

Technical Catalogue



DFLEX series

Desiccant rotor air dehumidifiers



fisair
air humidity control 





DFLEX series

Desiccant rotor air dehumidifiers

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General description



The quality and efficiency requirements demanded by today's society in terms of human comfort, and the control and stability of production processes, have made humidity control increasingly necessary or even essential.

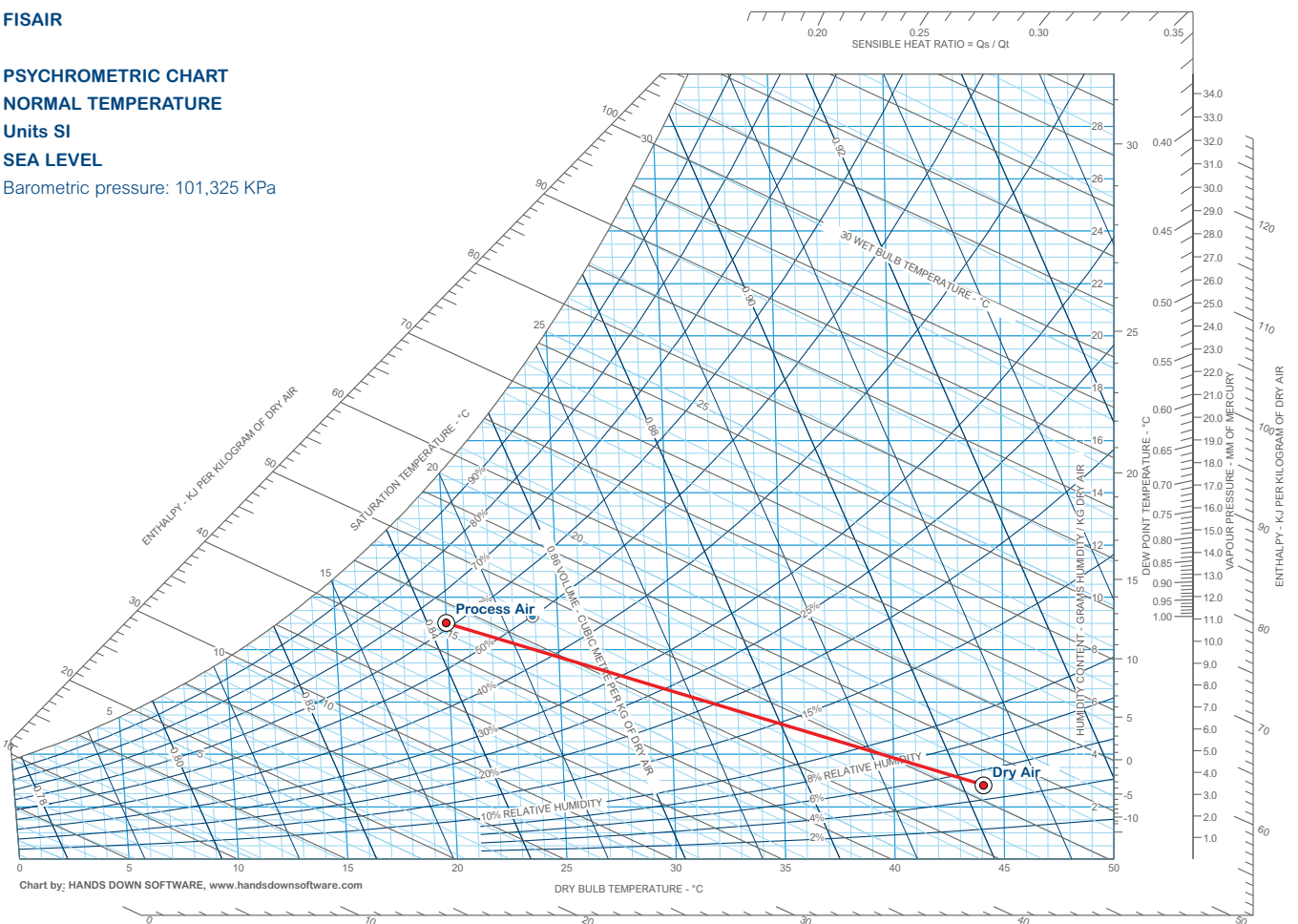
The fact that the water vapour content of air varies greatly, and relative humidity depends on this, means it is vital to employ a dehumidification system for the reduction and control of this value whenever the water vapour content exceeds the humidity content permitted by the process.

That is why Fisair, which has been manufacturing since 1994, designs air dehumidifiers that enable the constant attainment of required humidity levels in a simple and precise manner, for minimal investment and operating costs.

FISAIR

PSYCHROMETRIC CHART
NORMAL TEMPERATURE
Units SI
SEA LEVEL

Barometric pressure: 101,325 KPa





Operating principles of desiccant rotors

DFLEX series Fisair air dehumidifiers work using a high performance silica gel desiccant rotor, which is chemically and thermally stable, to prevent the deliquescence of the material it is made of, as occurs with other desiccant materials. Its cylindrical shape with a large number of small channels provides a large surface area for contact between the air and the desiccant material, which enables high levels of dehumidification, with a minimal volume of material.

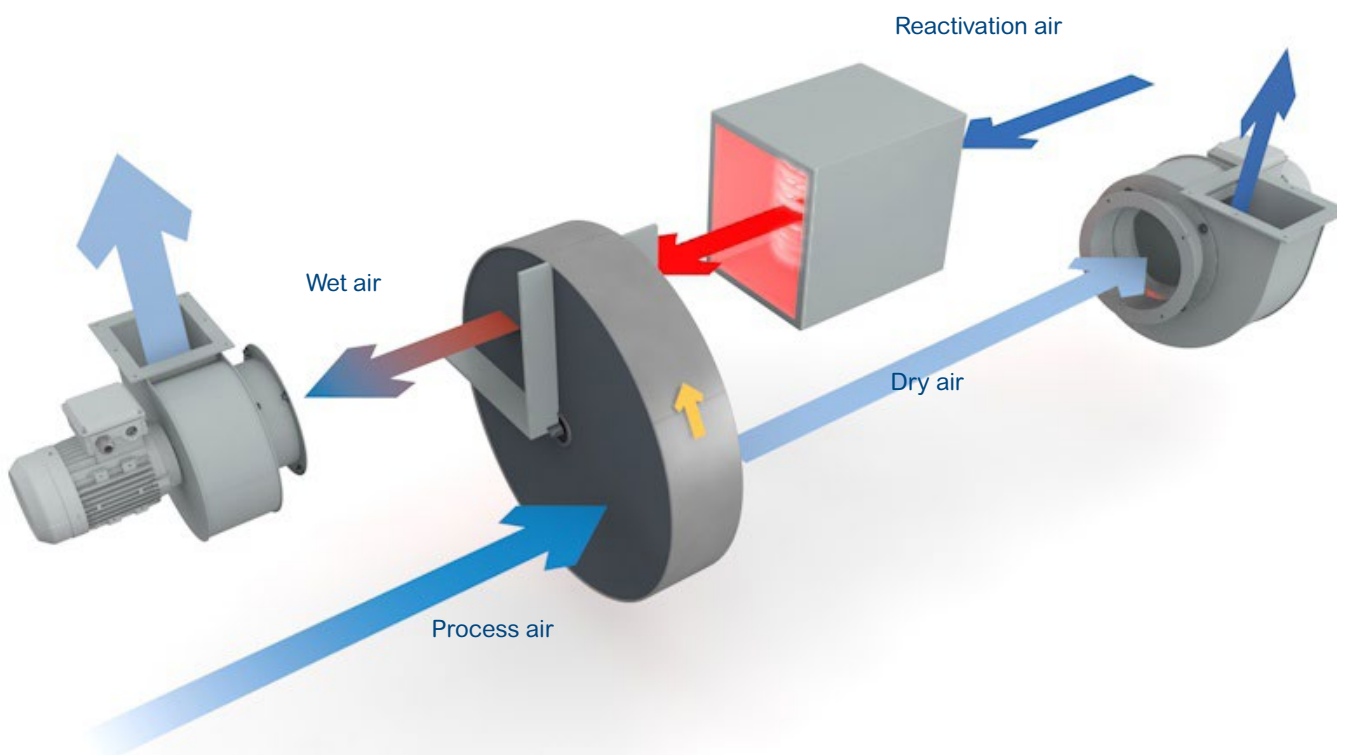
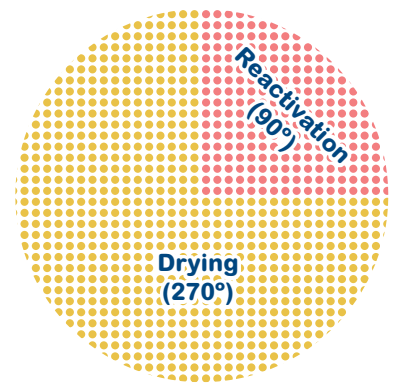
Its simple method involves two air flows moving continuously and simultaneously as counter-currents across the desiccant rotor. The desiccant rotor is equipped with a rotation device and a series of perimeter seals to make the drying process continuous and uniform, and to optimize performance.

The flow of air for drying (process air), is filtered and passes through the desiccant rotor material (270°), and a proportion of the water vapour molecules in the air are adsorbed. This air (dry air) is supplied to the controlled humidity zone by means of a fan.

The regeneration air flow from the desiccant rotor (reactivation air), is filtered and heated using a steam heater coil. It then passes through the desiccant rotor material (90°), and the water vapour molecules retained in the desiccant rotor are adsorbed, which regenerates the rotor for a new drying cycle. This air (wet air) is expelled outside of the controlled humidity zone, by means of a fan.

Fisair dehumidifiers have a long operating life because of the chemical resistance of the rotor and the possibility of washing it in water.

Standard dehumidifiers can ensure dry air humidity reaches dew point temperatures of up to -20°C, or even lower on demand.



Coding product
DFLEX

			Reactiv. Syst.	Process Air Initial Filter	Reactv. Air Initial Filter	PRE-Coils	POST-Coils	Fans	Dry Air Final Filter	Heat Recovery	Finishing	Electrical Power Supply	Control	Other Special		
DFLEX series	DFLEX-3500	E	GF	GF	WS	WS	WS	WS	SF	SF	H14	R	KR	405	AE04	0

- 1100
- 1300
- 1700
- 2100
- 2900
- 3500

model

Reactivation System

- E = Electric coil
- A = Coil for hot water
- V = Coil for saturated steam
- H = Stainless steel coil for saturated steam
- D = Saturated steam coil + electric coil
- X = Stainless steel coil for saturated steam+ electric coil
- G = Direct Gas

Process Air Filters

- 00 = Without filters
- G0 = 1 Filters stage class G4 (EN779:2012)
- GF = First stage class G4 filters and second stage class F9 (EN779:2012)
- C0 = 1 stage of filters of a specific class other than G4 (EN779:2012)
- 0F = 1 Filters stage class F9 (EN779:2012)
- CC = Two stages of filtering other than G4F9 (EN779:2012)

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- CC = Two stages of filtering other than G4F9 (EN779:2012)

Pre-Heating

- 00 = No pre-heating
- WE = ECO pre-heating coils for hot water.
- WS = STANDARD pre-heating coil for hot water.
- WH = Water High Power Heating Coil
- CW = Custom pre-heating coil



Coding product
DFLEX

DFLEX series	DFLEX-3500	Reactiv. Syst.	Process Air Initial Filter	Reactiv. Air Initial Filter	PRE-Coils	POST-Coils	Fans	Dry Air Final Filter	Heat Recovery	Finishing	Electrical Power Supply	Control	Other Special		
		E	GF	GF	WS	WS	WS	SF	SF	H14	R	KR	405	AE04	0

Pre-Cooling

- 00 = No pre-cooling
- WE = ECO pre-heating coil for cold water.
- WS = STANDARD pre-cooling coil for cold water.
- WH = High-power pre-cooling coil for cold water.
- DS = STANDARD pre-cooling coil for direct expansion.
- CW = Custom pre-cooling coil

Post-Cooling

- 00 = No post-cooling
- WE = ECO post-cooling coil for cold water.
- WS = STANDARD post-cooling coil for cold water.
- WH = High-power post-cooling coil for cold water.
- DS = STANDARD post-cooling coil for direct expansion.
- CW = Custom Post-cooling coil

Post-Heating

- 00 = No post-heating
- WE = ECO post-heating coil using hot water.
- WS = STANDARD post-heating coil using hot water.
- WH = Water High power heating Coil
- CW = Custom Post-Heating coil

Process Air / Dry Air Fan

- 00 = No process/dry air fan
- SF = STANDARD fan
- PF = POWERED fan
- PS = Plug-Fan for DFRA serie
- PP = POWERED Plug-Fan

Reactivation Air / Moist Air Fan

- SF = STANDARD fan
- PF = POWERED fan

Dry Air Filter

- H13 = HEPA H13 (EN 1822:2011) filter fitted after the process air/dry air fan (requires a Plug-Fan ventilator)
- H14 = HEPA H14 (EN 1822:2011) filter fitted after the process air/dry air fan (requires a Plug-Fan ventilator)

Sensitive Heat Recovery Unit

- 0 = Without heat recuperator. No by-pass in desiccant rotor.
- R = Static heat recuperator installed in the discharge of wet air.
- D = By-pass air damper in descending rotor.
- M = Static heat recuperator installed in the discharge of wet air. By-pass air damper in descending rotor.

Coding product
DFLEX

DFLEX series	DFRA-3500	Reactiv. Syst.	Process Air Initial Filter	Reactv. Air Initial Filter	PRE-Coils	POST-Coils	Fans	Dry Air Final Filter	Heat Recovery	Finishing	Electrical Power Supply	Control	Other Special			
		E	GF	GF	WS	WS	WS	WS	SF	SF	H14	R	KR	405	AE04	0

Finishing

- 00 = Standard production of components. Protection grade IP50 and finished with RAL7035 colour.
- 0R = Standard production of components. Protection grade IP50 and finished with specific colour (RAL___).
- K0 = Standard production of components. Protection grade IP54 and finished with RAL7035 colour.
- KR = Standard production of components. Protection grade IP54 and finished with specific colour (RAL___).

Power Supply Options (Not included in mechanical drawings)

- 405 = Standard electrical power supply at 400V ±5% /III/50Hz
- N05 = Electrical power supply at 400V ±5% /III/50Hz
- 406 = Electrical power supply at 400V ±5% /III/60Hz
- N06 = Electrical power supply at 400V ±5% /III+N/60Hz
- 445 = Electrical power supply at 440V ±5% /III/50Hz
- N45 = Electrical power supply at 440V ±5% /III+N/50Hz
- 446 = Electrical power supply at 440V ±5% /III/60Hz
- N46 = Electrical power supply at 440V ±5% /III+N/60Hz
- 466 = Electrical power supply at 460V ±5% /III/60Hz
- N66 = Electrical power supply at 460V ±5% /III+N/60Hz
- 235 = Electrical power supply at 230V ±5% /III/50Hz
- 236 = Electrical power supply at 230V ±5% /III/60Hz

Control Options (Not included in mechanical drawings)

- BE00 = Basic ON/OFF control with electric heater for reactivation
- BV00 = Basic ON/OFF control with saturated steam heater for reactivation
- AE13 = Advanced electrical reactivation control with one actuator. (Electrical . 0..10V)
- AE27 = Advanced electrical reactivation control with two actuators. (Electrical . 0..10V)
- AE49 = Advanced electrical reactivation control with four actuators. (Electrical . 0..10V)
- CE27 = Advanced electrical reactivation control with two actuators. (Electrical . (0..10V)+Profibus Gateway
- CE49 = Advanced electrical reactivation control with four actuators. (Electrical . (0..10V)+Profibus Gateway
- AV03 = Steam reactivation advanced control
- AV17 = Advanced steam reactivation control with one actuator. (Electrical . 0..10V)
- AV39 = Advanced steam reactivation control with three actuators. (Electrical . 0..10V)
- CV17 = Advanced steam reactivation control with one actuator (Electrical 0..10V) + Profibus Gateway
- CV39 = Advanced steam reactivation control with three actuators. (Electrical . (0..10V)+Profibus Gateway
- AG03 = Gas reactivation advanced control
- AG17 = Advanced gas reactivation control with one actuator. (Electrical . 0..10V)
- AG39 = Advanced gas reactivation control with three actuators. (Electrical . 0..10V)
- CG17 = Advanced gas reactivation control with one actuator (Electrical 0..10V) + Profibus Gateway
- CG39 = Advanced gas reactivation control with three actuators. (Electrical . (0..10V)+Profibus Gateway

Other Special Options

- C = Accessories that can be built-in subject to specification and preliminary study

[Note] Not all code options are included in technical data.

Example: DFLEX-3500V GFG0 0000 0000 SFSF 000 000 405AV170



Specification

DFLEX series, desiccant rotor air desiccant dehumidifier with high efficiency silica gel desiccant rotor for a long life and low energy consumption.

Key Features

S: Standard | **O:** Optional | **S:** Steam | **G:** Gas | **E:** Electric

- S**
 - Structure formed by corners cast aluminium and aluminium profiles.
 - Structure base frame based on c-steel profile as per UNE 36-525-72 standard. The structure base frame itself supports the lifting of the module. When supplied in modules, is prepared for an easy assembly on site, and each one base is supplied with heavy duty lifting lugs.
 - Panels mounted on to this structure, manufactured in galvanized steel with external finish RAL 7035. Assembled together and to the frame, with spongy neoprene gasket for better sealing. Including component & manhole cover plates to easy unit maintenance and inspection. Corrosion protection according to C3 class as per ISO 12944. Option in stainless steel. Panels thermal insulation using glass wool. 50mm thickness double wall.
 - Process air intake flow manual regulation damper made of aluminium. Differential pressure takes for manual regulation of exact air flow as a second reading to the VFD.
 - Type V process air filter, synthetic fiber made, G4 classification (EN 779: 2012).

- O**
 - Rigid bag process air filter, glass micro fiber media with plastic frame, F9 classification (EN 779: 2012).
 - Pre-heating coil by hot water. Made of copper tubes and aluminium fins. Condensates tray with threaded drainage coils and stainless steel material in all wet-parts.
 - Pre-cooling coil by chilled water. Made of copper tubes and aluminium fins. Droplet separator on a built-in glass-fiber panel. Condensates tray with threaded drainage coils and stainless steel material in all wet-parts.

- S**
 - Desiccant rotor made of inert, fire-resistant, hygienic, high performance silica gel material, which is thermally and chemically stable to prevent deliquescence. Including perimeter and radial sealing gasket.
 - Rotation driving system by gear motor for the rotor with a pulley and belt dragging system for the perimeter transmission with tensioner.

- O**
 - Process air bypass section on the desiccant rotor by aluminum damper with electric actuator two point control (summer/drying) - (winter/non-drying) operation.
 - Post-cooling coil by chilled water. Made of copper tubes and aluminium fins. Condensates tray with threaded drainage coils and stainless steel material in all wet-parts.
 - Post-heating coil by hot water. Made of copper tubes and aluminium fins. Condensates tray with threaded drainage coils and stainless steel material in all wet-parts.

S	<ul style="list-style-type: none"> Process air fan: Single inlet centrifugal fan direct driven (type Plug-Fan according to Ecodesign EU directive). Backward curved centrifugal impeller. High efficiency motor (IE3). Including frequency converter, C-LESS technology, THDi < 30%, MODBUS, BACnet, Apogee & Metasys communication bus. IP54 Protection class. CEM filters C2 class. Including pressure sensor to modulate the air flow. Type V reactivation air filter, synthetic fiber made, G4 classification (EN 779: 2012).
O	<ul style="list-style-type: none"> Rigid bag reactivation air filter, glass micro fiber media with plastic frame, F9 classification (EN 779: 2012).
S	<ul style="list-style-type: none"> Reactivation air intake flow manual regulation damper made of galvanized steel. Differential pressure takes for manual regulation of exact air flow.
E	<ul style="list-style-type: none"> Rotor reactivation air heater by means of electrical stainless steel shielded resistances with operative and security cut-off.
V	<ul style="list-style-type: none"> C-Steel tube reactivation air heater with aluminium fins, for steam at a maximum operating pressure of 8 kg/cm² (7 bar[g]). Flanged connections, DIN2633.
O	<ul style="list-style-type: none"> Stainless Steel tube reactivation air heater with aluminium fins, for steam at a maximum operating pressure of 8 kg/cm² (7 bar[g]). Flanged connections, DIN2633.
G	<ul style="list-style-type: none"> Calentador de reactivación del rotor formado por quemador de gas de tipo lineal compuestos por cuerpos de hierro fundido o aluminio y deflectores de aire en acero inoxidable divergentes. Incluye rampa modular de combustión con: <ul style="list-style-type: none"> Rampa de inyección de gas en fundición especial. Electrodo de ignición con conector acodado. Sonda de ionización para vigilancia de llama con conector acodado. Presostato de seguridad para control circulación aire con tobera. Tren de válvulas de gas, formado por: <ul style="list-style-type: none"> Presostato de seguridad gas mín. Presostato de seguridad gas máx. Doble electroválvula de seguridad en serie Electroválvula piloto Servoválvula de regulación de caudal de gas con servomotor modulante mediante señal 0-10 V
S	<ul style="list-style-type: none"> Ventilador de reactivación: Ventilador centrífugo de simple aspiración preparado para trabajar con aire hasta 110C, con rodete de álabes hacia delante, construido en plancha de acero galvanizado pintado en pintura poliéster anticorrosiva, equipado con motor trifásico.
S	<p>(depending on model)</p> <ul style="list-style-type: none"> Panel de control Avanzado mediante controlador con pantalla HMI para supervisión y control en tiempo real de todos los componentes del deshumidificador, preparado para las señales externas e internas requeridas, regulando la humedad de forma proporcional el equipo mediante relés de estado sólido del calefactor eléctrico o mediante válvula de control de fluido en el caso de la reactivación por vapor, gas, agua o aceite térmico. Cuadro eléctrico IP54 con acabado epoxi integrado en el equipo. Se incluye seccionador y magneto-térmicos adecuados para protección de los elementos consumidores, así como todo el cableado interno entre estos y el cuadro. Toda la instalación eléctrica según los reglamentos EU-CE sobre seguridad e instalaciones eléctricas, así como de compatibilidad electromagnética. Completa monitorización de estados para fácil mantenimiento: incluye interruptor manual / auto, tarjeta libre de potencial para señalización remota de los estados de tensión, marcha (habilita encendido remoto) y fallo (incluyendo parada del rotor). Apagado inteligente en reactivación eléctrica para disipación del calor. Voltaje de maniobra en 24V. Opción de comunicación Profibus disponible. Panel de control Básico mediante sinóptico en base a LED con estado en tiempo real de los componentes principales, preparado para las señales externas e internas requeridas para la regulación de la humedad. Cuadro eléctrico IP54 con acabado epoxi integrado en el equipo. Se incluye seccionador y magneto-térmicos adecuados para protección de los elementos consumidores, así como todo el cableado interno entre estos y el cuadro. Toda la instalación eléctrica según los reglamentos EU-CE sobre seguridad e instalaciones eléctricas, así como de compatibilidad electromagnética. Completa monitorización de estados para fácil mantenimiento: incluye interruptor manual / auto, tarjeta libre de potencial para señalización remota de los estados de tensión, marcha (habilita encendido remoto) y fallo. Apagado inteligente en reactivación eléctrica para disipación del calor. Voltaje de maniobra en 24V.



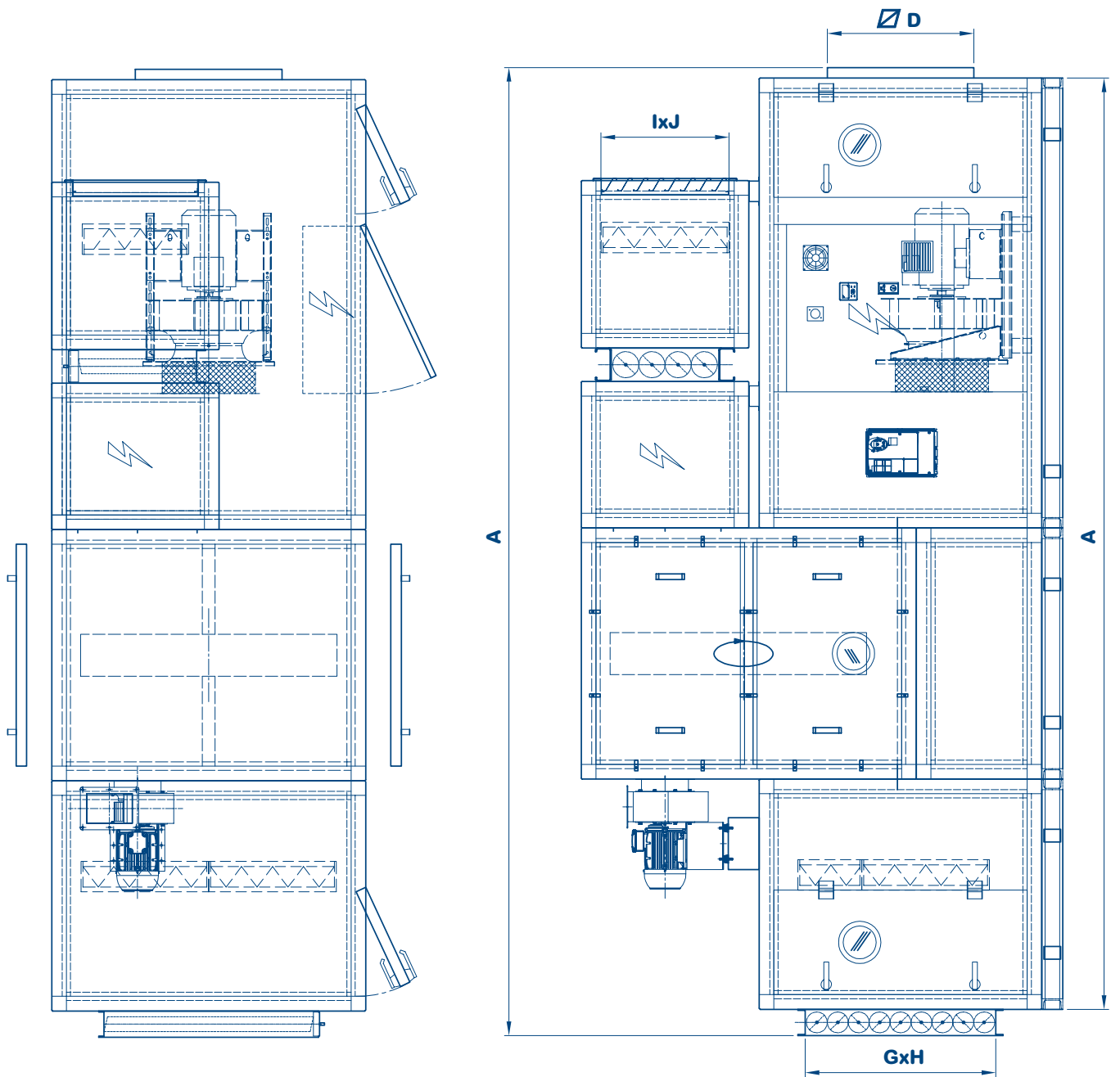
Performance table for standard units

DFLEX0000E G0G0 0000 SFSF 000 000 405AE03

Features (*)		DFLEX					
		1100	1300	1700	2100	2900	3500
Dehumidification capacity	(kg/h)	50,45	62,03	78,86	101,43	125,74	152,03
	(kg/24h)	1210,8	1488,7	1892,6	2434,3	3017,8	3648,7
Δx Specific capacity	(g/kg)	5,66	5,8	5,53	5,69	5,29	5,33
Δx Process air	(°C)	22,7	22,3	22	21,5	20,8	20,0
Dry air flow	(m ³ /h)	7500	9000	12000	15000	20000	24000
Dry air available pressure	(Pa)	912	729	818	562	980	775
Wet air flow	(m ³ /h)	2250	2700	3600	4500	6000	7200
Wet air available pressure	(Pa)	750	488	140	241	488	283
Heater power	(kW)	81,0	99,0	126,0	162,0	200,0	240,0
Total power	(kW)	88,8	107,6	137,6	173,6	219,1	262,6

(*)

- Nominal drying capacity (Wn) for process and reactivation air inlet conditions: 20° C & 60% RH. For different ones, please check specific model technical data sheet.
- Unit's efficiency under nominal reactivation built-in heater power, for reactivation heater by electrical resistance
- Technical data are subject to change without prior notice.
- Overall dimensions, weight and total power for electric heater reactivation. For steam coil or gas burner, please consult.
- Control voltage 24 VAC

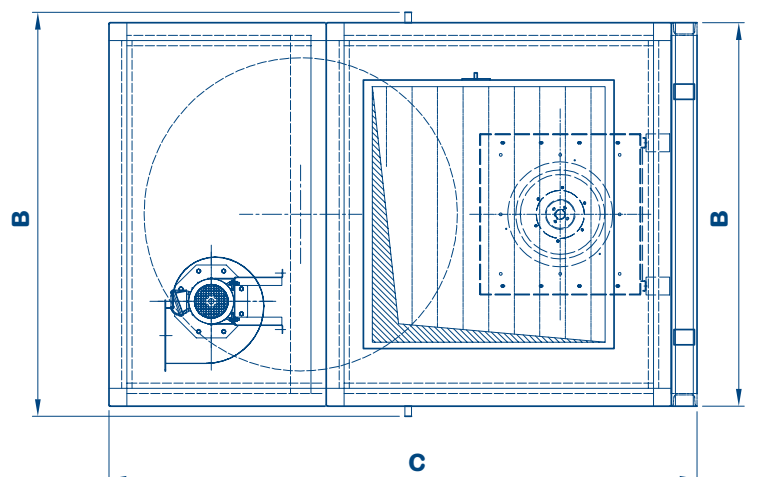


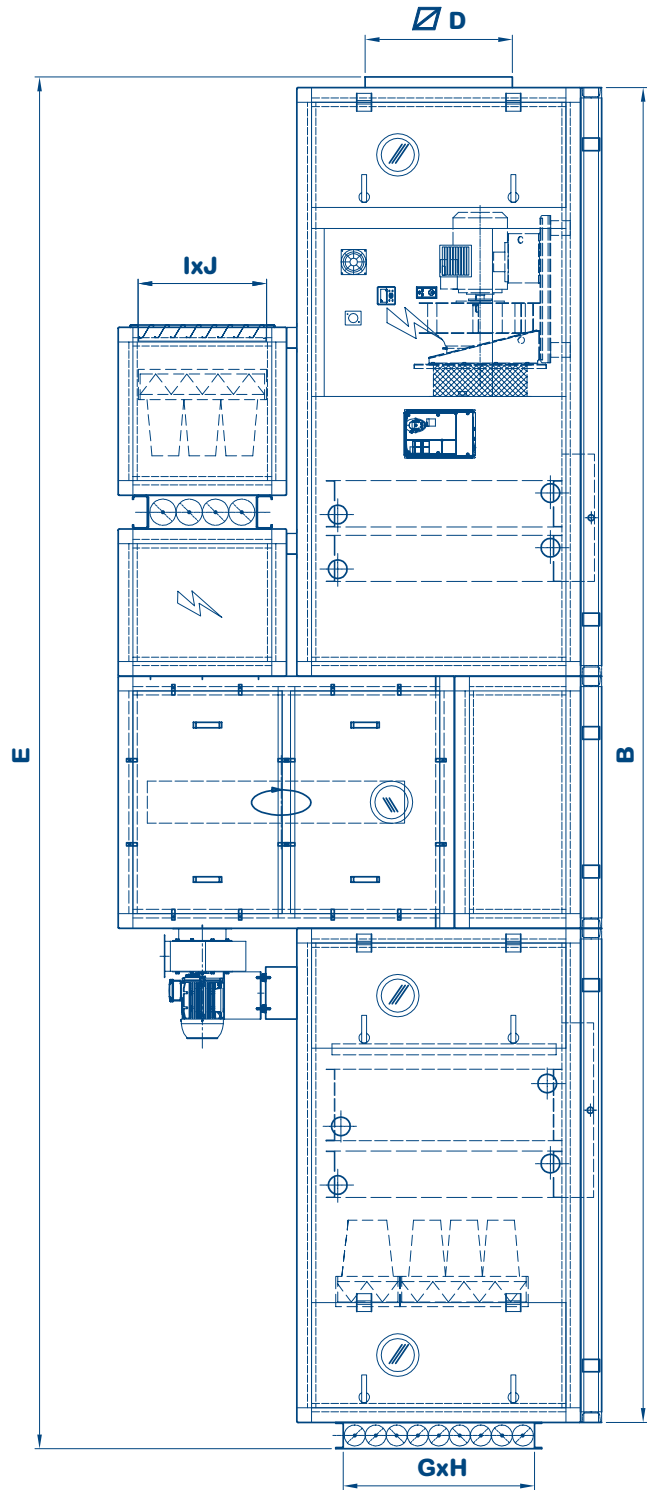
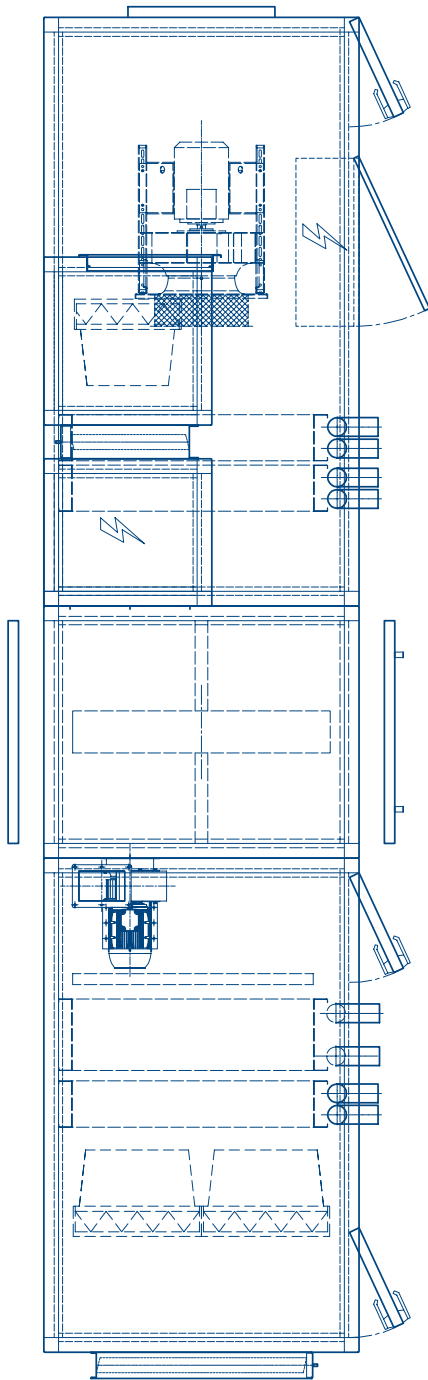
Overall dimensions drawing
ELECTRIC
reactivation

DFLEX series

1100 - 1300 - 1700 - 2100 - 2900 - 3500

(for gas or steam reactivation, please consult)





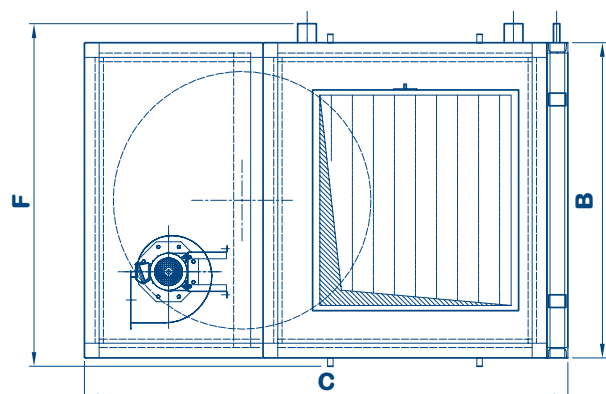
Overall dimensions drawing

**ELECTRIC
reactivation**

DFLEX series

1100 - 1300 - 1700 - 2100 - 2900 - 3500

(for gas or steam reactivation, please consult)



**Performance table for electric reactivation standard units
(for gas or steam reactivation please consult)**

		1100-1300							
		A	B	C	D	E	F	GxH	IxJ
DFLEX-E	minimum	4350	1500	2300	700	4535	1580	910x1000	612x600
	maximum	6600		1500		700	1630		

		1700-2100							
		A	B	C	D	E	F	GxH	IxJ
DFLEX-E	minimum	4450	1800	2790	900	4635	1880	810x1400	687x850
	maximum	6750		2790		6935	1920		

		2900-3500							
		A	B	C	D	E	F	GxH	IxJ
DFLEX-E	minimum	4550	2200	3270	1000	4735	2280	925x1800	837x1200
	maximum	6750		3270		6935	2320		



Optional mechanical components

PRE-HEATING COILS

With Pre-heating coils using hot water. Manufactured in copper tubes with aluminium wings.

Housing constructed using aluminium profiles, insulated by double wall panels.

Please bear in mind that you need to deduct the loss of charge in air of the coils that are part of the system from the available fan pressure.

STANDARD (WS) pre-heating coils using hot water

Features (*)		DFLEX					
		1100	1300	1700	2100	2900	3500
Airflow	(m ³ /h)	7500	9000	12000	15000	20000	24000
Total power	(kW)	78,34	86,46	132,64	150,72	212,92	234,61
Sensible power	(kW)	34,08	38,27	57,15	66,11	91,79	102,68
Air outlet temperature	(°C)	16,9	17,8	16,2	17,3	16,7	17,7
Air outlet HR	(%)	99,2	98,9	99,4	99,1	98,6	98,1
Pressure drop in air	(Pa)	144	188	110	153	115	151
Water flow	(l/h)	13475	14872	22814	25924	36622	40353
Pressure drop in water	(kPa)	15,3	18,2	9,9	12,4	27,5	32,6

(*) Performance figures at 0m above sea level for air entering at -15°C / 90% RH and water at 70°C and leaving at 50°C.

For pre-heating coils fitted with electrical resistances, please contact FISAIR.

PRE-COOLING COILS

Pre-cooling coils for cold water. Manufactured in copper tubes with aluminium wings. Housing constructed using aluminium profiles, insulated by double wall panels. Droplet separator on a built-in fibre-glass panel. Condensates tray with threaded drainage coils and stainless steel frame in contact with wet parts.

Please bear in mind that you need to deduct the loss of charge in air of the coils that are part of the system from the available fan pressure.

For each size of DFLEX there are different configurations available with water pre-cooling coils:

ECO water pre-cooling coils (WE)

Features (*)		DFLEX					
		1100	1300	1700	2100	2900	3500
Airflow	(m3/h)	7500	9000	12000	15000	20000	24000
Total power	(kW)	78,34	86,46	132,64	150,72	212,92	234,61
Sensible power	(kW)	34,08	38,27	57,15	66,11	91,79	102,68
Air outlet temperature	(°C)	16,9	17,8	16,2	17,3	16,7	17,7
Air outlet HR	(%)	99,2	98,9	99,4	99,1	98,6	98,1
Pressure drop in air	(Pa)	144	188	110	153	115	151
Water flow	(l/h)	13475	14872	22814	25924	36622	40353
Pressure drop in water	(kPa)	15,3	18,2	9,9	12,4	27,5	32,6

(*) performance figures at 0m above sea level for air entering at 31°C / 68% RH and water at 7°C and leaving at 12°C

STANDARD (WS) pre-cooling coils

Features (*)		DFLEX					
		1100	1300	1700	2100	2900	3500
Airflow	(m3/h)	7500	9000	12000	15000	20000	24000
Total power	(kW)	109,02	123,96	175,50	207,76	278,85	315,47
Sensible power	(kW)	45,75	52,14	73,64	87,39	117,14	133,06
Air outlet temperature	(°C)	12,0	13,0	11,9	12,9	12,8	13,8
Air outlet HR	(%)	100,0	100,0	100,0	100,0	99,9	99,9
Pressure drop in air	(Pa)	189	248	143	200	153	201
Water flow	(l/h)	18751	21320	30185	35735	47962	54260
Pressure drop in water	(kPa)	26,6	33,4	10,6	14,3	16,7	20,7

(*) performance figures at 0m above sea level for air entering at 31°C / 68% RH and water at 7°C and leaving at 12°C

HIGH POWER (WH) water pre-cooling coils

Features (*)		DFLEX					
		1100	1300	1700	2100	2900	3500
Airflow	(m3/h)	7500	9000	12000	15000	20000	24000
Total power	(kW)	122,27	142,10	200,78	243,64	320,72	370,91
Sensible power	(kW)	51,39	59,65	84,51	102,38	134,63	155,56
Air outlet temperature	(°C)	9,7	10,4	9,1	9,7	10,0	10,8
Air outlet HR	(%)	100,0	100,0	100,0	100,0	100,0	100,0
Pressure drop in air	(Pa)	268	353	204	284	217	286
Water flow	(l/h)	21031	24442	34534	41905	55164	63796
Pressure drop in water	(kPa)	33,1	43,2	27,0	38,2	28,9	37,4

(*) performance figures at 0m above sea level for air entering at 31°C / 68% RH and water at 7°C and leaving at 12°C

For direct expansion pre-cooling coils, please contact FISAIR.



Optional mechanical components

POST-COOLING COILS

Post-cooling coils using cold water. Manufactured in copper tubes with aluminium wings.
Housing constructed using aluminium profiles, insulated by sandwich-type panels.

Please bear in mind that you need to deduct the loss of charge in air of the coils that are part of the system from the available fan pressure.

For each size of DFLEX there are different configurations available with water post-cooling coils:

STANDARD (WS) water post-cooling coils

Features (*)		DFLEX					
		1100	1300	1700	2100	2900	3500
Airflow	(m ³ /h)	7500	9000	12000	15000	20000	24000
Total power	(kW)	60,00	69,30	91,85	108,81	157,18	180,77
Sensible power	(kW)	60,00	69,30	91,85	108,81	157,18	180,77
Air outlet temperature	(°C)	14,6	15,6	15,7	17,0	15,0	16,1
Air outlet HR	(%)	44,6	41,9	41,5	38,3	43,3	40,5
Pressure drop in air	(Pa)	88	120	61	89	69	94
Water flow	(l/h)	10320	11920	15798	18715	27036	31092
Pressure drop in water	(kPa)	9,5	12,3	5,1	6,9	16,0	20,5

(*) performance figures at 0m above sea level for air entering at 40°C / 10% RH and water at 7°C and leaving at 12°C

HIGH POWER water post-cooling coils (WH)

Features (*)		DFLEX					
		1100	1300	1700	2100	2900	3500
Airflow	(m ³ /h)	7500	9000	12000	15000	20000	24000
Total power	(kW)	71,78	84,56	110,97	135,00	185,82	217,98
Sensible power	(kW)	71,78	84,56	110,97	135,00	185,82	217,98
Air outlet temperature	(°C)	9,6	10,2	10,6	11,4	10,5	11,2
Air outlet HR	(%)	61,9	59,6	57,8	54,8	58,3	55,8
Pressure drop in air	(Pa)	148	201	103	149	116	158
Water flow	(l/h)	12346	14544	19087	23220	31960	37493
Pressure drop in water	(kPa)	12,6	16,9	4,7	6,6	8,1	10,7

(*) performance figures at 0m above sea level for air entering at 40°C / 10% RH and water at 7°C and leaving at 12°C

For direct expansion post-cooling coils, please contact FISAIR.

POST-HEATING COILS

Post-heating coils using hot water. Manufactured in copper tubes with aluminium wings. Housing constructed using aluminium profiles, insulated by sandwich-type panels.

Please bear in mind that you need to deduct the loss of charge in air of the coils that are part of the system from the available fan pressure.

STANDARD (WS) water post-heating coils

Features (*)		DFLEX					
		1100	1300	1700	2100	2900	3500
Airflow	(m3/h)	7500	9000	12000	15000	20000	24000
Total power	(kW)	93,59	105,18	157,06	178,09	261,12	292,91
Sensible power	(kW)	93,59	105,18	157,06	178,09	261,12	292,91
Air outlet temperature	(°C)	36,8	34,6	38,5	35,1	38,4	36,1
Air outlet HR	(%)	10,2	11,5	9,3	11,2	9,4	10,7
Pressure drop in air	(Pa)	55	75	40	59	46	62
Water flow	(l/h)	4024	4523	6754	7658	11228	12595
Pressure drop in water	(kPa)	11,0	13,6	5,7	7,1	9,2	11,3

(*) Performance figures at 0m above sea level for air entering at 2°C / 90% RH and water at 70°C and leaving at 50°C.

For direct expansion pre-heating coils, please contact FISAIR.

HIGH EFFICIENCY FILTERS

As an optional fitting, DFLEX series dehumidifiers can be supplied with process filters and high-efficiency reactivation filters. These filters are fitted on specific frames that ensure maximum water-tightness and they are supplied with a housing built with aluminium profiles and insulated with sandwich panels.

The high-efficiency filters have built-in pressure switches for filter clogging as standard, so that they can be connected to the advanced control systems of DFLEX units.

Filters can be supplied with the following kinds of filtering:

G4 ----- **F9** ----- **H14**
 (Standard)



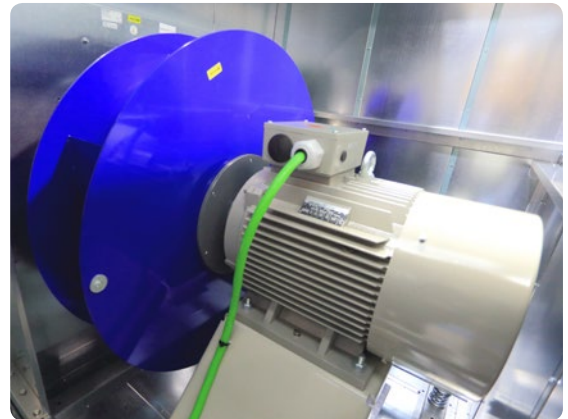


Optional mechanical components

PLUG-FAN DRY AIR FANS (Standard in DFLEX)

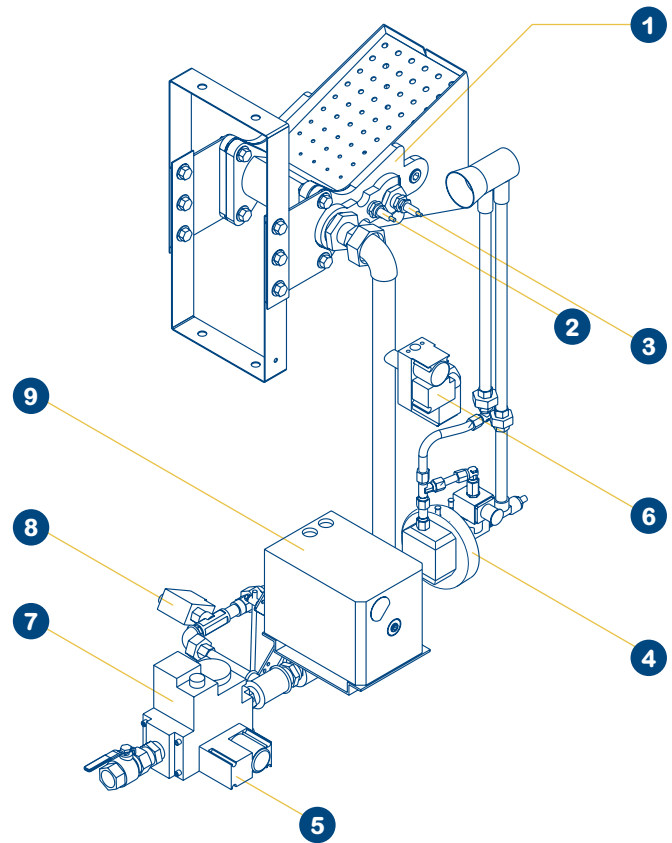
Thanks to these fans, setting up the installation is very simple, and they also allow you to maintain a constant flow/pressure as the process filters become clogged (as standard, they are fitted with a differential pressure probe that enables you to control the fan's electronics).

This control option is only available for units with advanced control.



Gas burners

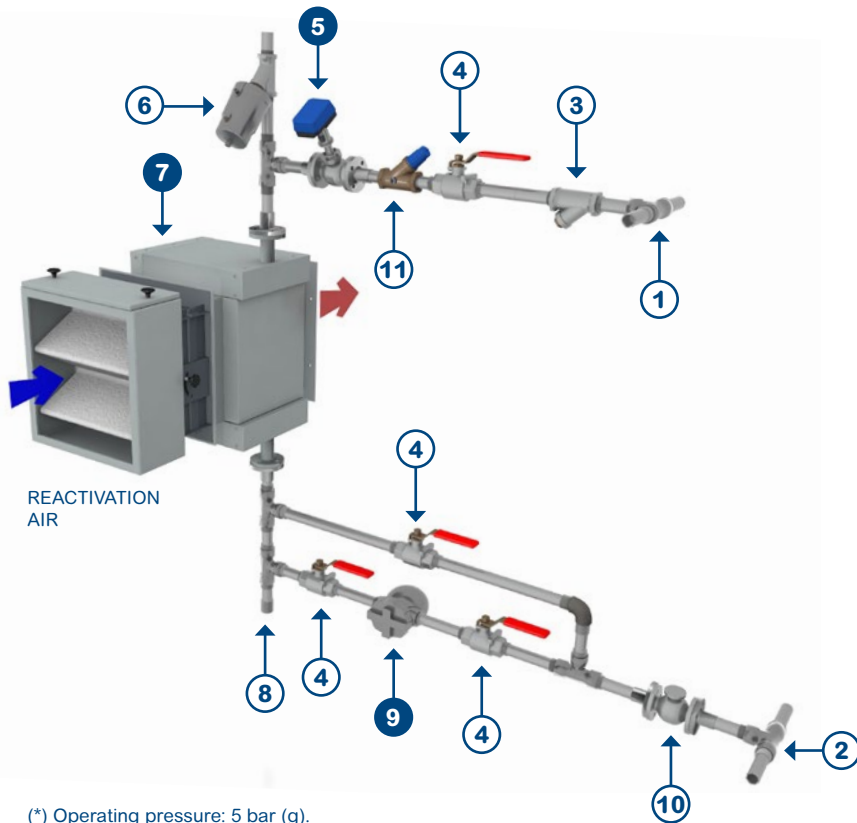
1	Gas injection ramp special cast iron
2	Ignition electrode
3	Ionization probe for flame monitoring
4	Safety pressure switch for air circulation control with nozzle
5	Minimum safety gas pressure switch
6	Maximum safety gas pressure switch
7	Double solenoid safety valve as standard
8	Pilot electrovalve
9	Gas flow regulating valve with modulating servomotor via 0-10V signal



Atm Pressure 1013,25mbar-Pressure (Natural Gas) PCI 10,8kW/Nm³: 20-40 mbar

Technical data of gas reactivated units		DFLEX					
		1100	1300	1700	2100	2900	3500
Reactivation air flow	(Nm³/h ±5%)	2250	2700	3600	4500	6000	7200
Gas consumption	(Nm³/h)	9	10,5	14	16	22	29
Nominal Reactivation Power	(kW)	86	104	133	170	220	250

Diagram of steam coil installation



(*) Operating pressure: 5 bar (g).
 For steam without anticorrosion protective additives we recommend a stainless steel reactivation air heater with aluminium flaps.

(**) A float and thermostatic type steam trap or inverted bucket steam trap is recommended; safety factor for condensate load: 3 to 1.

Installation out of FISAIR supply

- ① Steam supply (*)
- ② Condensate return
- ③ Y filter
- ④ Manual shut-off valves
- ⑥ Thermostatic deaerator
- ⑧ Droplet well
- ⑩ Retention valve
- ⑪ Steam regulating valve

FISAIR supply

- ⑤ Proportional regulation valve (Optional supply)
- ⑦ Steam heater coil
 Battery for saturated steam. Available in two grades, Fe/Al and SST/Al. (FISAIR supply for reactivation heaters V H and X)
- ⑨ Steam trap (**)
 (Optional supply)

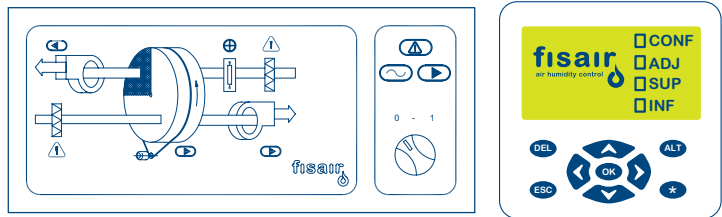
Atm pressure 1013,25 mbar- Steam pressure 5 bar.g

DFLEX							
Fe/Al V		1100	1300	1700	2100	2900	3500
Reactivation air flow	(Nm ³ /h ±5%)	2250	2700	3600	4500	6000	7200
Steam consumption	(Kg/h)	152,6	178,8	226,8	292,8	357,8	430,9
Nominal Reactivation Power	(kW)	88,4	103,6	131,4	169,6	207,3	249,6
SST/Al H							
SST/Al H		1100	1300	1700	2100	2900	3500
Reactivation air flow	(Nm ³ /h ±5%)	2250	2700	3600	4500	6000	7200
Steam consumption	(Kg/h)	141,7	166,4	210,9	272,2	332,8	400,7
Nominal Reactivation Power	(kW)	82,1	96,4	122,2	157,7	192,8	232,1



Control options

DFLEX dehumidifiers can have either basic 0 - 1 or advanced control. The main differences between the two are shown in the following table:



Function	Basic Control	Advanced Control
On/Off <ul style="list-style-type: none"> Manual Remote. Voltage free digital signal 	yes yes	yes yes
Drying capacity control <ul style="list-style-type: none"> Digital, external 1 or 2 stage hygrostat Analog, modulating from 0-10VDC external signal Via analog signal from optional sensor 	yes no no	yes yes yes (1)
Filter status <ul style="list-style-type: none"> Process air clogged filter alarm Reactivation air clogged filter alarm 	yes (2) yes (2)	yes (3) yes (3)
Pre-treatment coils control <ul style="list-style-type: none"> Pre-heating control option Pre-cooling control option 	no no	yes (4) yes (4)
Post-treatment coils control <ul style="list-style-type: none"> Post-heating control option Post-cooling control option 	no no	yes (4) yes (4)
Dry air flow or pressure control <ul style="list-style-type: none"> Option to keep dry air flow or pressure at a certain level 	no	yes (5)
Field elements connection <ul style="list-style-type: none"> 0-10Vdc temp sensor connection 0-10Vdc HR sensor connection 0-10Vdc Absolute humidity sensor connection Rotation detector connection 	no no no no	yes (6) yes (6) yes (6) yes (6)
Fault finding <ul style="list-style-type: none"> Sensor fault alarm Motors fault alarm Power supply fault alarm 	no yes no	yes (7) yes yes
BMS communication <ul style="list-style-type: none"> Profibus 	no	yes (8)
Other functions <ul style="list-style-type: none"> Rotation detector Controlled system shutdown Time counter LED's graphic display HMI display with sensors' values 	no yes no yes no	yes yes yes no yes (7)

- (1) Requires the optional humidity sensor 0-10Vdc and an analogue input available in the advanced control system.
- (2) Requires an optional pressure switch. LED alarm display.
- (3) Requires an optional pressure switch. Alarm can be viewed in the advanced control display.
- (4) Requires an analogue outlet which is available in the advanced control. In the case of water coils, a valve is required + 0-10VDC (optional) For other coil types please contact us.
- (5) Requires 1 analogue input available in the advanced control version, a plug-fan ventilator and optional differential pressure probe.
- (6) Requires an analogue output which is available in the advanced control.
- (7) Requires the optional probes to display its values.
- (8) Optional to be specified in the order.

Optional field elements

Description
Relative humidity sensor (DC 0...10V) for duct (1)
Measuring range: 0...100% HR. Measurement accuracy $\pm 2\%$ at 23°C
Combined relative humidity and temperature sensor (DC 0...10V) for duct (1)
Measuring range: 0...100% HR, -40 ... +70°C TBS
Measurement accuracy for HR $\pm 2\%$ at 23°C
Measuring accuracy for TBS ± 0.8 K
Temperature sensor (DC 0...10V) for duct (1). Measuring range: -50 ... +50 C. Measuring accuracy ± 0.9 K
Combined relative humidity and temperature sensor (0-10V)
HR% accuracy: -15...40 °C (5...104 °F) =90 % RH $\pm (1.3 + 0.003 \cdot \text{measured value})$ % RH -15...40 °C (5...104 °F) >90 % RH ± 2.3 % RH
Temperature measurement accuracy: Pt1000 (tolerance B, DIN EN 60751)
Execution of duct or environment.
Integrated calculation of related quantities: MOisture ratio (g/Kg), Tpr(°C) ...
Active transmitter with analog outputs 0..10V
Communication RS485 BACnet MS/TP or Modbus RTU
Dew point temperature sensor 4-20mA for duct (1)
Measuring range: -60...+60°C TPR
Measurement accuracy: $\pm 2^\circ\text{C}$
Dew point temparure sensor 4-20mA for duct (1)
Measuring range: -100...+20°C TPR
Measurement accuracy: $\pm 2^\circ\text{C}$
Differential pressure swith for filter alarm blocked process. Measuring range: 50...500 Pa
Differential pressure swith for filter alarm reactivation blocked. Measuring range: 50...500 Pa
Differential pressure probe for dry air flow control in plug-fan. Range 0-2500Pa, DC 0...10V
Valve + proportional actuator pre-heating coil
Valve + proportional actuator pre-cooling coil
Valve + proportional actuator post-heating coil
Valve + proportional actuator post-cooling coil
Ambient humidistat 2 stages for duct or wall mounting. IP54. Setpoint 10...100% RH, Hysteresis 3%HR at 45%HR
Certificate of calibration of any element

(1) Also available for measurement in room. Specify in order.



Operational limits (1)

Parameter	DFLEX
Process inlet dry bulb temperature range	2°C to 55°C (2)
Process inlet relative humidity range	without restrictions
Reactivation inlet dry bulb temperature range	-10°C to 55°C
Reactivation inlet relative humidity range	without restrictions
Designed to be installed under the direct action of the rain and sun	(3)
Temperature range in the area where you will install the unit	-10°C to 50°C
Relative humidity in the area where you will install the unit	< 95%

- (1) The performances of the unit will be affected depending of the working conditions. If your unit needs to work under other operating conditions, please, get in touch with FISAIR.
- (2) Process inlet dry bulb temperature under 5 °C could be possible for units with pre-heating coils (only for DFRA/DFLEX).
- (3) Available as special order for DFLEX. Specify in order.

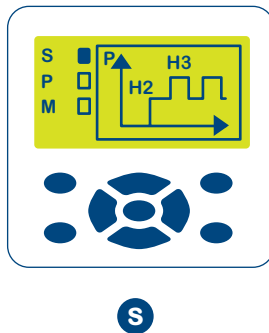
Functions provided by the microprocessor with advanced control



CONFIGURATIONS FOR DIFFERENT OPERATIONS (CONF)

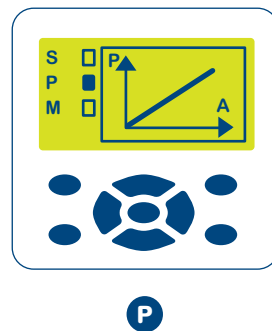
1^a) STAGES (S)

In order to control the reactivation coil BR by means of one/two external digital signal/s on/off (in two stages).



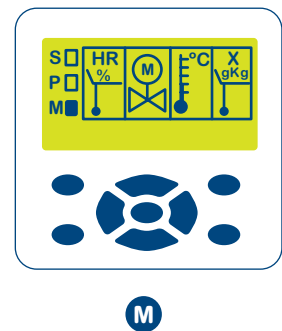
2^a) PROPORTIONAL (P)

In order to control the reactivation coil BR by means of an external analogical signal 0... 10Vcc, from a regulator/humidity controller.



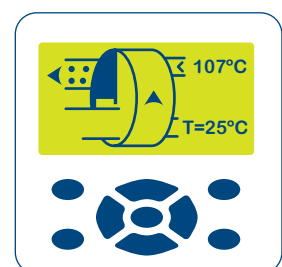
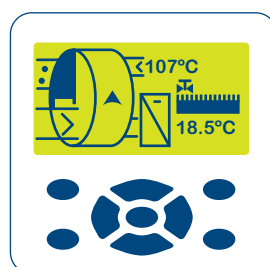
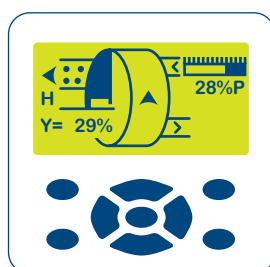
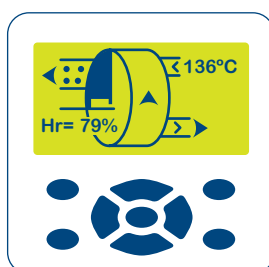
3^a) MEASUREMENT SIGNAL (M)

In order to act as a regulator/controller of the reactivation coil BR and possible pre or post cooling/heating coils (*on demand*), by means of 0... 10Vcc analogical signals from the humidity and temperature sensors.



MEASUREMENT AND SUPERVISION (SUP)

- Reactivation air temperature measured after the reactivation coil BR.
- On-screen diagram of the working of the components (motor-fans and gear motor).
- Supervision of the power supplied by the reactivation coil BR.
- Supervision of the measurement of the humidity sensor.
- Supervision of the setpoint for humidity and temperature.
- Supervision of the setpoint for the maximum humidity alarm.
- Rotor rotation.
- Process air temperature measured after the pre or post (cooling or heating) coil (*on demand*).
- Supervision of the proportional opening of the valve of the pre or post (cooling or heating) coil (*on demand*).
- Pressure switches in filters (*on demand*).





Functions provided by the microprocessor with advanced control

SECURITY AND ALARMS

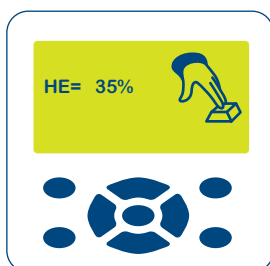


Space for the alphanumeric indicator for displaying unit faults.

- Timing of the disconnection of the motor-fan of the wet air and the dragging gear motor for cooling the equipment.
- Stoppage of the BR heater because of excessive temperature in the reactivation.
- Alarm and stoppage of the unit because of a lack of rotation in the desiccant rotor.
- Alarm and stoppage of the unit because any of the thermal switches of the motors are set off.
- Alarm because process and reactivation filters are blocked (on demand).
- Alarm because the maximum deviation for the humidity setpoint is exceeded.

ADJUSTMENTS (ADJ)

- 1) Adjusting the power supplied by each stage when configuration by stages is selected (S).
- 2) Adjusting the humidity setpoint when configuration by measurement signal is selected (M).
- 3) Adjusting the maximum deviation of the humidity alarm when configuration by measurement signal is selected (M).
- 4) Adjusting the setpoint of the temperature of the range of pre/post cooling coils (BF1 and/or BF2) or pre/post heating coils (BC1 and/or BC2) (on demand).



1



2 3



4



Fisair Selection Tool selection software

FISAIR has the advanced selection software Fisair Selection Tool, which since version 3.0, also allows the selection of the entire range of FISAIR dehumidifiers for different operating conditions.

