

# CDT Series

HEATLESS DESICCANT AIR DRYERS  
40 – 5,400 SCFM

► ISO Quality Dew Points

► Three Controller Selection

► NEMA4 Electrical Construction Standard on Two Controllers

► Purge Optimal Savings



**CHAMPION®**

# Personalized Performance



## DEW POINT SELECTION

CDT Series Heatless Desiccant Dryers open up a world of customizable performance opportunities with four standard ISO quality class levels of pressure dew points to choose from. Don't settle for less than the ability to satisfy all of your requirements for clean, dry compressed air. Maybe you need low dew point protection to prevent winter freeze-ups and are satisfied with higher dew points the rest of the year. Simply press the dew point selector button to select a new dew point level that is best for you. The custom-built performance of the CDT Series can be tailored to meet the most critical of applications...yours.

## APPLICATION FLEXIBILITY

Champion CDT Series Heatless Desiccant Dryers were designed to help you meet your goals. Customizable performance technology is integrated into our standard product so it can be tailored to benefit your specific critical compressed air drying application. Now, you have the liberty to personalize the performance of the standard product to adapt to your specific needs.

Variations in demand, pressure dew point, compressed air purity, and hours of operation have often forced engineers to compromise energy efficiency and system performance for an "off-the-shelf" product. Well...not anymore.

The CDT series offers three controller styles to meet every application.

### Basic Controller

- ▶ The basic controller presents traditional heatless drying system.
- ▶ Using a simple timer based controller, it offers a reliable fixed cycle operation.
- ▶ Automatic time controlled bed regeneration cycles offer consistent performance.
- ▶ The controller LED's reflect: power on, left tower drying, right tower drying.

### Standard Controller

- ▶ Four Dew Point choices from fixed cycle operating modes
- ▶ Eight levels of Purge Air Energy Savings to match to your specific air demand profile
- ▶ Controlled purge air shut-down when your air compressor unloads or is turned off

### Energy Saving Controller

- ▶ Demand driven operating cycles to maximize your return-on-investment
- ▶ Automatic Purge Air Control means exact matching to changing system load dynamics
- ▶ Complete sensitivity to actual operating conditions minimizes your cost of operation

## FOUR ISO 8573.1 DEW POINTS TO CHOOSE FROM

Specifying a pressure dew point is not simple work for an engineer. CDT Series dryer designs are optimized with the flexibility to meet your needs.

ISO 8573.1 Class	Dew Point	Remaining Moisture**		Cycle Time & Mode		
		ppmw	mg/m <sup>3</sup>	Basic Controller	Standard Controller	Energy Savings Controller***
1	-100° F -73° C*	0.12	0.15	--	4 min. fixed	4 min. fixed
2	-40° F -40° C	10	12	10 min. fixed	10 min. fixed	demand or 10 min. fixed
3	-4° F -20° C	81	97	--	16 min. fixed	demand or 16 min. fixed
4	+38° F +3° C	610	730	--	24 min. fixed	demand or 24 min. fixed

\* This performance exceeds Quality Class 1 set at -94° F (-70° C)

\*\* At 100 psig (7 bar)

\*\*\* The Optional Energy Saving controller also offers fixed cycle settings

# Critical Applications Use

CDT Series Heatless Desiccant Dryers and CFF Series Filters provide “critical use” applications of compressed air with a highly engineered quality air treatment system. “Critical uses” of compressed air have zero tolerance for contaminants whose presence will lead to manufactured product spoilage and rejection from a quality assurance standpoint. A carefully engineered desiccant dryer design provides a reliable method to remove moisture as a water vapor while coalescing filters remove solid particles, liquid water droplets, liquid oil and oil vapors from the compressed air system.

## CDT Series Dryers offer Pressure Dew Points to -100° F (-73° C)

Moisture (water vapor) is present in ambient air as a gas and cannot be filtered. Adsorbents present in the CDT Series remove water vapor to prevent it from condensing into harmful liquid water droplets inside compressed air systems. Microelectronic and pharmaceutical manufacturing are examples which cannot tolerate the presence of any moisture.

## CFF Series Coalescing Filters Remove Water Droplets and Solid Particles to 0.01 Micron

Water droplets are formed by the condensed water vapor present in ambient air. Solid particles come from ambient air contaminants like dust and

from rusted, oxidized pipework. They can cause pneumatic equipment to malfunction and trigger instrument and control failures.

## CFF Series Filters Remove Oil and Oil Vapors for Oil-Free Air

Liquid oil and oil vapors are introduced by compressor coolants and by hydrocarbon vapors present in ambient air. Oil-free compressed air is particularly important in food and pharmaceutical processes where direct and indirect contact with compressed air occurs. Oil contamination of food and drug products can generate significant liability issues and manufacturing spoilage costs.

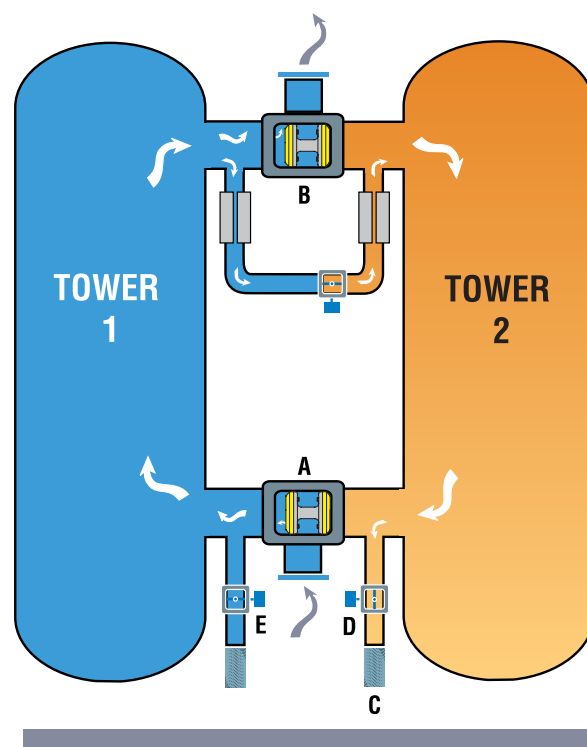
## How It Works

Moist, filtered compressed air enters the pressurized on-line desiccant filled drying Tower 1 through the shiftmatic valve (A). Up-flow drying enables the desiccant to strip the air stream of moisture. Clean, dry compressed air exits through the shiftmatic valve (B) to feed the air system. Tower 2 (when in regeneration mode) depressurizes to atmosphere through muffler (C) when valve (D) opens. A portion of dry compressed air (purge air) is diverted before exiting (B) and passes through off-line Tower 2 and exits at valve (D) to desorb the moisture from the desiccant. Once desorbed, valve (D) closes and Tower 2 is repressurized. At tower shift-over, valve (E) will open,

causing the shiftmatic valve (A&B) to shift. Tower 2 will be placed on-line to dry the bed. Operations will switch and Tower 1 will be regenerated.

Reliable valves are critical to dryer performance; that is why we use a proprietary shuttle-style switching valve in lieu of off the shelf plug, ball, butterfly, and diaphragm valves. The “Shiftmatic” is so reliable that we offer a 5-year warranty on models CDT 40-3000 with use of a properly sized CFF prefilter.

The shiftmatic valve has one moving part, no maintenance, no check valves, aluminum housing and nylon shuttle.



# Models CDT40-450 Features



Front

**Models CDT40-450** are engineered to benefit you with a clean, streamlined package. This design has a small footprint to increase your available floor space. Inlet and Outlet piping is conveniently located at the back to aid in installation and serviceability. Discharge piping exits the back of the towers to reduce the overall height of the package. Low headroom installations such as hospitals and laboratories will benefit from the reduced height of the overall package.

## STANDARD INSTRUMENTATION

- ▶ Left and right tower pressure gauges
- ▶ Purge pressure gauge
- ▶ Moisture indicator – alerts operator of elevated dew point
- ▶ Throttling valve provides accurate purge pressure adjustment

## THREE CONTROLLERS TO CHOOSE FROM

- ▶ Basic controller offers fixed cycle operation
- ▶ Standard controller includes fixed savings potential with Purge Optimizer
- ▶ Energy Saving Controller for exact automatic purge savings

## LARGE DESICCANT BEDS ENSURE CONSISTENT DEW POINTS

- ▶ 0.6 lbs (0.27 kgs) of desiccant per tower per scfm guarantees dry air
- ▶ 4.8 seconds of contact time for saturated air with the desiccant
- ▶ 30% extra desiccant provided to compensate for natural bed aging over the expected 3 to 5 years bed life
- ▶ Large, cleanable, stainless steel flow diffusers ensure even flow distribution and eliminate channeling through the bed
- ▶ Tower design saves 98% of the heat of adsorption

## CERTIFIED DESIGNS FOR SAFETY

- ▶ ASME code constructed vessels comply with codes. Models 115 and larger are stamped. Models are UL and CSA certified.
- ▶ Pressure relief valves on each tower mounted after flow diffusers to prevent clogging
- ▶ Heavy-duty mufflers for quiet operation
- ▶ NEMA 4 electrical construction standard

## OPTIONAL CFF SERIES FILTER PACKAGES WITH BYPASS SYSTEMS

- ▶ Convenient factory-mounted CFF Series prefilter/afterfilter packages with bypass available
- ▶ Optional Element Monitors inform of optimal element change-out time

## RUGGED AND RELIABLE VALVES

- ▶ Shiftmatic valves (on CDT 40-450) automatically shift to the low pressure side of the circuit to control process flow on models.
- ▶ Shiftmatic valve's life has been tested to over 500,000 cycles with tough desiccant dust challenge.
- ▶ Position memory ensures drying continues, even with loss of electrical power to the dryer.
- ▶ 5- year warranty on the shiftmatic valve. Parts and labor for the first full year of warranty. Parts only in remaining years. Appropriately sized CFF prefilter must be installed at the same time the dryer is installed to qualify for the 5-year warranty. Element maintenance must take place annually or more often as needed to maintain the warranty for the 5-year period.
- ▶ Three-way pilot operated solenoid valves manage the pilot air flow to direct the purge/repressurization valves.



# Models CDT590–5400 Features

## RUGGED AND RELIABLE VALVES

- ▶ Shiftmatic valves (on CDT 590-3000) automatically shift to the low pressure side of the circuit to control process flow on models.
- ▶ Shiftmatic valve's life has been tested to over 500,000 cycles with tough desiccant dust challenge.
- ▶ Position memory ensures drying continues, even with loss of electrical power to the dryer.
- ▶ 5-year warranty on the shiftmatic valve. Parts and labor for the first full year of warranty. Parts only in remaining years. Appropriately sized CFF prefilter must be installed at the same time the dryer is installed to qualify for the 5-year warranty. Element maintenance must take place annually or more often to maintain the warranty for the 5-year period.
- ▶ Three-way pilot operated solenoid valves manage the pilot air flow to direct the purge/repressurization valves.
- ▶ CDT 4100-5400 are supplied with premium quality butterfly switching valves.

## STANDARD INSTRUMENTATION

- ▶ Left and right tower pressure gauges
- ▶ Purge pressure gauge
- ▶ Moisture indicator – alerts operator of elevated dew point
- ▶ Throttling valve provides accurate purge pressure adjustment

## THREE CONTROLLERS TO CHOOSE FROM

- ▶ Basic Controller offers fixed cycle operation
- ▶ Standard controller includes fixed savings potential with Purge Optimizer
- ▶ Optional Energy Saving Controller for exact automatic purge savings

## LARGE DESICCANT BEDS ENSURE CONSISTENT DEW POINTS

- ▶ 0.6 lbs (0.27 kgs) of desiccant per tower per scfm guarantees dry air
- ▶ 4.8 seconds of contact time for saturated air with the desiccant
- ▶ 30% extra desiccant provided to compensate for natural bed aging over the expected 3 to 5 years bed life
- ▶ Large, cleanable, stainless steel flow diffusers ensure even flow distribution and eliminate channeling through the bed
- ▶ Tower design saves 98% of the heat of adsorption

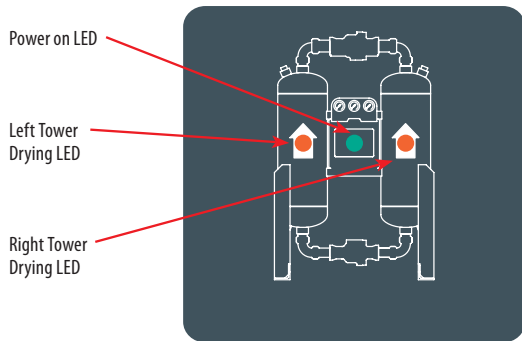
## CERTIFIED DESIGNS FOR SAFETY

- ▶ ASME code constructed vessels comply with codes. Models 115 and larger are stamped. Models are UL and CSA certified.
- ▶ Pressure relief valves on each tower mounted after flow diffusers to prevent clogging
- ▶ Heavy-duty mufflers for quiet operation
- ▶ NEMA 4 electrical construction standard on standard & energy savings controllers



**Models CDT590-5400** are engineered to benefit you with an extremely heavy-duty robust package designed for the most demanding industrial applications. Our in-line piping arrangement reduces installation times for those bigger installations. Rugged high capacity components ensure long-life for tough applications in hostile environments.

# Control Operating Costs



CDT Series Heatless Desiccant Dryer Controllers are designed to help engineers meet their goals for consistent dew point control and to ensure that their company can control operating costs. Invest in a CDT Series dryer and you gain rugged reliability and premium performance in a package that you can customize to meet your specific requirements. The key to controlling your cost of operation is to first identify the nature of your plant air demand profile and then select the Controller that best serves your needs. All CDT Series dryers come equipped with RS-232 communication ports.

## BASIC CDT SERIES CONTROLLER

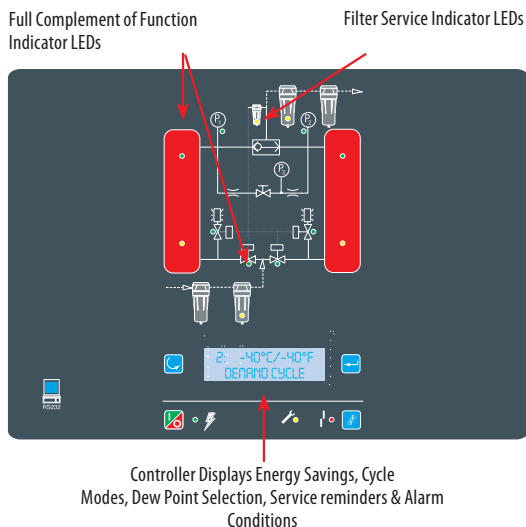
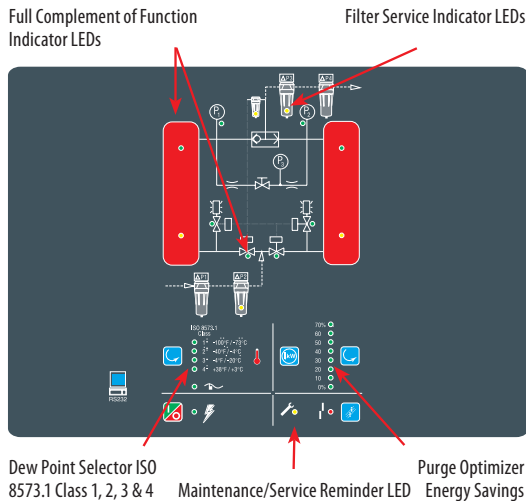
The basic controller offers basic fixed cycle operation.

## STANDARD CDT SERIES CONTROLLER

The Standard Controller provides a wealth of features that allows you to personally customize the dryer to meet the anticipated needs of your plant load. Purge Optimizer can be programmed to extend the repressurization cycle and save purge air at specific percentages of maximum load. You benefit from increased productivity and reduced operating costs.

Standard CDT Series Controllers include:

- ▶ Dew Point selections of -100° F, -40° F, -4° F, and +38° F operate from Fixed Mode regeneration cycles
- ▶ Purge Air savings to 70% of full capacity to match up to your largest air demand
- ▶ User programmable purge air shut-down capabilities can be synchronized to your air compressor
- ▶ Switches for ISO Class dew point, On/Off, Alarm and Service reminder reset
- ▶ LED lights that express power-on, valve status, and tower status
- ▶ Normal or severe duty selectable LED lights that warn when service is due on filters, drains, valves and desiccant



## ENERGY SAVING CDT SERIES CONTROLLER

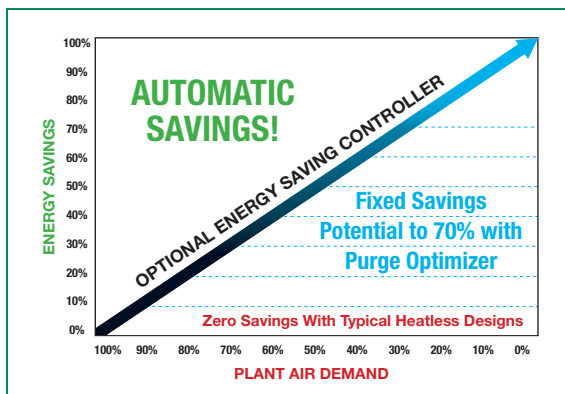
The Energy Saving Controller was engineered to continually adapt to ever changing air demand profiles to assure you of the straightest path to a rapid Return-On-Investment. Patented technology in Demand Mode senses the heat generated by your actual plant load and automatically adapts the regeneration cycles to match those load changes.

The Energy Saving Controller is packed with features to further optimize the CDT Series with:

- ▶ Maximum energy savings
- ▶ Consistent Demand Mode dew point control of -40° F, -4° F, and +38° F (-100° F in Fixed Mode only)
- ▶ Automatic Purge Air control
- ▶ Exact load matching sensitivity to adapt to system variations
- ▶ Alarm LED lights for tower switching failure, filter monitor signals, electronic demand drain alarms on filters
- ▶ Vacuum fluorescent text display expresses percentage of energy saved in real-time, operating mode and service reminders

# Pure Air Savings

Energy is consumed in the form of purge air to prepare the “off-line” desiccant tower for its next cycle of operation by a process called regeneration. You have the ability to optimize your purge air consumption to achieve energy savings that will pay you dividends for many years to come. The following describes variations in plant operations that dictate which Controller selection may deliver your best value.



## STANDARD CONTROLLER PURGE OPTIMIZER SAVINGS

Facilities operating at a constant level of air demand benefit the most from the Purge Optimizer feature. Ordinary heatless dryer designs offer zero purge air savings. The Purge Optimizer allows you to select purge air savings of 10%, 20%, 30%, 40%, 50%, 60% or 70% of inverse proportion to your air demand. For example, you can elect to save 30% of your purge air costs if your maximum air demand is 70% of full rated capacity; 40% savings at 60% load, 50% at 50% and so on. This feature is invaluable if your maximum load levels remain fairly constant and you are on a limited budget.

## ENERGY SAVING CONTROLLER

Events as transparent as lunch and coffee breaks represent energy saving opportunities that typically reflect 19% of every shift's working hours. Add in production changes and machine down time and there are more valleys than peaks on the demand chart. This patented Controller uses thermistors to carefully monitor the natural temperature changes that occur during each drying and regeneration cycle. The Controller acts on that data to precisely manage your system's purge air needs. No intervention is required on your part. Maximum energy efficiency is achieved. You save up to 84% on purge air energy costs... automatically.



## WORLD CLASS FILTRATION

Champion CFF Series Filters complete the integrity of your critical use air treatment system and are available in a variety of sizes and grades. Compressed air quality and desiccant bed life are dependent on clean compressed air. Compressed air must be prepared prior to entering the desiccant dryer.

Normal installations include a CFF Series Grade C (1 micron solid particles) prefilter followed by a CFF Series Grade E or Grade F oil removal filter. Grade E (to 0.008 ppm) filters are used for ISO 8573.1 Class 2, 3 or 4 requirements. Grade F (0.0008 ppm) satisfies the needs of Class 1 pressure dew points. A CFF Series Grade D (1 micron, reverse-flow) particulate filter is the right choice for installation after the dryer to collect the fine desiccant dust and prevent it from migrating downstream. Then, if it is technically oil-free air you need, complete the filter system with a Grade G Oil Vapor Removal Filter.

## OPERATIONAL SECURITY WITH THE ELEMENT MONITOR

Heightening the operational security of your CFF Series Filters is as simple as specifying you want the optional Element Monitor included with each filter you order. Rely on your Champion Distributor to assist you in selecting the best combination to satisfy your specific requirements.



# Sizing Information

**TABLE 1**

Model	Inlet Flow @ 100 psig, (7 bar) scfm	Dimensions (in.)			Connections (in.)	Weight (lb.)
		Height	Width	Depth		
CDT40	40	46	32	32	1" NPT	365
CDT60	60	61	32	32	1" NPT	445
CDT90	90	78	32	32	1" NPT	575
CDT115	115	54	44	38	1" NPT	685
CDT165	165	54	44	38	1" NPT	685
CDT260	260	72	48	38	2" NPT	1010
CDT370	370	63	55	38	2" NPT	1215
CDT450	450	71	55	38	2" NPT	1350
CDT590	590	101	52	48	2" NPT	1473
CDT750	750	104	54	48	2" NPT	2134
CDT930	930	109	59	56	2" NPT	2414
CDT1130	1130	112	63	56	3" ANSI Fig.	2875
CDT1350	1350	117	65	56	3" ANSI Fig.	3722
CDT1550	1550	115	71	56	4" ANSI Fig.	4167
CDT2100	2100	116	79	56	4" ANSI Fig.	4417
CDT3000	3000	122	78	65	4" ANSI Fig.	9010
CDT4100	4100	122	93	85	6" ANSI Fig.	9900
CDT5400	5400	122	102	86	6" ANSI Fig.	12000

\* BSP connections and DN Flg available. Dimensions and weights are for reference only. Request certified drawings for construction purposes.

**TABLE 2**

Operating Pressure	psig	60	70	80	90	100	110	120	130	140	150	175	200	225	250
	bar	4.2	4.9	5.6	6.3	7.0	7.7	8.4	9.1	9.8	10.5	12.3	14.1	15.8	17.6
Multiplier		0.65	0.74	0.83	0.91	1.00	1.04	1.08	1.12	1.16	1.20	1.29	1.37	1.45	1.52

To determine inlet flow at pressures other than 100 psig (7 kgf/cm<sup>2</sup>), multiply inlet flow at 100 psig from Table 1 by the multiplier that corresponds to your operating pressure from Table 2.

## OPERATING PARAMETERS

- Maximum Working Pressure 150 psig standard. Higher pressures are available
- Minimum Operating Pressure for 150 psig models are 60 psig
- Minimum Operating Pressure for 250 psig models are 120 psig
- Maximum inlet or ambient air temperature 120° F (49° C)
- Pressure drop at rated flow is less than 5 psi
- Standard voltages: Controllers automatically identify and adapt the controller:  
Basic: 100-120V/1ph/5-60Hz; Standard and Energy Savings controller:  
100- 240V/1ph/50-60Hz & 12-24VDC
- NEMA 4 Standard Feature with Standard and Energy Savings Controllers

## NOTES

Inlet flows are established in accordance with CAGI Standard ADF-200: Dual Stage Regenerative Desiccant Compressed Air Dryers-Methods for Testing and Rating. Conditions for rating dryers are: inlet pressure of 100 psig, inlet temperature saturated at 100° F.

Average purge flow rate is the amount of purge air used during the regeneration portion of the purge cycle (purge/repressurization valve open) plus the volume of air used to repressurize the tower after the purge/repressurization valve closes averaged over the cycle time. At 100 psig, the average purge rate is: 14.4% (13.7% for regeneration + 0.7% for repressurization) of rated inlet flow for dryers operating on a 10 minute cycle; 15.5% (13.7% for regeneration + 1.8% for repressurization) for dryers on a 4 minute cycle.

Outlet Flow: To determine flow of air available at outlet of dryer, subtract purge flow from inlet flow.



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