DTA Series Heatless Adsorption Dryers

aerospace
climate control
electromechanical
filtration
liquid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Parker

domnick hunter

ENGINEERING YOUR SUCCESS.

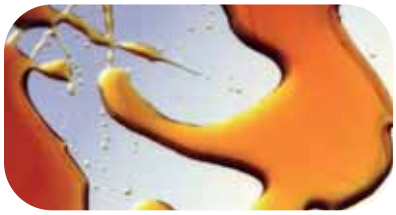
Compressed Air - The 4th Utility

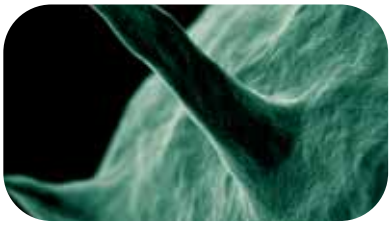
Compressed air is a safe and reliable power source that is widely used throughout industry. Approximately 90% of all companies use compressed air in some aspect of their operations, however unlike gas, water and electricity, compressed air is generated on-site, giving the user responsibility for air quality and operational costs.

Without proper treatment, compressed air systems suffer from performance and reliability issues. Almost all of these issues can be directly attributed to contamination, the main sources of which are:

- **The ambient air being drawn into the compressor**
- **The type and operation of the air compressor**
- **Compressed air storage vessels**
- **Distribution pipework**

There are 10 major contaminants found in a compressed air system, these are:





- **Water Vapor**
- **Condensed Water**
- **Water Aerosols**
- **Atmospheric Dirt**
- **Rust**
- **Pipescale**
- **Liquid Oil**
- **Oil Aerosols**
- **Oil Vapor**
- **Micro-organisms**

The largest quantity of contamination introduced into the compressed air system originates from the atmospheric air drawn into the compressor and, not as often believed, introduced by the compressor itself. The most prolific and problematic of the contaminants is water. Water accounts for 99.9% of the total liquid contaminants found in a compressed air system.

High efficiency compressed air filtration is not only used to remove particulate and oil, but most importantly, it removes water aerosols and is key to operating an efficient compressed air system.

Therefore, regardless of what type of compressor is installed, the same level of filtration is required.

Contaminant Removal

Failure to remove this contaminant can cause numerous problems in the compressed air system, such as:

- **Corrosion within storage vessels and the distribution system**
- **Blocked or frozen valves, cylinders, air motors and tools**
- **Damaged production equipment**
- **Premature unplanned desiccant changes for adsorption dryers**

In addition to problems associated with the compressed air system, allowing contamination such as water, particulate, oil and micro-organisms to exhaust from valves, cylinders, air motors and tools, can lead to an unhealthy working environment with the potential for personal injury, staff absences and financial compensation claims.

Compressed air contamination will ultimately lead to:

- **Inefficient production processes**
- **Spoiled, damaged or reworked products**
- **Reduced production efficiency**
- **Increase manufacturing costs**

What is adsorption drying?

Drying compressed air through adsorption represents a purely physical process in which water vapor (adsorbate) is bound to the drying medium (adsorbent) through binding forces of molecular adhesion. Adsorbents are solids in spherical and granular form which are permeated by an array of pores. The water vapor is deposited onto the internal and external surface of the adsorption medium, without the formation of chemical compounds taking place, therefore the adsorption medium does not have to be replenished but only periodically regenerated.

Heatless

The layout of adsorption dryers with heatless regeneration is clear and simple. Compared with other adsorption dryer systems, pressure dewpoints down to -100˚F (-73˚C) can be achieved without additional effort.

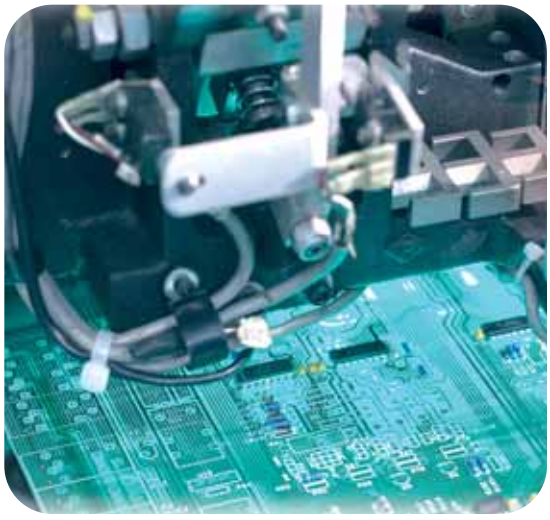
Use in the higher pressure ranges and at low inlet temperatures causes the quantity of air needed for desorption to be reduced to an economical value.

At low operating pressure the demand for already dried compressed air for purposes of regeneration is increased. This increase causes a large proportion of the prepared compressed air to be no longer available for productive purposes.

Depending on the cycle, the quantity of air enclosed in the adsorber expands upon release at regular intervals with an emission noise level of about 90-95 dB(A). Given suitable noise attenuation measures, a reduction of the noise emission level to the region of 10-15 dB(A) can be accomplished.

The use of adsorption dryers with heatless regeneration is preferred in the following applications:

- capacity range of up to 1000 scfm
- higher pressure ranges
- high inlet temperatures
- installation in explosion proof areas
- use under ground
- portable applications
- hazardous locations (pneumatic controls)

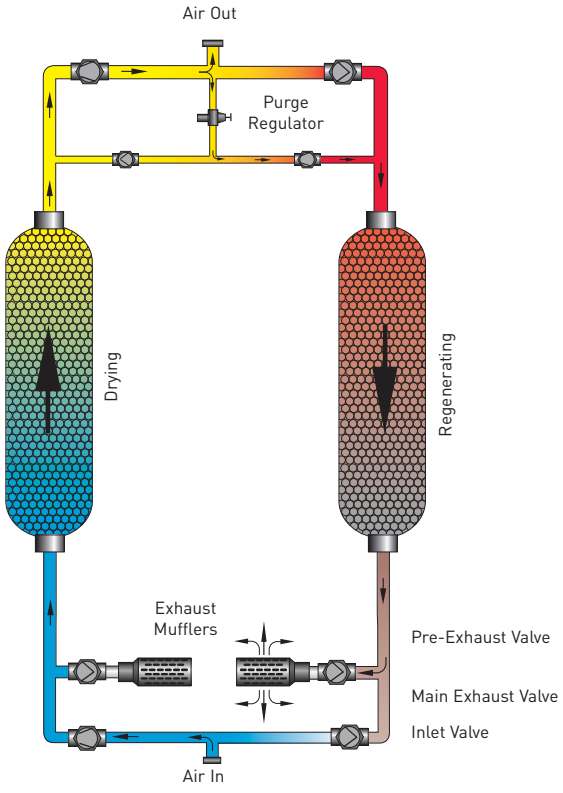


Behind the scenes of a DTA Series Heatless Adsorption Dryer

domnick hunter DTA Series Heatless Adsorption Dryers remove water vapor from compressed air through a process known as Pressure Swing Adsorption (PSA). Pressure dewpoints ranging from -40˚F to -100˚F are attained by directing the flow of saturated compressed air over a bed of desiccant. The most commonly used desiccant is activated alumina, a spherical shaped, hygroscopic material, selected for its consistent size, shape and extreme surface to mass ratio. This physically tough and chemically inert material is contained in two separate but identical pressure vessels commonly referred to as “dual” or “twin” towers. As the saturated compressed air flows up through the “on-line” tower, its moisture content adheres to the surface of the desiccant. The dry compressed air is then discharged form the chamber into the distribution system.

A solid state controller automatically cycles the flow of compressed air between towers, while the “on-line” tower is drying, the “off-line” tower is regenerating. Regeneration, sometimes referred to as purging, is the process by which moisture accumulated during the “on-line” cycle is stripped away during the “off-line” cycle. As low pressure dry purge air flows gently through the regenerating bed, it attracts the moisture that had accumulated on the surface of the desiccant during the drying cycle and exhausts it to the atmosphere.

To protect the desiccant bed from excess liquid, all **domnick hunter DTA Series** dryers are designed to work with the natural pull of gravity. By directing the saturated air into the bottom of the “on-line” tower and flowing up through the bed, liquid condensate caused by system upset, is kept away from the desiccant and remains at the bottom of the tower where it can be easily exhausted during the regeneration cycle. Counter flow purging ensures optimum performance by keeping the driest desiccant at the discharge end of the dryer.



Moisture load, velocity, cycle time and contact time determine tower size and the amount of desiccant. To ensure dewpoint, each tower is carefully sized to allow a minimum of 5.5 seconds of contact. To prevent desiccant dusting and bed fluidization, air flow velocities are kept below 50 feet per minute. The dryer can cycle for years without changing the desiccant.

In general, heatless dryers in general are the most reliable and least expensive of all desiccant type dryers. **domnick hunter DTA Series** are the most energy efficient thanks to standard features like, “Variable Cycle Control”, “CycleLoc” and purge flow regulator.

Switching valves

Full-flow angle seat valves

Dryers up to 800 scfm are equipped with **Parker's** time-proven and dependable non-lubricated full-flow angle seat valves, which carry a Five Year Warranty. (through 2")

Rotary actuated valves

High performance, rotary actuated butterfly style switching valves are standard on dryers 1000 scfm and larger. These premium, air operated butterfly valves are specifically designed for compressed air. They provide more opening and closing force compared to other types of valves. An indicator shows the "opened/closed" position of the valve and service can be performed without disturbing dryer piping. (3" and larger)

These valves are so reliable, they carry a Five Year Factory Warranty.

Purge flow regulator

While other dryers use a manual valve for purge control, **domnick hunter** provides a Purge Flow Regulator. Due to system pressure fluctuation, dryers equipped with manual purge valves waste air and energy by over-purging when system pressure is high and sacrifice performance by under-purging when system pressure is low. Manual purge valves do not compensate for system pressure variance. **domnick hunter's** exclusive Purge Flow Regulator saves energy and ensures performance by maintaining optimum purge regardless of system pressure. To prevent the purge flow from fluctuating and to discourage unauthorized tampering, the Purge Flow Regulator can be locked into position.

Standard equipment

- Electric 120/1/60
- Solid state controller
- Centrifugal compressor surge protection (up to DTA 6000)
- System sequence annunciator
- CycleLoc demand control
- Variable cycle control (up to DTA 6000)
- Purge flow indicator
- Purge flow regulator (up to DTA 3000)
- Repressurization circuit (up to DTA 6000)
- Control air filter (up to DTA 6000)
- High performance butterfly valves (DTA 1000 - DTA 6000)
- Warranty, 5-year valve (DTA 200 - DTA 6000)
- Separate tower pressure gauges
- Safety valves
- Cushioned seat, check valves
- Separate fill/drain ports
- NEMA 4X controls
- Stainless steel diffuser screen
- Pressure equalization
- Structural steel base
- 150 psi g design standard
- Moisture indicator (up to DTA 6000)
- Solid state sensors
- Standby mode
- Valves, cushioned seat check
- Vessels, ASME coded
- Filters, pre & after

Optional equipment

- Dewpoint Dependent Switching (DDS)
- All NEMA classifications
- Pressure up to 1000 psi g
- High humidity alarm
- Fail to shift alarm
- Electronic drain systems
- -80°F to -100°F dewpoint
- Contacts for remote alarms
- Oilfeld construction
- Flow meter

Operational status

Sequence annunciator

domnick hunter's sequence annunciator is a solid state visual display panel that shows exactly what is happening in the dryer. The panel lights signal which tower is "on-line" drying, and whether the "off-line" tower is purging, repressurizing or in **Dewpoint Dependent Switching (DDS)** mode. It will also annunciate optional equipment operation and function alarms. The panel is integral with the NEMA 4X Master Control and is conveniently mounted for easy monitoring.

Variable cycle control

Additional energy savings can be achieved by adjusting the amount of purge to the actual moisture load. When demand is expected to be less than maximum, **domnick hunter's** Variable Cycle Control provides a means to adjust the purge cycle time to reduce the total amount of purge used for regeneration. As a result of less frequent cycling, the desiccant will last longer and the switching valves will require less maintenance. The Variable Cycle Control incorporates a short cycle position that can be employed to provide dewpoints as low as -80°F (-62°C).

Surge protection

To accommodate the unique requirements of centrifugal compressors, all **domnick hunter** desiccant dryers are now programmed with a special anti-surge control. A sequenced timing circuit eliminates potential compressor surge by preventing momentary flow restrictions from occurring at tower switch over.

Total dryer operation is managed by **domnick hunter's** NEMA 4X automatic controller. The solid state module controls all dryer functions including the Sequence Annunciator.

Dewpoint Dependent Switching (Optional)

Compressed air systems are rarely constant and the dryer regeneration cycle frequency is dependent upon the actual inlet flow, pressure and temperature. Operation under inlet conditions where there is lower than design flow and temperature and or higher pressure, will result in less regeneration cycles and a maximum in the cost of utilities.

Dewpoint Dependent Switching (DDS) provides a precision demand cycle control which terminates the adsorption (drying). This results in the full adsorptive capacity of the desiccant bed being utilized prior to switch over and regeneration.

DDS is built into the dryer control system, with a precision hygrometer producing a continuous display of the outlet dewpoint. The preset contacts of the instruments are utilized to initiate tower changeover.

Dewpoint Dependent Switching (DDS)

An overview

The adsorption capacity of the desiccant within the dryer is essentially constant whereas the moisture loading and the air flow through the dryer are continuously varying as ambient and plant conditions change. In order to maintain the specified air quality downstream of the dryer, it has to be sized for the worst case conditions, namely the lowest pressure, highest flow and highest inlet temperature. These conditions may only occur for a small part of the service life of the dryer, for example, the highest inlet temperatures may only be present during the summer months. This means that the moisture loading on the desiccant beds is below the dryer's capacity for much of its service life (ie quiet periods in between shifts usually have lower air supply requirements).

DESIGNED FOR AIR QUALITY & ENERGY EFFICIENCY

To gain access to this dynamic adsorption capacity, a moisture sensor is fitted which continually monitors the downstream dewpoint. DDS interrupts the normal sequence of the controller, which is only permitted to change over when the desiccant has adsorbed moisture to its capacity, effectively elongating the drying cycle. However, as regeneration has been optimized for a fully laden desiccant bed, this remains of constant duration resulting in a period of zero energy consumption (ie purging is discontinued). In this way, energy savings are obtained while maintaining a constant supply of clean dry air to your plant.

OIL-X EVOLUTION - the complete package

OIL-X EVOLUTION pre & after filters are included as standard on **DTA Series**.

OIL-X EVOLUTION filters provide air quality in accordance with ISO 8573.1:2001, the international standard for compressed air quality.

OIL-X EVOLUTION coalescing filters are the first range of filters specifically designed to deliver air quality in accordance with ISO 8573.1:2001 when tested with the stringent requirements of the new ISO 12500-1 international for Compressed Air Testing.

Performance Verified Lloyd's Register ISO 8573.2 / ISO 8573.4 / ISO 8573.5

OIL-X EVOLUTION filter performance has been independently verified by Lloyds Register.

OIL-X EVOLUTION coalescing and dust removal filters are covered by one year compressed air quality guarantee.

The air quality guarantee is automatically renewed with annual maintenance.

purecare

purecare goes well beyond simply designing a compressed air network. We stay close to the user, ensuring the system is correctly installed and commissioned and maintained throughout the service life of the dryer.

- extended warranty programs
- genuine **domnick hunter** preventive maintenance kits
- factory trained and certified service technicians
- immediate technical assistance via phone
- factory auditing
- training for local personnel
- global support

purecare ensures that the user's system operates perfectly and at the minimum cost at all times and for many years to come. Because neither time nor technology stand still, we ensure our users will continue to receive the very best support and the most advanced solutions. purecare will allow our users to concentrate on doing what they do best...maximizing their business.
Welcome to **purecare**.

Technical Data

Model	Capacity scfm (Nm³/min)	Dimensions in (mm)			Approx Weight lbs (kg)	Prefilter	Afterfilter	Dryer Air In/Out	Power Supply (V/Ph/Hz)
		A	B	C					
DTA 200	200 (5.66)	44 (1118)	28 (711)	78 (1981)	692 (314)	AA-030GNFI	AR-030GNMI	1½" NPT	120/1/60
DTA 250	250 (7.07)	44 (1118)	30 (762)	78 (1981)	776 (352)	AA-035GNFI	AR-035GNMI	1½" NPT	120/1/60
DTA 300	300 (8.49)	44 (1118)	30 (762)	78 (1981)	796 (361)	AA-035GNFI	AR-035GNMI	1½" NPT	120/1/60
DTA 400	400 (11.32)	74 (1880)	41 (1041)	84 (2134)	1626 (738)	AA-040HNFI	AR-040HNMI	2" NPT	120/1/60
DTA 500	510 (14.44)	74 (1880)	41 (1041)	85 (2159)	1735 (787)	AA-045HNFI	AR-045HNMI	2" NPT	120/1/60
DTA 600	650 (18.40)	74 (1880)	41 (1041)	86 (2184)	1740 (789)	AA-045HNFI	AR-045HNMI	2" NPT	120/1/60
DTA 770	770 (22.65)	74 (1880)	41 (1041)	91 (2311)	2120 (962)	AA-045HNFI	AR-045HNMI	2" NPT	120/160
DTA 1000	1000 (28.31)	108 (2743)	54 (1372)	88 (2235)	3676 (1667)	AA-055JNFI	AR-055JNMI	3" Flg	120/160
DTA 1200	1200 (33.98)	108 (2743)	54 (1372)	111 (2819)	4605 (2089)	AA-055JNFI	AR-055JNMI	3" Flg	120/1/60
DTA 1500	1500 (42.47)	114 (2896)	66 (1676)	100 (2540)	4985 (2261)	AA-2250ODFI	AR-2250ODMI	4" Flg	120/1/60
DTA 2000	2000 (56.63)	120 (3048)	66 (1676)	100 (2540)	5206 (2361)	AA-2250ODFI	AR-2250ODMI	4" Flg	120/1/60
DTA 2600	2600 (73.62)	144 (3658)	72 (1829)	110 (2794)	7600 (3447)	AA-2300ODFI	AR-2300ODMI	4" Flg	120/1/60
DTA 3000	3000 (84.95)	144 (3658)	72 (1829)	110 (2794)	8300 (3765)	AA-2350PDFI	AR-2350PDMI	6" Flg	120/1/60
DTA 4000	4000 (113.26)	204 (5182)	84 (2134)	112 (2845)	10300 (4672)	AA-2350PDFI	AR-2350PDMI	6" Flg	120/1/60
DTA 5000	5000 (141.58)	156 (3962)	84 (2134)	115 (2921)	12700 (5761)	AA-2400QDFI	AR-2400QDMI	6" Flg	120/1/60
DTA 6000	6000 (169.50)	192 (4877)	84 (2134)	114 (7484)	16500 (7484)	AA-2400QDFI	AR-2400QDMI	6" Flg	120/1/60

Inlet Air Pressure Correction

psi g	50	60	70	80	90	100	110	120	130	140	150
bar g	3.5	4.1	4.9	5.5	6.2	6.9	7.6	8.3	9.0	9.7	10.3
Factor	0.56	0.65	0.74	0.83	0.91	1.00	1.09	1.18	1.27	1.37	1.43

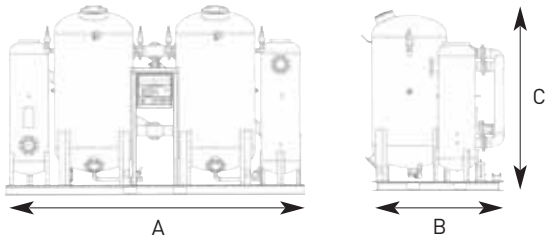
Temperature Correction

F	90	95	100	105	110	115	120
C	32	35	38	41	43	46	49
Factor	1.35	1.16	1.00	0.85	0.74	0.64	0.56

Example Calculations:
DTA 500 corrected for 120 psi (8.3 bar)
+110°F (43°C)

Corrected Capacity
= (Rated Capacity) x (psi Correction) x (Temperature Control)
= 500 scfm (13.9 Nm3/min) x (1.18) x (.74)
= 437 scfm (12.1 Nm3/min)

Flow Range @ 100 psi g (7 bar g):	200 scfm to 6000 scfm
Dewpoint:	-40°F (-40°C) Standard , -100°F (-70°C) Optional
Maximum operating pressure: **Minimum operating pressure:**	150 psi g (10.3 bar g) 80 psi g (5.5 bar g) (Lower minimum pressures available. Consult factory.)
Maximum inlet temperature: **Minimum inlet temperature:**	120°F (49°C) 50°F (10°C)
Controls:	Electronic
Dewpoint control optional	
Standard electrical supply:	120V/1Ph/60Hz



Parker

dh domnick hunter

domnick hunter Canada
Ontario, Canada
Tel: (905) 820-7146
Toll Free: 1-888-342-2623
Fax: (905) 820-5463

www.domnickhunter.com