Closed Expansion Tank

EX/WX/KX/PX Series



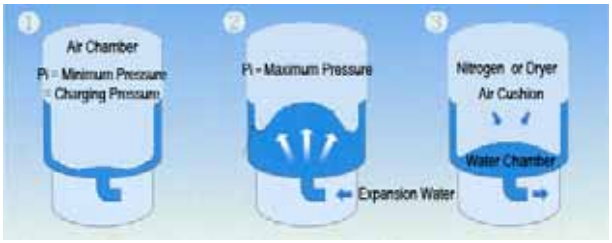
JANGHAN ENGINEERS, INCORPORATED.

Certificate :
ISO 9001 Registered (AC-03271)
Energy Service Company (ESCO) (97-2-14)
Research Center Attached (NO. 931145)

DIAPHRAGM TYPE CLOSED EXPANSION TANK

EX/WX-Series

Structure and Operational Principal



The closed expansion tank divided water and air chamber by an inner diaphragm completely intercepts the contact of the system water and the atmosphere, so that it is come true the best piping function.

① The air chamber of expansion tank was sealed with an initial pressure. This time the system water doesn't flow the inside of expansion tank.

② When a piping system operates and the temperature rises, the expansion water flows the inside of expansion tank. This time the volume of the air chamber diminishes and the pressure of the expansion tank rises until maximum pressure.

③ When the temperature falls, the system water contracts and the expansion water returns to piping system by the pressure of the air chamber. With this the volume of air chamber increases, the pressure decreases, and the state goes back to initial.

Characteristic and Advantage

1. Prevention of corrosion for air

By the contact of piping system and air is completely intercepted, an air (or oxygen) can not be mixed. This prevents the corrosion and extends a piping life far.

2. Excellent air venting capacity

By the piping system is maintained at an appropriate positive pressure, the air venting capacity is excellent at piping system.

3. No limitation in establishment place

It can be installed every position, so there is no worry about frozen to burst and the space application is convenient.

4. Expansion of operation temperature scope

By pressurization it can operate easily at high-temperature water such as above 100℃

5. Smooth operation capacity

By the matter due to mixing of air decreases, efficient operation is possible. (circulating obstacle, pump efficiency decrease, sound arresting, vibrating, and so on)

6. Semi-permanent life and energy saving

The life of tank and diaphragm is semi-permanent. The maintenance and repair is easy. There is no energy loss due to an evaporation or over flow. This reduces amount of make-up water.

Selection Procedures

① System Water Content : V [ℓ]

② Minimum Operating Temperature : T_I [℃]

③ Maximum Operating Temperature : T_F [℃]

④ Minimum Setting Pressure : P_I [kgf/cm²]

$P_I = P_O + P_V$

P_O : static pressure for installation position of expansion tank

P_V : additional pressure for preventing vaporization (Table 2)

⑤ Maximum Pressure of Piping System : P_F [kgf/cm²]

$P_F = P_I + \Delta P_{MAX}$

$\Delta P_{MAX} = P_E - (A + B + P_V + D)$

P_E : inner pressure of piping or setting pressure of relief valve

A : surplus against relief valve setting pressure (= $P_E \times 0.1$)

B : static pressure at piping

D : static head of circulation pump

⑥ Amount of Expanded Water : V_E [ℓ]

$V_E = V \times [v(T_F) - v(T_I)]$

v : specific volume (Table 1)

⑦ Acceptance Factor

A.F. = $1 - (1.033 + P_I) / (1.033 + P_F)$

⑧ Minimum Tank Volume (V_T)

$V_T = V_E / A.F.$

⑨ Select model according to P_F and V_T

Table 1 Specific Volume of Water

Temp. [℃]	S.V. [ℓ /kg]	Temp. [℃]	S.V. [ℓ /kg]	Temp. [℃]	S.V. [ℓ /kg]
4	1.00000	50	1.01207	100	1.04343
5	1.00001	55	1.01448	110	1.05150
10	1.00027	60	1.01705	120	1.06010
15	1.00087	65	1.01979	130	1.06930
20	1.00177	70	1.02270	140	1.07940
25	1.00294	75	1.02576	150	1.09020
30	1.00435	80	1.02899	160	1.10190
35	1.00598	85	1.03237	170	1.10450
40	1.00782	90	1.03590	180	1.12790
45	1.00985	95	1.03959	200	1.15900

Table 2 Additional Pressure for Preventing Vaporization

Max. Temp. [℃]	Additional Pressure [kgf/cm²]	Max. Temp. [℃]	Additional Pressure [kgf/cm²]	Max. Temp. [℃]	Additional Pressure [kgf/cm²]
below 100	0.3*	125	2.0	150	5.0
105	0.6	130	2.5	160	6.7
110	0.9	135	3.0	170	8.7
115	1.2	140	3.6	180	11.2
120	1.6	145	4.3	200	17.7

• The * sign is minimum pressure for the venting of air-vent.

Closed Expansion Tank for Heating and Cooling

EX-Series

N Series - Reflex

- Nozzle Connection : Screwed End
- Diaphragm Mode : Diaphragm
- CE Certification
- Color : Red (Powder Painting)
- Maximum Working Temperature : 70℃

◆ **Maximum Working Pressure : 6 kgf/cm²**

MODEL	Volume [ℓ]	Diameter [mm, Ø]	Height [mm]	ØF [mm]	Nozzle [A]	Weight [kg]
N 50/6	50	441	495	340	20	13
N 80/6	80	512	570	370	20	17
N 100/6	100	512	680	370	20	20
N 140/6	140	512	890	370	20	30
N 200/6	200	634	785	485	20	37
N 250/6	250	634	915	485	20	45
N 300/6	300	634	1085	485	20	52
N 400/6	400	740	1075	570	20	65
N 500/6	500	740	1295	570	20	80
N 600/6	600	740	1530	570	20	85
N 800/6	800	740	1990	570	20	103
N1000/6	1000	740	2430	570	20	120

◆ **Maximum Working Pressure : 10 kg/cm²G**

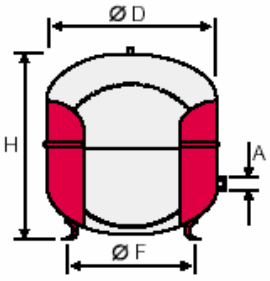
MODEL	Volume [ℓ]	Diameter [mm, Ø]	Height [mm]	ØF [mm]	Nozzle [A]	Weight [kg]
S 50/10	50	409	505	293	20	13
S 80/10	80	480	570	351	25	18
S 100/10	100	480	675	351	25	23
S 140/10	140	480	915	351	25	30
S 200/10	200	634	785	485	25	40
S 250/10	250	634	915	485	25	48
S 300/10	300	634	1085	485	25	54
S 400/10	400	740	1075	570	25	78
S 500/10	500	740	1295	570	25	80
S 600/10	600	740	1530	570	25	103

EX Series

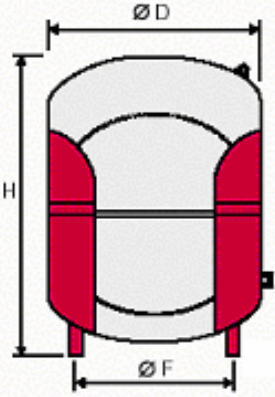
- Nozzle Connection : Screwed End (Flange and over 3000ℓ)
- Diaphragm Mode : Bladder (Disjointing assembly possible)
- Inspection Unit of Korea Industrial Safety Corporation
- Color : PRIMER+E54506(0.2PB 5.1/8.7)
- Maximum Operating Temperature : 95℃

MODEL	Volume [ℓ]	Diameter [mm, Ø]	Height [mm]	Max.Press. [kgf/cm²]	Nozzle [A]	Weight [kg]
EX - 200L	200	614	1200	14.4	40	180
EX - 300L	300	614	1600	14.4	40	210
EX - 400L	400	614	2000	14.4	40	260
EX - 500L	500	614	2300	14.4	40	290
EX - 600L	600	769	2000	14.4	40	360
EX - 800L	800	769	2400	14.4	40	430
EX-1000L	1000	933	2100	14.4	40	540
EX-1200L	1200	933	2400	14.4	40	610
EX-1400L	1400	933	2700	14.4	40	680
EX-1600L	1600	1233	2000	14.4	40	810
EX-2000L	2000	1233	2400	14.4	40	940
EX-2500L	2500	1233	2600	14.4	40	1030

– This is the specification of 9.0 kgf/cm² tank



50 – 140 liter



200 - 1000 liter



Inspection Unit of Korea Industrial Safety Corporation

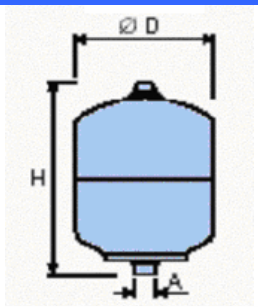
- It is a “Stand mode” installed vertically on the bottom, and the supplement piping must establish in expansion or main piping with separate way.
- Please, inquire to our company for a product of large volume (above 2500L) or high pressure (above 9.0)

Closed Expansion Tank for Water Supply and Hot Water System

WX-Series

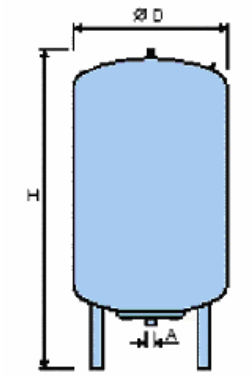
D & DE Series - Reflex

- Nozzle Connection : Screwed End
- CE Certification • Color : Blue (Powder Painting)
- All surfaces contacting with water are painted with a protective coating for the safety of hygiene
- Legionella spp. prevention vessel approved at Germany DVGW
- Maximum Working Pressure & Temperature : 16 kgf/cm², 95℃



◆ **D Series [Diaphragm : replacement impossible]**

MODEL	Volume [ℓ]	Diameter [mm, Ø]	Height [mm]	Nozzle [A]	Weight [kg]
D 8	8	206	315	20	2.5
D 12	12	280	293	20	3.5
D 18	18	280	370	20	4.5
D 25	25	280	490	20	5.5
D 33	33	354	460	20	6.3



◆ **DE Series [Bladder : disjointing assembly possible]**

MODEL	Volume [ℓ]	Diameter [mm, Ø]	Height [mm]	Nozzle [A]	Weight [kg]
DE 60	60	409	740	25	25
DE 80	80	480	730	25	27
DE 100	100	480	840	25	32
DE 200	200	634	980	25	50
DE 300	300	634	1280	25	55
DE 500	500	740	1485	25	85

AFE Series

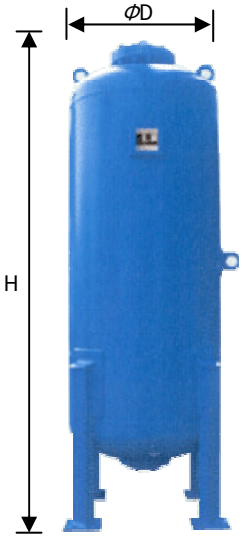
- Nozzle Connection : Screwed End
- Diaphragm Mode : Bladder (Disjointing assembly possible)
- CE Certification • Color : Red (Powder Painting)
- Maximum Working Pressure & Temperature : 16 kgf/cm², 95℃



MODEL	Volume [ℓ]	Diameter [mm, Ø]	Height [mm]	Nozzle [A]	Weight [kg]
AFE-200	200	409	740	25	25
AFE-300	300	480	730	25	27
AFE-500	500	480	840	25	32

WX Series

- Diaphragm Mode : Bladder (Disjointing assembly possible)
- Inspection Unit of Korea Industrial Safety Corporation
- Color : PRIMER+E54506(0.2PB 5.1/8.7)
- Maximum Operating Temperature : 95℃

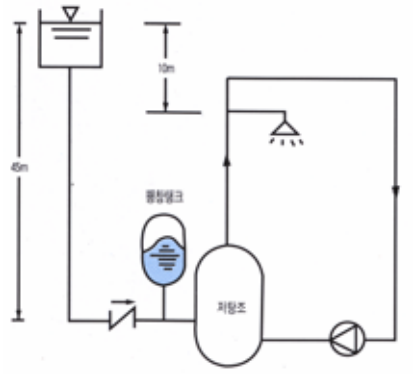


Inspection Unit of Korea Industrial Safety Corporation

MODEL	Volume [ℓ]	Diameter [mm, Ø]	Height [mm]	Max.Press. [kgf/cm²]	Nozzle [A]	Weight [kg]
WX-200L	200	614	1200	14.4	40	180
WX-300L	300	614	1600	14.4	40	210
WX-400L	400	614	2000	14.4	40	260
WX-500L	500	614	2300	14.4	40	290
WX-600L	600	769	2000	14.4	40	360
WX-800L	800	769	2400	14.4	40	430
WX-1000L	1000	933	2100	14.4	40	540
WX-1200L	1200	933	2400	14.4	40	610
WX-1400L	1400	933	2700	14.4	40	680
WX-1600L	1600	1233	2000	14.4	40	810
WX-2000L	2000	1233	2400	14.4	40	940
WX-2500L	2500	1233	2800	14.4	40	1030
WX-3000L	3000	1570	2400	14.4	65	1570
WX-3500L	3500	1570	2700	14.4	65	1730
WX-4000L	4000	1570	3000	14.4	65	1880
WX-5000L	5000	1570	3500	14.4	65	2190

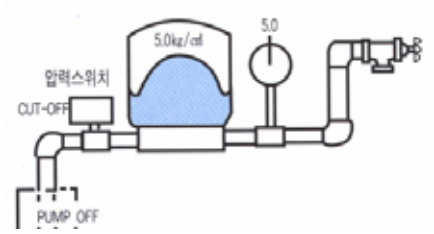
– This is the specification of 9.0 kg/㎠G tank

Characteristic of Closed Expansion Tank for Hot Water System

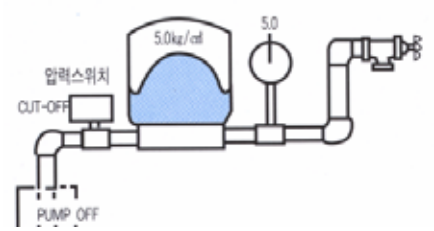


- Escaping from the previous method relieving with an elevated water tank or emitting to a safety valve, this tank prevents the hot water loss and saves the energy by absorbing the expansion water of hot water system.
- The method installing a safety valve in order to relieve an expansion pressure causes the possibility of explosion accident by breakdown and brings on the leakage by frequent operation.
- This tank guarantees the safe operation of hot water system, and also prevents the water hammer.

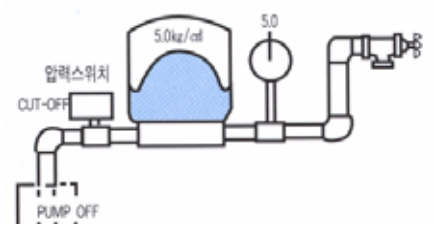
Operational Principal of Closed Expansion Tank for Water Supply



When water is used, the water compressed in tank is supplied and the pressure of air chamber falls. This time the pump is not yet operated.

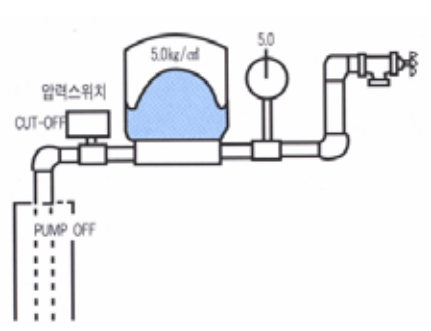


When the pressure of air chamber diminishes until Cut-in setting point, the pump is operated by pressure switch and the water supply is continued.



In case that the demand of water supply is low, the water of pump is supplied to tank. When the level of water in tank reaches to a Cut-off setting point, the pump is stopped by pressure switch.

◆ **Problem of no expansion tank**



- Even if little water goes out or comes in a fixed space, the pressure increases or decrease quickly because of the incompressibility of water.
- In case that there is no closed expansion tank for water supply or the capacity is insufficient on booster pumping system, this causes serious problems such as the frequently operation and stop of pump, the frequently damage of instrument parts (pressure switch, relay, electronic switch, Etc.), the breakdown of pump motor due to overload, and so on. Those serious problems can bring on the operation impossibility of overall system within a short time.

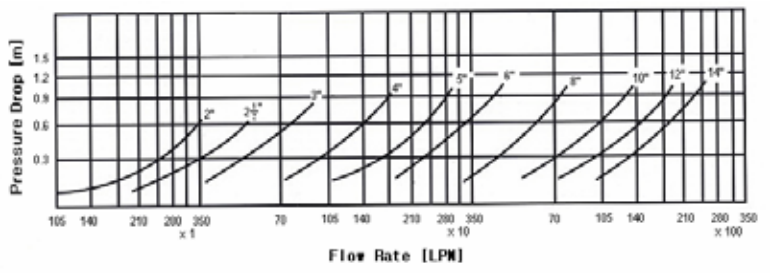
Tangential Air Separator

◆ **Maximum Working Pressure : 10 kgf/cm²**

Model	Nozzle [A]	Dimension [mm]					Max.Flow [lpm]	Weight [kg]
		C	L	D	H	B		
1AS	25	102	206	114.3	305	102	210	7
2AS	50	172	350	165.2	458	143	310	32
2½AS	65	108	404	216.3	415	154	450	45
3AS	80	203	456	267.4	577	187	680	56
4AS	100	254	540	318.5	750	248	1200	61
5AS	125	305	650	406.4	976	336	1800	79
6AS	150	356	704	457.2	1114	379	2600	116
8AS	200	460	810	615	1310	425	4700	206
10AS	250	560	1064	769	1511	476	7500	467
12AS	300	660	1168	914	1650	495	10500	517
14AS	350	762	1321	1067	1736	487	14800	998

– The other specification or special material is the order product.

◆ **Air Separator Flow Chart**



- Tangential air separator devices will solve your “System Air” problems.
- Tangential air separators are designed with tangential openings to create a low velocity vortex where entrained air is separated and removed from circulation chilled or hot water in a closed system.

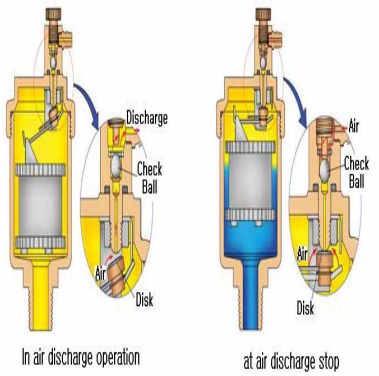


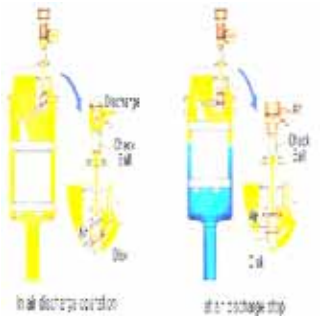
- Maximum working pressure : 10 kgf/cm²
- Maximum operating temperature : 120℃
- Materials : body – Steel
  flange – KS 10K

Pilot Operated Air Eliminator #720

The #720 Air Eliminator of the AMTROL adopts the Pilot Operated Mechanism which solves the leakage problem of a Direct Acting-Type Air Vent, and is a high performance Air Vent which improves air discharge efficiency.

◆ **Performance Chart**





- Maximum working pressure : 10 kgf/cm²
- Maximum operating temperature : 120℃
- Minimum demand pressure : 0.2 kgf/cm²
- Materials : body – Cast Iron
  Pilot part - Bronze

KX-SERIES

The KX-Series as a closed expansion tank consist of small-sized and light weight air compressor, precise pressure sensor, high reliable automatic controller, and so on, and the microprocessor based automatic control maintains the system pressure of heating and/or cooling water circuits within a desirable range at all time. The KX-Series compared with a pressure changed-type expansion tank (EX/WX Series) have merits as follows.

① A pressure changed-type expansion tank follows in establishment location, so that the effective capacity and the tank size are changed. But KX-Series, without in establishment location, have a uniform and small-sized.

② The effective capacity factor can be until maximum 85%, so the tank size and establishment area can be minimized.

③ A precise pressure sensor and a reliable automatic controller maintain the pressure fluctuation of piping system within +0.3kgf/cm^2, therefore the pressure of piping system is very stable.

④ The operation and management are very easy for the automatic control system.

⑤ It is an inspection unit of Korea Industrial Safety Corporation, so it is safe.

Function of Automatic Control Panel

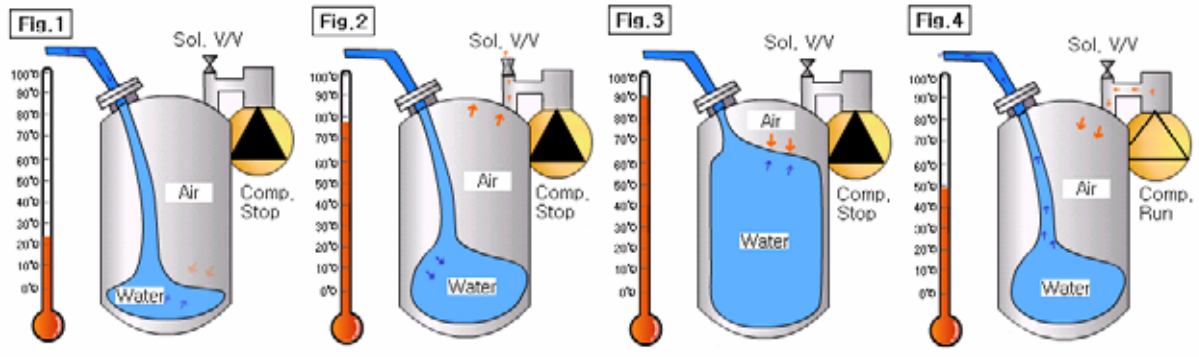




① Comprehensive Operation by the Microprocessor based Control System
② Digital Display of Water Level in the Expansion Tank
③ Digital Display of the System Pressure
④ Easy Setting of the Control Parameters
(System Pressure, Tank Water Level, Operating Time)
⑤ Replenishing Control of Tank Water (Option)
⑥ Display of Alarm Messages
⑦ Saving the Operation Data
(System Pressure, Tank Water Level, Events and Alarms)
⑧ Expansion Control and Maintaining the desirable System Pressure
⑨ LED Display of Device Status (on/off) (Pump, Solenoid Valve)

Operational principal and function

Fig.1 : At an initial state of piping system, the solenoid controlled valve is shut and the compressor is a stand-still.
Fig.2 : When the temperature rises, the expansion water is inflow and the pressure of the air chamber side increases. This time the solenoid controlled valve is opened and it discharges the pressurized air. The pressure fluctuation of piping system is controlled within the +0.3kgf/cm^2.
Fig.3 : When the temperature rises at maximum, amount of expansion water inside the tank become maximum, the solenoid controlled valve is closed, and air discharge is stopped.
Fig.4 : When the temperature falls, the expansion water inside the tank returns to the piping system. This time the diminished pressure is supplemented by the operation of the compressor, so the pressure of piping system is always maintained.



Compressor Controlled Closed Expansion Tank

KX-Series

Specifications

MODEL	Volume [ℓ]	Diameter [mm, Ø]	Height [mm]	Nozzle [A]	Weight [kg]	Max. Press. [kgf/cm²]	Accep. Factor
KX-300L	300	614	1657	40A	182	5.4 9.0 14.4	85%
KX-400L	400	614	2008		214		
KX-500L	500	614	2360		245		
KX-600L	600	769	1969		314		
KX-800L	800	769	2418		381		
KX-1000L	1000	933	2154		507		
KX-1200L	1200	933	2459		577		
KX-1400L	1400	933	2765		646		
KX-1600L	1600	1233	2081		757		
KX-2000L	2000	1233	2430		883		
KX-2500L	2500	1233	2860		1030		
KX-3000L	3000	1570	2429	65A	1573		65%
KX-3500L	3500	1570	2698		1728		
KX-4000L	4000	1570	2966		1882		
KX-5000L	5000	1570	3503		2191		

– Maximum Operating Temperature : 95℃

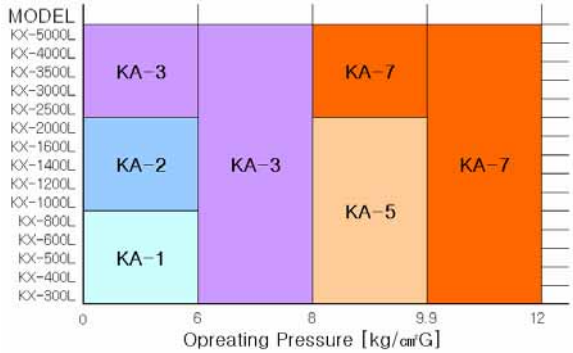
– The weight is the tank of 9.0 kgf/cm² and excepting compressor



Air Compressor

MODEL	Power [kW]	Supply	Form	Weight [kg]
KA-1	0.55	1Ø/220V/60Hz 3Ø/380V/60Hz	Integral Type Oil Free Type	14
KA-2	1.1	1Ø/220V/60Hz 3Ø/380V/60Hz		14
KA-3	1.8	1Ø/220V/60Hz 3Ø/380V/60Hz		25
KA-5	2.2	3Ø/380V/60Hz	Assembly Type Oil+Filter Type	37
KA-7	3.7	3Ø/380V/60Hz		163

Chart for Air Compressor Selection



Example of Tank Selection

① System Water Content (V) : 40,000 ℓ

② Minimum Operating Temperature (T_I) : 10 ℃

③ Maximum Operating Temperature (T_F) : 60 ℃

④ Amount of Expanded Water (V_E)

$V_E = V \times$ (Specific Vol at T_F - Specific Vol. at T_I)

$= 40{,}000 \times (1.01705 - 1.00027) = 671$ ℓ

⑤ Minimum Tank Volume (V_T)

$V_T = V_E$ / Acceptance Factor (85%)

$= 671 / 0.85 = 790$ ℓ

⑥ Maximum Pressure of Piping System : 5.1 kgf/cm²

⑦ Selection for Expansion Tank

➔ KX-800L & 5.4 kgf/cm²

Example of Compressor Selection

① Static Head (P_O) : 45 m

② Minimum Setting Pressure (P_I)

$P_I = P_O + P_V = 4.5 + 0.3 = 4.8$ kgf/cm²

P_O : Static Pressure for Installation Position of Expansion Tank

P_V : Additional Pressure for Preventing Vaporization

③ Maximum Pressure of Piping System

$P_T = P_I + 0.3 = 4.8 + 0.3 = 5.1$ kgf/cm²

④ Expansion Tank : KX-800L

⑤ Selection for Air Compressor

➔ KA-1

PUMP CONTROLLED CLOSED EXPANSION TANK

PX-Series

PX-SERIES

PX-tank system is consist of air-tight expansion tank, pressure holding pumps, automatic control panel, throttling valve, solenoid valves, stop valves, piping, and so on. The air-tight expansion tank contains a Diaphragm (Bladder) in a cylindrical steel vessel of atmospheric pressure applied. And the microprocessor based automatic control enables to maintain the system pressure of heating and/or cooling water circuits within a desirable range at all time. If the system pressure be increased due to the water temperature rise in a heating/cooling circuit, the expanded water shall be directed into the expansion tank by opening the solenoid valve of overpressure-relief through the throttling valve until the system pressure is reduced under the preset pressure. Then, the free air bubbles and some dissolved gases can be separated from the expanded water due to the release of its pressure at the inside of the Bladder which is un-pressurized. That is, the dissolved gases in the water come to be appeared as free air bubbles by relief of its pressure and then the free air bubbles shall be removed from the system through the Air Vent on the top of expansion tank. In theory, the level of air contents in the system can be reduced to approximately the same level of the solubility at the atmospheric pressure according to Henry's Law.

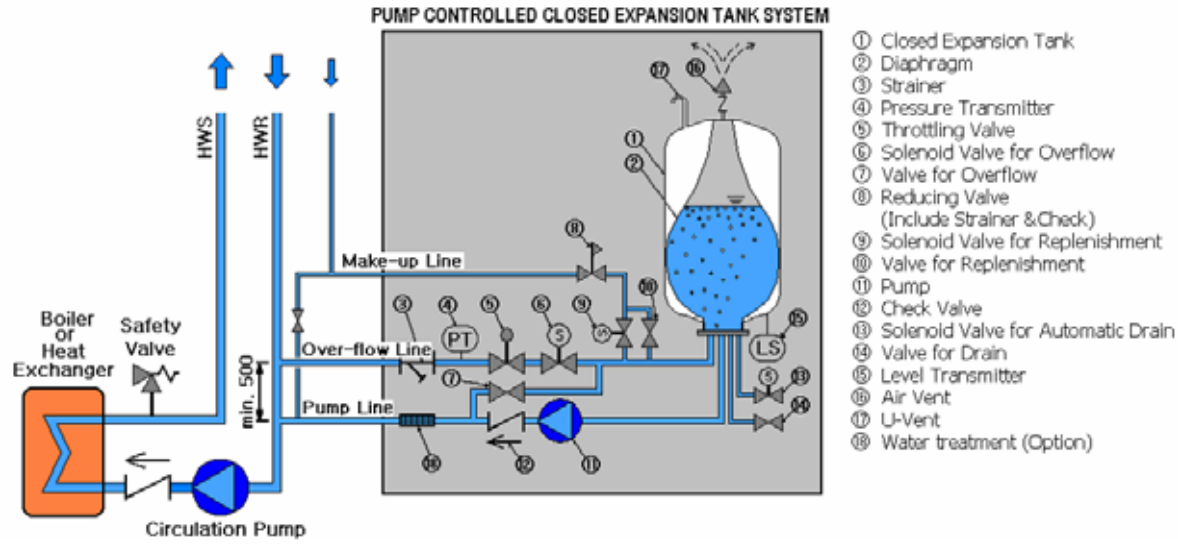
On the other hand, if the system pressure be decreased due to the water temperature drop in the piping circuit, the pressure holding pump shall operate to get the expanded water back into the piping circuit until the system pressure is recovered as higher than the preset pressure. PX-tank system has an additional function of automatic replenishment of tank water at the LOW LEVEL and the draining of tank water at the HIGH LEVEL.

- Automatic replenishment; PX-tank system detects the tank water level by the Level transmitter, which is installed at one supporting leg of the expansion tank. If the water level drops below the minimum preset value, the replenishing solenoid valve opens to refill the tank until the tank water level is re-established over the minimum preset level.
- Automatic draining: By the same way, if the water level goes higher than the maximum preset value, the draining solenoid valve opens to drain the excess water from the tank until the tank water level is lowered under the preset maximum level. As a result, even if the heating/cooling system is operated somehow out of the design range for a while, the system can be operated as safe in some extent.
- Automatic deaerated gas: The dissolved gases in the high pressure water are deaerated in the closed expansion tank of atmospheric pressure according to the Henry's Law.

Function of Automatic Control Panel

① Comprehensive Operation by Microprocessor Control System
② Easy Setting of the Control Parameters
(System Pressure, Tank Water Level)
③ Digital Display of Water Level in the Expansion Tank
④ Digital Display of the System Pressure
⑤ Display of Alarm Messages
⑥ Expansion Control and System Pressure Maintainance
⑦ Automatic Replenishing/Drain of Tank Water
⑧ LED Display of Device Status (on/off) (Pump, Solenoid Valve)
⑨ Saving the Operation Data
(System Pressure, Tank Water Level, Events and Alarms)

Installation & Diagram



✳ The install of **Safety Valve** is necessary on pipe line for Heat Exchanger (Water Side)

Pump Controlled Closed Expansion Tank

PX-Series

Specifications

◆ Closed Expansion Tank

MODEL	Volume [ℓ]	D [㎜Ø]	H [㎜]	L [㎜]		W [㎜]	Weight [kg]	Remarks
				1Pump	2Pump			
PX-100	100	480	1600	1000	-	700	32	Max. of Operating Temp : 95℃ Acceptance Factor for Capacity : 80%
PX-200	200	634	1600	1000	-	700	50	
PX-300	300	610	1800	1500	1600	720	100	
PX-400	400	610	2150	1500	1600	720	130	
PX-500	500	610	2500	1500	1600	720	160	
PX-600	600	763	2120	1800	1900	950	210	
PX-800	800	763	2570	1800	1900	950	270	
PX-1000	1000	925	2330	2000	2100	1100	340	
PX-1200	1200	925	2630	2000	2100	1100	390	
PX-1400	1400	925	2940	2000	2100	1100	440	
PX-1600	1600	1225	2250	2300	2400	1400	570	
PX-2000	2000	1225	2590	2300	2400	1400	660	
PX-2500	2500	1225	3030	2300	2400	1400	760	
PX-3000	3000	1570	2510	2650	2750	1700	1020	
PX-3500	3500	1570	2770	2650	2750	1700	1130	
PX-4000	4000	1570	3040	2650	2750	1700	1240	
PX-5000	5000	1852	2830	2950	3050	2000	1650	
PX-6000	6000	1852	3210	2950	3050	2000	1870	
PX-7500	7500	1852	3780	2950	3050	2000	2210	

❑ Tank Model Number

P X – 1 0 0 0
- Volume : 1000 ℓ
- closed eXpansion tank
- Pump controlled

❑ Pump System Model Number

PA – 1 2 08
- Minimum setting pressure : 8 kgf/cm²
- Heat capacity : 2 Gcal/h
- The number of pump : 1 Pump
- Pump Assembly

The Minimum setting pressure is the sum value of the static pressure at installed tank position and the additional pressure for preventing evaporization

※ Please inquiry at our company about the system exceeding maximum operating temperature 95℃ or maximum tank volume 7500L.

◆ Pump System [1 Pump] (electricity: 3Ø 380V 60Hz)

MODEL	Power [kW]	Pset [kgf/cm²]	Capacity [Mcal/h]	Pump Nozz.[A]	Overflow Nozz.[A]	Makeup Nozz..[A]	Weight [kg]
PA-1202	0.9	2.8	2,000	25	25	15	210
PA-1205	0.75	5.0	2,000	25	25	15	215
PA-1208	1.1	8.8	2,000	25	25	15	225
PA-1212	1.5	12.4	2,000	25	25	15	230
PA-1217	2.2	16.0	2,000	25	25	15	235
PA-1405	0.75	5.0	4,000	25	25	15	225
PA-1408	1.1	8.8	4,000	25	25	15	235
PA-1412	1.5	12.4	4,000	25	25	15	240
PA-1417	2.2	16.0	4,000	25	25	15	245
PA-1717	3.0	16.0	7,000	32	32	15	265

◆ Pump System [2 Pump] (electricity: 3Ø 380V 60Hz)

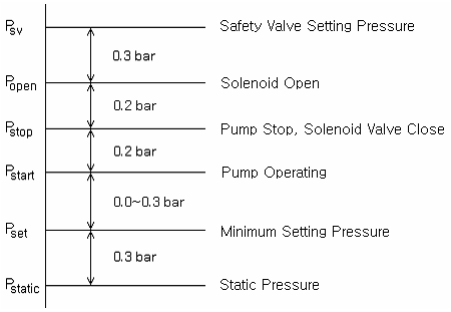
MODEL	Power [kW]	Pset [kgf/cm²]	Capacity [Mcal/h]	Pump Nozz.[A]	Overflow Nozz.[A]	Makeup Nozz.[A]	Weight [kg]
PA-2202	0.9	2.8	2,000	25	25	15	245
PA-2205	0.75	5.0	2,000	25	25	15	250
PA-2208	1.1	8.8	2,000	25	25	15	260
PA-2212	1.5	12.4	2,000	25	25	15	265
PA-2217	2.2	16.0	2,000	25	25	15	270
PA-2405	0.75	5.0	4,000	25	25	15	260
PA-2408	1.1	8.8	4,000	25	25	15	270
PA-2412	1.5	12.4	4,000	25	25	15	275
PA-2417	2.2	16.0	4,000	25	25	15	280
PA-2717	3.0	16.0	7,000	32	32	15	295

※ The pump, over-flow, and make-up line connection sizes are extended by heat capacity and maximum operating temperature.
※ 2 pump system operates 100%x2EA, stand-by one of two pumps.

Form of PX



Setting Pressure



Deaerated Capacity

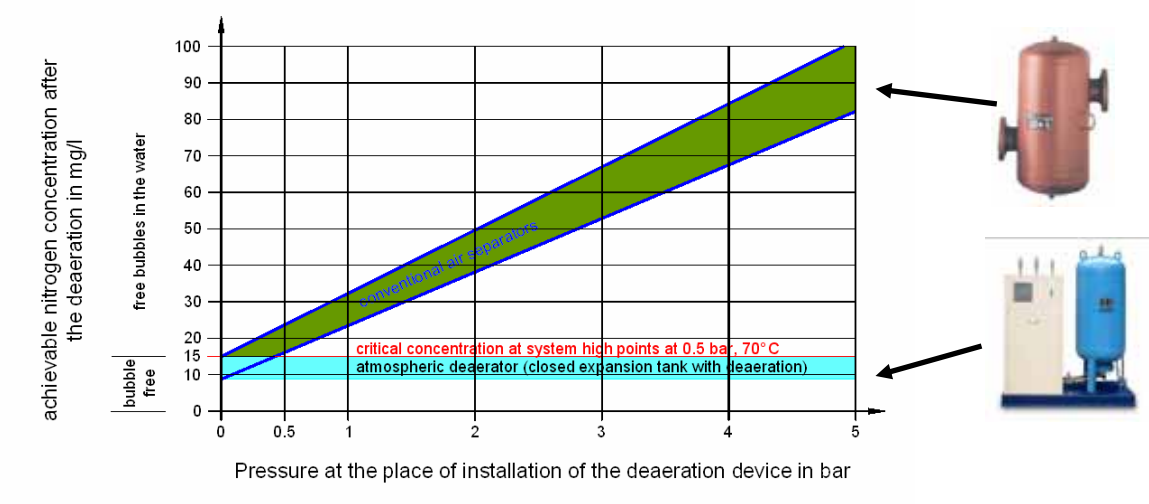


Chart for Pump System Selection

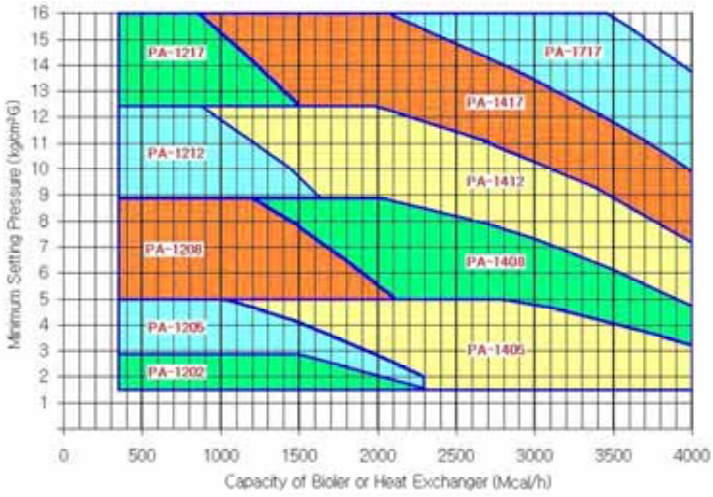


Table 1 Specific Volume of Water

Temp. [°C]	S.V. [ℓ /kg]	Temp. [°C]	S.V. [ℓ /kg]	Temp. [°C]	S.V. [ℓ /kg]
4	1.00000	50	1.01207	100	1.04343
5	1.00001	55	1.01448	110	1.05150
10	1.00027	60	1.01705	120	1.06010
15	1.00087	65	1.01979	130	1.06930
20	1.00177	70	1.02270	140	1.07940
25	1.00294	75	1.02576	150	1.09020
30	1.00435	80	1.02899	160	1.10190
35	1.00598	85	1.03237	170	1.10450
40	1.00782	90	1.03590	180	1.12790
45	1.00985	95	1.03959	200	1.15900

Table 2 Additional Pressure for Preventing Vaporization

Max. T [°C]	A.P. [kgf/cm²]	Max. T [°C]	A.P. [kgf/cm²]	Max. T [°C]	A.P. [kgf/cm²]
below 100	0.3*	125	2.0	150	5.0
105	0.6	130	2.5	160	6.7
110	0.9	135	3.0	170	8.7
115	1.2	140	3.6	180	11.2
120	1.6	145	4.3	200	17.7

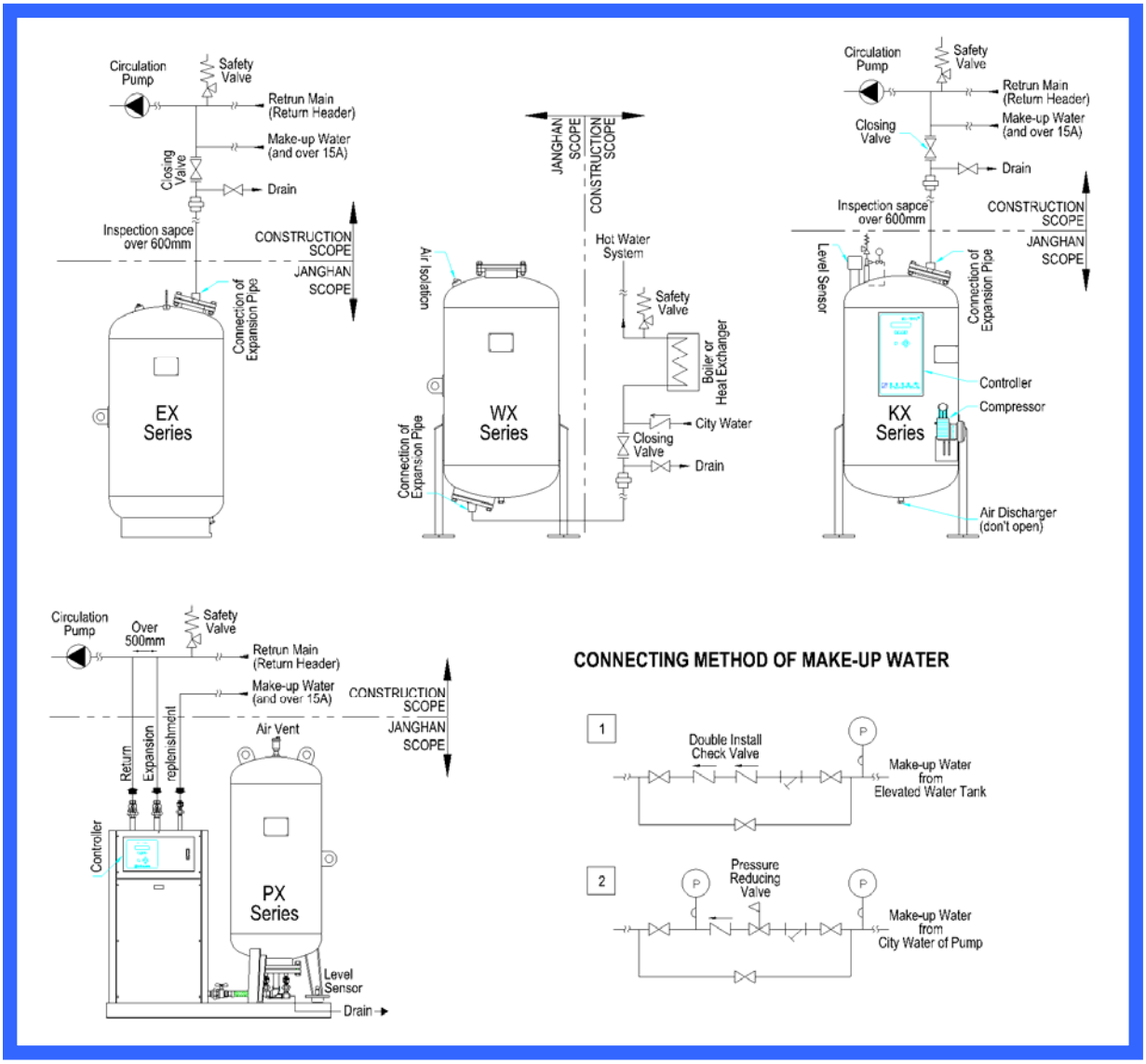
Example of Tank Selection

① System Water Content (V) : 18,000 ℓ
② Minimum Operating Temperature (T_{MIN}) : 10 ℃
③ Maximum Operating Temperature (T_{MAX}) : 60 ℃
④ Amount of Expanded Water (V_E)
$V_E = V \times$ (Specific Vol at T_{MAX} - Specific Vol. at T_{MIN})
$= 18{,}000 \times (1.01705 - 1.00027) = 302$ ℓ
⑤ Minimum Tank Volume (V_T)
$V_T = V_E$ / Acceptance Factor(80%) = 302 / 0.8 = 378 ℓ
⑥ Selection for Expansion Tank ➔ PX-400L

Example of Pump Selection

① Heat Exchanger Capacity : 1.2 Gcal/h
② Static Head : 40 m
③ Minimum Setting Pressure (P_I)
$P_I = P_O + P_V = 4 + 0.3 = 4.3$ kgf/cm²
P_O : Static Pressure for Installation Position of Expansion Tank
P_V : Additional Pressure for Preventing Vaporization
④ Selection for Pump System ➔ PA-1205

Installation Method



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■ Specifications are subject to change for without notice.

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