

Product Data Sheet

Refrigeration Dryer DFX

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Field of application

Refrigeration dryers of the DFX series are designed for drying compressed air flows up to 14 bar(g) / 16 bar(g) to pressure dew points up to +3°C for compressed air without aggressive substances.

Function

Refrigeration dryers of the DFX series mainly consist of two heat exchangers and a controlled refrigerant circuit. In the first heat exchanger, the air/air heat exchanger, the incoming compressed air flow will be pre-cooled by the outgoing compressed air flow in the counterflow circuit, which is already cooled down to the dewpoint temperature. This means that additional energy for pre-cooling is not required. In the second heat exchanger, the refrigerant/air heat exchanger, which is cooled by the refrigerant circuit, the compressed air is cooled down to the minimum temperature (dewpoint temperature). During the entire cooling process moisture in the compressed air precipitates in the form of condensate which is collected centrally and discharged automatically. Finally, the compressed air is heated and thus sub-saturated in the air/air heat exchanger by the warm incoming compressed air in the counterflow circuit. As long as the compressed air temperature does not fall below the pressure dew point, condensate will no longer be generated. To prevent the dryer from freezing when being operated at partial load, the cooling capacity generated by the refrigerant circuit has to be controlled. For the DFX series a hot gas bypass controller is used for controlling.



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Features

All the models are provided with an electronic condensate drain and a potential free alarm contact as standard. The refrigeration dryers comply with the requirements of the Pressure Equipment Directive 2014/68/EU as well as with the Machinery Directive 2006/42/EC and have the corresponding CE marking.

The dryer will be delivered as turn-key-unit. All electrical and mechanical components are ready mounted on a robust base frame with metal silencing hood. All components are easy to access and can be handled with standard tools for maintenance. Serially with an electronic condensate drainer, dewpoint indicator, main switch and power plug.

The plate heat exchanger block, made of aluminium has three functions:

- Air to Air -heat exchanger
- Air to refrigerant-heat exchanger
- Condensate separator system.

Partial load regulated by a hot gas bypass automatic controller. In case of overloading the dryer will switch off if dewpoint is higher +20 °C. Start-up time before using only 5 minutes. Models DFX2 up to DFX15 are usable and prepared for wall mounting

A pre-assembled dryer bypass incl. 3 ball valves is optionally available.



Control unit

- Microprocessor control with LED display
- Display of the dewpoint by 10 LED's (dewpoint ladder)
- Operation mode, common alarm indicated by LED's
- Fan operation at DFX2-DFX18 indicated by LED's.
- Programmable dewpoint alarm (from +3°C up +20°C)
- Volt.-free common alarm (max. 1A)

DFX23-85 with additional Fan control pressure switch (PS00)

DFX45-85 with additional refrigerant safety thermo switch (TSAH)

DFX55-85 with additional refrigerant high pressure safety switch (PSAH)

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Basic data

Model	Nominal volume flow (VN) ^{*1}	Min./Max. operating pressure	Min./Max. operating temperature	
			Compressed air	Ambient
DFX 2	20 m ³ /h	2 - 16 bar	+2°C - +55°C	+2°C - +45°C
DFX 4	35 m ³ /h			
DFX 5	50 m ³ /h			
DFX 7	65 m ³ /h			
DFX 9	85 m ³ /h			
DFX 11	105 m ³ /h			
DFX 13	125 m ³ /h	2 - 14 bar		
DFX 15	150 m ³ /h			
DFX 18	180 m ³ /h			
DFX 23	225 m ³ /h			
DFX 30	300 m ³ /h			
DFX 36	360 m ³ /h			
DFX 45	450 m ³ /h			
DFX 55	550 m ³ /h			
DFX 65	650 m ³ /h			
DFX 75	750 m ³ /h			
DFX 85	850 m ³ /h			

*1 - refers to 1 bar(a) and 20°C at 7 bar operating pressure; according to ISO 7183

Volume flow conversion factors

«F1» - Pressure (in bar)

2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0.60	0.70	0.80	0.88	0.94	1.00	1.04	1.06	1.09	1.10	1.12	1.14	1.15	1.16	1.17

«F2» - Inlet temperature (in °C)

30	35	40	45	50	55
1.17	1.00	0.88	0.75	0.58	0.48

«F3» - Ambient temperature / Cooling air temperature (in °C)

25	30	35	40	45
1.00	0.97	0.94	0.87	0.78

«F4» - Pressure dewpoint (in °C)

3	5	7	10
0.90	1.00	1.11	1.25

Calculation of the converted volume flow

Converted volume flow VK	Nominal required volume flow VN_{min}
$VK = VN \times F1 \times F2 \times F3 \times F4$	$VN_{min} = VK / F1 / F2 / F3 / F4$

VK : Converted volume flow calculated for the operating conditions

VN_{min}: Nominal required volume flow calculated for the operating conditions, based on the volume flow at operating conditions

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Purity classes according to ISO 8573-1

Contamination	
Solid particles *2	Class 4
Water content *2	Class 4-6*3
Total oil content *2 *4	Class 4

*2 - typical result, on the assumption that the suitable inlet concentrations and operating and marginal conditions are given

*3 - depending on the design (see conversion factors below)

*4 - the oil vapour content is not taken into account, it may reduce the purity class

Maintenance rules

	Maintenance interval and maintenance activities
All models	<ul style="list-style-type: none"> ■ Daily <ul style="list-style-type: none"> - Check dewpoint, Check function of the condensate drain. ■ Monthly <ul style="list-style-type: none"> - Clean condensate drain (interval could be different in dependence on compressed air quality) - Clean refrigerant condenser (cooler and fan) (interval could be different in dependence on ambient air quality) ■ Yearly <ul style="list-style-type: none"> - Leak tightness check : *5 for refrigerant dryers with filling <30 kg refrigerant the maximum allowed leak rate of 2% must not be exceeded

*5 -Maintenance and works on refrigerant circuits has to be provided by qualified personnel only (see. EN 13313)

For the qualified personnel a yearly instruction (acc. BetrSichV §9I, EN378-1, BGR 500 2.35) is mandatory

Product specific data

Model	Pressure drop*6	Cooling air requirement	Refrigerant type	Amount of refrigerant	Power consumption*6	Electrical connection	Protection class
DFX 2	0.15 bar	200 m ³ /h	R134a	0.20 kg	0.16 kW	230 V 50-60 Hz 1~	IP20
DFX 4	0.06 bar	200 m ³ /h		0.20 kg	0.18 kW		
DFX 5	0.09 bar	200 m ³ /h		0.22 kg	0.19 kW		
DFX 7	0.11 bar	300 m ³ /h		0.25 kg	0.22 kW		
DFX 9	0.15 bar	300 m ³ /h		0.30 kg	0.29 kW		
DFX 11	0.36 bar	300 m ³ /h		0.30 kg	0.31 kW		
DFX 13	0.22 bar	300 m ³ /h		0.33 kg	0.39 kW		
DFX 15	0.28 bar	300 m ³ /h		0.33 kg	0.40 kW		
DFX 18	0.22 bar	340 m ³ /h		0.44 kg	0.53 kW		
DFX 23	0.23 bar	350 m ³ /h	R407C	0.47 kg	0.71 kW	230 V 50 Hz 1~	
DFX 30	0.38 bar	380 m ³ /h		0.48 kg	0.80 kW		
DFX 36	0.26 bar	380 m ³ /h		0.63 kg	0.81 kW		
DFX 45	0.33 bar	430 m ³ /h		0.80 kg	0.76 kW		
DFX 55	0.16 bar	450 m ³ /h		0.95 kg	0.79 kW		
DFX 65	0.23 bar	1,900 m ³ /h		1.10 kg	0.88 kW		
DFX 75	0.26 bar	1,900 m ³ /h		1.20 kg	1.35 kW		
DFX 85	0.14 bar	2,200 m ³ /h		1.70 kg	1.38 kW		

*6 - at full nominal load, supply voltage 230 V / 50 Hz

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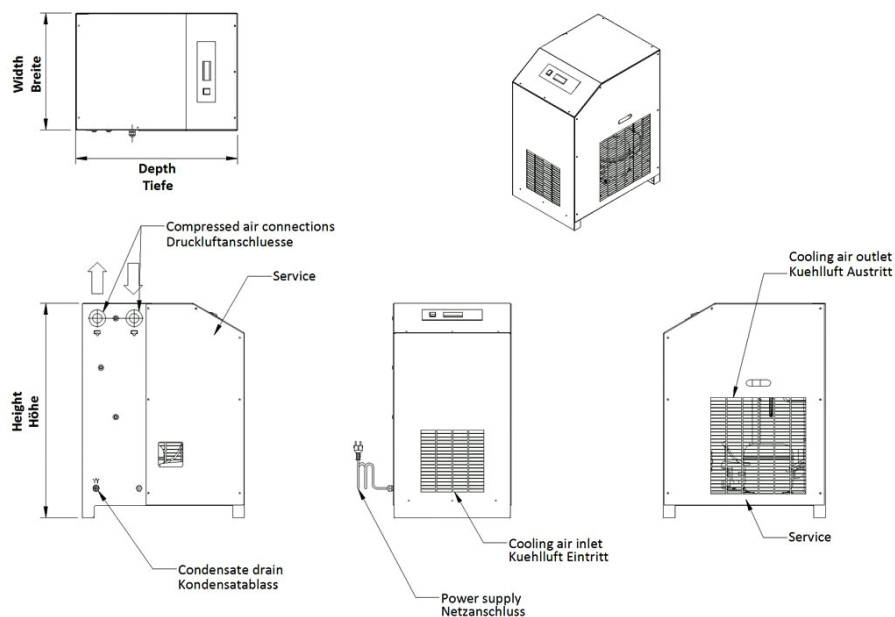
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Materials

Component	
Heat exchanger	Aluminium
Connections	Aluminium
Housing	Steel sheet, powder-coated

Connections, dimensions and weight

Model	Connection	Height	Width	Depth	Weight
DFX 2	G 3/8	645 mm	360 mm	410 mm	24 kg
DFX 4	G 1/2				26 kg
DFX 5					27 kg
DFX 7					29 kg
DFX 9					31 kg
DFX 11					31 kg
DFX 13	G 1				33 kg
DFX 15		33 kg			
DFX 18	G 1 1/4	870 mm	480 mm	660 mm	55 kg
DFX 23					56 kg
DFX 30					57 kg
DFX 36					61 kg
DFX 45	G 1 1/2	68 kg			
DFX 55	G 2	1055 mm	645 mm	920 mm	116 kg
DFX 65					118 kg
DFX 75					121 kg
DFX 85					155 kg



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Classification according to Pressure Equipment Directive 2014/68/EU for group 2 fluids

Model	Volume	Category
DFX 2	0.35 litres	---
DFX 4	0.70 litres	---
DFX 5	0.70 litres	---
DFX 7	0.70 litres	---
DFX 9	0.70 litres	---
DFX 11	0.70 litres	---
DFX 13	1.30 litres	---
DFX 15	1.30 litres	---
DFX 18	2.30 litres	---
DFX 23	2.30 litres	---
DFX 30	2.30 litres	---
DFX 36	5.90 litres	I (>8.4 bar)
DFX 45	5.90 litres	I (>8.4 bar)
DFX 55	10.2 litres	I (>4.9 bar)
DFX 65	10.2 litres	I (>4.9 bar)
DFX 75	10.2 litres	I (>4.9 bar)
DFX 85	28.0 litres	II (>7.1 bar)

Other Directives

Model	
All model	CE marking is according to the Machinery Directive 2006/42/EC

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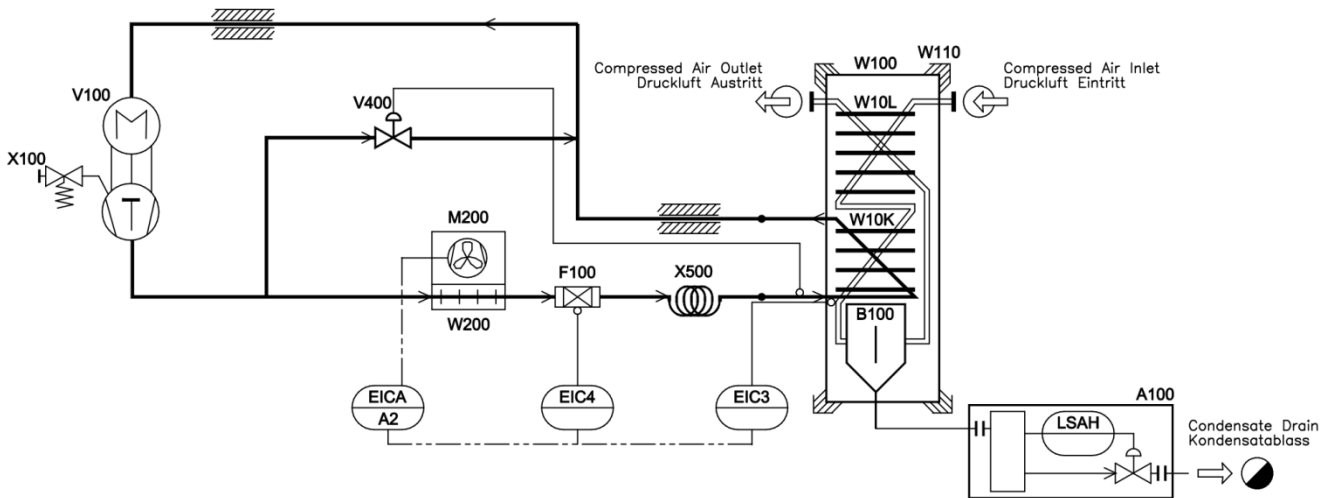
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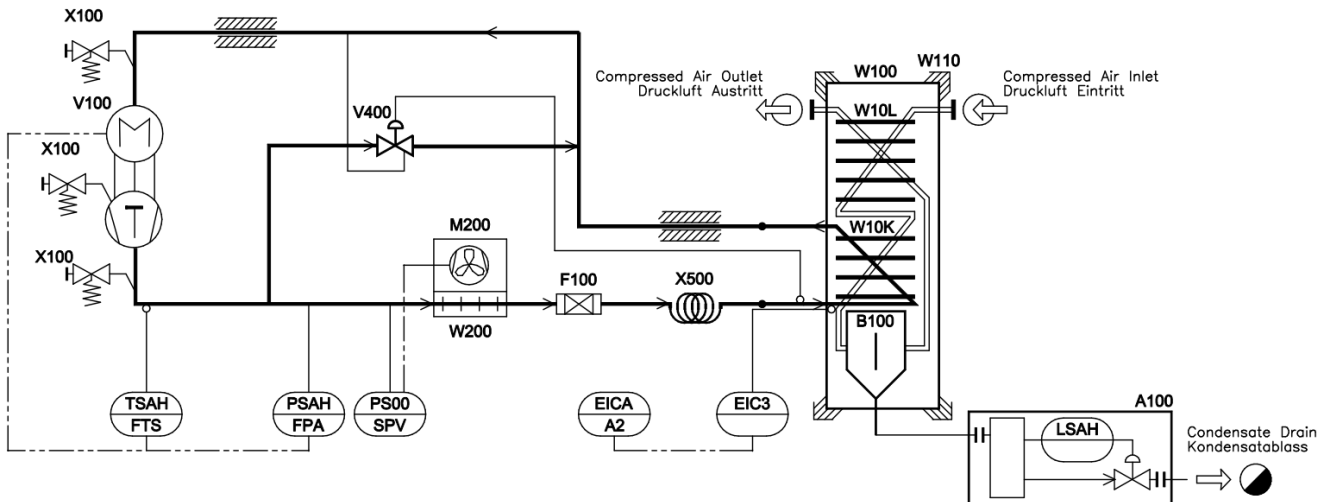
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Flow diagram (PID) for DFX 2-18



Flow diagram (PID) for DFX 23-85



A100	Condensate drain
EIC3	Dewpoint sensor
EIC4	Fan sensor
EICA	Electronic regulator
F100	Refrigerant filter
LSAH	Level Sensor Condensate drain
M200	Fan
V100	Refrigerant compressor
V400	Hot gas-Bypass-Valve
W100	Heat exchanger package

W10L	Air / Air heat exchanger
W10K	Air / Refrigerant heat exchanger
W110	Heat exchanger insulation shell
W200	Refrigerant condenser
X100	Schrader valve (for refilling)
X500	Capillary tube
PS00	Fan control pressure switch (only at DFX23-85)
PSAH	High pressure switch (only at DFX55-85)
TSAH	Safety thermo switch (only at DFX45-85)
B100	Condensate separator

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Accessories



The DA-CM1-230 switch-over control system enables the control of two redundant compressed air dryers in a compressed air system. The two dryers can be operated alternately while switching-over automatically. All dryers, provided with a «remote start/stop contact» or a «compressor synchronisation contact», can be directly connected to the switch-over control system without the need for any further modifications. The DA-CM1-230 also controls all required shut-off valves (no scope of supply) to open or close the compressed air line to a dryer (e.g. solenoid valves or valves with actuating drive for 230V AC supply voltage). Furthermore, additional input signals can be hooked up to the common alarm message of each dryer. Beside the power supply the DA-CM1-230 provides alarm inputs for condensate drains, differential pressure gauges, etc. for each dryer.

The GSM Module DA-ETR-107 is an easy to install extension for all dryers with alarm contact. In case of an alarm a SMS message is send to up to 6 different recipients or, if supported by the provider, an email message. Within the message, the dryer type and serial number is transferred, if required.

The programming can be done with a usual mobile phone, protected by the PIN code of the SIM card (no scope of supply) applied to the GSM module. The DA-ETR-107 is operated with 5-32V DC supply voltage. An internal battery ensures operation of up to 120 hours in case of loss of the supply voltage. The GSM module has an integrated antenna while an external antenna can be connected in the case of low signal levels.



The Start-up device (minimum pressure valve) DA-VPM-... protects the dryer from overload due to high flow velocities during pressure build-up of the compressed air system. For connection size G ½ to G 2½ spring loaded angle valves are offered (DA-VPM-B./16), providing an opening pressure of 3-5 bar (standard 3.5 bar). For connection size DN80 to DN250 butterfly valves with pneumatic actuator are offered (DA-VPM-F.../11), directly operated by the working pressure while opening at 3 bar (full cross-section at 4 bar). Special versions with adjustable opening pressure or working pressures of up to 450 bar are available on request.



Differential pressure gauges FAD01C with potential free alarm contact allow to hook up the differential pressure control of the pre- and after-filter to the common alarm message of each dryer. In order to avoid a false error report due to start-up conditions or short-time peaks, an alarm delay can be set in the dryer control unit. The alarm message then will just be generated, if a too high differential pressure was indicated during the entire delay time interval.

... and many more. Please contact us.