TW Series Heatless Desiccant Air Dryers

Parker Airtek TW Series Heatless Desiccant Air Dryers remove water vapor from compressed air through a process known as Pressure Swing Adsorption. A pressure dewpoint of -40°F (-40°C) is 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,

TW75 with NEMA 7

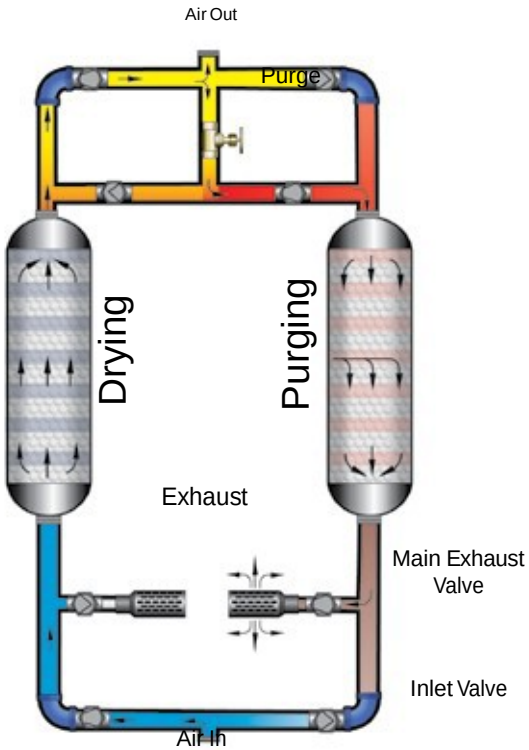
its moisture content adheres to the surface of the desiccant. The dry compressed air is then discharged from the chamber into the distribution system.

A solid state controller automatically cycles the flow of compressed air between the 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 Parker Airtek TW Series Heatless Air 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 design 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.

Heatless dryers in general are the most reliable and least expensive Of all desiccant type dryers. Parker Airtek TW Series Heatless Desiccant Air Dryers are the most energy efficient thanks to standard features like, "Variable Cycle control", "CycleLoc™" and purge flow regulator.



Flow Schematic

Sequence Annunciator

Sequence Annunciator Parker Airtek'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 "CycleLoc™". It will also annunciate optional equipment operation and function alarms. The panel is integral with the NEMA 4 Master Control and is conveniently mounted for easy monitoring.

Surge Protection
To accommodate the unique requirements of centrifugal compressors, all Parker Airtek 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 Parker Airtek's NEMA 4 automatic control center. The solid state module controls all dryer functions including the Sequence Annunciator.

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, Parker Airtek'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).

CycleLoc™
Significant energy saving and reduced air compressor demand are achieved by cycling the dryer with the air compressor. When the air compressor unloads or shuts off, "CycleLoc™" automatically stops the purge and holds the dryer's cycle position until load is resumed. The "CycleLoc™" function is activated by the air compressor's relay or pressure switch. Contacts are provided in the dryer's NEMA 4 control panel. A panel mounted light indicates "CycleLoc™" activation.

PowerLoc™ Energy Management (optional)

The Sequence Annunciator is designed to accommodate Parker Airtek's optional PowerLoc™ Demand Controller.

PowerLoc™ automatically adjusts energy use to actual moisture load. Moisture loading is affected by inlet temperature, pressure, relative humidity and flow. These conditions vary throughout the day and rarely combine in such a manner as to produce maximum moisture loads. An inlet temperature reduction of just 20°F (-7°C) will reduce the moisture load by almost 50%. Desiccant dryers are normally sized for "worst case" operation with the cycle fixed to accommodate maximum moisture loads. Because the fixed cycle does not compensate for fluctuating loads, dryers not equipped with PowerLoc™ waste energy by regenerating more often than necessary. PowerLoc™ eliminates this unnecessary use of energy by delaying regeneration until the total design moisture load is achieved. The system monitors actual moisture loading and limits the number of purge cycles accordingly.

At $0.08 per KWH, the PowerLoc™ would save $10,116 annually when used with a 1000 scfm externally heated dryer operating at 75% load for 8,000 hours, at an average inlet temperature of +80°F (27°C). Digital dewpoint control provides for additional energy savings by allowing the operator to select higher dewpoints when appropriate. The moisture probe is contained in and protected by a rugged, stainless steel housing that also contains an electronics package for continuous self calibration, temperature compensation, and signal stabilization. Due to less frequent cycling, switching valves and desiccant will last longer and require less maintenance.

The PowerLoc™ ceramic sensor is made from state-of-the-art metallized ceramic and replaces traditional materials such as aluminum, silicon and hydroscopic salts. This fast response sensor is made from a ceramic tile that is plated and vapor deposited to form a surface that is very sensitive to small changes in water vapor pressure.

The proprietary coating processes make the ceramic sensor inherently faster to respond than other impedance or capacity sensors currently available. The ceramic sensor features the latest digital technology with calibration data stored directly in the sensor's memory, and is equipped with a built-in thermistor for automatic temperature compensation. The PowerLoc™ is traceable to the National Institute of Standards and Technology. A certificate of traceability is available.

The PowerLoc™ ceramic sensor is protected by an 80 micron sintered metal guard and is enclosed in a rugged, stainless steel housing with a pressure rating of 5000 psi g. This housing increases the sensor's ability to withstand reasonable shock and vibration.

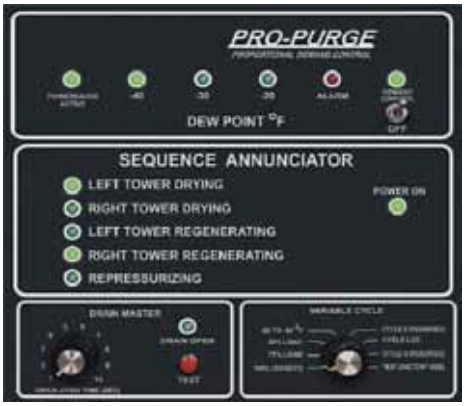
Optional Pro-Purge™ Demand Control

Pro-Purge Operation
Parker Airtek's Pro-Purge™ is optional equipment on all Heatless Air Dryers. It is an advanced "Proportional Demand Controller" that saves energy by automatically regulating the purge cycle in response to actual loads. Moisture loads fluctuate throughout the day and rarely reach maximum moisture levels, and therefore, waste energy by regenerating more often than is necessary. The Pro-Purge monitors actual compressed air moisture levels and prevents cycle advancement until the designed saturation is read.

LED Display Panel
The Pro-Purge Panel lights indicate:

- Power Saver Mode/Demand Control active "ON" LED.
- "OFF" LED indicates the Pro-Purge Demand Control is deactivated and the dryer is functioning in the fixed cycle default mode.

High Dewpoint Alarm
The High Dewpoint Alarm is activated when dewpoints rise above -20°F (-28°C). It would also activate in the event of a short circuit or should the sensor become disconnected. Dry contacts for an external alarm are provided.



Retrofit Capability
The Pro-Purge module can be retrofitted to all older Parker Airtek Heatless Air Dryers.

Features

- **Electric 120V/1PH/60Hz**
- **Solid State Controller**
- **Centrifugal Compressor Surge Protection (Models TW75 - TW6000)**
- **System Sequence Annunciator**
- **CycleLoc™ Demand Control**
- **Variable Cycle Control (Models TW75 - TW6000)**
- **Purge Flow Indicator**
- **Purge Flow regulator (Models TW75 - TW3000)**
- **Repressurization Circuit (Models TW75 - TW6000)**
- **Control Air Filter (Models TW75 - TW6000)**
- **5 Year Warranty on High Performance Butterfly Valves 3" and Larger (Models TW1000 - TW6000)**
- **ASME Coded Pressure Vessels (Models TW100 - TW6000)**
- **Separate Tower Pressure Gauges**
- **Safety Valves**
- **Cushioned Seat, Check Valves**
- **Separate Fill/Drain Ports**
- **NEMA 4 Dryer**
- **Stainless Steel Diffuser Screen**
- **Pressure Equalization**
- **150 psi g (10.3 bar g) Design Standard**
- **Structural Steel Base (Models TW1000-TW6000)**
- **Moisture Indicator (TW10 - TW6000 scfm)**
- **CSA/UL Approved Controller**
- **Filter Packaging with ΔP Gauges***
- **Pro-Purge Demand Control***
- **PowerLoc™ Automatic Demand Control Includes*:**
  - **Solid State Controller**
  - **Digital Dewpoint Read Out**
  - **High Humidity Alarm**
  - **with Dry Contacts**
  - **Self Calibrating**
  - **Ambient Compensation**
  - **Signal Stabilizer**
  - **4-20 mA Output**
- **All NEMA Classifications***
- **Pressure to 1,000 psi (69 bar g)***
- **Switch Failure Alarm***
- **Contacts for Remote Alarms***
- **Low Ambient Package***
- **Pneumatic Controls***

***Optional Equipment**

Complete Air Treatment

Without proper filtration, desiccant air dryers will not work. Desiccant dryers are designed to adsorb vapor from compressed air; they are not designed for liquid. When liquid, especially oil, is allowed to enter The desiccant chamber, it coats the desiccant material preventing any further adsorption. Oil coated desiccant cannot be regenerated, and must be replaced.

The coalescing pre-filter is installed at the dryer inlet. It protects the dryer by removing liquids and reducing the contamination level of the compressed air to .01 PPM by weight. The element is DOP rated at 99.9+% efficient in the 0.3 to 0.6 micron range. An integrated digital indicator is provided to determine element condition. An electronic drain valve is provided on systems 100 through 800 scfm to ensure proper drainage. On systems 1000 scfm and larger a zero air loss demand drain is provided.

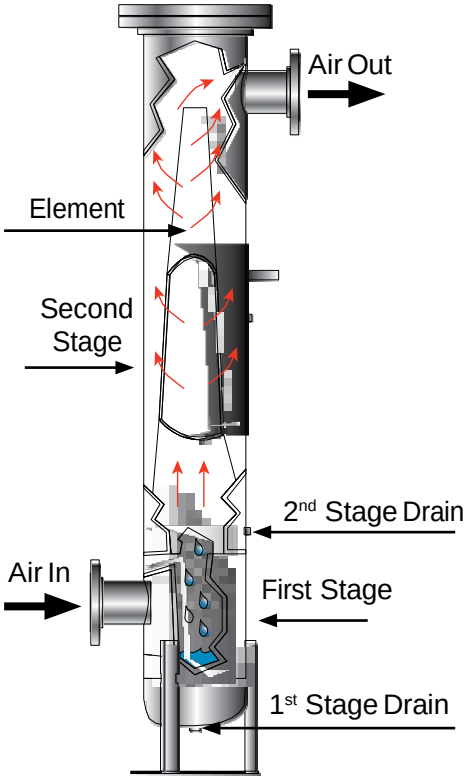
The drain controller includes push to test, drain alarm, and common alarm contact.

To protect downstream equipment from desiccant dust a particulate after-filter is installed at the dryer discharge. The after-filter element is Designed to remove solid particulates from compressed air. The hybrid pleated filter media provides high dirt retention, low pressure drop, and long element life. The element is 99+% effective in removing particles 0.9 micron and larger. An integrated digital element condition indicator is also provided.

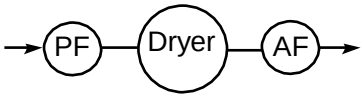
Most field problems experienced with desiccant air dryers are the result of improper filter selection, installation, maintenance, and/or draining of condensate. Considering the importance of filtration to dryer performance, Parker Airtek recommends that all desiccant dryers be ordered as a complete, factory assembled Air Treatment System. The Optional Parker Airtek Package "E" includes: properly sized, factory installed coalescing pre-filter and particulate after-filter with electronic drain system (No Loss Demand Drains standard on 1000 scfm and larger), and color change indicators.

Airtek Package "E" systems match our TW dryers with Airtek high performance filters. In-line filters (JC) are used on systems 10 through 800 scfm and two stage (JLA) severe duty filters are used on systems 1000 scfm and larger. Mist eliminators are available as extra protection.

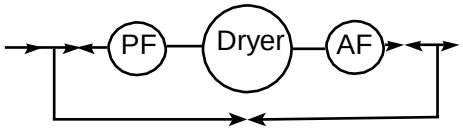
Factory packaging, with matched components and single point connections reduces installation costs, ensures performance and allows Parker Airtek to assume total responsibility for system integrity.



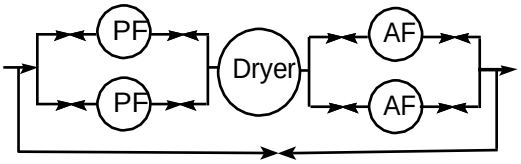
Package Schematic



Package "E"
Includes dryer with factory installed pre-filter and after-filter



Package "EB"
Includes dryer with factory installed pre-filter and after-filter with system bypass



Package "ED"
Includes dryer with factory installed dual selectable pre and after-filters with system bypass

Engineering Data Specifications

Model	Capacity scfm @100 psi g (Nm³/min @ 7 bar g)	Approximate Purge scfm (Nm³/min)	*TW Dryer with Package "E"			Weight lbs (kg)	Air In/Out	Power Supply Volts/ Phase/ Hz
			Height ins (mm)	Width ins (mm)	Depth ins (mm)			
TW10**	10 (.28)	2 (.05)	44 (1118)	19 (483)	14 (356)	108 (49)	3/8" NPT	120/1/60
TW15**	15 (.42)	2 (.05)	44 (1118)	19 (483)	14 (356)	112 (51)	3/8" NPT	120/1/60
TW25**	25 (.70)	4 (.11)	63 (1600)	19 (483)	14 (356)	156 (71)	1/2" NPT	120/1/60
TW40**	42 (1.19)	6 (.19)	48 (1219)	21 (533)	14 (356)	190 (86)	1/2" NPT	120/1/60
TW55**	60 (1.70)	9 (.25)	65 (1651)	21 (533)	14 (356)	230 (104)	3/4" NPT	120/1/60
TW75	75 (2.13)	11 (.31)	81 (2057)	30 (762)	18 (457)	384 (174)	3/4" NPT	120/1/60
TW100	107 (3.03)	16 (.45)	79 (2007)	31 (787)	18 (457)	468 (212)	1" NPT	120/1/60
TW130	135 (3.82)	20 (.56)	79 (2007)	31 (787)	18 (457)	496 (225)	1" NPT	120/1/60
TW200	200 (5.66)	30 (.85)	82 (2083)	37 (940)	22 (559)	692 (314)	1 1/2" NPT	120/1/60
TW250	250 (7.07)	38 (1.08)	80 (2032)	40 (1016)	22 (559)	776 (352)	1 1/2" NPT	120/1/60
TW300	300 (8.49)	45 (1.27)	80 (2032)	40 (1016)	22 (559)	796 (361)	1 1/2" NPT	120/1/60
TW400	400 (11.32)	60 (1.70)	85 (2159)	43 (1092)	27 (686)	1626 (738)	2" NPT	120/1/60
TW500	500 (14.16)	77 (2.18)	84 (2134)	45 (1143)	27 (686)	1735 (787)	2" NPT	120/1/60
TW600	600 (16.99)	98 (2.77)	84 (2134)	47 (1194)	27 (686)	1740 (789)	2" NPT	120/1/60
TW800	800 (22.65)	120 (3.39)	87 (2210)	50 (1270)	28 (711)	2120 (962)	2" NPT	120/1/60
TW1000	1000 (28.31)	150 (4.25)	92 (2337)	78 (1981)	48 (1219)	3676 (1667)	3" Flg	120/1/60
TW1200	1200 (33.98)	180 (5.10)	103 (2616)	78 (1981)	48 (1219)	4605 (2089)	3" Flg	120/1/60
TW1500	1500 (42.47)	225 (6.37)	115 (2921)	96 (2438)	60 (1524)	4815 (2184)	3" Flg	120/1/60
TW2000	2000 (56.63)	300 (8.49)	98 (2489)	96 (2438)	60 (1524)	5206 (2361)	4" Flg	120/1/60
TW2600	2600 (73.62)	390 (11.04)	112 (2845)	120 (3048)	72 (1828)	7600 (3447)	4" Flg	120/1/60
TW3000	3000 (84.95)	450 (12.74)	112 (2845)	114 (2896)	66 (1676)	8300 (3765)	6" Flg	120/1/60
TW4000	CF	CF	CF	CF	CF	CF	6" Flg	120/1/60
TW5000	CF	CF	CF	CF	CF	CF	6" Flg	120/1/60
TW6000	CF	CF	CF	CF	CF	CF	6" Flg	120/1/60

*Package "E" includes dryer with factory installed pre-filter and after-filter.

Correction Factors

Inlet Air Pressure

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	.56	.65	.74	.83	.91	1.00	1.09	1.18	1.27	1.37	1.43

Temperature

Temp °F	90	95	100	105	110	115	120
Temp °C	32	35	38	41	43	46	49
Factor	1.35	1.16	1.00	.85	.74	.64	.56

EXAMPLE CALCULATIONS

TW500 Corrected for 120 psi (8.3 bar)

Corrected Capacity: = (Rated Capacity) X (psi Correction)
= 500 scfm (13.9 Nm³/min) X (1.18)
= 590 scfm (16.7 Nm³/min)

NOTES:

**Electronic Switching Valves
- Dimensions and weight are for dryer with Package "E" installed
- Dimensions measured in inches and millimeters
- Weight measured in pounds and kilograms and includes desiccant
- Specifications and dimensions are subject to change without notice
- Pressure drop at rated flow: less than 5 psi (0.34 bar)
- Maximum inlet air or ambient air temperature 120°F (49°C)
- Maximum working pressure: 150 psi g (10.5 bar g) standard units higher maximum working pressure are available
- Minimum operating pressure: 80 psi g (5.5 bar g)