

# ECOTROC DD

## Heatless-regenerated Desiccant Dryers



Rev 05\_1222

System solutions for compressed air and gases –  
reliable and safe processing



### Reliable and safe achievement of pressure dew point is guaranteed

Desiccant dryers are used in environments where a specified pressure dew point of  $-40^{\circ}\text{F}$  to  $-94^{\circ}\text{F}$  must be reliable and safe. Dryers of the **ECOTROC DD** series are available in three versions: as a compact aluminum series (DDAP) for volume flows up to 110 cfm, with welded vessels (DDN) for volume flows up to 705 cfm as well as in the large version (DDF) up to 1,800 cfm\*. Higher volume flows are available on request.

\*based on standard conditions - higher capacities on request

### The ECOTROC DD Plus-Effects +++

- + two large dimensioned silencers
  - ▶ clogging with desiccant dust almost impossible
- + use of quality drying agents
  - ▶ more safety in performance
- + standard pre and post filtration (up to DDN 110)
  - ▶ system security
- + regeneration gas recirculation included as standard (up to DDN 705)
- + design adapted to room conditions possible due to symmetry of piping and components
- + delivery of ready-to-connect units
- + robust and solid construction
- + floor fixation possible
- + DDAP6 to DDAP12 can optionally be supplied with wall mounting bracket
- + modular concept allows individualized designs

### Models and capacity ranges



#### DDAP6 - 110

Volume flow: up to 110 cfm\*

Pressure dew point: -40°F up to 94°F

\*calculated at 14,5 psi (abs.) and 68°F at 101,5 psi working pressure



#### DDN105 - 705

Volume flow: up to 705 cfm\*

Pressure dew point: -40°F up to 94°F

\*calculated at 14,5 psi (abs.) and 68°F at 101,5 psi working pressure



#### DDF915 - 1800

Volume flow: up to 1,800 cfm\*

Pressure dew point: -40°F up to 94°F

\*calculated at 14,5 psi (abs.) and 68°F at 101,5 psi working pressure

### Further versions and options at a glance:

- **ECOTROC CTAP, ECOTROC CTN** and **ECOTROC CTF**: system solution for oil-free compressed air (see additional product information)
- **ECOTROC** high pressure desiccant dryers for operating pressures up to 7,250 psi and volume flows up to 825 cfm
- further special versions on request
- standard controller included; the **ETC 4.0** and **ETP 4.0** pressure dew point controllers are available optionally

### Consistently high compressed air quality

KSI provides optimal compressed air treatment solutions. Dryers of the **ECOTROC DD** series are offered in three versions: as a compact aluminium series (AP) for volume flows up to 110 cfm, with welded vessels and innovative pipe bridges for volume flows up to 705 cfm and in the large version up to 1,800 cfm. Higher volume flows are available on request.

KSI produces long-lasting **ECOTROC DD** desiccant dryers in high-end industrial quality using first-class materials. The use of quality desiccants in combination with intelligent control systems ensures constant compressed air or compressed gas quality and stable pressure dew points (from -40°F to -94°F). Flow-independent shuttle valves ensure reliable and risk-free operation. Standardized brand name blow-off valves extend operating life, minimize service times and significantly simplify maintenance and service. The excellent price/performance ratio is complemented by economical operation and functionality.

The intelligent 10-minute **ECOMATIC** cycle (control cycle for adsorption, regeneration and pressure build-up) requires less regeneration energy than dryers with shorter cycles and protects the adsorbents due to the lower number of load cycles. The possibility of individual time setting creates further savings potential.

The standard integrated compressor synchronization circuit in the **ECOMATIC** controller enables further regeneration energy savings, as the **ECOTROC DD** only works when the compressor is running. This way, no purge air escapes during standstill periods. Highly streamlined compressed air and compressed gas ducts are achieved by design features such as consistently large free flow cross-sections at the inlet and outlet, in internal and external pipelines as well as on the valves and silencers. Coordinated integrated solutions such as **KSI ECOCLEAN** compressed air filters and **KONDRAIN** condensate drains open up further savings potential and increase operational reliability.

### The functional principle

#### Prefiltration

In the flow-optimized **KSI ECOCLEAN** SMA pre-filter, solid and liquid components are easily separated from the saturated compressed air. Compressor condensate is reliably discharged via the electronic, level-controlled **KONDRAIN** condensate drain (optional) without losing valuable compressed air.

#### Adsorption

Dry compressed air is distributed through the diffuser from the lower end of the desiccant vessel to the desiccant bed for pre-drying in the so-called „wet zone“. Then the actual adsorption takes place: by adsorption of water molecules on the large surface of the desiccant.

#### Postfiltration

Dry compressed air flows through the entire desiccant bed at the upper end of the desiccant vessel via a flow optimizer and a shuttle valve into the **KSI ECOCLEAN DMF** for the final dust filtration, behind which high-purity compressed air is available, at the desired pressure dew point.

#### Regeneration / Desorption

Parallel to the adsorption phase in the first vessel the desiccant in the second vessel is regenerated. For this purpose, a small part of the already dried compressed air from the desiccant vessel is directed through an air nozzle and in countercurrent flow through the desiccant in vessel two. By using the physical effect of pressure relief to atmospheric pressure, the purge air regenerates the moist desiccant particularly effectively.

The moisture is released into the atmosphere via the blow-off valve and silencer.

#### Switching

When regeneration is complete, the pressure build-up begins in the vessel. Once the operating pressure is reached, the system switches the flow from the adsorbing vessel to the regenerated vessel. Now the freshly regenerated vessel starts adsorption, while the other vessel starts its regeneration cycle.

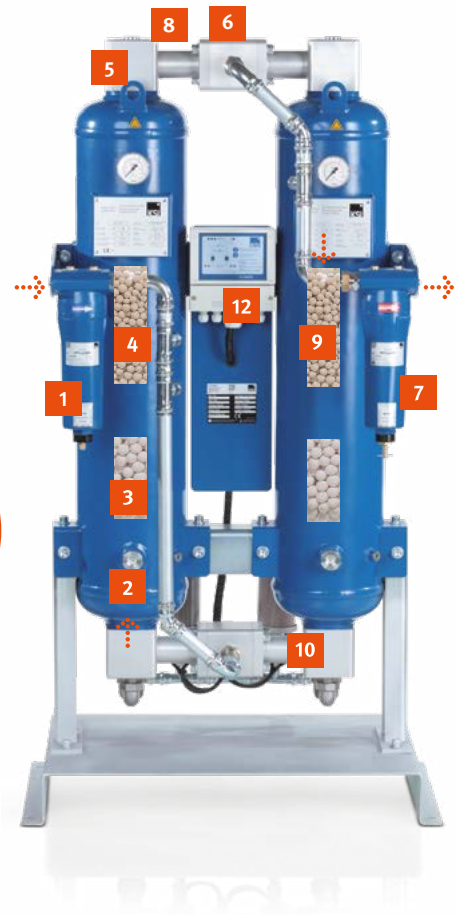
- 1 flow-optimized pre-filter **KSI ECOCLEAN SMA**
- 2 inlet diffuser
- 3 wet zone for pre-drying
- 4 desiccant vessel adsorption phase
- 5 outlet diffuser
- 6 shuttle valve
- 7 flow-optimized final filter **KSI ECOCLEAN DMF**
- 8 purge air nozzle
- 9 desiccant vessel regeneration phase
- 10 blow-off valve
- 11 silencer
- 12 electronic control **ECOMATIC**



various desiccants



silencer,  
blow-off valves



silencer

# ECOTROC DD

## Heatless-regenerated Desiccant Dryers – Compact Series up to 110 cfm



### Aluminum profile series at the highest level

The solid and rugged construction of the DDAP series provides long uptime, high reliability and trouble-free installation. All sizes can be fixed to the floor.

An aluminum profile developed by KSI together with the globally active SAPA Group offers optimal flow conditions in the desiccant bed and ensures a safe pressure dew point. In the standard version, the DDAP units achieve a safe pressure dew point of -40°F. Pressure dew point of -94°F are optionally available and offer maximum operational and process reliability.

### Simple and fast service

The DDAP desiccant dryers are designed to offer advantages compared to other dryers in the market. For example, for the desiccant change neither an overpriced cartridge has to be changed nor the top and bottom plates of the dryers have to be dismantled. This work is very time-consuming and always involves a risk in the event of servicing. The DDAP range offers generously dimensioned emptying openings in the lower plate and the filling openings in the upper plate offer the advantage of safe and quick emptying (possible with a vacuum cleaner) as well as quick filling with new desiccant.

The two service blocks on the upper and lower plate contain all the parts required for service. After simple disassembly, all service work is carried out in a relaxed posture, eliminating the need for laborious work directly on the dryer. Important: The dryer remains installed in the overall installation.

### Operational safety in the sense of the specialist company

The DDAP series comes with two large silencers that offer more safety compared to dryers with only one or smaller sized silencers, both during expansion when switching the flow direction and during discharge of the regeneration air. KSI is convinced that this system offers more safety, as backflow into the dryer is hardly possible due to the large silencer surface.

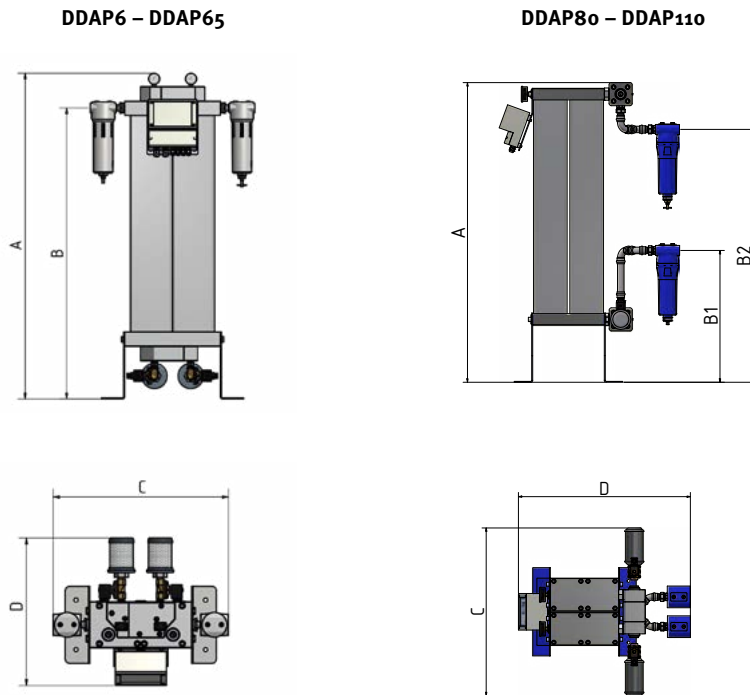
KSI pre- and final-filters **KSI ECOCLEAN** SMA and DMF are of course included in the standard scope of supply and offer an optimal pre-filtration of incoming particles and water and oil droplets. This significantly increases the operational reliability and service life of the DDAP units.



### Performance data and dimensions

Type	Capacity cfm	Dimensions (inch)				Connection Inlet	Connection Outlet	Installed power HP	Electric voltage V	Frequency Hz
		A	B	C	D					
DDAP6	6	28.43	25.00	15.51	12.17	3/8"	3/8"	0.042	115	50 / 60
DDAP12	12	32.36	28.94	15.51	12.68	3/8"	3/8"	0.042	115	50 / 60
DDAP20	20	34.29	30.20	18.90	16.93	3/8"	3/8"	0.042	115	50 / 60
DDAP30	30	38.23	34.13	18.90	16.93	3/8"	3/8"	0.042	115	50 / 60
DDAP35	35	42.17	38.07	18.90	16.93	1/2"	1/2"	0.042	115	50 / 60
DDAP40	40	38.54	33.86	21.73	17.80	1/2"	1/2"	0.042	115	50 / 60
DDAP55	55	44.06	39.37	21.73	17.80	1/2"	1/2"	0.042	115	50 / 60
DDAP65	65	51.14	46.46	23.62	17.80	1/2"	1/2"	0.042	115	50 / 60
DDAP80	80	38.43	22.44	29.96	31.69	1"	1"	0.042	115	50 / 60
DDAP110	110	43.94	22.44	29.96	31.69	1"	1"	0.042	115	50 / 60

\*calculated at 14.5 psi (abs.) and 68°F at 101.5 psi working pressure



### Correction factors

#### Correction factors inlet temperature

°F	<77	77	86	95	100.4	104	113	118.4	122
F(t)	1.2	1.1	1.09	1	0.84	0.78	0.72	0.65	0.58

#### Correction factors operating pressure

psi	58	65	73	80	87	94	102	109	116	123	131	138	145	152	160	167	174	181	189	196	203	210	218	225	232
F(p)	0.6	0.7	0.74	0.82	0.89	0.97	1	1.08	1.11	1.16	1.22	1.29	1.36	1.42	1.5	1.57	1.63	1.69	1.75	1.83	1.9	1.96	2.03	2.1	2.14

Multiply the capacity of the dryer by the correction factor in the table above and you will get the corrected capacity.  
Higher inlet temperatures on request.

### Range of application

<b>installation site</b>	inside non-aggressive atmosphere				
<b>ambient humidity max.</b>	25% r.h. at 104°F	37% r.h. at 95°F	50% r.h. at 86°F	70% r.h. at 77°F	90% r.h. at 68°F
<b>ambient temperature max.</b>	122°F				
<b>ambient temperature min.</b>	35.6°F				
<b>operating pressure</b>	58 up to 232 psi (DDAP65: up to 195.75 psi)				
<b>flow medium</b>	compressed air and gases				
<b>pressure dew point</b>	-40°F* (-94°F optionally available)				

\*calculated at 14.5 psi (abs.) and 68°F at 101.5 psi working pressure

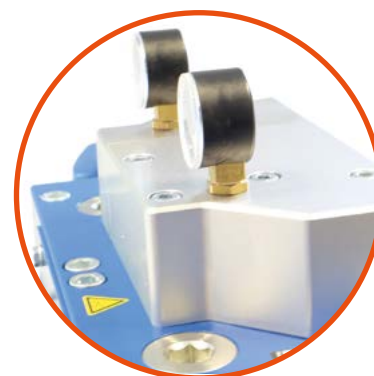
### The ECOTROC DDAP Plus-Effects +++

- + two large-dimensioned silencers ▶ risk of clogging with desiccant dust virtually eliminated
- + use of quality drying agents ▶ more safety in performance
- + standard pre and post filtration ▶ system safety
- + regeneration gas recirculation included as standard
- + delivery of ready-to-connect units
- + robust and solid construction
- + floor fixation possible
- + DDAP6 and DDAP12 can optionally be supplied with wall mounting bracket
- + modular approach



### Service advantages: less effort, more time savings

- change of desiccant via filling and emptying openings
- filling nozzles eliminate the need for laborious removal of the plates
- simple and clear service packages
- easy to understand control unit, simple menu navigation (with ETC 4.0)
- the two service blocks on the upper and lower plate contain all the parts required for service. After simple disassembly, all service work is carried out in a relaxed posture, eliminating the need for laborious work directly on the dryer. Important: The dryer remains installed in the overall installation.



Upper service block with easily accessible filling nozzle

## Heatless-regenerated Desiccant Dryers – Compact Series up to 110 cfm

### Technical features

Regeneration by means of purge air in countercurrent flow

Low purge air requirement thanks to shorter cycles and optimized compressed air or compressed gas ducts

According to the guidelines 87/404/EWG about simple pressure vessels and the guideline 2014/68/EU about pressure equipment devices. The dryers of the ECOTROC DDAP series have been audited regarding the conformity of the design according attachment III Modul B + D.

#### Approvals for pressure equipment

<b>EU</b>	<b>approval for fluid group 2 according to Pressure Equipment Directive 97/23/EC, module B+D (category IV)</b>
<b>Classifikation acc.</b>	<b>DDAP6 to 12 paragraph 3 article 4</b>
<b>DGRL 2014/68/EU</b>	<b>DDAP20 to 110 category  </b>
<b>Fluid group</b>	<b>2</b>
<b>Northern America</b>	<b>CRN (certificates on request)</b>

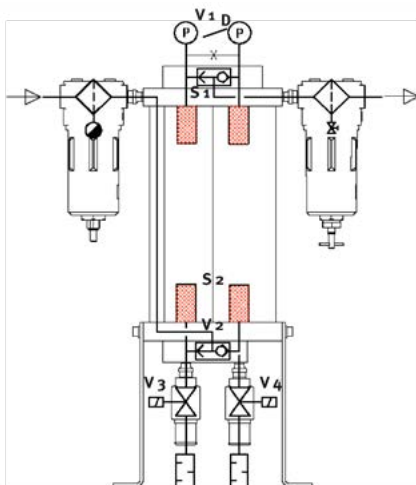
#### Quality assurance

Development/production **DIN EN ISO 9001**

#### Air purity class according to ISO 8573-1:2010

<b>Solid particles</b>	<b>class 2 (by postfiltration, standard scope of supply)</b>
<b>Humidity (gaseous)</b>	<b>class 3 (PDP -4°F), class 2 (PDP -40°F), opt. class 1 (PDP -94°F)</b>
<b>Total oil</b>	<b>-</b>

### R&I scheme



**P 1** pressure gauge vessel 1

**P 2** pressure gauge vessel 2

**V 1** upper shuttle valve

**V 2** lower shuttle valve

**S 1** upper diffuser

**S 2** lower diffuser

**V 3** blow-off valve vessel 1

**V 4** blow-off valve vessel 2

**D** nozzle



## ECOTROC DD

# Heatless-regenerated Desiccant Dryers – Series up to 1,800 cfm



### Operational reliability and long service life

With the DD series, KSI offers heatless-regenerated desiccant dryers in connection sizes from 1" to DN 100 as well as volume flows from 105 - 1,800 cfm as a standard. Larger capacities are available upon request.

### Best materials for a premium product

All vessels of the **ECOTROC** DDN series up to and including DDN705 (705 cfm) are designed and manufactured for an operating pressure of up to 232 psi. Please contact your contact person for respective CRN Registrations or different approvals such as ASME, BS 5500, ANCC.

Equal to the **ECOTROC** DDAP compact series, the KSI also offers a very robust design in the DD series, an easily accessible design for service and an oversized desiccant volume for safe pressure dew points.

### Operational reliability and service benefits

The **ECOTROC** DD models (DDN = 2, DDF = 4) have large silencers on the downstream side which ensure safe and carefree operation, as the large silencer surface virtually eliminates the risk of clogging with desiccant dust and the associated backwater. Lifting lugs on the vessels, easily accessible emptying and filling nozzles on the vessels, easily dismantled pipe bridges at the top and bottom are just some of the many advantages.

KSI products: Service made easy and without potential risk for the compressed air specialist and end-user.

### Valve controlled: full passage in the adsorption and expansion path

KSI desiccant dryers **ECOTROC** DDF915 and larger are characterized by the following features, which in the performance range from 1,800 cfm ensure an optimization of economic efficiency and operational safety:

- particularly large cross-sections in the main and expansion lines
- air distribution at the inlet via individually controlled shut-off valves
- optimized flow velocity and dwell time of the air in the vessel
- check valves with enlarged inner diameter (compared to a standard valve) at the outlet
- expansion line via butterfly valves, therefore less back pressure than with a standard valve



DDN



DDF

### Performance data and dimensions

Type	Capacity*	Dimensions (inch)				Connection Inlet	Connection Outlet	Weight lbs	Installed power HP	Electric voltage V	Frequency Hz
		cfm	A	B	C						
DDN105	105	53.86	35.87	31.89	23.66	1"	1"	370	0.042	115	50 / 60
DDN125	125	58.74	40.75	31.89	23.66	1"	1"	406	0.042	115	50 / 60
DDN200	200	61.81	41.26	39.96	30.55	1 1/2"	1 1/2"	785	0.042	115	50 / 60
DDN285	285	65.75	45.20	39.96	30.55	1 1/2"	1 1/2"	833	0.042	115	50 / 60
DDN350	350	83.86	63.31	39.96	30.55	1 1/2"	1 1/2"	1049	0.042	115	50 / 60
DDN480	480	73.07	51.46	52.76	41.54	2"	2"	1629	0.042	115	50 / 60
DDN590	590	84.88	63.27	52.76	41.54	2"	2"	1836	0.042	115	50 / 60
DDN705	705	88.82	67.20	52.76	41.54	2"	2"	1971	0.042	115	50 / 60
DDF915	915	83.27	79.21	59.45	30.55	DN 80	DN 80	1819	0.042	115	50 / 60
DDF1090	1090	83.54	79.61	61.46	31.26	DN 80	DN 80	2050	0.042	115	50 / 60
DDF1210	1210	83.98	80.04	63.46	32.17	DN 80	DN 80	2315	0.042	115	50 / 60
DDF1445	1445	91.65	87.32	72.24	35.35	DN 100	DN 100	2778	0.042	115	50 / 60
DDF1800	1800	92.13	87.80	74.65	33.46	DN 100	DN 100	3219	0.042	115	50 / 60

\*calculated at 14,5 psi (abs.) and 68°F at 101,5 psi working pressure

### Correction factors

#### Correction factors inlet temperature

°F	<77	77	86	95	100,4	104	113	118,4	122
F(t)	1,2	1,1	1,09	1	0,84	0,78	0,72	0,65	0,58

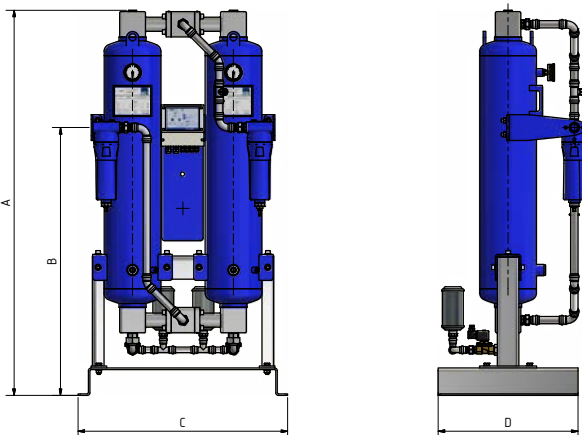
#### Correction factors operating pressure

psi	58	65	73	80	87	94	102	109	116	123	131	138	145	152	160	167	174	181	189	196	203	210	218	225	232
F(p)	0,6	0,7	0,74	0,82	0,89	0,97	1	1,08	1,11	1,16	1,22	1,29	1,36	1,42	1,5	1,57	1,63	1,69	1,75	1,83	1,9	1,96	2,03	2,1	2,14

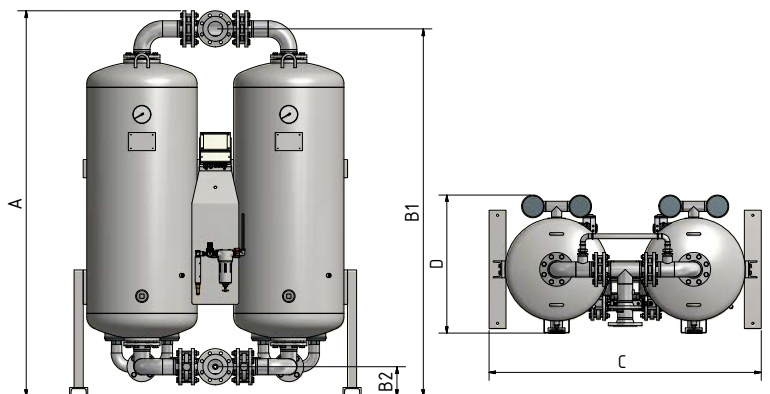
Multiply the capacity of the dryer by the correction factor in the table above and you will get the corrected capacity.

Higher inlet temperatures on request.

DDN105 - 705



DDF915 - 1800



# ECOTROC DD

## Heatless-regenerated Desiccant Dryers – Series up to 1,800 cfm



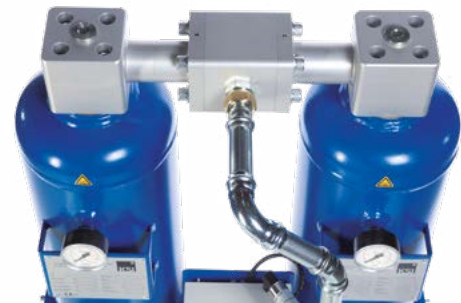
### Range of application

<b>installation site</b>	inside non-aggressive atmosphere				
<b>ambient humidity max.</b>	25% r.h. at 104°F	37% r.h. at 95°F	50% r.h. at 86°F	70% r.h. at 77°F	90% r.h. at 68°F
<b>ambient temperature max.</b>	122°F				
<b>ambient temperature min.</b>	35.6°F				
<b>operating pressure</b>	58 up to 232 psi				
<b>flow medium</b>	compressed air and gases				
<b>pressure dew point</b>	-40°F* (-94°F pressure dew points available on request)				

\* related to 14.5 psi (abs.) and 68°F at 101.5 psi operating pressure

### The ECOTROC DD Plus-Effects +++

- + large-dimensioned silencers ▶ risk of clogging with desiccant dust virtually eliminated
- + use of quality drying agents ▶ more safety in performance
- + standard pre and post filtration ▶ system safety
- + regeneration gas recirculation included as standard
- + delivery of ready-to-connect units
- + lifting lugs at all vessels make the installation into an existing system easier
- + robust and solid construction
- + floor fixation possible
- + modular approach ▶ many individual solutions possible



### The service advantages

- change of desiccant via filling and emptying openings
- disassembly of the complete pipe bridges by loosening just three screws ▶ comfortable and fast service work
- simple and clear service packages
- easy to understand control unit, simple menu navigation (with ETC 4.o)



### Technical features

Regeneration by means of purge air in countercurrent flow.

Low purge air requirement thanks to shorter cycles and optimized compressed air or compressed gas ducts

According to the guidelines 87/404/EWG about simple pressure vessels and the guideline 2014/68/EU about pressure equipment devices. The dryers of the ECOTROC DD series have been audited regarding the conformity of the design according attachment III Modul B + D.

#### Approvals for pressure equipment

**EU** approval for fluid group 2 according to Pressure Equipment Directive 97/23/EC, module B+D (category IV)  
**Northern America** CRN (certificates on request), ASME (on request)

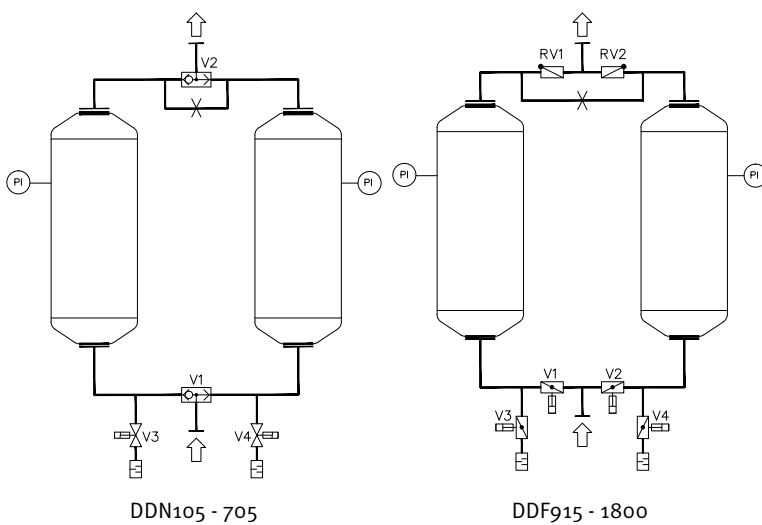
#### Quality assurance

**Development/production** DIN EN ISO 9001

#### Air purity class according to ISO 8573-1:2010

**Solid particles** class 2 (by postfiltration, standard up to DDN705)  
**Humidity (gaseous)** class 3 (PDP -4°F), class 2 (PDP -40°F), opt. class 1 (PDP -94°F)  
**Total oil** -

### R&I scheme



#### DDN series

- PI 1** pressure gauge vessel 1
- PI 2** pressure gauge vessel 2
- V 1** shuttle valve inlet
- V 2** shuttle valve outlet
- V 3** blow-off valve vessel 1
- V 4** blow-off valve vessel 2

#### DDF series

- PI 1** Pressure gauge vessel 1
- PI 2** Pressure gauge vessel 2
- V 1** Control valve inlet 1
- V 2** Control valve inlet 2
- V 3** blow-off valve vessel 1
- V 4** blow-off valve vessel 2
- RV 1** non-return valve vessel 1
- RV 2** non-return valve vessel 2

# ECOTROC DD

## Heatless-regenerated Desiccant Dryers



### Service instructions

The following maintenance rules ensure safe and trouble-free operation. These should be observed by the operator.

<b>daily</b>	Pressure gauge + control unit:	visual and functional check
<b>annually</b>	Control box + silencer:	check cable and terminals for position, clean
	Pre-filter & final-filter element:	replace
<b>2 years</b>	Silencer:	replace
	Sieves/diffuser:	clean, replace if necessary
	O-rings of the filter housing:	replace
	Piston shuttle valves:	replace
	Solenoid valves:	replace
	pressure dew point sensor (opt.):	recalibrate
<b>4 years</b>	Desiccant:	replace

### The control units

#### Controller with fixed cycle times

##### ECOMATIC

Standard scope of supply in all **ECOTROC DD** dryer units

- display of adsorption/regeneration cycle
- microprocessor fully electronic
- energy saving compressor synchronization
- cycle times adjustable (selectable)
- status display and potential-free alarm signal for service
- 24 V optionally available
- can also be used for desiccant dryers of other manufacturers (after configuration by KSI)



### NEW: Advanced dew point controller with intelligent functions (ETC 4.0 / ETP 4.0)

- wifi transmission / parameterization
- GSM module
- control as „master“ with touch display for connectable sensor boxes
- can be used as a master for internet-based monitoring and planning
- configurable inputs through selectable signal reception: potential-free or 4-20 mA (2-wire)
- control up to 5 valves

More information about the  
online system monitoring  
KSI ECOCONTROL at  
[www.ksi-technologies.com](http://www.ksi-technologies.com)

### ECOTROCONOMY-Comfort (ETC 4.0)

- available for the entire **ECOTROC DD** series
- sending of notification and alarm messages by email
- all **ECOTROC DD** dryers can easily be upgraded (even older models and models from other manufacturers)
- dew point measurement and display up to  $-148^{\circ}\text{F}$
- demand-oriented regeneration control by measuring the operational conditions
- integrated load change counter (makes vessel inspections at a later time possible)
- saves the operating parameters in combination with date and time (still available after power failure)
- password protection on all levels (can be modified)
- connection for optical and acoustic signals (flashing light, horn etc.)
- automatic service indicator
- service interval display, adjustable intervals
- potential-free alarm output
- external 4-20mA-signal to transfer the displayed dew point value, i.e. to a master display or control room

### ETP 4.0 (Premium)

Functions like ETC 4.0, plus:

- pressure measurement at the dryer inlet and indication on the control display
- temperature measurement at the dryer inlet and indicator in the control display
- safety shutdown in case of divergence from specified values is possible

