

# Liquid Nitrogen Cooling System Model 5466 Instruction Manual

## DESCRIPTION

The Model 5466 Liquid Nitrogen Cooling System when used with an ETS Model 5506A, Model 5518, Model 5532 or any other similar sealed test chamber enables the temperature within the chamber to be reduced below that of the surrounding (lab ambient) temperature. This cooling system utilizes Liquid Nitrogen\* which is allowed to evaporate (convert from a liquid to a gas) within the chamber to achieve the cooling effect. An ETS Series 5100/5200 Automatic Temperature Controller or integrated chamber control unit (Models 5518 and 5532) is used to monitor the chamber temperature and to control the flow of nitrogen to automatically maintain the desired chamber temperature level. When used with the ETS Model 5474 heater assembly (sold separately) or the integrated heating system of the Model 5518 and 5532 Chambers the temperature within the chamber may be adjusted and automatically maintained at any level from approximately 32-135°F (0-55°C). The complete cooling system is shown in Figure 1.

**Note:** A Nitrogen cylinder with bottom siphon (“dip tube”) for feeding liquid nitrogen is required. DO NOT order Nitrogen gas. It will not provide cooling with this system.

### Items Supplied With the Cooling Kit

<u>Item</u>	<u>Quantity</u>	<u>Description</u>
1	1	6 ft. Cryogenic Transfer Hose and Adapter Fittings
2	1	Cryogenic Solenoid Valve
3	1	Cooling Nozzle
4	1	25” clear, ½” ID PVC Tubing
5	1	½” OD Plastic Barb
6	1	Safety Relief Valve
7	1	5/8” , PG16 Straight-Thru Fitting

## INSTALLATION

Unpack cooling kit components and check for visible damage.

### A. Mounting to Model 5506

1. Drill a .886" clearance hole in the chamber wall to accept the PG16 straight-thru fitting.
2. Install the PG16 and locknut onto the chamber wall with the body of the fitting inside the chamber.
3. Place the 3" output pipe attached to the valve into the PG16 fitting until the threads show inside the chamber.
4. On the threaded end of the pipe (now inside the chamber), attach the cooling nozzle. Make sure the nozzle is tight to avoid any pressure leaks.
5. On the other end of the valve (the side marked "IN") attach the adapter fittings to the existing bulkhead fitting. Again, make sure the fittings are screwed in tightly to avoid any pressure leaks.
6. Rotate the whole assembly until the solenoid (black housing with power wires) is directly below the Valve. This orientation is important to ensure proper cooling valve operation.
7. Drill a .828" clearance hole in the chamber wall to accept the 1/2" NPT thread x 1/2" hose barb. Install the fitting with the hose barb outside the chamber. Secure the fitting to the wall with the included 1/2" NPT locknut as shown in Figure 1.
8. Connect the 1/2" clear tubing to the 1/2" hose barb. Install the one-way pressure relief safety valve in-line with the tubing. Cut through the tubing at a distance 2-3" from the hose barb. Orient the one-way safety valve with the arrow pointing away from the chamber. Slide the 1/2" tubing over the brass threads on both ends of the safety valve. This valve ensures that the gas can be vented out of the chamber when the pressure at the safety valve opening exceeds 1/3 p.s.i. Cut tubing to needed length as shown in Figure 1.
9. Although Nitrogen is non-toxic (non-poisonous), it can cause asphyxiation if used in areas without adequate ventilation. For proper use with nitrogen cooling, the Model 5506A Chamber should be totally sealed and the clear vent tube should be connected to the chamber and the open end exhausted outside the area.
10. Plug the AC Line Cord from the solenoid valve into the AC outlet for temperature control marked "DECREASE" on the rear of the controller.
11. Check all fittings to ensure they are tight.

### B. Mounting to Models 5518 and 5532

1. Turn off power.
2. Remove the acrylic right side panel by removing the 8 screws.

3. Unplug the existing solenoid valve. The solenoid is plugged in using slip-on connectors. Simply pull apart the connectors.
4. Remove the existing cooling nozzle from the chamber interior using an adjustable wrench.
5. Remove the male CO<sub>2</sub> hose coupler from the side bracket on the exterior wall of the chamber.
6. Remove the brass nut and lockwasher.
7. Loosen the PG16 fitting.
8. Remove the existing valve from the bracket.
9. Replace the CO<sub>2</sub> solenoid valve with the nitrogen cryogenic solenoid valve.
10. Connect solenoid valve wires to the orange and orange/white wires.
11. Tighten the brass nut in the bulkhead securing assembly to the bracket.
12. Tighten the PG16 fitting.
13. Replace all screws and panels.
14. Install the nitrogen cooling nozzle.
15. Install the adapter fittings onto the bulkhead side of the divider panel.
16. Attach the cryogenic transfer hose to the valve and liquid nitrogen tank.

## Operation

**Note:** If there are any questions concerning the installation or operation of this cooling system, contact ETS for assistance before operating it.

1. Select the desired temperature set point and set the temperature controller accordingly.
2. To activate the Nitrogen Gas Cooling System, open the manual Nitrogen shut off valve on the top of the nitrogen cylinder by slowly turning the hand valve counterclockwise. If there are any leaks, close the valve fully and tighten fittings accordingly. **Note: Check that vent tube is open on Model 5518/5532 Chambers.**
3. When ready to start the cooling cycle, open the manual nitrogen cylinder valve then place "COOL" switch in the "ON" position. When the temperature set point is below the ambient temperature of the chamber, the cryogenic control valve will open with an audible "click" and nitrogen gas will be released into the chamber. A white nitrogen plume will be visible at the cooling nozzle when nitrogen gas is flowing.

The chamber temperature will continue to decrease until the set point is reached. Around the set point, the temperature controller will pulse the cryogenic control valve to regulate the cooling process.

When the cooling mode is used always check to see that the pressure relief valve and vent hose is attached. If this valve is not in place, nitrogen gas will enter the laboratory area.

4. After completion of testing, or whenever the cooling mode is not required, the manual nitrogen shut off valve on the cylinder should be closed (turned full clockwise).
5. It is recommended that the circulating fan, which is installed in the chambers be operated to reduce temperature gradients within the chamber.

## **WARRANTY**

Electro-Tech Systems, Inc. warrants its equipment, accessories and parts of its manufacture to be and remain free from defects in material and workmanship for a period of one (1) year from date of invoice and will, at the discretion of Seller, either replace or repair without charge, F.O.B. Glenside, similar equipment or a similar part to replace any equipment or part of its manufacture which, within the above stated time, is proved to have been defective at the time it was sold. All equipment claimed defective must be returned properly identified to the Seller (or presented to one of its agents for inspection). This warranty only applies to equipment operated in accordance with Seller's operating instructions.

Seller's warranty with respect to those parts of the equipment which are purchased from other manufacturers shall be subject only to that manufacturer's warranty.

The Seller's liability hereunder is expressly limited to repairing or replacing any parts of the equipment manufactured by the manufacturer and found to have been defective. The Seller shall not be liable for damage resulting or claimed to result from any cause whatsoever.

This warranty becomes null and void should the equipment, or any part thereof, be abused or modified by the customer or if used in any application other than that for which it was intended. This warranty to replace or repair is the only warranty, either expressed or implied or provided by law, and is in lieu of all other warranties and the Seller denies any other promise, guarantee, or warranty with respect to the equipment or accessories and, in particular, as to its or their suitability for the purposes of the buyer or its or their performance, either quantitatively or qualitatively or as to the products which it may produce and the buyer is expected to expressly waive rights to any warranty other than that stated herein.

ETS must be notified before any equipment is returned for repair. ETS will issue an RMA (Return Material Authorization) number for return of equipment.

Equipment should be shipped prepaid and insured in the original packaging. If the original packaging is not available, the equipment must be packed in a sufficiently large box (or boxes if applicable) of double wall construction with substantial packing

around all sides. The RMA number, description of the problem along with the contact name and telephone number must be included in formal paperwork and enclosed with the instrument. Round trip freight and related charges are the owner's responsibility.

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**electro-tech systems, inc.**

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3101 Mt. Carmel Avenue, Glenside, PA 19038 • Tel: (215) 887-2196 • Fax: (215) 887-0131