

Ingersoll Rand Air treatment Solutions



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(Dedicated expert to unlock the potential of your business)



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(More detailed understanding of post-processing)



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05 Promotion expert

(Have a full understanding of the product and give excellent recommendations)



06 Quality improvement

(Proactively find problems and solve problems in time)





01

About us

- Company profile
- Product type
- Marketing network



Company profile



COMPANY PROFILE

Ingersoll Rand Inc., driven by an entrepreneurial spirit and ownership mindset, is dedicated to helping make life better for our employees, customers and communities. Customers lean on us for our technology-driven excellence in mission-critical flow creation and industrial solutions across 50+ respected brands where our products and services excel in the most complex and harsh conditions. Our portfolio of products consists of air compressors, pumps, blowers, and systems for fluid management, loading and material handling as well as power tools.

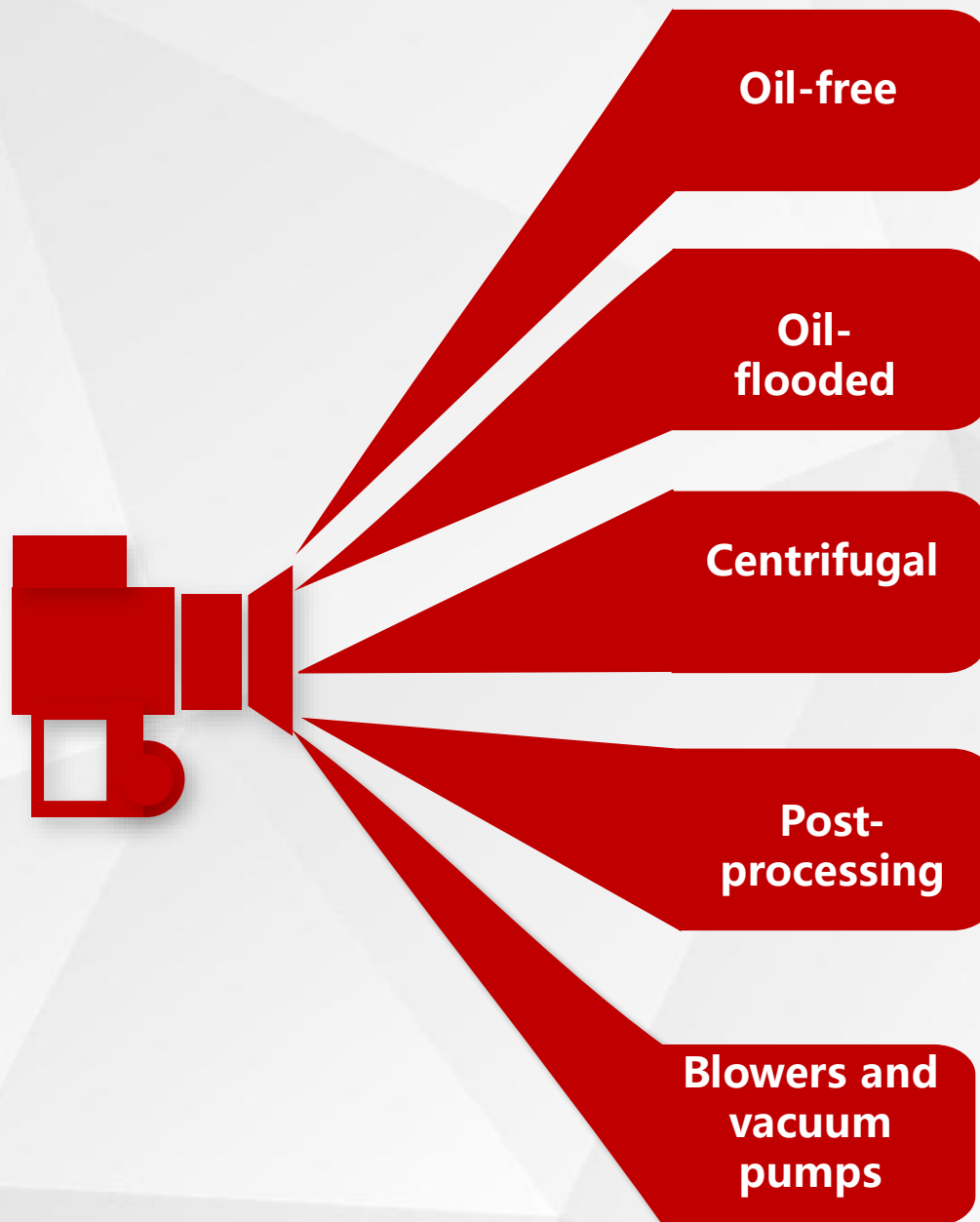
The Ingersoll Rand Group's brands include: Ingersoll Rand, Gardner Denver, Elmo Rietschle, Robuschi and dozens of other well-known companies in the field of air compressors, blowers and vacuum pumps.



Product type

Ingersoll Rand products

Reliable, efficient and low-maintenance systems and solutions for any industry



Oil-free compressors - screw & scroll

Our oil-free air compressors provide 100% oil-free air and comply with the ISO 8573-1:2000 air quality standards

Oil-flooded compressors - screw & piston

Many of our compressors are developed using our design expertise, equipped with VSD drives and having intuitive user interfaces

Centrifugal compressors

Our market coverage extends to the applications with higher pressure, higher flow rate and process gas compression

Air post-processing

We provide complete and comprehensive air compression systems, covering refrigerated air dryer, desiccant dryer, filter and other Air treatment equipment in addition to various types of compressors in the front end

Blowers and full-range vacuum pumps

Blowers include: screw, Roots, centrifugal and magnetic levitation

Types of vacuum pumps include: dry screw, oil-lubricated screw, dry rotary vane, oil rotary vane, rotary vane and flow measuring blower, which meet various fields and applications



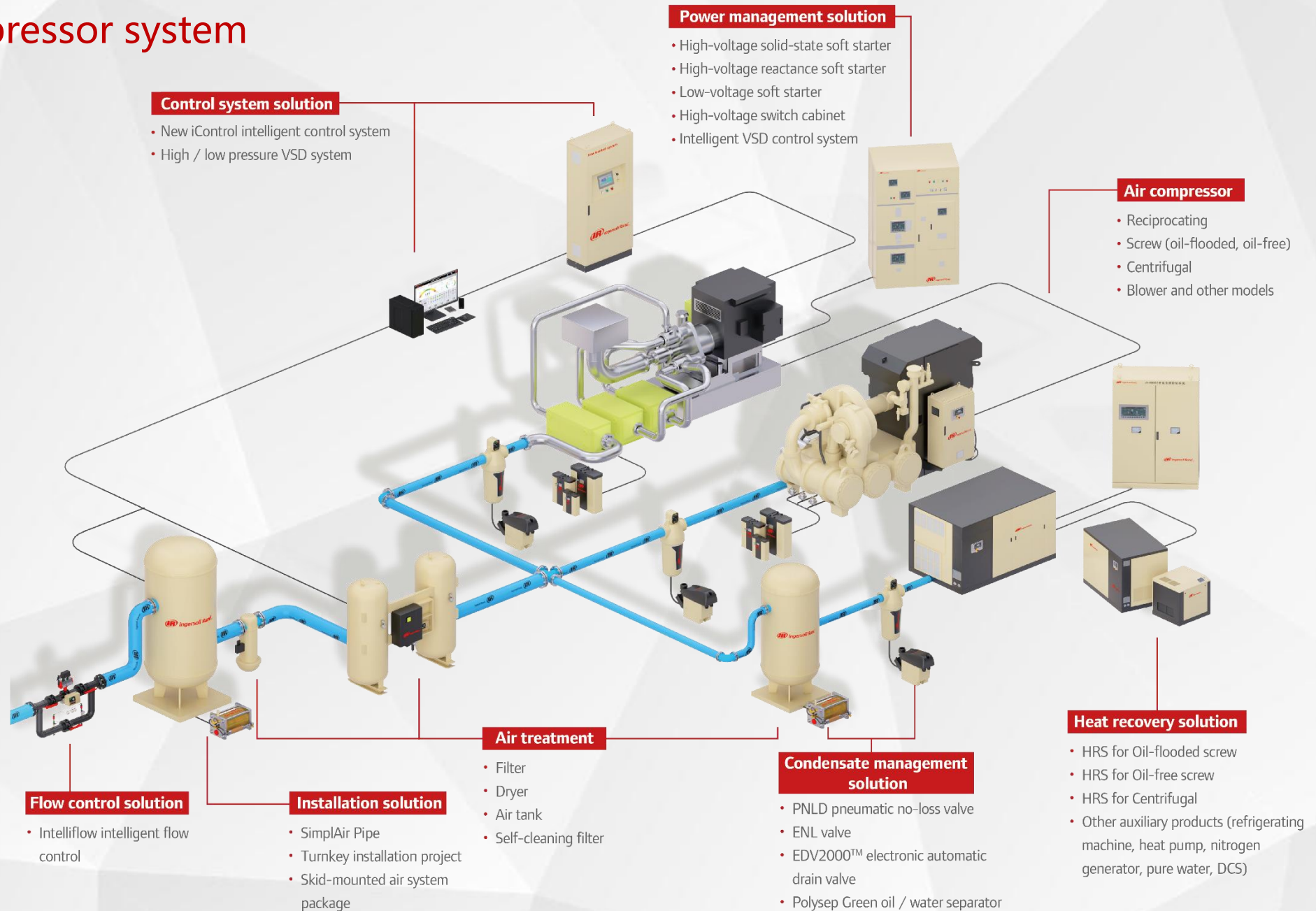
02

Understand post-processing

- Air compressor system
- Moisture in the compressed air
 - Terms and definitions
 - Grade of air quality
- Industrial application

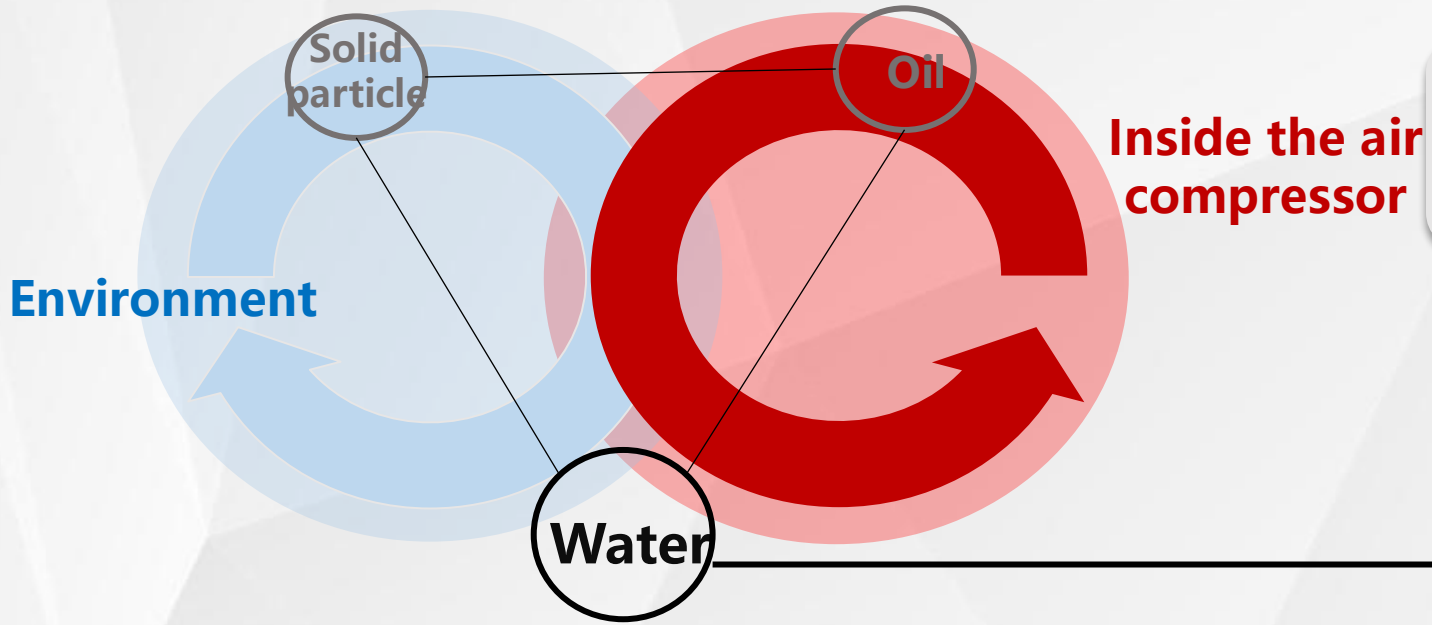


Air compressor system



Air compressor system

Three major pollutants requiring post-treatment



How does the moisture in compressed air come about?





Moisture in the air



- Air is like a sponge. It can absorb and carry moisture
 - The more moisture
 - The higher the humidity

- When we turn on the air compressor to compress the air, the moisture will be "squeezed" out

- Wet compressed air





Moisture in the air

Pipeline corrosion (direct and major hazard)



Corroding the inner wall of pipelines

- **Increasing** pipeline **pressure drop**
- Causing pipeline **leakage**, energy loss and increased operating cost
- Increasing pipeline maintenance **cost**

Damaging gas consumption equipment

- **Reducing** the performance and service life of gas consumption equipment
- Leading to **production suspension** and greatly reducing productivity



Damaging connected pneumatic tools

Damaging the quality of end products

- **Reducing** pass rate, and affecting productivity and product compliance
- Increasing the workload of returned goods, and leaving the production cost uncontrolled
- If **unqualified** products are delivered, it will also **damage** the reputation of the product and lead to a reduction in orders



Producing defective products

Hazards



Terms and definitions - Relative Humidity

Formula

$$\text{相对湿度 } RH\% = \frac{\text{空气中的水分}}{\text{最多能承载的水分量}}$$

maximum water content that can be loaded

Constant value

Depending on pressure and temperature

Pressure



RH%



- In a certain environment, the living space of water decreases

Temperature



RH%



- Due to expansion and contraction, the living space of water increases

When RH reaches 100%, we call it: **"Dew Point"**



Terms and definitions - Pressure Dew Point

"The temperature at which water vapor begins to condense into water at a given pressure."

The lower the PDP, the less water vapor there is in the compressed air

At 3°C dew point,
moisture content
decreases by
30%
compared with
7°C dew point

At -20°C dew point,
moisture content
decreases by
82%
compared with 3°C
dew point

At -40°C dew point,
moisture content
decreases by
87%
compared with
20°C dew point

Dew Point (°C)	Grams of water vapor per kg of air (g/kg)
-40	0.1
-35	0.2
-30	0.3
-25	0.51
-20	0.75
-10	1.8
0	3.8
5	5
10	7.8
15	10
20	15
25	20
30	27.7
35	35
40	49.8

At average sea level pressure



Grade of air quality

ISO 8573.1

ISO	Solid particle				Water		Oil
8573-1: 2010	Maximum number of solid particles per m ³ of air			Concentration	Vapor	Liquid	Total content (oil mist, oil drop and vapor)
CLASS	0.1-0.5 μm	0.5-1 μm	1 μm	mg/m ³	Pressure dew point	g/m ³	mg/m ³
0	Defined by the user or supplier						
1	≤20,000	≤400	≤10	-	≤-70°C	-	0.01
2	≤400,000	≤6,000	≤100	-	≤-40°C	-	0.1
3	-	≤90,000	≤1,000	-	≤-20°C	-	1
4	-	-	≤10,000	-	≤+3°C	-	5
5	-	-	≤100,000	-	≤+7°C	-	-
6	-	-	-	≤5	≤+10°C	-	-
7	-	-	-	5-10	-	≤0.5	-
8	-	-	-	-	-	0.5-5	-
9	-	-	-	-	-	5-10	-

Industrial application - Spraying

Examples of oil-lubricated machine Air treatment equipment deployment

Reduce cost

•The purity and dryness of compressed air can minimize the pressure loss caused by pipeline rust and reduce the use cost of compressed air

Class 2-4-1

•Common gas quality requirements for general manufacturing, spraying industry and gas consumption of pneumatic tools

•Select **D-grade and G-grade** filters for effective removal of solid particles and oil particles

•Refrigerated air dryer effectively removes moisture

•Through the **H-grade** efficient precision filter, the filtration accuracy for solid particles and oil particles is up to 0.01μm

ISO	Solid particle			Concentration mg/m ³	Water		Oil
	Maximum number of solid particles per m ³ of air				Vapor	Liquid	Total content (oil mist, oil drop and vapor)
CLASS	0.1-0.5 μm	0.5-1 μm	1 μm		Pressure dew point	g/m ³	mg/m ³
0	Defined by the user or supplier						
1	≤20,000	≤400	≤10	-	≤-70°C	-	0.01
2	≤400,000	≤6,000	≤100	-	≤-40°C	-	0.1
3	-	≤90,000	≤1,000	-	≤-20°C	-	1
4	-	-	≤10,000	-	≤+3°C	-	5
5	-	-	≤100,000	-	≤+7°C	-	-
6	-	-	-	≤5	≤+10°C	-	-
7	-	-	-	5-10	-	≤0.5	-
8	-	-	-	-	-	0.5-5	-
9	-	-	-	-	-	5-10	-



Ingersoll Rand 2nd generation R series oil-flooded rotary screw air compressor



Air collector



D-grade and G-grade filters

2



D-INRi series refrigerated air dryer

4



H-grade filters

1

Industrial application - Electronics

Examples of oil-free machine Air treatment equipment deployment

Impurities in the environment

• Although the oil-free machine does not bring oil particles into the compressed air process, the ambient air has contained ***various pollutants*** before entering the compressor, so it also requires fine post-processing

Class 1-2-1

- Common gas quality requirements in the electronics industry
- Select **G-grade and H-grade** filters for ***effective removal of solid particles and oil particles of 0.01µm and above***
- The **desiccant dryer** produces compressed air with a ***pressure dew point of -40 °C***
- Through **D-grade and A-grade** ***efficient precision filters, oil mist and other impurities can be removed***

ISO	Solid particle			Concentration	Water		Oil
	Maximum number of solid particles per m ³ of air				Vapor	Liquid	Total content (oil mist, oil drop and vapor)
CLASS	0.1-0.5 µm	0.5-1 µm	1 µm	mg/m ³	Pressure dew point	g/m ³	mg/m ³
0	Defined by the user or supplier						
1	≤20,000	≤400	≤10	-	≤-70°C	-	0.01
2	≤400,000	≤6,000	≤100	-	≤-40°C	-	0.1
3	-	≤90,000	≤1,000	-	≤-20°C	-	1
4	-	-	≤10,000	-	≤+3°C	-	5
5	-	-	≤100,000	-	≤+7°C	-	-
6	-	-	-	≤5	≤+10°C	-	-
7	-	-	-	5-10	-	≤0.5	-
8	-	-	-	-	-	0.5-5	-
9	-	-	-	-	-	5-10	-



Ingersoll Rand R series oil-free screw air compressor



Air collector



G-grade and H-grade filters

1



D-IBRi series desiccant dryer

2



D-grade and A-grade filters

1



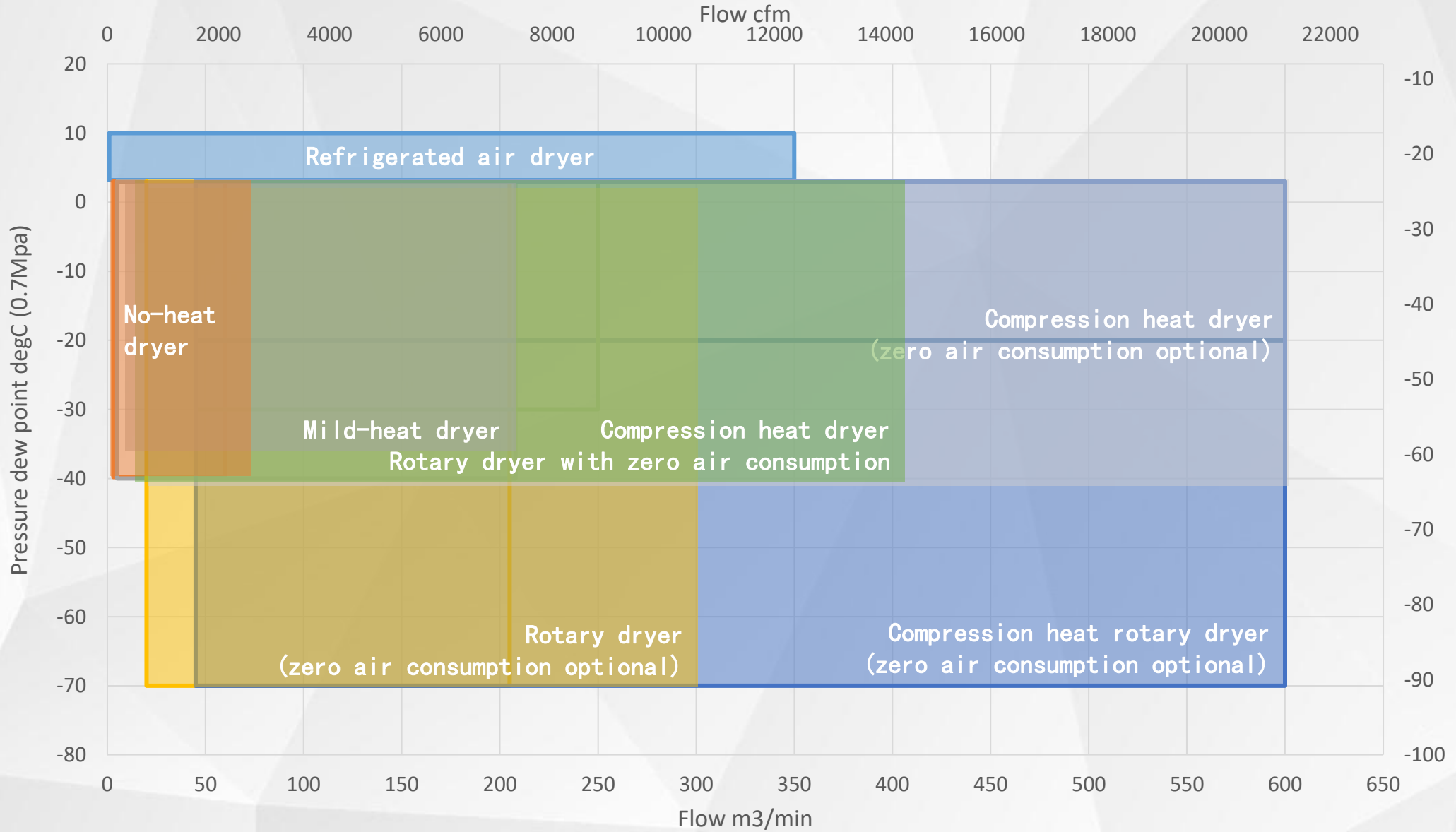
03

**Product
family**

- Product model
- Refrigerated dryer
- Adsorption dryer
- Filter



Product model





Refrigerated dryer



D-HP series

- Flow range: 0.5-55.6m³/min
- Pressure dew point: 10°C
- Standard working conditions: air inlet pressure at 30-80bar, ambient temperature at 45°C, maximum air inlet temperature at 80°C



D-INRi series

- Flow range: 0.7-145m³/min
- Pressure dew point: 7°C
- Standard working conditions: air inlet pressure at 7bar, ambient temperature at 30°C, air inlet temperature at 40°C



DM-INR series

- Flow range: 23-68m³/min
- Pressure dew point: 10°C
- Standard working condition: air inlet pressure at 7bar
- Ship-application level



Adsorption dryer



HCD compression heat regenerative desiccant dryer

- Flow range: 40-400m³/min
- Pressure dew point: -20°C/-40°C
- Standard working conditions: pressure at 7-10bar, air inlet temperature at 120°C/180°C

D-IBRi blower heat regenerative desiccant dryer

- Flow range: 14-300m³/min
- Pressure dew point: -40°C/-70°C
- Standard working conditions: working pressure at 7bar, ambient temperature at 38°C, air inlet temperature at 38°C

D-ILRi/IERi No-heat/mild-heat regenerative desiccant dryer

- Flow range: 1.2-155m³/min
- Pressure dew point: -20°C/-40°C
- Standard working conditions: working pressure at 7bar, ambient temperature at 38°C, air inlet temperature at 38°C

IRDR rotary desiccant dryer

- Flow range: 5.1-84.2m³/min
- Pressure dew point: -40°C
- Standard working conditions: working pressure at 7bar, ambient temperature at 40°C, air inlet temperature at 38°C



F-IU absolute filter pipeline filter

- ISO 8573.1:2001
- Test meeting ISO12500
- Standard 304 stainless steel
- Pressure drop resistance: 3.5bar@60°C
- Steam sterilization resistance: 142°C, 225 times in 30 minutes



FA Conventional pipeline filter

- ISO 8573.1:2001
- Test meeting ISO12500
- Patented double-pointer differential pressure indicator
- Ergonomic filter cup design



F-NG Energy-saving filter

- Dust removal accuracy up to: 0.1 micron
- Oil removal efficiency up to: 0.015ppm
- Differential pressure at 0.034-0.07bar
- Saving energy by 4Psig compared with ordinary filter = 2% system energy efficiency



04

Product advantages

- D-INRi refrigerated air dryer
- D-ILRi/IERi desiccant dryer
- D-IBRi desiccant dryer
- HCD desiccant dryer
 - IRDR desiccant dryer
- D-ICR desiccant dryer
- FA filter
- F-IU filter
- F-NG filter



D-INRi refrigerated air dryer



Product introduction

Working principles

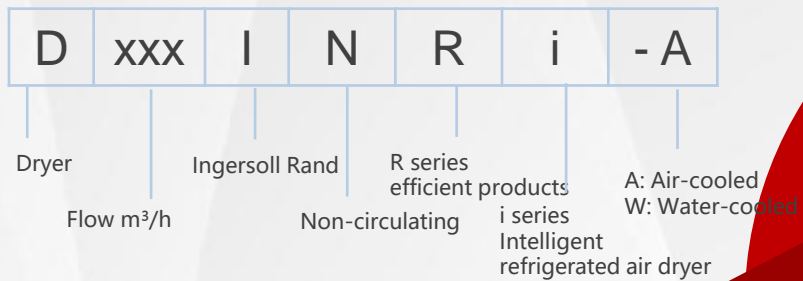
Model selection

Product advantages and disadvantages



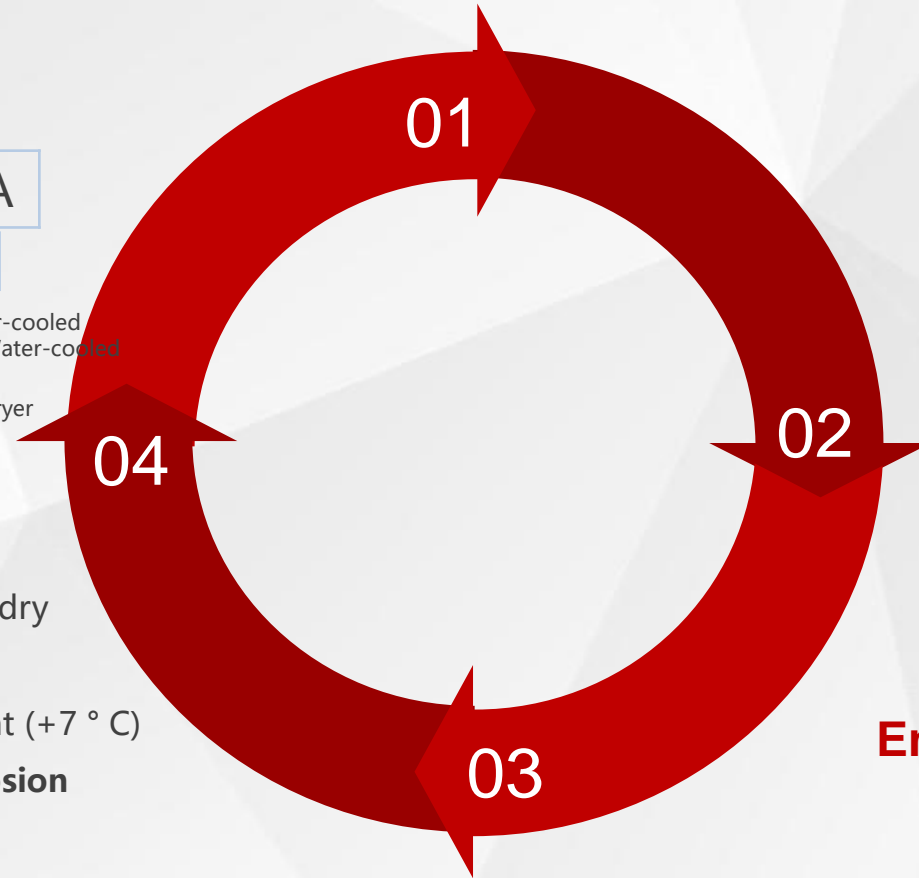
D-INRi refrigerated air dryer - Product introduction

Naming rule



Product highlights

- Standard remote start/stop failure warning dry contact signal control
- Set according to ISO 7183 Level-5 dew point (+7 ° C)
- Aluminum alloy heat exchanger shell; **corrosion protection**
- **Efficient** air-water separator can efficiently separate liquid water by more than 99%



Product parameters

- Non-circulating, with flow range at 0.7-145m³/min
- Standard working conditions of unit: air inlet pressure at 7bar, ambient temperature at 30°C, and air inlet temperature at 40°C
- Maximum air inlet temperature at 60°C, maximum operating pressure at 10bar, and maximum ambient temperature at 46°C
- (Water-cooled) Maximum cooling water temperature at 35°C

Environmental refrigerant

- Use **environmental refrigerant** R134a/R407c



D-INRi refrigerated air dryer - Product introduction

**Efficient
condenser**

**Efficient
blower**

Filter

**Capillary
tube**

**Automatic
drain valve**



**Low pressure-drop three-in-
one heat exchanger**
Air/air heat exchanger
*Air/refrigerant heat
exchanger*
Condensate separation

**Intelligent control
panel**

**Fully-closed refrigerant
compressor**



D-INRi refrigerated air dryer - Product introduction

- Operation panel indicating five working states
- Refrigerant temperature display to observe the working effect
- Standard emergency stop switch to ensure safety



Intelligent control system

- Easy disassembly and assembly
- Easy maintenance



Pulling-type box board Screw connection of heat exchanger

- First used in small units
- Ensure internal cold air convection
- Dust being not easy to adhere to the fin, thus having easy maintenance



Overhead air condenser (First used in small units)

- Each unit is equipped with an electronic automatic drain valve, and the drainage time can be adjusted



Standard electronic automatic drain valve

- Aluminum alloy
- Anodized shell for corrosion protection
- Three-compartment design to reduce cooling loss



Efficient heat exchanger

- Efficiently separate liquid water by more than 99%
- Ensure the product's pressure dew point to meet specified requirements



Air-water separator

D-INRi refrigerated air dryer – Working principles

01



Phase I

- Compressed air inhaled in the air/air heat exchange section is cooled by the cooler convective compressed air from the condensate separator

02



Phase II

- The compressed air temperature in the refrigerant/air heat exchange section further drops to the dew point temperature

03



Liquid separation

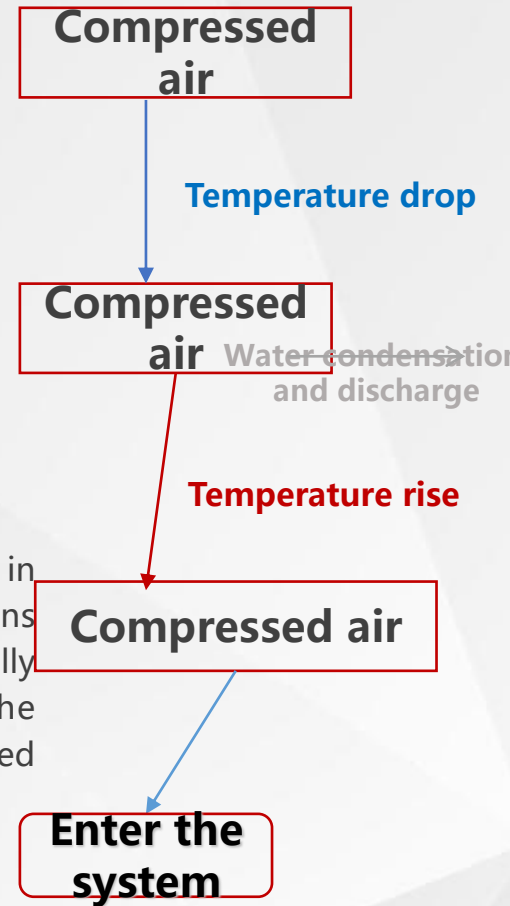
- Almost all the oil and water vapor contained in the compressed air in the above two sections are condensed into liquids, and are successfully separated from the compressed air in the condensate water separator, and then drained through the automatic condensate drain valve

04



Energy recovery

- At this point, all the primary air/air heat exchangers that get the cold air re-convective are reheated by the hot air inhaled, thus receiving the effect of energy recovery while reducing the relative humidity of the outgoing air





D-INRi efrigerated air dryer – Working principles

01



Refrigerant

- Refrigerant is the working fluid used to transfer heat energy and produce freezing effect in the refrigerated air conditioning system
- In the refrigerated dryer, the refrigerant **absorbs heat** from the evaporator and **transfers it** to the condenser
- Finally, the refrigerant **releases heat to the cooling water or cooling air** through the condenser

02



Selection factors

- Cooling efficiency (Btu/kW)
- Environmental impact
- Market supply
- Azeotropic or non-azeotropic
- Whether the physical properties are stable and whether there is temperature deviation

Refrigerant type	R22	R404a	R407c	R134a1	R4102
Set prohibited time limits	2020	-	-	-	-
Mixed or not	X	✓	✓	X	✓
Deviation and differentiation	-	1F	7-12F	-	-
Evaporation/condensation pressure (PSI)	58/298	72/355	58/335	28/198	100/475
Compression ratio	4.31	4.26	4.81	4.98	4.27
Btu/kW3	6,625	6,174	6,580	6,456	6,750
Scoring of component modification difficulty	0	2	0	4	7
Scoring of compressor fitness	10	8	10	7	1
Total score	10	8	6	5	3
Others	Non-environmental refrigerant		Market supply gap	Low density	Poor equipment adaptation

• Evaporation and condensing pressure is for 30F evaporation and 130F condensation, equivalent to the operating conditions of standard non-circulating refrigerated air dryer

• ¹ The density of R134a is equivalent to 60% of other refrigerants, and the same pressure and performance requirements require larger compressors

• ² R410 is not widely used at present, and it is possible that this can be improved with the popularization of R410 application devices

• ³ The Btu calculation is based on the 100F ambient temperature and 30F evaporation temperature of the Maneurop piston refrigeration compressor unit



D-INRi refrigerated air dryer - model selection

Correction factor

Air inlet Pressure (Mpa)	Air inlet temperature (°C)				
	40	45	50	55	60
0.7	1	1.18	1.41	1.63	1.86
0.8	0.98	1.13	1.32	1.54	1.72
0.9	0.96	1.08	1.24	1.42	1.61
1.0	0.93	1.03	1.16	1.35	1.49

Ambient temperature (°C)	30	35	40	46
Correction factor	1.0	1.11	1.25	1.42

Formula:

Working capacity of refrigerated air dryer = customer required capacity / (ambient temperature coefficient * comprehensive coefficient for air inlet temperature and air inlet pressure)

Configuration list

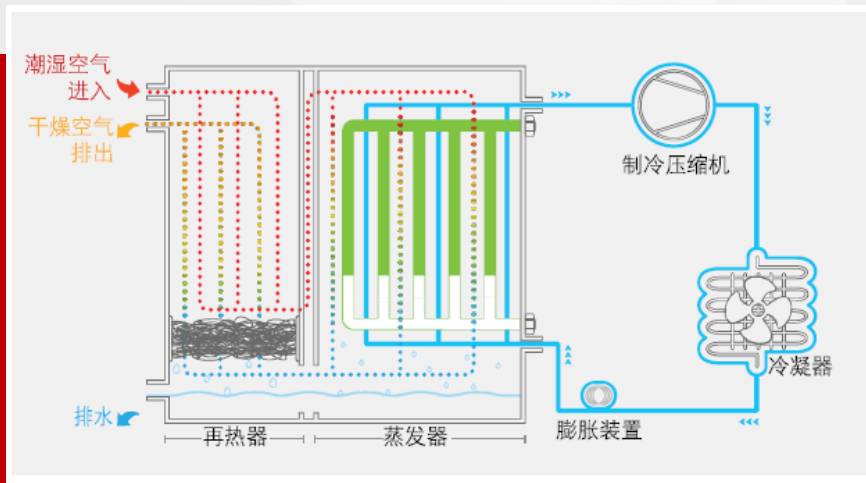
Technical features	Common configuration	Non-standard option
Air inlet temperature	40°C	>40°C
Air inlet pressure	7barg	Low pressure, high pressure
Ambient temperature	30°C	High temperature
Dew point requirement	7°C	3 ~ 7°C
Compressor form and refrigerant requirements	Turbine rotor R407C	R404A, R134A, R410A
Power requirement	380V/3/50hz	415V/50hz, 440V~480V/60hz, 690V for ships
Requirement for electrical component brands	Homemade	Imported, brand requirement
Integrated filter or not	No	Yes
Interface requirement	Threaded bspt / Flange HG20592	Client requirement
Requirement for internal pipe material	Carbon steel	Stainless steel, hot-dip galvanizing, anti-corrosion treatment
Requirement for heat exchanger	Tubular	Stainless steel plate / aluminum alloy plate-fin
Cooling mode	Air-cooling / water-cooling (fresh water)	Seawater cooling
Non-destructive drain valve	/	Designated
Electrical control cabinet	Carbon steel, protection class IP44	Material, protection class
Required certification	/	Classification society (ABS, CCS) certification, CE, UL, DOSH, etc...
Control mode	Single-chip microcomputer (standard hard-contact remote start/stop and fault alarm)	With communication function, with dew point meter, touch screen, display content



Circulating refrigerated air dryer

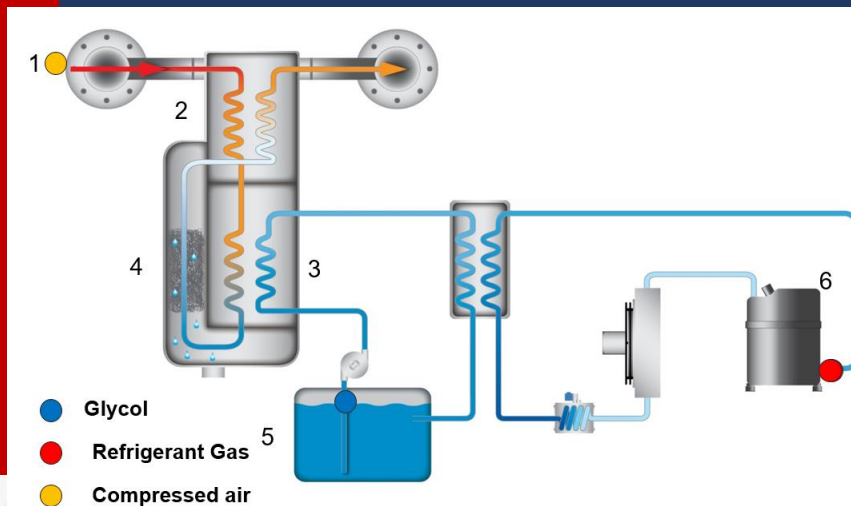
PCM Phase-changing refrigerated air dryer (ATS, Korea)

- Compressed air containing saturated water vapor enters the plate-type air heat exchanger, then is pre-cooled by the cold air at the outlet, and finally enters the PCM plate-type heat exchanger (evaporator) to be further cooled by the phase-change material
- Phase-changing process: When the refrigeration compressor and condenser are running, the refrigerant in the evaporator cools the phase-changing material (PCM) and gradually freezes it
 - When the PCM is fully cooled and chilled, the refrigeration compressor and condenser stop running. The PCM then continues to cool the compressed air, during which no power is consumed
 - The PCM gradually melts after absorbing heat, and when it is completely melted, the refrigeration compressor and condenser recover the cooling of the PCM



D-EC Circulating refrigerated air dryer (IR, Europe)

- Ethylene glycol as an intermediary
- When the air compressor is not running at full load, only ethylene glycol is used for heat exchange, without starting the refrigerant compressor
- When the temperature of ethylene glycol is raised to a certain level, start the refrigerant compressor to cool the ethylene glycol





D-ILRi/IERi No-heat/mild-heat regenerative desiccant dryer



Product introduction

Working principles

Configuration list

Product advantages and disadvantages



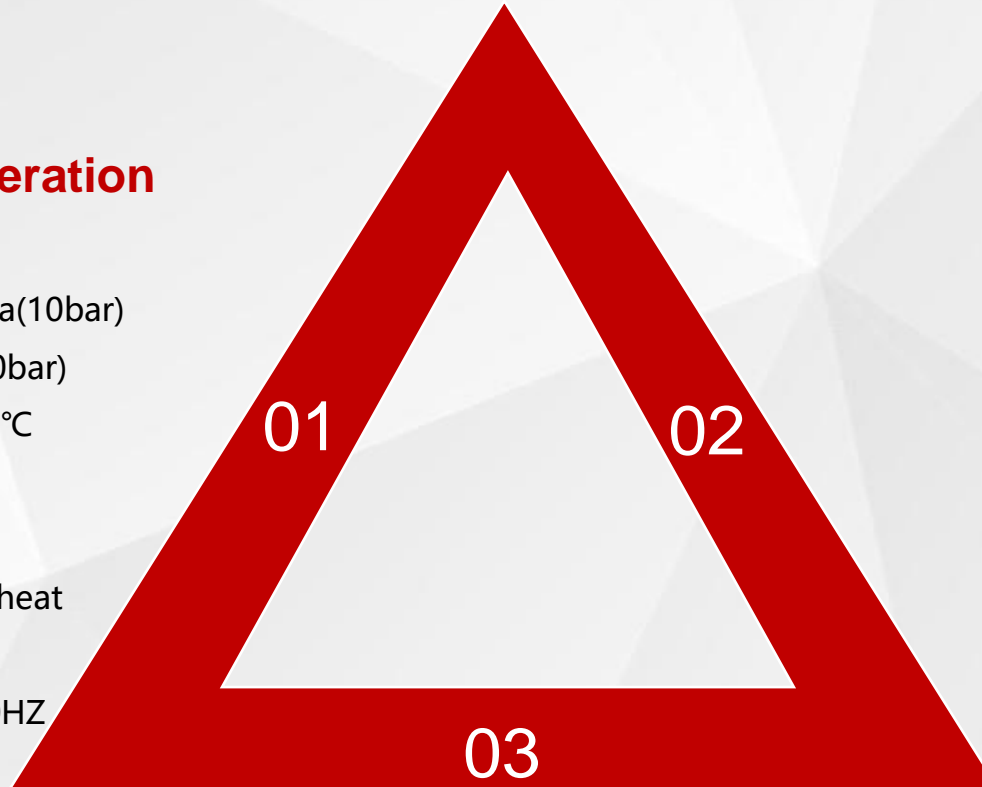
D-ILRi/IERi No-heat/mild-heat regenerative desiccant dryer - product introduction

D-ILRi No-heat regeneration

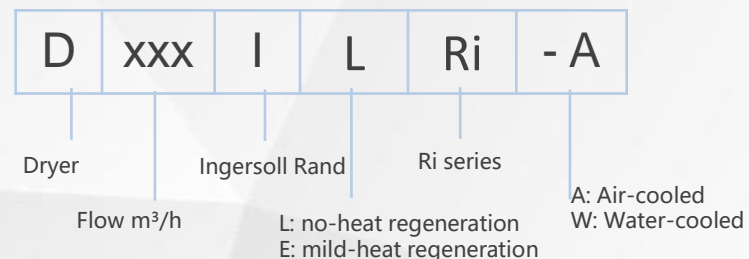
- Air flow: 1.2– 127m³/min
- Maximum working pressure: 1.0MPa(10bar)
- Rated working pressure: 0.7MPa(7.0bar)
- Maximum air inlet temperature: 45 °C
- Pressure dew point: -20 °C /-40°C
- Adsorbent: activated alumina
- Regeneration air consumption: no-heat regeneration ≤14%
- Standard power supply: 220V/1/50HZ
- Standard cycle: 20 minutes

D-IERi Mild-heat regeneration

- Air flow: 1.2– **155**m³/min
- Maximum working pressure: 1.0MPa(10bar)
- Rated working pressure: 0.7MPa(7.0bar)
- Maximum air inlet temperature: 45 °C
- Pressure dew point: -20 °C /-40°C
- Adsorbent: activated alumina
- Regeneration air consumption: mild-heat regeneration ≤8%
- Standard power supply: 220V/1/50HZ、380V/50HZ
- Standard cycle: 90 minutes



Naming rule





D-ILRi/IERi No-heat/mild-heat regenerative desiccant dryer - product introduction



Left/right tower control valve



Exhaust check valve



Solenoid valve



High-efficiency adsorbent



High efficiency silencer



Precise pressure relief valve



Precise pressure gauge

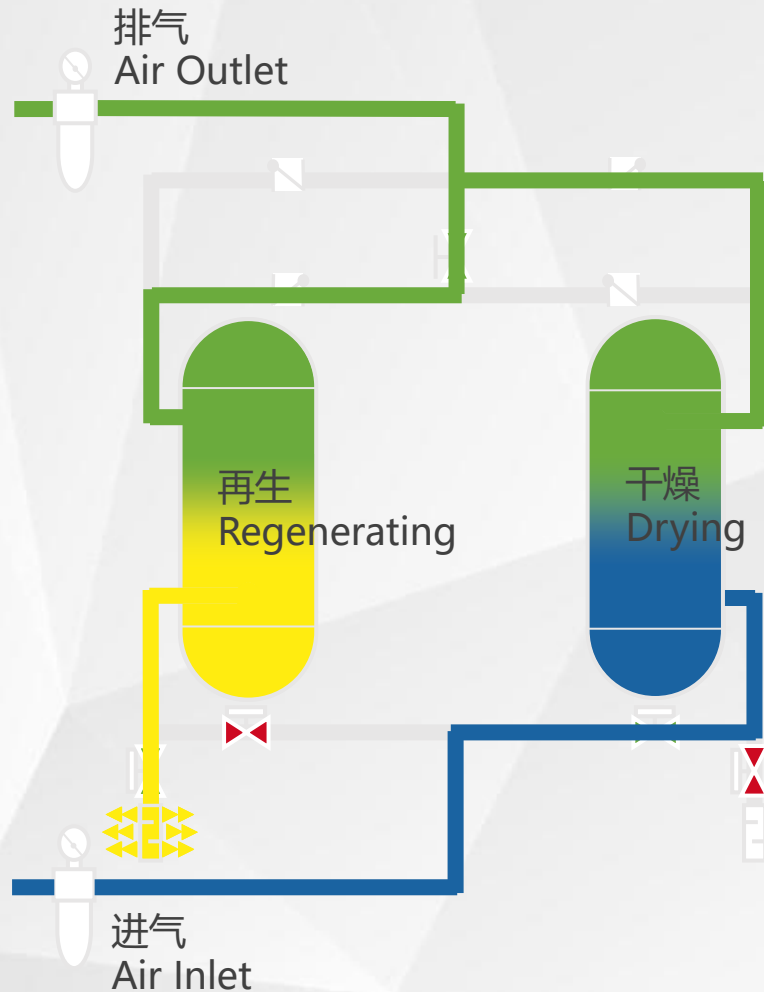


High-efficiency heater (mild heat)



D-ILRi/IERi No-heat/mild-heat regenerative desiccant dryer - working principles

No-heat regeneration process



Drying cycle

- Saturated compressed air enters the dryer
- The air inlet valve of the regeneration tower is closed; the air inlet valve of the drying tower is opened to allow air inlet
- Compressed air flows through the desiccant with pressure; the moisture in the air stream is absorbed



Regeneration cycle

- The regeneration tower opens the pressure relief valve
- The previously adsorbed water vapor is desorbed from the desiccant and exhausted into the atmosphere
- Dehumidification is accomplished by using a portion of dry compressed air expanded to atmospheric pressure



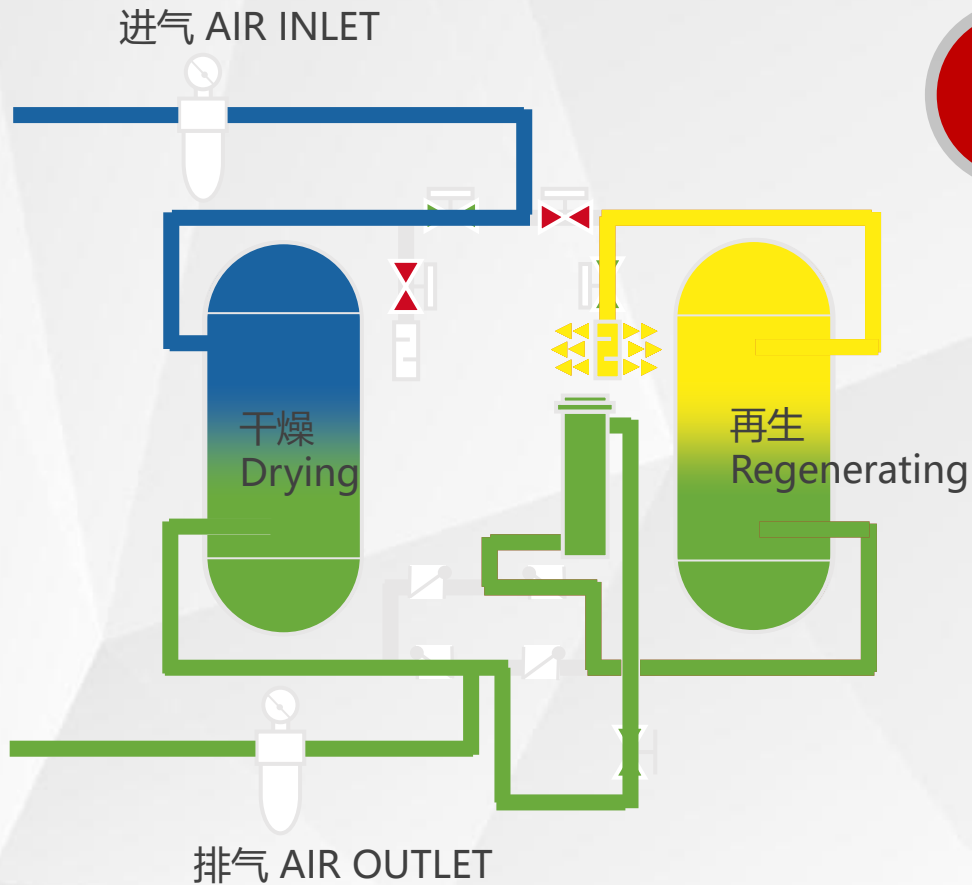
Tower re-pressurization

- After the regeneration process is completed, close the regenerated air exhaust valve and allow the regenerated air to re-pressurize the tower to ensure that the pressure in the regeneration tower is raised from normal pressure to protect the desiccant material before the air inlet valve is switched



D-ILRi/IERi No-heat/mild-heat regenerative desiccant dryer - working principles

Mild-heat regeneration process



Drying cycle

- Saturated compressed air enters the dryer
- The air inlet valve of the regeneration tower is closed; the air inlet valve of the drying tower is opened to allow air inlet
- Compressed air flows through the desiccant with pressure; the moisture in the air stream is absorbed



Regeneration cycle

- After the air inlet valve is switched, the regeneration tower decompresses. The water vapor adsorbed previously is separated from the desiccant and exhausted into the atmosphere
- Part of the outlet air enters the regenerative heater for heating
- The heated dry air constantly regenerate the regeneration tower



D-ILRi/IERi No-heat/mild-heat regenerative desiccant dryer - configuration list

Technical features	Common configuration	Non-standard option
Dew point requirement	- 20°C/ - 40°C	≤-70°C
Working pressure	7barg	High pressure ≥10barg
Ambient temperature	38°C	< 50°C
Power requirement	380V/3/50hz	415V/50hz, 440V~480V/60hz
Requirement for electrical component brands	Homemade	Imported, brand requirement
Integrated filter or not	No	Yes
Interface requirement	Threaded bspt / Flange HG20592	Client requirement
Requirement for internal pipe material	Carbon steel	Stainless steel, hot-dip galvanizing, anti-corrosion treatment
Valve requirement	Homemade	Brand requirement, material requirement, interface
Control air path requirement	Flexible hose	Stainless steel (304,316)
Electrical control cabinet	Carbon steel, protection class IP44	Material, protection class
Pressure vessel material and national standards	GB150	ASME, PED and other standards
Required certification	/	Classification society (ABS, CCS) certification, CE, UL, DOSH, etc...
Control mode	Single-chip microcomputer	With valve position switch, hard-contact remote control, remote communication control, with dew point meter, touch screen, display content
Adsorbent	Aluminum oxide	Molecular sieve, silica gel
Appearance and color requirements of the device	Ingersoll Rand default of beige	Specified color (with color card number)



D-ILRi/IERi No-heat/mild-heat regenerative desiccant dryer - advantages and disadvantages for no-heat regeneration

Advantages of D-ILRi

- Easy operation
- Excellent dew point control
- Longer adsorption life (theoretically 3-5 years for desiccant replacement)
- Low maintenance workload
- No additional heat source required
- Low initial cost

R 系列高效吸附再生式干燥机

**D-ILRi/D-IERi 系列
无热/微热再生吸附式干燥机**

英格索兰 D-ILRi 和 D-IERi 吸附式干燥机, 采用无热和微热两种工艺技术结合双干燥塔和附件控制, 实现高效的压缩空气后处理及卓越的产品可靠性。

产品特点:

- 性能可靠, 寿命长
- 卓越设计, 表面非凡
- 智能控制, 准确高效
- 优质选材, 寿命倍增
- 整体结构, 安装简便
- 更多功能设计, 优化客户体验



Disadvantages of D-ILRi

- High regenerated air consumption (about 20%)
- Regenerated air flow affected by air inlet flow
- Short cycle, frequent tower switching
- Adsorbent only functioning at surface, with adsorption capacity not fully utilized

技术参数:

D-ILRi 系列无热再生式干燥机

- ✓ 空气流量: 1.2-127m³/min
- ✓ 最高工作压力: 1.0MPa
- ✓ 额定工作压力: 0.7MPa
- ✓ 最高进气温度: 45 °C
- ✓ 压力露点: -40 °C
- ✓ 再生耗气量: 61%

D-IERi 系列微热再生式干燥机

- ✓ 空气流量: 1.2-127m³/min
- ✓ 最高工作压力: 1.0MPa
- ✓ 额定工作压力: 0.7MPa
- ✓ 最高进气温度: 45 °C
- ✓ 压力露点: -40 °C
- ✓ 再生耗气量: 61%

型号	流量 m ³ /min	电压 V	空气接口管径 mm	长 (mm)	外形尺寸 宽 (mm)	高 (mm)	重量 kg	
D-ILRi 系列无热再生式干燥机								
DI2100-040	1.2	230/1-50	1/2"	600P	730	480	1050	132
DI2105-040	2.1	230/1-50	3/4"	600P	900	500	1050	168
DI2140-040	3.6	230/1-50	1"	600P	1050	600	1080	221
DI2160-040	6.2	230/1-50	1.5/2"	600P	1050	600	1080	320
DI2170-040	5.2	230/1-50	1.5/2"	600P	1050	600	1080	328
DI2180-040	6.8	230/1-50	1.5/2"	600P	1200	600	1160	406
DI2400-040	8	230/1-50	2"	600P	1200	700	1380	442
DI2600-040	11.5	230/1-50	2"	600P	1300	700	1480	485
DI2800-040	14	230/1-50	2"	600P	1300	700	1480	520
DI3000-040	17.5	230/1-50	2.5/2"	600P	1400	800	1500	614
DI3800-040	23	230/1-50	2"	600P	1600	900	2000	850
DI3100-040	28.5	230/1-50	2"	600P	1700	900	2080	1112
DI2000-040	34	230/1-50	DN100	FLC	1800	1000	2150	1208
DI2500-040	42.5	230/1-50	DN100	FLC	2000	1100	2400	1537
DI1100-040	51	230/1-50	DN100	FLC	2100	1100	2400	1600
DI1600-040	68	230/1-50	DN125	FLC	2200	1200	2420	2156
DI1800-040	76	230/1-50	DN100	FLC	2300	1400	2480	2607
DI1200-040	87	230/1-50	DN150	FLC	2300	1400	2680	2800
DI1400-040	99	230/1-50	DN150	FLC	2400	1400	2680	3305
DI1700-040	113	230/1-50	DN150	FLC	2400	1400	2680	3800
DI1900-040	127	230/1-50	DN150	FLC	2600	1500	2750	4206
D-IERi 系列微热再生式干燥机								
DI2100-040	1.2	230/1-50	1/2"	600P	730	480	1050	132
DI2105-040	2.1	230/1-50	3/4"	600P	900	500	1050	168
DI2140-040	3.6	230/1-50	1"	600P	1050	600	1080	221
DI2160-040	6.2	230/1-50	1.5/2"	600P	1050	600	1080	320
DI2170-040	5.2	230/1-50	1.5/2"	600P	1050	600	1080	328
DI2180-040	6.8	230/1-50	1.5/2"	600P	1200	600	1160	402
DI2400-040	8	230/1-50	2"	600P	1200	700	1380	446
DI2600-040	11.5	230/1-50	2"	600P	1300	700	1480	489
DI2800-040	14	230/1-50	2"	600P	1300	700	1480	524
DI3000-040	17.5	230/1-50	2.5/2"	600P	1400	800	1500	618
DI3800-040	23	230/1-50	2"	600P	1600	900	2000	854
DI3100-040	28.5	230/1-50	2"	600P	1700	900	2080	1112
DI2000-040	34	230/1-50	DN100	FLC	1800	1000	2150	1208
DI2500-040	42.5	230/1-50	DN100	FLC	2000	1100	2400	1537
DI1100-040	51	230/1-50	DN100	FLC	2100	1100	2400	1600
DI1600-040	68	230/1-50	DN125	FLC	2200	1200	2420	2156
DI1800-040	76	230/1-50	DN100	FLC	2300	1400	2480	2607
DI1200-040	87	230/1-50	DN150	FLC	2300	1400	2680	2800
DI1400-040	99	230/1-50	DN150	FLC	2400	1400	2680	3305
DI1700-040	113	230/1-50	DN150	FLC	2400	1400	2680	3800
DI1900-040	127	230/1-50	DN150	FLC	2600	1500	2750	4206

注: 1. 再生耗气量按环境温度: 40°C, 进气露点: 4°C, 再生露点: 7°C。
2. 再生耗气量按环境温度: 40°C, 最高进气露点: 40°C, 再生露点: 7°C。



D-ILRi/IERi No-heat/mild-heat regenerative desiccant dryer - advantages and disadvantages for mild-heat regeneration

Advantages of D-IERi

- Regenerated air consumption is less than that of no-heat units
- More adequate application of adsorbent
- Long cycle, long service life of parts

Disadvantages of D-IERi

- Regenerated air consumption (about 10%)
- Additional control elements and heaters are required
- Easy efflorescence of desiccant
- Requiring more maintenance than no-heat units



R 系列高效吸附再生式干燥机

**D-ILRi/D-IERi 系列
无热/微热再生吸附式干燥机**

英格索兰 D-ILRi 和 D-IERi 吸附式干燥机, 采用无热和微热两种工艺技术结合双干燥塔和单元控制, 实现高效的压缩空气后处理及卓越的产品可靠性。

产品特点:

- 性能可靠, 寿命长
- 智能控制, 准确高效
- 整体结构, 安装简便
- 卓越设计, 表现非凡
- 优质选材, 秀外慧中
- 更多功能设计, 优化客户体验

技术参数:

D-ILRi 系列无热再生式吸干机

- ✓ 空气流量: 1.2-127m³/min
- ✓ 最高工作压力: 1.0MPa
- ✓ 额定工作压力: 0.7MPa
- ✓ 最高进气温度: 45 °C
- ✓ 压力露点: -40 °C
- ✓ 再生耗气量: 614%

D-IERi 系列微热再生式吸干机

- ✓ 空气流量: 1.2-127m³/min
- ✓ 最高工作压力: 1.0MPa
- ✓ 额定工作压力: 0.7MPa
- ✓ 最高进气温度: 45 °C
- ✓ 压力露点: -40 °C
- ✓ 再生耗气量: 61%

型号	流量 m ³ /min	流量 Nm ³ /hr	空气进口管径	长 (mm)	外形尺寸 宽 (mm)	高 (mm)	重量 kg	
D-ILRi 系列无热再生式吸干机								
DI2100-040	1.2	250.1-750	1/2"	800P	730	480	1050	132
DI2105-040	2.1	220.1-750	3/4"	800P	900	520	1050	168
DI2140-040	3.6	220.1-750	1"	800P	1050	600	1080	221
DI2150-040	4.2	220.1-750	1.1/2"	800P	1050	600	1080	240
DI2170-040	5.2	220.1-750	1.5/2"	800P	1050	600	1080	258
DI2180-040	6.8	220.1-750	1.5/2"	800P	1200	600	1140	406
DI2400-040	8	220.1-750	2"	800P	1200	700	1380	442
DI2600-040	11.5	220.1-750	2"	800P	1350	700	1480	485
DI2800-040	14	220.1-750	2"	800P	1350	700	1480	525
DI3500-040	17.5	220.1-750	2.1/2"	800P	1450	800	1530	814
DI3800-040	21	220.1-750	2"	800P	1600	920	2060	925
DI3700-040	28.5	220.1-750	2"	800P	1750	920	2080	1112
DI2000-040	34	220.1-750	DN100	FLG	1800	1000	2150	1208
DI2500-040	42.5	220.1-750	DN100	FLG	2000	1100	2320	1537
DI1100-040	51	220.1-750	DN125	FLG	2100	1100	2350	1618
DI6000-040	60	220.1-750	DN125	FLG	2200	1250	2420	2756
DI1000-040	75	220.1-750	DN150	FLG	2300	1400	2480	3007
DI1200-040	87	220.1-750	DN150	FLG	2300	1400	2480	2800
DI2400-040	99	220.1-750	DN150	FLG	2420	1450	2640	3305
DI2700-040	113	220.1-750	DN150	FLG	2420	1450	2640	3520
DI2100-040	127	220.1-750	DN150	FLG	2620	1500	2720	4226
D-IERi 系列微热再生式吸干机								
DI2100-040	1.2	220.1-750	1/2"	800P	730	480	1050	145
DI2105-040	2.1	220.1-750	3/4"	800P	900	520	1050	188
DI2140-040	3.6	220.1-750	1"	800P	1050	600	1070	247
DI2150-040	4.2	220.1-750	1.1/2"	800P	1050	600	1070	265
DI2170-040	5.2	220.1-750	1.5/2"	800P	1050	600	1070	285
DI2180-040	6.8	220.1-750	1.5/2"	800P	1200	600	1120	447
DI2400-040	8	220.1-750	2"	800P	1200	700	1380	486
DI2600-040	11.5	220.1-750	2"	800P	1350	700	1480	529
DI2800-040	14	220.1-750	2"	800P	1350	700	1480	571
DI3500-040	17.5	220.1-750	2.1/2"	800P	1450	800	1530	814
DI3800-040	21	220.1-750	2"	800P	1600	920	2060	925
DI3700-040	28.5	220.1-750	2"	800P	1750	920	2100	1079
DI1100-040	28.5	220.1-750	2"	800P	1750	900	2110	1145
DI2000-040	34	220.1-750	DN100	FLG	1800	1000	2150	1216
DI2500-040	42.5	220.1-750	DN100	FLG	2000	1100	2300	1611
DI1000-040	51	220.1-750	DN125	FLG	2100	1100	2350	1692
DI6000-040	60	220.1-750	DN125	FLG	2200	1250	2420	2786
DI1000-040	75	220.1-750	DN150	FLG	2300	1400	2480	3037
DI1200-040	87	220.1-750	DN150	FLG	2300	1400	2470	2830
DI2400-040	99	220.1-750	DN150	FLG	2420	1450	2620	3325
DI2700-040	113	220.1-750	DN150	FLG	2420	1450	2620	3540
DI2100-040	127	220.1-750	DN150	FLG	2620	1500	2700	4236

注: 1. 最大工作压力: 1.0MPa; 2. 最高进气温度: 45 °C; 3. 最低露点: -40 °C; 4. 再生耗气量: 100% (无热再生); 5. 再生耗气量: 61% (微热再生)



D-IBRi blower heat regenerative desiccant dryer



Product introduction

Working principles

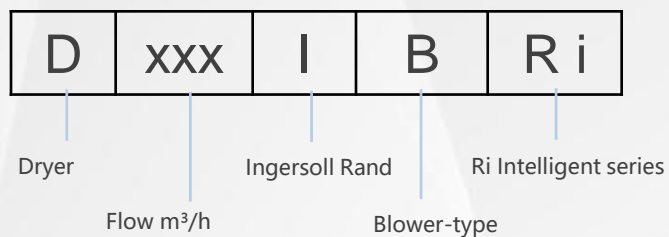
Product's competitive advantage

Product advantages and disadvantages



D-IBRi blower heat regenerative desiccant dryer - product introduction

Naming rule



D-IBRi blower heat regeneration

- Blower heat regeneration flow rate: 14-300m³/min;
- Standard working conditions: standard working pressure at 7bar, ambient temperature at 38°C, air inlet temperature at 38°C
- Pressure dew point at -40°C, optional -70°C available;
- Adsorbent: activated alumina / molecular sieve
- Regenerated gas consumption: ≤ 3% or 0
- Cycle: Standard 8 hours (with energy saving control)
- Power: 380V/3PH/50Hz
- Pressure drop: ≤ 0.02 MPa (under standard working pressure)
- Control system: SIEMENS PLC+ display screen, electric materials of Schneider brand
- Control pipe: stainless steel mirror tube

D-IBRi blower heat regenerative desiccant dryer - product introduction

High-performance blower



- Blower high air volume, high air pressure
- Ensure regeneration effect
- Long service life

Electrical components of Schneider brand



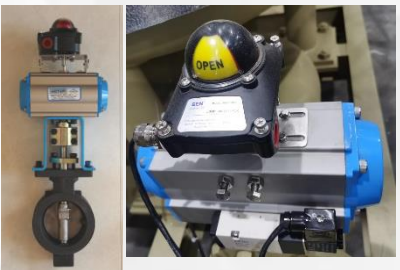
- High-quality electrical components
- Ensure stable operation of blower and electric heater

High-efficiency cooler



- High heat transfer efficiency, small wind resistance
- Using fins and copper tubes for coolers
- Stainless steel materials optional

High-quality pneumatic valve



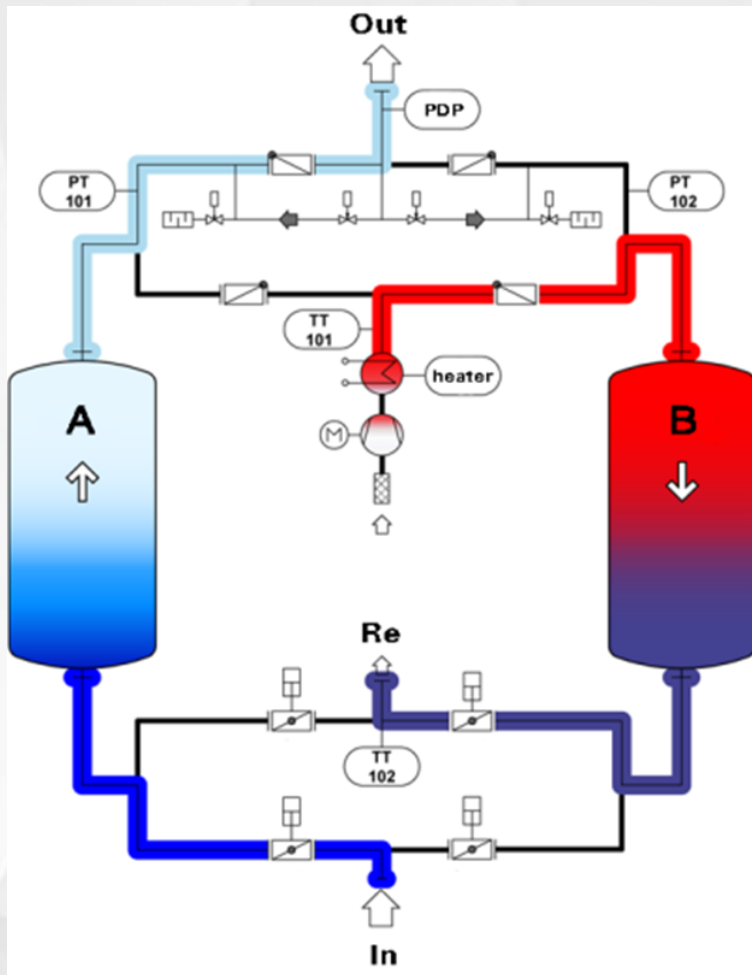
- Each valve is equipped with a position switch
- Sensitive and reliable component operation
- Excellent performance, long service life

Siemens PLC Modules and displays



- With fault alarm and protection functions, achieving unattended operation
- Dew point control and communication optional

D-IBRi blower heat regenerative desiccant dryer - working principles



Drying

- Use the blower to absorb the ambient air, heat it through the heater to the set temperature, and directly heat the adsorbent, so that the adsorbent is thoroughly dehydrated and regenerated. Because the heating and regeneration process does not use compressed air, the maximum energy is saved.



Regenerating

- After the completion of the regeneration and heating stage of the regeneration tower, enter the blowing and cooling stage, reduce the temperature of the regeneration tower to normal temperature and reach a higher degree of dryness until the regeneration is completed.

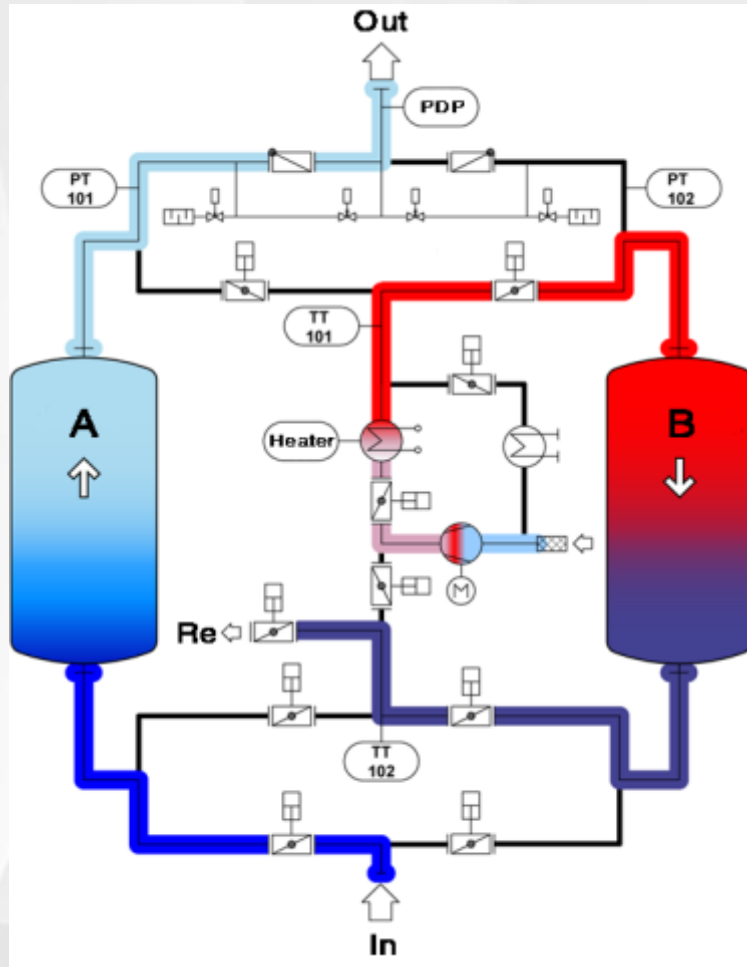


Stamping

- Perform stamping after the completion of regeneration, and wait for the next cycle after the completion of stamping.

D-IBRi blower heat regenerative desiccant dryer - working principles

ZERO PURGE zero air consumption closed cycle



Heating and regeneration process

- A special blower first inhales air, and then transfers it to the suction tower B through the heater.
- The incoming air is heated by the heater, and then enters the wet additive bed from the top down; and the moisture in the tower body is gradually drained through the silencer.



Zero air consumption closed cycle

- Application industries: Electronics/Pharmaceutical/petrochemical...
- Especially suitable for occasions of chilled water $\leq 15^{\circ}\text{C}$
- (PDP-70 °C can be achieved **stably**)



D-IBRi blower heat regenerative desiccant dryer - competitive advantage

High performance

- The maximum flow rate of a single unit is **increased by 33%**
- The equipment with same specifications has **better performance** than the old products
- Better single unit performance parameters help products gain an **overall competitive advantage**

More model options

- The number of standard product models is **36% higher** than that of older models
- It has **50% more** models than main competing products
- The model selection is **more rich and flexible**, which is conducive to meeting the selection needs of customers and creating **more competitive solutions**

Higher space utilization

- The spatial layout of a single unit is further optimized
- It has **30% higher space utilization than the main competitors**
- The high space utilization rate can **better match** the user's site conditions and bring more project opportunities



D-IBRi blower heat regenerative desiccant dryer – advantages and disadvantages of blower

Advantages of D-IBRi

- No regenerated air consumption except cold blowing
- Can be designed to be completely free of regenerated air consumption
- Optional air consumption for cold blowing at 2-3% of the inlet air
- Energy consumption lower than that of the no-heat desiccant dryer



鼓风加热再生吸附式干燥机



D-IBRi 系列

鼓风加热再生吸附式干燥机

英格索兰D-IBRi系列吸附式干燥机，采用鼓风加热原理，实现高效压缩空气干燥工作，大大节省了压缩空气的消耗，节省了能量。

- 1 鼓风加热再生空气，经过外置式电加热器加热后，热空气进入再生塔用于吸附剂的加热再生；
- 2 经过一段时间的加热再生后，采用鼓风机冷吹再生并降温；
- 3 当吸附温度降低到某一点后，采用工作塔出口的干燥气体对再生塔进行冷再生，周期内平均耗气量<3%，以最终完成再生塔内吸附剂的再生活化；
- 4 当出口空气质量要求不高时（如露点温度<40℃），或环境温度较低的情况下，可以对吸附塔进行冷吹再生，再生塔内无外置电加热器干燥气体，避免没有再生气体的产生（节约再生耗气量为零）。

产品特点

- 采用双核心控制逻辑，性能可靠，寿命长。
- 采用优质二位五通电磁阀控制空气气路切换，确保设备的可靠运行。
- 采用性能可靠鼓风机，确保干燥系统的正常运转。
- 独特的设计，确保干燥、再生气体的均匀分布，杜绝中心流速大、边缘流速小的“短程”现象。
- 塔体和管道保温保冷，外包装铝铂，杜绝能源浪费。
- 特定的泄压功能确保干燥塔切换时不泄压。
- 采用多种措施确保设备不松动，干燥剂不脱落，延长干燥剂的使用寿命。
- 气流通过干燥塔流速较慢，增加了与干燥剂的接触时间，提高了干燥效率，降低了压力损失。
- 每个塔体上均有压力表及安全阀。
- 再生塔中包含适当的保温层，以防止在转换中发生温度骤变。
- 标准配置：PLC可编程控制器、人机交互界面。



Disadvantages of D-IBRi

- Additional blower and heater
- Shorter service life of the adsorbent
- Unstable dew point temperature due to atmospheric regeneration
- Large initial input cost

技术参数

- 工作压力范围：0.7-1.0Mpa
- 循环周期：6小时
- 最高平均再生耗气量：<3%
- 电源：380V/50Hz
- 公称压力露点：-40℃ (-70℃压力露点可选)
- 压力降：<0.02MPa
- 额定进气温度：<38℃
- 控制方式：全自动PLC控制
- 吸附剂：活性炭型（非标准可选分子筛/硅胶）

D-IBRi系列鼓风加热再生吸附式干燥机

机型	流量 m³/min	电源 V/Ph/Hz	空气接口管径 mm	装机功率 kW	外形尺寸 (mm)			重量 kg
					长	宽	高	
D1400HR	14	380/3/50	DN125	18.4	1550	600	2350	1320
D1800HR	18	380/3/50	DN150	20.5	1700	800	2380	1360
D2200HR	22	380/3/50	DN180	23.5	1700	1050	2400	1530
D2500HR	25	380/3/50	DN180	23.5	1700	1050	2400	1530
D3000HR	33	380/3/50	DN180	28.5	1800	1350	2520	2130
D3600HR	44	380/3/50	DN180	43.5	2200	1150	2540	2890
D3000HR	50	380/3/50	DN180	43.5	2200	1150	2540	2890
D3600HR	60	380/3/50	DN125	54	2340	1250	2680	3750
D4200HR	70	380/3/50	DN125	71	2550	1600	2780	5120
D4800HR	80	380/3/50	DN125	71	3300	1900	2780	5360
D5400HR	90	380/3/50	DN150	77	3360	2000	2860	7440
D6000HR	100	380/3/50	DN150	77	3360	2000	2860	7480
D7200HR	138	380/3/50	DN150	89	3600	2300	3030	8650
D9000HR	150	380/3/50	DN200	123	3800	2300	3310	9000
D12000HR	200	380/3/50	DN200	153.5	4200	2450	3400	11400

注：性能参考工况：环境温度：38℃，进气温度：38℃，工作压力：7 barg。
Note: Data refer to the following conditions: ambient temperature: 38°C, inlet temperature: 38°C, inlet pressure: 7 barg.

可选配置

- 露点仪附件：用于在线露点检测与显示。
- 外置加热器：在有过剩热气的场合，可以利用过剩热气对电加热器，以节省电能。
- EMS 露点节能控制系统。
- 集中控制系统：采用PLC进行控制，可选RS485通讯接口，MODBUS或PROFIBUS通讯协议，与空压机进行连接，集中控制。
- 内循环带气耗选项。



HCD compression heat regenerative desiccant dryer



Product introduction

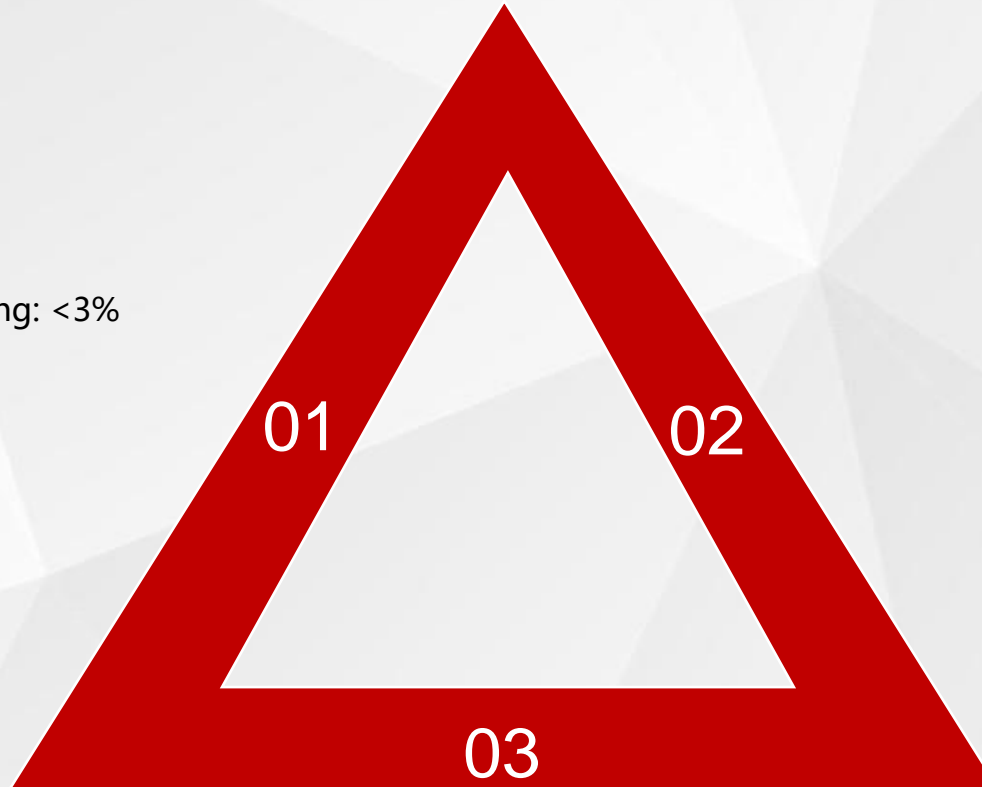
Working principles



HCD compression heat regenerative desiccant dryer - product introduction

HCD-H series

- Working pressure range: 0.7~1.0Mpa
- Average air consumption for cold blowing: <3% (zero air consumption optional)
- Nominal pressure dew point: -40°C
- Inlet temperature: $\geq 180^{\circ}\text{C}$
- Oil content at air inlet: $\leq 0.01\text{mg}/\text{m}^3$
- Cycle: 6 hours (standard)
- Power: 220V/1PH/50Hz
- Pressure drop: $\leq 0.03\text{MPa}$
- Control mode: fully-automatic control



HCD-L series

- Working pressure range: 0.7~1.0Mpa
- Average air consumption for cold blowing: <3% (zero air consumption optional)
- Nominal pressure dew point: -40°C
- Inlet temperature: $\geq 120^{\circ}\text{C}$
- Oil content at air inlet: $\leq 0.01\text{mg}/\text{m}^3$
- Cycle: 8 hours (standard)
- Power: 380V/3PH/50Hz
- Pressure drop: $\leq 0.03\text{MPa}$
- Control mode: fully-automatic control

Naming rule



Compression heat regeneration

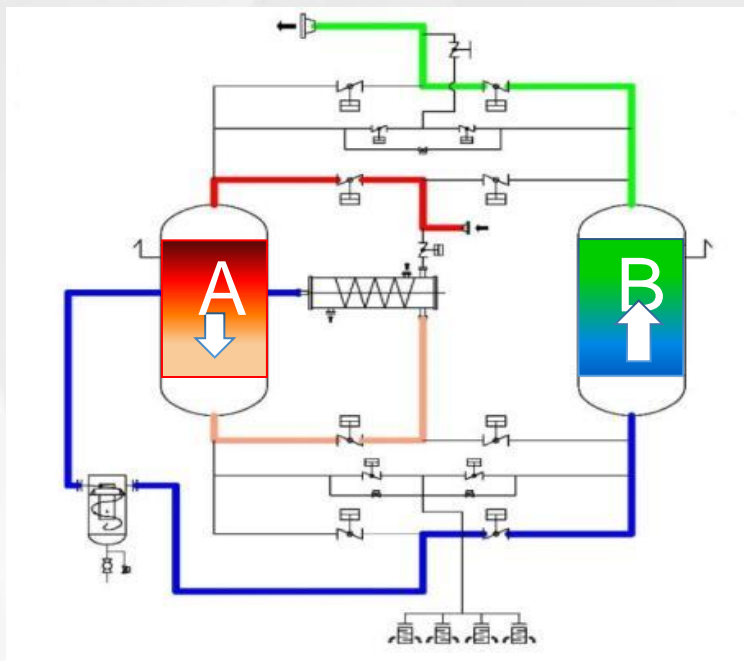
Dryer

Volume flow Nm³/min

High/low temperature



HCD compression heat regenerative desiccant dryer - working principles



Tower A for regeneration / Tower B for absorption

- The high-temperature air exhausted by the compressor enters Tower A directly for regeneration. Then, the saturated high-temperature moisture enters the after-cooler for cooling, and the liquid water is removed by an air-water separator.
- The cooled compressed air enters Tower B for adsorption, and is finally exhausted from the top along the pipe to the use point.

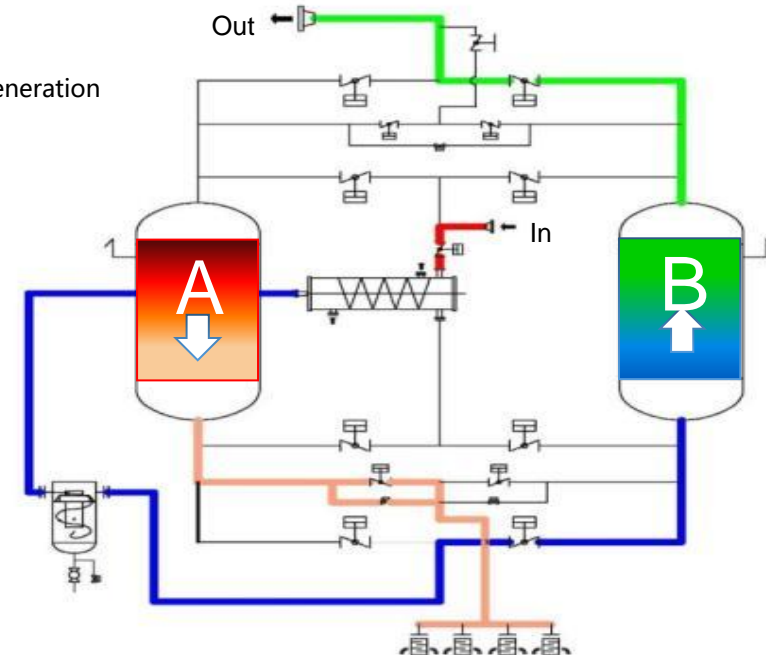
Calculated according to the law of conservation of energy:

- For customers whose dew point needs to reach PDP-40°C, we recommend installing an electric heater to increase the regeneration temperature to above 180 °C, and provide cooling water ≤ 20 °C on site;
- If the dew point reaches PDP-70°C, it requires to provide a regeneration temperature of above 200 °C and chilled water of ≤ 12 °C.



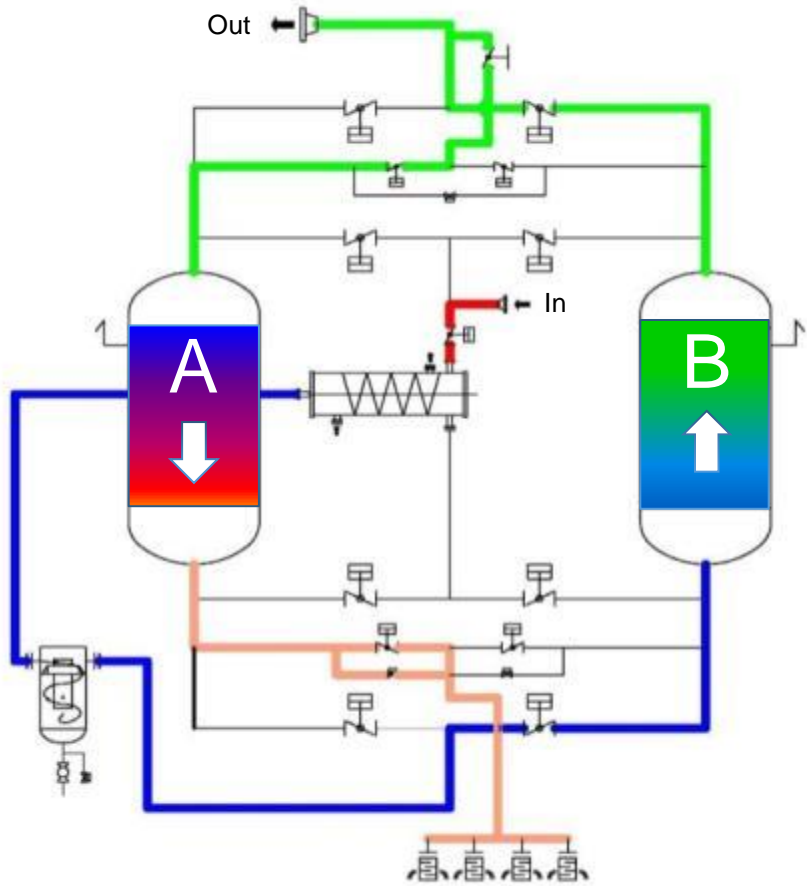
Tower A for pressure relief / Tower B for absorption

- The high-temperature air exhausted from the centrifuge directly enters the after-cooler for cooling, and the liquid water is removed by an air-water separator.
 - The cooled compressed air enters Tower B for adsorption, and is finally exhausted from the top along the pipe to the use point.
 - At this moment, the pressure relief valve of Tower A is opened, and the pressure is released through the silencer
- If the customer's on-site chilled water volume is limited, we may first install a Level-1 after-cooler using conventional ≤ 32 °C cooling water for cooling





HCD compression heat regenerative desiccant dryer - working principles

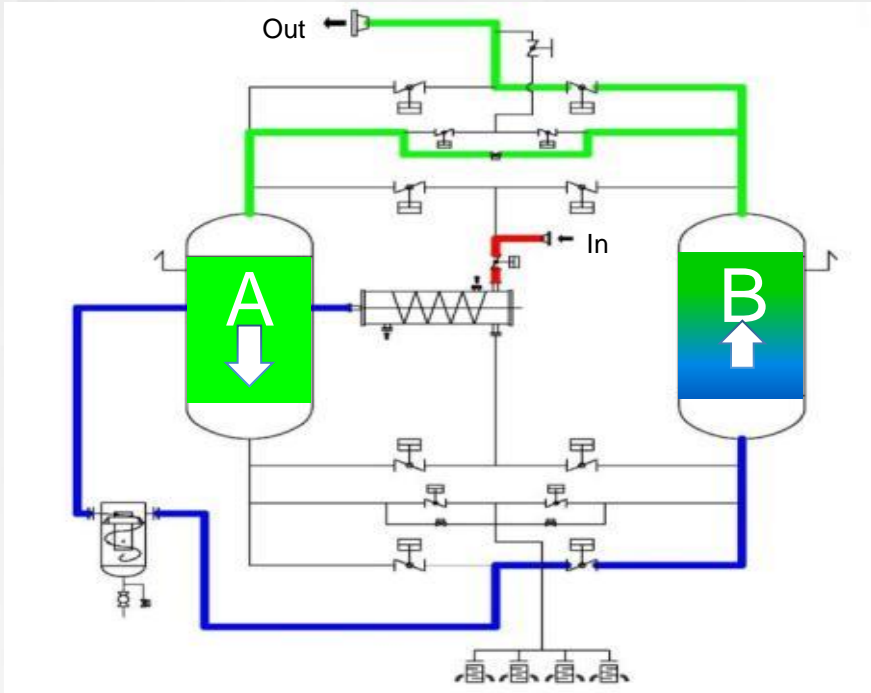


Tower A for cold blowing / Tower B for adsorption

- The high-temperature air exhausted from the centrifuge directly enters the after-cooler for cooling, and the liquid water is removed by an air-water separator.
- The cooled compressed air enters Tower B for adsorption, and is finally exhausted from the top along the pipe to the use point.
- At the same time, a small part of the outlet product air is inhaled into Tower A to reduce the temperature of the adsorbent and further purify the adsorbent



HCD compression heat regenerative desiccant dryer - working principles



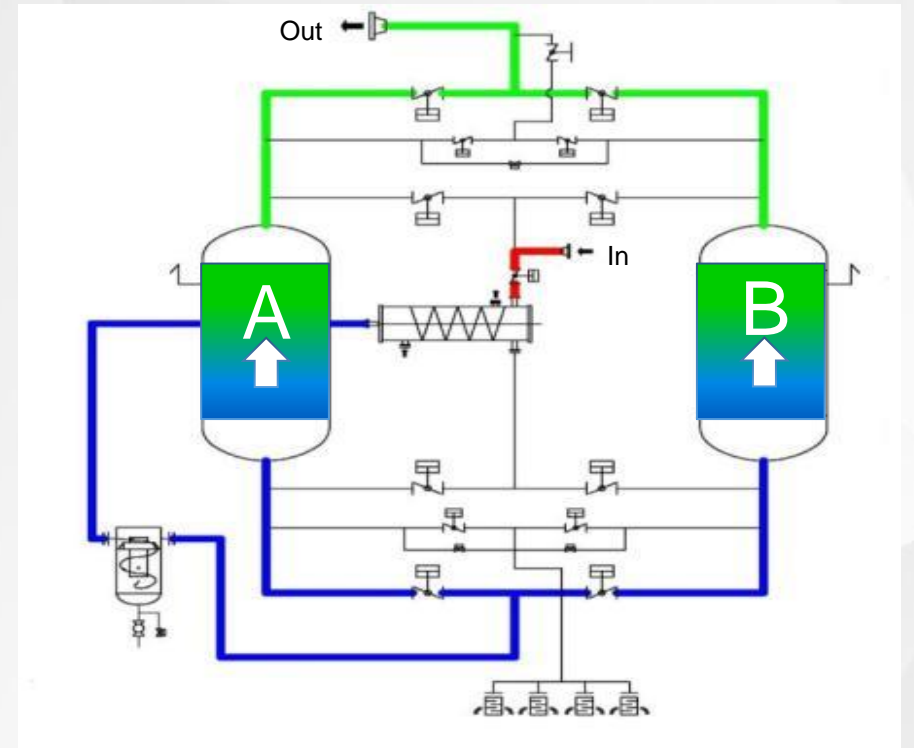
Tower A for pressurization waiting / Tower B for continuous adsorption

- The high-temperature air exhausted from the centrifuge directly enters the after-cooler for cooling, and the liquid water is removed by an air-water separator.
- The cooled compressed air enters Tower B for adsorption, and is finally exhausted from the top along the pipe to the use point.
- At this moment, the adsorbent of Tower A has been cooled, so it may close the exhaust valve and open the charging valve for charging. After completion, Tower A enters the switchover waiting state



Simultaneous adsorption in Tower A / Tower B

- The high-temperature air exhausted from the centrifuge directly enters the after-cooler for cooling, and the liquid water is removed by an air-water separator.
- The cooled compressed air enters Tower A and Tower B simultaneously for adsorption, and is finally exhausted from the top along the pipe to the use point.
- This ensures that pressure fluctuations and dew point fluctuations in the pipe network are minimized





HCD ZP zero air-consumption compression heat regenerative desiccant dryer



Product introduction

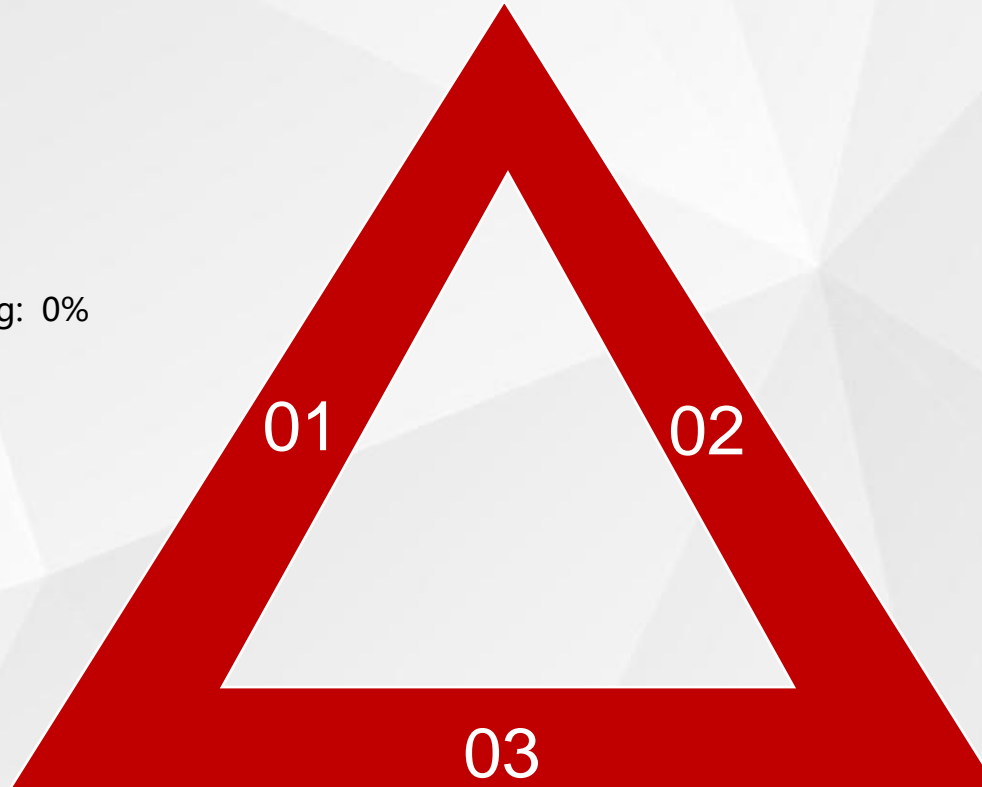
Working principles



HCD ZP zero air-consumption compression heat regenerative desiccant dryer - product introduction

HCD-H ZP series

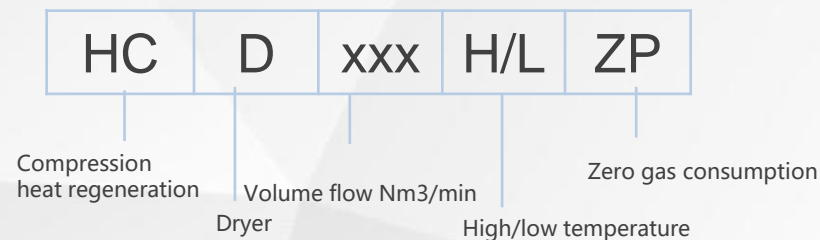
- Working pressure range: 0.7-1.0MPa
- Average air consumption for cold blowing: 0%
- Nominal pressure dew point: -20°C
- Inlet temperature: $\geq 180^{\circ}\text{C}$
- Oil content at air inlet: $\leq 0.01\text{mg}/\text{m}^3$
- Cycle: 6 hours
- Power: 220V/1P/50Hz
- Pressure drop: $\leq 0.03\text{MPa}$
- Control mode: fully-automatic control



HCD-L ZP series

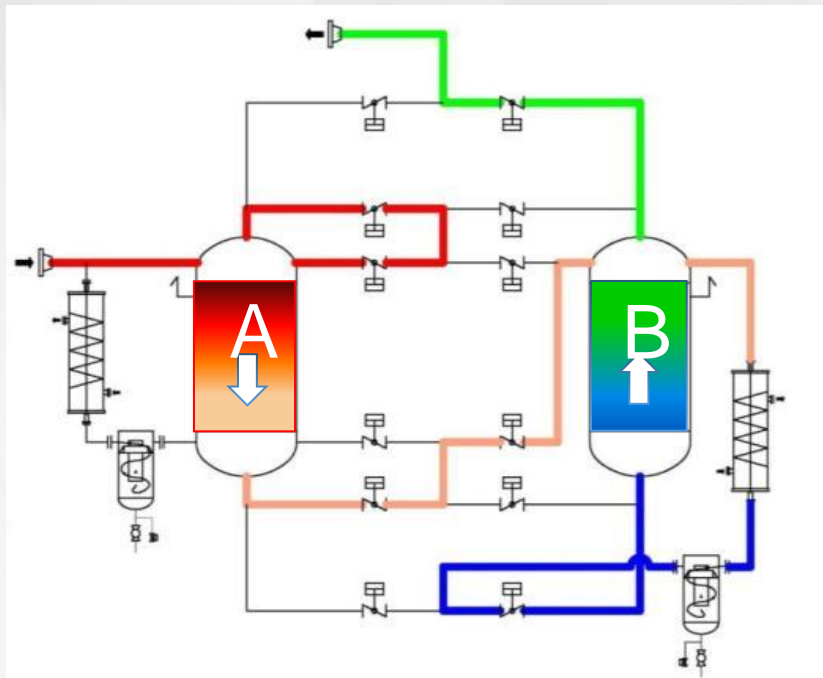
- Working pressure range: 0.7-1.0MPa
- Average air consumption for cold blowing: 0%
- Nominal pressure dew point: -20°C
- Inlet temperature: $\geq 120^{\circ}\text{C}$
- Oil content at air inlet: $\leq 0.01\text{mg}/\text{m}^3$
- Cycle: 6 hours
- Power: 380V/3P/50Hz
- Pressure drop: $\leq 0.03\text{MPa}$
- Control mode: fully-automatic control

Naming rule





HCD ZP zero air-consumption compression heat regenerative desiccant dryer - working principles



Tower A for regeneration / Tower B for adsorption

- The high-temperature air exhausted by the centrifuge enters Tower A directly for regeneration. Then, the saturated high-temperature moisture enters the after-cooler for cooling, and the liquid water is removed by an air-water separator.
- The cooled compressed air enters Tower B for adsorption, and is finally exhausted from the top along the pipe to the use point.

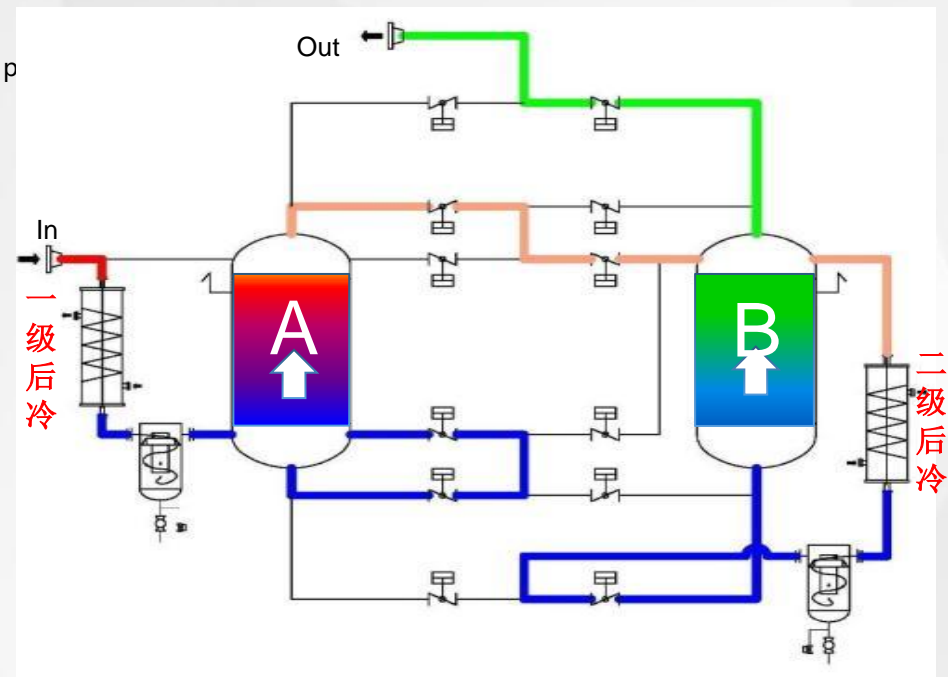
Calculated according to the law of conservation of energy:

- For customers whose dew point needs to reach PDP-40°C, we recommend installing an electric heater to increase the regeneration temperature to above 180 °C, and provide cooling water ≤ 20 °C on site;
- If the dew point reaches PDP-70°C, it requires to provide a regeneration temperature of 200 °C and chilled water of ≤ 12 °C.



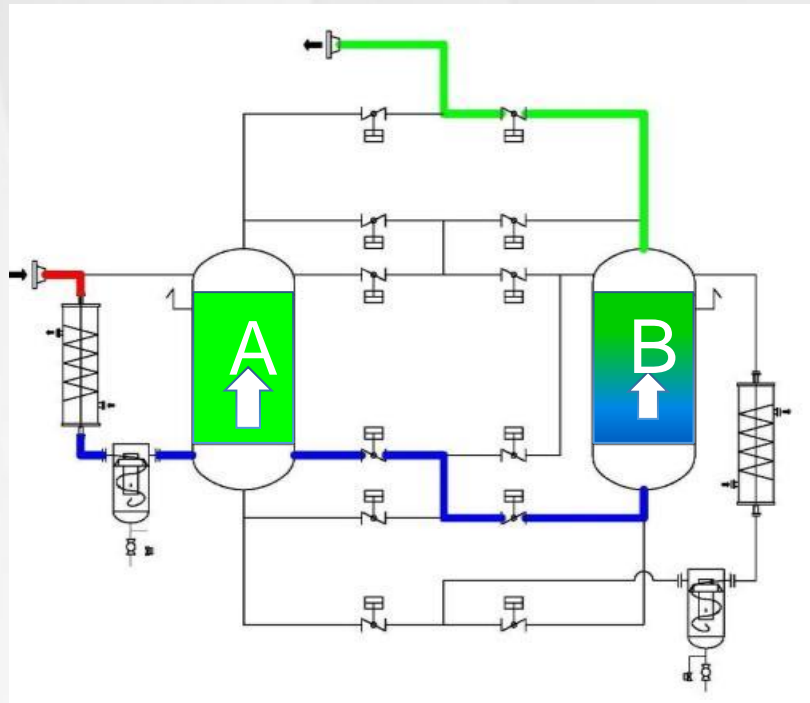
Tower A for cold blowing / Tower B for adsorption

- The high-temperature air exhausted from the centrifuge directly enters the Level-1 after-cooler for cooling, and the liquid water is removed by an air-water separator.
 - The cooled compressed air then enters Tower A for cold blowing, and then enters Tower B for normal adsorption after cooling by the Level-2 cooler and water-removing by the separator.
 - It is finally exhausted from the top along the pipe to the use point.
- If the customer's on-site chilled water volume is limited, we may further install another after-cooler using conventional ≤ 32 °C cooling water for cooling.





HCD ZP zero air-consumption compression heat regenerative desiccant dryer - working principles



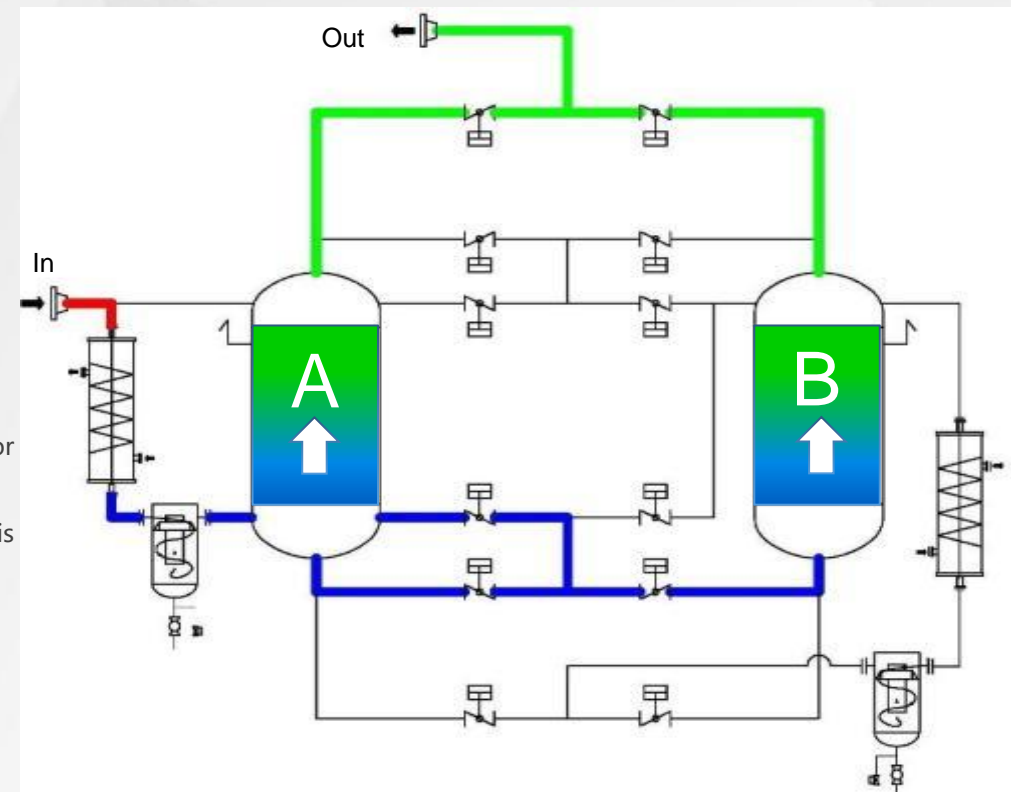
Tower A for waiting / Tower B for continuous adsorption

- The high-temperature air exhausted from the centrifuge directly enters the after-cooler for cooling, and the liquid water is removed by an air-water separator. The cooled compressed air enters Tower B for adsorption, and is finally exhausted from the top along the pipe to the use point.
- At this moment, the adsorbent of Tower A has been cooled, so it may close the exhaust valve and open the charging valve for charging. After completion, Tower A enters the switchover waiting state



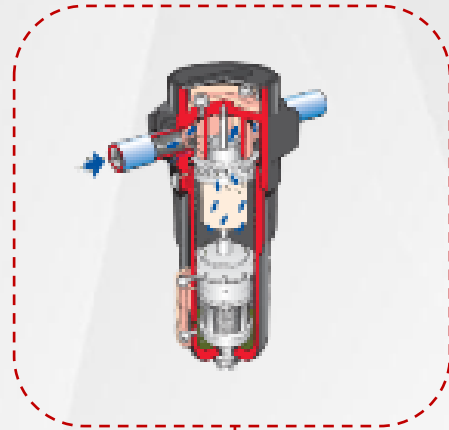
Simultaneous adsorption in Tower A / Tower B

- The high-temperature air exhausted from the centrifuge directly enters the after-cooler for cooling, and the liquid water is removed by an air-water separator.
- The cooled compressed air enters Tower A and Tower B simultaneously for adsorption, and is finally exhausted from the top along the pipe to the use point.
- This ensures that pressure fluctuations and dew point fluctuations in the pipe network are minimized





HCD & HCD ZP compression heat regenerative desiccant dryer - product introduction



High-efficiency WS air-water separator

- Efficiency above 99%
- Compact structure, low pressure
- Stable and reliable operation



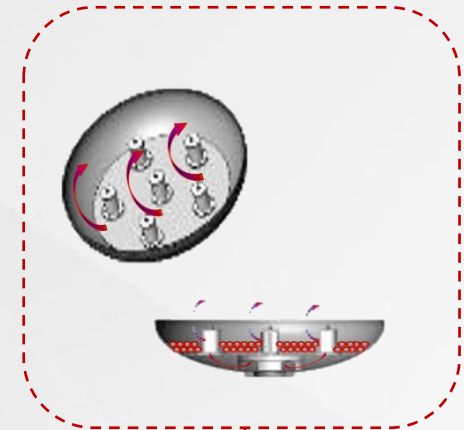
High-efficiency after-cooler

- Interpolated spoiler to strengthen heat exchange, and enable the temperature difference between the cooling water inlet and outlet to reach 7 °C. Effectively reducing energy consumption by 10%



Multi-drainage setup

- Stainless steel hand valve for manual drainage
- Stainless steel pneumatic ball valve for intermittent drainage
- Electronic liquid level for airless drainage (optional)



Adsorption tower bottom design

- The special "Lotus Layout" bypass structure at the bottom of the adsorption tower has no dead corner area to ensure uniform air distribution
- The bottom is filled with porcelain balls to ensure more uniform distribution, effectively prevent the lower adsorbent from soaking water and caking, and extend the service life of the adsorbent.



IRDR rotary desiccant dryer



Product introduction

Application industries

Installation instructions

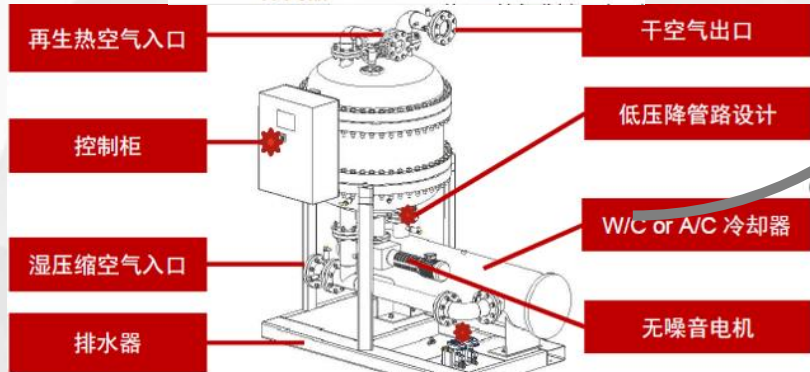
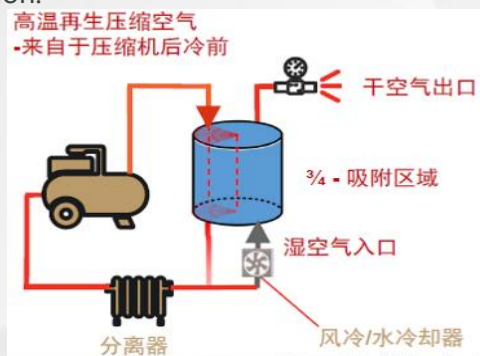
Product advantages and disadvantages



IRDR rotary desiccant dryer - product introduction

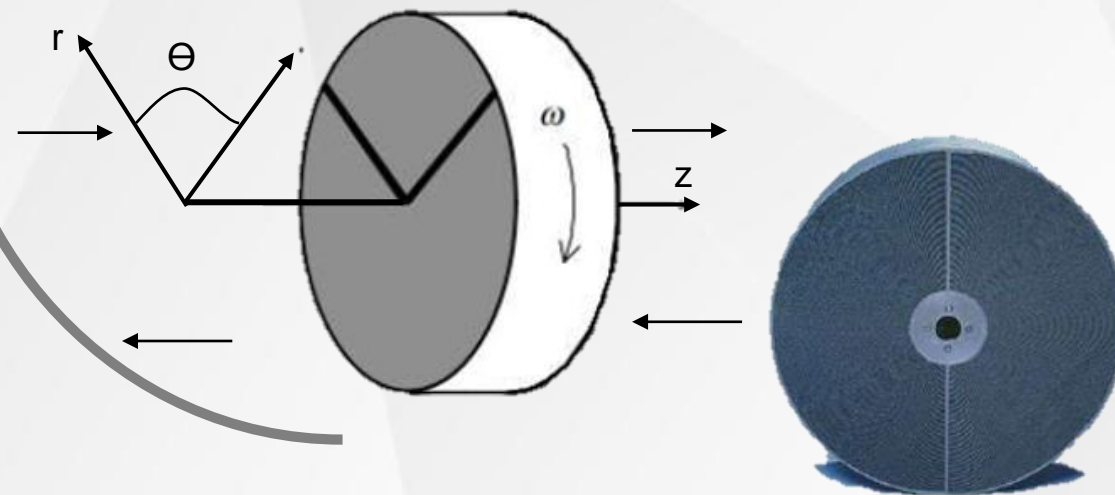
Designed structure

- Most common adsorption dryers are in twin-tower design, and rotary dryers have only one container.
- It adopts a honeycomb structure without powdery adsorbent, containing corrugated high-performance composite adsorbents.
- About 3/4 is used to dry the hot compressed air, while 1/4 is used for regeneration.



Product highlights

- Zero energy consumption, compression heat, -10 ~ -40°C pressure dew-point
- Use rotary wheels with higher adsorption performance than twin towers
- Can be used with various types of oil-free compressor (piston, screw and centrifugation)
- Optimize processes and controls for more stable dew points
- Almost no electricity consumption, and no air consumption; and use the waste heat of compressor to dry compressed air





IRDR rotary desiccant dryer - product introduction

High quality, simple and efficient

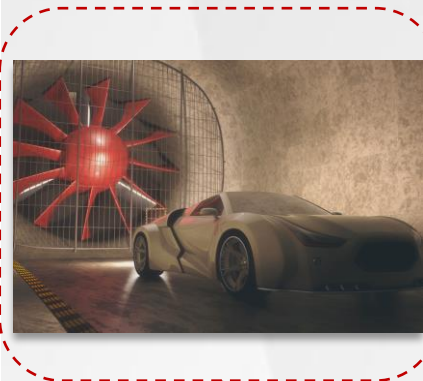
							
专业为无油压缩机设计	压缩热吸附	零气耗	单塔设计	节约50%的占地面积	即插即用	低露点, 低压降	低运行成本
<ul style="list-style-type: none"> ⑩ 与各种无油压缩机无缝连接 ⑩ Class 0 空气质量.....无污染风险 ⑩ 一级CAS (T/CGMA 033001-2018) 	<ul style="list-style-type: none"> ⑩ 100%余热回收用于再生 ⑩ 没有外部加热器 ⑩ 零能耗 	<ul style="list-style-type: none"> ⑩ 无压缩空气损失 ⑩ 100%干燥空气输出 ⑩ 0.12 kW电机驱动转轮旋转 ⑩ 零碳排放 	<ul style="list-style-type: none"> ⑩ 连续运行的最简单的单塔结构 ⑩ 可移动部件 ⑩ 无故障, 无泄漏 	<ul style="list-style-type: none"> ⑩ 在不降低性能的情况下节省50%的空间 ⑩ 减去资本支出和土建工程 ⑩ 环保设计 	<ul style="list-style-type: none"> ⑩ 易于安装和调试 ⑩ 带压缩机的预装管道和电缆 	<ul style="list-style-type: none"> ⑩ 大型冷却器和水分离器保证PDP-20°C ⑩ 通过CFD分析减少压降 ⑩ 经第三方认证机构认证, 与MD相比性能更好 	<ul style="list-style-type: none"> ⑩ 没有易损件 ⑩ 无故障运行 ⑩ 无粉尘污染风险 ⑩ 无需粉尘过滤器 ⑩ 与冷冻干燥机相比, 节能85%



IRDR rotary desiccant dryer - product introduction

Flow FAD	Model	Combined with compressor	Application fields
m ³ /min	IRDR	Can match all rotary-teeth, screw, piston and centrifugal oil-free compressors	Food processing Beverages Pharmaceuticals Clean rooms Process clean air Electronic workshop Photo processing Automotive wind tunnel Textile spinning Powder spraying Instrument air Pneumatic valve control
≤5.1	IRDR 5		
≤9.6	IRDR10		
≤15.4	IRDR16		
≤20.3	IRDR20		
≤25.9	IRDR26		
≤31.8	IRDR32		
≤45.1	IRDR35		
≤41.1	IRDR41		
≤45.2	IRDR45		
≤49.5	IRDR50		
≤52.9	IRDR53		
≤62.1	IRDR60		
≤65	IRDR65		
≤73.4	IRDR70		
≤84.2	IRDR80		

Full-series standard VSD control; Configurable with heater and IRDR5-53 usable air cooling





IRDR rotary desiccant dryer - product introduction



High-temperature air intake



Room-temperature air intake

Application requirements

- The front-end compressor shall be an oil-free compressor
- The residual heat temperature is higher than 110°C, and 140°C is the best.
- The dryer is located between the air storage tank and the compressor
- The dryer may, according to site conditions, use cooling with chilled water or add a regenerative heater to improve the stability of dew point.
- The installation of back-end dust filter is not required

Schematic diagram for
reference only



IRDR rotary desiccant dryer - advantages and disadvantages of compression heat

Advantages of IRDR

- No regenerated air consumption except cold blowing for pressure relief
- Low operating cost
- No additional blowers and heaters
- Simple design
- No initial filtration required



工作原理

转轮技术于1950年就被发明,一直以作为成熟技术应用用于各个需要增压干燥的领域,例如大型楼宇新风系统,无尘车间、食品加工等。IRDR转轮式干燥器,是把压缩的转轮设计改变为适用于承压状态,转轮是吸水的核心部件(使用原装进口吸附材料),使得压缩空气通过时,水分会留在转轮上,采用了类似发动机废气催化装置上的蜂窝结构保证更大吸附面积,表面使用了高性能的特殊复合材料,除湿能力优于传统氧化铝,尚可见透透的转轮,压降极低。

常见的吸附式干燥器都是双塔设计的,我们专门设计了一款特殊的转轮式干燥器,这款转轮式干燥器只有一个容器,没有颗粒状的吸附剂,采用蜂窝架结构,内含波状的特殊高性能复合吸附材料,大约1/4部分用于吸附压缩空气的水分,同时1/4部分使用压缩热再生。



与无油空压机完美搭配,简单,干燥器在储气罐和压缩机之间,不需要过滤器



英格索兰IRDR压缩热转轮式吸干机

Disadvantages of IRDR

- Must be directly connected to the air compressor
- Apply only to oil-free machines
- Unstable dew point
- Shorter service life of adsorbent than no-heat desiccant dryer

IRDR系列

机型	公称进口容积流量 CFM or m³/min	额定工作压力 Mpa	环境温度 °C	常温进气温度 °C	高温进气温度 °C	加热器 kW	机组重量 kg	机组尺寸(cm) CW x D x H
水冷								
IRDR-6.5	5.1	0.85	1-40	c38	≤110	/	700	110 x 130 x 200
IRDR10-7	9.6	0.70	1-40	c38	≤110	/	700	110 x 130 x 200
IRDR16-7	16.1	0.70	1-40	c38	≤110	/	950	125 x 160 x 230
IRDR20-10	20.3	1.00	1-40	c38	≤110	/	800	120 x 130 x 200
IRDR25-8.5	24.6	0.85	1-40	c38	≤110	/	1000	130 x 160 x 230
IRDR32-10	31.8	1.05	1-40	c38	≤110	/	1050	135 x 160 x 230
IRDR35-8.5	35.0	0.85	1-40	c38	≤110	/	1130	140 x 160 x 230
IRDR41-10	40.6	1.05	1-40	c38	≤110	/	1130	140 x 160 x 230
IRDR45-7.5	45.2	0.75	1-40	c38	≤110	/	1400	160 x 190 x 240
IRDR51-10	50.9	1.07	1-40	c38	≤110	/	1400	160 x 190 x 240
风冷								
IRDR3W-6.5	5.2	0.85	1-40	c38	≤110	/	600	80 x 120 x 200
IRDR10W-7	9.6	0.70	1-40	c38	≤110	/	630	90 x 120 x 200
IRDR16W-7	16.1	0.70	1-40	c38	≤110	/	800	90 x 130 x 210
IRDR20W-10	20.3	1.00	1-40	c38	≤110	/	650	80 x 130 x 200
IRDR25W-8.5	24.6	0.85	1-40	c38	≤110	/	800	90 x 140 x 210
IRDR30W-10	31.8	1.05	1-40	c38	≤110	/	850	90 x 150 x 230
IRDR35W-8.5	35.1	0.85	1-40	c38	≤110	/	900	90 x 160 x 230
IRDR41W-10	41.1	1.05	1-40	c38	≤110	/	900	90 x 160 x 230
IRDR45W-7.5	45.2	0.75	1-40	c38	≤110	/	1600	150 x 200 x 230
IRDR51W-10	50.9	1.07	1-40	c38	≤110	/	1600	150 x 200 x 230
IRDR54W-7.5	53.3	0.75	1-40	c38	≤110	/	1600	150 x 200 x 230
IRDR60W-7.5	62.1	0.75	1-40	c38	≤110	/	1700	150 x 200 x 230
IRDR65W-8.5	65.0	0.85	1-40	c38	≤110	/	1800	150 x 200 x 250
IRDR70W-8.5	72.5	0.85	1-40	c38	≤110	/	1800	150 x 200 x 250
IRDR80W-8.5	80.1	0.85	1-40	c38	≤110	/	1900	150 x 200 x 250

*详细选型请咨询英格索兰销售

运行工况

- 标准工作压力: 0.7Mpa
- 常温进气温度: <30°C
- 高温进气温度: >110°C
- 环境温度: -14°C
- 电源: AC380V/3P/50Hz
- 冷却水: <32°C

标准配置

- 全系列智能控制
- 带气路球阀
- PLC控制, 彩色触摸屏
- 远程控制

可选配置

- 进气温度: >90°C
- 单独高温进气
- 液体冷却功能
- 不锈钢材质
- 露点显示及节能模块





D-ICD combined desiccant dryer



Product introduction

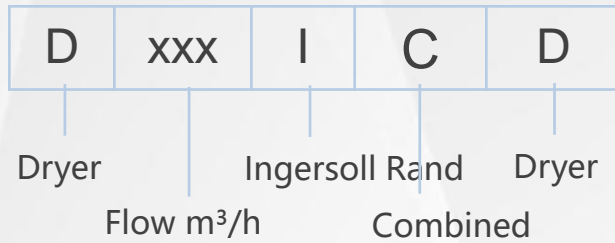
Working process

Product advantages and disadvantages



D-ICD combined desiccant dryer - product introduction

Naming rule



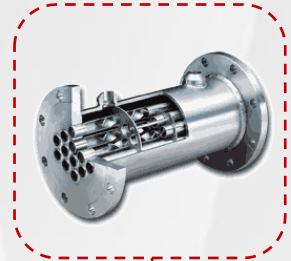
Product parameters

- No-heat regeneration flow range: 15~150m³/min
- Standard working conditions: standard working pressure at 7bar, ambient temperature at -38°C, air inlet temperature at 45°C
- Designed pressure dew point: -40°C
- Average regeneration air consumption: 3%
- Maximum cooling water temperature: Max 32°C

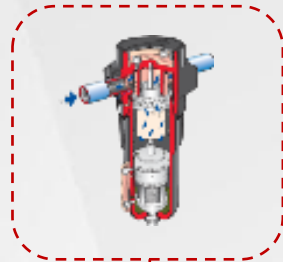




D-ICD combined desiccant dryer - product introduction



High-efficiency cooler



Cyclone-type air-water separator



Refrigeration compressor

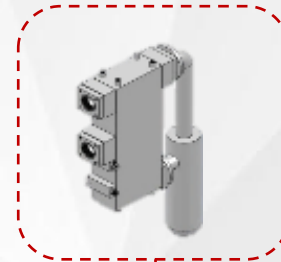


Plate-fin heat exchanger



Siemens PLC



High-performance pneumatic butterfly valve



Siemens LCD screen



Brand dew point meter



Refrigerant high/low-pressure protector



High-performance solenoid valve



Temperature transmitter



Schneider low-voltage appliances



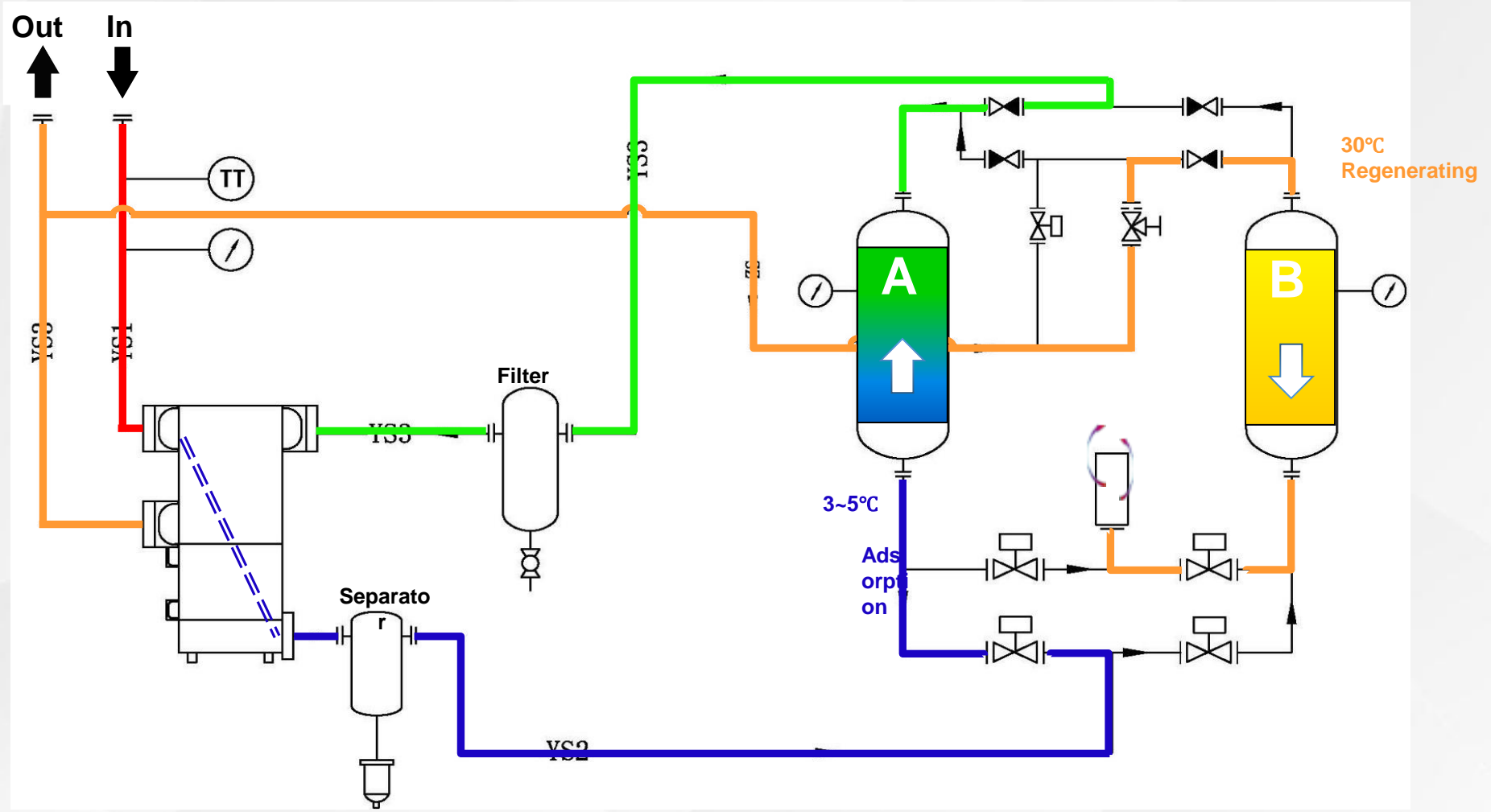
Refrigeration parts



Stainless steel air-control line



D-ICD combined desiccant dryer - working process





D-ICD combined desiccant dryer - advantages and disadvantages

Advantages of D-ICD

- Stable dew point temperature
- Good drying effect
- The efficient internal design makes up for the deficiencies of the connection between desiccant dryer and refrigerated air dryer

D-ICR 系列 高效组合式干燥机

D-ICR 系列高效组合式干燥机突破了普通的冷冻装置和吸附装置的简单串联方式，设备的节能效果大大提高用户的投资回报率。

- 通过冷冻干燥技术，将入口高温空气降低到 5°C 及以下；
- 低温状态下的饱和湿空气通过高效旋风分离器被除水，再通过高效除油过滤器去除油污杂质，进入吸附装置进行深度吸附；
- 吸附后的干燥冷空气再次进入冷冻干燥系统，与入口的湿热空气进行热交换，达到温度升高效果；
- 升温后湿后的大部分干燥压缩空气排往用气管路，小部分干燥热空气返回到再生塔，对低温状态下处于饱和状态的吸附剂进行变温再生。



产品特点：

性能高
出口温度稳定，能获取稳定的低露点，高品质的出口压缩空气，完全去除杂质和水分。

维护简单

通过冷冻干燥系统先降低压缩空气水分含量，从而有效的延长吸附剂寿命；延长工作周期，减少阀门故障。

压力露点可选择

可根据用户要求设计压力露点为 -40°C 或 -70°C。

节能效果好

本干燥装置无需附加加热器和增大再生耗电量，大幅度降低吸附剂再生耗气量（再生气耗量 < 3%），并可降低制冷压缩机耗电量 20%~40%。

节约空间

结构设计紧凑，与冷冻装置和吸附装置的简单串联相比，更加节约空间。



Disadvantages of D-ICD

- Large initial cost investment
- Complex structure
- Inconvenient maintenance and service
- Certain energy consumption

技术参数：

- ✓ 公称压力露点：-40°C (-70°C 压力露点可选)
- ✓ 工作压力范围：0.7-1.0Mpa
- ✓ 再生气耗量：< 3%
- ✓ 进口温度：1-65°C
- ✓ 环境温度：2°C -38°C (仅指风冷式)
- ✓ 冷却水温度：2°C -35°C (仅指水冷式)

D-ICR 系列高效组合式干燥机 (单冷)

规格	流量	电压	额定功率	空气接口	外形尺寸	重量	净重	最大尺寸	最大重量		
ICR	m³/min	V/Ph/Hz	kW	英寸	长 (mm)	宽 (mm)	高 (mm)	mm	mm		
D1000C-W	15.00	380/3/50	3.75	DN65	1700	1000	2112	1130	85.4"	2.0	85.12"
D1200C-W	20.00	380/3/50	5.75	DN65	1700	1000	2112	1130	85.4"	3.0	85.12"
D1500C-W	30.00	380/3/50	8.50	DN65	1800	1100	2342	1260	97"	4.0	85.12"
D2000C-W	40.00	380/3/50	11.75	DN100	2000	1300	2512	1360	111.4"	6.0	85.12"
D3000C-W	50.00	380/3/50	15.75	DN125	2200	1400	2782	1500	121.4"	7.2	85.12"
D4000C-W	60.00	380/3/50	19.75	DN150	2300	1400	2912	1600	121.4"	9.0	85.12"
D6000C-W	80.00	380/3/50	27.00	DN175	2500	1600	3042	1800	121.2"	12.0	85.12"
D8000C-W	100.00	380/3/50	35.00	DN175	2700	1800	3202	2000	121.2"	15.0	85.12"
D12000C-W	120.00	380/3/50	43.00	DN175	2700	1800	3215	2000	121.2"	16.0	85.12"
D16000C-W	150.00	380/3/50	56.75	DN200	3000	2000	3752	2200	131.2"	18.0	85.12"

注：表中干燥装置均指单冷式干燥装置，如需要加热干燥装置，请咨询本厂家技术人员。

选择配置：

- ✓ 露点仪附件
- ✓ 罐体电加热器附件
- ✓ 远程通信 Modbus/Profibus
- ✓ 触摸屏控制
- ✓ 串联组合式选项



Comprehensive comparison of desiccant dryer

Technologies of desiccant dryer	Heater	Blower	Regenerated air consumption	-20/-40 °C PDP dew point	Cycle	Investment cost	Operation and maintenance cost	Payback period
No-heat regeneration	/	/	14-15%	Stable	10 minutes	Medium	High	/
Mild-heat regeneration	✓	/	7%-8%	Stable	8 hours	Medium	High	/
Blower heat regeneration	✓	✓	1%-3%	Stable	8 hours	Slightly high	Medium	2.5 years
Blower heat regeneration Zero gas consumption	✓	✓	0	Very stable	8 hours	High	Medium	3.0 years
Compression heat regeneration	/	/	1%-4%	Stable	6 hours	Slightly high	Low	1.5 years
Compression heat regeneration Zero gas consumption	/	/	0	Stable	6 hours	High	Low	1.5 years
Combined no-heat	/	/	~7%	Stable	1 hour	Slightly high	High	/
Combined mild-heat	✓	/	~4%	Stable	2 hour	Slightly high	High	/

* Calculation method of operation and maintenance cost: energy consumption for annual operation of 8000 hours + converted energy consumption for regenerated air + cost of adsorbent and other consumables



FA Conventional pipeline filter

Naming rule

F	A	xxx	I	X
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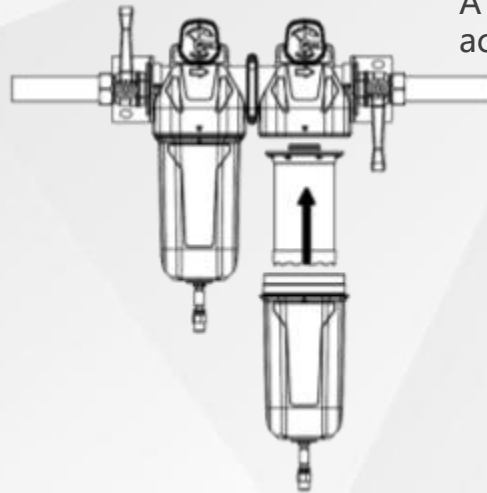
Filter

IR first-generation products

Flow m³/h

Ingersoll Rand

Filtration class:
G – Conventional protective filtration
H – Efficient and precise filtration
D – Ordinary dust removal
A – Filtration with activated carbon



Product introduction

- Ingersoll Rand's proprietary patented design, development and production
- Low pressure drop / Low energy consumption
- Convenient filter element replacement
- Improved channel loyalty
- Complete control of design and supply chain
- More durable product component structure
- Superior interior design
- Standardized differential pressure indicator
- 17 models, 5 head structures optional - 9 cylinder structures optional
- Processing capacity: 0.5~45.3 m³/min
- Connection: From "3/8" to "3" (BSPT/NPT)
- Maximum working pressure: (17.2 barg / 250 psig)
- Maximum operating temperature: (80 °C / 176 °F)
- Class-4 filtration: D, G, H & A
- High-efficiency filter element adapter



FA Conventional pipeline filter

Grade D – dust removal filter

- Level-3 solid particle filtration accuracy
- Filtration accuracy of solid particles reaching 1 micron
- Filter element material: cellulose

Grade H – efficient and precise filtration

- Level-1 solid particle filtration/ Level-1 oil filtration
- Solid particle filtration accuracy reaching 0.01 micron, including coolant, water and oil; the maximum oil content at 21°C is below 0.01mg/m³
- Filter element material: borosilicate glass fiber



Grade A – activated carbon filter

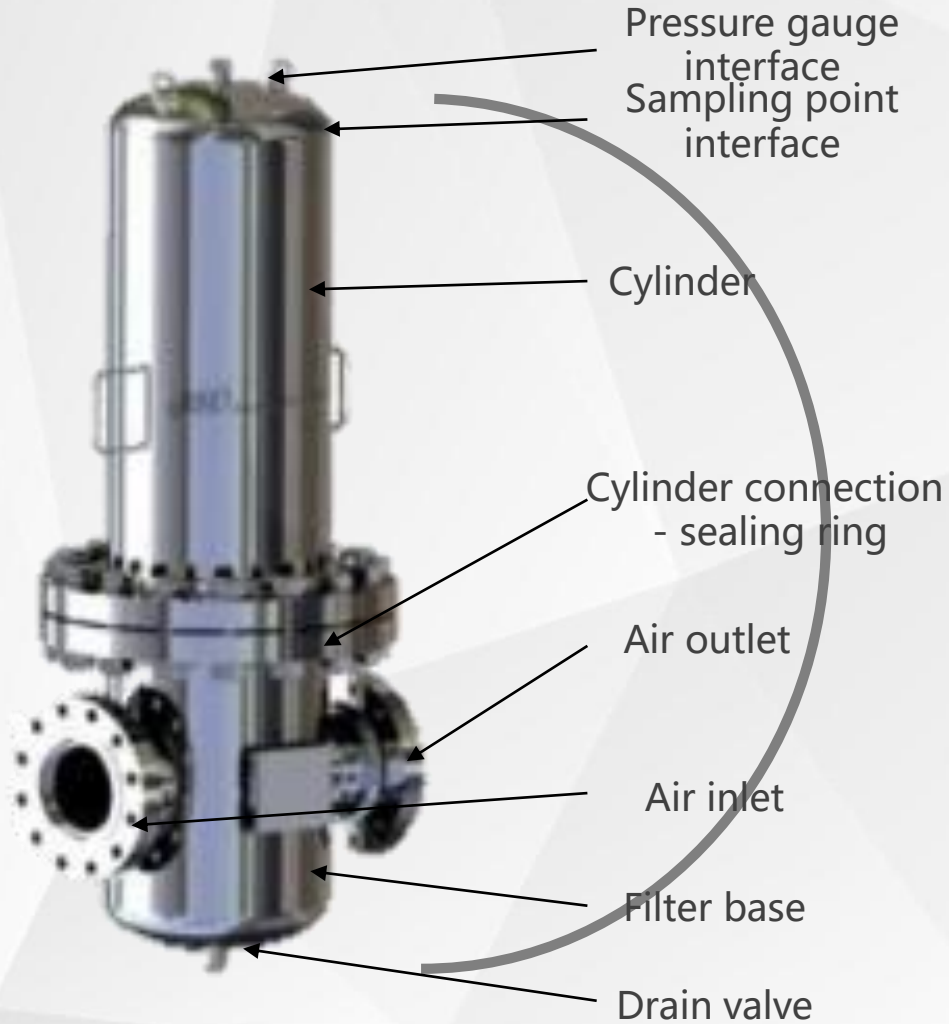
- Level-1 oil filtration
- Removal of oil mist and hydrocarbons, with a maximum oil content below 0.003mg/m³ (including methane) at 21 ° C (Preposition of Level-H filter required)
- Filter element material: activated carbon

Grade G – conventional protection filter

- Level-2 solid particle filtration/ Level-2 oil filtration
- Solid particle filtration accuracy reaching 0.1 micron, including coolant, water and oil; the maximum oil content at 21°C is below 0.03mg/m³
- Filter element material: borosilicate glass fiber

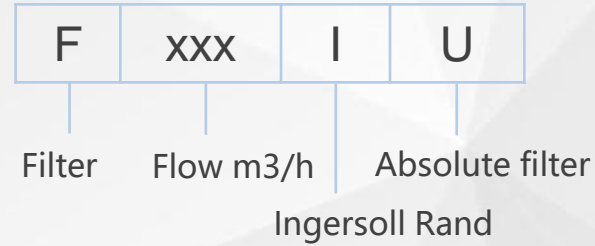


F-IU absolute filter pipeline filter



Sterilizing (process) filter
F-IU: 2.5-150 m³/m

Naming rule



Typical sterilizing air filter enclosure

- Not all enclosures contain these elements
- The shapes of enclosure will be different for different models
- Ensure the correct inlet/outlet directions

Product introduction

- 304/316 stainless steel filter enclosure
- High-efficiency sterilizing filter element
- Filter area: Each 25cm-long filter element has a filtration area of 0.8m², and so on.
- Steam sterilization resistance: 142°C, 225 times in 30 minutes
- Operating temperature: ≤60°C
- Pressure drop resistance: 3.5bar@60°C
- Biological safety: Compliant with USP plastic Class VI, BS5736
- Polytetrafluoroethylene (PTFE) hydrophobic filter material, 100% filtration to 0.01μ for absolute sterilization and bacteriophage grade
- Unique heat-resistant polypropylene sheath and 316L stainless steel center column, not only withstanding repeated 142°C steam sterilization, and also having 300% higher porosity than competitive products, strong structure, and minimized air flow resistance.



F-NG Energy-saving filter



Product introduction*

Dust removal accuracy up to: 0.1 micron

- 99.98% removal of particles within 0.1-3 microns
- 100% removal of particles above 3 microns

Oil removal efficiency up to: 0.015ppm

- Efficient removal of oil/gas particles
- 2 ppm (enter) = 0.01 ppm (discharge)
- 3 ppm (enter) = 0.015 ppm (discharge)
- If the user's working condition (0.1u, 0.015ppm) is met, 1 NG can replace the original GP/HE 2 filters"
- The pressure difference is 0.034-0.07 bar g (0.5-1Psig), which saves system energy consumption by 4Psig = 2% than ordinary filters
- Standard differential pressure meter
- Deep filter bed filtration
- Pressure vessel compliant with GB specifications
- Normal service life of filter element: more than 5 years

- * Performance parameters are based on the following conditions:
- Air inlet pressure at 7 bar(g)
 - Air inlet temperature at 21 °C



F-NG Energy-saving filter

ISO 8573 corresponding configuration scheme

CLASS	Solid particle		Water	Oil
	Solid wet particle	Solid dry particle	Vapor	Oil mist and oil vapor
0	Defined by the user or supplier			
1	G(GP)+H(HE)+U	D(DP)+H(HE)+U	Adsorption dryer -70°C PDP	G(GP)+H(HE)+A(AC)
2	G(GP)+H(HE)	D(DP)+H(HE)	Adsorption dryer -40°C PDP	G(GP)+H(HE)+U
3	G(GP)	D(DP)	Adsorption dryer -20°C PDP	G(GP)
4	G(GP)	D(DP)	Refrigeration dryer +3°C	G(GP)
5	G(GP)	D(DP)	Refrigeration dryer +7°C	G(GP)
6	G(GP)	D(DP)	Refrigeration dryer +10°C	G(GP)

Filtration grade and selection

Preposition required			Solid particle removal accuracy	Maximum oil content	Suggested filter element
Filter grade	Filtration grade	Filter type	(including water and oil mist)	@ 21°C	Replacement frequency
	G(GP)	Condensed-type	1 μm	0.6mg/m ³ 0.5ppm	6个月
G(GP)+	H(HE)	Condensed-type	0.01 μm	0.01mg/m ³ 0.01ppm	6个月
G(GP) H(HE)+	A(AC)	Oil vapor removal	N/A	0.003mg/m ³ 0.003ppm	3个月
	D(DP)	Solid dry particle	1 μm	N/A	6 months
D(DP)+	H(HE)	Solid dry particle	0.01 μm	N/A	6 months
G(GP) H(HE) A(AC)+	U	Solid dry granules / sterilization	0.01 μm / sterilization	N/A	12 months



05

Promotion expert

- Frequently asked questions (FAQ)
- Application and marketing strategy



FAQ - Confirm what type of dryer to choose

Will compressed air be used as a raw material in the specific production process? Do you need a pressure dew point of -40°C ? What grade of air quality is required?

Are you using a oil-flooded compressor system or an oil-free compressor system?

Is there sufficient finished compressed air for the supply of purified and regenerated air (regenerated air consumption)?

Does your compressed air flow vary significantly?

Are there any problems caused by moisture or water content in your air system pipeline?

Is there too much water in your air pipeline, or is there freezing in your air pipeline?

Do you currently monitor the pressure dew point?

What grade of air quality is required on the demand side?

How important is contamination prevention to your process?

Is the life-cycle cost of equipment a priority for your company?



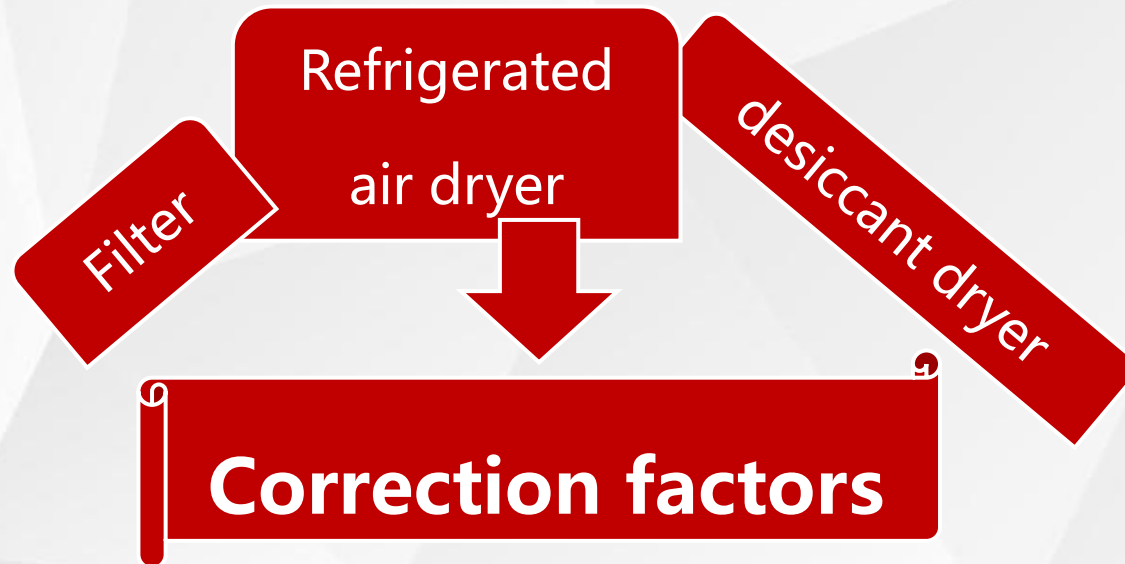
 FAQ - Choose which grade of drying and filtration equipment

What is the temperature of the compressed air entering the dryer?

What is the ambient temperature of the dryer?

If the dryer is a water-cooled model, what is the temperature of the cooling water?

What is the maximum temperature in winter and summer at the customer's site?

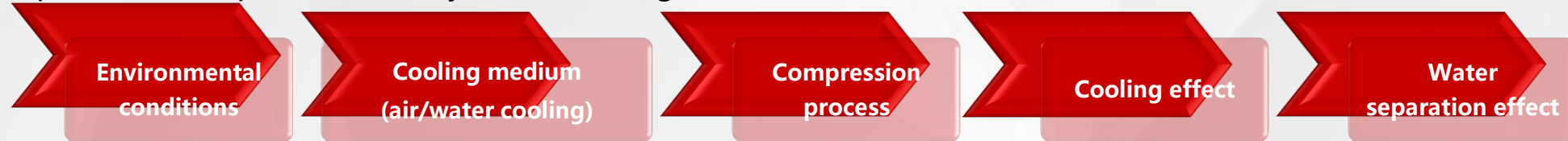




FAQ - Q&A

- Q: What factors affect dryer performance?

- A: The pressure dew point of the dryer often changes with the inlet conditions, such as:



- Q: What is peak dew point temperature?

- A: The peak dew point temperature often occurs during the regeneration or switching cycle, and many regenerative dryers have higher peak temperature and dew point, which requires additional heaters or consumes more finished air (higher regeneration air consumption) to mitigate this effect.

- Q: What is the difference between the pressure dew point PDP and the atmospheric dew point ADP?

- A: Atmospheric dew point, also known as atmospheric dew point, is a temperature below which water vapor will condense at atmospheric pressure; while pressure dew point is the temperature below which water vapor will begin to condense at a set pressure. For example, under a pressure dew point at 7kg of -40°C corresponds to a normal pressure dew point of -58°C .

- **Q: Does the customer really need -40°C PDP compressed air? Is -20°C sufficient in most cases?**

- A: We need to make it clear that in most applications, the pressure dew point of $3-10^{\circ}\text{C}$ can meet the requirements, and a lower pressure dew point will inevitably increase the cost of the user. Only in some segments such as electronic semiconductors, panels, medicine and experimental process air, there are harsh requirements for dew point; and the salesman needs to make decisions based on actual situations at the front end.

Comparison of desiccant dryer - application and marketing strategy

PDP -20 °C Low comprehensive cost of compression heat
(zero air consumption)

Technical features	No-heat regeneration	Mild-heat regeneration	Blower heat regeneration	Blower heat regeneration with zero air consumption	Compression heat regeneration	Compression heat regeneration Zero gas consumption	Combined no-heat regeneration	Combined mild-heat regeneration
Recommended flow range Nm ³ /min	< 20	< 40	>10	>10	> 10	> 10	> 10	> 10
Energy consumption	Very high	High	Energy conservation	Very efficient	Energy conservation	Very efficient	Ordinary	Ordinary
Supporting air compressor	Small-power air compressor	Small screw air compressor	Medium and large screw air compressor	Medium and large screw air compressor	Large centrifuge Large oil-free screw air compressor	Large centrifuge Large oil-free screw air compressor	Medium and large screw air compressor	Medium and large screw air compressor
PDP-20 °C Stability	Relatively good	Relatively good	Good	Very good	Good	Good	Relatively good	Relatively good
Features	Simple design, suitable for small flow occasions	Obsolete technology, currently used less	Stable dew point	Stable dew point	Energy conservation	Energy conservation	Energy conservation	Energy conservation
Application scenarios	It is not sensitive to energy consumption and is suitable for small-flow air consumption points at the terminal	For customers with small air consumption, inattention to energy consumption, and limited investment budget	For customers requiring stable dew point and energy conservation Major model in high-end markets		Especially suitable for use with large centrifuges Less comprehensive cost at -20°C PDP		For customers having certain requirements for dew point and energy conservation, as well as certain limits on investment cost	
Application industries	Ordinary	Ordinary	Medium- and high-end customers in the electronics, power, petrochemical, automotive, iron & steel, food and other industries		Customers with large air consumption in the electronics, petrochemicals, and iron & steel industries		Electronics, power, petrochemicals, automotive, iron & steel, food and other industries	

Comparison of desiccant dryer - application and marketing strategy

PDP -40 °C More prominent advantages (dew point and energy saving) in blower heat regeneration and compression heat (zero air consumption)

Technical features	No-heat regeneration	Mild-heat regeneration	Blower heat regeneration	Blower heat regeneration with zero air consumption	Compression heat regeneration	Compression heat regeneration with zero air consumption	Combined no-heat regeneration	Combined mild-heat regeneration
Recommended flow range Nm ³ /min	< 20	< 40	> 10	> 10	> 10	> 10	> 10	> 10
Energy consumption	Very high	High	Energy conservation	Very efficient	Energy conservation	Very efficient	Energy conservation	Energy conservation
Supporting air compressor	Small-power air compressor	Small screw air compressor	Medium and large screw air compressor	Medium and large screw air compressor	Large centrifuge Large oil-free screw air compressor	Large centrifuge Large oil-free screw air compressor	Medium and large screw air compressor	Medium and large screw air compressor
PDP-40°C Stability	Relatively good	Relatively good	Good	Very good	Good	Good	Relatively good	Relatively good
Features	Simple design, only suitable for small flow occasions	Obsolete technology, currently used less	Stable dew point	Stable dew point	The technology is mature, and there is requirement for exhaust temperature The centrifuge exhaust is about 120°C above, and screw machine is about 150°C above		Energy conservation	Energy conservation
Application scenarios	It is not sensitive to energy consumption and is suitable for small-flow air consumption points at the terminal	For customers with small air consumption, inattention to energy consumption, and limited investment budget	For customers requiring stable dew point and energy conservation Major model in high-end markets		Ordinary	Ordinary	For customers having certain requirements for dew point and energy conservation, as well as certain limits on investment cost	
Application industries	Ordinary	Ordinary	Medium- and high-end customers in the electronics, power, petrochemical, automotive, iron & steel, food and other industries		Customers with large air consumption in the electronics, petrochemicals, and steel & iron industries		Electronics, power, petrochemicals, automotive, iron & steel, food and other industries	

Comparison of desiccant dryer - application and marketing strategy

PDP -70 °C Obvious advantages in blower (zero gas consumption) regeneration

Technical features	No-heat regeneration	Mild-heat regeneration	Blower heat regeneration	Blower heat regeneration with zero air consumption	Compression heat regeneration	Compression heat regeneration with zero air consumption	Combined no-heat regeneration	Combined mild-heat regeneration
Recommended flow range Nm ³ /min	< 20	< 40	> 10	> 10	> 10	> 10	> 10	> 10
Energy consumption	Very high	High	Energy conservation	Very efficient	Energy conservation	Very efficient	Energy conservation	Energy conservation
Supporting air compressor	Small-power air compressor	Small screw air compressor	Medium and large screw air compressor	Medium and large screw air compressor	Large centrifuge Large oil-free screw air compressor	Large centrifuge Large oil-free screw air compressor	Medium and large screw air compressor	Medium and large screw air compressor
PDP-70°C Stability	Ordinary	Ordinary	Good	Very good	Relatively good	Relatively good	Ordinary	Ordinary
Features	Very high requirements for adsorption materials and energy consumption, only suitable for small-flow scenarios, and having requirement for inlet temperature	High energy consumption and few applications at present	Small fluctuation of dew points, and certain requirement for inlet temperature.	The dew point is very stable, requiring chilled water below 20°C, and there is requirement for inlet temperature; Especially suitable for -70°C PDP scenarios	Highlighting energy conservation; at -70°C PDP, it is only suitable for customers requiring special conditions		Energy conservation	Energy conservation
Application scenarios	At -70PDP, it is generally only used in laboratory of less than 10 cubic meters	Not recommended	Major model in high-end markets at the early stage	Current flagship model in high-end markets at -70°C PDP	Special high-end customers	Special high-end customers requiring large air consumption; Oil-free screw air compressor for food-grade applications	For customers having certain requirements for dew point and energy conservation, as well as certain limits on investment cost	
Application industries	Not recommended	Not recommended	Medium- and high-end customers in the electronics, power, petrochemical, automotive, iron & steel, food and other industries		Special high-end customers with large air consumption in the electronics, petrochemicals, and iron & steel industries	Electronics, petrochemicals, and iron & steel	Electronics, power, petrochemicals, automotive, iron & steel, food and other industries	



06

Quality improvements

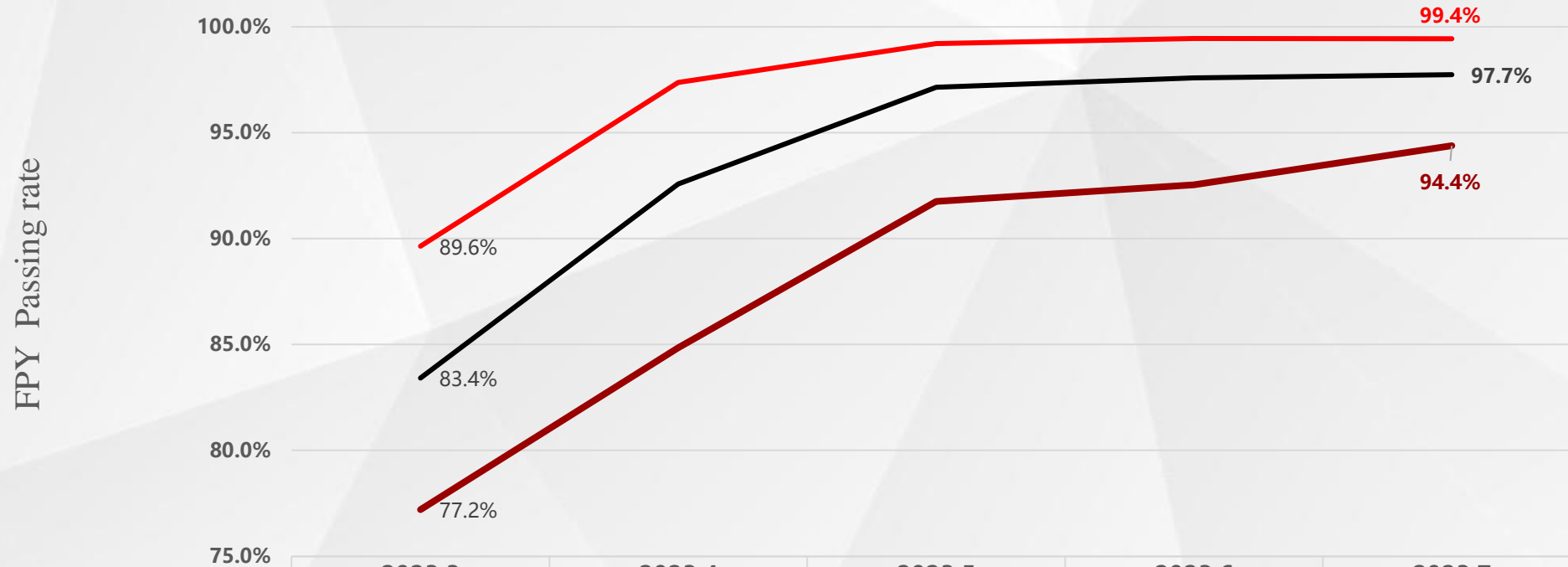
- Comprehensive self-examination
- Improvements



Comprehensive self-examination

- Since March 2023, we have been monitoring the pass rate of FPY test throughout the process

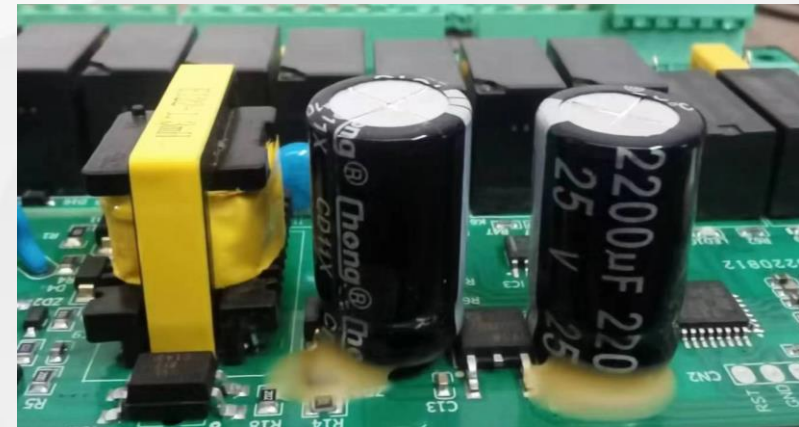
Trend of detection rate



- As of July 2023, the passing rate of the refrigerated air dryer is as high as 99.4%, the passing rate of the desiccant dryer is as high as 94.4%, and the comprehensive passing rate is 97.7%



Improvements - desiccant dryer controller



- The controller of the mild-heat desiccant dryer has no output
- The output capacitance capacity increases from the original 470uf to 2200uf



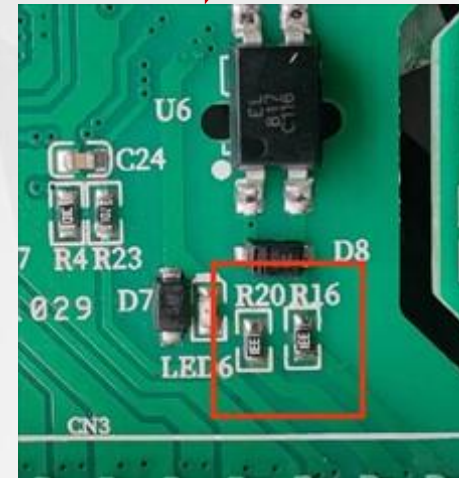
Improvements - Refrigerated air dryer controller

Before improvement



- No remote output / The compressor does not start after the power button is pressed
- No alarm / The unit does not start when the switch is pressed
- Power off and then power on, and the delay lamp is always on

After improvement



- Enhance the anti-jamming ability of the resistance-capacitance circuit
- Reduce the resistance value in the remote control circuit, and improve the working stability of the remote start
- Change R16 and R20 from 1K Ω to 330 Ω



Improvements - Electronic drain valve / coil

Before improvement

After improvement

No label prompts

- Air leakage of the electronic drainage valve, and burned coil



- A label of regular cleaning once a month is affixed to the equipment panel
- Install a plastic protective cover for the drain valve
- Increase the number of layers for the filter of the valve body from one to two
- Increase the number of coils from 6,800 to 7,000



Improvements - Electronic drain valve



- The solenoid valve does not work
- The hexagonal and filter element stems are separated

- Change to integrated processing for the filter elements
- Add the inspection of the filter element of the solenoid valve to the inspection of incoming materials



Improvements - Solenoid valve



"Yongke" local brand

亞德客
AIRTAC

- The solenoid valve cannot be closed normally, and the unit cannot be switched over normally

- Stop purchasing alternative brand solenoid valves
- Establish an internal assessment process for the deviant use of key parts



Improvements - 630 blower



- After the 630 blower is turned on, the air switch trips. After testing, the resistance between the two phases of the blower is 1.5K Ω , 50K Ω and 50K Ω respectively
- The operation of the blower motor of the unit is abnormal, and the inspection finds that the blower motor shaft flutters

- Train the supplier on how to correctly control the machining tolerance of the rotor bearing base (+0.02mm)
- Train the supplier how to correctly control the installation process of rotor bearing and bearing base to ensure that the matching clearance between the two is within the specification



Improvements - Blower blade



- Falling of blower blades
- 3 welding spots

- Ensure that the width of the welding spots is 1CM
- For three blower models, i.e., 450, 500 and 550, the number of welding spots on the blade will be increased from 3 to 4, thereby improving the overall welding strength of the blade



Improvements - Blower pressure switch



- Malfunction of the pressure switch

- Improve the structure and material of the spring plate, thus increasing the over-current performance of the switch and the strength and elasticity of the spring plate, and enhancing the service life of the switch



Improvements - Pneumatic butterfly valve



- Air leakage or poor operation of the pneumatic valve
- The butterfly valve cannot be opened properly

- Change the material of the butterfly valve base from EPDM to NBR, which is oil resistant, denser and softer, to improve the sealing of the valve and reduce the torque of the valve
- Standardize grease filling action and train employees



THANKS FOR YOUR TIME

