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4222 (Wall) and (Desk)

EZ Install Manifold and Alarm

Installation Instructions

FM-1139 Rev. A 3/10

Table of Contents

Please read this manual carefully before operating the Vanguard Manifold System.

Remove product from package and inspect for damage. If there is any damage, do not use (Contact your dealer.). Complete Warranty Card and return to Porter.

These warnings and precautions are to help you to understand how to safely operate or troubleshoot the Porter Vanguard Manifold System. A WARNING alerts you to a possible hazard to people. A CAUTION alerts you to the possibility of equipment damage.

WARNING

Dental workers are exposed to N_2O during administration of N_2O / O_2 conscious sedation analgesia. NIOSH has recommended that exposures should be minimized. Contact NIOSH (1-800-35-NIOSH) to receive NIOSH Publications on *Control of Nitrous Oxide in Dental Operatories.* Exposure can be minimized by effective controls. National Institute for Occupational Safety and Health (NIOSH) publications state that controls, including System Maintenance, Ventilation and Work Practices can effectively reduce N_2O concentrations in dental operations. Your Porter Scavenger System is an important part of the system of controls.

Porter Instrument Vanguard Manifolds, Zone Valves and Outlet Stations utilize the **cross + protection** system. The copper tubing is diameter indexed; 3/8" O.D. for Nitrous Oxide and 1/2" O.D. for Oxygen. The **cross + protection** system is designed to prevent misconnection of Oxygen and Nitrous Oxide piping.

DO NOT ATTEMPT TO CHANGE THE DIAMETERS! ! Tampering with the **cross + protection** system constitutes acceptance of liability by the installer. For your own protection, as well as that of the Doctor and the patients, use 3/8" O.D. tubing for all Nitrous Oxide lines and 1/2" O.D. tubing for all Oxygen lines.

If you are using Outlet Stations of another manufacturer, which have 3/8" O.D. tubing on both inlets, use a reducer at the Outlet Station, NOT at the Porter Manifold. This will enable you to utilize the **cross + protection** system to that point.

The Porter 4222 Manifold is not intended to be used with or in the presence of flammable anesthetic mixtures.

The Porter 42222 Manifold has safety protection provided in the equipment. If the equipment is tampered with or used in a manner not specified in this manual the safety protection provided by the equipment might be impaired.

CAUTIONS

Use no Oil: Never use oils, greases, organic lubricants or any combustible materials on or near this product.

The Porter 4222 Manifold controls both Oxygen (O_2) and Nitrous Oxide (N_2O). Both gases could be present in an over pressure event that requires the safety relief valve to function.

Static Damage Hazard: Computer and other electronic components can be permanently damaged by static electric discharge. Use caution when working with the molded manifold cover off.

Power Outage: During any power outage, remember to turn OFF the flowmeter and manually turn OFF the tank valves. When the power is restored, the alarm will come back to its status prior to the power outage. If gas was flowing when the power went out, gas will be flowing when the power is restored.

Safe handling of gas cylinders is important. Please see your gas supplier or refer to training aids such as the 7 Minute Trainer from Business and Legal Reports Inc.

INSTALLATION REQUIREMENTS

To assure safe operation and conformation to local fire codes, all Porter Instrument Manifold Systems are designed to be used with sedation delivery systems mounted inside walls and they meet or exceed the guidelines established by the National Fire Protection Association for Nonflammable Medical Gas Systems, NFPA 99. Copies of NFPA 99 or portions thereof may be obtained by writing to:

National Fire Protection Association
Batterymarch Park, Quincy, MA 02269-9904, Or call: 1-800-344-3555

Level III Systems include, but are not limited to, the following requirements:

1. No more than 3000 cu. ft. total capacity of all gases (excluding nitrogen) connected and in storage at one time.
2. Enclosure for supply systems shall be provided with doors or gates that may be locked.
3. Doors to supply system storage locations shall be provided with a louvered opening having a minimum of 72 sq. in. total free area. But, louver is only needed when no other venting is possible.
4. Each cylinder of gas shall have a listed pressure regulator directly connected.
5. A pressure relief valve set at 50 percent above (75 PSIG.) normal line pressure (50 PSIG).
6. A shut-off valve or check valve shall be installed downstream of each pressure regulator.
7. A pressure gauge shall be installed in the main line adjacent to the actuating switch... It shall be appropriately labeled.
8. Piping shall be seamless Type K or L (ASTM B88) copper tubing... shall be thoroughly cleaned of oil grease... and be temporarily capped or plugged to prevent recontamination.
9. Flexible connectors of other than all-metal construction used to connect outlets of pressure regulators to fixed piping shall have a minimum burst pressure of 1000 PSIG and shall NOT penetrate walls, floors, ceilings, or partitions.
10. Before closing of the walls, each section of the piping system, **excluding manifold,** shall be subjected to a minimum test pressure of 150 PSIG with oil-free, dry air or nitrogen. This test pressure shall be maintained until each joint has been examined for leakage, and any leaks located shall be repaired and retested as above. After testing as above, the completely assembled piping system shall be subjected to a 24-hour standing pressure test at 20 percent above the normal operating line pressure using required test gas.
11. Piping systems, with the exception of nitrogen systems, shall be capable of delivering 50 to 55 PSIG to all outlets at the maximum flow rate.
12. All brazed joints in the piping shall be made up using brazing filler alloys that bond with the base metals being brazed and that comply with "Specifications for Brazing Filler Metal," ANSI/AWS A5.8.

    a) Copper-to-copper joints shall be made using a copper-phosphorus brazing filler alloy (BCuP series) without flux.

    b) Dissimilar metals such as copper and brass shall be joined using an appropriate flux with either a copper-phosphorus (BCuP series) or a silver (BAg series) brazing filler alloy. Apply flux sparingly and in a manner to avoid leaking any excess inside of completed joints. Use of prefluxed rod is acceptable.
13. Audible and non-cancelable visual signals shall indicate if the pressure in the main line increases or decreases 20 percent from the normal operating pressure, and shall be installed in the office or principal working area of the individual responsible for the maintenance of the medical gas system, to assure continuous surveillance.
14. Where the central supply is remote from the medical gas systems use points, the main supply line shall be provided with a shut-off valve so located in the treatment facility as to be accessible from use-point locations in an emergency.
15. Outlet stations shall be designed so that parts or components that are required to be gas specific cannot be interchanged between station outlets for different gases.
16. Labeling shall appear on the piping at intervals of not more than 20 ft. and at least once in each room and each story traversed by the piping systems.

PLUMBER'S INSTRUCTIONS

1. **Install Outlet Stations in designated locations.**
   See Outlet Station Installation Instructions.
2. **Install Manifold in tank room.** Bottom edge is 5 feet from floor.
   (See template FM-1144 provided with Manifold.)
3. **Run Oxygen and Nitrous Oxide piping.**

   a) Use type K or L, pre-cleaned, degreased, capped copper tubing only.

   b) Use 1/2" O.D. tubing for Oxygen lines.

   c) Use 3/8" O.D. tubing for Nitrous Oxide lines.

   d) Flow Nitrogen through lines while soldering. This will prevent oxidation from contaminating the line. Use Porter Nitrogen Test fixture.

   CAUTION: Use medical grade dry Nitrogen only. See Test Fixture instructions.

   e) Solder all joints. **Solder must have a melting point of at least 1000°F. Use silver solder** or similar brazing alloy. **DO NOT USE CORROSIVE FLUX! USE FLUX SPARINGLY!** Do NOT USE flare, compression or pipe fittings.

   f) Purge system before attaching Manifold.

   g) DO NOT USE oil or grease.

   h) Mark pipelines with gas name at least every 20 feet. Twenty labels are provided by Porter with Manifold.

   i) When pipelines are concealed in a **combustible** wall, cover with conduit to protect from accidental puncture. (See tank room drawing.)

   When Outlet Stations of another manufacturer are used, reduce size of Oxygen line at the Outlet Station – use 2 sizes of pipe for Oxygen and Nitrous Oxide lines to avoid crossed lines.

   CAUTION: Do not connect manifold until <u>after</u> the Nitrogen purging and leak test are performed with acceptable results. System may fail leak test if manifold is connected due to high pressure.

4. **Porter Nitrogen Test Fixture.**

   a) After spotting outlet station in proper locations (see Porter Installation Instructions), connect hoses to test fixture.

   b) Attach test fixture to Nitrogen tank. **CAUTION: Use medical grade dry Nitrogen only**.

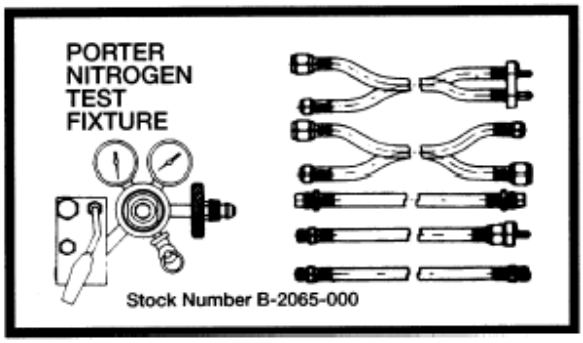
   c) Remove dust cover, if supplied, from Outlet Station and connect hose to station.

   d) Set test fixture to "solder" position.

   e) **Open tank slowly.** The "solder" position allows very low flows of Nitrogen through the pipeline to prevent oxidation inside the line. The "Purge" position flows a high volume to remove any foreign material before attaching the manifold.

   f) After soldering and purging the lines, pressurize the system to 150 PSIG to leak test. Check all joints for leaks. Do not use soapy water – soap contains grease.

   g) If no leaks are detected, disconnect the test fixture from the system, attach manifold and pressure test the system for 24 hours at 60 PSIG per NFPA 99. Contact the dental dealer or Porter with further questions.



PLUMBER'S INSTRUCTIONS

TEST FOR CROSSED LINES

WARNING: New or Modified Installations
Assure That Lines Are Not Crossed!

Do not allow crossed lines to defeat the safety features of the dental flowmeter and / or central gas supply manifold systems. Crossed lines will create a dangerous and hazardous condition where 100% nitrous oxide will be delivered through the Oxygen dental flowmeter tube and subsequently to the patient. In addition, the resuscitator quick connect would deliver 100% Nitrous Oxide to an Oxygen demand valve.

Although two sizes of tubing were used, for your own protection as well as the Doctor and Patients, test the system for crossed lines as outlined below. The purpose of this test is to confirm that Oxygen gas is flowing through the Oxygen gas pipeline and Nitrous Oxide gas is flowing through the Nitrous Oxide pipelines. Doctor and / or dental dealer should witness this test. **Do Not Assume The System Has Been Tested.**

1. Use quick connect hoses into Outlet Stations (without machine attached) to bleed Nitrogen out of system.
2. Connect Oxygen and Nitrous Oxide tanks.
   a) Use a regulator for each tank.
   b) Chain tanks to wall.
3. Turn on Oxygen pressure ONLY by opening both Oxygen tank regulators.
   a) Make sure Nitrous Oxide line pressure reads 0 PSIG on manifold gage.
   b) Oxygen line pressure will read 50 PSIG on manifold gage.
4. Insert quick connect hoses in each Outlet Station.
   a) Quick connect inserts simultaneously into both Oxygen and Nitrous Oxide outlets.
   b) Pressure should be on Oxygen ONLY. Hear and feel flow coming from the Green Hose.

WARNING: If pressure and flow is detected coming from the Nitrous Oxide line ONLY (Blue Hose), there are **crossed lines. This is a dangerous and hazardous condition and it must be fixed immediately.**

5. When the system passes the crossed line test, remove the quick connect and the Oxygen flow and pressure will be checked by the Outlet Station and 50 PSIG will be trapped in the tubing.
6. Turn off Oxygen at the tank regulator.
   a) Bleed Oxygen pressure by inserting quick connect hoses into Outlet Station.
   b) Make sure Oxygen line pressure reads 0 PSIG on manifold gage.
7. Turn on Nitrous Oxide pressure ONLY by opening Nitrous Oxide tank regulator.
   a) Nitrous Oxide line pressure will read 50 PSIG on manifold gage.

PLUMBER'S INSTRUCTIONS

8. Insert quick connect hoses in each Outlet Station.

   a) Pressure should be on Nitrous Oxide ONLY. Hear and feel flow coming from the Blue Hose.

WARNING: If pressure and flow is detected coming from the Oxygen line ONLY (Green Hose), there are **crossed lines. This is a dangerous and hazardous condition and it must be fixed immediately.**

9. When the system passes the crossed line test, remove the quick connect and the Nitrous Oxide flow and pressure will be checked by the Outlet Station and 50 PSIG will be trapped in the tubing.
10. Turn off Nitrous Oxide at the tank regulator.
11. Bleed Nitrous Oxide pressure by inserting quick connect hoses into Outlet Station.
12. Immediately following the test for crossed lines,**"Test for Failsafe Operation"**. Refer to dealers section for instructions.

    Note: Manifolds with normally open valves, (model series 4222 NO), require electric to perform this test.

Nitrogen Pressure Test - Test System for Leaks

a) Use Porter Nitrogen Text Fixture (Stock Number B-2065-000).

b) Use medical grade dry Nitrogen.

c) Test with Manifold in place and Outlet Stations assembled.

d) Fill system (both sides) to 60 PSIG.

e) Disconnect Nitrogen tank and fittings.

f) System should hold pressure for 24 hours (allow ±5 PSIG for temperature differences). If system does not hold pressure, test for leaks at each joint. Repair all leaks and retest. Do not use soapy water – soap contains grease.

g) After completion of 60 PSIG leak test, bleed system completely. Remove the plugs on the pressure relief valves. The **relief valves** supplied on the Porter 4222 Manifold are designed with internal ¼ NPT connections that allow the user to connect piping to vent the relief valve flow to the outside if desired.

h) Remove pipe plugs from elbows in the blue and green manifolds. Install the Porter ASME relief valve assembly into the proper manifold. The assemblies are supplied with pipe tape on threads. The blue labeled N_2O relief valve assembly in the blue manifold block and the green labeled O_2 relief valve assembly into the green manifold block. Tighten each assembly into the appropriate elbow.

i) Pressurize the system to **50 PSIG only** and check the ASME relief valve connections for leaks using Snoop, LeakTec or soapy water. If leaks are found tighten the connections and check again.

j) After system is leak tight, bleed system completely.

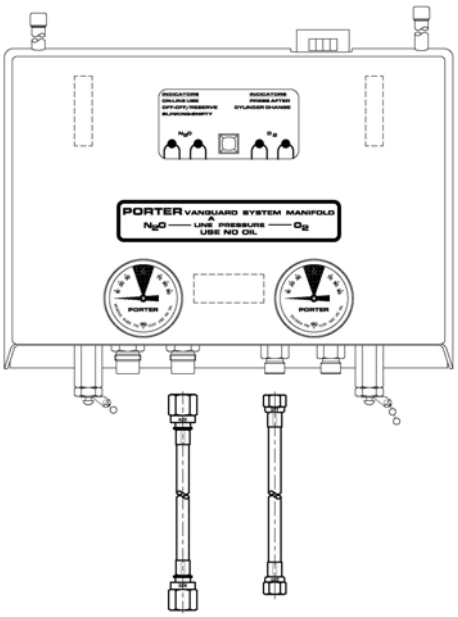
PLUMBER'S INSTRUCTIONS

MANIFOLD SYSTEM LEAK TEST

Pressure Test System for: 24 hours at 60 PSIG per NFPA 99C Section 5.3.12.23 thru 5.3.12.2.7.4

Function Test Manifold for tank changeover operation.

Test: 60 PSIG Dry Nitrogen Leak Test



B-2065-000
NITROGEN TEST FIXTURE

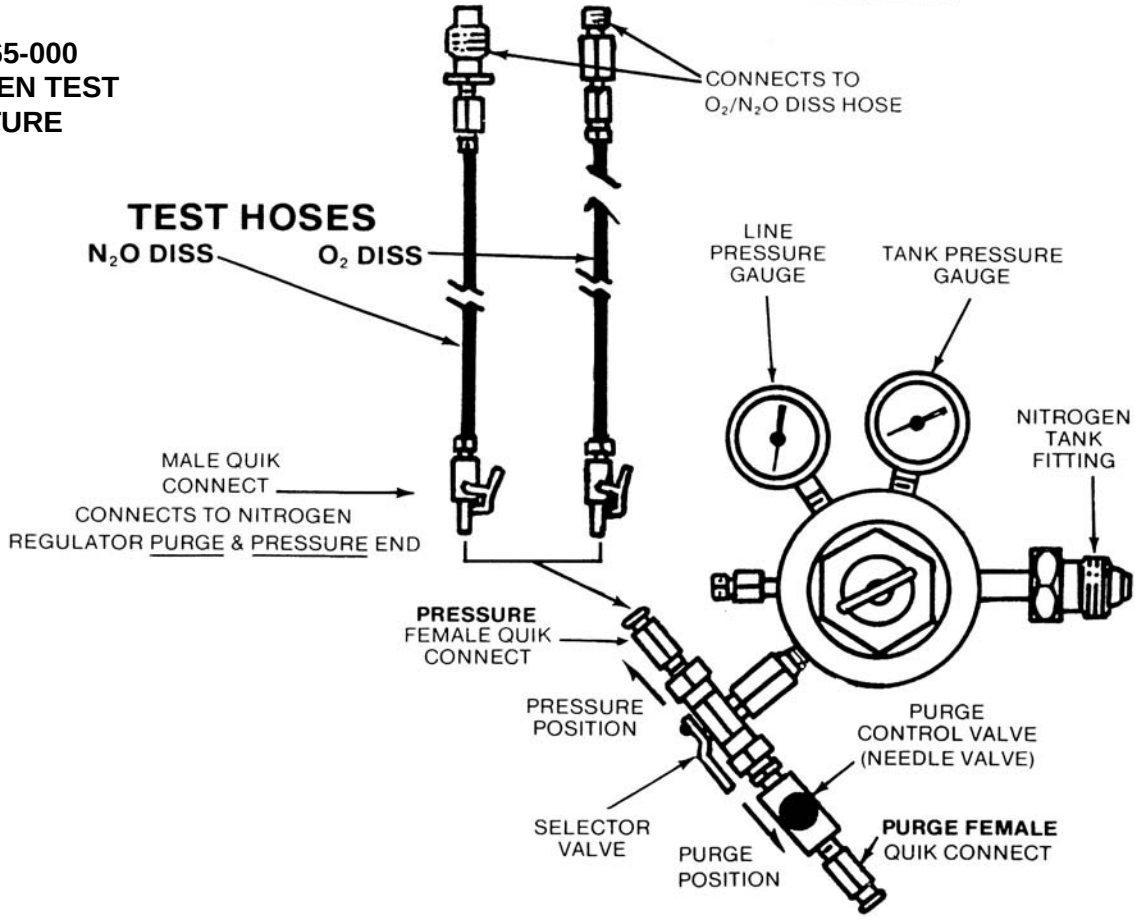


ILLUSTRATION IS NOT IN SCALE

ELECTRICIAN'S INSTRUCTIONS

1. Wall Alarm Installation Instructions

a) Cut out opening in wall – 5 7/8" W. x 3 1/4"H.

b) Make (4) points for molly fasteners to be secured using the alarm housing as a template.

c) Secure molly fasteners in wall.

d) Connect modular cable (5700-EZ) to the alarm housing.

e) Attach four conductor cable to removable connector at other end of modular cable (5700-EZ). Match wire colors to colors on connector.

f) Attach terminal block at end of modular cable, to a stud in the wall (if desired).

g) Fasten housing in wall with flat head molly screws.

Press front plate into place.

2. AC Outlet

a) Locate and install AC outlet above manifold no more than 8 ft. from power supply.

3. Power Supply

a) Power supply must be located no more than 3 ft. from manifold and no more than 8 ft. from the AC Outlet (note cable lengths).

b) Mount box in place.

c) Attach 4 conductor cable onto terminal strip on top of power supply box.

CAUTION: Check color to number sequence!

See Installation Illustrations Pages 13, 14 and 15

4. Manifold Connection

a) Plug cable in w/ferrite core from power supply.

5. Desk Model

Desk model alarm installation is the same as wall model except the following:

Signal Interconnect Assembly

a) Mount exposed signal interconnect assembly at desired location no further than 10 ft. from desk alarm. (See installation illustration page 14)

b) Remove front plate.

c) Insert four conductor cable at appropriate knock-out location and attach on terminal strip.

d) Install cover in place.

e) Connect modular cable (5700-10) to the alarm housing and signal interconnect assembly.

Note: Contact Porter for available lengths of cable beyond 75 ft.

CARPENTER'S INSTRUCTIONS

Tank Room

1. Must be in a separate room or cabinet.
2. A drywall studded room with a one hour fire rating will suffice.
3. Door should lock.
4. Room should be vented (72 square inch minimum). A vent in the door will suffice, only if no other area is available.
5. Attach tank restrainers with lag screws. Install 40" from the floor.
6. Tank Room Instructions (LB-315) and Caution for Non-flammable Medical Gases in Use (LB-612) are posted.

DO NOT USE TANK ROOM FOR COMPRESSORS OR OTHER EQUIPMENT
DO NOT USE TANK ROOM FOR STORAGE OF FLAMMABLE MATERIAL

DEALER'S INSTRUCTIONS

1. **Verify that the system has been tested for leaks.**
2. Install Wall Mounts or Cabinet Mounts in appropriate locations.
3. Install Cover Plates on Outlet Stations.
4. Install flowmeter heads.
5. **Test the system for crossed lines.** Refer to section "Test for Crossed Lines" under Plumbers Instructions and perform test. **Do Not Assume The System Has Been Tested.**

6. Test for Failsafe Operation

(Immediately Following the Test for Crossed Lines)

1. When the system passes the crossed line test, remove the quick connect and the Oxygen flow and pressure will be checked by the Outlet Station and 50 PSIG will be trapped in the tubing.
2. Verify that the Oxygen manifold gauge reads 50 PSIG. Shut off the Oxygen at the manifold tank valve.
3. Turn on Nitrous Oxide pressure by opening the tank valve.
   a) Make sure Nitrous Oxide line pressure reads 50 PSIG on manifold gauge.
   b) Again, make sure Oxygen line pressure reads 50 PSIG on manifold gauge.
4. Bleed lines with quick connect hoses only, (do not use flowmeter), and observe the failsafe operating (requires one person at an Outlet Station and one person observing at the Manifold).
   a) Insert quick connect hoses in an Outlet Station.
   b) **Temporary Condition:** Observe the Oxygen pressure gauge go down while the Nitrous Oxide pressure gauge temporarily remains at 50 PSIG (the Oxygen pressure is being depleted and is not replenished since the Oxygen tank is closed; the Nitrous Oxide pressure is kept at 50 PSIG by the open Nitrous Oxide tank).
   c) Further observe as the Oxygen pressure gauge decreases to a low pressure (below 20 PSIG), the Nitrous Oxide pressure will also then decrease (the failsafe will be activated at the lower Oxygen pressure and will shut off the 50 PSIG Nitrous Oxide from replenishing the Nitrous Oxide bleeding out at the Outlet Station).
   d) Observe that both the Oxygen and Nitrous Oxide pressure gauges will go to 0 PSIG. **Note:** 50 PSIG Nitrous Oxide is trapped in the tubing from tank to manifold, but is upstream of the gauge and will not be indicated on the gauge.
   e) Observe that there is no Nitrous Oxide pressure or flow detectible at the quick connect hoses at the Outlet Station. **Note:** The Nitrous Oxide tank is open and the Oxygen tank is closed; therefore the failsafe is working properly.
   f) Remove the quick connect hose from the Outlet Station.
   g) Shut off the Nitrous Oxide tank regulator.

DEALER'S INSTRUCTIONS

CHECK ALARM

DEMONSTRATE SYSTEM TO DOCTOR

1. Shut off both gases.
2. Bleed lines.
3. Turn ON Alarm.
4. Silence buzzers by pressing silence button.
5. Turn ON Oxygen tank.
   a) Normal light should come on indicating 50 PSIG system pressure.
   b) Yellow light should go off.
6. Turn ON Nitrous Oxide tank.
   a) Normal light should come on indicating 50 PSIG system pressure.
   b) Yellow light should go off.
7. Turn Alarm OFF, then back ON.
   a) Both Normal lights should come on indicating normal system pressure.
8. Install Tank Room Instruction sheet (LB-315). Peel off backing and place on the tank room wall.
9. Post on Tank Room door sign LB-612 Caution for Non-flammable Medical Gases in Use.

CAUTION
Non-Flammable
Medical Gases in Use

Oxygen
&
Nitrous Oxide

No Smoking or Open Flame
Room May Have Insufficient Oxygen
Open Door and Allow Room to
Ventilate Before Entering

NFPA 2005 Level III Section 5.3.3.1.5

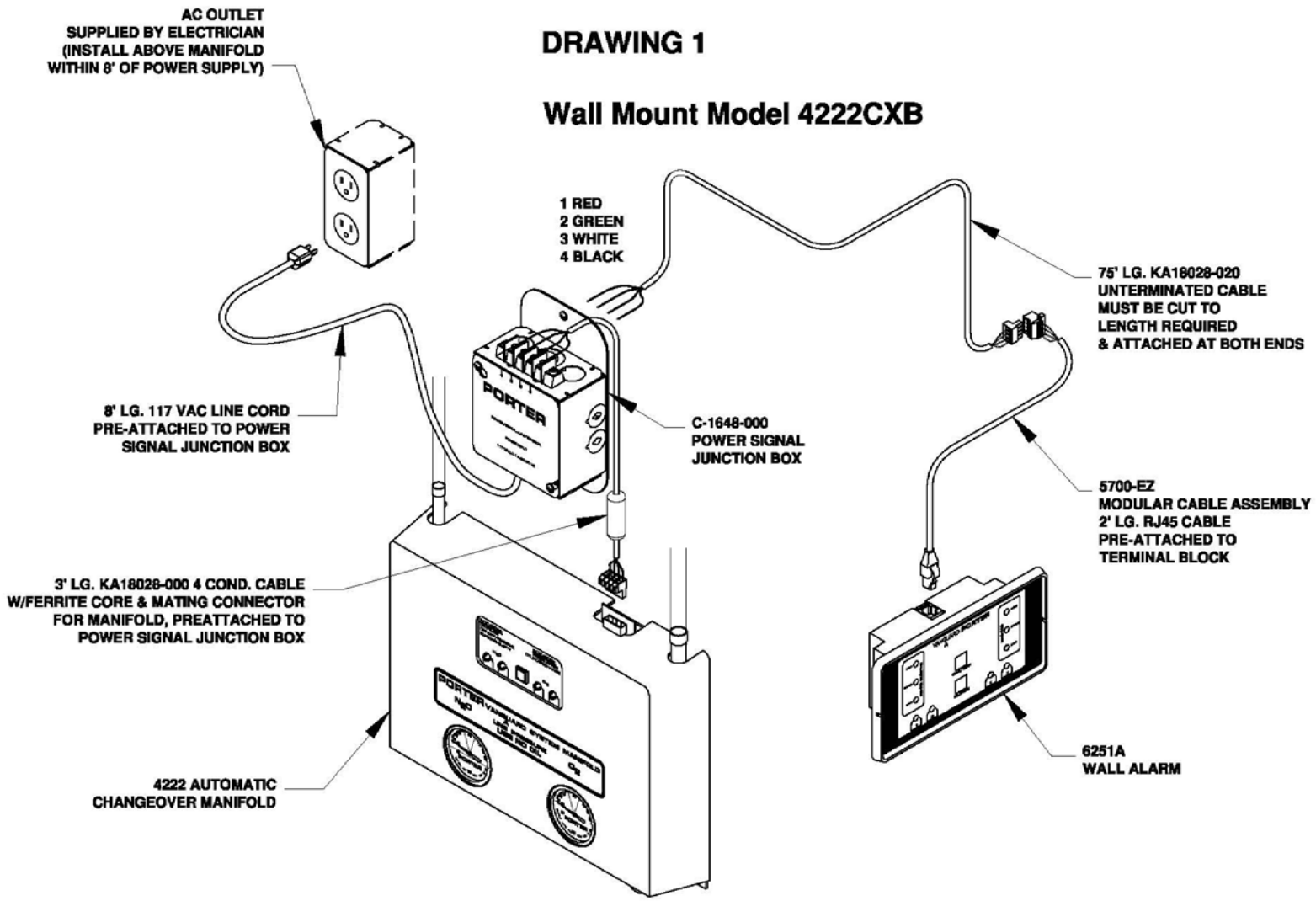
LB-612

Tank Room Instructions

LB-315

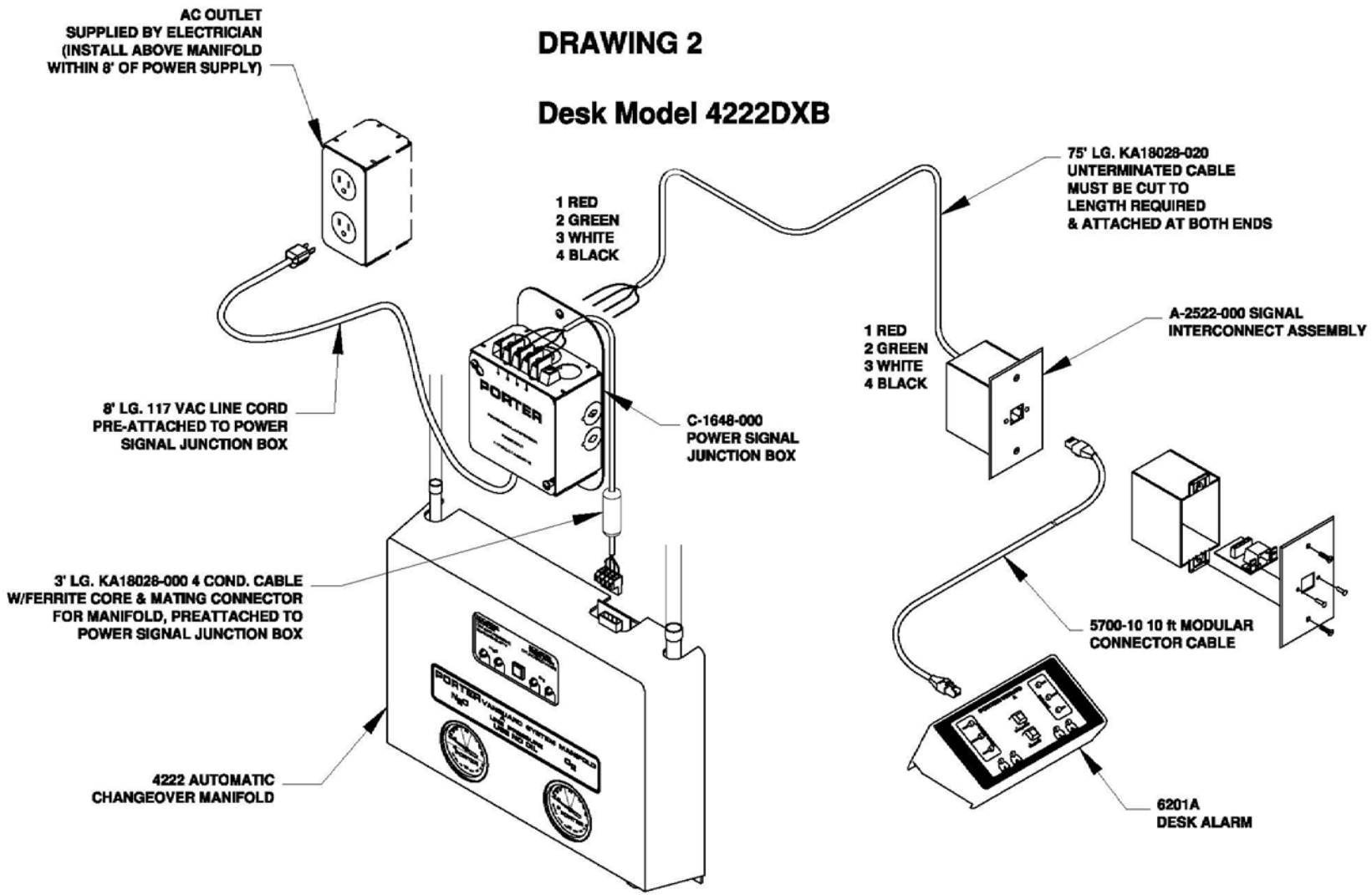
DRAWING 1

Wall Mount Model 4222CXB

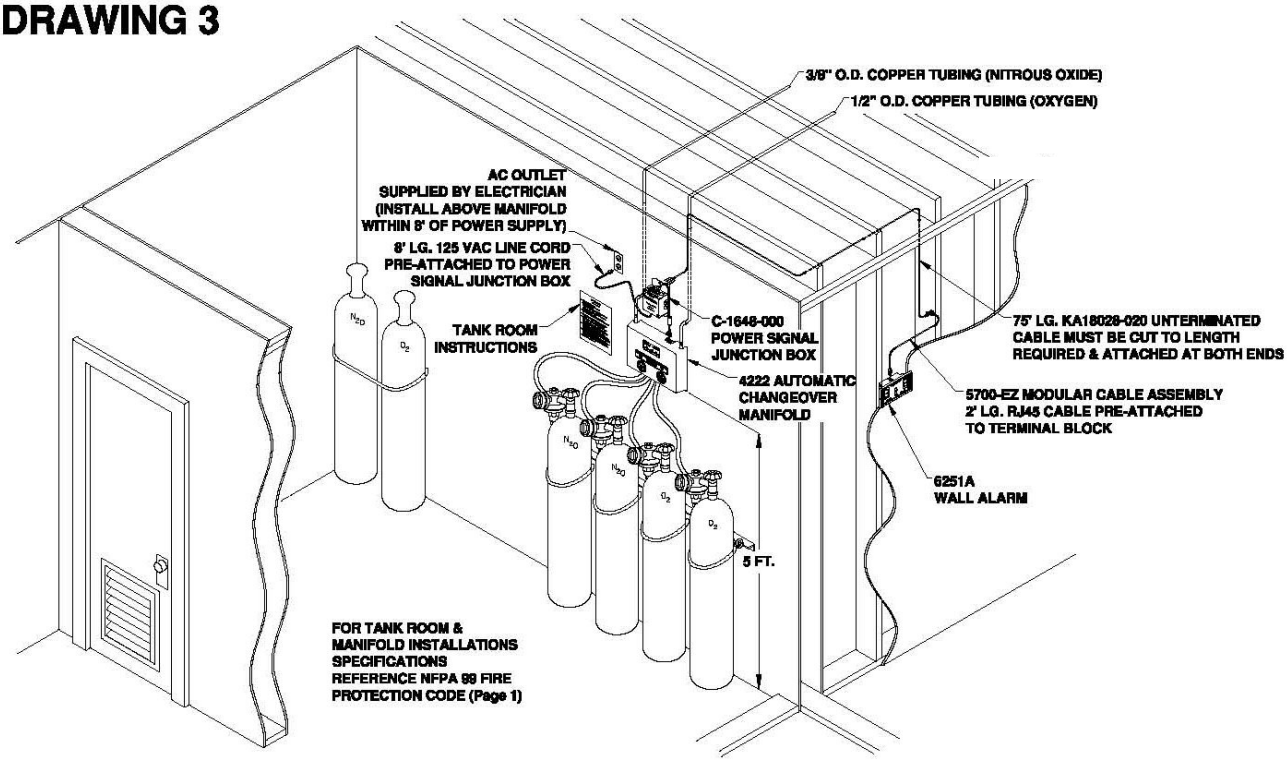


DRAWING 2

Desk Model 4222DXB

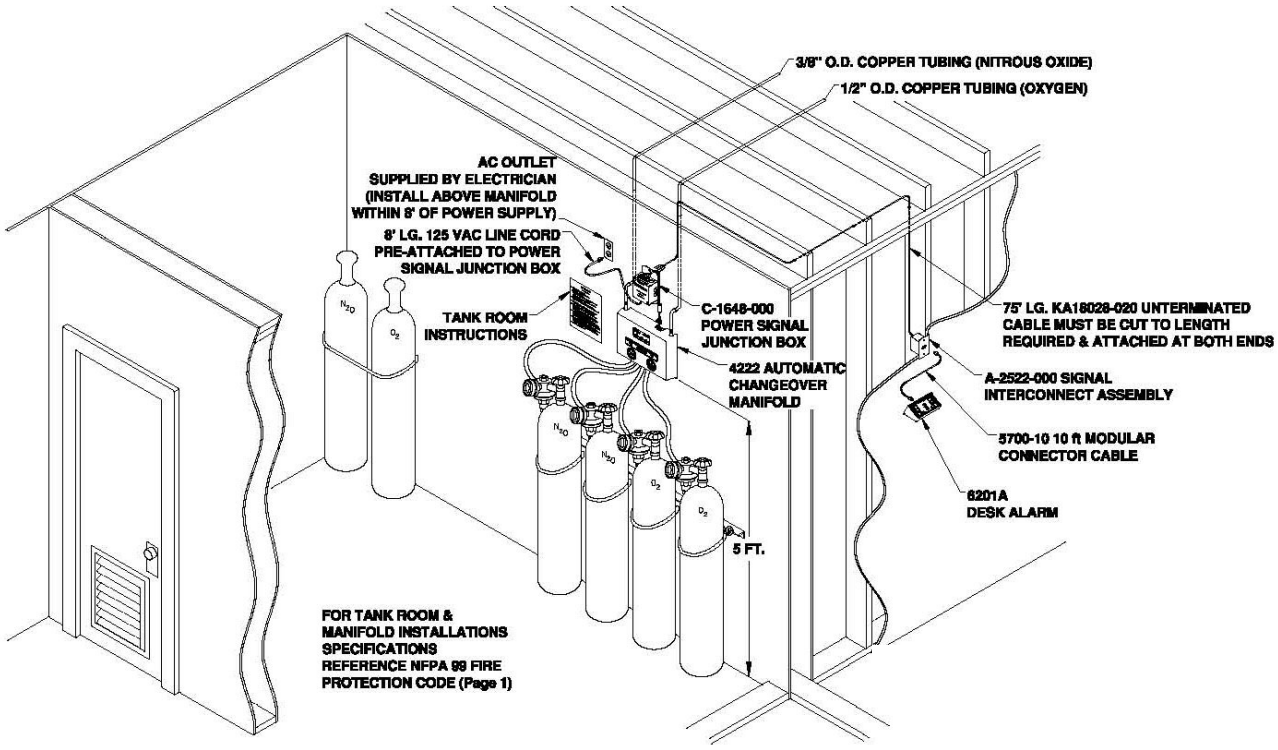


DRAWING 3



TYPICAL TANK ROOM LAYOUT

WALL and DESK SENTINEL WIRING ILLUSTRATION



WARRANTY

THIS WARRANTY IS GIVEN IN PLACE OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE.

Under no circumstances shall Parker Hannifin Corporation be liable for incidental or consequential damages as those terms are defined in the uniform commercial code.

Parker Hannifin Corporation, Porter Instrument Division warrants that each product or part shall be free from defects in workmanship and materials, under normal use and with appropriate maintenance, for one (1) year from the date of delivery to customer unless otherwise specified in writing. All rubber and plastic parts and accessories are warranted under the same conditions for a period of ninety (90) days from date of purchase.

No statement or claim about the product by any employee, agent, representative, or dealer of Parker Hannifin Corporation shall constitute a warranty by Parker Hannifin Corporation or give to rise to any liability or obligation of Parker Hannifin Corporation.

Parker Hannifin Corporation shall not be liable for any damage, injury or loss arising out of the use of the product, whether as a result of a defect in the product or otherwise, if, prior to such damage, injury or loss, the product was (1) damaged or misused; (2) repaired, altered or modified by persons other than Parker Hannifin Corporation; (3) not installed in strict compliance with applicable codes and ordinances; or (4) not installed by an authorized Parker Hannifin Corporation dealer. Parker Hannifin Corporation's obligation for breach of this warranty, or for negligence or otherwise, shall be strictly and exclusively limited to the repair or replacement of the product or part. This warranty shall be void on any product on which the serial number has been altered, defaced or removed.

ORDERS All orders are to be made through authorized Parker Hannifin Corporation distributors. All billing will be done through said distributors. Direct orders will be handled through the authorized local dealer as determined by Parker Hannifin Corporation.

RETURNS No returns will be accepted unless authorized in writing by Porter Instrument Division, and accompanied by a properly completed return goods authorization. All returns are subject to a re-stocking and possible rework charges to be determined by Porter Instrument Division.

Policies subject to change without notice.