

nano



Maintenance & Service Manual

GEN2 i4.0 nitrogen gas generator

revision: REV;2022-045 document: 17-100-0660

© 2021 Air & Gas Solutions LLC.

www.n-psi.co.uk



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.

GEN₂ i4.0

nitrogen gas generator

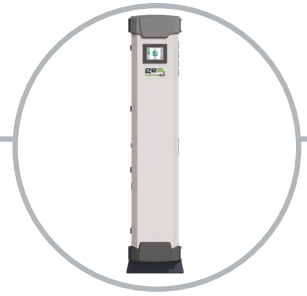


table of contents

section		description	page
1	1.0	general information	4
	1.1	document information	
	1.2	support and manufacture details	
	1.3	general safety	
2		recommended tools	
3		maintenance guidelines	5
4		shut down procedure before maintenance	
5		start up procedure after maintenance	6
6		service intervals	7
7	7.0	procedure assemblies - 130	8
	7.1	procedure assemblies - 110	9
	7.2	panel configuration - 130	10
	7.3	panel configuration - 110	11
	7.4	process diagram	12
8		service "A" instructions; external exhaust silencer / muffler(s)	13
9	9.0	service "B" instructions; piston valve seals - inlet / outlet block	14
	9.1	service "B" instructions; exhaust block	15
10	10.0	service "C" instructions - O ₂ sensor solenoid valve(s)	16
	10.1	service "C" instructions; control valve	17/18
11		service "D" instructions; percentage / PPM oxygen zirconia sensor	18/19
12		GEN ₂ service reset	20/21
13		trouble shooting	22
14		notes	23



GEN₂ i4.0

nitrogen gas generator

1. general information

This manual is copyrighted, all rights reserved. It may not, in whole or in part, be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine readable form without prior consent in writing from nano purification solutions. It may not be distributed through the internet or computer bulletin board system without prior consent from nano purification.

©2021 Air & Gas Solutions LLC.

range: GEN2 i4.0 nitrogen gas generators
models: GEN2 i4.0 -1110/2110/3110 & GEN2 2130/3130/4130/6130/8130/10130/12130
doc no: 17-100-0660
issue: 003

1.1 document introduction

This manual provides factory prescribed maintenance procedures for a nano purification solutions GEN₂ i4.0 Nitrogen Generator. The procedures illustrated in this document are only to be performed by authorised personnel. For further information regarding the procedures outlined in this document contact nano purification solutions before proceeding. Read this document carefully before attempting to install, service or operate the generator.

1.2 support and manufacture details

nano-purification solutions Ltd. (Manufacturer)

address: Dukesway
Team Valley Trading Estate
Gateshead
NE11 0PZ
United Kingdom

telephone: +44 (0) 191 497 7700

internet: www.n-psi.co.uk

e-mail: sales@n-psi.co.uk

nano-purification solutions

address: 5509 David Cox Road
Charlotte, NC 28269
USA

telephone: +1 (704) 897-2182

internet: www.n-psi.com

e-mail: support@n-psi.com

canada - nano-purification solutions inc.

address: 7 Petrie Street
St. Catharines,
Ontario
L2P 3J6
Canada

telephone: +1 (905) 684-626

internet: www.n-psi.com

e-mail: support@n-psi.com

germany - nano-purification solutions inc.

address: Mommenpesch, 46
D-47839 Krefeld
Germany

telephone: +49 2151 4828 418

internet: www.n-psi.de

e-mail: sales@n-psi.de

1.3 general safety

For your own safety, when carrying out maintenance work on the generator, all relevant national safety regulations must be complied with relating to pressurised and electrical systems. Only authorised, competent and trained personnel should maintain the generator, this service 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.



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.

GEN₂ i4.0

nitrogen gas generator



2. recommended tools

The following tools will be required to service the generator

- Terminal screw driver
- 3mm flat screwdriver
- Various metric allen keys/sockets
- Various metric spanners
- Torque wrench (0-40nm)
- Food grade lubricating grease

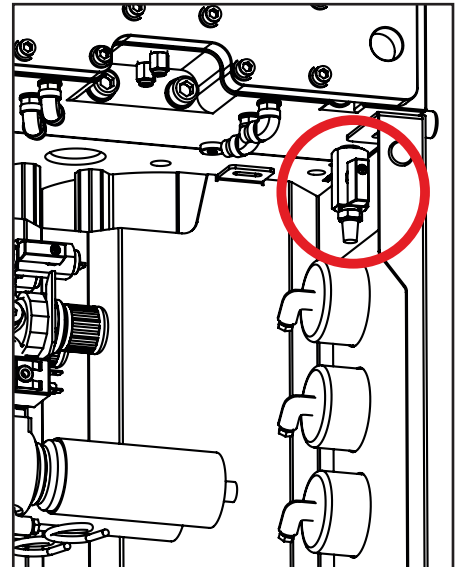
3. maintenance guidelines

- Maintenance operations only to be conducted when the system has been shut down and fully depressurised.
- All connections must be undone with care, paying particular attention to the areas that become pressurised.
- Do not modify or adjust the control settings.
- Only certified nano-purification solutions approved replacement parts to be used.
- Always check all connections for leakage and secure seating before operation.
- Ensure all loose parts removed during maintenance are refitted correctly before operation.

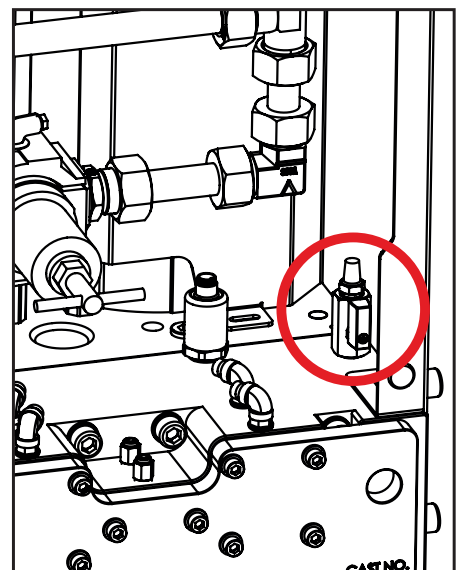
4. shut down procedure before maintenance

If only Service A is to be carried out, only step 1 to 7 is required.

1. Isolate the buffer tank inlet and outlet.
2. Isolate the inlet air supply
3. Isolate the Nitrogen outlet
4. Allow unit to shutdown on low inlet pressure, unit shutdown will take approximately 2 minutes to complete a full shutdown
5. Press the Start / Stop button on the controller
6. Remove mains power from the generator.
7. Open the generators door to gain access to the control panel
8. Open both service valves mounted on the inlet & outlet manifolds.
9. Allow the unit to stand until no venting sound is heard from both valves before carrying out any service work on the generator.



Service Valve Top



Service Valve Bottom



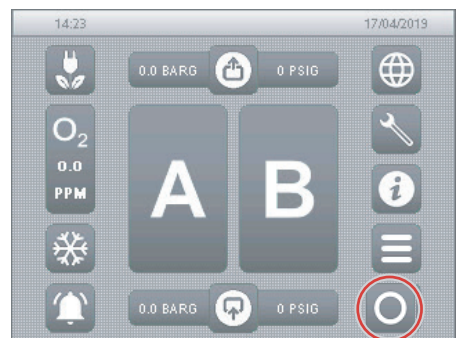
Characteristics of the CMS, pressure can build up to 2 Barg after being shut-down



Before performing any maintenance or service operations on this product, ensure the product is isolated from the compressed air supply and fully depressurised. Also, ensure the product is switched off and isolated from the mains power.



The configuration and orientation may vary per model



HOLD



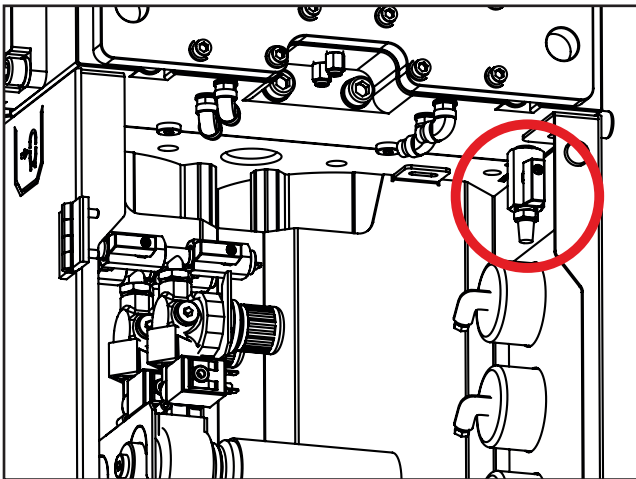
GEN₂ i4.0

nitrogen gas generator

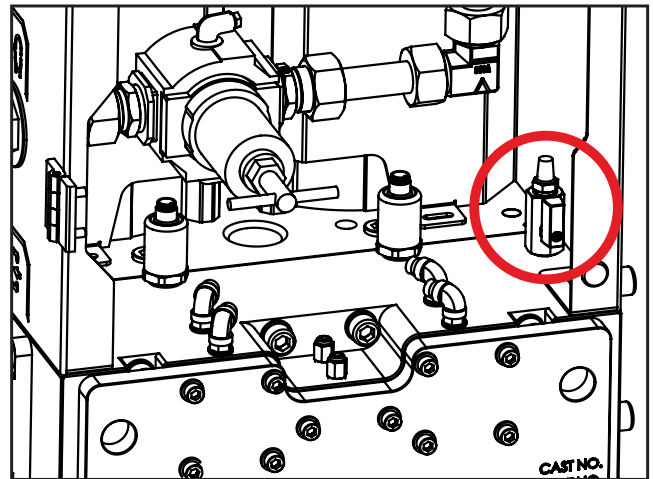
5. start up procedure after maintenance

Test and ensure no leaks with in the unit and system after every step after step 5

1. Ensure all serviced parts and assemblies are secured (excluding the electronic panel on 110 units)
2. Connect mains power supply
3. Close the 2 service valves
4. Press and hold the 'Start-up' button on the front screen
5. Slowly open the compressed air inlet valve, allow to cycle for 2 minutes
6. Slowly open the buffer tank inlet and outlet valves
7. Slowly open the Nitrogen Outlet Valve
8. Allow the unit to cycle to set purity.
Note: A high purity alarm may occur
9. Final internal leak check
10. Secure the electronic panel (on 110 units)
11. Close door



Service Valve Top



Service Valve Bottom



The configuration and orientation may vary per model

GEN₂ i4.0

nitrogen gas generator



6. service intervals

The following table details the recommended service intervals for this product and the service kits to be used.

Service	Recommended Service Intervals				
	1 Year (or 8,000 running hours)	2 Year (or 16,000 running hours)	3 Year (or 24,000 running hours)	4 Year (or 32,000 running hours)	5 Year (or 40,000 running hours)
A	✓	✓	✓	✓	✓
B		✓		✓	
C				✓	
D					✓

Oxygen Analyser Recommended Service Intervals

F (Zirconia)					✓
---------------------	--	--	--	--	---

Nitrogen Generator Model	Service Code				
	A		B	C	D
	6 - 12 Barg (87 - 174 psig)	6 - 16 Barg (87 - 232 psig)			
GEN₂ - 01110	A-BSP-110 A-NPT-110	A-BSP-130HP A-NPT-130HP	B-PVSK-130	C-SSVK-130 C-CVK-130	D-GCR-PPM
GEN₂ - 02110					
GEN₂ - 03110					
GEN₂ - 02130	A-BSP-130 A-NPT-130	A-BSP-130HP A-NPT-130HP	B-PVSK-130	C-SSVK-130 C-CVK-130	D-GCR-PPM
GEN₂ - 03130					
GEN₂ - 04130					
GEN₂ - 06130					
GEN₂ - 08130					
GEN₂ - 10130					
GEN₂ - 12130					

Service A - (A-XXX-1X0)	1" external exhaust silencer/muffler
Service A - (A-XXX-130HP)	2" external exhaust silencer/muffler
Service B - (B-PVSK-130)	All piston valve seals are to be replaced
Service C - (C-SSVK-130)	O ₂ Sensor solenoid valves
Service C - (C-CVK-130)	All control valves are to be replaced
Service D - (D-GCR-PPM)	Percentage/ppm oxygen zirconia sensor



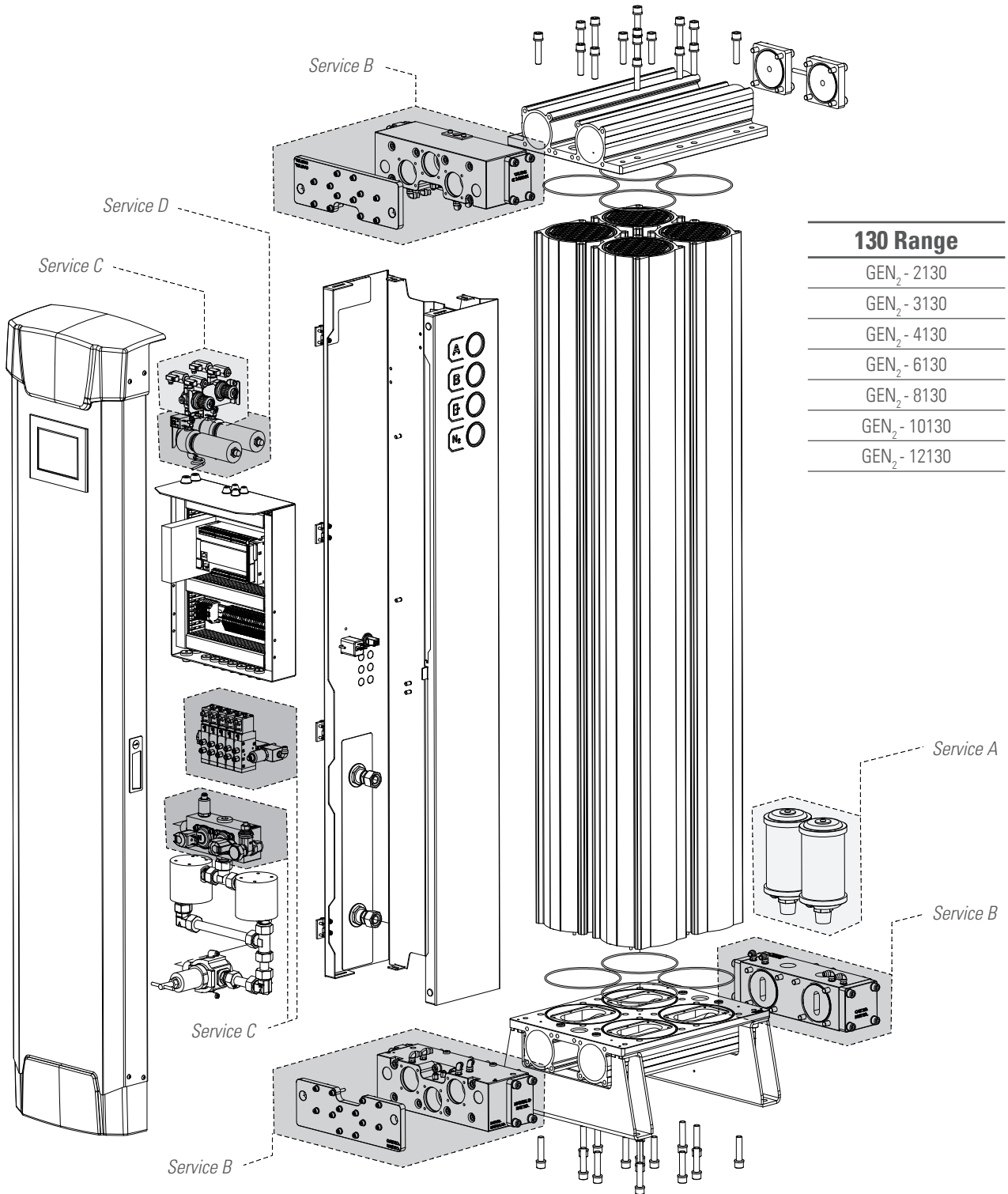
The serial/part number of the nitrogen generator must be supplied when requesting any of the services listed above, this is to ensure the correct service parts are selected.



GEN₂ i4.0

nitrogen gas generator

7. product assemblies - 130



130 Range

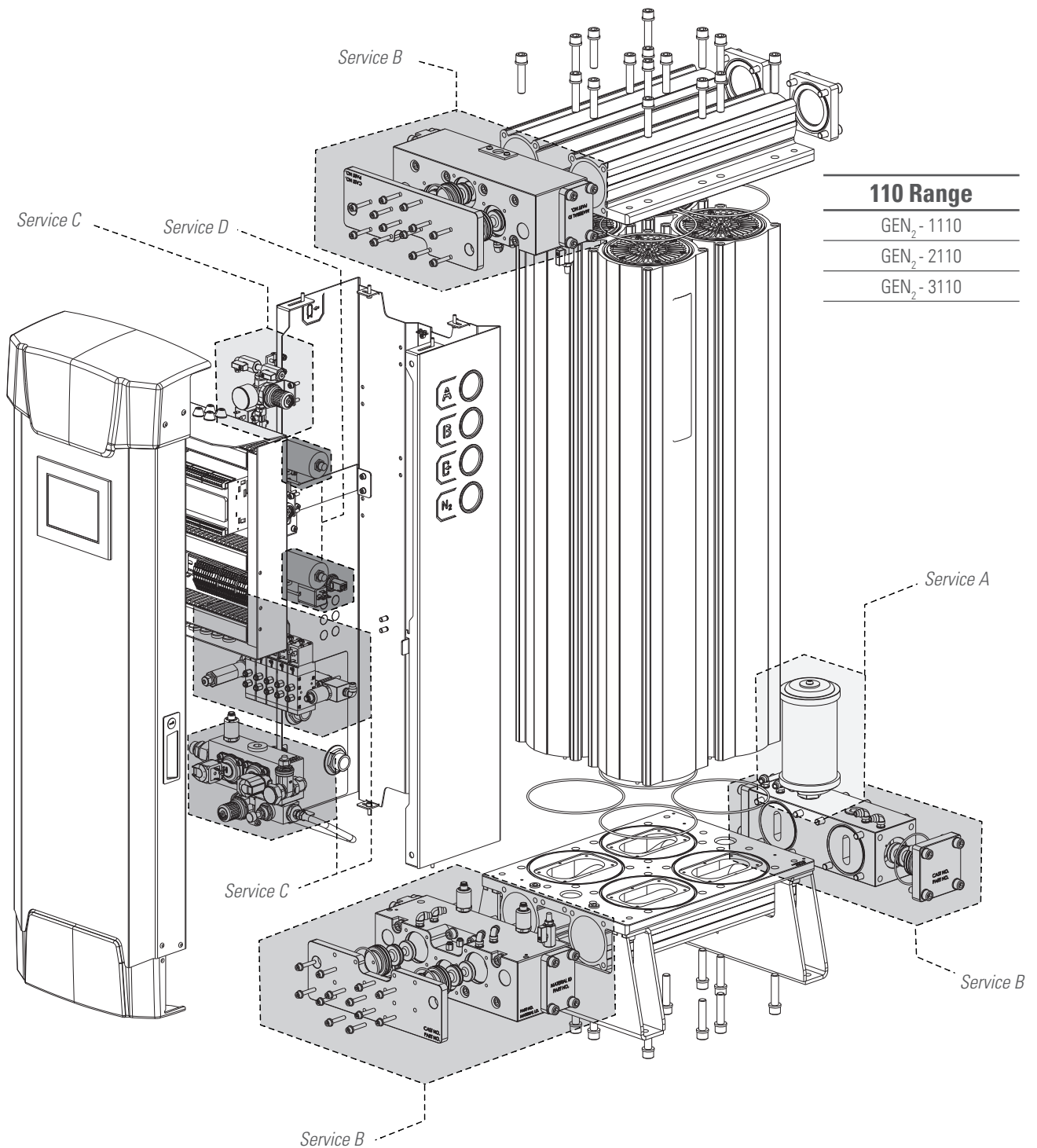
GEN ₂ - 2130
GEN ₂ - 3130
GEN ₂ - 4130
GEN ₂ - 6130
GEN ₂ - 8130
GEN ₂ - 10130
GEN ₂ - 12130

GEN₂ i4.0

nitrogen gas generator



7.1 product assemblies - 110

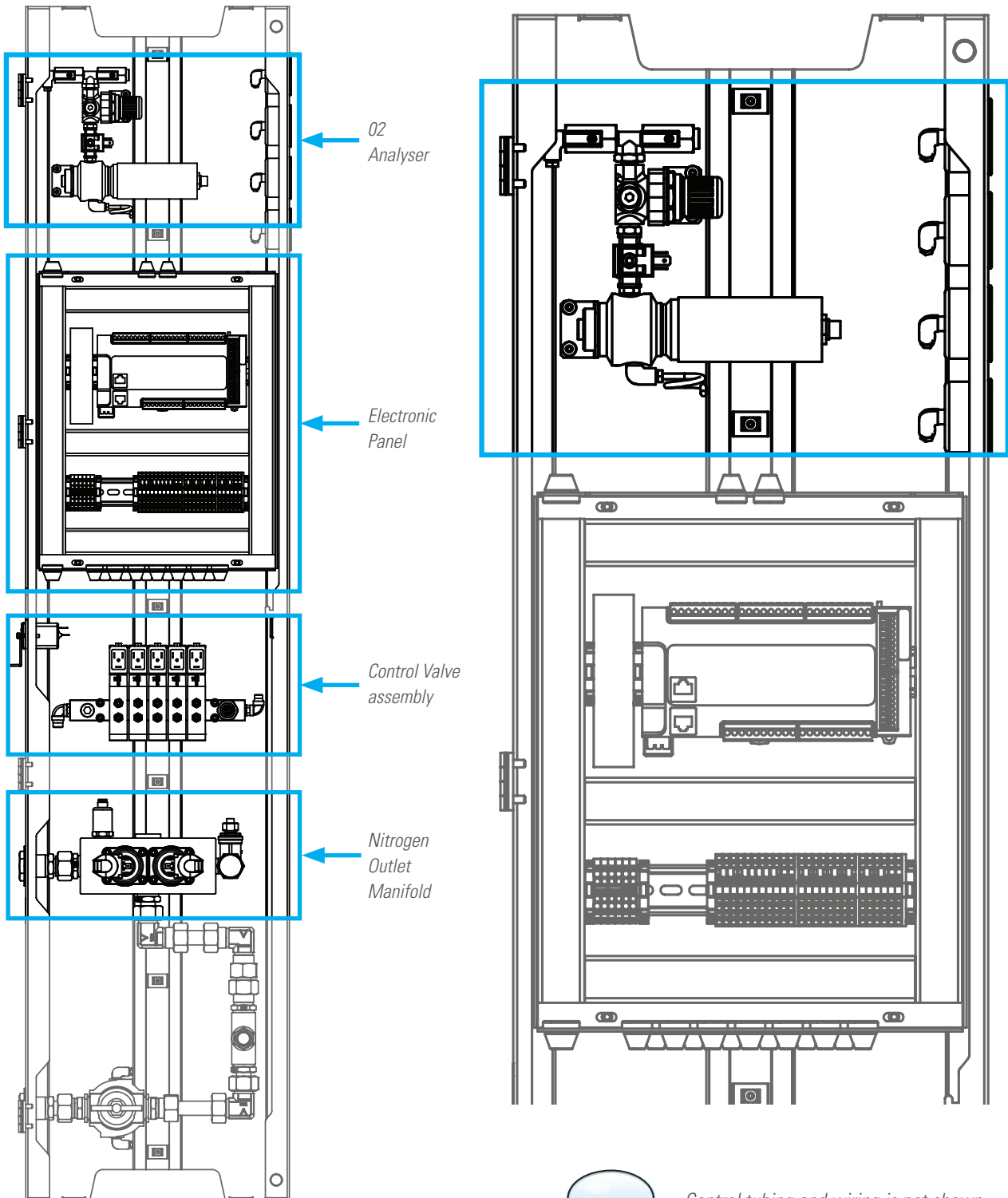




GEN₂ i4.0

nitrogen gas generator

7.2 panel configuration - 130



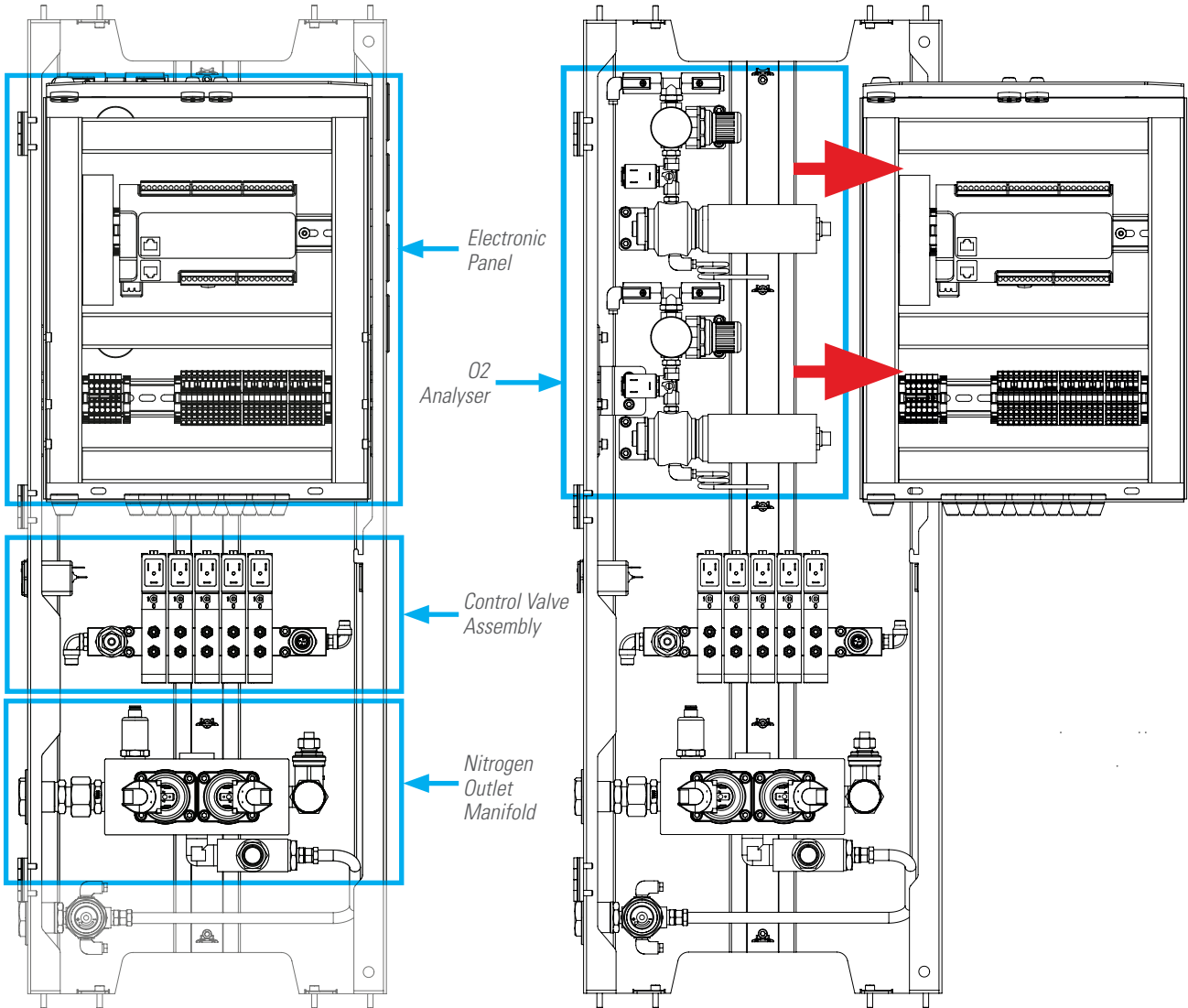
Control tubing and wiring is not shown

GEN₂ i4.0

nitrogen gas generator



7.3 panel configuration - 110



Control tubing and wiring is not shown



GEN₂ i4.0

nitrogen gas generator

7.4 process diagram

Note:

Letters surrounded by a red ring are reference to the required service kit for that component.

Service A: Replace exhaust silencer(s)/ muffler(s)

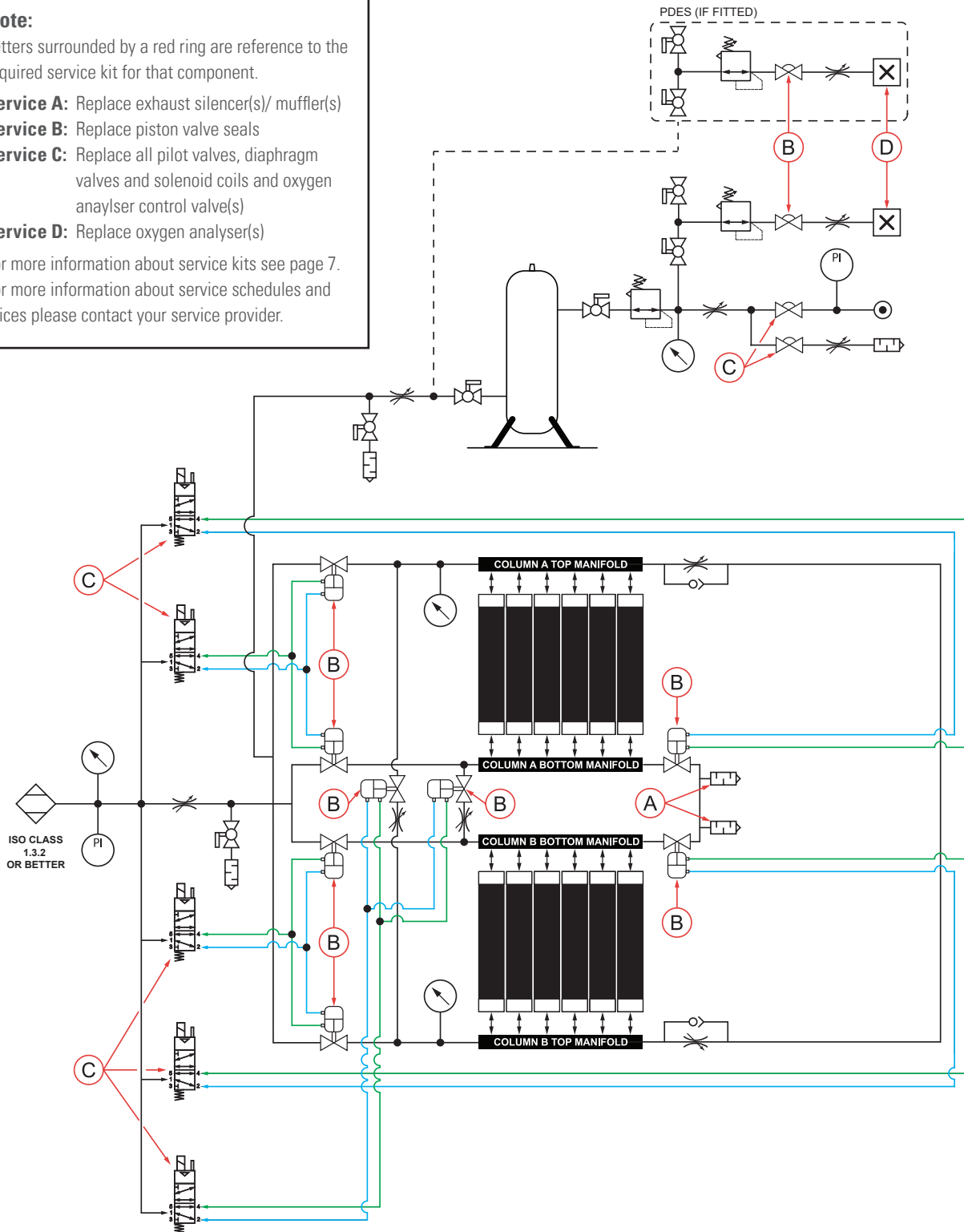
Service B: Replace piston valve seals

Service C: Replace all pilot valves, diaphragm valves and solenoid coils and oxygen analyser control valve(s)

Service D: Replace oxygen analyser(s)

For more information about service kits see page 7.

For more information about service schedules and prices please contact your service provider.



GEN₂ i4.0

nitrogen gas generator



8. service 'A' instructions - external exhaust silencer/muffler(s)

(A-XXX-1X0)
(A-XXX-1X0HP)

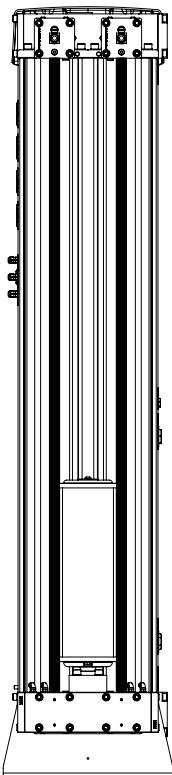
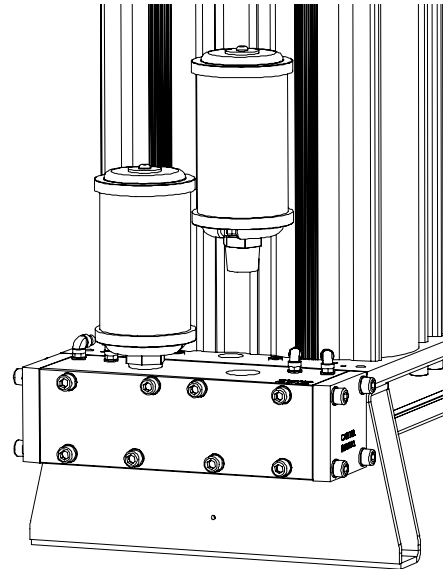
Recommended tools;

- 35mm Spanner (1inch silencer)
- 70mm Spanner (2inch silencer)
- Strap wrench if available
- Thread sealing material

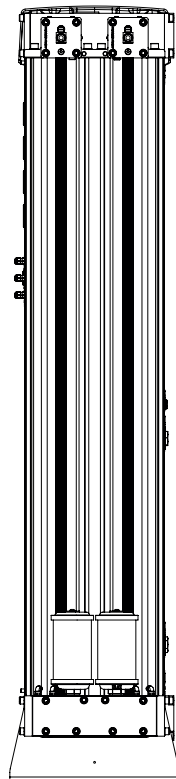
1. Carry out step 1-7 of the 'Shut Down Procedure Before Maintenance' (page 5)
2. Remove Exhaust Silencer/Muffler(s) from the unit
3. Clean the thread and remove any sealing material debris from exhaust block
4. Apply new thread sealing material to new Exhaust Silencer/ Muffler(s)
5. Attach Exhaust Silencer/Muffler(s), ensuring they are tight.



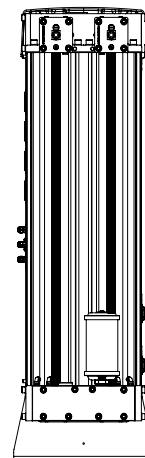
Do Not Over Tighten



High Pressure
6 - 16 Barg
GEN₂ HP 130 build
1 x 2 inch silencer/muffler



Standard Pressure
6 - 12 Barg
GEN₂ 130 build
2 x 1 inch silencer/muffler



Standard & High Pressure
6 - 12 & 6 - 16 Barg
GEN₂ 110 build
1 x 1 inch silencer/muffler



There are two 1inch silencer variants, please consult customer service



GEN₂ i4.0

nitrogen gas generator

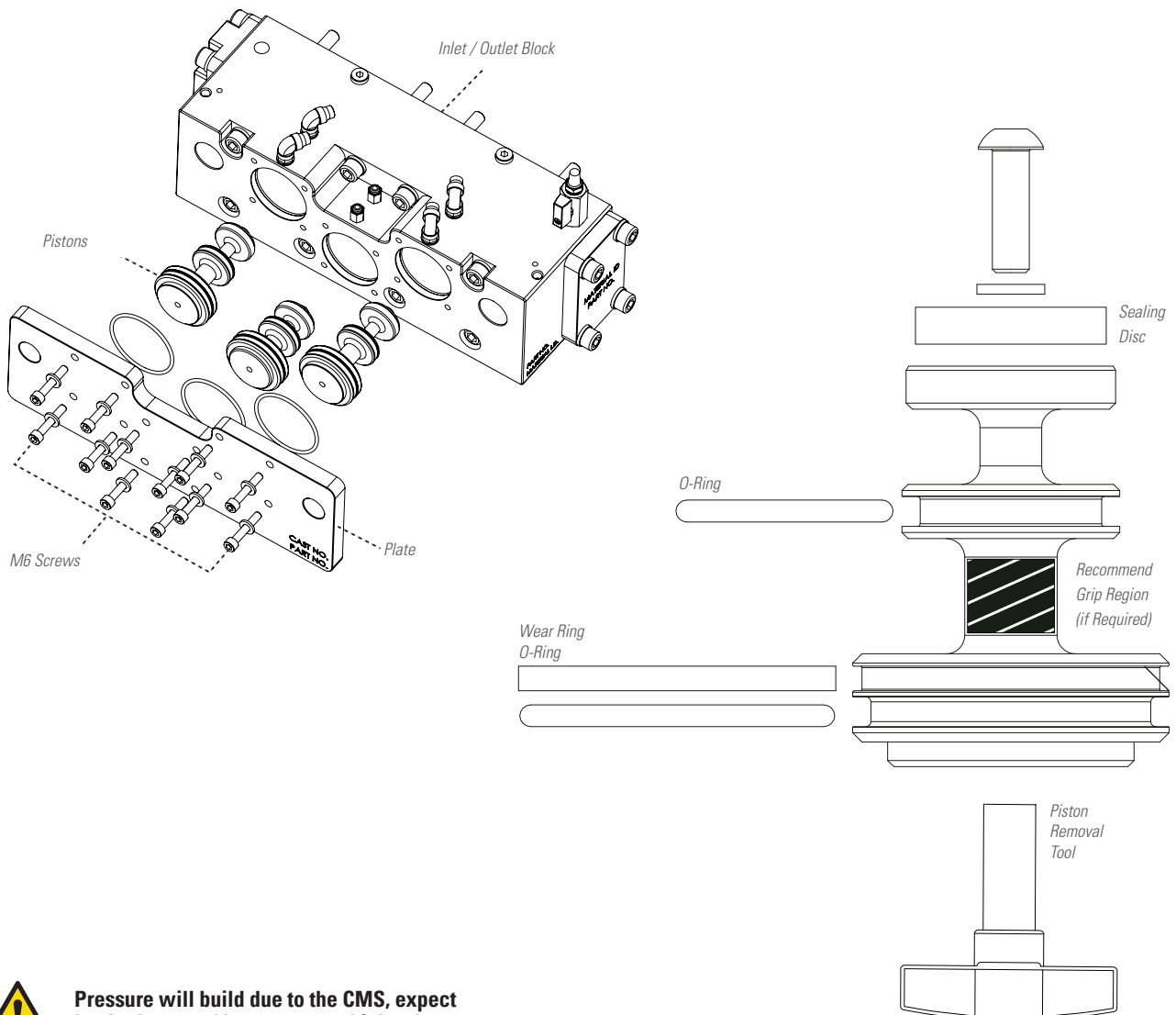
9. service 'B' instructions; piston valve seals - inlet / outlet block

(B-PVSK-130)

Recommended tools;

- 5mm, 8mm, Allen Key Attachments
- Torque Wrench (7-40Nm)
- Piston Removal Tool

1. Carry out all steps of the 'Shut Down Procedure Before Maintenance' (page 5)
2. Remove the front plates (12x M6 screws)
3. Screw the Piston Removal Tool into the rear of the piston and pull
- Take note of the piston positioning
4. Discard the O-rings, wear rings and sealing disc.
5. Clean the piston
6. Grease the new O-rings and apply to the piston
7. Clean and lightly regrease piston bore
8. Refit the pistons into the manifold
- The small piston is located in the center hole
9. Re-attach the front plates. The 6mm bolts torqued setting; 7Nm
10. Carry out all the start up procedure steps on page 6



Pressure will build due to the CMS, expect loud releases of low pressure, high volume gas



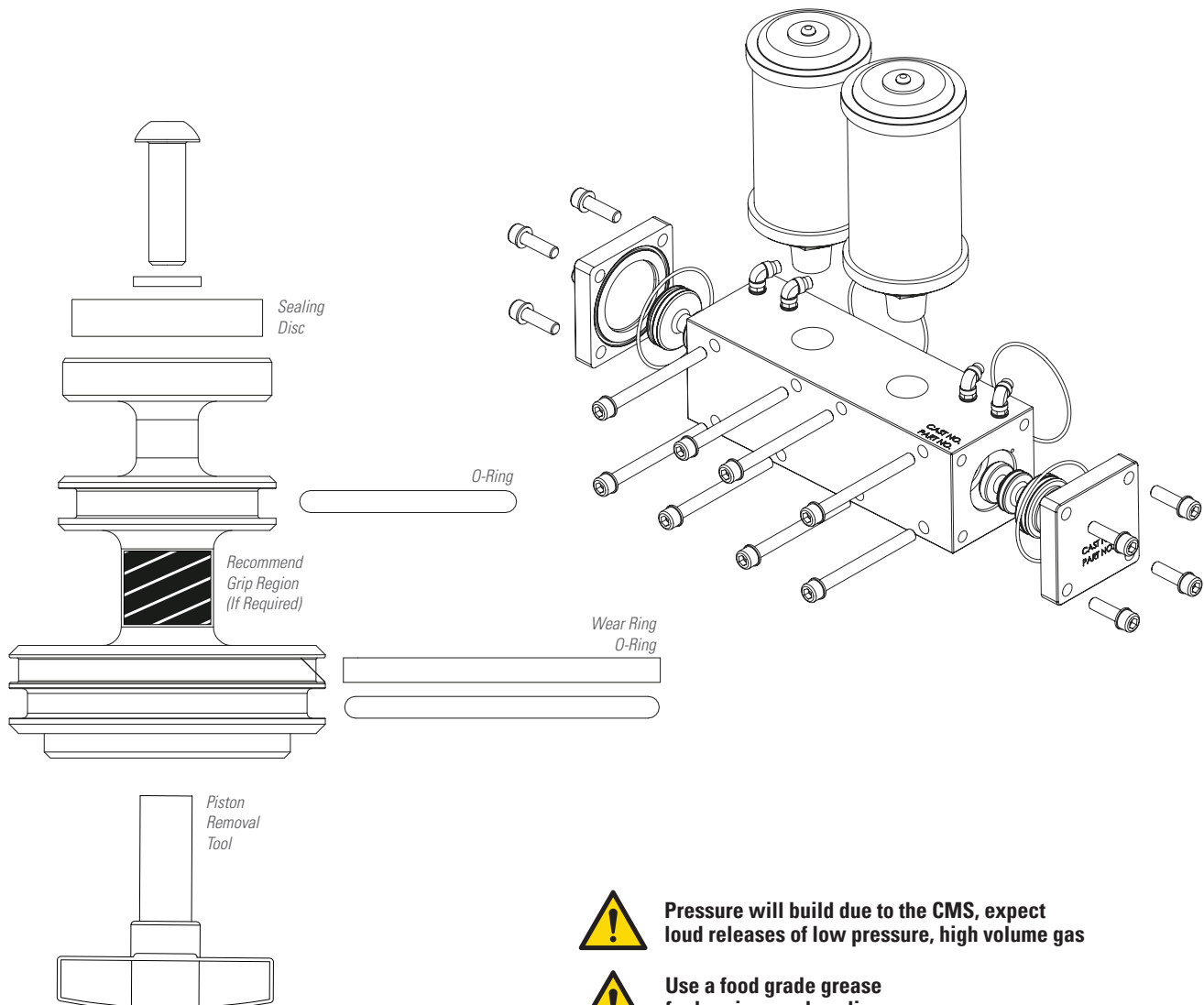
9.1 service 'B' instructions - exhaust block

Piston Servicing

Recommended tools;

- 5mm, 8mm, Allen Key Attachments
- Torque Wrench (7-40Nm)
- Piston Removal Tool

1. Carry out all steps of the 'Shut Down Procedure Before Maintenance' (page 5)
2. Remove the end plates (4x M10 screws)
3. Screw the Piston Removal Tool into the rear of the piston and pull
- Take note of the piston positioning
4. Discard the O-rings, wear rings and sealing disc.
5. Clean the piston
6. Grease the new O-rings and apply to the piston
7. Clean and lightly regrease piston bore
8. Refit the pistons into the manifold
- The small piston is located in the center hole
9. Re-attach the front plates. The 10mm bolts torque setting; 40Nm
10. Carry out all the start up procedure steps on page 6



Pressure will build due to the CMS, expect loud releases of low pressure, high volume gas



Use a food grade grease for bearings and sealing



GEN₂ i4.0

nitrogen gas generator

10. service 'C' instructions - O₂ sensor solenoid valve(s)

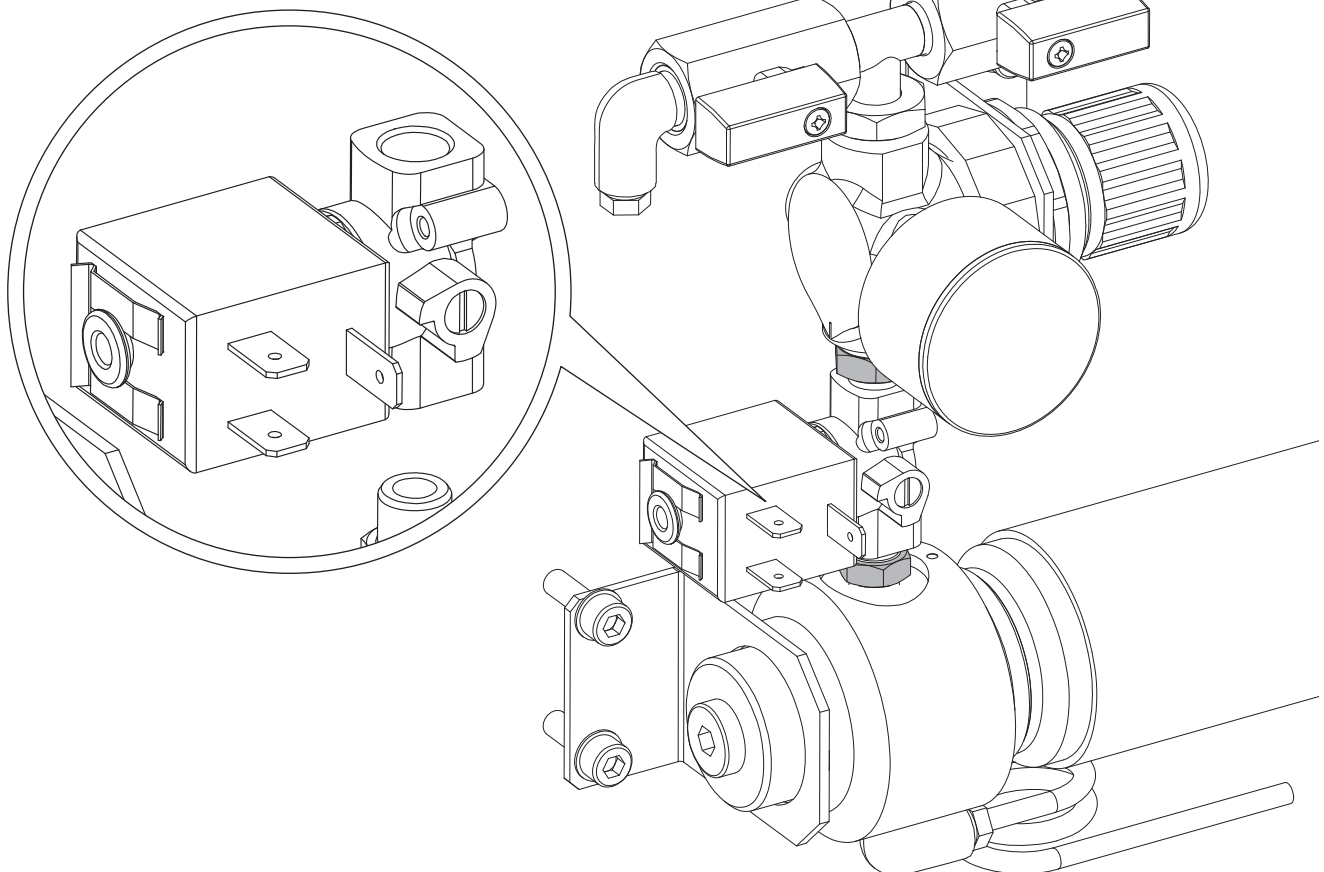
(C-SSVK-130)

Recommended tools;

- Various spanners
- Thread sealing material
- Terminal Screw Driver

It is recommended that the analyser is not left open to atmospheric oxygen for prolonged time periods, it is advised to complete the service in a timely manner.

1. Carry out all steps of the 'Shut Down Procedure Before Maintenance' (page 5)
2. Identify the type and location of the O₂ analyser
3. Take note of the positioning of the electronic connections, and remove
4. Release the clip retaining the sensor and carefully angle away the assembly from the unit.
5. Loosen the fittings highlighted to release the sensor
6. Discard the solenoid valve(s)
7. Clean the threads and reapply sealing material
8. Fit the new solenoid valve(s)
9. Replace the assembly in place
10. Carry out all the start up procedures on page 6.



GEN₂ i4.0

nitrogen gas generator



11. service 'C' instructions - control valves

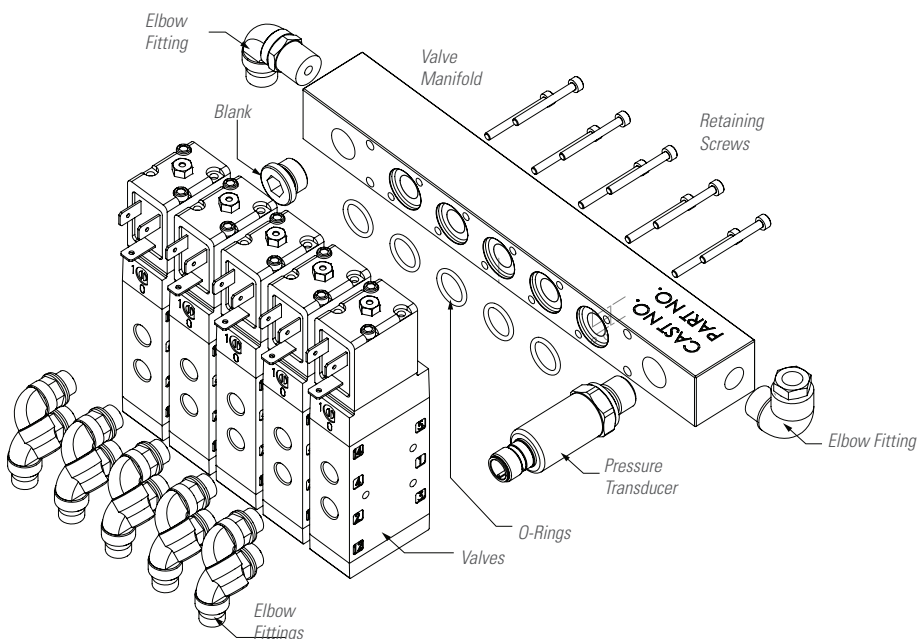
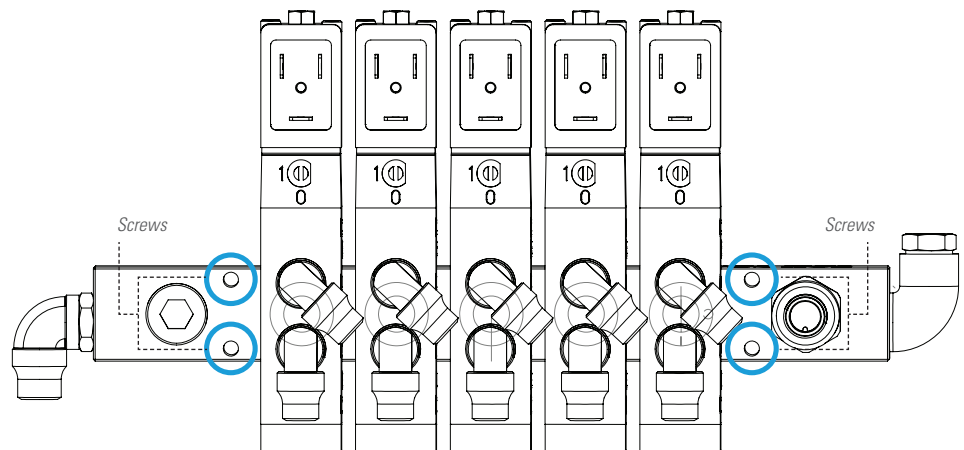
(C-CVK-130)

Recommended tools;

- 3mm Flat screw driver
- 11mm spanner
- Food safe lubrication grease
- Thread sealing material
- Terminal Screw driver

Part 1 - Control valves

1. Carry out all steps of the 'Shut Down Procedure Before Maintenance' (page 5)
2. Release the assembly by the four screws on the base of the control valve assembly (circled)
3. We recommend to service a valve one by one
4. Disconnect the electronic connection on the valve
5. Remove retaining screws to release a control valve
6. Unscrew the fittings from valve, take note of removed connections
7. Discard the valve and O-ring from the control valve manifold
8. Lightly grease and fit the new O-ring into the control valve manifold
9. Attach the new valve with the push-fits and electronic connection
10. Repeat until all valves have been serviced
11. Fit the Control valve manifold assembly back into the unit





GEN₂ i4.0

nitrogen gas generator

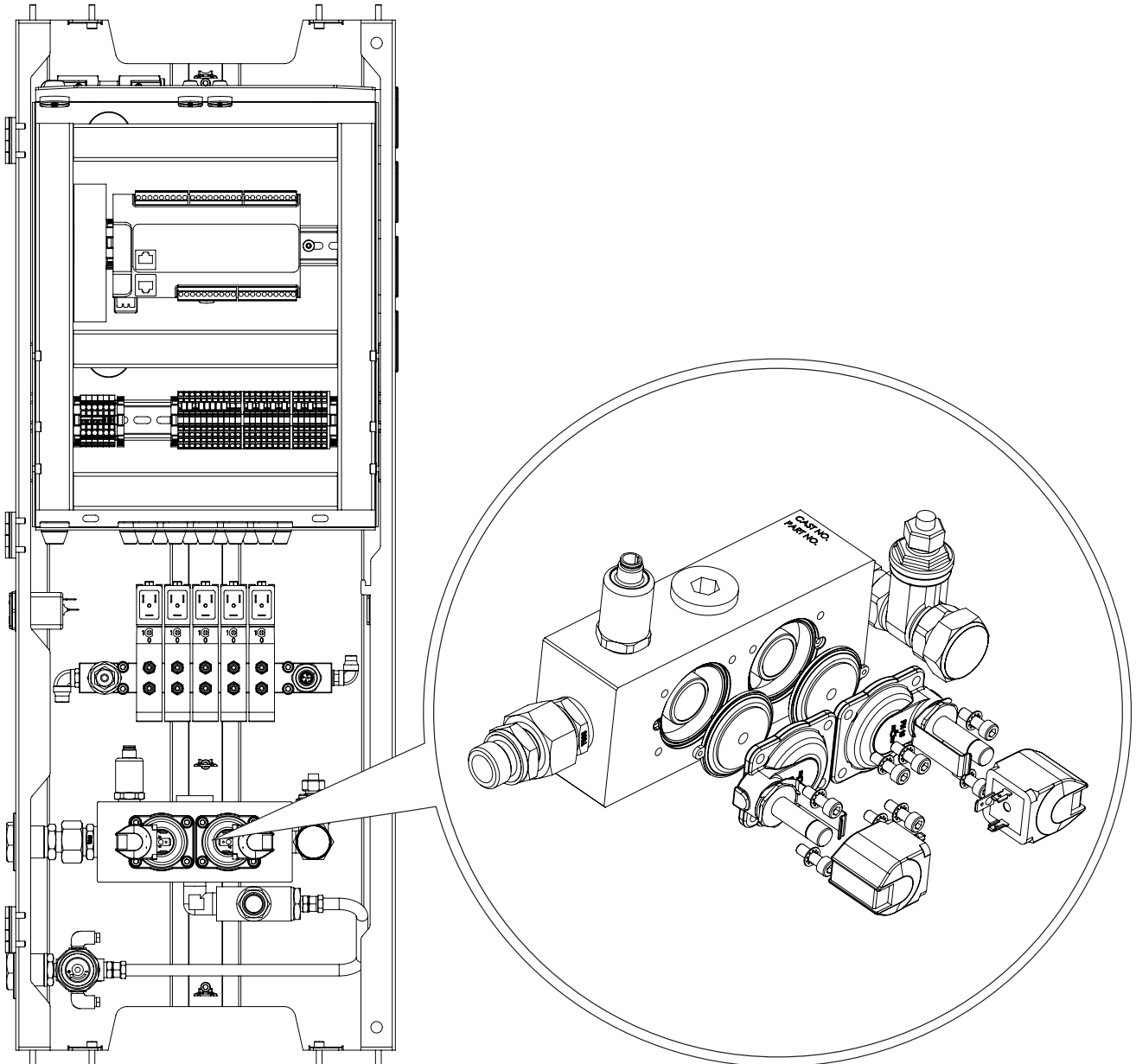
11.1 service 'C' instructions - control valves

C-CVK-130

Part 2 - Nitrogen outlet manifold control valves

1. Disconnect the electrical connectors
2. Remove the solenoid coils
3. Evenly and slowly (1 full revolution per screw), loosen the 4 screws around the 2 valves. This will release any trapped gas
4. Allow gas to vent.
5. Once the venting has reduced, fully remove the screws
6. Take note of the positioning of the valve bonnet direction and diaphragm
7. Discard the valves and solenoids
8. Place the new valve bonnet and diaphragm
9. Torque the 8 screws to 7Nm
10. Connect the solenoid coils and electrical connector to valves
11. Carry out all the start up procedure steps on page 6

Typical 130 Build



GEN₂ i4.0

nitrogen gas generator



12. service 'D' instructions - percentage/ppm oxygen zirconia sensor

(D-GCR-%) SEN ZTX %

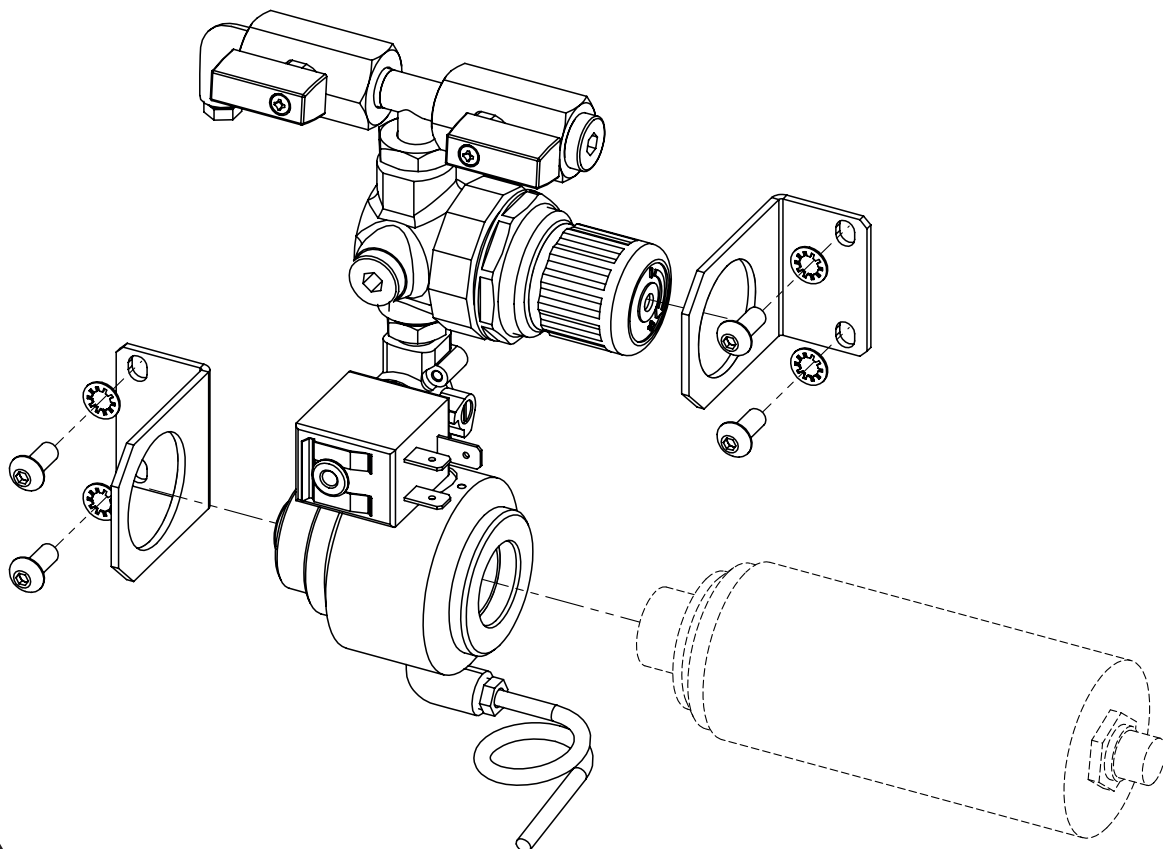
(D-GCR-PPM) SEN-ZTX ppm

Recommended tools;

- 3mm Allen Key

It is recommended that the analyser is not left open to atmospheric oxygen for prolonged time periods, It is advised to complete the service in a timely manner.

1. Carry out all steps of the 'Shut Down Procedure Before Maintenance' (page 5)
2. Undo electrical connection
3. Unscrew Sensor Cell
4. Discard the expired sensor cell - On PPM sensors, take note of the 'Offset' located on the side of the new sensor cell.
5. Hand tighten the new sensor cell.
6. Reconnect electronic connection
7. For PPM sensors, reconnect the mains power, and follow calibration instructions from the manufactures supplied manual.
8. Carry out all the start up procedure steps on page 6



Atmospheric Oxygen degrades the sensor



The configuration and orientation may vary per model

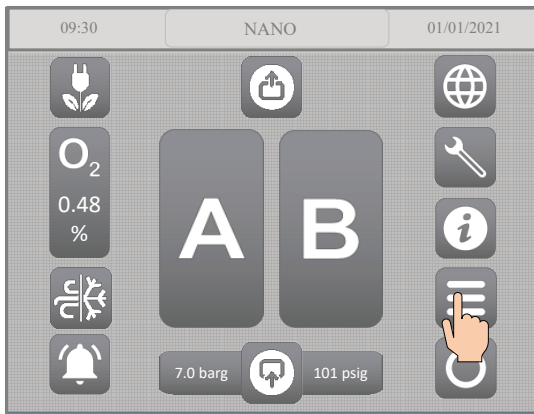


GEN₂ i4.0

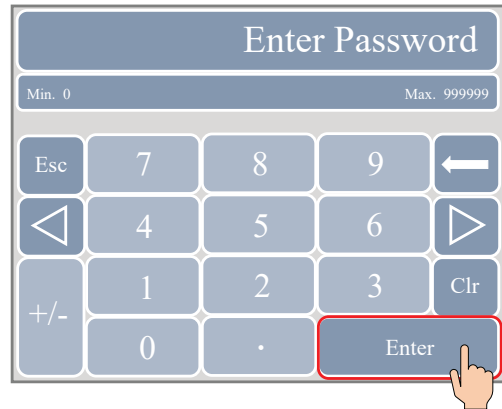
nitrogen gas generator

13. GEN₂ i4.0 service reset

1 Home Screen



4 Enter the password then press the Enter button.



2 Select your required access level



5 Press the unlock key.



3 Press the password input section



6 Press "Service Details"

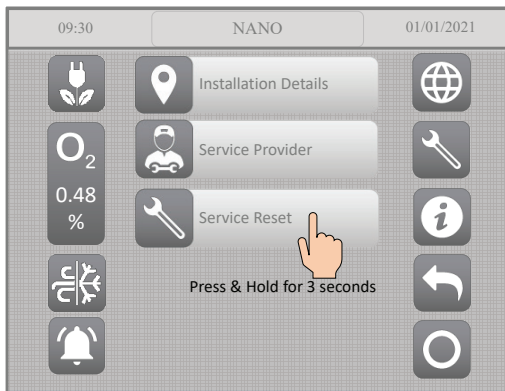


GEN₂ i4.0

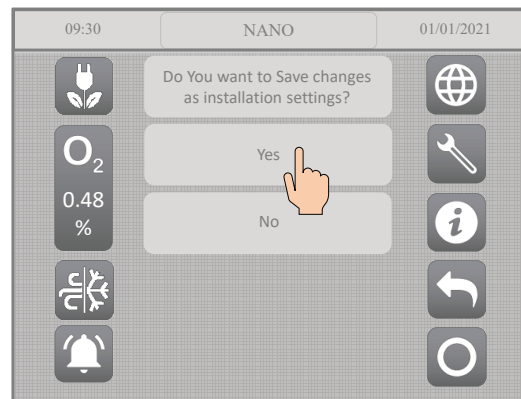
nitrogen gas generator



7 Press and hold "Service Reset" for 3 seconds



9 Saving will update the restore to installation data.



8 Reset complete





GEN₂ i4.0

nitrogen gas generator

13.1 troubleshooting

Problem	Problem Caused	Solution
Poor N² Purity or Product Performance	Insufficient inlet Pressure	Adjust inlet pressure settings.
	Electrical Fault	Ensure the power is on and the generator display panel is illuminated; check the generator is cycling correctly
	Moist or contaminated CMS	Eliminate the cause of contamination, check the external inlet filtration (water separator etc.) for failed auto-drains or condensate build up. Replace inlet AMT dryer cartridge (were fitted) & CMS - Do not reuse.
	Excessive air consumption	Ensure the performance of the generator matches the system and required N ² outlet delivery. Check for leaks through out the unit and system
	Excessive inlet air temperature	Check against technical specifications (remove heat source)
	Insufficient purge air	Consult service personnel to adjust settings
	Exhaust silencer blocked	Replace silencer/muffler & consult service personnel if problem persists
Failure of generator to cycle	Control not functioning correctly	Ensure the generator is powered; check the control solenoids valves are cycling correctly
	Controller not illuminated	Check power to unit & fuse
	Insufficient inlet pressure	Check rating plate for set operating pressures
	Failure to de-pressurised when cycling	Solenoid valve not functioning correctly; check if there is no power to coil, replace valve if faulty. A correctly working valve outputs an audible click when it energises.
	Outlet flow stops	Check inlet air supply, purity valve & N ² Purity (check alarm status)
Constant pressurisation	Failure to cycle	Switch off, allow for 30 seconds and turn on.
	Erratic air flow from exhaust	Faulty or damaged valve; service required

Reference to known misuses;

Opening the inlet valve too quickly

- Valve should be opened slowly allowing the pressure to build up gradually

Inlet/outlet head pipe

- Pipe diameter too small or pipe work unsupported
- Inlet pipe work from low point in system allowing bulk water to collect and enter the generator

Electrical Controller

- Incorrect fuse fitted or fuse blow. Check the main IEC connection for fuse

Additional Items:

- Use of non-authorized components
- Untrained/unauthorized maintenance/installation personnel used
- Cleaning the unit with cleaning products that could damage the components or the CMS.
- No direct contact with water, i.e.. a water hose.
- Covers removed or loose during operation.
- Located outside without appropriate protection
- Failure to carry out a service when indicated by the product.

GEN₂ i4.0

nitrogen gas generator



14. notes

A series of horizontal dotted lines for taking notes.



nano

Experience. Customer. Service.



nano-purification solutions

gateshead, united kingdom
tel: +44 (0) 191 497 7700
sales@n-psi.co.uk
www.n-psi.co.uk



nano-purification solutions

krefeld, germany
tel: +49 (0) 2151 482 8218
sales@n-psi.de
www.n-psi.de



nano-purification solutions

st. catharines, ontario, canada
tel: +1 905 684 6266
support@n-psi.com
www.n-psi.com



nano-purification solutions

new bethlehem, pennsylvania
tel: +1 724 297 3416
airtak@airtak.com
www.airtak.com



nano-purification solutions

charlotte, north carolina
tel: +1 704 897 2182
support@n-psi.com
www.n-psi.com