

NOY UMBILICAL RETROFIT

I. PURPOSE:

To provide clear and concise instructions that outline the retrofit procedure for the NOy Umbilical assembly. The NOy Umbilical connects the bundled electrical wires and gas tubing between the NOy Converter Enclosure assembly and M501Y Pump Pack assembly. The old umbilical assembly first needs to be removed, then the existing M501Y Pump Pack and NOy Converter Enclosure need to be modified internally. Thereafter, the new umbilical needs to be installed between the Converter and Pump Pack. Following the retrofit, the analyzer will need a leak check, a full gas calibration, and then a converter efficiency check.

II. TOOLS AND MATERIALS:

#1 and #2 cross tipped (Phillips) screwdrivers, flat blade screwdrivers, 2 adjustable wrenches or a set of open ended standard wrenches, side cutting pliers, glass cleaner or isopropyl alcohol, sandpaper if necessary to remove paint overspray. (A #1 offset Phillips screwdriver has been provided in the retrofit kit for the 2-56 screw of the thermocouple connector)

III. PARTS:

KIT000381 KIT, RETROFIT, UMBILICAL CORD, NOY

IV. PROCEDURE:

Contact Teledyne-API Technical Support concerning any issues, questions, assistance, or comments
API-TechSupport@teledyne.com or 858-657-9800

Preliminary

1. Power down the analyzer and pump pack power switches, unplug the power cords from the back of the analyzer and pump pack as well as unplugging the cords at the wall outlet. Unplug the external pump power cord of the analyzers large vacuum pump from its power outlet.
2. Lower the NOy Converter Assembly to ground level (lower the mast, trolley, tower, or other mounting apparatus) if possible to facilitate removal of old components and the installation of new components.

NOTE:

The metal NEMA box must be secured by its four mounting holes to a grounded structure, using a grade of metal fasteners, including locking washers and/or nuts that are resistant to both corrosion and vibration.

NOy Moly Converter Enclosure Assembly

3. Loosen latch screws and open the NOy Converter cabinet door. Let the Moly cool off, **as it operates at 315 degrees C** inside (Figure 1).

4. Disconnect the internal components from the umbilical's wire and tubing connections (Figure 1) (see re-assembly instructions throughout this procedure like Figures 17 and 18):
 - a. Disconnect the thermocouple connector coming from the Moly (Figures 17 and 18).
 - i. Use the offset Phillips screwdriver provided to loosen the 2-56 cross-tip machine screw holding the mounted thermocouple housing on the side mounting plate. Disconnect the thermocouple connector body that comes from the umbilical (female side).
 - b. On the Moly heater AC voltage white connector (that is just behind the thermocouple connector), pinch the locking tab down and pull to disconnect the wire that comes from the umbilical (Figures 14, 15, and 16).
 - c. Remove star-nut from ground lug of the thermocouple / line voltage ground point, and remove the wire(s) on the back plate. Reattach star-nut to the lug screw for later use (Figure 19).
 - d. Loosen and disconnect the 3 tubes from the fittings they are attached to, label the tubes and / or fittings as necessary:
 - i. CAL GAS IN, NO OUT, and NOY OUT (Figure 20).
5. Remove the conduit fitting's lock ring / nut and guide the conduit fitting with the tubes and electrical wires out of the hole in the cabinet (Figure 10, 11). Coil the conduit safely out of the way.
6. Close the cabinet door to prevent adverse weather entering if necessary.



Figure 1

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T501Y / M501Y Pump Pack Assembly

7. Take off the cover from the T501Y / M501Y Pump Pack Assembly and set it aside, retain the screws in the holes of the cover if desired.
8. Disconnect the 3 tubes and 2 electrical connectors from the back of the 501Y. (Figure 2)
 - a. NO IN, NOY IN, and CAL GAS OUT, label the tubes fittings if they are not labeled already
 - b. 3-pin thermocouple connector and Moly heater AC voltage twist-lock connector.

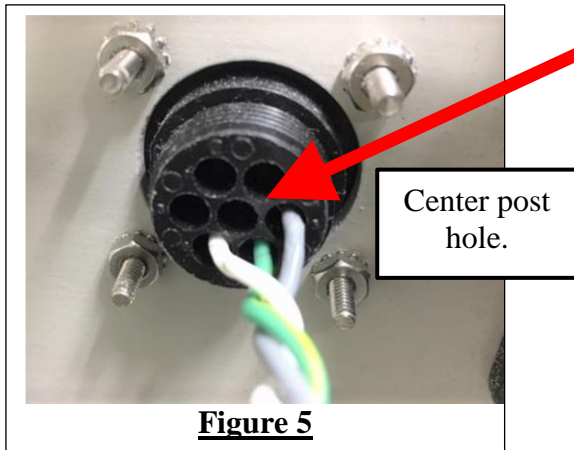
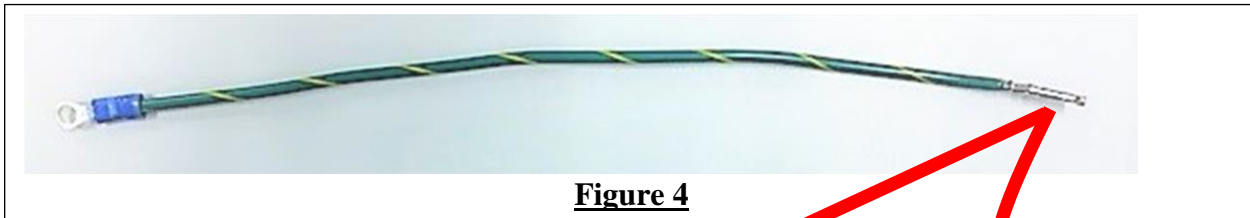
**Figure 2**

9. Break loose any weather sealant around the conduit where it passes through the shelter / building wall. (Figure 3)
 - a. Disconnect any mounting brackets for the conduit run from the M501Y to the wall.
 - b. Remove any mounting brackets and screws and tubing fittings from the conduit as necessary to enable removal of umbilical assembly from the shelter or building.
 - c. Disconnect any additional conduit fittings or additional conduit from the inside of shelter if utilized.
 - d. Remove the conduit fitting's lock ring / nut (if installed or utilized).
 - e. Guide the conduit outside of the shelter. Coil up remaining umbilical and set aside for disposal. **DO NOT re-use the metal conduit.**

**Figure 3**

10. Uncoil and arrange the new Umbilical assembly to prepare for installation. Protect the exposed tubing and electrical fittings from dirt and debris entry and scuffing (on both ends) as the fittings and conduit are guided into place. (Wrap with plastic and / or tape as necessary).
11. Install the end of the conduit through the shelter / building location ensuring the conduit is not twisted.
12. Route the umbilical inside of the shelter and then near to the 501Y Pump Pack Assembly. Route and attach to instrument rack and wall as necessary.
 - a. **Do not install the connections of the umbilical to the back panel of the M501Y yet.**
13. Coil any extra conduit inside the shelter or outside as desired.

14. On the inside of the 501Y back panel, install the new grounding wire (Figure 4) by first pushing the socket contact pin terminal into the **center post hole** of the NOy heater circular connector on the back panel (Figure 5). Ensure it “clicks” into place and give a slight pull on the wire to assure it is firmly locked into place (Figure 6).



- NOTE: For the other side of the ground wire (the ring terminal side that will be mounted on the chassis floor, see Figures 7 and 8), first find a hole in the bottom of the chassis where the 10 x 32 x 1/2" machine screw with integral star washer will be installed. The hole must be close enough so that the wire can be attached. The screw will need to come UP from underneath the bottom of the chassis.
 - NOTE: a size 8-32 screw, star washer, and nut are included if no size 10 x 32 hole is available
15. Check if there is paint overspray or other material on chassis floor near the hole (Figures 7 and 9) – scrape away to bare metal with a flat blade screwdriver tip, sand paper, or other suitable tool(s). The star washer must come in contact with bare metal of chassis.
 16. Install (and hold in place) the machine star-screw up through the hole from underneath the chassis (Figure 9).
 17. Put a star washer over the screw so the star washer lays flush with chassis floor, (this is necessary for good ground connection (Figure 9).
 18. Now route the wire (Figure 8) to the screw and place the ring terminal with ground wire attached onto the screw.
 - a. The star washer must be between the chassis floor and the ring terminal of the wire.
 19. Then finally install a star-nut and tighten for a firm connection to complete the ground connection. (Figure 9)).
 20. Use wire ties as necessary to secure the new ground wire from being able to rub against any sharp edges or get in contact with the fan blades of the chassis fan.

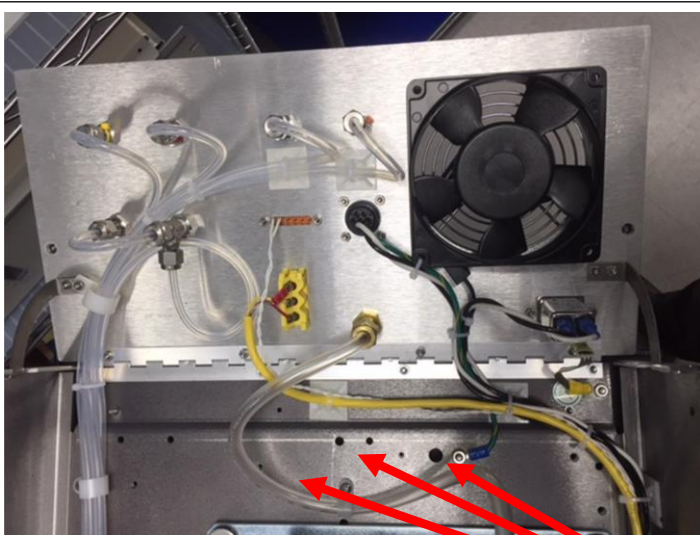


Figure 7

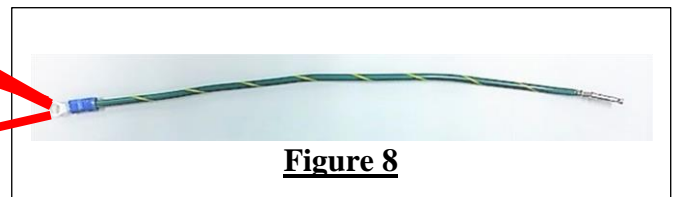


Figure 8

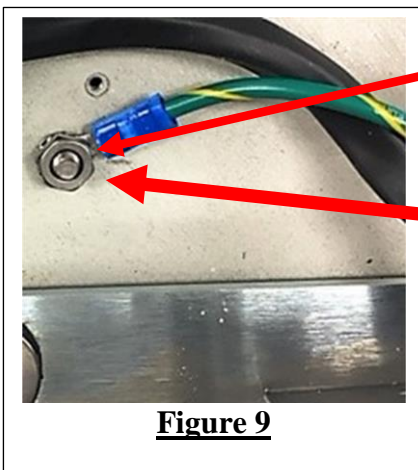


Figure 9

A star washer must be between the chassis floor and the ring terminal of the wire.

Use flat blade screwdriver or sandpaper to take off any paint overspray or other non-conductive material – there must be bare metal on the chassis floor where star washer and terminal connect.

21. On the back panel of the 501Y, connect and tighten the umbilical gas and electrical connections to their prospective locations:
 - a. For the 3 tubes: NO IN, NOy IN, and CAL GAS OUT. The 3-pin thermocouple connector and line moly heater AC voltage twist-lock connector. Refer to the pneumatic diagrams (Figures 21, 22, and 23).
22. Reinstall the cover on the 501Y.
23. Coil any extra conduit inside the shelter or outside as desired. Use RTV or sealant at shelter entry hole for conduit as necessary. You may first want to restore the NOy converter to the normal height before deciding on the coiling of extra length and sealing entry hole of the new conduit. NOTE: usually (if possible) the analyzer should be leak checked, calibrated with zero / span gas, and have a converter efficiency test – before raising the converter back to its original height, so coiling and sealing of the conduit can wait for a later time.

NOy Moly Converter Enclosure Assembly

24. Route the new umbilical's tubing and electrical connectors inside of NOy Converter Enclosure (Figure 10).
25. Route the conduit fitting's ring/nut over the tubing and electrical fittings and then run it down the tubing / wires.
26. Pull the fitting up through the hole tight so it is flush and the threads appear on the inside of the enclosure.
27. Thread on the nut to the fitting inside of the enclosure – using a hammer tap on a flat blade screwdriver to drive the tabs of the nut so it is tight and securely holds the fitting so it can't be rotated or come loose (Figure 11).



Figure 10



Figure 11

Tap a hammer on a flat blade screwdriver against the tab right here to tighten.

28. Remove lower left slot head machine screw from Moly mounting plate (Figure 12). Put the original screw through the new ground cable ring terminal with 2 wires.
29. Put a new star washer on the screw and then thread the screw into the original hole and tighten.
 - a. The star washer must be between the back plate and the ring terminal of the wire.

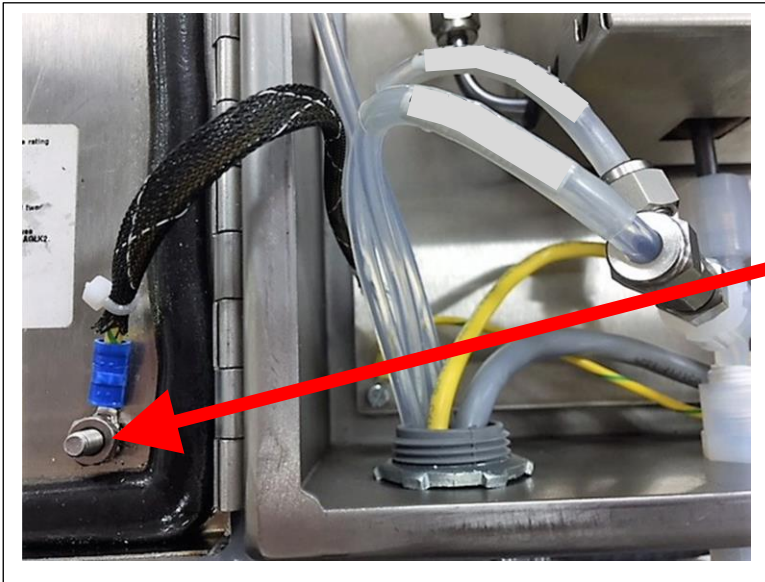


Figure 12

Install a new star washer under the new 2-wire ground cable ring terminal using the original screw.

A star washer must be between the back plate and the ring terminal of the wire.

30. Put a new star washer on the enclosure door ground screw post first.
31. Place the other ground single wire ring terminal (coming from the 2-wire ground point on the back plate) to the screw post on the enclosure door (Figure 13). Use a new star-nut to tighten.
 - a. The star washer must be between the enclosure door and the ring terminal of the wire.



Use a new star-nut on the single wire ring terminal.

A star washer must be between the enclosure door and the ring terminal of the wire.

Figure 13

32. Install the Moly heater AC voltage adapter jumper red end (Figure 15) into the matching red connector coming from the umbilical (Figure 16).
33. Plug the white connector end from the heater adapter jumper (Figure 15) into the matching heater white connector mounted into the knock out hole of the mounting bracket that goes to the Moly oven (Figures 14 / 16).



Figure 14



Figure 15

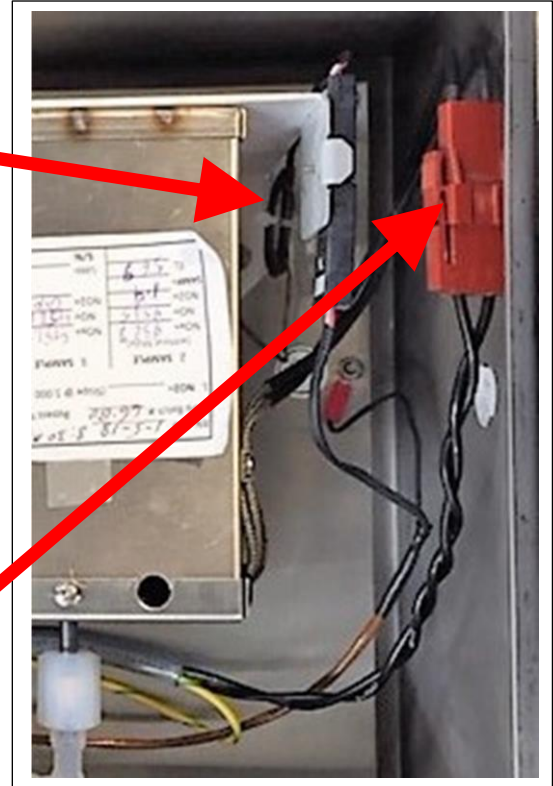


Figure 16

34. Install the new thermocouple wire connector coming from the umbilical (Figure 17) to the matching thermocouple connector mounted on the mounting bracket (Figure 18).
35. Tighten the 2-56 machine screw with offset screwdriver to retain the connectors together (Figure 18).



Figure 17

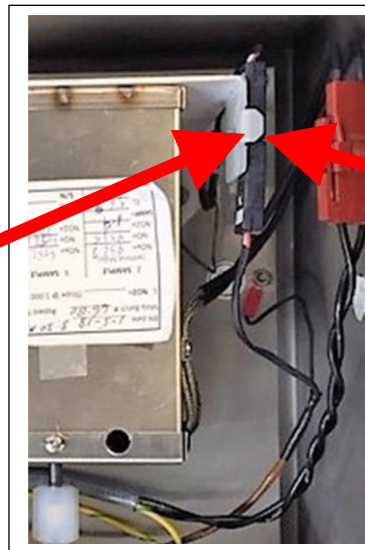


Figure 18

Plug the new thermocouple connector from the umbilical to the matching connector on the bracket. Tighten the 2-56 screw with offset Phillips screwdriver.

- Remove the previously installed star-nut from the ground lug screw on the back plate for the thermocouple ground wire coming from the umbilical (Figure 19).
- 36. Place a new star washer on the ground lug screw.
- 37. Put the new thermocouple ground wire ring terminal on the screw next.
- 38. Put on the previously removed star-nut and tighten.
 - a. The star washer must be between the back plate and the ring terminal of the wire.
- 39. Wipe the side wall of the enclosure with surface cleaner (such as glass cleaner or Iso-Propyl Alcohol) to the area right of thermocouple ground lug screw and install an adhesive tie point.
- 40. Bundle the thermocouple and AC line voltage wires together and use tie-wraps to secure the wires to the adhesive mounting point on the right side of the enclosure.
- 41. Connect the 3 new tubes CAL GAS IN, NO OUT, and NOY OUT to the appropriate fittings (Figure 20)
- 42. Close enclosure door and tighten latch screws

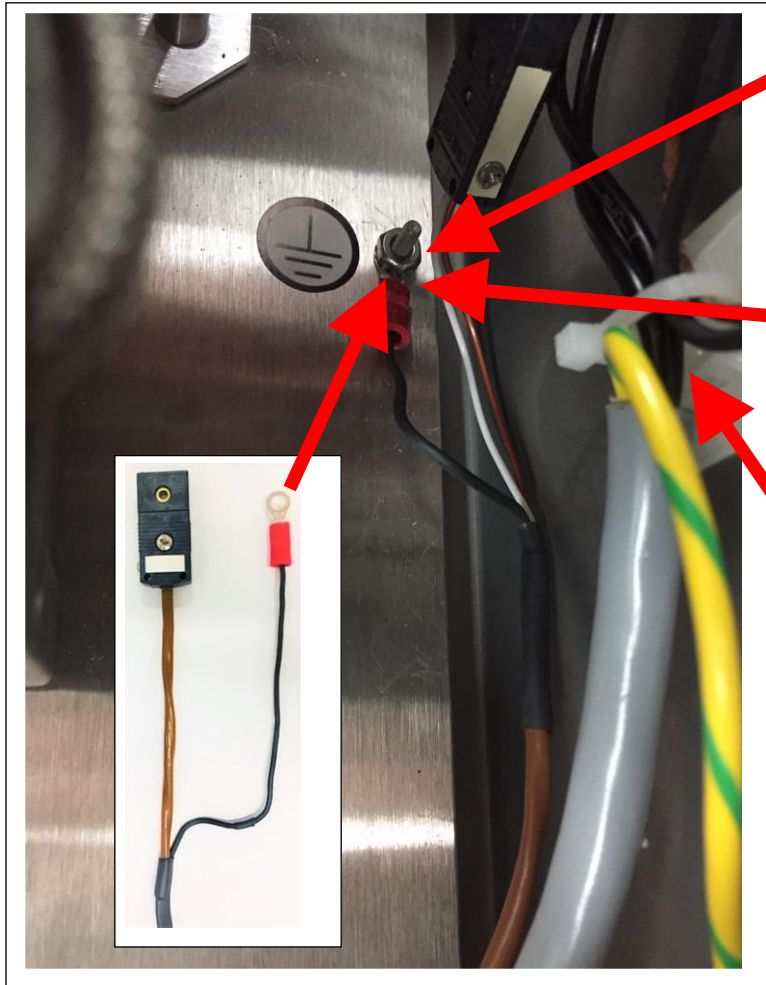


Figure 19

Put a new star washer on the ground lug screw first.

Put the wire ring terminal next.

Then re-install the original star-nut and tighten.

A star washer must be between the back plate and the ring terminal of the wire.

Wipe surface with glass cleaner or isopropyl alcohol and install an adhesive tie-point. Bundle the wires together and use a tie-wrap to secure the wires to the tie-point



Figure 20

Connect the 3 new tubes:
NOY OUT
NO OUT
CAL GAS IN

Finishing

43. (If possible), before raising the Converter back to the original position and height, perform leak and calibration checks:
 - b. Reinstall the power cords to the power inlet fittings of the analyzer and pump pack, reconnect the power cords to line voltage.
 - c. Power up the analyzer and pump pack, and plug in the T200U NOY external vacuum pump.
 - d. Perform a leak check on the system.
 - e. NOTE, if performing the zero-span check at a temporary location (on the ground level), the NOy converter stainless steel enclosure cabinet **MUST** be mounted in the normal VERTICAL position, just as if it were mounted up high in the normal sampling location with the inlet fitting pointing straight down to the ground. If it is not vertical – it will not pass calibrations and converter efficiency test because the moly canister will be sideways and able to “channel” the gases so they don’t completely contact the molybdenum chips to assure complete conversion.
 - f. Allow to warm up for at least 1 hour.
 - g. Perform a zero and span check, zero calibrate and span calibrate as necessary
 - h. Perform a converter efficiency (CE) check
44. After all modifications (and leak check, zero-span check, and converter efficiency check, if being done at ground level) are complete, raise the NOy converter back up to the previous normal height and mounted position.
 - i. Ensure converter enclosure and conduit are mounted solidly and locking mechanisms are secure.
 - j. Ensure conduit is rerouted properly to prevent getting from twisted, tangled, or getting in the way with ground personnel.
 - k. Coil any extra conduit inside the shelter or outside as desired.
 - l. Ensure conduit is weather sealed at entry to shelter or building as required, and mounted securely to wall as necessary.
45. Perform zero, span, and CE checks (again even if done previously on the ground level) to assure the reinstallation of the converter is done with integrity.

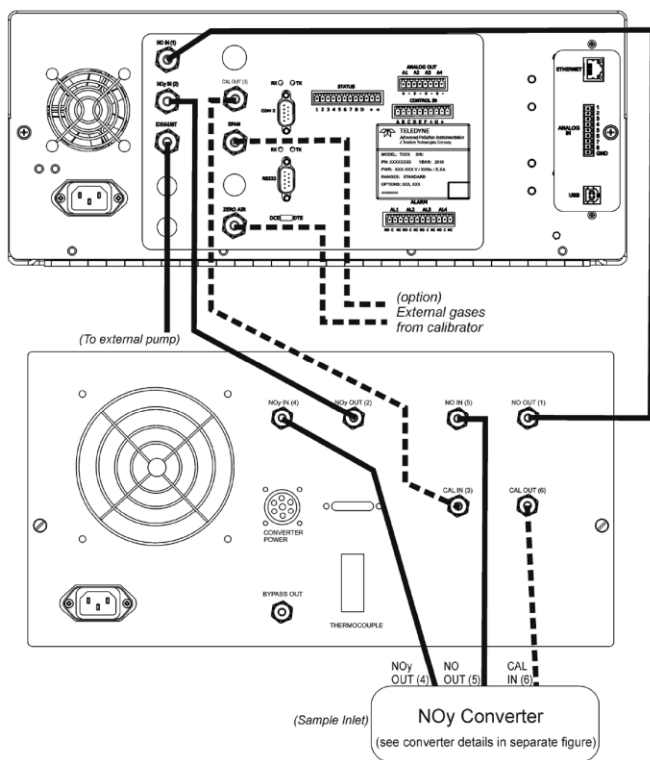


Figure 21

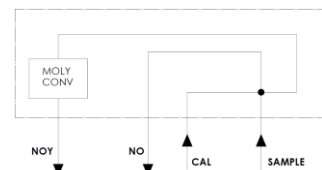


Figure 22

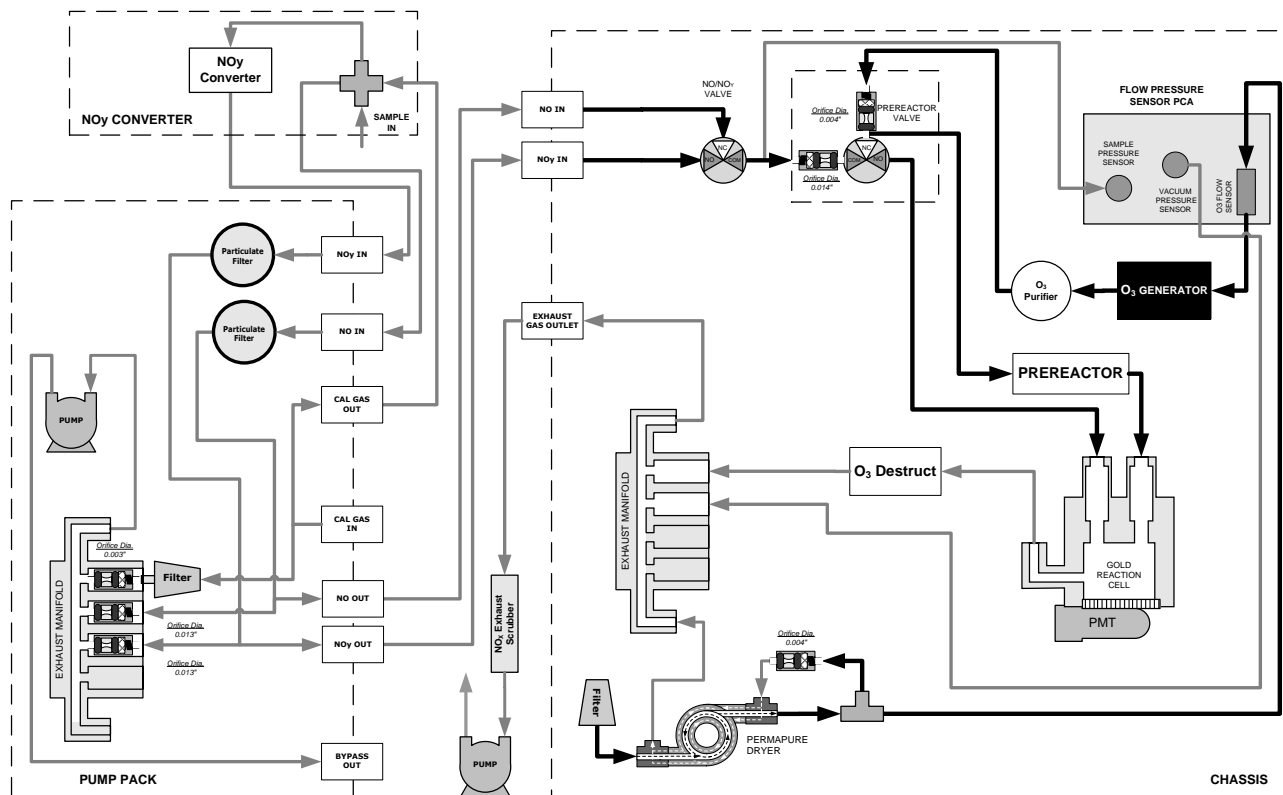


Figure 23

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