



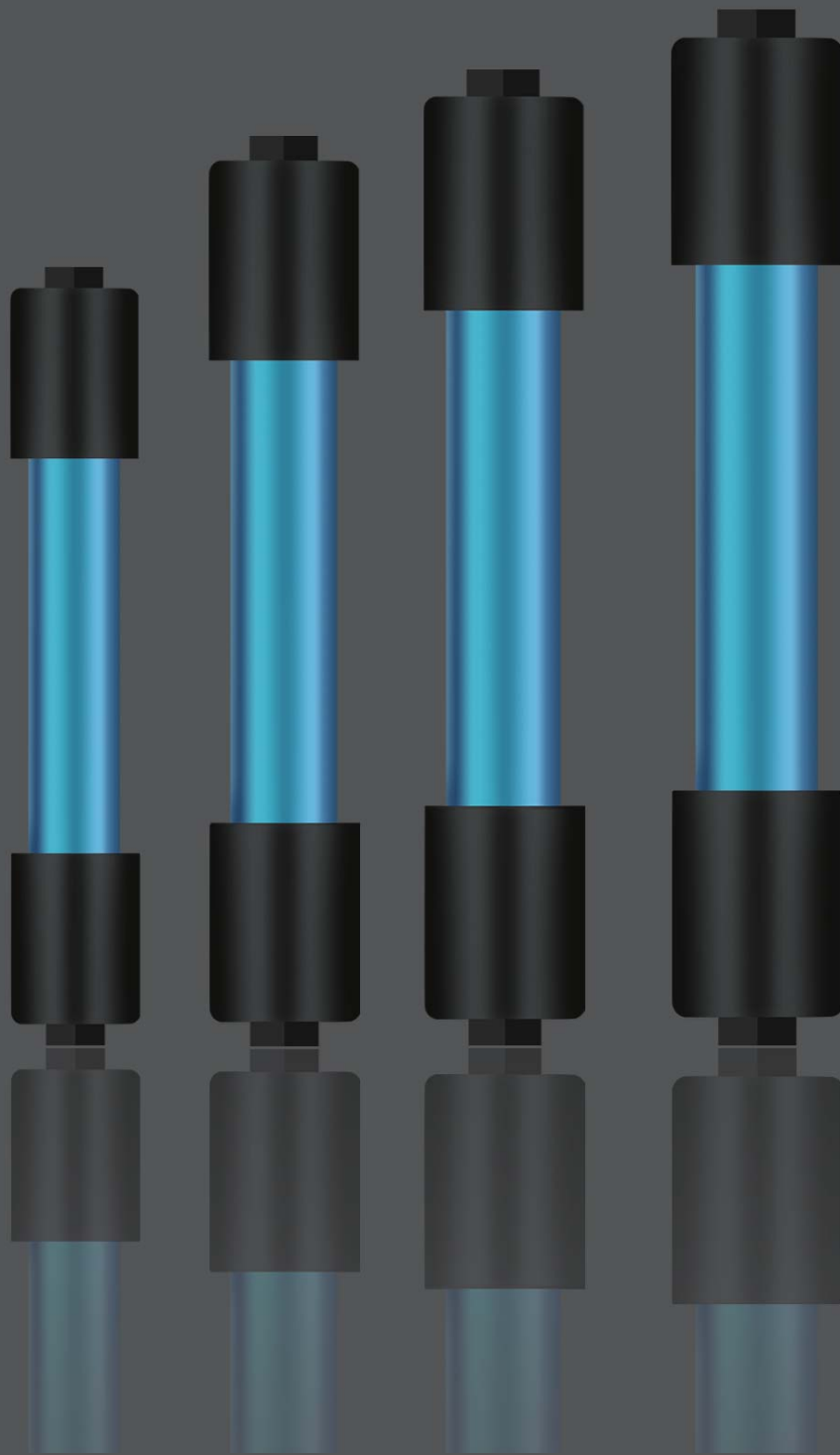
R&D and manufacturing
EXPERIENCE



ULTRA-DRYER

DEW POINT
-40°C CLASS 2

Membrane Air Dryer



ULTRA-DRYER

Content

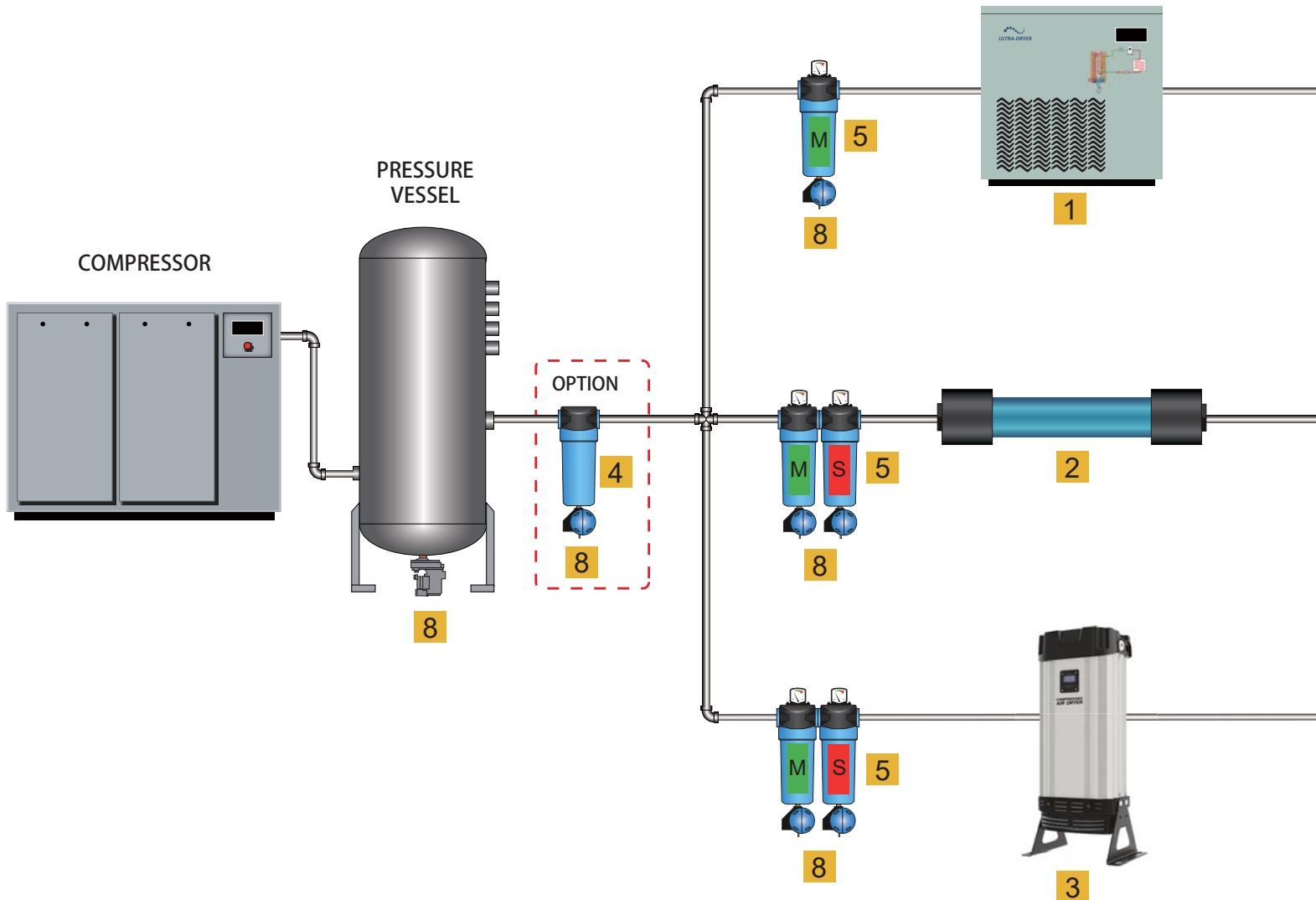
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ISO 8573-1 purity classes

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)
	$0,1 \mu\text{m} < d \leq 0,5 \mu\text{m}$	$0,5 \mu\text{m} < d \leq 1,0 \mu\text{m}$	$1,0 \mu\text{m} < d \leq 5,0 \mu\text{m}$	°C	mg/m^3
0	As specified by the equipment user or supplier and more stringent than class 1				
1	$\leq 20\,000$	≤ 400	≤ 10	≤ -70	$\leq 0,01$
2	$\leq 400\,000$	$\leq 6\,000$	≤ 100	≤ -40	$\leq 0,1$
3	Not specified	$\leq 90\,000$	$\leq 1\,000$	≤ -20	≤ 1
4	Not specified	Not specified	$\leq 10\,000$	$\leq +3$	≤ 5
5	Not specified	Not specified	≤ 100.000	$\leq +7$	Not specified
6				$\leq \pm 10$	Not specified
	Mass concentration ^(a) $C_p \text{ mg}/\text{m}^3$			concentration of liquid water ^(a) $C_w \text{ g}/\text{m}^3$	
6	$0 < C_p \leq 5$				Not specified
7	$5 < C_p \leq 10$			$C_w \leq 0,5$	Not specified
8	Not specified			$0,5 \leq C_w \leq 5$	Not specified
9	Not specified			$5 < C_w \leq 10$	Not specified
X	$C_p > 10$			$C_w > 10$	> 5

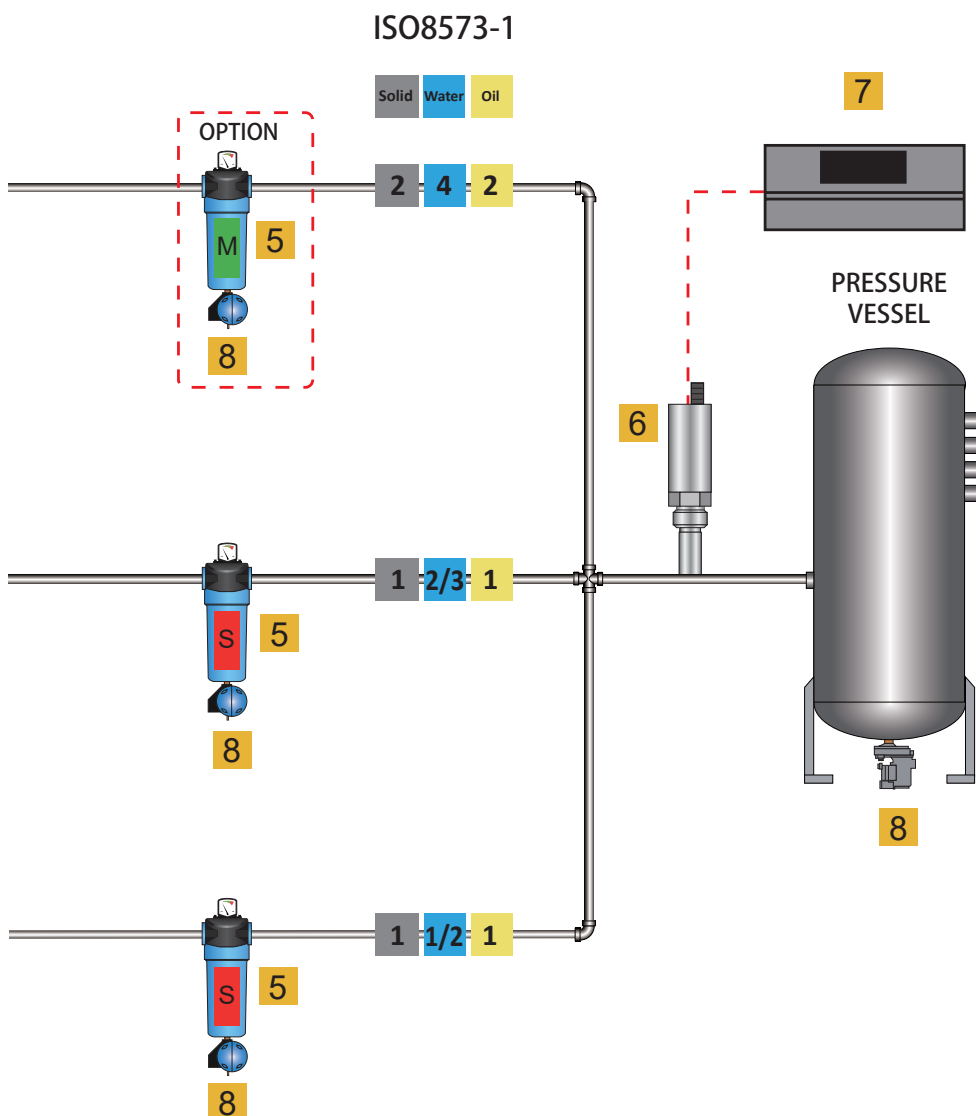
(a) At reference conditions: air temperature of 20° C, absolute air pressure of 100 kPa (1 bar), relative water vapour pressure 0.



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

1 REFRIGERATED COMPRESSED AIR DRYER	2 MEMBRANE AIR DRYER	3 HEATLESS ADSORPTION DRYER	4 CONDENSATE SEPARATOR
<p>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.</p>	<p>The compressed air through a bundle of hollow fibres. Water vapour diffuses through the 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.</p>	<p>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.</p>	<p>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.</p>
ISO 8573-1(water): Class 4	ISO 8573-1(water): Class 2 Class 3	ISO 8573-1(water): Class 1 Class 2	ISO8573-1: [X:8:X]
Dew point: ≤3 C	Dew point: ≤-40°C ≤-20°C	Dew point: ≤-70°C ≤-40°C	efficiency: >98%
Capacity: 25-1700 Nm³/h	Capacity: 2-110 Nm³/h	Capacity: 6-1886 Nm³/h	
Max. operating pressure: 16 bar(g)	Max. operating pressure: 12.5 bar(g)	Max. operating pressure: 16 bar(g)	
Refrigerant: R134a, R407c,		IP grade: 54	
IP grade: IP22 / IP44		Power supply: 200-240V/1ph 360-440/3ph 50&60 Hz	
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.			

Compressed Air & Gas Treatment



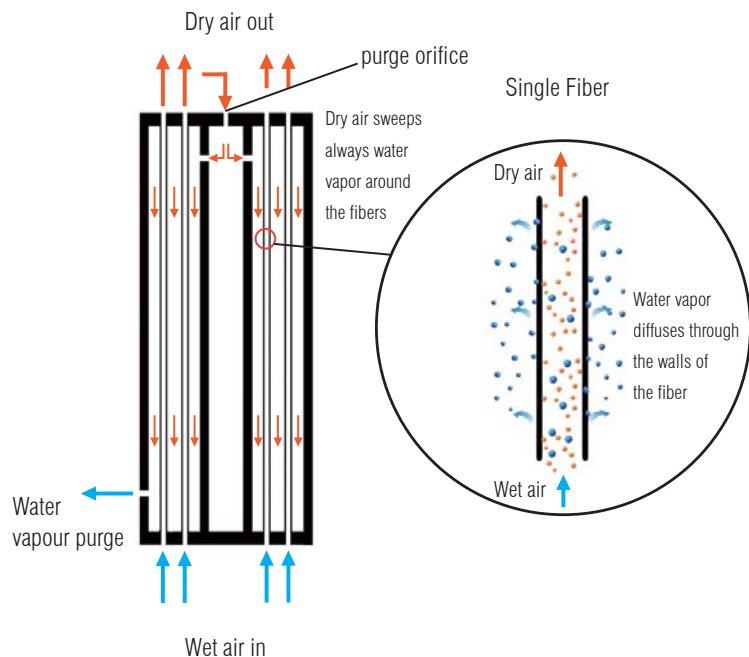
Compressed air consumptions which require good air quality. Such as pneumatic systems (SCR, VRCS, M/E, A/E, BWTP, EGCS, etc.), pneumatic equipments, elements etc..

Email: info@ultra-dryer.de

5 FILTER	6 DEW POINT MONITOR	7 DEW POINT MONITOR DISPLAY	8 CONDENSATE DRAIN												
<p>Compressed air filters are used for high efficient removal of solid particles, water, oil aerosols, hydrocarbons, odour and vapours from compressed air systems. To meet the required compressed air quality, appropriate filter element must be installed into filter housing.</p>	<p>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.</p>	<p>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.</p>	<p>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.</p>												
<table border="1"> <tr> <td></td> <td>M</td> <td>S</td> </tr> <tr> <td></td> <td>0.1 μm</td> <td>0.01 μm</td> </tr> <tr> <td>ISO8573-1:</td> <td>[2:-:2]</td> <td>[1:-:1]</td> </tr> <tr> <td>MAX. Temperature:</td> <td>65°C, 85°C, 120°C</td> <td></td> </tr> </table>		M	S		0.1 μm	0.01 μm	ISO8573-1:	[2:-:2]	[1:-:1]	MAX. Temperature:	65°C, 85°C, 120°C		<p>measurement range: -40 ... +20 °C</p>	<p>Protection grade: IP44</p>	<p>Internal, external, electricity automatic.</p>
	M	S													
	0.1 μm	0.01 μm													
ISO8573-1:	[2:-:2]	[1:-:1]													
MAX. Temperature:	65°C, 85°C, 120°C														
<p>Optional: differential pressure indicator with voltage-free contact version for remote alarm.</p>	<p>option 1 -60 ... +20 °C</p>	<p>High dew point alarm output.</p>	<p>mechanical condensate drain</p>												
<p>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.</p>	<p>option 2 -80 ... +20 °C</p>		<p>Optional: IP54, Time ON/OFF, Alarm output.</p>												
	<p>option 3 -100 ... +20 °C</p>														
	<p>Accuracy: ±2 °C (±3.6 °F)</p>														
	<p>IP grade: IP54</p>														
	<p>Outputs:</p>														
	<p>Analog output (scalable) 4-20 mA</p>														
	<p>Digital output. RS-485</p>														

How it Works

Water vapor from the supplied compressed air passes & diffuses through the walls of a bundle of hollow fibers of the membrane, at the same time, a small portion of the dry air product is redirected along the length of the fibers to sweep out the water vapor loaded air which has permeated the membrane. The moisture-loaded sweep air is then vented to the atmosphere. The clean & dry air is supplied for your application.



ULTRA-DRYER Membrane Dryers

THE NEXT GENERATION IN MEMBRANE TECHNOLOGY

Advancements in design allow membrane technology to efficiently dehydrate compressed air. Versatile, environmentally and user-friendly, membrane dryers are the ideal solution for low flow and point of use applications.

Versatile

- Lightweight—can be installed without additional support
- Convenient mounting systems available
- High inlet and outlet flows
- Dryers may be sized to produce dew point temperatures from -40°F (-40°C) or below to +50°F (+10°C)

Efficient

- Low sweep air rates — more air available downstream
- No electricity, lowering operating costs

Low Maintenance

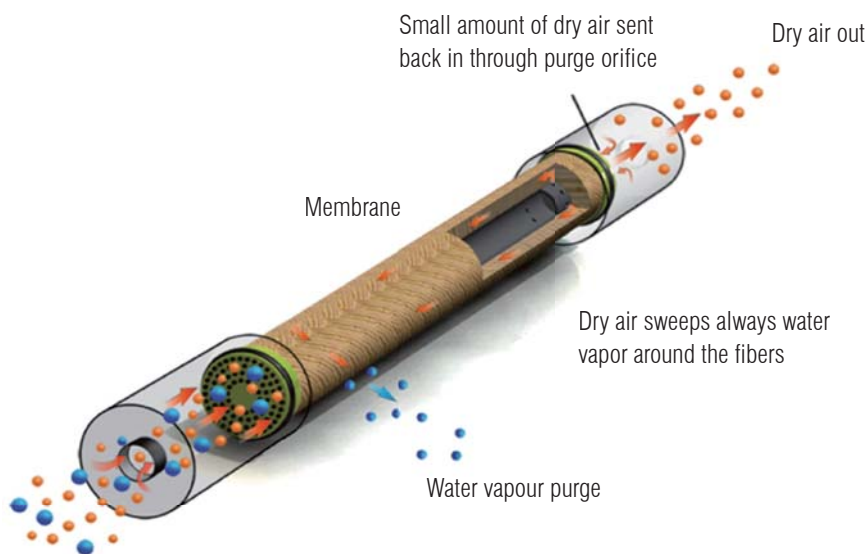
- No power source required
- No moving parts to maintain, repair or wear out
- No consumables to replace
- No liquid condensate to dispose of

Drying Protection

- Pressurized air is contained inside the membranes
- Housing contains air at atmospheric pressure
- No oil/water emulsions or chemicals to dispose of

Durable Construction

- Maximum working pressure for all models: 12.5 bar(g)
- Maximum inlet temperature: 60 °C



**Attention to avoid oil inside membrane air dryer !
If membrane contaminated by oil, it would be damaged and could not be repaired.**



Technical specifications

Inlet conditions		7 bar(g), 35°C to:							
Outlet pressure dew point		15°C		3°C		-20°C		-40°C	
% Water removal		69.70%		86.53%		98.20%		99.77%	
Model	Purge air m ³ /h	Inlet air flow m ³ /h	Outlet air flow m ³ /h	Inlet air flow m ³ /h	Outlet air flow m ³ /h	Inlet air flow m ³ /h	Outlet air flow m ³ /h	Inlet air flow m ³ /h	Outlet air flow m ³ /h
UDM 2	0.3	5.3	5	2.3	2	1.8	1.5	1.3	1
UDM 4	0.6	8.6	8	4.6	4	3.6	3	2.6	2
UDM 5	1	10	9	6	5	5	4	4	3
UDM 8	1	16	15	9	8	7	6	6	5
UDM 11	2	22	20	13	11	12	10	10	8
UDM 15	2	27	25	17	15	15	13	12	10
UDM 22	3	38	35	25	22	20	17	15	12
UDM 30	5	50	45	35	30	30	25	20	15
UDM 40	6	66	60	46	40	40	34	31	25
UDM 60	9	109	100	69	60	50	41	44	35
UDM 80	12	132	120	92	80	70	58	57	45
UDM 110	18	178	160	128	110	100	82	78	60

*Purge tolerance +3% of maximum inlet flow range.

Performance correction factors for alternate pressures

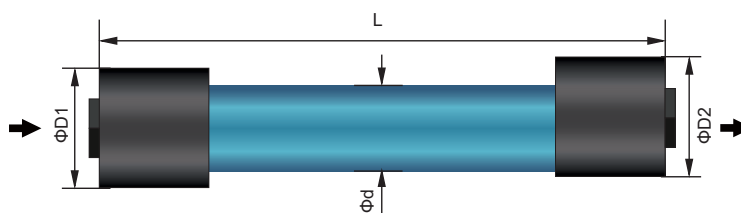
For maximum flow rate, multiply flow rate shown in above table by the correction factor corresponding to the working pressure.

Operating pressure bar(g)	4	5	6	7	8	9	10	11	12
Correction factor	0.4	0.6	0.8	1	1.2	1.5	1.7	1.9	2.2

Equation for determining inlet flow at designated pressure:

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

Specifications	Material / Value
Air Dryer Shell Material	Blue aluminum
Air Dryer End Cap Material	See dimensions table
Maximum Operating Temperature	80°C
Maximum Operating Pressure	12.5 bar(g)
Typical Pressure Drop	0.2 to 0.5 bar(g)
Compressed Air Temperature	3°C to 60°C
Pre-Filter(s)	Yes
After-Filter(s)	Optional



Model	Dimensions(mm)				Compressed air connections	Air dryer end cap material	Weight (kg)
	L	Φd	ΦD1	ΦD2	BSPT		
UDM 2	224	43	58	58	1/4	Nylon	0.5
UDM 4	325	43	58	58	1/4	Nylon	0.7
UDM 5	427	43	58	58	1/4	Nylon	0.8
UDM 8	503	43	58	58	1/4	Nylon	0.9
UDM 11	312	61	81	81	1/2	Nylon	1.1
UDM 15	376	61	81	81	1/2	Nylon	1.2
UDM 22	465	61	81	81	1/2	Nylon	1.5
UDM 30	592	61	81	81	1/2	Nylon	1.7
UDM 40	411	89	109	109	1/2	Nylon	2
UDM 60	551	89	109	124	1/2	Nylon inlet, Aluminum outlet	5.2
UDM 80	627	89	109	124	1/2	Nylon inlet, Aluminum outlet	5.5
UDM 110	607	114	132	150	1	Aluminum	7.8

Note:

(1) The correction factors should be applied to volume flow to suit the application and ensure dryer performance.

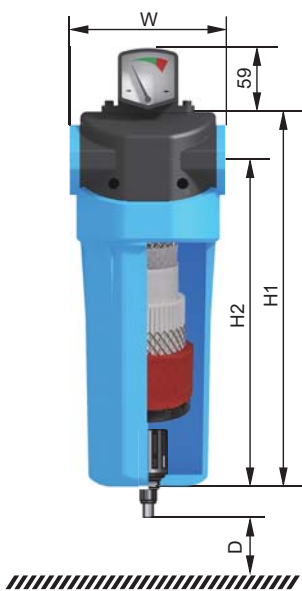
(2) As the version is updated, the drawings are changed without prior notice.

(3) To be used as a rough guide only, for special requirements please contact our technical department.

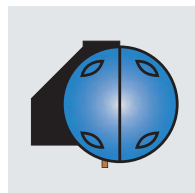
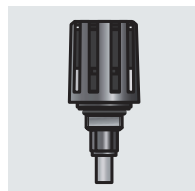
Filter

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

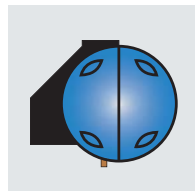
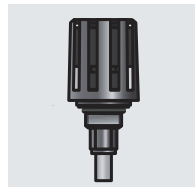
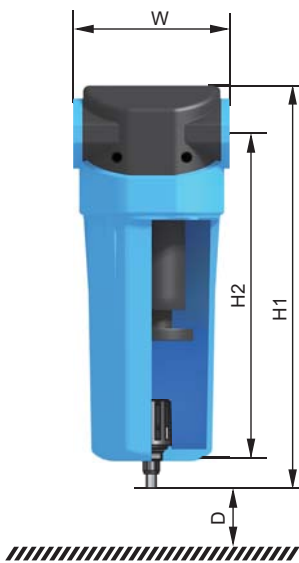
Outlet flow 7 bar(g) x Correction factor at different operating pressure = Outlet flow at different operating pressure.

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. [bar]	Flow rate at 7 bar(g) 20 °C Nm ³ /h	Temperature oper.range °C	Dimensions [mm]			
	inch				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)	
efficiency	>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.

Design

Caution

a. Devise a layout which considers the position of the purge air discharge ports.

Purge air is humid air. Devise a layout in which the humid purge air will not cause corrosion or malfunction of peripheral equipment.

b. Ultra-dryer Liability:

Warranty for Ultra-dryer UDM is 1 year from date of shipment. Ultra-dryer will not accept any liability if the following requirements and the instructions for installation are not respected:

- Appropriate pre filtration must be installed upstream the membrane air dryer (1µ particulate and 0,01 µ coalescing)
 - The pre-filtration must be replaced on a regular basis (minimum half a year).
- Ultra-dryer shall not be liable for damage due to improper or incorrect use, wear, storage or other actions by third parties or the purchaser.

Requirements:

Temperature:	There must be no possibility of frost at the place of installation. Both the environmental temperature and compressed air temperature should range from +3°C to +60°C (140°F).
Maximum Pressure:	12.5 barg
Pre-Filtration Required:	1µm particulate filter 0.01 µ coalescing filter Particulate and oil contamination as well as liquid condensate have to be safely removed and retained before the compressed air flows into the membrane air dryer.

c. Time to reach the rated dew point

A certain amount of time is required to achieve the rated dew point after the air begins flowing into the membrane air dryer. Use the times below as a guide, and begin operating the outlet side equipment after the rated dew point is achieved.

Standard dew point -20oC, -15oC : about 10 min.

Selection

Caution

Consider the purge air flow rate in total flow rate requirements.

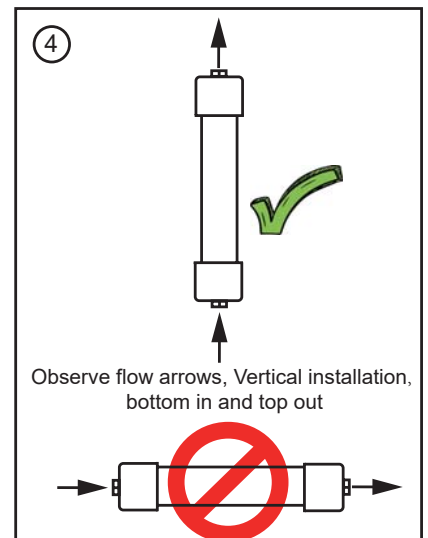
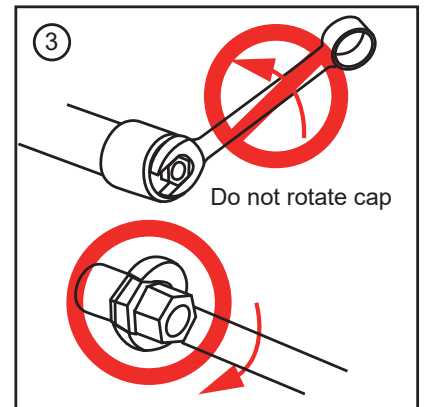
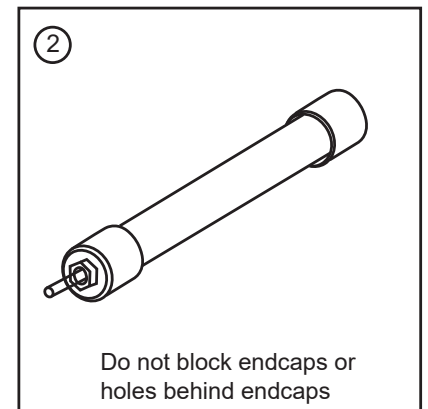
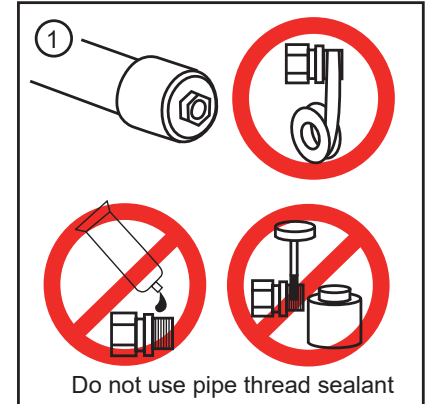
Find the purge air flow rate from the charts and calculate the “required outlet air flow rate + purge air flow rate”. The air supply capacity must be at least equal to the calculated flow or the required outlet air flow rate cannot be obtained.

Mounting

Caution

- a. Ultra-dryer UDM membrane air dryer must only be used in industrial applications for compressed air.
- b. The compressed air system must be fully depressurized while pneumatic components are being installed.

Note: If maximum flow rate for the membrane air dryer exceeds the published rate, the specified dew point suppression may not be met.



- c. Do not obstruct the purge air discharge ports.
Dehumidification performance will decrease or may become impossible if purge air back pressure becomes too high or purge air stops flowing.
- d. Provide proper filtration on the inlet side of a membrane air dryer. 1µm air filter and a 0.01 µ coalescing filter must be installed inline, prior to the Ultra-dryer UDM membrane air dryer. The Membrane air dryer must be located directly downstream of the 0,01 coalescing filter in order to avoid renewed condensate formation.
- e. Remove water droplets from the inlet air
Water droplets in the air can lower performance and cause malfunction.
- f. Large quantities of dust (solid foreign matter) are contained in the supply air.
When there are large quantities of dust (solid foreign matter), install an air filter or main line filter to the inlet side of the mist separator.
- g. Install a regulator on the outlet side of the membrane air dryer. Dehumidification performance will be reduced if a regulator is installed on the inlet side of the membrane dryer.
- h. Ensure that intermittent pressure is not applied to the product. Do not frequently operate a solenoid valve on the inlet side. The membrane dryer can be damaged if inlet pressure is applied intermittently.
- i. Ultra-dryer UDM membrane air dryer to be installed vertically, the air flow direction to be bottom-up.
- j. Ensure air lines to the air dryer and air dryer are aligned in the correct flow direction

Piping

Warning

a. Confirm locking of case and body

When using in a unit, be sure to set the air pressure to zero before using a condensate separator or prefilter with modular connections. Also, confirm that the body and case are locked together with a click before starting the flow of compressed air.

b. Confirm tightening of the holder.

Before starting the flow of compressed air, turn the Membrane air dryer's holder in its tightening direction, confirming that it is completely tightened and that the case will not come off.

Caution

a. Use of tools

Hold the upper portion of the body (aluminum die-casted section) with a spanner or adjustable angle wrench. Do not turn it while holding the case section.

b. Drain piping for separators

Use a tube of the prescribed size and keep the length within 5 meters or less when installing drain piping for condensate separator or filters. Be sure that the tube does not rise up or become folded over.

c. Flush pipes before installation.

Use an air blower to flush the piping to thoroughly remove any cutting chips, cutting oil, or debris from the piping inside, before connecting them. If they enter the inside of products, they could cause products to malfunction, lower performance or damage the element.

Air Supply

Caution

a. Compressed air supply capacity

An air source that has a supply capacity that is larger than the "necessary outlet air flow rate (dry air flow rate) + purge air flow rate" is required. See the purge air flow rate diagram in the catalog for the purge air flow rate.

b. Avoid chemical substances which have an adverse effect on the product

The chemical substances stated in the table below can reduce the performance or damage the membrane element. Do not use the membrane dryer in an environment containing these chemicals substances.

Type	Harmful Substances
Solvent	Acetone, Benzene, Phenol, Toluene, Trichloroethylene, Xylene, Cresol, Thinner, Aniline, Chloroform, Ethyl Alcohol, Methyl Alcohol, Chlorobenzene, Trichloroethane, Ethylbenzene, Isopropyl Alcohol, Dioxane, Tetrahydrofuran, Methyl Chloride, Cyclohexanone, Carbon Tetrachloride, Methyl Ketone, Ethyl Ketone, etc.
Acid	Sulfuric Acid, Nitric Acid, Hydrochloric Acid, Acetic Acid, Lactic Acid, Chromic Acid, etc.
Gas	Chlorine, Sulfurous Acid, Hydrogen Sulfide, Bromine, Ozone, Ammonia, etc.
Oil	Hydraulic Fluid (Phosphoric Ester), Fuel Oil, Water Soluble Cutting Fluid (Alkaline), Kerosene, etc.
Strong Bases	Lithium hydroxide, Sodium hydroxide, Potassium hydroxide, Calcium hydroxide, etc.
Others	Anaerobic thread lockers

Operating Environment

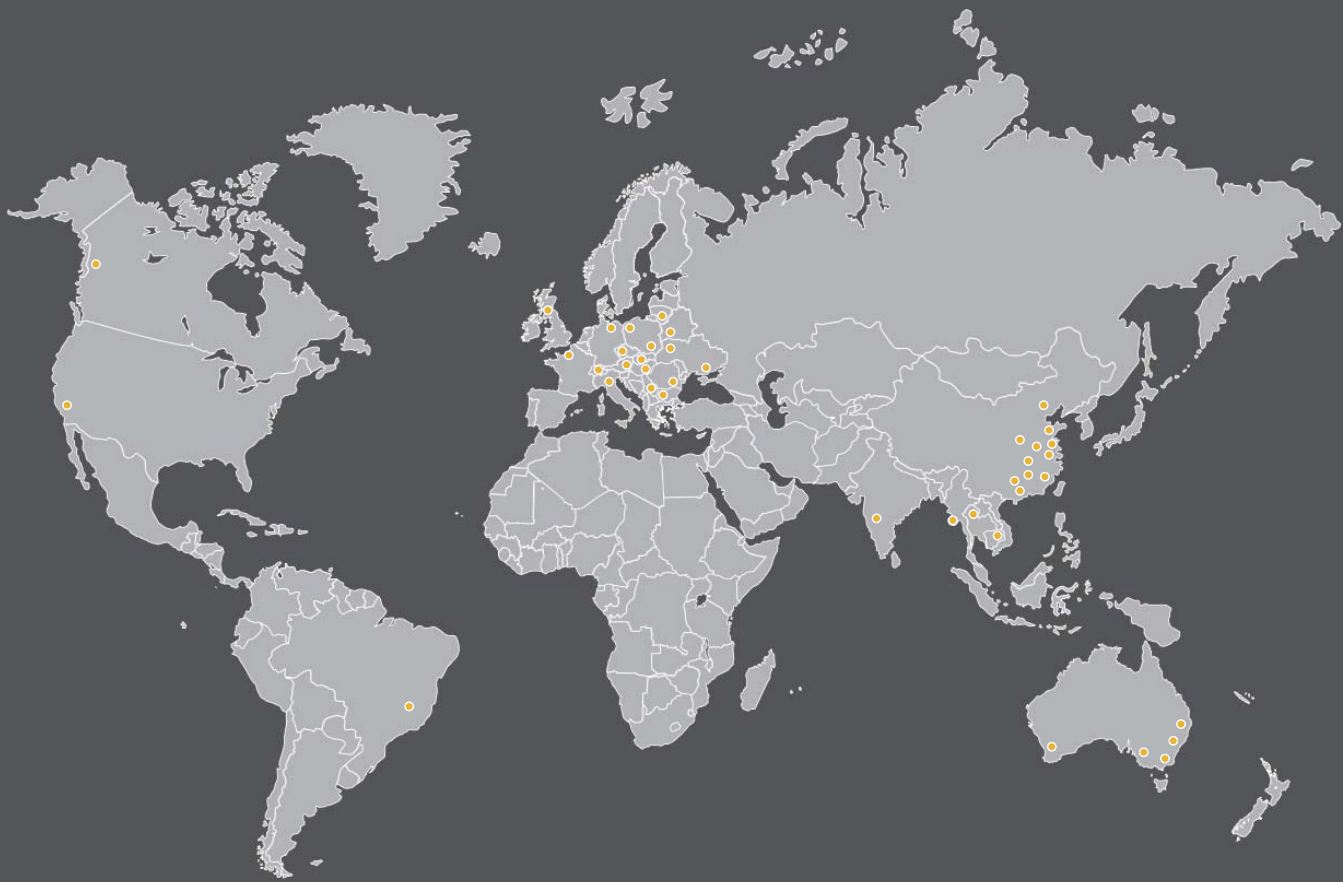
Caution

a. Do not use at temperatures (fluid or ambient temperatures) higher than the prescribed operating conditions.

Resin is used in the membrane module (element), and it can be damaged by operation at high temperatures. confirm that the fluid temperature does not exceed the membrane dryer's range of operating conditions during use, especially when installed immediately after a reciprocating type air compressor.

b. Keep the inlet air temperature lower than the ambient temperature.

Condensation and water drops may accumulate inside of the membrane dryer's body and reduce its dehumidification capacity if the membrane air dryer's body is cooled by the ambient air.



ULTRA-DRYER



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

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