KOGANEI

GENERAL CATALOG OF AIR TREATMENT, AUXILIARY, VACUUM

REFRIGERATING AIR DRYERS

INDEX

Removes water and other impurities from compressed air to keep your devices running smoothly

KOGANEI REFRIGERATING AIR DRYERS

KOGANEI provides a new type of refrigerating air dryer which is designed to handle compressors with outputs ranging from 1.5kW to 5.5kW. We have just the right air dryer for your air pressure devices.

KRX Series Compatible with Specified Freon Regulations

S Model

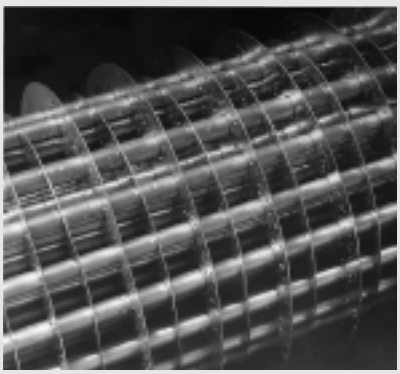
- Can be connected directly to the compressor
- Maximum intake is an air temperature of 50°C
- Suitable for compressors with outputs ranging from 0.2 to 5.5kW

SES Model

- Can be connected directly to compressor
- Maximum intake air temperature of 80°C
- Suitable for compressors with outputs ranging from 0.2 to 5.5kW

Baffle fin design eliminates worries about pressure loss and clogging.

The unique baffle fin design employs cooling pipes with baffle plates attached at a large pitch. Air collides with the baffle fins, which produces eddy currents. The air then undergoes alternate phases of cooling and adiabatic expansion, during which process water and oil are efficiently separated and removed. Water droplets and oil droplets which adhere to the baffle fins collect in the bottom of the cooler and are discharged automatically by the auto drain. Utilization of this design means these air dryers are never clogged by water droplets, oil droplets, or other impurities. Worries about pressure loss are thus eliminated. These air dryers provide a steady supply of air regardless of changes in discharge and flow velocity.



1. Selecting an air dryer to match compressor output

KOGANEI air dryers are designed in a series to work with compressors of different outputs. You can easily select the proper air dryer to meet your needs.

●For screw compressors

Compressor		Intake air temperature (°C)		
Output (kW)	Horsepower (PS)	40 or lower	41~70	71~80
1.5	2	KRX-3S	KRX-3SES	KRX-4SES
2.2	3			KRX-6SES
3.7	5	KRX-6S	KRX-4SES	—
5.5	7		KRX-6SES	

Comment: Figures are based on the assumption of an ambient temperature of 30~32°C, air pressure of 0.64~0.8MPa {6.5~8.2kgf/cm^2}, and an output pressure dew point temperature of 2~15°C.

●For recipro-type compressors

Compressor		Intake air temperature (°C)		
Output (kW)	Horsepower (PS)	40 or lower	41~70	71~80
1.5	2	KRX-3S	KRX-6S,KRX-3SES	KRX-4SES
2.2	3		KRX-3SES	KRX-6SES
3.7	5	KRX-6S	KRX-4SES	—
5.5	7		KRX-6SES	

Comment: Figures are based on the assumption of an ambient temperature of 30~32°C, air pressure of 0.64~0.8MPa {6.5~8.2kgf/cm^2}, and an output pressure dew point temperature of 2~15°C.

2. Selecting an air dryer to match air line volume

Air dryer processing capacity (air processing capacity) varies depending upon intake air temperature, ambient temperature, air pressure, power supply frequency, etc. By correcting the air volume of the air line, a model with a suitable standard volume of processed air can be selected. The method of calculation is described below. Select a model for which the standard volume of processed air is well above the required level.

[Method of calculation]

Using the appropriate correction factors, correct the air volume to match pressure and temperature conditions.

Depending on the intake air temperature, the temperature correction should be selected from either Table 2 or Table 4.

Intake air temperature of 50°C max. .....Table 4
Intake air temperature of 45°C min. .....Table 2

[Sample calculation] For KRX-□S model

Air volume: Q = 0.4m^3/min (ANR)
Power supply frequency: 50Hz
Air pressure: 0.5MPa{5.1kgf/cm^2}
Ambient temperature: 30°C
Intake air temperature: 40°C
Outlet dew point temperature: 10°C
Assuming the above conditions, total corrected air volume is calculated as follows:

$Q_1 = Q \div (p \times t)$
$= 0.4 \div (0.87 \times 0.84)$
$= 0.55$m^3/min (ANR)

In this case, the proper model would be **KRX-6S**.

3. The maximum volume of processed air for an air dryer

The maximum volume of processed air for an air dryer is calculated using the following formula: $q_1 = qxpxt$

[Sample calculation]

Air dryer model: **KRX-6SES**
Power supply frequency: 50Hz
Pressure: 0.5MPa{5.1kgf/cm^2}
Ambient temperature: 35°C
Intake air temperature: 65°C
Outlet dew point temperature: 10°C
Assuming the above conditions, the maximum volume of processed air would be calculated as follows: $q_1 = q \times p \times t$

$= 0.72 \times 0.87 \times 0.80 \fallingdotseq 0.5$m^3/min (ANR)

Q: Air volume (m^3/min (ANR))
Q_1: Total corrected air volume (m^3/min (ANR))
q: Standard volume of processed air (m^3/min (ANR)) .....<Tables 3,5>
q_1: Air dryer's maximum volume of processed air (m^3/min (ANR))
p: Pressure modification coefficient .....<Table 1>
t: Temperature correction.....<Tables 2,4>

<Table 1> p: Pressure modification coefficients

Air pressure MPa{kgf/cm^2}	Factor
0.2{2.0}	0.67
0.3{3.1}	0.73
0.4{4.1}	0.80
0.5{5.1}	0.87
0.6{6.1}	0.93
0.7{7.1}	1.00
0.8{8.2}	1.07
0.9{9.2}	1.13
0.97{9.9}	1.20

KRX-□SES

<Table 2> t: Temperature correction

Intake air temperature (°C) / Dew point temperature (°C) / Ambient temperature (°C)	45			55			65			75			85		
	5	10	15	5	10	15	5	10	15	5	10	15	5	10	15
25	1.12	1.20	1.25	1.07	1.20	1.25	0.97	1.15	1.20	0.89	1.04	1.19	0.85	0.97	1.06
30	0.96	1.14	1.22	0.88	1.06	1.20	0.82	0.97	1.12	0.73	0.88	1.06	0.64	0.85	0.99
32	0.90	1.10	1.20	0.82	1.00	1.16	0.75	0.90	1.07	0.67	0.82	0.99	0.57	0.79	0.94
35	0.80	1.02	1.13	0.73	0.89	1.08	0.67	0.80	0.98	0.59	0.73	0.89	0.49	0.70	0.84
40	0.62	0.82	0.95	0.62	0.70	0.87	0.52	0.65	0.77	0.47	0.59	0.70	0.40	0.52	0.63

<Table 3> q: Standard volumes of processed air

Model	Volume of processed air 50/60Hz m^3/min (ANR)
KRX-3SES	0.30/0.35
KRX-4SES	0.50/0.57
KRX-6SES	0.72/0.80

KRX-3S～6S

<Table 4> t: Temperature correction

Intake air temperature (°C) / Dew point temperature (°C) / Ambient temperature (°C)	30			35			40			45			50		
	5	10	15	5	10	15	5	10	15	5	10	15	5	10	15
25	1.15	1.30	1.30	0.90	1.17	1.30	0.70	0.90	1.20	0.57	0.78	0.90	0.27	0.50	0.80
30	1.11	1.30	1.30	0.76	1.04	1.30	0.65	0.84	1.06	0.53	0.73	0.88	0.26	0.47	0.70
32	1.09	1.30	1.30	0.72	1.00	1.30	0.62	0.82	1.02	0.50	0.70	0.87	0.25	0.45	0.67
35	1.05	1.28	1.30	0.67	0.96	1.28	0.58	0.78	0.97	0.44	0.65	0.72	0.21	0.43	0.62
40	0.90	1.20	1.30	0.60	0.90	1.20	0.50	0.70	0.92	0.30	0.55	0.70	0.10	0.37	0.55

<Table 5> q: Standard volumes of processed air

Model	Volume of processed air 50/60Hz m^3/min (ANR)
KRX-3S	0.30/0.35
KRX-6S	0.72/0.80

Calculation of dehumidifying capacity

[Sample]

The following calculation is carried out based on the assumption that air (30°C, 100% humidity) is compressed to a pressure of 0.7Pa {7.1kgf/cm^2}, then cooled in an air dryer to 10°C.

1. Use the atmospheric dew point graph to find the atmospheric dew point.

   Since the pressure dew point is 10°C and the air pressure is 0.7MPa {7.1kgf/cm^2}, the graph indicates an atmospheric pressure dew point of -17°C.

2. Use the table for saturated aqueous vapor to find the saturation point for aqueous vapor at 30°C and -17°C.

   Saturated aqueous vapor at 30°C
   .....30.3 g/m^3
   Saturated aqueous vapor at -17°C
   .....1.37 g/m^3

   Thus, the dehumidifying capacity under these conditions is 28.93 g/m^3 (30.3 -1.37).

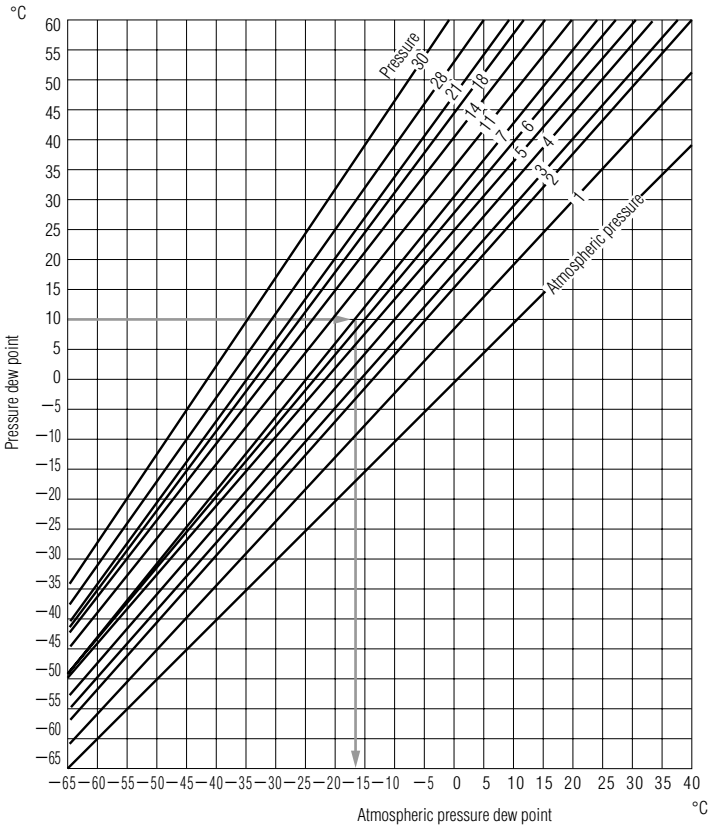


Table of saturated aqueous vapor amounts

Temperature (°C)	Vapor (g/m^3)	(Specific humidity at saturation)			
-50	0.0617	-16	1.48	18	15.4
-49	0.0689	-15	1.61	19	16.3
-48	0.0767	-14	1.74	20	17.3
-47	0.0853	-13	1.88	21	18.3
-46	0.0950	-12	2.03	22	19.4
-45	0.106	-11	2.19	23	20.6
-44	0.117	-10	2.36	24	21.8
-43	0.130	-9	2.54	25	23.0
-42	0.144	-8	2.74	26	24.4
-41	0.159	-7	2.95	27	25.8
-40	0.176	-6	3.17	28	27.2
-39	0.194	-5	3.41	29	28.7
-38	0.214	-4	3.66	30	30.3
-37	0.236	-3	3.93	31	32.3
-36	0.260	-2	4.22	32	33.8
-35	0.286	-1	4.52	33	35.6
-34	0.314	0	4.85	34	37.5
-33	0.345	1	5.19	35	39.6
-32	0.378	2	5.56	36	41.7
-31	0.414	3	5.95	37	43.9
-30	0.453	4	6.36	38	46.2
-29	0.496	5	6.79	39	43.6
-28	0.542	6	7.26	40	51.5
-27	0.592	7	7.75	41	53.7
-26	0.646	8	8.27	42	56.4
-25	0.705	9	8.82	43	59.3
-24	0.768	10	9.40	44	62.2
-23	0.863	11	10.0	45	65.3
-22	0.909	12	10.7	46	68.5
-21	0.989	13	11.3	47	71.9
-20	1.07	14	12.1	48	75.4
-19	1.17	15	12.8	49	79.0
-18	1.26	16	13.6	50	82.8
-17	1.37	17	14.5		

This table was compiled from JIS Z 8806.

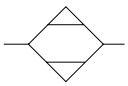
AIR DRYERS

KRX-S Series/KRX-SES Series

- **Compatible with CFCs regulations**
- **Non-rusting air circuits built for the age of oil-free machinery**
- **New type of heat exchanger provides improved thermal efficiency, more compact body**

KRX-3S **KRX-6S KRX-3SES KRX-4SES** **KRX-6SES**

Symbol



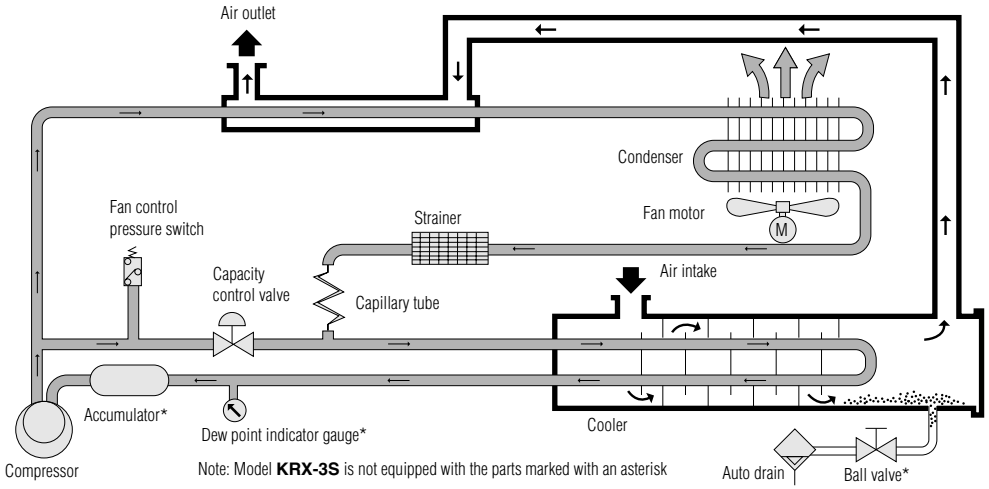
Basic Specifications

Item \ Model			KRX-3S	KRX-6S	KRX-3SES	KRX-4SES	KRX-6SES
Volume of processed air (Note) 50/60Hz		m^3/min (ANR)	0.30／0.35	0.72／0.80	0.30／0.35	0.50／0.57	0.72／0.80
Port aperture		Rc	1/2				3/4
Operating conditions	Media		Compressed air				
	Maximum intake air temperature	℃	50		80		
	Pressure range	MPa {kgf/cm^2}	0.2～0.99 {2.0～10.1}				
	Ambient temperature	℃	2～40				
External dimensions	Height	mm	445	510			550
	Depth	mm	440	515			565
	Width	mm	180	255			255
Mass		kg	18	20			25
Electrical characteristics	Power supply	V	Single-phase, 100V				Single-phase, 200V
	Power consumption	50/60Hz kW	0.17／0.18	0.29／0.32	0.31／0.33	0.32／0.36	0.3／0.34
	Current consumption	50/60Hz A	1.7／1.7	3.7／3.2	3.9／3.5		1.7／1.6
Refrigerant			R-22				
Paint		(Munsell No.)	7.5Y7.5／0.5				

Note: The calculation of the volume of processed air is based on the assumption that the air is at atmospheric pressure.
<Processing conditions>
Intake air pressure:0.7MPa {7.1kgf/cm^2}
Intake air temperature: 35°C for **KRX-3S,-6S**; 55°C for **KRX-3SES,-4SES,-6SES**.
Ambient temperature: 32°C
Outlet air dew point: -17°C at atmospheric pressure; 10°C when pressurized.

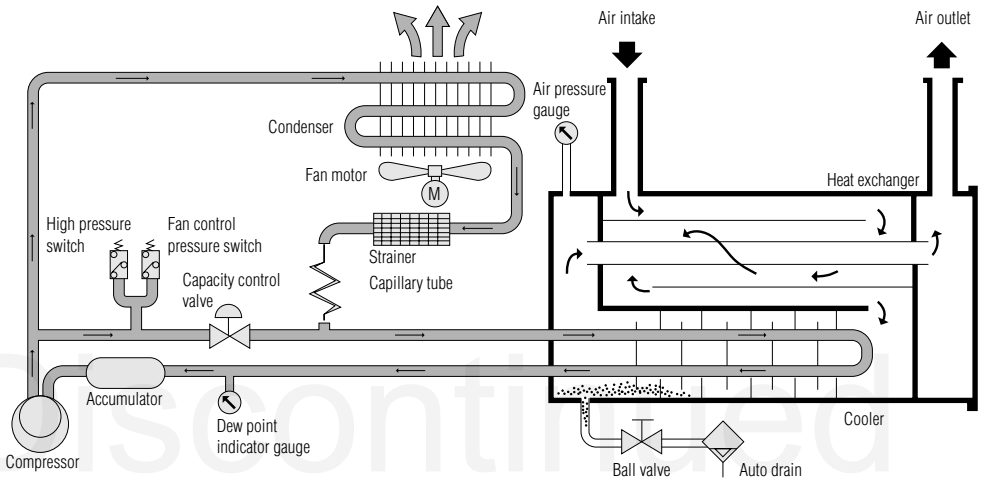
Operating Principles

● **KRX-3S**
KRX-6S
KRX-3SES
KRX-4SES



Note: Model **KRX-3S** is not equipped with the parts marked with an asterisk

● **KRX-6SES**



Operating principles

① Hot compressed air (not yet dehumidified) from the compressor enters the air dryer's heat exchanger. Through exchange with cold air from the cooler, this air is cooled, and water and oil vapors are condensed.
② Cooled compressed air from the heat exchanger flows into the cooler, where it is cooled to approximately 10°C. This rapid cooling further condenses oil and water vapors.
③ Condensed water and oil are discharged together by the auto drain.
④ Cold dry air from the cooler enters the heat exchanger once again, where it is heated through exchange with hot compressed air from the air intake.
This reheating process raises the temperature of outflow air and prevents dew condensation inside the piping system.

Functions of the various components

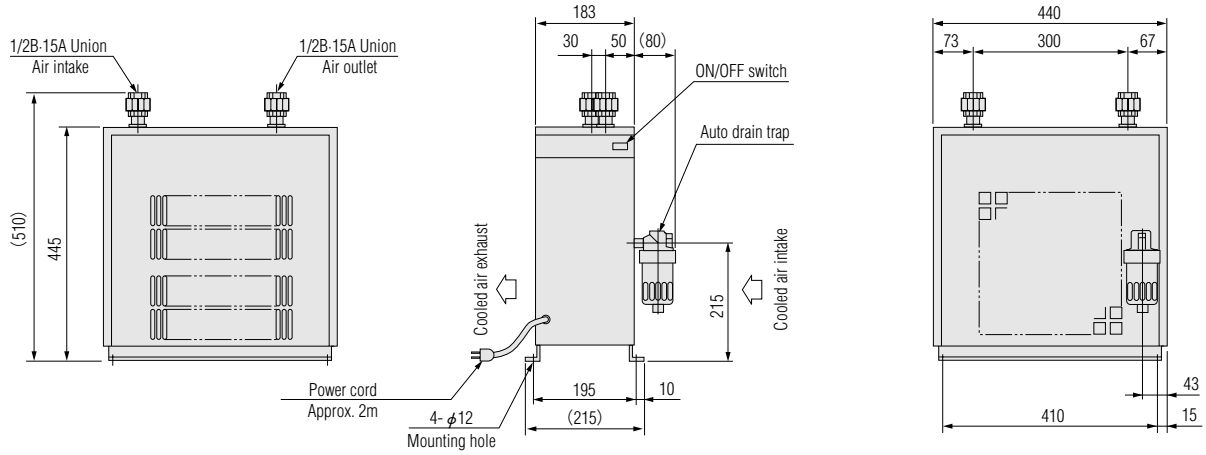
Name	Function
Condenser	Condenser which cools and liquefies refrigerant gas
Capillary tube	Metering device which maintains the supply of liquefied refrigerant at the proper level
Accumulator	Liquid reservoir which prevents liquid refrigerant from entering the compressor
Strainer	Filter which eliminates impurities and foreign material from refrigerant
Capacity control valve	Pressure regulating valve for refrigerant gas (hot gas bypass valve)
High-pressure switch	Detects abnormally high pressure in the refrigerant (compressor stops)
Fan control pressure switch	Detects condensation pressure of the refrigerant (starts and stops fan motor)
Dew point indicator gauge	Indicates the dew point of compressed air at the outlet

Specifications

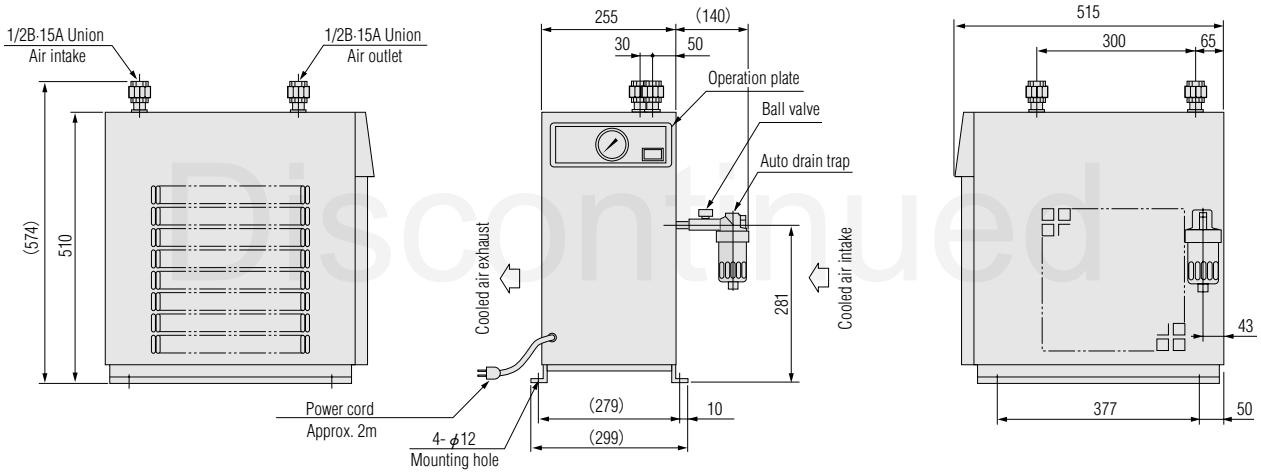
Item \ Model		KRX- 3S	6S	3SES	4SES	6SES
Compressor protection device	Overcurrent relay (for motor protection)	Present				
Condensation method		Fin-and-tube forced air cooling				
Cooler		New baffle fin model				
Refrigerant control device		Capillary tube				
Capacity control equipment		Capacity control valve				
Refrigerant		R-22				
Refrigerant cycle protection device	Fan control pressure switch	Present				
Auto drain		Float type				

Dimensional Drawings (Unit: mm)

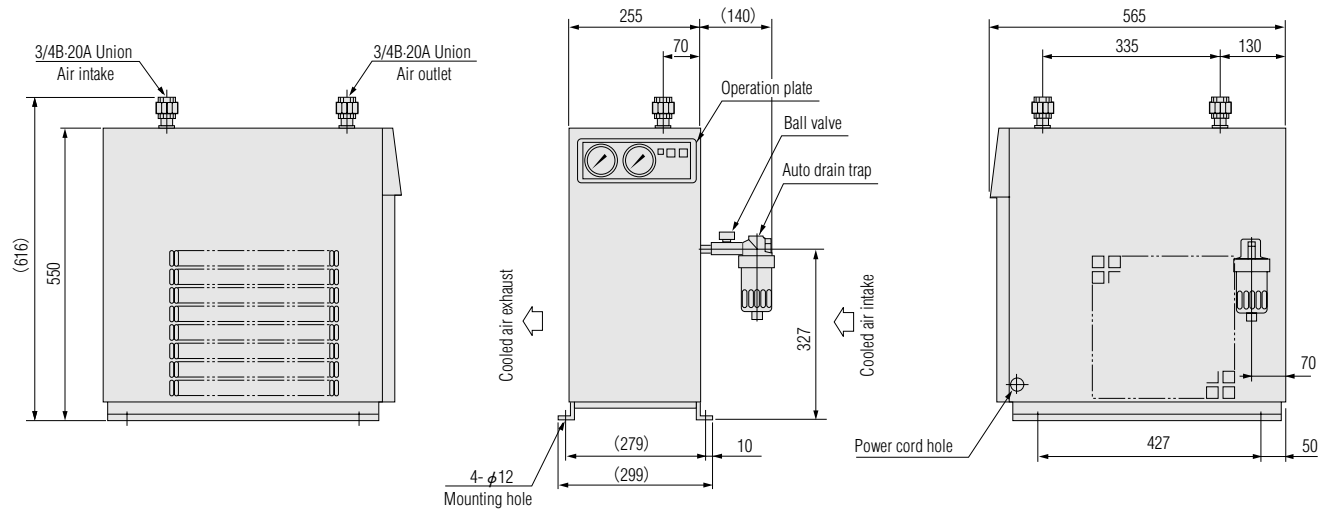
KRX-3S



KRX-6S
KRX-3SES
KRX-4SES



KRX-6SES



Proper Handling and Precautions

Caution: Before using any air dryer, be sure to read the Operation Manual that comes with it.

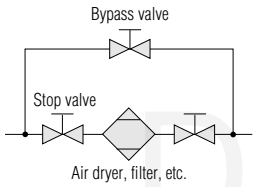
Installation • Piping

Installation

1. In order to enhance cooling effectiveness, avoid installing the air dryer in a location exposed to direct sunlight and keep it away from heat sources as much as possible.
2. Leave ample space around the air dryer to allow maximum ventilation within the machine (at least 30cm (approx.) for model **KRX-3S**; at least 60cm (approx.) for models **KRX-6S** and **KRX-3SES** through **KRX-6SES**).
3. Install the air dryer on a strong, level surface. Installing it on a weak floor may result in extra noise.

Piping

1. The air dryer port is not supported, so connect the piping to it in such a manner that the weight of the piping does not bear upon the port.
2. In order to enhance ease of maintenance, install a bypass circuit between the intake and outlet of the air dryer.



3. Leave a sag of approximately 2% in the piping between the compressor and the air dryer. If you want to bend this part vertically, install a drain trap and keep the piping drained.
4. If installing piping to the drain exhaust port on the auto drain trap, do not bend the piping vertically at that point.
5. In regions with cold climates, any piping downstream from the air dryer's outlet which is exposed to the outdoors must be wrapped in insulating material to prevent dew condensation inside the piping.

Electrical Circuits

1. In order to protect against overload and prevent earth leakage from causing electrical shock, be sure to equip the air dryer with an earth leakage breaker which is designed to provide overload protection and which matches the capacity listed in the table below.

Breaker Capacity

KRX-□SES model

Model	Power cord mm²	Breaker capacity A
KRX-3SES	1.25 min.	10
KRX-4SES		
KRX-6SES		

KRX-□S model

Model	Power cord mm²	Breaker capacity A
KRX-3S	1.25 min.	5
KRX-6S		10

2. The air dryer can operate at ±10% of rated voltage.

General Precautions

1. Before installing piping, be sure to clean out the inside of the piping either by flushing (using compressed air) or by air blowing. Be careful not to let chips, seal tape, rust, or other foreign material get inside the piping while installing it.
2. These air dryers cannot be used if any of the following substances are mixed in with the fluid or air: organic solvents • phosphoric acid, ester-type machine oil • sulfurous gas • chlorine gas • acids.