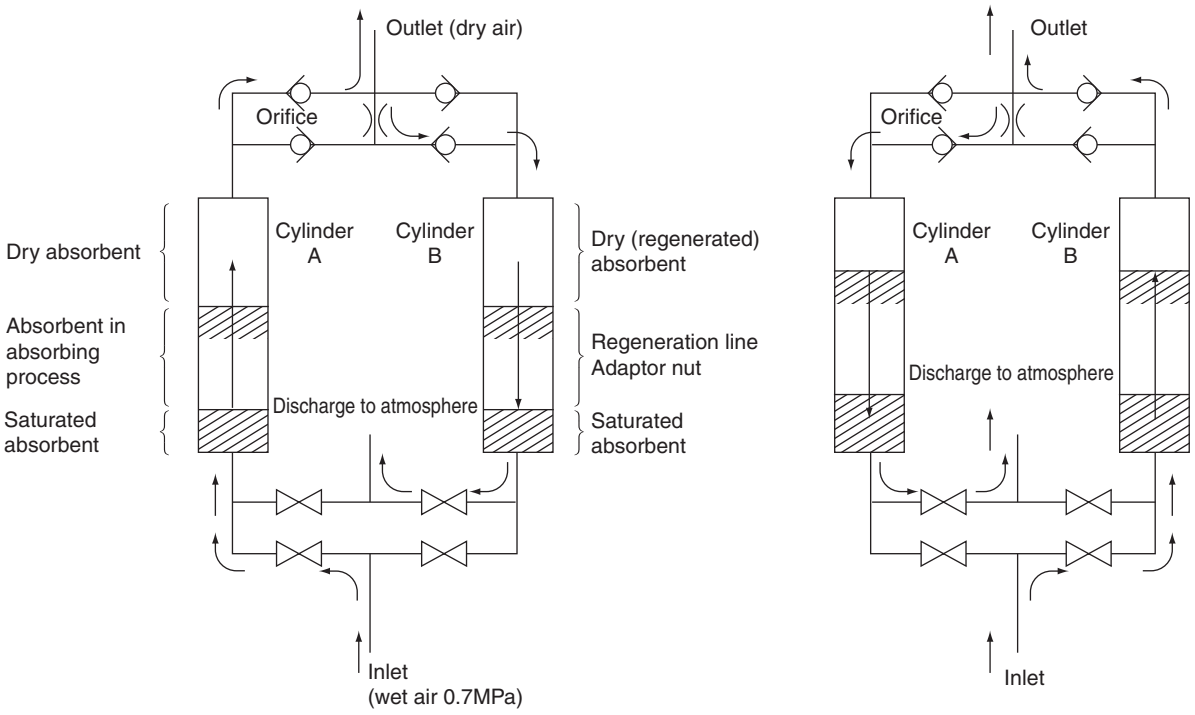
Desiccant type air dryer (Heatless dryer)

■ Components for air preparation and pressure adjustment / main line unit

CONTENTS

Suction type principle and circuit diagram

The heatless air dryer uses a desiccant, which constantly balances moisture content of ambient air. One cylinder containing desiccant is used in absorption to absorb moisture in wet air, while another cylinder is used in regeneration to extract moisture in wet desiccant to dry air. These processes are repeated so wet air entering the unit is constantly supplied from the unit as dry air.



Wet air enters from the inlet to the cylinder A, where moisture is removed with dry adsorbent. Then, dry air is discharged from the outlet. Part of the dry air discharged from cylinder A passes through the orifice and is depressurized to atmospheric pressure. The air is supplied to cylinder B, where moisture is removed with desiccant before being discharged into the atmosphere.

By depressurizing part of the air, drain in a pressurized state, to the atmospheric level, dryness increases and sufficiency in regeneration is increased.

For example, when 0.7MPa dry air is depressurized to the atmospheric level, air volume becomes 8-fold and relative humidity per unit volume 1/8-fold. Thus, absorbent removes more moisture than when balanced with air.

After a set time, the air flow is reversed by the timing motor, and air is absorbed with cylinder B and regenerated with cylinder A. This operation is repeated.

System of heatless dryer

1. Purge flow rate

The heatless air dryer uses dry air from the dryer to regenerate desiccant that has absorbed water. The air used for this regeneration is called purged air, and the minimum flow rate is determined in principle.

$$\text{Theoretic purge rate} = \frac{1}{\text{Air pressure during absorption (absolute pressure)}}$$

For example, the theoretic purge rate is 12.9% (at 100% load) for 0.7MPa.

In actual use, the theoretic purge rate is set to 15 to 23% based on desiccant absorption and removal rate and unit efficiency.
Thus, if operation conditions differ, the purge rate, processed air rate and purge rate differ.
Refer to the catalog and confirm that applicable operation conditions and required outlet dew point are satisfied.
The purge rate can be set at the factory (special order) to match customer specifications. Contact CKD when conditions change, such as when the unit is moved, as the rate must be reset.

2. Oil removing

When using the desiccant air dryer, water absorption is prevented if desiccant absorbs oil. This can cause outlet dew point performance and desiccant life to drop.
When using the desiccant air dryer in an air line containing a lubricated air compressor, install an oil removing filter (M filter) on the primary side of the dryer.

3. Installation of filter on secondary side of dryer

When using the desiccant air dryer, desiccant power is discharged to the secondary side of the dryer. Thus, install a filter (P, S or M filter or their combination) on the secondary side of the dryer based on the air application (required air quality).

4. Silencer replacement

When changing the desiccant cylinder to the absorption side, the pressurized cylinder absorbing moisture is suddenly depressurized to atmospheric level, and large exhaust noise is occurred each time the state changes. A silencer is mounted to suppress this exhaust noise, but when used for a long time, desiccant power will accumulate and clog the silencer. If left as is, desiccant regeneration could be affected and the required dew point performance not achieved. If the silencer is heavily clogged, it could be damaged because of pressure when exhausting.
The silencer should be replaced once a year, or when the regeneration cylinder side pressure exceeds 0.05MPa.

5. Pressure fluctuation on dryer's secondary side

Just before and after the desiccant cylinder's changeover (absorption/regeneration), the air flow rate may fluctuate since the purge air is temporarily stopped and atmospheric pressure (regeneration pressure) is pressurized and filled. This may cause pressure to fluctuate, depending on pipes connected to the dryer. This may cause pressure to fluctuate, depending on pipes connected to the dryer. when large, it could extend to 0.1MPa. If this pressure fluctuation affects factory operations, increase the main pressure setting, or install an air tank on the secondary side, etc.

6. By-pass circuit

Many dryers have a bypass circuit to detour the dryer and supply air in an emergency, The valve is opened when air is supplied even during dryer failure or when the dryer must be repaired while following air for remedial measure, etc. In this case, however, wet, nondehumidified air is supplied to the factory.
Often when the heatless air dryer is selected, very dry air must be supplied. If the bypass circuit is opened inadvertently, moisture enters all air pipes following the dryer, which requires many hours to correct. Installation of a spare unit is recommended in this case.

7. Dew point display

Conventionally, the refrigerating dryer's performance was indicated with the pressure dew point, and the heatless dryer and membrane dryer were indicated with the atmospheric dew point (refer to page 10 for the terminology). However, with the enactment of JISB8392-1, this has been unified to the pressure dew point display. CKD has also started indicating the performance with the pressure dew point from the super heat-less air dryer SHD3000 Series. Note that depending on the model or maker, both indications may still be in use.

Series variation

Desiccant type air dryer (Heatless dryer)

	Small type			Large type		
Series	HD Series			Super heatless SHD Series		
Installation applications	Terminal installation in plant, device integrated type					
Features / kW	Inlet air temperature 21˚C			Inlet air temperature 35˚C		
	Atmospheric dew point −17.5˚C	Atmospheric dew point −40˚C	Atmospheric dew point −72˚C	**Pressure dew point** −20˚C (−40˚C) Note 2	**Pressure dew point** −40˚C (−57˚C) Note 2	**Pressure dew point** −60˚C (−74˚C) Note 2
0.4			● (HD-0.5)			
0.75	● (HD-0.5)	● (HD-0.5)	● (HD-1)			
1.5	● (HD-1)	● (HD-1)	● (HD-1.5)			
2.2	● (HD-1.5)	●● (HD-1.5, -2)	● (HD-2)			
3.7	● (HD-2)	● (HD-4)	● (HD-4)			
5.5	● (HD-4)		● (HD-6)			
7.5	● (HD-6)	● (HD-6)	● (HD-9)			
11	● (HD-9)	● (HD-9)				
15	▲ (HD-9)			● (SHD3025-G/M)	● (SHD3025-G/M)	● (SHD3025-M)
22				● (SHD3045-G/M)	● (SHD3045-G/M)	● (SHD3045-M)
37				● (SHD3075-G/M)	● (SHD3075-G/M)	● (SHD3075-M)
55				● (SHD3100-G/M)	● (SHD3100-G/M)	● (SHD3100-M)
75				●● (SHD3125, SHD3150-G/M)	●● (SHD3125, SHD3150-G/M)	●● (SHD3125, SHD3150-M)
95				● (SHD3200-G/M)	● (SHD3200-G/M)	● (SHD3200-M)
120				● (SHD3240-G/M)	● (SHD3240-G/M)	● (SHD3240-M)
150						
200						
250						
300						
400						
480						
710						
960						
1450						
Dew point monitor	X	X	X	● Standard equipment	● Standard equipment	● Standard equipment
With energy saving device	X	X	X	● Standard equipment	● Standard equipment	● Standard equipment
Optional voltage	● Option	● Option	● Option	● Option	● Option	● Option
Paint color specification	● Option	● Option	● Option	● Option	● Option	● Option
Remote control and external signal	● Custom order	● Custom order	● Custom order	● Standard equipment	● Standard equipment	● Standard equipment
Outdoors specifications	X	X	X	X	X	X
Anchor bolt	X	X	X	● Option	● Option	● Option
SUS name plate	● Option	● Option	● Option	● Custom order	● Custom order	● Custom order
Export specifications	● Option	● Option	● Option	● Option	● Option	● Option
Export packing	● Option	● Option	● Option	● Option	● Option	● Option
Product photo	● Option	● Option	● Option	● Custom order	● Custom order	● Custom order
Appearance						
Page	112			118		

Note 1: This table is prepared based on the following conditions. If the conditions differ, the model must be corrected with multiplication.
Inlet air pressure: 0.7MPa
Inlet air temperature: Follows each series rating.

Note 2: Values in parentheses indicate the atmospheric dew point conversion value.

⚠ Features and handling of desiccant

1. Disposing of desiccant

Desiccant is an absorbent and, in addition to moisture, may absorb other materials in compressed air. Spent desiccant must be disposed properly as industrial waste.

2. Inlet air temperature and absorption performance

Absorption performance of desiccant depends on temperature. Absorption performance drops if the temperature exceeds 55°C. (The inlet temperature range of the heatless air dryer is limited to 50°C for this reason.) Generally absorption performance is higher when temperature is low. Efficient operation is ensured by installing the heatless air dryer where the inlet temperature is low.

3. Oil removal

As opposed to a heat dryer, a heatless dryer does not absorb moisture until desiccant is full. Instead, a process of absorbing a small amount on the surface and immediately regenerating the desiccant is repeated. Thus, it is necessary to keep the desiccant surface clean so the desiccant absorbs moisture easily.

If compressed air contains oil, desiccant absorbs oil, which cannot be removed as easily as moisture, and instead permeates desiccant and prevents the absorption of moisture.

When using this product in a lubricated air line, install an oil removing filter on the primary side of the heatless air dryer.

4. Desiccant replacement timing

Desiccant replacement timing differs with the working conditions and required dew points.

Refer to the dew point meter, and replace desiccant performance starts to drop.

When the required dew point (atmospheric dew point) is between -30 to -50°C, desiccant is normally replaced every 3 to 5 years.

When the required dew point is -70°C or less, desiccant is replaced every 2 years.

Safety precautions

Always read this section before starting use.
Refer to Intro 67 for general precautions.

Heatless dryer

Manufacturer's Liability

⚠WARNING

■ The manufacturer cannot be held liable in the following cases:

- Serious errors in use occur due to the operator.
- Illegal modifications or repairs using nonstandard parts by user.

Design & Selection

⚠WARNING

■ Avoid direct sunlight and rain water. The resin parts, etc., could deteriorate and break.

■ Do not use this product where corrosive gasses are present.

■ Use this product within the range of working temperature.

■ Do not use where there is a risk of freezing.

The condensed water accumulated inside could freeze and cause product damage.

■ Do not use in dangerous places (atmosphere with risk of explosions, etc.).

■ Keep the intake temperature as low as possible. The desiccant absorption performance will drop if the temperature is high.

■ Do not use this product if inlet air contains corrosive gases, chemicals, organic solvents, or combustible gases.

■ Do not use where water drops, etc., could enter.

■ The SHD Series G type dew point display value is a reference accuracy. The accuracy will drop in low dew point areas.
The M type is recommended when using dew point control.

Installation & Adjustment

⚠CAUTION

■ "Class 2 pressure vessel" according to "safety regulation of boiler and pressure vessel" in Occupational Safety Sanitation Laws is applied in model no. SHD3075 to SHD3240.

■ Model SHD3075 to SHD3240 have a Class 2 pressure vessel withstand pressure proof certificate. This certificate must be kept in safe-keeping while using this product. (Applications to the Labor Standards Supervision Office are no longer required in Japan.)

■ This product may be used only in Japan.
(Consult with CKD for use overseas.)

■ Install this product on a stable, flat surface not subject to vibration.

■ Do not step onto this product.

■ Secure enough space for maintenance and inspection. (600mm or more on front, both sides and back.)

■ Stainless steel or galvanized steel pipes (white pipes) are recommended for pipe materials. Flush pipes before connecting.

■ Always use a fork lift to move the product. Set the fork lift's claws into the fork lift holes.
(Excluding compact HD Series)

■ Do not plug the fork lift holes as recycled air is discharged. (Only SHD Series)

■ Ground the GND.

■ The SHD Series has a filter.
Always install the enclosed oil removal filter (M type) on the primary side (inlet side) and the enclosed dust filter (P type) on the secondary side.
If the quality of the air flowing in is poor, install a separate filter in front of the M type filter. If the user requires a high air quality, install separate filters.

■ A filter is not provided with the series (HD Series) other than the SHD Series.
Purchase and install an appropriate filter for the system.

■ Install the filter as close to the dryer as possible.

During Use & Maintenance

Operation

⚠ CAUTION

■ Use this product within working pressure range.

■ Use this product within the power voltage range in specifications.

■ Energy-saving operation can be set randomly with the “ECO MODE” ON/OFF button. (Only SHD Series)

■ It is not possible to attain a stable dew point in applications where the working flow rate varies greatly.

■ In rare cases, the water drops may be discharged from the silencer section because of the air intake conditions and ambient temperature, etc. The user should prepare a drain pan in these cases.

Inspection / Maintenance

⚠ CAUTION

■ Desiccant replacement timing differs with the working conditions and required dew points. Refer to the dew point meter, and replace desiccant performance starts to drop.
When the required dew point (atmospheric dew point) is between -20 to -30°C, desiccant is normally replaced every 3 to 5 years. When the required dew point is -60°C or less, desiccant is replaced every 2 years.

■ Desiccant is an absorbent and, in addition to moisture, may absorb other materials in compressed air. Spent desiccant must be disposed properly as industrial waste.

■ Always replace the silencer when the regeneration tube pressure exceeds 0.05MPa, or when one year has passed.

■ The SHD Series G type temperature and humidity sensor should be replaced once a year. (Can not calibrate)
The M type dew point gauge should be calibrated once a year.

Repair parts

⚠ CAUTION

■ To ensure use for a long time, always periodically inspect the wear state, and replace the parts. Refer to the Instruction Manual enclosed with the product for details.

Periodical maintenance part

⚠ CAUTION

■ To ensure long use, regularly inspect maintenance parts and replace them based on the standard replacement cycle.
Refer to the Instruction Manual enclosed with the product for details.

Heatless dryer
HD/SHD

■ Components for air preparation and pressure adjustment / main line unit / desiccant type air dryer

Overview

Heatless dryer with pressure reducing self regeneration method to regenerate desiccant without using heat.
Stable ultra dry air can be easily supplied.

Features

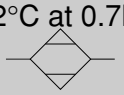
(1) Ultra dry air can be easily supplied
Ultra low dew point -60 to –72˚C (at atmospheric pressure)
(2) Easy maintenance
(3) With indicator for dew point monitor
Pressure dew point digital display (only SHD)
(4) High durability

CONTENTS

Desiccant type air dryer (compact heatless dryer)

HD Series

Stably supplying ultra dry air with atmospheric dew point -72°C.
Treating air flow rate: 75 to 1235 ℓ/min. (ANR) (atmospheric dew point -72°C at 0.7MPa)

JIS symbol 

Specifications

Descriptions	HD-0.5	HD-1	HD-1.5	HD-2	HD-4	HD-6	HD-9
Port size Rc	3/8						3/4
Inlet air pressure range MPa	0.2 to 1.0						
Inlet air temperature range ˚C	5 to 52						
Ambient temperature ˚C	-1 to 52						
Regeneration method	Self regeneration heatless type						
Regeneration cycle	1 minute (0.5 minute switchover)					4 minutes (2 minutes switchover)	
Power supply V	Single phase 100 VAC, 200 VAC 50/60Hz						
Power consumption W	26						52
Desiccant	Synthetic zeolite						
Product weight kg	6.5	7.0	7.5	9.5	11.5	21.5	42.5
Desiccant tube No.	15-8771	15-8772	15-8773	15-8774	15-8775	505026	505026
Desiccant charged number	15-8771-D	15-8772-D	15-8773-D	15-8774-D	15-8775-D	505026D	505026D
Indicator for dew point monitor	Standard equipment						
Silencer	Standard equipment						

Note 1. If oil is contained in the fluid, install a decreasing filter (oil mist type filter) to the inlet side, while install a filter with proper filtration rating (5 μm, 0.3 μm, oil mist filter) to OUT side.
Note 2. IN and OUT ports are provided at two points both left and right, so a port not used should be plugged with a blanking plug.
Note 3. Standard paint color is quality cool white (munsell No. 5GY7.5/0.5).
Note 4. If used in clean room, please consult with CKD.

How to order

HD – ( ) – ( ) – **AC100V**

Ⓐ Flow rate code

Symbol	Descriptions
Ⓐ Flow rate code	
0.5	
1	
1.5	
2	
4	
6	
9	

Ⓑ Option
Note 4

Ⓑ Option	
Blank	Standard
F	Optional color
G	Voltage assignment
H	English documentation
H1	Export packing
H2	SUS name plate
Y2	Product photo

Ⓒ Voltage

Ⓒ Voltage	
100 VAC	
200 VAC	

When placing an order

- Heatless dryer is adjusted to the required atmospheric dew point, flow rate, etc. at shipment. Always indicate following descriptions when placing an order.
- Model no. [ ]
- Required outlet flow rate [ ] ℓ/min (ANR)
- Required atmospheric dew point [ ] °C
- Inlet air pressure [ ] MPa
- Inlet air temperature [ ] °C

Note on model no. selection

Note 1. If oil is contained in the fluid, install a decreasing filter (oil mist type filter) to the inlet side, while install a filter with proper filtration rating to OUT side.
Note 2. The heatless air dryer is equipped with a dew point monitor (moisture indicator), allowing the drying state to be confirmed.
Note 3. The unit's performance may not be attained if used at less than the selected pressure. Always select the model with the working pressure.
Note 4. When ordering several options, indicate the required options in alphabetical order.

Selection guide

●Reading maximum flow rate table

Two kind of numbers are listed in each box in the maximum flow rate table. The upper numbers show the required inlet air flow rate to dry in lower flow rate. The lower numbers show maximum outlet flow rates in dry air. The differential between upper and lower numbers shows the required purge flow rate to regenerate and re-dry.

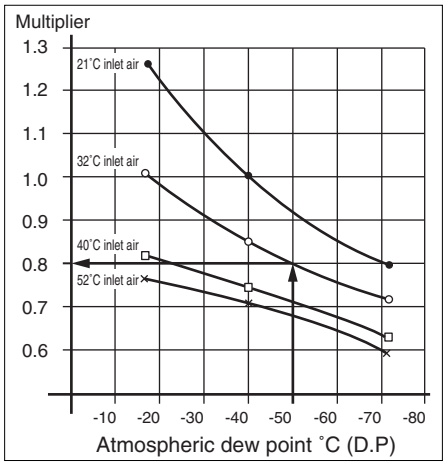
Maximum flow rate table

Unit: ℓ/min. (ANR)

Model no.		Atmospheric dew point -17.5 ˚C							Atmospheric dew point -40 ˚C							Atmospheric dew point -72 ˚C						
		HD-0.5	HD-1	HD-1.5	HD-2	HD-4	HD-6	HD-9	HD-0.5	HD-1	HD-1.5	HD-2	HD-4	HD-6	HD-9	HD-0.5	HD-1	HD-1.5	HD-2	HD-4	HD-6	HD-9
Inlet air pressure (MPa)	1.0	165	325	445	665	1,225	1,870	3,000	130	255	335	500	935	1,405	2,150	105	210	290	435	735	1,105	1,685
		145	280	380	570	1,085	1,645	2,605	110	210	270	405	795	1,180	1,830	85	165	225	340	595	880	1,345
	0.9	150	300	405	615	1,120	1,710	2,740	115	235	310	460	855	1,285	1,970	95	195	265	400	670	1,010	1,540
		130	255	340	520	980	1,485	2,345	95	190	245	365	715	1,060	1,650	75	150	200	305	530	785	1,200
	0.8	135	270	370	555	1,015	1,545	2,475	105	215	280	415	775	1,160	1,780	85	175	240	360	610	910	1,390
		115	225	305	460	875	1,320	2,080	85	170	215	320	635	935	1,460	65	130	175	265	470	685	1,050
	0.7	120	240	325	490	890	1,370	2,195	95	190	245	370	685	1,030	1,575	75	155	215	320	540	810	1,235
		100	195	260	395	750	1,145	1,800	75	145	180	275	545	805	1,255	55	110	150	225	400	585	895
	0.6	105	210	285	430	785	1,195	1,915	80	165	215	320	600	900	1,375	65	135	185	280	470	705	1,075
		85	165	220	335	645	970	1,520	60	120	150	225	460	675	1,055	45	90	120	185	330	480	735
	0.5	90	180	245	370	675	1,030	1,650	70	140	185	280	515	775	1,185	55	115	160	240	405	610	930
		70	135	180	275	535	805	1,255	50	95	120	185	375	550	865	35	70	95	145	265	385	590
	0.4	75	150	205	305	560	855	1,370	60	120	155	230	430	640	985	45	95	135	200	335	505	770
		55	105	140	210	420	630	975	40	75	90	135	290	415	665	25	50	70	105	195	280	430
	0.3	60	120	165	245	450	690	1,105	45	95	125	185	345	520	795	40	80	105	160	270	405	620
		40	75	100	150	310	465	710	25	50	60	90	205	295	475	20	35	40	65	130	180	280
	0.2	45	90	125	185	340	515	825	35	70	95	140	260	385	595	30	60	80	120	205	305	465
		25	45	60	90	200	290	430	15	25	30	45	120	160	275	10	15	15	25	65	80	125

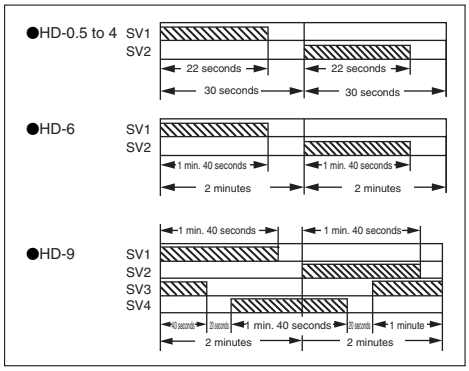
●Selection method

Above flow rate table applies where inlet air temperature 21°C, and atmospheric dew point -17.5°C, -40°C and -72°C.
If conditions differ, use the multiplier table below.
Inlet air flow rate = (inlet air flow rate at atmospheric dew point -40°C in max. flow rate table) x multiplier
Purge flow rate = (inlet air flow rate at atmospheric dew point -40°C in max. flow rate table) - (outlet air flow at atmospheric dew point -40°C in max. flow rate table)
Outlet air flow rate = (inlet air flow rate) - (purge flow)



(Example)
When pressure 0.9MPa, atmospheric dew point -50°C and inlet air temperature 32°C, inlet air flow rate, purge flow rate and outlet air flow rate of HD-4 are followings.
Inlet air flow rate =855 x 0.8≈684ℓ/min
Purge flow rate =855 – 715=140ℓ/min
Outlet air flow rate =684 – 140=544ℓ/min

Time chart



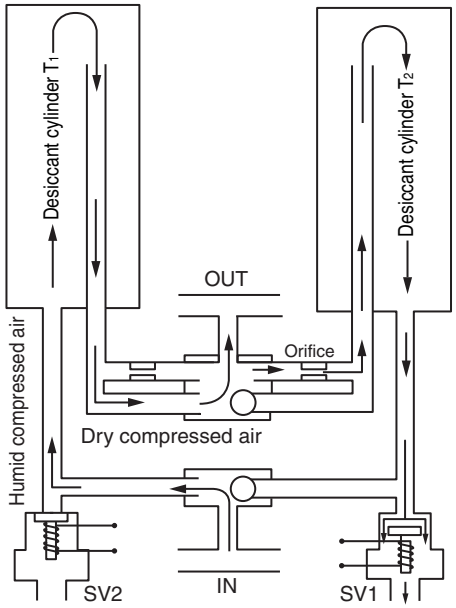
* Number of second indicates at 60Hz.
Multiply approx. 1.2 for 50Hz.

When heatless dryer is installed

●With 10 to 20% of usage rate, perform a trial operation for the following time at the first trial run after this machine is installed.

Atmospheric dew point (˚C)	-17.5	-40	-72
Hour (h)	2	6	72

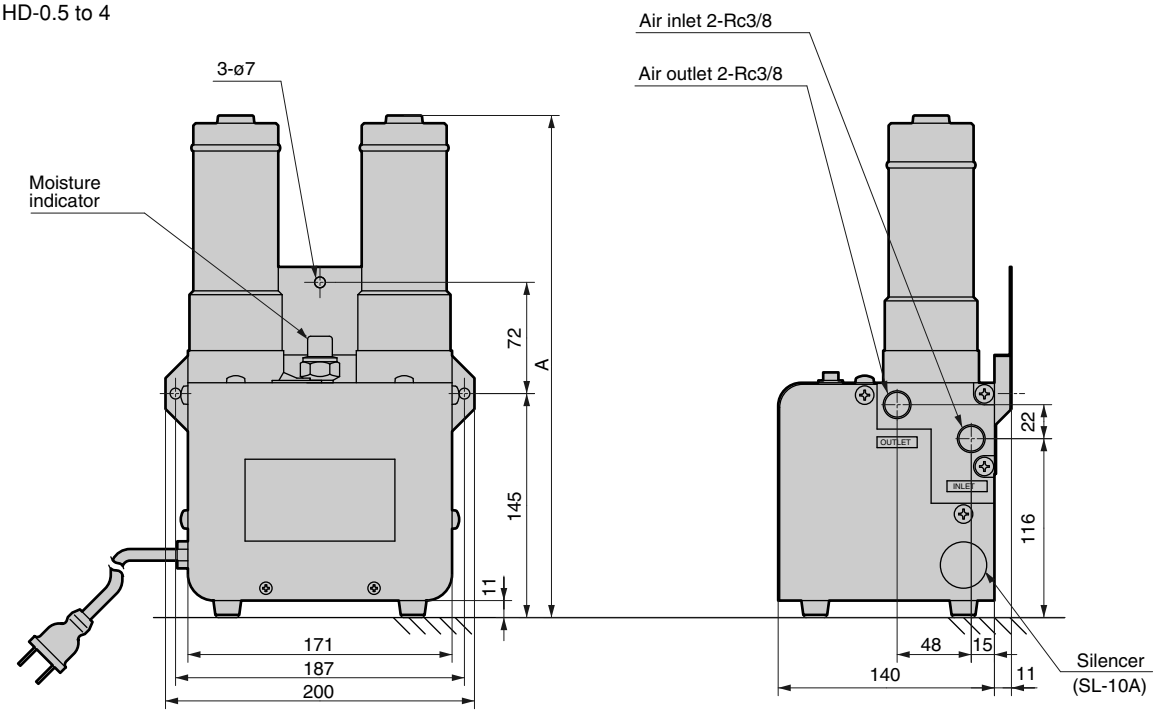
Functional explanation



Humid compressed air entered from IN passes through the shuttle valve, and enters into desiccant cylinder T_1. Viper in humid compressed air is absorbed with desiccant cylinder during flowing equally in the inside of desiccant, and finally ultra dry air goes out from OUT through the shuttle valve.
Some ultra dry air depressurized passing through the orifice, enters into desiccant cylinder T_2, and used to dry and regenerate the dry agent in desiccant cylinder T_2, and release to the atmosphere. This drying and regeneration process is switched by the timing motor in control box. This allows to continue to supply constant ultra dry air to the OUT side.

Dimensions

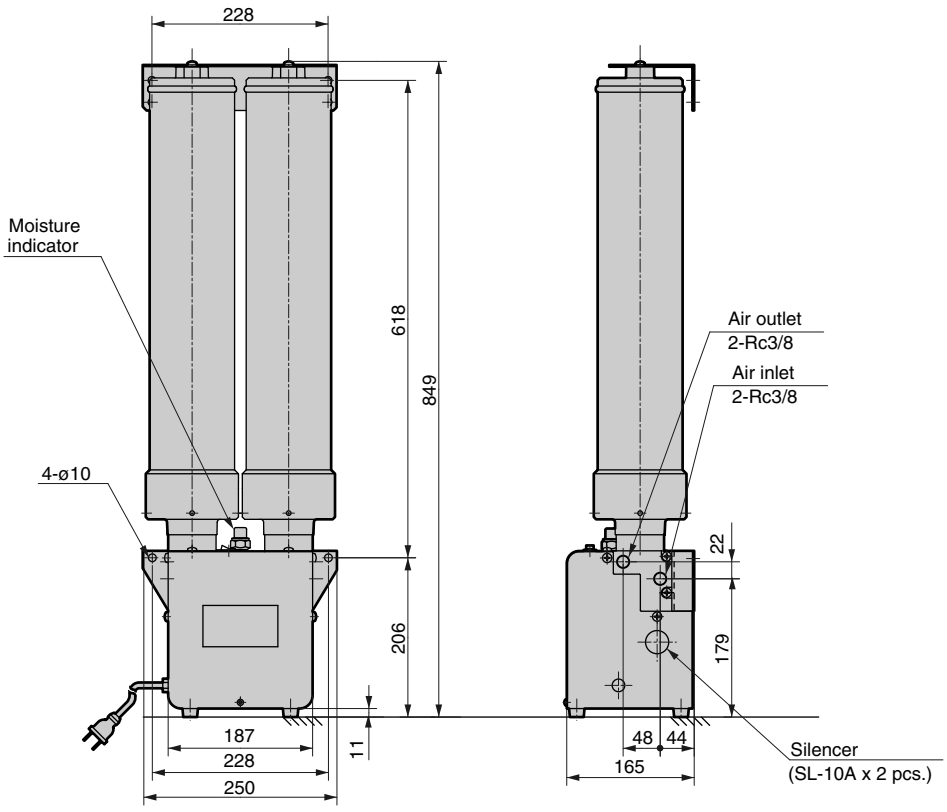
● HD-0.5 to 4



Model no.	Dimension A
HD-0.5	325
HD-1	440
HD-1.5	485
HD-2	467
HD-4	689

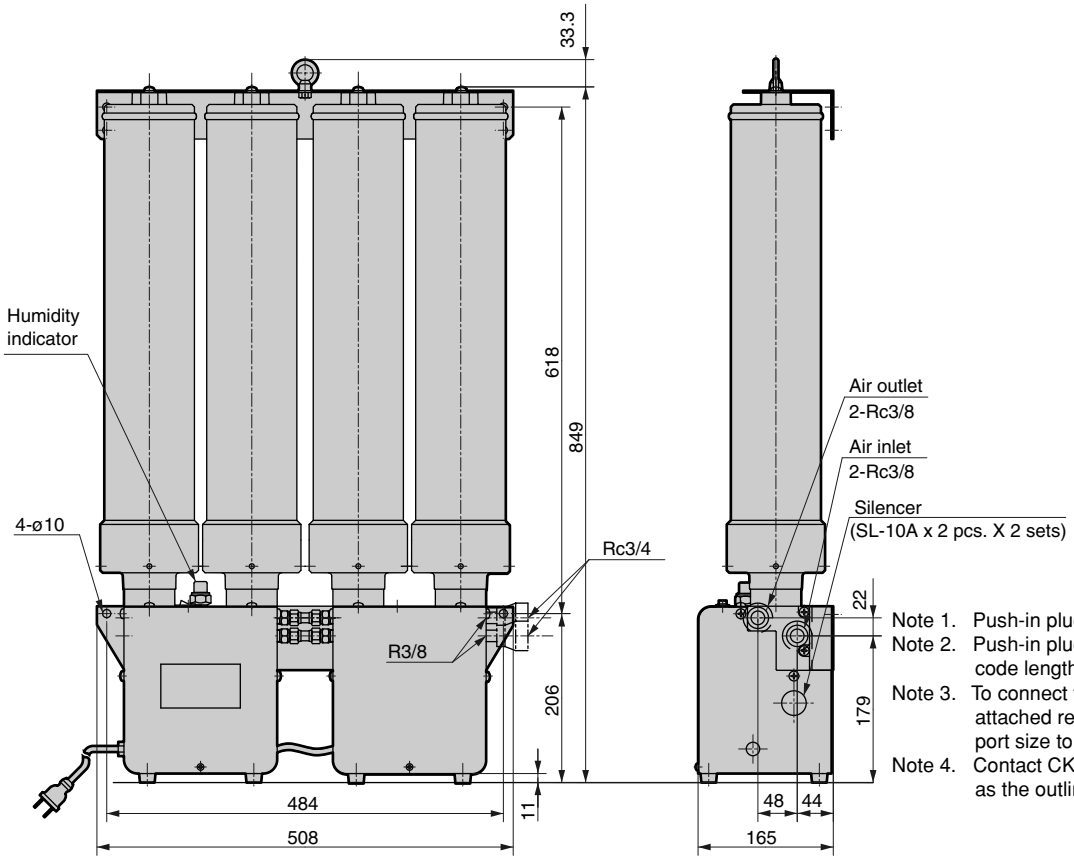
Dimensions

● HD-6



Dimensions

● HD-9



Note 1. Push-in plug is provided to 100 VAC (2.3m)
Note 2. Push-in plug is not provided to 200 VAC (with code length 2.3m)
Note 3. To connect to IN or OUT port of HD-9, use an attached reducing socket or nipple to adjust port size to 3/4B.
Note 4. Contact CKD for option G (specified voltage) as the outline dimensions are different.

Heatless - the eco-friendly model for improving environment performance

SHD Series

The purge flow is reduced (max. approx. 96%) with the energy-saving dew point monitor.
At the same time, noise is reduced with our original exhaust method.
The super heatless dryer SHD Series offers ultimate reliability, performance and ease-of-use.

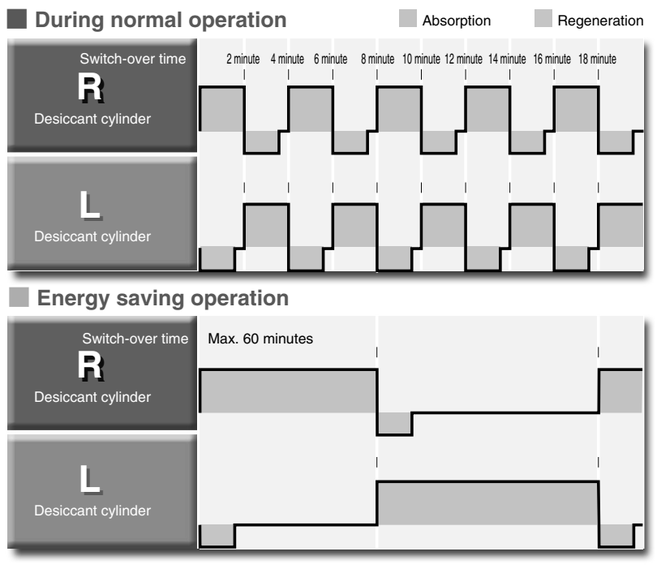
Energy saving

Eliminate unnecessary purging with dew point monitoring

The absorption ↔ regeneration changeover time can be variably controlled by directly monitoring the outlet air dew point.
This suppresses purging and enables optimum energy-saving operation.

During normal operation
Regardless of the outlet dew point, the cycle changes between absorption ↔ and regeneration at a two-minute interval.

Energy saving operation
If the set dew point is cleared when the mode is switched, the state can be maintained without changing the desiccant tube. When the set dew point is reached, the cylinder is changed and operation is returned to normal operation to keep the dew point.
The maximum changeover item is 60 minutes (purge flow rate is reduced by approx. 96% in this case).



Desiccant cylinder changeover time and purge reduction rate

Switch-over time	Purge reduction ratio
2 minutes	0%
4 minutes	50%
10 minutes	80%
20 minutes	90%
60 minutes	96%

Approx. 13% reduction even during normal operation

The optimum desiccant tube design allows the purging rate to be reduced by 13% even during normal operation.
(CKD comparison)

Reduce power consumption by one-third

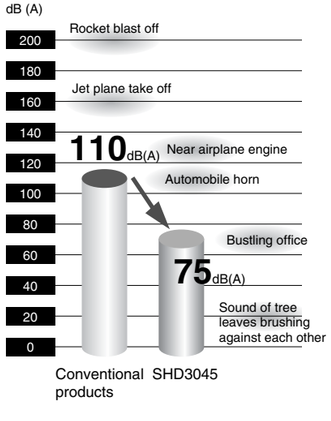
The electronic control system allows the power consumption to be reduced by one-third.
(CKD comparison)

Low noise level

Greatly reducing noise at changeover

The two-stage exhaust method (PAT.P) greatly reduces the noise by approx. 35dB (A) compared to the conventional parts.

Noise reduction
The human ear perceives as 10db reduction in noise as a reduction of **"noise by half"**.



ISO14001 compliant
Freon-less type

Greatly reducing foot print

1/3 to 1/2 (CKD comparison)

HEATLESS AIR DRYER
SHD 3000

Direct control of pressure dew point with values

A dew point sensor is equipped as a standard. The pressure dew point is displayed digitally, enabling accuracy confirmation of the performance.

Stainless steel tower

A non-corrosive stainless steel vessel is incorporated for the desiccant tube, thus improving the quality of supplied air and the unit's reliability.

Easy maintenance

The desiccant tube can be removed easily by turning it 45˚.
Safety is ensured by the latch mechanism which locks the tube.

Direct connection to air compressor

A refrigerating type dryer is no longer required on the inlet side.
This single unit accurately maintains the performance.

Standard filter on inlet and outlet

A filter is mounted on the inlet to maintain the heatless dryer's performance, and on the outlet to maintain the quality of supplied air. An AF2000 Series filter is mounted on both sides. (Enclosed)
The stainless steel type AF4000 and AF5000 series can also be selected as an option.

Ample 16 model lineup

A total of 16 models are available with eight types of air flows (2.5 to 24m³/minANR) and two types of dew point sensors (G: thermo-humidity sensor, M: dew point gauge).

Applicable compressor kW	15	22	37	55	75		95	125
Inlet air flow rate m³/min. (ANR)	2.5	4.5	7.5	10	12.5	15	20	24
G type	●	●	●	●	●	●	●	●
M type	●	●	●	●	●	●	●	●

Improved operability with electronic control system

Digital display of pressure dew point

The dew point faults and sensor faults, etc., are also displayed.

Energy-saving/normal operation selection

The mode can be easily and manually switched between the energy-saving mode and normal operation mode.

Selective energy-saving setting dew point

The G type has three stages, -10, -20, -40°C, and the M type has three stages -20, -40 and -60°C.
The setting can be made according to the required dew point, enabling optimum energy-saving.

Central control in control room, etc.

A remote operation, dew point sensor fault output terminal, dew point fault output terminal and dew point analog output terminal are provided as a standard.
The system's operation status can be centrally controlled.

ECO display

Indicator turns on to indicate that the energy-saving mode is activated.

Energy-saving rate display

The energy-saving rate for 24 hours can be displayed. Use this for daily control.

Desiccant type air dryer (heatless dryer)

SHD Series

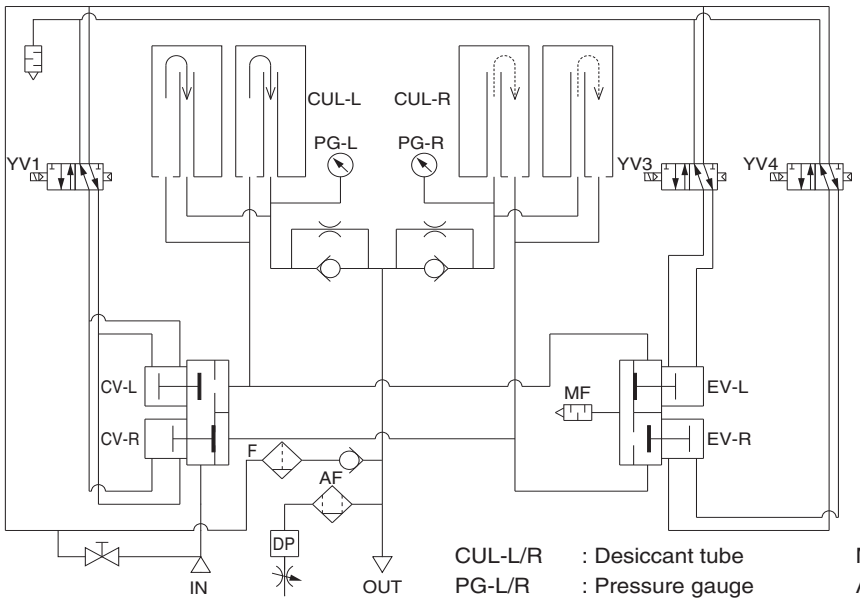
JIS symbol 

Specifications

Descriptions		SHD3025	SHD3045	SHD3075	SHD3100	SHD3125	SHD3150	SHD3200	SHD3240
Working fluid		Compressed air							
Inlet air pressure range MPa		0.4 to 1.0							
Inlet air temperature range ˚C		5 to 50							
Ambient temperature ˚C		0 to 40							
Rated conditions	Inlet air temperature ˚C	35 (no water drip)							
	Ambient temperature ˚C	25							
	Inlet air pressure MPa	0.7							
	Inlet air flow rate m³/min. (ANR)	2.5	4.5	7.5	10	12.5	15	20	24
	Outlet pressure dew point ˚C	-20, -40, -60							
	Average purge ratio %	–20˚C : 14 /–40˚C : 16.5 /–60˚C : 23							
Desiccant tube module number		1	2	3	4	5	6	8	10
Regeneration method		Self regeneration heatless type							
Desiccant		Activated alumina, synthetic zeolite							
Dew point sensor		G type: Capacitance type thermo-humidity sensor M type: Dew point gauge (capacitance type sensor)							
Power supply		Single phase 100/200 VAC 50/60Hz							
Power consumption		15W							
Port size	Rc	1	1	1 1/2	1 1/2	2	2	2 1/2	2 1/2
Product weight	kg	120	180	240	300	370	430	550	670
Enclosed filter (inlet side) standard		AF2004M-25	AF2007M-40	AF2010M-40	AF2013M-50	AF2013M-50	AF2020M-50	AF2026M-65	AF2026M-65
Enclosed filter (outlet side) standard		AF2004P-25	AF2007P-40	AF2010P-40	AF2013P-50	AF2013P-50	AF2020P-50	AF2026P-65	AF2026P-65
Enclosed filter (inlet side) option E2		AF4004M-25	AF4007M-40	AF4010M-40	AF4010M-40	AF4013M-50	AF4020M-50	AF5032M-80	AF5032M-80
Enclosed filter (outlet side) option E2		AF4004P-25	AF4007P-40	AF4010P-40	AF4010P-40	AF4013P-50	AF4020S-50	AF5032P-50	AF5032P-80

Note 1: Standard paint color is quality cool white (munsell No. 5GY7.5/0.5).
Note 2: Install the enclosed filters on the inlet side and outlet side. Additional filters may be required depending on this system. Prepare such filters separately if required.
Note 3: ANR indicates the state at 20˚C atmospheric pressure and relative humidity 65%.
Note 4: S type is applied only for the outlet of SHD3150 option E2.
Note 5: AF5032 is used only for the SHD3200 and SHD3240 option E2.
Note 6: Refer to page 163 and 173 in the catalog for details on the enclosed filter.

Functional explanation



The wet compressed air which enters from INV passes through the valve CV and into the desiccant tube CUL-L. The wet compressed air flows evenly through the desiccant, which absorbs the moisture in the compressed air. The ultra dry air then passes through the check valve and is discharged from OUT.
Some of the ultra dry air which is depressurized by the orifice enters the desiccant tube CUR-L and is used to regenerate and dry the CURL-R desiccant. It is then discharged to the atmosphere.
Part of the air discharged from OUT is led to the dew point sensor DP where the dew point is measured. This dew point determines whether to activate the energy-saving mode which extends the changeover time.
(The changeover time is extended after the absorption process ends and the pressure of both tubes rises.)

CUL-L/R : Desiccant tube
PG-L/R : Pressure gauge
CV-L/R : Inlet switching valve
EV-L/R : Exhaust switching valve
(L/R indicate left and right.)
MF : Noise reduction device
AF : Dew point sensor protection filter
DP : Dew point sensor D
YV1 : Valve for inlet switching valve
YV3/4 : Valve for exhaust switching valve

How to order

SHD3 045 - G 07 - 40 - E - AC100V

Model no.

Ⓐ Flow rate code

Symbol	Descriptions
Ⓐ Flow rate code	
025	2.5m³/min. (ANR)
045	4.5m³/min. (ANR)
075	7.5m³/min. (ANR)
100	10m³/min. (ANR)
125	12.5m³/min. (ANR)
150	15m³/min. (ANR)
200	20m³/min. (ANR)
240	24m³/min. (ANR)

Ⓑ Sensor type
Note 1

Ⓑ Sensor type	
G	Thermo-humidity sensor
M	Dew point hygrometer

Ⓒ Inlet air pressure

Ⓒ Inlet air pressure	
04	0.4MPa
05	0.5MPa
06	0.6MPa
07	0.7MPa
08	0.8MPa
09	0.9MPa
10	1MPa

Ⓓ Outlet pressure dew point

Ⓓ Outlet pressure dew point	
20	-20˚C
40	-40˚C
60	-60˚C

Ⓔ Option
Note 3

Ⓔ Option	
E	Standard (AF2000 enclosed)
E1	Without enclosed filter
E2	AF4000 Series enclosed
F	Optional color
G	Voltage assignment
H	English
H1	Export packing
L	Anchor bolt nut (SS400)
L1	Anchor bolt nut (SUS304)

Ⓕ Voltage

Ⓕ Voltage
100 VAC
200 VAC

⚠ Note on model no. selection

Note 1: The outlet pressure dew point "-60˚C" specifications cannot be selected for the sensor type "G".
The "G" type dew point display value is a reference accuracy. The accuracy will drop especially at low dew point areas. Use of the "M" type is recommended if importance is to be laid on dew point control.

Note 2: The required performance may not be attained if using at a level less than the selected pressure. Always select the model with the working pressure.

Note 3: When ordering several options, indicate the required options in alphabetical order.

<Example of model number>

SHD3045-G07-40-EL-AC100V

Model: Heatless dryer

- Ⓐ Flow rate code : 4.5m³/min. (ANR)
- Ⓑ Sensor type : Thermo-humidity sensor
- Ⓒ Inlet air pressure : 0.7MPa
- Ⓓ Outlet pressure dew point : –40˚C
- Ⓔ Option : Anchor bolt nut
- Ⓕ Voltage : 100 VAC

	Dew point sensor type	Rated dew point ˚C (Note 1)	Energy-saving/setting dew point ˚C (Note 2)	
SHD3000 Series	-G	-20	-10	3 stage switching
		-40	-20	
			-40	
	-M	-20	-20	3 stage switching
		-40	-40	
		-60	-60	

Note 1: Default
(Setting purge rate)

Note 2: Set by user
Select randomly from three stages according to the application and usage state.

If the load is smaller than the rating, the energy-saving operation mode will be activated at this set temperature.

Selection guide

Maximum flow rate table Values at inlet temperature 35°C.

Model no.	SHD3025	SHD3045	SHD3075	SHD3100	SHD3125	SHD3150	SHD3200	SHD3240
Inlet air flow rate	2.5	4.5	7.5	10	12.5	15	20	24

Note 1: The same air flow rate is applied at the -20, -40 and -60˚C specifications.

Unit: m³/min. (ANR)

●Selection method

The above flow rate table shows the values for the inlet pressure 0.7MPa and inlet air temperature 35˚C.
If the conditions are different, obtain the values with the following coefficient table and curves.

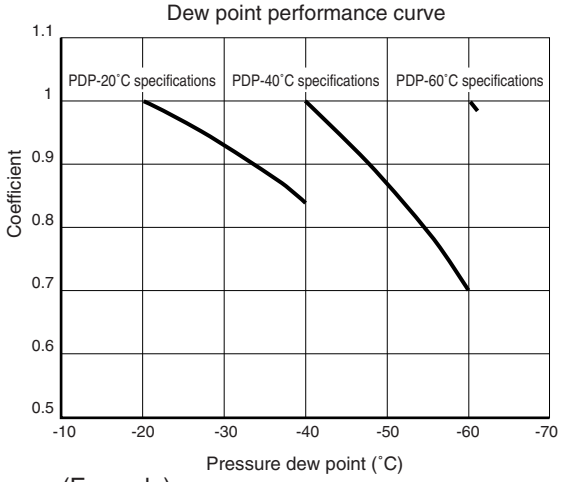
Inlet air flow rate = (Inlet flow rate in max. flow rate table (Note 2)) x (pressure coefficient) x (temperature coefficient)
Purge flow rate (Note 3) = (Inlet flow rate in max. flow rate table (Note 2)) x (purge rate for each dew point (Note 4))
Outlet air flow rate = (inlet air flow rate) - (purge flow rate)

Note 2: Value shown above, which is determined by model.
Note 3: Indicates average value.
Note 4: 14% for -20˚C specifications, 16.5% for -40˚C specifications and 23% for -60˚C specifications.
Note 5: Abbreviation for PDP (pressure dew point).

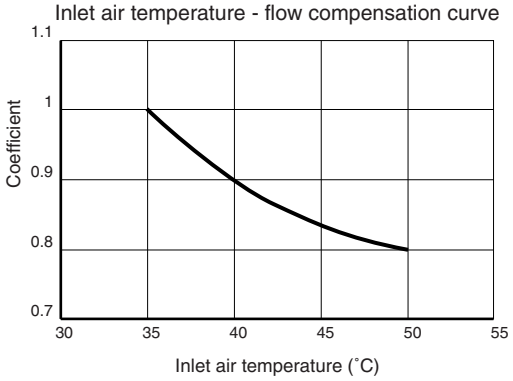
Pressure coefficient table (Always select with the working pressure)

Input air pressure (MPa)	0.4	0.5	0.6	0.7	0.8	0.9	1
Coefficient	0.63	0.75	0.88	1.00	1.13	1.25	1.38

Dew point performance curve



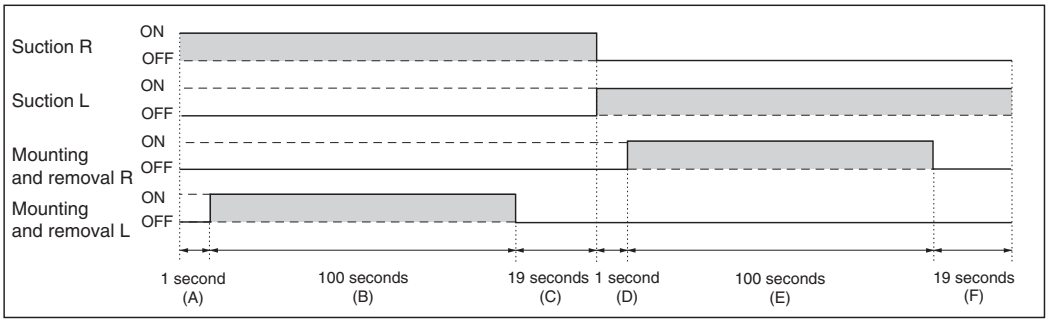
Inlet air temperature - flow compensation curve



(Example)
SHD3045 air flow rate at pressure 0.6MPa, pressure dew point -40˚C and inlet air temperature 50˚C.

Inlet air flow rate = 4.5 x 0.88 x 0.8 = 3.168m³/min.
Purge flow = 4.5 x 0.165 = 0.743m³/min.
Outlet air flow = 3.168 - 0.743 = 2.425m³/min.

Time chart



The normal process is shown on the left.
During energy-saving, the state (C.F) after absorption ends is held. If the dew point worsens after that, the changeover resumes, and the normal process is returned to.

B, E indicate the absorption (regeneration) time
C, F indicate the pressure rise time

When heatless air dryer is installed

●The SHD3075 to SHD3240 models are equipped with a Class 2 Pressure Vessel Withstand Certificate.
This certificate must be kept in safekeeping while this system is in used. (Application of the Labor Standards Bureau is no longer required.)

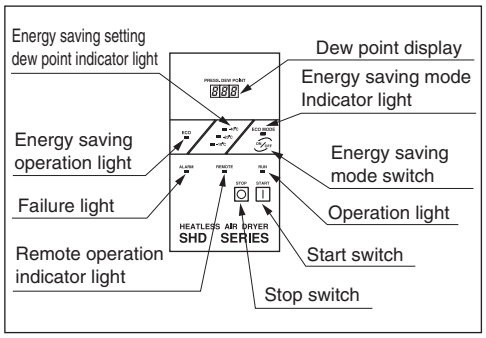
●When starting test operation after installing this system, flow air at 10 to 20% of the working flow rate for the following operation time.

Pressure dew point (˚C) (Note 6)	-20	-30	-40	-60
(References) atmospheric dew point (˚C)	-40	-48	-57	-74
Time (h)	6	12	24	72

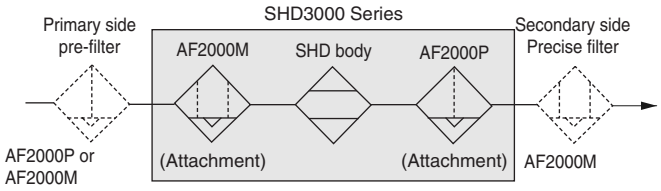
Note 6: The pressure dew point is for 0.7MPa.

Dimensions

Operation panel



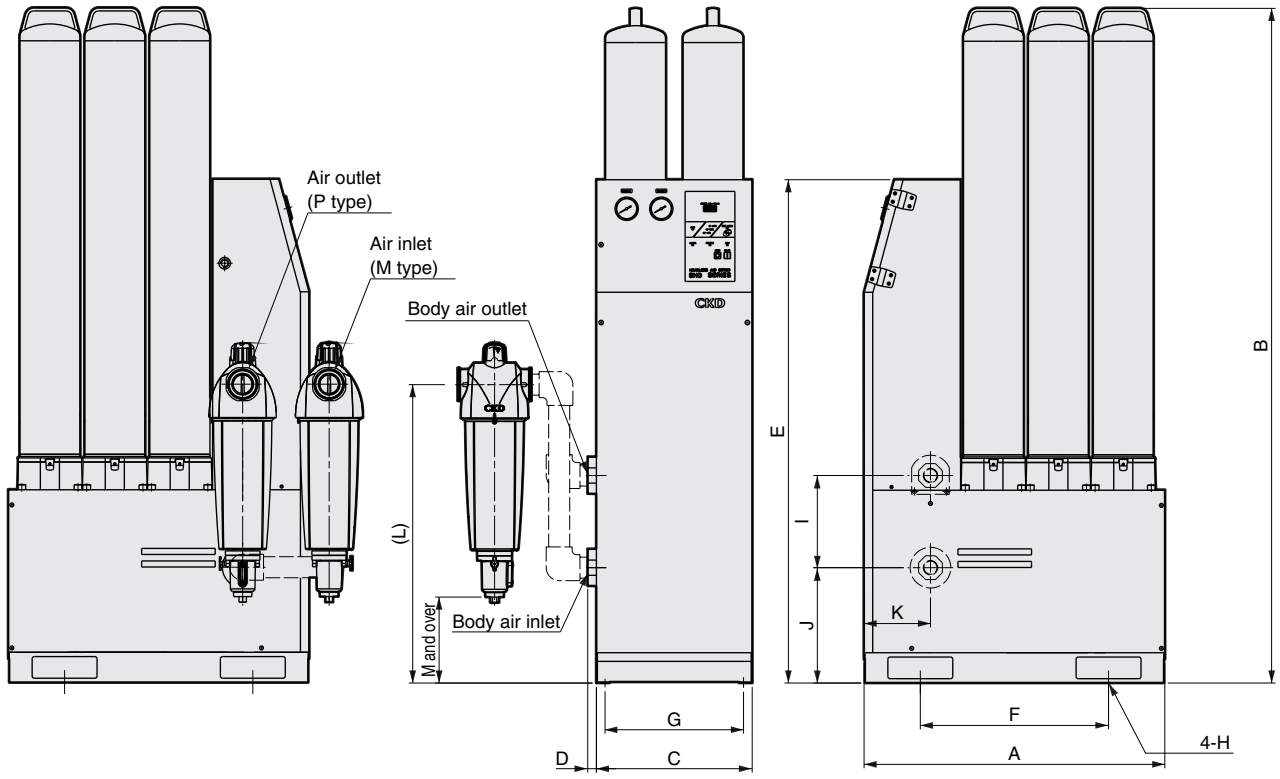
■Piping system



For possible use in an oiled air compressor line, the SHD3000 Series is equipped with an AF2000M type for the heatless dryer's primary side and the AF2000P type for the secondary side. If necessary, provide a pre-filter on the primary side or a precision filter on the secondary side. When selecting the AF4000 or 5000 Series as an option, also select the AF4000 and 5000 Series for the separately installed filter.

●Filter performance

	AF2000P	AF2000M	AF4000P AF5000P	AF4000S	AF4000M AF5000M
Filtration rating (μm)	1	0.01	5	1	0.01
Secondary side oil content concentration (mg/m³)	0.6	0.01	–	–	0.01



* The drawing shows the AF2000.

Model no.	Port size	A	B	C	D	E	F	G	H	I	J	K	L	M	L (Option E2)	M (Option E2)
SHD3025	Rc1	545	1559	360	20	1163	285	320	ø12	213	266.5	153.5	410	70	570	126
SHD3045	Rc1	545	1559	360	20	1163	285	320	ø12	213	266.5	153.5	500	70	730	212
SHD3075	Rc1 1/2	695	1559	360	20	1163	435	320	ø12	213	266.5	153.5	591	100	940	314
SHD3100	Rc1 1/2	845	1559	360	20	1163	585	320	ø12	213	266.5	153.5	683	100	940	314
SHD3125	Rc2	995	1589	360	20	1193	590	330	ø15	213	296.5	153.5	683	100	1100	387
SHD3150	Rc2	1145	1589	360	20	1193	700	330	ø15	213	296.5	153.5	683	100	1420	550
SHD3200	Rc2 1/2	1445	1589	360	20	1193	780	330	ø15	213	296.5	153.5	810	120	1255	–
SHD3240	Rc2 1/2	1745	1589	360	20	1193	780	330	ø15	213	296.5	153.5	810	120	1255	–

The piping shown with dotted lines in the drawing is not enclosed, and must be prepared by the user.
The filter is enclosed.
Install an M type filter on the inlet side and a P type on the outlet side. Prepare such filters separately if required.
The M dimensions show the minimum dimensions required to remove the element. Allow for the auto drain piping dimensions when actually laying the pipe.