μ/*AUTO-TEND* CONTROL SYSTEM

Introduction:

The μ/*AUTO-TEND* Control System is designed to provide simple, reliable liquid level control in your LN_2 freezer. It operates on 24 Volts AC and uses a two-sensor system to open and close a solenoid valve. The liquid level, the sensor condition, the valve condition and the LN_2 supply condition are indicated by lights on the front panel. All instructions for easy operation are printed right on the front panel.

System Components:

AT-01	μ/*AUTO-TEND* Control
AT-02	24 VAC Wall Transformer
AT-03	Harness Assembly
AT-04	24 VAC Solenoid Valve
AT-05	Sensor Assembly

Installation:

The μ/*AUTO-TEND* Control System is designed to drop into your Cryogenic refrigerator. The components plug into the back of the control panel as follows: The harness assembly has a 5-pin connector with a red dot. The Solenoid Valve has a 2-pin connector with a green dot. The sensor assembly has a 6-pin connector with a brown dot. These plug into the mates with the matching dots on the back of the control panel.

The sensor assembly should be installed with the yellow and orange wires at the High Level and the black and brown wires at the Low Level. These are labeled for easy reference.

Description of Front Panel:

Key Lock: This turns the control On/Off. Turning the key to the 3 o'clock position provides power to the control while rotating the key to the 12 o'clock position turns the control off.

Start Fill: This button opens the solenoid valve and allows LN_2 to flow into the freezer.

Stop Fill & Mute: This button closes the solenoid valve and stops the flow of LN_2 into the freezer. This button also silences the audible alarm.

Filling LED: Lights green to indicate that the solenoid valve is open.

LN_2 Level LED: Lights red to indicate that the liquid level is above the high level sensor. Lights green to indicate that the liquid level is between the low-level sensor and the high level sensor. Lights yellow to indicate that the liquid level is below the low-level sensor.

Please Note: The LED will not light if the high level sensor is submerged in LN2 while the low level sensor is located in gas. The only time that this can occur is if the sensors are installed backwards.

Sensor Fault LED: Lights red to indicate that a sensor fault has occurred. A sensor fault can be either an open circuit or a short circuit in the sensor assembly.

Low LN$_2$ Supply LED: Lights red to indicate that the LN$_2$ supply is low. This is triggered when the liquid level does not reach the high level sensor within 1 hour of opening the valve.

Basic Operation:

Automatic Fill: The control will open the solenoid valve automatically when the liquid level falls below the Low Level Sensor. It will continue filling until the High Level Sensor is covered by liquid.

Manual Fill: The Start Fill button can be pressed at any time and the solenoid valve will open. If the liquid level is between the High Level Sensor and the Low Level Sensor the solenoid will stay open until the Stop Fill button is pressed or until the liquid level covers the High Level Sensor. If the liquid level is above the High Level Sensor the solenoid valve will stay open while the user presses the Start Fill button but will close when the user releases the button.

> **Please Note:** The maximum time that the valve will stay open when the liquid level is above the High Level Sensor is 1 minute. The user can open the valve again by simply releasing and then pressing the Start Fill button again.

Alarm Conditions: An alarm condition occurs when a sensor problem develops or the supply tank runs low on LN2. When an alarm condition does occur, the appropriate light on the front panel flashes and an audible alarm is activated.

Testing the front panel lights: To test all the lights on the control except the Filling LED, press the Stop Fill & Mute button and hold for 8 seconds.

Testing the Remote Alarm: To test the remote alarm press the Stop Fill & Mute button and hold for 13 seconds (5 additional seconds after testing the lights).

Remote Alarm: The remote alarm is triggered 30 minutes after an error condition occurs. The remote alarm will be reset when the error condition is corrected. Pins 1 and 2 are closed in normal operating condition while pins 2 and 3 are closed in a remote alarm condition.