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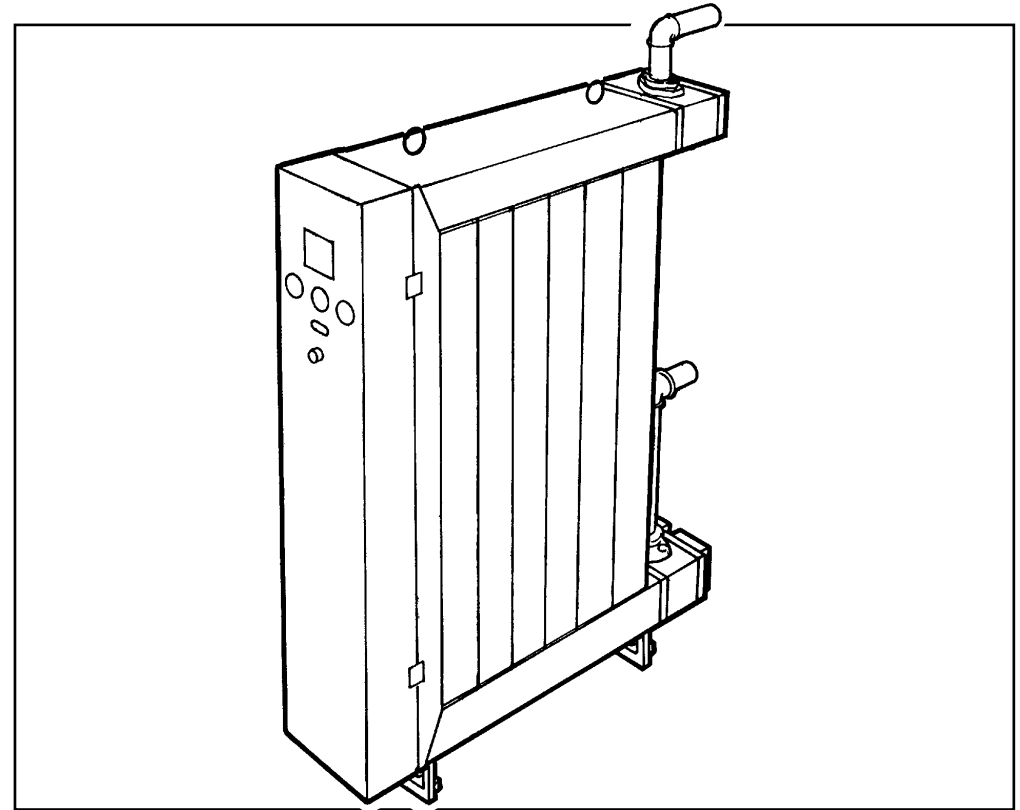
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Sullair has an ongoing policy of product development and although the company reserves the right to change specifications it attempts to keep customers informed of any alterations. This publication is for information only and customers are requested to ask our Industrial Applications Department or Sullair's Representative for advice if in doubt on a product's suitability for a specific application.

## Worldwide Sales and Service



# SM160 - SM800XN

**DESICCANT AIR DRYERS**

**Installation, Operating & Maintenance Instructions**

## **SAFETY WARNING!**

**Do not operate the dryer until the instructions in the operation section of this manual have been read and understood by all personnel concerned.**

It is essential that personnel employ safe working practices and observe all related regulations and legal requirements for safety when operating the dryer.

When handling, operating or carrying out maintenance on the dryer, personnel must employ safe engineering practices and observe all relevant local health and safety requirements and regulations. The attention of UK users is drawn to the Health and Safety at Work Act 1974, and the Institute of Electrical Engineers Regulations.

Most accidents which occur during the operation and maintenance of machinery are the result of failure to observe basic safety rules or precautions. An accident can often be avoided by recognising a situation that is potentially hazardous.

Improper operation or maintenance of the dryer could be dangerous and result in an accident causing injury or death.

**Sullair** can not anticipate every possible circumstance which may represent a potential hazard. The **WARNINGS** in this manual cover the most common potential hazards and are therefore not all-inclusive. If the user employs an operating procedure, an item of equipment or a method of working which is not specifically recommended by **Sullair** he must ensure that the dryer will not be damaged or made unsafe and that there is no risk to persons or property.

Your attention is drawn to the pre-use checklist and commissioning information in the Desiccant Air Dryer Installation, Operating and Maintenance Instructions.

### **IMPORTANT**

#### **Safety Signs**

Operations or procedures involving specific hazards which could cause injury or death if precautions are not heeded, are identified by the following symbols which are displayed on the desiccant air dryer to indicate potential danger points.



**WARNING: RISK OF DANGER**



**CAUTION: RISK OF ELECTRIC SHOCK**



**CAUTION: RISK OF HIGH PRESSURE**

**IT IS STRONGLY RECOMMENDED THAT THE INSTALLATION AND OPERATING INSTRUCTIONS ARE READ THOROUGHLY BEFORE PROCEEDING ANY FURTHER.**

**PLEASE NOTE: YOUR WARRANTY MAY BE INVALIDATED IF THE EQUIPMENT HAS NOT BEEN INSTALLED, COMMISSIONED OR MAINTAINED BY Sullair OR ITS APPROVED AGENTS**

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## 9. WARRANTY

### LIMITED WARRANTY AN LIMITATION OF REMEDIES

**What Is Covered By This Warranty.** Sullair warrants that its products are free from defects in materials and workmanship. The duration of this warranty for each category of Sullair products is as follows:

*	Encapsulated Compressors:	1 year	24 KT Air Ends:	10 years
*	Stationary Compressors:	1 year	Air Ends (except shaft seals):	2 years
*	Vacuum Systems	1 year	Dryers and Filters:	1 year
			Replacement (Spare) Parts	90 days

\* The one year warranty on these products applies to all factory-supplied parts and components other than the Air Ends which are warranted for two years (as indicated above), and the drivers (motors or engines) supplied with the products, which are separately warranted by the manufacturers of those drivers. Sullair hereby assigns to Purchaser all of Sullair's rights under those warranties.

The duration of the warranty is from the date of first start-up or six (6) months after Sullair's shipment date, whichever occurs first. If Purchaser notifies Sullair that the products will be stored for longer than six (6) months after Sullair's shipment date and follows Sullair's long-term storage guidelines, then the duration of the warranty shall be from the date of start-up but in no event longer than two years from the date of shipment.

If within the applicable warranty period, Purchaser discovers defects, Purchaser must promptly notify Sullair and ship the product, freight prepaid, to the Sullair service centre designated by Sullair. Purchaser's **exclusive** remedies for any breach of this warranty are (i) repaired product F.O.B. Sullair's service centre, (ii) replacement product F.O.B. Sullair's service centre, or (iii) a refund of the purchase price paid by Purchaser for the product. Sullair shall choose the applicable remedy at its sole option.

**What Is Not Covered By This Warranty.** This warranty is **strictly conditioned** on the use of genuine Sullair replacement parts (such as filters and separators) and the recommended Sullair lubricant. Use of replacement parts or lubricants not supplied or recommended by Sullair will void all coverage hereunder, as will any disassembly of the products by anyone other than an authorised Sullair repair person. This warranty **does not** cover (i) expenses associated with the removal of defective products or the re-installation of repaired or replacement products; (ii) defects caused by Purchaser's failure to produce a suitable installation environment; (iii) defects caused by abuse or use of products for purposes other than those for which designed; (iv) defects caused by unauthorised attachments or modifications; or (v) damage that occurred during shipping.

**Disclaimer of Warranty.** THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES. EXPRESS OR IMPLIED. INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

**Limitation of Remedies.** In no case shall Sullair be liable for any special, incidental, or consequential damages based upon breach of warranty, breach of contract, negligence, strict tort, or any other legal theory. Such damages include, but are not limited to loss of profits, loss of savings or revenue, loss of use of the products or any associated equipment, cost of capital, cost of any substitute equipment, facilities or services, downtime, the claims of third parties including customer, and injury to property.

**Time Limit for Bringing Suit.** Any action for breach of warranty must be commenced within 3 months after the applicable warranty period has expired.

**No Other Warranties.** Unless modified in a writing signed by both parties, this Limited Warranty is understood to be the complete and exclusive agreement between the parties, superseding all prior agreements, oral or written, and all other communications between the parties relating to warranties. No employee of Sullair or any other party is authorised to make any warranty in addition to those made herein.

**Allocation of Risks.** Purchase acknowledges that this Limited Warranty allocates the risks of product failure between Sullair and Purchaser and that this allocation is reflected in the price of the products. Purchaser acknowledges that it has read and understands this Limited Warranty, and is bound by its terms.

**8. MAINTENANCE & EXAMINATION RECORD**

**OWNERSHIP DATA**

MODEL NO: ..... COMMISSIONED BY: .....  
 (PLEASE PRINT)  
 SERIAL NO: ..... COMPANY NAME: .....  
 INSTALLATION DATE: ..... TELEPHONE NO.: .....  
 COMMISSIONING DATE: ..... SERVICE PLAN: .....

INSPECTION/EXAMINATION		REPAIR/MAINTENANCE (IF ANY)	
Name	Signature	Date	Summary Remarks

**1. GENERAL DESCRIPTION**

The **Sullair** range of desiccant air dryers is designed to remove moisture from compressed air by utilising the most up to date technology to achieve pressure dewpoints of -40°C (-40°F) and by appropriate flow de-rating, -70°C (-100°F).

The Desiccant Air Dryers comprise of aluminium columns each containing twin chambers filled with desiccant material which dries the compressed air as it passes through. One chamber is operational (drying), whilst the opposite chamber is regenerating by Pressure Swing Adsorption (PSA)

**PRESSURE SWING ADSORPTION (PSA) - HEATLESS SM MODELS**

A small amount of the dried compressed air is used to regenerate the saturated desiccant bed by expanding dried air from line pressure to atmospheric pressure, "stripping off" the moisture adsorbed by the desiccant material, and therefore effecting regeneration.

**MODULAR CONSTRUCTION**

By simply adding further modules (banks) of Desiccant Air Dryers, the operational capacity of the dryer can be increased to precisely match any system demand. Addition of further dryer banks also allows the dryer capacity to be extended to cater for any plant expansion, or a standby capacity.

The Desiccant Air Dryers have been designed to make maintenance requirements minimal, and because of its compact size, can be installed virtually anywhere within a factory.

## 2. TECHNICAL SPECIFICATION

### A. General

<b>Desiccant Air Dryer type:</b>	<b>Heatless</b>
<b>Model:</b>	<b>SM</b>
<b>Pressure Dewpoint:</b>	<b>Nominal</b> -40°C (-40°F) <b>Optional</b> -70°C (-100°F)
<b>Air Quality: (dirt/water/oil):</b>	ISO 8573.1 Class 1.2.1 Class 1.1.1 optional
<b>Maximum Operating Pressure:</b>	10.5 bar g (152 psi g)
<b>Minimum Operating Pressure:</b>	4 bar g (58 psi g)
<b>Maximum Inlet Temperature:</b>	50°C (122°F)
<b>Minimum Inlet Temperature:</b>	5°C (41°F)
<b>Regeneration:</b>	Pressure Swing Adsorption (PSA) [Air Purge Principle]
<b>Nominal pressure drop across desiccant bed:</b>	140 m bar (2 psi)
<b>Standard Electrical Supply:</b>	110V/1ph/60Hz 240V/1ph/50Hz or 240V/1ph/60Hz (other voltages available)
<b>Controls:</b>	Electric Cam Timer (pneumatic option available)
<b>Noise Level (Average):</b>	75db (A)
<b>Media</b>	Desiccant
<b>Inlet/Outlet Connections:</b>	2" BSPP/NPT flange up to and including 5 column units 2 1/2" BSPP/flange, 6 column units and above NPT option available
<b>Material:</b>	High tensile extruded aluminium coated with Alocrom anti-corrosion protection and paint finished with an abrasion resistant dry powder epoxy coating.
<b>Construction:</b>	Constructed from extruded aluminium sections connected together by high tensile bolts i.e. desiccant filled columns are contained between an upper and lower manifold.
<b>Pre filtration:</b>	Grade (MPF), MPH filters
<b>After filtration:</b>	Grade MPF(R)*

## 7. OPTIONAL ACCESSORIES

### A) Hygrometer

A ceramic moisture sensor based hygrometer can be integrated with the Desiccant Air Dryer to perform two main functions. Firstly, it can be used to constantly monitor the outlet dewpoint of the dryer. Secondly, it can be used with additional hardware to control the dryer cycle. This system is called 'Dewpoint Dependent Switching (DDS)'.

#### Hygrometer Operation

The hygrometer is located in an aperture within the instrumentation shroud.

Dewpoint in °C, °F or ppm(v) from the outlet can be continually read on the hygrometer liquid crystal display.

In addition to its ability to continuously monitor the delivered air dewpoint, the hygrometer also has the following features:

#### Alarm Output

Single-pole, double-throw, voltage-free changeover contacts, suitable for switching up to 1A at 250V 50Hz/60Hz non-inductive loads. The signal can open or close a circuit at the pre-set alarm point depending upon the plug pins selected. Adjustment of the pre-set alarm level is possible within the hygrometer.

**\*NB Consult the manufacturer's Service Department before attempting any adjustment.**

#### Analogue Output

For connection to an external chart recorder or continual remote monitor a fully floating 4 to 20mA output is provided, capable of feeding a maximum load impedance of 800 ohms. 0 to 10 V output is also provided. A detailed manual is provided with each hygrometer.

### B) Dewpoint Dependent Switching (DDS)

Because compressed air systems rarely operate at full capacity all of the time, when the dryer changes over there is often spare drying capacity remaining in the bed about to undergo regeneration. This is the basis and reason for operating Dewpoint Dependent Switching.

Using the hygrometer to monitor the outlet dewpoint, the drying cycle can be extended to fully utilise the drying capacity.

In this way long periods of 'Energy Free Drying' are achievable and energy savings of up to 80% are considered normal with greater savings possible in some systems.

For alarm outputs, refer to section 7A for additional hygrometer features.

For details of the Energy Management Dewpoint Dependent Switching (DDS) equipment for inclusion in new product or to retrofit to your existing Desiccant Air Dryer unit, please contact your nearest **Sullair** distributor or **Sullair** direct.

## G) Fault Finding

PROBLEM	VISUAL INDICATION	PROBABLE CAUSE	CHECK	REMEDY
Poor Dewpoint.	Moisture content indicator (amber).	Inlet temperature too high.	Check inlet temperature.	Reduce inlet temperature.
		Contaminated desiccant.	Check desiccant.	Replace desiccant and eliminate source of contamination.
	Hygrometer (if fitted).	As above.	Check fuses and calibration of hygrometer.	Replace fuses, re-calibrate and if necessary replace.
High pressure drop.	Pressure gauges.	Excessive outlet flow.	Check outlet flow.	Regulate.
	Differential pressure indicator in red.	Blocked filter.	Filter element.	Replace filter.
Failure to purge.	No depressurisation.	No signal to exhaust valve.	Check signal line.	Replace signal line if necessary.
	Loss of dewpoint.	Purge air orifice closed.	Check for purge air.	Reset purge air to suit air demand.
		Exhaust silencer blocked.	Check condition of silencer.	Replace if blocked.

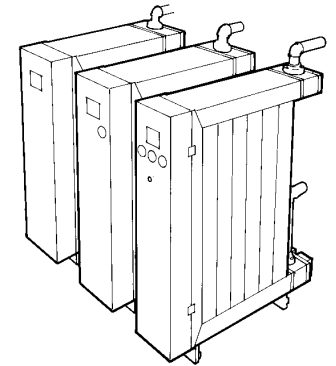
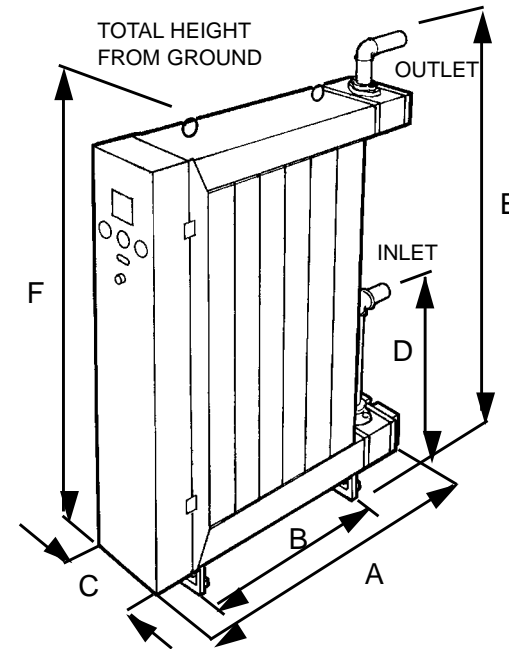
## 2. TECHNICAL SPECIFICATION

### B) DIMENSIONS

#### Heatless - SM

	Dimensions in mm (")						Pipe Con.	Wt Kg.	Recom. Inlet Filter	Recom. Outlet Filter	Filter Con.
	A	B	C	D	E	F					
160XB/XN	692(27.24)	239(9.41)	240(9.45)	831(32.72)	1884(74.17)	1630(64.17)	2"	135	MPF/H-470B/N MPF/H-470B/N	MPF-470B/N	2"
240XB/XN	798(31.41)	345(13.58)	240(9.45)	831(32.72)	1884(74.17)	1630(64.17)	2"	180	MPF/H-470B/N MPF/H-470B/N	MPF-470B/N	2"
320XB/XN	905(35.62)	452(17.79)	240(9.45)	831(32.72)	1884(74.17)	1630(64.17)	2"	220	MPF/H-470B/N MPF/H-470B/N	MPF-470B/N	2"
400XB/XN	1011(39.81)	558(21.97)	240(9.45)	831(32.72)	1884(74.17)	1630(64.17)	2"	250	MPF/H-850B/N MPF/H-850B/N	MPF-850B/N	2"
480XB/XN	1118(44.01)	665(26.18)	240(9.45)	1002(39.45)	2198(86.54)	1630(64.17)	2 1/2"	295	MPF/H-850B/N MPF/H-850B/N	MPF-850B/N	2 1/2"
560XB/XN	1224(48.18)	771(30.35)	240(9.45)	1002(39.45)	2198(86.54)	1630(64.17)	2 1/2"	345	MPF/H-850B/N MPF/H-850B/N	MPF-850B/N	2 1/2"
640XB/XN	1311(51.61)	878(34.56)	240(9.45)	1002(39.45)	2198(86.54)	1630(64.17)	2 1/2"	400	MPF/H-850B/N MPF/H-850B/N	MPF-850B/N	2 1/2"
800XB/XN	1544(60.78)	1091(42.95)	240(9.45)	1002(39.45)	2198(86.54)	1630(64.17)	2 1/2"	520	MPF/H-850B/N MPF/H-850B/N	MPF-850B/N	2 1/2"

**Note:** B to nominate BSPP pipethreads  
N to nominate NPT pipethreads



#### Multiple Banks

The Desiccant Air Dryers unique modular construction allows for higher flow rates to be catered for by simply using additional banks joined side by side

On Multibank installations ensure the minimum distance between centres is 500mm.

### 3. CONTROL AND INSTRUMENTATION

#### A) OPERATION

A hinged **INSTRUMENTATION SHROUD (1)** contains the control circuitry, the purpose of which is to provide a fixed time cycle between the adsorbing and regenerating desiccant beds, and to provide automatic changeover at the end of each half cycle.

Filtered compressed air enters through the **INLET ASSEMBLY (2)** and is directed by the inlet valves into one of the chambers of the lower manifold (either column A or B). Air from the lower manifold flows upwards, equally through the dryer columns filled with **MOLECULAR SIEVE DESICCANT MATERIAL (3)**. The desiccant material adsorbs the moisture contained within the air flow.

The now dried air then enters the **UPPER MANIFOLD (4)** and exits the dryer through the **OUTLET ASSEMBLY (5)**. A simple check valve housed within the outlet assembly prevents the dried air passing through the opposite regenerating bed to atmosphere.

An **ADJUSTABLE ORIFICE (6)** located on the **UPPER MANIFOLD (4)**, allows a small amount of dried purge air to flow downwards through the off-line desiccant bed for regeneration.

The regeneration air now contains desorbed moisture when it enters the **LOWER MANIFOLD (7)** and exhausts to atmosphere via two exhaust silencers located on the **EXHAUST ASSEMBLY (8)** in the lower part of the hinged **INSTRUMENTATION SHROUD (1)**.

Cycling is continuous and automatic, with instrumentation located on the hinged **INSTRUMENTATION SHROUD (1)** giving a visual indication of the dryer operation at all times.

Pressure gauges are provided to indicate:

#### **COLUMN 'A' PRESSURE (9), INLET PRESSURE (10) AND COLUMN 'B' PRESSURE (11).**

Outlet pressure is the same as the column pressure. During the normal operation of the dryer one column will be drying the incoming air and the opposite column will be undergoing regeneration. This can be identified by checking column pressure gauges. The adsorbing column will be pressurised whilst the regenerating column is at atmospheric pressure.

During the dryers cycle, the control circuit will signal the exhaust valves to close, to allow the regenerating column to reach line pressure before changeover. At this time both column pressure gauges will indicate line pressure.

The dryer cycle will then proceed to changeover, allowing the fully regenerated bed to dry the incoming compressed air.

During normal operation the cobalt chloride paper within the **MOISTURE INDICATOR (12)** will be a blue/green colour.

Should a system or dryer malfunction occur the paper will gradually change colour to amber (see fault diagnosis section).

Should this occur, the fault should be identified and rectified before the paper in the moisture indicator is replaced.

#### G) Fault Finding

PROBLEM	VISUAL INDICATION	PROBABLE CAUSE	CHECK	REMEDY
Poor Dewpoint.	All pressure gauges showing line pressure for more than 5 mins.	Loss of power.	Incoming supply.	Replace fuses if necessary.
		Poor signal to open exhaust valve.	Remove non-pressurised side tube. Check fittings for air leaks.	Replace seals or cylinders.
		Exhaust valve by-passing.	As above.	As above.
		Faulty logics.	Check function by removing tubes.	Change if necessary.
Pressure gauge showing back pressure on depressurised side.		Exhaust elements blocking up.	Element media blocked up with water, desiccant or oil carryover.	Replace elements. Check for desiccant attrition and oil carryover.
		Faulty 'or' logic at moisture indicator causing by-passing.	Remove non-pressurised side tube, and check for back pressure.	Replace 'or' logic.
Dryer fails to pressurise.		Air leak.	Broken or damaged exhaust/inlet valve discs.	Check and renew where necessary.
		Dryer pressurised on one side only.	Check cam timer rotation and fuse.	Replace where necessary.
Moisture content indicator (amber).		Entrained water.	Check pre-filter drains	Replace drain if necessary.
		Purge air too low.	Check purge rate.	Reset purge rate.
		Inlet pressure too low.	Check inlet pressure.	Increase inlet pressure
		Air flow demand too high.	Check for recent additions to compressed air system or excessive peak demands.	Ensure flow rate does <u>not</u> exceed the rated flow capacity of the dryer.

### Columns

- \* Omission or use of incorrect snowstorm filling devices.
- \* Excessive exposure of desiccant to atmosphere during filling.
- \* Hand filling or 'topping up' without correct filler.
- \* Leaving desiccant media in bolt holes when torquing down top manifold bolts.
- \* Failure to remove all desiccant from column during desiccant change.

### Top Manifold/Outlet Valve

- \* Incorrect torquing of column bolts - sequence tightening must be employed.
- \* Cleaning of column bolts before torquing.
- \* Faulty torque setting.
- \* Use of incorrect wire stripping tools.

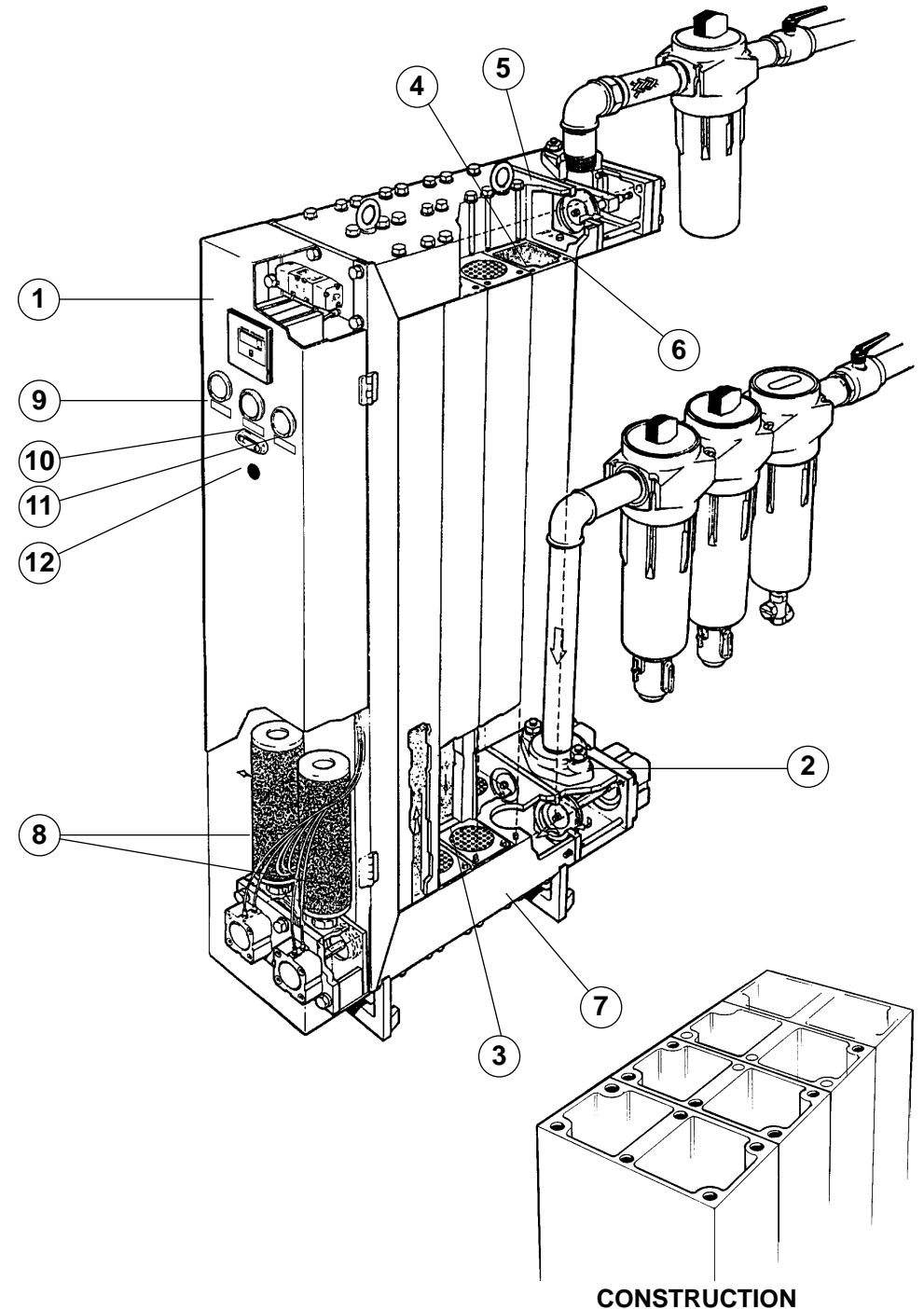
### Control Box

- \* Excessive voltage drop on incoming supply.
- \* Purge setting by amps, non-use of flow meters.
- \* Incorrect fusing used (external).
- \* Incorrect supply wire (incoming).
- \* No earth wire between earth terminal and armour cable clamp on shroud.
- \* Manually turning cam timer backwards.

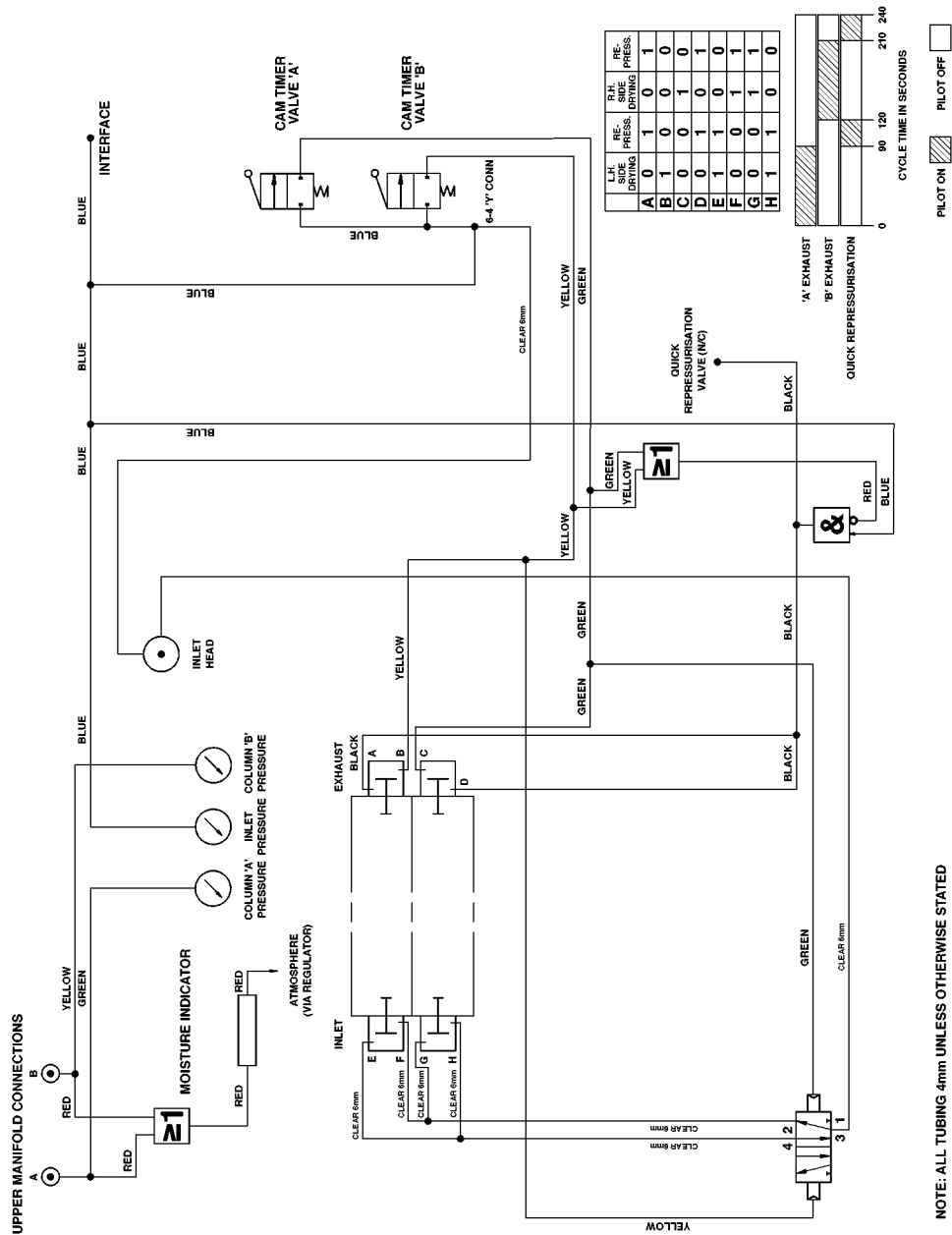
### Additional Items

- \* Use of non-recommended desiccant or non-genuine **Sullair** spare parts from alternative suppliers.
- \* Servicing undertaken by untrained distributor personnel.
- \* Inability to maintain inlet pressure and temperature at levels stated for sizing.
- \* Not to use dryer/dryers if piped directly after a portable compressor.

FIGURE 1 - TYPICAL HEATLESS DRYER CUTAWAY



**FIGURE 2 - HEATLESS CONTROL - ELECTRIC CAM SCHEMATIC**



NOTE: ALL TUBING 4mm UNLESS OTHERWISE STATED

**F) Known Misuse**

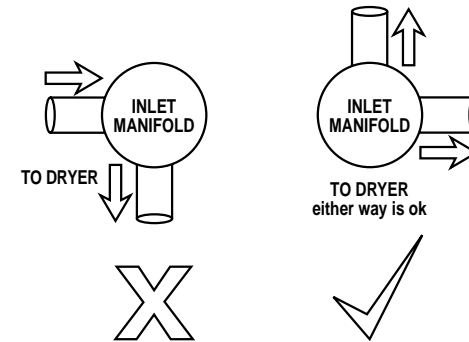
(Please ensure that the following do not occur in your installation)

**Inlet Filters**

- \* Installation of filters remote from dryer allowing further condensation to occur between filters and the dryer.
- \* Blow down valve upstream of filters causing back flow/possible collapse of filter element.
- \* Installing MPF/MPH filters in wrong flow direction.
- \* Opening inlet valve too quickly, causing initial high Differential Pressure across filter element.
- \* Differential Pressure gauge fitted wrong way round giving false Differential Pressure indication.
- \* Combining drain pipes from a water separator and MPF/MPH.

**Inlet Manifold**

- \* Pipe diameter too small, causing preferential flow on multi-bank installations.
- \* No automatic drains fitted to pipework.
- \* Unsupported pipework causing strain on gasket joints.
- \* Not enough clearance for removing filter bowls.
- \* Pipework from manifold to dryer taken from the bottom of the manifold instead of the top or centre allowing bulk water to drain into dryer inlet.



**Lower Manifold**

- \* Pipe kinks to control valves causing poor/non-response - use of too short pipes.
- \* Insufficient room to remove inlet valve assembly.
- \* Insufficient room to remove exhaust valve assembly.

### Transportation and tariffs

Desiccant is classified as 'NON-HAZARDOUS' for transportation.

### Storage

The product is stable indefinitely at ambient temperature. It will, however, lose its desiccant and adsorption properties when heated to 900°C (1652°F).

This product evolves heat on contact with moisture. Ideally, it should be stored in a clean dry warehouse, in the original package, on pallets.

It should not be stored with materials subject to catalytic decomposition.

### Fire and explosion hazard

The product is non-flammable. Any fire should be fought by means appropriate to the material causing the fire. Contact with water will cause the evolution of heat and may thus generate pressure in a confined space.

### Handling and disposal of spent material

This information is dependent upon the application. Great care should be exercised with spent material. As a powerful adsorbent, the product may retain hazardous or flammable components from the process fluid. The process vessels should be purged of contaminants before discharge, normally after regeneration. To remove residual vapours the spent product should be thoroughly drenched with water during or after discharge.

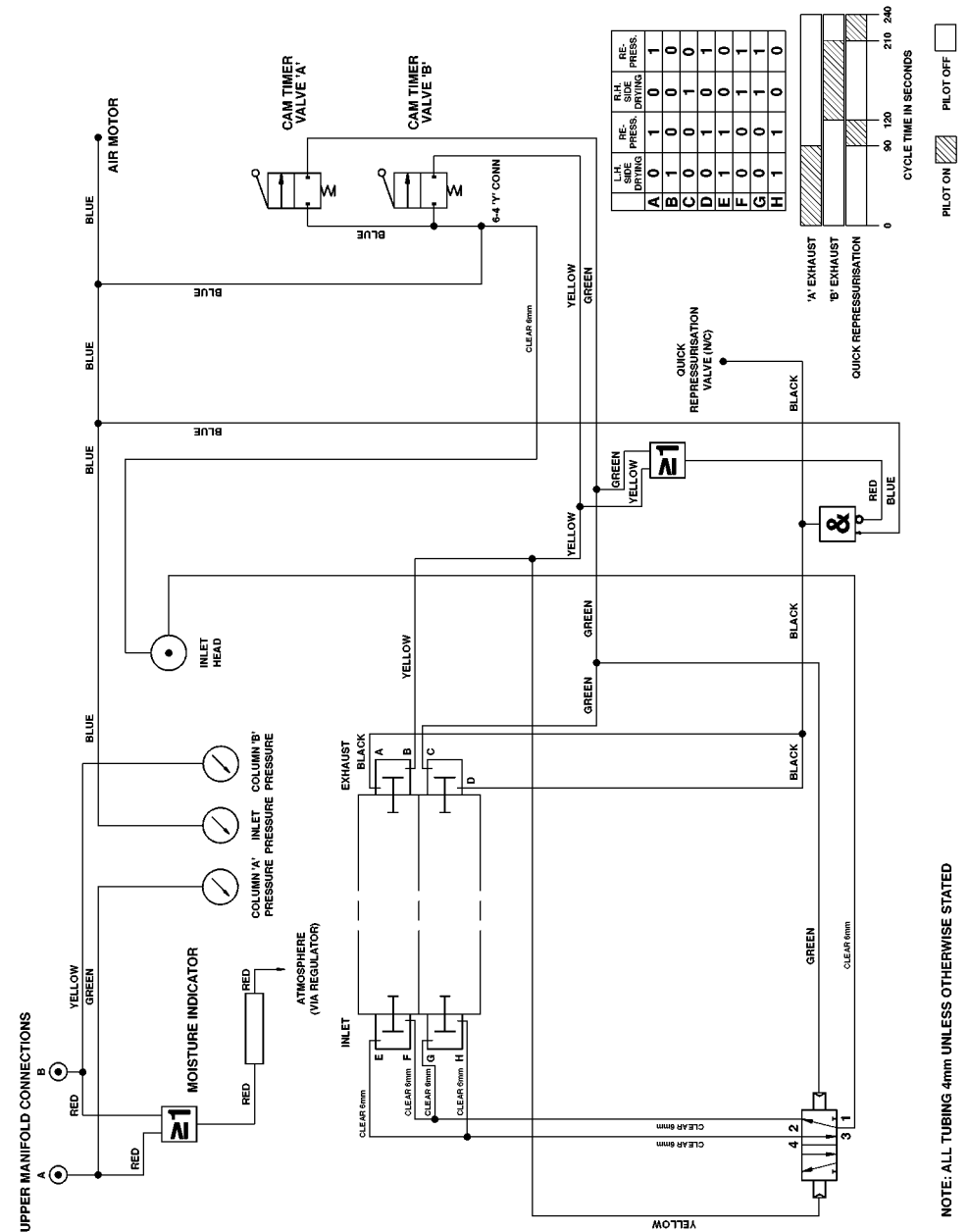
### CAUTION! HEAT WILL BE GENERATED!

It is also possible that the product may contain decomposition, polymerisation or trace contaminants from the process fluid and should be treated accordingly. Dust may have been created in service.

The product should be disposed of into a licensed land fill site.

This reply is based on information which was available at this moment in time. To the best of our knowledge we believe this information to be correct at the time of printing.

FIGURE 3- HEATLESS CONTROL - PNEUMATIC CAM SCHEMATIC

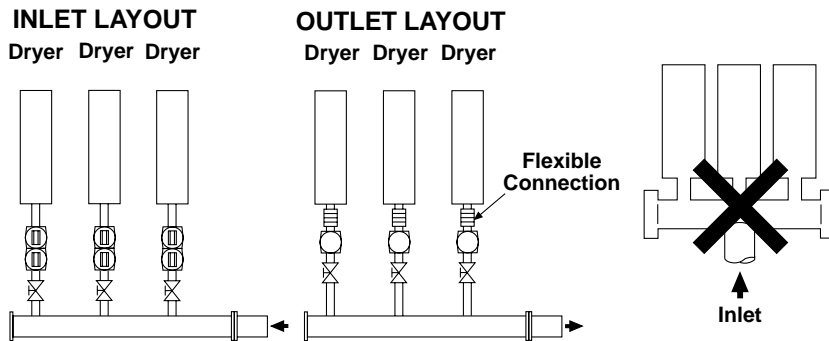


NOTE: ALL TUBING 4mm UNLESS OTHERWISE STATED

## 4. INSTALLATION

### A) Checklist

- ✓ Ensure the Desiccant Air Dryer is correctly sized for the inlet pressure, taking into consideration pressure drops caused by valves, pipes, filters etc. Allowance should be made for purge air loss. The dryer should be typically sized at 1 bar g (14 psi g) below nominal compressor output pressure.
- ✓ Ensure the Desiccant Air Dryer is correctly sized for inlet temperature and to meet the dewpoint specified e.g. -40°C or -70°C pdp (-40°F or 100°F pdp).
- ✓ A receiver must be fitted before the Desiccant Air Dryer to ensure optimum performance. (Establish the volume flowrate of compressed air required and calculate variation in air demand to establish the size of air receiver required).
- ✓ The pipe should predominantly remain at compressor discharge size. On multibank installations, ensure that dryers are located in an end fed manifold arrangement.



- ✓ Ensure the Desiccant Air Dryer is securely mounted on a suitably structured, flat and level floor or base which is free from vibration. It should be secured to the base using bolts located through the slots in the mounting feet.
- ✓ Ensure that there is sufficient space around the equipment for safety and maintenance, including space for lifting tackle and loading.
- ✓ Ensure minimum distance between dryer bank centres is 500mm (20").
- ✓ Check rating plate for correct supply voltage/frequency.
- ✓ Electrical isolators should be provided in a safe and accessible place and rated correctly for the power required. Miniature Circuit Breakers (MCB's) MUST be used.
- ✓ Ensure that the correct quality, size and type of filtration equipment is fitted e.g. MPF and MPH grades before the dryer and MPF(R) Grade after the dryer.
- ✓ All noise considerations should be taken into account when choosing a site for the Desiccant Air Dryer.
- ✓ Ensure that water removed by the dryer is allowed for. If exhaust is to be piped away, ensure adequate pipe sizes are used, e.g. min 100mm (4") .
- ✓ Separate drainage should be fitted to each filter condensate drain and piped away. Ensure that any effluent is disposed of properly, to conform with legal requirements, e.g. Oil/Water Separator.

### E) Desiccant Safety Information

#### Instructions for use of 'SNOWSTORM' filler

**Sullair 'snowstorm' fillers must always be used when recharging SM compressed air dryers with desiccant material.**

#### The 'SNOWSTORM' filler

To ensure optimum performance from your Desiccant Air Dryer it is essential to 'snowstorm' fill with desiccant material, recharging using a genuine Sullair "snowstorm" filler.

The filler controls the flow of desiccant material to achieve maximum packing density, and avoids channelling and fluidisation, preventing attrition and rapid deterioration of the desiccant bed.

#### Use Of the 'SNOWSTORM' filler

After removing the expended desiccant, place the filler on top of the empty dryer column, using the pins in the base for positive location over the centre of the column chamber.

Pour desiccant into the filler ensuring continuous filling is maintained where possible. As the chamber becomes full, it is possible to monitor through the perspex base the quantity of desiccant required to complete the filling process without causing spillage.

#### IMPORTANT NOTE:

**To ensure reliability, always refill SM Dryers with desiccant material recharged using a genuine Sullair 'snowstorm' filler.**

#### Desiccant Safety Data

Sullair desiccant is a high performance Activated Alumina which is '**NON-HAZARDOUS**' for transportation. It is formed into spherical particles using clay binders, buff coloured, non-volatile and nonflammable.

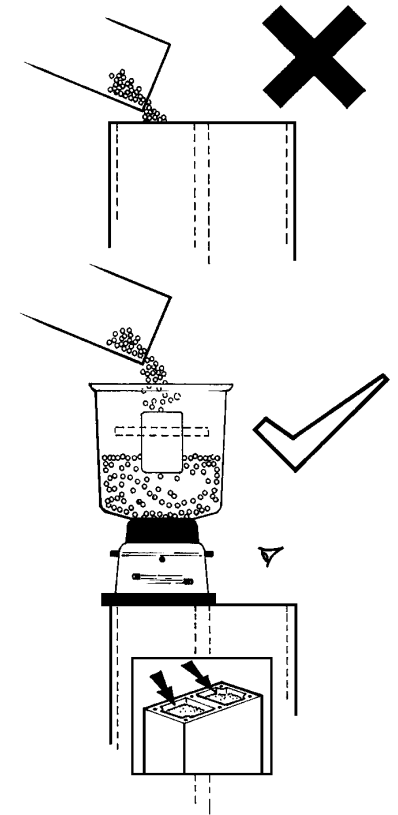
#### Handling precautions

The product may contain some dust, if so an orinasal dust respirator should be worn when handling the product. By providing adequate ventilation the dust levels in the working atmosphere should be maintained below 10mg/m<sup>3</sup>, the recommended maximum level for nuisance dusts.

The product is a powerful desiccant and will dry out the atmosphere, eyes, nose and mouth.

Eyes and skin coming into contact with dust or product should be washed with copious amounts of clean water. If symptoms develop consult a doctor.

Any spillage should be swept away immediately because the spheres roll freely and it is very easy to slip if walked on.



## 6. MAINTENANCE

### A) Maintenance Precautions

Maintain and keep a written record of all maintenance and repair work carried out on the dryer and its' auxiliary equipment.

The frequency and nature of the work required over a period can reveal adverse operating conditions which should be corrected.

Ensure that all instructions concerning operating and maintenance are strictly followed, and that the complete unit, with all accessories and safety devices is kept in good working order.

Maintenance, overhaul and repair work must only be carried out by either **Sullair** or a **Sullair** authorised distributor.

Before dismantling any part of the dryer ensure that all heavy movable parts are secured.

### B) Routine Maintenance

At regular intervals check the following:

*(Ensure that all necessary safety precautions are undertaken when working with pressurised components).*

1. Dryer and system for leaks.
2. Open kaddis drains on lower manifold, inlet and exhaust valve assemblies, to remove any entrained moisture.
3. Moisture indicators.
4. Differential pressure indicators and kaddis drains on filters.
5. Exhaust silencer (should be changed when differential pressure exceeds 500 m bar (7 psi) or annually, whichever is earliest).
6. Inlet and outlet filtration (should be changed when differential pressure exceeds 350 m bar (5 psi) or annually, whichever is earliest).
7. Use only GENUINE **Sullair** spare parts.

### C) Maintenance Examination

The user of the equipment may be subject to the requirements of the PRESSURE SYSTEMS REGULATIONS (1989). These regulations require regular maintenance, examination and the keeping of records of all examination, tests and any repairs undertaken.

The **Sullair** SM range of Desiccant Air Dryers are regarded under Regulation 2, not as a pressure vessel, but as a pressure containing component, such as equipment that is not fabricated or welded (e.g. filters, pressure regulators, refrigerant dryers).

The period of inspection under the regulations is to be decided by the owner of the equipment, but **Sullair** would recommend that the dryers aluminium componentry is internally inspected for corrosion within a six year period, or whenever the desiccant material is changed.

### D) Maintenance Plans

**Sullair** offers a comprehensive range of service plans tailored to suit your requirements to ensure the optimum operating performance of your dryer is maintained at all times.

For further details, please contact our Service Manager.

### DO NOT

- ✗ Install the Desiccant Air Dryer flat against a wall.
- ✗ Install the Desiccant Air Dryer without adequate pre- and after filtration.
- ✗ Install multiple banks less than 500mm (20") between centres. (The instrumentation shroud will not open).
- ✗ Manifold multiple banks in a centre fed (fork) arrangement.

### B) Unpacking

Every care is taken with product packaging. After carefully removing your dryer from its crate and packing material, carry out a thorough inspection for any sign of transit damage incurred after leaving the factory.

Any damage should be reported immediately to the carrier and/or from whom it was purchased.

Provision is made for lifting as a complete unit by eye bolts located in the top of the dryer.

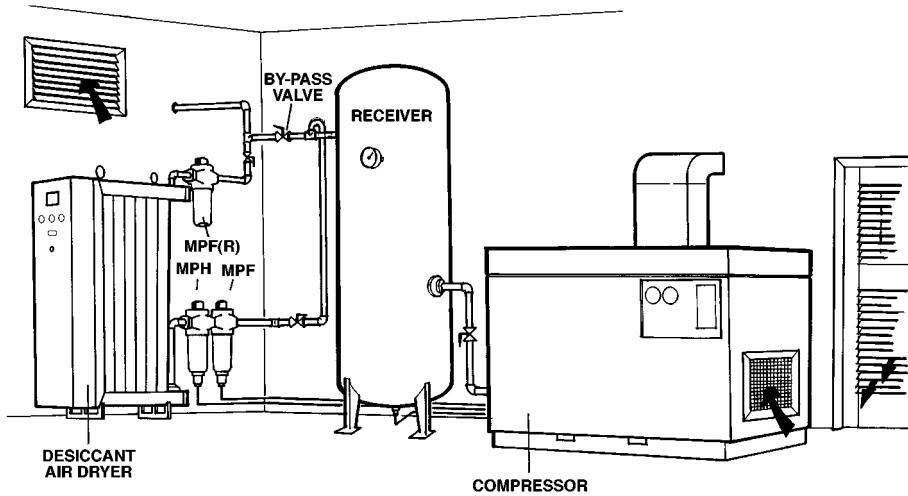
Ensure that the eye bolts are tightly secured before attempting to lift. The preferred method of lifting is by using a crossbar. (Each bank of a multibank installation must be lifted separately).

If it proves necessary to manoeuvre the dryer into an awkward space, take care not to place any stress on the instrumentation shroud as this may cause damage.

### C) Positioning your System

A typical Desiccant Air Dryer installation is illustrated below, where the dryer is sized to match the output of the compressor and installed downstream of a 'wet' air receiver. Care must be taken to ensure that the dryer cannot be subjected to flows (even peak flows) in excess of its full rated flow capacity.

As the Desiccant Air Dryer is sized to the compressor output, the potential therefore exists for overflowing i.e. the system can draw volumes of air in excess of the compressor output by also utilising the stored volume in the air receiver.



**DESICCANT AIR DRYER INSTALLED AFTER A WET AIR RECEIVER**

In the ideal situation **Sullair** would always recommend a receiver to be fitted both before and after the Desiccant Air Dryer.

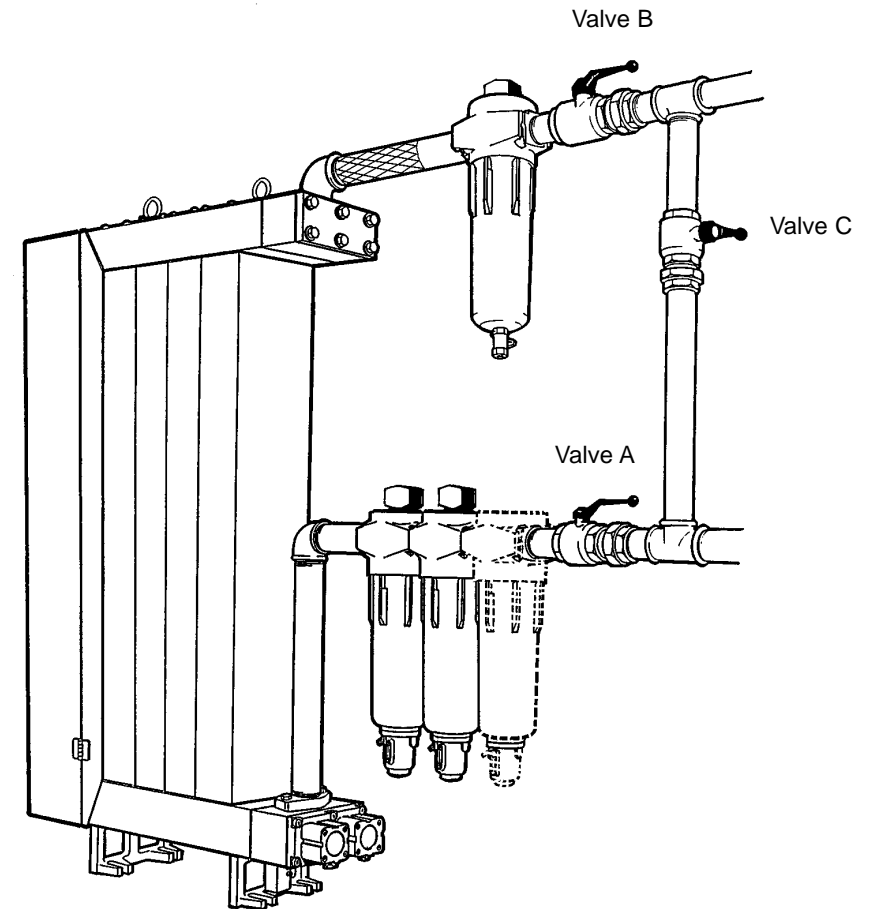
The dryer should be securely mounted on a suitably structured, flat and level floor or base which is free from vibration. It should be secured to the ground using bolts located through the slots in the mounting feet.

Ensure that there is sufficient space around the dryer(s) and 500mm (20") (minimum distance) between dryer bank centres.

### C) By—Pass Procedure

1. Gradually open the by-pass valve 'C' to allow the air to by-pass the dryer.
2. Gradually close 'SHUT OFF' valves 'A' and 'B' fully.
3. Wait until the dryer has depressurised, indicated by the pressure gauges.
4. A small amount of pressure\* may remain in the outlet chamber.
5. Turn the external electrical isolator to the 'OFF' position.

\* This pressure must be released by slackening the outlet connection prior to undertaking maintenance work on the dryer.



## 5. OPERATION

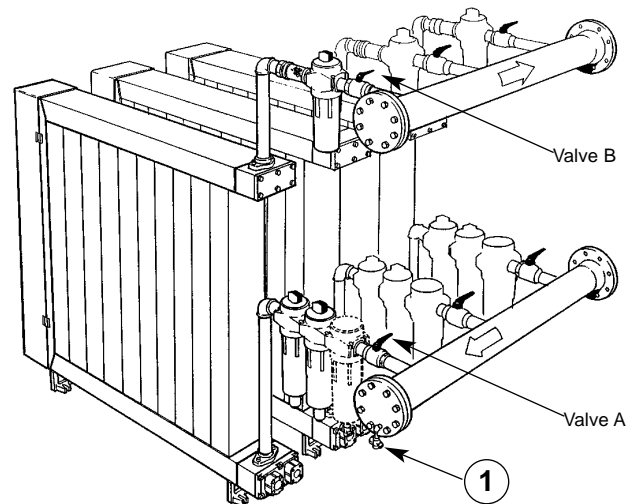
### A) Start up Procedure

1. Turn external electrical isolator to 'ON' position.
2. Ensure 'SHUT OFF' valves 'A and B' are closed.
3. Ensure that inlet manifold is drained of any condensate (1).
4. Introduce air by gradually opening 'SHUT OFF' valve 'A' to the fully open position.
5. When the dryer is fully pressurised, indicated by one of the column pressure gauges registering a similar pressure to the inlet pressure, the cam timer will initiate its cycle.
6. Open 'SHUT OFF' valve 'B'.
7. Indication of the operating condition is provided by pressure gauges which denote drying and purging in the relevant columns.
8. The operating cycle will commence on either column 'A' or 'B' and will remain at line pressure, whilst the opposite column depressurises. This indicates that the dryer is now operational.
9. Towards the end of each drying cycle, both column gauges will show equal pressure, indicating repressurisation has taken place before changeover.
10. Operation is now continuous until shutdown procedure is initiated.

### B) Shutdown Procedure

1. Gradually close valve 'B' then 'A' fully.
2. Wait until the dryer has depressurised, indicated by the pressure gauges.
3. A small amount of pressure\* may remain in the outlet chamber.
4. Turn the external electrical isolator to The 'OFF' position.

\* This pressure must be released by slackening the outlet connection prior to undertaking maintenance work on the dryer.



TYPICAL MULTI BANK INSTALLATION START UP & SHUT DOWN PROCEDURES

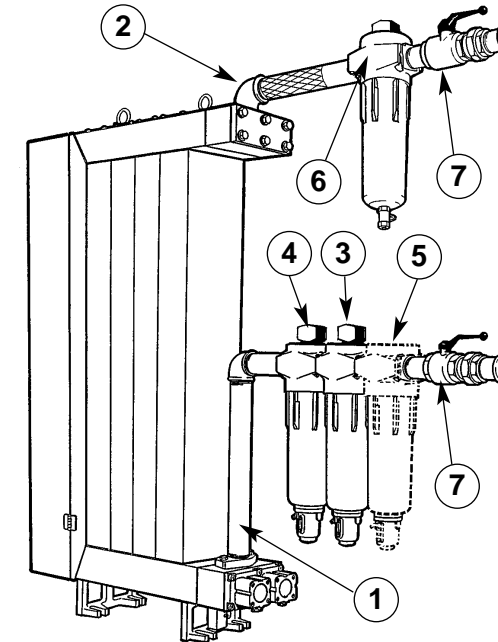
### D) Installing your System

Install the dryer where the ambient air is as clean as possible and where the air temperature will never exceed the dryers temperature limits.

Connect the Inlet (1) and Outlet (2) compressed air lines to the valve housings marked Inlet and Outlet, ensuring the protective dust covers on the Desiccant Air Dryer are removed prior to connection.

Ensure the Desiccant Air Dryer is protected with the correct pre- and after filtration with the flow directional arrows correctly aligned with the dryers flow path.

It is recommended that each dryer bank has its own independent filtration. Size 470B/N filters should be used on banks of up to and including 5 columns; size 850B/N filters should be used on banks of 6 columns and above.



TYPICAL SINGLE BANK INSTALLATION

#### Pre-filtration

This must be positioned as close to the Desiccant Air Dryer inlet as possible. **Sullair** grades MPF (3) and MPH (4) pre-filters must be fitted upstream of the inlet to prevent contamination of the desiccant beds.

In cases of extreme contamination, a **Sullair** Water Separator (5) should be incorporated into the system.

#### After-filtration

A **Sullair** Grade MPF(R) (6) filter must be fitted downstream of the dryer to prevent dust carryover.

## By-pass line and valve

It should be noted that the use of a by-pass line allows wet and untreated air into the system. For continuous duty, a standby dryer should be installed. Even with multi-bank systems, this means that only one more bank is required, which offers the benefit of 100% standby.

## Shut-off valves

Shut-off valves (7) must be fitted to the inlet and outlet pipework of each dryer bank and are used during the 'start up/shutdown' procedures and during maintenance periods.

## Manifold & Drains

On installations with fabricated manifolds, an automatic drain valve must be fitted at the lowest point of the inlet manifold to prevent condensate from entering the dryer.

Recommended inlet and outlet fabricated manifolds to suit each dryer are listed below.

MODEL	PIPE DIAMETER
SM160/240/320/400	2"
SM480/560/640/800	2 <sup>1</sup> / <sub>2</sub> "
2 x SM480 - 3 x SM800	6"
4 x SM640 - 4 x SM800	8"

## INLET & OUTLET DISTRIBUTION MANIFOLDS

For larger installations please contact Sullair Corporation.

## Flexible Connections

A flexible connection must be used on the outlet of the Desiccant Air Dryer and fitted before the MPF(R) filter.

## E) Electrical

### General

Ensure that the dryer is connected to a suitably rated AC supply with means of external fused isolation. Installation should only be carried out by a qualified electrical engineer.

The dryer must only be used on alternating current (AC) at the voltage shown on the rating plate [fixed to the instrumentation shroud] and **MUST BE EARTHED**.

## Cable Size

### Heatless SM Models

Recommended cable rating for 110V/1ph/60Hz 240V/1ph/50Hz 240V/1ph/60Hz supply is 1.5mm<sup>2</sup>.

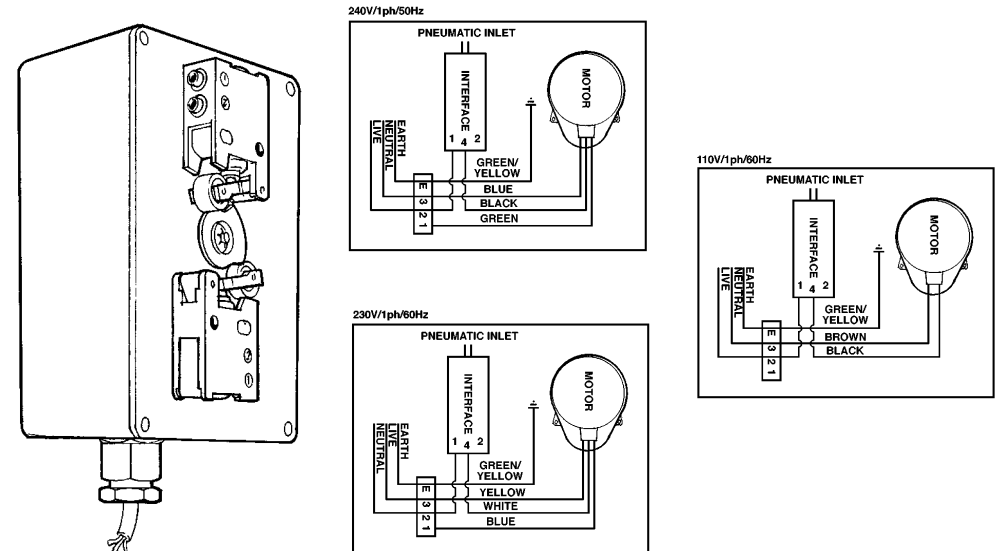
## F) Electrical Connection Heatless SM Models

Open control shroud and identify location of Electric Cam Timer.

Feed supply cable through cut outs provided in instrumentation shroud support bracket, allowing adequate cable for connection.

Remove electric cam timer cover and feed cable through gland in the side of the Electric Cam Timer enclosure. Connect 240V/1ph/50Hz, 230V/1ph/60Hz, 110V/1ph/60Hz supply to the terminal blocks provided.

For other voltages, refer to diagram printed on the inside of the enclosure.



## G) Commissioning

### IMPORTANT INFORMATION CONCERNING THE WARRANTY

Each dryer must undergo a detailed commissioning procedure.

This must be carried out by **Sullair** or an approved engineer from a **Sullair** authorised distributor.

During commissioning, ensure that the dryer is installed and continuously maintained and operated in the manner specified in this manual.