User guide

L1 lab gas CO2 removal dryer

revision: 2022-104 document: 17-110-0226

www.n-psi.co.uk

about us

Experience.

Our team is comprised of and supported by individuals spanning all disciplines from research & development, engineering & manufacturing, marketing & sales and service & support. Our backgrounds are in air and gas purification and our experience in this field spans a wide range of industries. We combine this knowledge and experience to ensure our products and services are designed and provided to meet the objectives and expectations of you - our Customer.

Customer.

We recognise that our Customers are not only our valuable distribution partners who sell and support our products or the machine builders who depend on them as protection for their equipment. They are the contractors who install them, the manufacturers who use them in their processes and the service people who maintain them. At nano we have developed our products, packaging and support materials to ensure they exceed all of our Customers' expectations.

Service.

At nano we recognise that world-class customer service is the most important component to any successful business. Your business needs to exceed your customers' expectations to stand out from your competitors and our service must positively impact your business so you can be successful in doing so. Our commitment is simple… we will stand behind our products and ensure that our customer service is unrivaled in the industry.

Experience. Customer. Service.

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1. general information

1.1 document introduction

This manual provides factory prescribed installation and maintenance procedures for the lab gas CO2 removal 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 the manufacturer before proceeding. Be sure to read this document carefully before attempting to install or operate the lab gas CO2 removal dryer. This document should be permanently available at the lab gas CO2 removal dryer installation site.

1.2 warranty guidelines

All products are supplied with a 2 year manufacturer's warranty from the date of purchase when installed and maintained in accordance with the manufacturers guidelines. Only genuine service parts should be used and no modifications made.

1.3 general safety

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.

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.

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.

1.4 intended use of the product

The lab gas CO2 removal 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 lab gas CO2 removal 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

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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 paid.*

WARNING: This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and/or birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

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2. technical specification

specifications	standard	options
maximum water content (ISO class)	class 2 -40°C (-40°F) pdp	-
minimum operating pressure	4 barg (58 psig)	-
maximum operating pressure	16 barg (232 psig)	-
recommended operating temp range	1.5 to 35°C (35 to 95°F)	-
design operating temperature range	1.5 to 50°C (35 to 122°F)	-
power supply requirements	100-240V AC @ 50-60 Hz	24V DC
consult rating label, options operating parameters may differ		

ISO Class 2 at recommended max rated flow at 7 Barg and 25° C inlet; see correction factors

2.1 flow rates

model	inlet flow rate		connection	
	ft³/hr	l/min	inlet	outlet
NDC-015	5.3	2.5	3/8" BSPP	3/8" BSPP
NDC-600	17.6	8.3		
NDC-140	53	25		
NDC-300	106	50		
NDC-600	212	100		
NDC-900	318	150	1" BSPP	1" BSPP
NDC-1200	424	200		

Units supplied with push fit connections

Inlet Pressure Correction Factors												
barg	4	5	6	7	8	9	10	11	12	13	14	16
psig	58	72	87	101	116	130	145	159	188	203	217	232
correction factor	0.63	0.75	0.88	1	1.13	1.25	1.38	1.50	1.63	1.75	1.88	2.13

Inlet Temperature Correction Factors										
°C	5	10	15	20	25	30	35	40	45	50
°F	41	50	59	68	77	86	95	104	113	122
correction factor	0.8	0.9	0.94	1	1	0.98	0.95	0.9	0.85	0.72

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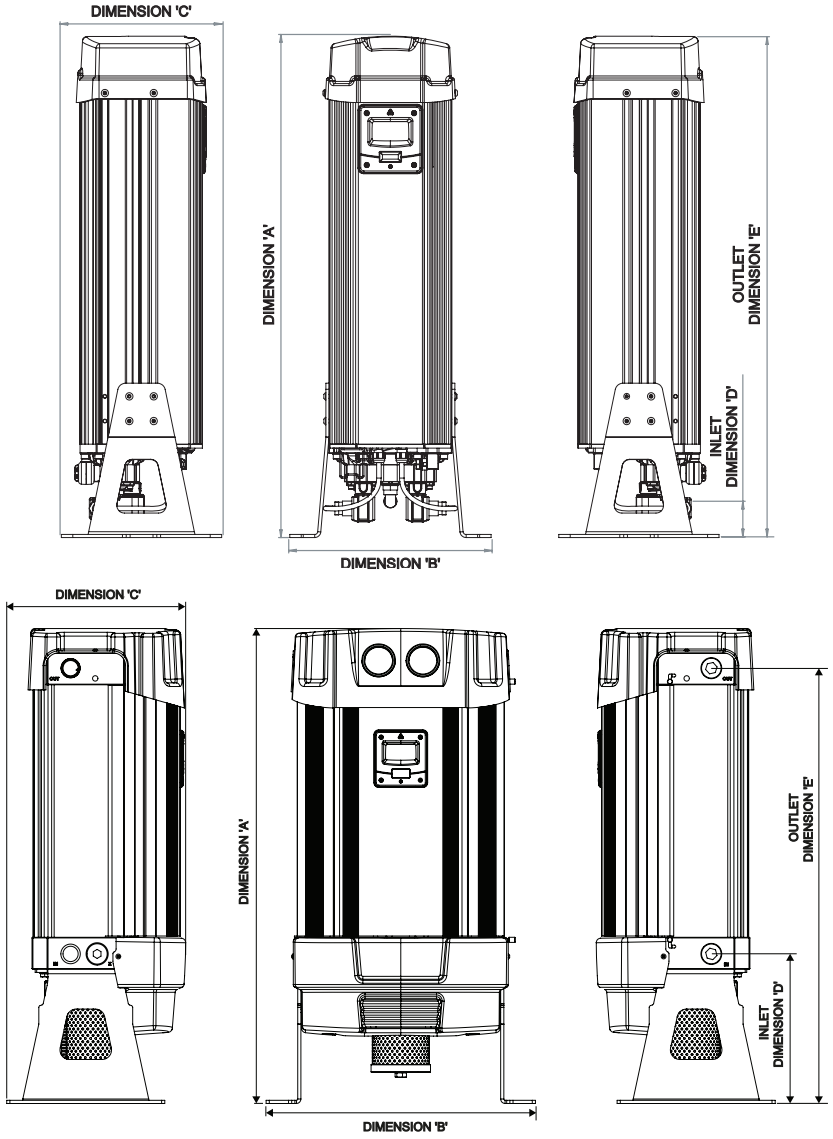
2.2 product dimensions



model	dimension										weight	
	A		B		C		D		E			
	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	kg	lbs
NDC-015	439	17	222	8.7	254	10.0	47	1.8	439	17.2	9.0	20
NDC-600	439	17							439	17.2	9.0	20
NDC-140	439	17							649	25.5	9.0	20
NDC-300	649	25.5							889	35	13.5	30
NDC-600	1199	47	330	13.0	330	13.0			1181	46.5	25.5	56
NDC-900	743	17	283	11.0	283	11.0	47	1.8	439	17.2	47.0	20
NDC-1200	743	29							439	17.2	47.0	103

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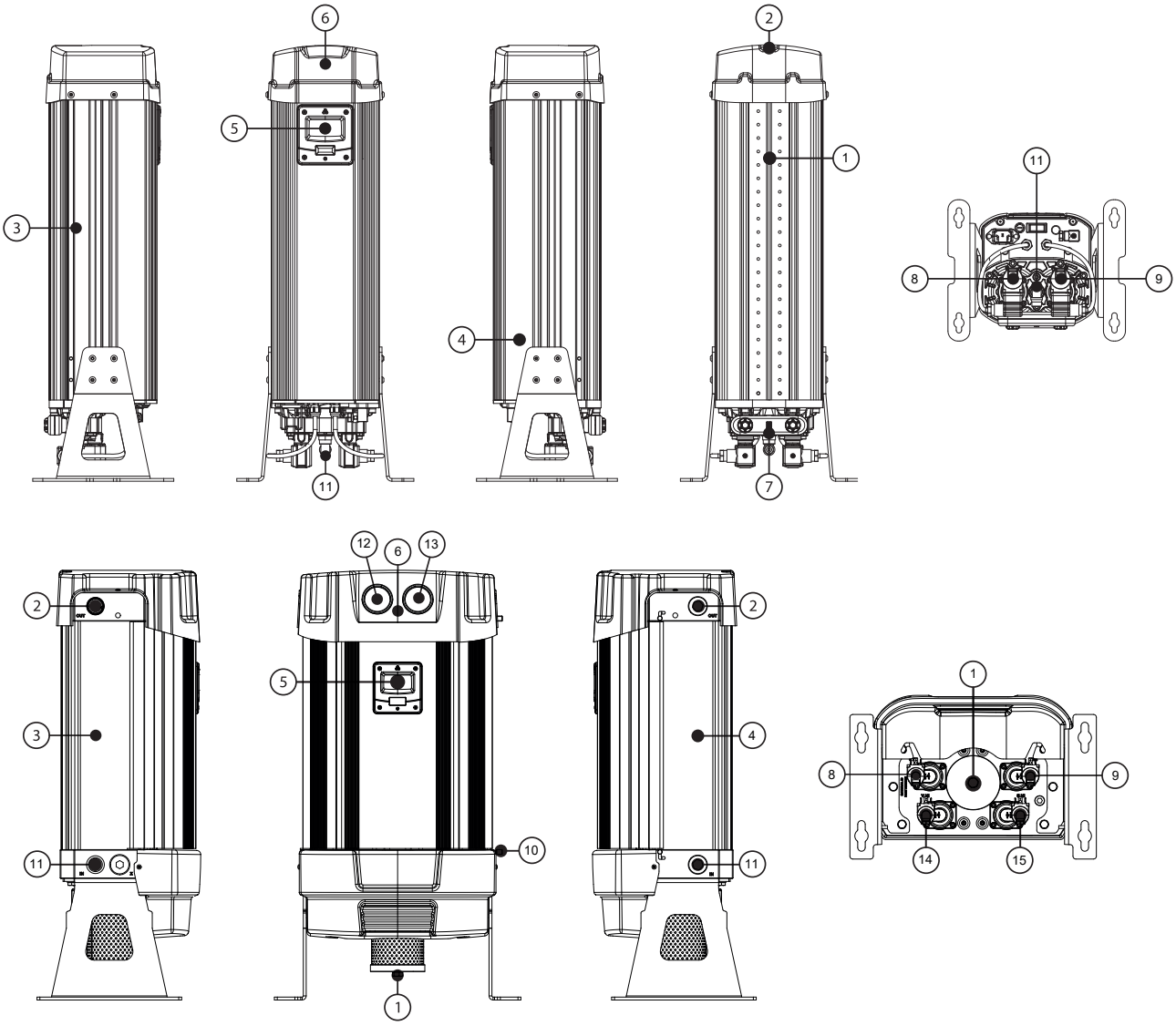
2.3 product overview



number	description	number	description
1	exhaust silencer	9	exhaust valve 'B'
2	air outlet	10	shroud latch
3	column	11	air inlet
4	shroud	12	Gauge 'A'
5	control panel display	13	Gauge 'B'
6	top cover	14	inlet valve 'A'
7	exhaust box	15	inlet valve 'B'
8	exhaust valve 'A'		

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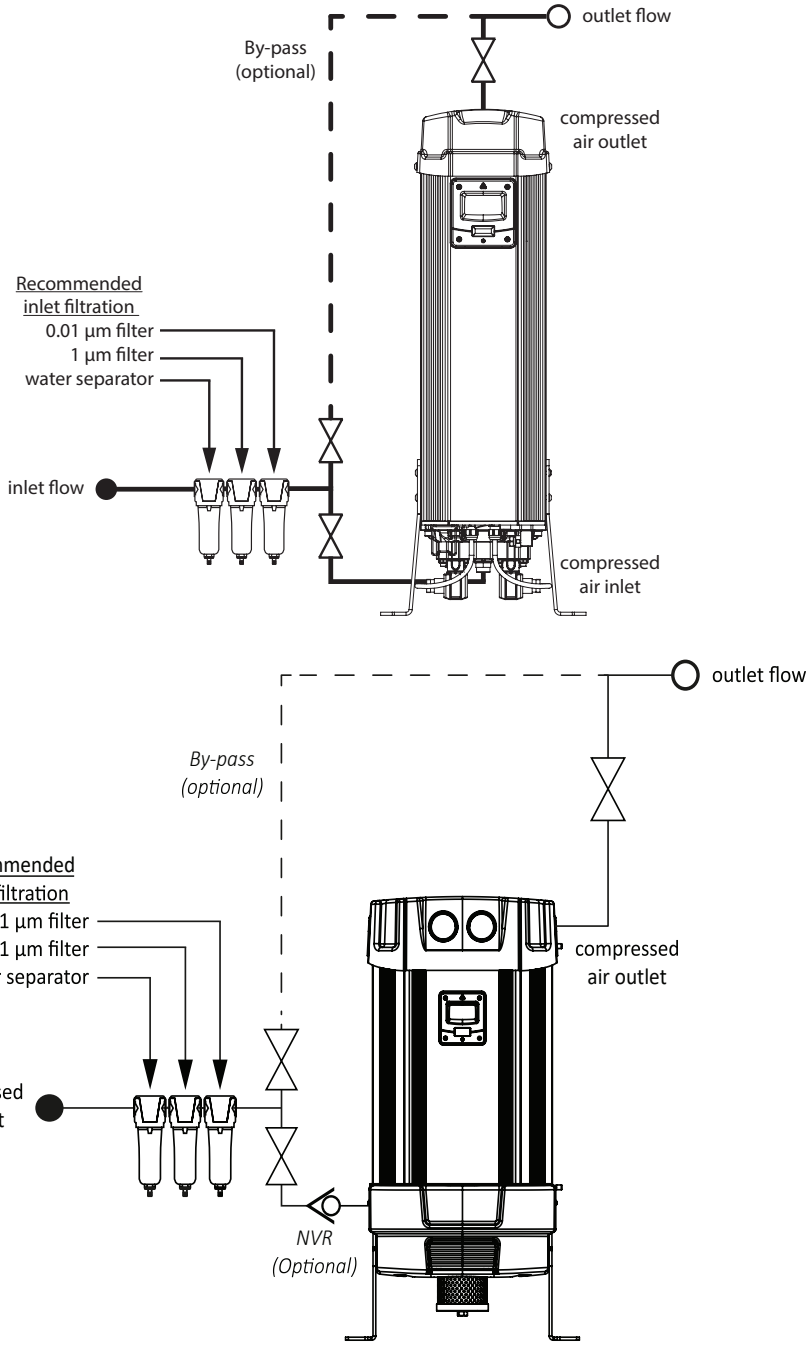
2.4 typical system layout

IMPORTANT: It is essential that the system into which the unit is installed is fitted with a pressure limiting/ relief device. This device should be installed between the compressor and the unit.

IMPORTANT: Inlet valves have a single direction flow. Any reverse flow of these valves can cause irreparable damage to the valve diaphragms.



2.5 site location

When selecting an installation site for the unit, 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 1.5°C (34.7°F) or exceed 50°C (122°F).
- 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 unit exhausting while in use when considering location.

2.6 wall mounting (NDC-015-600)

- All L1 units can be configured so they may be wall mounted. Locate and remove the leg mounting screws using the allen key provided.
- Remove the legs and rotate 90°.
- Align the legs and insert the leg mounting screws and tighten.
- Align the additional wall mounting brackets with the mounting holes located near the top of the unit
  (Only Applicable to NDC-300 & 600)
- Insert the additional mounting screws and tighten using the allen key provided.

All NDC-015, 050 & 140 units can use the standard leg supplied with the product. These can be configured to allow for wall mounting. All NDC-300 & 600 units are recommended to have the additional wall mounting kit (sold seperatley) fitted due to the size and weight of the unit.

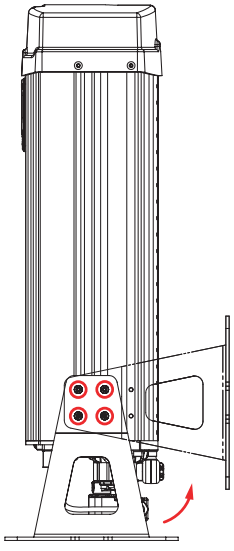


Figure 1

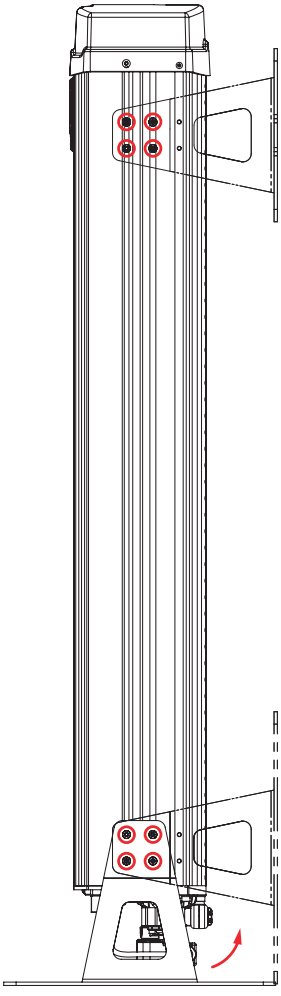


Figure 2

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2.7 operation

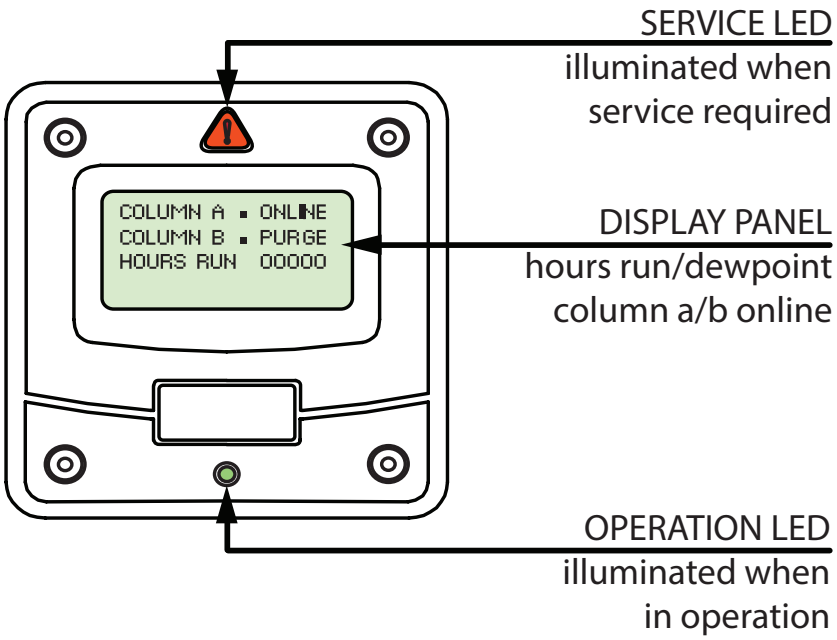
Do not allow the unit to flow air unless switched on and cycling.
Resulting effect could be desiccant contamination; requiring a desiccant service.

- Ensure all pipe work is connected as per the typical layout
- The unit is connected with a power supply as stated on the rating label.
- Ensure the inlet air pressure is with in limits as stated on the rating label on the product.
- Ensure the inlet air temperature is with in limits as stated on the rating label on the product.
- Slowly open the inlet flow and allow the unit to pressurize
- Turn on the power to the unit, the unit will display its' status.
- Allow the unit to cycle at least 2 times before slowly opening the outlet flow.
- In case of using the Remote Start/Stop function, ensure external voltage is active.

This unit must be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This unit is equipped with a cord having a grounding wire with an appropriate grounding plug.

The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

Do not modify the plug provided; if it does not fit the outlet, have the proper outlet installed by a qualified electrician.



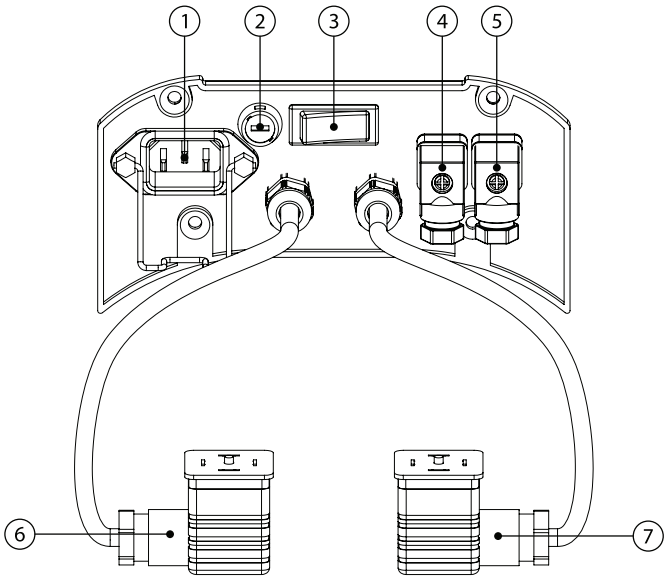
2.8 remote start/stop control

To gain access to the remote start/stop feature:

- Locate electrical connector 4. Remove the screw from electrical connector.
- Remove the electrical connectors cover.
- Locate and remove the link between pins 1 and 4.
- A zero volt switching signal from the remote control needs to be connected between pins 1 and 4.
- When the connection is made, the unit will operate as normal. If the connection is broken, i.e. the unit has been remotely switched off, the unit will stop cycling and go into standby mode, displaying “REMOTE STOP ACTIVE”.
- Re-attach the electrical connectors cover and screw back onto the control plate.
- Using remote stop / start ensures the correct shut-down sequence is implemented.

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.

IMPORTANT: Ensure the mains is isolated/switched off prior to the service of the product. Under no circumstances should the controller be used without being fitted to the product. This product should be connected to a grouded, metallic, permanent wiring system or an equipment-grouding terminal or lead.



number	description
1	IEC mains inlet connection
2	Fuse Holder (1.6A)
3	Unit On/Off Switch
4	Remote Start & Alarms Feature
5	Emergency Stop (Remote Override)
6	Exhaust Valve ‘A’ connector
7	Exhaust Valve ‘B’ connector

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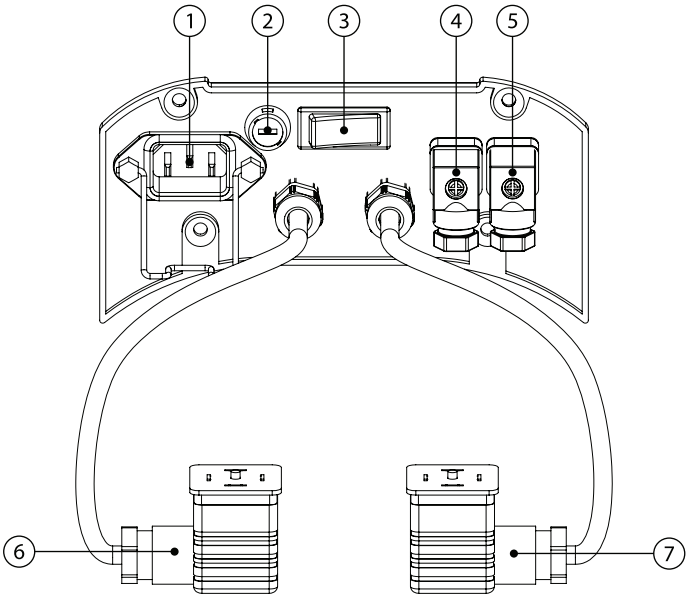
2.9 emergency stop

To gain access to the emergency stop feature:

- Locate electrical connector 5. Remove the screw from electrical connector.
- Remove the electrical connectors cover.
- Using the connections available create a link between pins 1 and 4;

Pin 1: 24V DC + (Positive) Output
Pin 2: N/A
Pin 3: N/A
Pin 4: Remote Stop Input

- When the connection is made, i.e. the unit has been remotely switched off, the unit will stop cycling and go into standby mode, displaying “REMOTE STOP ACTIVE”. If the connection is broken the unit will operate as normall.
- Re-attach the electrical connectors cover and screw back onto the control plate.
- Using emergency stop ensures the correct shut-down sequence is implemented.



number	description
1	IEC mains inlet connection
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7	Exhaust Valve ‘B’ connector

2.10 shutdown procedure

Isolate unit from compressed air system.

The unit will still be pressurized
Ensure the unit is fully depressurized and isolated

To fully depressurize, following the steps below;

- Cycle the dryer at least twice to ensure the unit exhausts and is completely depressurized.
- When fully depressurized the 'clicking' of the exhaust valves will be heard but no air exhausted.
- When the unit is fully depressurized, isolate from the electrical supply.

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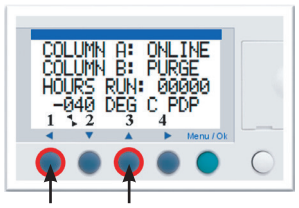
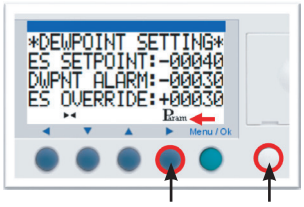
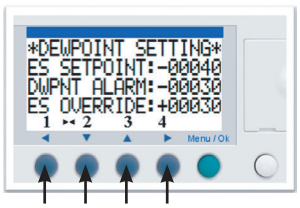
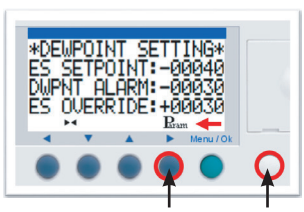
3. monitoring dryer performance (when ES option is fitted)

The pressure dew-point is displayed on the display of the control panel. When the dew-point displayed is equal to or better than -40°C (-40°F) PDP the dryer will switch into energy saving mode and stop cycling, resulting in zero purge, but no interruption in flow. When the dew-point degrades to -39°C (-40°F) or higher, then the dryer will restart cycling ensuring the dew-point is maintained at or better than -40°C (-40°F).

If during normal operation, the unit fails to achieve dew-point (degrades above -30°C (-22°F)) the dewpoint alarm output will be indicated on the front screen and the remote alarm output will activate.

The set levels for the ES and dewpoint alarm are adjustable and can be accessed by carefully removing the front bezel to expose the PLC and adjustment buttons.

Hold buttons A & B down for 8 seconds to access the menu shown on page 17 display 8.

Adjusting Dewpoint Settings	
Hold down button 1 and button 3 for five seconds	
In the DEWPOINT SETTING menu, hold down the white button until the word 'Param' appears at the bottom of the screen Press button 4 once. The text will change to 'Prog'. The 'ES SETPOINT' line will begin to flash.	
Using the buttons, adjust the 'ES SETPOINT' or 'DWPNT ALARM' Button 1 is used to move up a line. Button 4 is used to move down a line. Button 2 is used to lower the value Button 3 is used to increase the value.	
Following any changes to the configuration, it is essential that the program is reverted back to 'Param'. Hold down the white button until 'Prog' is displayed at the bottom of the screen Once 'Prog' appears, press button 4 once. The text will change back to 'Param'.	

Beware, this is only an illustrative example.
Dewpoint set-points and alarms are adjustable through the display panel.

1	**Power-up Display (only visable on power start-up for 10 seconds)**	
	During power-up the screen will display: Program number followed by the version Total hours the product has operated This screen can be displayed at any time by pressing and holding buttons 1 & 2 for two seconds	PROGRAM NUMBER 99-100-0060-V1.1 TOTAL HOURS:+00000 x10,000:+00000
2	**Normal Operation Display**	
	During normal operation the screen will display: Column 'A' and 'B' status, this will show as one of three sequences: ONLINE - column is flowing PURGE - column is regenerating READY - column is waiting to switch Hours the dryer has run between services	COLUMN A: ONLINE COLUMN B: PURGE HOURS RUN: 00000
3	**Service Re-set Display**	
	When due a service, the product display will show 'SERVICE REQUIRED'. After servicing the product, you will be required to reset the service hours run counter. When a magnet is held to the specified area on the dryer shroud for 10 seconds, the screen will display 'SERVICE RE-SET'. The hours run counter will revert back to zero.	COLUMN A: ONLINE COLUMN B: PURGE HOURS RUN: 00000 SERVICE REQUIRED COLUMN A: ONLINE COLUMN B: PURGE HOURS RUN: 00000 SERVICE RE-SET
4	**Normal Operation Display (ES Models)**	
	During normal operation of an ES enabled product, the screen will constantly disply the updated pressure dewpoint reading. This can be displayed in either degrees celcius or degrees fahrenheit, depending on how the controller is configured. Speak to the manufacturer about your requirements	COLUMN A: ONLINE COLUMN B: PURGE HOURS RUN: 00000 -045 DEG C PDP

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5	**Energy Saving Mode Active Display (ES Models)**	
	While energy saving mode is active the screen will display: • Column 'A' status and Column 'B' status, this will be shown as; • ONLINE; this column is flowing • 'ENERGY SAVING MODE' • Hours the dryer has run between services/hours in ES mode • Constantly updated dew-point reading, this can be displayed in either degrees celcius or degrees fahrenheit.	COLUMN A: ONLINE ENERGY SAVING MODE HOURS IN ES: 00000 -045 DEG C PDP
6	**Dew-point Sensor Fault Display (ES Models)**	
	If a fault occurs with the dew-point sensor or the connection to the dew-point sensor, the screen will display; • Column 'A' status and Column 'B' status • Hours the dryer has run between services/hours in ES mode • 'DEWPT SENSOR FAULT'	COLUMN A: ONLINE COLUMN B: READY! HOURS RUN: 00000 DEWPT SENSOR FAULT
7	**Dew-point Alarm Display (ES Models)**	
	If the dew-point sensor reading falls below the desired alarm limit the screen will display; • Column 'A' status and Column 'B' status • Hours the dryer has run between services/hours in ES mode • 'DEWPOINT ALARM'	COLUMN A: ONLINE COLUMN B: PURGE HOURS IN ES: 00000 DEWPOINT ALARM
8	**Energy Savings Adjustment Display (ES Models)**	

3.1 maintenance

Maintenance operations should only be conducted once the system has been shut down and is fully depressurized. All operations should be carried out by authorized and suitably trained personnel

- Isolate the unit from the compressed air and electrical supply ensuring the system is in a safe condition for maintenance to be carried out.
- All connections must be removed with care, paying particular attention to the areas that become pressurized.
- All seals removed during maintenance operations must be replaced with new seals.
- Only certified and approved replacement parts should be used.
- Do not modify or adjust the control settings.
- Check all connections and sealing faces for cleanliness and secure seating prior to assembly.
- Ensure all components are re-fitted to the product before operation.
- Check all connection and sealing faces for any leakage, if any found resolve and check again.
- Ensure the unit is left operating in a safe working condition after completion of maintenance

3.2 cleaning

Clean the equipment with a damp cloth only and avoid excessive moisture around any electrical connections.
If required a mild detergant can be used. Do not use abrasives/solvents as these may cause damage.

3.3 daily checks

- Check the unit for any signs of external damage.
- If the red service indicator is active, the unit must be serviced to ensure continued operation.
- Remove any loose dust or dirt from the unit, clean all surfaces that appear to have attracted unwanted contaminants.
- Ensure the unit is operating within the specification.
- Always check all connections for any leaks.
- Ensure all loose parts are removed or secured to the unit before operation.

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3.4 service schedule and breakdown

service	year 1 (12 months)	year 2 (24 months)	year 3 (36 months)	year 4 (48 months)	year 5 (60 months)	year 6 (72 months)	year 7 (84 months)	year 8 (96 months)
A		✓		✓		✓		✓
B		✓		✓		✓		✓
C		✓		✓		✓		✓
D				✓				✓
E (ES MODELS ONLY)				✓				✓

Service A - Every 2 year (24 months)
Replace desiccant cartridges
Replace top manifold gasket seal

Service B - Every 2 year (24 months)
Replace internal inlet & outlet ball valve & seals

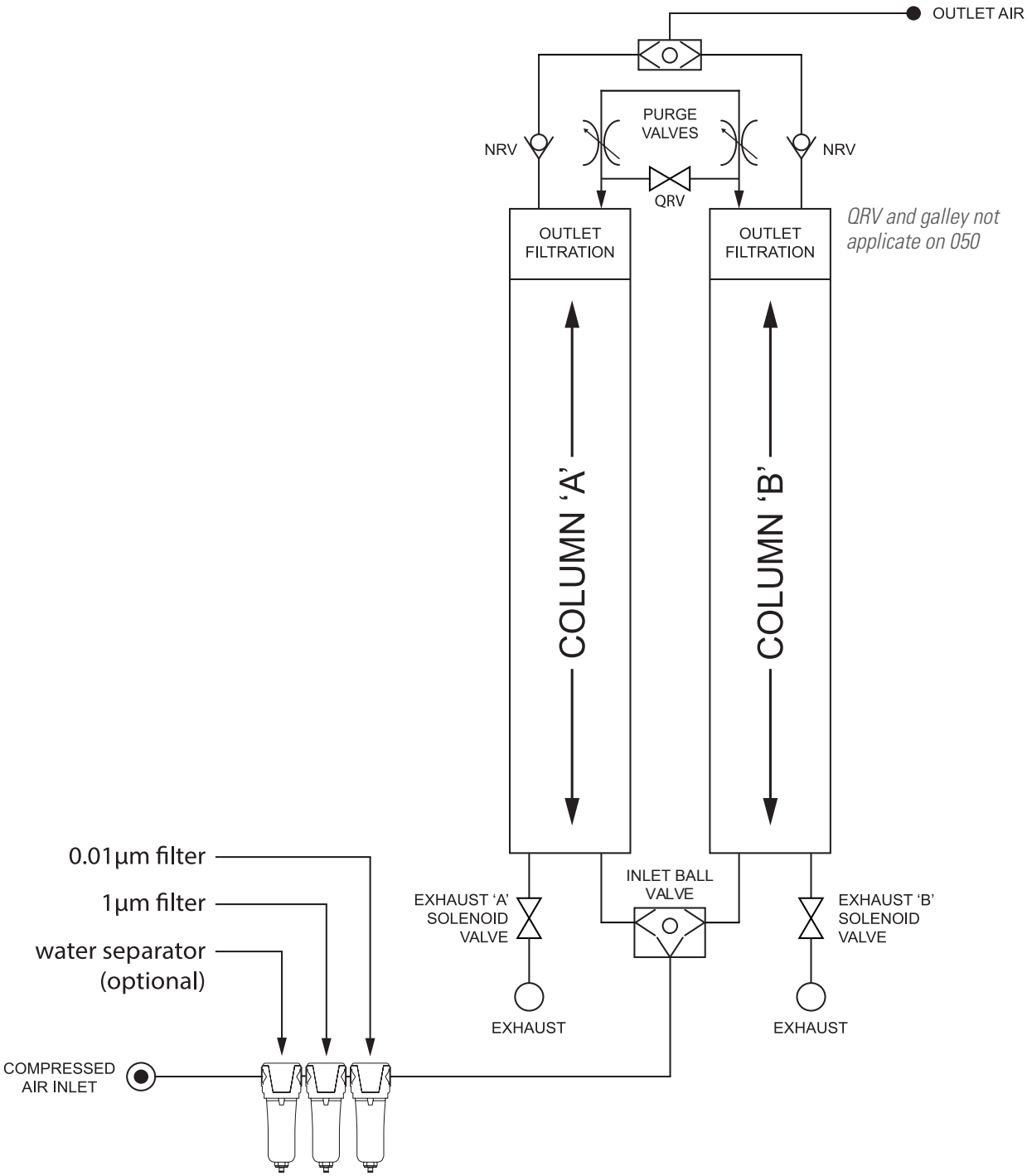
Service C - Every 2 year (24 months)
Replace exhaust silencer strip

Service D - Every 4 year (48 months)
Replace exhaust valves

Service E - Every 4 year (48 months)
Replace QRV

When contacting your service provider be sure to provide the part number and serial number of your dryer, this can be found on the rating plate located top right hand side of the dryer.

4. process and instrumentation diagram (NDC 015-600)



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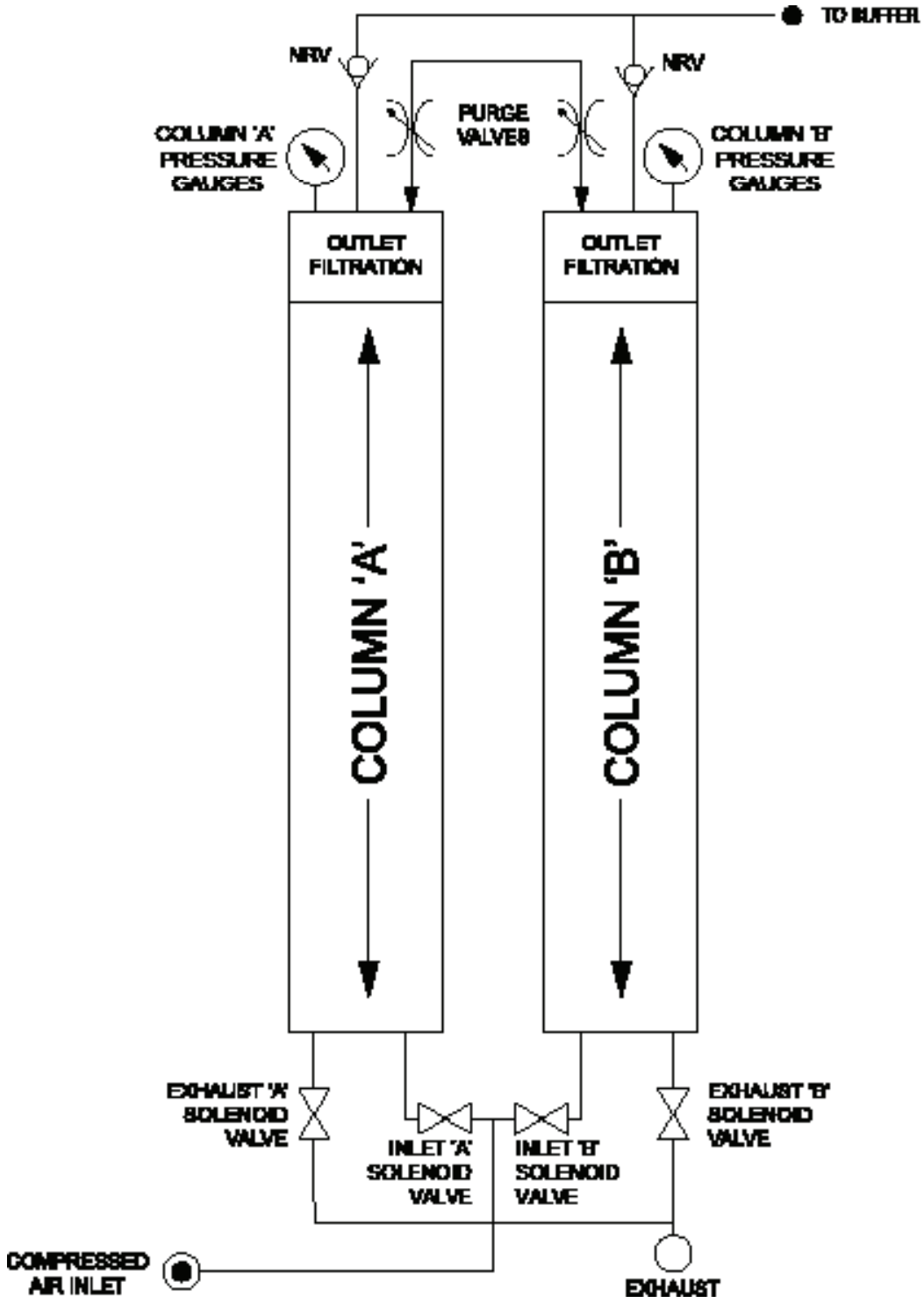
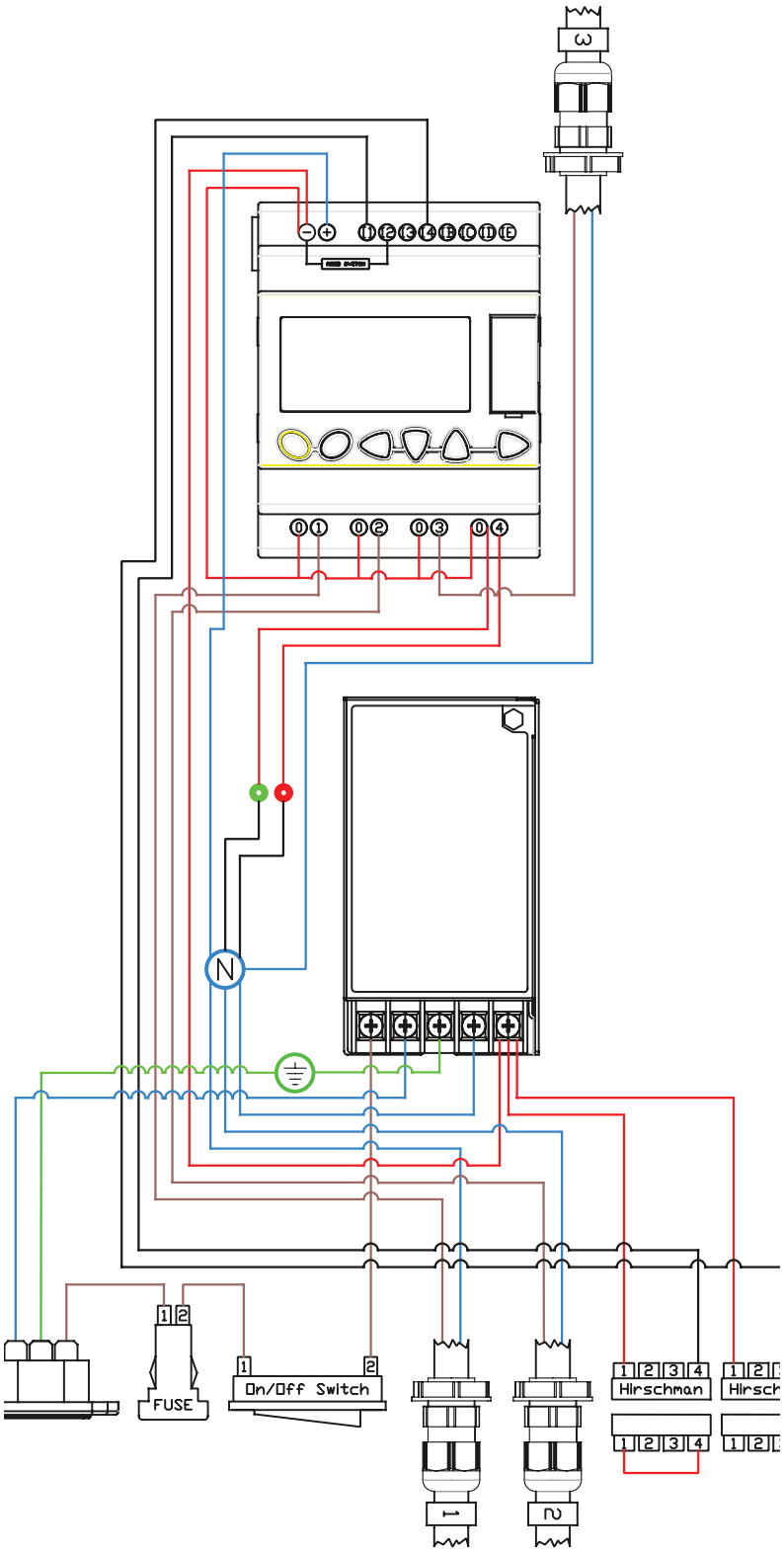
4.1 process and instrumentation diagram (NDC 900-1200)



5. wiring diagram - (NDC 015-600)



Connector 3 not applicate on 050

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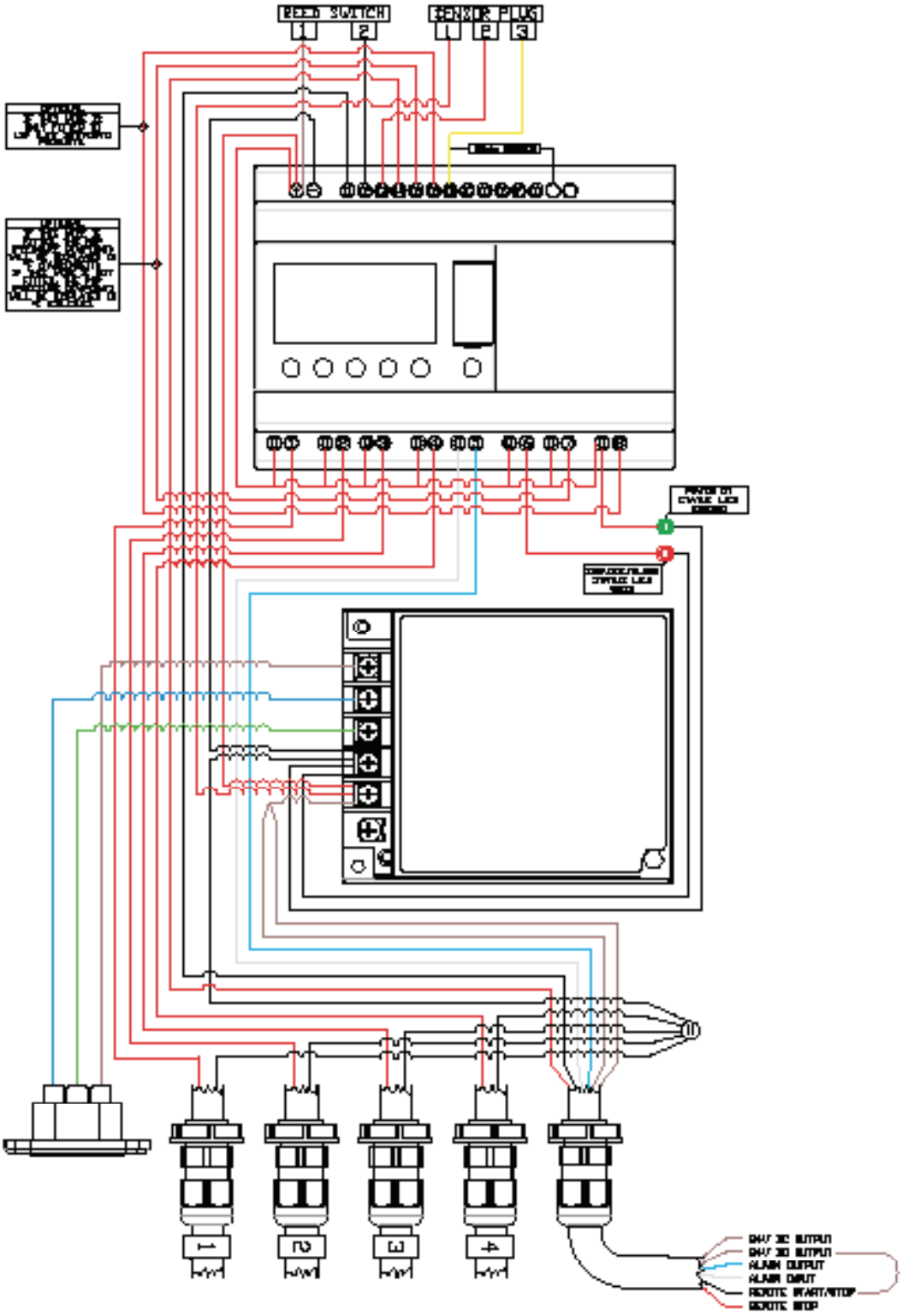
5.1 wiring diagram - (NDC 900-1200)



6. trouble shooting

problem	problem caused	solution
Poor dew-point performance	Insufficient inlet pressure	4barg (58psig) minium inlet pressure required to operate, if not, check and restore system pressure
	Electrical fault	Ensure the power is on and the dryer front panel is illuminated; check the dryer is cycling correctly
	Moist or contaminated desiccant	Eliminate the cause of contamination, replace desiccant cartridges (do not re-use).
	Excessive inlet air temperature	Check against the technical specification
	Insufficient purge air	Purge incorrectly adjusted, consult the service personnel to adjust settings (factory pre-set). Consult Service Technician to adjust as per site condition
	Exhaust silencer blocked	Replace exhaust silencer/muffler element.
Failure of dryer to cycle	controller not functioning correctly	ensure the controller is powered up, check the on screen column status to ensure it is powering the solenoid valves during operation
	insufficient inlet pressure	4barg (58psig) minium inlet pressure required to operate, if not, check and restore system pressure
	controller not illuminated	Check power supply to the dryer, check fuse and replace.
	failure to de-pressurize when cycling	Solenoid valve not functioning correctly; if there is power to the coil, replace valve. Consult PLC display
	outlet flow stops	Check inlet air supply
	failure to initialize dryer	Switch off and restart dryer. Ensure dryer is pressurized before powering up to allow the dryer to initialize before operation.
	erratic air flow from exhaust	Faulty or damaged valves, carry out service

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