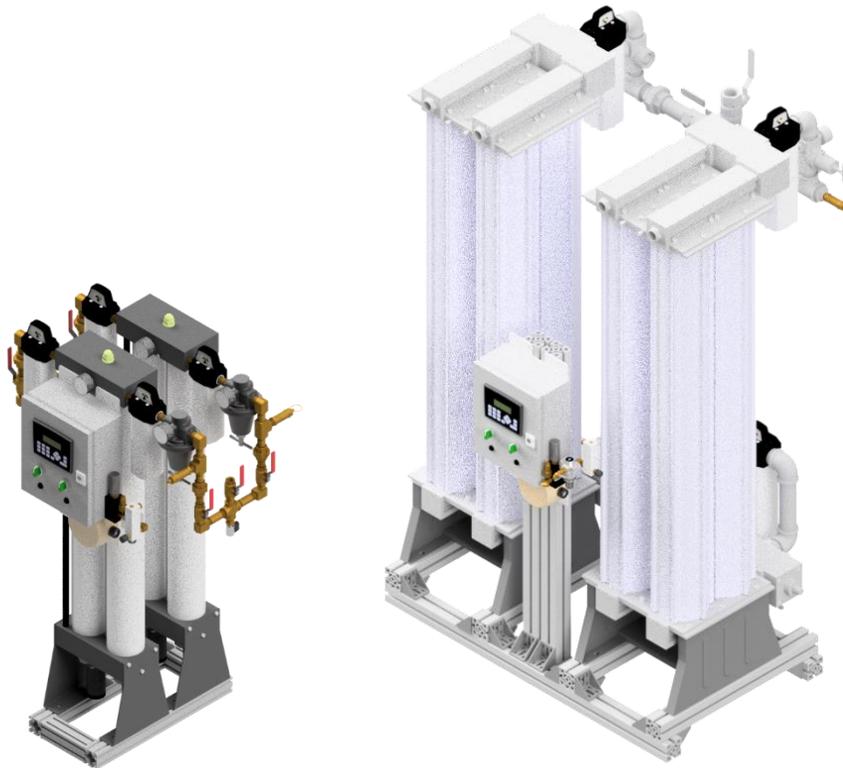


Operation and Maintenance Manual

Duplex Medical Desiccant Dryer System

AT2D-10 to 375



Introduction

For technical assistance, service or replacement parts, please contact:

3DPROTOTECH

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Safety Precautions

Operator should have carefully read and become familiar with the operation of this unit prior to installing, wiring, starting, operating and maintaining the equipment. It is expected that the operator uses standard safety precaution and good workmanship practice while working on the unit.

Unit should be operated based on local regulation applicable to where the unit are being installed and operated.

Pressurized air in the air line can cause damage to property and personnel injury. Ensure pressure is released from the line prior to removal of any pressurized parts.

General Information

Product Description

The AT2D is a NFPA 99 compliant duplex heatless regenerative desiccant dryer and filter package.

This system is intended for:

- Medical use for patient
- Clean dryer air for medical and lab environment

Suggested operating temperature: 78°F (26°C).

The system is intended for indoor use

The system is to be connected to an existing air compressor system

Principles of Operation

The air from the air compressor system travels through a 0.01μ pre-filter.

The air is then dried by the heatless desiccant dryer system to reduce the dew point of the air. Finally, the air passes through an after-filter and regulated down to the demanded pressure before being delivered to the facility.

Installation

Installation Prerequisites

Ensure that the site where the system will be installed has a source of 120VAC electrical power.

For maintenance and ventilation of the system, it is recommended that the system has 2' of clearance around the system. Brackets are provided to allow system to be secured to the concrete pad should it be necessary.

Sound levels of 76 to 85 dbA are to be anticipated. Though the sound levels are not excessive, they should be considered when choosing the installation location for the system.

Piping

The air intake and discharged line must be piped in accordance with NFPA 99. To ensure that no restriction of air flow will occur, size the piping to the inlet/discharge size of the package. All pipes must be pre-cleaned for medical gas in accordance with NFPA 99. All necessary flex connectors (both intake and discharge) are already piped and no further flex connectors are needed.

Rated Flow (CFM)	Size (NPT)
10	1/2
20	1/2
30	1/2
45	1/2
60	1
100	1
125	1
200	1 1/2
250	1 1/2
300	2
375	2

Wiring

Refer to electrical diagram provided with the unit for proper wiring location.

Power Connection

Some AT2D is supplied with a standard North America 110VAC power cord for power connection. You may wish to replace it with a hard wire connection if needed by removing the power cord and connecting the on-site connection to the “L” “N” and “G” terminal

Warning: This must be done by electrician in accordance to local regulation

Remote Monitoring Connection

AT2D is provided with 2 alarm dry contact relays.

AR1 – Dew Point High Alarm – Connect to remote alarm monitor system

AR2 – CO High Alarm – Connect to remote alarm monitor system

Each relay is provided with terminal 11 as common, 12 as normal closed and 14 as normal open.

Heatless Desiccant Dryer

The Heatless Desiccant Dryer in the System Comes Standard With:

- Electronic drain valve on the inlet filter
- A built-in 1-micron particulate after-filter (within the diffuser screen or compactor plate) to protect downstream equipment from desiccant fines



Design

The air enters a coalescing pre-filter where solids and condensates are filtered through a $0.01\ \mu$ element. The heatless regenerative dryer then adsorbs moisture from the compressed air stream down to a pressure dew point (PDP) of -40°F (-40°C) at standard inlet conditions: 100°F (37.8°C), 100% saturated, 100 psig.

The built-in after-filter removes any desiccant fines before they can travel downstream. An after-filter installed after the dryer further removes any desiccant fines that are carried over with a $1\ \mu$ element.

Each system contains two dryers as per NFPA 99. During normal operation, one dryer will be powered on and the other will be deactivated and on standby. For instruction on switching the active dryer, please refer to the maintenance section of this manual.

Contents

Each dryer consists of:

- Two aluminum towers filled with desiccant
- Two aluminum blocks including air seals and check valves
- Two solenoid pilot valves
- Built in after-filters
- One electronic control
- One pressure gauge
- Two mufflers
- Electronic auto drain

Operating Principles

Wet air enters the filters and flows from the top block to the lower block via air transfer tubes. Air then flows to the shuttle inlet valve and is diverted to tower #1. The compressed air flowing through tower #1 is dried to a -40°F (-40°C) PDP and exits via the outlet filter.

A small portion (12%) of the compressed air is expanded to near atmospheric pressure by passing through the purge orifice. Expansion of this already dry gas to near atmospheric pressure increases the ability of the purged air to strip the previously adsorbed water vapor from the partially saturated desiccant bed in tower #2.

The air exhausts through the opened two-way purge valve. This cycle continues for 1.5 minutes then the purge valve closes and tank #2 begins re-pressurization. After 30 seconds, purge valve #1 opens and the process repeats for tower #2.

- The online tower dries for 2 minutes
- The offline tower regenerates for 1 minute, 30 seconds
- The offline tower re-pressurizes for 30 seconds

Time of Operating Cycles

Drying time: 2 minutes

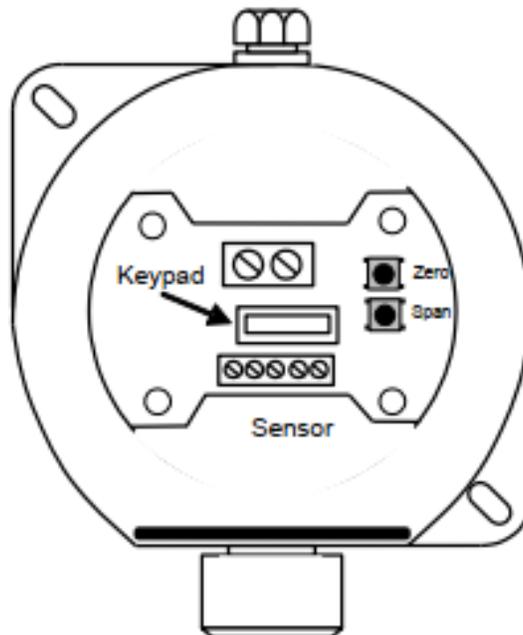
Regeneration time: 1 minute, 30 seconds

Pressurization time: 30 seconds

First Cycle		Second Cycle	
Left Tower	Right Tower	Left Tower	Right Tower
Drying	Regeneration	Regeneration	Drying
	Re-pressurization	Re-pressurization	

CO Transmitter

The CO transmitter uses an electrochemical sensor to convert a gas concentration into a linear, 4–20 mA electrical signal and transmits it via cable to a controller. It is an easy to connect, loop powered, two wire transmitter.



Dew Point Sensor

The AT2D system is equipped with a Dew Point Sensor which provides the readout of the dew point. The readout is integrated into our panel and all settings are preset.

Control Panel

Each dryer is equipped with a single control panel for operation.



Main Screen

- The current Dew Point (DP) level is displayed in degrees Fahrenheit (F).
- The current Carbon Monoxide (CO) level is displayed in part per million (ppm)
- In case dew point sensor fails the DP will display "104.0F" and "FLT!" will alternate with "DP" on display
- In case CO sensor fails the CO will display "50" and "FLT!" will alternate with "CO" on display
- After sensor is repaired, controller should resume monitoring the DP, to clear sensor fault push alarm silence/reset button for 3 seconds to reset. (See paragraph "Faults & Alarms" for additional information)
- The current status of each dryer (D1 and D2) are display
- OFF – the dryer is offline
- PRG1 – Left tower is purging. Air should be coming out of the bottom muffler of the left tower
- PRS1 – Left tower repressurizing. No air should be coming out of the muffler
- PRG2 – Right tower is purging. Air should be coming out of the bottom muffler of the right tower
- PRS2 – Right tower repressurizing. No air should be coming out of the muffler
- DRN – Pre filter solenoid is activated to drain the filter
- ECO – Dew Point is reached and the dryer is standing by

Purging & Economy Mode Setup

We can adjust the Purge and Eco set points on both controllers. (See Purging and Economy Mode to setup these set-point).

Purge mode becomes active when the DP level reaches above the purge set-point and allows the dryer to purge. Economy mode becomes active when the DP level reaches below the economy (ECO) set-point and stop the dryer from purging.

- This screen can be access by pressing the right directional arrow from the Main Screen.
- Press Access/Enter button to enter into edit mode.
- Enter the desired Numeric value
- Use the Access/Enter to jump between fields or the left and right arrow directional buttons.
- “i” button to return to main screen.

Dew Point and CO Alarm Setup

Use the left and right directional arrows to locate the Alarm Set Points screen. On this screen you can adjust the High Set Point of the DP Alarm and the CO Alarm.

- Press Access/Enter button to enter into edit mode.
- Enter the desired Numeric value
- Use the Access/Enter to jump between fields or the left and right arrow directional buttons.
- “i” button to return to main screen.

Faults and Alarms

When there is no alarm, the illuminated button will be lid green to indicate there are no alarm condition. When there is an alarm condition, the buzzer will sound and the illuminated button will be lit red. To silence the alarm without reset, touch and release the illuminated button. To reset, touch and hold the illuminated button for 3 seconds. If the alarm condition still exists, the buzzer will sound again and the illuminated button will be lit red as well.

Dew Point Failure

Dew Point Transducer fail alarm is available on AT2D. This alarm is a latching alarm with audio and visual indication. A dry contact is provided for remote monitoring of this alarm. This occurs when a dew point sensor is connected incorrectly or has stopped working. The main screen will show a message “FLT!” instead of a dew point read out. There is also a time delay of 30 seconds preprogram so the alarm will only trigger after this time has elapsed. Check the condition of the sensor and wiring if this alarm occurs.

Dew Point High Alarm

Dew point high alarm is available on AT2D. This alarm is a latching alarm with audio and visual indication. A dry contact is provided for remote monitoring of this alarm. This occurs when a dew point is above the dew point alarm set point. The main screen will show a message “HI!” instead

of a dew point read out. There is also a time delay of 30 seconds preprogram so the alarm will only trigger after this time has elapsed.

CO Failure

CO Transducer fail alarm is available on AT2D. This alarm is a latching alarm with audio and visual indication. A dry contact is provided for remote monitoring of this alarm. This occurs when a CO sensor is connected incorrectly or has stopped working. The main screen will show a message "FLT!" instead of a CO read out. There is also a time delay of 30 seconds preprogram so the alarm will only trigger after this time has elapsed. Check the condition of the sensor and wiring if this alarm occurs.

CO High Alarm

CO high alarm is available on AT2D. This alarm is a latching alarm with audio and visual indication. A dry contact is provided for remote monitoring of this alarm. This occurs when a CO is above the CO alarm set point. The main screen will show a message "HI!" instead of a dew point read out. There is also a time delay of 30 seconds preprogram so the alarm will only trigger after this time has elapsed.

Maintenance

Dew Point Sensor Calibration

3D Prototech Corp. recommends the dew point sensor be replaced or calibrated annually due to sensor drift over time. For calibration, please contact 3D Prototech Corp.

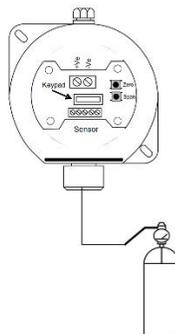
CO Sensor Calibration

Material Needed

- Zero Gas
- CO Test Gas (50ppm CO or less)
- Gas Bottle Valve
- Flow Meter with connection tube
- SSC Calibration/ Configuration Keypad

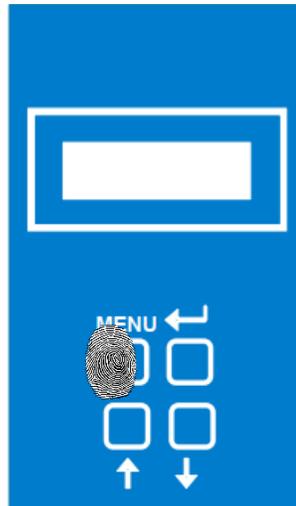
Calibration Instructions

1. Connect zero gas to the Transmitter and set gas flow rate between 300cc/min (0.01cfm) to 1000cc/min (0.04cfm) and allow the reading to stabilize.



1.

2. Insert the keypad cable to the USB port in the transmitter. The keypad should start showing SSCL. If the keypad keeps showing '----' then the instrument is not communicating with the keypad.
3. On the keypad, press MENU



4. Using the arrow key up , select menu option E: 01 and press 
5. Press  to zero the sensor, '----' will be displayed to confirm the sensor zero has been performed
6. Press MENU to close the menu
7. Turn off and disconnect the zero gas and connect the CO test gas to the transmitter and set gas flow rate between 300cc/min (0.01cfm) to 1000cc/min (0.04cfm) and allow the reading to stable.
8. press MENU
9. Using the arrow key up , select menu option E: 02 and press 
10. Using the up  and down  buttons, set the reading to the calibration gas level.
11. Press  to span the sensor, '----' will be displayed to confirm the sensor span has been performed. If reading doesn't stabilize, press  again to span the sensor
12. Press MENU to close the menu system
13. Turn off and disconnect the calibration gas

Dryer Maintenance

Check Item	Procedures	Schedule		
		Weekly	Monthly	Annual
Purge Cycle	Observe that the dryer is performing a purge cycle every four (4) minutes	Inspect		
Purge	Place hand below dryer and check if air is purging from both towers	Inspect		
Filter	Check gauge for back pressure, replace element as needed	Inspect		Replace element
Dryer Rotation	Change dryer unit		Perform	
Dryer Annual Maintenance	Perform annual maintenance			Replace parts
Dew Point Sensor	Perform calibration			Calibrate
CO Transmitter	Perform calibration			Calibrate

Dryer Rotation

Dryer should be rotated once a month. This will allow both dryers to wear evenly and prolong the use of this dryer package.

1. On the control panel, press the System Status button.
2. Set "Dryer Override" to On.
3. Open the inlet ball valve for the dryer being put into service slowly to allow pressurization.
4. Allow the dryer to complete two purge cycles.
5. Open the discharge ball valve of the dryer being put into service to supply air to the facility.
6. Check the dew point of the system. Make sure the dew point does not rise past the alarm point. If it does, shut off the discharge ball valve of the dryer being put into service and allow it to purge for one more cycle before repeating step 5.
7. Shut off the discharge ball valve for the dryer being put out of service.
8. Shut off the inlet ball valve for the dryer being put out of service.
9. On the control panel, change "Dryer Select" to the dryer being put into service.

10. Set "Dryer Override" to Off

Dryer Annual Maintenance

It is recommended that the AT2D have the following parts replaced annually as preventative maintenance:

- All seals and O-rings
- Diffuser screen
- Exhaust valve
- Internal after-filter
- All filter elements
- Desiccant

Please contact 3D Prototech for parts needed and reference your call with the serial number on the system.

AT2D 10, 20, 30

- Bypass the dryer
- Disconnect the dryer from air lines
- Loosen the tie rod and remove it
- Remove the old adsorbent and fill activated alumina and molecular sieves
- Make sure O-rings or gaskets are in place
- Install and screw the tie rod

AT2D 45, 60

- Bypass the dryer
- Disconnect dryer from air lines
- Loosen the M8 Allen bolt and remove the top block and top compactor plate
- Remove the saturated desiccant bag by pulling the bag handle in an upward direction and replace the new desiccant bag. If there is no desiccant bag, just tilt the dryer to remove the old desiccant and replace with a new desiccant bag.
- Make sure O-rings or gaskets are in place
- Install the top compactor plate, followed by the top block, then screw in the M8 Allen bolt

AT2D 100, 200, 300

- Bypass the dryer
- Disconnect dryer from air lines
- Loosen the M8 Allen bolt and remove the top block and top compactor plate
- Remove the saturated desiccant bag by pulling the bag handle in an upward direction and replace the new desiccant bag. For replacement, put a no. 3 activated alumina bag and a no. 1 molecular sieves bag in each tower. If there is no desiccant bag, just tilt the dryer to remove the old desiccant and replace with a new desiccant bag.
- Make sure O-rings or gaskets are in place
- Install the top compactor plate, followed by the top block, then screw in the M8 Allen bolt

AT2D 125, 250, 375

- Bypass the dryer
- Disconnect dryer from air lines
- Loosen the M8 Allen bolt and remove the top block and top compactor plate

- Remove the saturated desiccant bag by pulling the bag handle in an upward direction and replace the new desiccant bag. For replacement, put a no. 3 activated alumina bag and a no. 1 activated alumina and molecular sieves bag as well as a no. 1 molecular sieves bag (AD1424) in each tower. If there is no desiccant bag, just tilt the dryer to remove the old desiccant and replace with a new desiccant bag.
- Make sure O-rings or gaskets are in place
- Install the top compactor plate, followed by the top block, then screw in the M8 Allen bolt

Troubleshooting

Problem	Possible Causes	Solution
Control Screen indicates a tower switch, but tower not switching	<ul style="list-style-type: none"> • Loose wire • Stuck solenoid valve 	<ul style="list-style-type: none"> • Check coil connection at DIN and terminal connector in the panel • Check the solenoid valve
No purging	<ul style="list-style-type: none"> • Stuck solenoid valve • Clogged exhaust valve • Clogged silencer/ muffler 	<ul style="list-style-type: none"> • Check the solenoid valve • Check the exhaust valve • Clean the silencer (muffler)
Continuous purging at tower 1	<ul style="list-style-type: none"> • Shuttle not closing 	<ul style="list-style-type: none"> • Check pilot air for exhaust valve • Check exhaust valve piston stuck
High purge loss	<ul style="list-style-type: none"> • Shuttle not closing 	<ul style="list-style-type: none"> • Check outlet shuttle closing • Check for silencer choke
High pressure drops across dryer	<ul style="list-style-type: none"> • Pre-filter may be clogged 	<ul style="list-style-type: none"> • Check and replace filter elements
DP sensor failed (DP FLT)	<ul style="list-style-type: none"> • Loose wire 	<ul style="list-style-type: none"> • Check the wiring between the sensor and terminal in the panel
CO sensor failed (CO FLT)	<ul style="list-style-type: none"> • Faulty Sensor 	<ul style="list-style-type: none"> • Check connection to CO transmitter, replace if needed
Dew point high (DP HI)	<ul style="list-style-type: none"> • High dew point 	<ul style="list-style-type: none"> • Check the wiring between the sensor and terminal in the panel
CO high alarm (CO HI)	<ul style="list-style-type: none"> • High CO level • RF interference 	<ul style="list-style-type: none"> • Check the inlet of the air system for possible source of CO • Call 3D Prototech technical support to adjust setting of the CO readout • Press "Alarm Reset" once CO level falls below the set alarm valve

Warranty

3D Prototech Corp. warrants the equipment to be free of defects in materials or workmanship when installed and operated in accordance with instructions. The Warranty Period will be (12) months commence upon shipment of the product. This warranty covers the replacement of defective parts and shipping costs within the continental United State and Canada.

This warranty covers all necessary parts as defined in the Conditions of Standard Warranty Periods, required for correction of the defect whether by any or all of replacement, or credit, which election shall be made by 3D Prototech Corp. at its sole discretion, and which are purchaser's only remedies for breach of warranty.

This warranty requires the owner to ensure that the equipment is:

- Installed in accordance with installation and maintenance manuals provided with the product
- Certified in accordance with all applicable local standards, by a properly qualified certification agency
- Maintained in strict accordance with Operation and Maintenance Instructions provided with the product

Warranty claims will be honored only after defective parts are evaluated by 3D Prototech Corp and only when the examination discloses to 3D Prototech Corp's reasonable satisfaction that the equipment has not been damaged in shipment or improperly installed, operated outside of any published parameters (including but not limited to mechanical, electrical, temperature, pressure, or ventilation), improperly or inadequately maintained, field modified in any way, improperly repaired, or in any other way improperly applied or used.

All claims against this warranty require prompt notification, within the warranty period, of any seeming defect. Failure to promptly notify 3D Prototech Corp. of the seeming defect will invalidate all warranties.

3D Prototech Corp. is not liable for delay, damage or defect caused by shipping, acts of God, fire, war, labor difficulties, action of government, or other cause beyond the reasonable control of 3D Prototech Corp. If there is a material delay in delivery for any reason, purchaser's only remedy is to cancel the purchase order.

This warranty is given in lieu of all other warranties, expressed or implied, including implied warranties of fitness for a particular purpose and merchantability. In no event is 3D Prototech Corp. liable for damages in excess of the value of the defective product, nor is 3D Prototech Corp liable for any indirect, special or consequential damages, loss of profit of any kind, or for loss of use of the products, even if 3D Prototech Corp. is aware or should be aware of the possibility of the same.

Technical Support

For further information regarding this product, please contact 3D Prototech Corp. or visit www.3dproto.ca