MARINE &
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R&D and manufacturing
EXPERIENCE

DEW POINT
3°C CLASS 4

ULTRA-DRYER

Refrigerated Air Dryer

ULTRA-DRYER

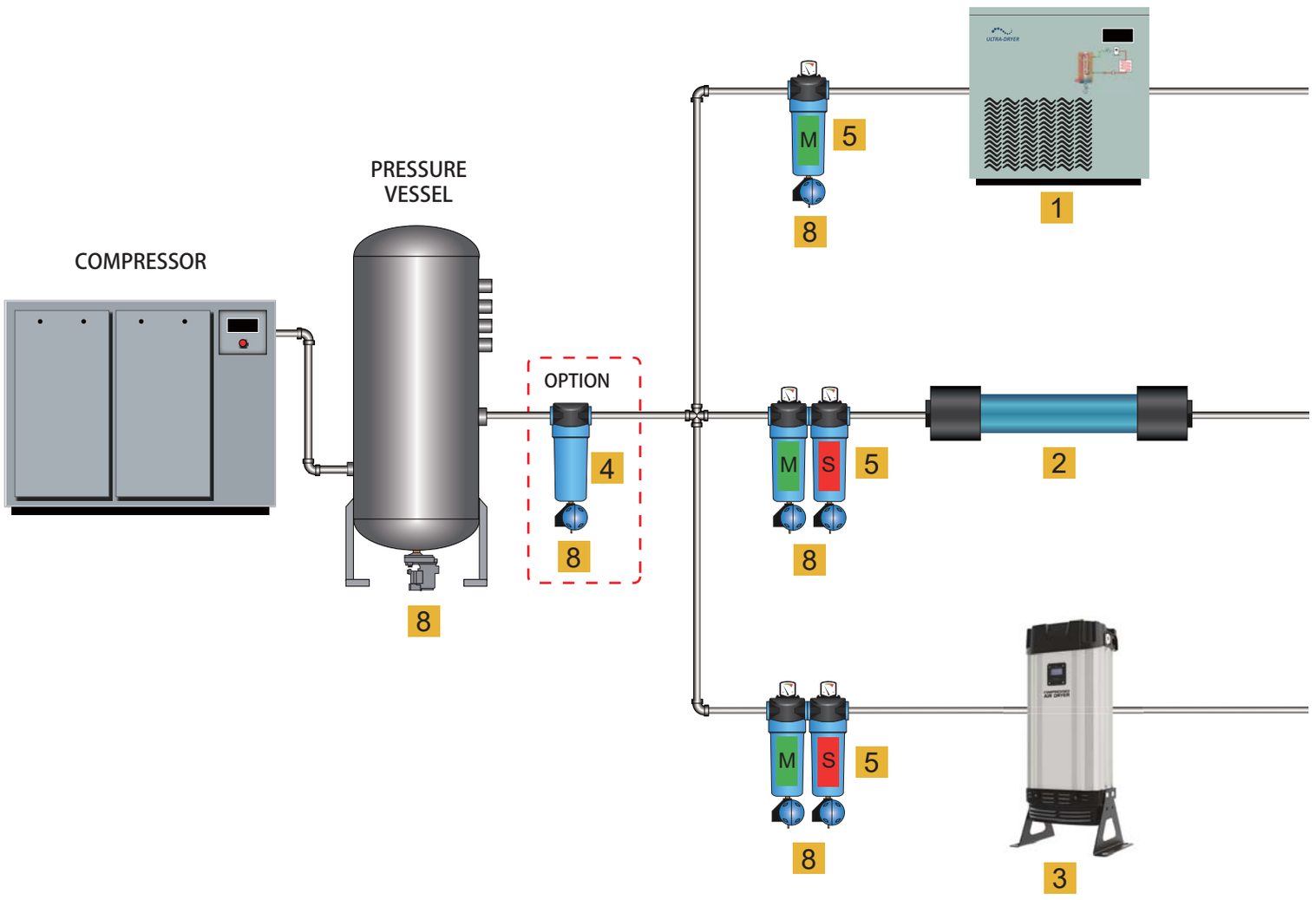
Content

ISO 8573-1 purity classes

The ISO 8573 group of international standards is used for the classification of compressed air purity. The standard provides the test methods and analytical techniques for each type of contaminant. The table below summarises the maximum contaminant levels specified in ISO 8573.1: 2010 for the various compressed air quality classes. Each compressed air classification can be achieved by installing a specific filter grade or a combination of filter grades, depending upon the required performance as shown in the diagram opposite.

CLASS	SOLID PARTICLES			HUMIDITY AND LIQUID WATER	OIL
	Maximum number of particles per cubic meter as a function of particle size, d[(a)]			Pressure dew point	Concentration of total oil[(a)] (liquid, aerosol and vapour)
	0,1 µm < d ⩽ 0,5 µm	0,5 µm < d ⩽ 1,0 µm	1,0 µm < d ⩽ 5,0 µm	°C	mg/m^3
0	As specified by the equipment user or supplier and more stringent than class 1				
1	⩽ 20 000	⩽ 400	⩽ 10	⩽ -70	⩽ 0,01
2	⩽ 400 000	⩽ 6 000	⩽ 100	⩽ -40	⩽ 0,1
3	Not specified	⩽ 90 000	⩽ 1 000	⩽ -20	⩽ 1
4	Not specified	Not specified	⩽ 10 000	⩽ +3	⩽ 5
5	Not specified	Not specified	⩽ 100.000	⩽ +7	Not specified
6				⩽ ±10	Not specified
	Mass concentration[(a)] C_p mg/m^3			concentration of liquid water[(a)] C_w g/m^3	
6	$0 < C_p \leqslant 5$				Not specified
7	$5 < C_p \leqslant 10$			$C_W \leqslant 0,5$	Not specified
8	Not specified			$0,5 \leqslant C_W \leqslant 5$	Not specified
9	Not specified			$5 < C_W \leqslant 10$	Not specified
X	$C_p > 10$			$C_W > 10$	> 5

(a) At reference conditions: air temperature of 20° C, absolute air pressure of 100 kPa (1 bar), relative water vapour pressure 0.



Suggestion: the optional items to be applied when compressed air with much oils.

1 REFRIGERATED COMPRESSED AIR DRYER

A refrigerant dryer uses a refrigerant circuit and heat exchanger to precool air, refrigerate it to condense out moisture vapor, and then reheat the air to prevent pipe sweating downstream.

ISO 8573-1(water):	Class 4
Dew point:	≤3℃
Capacity:	25-1700 Nm³/h
Max. operating pressure:	16 bar(g)
Refrigerant:	R134a, R407c,
IP grade:	IP22 / IP44
Power supply：	200-240V/1ph 360-440/3ph 50&60 Hz
Alarm:	1. Evaporator over temperature alarms, Sensor failure. 2. Common alarm, high dew point temperature alarm output.

2 MEMBRANE AIR DRYER

The compressed air through a bundle of hollow fibres. Water vapour diffuses throughthe walls of the fibres. At the outlet of the unit, a small volume of the dry compressed air sweeps the moisture away from the outside of the fibres and exhausts to the atmosphere.

ISO 8573-1(water)：	Class 2	Class 3
Dew point:	≤-40°C	≤-20°C
Capacity:	2-110 Nm³/h	
Max. operating pressure:	12.5 bar(g)	

3 HEATLESS ADSORPTION DRYER

Heatless adsorption dryers, are simple, reliable and cost effective and for small to medium flow systems, provide an even more reliable, smaller, more compact & lightweight dryer.

ISO 8573-1(water):	Class 1	Class 2
Dew point:	≤-70°C	≤-40°C
Capacity:	6-1886 Nm³/h	
Max. operating pressure:	16 bar(g)	
IP grade:	54	
Power supply:	200-240V/1ph 360-440/3ph 50&60 Hz	

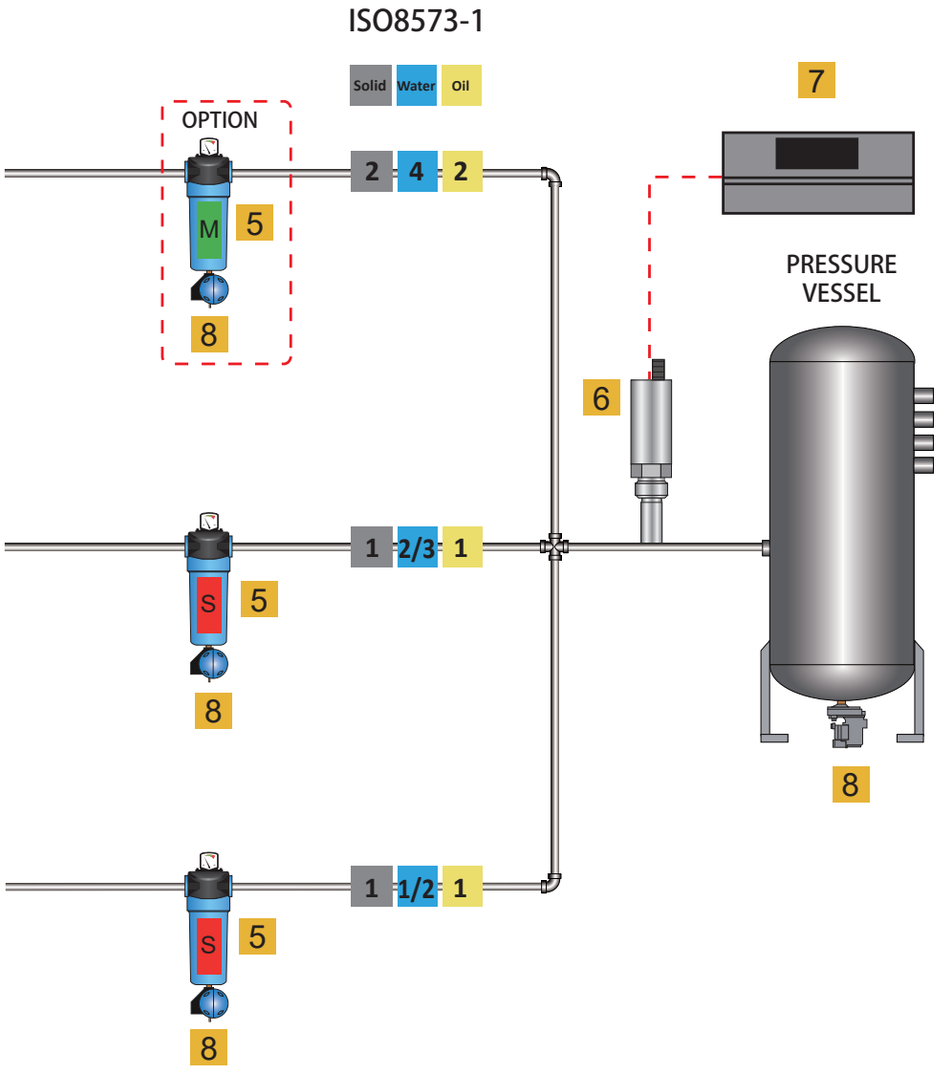
4 CYCLONE CONDENSATE SEPARATOR

Cyclone condensate separators use centrifugal motion to force liquid fluid out of compressed air. The spinning causes the condensate to join together on the centrifugal separators walls, then falls to the bottom of the separators bowl and flushed out of the system by the automatic float drain valve.

ISO8573-1:	[X:8:X]
efficiency:	>98%

Compressed Air & Gas Treatment

MARINE & OFFSHORE



Compressed air consumptions which require good air quality.Such as pneumatic systems (SCR, VRCS, M/E, A/E, BWTP, EGCS, etc.), pneumatic, equipments, elements etc..

Email: info@ultra-dryer.de

5 FILTER

Compressed air filters are used for high efficient removal of solid particles,water, oil aerosols, hydrocarbons, odour and vapours from compressed airsystems. To meet the required compressed air quality, appropriate filter element must be installed into filter housing.

	M	S
	0.1μm	0.01μm
ISO8573-1:	[2:–:2]	[1:–:1]
MAX. Temperture:	65°C, 85°C, 120°C	

Optional: differential pressure indicator with voltage-free contact version for remote alarm.

Notice: If the differential pressure gauge is reaching the red area or the filter is working for more than 4000 hours, please replace the filter element in time.

6 DEW POINT MONITOR

Miniature size dew point transmitter ;
With auto-calibration ;
Calibration interval of two years ;
With stands condensation ;
Fast response time ;
Easy servicing and data transfer via the RS485 user interface.

measurement range:	-40 ... +20 °C
option 1	-60 ... +20 °C
option 2	-80 ... +20 °C
option 3	-100 ... +20 °C
Accuracy:	±2 °C (±3.6 °F)
IP grade:	IP54
Outputs:	
Analog output (scalable)	4-20 mA
Digital output.	RS-485

7 DEW POINT MONITOR DISPLAY

Ultra-Dryer's instruments provided with newest components and control algorithm. They will present the features of intelligent, standardization, as well as high reliability of microprocessor-based instruments to our customers.

Protection grade:	IP44

High dew point alarm output.

8 CONDENSATE DRAIN

Drains are needed at all separators, filters, dryers and receivers in order to remove the liquid condensate from the compressed air system.
Failed drains can allow slugs of moisture to flow downstream, that can overload the air dryer and foul end use equipment.

Internal, external, electricity automatic.

mechanical condensate drain

Optional: IP54, Time ON/OFF, Alarm output.

Superior productivity

HIGH-PERFORMANCES CONDENSER

The air-cooled condenser is designed to ensure operation up to 50 °C external temperature and to achieve very high energy efficiency values. supplied with a condenser coil with copper tubes and aluminium fins.

ELECTRIC POWER AND CONTROL PANEL

High temperature & low temperature alarm, sensor failure alarm, compressor high pressure alarm.
Stylish design, intuitive functionality.
WIth dew point temperature display.

THERMAL EXPANSION VALVE

Adjust the flow rate according to the temperature of the evaporator outlet to avoid freezing phenomenon when the evaporator temperature is too low.

ENVIRONMENTALLY FRIENDLY REFRIGERANTS

R134a refrigerant.

REFRIGERATION COMPRESSORS FULLY HERMETIC

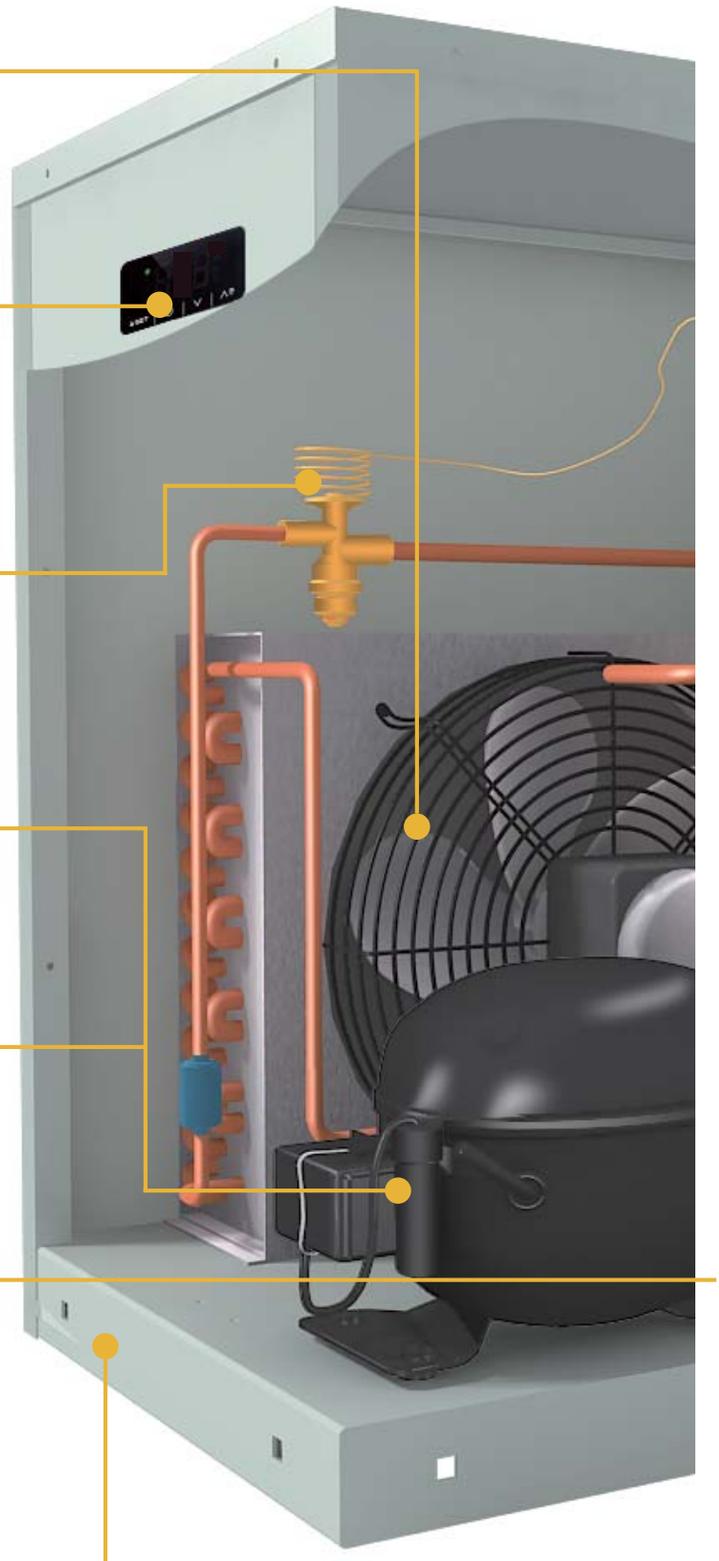
Piston compressors ensure high reliability and long service life, less moving parts and high reliability.

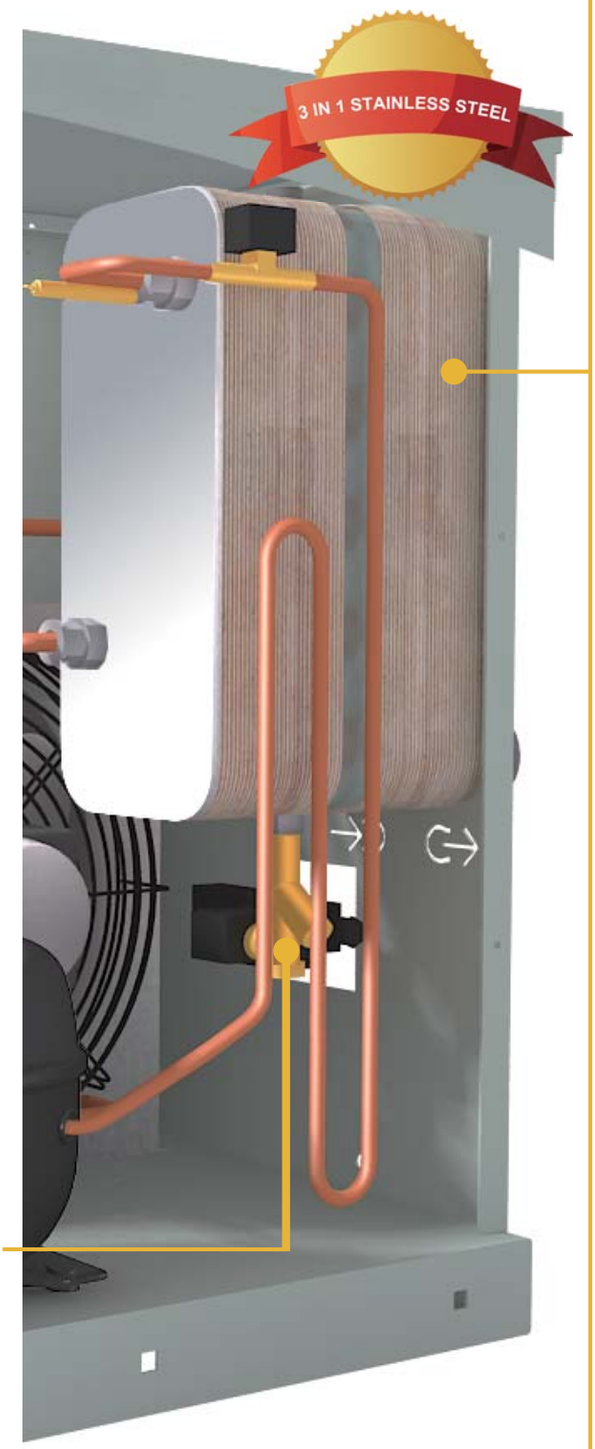
CONDENSATE DRAINS

All the dryers have controlled drains. Plan A (Standard): the drain open time and cycle time are fully adjustable. Plan B (Optional): level sensor measures the level of the condensed moisture and automatically opens a valve to drain it off, preventing any pressure loss.

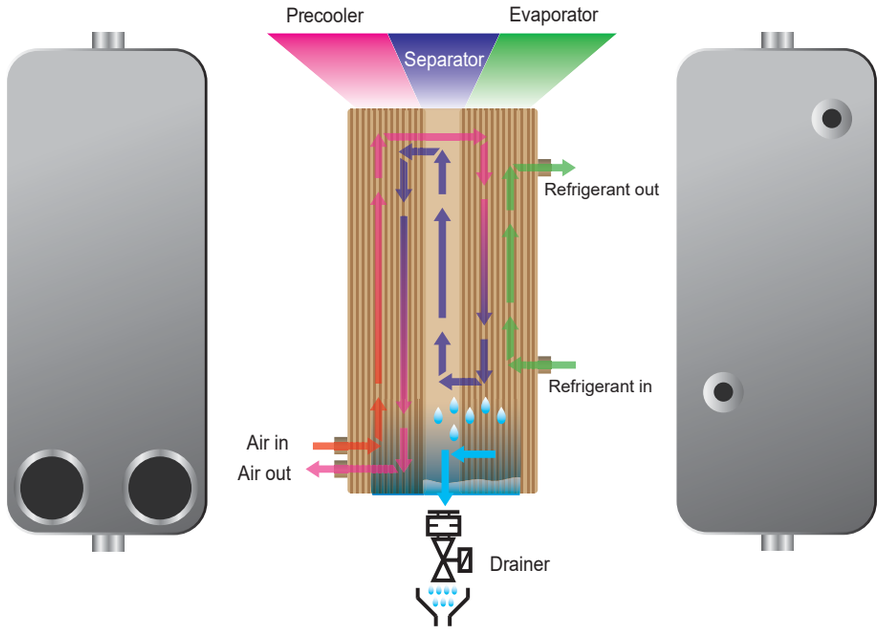
ROBUST CABINET AND STRUCTURE

Heavy duty structure with panels protected by an epoxy polyester powder coating RAL 7035. Simple and safe handling by forklift or pallet truck.





BRAZED PLATE HEAT EXCHANGER



NEW ADVANCED 3-IN-1 HEAT EXCHANGER

Three-in-one stainless steel plate exchanger including an Air-Air heat exchanger, the evaporator and a separator combined in a single module. The new internal geometry allowed to optimize the fluid dynamics of the heat exchanger, increasing the exchange capacity with the same surface area, keeping pressure losses to a minimum level.
Stainless steel material relative to the traditional aluminum alloy more with stand pressure, corrosion resistance at the same time also improve the life of the heat exchanger.

Air-to-Air Heat Exchanger

Hot and moist air enters the Air-to-Air heat exchanger where it exchanges heat in total counter flow with the outgoing cold air.
Precooling saves energy by reducing the heat load on the evaporator section. The cold dry compressed air passes through the secondary side of the Air-to-Air heat exchanger where it is reheated by the hot inlet air it is precooling. Reheating prevents downstream pipe sweating. exchanger where it is reheated by the hot inlet air it is precooling. Reheating prevents downstream pipe sweating.

Evaporator (Air-to-Refrigerant Heat Exchanger)

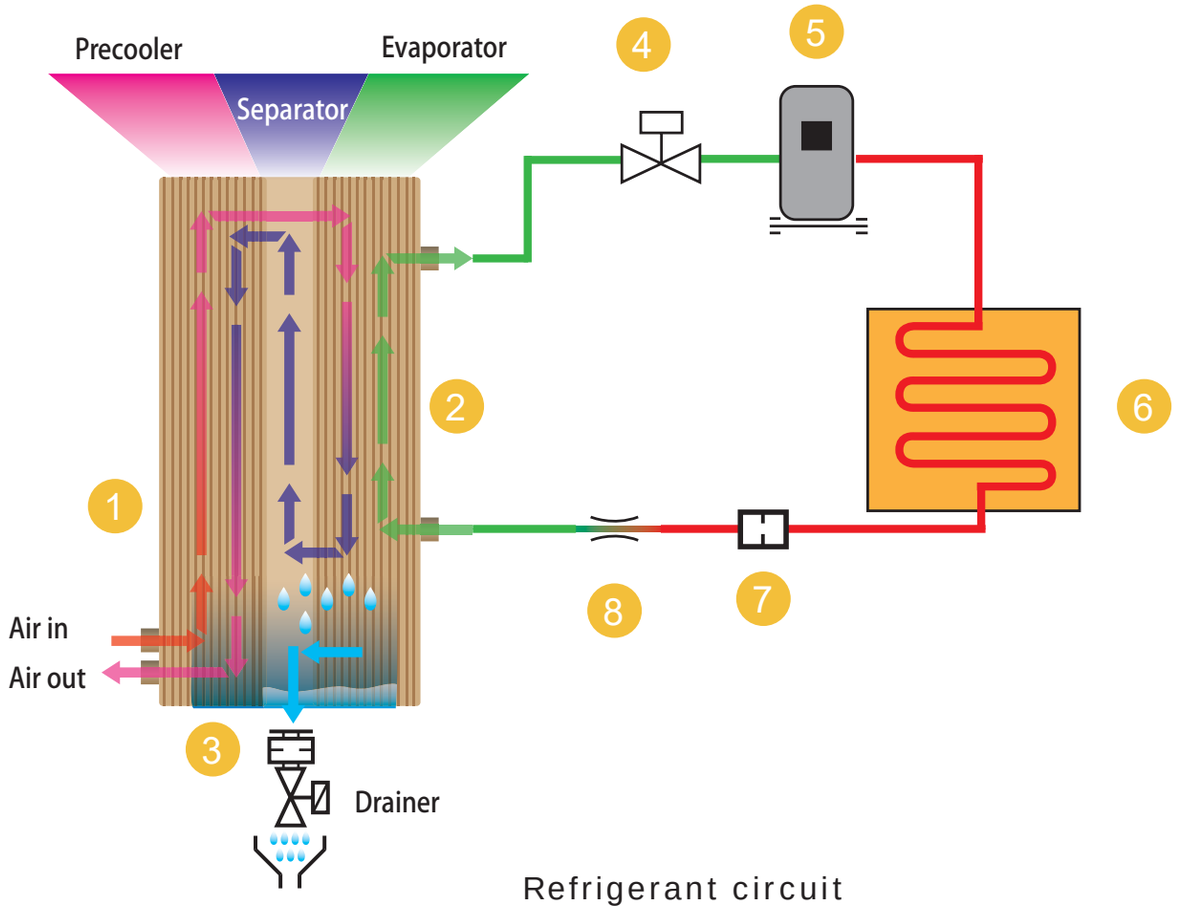
The pre-cooled air enters the evaporator where it is cooled to the required dew point by exchanging heat in counter flow with the evaporating refrigerant, allowing maximum thermal exchange. The dew point temperature is held within its optimum performance range by the microprocessor even under differing ambient conditions.

Demister Separator

After cooled the cold air enters the high efficiency stainless steel separator, the separator space is special designed, it is use gravity & centrifugal foreces to remove the water droplets..

How does the UD dryer work?

A refrigerated dryer uses a refrigerant circuit and heat exchanger to precool air, refrigerate it to condense out moisture vapor, and then heat exchange it with the incoming untreated air to increase the air temperature, to prevent pipe sweating downsteam and save the energy. Refrigerated dryers can lead to a pressure dewpoint (PDP) as low as +3°C/ +37.4°F for many applications where there is a need for dry air.
They can be used at different pressures and consume no processed compressed air.



Air circuit

1 ***Air-to-air heat exchanger:*** Incoming air is cooled down by the outgoing dried cold air.

2 ***Air-to-refrigerant heat exchanger:*** The air is cooled to the required dewpoint by the refrigerant circuit.

3 ***Integrated water separator:*** The condensate water vapor condenses into water droplets, The moisture is collected and evacuated by the automatic drain.

Refrigerant circuit

4 ***Solenoid valve:*** Prevent compressor fluid accumulation.

5 ***Refrigerant compressor:*** Compresses the gaseous refrigerant to a higher pressure.

6 ***Refrigerant condenser:*** Cools the refrigerant so that it changes from a gas to a liquid.

7 ***Refrigerant filter:*** Protects the expansion device from harmful particles.

8 ***Thermostatic expansion valve:*** Automatically adjust refrigerant flow based on temperature and set temperature detected by the temperature package.

Technical specifications

Model	Volume flow CLASS 4 dew point ⩽ 3°C	Power supply	Power consumption	Compressed air connections	Overall dimensions (mm)						Weight
	Nm³/h	V/ph/Hz	kW	Rp	A	B	C	D	E	F	(Kg)
UD 0025	25	230/1/60	0.21	3/4"	450	385	455	40	110	330	29.8
UD 0035	32	230/1/60	0.21	3/4"	450	385	455	40	110	330	30.0
UD 0060	60	230/1/60	0.21	3/4"	450	385	455	40	110	330	31.0
UD 0085	85	230/1/60	0.22	3/4"	500	385	455	40	110	330	32.0
UD 0110	110	230/1/60	0.38	3/4"	500	385	570	40	110	330	38.0
UD 0150	150	230/1/60	0.46	1 1/4"	500	385	610	70	65	295	45.0
UD 0190	190	230/1/60	0.60	1 1/4"	500	385	610	70	65	295	48.0
UD 0250	250	230/1/60	0.78	1 1/4"	500	445	610	70	65	295	52.0
UD 0300	300	230/1/60	1.28	1 1/4"	500	725	750	70	55	425	79.0
UD 0350	350	230/1/60	1.28	1 1/4"	500	725	750	70	55	425	82.0
UD 0450	450	230/1/60	1.48	2"	500	765	835	125	85	350	102.0
UD 0500	500	230/1/60	1.48	2"	500	765	835	125	85	350	112.0
UD 0600	600	230/1/60	2.31	2"	530	800	835	125	85	350	127.0
UD 0850	850	230/1/60	2.31	2"	600	800	835	125	85	350	142.0
UD 1050	1050	230/1/60	3.02	2 1/2"	700	1250	925	148	110	350	200.0
UD 1200	1200	230/1/60	3.49	2 1/2"	700	1250	925	148	110	350	205.0
UD 1400	1400	440/3/60	3.60	2 1/2"	850	1300	925	148	110	350	240.0
UD 1700	1700	440/3/60	4.23	2 1/2"	850	1300	925	148	110	350	250.0

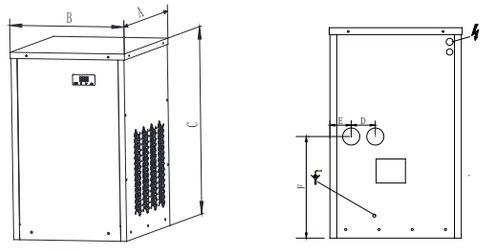
Data refers to the following working conditions:

Specifications	Inlet air pressure	7 bar(g)
	PDP (Pressure dew point)	≤3°C (ISO 8573-1 Class4)
	Ambient temperature	25 °C
	Air inlet temperature	35 °C
Design Parameters	Maximum working pressure	16 bar(g)
	Maximum ambient temperature	50 °C
	Maximum inlet temperature	70 °C (UD 0025-600), 60 °C (UD 0850-1700)
	Degree of protection	IP22
	Color	RAL 7035
	Alarm	1. Local display: Sensor failure,evaporator over temperature(high, low) alarms; 2. Output: Common alarm, high dew point temperature alarm.
Others	Degree of protection: IP44 (optional)	
	Color: Munsell 7.5 BG 7/2 (optional)	

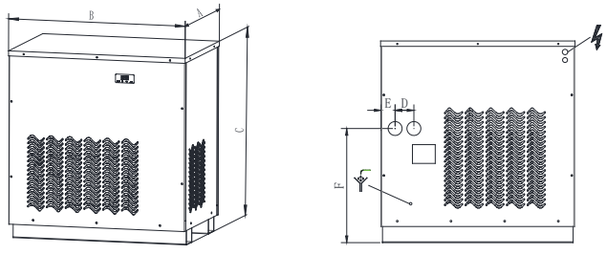
The correction factors in the following table should be used as a guide only; for accurate selection at conditions differing from the above the selection software should be utilised.

Operating pressure bar(g)	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Correction factor K1	0.75	0.84	0.92	0.98	1	1.06	1.08	1.12	1.13	1.14	1.16	1.18	1.2	1.22
Compressed air inlet temperature °C	30	35	40	45	50	55	60	65	70					
Correction factor K2	1.25	1	0.87	0.78	0.7	0.6	0.52	0.46	0.42					
Ambient temperature °C	20	25	30	35	40	45	50							
Correction factor K3	1.08	1	0.98	0.94	0.9	0.87	0.79							
Dew point °C	3	7	10											
Correction factor K4	1	1.38	1.4											

To determine the required dryer model, multply the requested volume flow by the correction factors (required volume flow / (K1 x K2 x K3x K4)) and then select the model from the table with nearest higher flow rate. For example: If the rate value is 100m³/h, the dew point temperature required is 3°C, the operating pressure is 7bar, the compressed air inlet temperature is 50°C, and the ambient temperature is 45°C.
Capacity=Rated value / (K1 x K2 x K3 x K4). K1=1, K2=0.7, K3=0.87, K4=1. So rated capacity= 100/(1x0.7x0.87x1)=144.92＜150m³/h.



(*UD0025-UD0250*)



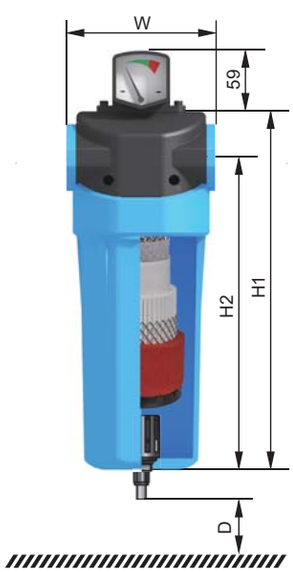
(*UD0300-UD1700*)

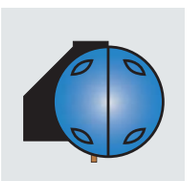
Note:
(1) Per ISO 8573-1.
(2)The correction factors should be applied to volume flow to suit the application and ensure dryer performance.
(3) As the version is updated, the drawings are changed without prior notice.
(4) To be used as a rough guide only, for special requirements please contact our technical department.

Filter

Floeriner's filters are designed for protection of the downstream compressed air system, equipment against defects and other failures.
They ensure high efficient removal of solid particles, water, oil aerosols, hydrocarbons, odour and vapours from compressed air systems up to 16 bar.
Required compressed air quality according to standard ISO 8573-1 can be achieved with 5 different grades of filter elements(P, R, M, S, A). Optional internal and external condensate drains should be used for efficient condensate draining from filter housing.

FILTER HOUSING DATA								FILTER ELEMENTS				
Filter housing size	Pipe size	Max. oper. Press.	Flow rate at 7 bar(g) 20 °C	Dimensions [mm]				P prefilter 3 µm	R prefilter 1 µm	M microfilter 0,1 µm	S microfilter 0,01 µm	A activated carbon
	inch	[bar]	Nm^3/h	W	H1	H2	D					
UF0060	G 1/2"	16	60	95	220	197	95	0060 P	0060 R	0060 M	0060 S	0060 A
UF0078	G 1/2"	16	78	95	220	197	110	0078 P	0078 R	0078 M	0078 S	0078 A
UF0120	G 3/4"	16	120	95	280	257	145	0120 P	0120 R	0120 M	0120 S	0120 A
UF0198	G 1"	16	198	125	320	290	185	0198 P	0198 R	0198 M	0198 S	0198 A
UF0335	G 1"	16	335	125	320	290	185	0335 P	0335 R	0335 M	0335 S	0335 A
UF0510	G 1 1/2"	16	510	125	400	370	230	0510 P	0510 R	0510 M	0510 S	0510 A
UF0780	G 2"	16	780	170	520	478	390	0780 P	0780 R	0780 M	0780 S	0780 A
UF1000	G 2"	16	1000	170	700	658	570	1000 P	1000 R	1000 M	1000 S	1000 A
UF1500	G 3"	16	1500	200	995	938	570	1500 P	1500 R	1500 M	1500 S	1500 A
UF1680	G 3"	16	1680	200	995	938	630	1680 P	1680 R	1680 M	1680 S	1680 A
UF2160	G 3"	16	2160	200	995	938	700	2160 P	2160 R	2160 M	2160 S	2160 A
UF2760	G 3"	16	2760	200	995	938	700	2760 P	2760 R	2760 M	2760 S	2760 A
								quality class - solids (ISO 8573-1)	6	3	2	1	1
								quality class - oils (ISO 8573-1)	——	——	2	1	——
								pressure drop - new element [mbar]	10	20	50	80	60
								change filter cartridge at pressure drop [mbar]	350	350	350	350	6 mouths





Specification	Value
operating pressure	2 to 16 bar
connections	1/2" to 3"
volume flow rate	60 to 2760 Nm^3/h
operating temperature range	1.5 to 65°C
standard colour:	RAL 5015

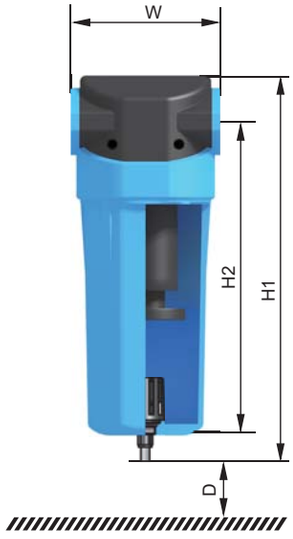
CORRECTION FACTORS															
Operating pressure [bar]	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Operating pressure [psi]	29	44	58	72	87	100	115	130	145	160	174	189	203	218	232
Correction factor	0.38	0.5	0.63	0.75	0.88	1	1.13	1.25	1.38	1.5	1.63	1.75	1.88	2	2.13

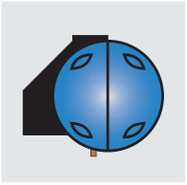
Outlet flow 7 bar(g) x Correction factor at different operating pressure = Outlet flow at different operating pressure.

Condensate separator

Condensate separators are designed for high efficient removal of bulk liquids from compressed air and vacuum systems. Inside the housing there is an insert with vanes that creates controlled rotation of the air.
As a result of centrifugal action, liquids (water, oil) and large particles are forced to the housing wall, slowed down and accumulated at the bottom of separator housing as condensate. The turbulent free zone in the lower part of the filter housing prevents condensate from being picked up and "carried over" into the airstream. To discharge condensate from the cyclone separator it is essential to install automatic or electronic condensate drain.

TECHNICAL DATA								
Filter housing size	Pipe size	Max. oper. Press.	Flow rate at 7 bar(g) 20 °C	Temperature oper.range	Dimensions [mm]			
	inch	[bar]	Nm^3/h	°C	W	H1	H2	D
US 60	G 1/2"	16	60	1.5-65	95	220	197	95
US 78	G 3/4"	16	78	1.5-65	95	220	197	110
US 120	G 3/4"	16	120	1.5-65	95	280	257	145
US 198	G 1"	16	198	1.5-65	125	315	290	185
US 510	G 1 1/2"	16	510	1.5-65	125	400	370	230
US 1000	G 2"	16	1000	1.5-65	170	700	658	570
US 1500	G 2 1/2"	16	1500	1.5-65	200	995	938	570
US 2160	G 3"	16	2160	1.5-65	200	995	938	700



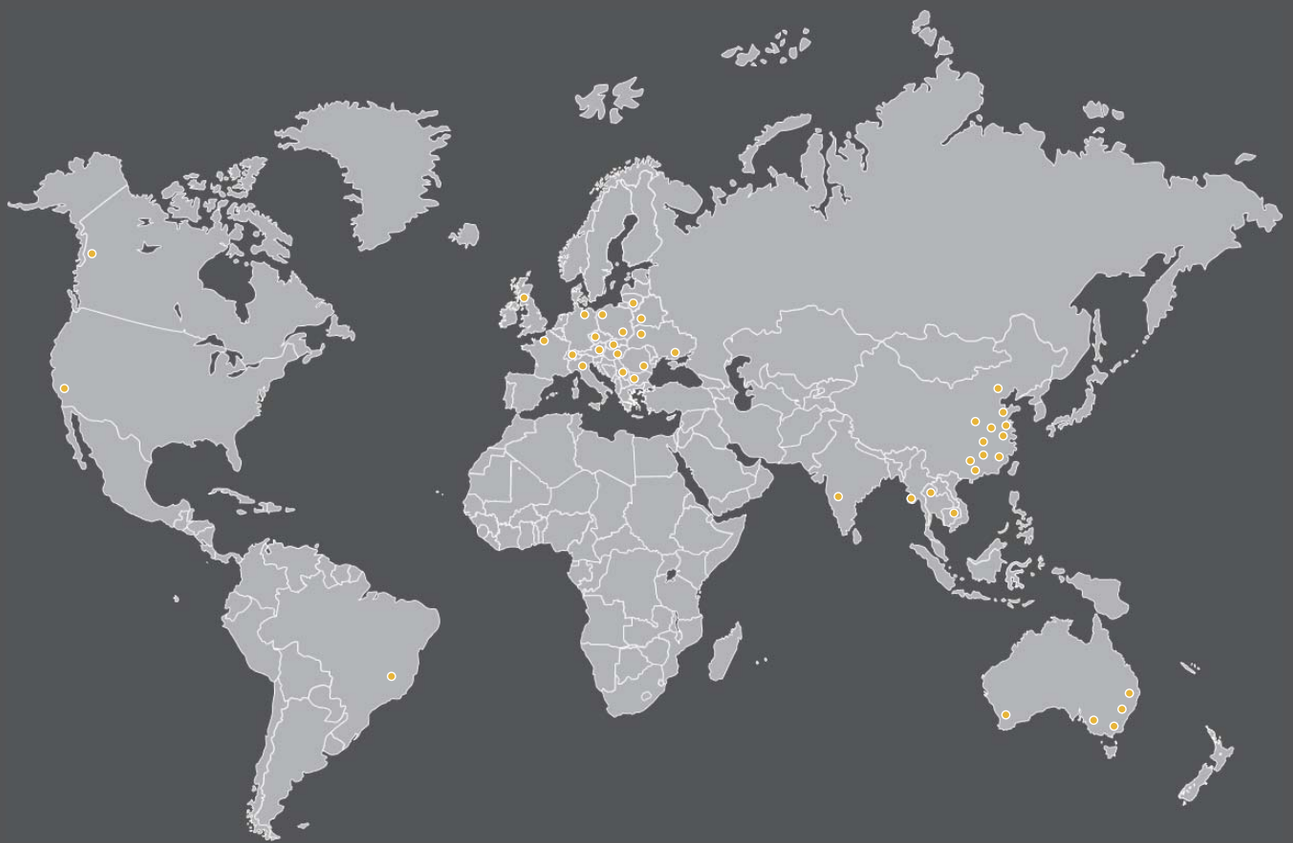


quality class - solids (ISO 8573-1)	
quality class - water (ISO 8573-1)	8
quality class - oils (ISO 8573-1)	
efficienty	>98%

Specification	Value
operating pressure	2 to 16 bar
connections	1/2" to 3"
volume flow rate	60 to 2160 Nm^3/h
operating temperature range	1.5 to 65°C
standard colour:	RAL 5015

CORRECTION FACTORS															
Operating pressure [bar]	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Operating pressure [psi]	29	44	58	72	87	100	115	130	145	160	174	189	203	218	232
Correction factor	0.38	0.5	0.63	0.75	0.88	1	1.13	1.25	1.38	1.5	1.63	1.75	1.88	2	2.13

Outlet flow 7 bar(g) x Correction factor at different operating pressure = Outlet flow at different operating pressure.



ULTRA-DRYER

APPROVED
TYPE APPROVAL SCHEME

Ultra-dryer products comply with European safety directives, as recognised by the CE symbol.

EUROPE

Rödingsmarkt 20, 20459 Hamburg, Germany
Telephone：+49 (40) 3501 5259
Mobilephone：+49 0152 0752 2303
Email: info@ultra-dryer.de

ASIA

16F, Ping'an Fortune Center, Binhu Districr, Wuxi city, China
Telephone: +86 0510 85609386
Email: sales@ultra-dryer.de