TOPRING

HEATLESS DESICCANT AIR DRYER

INSTRUCTION MANUAL

1. General Information

Product:	Series 2 Regenerative Air Dryer
Models:	54.316, 54.318, 54.320, 54.322, 54.324, 54.326, 54.328, 54.330

1.1 Document Introduction

This manual provides factory prescribed installation and maintenance procedures for a **TOPRING** compressed air dryer. The procedures illustrated in this document are only to be performed by authorized personnel. For further information regarding the procedures outlined in this document contact **TOPRING** before proceeding.

Read this document carefully before attempting to install or operate the dryer. This document should be permanently available at the dryer installation site and be kept in an easily accessible place alongside the dryer.

1.2 Support and Manufacturers details

TOPRING

LLOYD'S REGISTER · LRQA
ISO 9001
UKAS MANAGEMENT SYSTEMS
001

Annotations:

CAUTIONS: indicate any situation or operation that may result in potential damage to the product, injury to the user, or render the product unsafe.

NOTES: highlight important sections of information where particular care and attention should be pai

1.3 Packaging

All products are securely packaged in a specifically designed wooden packing box. The dryer will be held in a horizontal position by wooden struts; using straps to secure the product to the box base. The box top cover can be removed by removing the 4 fixing screws and lifting off in one piece.

Damage to Packaging

- Check immediately to establish whether damage has occurred to the external packaging and if the damage extends to the product inside.
- If there is damage to a product, contact the relevant supplier immediately.

In no circumstances must a damaged product be used in operation. Using damaged products can lead to irreparable functional faults or cause serious physical harm.

The support packing box permits limited longitudinal stacking; however the central section of the packing box should not be considered load bearing.

2. General safety

For your own safety, when carrying out work on this product, all relevant national safety regulations must be complied with relating to pressurized and electrical systems.

2.1. Intended use of the Product

The dryer is exclusively intended for the treatment of compressed air, which is free from bulk water, oil and solid matter constituents.

The product should be located within a building and protected from extreme conditions and weather. The dryer must be operated only in accordance with the data on the rating plate. Any operations that do not comply with those stated on the product rating label will render the warranty void.

This product is only designed to operate at pressures of between 58 - 232 psig (4 - 16barg).
It is not suitable for pressures in excess of 232 psig (16barg).

IMPORTANT: It is essential that the system into which the dryer is installed is fitted with a pressure limiting/relief device. This device should be between the compressor and the dryer. The device must be set to prevent the maximum working pressure of 232 psig (16barg) from being exceeded.

No modifications must be made to the product. Any modifications may reduce the operational safety of the product and invalidate the manufacturer's warranty. This could potentially result in damage to the product and serious personal injury.

2.2. Personnel

Only authorized, competent and trained personnel are permitted to work on this product. This user guide is intended solely for such personnel and is to be used only as a reference; it should not be used to replace conventional training.

2.3. Safe Handling

Please ensure the relevant safe engineering practices and handling procedures are employed when handling, installing and operating this product. Ensure that the equipment is depressurized and electrically isolated prior to carrying out any of the scheduled maintenance instructions specified within this user guide.

A suitable lifting aid must be used to minimize the risk of physical injury or damage to the product.

In no circumstances must a damaged product be used in operation. Using damaged products can lead to irreparable functional faults or cause serious physical harm.

3. Technical Description

The dryer uses the pressure swing adsorption principle of drying compressed air, utilizing two identical columns each containing a hygroscopic desiccant bed.

- Inlet filtration removes water, oil aerosols and particles (Inlet filtration supplied separately).
- Wet air enters the dryer through the inlet valve and is directed into one of the columns.
- Each column contains a densely filled desiccant cartridge.
- Air then passes through the desiccant cartridge where any remaining moisture is adsorbed.
- Simultaneously, a small amount of dry filtered air is counter flowed down through the other desiccant cartridge and exhausted to atmosphere, removing the moisture and regenerating the desiccant bed.
- The dryer controller periodically switches columns after top end repressurization; ensuring a continuous supply of dry air at constant pressure. The dryer can also be controlled using a Zero Volt signal from the compressor. This energy saving mode senses when the compressor is switched off and stops the dryer operation until the compressor restarts.
- The dry air passes out through the final particulate filter (<1micron/ISO8573.1 Class 2).

4. Technical Specification

Specification	
ISO 8573 - 2:2001 Quality Classes	Class 2: Water: -40°C (-40°F) PDP Class 2: Dirt: 1µm
Minimum working pressure	58 psig (4 barg)
Maximum working pressure	232 psig (16 bar)
Power Supply	88 - 264v AC / 47 - 63Hz
Minimum inlet temperature	50°F (10°C)
Maximum inlet temperature	122°F (50°C)
IP Rating	IP54 / NEMA 3
Power	38W
Noise	<80dB (A)

- Flow rate based on air inlet pressure of 100 psig (7.0 barg) and temperature of 95°F (35°C).
- For dryer performance at other inlet conditions or -100°F (-70°C) dewpoint requirements, contact **TOPRING**.
- All dryers should be proceeded by a coalescing filter regardless of oil or oil free applications, a 0.01mg/m3 grade coalescing filter must be installed on the inlet to the dryer.

5. Product Contents

1. **Series 2 Compressed Air Dryer**

2. **Documentation**
- 1 x User Guide
- 1x Quick Start Guide
- 1 x Declaration of Conformity

3. **Packaging**
- 1 x Dryer support base and box cover

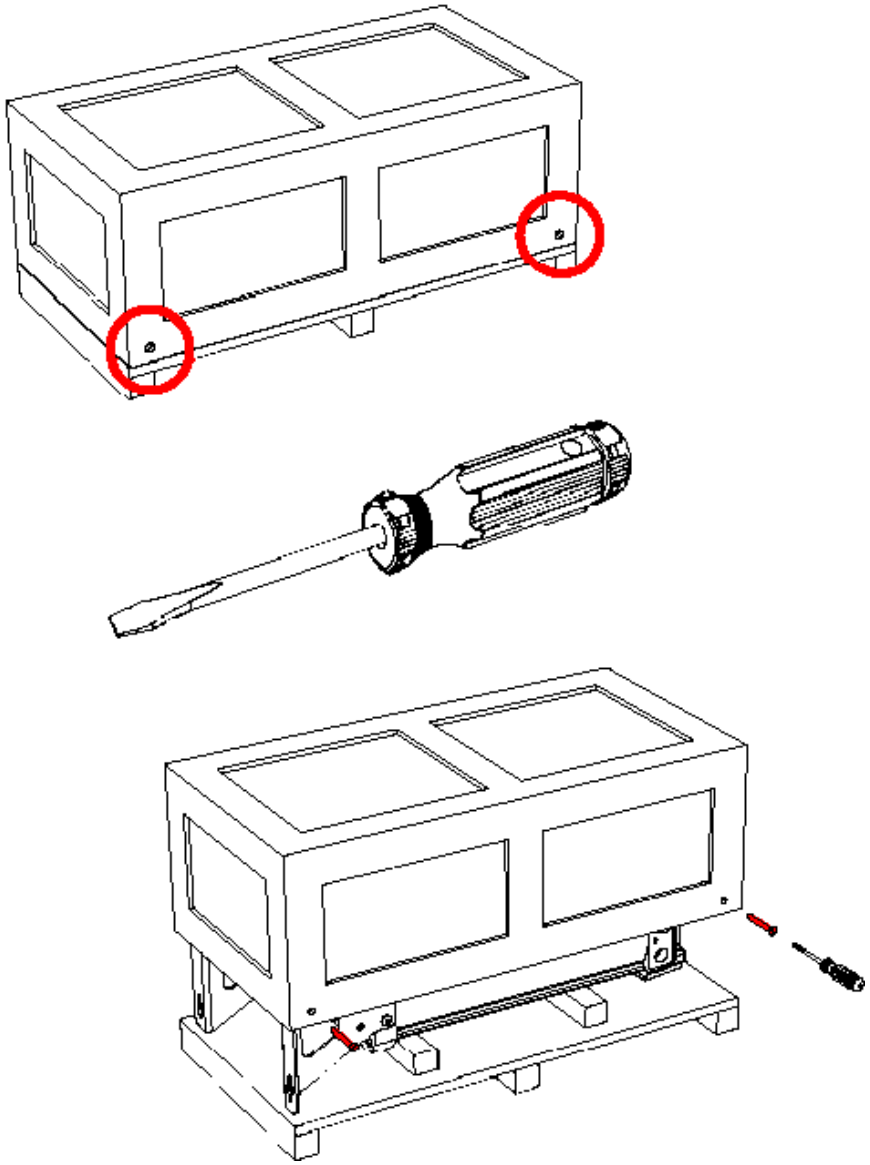
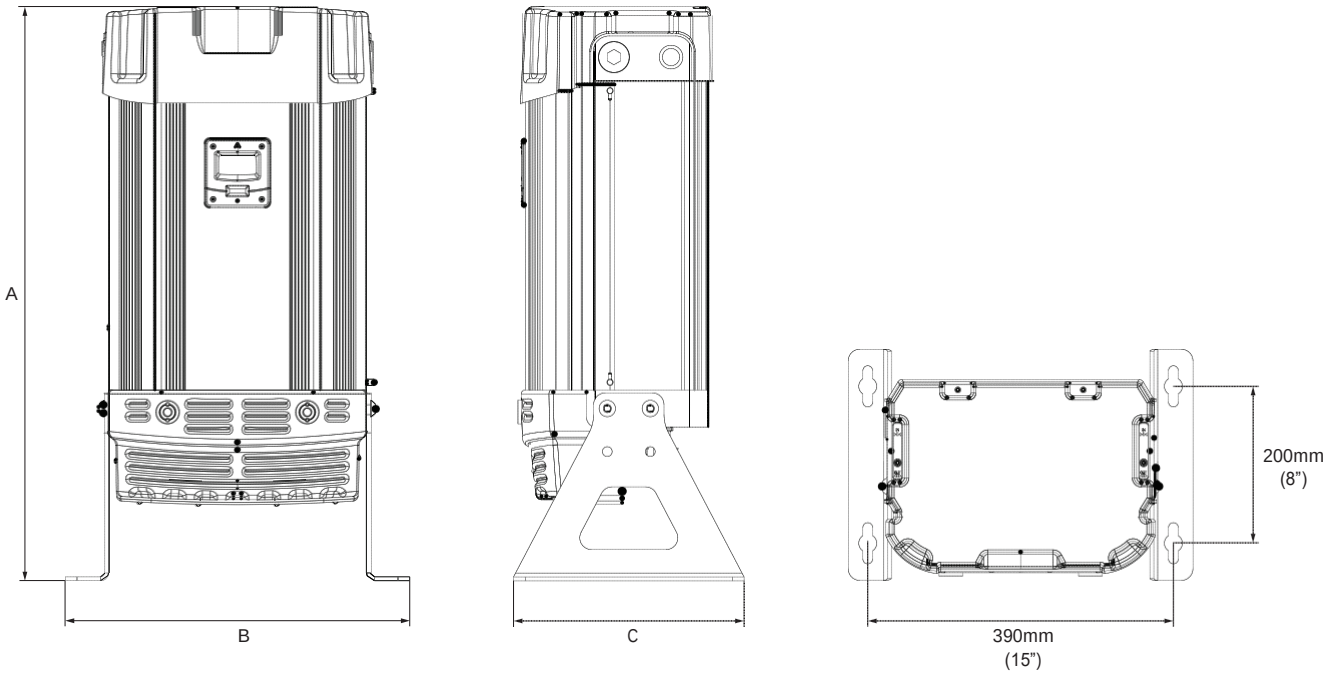


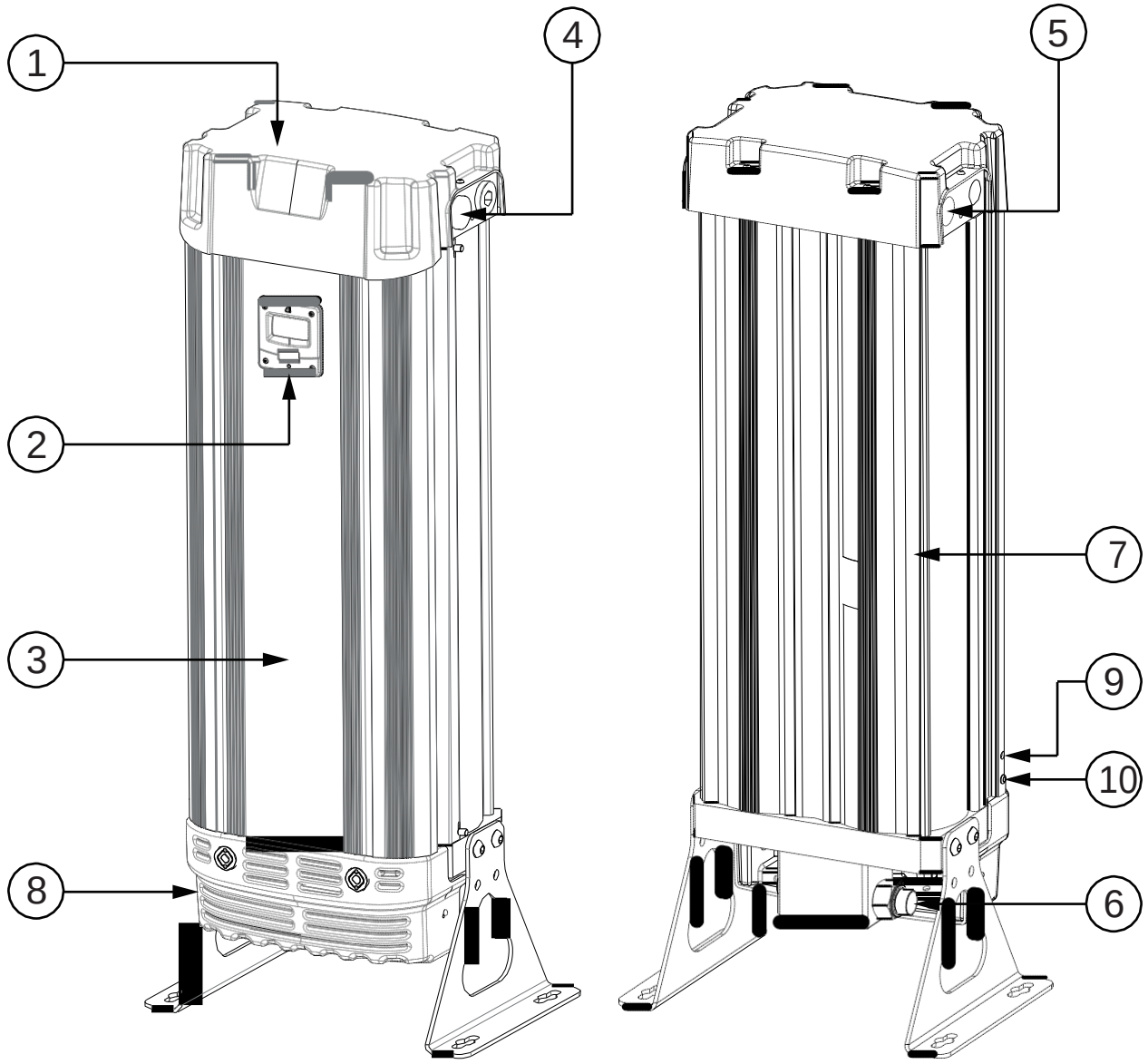
Figure 1: Contents Layout

6. Product Dimensions



Model	Inlet Flow Rate		Connection (Push-in)	Dimension			Weight Lbs (kg)
	$\frac{Nm^3}{h}$	scfm		A ins (mm)	B ins (mm)	C Ins (mm)	
54.316	59	35	1'' NPT	734 (30)	440 (17)	295 (12)	40 (88)
54.318	72	42		734 (30)	440 (17)	295 (12)	40 (88)
54.320	91	54		914 (36)	440 (17)	295 (12)	54 (119)
54.322	115	67.5		914 (36)	440 (17)	295 (12)	54 (119)
54.324	153	90		1089 (43)	440 (17)	295 (12)	64 (141)
54.326	183	108		1239 (49)	440 (17)	295 (12)	78 (172)
54.328	229	135		1489 (59)	440 (17)	295 (12)	95 (209)
54.330	306	180		1839 (72)	440 (17)	295 (12)	119 (262)

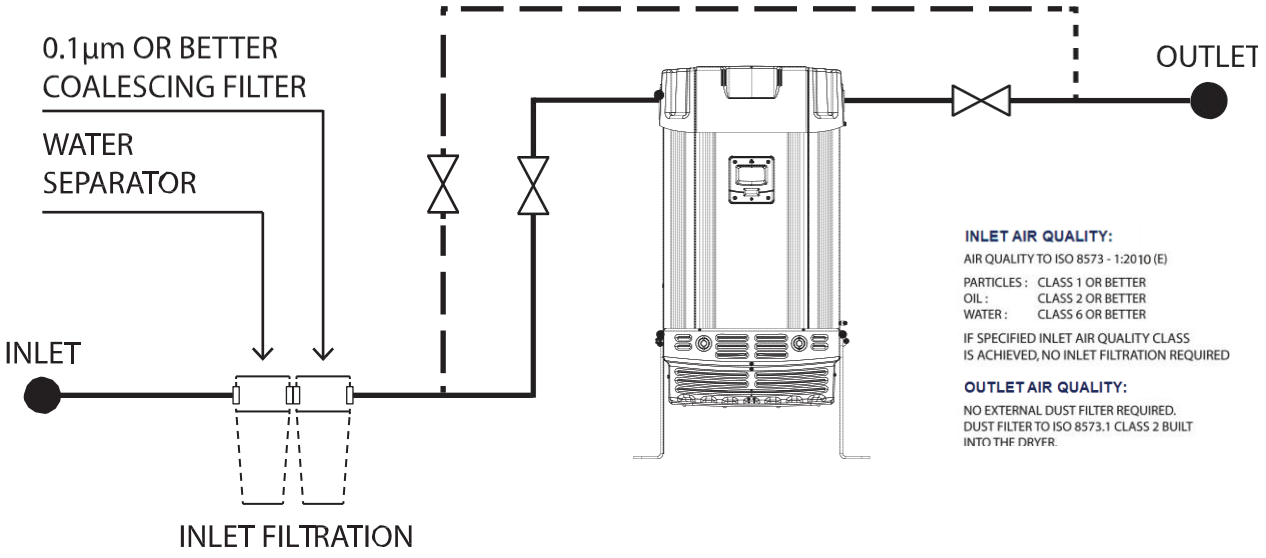
7. Equipment Overview



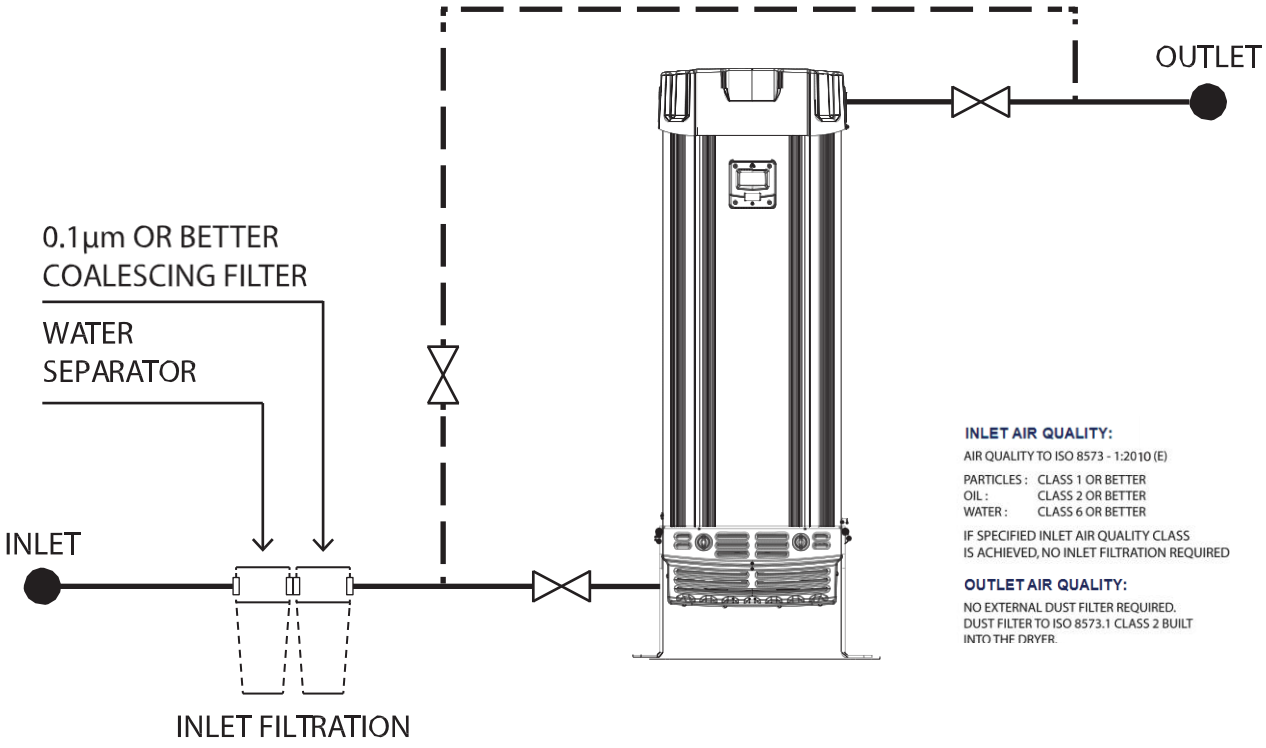
1	Dryer Top Cover	**2**	Controller Display Unit
3	Front Shroud	**4**	Air Outlet
5	Air Inlet (54.316-54.322)	**6**	Air Inlet (54.324-54.330)
7	Dryer Column	**8**	Silencer Box
9	Main Power Electrical Installation	**10**	Remote Stop/Start Control (if required)

8. System Layout

8.1. Typical installation 54.316 – 54.322



8.2. Typical installation 54.324 – 54.330

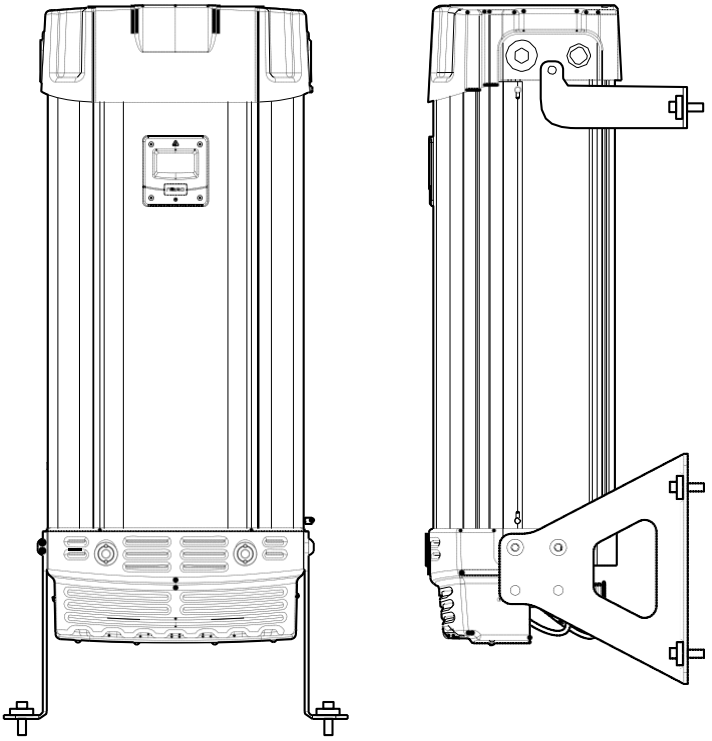


IMPORTANT: It is essential that the system into which the dryer is installed is fitted with a pressure limiting/relief device. This device should be between the compressor and the dryer. The device must be set to prevent the maximum working pressure of 232 psig (16 barg) from being exceeded.

8.3. Site Location

When selecting an installation site for the dryer, ensure the following conditions are met:

- Installation site should be located indoors on a flat surface protected from the weather and other harmful conditions.
- The ambient temperature must not drop below 33.8°F (+1°C) or exceed 122°F (50°C).
- The installation site should be level and able to support the weight of the product.
- Ensure sufficient space around the product, to allow access for operation and maintenance.
- Take into account the noise generated by the dryer exhausting while in use when considering location.



Do not attempt to wall mount dryer without wall bracket kit. For more information please contact your supplier.

*Note: Floor and wall mounting bolts not supplied. Additional wall mounting brackets supplied separately.

9. Electrical Installation

9.1 Mains Power Connection

To install the mains power cable:

1. Remove the two screws from the top cover and lift from the dryer.
2. Locate the two latches at the top and bottom of the shroud and pull them towards each other to open the shroud to expose the controller (See Fig 1.)
3. Remove the IEC plug from the controller (See Fig 2.)
4. Unscrew the cap head screw to remove the plug top cover.
5. Feed the mains power cable through the grommets located near the bottom of the shroud
   (See Fig 2.)
6. Wire the mains power cable into the IEC plug (See Fig 3.)
7. Once the mains cable is correctly wired into the IEC plug, reattach the plug into its socket, securing with the clip.
8. Lock shroud (close door).
9. Refit top cover.

Electrical Power Requirements

Supply:	88 - 264vAC
	47 - 63 Hz
Input Current:	1.3 / 0.8A
	(110/23O VAC)

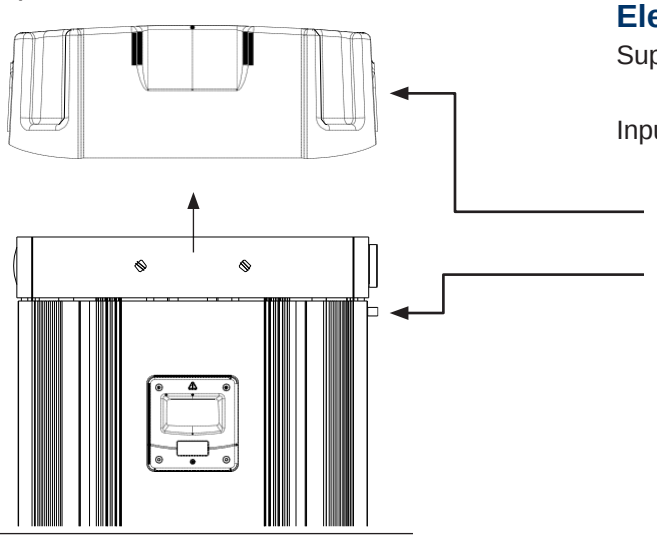


Figure 1

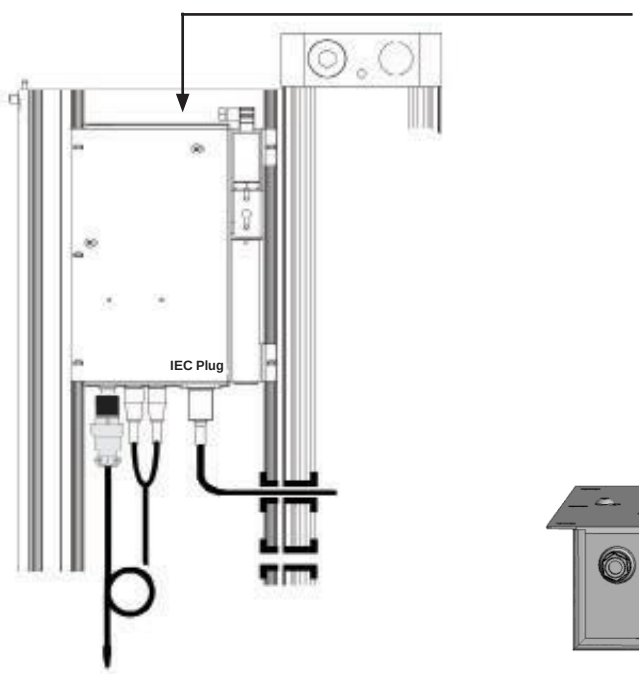
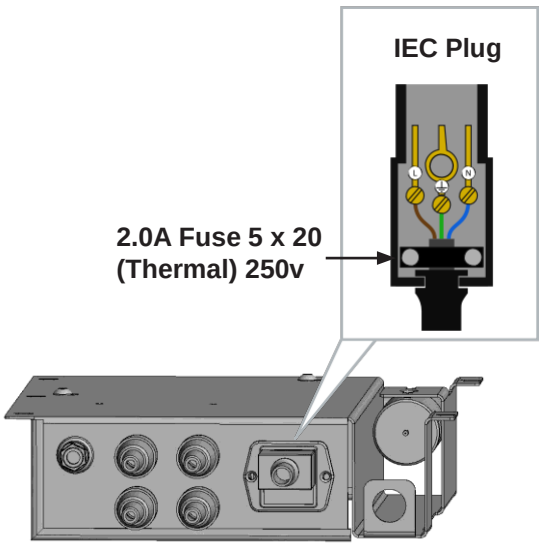


Figure 2.

Figure 3.



9.2 Remote Stop/Start Control (if required)

To gain access to the remote start/stop feature:

- Remove the two M5 screws from the top cover and lift away from the dryer.
- Locate the two latches on the top and bottom manifold and pull in the oposite direction to each other to open the shroud, this will then expose the controller.
- Remove the insulation from the flying lead (See Fig 4.)
- There are six wires;
  1. Brown Wire - 24V DC Output
  2. Blue Wire - 24V DC Output
  3. Black Wire - Remote Start/Stop Input
  4. White Wire - Alarm Input (Zero volt contact)
  5. Green Wire - Alarm Output (Zero volt contact)
  6. Red Wire - Remote Stop Input

- To set up the Remote Start/Stop control, remove/break the connection between the Red and Black wires and connect externally to a remote switch or relay.
- A 24V DC Output must be connected to the Black wire to enable the dryer to operate, if the connection is broken or if there is no voltage the dryer will switch off and revert to standby mode, displaying “REMOTE STOP ACTIVE” on the controller display.

Under no circumstances should an external voltage or current be applied to any of these wires, as damage to the control system will occur, negating the warranty.

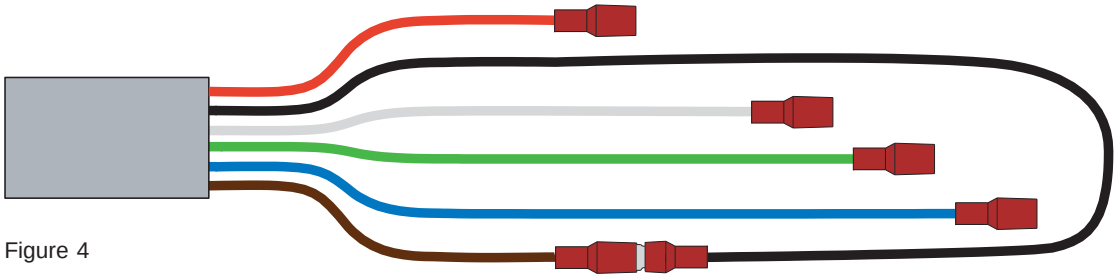


Figure 4

9.2 Remote Stop Control

To gain access to the remote stop feature:

- Remove the two M5 screws from the top cover and lift away from the dryer.
- Locate the two latches on the top and bottom manifold and pull in the opposite direction to each other to open the shroud, this will then expose the controller.
- Remove the insulation from the flying lead (See Fig 3.)
- There are six wires;
  1. Brown Wire - 24V DC Output
  2. Blue Wire - 24V DC Output
  3. Black Wire - Remote Start/Stop Input
  4. White Wire - Alarm Input (Zero volt contact)
  5. Green Wire - Alarm Output (Zero volt contact)
  6. Red Wire - Remote Stop Input

- To set up the Remote Stop control, make a connection to the blue wire (24V DC +), when a connection is detected the dryer will automatically shut down. Break the connection to allow the dryer to start again.
- A 24V DC Output must be connected to the Black wire to enable the dryer to operate, if the connection is broken or if there is no voltage the dryer will switch off and revert to standby mode, displaying “REMOTE STOP ACTIVE” on the controller display.

10. Dryer Operation

Locate the electrical connector on the underside of the controller in the shroud.

10.1. Dryer Start-up (see **15. PID** page 22 & 23.)

Do not allow the dryer to flow air unless switched on and cycling. Resulting effect could be desiccant contamination; requiring replacement desiccant cartridges.

- Ensure all pipe work is connected as per section 8 and the dryer is securely hardwired into the electrical supply and inlet & outlet valves are closed.
- Ensure the inlet operating pressure parameters are between 4-16 barg (58-232 psig).
- Ensure the inlet air temperature is between 2°C - 50°C (35°F - 122°F).
- Turn on the power to the dryer, the dryer will display its status.
- Slowly open the inlet valve and allow dryer to pressurize.
- Check for leaks & rectify if any.
- Allow the dryer to cycle at least 2 times.
- Slowly open the outlet valve.
- In case of using Remote stop/start control, ensure external sign is on.

10.2. Function Monitoring

DISPLAY		
Power-up & standby	During power-up screen will display: • Program, serial no, and version. • Total hours dryer has operated. Total hours in example shown on opposite screen 25,364 hours	
Start-up & run	Normal running screen will display: • Column online and regenerating column as either PURGE or READY • Service hours also displayed.	
Remote stop/start	Can be used as an energy saving method, MUST ONLY BE USED WHEN NO AIR REQ'D TO FLOW THROUGH THE DRYER WHEN STOPPED. Screen will display: REMOTE ACTIVE STOPPED	
ES (optional)	Screen will display: • Outlet dewpoint from sensor • Hours will also alternate hours run to show energy saving.	

10.3. Monitoring dryer performance

Energy saving option
(If installed model numbers have B in place of A at 7th digit)

- The dew-point is displayed on the control panel. When the pressure dew-point displayed is better than -42°C PDP the dryer will switch into economy mode and stop cycling, resulting in zero purge, but no interruption in flow. When the dew-point degrades to -40°C the dryer will restart cycling ensuring the dew-point is maintained at or better than -40°C.
- If during normal operation the dryer fails to achieve dew-point (falls below -30°C) the alarm output will be indicated on the front screen and the remote alarm output will activate.

Beware this is only an example as the dew-point set-points and alarms are adjustable through the display panel.

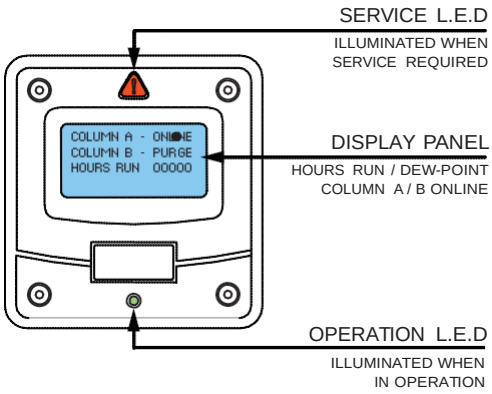


Figure 1.

- The set levels for the ES and dewpoint alarm are adjustable and can be accessed by carefully removing the front bezel to expose PLC and adjustment buttons. (see Figure1.)
- Hold buttons A & B down for 8 seconds to access the menu shown left.
- Select the line you want to adjust by using the up down buttons, then press ok. The digits will flash and can be changed again using the up/down buttons.
- When set press ok to store then move to the next line.
- The screen will exit after 60 seconds or press escape.

10.4. Shutdown Procedure

- Close the inlet and outlet valves.

The dryer will still be pressurized! In order to depressurize the dryer; ensure the dryer is isolated from the compressed air supply source:

- Cycle the dryer at least twice to ensure the dryer exhausts and is completely depressurized.
- When fully depressurized the ‘clicking’ of the exhaust valves will be heard but no air exhausted.

- When the dryer is fully depressurized, isolate from the electrical supply and isolate from compressed air.

11. Maintenance

Maintenance operations should only be carried out by authorized, suitably trained personnel.

11.1. Maintenance Guidelines

- Maintenance operations should only be conducted when the system has been shut down and fully depressurized.
- All connections must be isolated and removed with care, paying particular attention to the areas that become pressurized.
- Do not modify or adjust the control settings.
- Only certified **TOPRING**. Approved replacement parts should be used.
- Always check all connections for leakage and secure seating.
- Ensure all loose parts are removed or secured to the dryer before operation.

11.2. Cleaning

Clean the equipment with a damp cloth only and avoid excessive moisture around any electrical sockets. If required a mild detergent may be used, however do not use abrasives or solvents as they may cause damage.

11.3. Daily Checks

Visual and functional check of the dryer should be carried out daily:

- Check the dryer for any external damage.
  Assess and eliminate any defects found.

- If the red service light appears, the dryer must be serviced to ensure the best air quality possible.
  Contact the service department and request a dryer service kit.

- Remove any loose dust or dirt from the dryer; clean all surfaces that appear to have attracted unwanted contaminants.

- Check the dewpoint sensor display (if installed). If the dewpoint is not maintained at <-30°C the reading on the display will alternate with “dewpoint alarm” every 5 seconds. The no-volt alarm will also activate.
- ***Contact the service department and request a product service.***

12. Servicing

Maintenance operations should only be carried out by authorized, competent and suitably trained personnel.

12.1. Servicing Guidelines

- Maintenance operations only to be conducted when the system has been shut down, fully depressurized and isolated completely from the compressed air and electrical supply.
- Ensure the system is in a safe condition for maintenance to be carried out on.
- Dismantle and assemble with care, paying particular attention to the areas that become pressurized.
- All gaskets removed during maintenance operations must be replaced with new gaskets.
- Only certified approved replacement parts to be used.
- Do not modify or adjust the control settings.
- Always check all connections / sealing faces for cleanliness and secure seating prior to assembly.
- Ensure all components are refitted to the product before operation.
- Ensure the dryer is left operating in a safe working condition after completion of maintenance.

12.2. Service Procedures

A dryer service should take place every 2 years or 12,000 hours of operation (whichever occurs first). Service kits are available which include: replacement desiccant cartridges, seals and valves. Please contact the manufacturer or distributor for service kit information.

- **Service A - 12,000 hours (or every 2 years) service.**
  Replace desiccant cartridges (54.416 - 54.430)
  Replace all gaskets and seals removed while servicing the dryer (included in relevant service kits).
- **Service B - 24,000 hours (or every 4 years) service.**
  Replace exhaust valves.
  Replace check valves.
  Replace ICF valves.
  Replace Pilot valves.
- **Service C - 6,000 hours (or every 1 year) service.**
  Dewpoint sensor calibration service.

MODEL	SERVICE A (With Pre-filter Element)
54.316	54.416
54.318	54.418
54.320	54.420
54.322	54.422
54.324	54.424
54.326	54.426
54.328	54.428
54.330	54.430

Please refer to the Series 2 Dryer service guide for instruction regarding carrying out a service.

13. Troubleshooting

Problem	Problem Caused	Solution
Poor dew point performance	1. Insufficient inlet pressure	1. Inlet pressure min 58 psig (4 barg). If not adjust inlet pressure settings.
	2. Electrical Fault	2. Ensure the power is on and the dryer front panel is illuminated; check the dryer is cycling correctly.
	3. Moist or contaminated desiccant	3. Eliminate the cause of contamination. Replace desiccant cartridges – do not re-use.
	4. Too high air consumption	4. Ensure the performance of the dryer matches the required system air consumption.
	5. Excessive inlet air temperature	5. Check against technical specification.
	6. Insufficient purge air.	6. Purge incorrectly adjusted. Consult service personnel to adjust settings (factory pre-set).
	7. Exhaust silencer blocked	7. Consult service personnel.
Failure of dryer to cycle	8. Controller not functioning correctly	8. Ensure the controller is powered; check the on screen column status to ensure it is powering the solenoid valves during normal cyclic operation.
	9. Insufficient inlet pressure	9. Inlet pressure min 58 psig (4 barg). If not adjust inlet pressure settings.
	10. Controller not illuminated	10. Check power to unit & fuse.
	11. Failure to de-pressurize when cycling.	11. Solenoid valve not functioning correctly; if there is power to the coil, replace valve. A correctly working valve outputs an audible click when it energizes.
	12. Outlet flow stops	12. Check inlet air supply.
Constant depressurization	13. Failure to initialize dryer	13. Switch off and restart dryer. Ensure dryer is pressurized before powering dryer to allow dryer to initialize before commencing operation.
	14. Erratic air flow from exhaust	14. Faulty or damaged valve; service required.

Reference to known issue

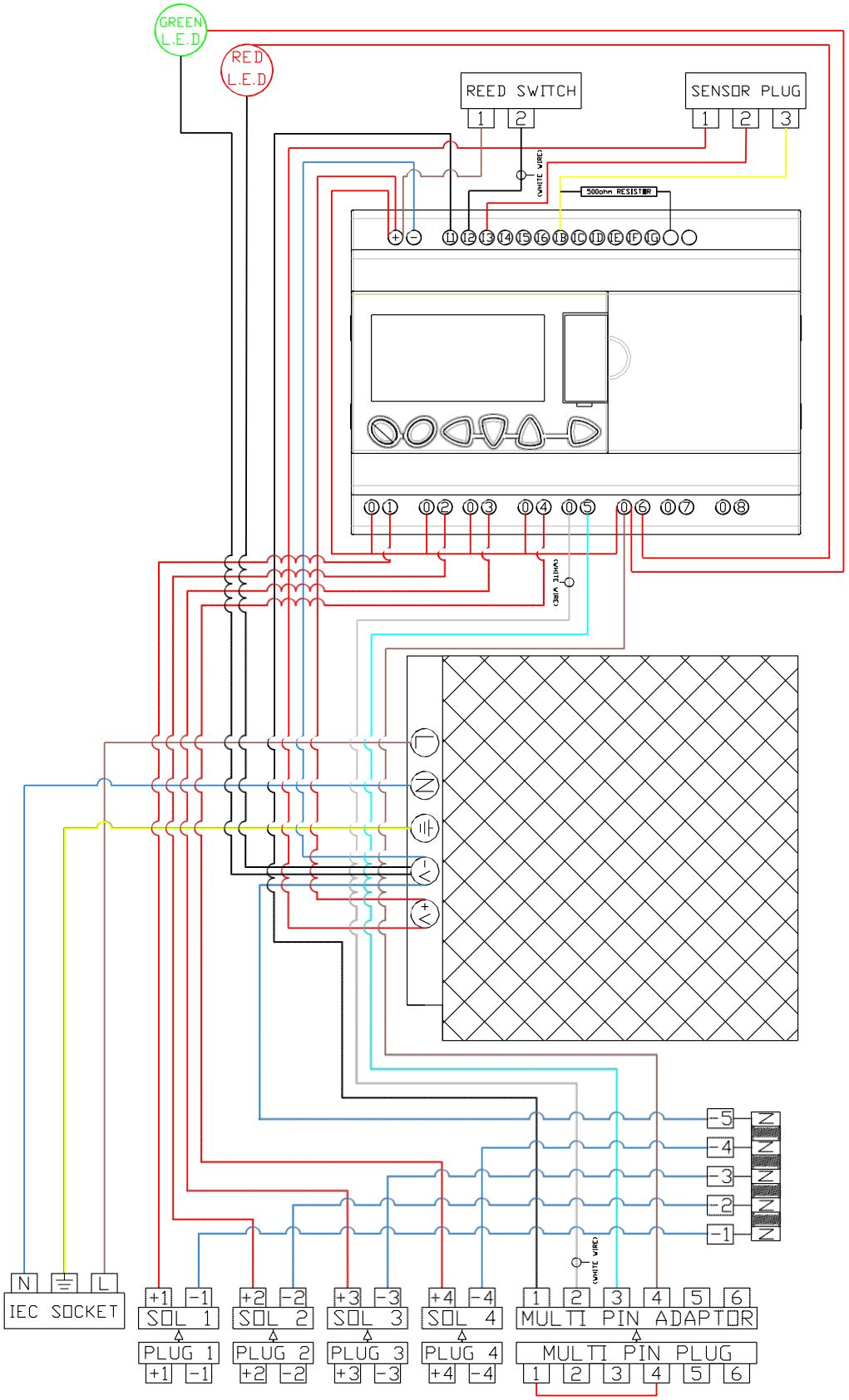
Opening the inlet valve too quickly
Valve should be opened slowly allowing the pressure to build up gradually.

Inlet/outlet head pipe
Diameter too small.
Pipe work unsupported.
Inlet pipe work from low point in system, allowing bulk water to collect and enter the dryer.

Electrical controller
Incorrect fuse fitted or fuse blown. Check the plug and fuse located on top of the controller back plate inside the dryer front shroud.

Additional Items
Use of non-authorized components.
Untrained / unauthorized maintenance / installation personnel used.
Increase in air consumption without relation to the flow capacity of the dryer.
Purging the dryer with cleaning agents that could damage the components or the desiccant.
Covers removed or loose during operation.
Failure to carry out a service when indicated by the dryer service light.
Do not allow the dryer to flow air unless powered up, switched on and cycling. Resulting effect could be desiccant contamination; requiring replacement desiccant cartridges.

14. Electrical Schematic



NOTES:

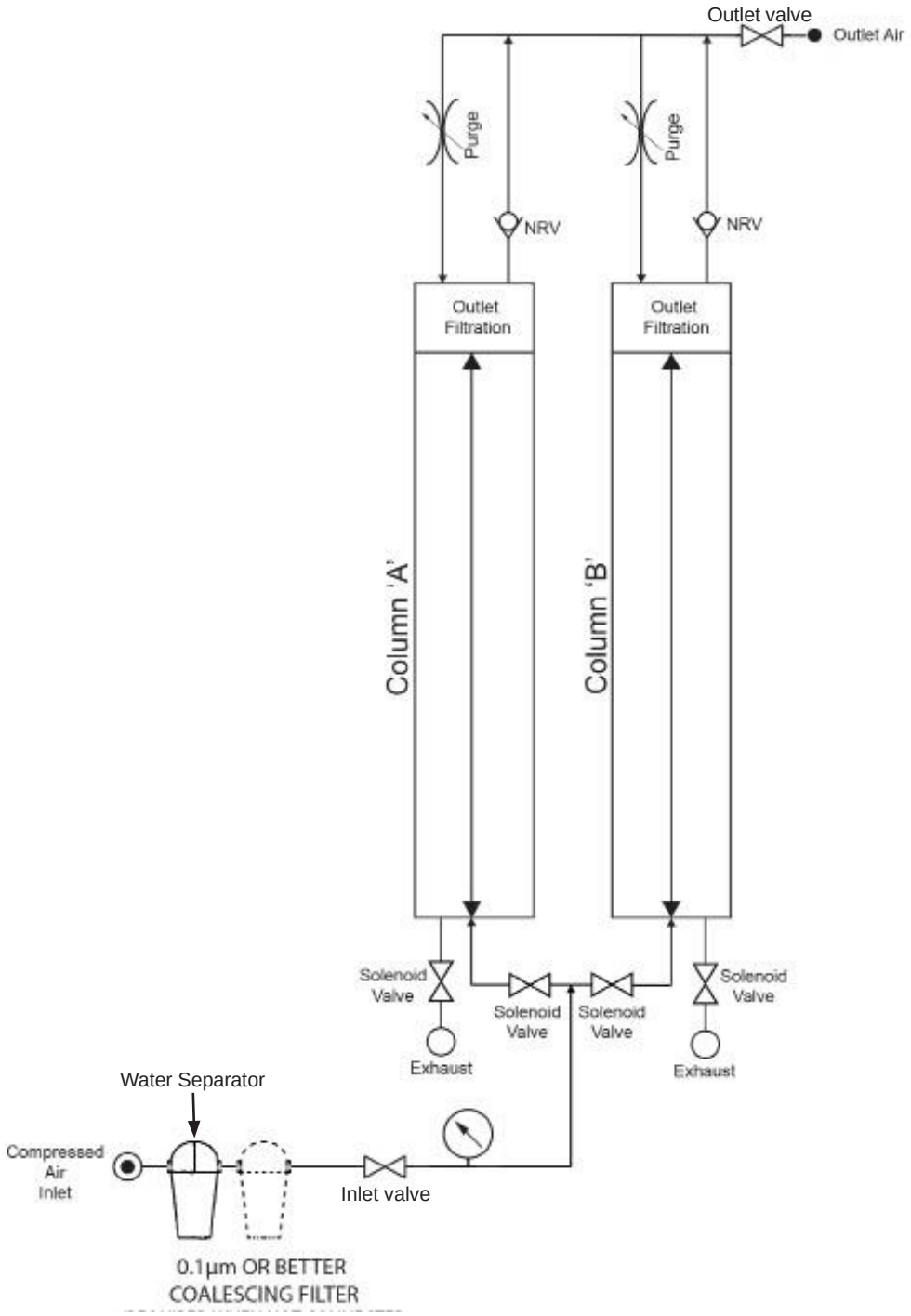
THIS DRAWING IS NOT AN ACCURATE VISUAL REPRESENTATION AND SHOULD BE USED ONLY FOR WIRING INSTRUCTIONS.

FOR N/C OPERATION:
SOL 1 + PLUG 1 - EXHAUST VALVE A
SOL 2 + PLUG 2 - INLET VALVE A
SOL 3 + PLUG 3 - INLET VALVE B
SOL 4 + PLUG 4 - EXHAUST VALVE B

FOR N/O OPERATION
SOL 1 + PLUG 1 - EXHAUST VALVE A
SOL 2 + PLUG 3 - INLET VALVE A
SOL 3 + PLUG 2 - INLET VALVE B
SOL 4 + PLUG 4 - EXHAUST VALVE B

15. PROCESS & INSTRUMENTATION DIAGRAM

15.1. 54.316 à 54.322



15.2. 54.324 à 54.330