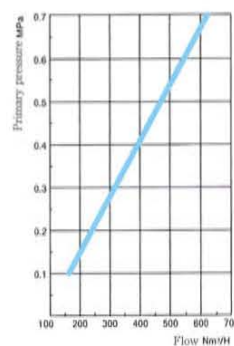


Note: An asterisk (*) denotes a case of ANSI 150 / JPI 150.

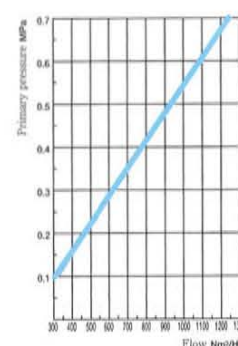
GU-10 Flow Capacity Curve



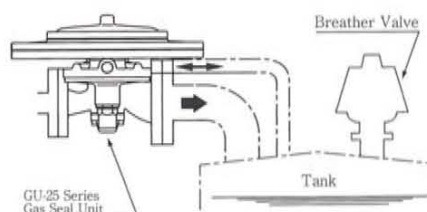
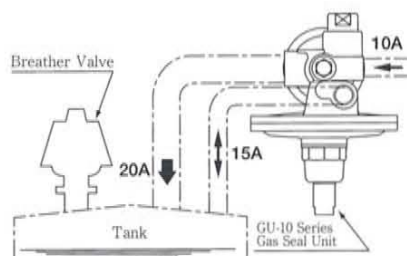
GU-25 Standard Flow Capacity Curve



GU-25 Large Flow Capacity Curve



GU-10 Reference Piping Drawing



GU-25 Reference Piping Drawing

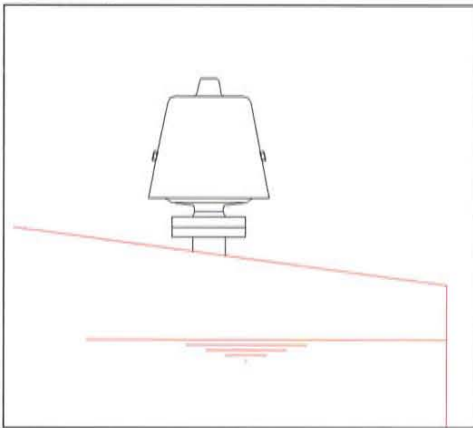
What is a Keeper Breather?

A keeper breather is a product into which a breather valve and a gas seal unit are functionally integrated. This product is suited to meet such a request as to seal nitrogen gas into an existing tank originally equipped with a breather valve or a latest tank or to minimize piping costs.

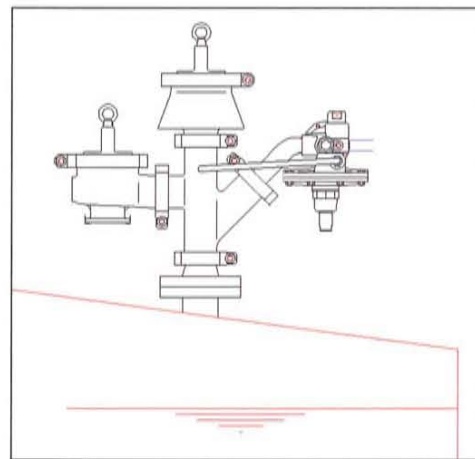
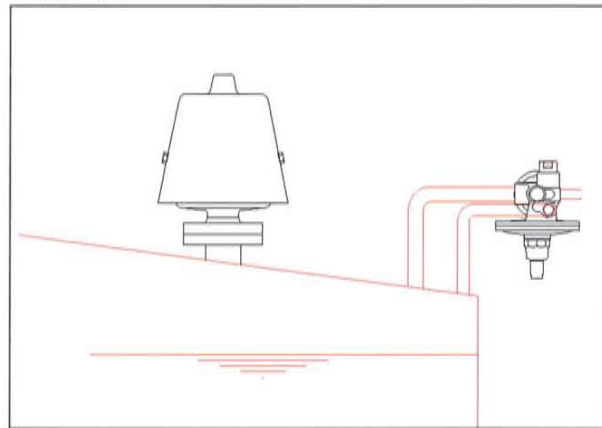
* For information on the functions and specifications of breather valves and gas seal units, refer to the respective pages.

Breather valves **P03**
Gas seal units **P13**

◇ Request to seal nitrogen gas into an existing tank



◇ Request to decrease tank top piping and reduce piping costs in construction work



Explanation of Model Number

KGN1 - 40JF - BBA - BS

- | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <p>① Function (breather valve)</p> <ul style="list-style-type: none"> 1 : Air intake and atmospheric exhaust 2 : Intake vent and atmospheric exhaust 3 : Air intake and exhaust vent 4 : Intake and exhaust vents 5 : Atmospheric exhaust without intake 6 : Exhaust vent without intake | <p>② Bore</p> <ul style="list-style-type: none"> 40 : 40A (1-1/2") 50 : 50A (2") | <p>③ Connection standard</p> <ul style="list-style-type: none"> JF : JIS 10K FF JR : JIS 10K RF AF : ANSI 1150 FF AR : ANSI 1150 RF PF : JPI 150 FF PR : JPI 150 RF | <p>④ Body material</p> <ul style="list-style-type: none"> B : SCS13A C : SCS14 D : SCS16 | <p>⑤ Trim material</p> <ul style="list-style-type: none"> B : SUS304 C : SUS316 D : SUS316L |
| <p>⑥ Rubber material (gas contact part/others)</p> <ul style="list-style-type: none"> A : FKM / NBR E : Kalrez / NBR | | | <p>⑦ Option</p> <ul style="list-style-type: none"> BS : Bird screen | |

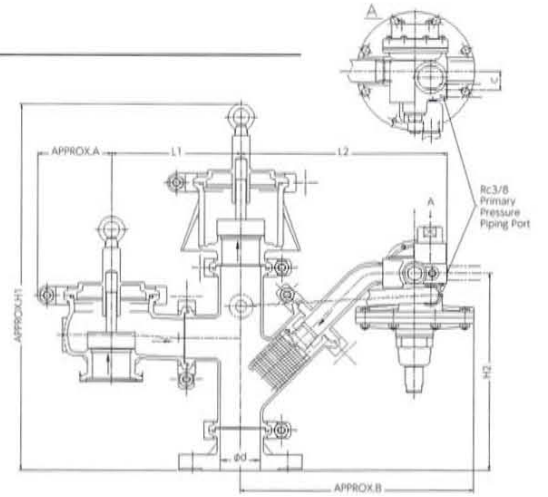
Standard Specifications

- | | |
|----------------------------|---------------------------------------------------------|
| 1. Connecting bore size | 40A, 50A
* Unsuitable for bore sizes 80A or greater. |
| 2. Available gas seal unit | GU-10- □□□ -H
* Unsuitable for GU-25 type. |

* For additional information on the standard specifications of breather valves and gas seal units, refer to the respective pages.

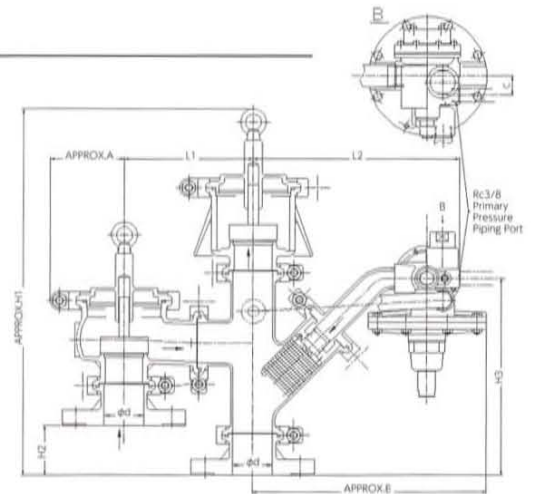
Breather valves **P03**
Gas seal units **P13**

KGNI Series (Breather Valves)



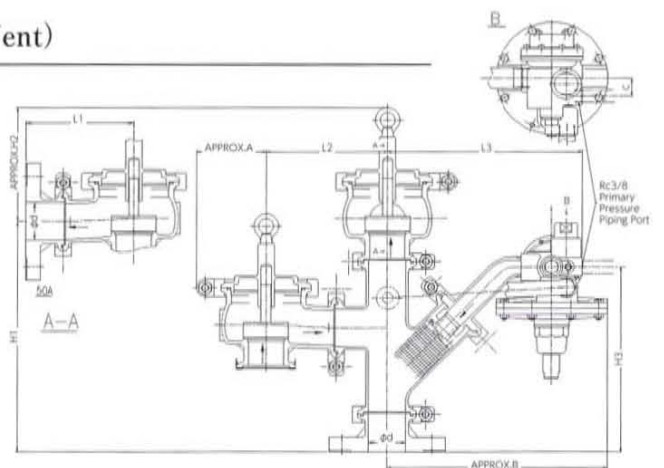
Model No.	H1	H2	L1	L2	A	B	C	W(kg)
KGNI-40□□-□□□	460	245	162	259	93	293	24	19
KGNI-50□□-□□□	460	245	162	259	93	293	24	19

KGNI Series (Breather Valves with Intake Vent)



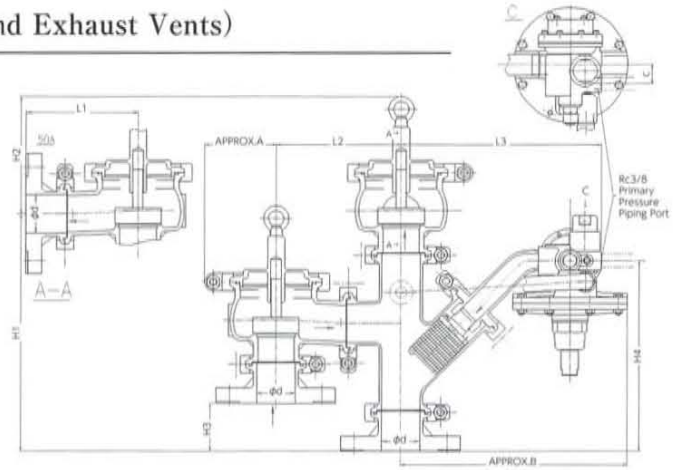
Model No.	H1	H2	H3	L1	L2	A	B	C	W(kg)
KGNI-40□□-□□□	460	62	245	162	259	93	L2 293	24	22
KGNI-50□□-□□□	460	62	245	162	259	93	293	24	23

KGNI Series (Breather Valves with Exhaust Vent)



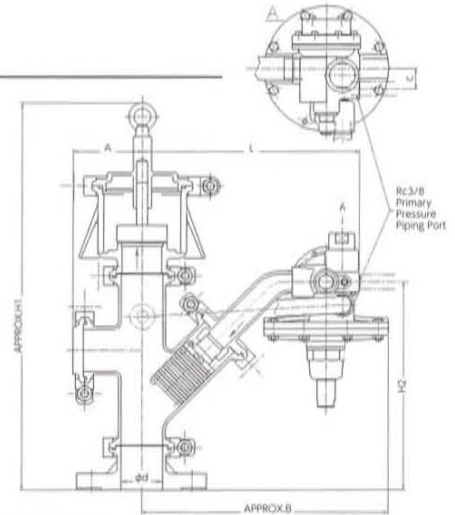
Model No.	H1	H2	H3	L1	L2	L3	A	B	C	W(kg)
KGNI-40□□-□□□	301	159	245	144	162	259	93	293	24	21
KGNI-50□□-□□□	306	154	245	144	162	259	93	293	24	22

KG N4 Series (Breather Valves with Intake and Exhaust Vents)



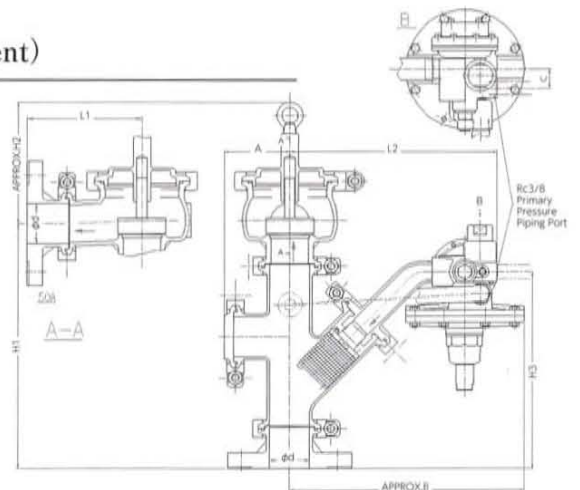
Model No.	H1	H2	H3	H4	L1	L2	L3	A	B	C	W (kg)
KG N4-40□□-□□□	301	159	62	245	144	162	259	93	293	24	24
KG N4-50□□-□□□	306	154	62	245	144	162	259	93	293	24	26

KG N5 Series (Pressure Relief Valves)



Model No.	H1	H2	L	A	B	C	W (kg)
KG N5-40□□-□□□	460	245	259	82	293	24	15
KG N5-50□□-□□□	460	245	259	82	293	24	16

KG N6 Series (Pressure Relief Valves with Exhaust Vent)



Model No.	H1	H2	H3	L1	L2	A	B	C	W (kg)
KG N6-40□□-□□□	301	159	245	144	259	82	293	24	18
KG N6-50□□-□□□	306	154	245	144	259	82	293	24	19

KGF Series

The KF series is a series of products each composed of a breather valve and a flame arrester integrated by clamping, while the KGF series is a series of products each composed of a keeper breather and a flame arrester integrated by clamping.

Explanation of Model Number

KGF 1 - 40**JF** - **BBA** - 3 - **BS**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <p>① Function (breather valve)</p> <ul style="list-style-type: none"> 1 : Air intake and atmospheric exhaust 2 : Intake vent and atmospheric exhaust 3 : Air intake and exhaust vent 4 : Intake and exhaust vents 5 : Atmospheric exhaust without intake 6 : Exhaust vent without intake | <p>② Bore</p> <ul style="list-style-type: none"> 40 : 40A (1-1/2") 50 : 50A (2") | <p>③ Connection standard</p> <ul style="list-style-type: none"> JF : JIS 10K FF JR : JIS 10K RF AF : ANSI150FF AR : ANSI150RF PF : JPI150FF PR : JPI150RF | <p>④ Body material</p> <ul style="list-style-type: none"> B : SCS13A C : SCS14 D : SCS16 | <p>⑤ Trim material</p> <ul style="list-style-type: none"> B : SUS304 C : SUS316 D : SUS316L |
| | <p>⑥ Rubber material (gas contact part/others)</p> <ul style="list-style-type: none"> A : FKM / NBR E : Kalrez / NBR | <p>⑦ Flame quenching element</p> <ul style="list-style-type: none"> 3 : 30 mesh 4 : 40 mesh A : Crimped ribbon | <p>⑧ Option</p> <ul style="list-style-type: none"> BS : Bird screen | |

Standard Specifications

1. Connecting bore size 40A, 50A
* Unsuitable for bore sizes 80A or greater.
2. Available gas seal unit GU - 1 0 - □□□ - H
* Unsuitable for GU-25 type.

* For additional information on the standard specifications of breather valves and gas seal units, refer to the respective pages.

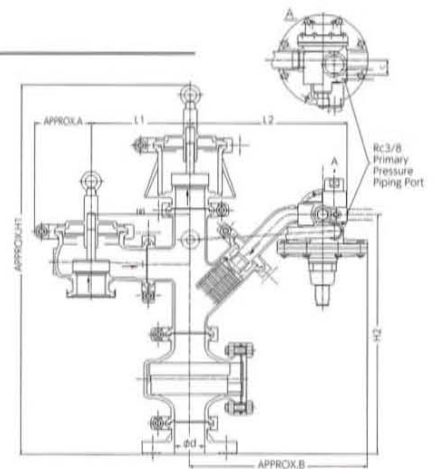
Breather valves → P03
Gas seal units → P13

KGF1 Series (Breather Valve)



Model No.	H1	H2	L1	L2
KGF1-40□□□□□□□□	605	390	162	259
KGF1-50□□□□□□□□	605	390	162	259

A	B	C	W(kg)
93	293	24	26
93	293	24	26

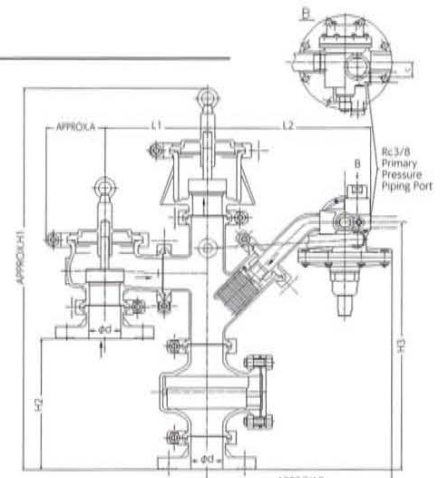


KGF2 Series (Breather Valves with Intake Vent)



Model No.	H1	H2	H3
KGF2-40□□□□□□□□	605	207	390
KGF2-50□□□□□□□□	605	207	390

L1	L2	A	B	C	W(kg)
162	259	93	293	24	29
162	259	93	293	24	30

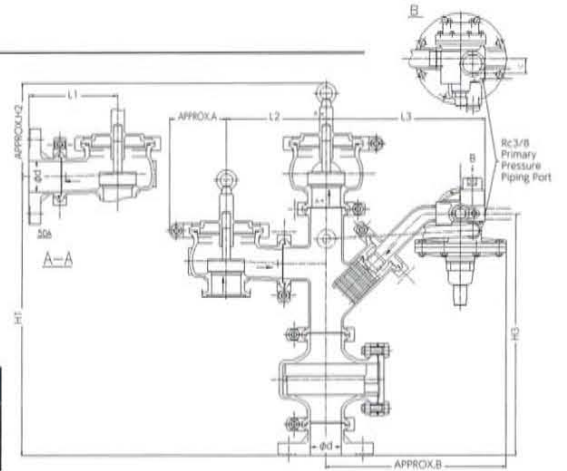


KGF3 Series (Breather Valves with Exhaust Vent)



Model No.	H1	H2	H3	L1
KGF3-40□□-□□□□-□	446	159	390	144
KGF3-50□□-□□□□-□	451	154	390	144

L2	L3	A	B	C	W(kg)
162	259	93	293	24	28
162	259	93	293	24	29

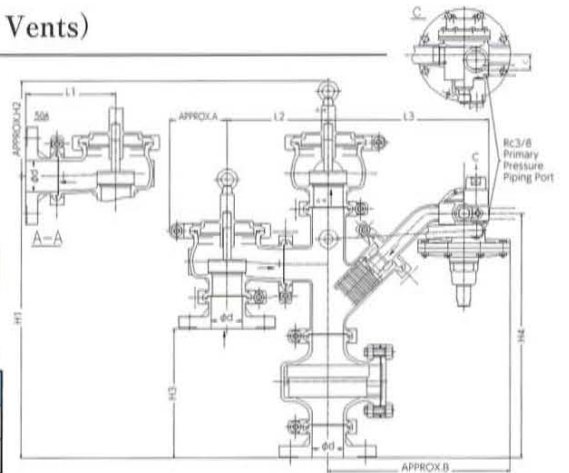


KGF4 Series (Breather Valves with Intake and Exhaust Vents)



Model No.	H1	H2	H3	H4
KGF4-40□□-□□□□-□	446	159	207	390
KGF4-50□□-□□□□-□	451	154	207	390

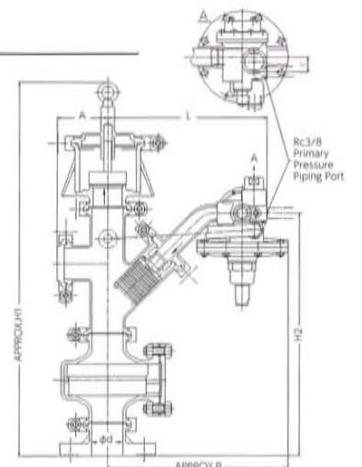
L1	L2	L3	A	B	C	W(kg)
144	162	259	93	293	24	31
144	162	259	93	293	24	33



KGF5 Series (Pressure Relief Valves)



Model No.	H1	H2	L	A	B	C	W(kg)
KGF5-40□□-□□□□-□	605	390	259	82	293	24	22
KGF5-50□□-□□□□-□	605	390	259	82	293	24	23

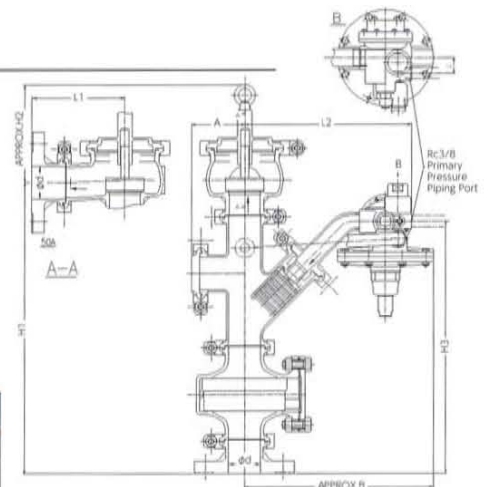


KGF6 Series (Pressure Relief Valves with Exhaust Vent)



Model No.	H1	H2	H3	L1
KGF6-40□□-□□□□-□	446	159	390	144
KGF6-50□□-□□□□-□	451	154	390	144

L2	A	B	C	W(kg)
259	82	293	24	25
259	82	293	24	26



How to Select Ventilation Equipment?

In order to ensure safe operation of our ventilation equipment, it is necessary to determine equipment specifications, taking into account the required flow capacity, pressure/vacuum settings, pressure balance between devices, etc.

(1) Calculation of Required Ventilation Rate

In order to control the tank pressure properly, calculate the required ventilation rate based on parameters such as tank capacity, flash point of tank contents, tank charge and discharge rates, etc. For details of the calculation procedure, refer to page 21.

(2) Selection of Breather Valve

① Determine pressure/vacuum settings.

It is necessary to determine pressure/vacuum settings, taking into account the tank strength, design pressure, structure, etc. The pressure/vacuum settings should be determined, considering that the required ventilation rate can be obtained at a pressure below the tank design pressure.

For breather valves with vents, it is necessary to determine disc ratings with consideration to the supply pressure from the vacuum side piping and the back pressure in the pressure side piping.

* Refer to the Relation between Pressure/Vacuum Settings and Pipe Pressure (page 22).

② Determine bore size.

Check the flow capacity curves based on the determined pressure/vacuum settings and required ventilation rate and select a ventilation equipment of the bore size able to satisfy the required ventilation rate.

* Refer to How to Read a Flow Capacity Curve (page 23).

(3) Selection of Flame Arrester

A flame quenching element should be selected based on the laws and regulations related to tank contents, hazardous material tanks according to the Fire Service Act, etc.

(4) Selection of Gas Seal Unit

The set pressure of the gas seal unit should be up to 1/2 the pressure setting of the breather valve selected in Item ①, Paragraph (2). The required flow capacity should be greater than the required ventilation rate on the vacuum side of the breather valve, calculated in Paragraph (1), and less than 3/4 the flow capacity on the pressure side, calculated in Items ① and ②, Paragraph (2).

Note 1:

In order to secure the required quantity of nitrogen, the pressure of nitrogen supplied should be 0.1 to 0.7 MPa.

In the event of a malfunction due to inclusion of foreign matter into the gas seal unit, a high-pressure nitrogen gas may continue to flow into the tank and cause damage to it. To prevent tank damage, it is necessary to set the flow capacity, taking into account the exhaust capability of the ventilation equipment such as breather valve.

Note 2:

As an orifice is used for flow setting, the flow capacity will decrease when the primary pressure drops.

The primary pressure should be maintained.

* Refer to What Is a Gas Seal Unit (page 13).

(5) Selection of Keeper Breather

Though the selection of a keeper breather is a combination of Paragraphs (2) and (4), the following should be kept in mind:

① As the pressure setting of a keeper breather is up to 3.0 kPa (standard), the pressure setting for nitrogen gas sealing is 1.5 kPa at a maximum.

② The connecting bore sizes of a keeper breather are two, 40A and 50A, so the required flow capacity for nitrogen gas sealing is limited.

* In cases where performances beyond the above limitations are necessary for pressure/vacuum settings and required flow capacity, please contact us.

(6) Selection of Emergency Vent

An emergency vent is to be installed depending on the tank strength and structure, related laws and regulations, etc.

Select a bore size based on the set pressure and required flow capacity.

* Refer to the Emergency Ventilation Rate (page 21) and Flow Capacity Curve of Emergency Vent (page 25).

1. Method of Calculating Tank Ventilation Rate (Excerpt from JIS B8501-1995)

Ventilation Rate in Normal Times

Ventilation in normal times means:

- Intake when oil is discharged from the tank
- Intake when tank vapors or air contracts due to temperature drop or rainfall
- Exhaust when oil is charged into the tank
- Exhaust when tank vapors or air expands due to temperature rise

(1) When the flash point of oil is less than 40°C :

$$Q_i = V_o + Q_t$$

$$Q_o = 2.14V_i + Q_t$$

(2) When the flash point of oil is 40°C or higher:

$$Q_i = V_o + Q_t$$

$$Q_o = 1.07V_i + 0.6Q_t$$

<where>

Q_i : Total intake ventilation rate (m³/h)

* Converted to air at 15°C and 1 atm.

Q_o : Total exhaust ventilation rate (m³/h)

* Converted to air at 15°C and 1 atm.

V_i : Max. charge rate (m³/h)

V_o : Max. discharge rate (m³/h)

Q_t : Ventilation rate varying with temperature change, etc. (m³/h)

Tank less than 3,200 kL . . . $Q_t = 0.178V$

Tank 3,200 kL or more . . . $Q_t = 0.61 S$

V : Tank capacity (kL)

S : Total surface area of the side walls and roof of the tank (m²)

Emergency Ventilation Rate

Emergency ventilation means exhaust venting when a tank is exposed to fire as a result of fire occurrence in or around the tank.

Wet Area	Total Exhaust Ventilation Rate Q_e (m ³ /h)
20 or less	$Q_e = 318A$
Over 20 to 90	$Q_e = 1151A^{0.566}$
Over 90 to 200	$Q_e = 3212A^{0.338}$
Over 200	Tanks withstanding pressures 70 kPa or less $Q_e = 21,000$ Tanks withstanding pressures in excess of 70 kPa $Q_e = 220A^{0.82}$

<where>

Q_e : Total exhaust ventilation rate (m³/h)

A : Wet area of the tank (m²)

* Side wall area up to a height of 9 m from the ground level

<Note>

The emergency ventilation rate is calculated, assuming the stock solution as hexane. Generally, it is also applicable to oils other than hexane. However, when it is necessary to calculate the ventilation rate more accurately, correct it using the following equation:

$$Q'e = Q_e \times \frac{742}{\lambda \sqrt{M}}$$

$Q'e$: Total emergency exhaust ventilation rate (m³/h) relative to a given stock solution

Q_e : Total emergency exhaust ventilation rate (m³/h) determined by a calculation equation

M : Molecular weight of the given stock solution (kg/kmol)

λ : Evaporation latent heat at the boiling point of the given stock solution (kcal/kg)

* When the external surface of the tank is covered with a heat insulating material, the total emergency exhaust ventilation rate can be decreased by multiplying it by the following coefficient, provided that the heat insulating material is fireproof and not subject to damage by discharge of water, etc.:

Material thickness:

25 mm: 0.3, 50 mm: 0.15, 100 mm: 0.075

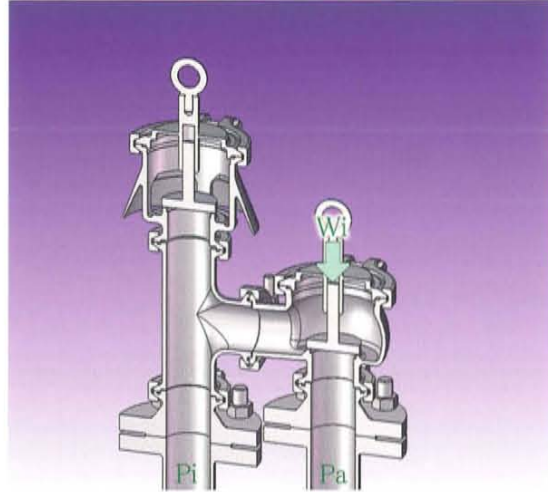
2. Relation between Pressure/Vacuum Settings and Supply/Baek Pressure

When nitrogen gas is sealed into the tank from the vacuum side of the valve or a back pressure is applied to the pressure side piping, the disc ratings that determine pressure/vacuum settings should be considered, taking into the supply pressure and back pressure.

(1) Connecting Intake Port by Piping

The tank pressure (P_i) at the start of intake after pressure drop in the tank is equal to the seal gas pressure (P_a) minus the disc rating (W_i):

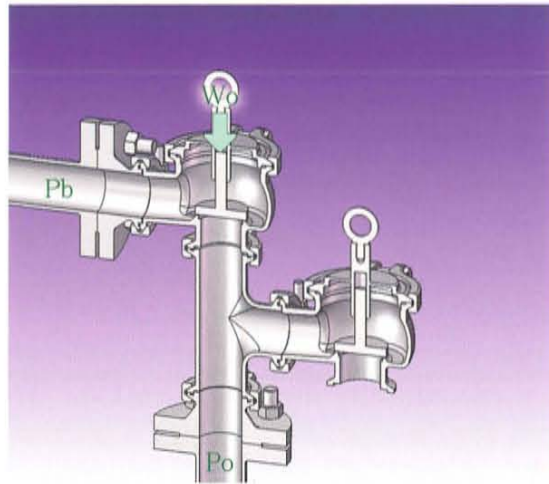
$$P_i = P_a - W_i$$



(2) Connecting Exhaust Port by Piping

The tank pressure (P_o) at the start of exhaust after pressure rise in the tank is equal to the disc rating (W_o) plus the back pressure (P_b):

$$P_o = W_o + P_b$$

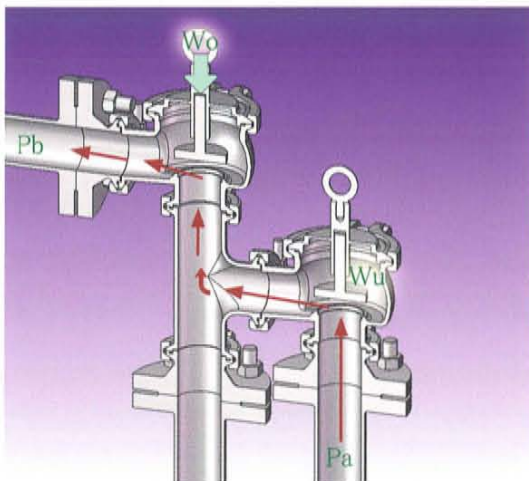


<Note>

Mistaking the pressure relationship may cause the seal gas to be exhausted directly from the pressure side. In order to prevent direct exhaust, use care to satisfy the following conditions ① and ②:

$$\textcircled{1} \quad \underline{ABW_o + P_b > P_a - AW_i} \quad \rightarrow \quad \underline{0.72W_o + P_b > P_a - 0.9W_i}$$

$$\textcircled{2} \quad \underline{AW_o + P_b > P_a - ABW_i} \quad \rightarrow \quad \underline{0.9W_o + P_b > P_a - 0.72W_i}$$

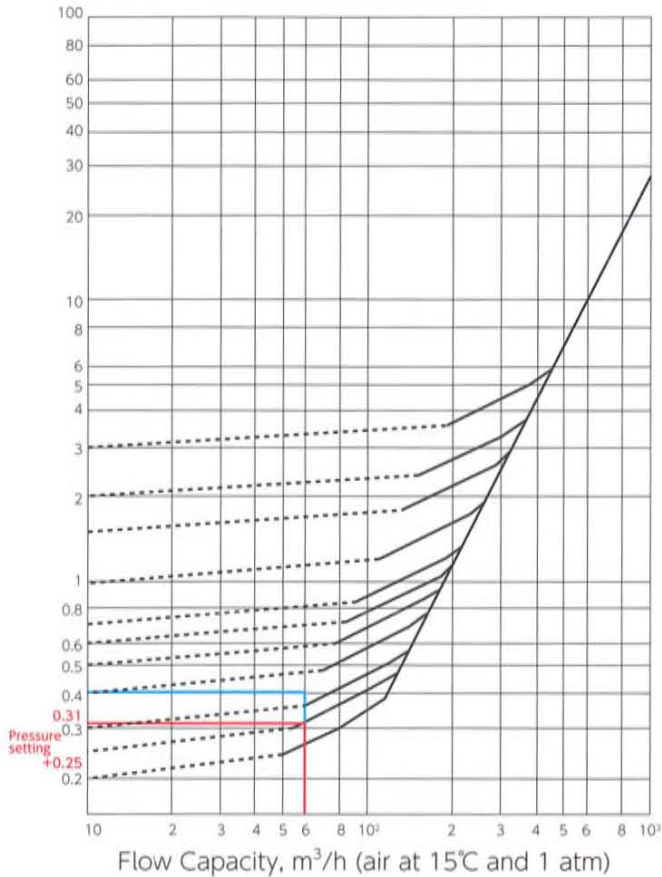


※ where

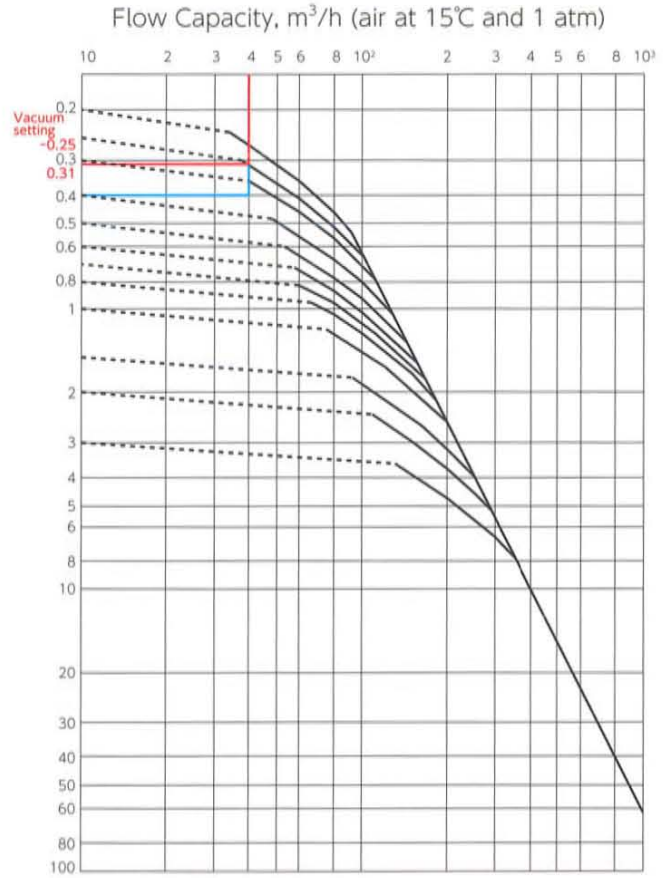
- Pa : Pressure of the seal gas
- Pb : Pressure in the exhaust pipe
- Wo : Disc (pressure side) rating
- Wi : Disc (vacuum side) rating
- Po : Tank pressure at the start of exhaust
- Pi : Tank pressure at the start of intake
- A : Coefficient of tolerance for pressure/vacuum settings: 0.9
- B : Closing coefficient: 0.8

3. How to Read a Flow Capacity Curve

(Example 1) Flow Capacity Curve on Pressure Side of Size 40A



(Example 2) Flow Capacity Curve on Vacuum Side of Size 40A



The y-axis indicates the pressure (kPa). The x-axis indicates the flow capacity (m³/h).

Checking the value of tank pressure when passing a required flow of 60 m³/h at the pressure setting of +0.25 kPa:

The line from the start point of 0.25 kPa on the y-axis is the line of the pressure setting of +0.25 kPa.

The point (about 0.31 kPa) on the y-axis to which the leftward line from the intersection of the above-mentioned line and the line of 60 m³/h on the x-axis connects indicates the tank pressure at the time of passing the required flow of 60 m³/h. (Red line).

How to determine the pressure setting when you want to set the pressure at +0.4 kPa or less when passing the required flow of 60 m³/h.

As a line below the intersection of the line of 60 m³/h on the x-axis and the pressure curve of 0.4 kPa is applicable, it can be seen that the pressure setting can be +0.3 kPa or less. Then determine the pressure setting based on the tank strength, characteristics, etc. (Blue line).

Checking the value of tank pressure when passing a required flow of 40 m³/h at the vacuum setting of -0.25 kPa:

The line from the start point of 0.25 kPa on the y-axis is the line of the vacuum setting of +0.25 kPa.

The point (about 0.31 kPa) on the y-axis to which the leftward line from the intersection of the above-mentioned line and the line of 40 m³/h on the x-axis connects indicates the tank pressure at the time of passing the required flow of 40 m³/h. (Red line).

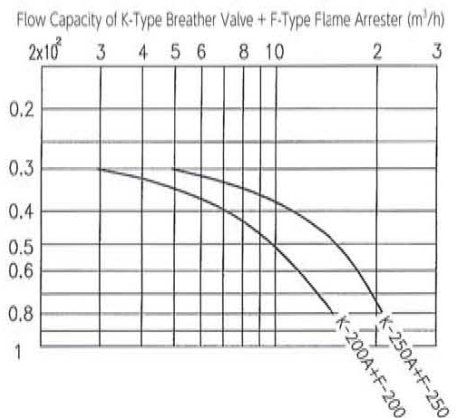
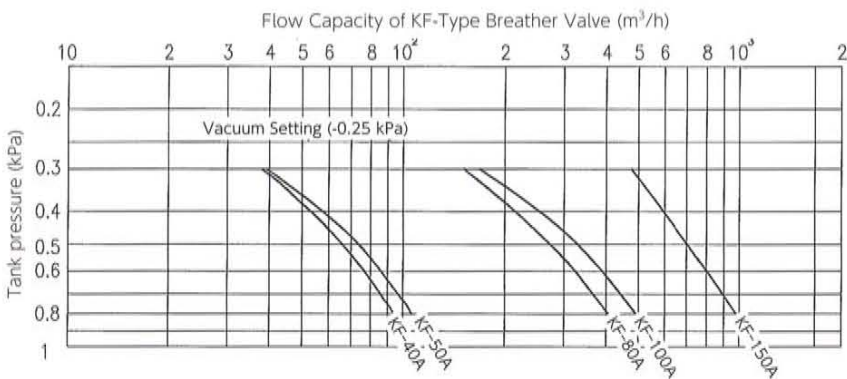
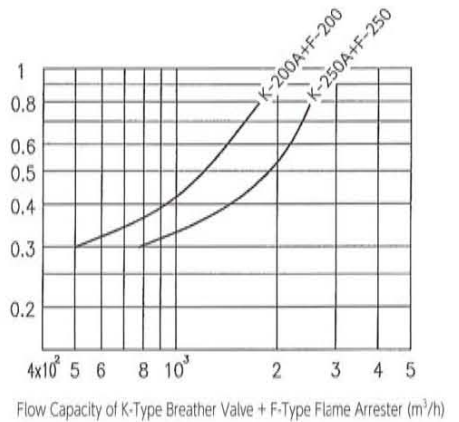
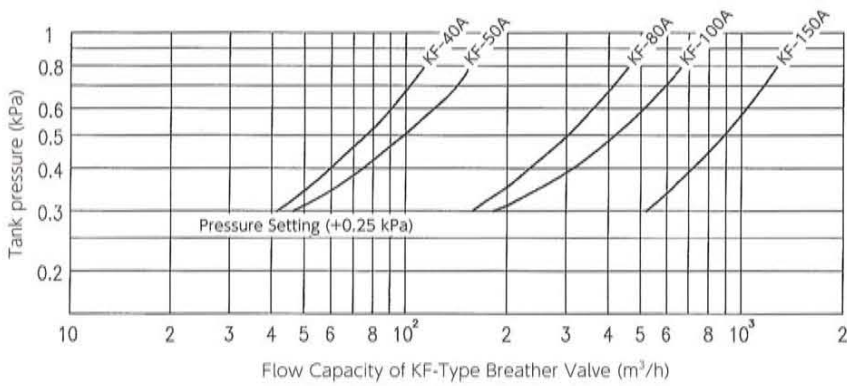
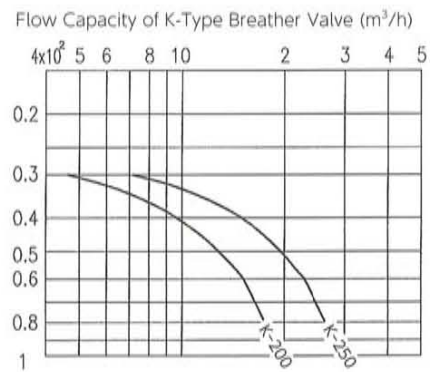
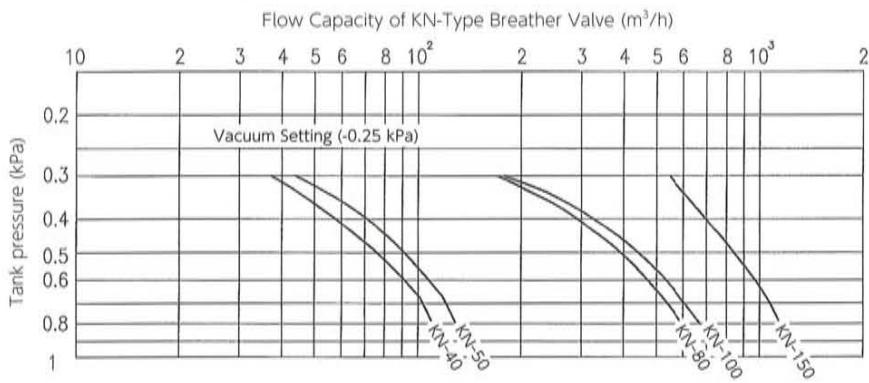
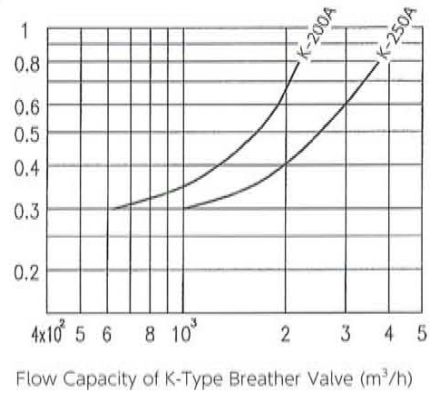
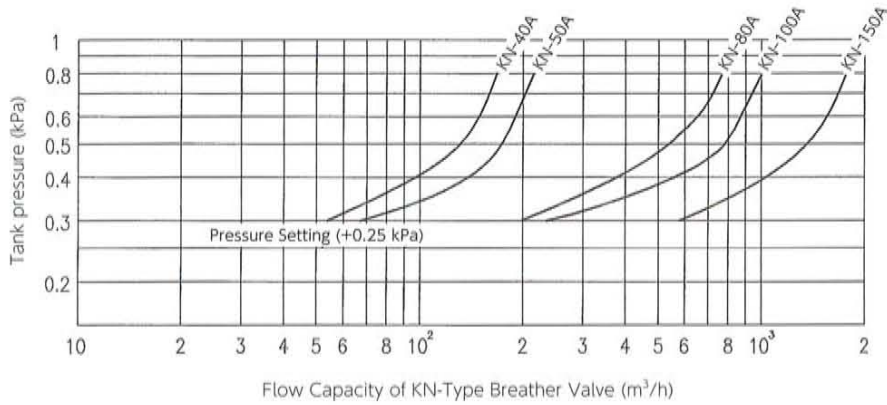
How to determine the vacuum setting when you want to set the pressure at -0.4 kPa or less when passing the required flow of 40 m³/h.

As a line below the intersection of the line of 40 m³/h on the x-axis and the pressure curve of 0.4 kPa is applicable, it can be seen that the vacuum setting can be -0.3 kPa or less. Then determine the vacuum setting based on the tank strength, characteristics, etc. (Blue line).

When there is no line above the intersection of the x- and y-axes, assume a line passing through the intersection in parallel with the nearby line.

Note:

The dotted line regions of each flow capacity curve are regions where the pressure is under 1.2 times the set pressure and flow measurements are unstable. Therefore, studies in these regions should be avoided. When the standard pressure is not specified, note that 1.5 times the set pressure will be selected as the standard pressure.



Emergency Vent

An emergency vent is a device designed to prevent tank damage by releasing the suddenly rising tank pressure at once into the atmosphere in the event of a fire around the tank.

The vent size is selected by calculating the total exhaust venting rate based on the Emergency Ventilation Rate of the preceding page.

Explanation of Model Number

KE - 500
①

① Bore

500 : 500A

600 : 600A

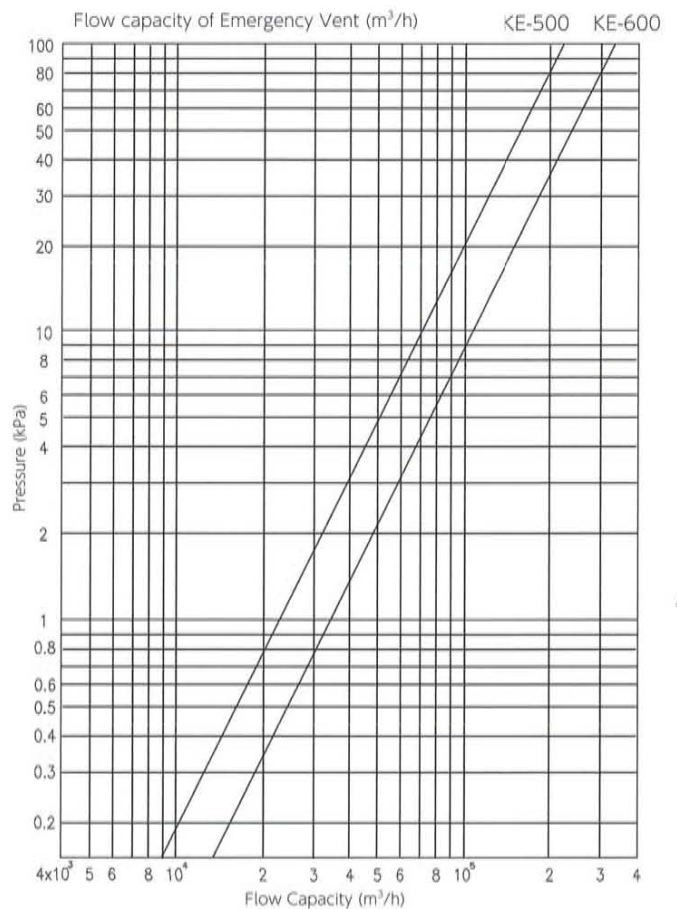
【Standard Specifications】

Body material : FC200 or SCS13A

Diaphragm material : PTFE

Connection standard : JIS B8501 Roof Manhole

* For other specifications, please contact us.



Gauge Hatch Cover

A gauge hatch cover is installed on the top of a storage tank and used as an opening for sampling of tank contents and measurement of temperature and liquid level.

A lever mechanism is provided, so the hatch cover can be opened by stepping on the lever.

① Bore

100 : 100A

150 : 150A

200 : 200A

【Standard Specification】

Body material : Aluminum casting

Trim material : NBR

Connection standard : Screw-in or flange

* For other specifications, please contact us.



STK Safety Devices

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Breather Valves

Flame Arresters

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