

No.1 Share in Japan

**ORION**<sup>®</sup>

ISO Quality Policy

Orion strives to offer products that delight its customers.

# Clean Air System (Heavy Duty Models)

## Air Dryer and Air Filter Series



CRX3500A-E



CRX7400A-WE

# Air Dryer Operation Management

## Built-in Electronic Control Panel for Simple and Clear Display of Operating Conditions



※ Terminal connections for item ③ above are on a terminal block in the distribution box and are not part of the control panel.

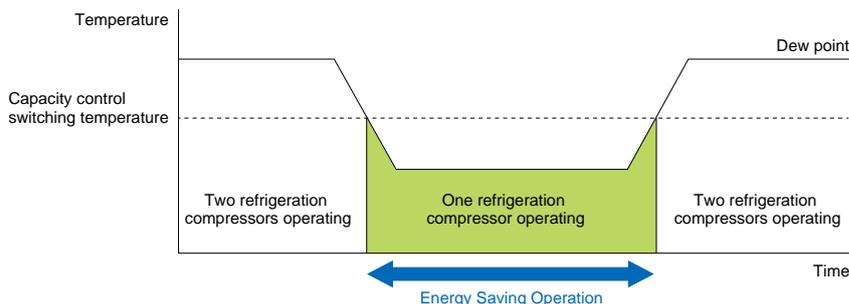
- ① **Digital display of dew point temperature and alarm details.**  
 Concise alarm information from combined use of an error code display and an alarm indicator light.
- ② **Advanced functions including automatic capacity control switching and a dew point temperature alarm.**  
 Automatic temperature based switching between single or dual compressors (energy saving setting) and a user programmable dew point alarm.
- ③ **Comes standard with external signal terminals (remote operation control signal, operating signal, failure alarm, warning alarm).**
  - Remote monitoring of CRX operating conditions, drops in dehumidifying capacity, etc.
  - Warning alarm notification for rise in dew point.  
 ※ Operation will continue and the CRX unit will not shut down during warning alarm conditions.
- ④ **Includes filter change warning alarm.**
  - A blinking lamp on the control panel indicates when filter units installed before or after the CRX unit require filter element changes.
  - Air quality can be maintained to match the user's needs by timely replacement of filter elements.  
 ※ Replacing the filter element in the Super Drain Filter (DSF) installed before the CRX unit is important for maintaining CRX unit performance.
- ⑤ **Includes Local/Remote Operation Switch**  
 User selectable local/remote operation control.
- ⑥ **Pressure Gauges**
  - Check conditions easily during normal operation, inspection, and maintenance.
  - Multiple pressure gauges in a single, easy to see location on the control panel for quick and convenient regular inspections.

## ORION's Built-in Dual-Drive Eco System Offers Energy Savings as high as 46%. Patent Pending

(CRX3100A-E/3500A-E/4100A-WE/5300A-WE/7400A-WE)

### What Is the Dual-Drive Eco System?

The Dual-Drive Eco System automatically controls 2 built-in refrigeration compressors to match air conditions. Only 1 refrigeration compressor will operate during times of low air use or when the actual dew point temperature is below the set capacity control temperature. By controlling operation of the refrigeration compressors, which make up the majority of power consumption of the CRX, reductions in power consumption as much as 46 can be achieved. Furthermore, during single refrigeration compressor operation, operation is automatically switched between the 2 compressors in order to maintain a balanced accumulated operating time between them.

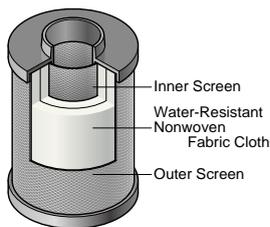


# Clean Air System

## High Quality Air

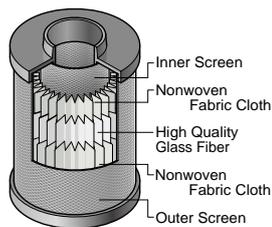
### Pursuing Clean Air

Filters with stainless steel casings, installed before and after the CRX, and that connect to the built-in heat exchanger and air pipes of the CRX unit, will reduce dust emissions. We can recommend a configuration for semiconductor related installations which have demanding clean air requirements.



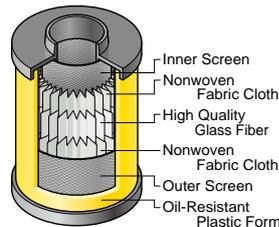
Sectioned Drawing of Element

Element : EDS



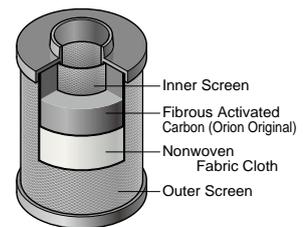
Sectioned Drawing of Element

Element : ELS



Sectioned Drawing of Element

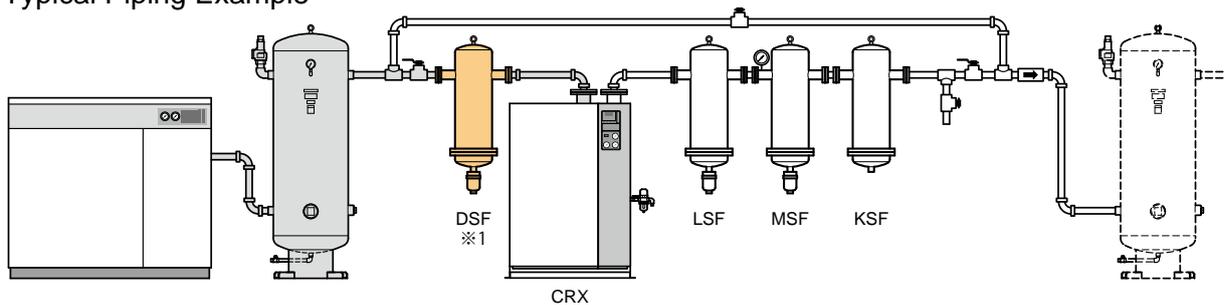
Element : EMS



Sectioned Drawing of Element

Element : EKS

### Typical Piping Example



※1 Always install a DSF unit before the CRX.  
And install the DSF unit as close as possible to the CRX.

Refrigerated Compressed Air Drying Equipment

# Heavy Duty CRX Series Product Specifications

## Model

《Water Cooled》 CRX2900A-W  
 CRX4100A-WE  
 CRX5300A-WE  
 CRX7400A-WE

《Air Cooled》 CRX2300A  
 CRX3100A-E  
 CRX3500A-E



CRX3500A-E



CRX7400A-WE

Item		Model	Water Cooled Models			
			CRX2900A-W	CRX4100A-WE	CRX5300A-WE	CRX7400A-WE
Air processing conditions	Air processing capacity	m <sup>3</sup> /min	29	41	53	74
	Inlet air pressure	MPa	0.69			
	Inlet air temperature	℃	45			
	Outlet pressure dew point	℃	10			
	Cooling water temperature	℃	32			
	Cooling water flow rate	m <sup>3</sup> /h	4.8	5.2	5.4	9
Operating ranges	Inlet air temperature	℃	10~60			
	Ambient temperature	℃	2~45			
	Compressed air pressure	MPa	0.29~0.98			
	Cooling water temperature	℃	2~34			
	Cooling water operating pressure (gauge pressure)	MPa	0.3~0.7			
Outside dimensions	H x D x W	mm	1500x1000x802	1500x1000x802	1500x1199x850	1620x1654x877
Mass		kg	278	350	395	495
Air connection	Flange		2 · 1/2B (65A)	3B (80A)	4B (100A)	4B (100A)
Dual-Drive Eco system (Capacity control function)			-	○	○	○
(Power savings during capacity control operation)			-	46%		
Refrigerant			R407C	R407C	R407C	R410A
Electrical specifications	Power	V	Three phase 380V 50Hz			
	Power consumption	kW	4.2	6.8	9.5	12.5
	Electric current	A	8	12.5	17.5	21
Recommended pre-filter	Installed before the CRX	(Option)	DSF2900A-SUS	DSF4100A-SUS	DSF5300A-SUS	DSF6100A-SUS, DSF8000A-SUS

※ Special-order models available with an air pressure specification of 1.0 MPa. ※ Air processing capacity figures are based on ANR and adjusted to atmospheric pressure, 32℃, 75% RH.  
 ※ Refer to the specifications sheet for further details. ※ Always install a Super Drain Filter (DSF) along the piping before the CRX unit.

Item		Model	Air Cooled Models		
			CRX2300A	CRX3100A-E	CRX3500A-E
Air processing conditions	Air processing capacity	m <sup>3</sup> /min	23	31	35
	Inlet air pressure	MPa	0.69		
	Inlet air temperature	℃	50		
	Outlet pressure dew point	℃	10		
	Ambient temperature	℃	35		
Operating ranges	Inlet air temperature	℃	10~60		
	Ambient temperature	℃	2~45		
	Compressed air pressure	MPa	0.29~0.98		
Outside dimensions	H x D x W	mm	1500x1500x802	1500x1500x802	1500x1500x802
Mass		kg	323	385	380
Air connection	Flange		2 · 1/2B (65A)	3B (80A)	3B (80A)
Dual-Drive Eco system (Capacity control function)			-	○	○
(Power savings during capacity control operation)			-	46%	
Refrigerant			R407C	R407C	R407C
Electrical specifications	Power	V	Three phase 380V 50Hz		
	Power consumption	kW	5.6	10	10
	Electric current	A	10.5	18	18
Recommended pre-filter	Installed before the CRX	(Option)	DSF2900A-SUS	DSF3500A-SUS	

※ Special-order models available with an air pressure specification of 1.0 MPa. ※ Air processing capacity figures are based on ANR and adjusted to atmospheric pressure, 32℃, 75% RH.  
 ※ Refer to the specifications sheet for further details. ※ Always install a Super Drain Filter (DSF) along the piping before the CRX unit.

# Clean Air System

Compressed Air Purification Equipment

## Super Filter Series Product Specifications

### Model

《4 Unit Types and 24 Models to Suit Your Needs》  
DSF/LSF/MSF/KSF2900A-SUS ~ 8000A-SUS

- For Heavy Duty CRX Air Flow.
- Stainless Steel Vessel Standard (For both cleanliness and reduced weight.)
- Highly Efficient Filter Element (Made in Japan)
  - Super Drain Filter DSF Series : Removes water droplets and solid particulate (5 μm and larger).
  - Super Line Filter LSF Series : Removes solid particulate (1 μm and larger).
  - Super Mist Filter MSF Series : Removes oil and solid particulate (0.01 μm and larger).
  - Super Activated Carbon Filter KSF Series : Oil and odor removal (oil concentration at outlet: 0.003 wt ppm).



Model	DSF / LSF / MSF / KSF	2900A-SUS	3500A-SUS	4100A-SUS
Air processing capacity (at 0.69 MPa)	m <sup>3</sup> /min	29	35	41
Body and housing		Stainless steel		
Operating ranges	Operating ranges	Mpa 0.05 - 0.98 (DSF: 0.2 - 0.98)		
	Inlet air temperature	℃ 5 - 60		
	Ambient temperature	℃ 2 - 60		
Performance specifications	Filtration	DSF : 5μm (Water droplet separation efficiency: 99%) LSF : 1μm (Filtration efficiency: 99.999%) MSF : 0.01μm (Filtration efficiency: 99.999%)		KSF : Adsorption by activated carbon fiber
	Output oil concentration	Wtppm MSF : 0.01 KSF : 0.003 ※ Subject to inlet air conditions of the system piping.		
When to replace filter element		One year or pressure loss 0.02 MPa for DSF, 0.035 MPa for LSF/MSF, whichever comes first.		
Main dimensions	Air connection (flange)	2 1/2B (65A)		3B (80A)
	Dimensions (front face x depth x height)	DSF : 590x377x1012 LSF/MSF : 590x377x977 KSF : 590x377x828		DSF : 590x377x1169 LSF/MSF : 590x377x1134 KSF : 590x377x985
	Mass	kg DSF/MSF : 27 LSF : 26 KSF : 25		DSF/MSF : 32 LSF : 31 KSF : 30
Element	EDS/ELS/EMS/EKS models	1300		2000
	Quantity	2		2
Accessories	Auto drain trap	FD-10-A (DSF) FD-1D (LSF/MSF) None with KSF.		
	Pressure differential gauge	DGX-50A (Comes standard only with the MSF. Available as an option on other models.)		
	Other	-		

※Special-order models available with an air pressure specification of 1.0 MPa. ※ Refer to the specifications sheet for further details.

Model	DSF / LSF / MSF / KSF	5300A-SUS	6100A-SUS	8000A-SUS
Air processing capacity (at 0.69 MPa)	m <sup>3</sup> /min	53	61	80
Body and housing		Stainless steel		
Operating ranges	Operating ranges	MPa 0.05 - 0.98 (DSF: 0.2 - 0.98)		
	Inlet air temperature	℃ 5 - 60		
	Ambient temperature	℃ 2 - 60		
Performance specifications	Filtration	DSF : 5μm (Water droplet separation efficiency: 99%) LSF : 1μm (Filtration efficiency: 99.999%) MSF : 0.01μm (Filtration efficiency: 99.999%)		KSF : Adsorption by activated carbon fiber
	Output oil concentration	Wt ppm MSF : 0.01 KSF : 0.003 ※ Subject to inlet air conditions of the system piping.		
When to replace filter element		One year or pressure loss 0.02 MPa for DSF, 0.035 MPa for LSF/MSF, whichever comes first.		
Main dimensions	Air connection (flange)	4B(100A)		
	Dimensions (front face x depth x height)	DSF : 640x442x1245 LSF/MSF : 640x442x1210 KSF : 640x442x1061		680x639x1779
	Mass	kg DSF/MSF : 48 LSF : 47 KSF : 46		DSF/LSF : 117 MSF : 116 KSF : 115
Element	EDS/ELS/EMS/EKS models	2000		2000
	Quantity	3		4
Accessories	Auto drain trap	FD-10-A (DSF) FD-1D (LSF/MSF) None with KSF.		
	Pressure differential gauge	DGX-50A (Comes standard only with the MSF. Available as an option on other models.)		
	Other	-		Stand

※Special-order models available with an air pressure specification of 1.0 MPa. ※ Refer to the specifications sheet for further details.

## Technical Information and Operating Constraints

### Heavy Duty CRX Model Choice

Air dryer processing capacity differs based on operating conditions. Confirm the installation location and operating requirements and choose the model that adequately meets your needs.

Dryer processing air flow (m<sup>3</sup>/min) = standard air flow ① (m<sup>3</sup>/min) × the temperature coefficient ② × the pressure correction coefficient ③

#### ① Standard Air Flow

Water Cooled Models

Model	CRX	2900A-W	4100A-WE	5300A-WE	7400A-WE
Air processing capacity(m <sup>3</sup> /min)		29	41	53	74

Air Cooled Models

Model	CRX	2300A	3100A-E	3500A-E
Air processing capacity(m <sup>3</sup> /min)		23	31	35

#### ② Temperature Correction Coefficient

Water Cooled Models

Inlet air °C	40			45			50			55			60		
	5	10	15	5	10	15	5	10	15	5	10	15	5	10	15
Pressure dew point °C															
Temperature correction coefficient	0.88	1.14	1.14	0.77	1.00	1.14	0.66	0.91	1.10	0.59	0.83	0.98	0.54	0.75	0.89

※ In water cooled models, use the coefficients above regardless of the temperature of the cooling water. Note however that the cooling water should be 2~34 °C.

Air Cooled Models

Inlet air °C	40			45			50			55			60				
	5	10	15	5	10	15	5	10	15	5	10	15	5	10	15		
Pressure dew point °C																	
Temperature correction coefficient	Ambient temperature (°C)	30	0.85	1.15	1.37	0.83	1.12	1.35	0.78	1.06	1.27	0.67	0.88	1.04	0.62	0.80	0.92
		32	0.82	1.12	1.34	0.80	1.09	1.31	0.76	1.03	1.24	0.64	0.85	1.01	0.60	0.75	0.89
		35	0.79	1.09	1.30	0.77	1.06	1.28	0.73	1.00	1.21	0.62	0.81	0.98	0.57	0.70	0.86
		40	0.60	0.81	0.98	0.58	0.80	0.96	0.55	0.75	0.91	0.47	0.62	0.75	0.44	0.56	0.66

#### ③ Pressure Correction Coefficient

Air pressure MPa	0.29	0.39	0.49	0.59	0.69	0.79	0.89	0.98
Pressure correction coefficient	0.73	0.80	0.87	0.93	1.00	1.07	1.13	1.2

## Information Regarding Cooling Water

### Water Cooled Heavy Duty CRX

#### Standard concentration levels for cooling water for use with a condenser

Use the chart on the right as a standard guide for water quality standard levels. Using cooling water of a standard outside these levels will lead not only to scaling within the condenser and a drop in cooling capacity, but can also lead to corrosion of the refrigeration piping in the condenser and breakdown of the CRX.

Item	Type of Cooling Water		Has Tendency Towards:	
	Circulating Water	Make-up Water	Corrosion	Scaling
PH (25°C)	6.5 ~ 8.2	6.0 ~ 8.0	○	○
Electrical conductivity (mS/m) (25°C)	Max. 80	Max. 30	○	○
Chloride ion (mgCl/L)	Max. 200	Max. 50	○	
Sulphate (mgSO <sub>4</sub> <sup>2-</sup> /L)	Max. 200	Max. 50	○	
Acid consumption (pH4.8) (mgCaCO <sub>3</sub> /L)	Max. 100	Max. 50		○
Total hardness (mgCaCO <sub>3</sub> /L)	Max. 200	Max. 70		○
Calcium hardness (mgCaCO <sub>3</sub> /L)	Max. 150	Max. 50		○
Silica ion (mgSiO <sub>2</sub> /L)	Max. 50	Max. 30		○
Iron (mgFe/L)	Max. 1.0	Max 0.3	○	○
Copper (mgCu/L)	Max 0.3	Max 0.1	○	
Sulfide ion (mgS <sup>2-</sup> /L)	Not detected	Not detected	○	
Ammonium ion (mgNH <sub>4</sub> <sup>+</sup> /L)	Max. 1.0	Max 0.1	○	
Residual chlorine (mgCl/L)	Max 0.3	Max 0.3	○	
Free carbon dioxide (mgCO <sub>2</sub> /L)	Max. 4.0	Max. 4.0	○	
Ryznar Stability Index	6.0 ~ 7.0	—	○	○

#### Cooling Water Operating Conditions

- Cooling water operating pressure : 0.3 ~ 0.7 MPa (gauge pressure)
- Cooling water operating temperature : 2.0 ~ 34.0 °C
- Required cooling water flow rate : See chart at right (cooling water temp. : 32 °C)

Model	Typical Cooling Water Flow Rate (m <sup>3</sup> /h)	Cooling Tower Capacity
CRX2900A-W	4.8	10 tons or greater
CRX4100A-WE	5.2	
CRX5300A-WE	5.4	
CRX7400A-WE	9.0	

## Regarding Indoor Ventilation

Air Cooled Heavy Duty CRX

If there is a chance that the ventilation conditions in the installation location could reach an ambient temperature of 43 °C or higher, a forced air ventilation system will be required.

### Heat output and exhaust air flow by model

Model	CRX	2300A	3100A-E	3500A-E
Heat output (kW)		20.24	27.28	30.80
Exhaust air flow (m <sup>3</sup> /min)		206	206	175

### 1. Main unit ventilation

In cases of ventilation of indoor units, calculate the ventilation air flow based on the following calculation.

$$\text{Ventilation air flow (m}^3\text{/min)} = \frac{H \cdot 3600}{\gamma \cdot CP \cdot (t_2 - t_1) \cdot 60}$$

H : Heat output (kW)  
 γ : Air mass (1.2 Kg/m<sup>3</sup>)  
 CP : Specific heat of air (1.006 kJ/kg·°C)  
 t<sub>2</sub> : Indoor temperature (°C)  
 t<sub>1</sub> : Outside air temperature or intake temperature (°C)

Ventilation air flow should include sufficient leeway to also take into account other heat sources (such as solar radiation, etc.)

### 2. Local ventilation

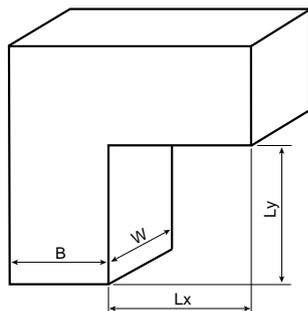
When installing a heat output duct, be aware of the following points.

#### 2-1. For vertically extended ducts:

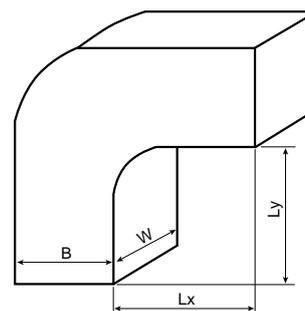
Minimum cross sectional area (m <sup>2</sup> )	0.5
Maximum length (m)	2

#### 2-2. When installing a square elbow

1) L<sub>x</sub> and L<sub>y</sub> should be 2 m or shorter at the above listed cross sectional area.



Square elbow with straight back



Square elbow with rounded back

2) If the length of L<sub>x</sub> and L<sub>y</sub> exceed 2m, a gap of 20 cm should be established between the main unit hot air outlet and the duct, and installation of a motor fan is required. The choice of motor fan should be made to ensure there is the minimum required air flow as indicated below.

Model	CRX	2300A · 3100A-E	3500A-E
Minimum required air flow (m <sup>3</sup> /min)		206	175

Important!: Ensure L<sub>x</sub> and L<sub>y</sub> are 5 m or shorter.



- **Safety Notes**

- Before using this equipment, read the operating manual thoroughly and operate the equipment correctly as directed.
- Consult with a qualified professional or your ORION dealer for product installation and wiring.
- Please select a product that is suitable for the desired application. Do not use for other than intended purposes. Use for other than intended purposes can lead to accidents or unit breakdown.

- **Air-Cooled Spec. Models**

If the condenser becomes clogged with dust or dirt, heat exchange will be greatly reduced and electricity consumption will increase. This will lead not only to decreased performance, but can also lead to the activation of built-in safety devices, and eventual damage to the equipment. For these reasons, the condenser should be cleaned on a regular basis.

- **Water-Cooled Spec. Models**

In general, water used to cool condensers will be well water, tap water, or water from a cooling tower. However water of insufficient quality can lead to scaling in cooling pipes resulting in lower levels of heat exchange, increased electricity consumption and lower performance. Therefore water quality should be confirmed on a regular basis.

#### Regarding After Service

- Please contact your dealer for any repairs required after using this unit.
- Costs will be incurred by the customer for repairs conducted after the warranty period has expired. In cases where equipment function can be improved by certain service procedures, such procedures will be taken at the specific request of the customer.
- Spare parts are items necessary to maintain the proper function and operating specifications of the equipment. It is the policy of ORION to maintain a stock of replacement parts for 7 years after production of the product ceases.

#### Recommended Maintenance Inspections

- After having used the unit for a long time, actual performance may drop due to the effects of dirt or wear, etc. In order to realize continued best performance of this equipment, in addition to prescribed customer maintenance, it is also recommended that regular inspections be conducted. Please consult with your dealer or ORION directly for details.

For inquiries, please contact the following representative: —



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- This catalog contains product specifications as of September, 2012.
- Images in this catalog are printed images and actual product colors may differ from the colors herein.
- Product mechanisms, specifications, etc. listed in this catalog are subject to change without notice.