

# ***DRY AIR PAC™***

## **FACTORY MUTUAL APPROVED AIR DRYING UNITS FOR REFRIGERATED AREA AND DRY PIPE SPRINKLER SYSTEMS**

### **INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS**

#### **MODELS DAP500, DAP1000 & DAP2000**

#### **ENGINEERED COMPRESSED AIR DRYING SYSTEMS FOR COLD STORAGE/ FREEZER ROOM DRY PIPE SPRINKLER SYSTEMS**

<b>MODEL NUMBER</b>	<b>SYSTEM CAPACITY</b>	<b>COMPRESSOR HORSEPOWER</b>	<b>DRYER RATING SCFM</b>	<b>APPROXIMATE SHIPPING WT.</b>
DAP500	500 GALLON	2	10	375LBS
DAP1000	1000 GALLON	5	20	500LBS
DAP2000	2000 GALLON	5	27	550LBS

## INSTALLATION

1. Install DRY AIR PAC in a clean, dry location, ***with ambient temperatures at all times above 50° F.***, adjacent to the sprinkler system piping outside the cold room.  
***NO MORE THAN 3 SYSTEMS ARE TO BE CONNECTED TO A SINGLE DRY AIR PAC; CAPACITY OF EACH SYSTEM SHOULD NOT EXCEED THE RATED CAPACITY OF THE DRY AIR PAC.*** The unit must be accessible at the front for servicing all major components. The unit should be leveled and anchored to the floor (**the vibration isolators supplied with the unit MUST be utilized**). *If the location is below freezing at any time the unit must be enclosed in a separate, heated enclosure to keep the temperature above 50° F.*

### NOTE:

**Do not install the Dry Air Pac in an area where ammonia vapors or similar contaminants exist. The equipment and desiccant can be damaged by ammonia and other vapors. Locate the Dry Air Pac to ensure no ammonia or other vapors are drawn into the intake.**

2. The unit has been filled with oil for test purposes, it is strongly recommended to change this oil after the initial run in period on site. 2 Quarts of oil are shipped with each Dry Air Pac for this purpose. When adding or replacing oil only use ***General Part Number ACPO1Q Specially Formulated Compressor Oil.***

***Oil requirements are as follows:***

<b><i>DAP500</i></b>	<b><i>22ounces</i></b>
<b><i>DAP1000</i></b>	<b><i>Approximately 1 1/2 quarts (middle of oil level window)</i></b>
<b><i>DAP2000</i></b>	<b><i>Approximately 1 1/2 quarts (middle of oil level window)</i></b>

***Lightweight lubricants should not be used nor heavy gear oils.***

3. Connect proper supply voltage to the starter line terminals in the control panel.  
***Note: Wire size must be capable of carrying the unit load, without dropping the voltage at the terminals below normal operating levels. Double check incoming wire size; if there are any questions please call us, we can assist you in ensuring you have selected the correct size.*** Be sure the control power transformer has its primary side jumpers connected to match the incoming supply voltage. Each unit is run at the factory and results noted for reference so if there are any questions please contact the factory. Motor rotation will always need to be checked. After connecting the power, use the on/off switch on the front of the unit to turn on the compressor briefly to check rotation. An indicating arrow is on the compressor flywheel. If rotation is not correct on three phase units, reverse any two leads. On single phase units refer to the motor nameplate, however it should not require changing as it has been run at

the factory. If you feel this is required please consult with factory personnel as there may have been changes made to the unit, which should be discussed with the factory *PRIOR TO* starting the unit. Please ensure sufficient power is available at the unit. Long feed line runs can cause voltage drops, which can affect the performance of the unit and damage the motor.

**ONLY QUALIFIED ELECTRICAL PERSONNEL SHOULD CONNECT THE UNIT.**

4. Each DRY AIR PAC is shipped with desiccant installed. The unit will need to be run for a minimum of 8 hours *PRIOR TO* any air being used from the Dry Air Pac in the sprinkler system. Air should be bled from the tee after the regulator in an amount to allow the compressor to run *NO MORE* than 4 times per hour.

*NOTE: If you are connecting to an old piping system there may be existing leaks in the system which cause the compressor to cycle more frequently than 4 times per hour. If this is the case there are three suggestions: 1. Fix the leaks. 2. Add a second DRY AIR PAC to provide enough air to bring the cycle times back to less than 4 times per hour. 3. Add a receiver, which can act as a storage buffer to supply more air to the system. This should be discussed with the factory personnel, as it will only work in cases where minor leaks are involved.*

5. The DRY AIR PAC is supplied with a removable, threaded inlet air filter so that if the AHJ requires the air to be drawn from the cold room this can be done. **These units have been FM Approved with air NOT being drawn from the freezer room. Therefore WE DO NOT RECOMMEND they be connected to the freezer room.** The Dry Air Pac is designed so that performance will not be adversely affected with the filter left in place directly on the compressor. If connected in the cold room, the piping back to the compressor must be 1 1/2" minimum pipe size for this run, bushed down directly at the compressor inlet elbow. ***This pipe must be heat traced and insulated.*** The filter should be mounted on the inlet end of this pipe directly in the cold room. *The interconnecting piping should be clean of any foreign matter, which may be drawn into the compressor and cause damage.*

6. There is a 1/2" pipe plug installed in the outlet tee. This is provided as a point to install a dew point monitoring device, should you require one. This is after the regulator and gives you the pressure dew point of the system. Be careful to follow the dew point monitor manufacturer's recommendations as far as installation is concerned.

7. The DRY AIR PAC outlet is from the combination particulate filter with pressure regulator, mounted on the right lower side of the unit facing the control panel. Connect this outlet to the sprinkler system air inlet.

8. The DRY AIR PAC has a UL/FM approved Air Maintenance Device built into the unit. It will require adjustment of the regulator to your system requirements. It replaces the final regulator, which should be left fully open once the Air Maintenance Device has been adjusted and valved into the line. If connecting more than one system to the unit, the Air Maintenance

Device should be left valved out of the system and the individual AMD's used to control each system should be utilized.

*NOTE: Leaks in the piping system will affect the pump up time of the system. The DRY AIR PAC has been factory tested to produce the published capacity.*

9. An integral electronic drain valve is installed on each unit. The drain is pre-set when the unit leaves the factory. If necessary you can adjust the time between openings and the length of time the valve is open using the control knobs located above the hour meter on the front of the control panel. Under normal circumstances the maximum time between openings should be sufficient. If more frequent openings are required due to excessive compressor operation simply decrease the duration between openings. The On/Off - Manual Test switch can be used to check operation.

## START UP

AS NOTED PREVIOUSLY - The unit must run for a minimum of 8 hours PRIOR TO any air being taken from the Dry Air Pac into the sprinkler system. Air should be bled from the tee after the regulator in an amount to allow the compressor to run NO MORE than 4 times per hour for this period.

1. With all the connections made as described in INSTALLATION, the unit is ready to start. With the valve ahead of the coalescing filter closed, turn the unit on with the switch on the front of the control panel. The compressor should start to fill the receiver tank and the tank pressure gauge on the front of the control panel should indicate the pressure. The unit should pressurize the receiver to approximately 100psig and then shut off.

### *Note:*

*Do not adjust the pressure switch on the unit. It is factory set at the values required for correct operation of the unit. Warranty may be void if the pressure switch is reset.*

The unloader line will operate to bleed off the pressure in the line from the compressor to the receiver inlet so that the compressor does not start loaded. Air will exhaust from the small valve at the side of the switch immediately after the compressor is shut off. This should not occur when the compressor is running or for long periods of time after the compressor shuts off. *If this occurs, contact the factory.*

2. Open the valve ahead of the coalescing filter and pressurize the rest of the DRY AIR PAC. The Air Maintenance Device should be in bypass mode, with the 3/4" valve open.

3. The outlet valve should now be open to allow air to begin to purge into the sprinkler system. The final regulator is factory set to 40 psig. The regulator should always be set to maintain pressure on the drying tower between 70 to 100 psig. At no time should the regulator be opened to bleed all pressure off the drying system, as this will adversely affect drying quality.

4. Open an inspection test point on the far end of the sprinkler system to allow the current wet air in the sprinkler system to be purged out of the system. This leak should be adjusted to allow the compressor to run, after filling the system to pressure, NO MORE than 4 times per hour. Allow this to run for 24 hours then close the inspection test port to allow the system to function normally.

5. The automatic drain is set to a mid position at the factory. You should not need to adjust this frequency or duration but if you do, be aware that the quicker the cycle and the longer the open time, the more air will be used and the less will be available at the unit outlet. A light on the control panel will indicate when the drain is operating. A length of tubing is provided at the drain valve outlet for piping to a convenient drain water disposal position.

*BE SURE TO PIPE THIS DISCHARGE TO A POSITION WHERE THE DISCHARGED AIR AND WATER WILL NOT BE A HAZARD TO PERSONNEL.*

6. Once the system is filled the Air Maintenance Device will need to have the 3/4" valve closed, the two 1/4" valves opened and the regulator set for final system maintenance pressure. The final regulator should then be opened to full to allow the Air Maintenance Device to be the controller.

**7. REMEMBER - After the 24-hour period, close the inspection port.**

## OPERATION

The following is a description of the operation of the DRY AIR PAC.

Typically air is drawn into the compressor intake through the threaded inlet filter. **These units have been FM Approved with air NOT being drawn from the freezer room. Therefore WE DO NOT RECOMMEND they be connected to the freezer room.** If required by the AHJ, air is drawn in from the cold room through the inlet filter installed inside the cold room.

This air then travels to the compressor intake via 1 1/2" minimum line size piping.

Upon reaching the compressor, it is drawn into the compressor intake and compressed through the compression cycle and then discharged into the intercooler. The air then crosses over into the air cooled aftercooler where ambient air being pulled over the coil cools the hot compressed air. Water in the compressed air will now drop out of the air as it cools and drops down into the receiver. A check valve in this line prevents any back flow to the compressor. The water settles

into the bottom of the receiver and is discharged from the receiver when the automatic drain valve opens.

This air then leaves the receiver and goes into the coalescing filter where it has entrained oil removed. This air then travels to the dryer inlet. The air is diverted to the corresponding tank via two solenoid valves. The air travels upwards through the desiccant bed and exits through the top of the tank. A portion of this dried air is diverted to the opposite tank via the purge valve and gauge/orifice combination. The pressure gauge setting is factory set (see following settings for each model). If re-setting is required, consult the factory for assistance. The purge air enters the top of the tower and travels in a downward direction to pick up the water molecules from the desiccant as the pressure drops to atmosphere. The wet purge air then exits the bottom of the tank and is vented to atmosphere via the purge mufflers. These mufflers act to quiet the discharging air and also reduce the noise when the towers depressurize. These mufflers are removable for cleaning with soap and water periodically. Cleaning will ensure no build up, which will create back pressures in the tanks and decrease dryer performance. Both inlet and outlet of the tanks have screens to retain the desiccant. The exiting air then goes to the Air Maintenance Device. (See Start Up above for operating positions). From the Air Maintenance Device the air goes into the final filter regulator. The air up to this point has been at 70 – 100 psig. When it leaves the filter regulator it is reduced to system pressure.

*NOTE: THE DRYER MUST OPERATE AT THE HIGHER PRESSURE IN ORDER TO FUNCTION CORRECTLY. THE AIR MAINTENANCE DEVICE REGULATOR MUST BE SET AND VALVED INTO THE SYSTEM.*

## SETTING PURGE PRESSURE

The purge pressure set valve is located between the two tanks just over the top of the control panel. This valve is pre-set at the factory, however should it need to be adjusted for any reason, the following listing shows the correct set pressures.

DAP500	20psig
DAP1000	30psig
DAP2000	27psig

## COALESCING FILTER - OPERATION

The coalescing filter is there to protect the desiccant dryer from oil carryover from the compressor. The filter has a built in differential pressure indicator with three color bands. Green is normal condition, yellow is warning that the element is going to need to be replaced, and red indicates the filter is overdue for replacement.

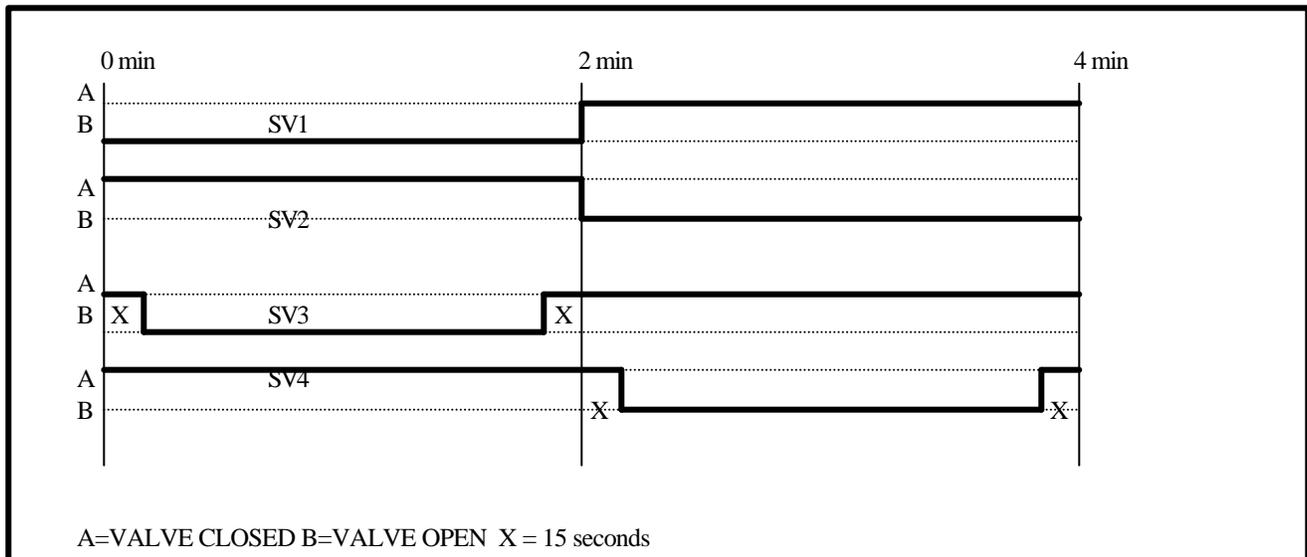
The filter has a built in automatic drain, which in normal service will expel accumulated oil or moisture from the bottom of the bowl. The drain can be tested by pushing up on the needle valve stem, which is in the mouth of the black outlet nipple on the bottom of the filter.

SERVICE KITS ARE AVAILABLE AS DETAILED BELOW. MODEL AND SERIAL NUMBERS ARE REQUIRED WHEN ORDERING SERVICE KITS

KIT# KSMB01	Compressor Intake Filter Element(s), Coalescing Filter Element, Particulate After Filter Element and Compressor Oil
KIT# KAMA01	Same as Kit # KSMB01 and full desiccant charge for both dryer towers

**OPERATING SEQUENCE - DRYER**

The dryer operates on a 4-minute total cycle. There are four valves at the inlet manifold, and four at the outlet manifold. The timing cycle diagram shows the sequence of operation of the four inlet valves. The outlet valves are check valves, which sequence automatically with the operation of the inlet valves. SV1 and SV2 are the inlet valves to the towers, SV3 and SV4 are the opposite purge valves such that when the left tower is drying and its inlet valve is open, the purge valve on that tower is closed.



With the unit turned on and the tank pressurized, air is ready to be used from the unit. As air is withdrawn from the unit into the sprinkler system, the pressure will drop and the pressure switch will start the compressor. As the compressor runs, the dryer is energized. The drying tower is indicated by a light on the front of the panel, as shown in the mimic panel. The drying tower will show tank pressure and the opposite tank, when purging will show no pressure; when repressurizing prior to switch over, it will show tank pressure. The purge valve can only be

adjusted during the time the off line tower is purging and is showing no pressure. At this time, if necessary, adjust the purge pressure to the value in the above table. The dryer cycle timer runs only when the compressor is running and accumulates time so that the length of the cycle on any one tower does not get out of line with its normal operation and does not saturate one desiccant bed.

The frequency of change for the oil, filter elements and desiccant is highly dependent upon the following:

Number of times the unit has to operate to satisfy the system air requirement. The tighter the system, the less the unit will have to run.

Cleanliness of the environment in which the compressor is located.

Maintenance schedule for the equipment.

As the desiccant will degrade (age) slightly over time, it is recommended that the desiccant be changed once every year.

***Consult the factory for type and quantity per unit.***

### ADDITIONAL SPECIFICATIONS

MODEL	COMPRESSOR HP	DRYER RATING CFM	CURRENT LOAD 460V	CURRENT LOAD 230V	WIRE SIZE 460V	WIRE SIZE 230V
DAP500	2	10	2.9 AMPS	5.8 AMPS	12 GA	12 GA
DAP1000	5	20	6.2 AMPS	12.4 AMPS	12 GA	10 GA*
DAP2000	5	27	6.2 AMPS	12.4 AMPS	12 GA	10 GA*

\*IF UNDER 50' RUN 12 GA CAN BE USED HOWEVER, CHECK VOLTAGE WHILE RUNNING TO ENSURE NO UNDERVOLTAGE CONDITION EXISTS. FOR RUNS OVER 100' INCREASE WIRE SIZE TO CORRECT FOR VOLT DROPS.

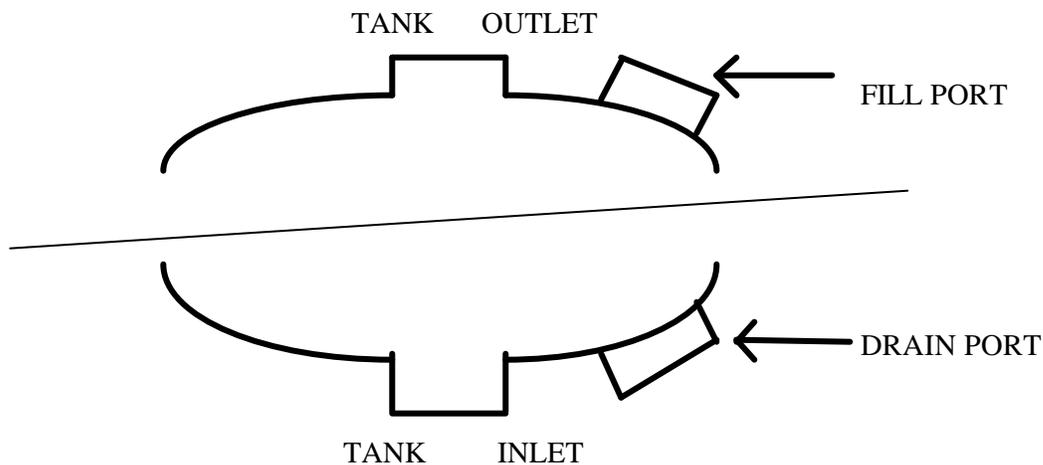
## DESICCANT REPLACEMENT

NOTE: You will need the following in order to service the unit:  
Annual Service Kit - “General” part number: KAMA01

1. Close the outlet valve of the unit and turn the power to the unit off.
2. Depressurize the unit completely by opening the petcock on the bottom of the receiver and checking the pressure gauges to ensure all air is removed. If air remains in the desiccant tanks, pull on the relief valve toggles to depressurize the tanks.

**ALL PRESSURE MUST BE OUT OF THE UNIT PRIOR TO WORKING ON THE UNIT.**

3. The tanks have separate desiccant fill and drain ports at the top and bottom.



4. Once the pressure has been removed from each tank, remove the lower (drain) port plug. Desiccant will start to drop out of the 1/2” port. It is easiest to vacuum the desiccant out with a shop vac; however, the desiccant will drop out of the tower. You may have to probe the outlet with a thin probe in order to keep the desiccant from jamming together at the port. The desiccant is white in color; yellow means the desiccant has oil on it.

5. Ensure that all desiccant is removed from the tower. Replace the plug ensuring the threads are cleaned and re-doped with thread sealant before replacing.

CHECK the condition of the lower desiccant. As flow is upward through the bed, the lower desiccant will see any major contaminants and any carryover from the inlet filter if this has not been serviced correctly. Oil on the lower desiccant means that the filter element has been over saturated allowing oil to be carried over into the desiccant bed.

CHECK the filter drain and element before putting the new desiccant into the towers.  
**Consult the factory if any oil is in the towers.**

6. Remove the upper plug from the fill port.

7. Using “General” part number 34006-50, refill the tower with new, white desiccant.

**NOTE:**

Only add desiccant beads to towers when refilling. Avoid adding chips and dust, which may be in the bottom of the bag of desiccant, to the towers.

8. Reinstall the fill port ensuring that you clean the threads and re-dope prior to installation.

9. Remove and replace the pre & afterfilter elements prior to putting the unit back in service. This is accomplished by unscrewing the bowls and following the kit instructions to replace the elements. We would be happy to look at the old elements if you feel there is any question as to the condition. Please contact the factory for shipping instructions. Replace the filter bowls and tighten securely prior to re-pressurizing the unit.

10. Turn the power back on to the unit (see 11.).

11. Open the discharge valve of the unit, then the valve ahead of the coalescer, turn power back on to the unit and allow the unit to repressurize.

12. Operate the drain valve manually to bleed air to force the dryer through a full cycle to ensure that the towers pressurize and repressurize correctly and go through their cycle. This is simply a check to see that the unit is operating normally. The unit is now ready to go back in operation.

Run the unit for the 8 hours as above in INSTALLATION, item 4, before letting air feed back into the system.

**NOTE:**

The purge mufflers **must** be removed during the first 2 hours of the 8-hour break-in period detailed above. Reinstall the mufflers **only after** 2 hours of operation.

Once this has been done, valve the unit back into the system.

Should you have any questions, please call the factory and ask for Customer Service at 1-800-345-8207.

TROUBLE SHOOTING GUIDE

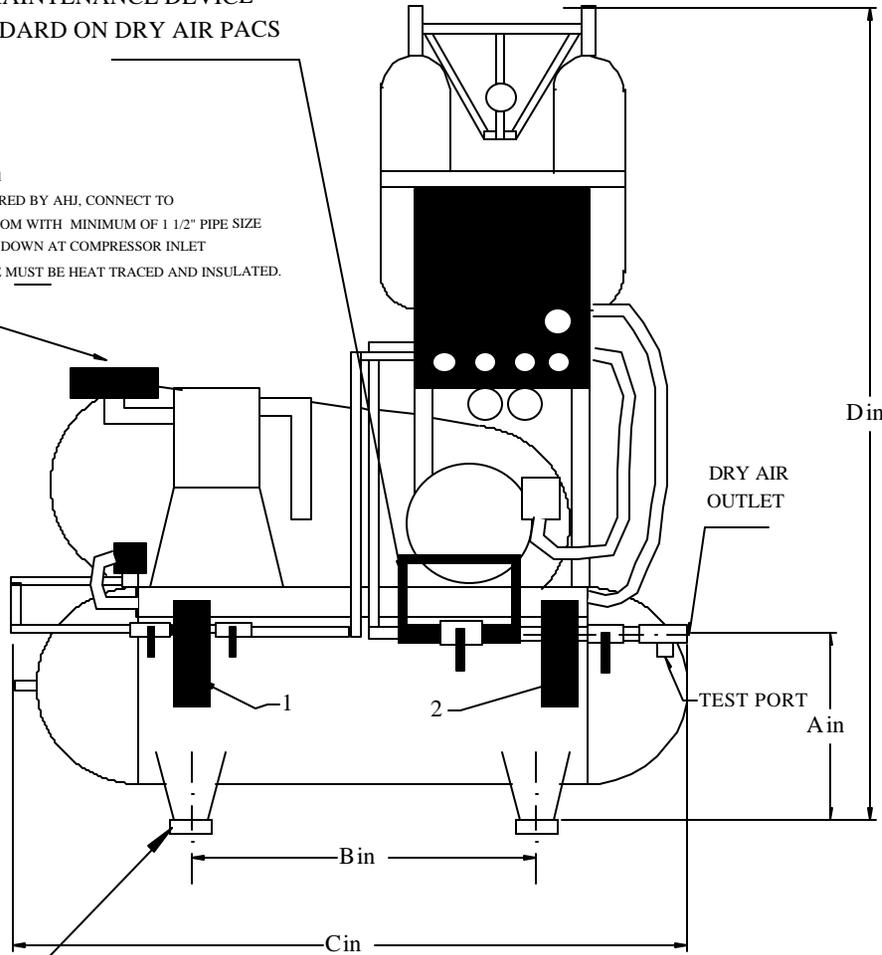
PROBLEM	PROBABLE CAUSE	SOLUTION
POOR DEWPOINT PERFORMANCE	Low pressure on desiccant dryer.	Dryer is set to operate at 70 to 100 psig. Re-set regulator on DAP Air Maintenance Device to hold back pressure on dryer side to normal settings. Check to see that Air Maintenance Device bypass valve has not been opened. Check compressor output to ensure compressor is running normally. Check no leaks have developed in DAP system such as drain valve sticking open, filter drain valves sticking open, etc.
	Excessive water &/or oil in dryer.	Check coalescing filter & automatic drain operation.
	Low purge flow.	Check purge pressure setting.
	Desiccant contamination.	Check compressor intake is not in an area where chemicals can be drawn into the intake filter with air. Check when the last time the desiccant was changed. Recommended frequency of change, 1 to 2yrs. Check condition of coalescing filter element and drain.
EXCESSIVE PRESSURE DROP	High inlet temperature to dryer.	See alternatives above.
	Low inlet pressure.	See alternatives above.
	Switching valve failure.	Check tower-operating sequence to verify and identify which valves are operating.
Desiccant breakdown.	Change desiccant.	

EXCESSIVE PRESSURE DROP (continued)	Clogged filters.	Change filter elements.
	Valve shut.	Open valve.
SWITCHOVER FAILURE	Electric power loss.	Turn dryer off; check connections to cam timer and inlet to unit.
	Solenoid valve failure.	Check valve operating sequence. Replace valve.
REPRESSURIZATION FAILURE OR PURGE FAILURE/TOWER BACKPRESSURE	Purge flow control valve orifice clogged.	Clean or replace.
	Failed check valve.	Replace.
	Purge exhaust solenoid valve failure.	Turn dryer off, check connections to cam timer, inspect valve and solenoid, replace if necessary.
	Purge exhaust muffler clogged.	Clean or replace.

**THANK YOU FOR USING OUR PRODUCTS, WE APPRECIATE YOUR BUSINESS.**

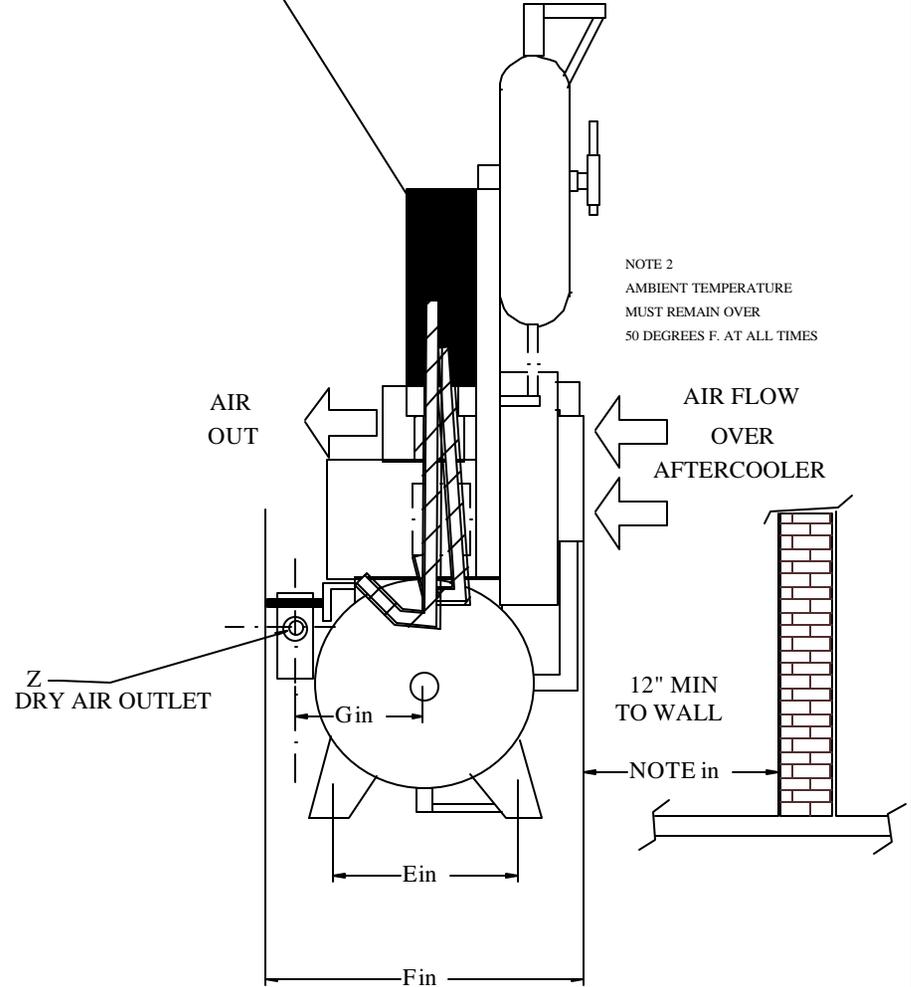
**UL/FM APPROVED  
AIR MAINTENANCE DEVICE  
STANDARD ON DRY AIR PACS**

NOTE 1  
IF REQUIRED BY AHJ, CONNECT TO  
COLD ROOM WITH MINIMUM OF 1 1/2" PIPE SIZE  
BUSHED DOWN AT COMPRESSOR INLET  
THIS PIPE MUST BE HEAT TRACED AND INSULATED.



1" THICK VIBRATION ISOLATION PADS SHIPPED WITH UNIT.  
UNIT MUST BE MOUNTED ON VIBRATION PADS.

**CONTROL PANEL CUSTOMER CONNECTION AREA**



NOTE 2  
AMBIENT TEMPERATURE  
MUST REMAIN OVER  
50 DEGREES F. AT ALL TIMES

1. COALESCING FILTER - AHEAD OF DRYER.
2. FILTER REGULATOR, AFTERFILTER - AFTER DRYER.

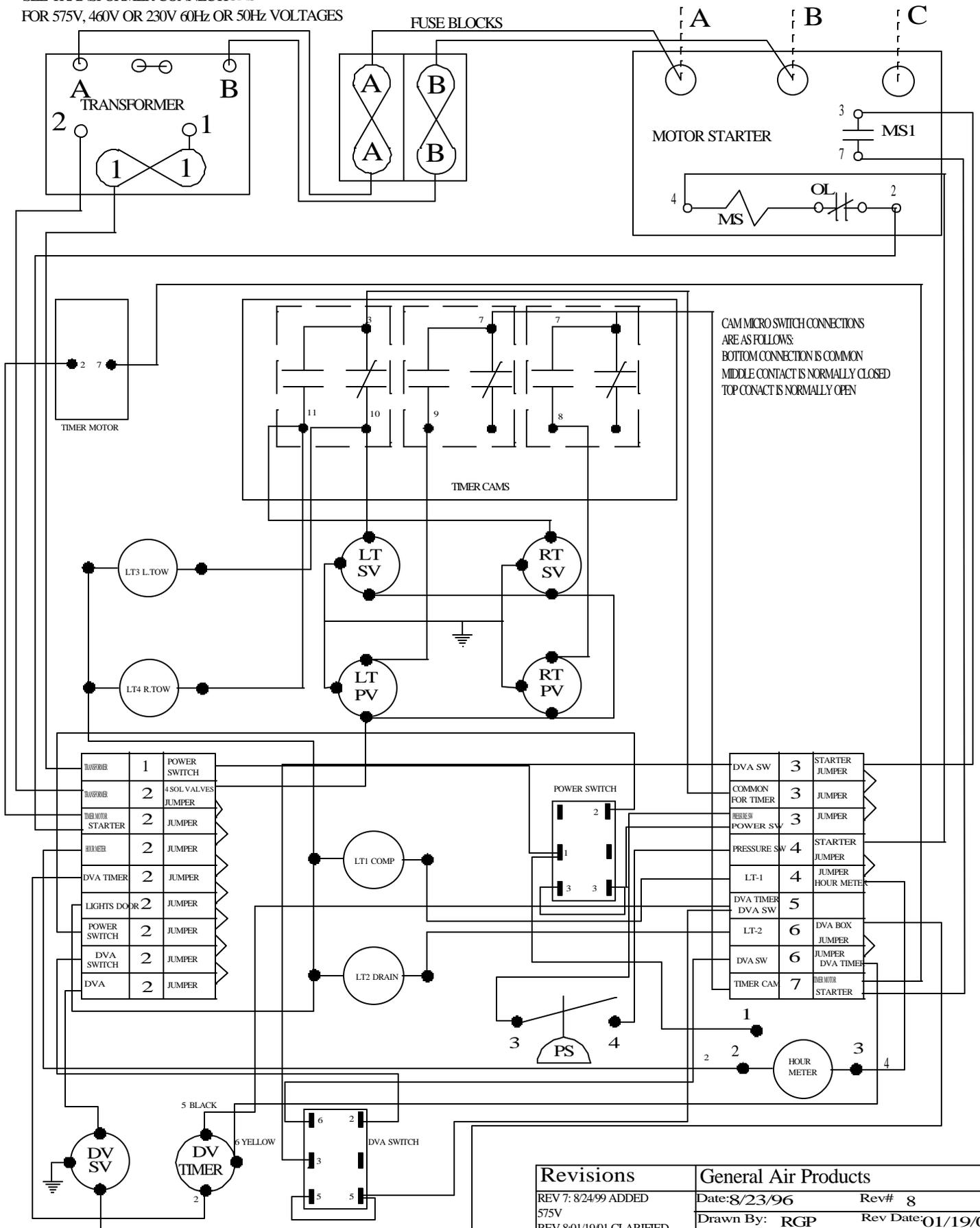
MODELS DAP 500, 1000 & 2000		DIMENSIONS						
	A	B	C	D	E	F	G	Z
500 1000	17 5/8"	18"	44"	69 1/2"	13"	23 1/2"	10"	1/2" FPT
2000	17 5/8"	18"	44"	72 1/2"	13"	23 1/2"	10"	1/2" FPT

DAPOL

Revisions	General Air Products	
	Date: 8/15/96	Rev# 6
	Drawn By: RGP	Rev Date: 7/22/97
	Drawing # G-9646	Scale: NTS
Title: DRY AIR PAC OUTLINE DIMENSIONS		

SEE TRANSFORMER CONNECTIONS  
FOR 575V, 460V OR 230V 60Hz OR 50Hz VOLTAGES

POWER INPUT FROM CUSTOMER



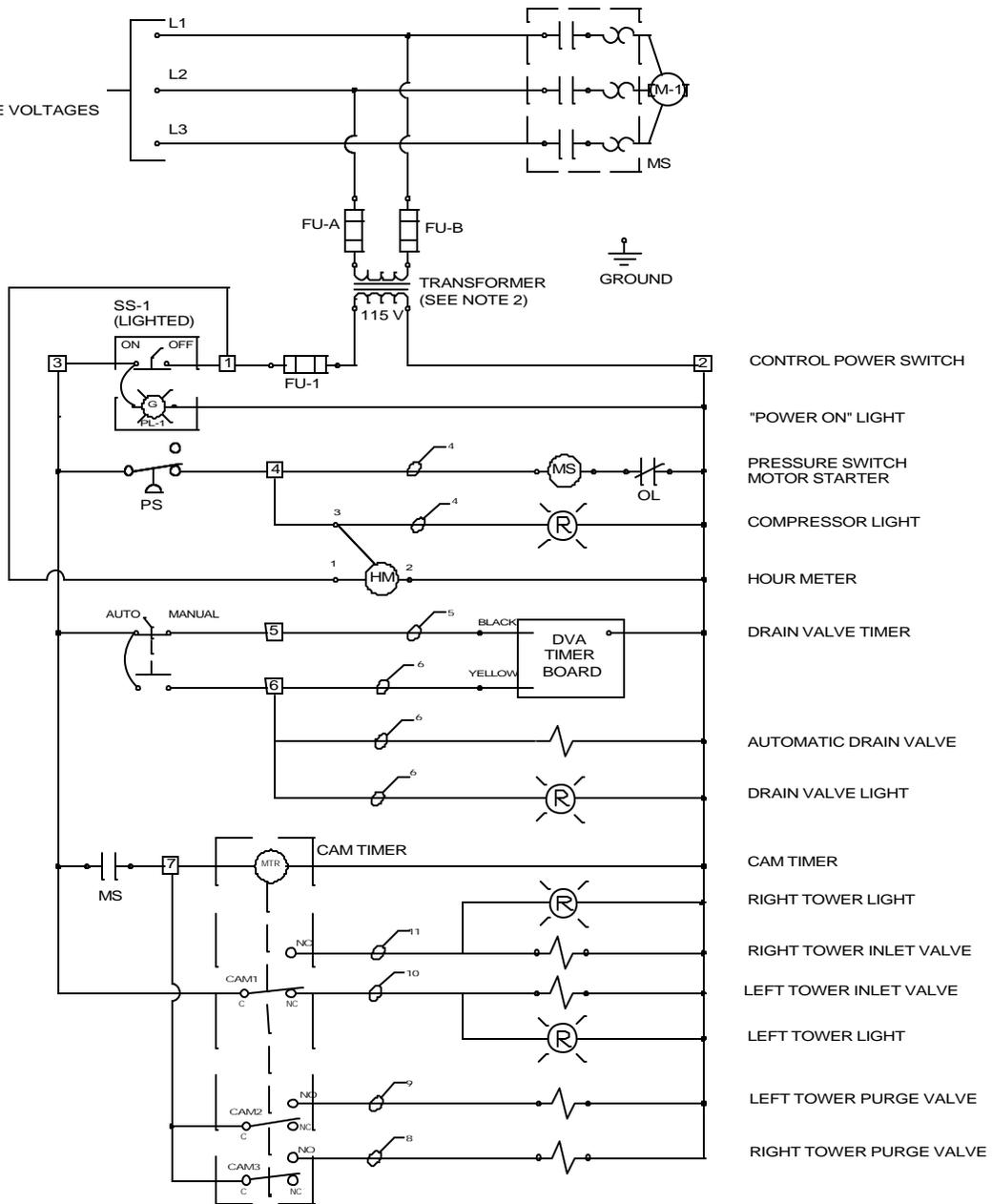
CAM MICRO SWITCH CONNECTIONS  
ARE AS FOLLOWS:  
BOTTOM CONNECTION IS COMMON  
MIDDLE CONTACT IS NORMALLY CLOSED  
TOP CONTACT IS NORMALLY OPEN

TRANSFORMER	1	POWER SWITCH
TRANSFORMER	2	4 SOL VALVES JUMPER
TIMER MOTOR STARTER	2	JUMPER
HOUR METER	2	JUMPER
DVA TIMER	2	JUMPER
LIGHTS DOOR	2	JUMPER
POWER SWITCH	2	JUMPER
DVA SWITCH	2	JUMPER
DVA	2	JUMPER

DVA SW	3	STARTER JUMPER
COMMON FOR TIMER	3	JUMPER
PRESSURE SW	3	JUMPER
PRESSURE SW	4	STARTER JUMPER
LT-1	4	JUMPER HOUR METER
DVA TIMER	5	JUMPER
DVA SW	6	DVA BOX JUMPER
DVA SW	6	JUMPER DVA TIMER
TIMER CAM	7	TIMER MOTOR STARTER

Revisions	General Air Products	
REV 7: 8/24/99 ADDED 575V	Date: 8/23/96	Rev# 8
REV 8/01/19/01 CLARIFIED TIMER CONNECTIONS	Drawn By: RGP	Rev Date: 01/19/01
	Drawing # E-9645	Scale: NTS
Title: DRY AIR PAC ELECTRICAL - POINT TO POINT		

CUSTOMER CONNECTIONS (SEE NOTE 1) SEE ACCEPTABLE VOLTAGES



- NOTES:  
 1) INPUT VOLTAGE IS CONNECTED TO L1, L2 AND L3 CONNECTIONS ON THE MOTOR STARTER.  
 2) TRANSFORMER CONNECTIONS ARE DETERMINED BY SUPPLY VOLTAGE.  
 3) CAM TIMER MICRO-SWITCH CONNECTIONS ARE: BOTTOM CONTACT IS COMMON, MIDDLE CONTACT IS NORMALLY CLOSED, TOP CONTACT IS NORMALLY OPEN.

ACCEPTABLE VOLTAGES:  
 DAP500B, DAP1000B AND DAP2000B: 460V/230V/208V/3PH/60HZ  
 DAP500B-5, DAP1000B-5 AND DAP2000B-5: 575V/3PH/60HZ  
 DAP500B-50: 190V/200V/208V/220V/380V/400V/415V/3PH/50HZ  
 DAP1000B-50 AND DAP2000B-50: 190V/200V/208V/220V/380V/400V/415V/440V/3PH/50HZ

REV 1: 2/24/06: ADDED ACCEPTABLE VOLTAGES



**GENERAL AIR PRODUCTS**

TITLE  
**ELECTRICAL SCHEMATIC  
 3 PHASE DRY AIR PAC**

SIZE A	DRAWN BY: DPH	DATE: 05/03/04	REV 1
SCALE NTS	DWG NO E-204028	SHEET 1 of 1	