

# CRYOCOOL LN-3

## Liquid Nitrogen Gas Stream Cooler Featuring Never Ice 'Warm Tip'



### Complete System Features Include:

Never ice 'warm-tip' (no shield gas needed -ever!)

Variable temperature range from 83 K to 500 K

Temperature Stability better than +/- 0.1 K

50% - 60% Less Nitrogen Consumption than other systems

Liquid Nitrogen Dewar (with Autofill)

Temperature Controller

Dual channel level controller for nitrogen generator and main reservoir

25% - 30% Lower Price than our Competition

Lowest price in the industry

**CRYO**  
INDUSTRIES

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## CRYOCOOL LN-3

The Cryocool LN-3 is an innovative 3rd generation single-flow gas stream cooler system that provides a continuous stream of cold nitrogen gas. Flow rates are set electronically by setting the flow power supply voltage. Simple to operate - turn on the flow power supply and the flow starts and sets instantly and automatically! The gas stream temperature is maintained automatically with the true PID cryogenic controller.



Cryocool LN-3 in lab

The storage dewar has TWO liquid nitrogen reservoirs. The inner reservoir is surrounded by the main outer storage reservoir, liquid nitrogen of same temperature; hence, heat input is zero (temperature difference is  $\sim 0$  K). This allows setting the flow rate exactly by simply energizing a heater, as the heater is the only heat input.

Liquid nitrogen level in the gas flow generator is controlled by the electronic level controller,

The Cryocool LN-3 is comprised of the following:

### High Efficiency Nitrogen Transfer System:

- Never ice 'warm-tip' (no shield gas needed-ever!)
- Variable temperature operating range from 90 K to 500 K
- Temperature stability better than  $\pm 0.1$ K
- Large nozzle diameter of 0.312 inch ( $\sim 8$  mm) inside diameter 0.272 inch ( $\sim 7$  mm)
- Control heater installed in transfer line nozzle
- Vacuum and super insulated for highest efficiency
- All welded stainless steel transfer line for long term reliability
- Entire length flexible for easy handling and manipulation of nozzle
- Auto shut off on low LN2 level
- Pressure relief in transfer line
- Charcoal vacuum maintenance cryopump insert leg



which does not require any adjustment. This allows conditions in the gas generator to be constant over a long period of time, resulting in constant flow, independent of the pressure or changes in the other reservoir. Refill does not disturb the temperature of the sample.



Cryocool LN-3 in lab

**Reliability:** The Cryocool LN-3 is modular in design with easy lift-out access to all components. The Cryocool LN-3 is a superior low-maintenance system- no line drier, no ice blockages, no diaphragm pumps and no shield gas! A truly low-maintenance, superior, easy-to-use system!

Flow throughout is high, flow control excellent. Low temperatures are quickly reached. Flash cooling is fast and easy. Temperature control is excellent. 'Never-Ice' technology means no shield gas and a frost-free nozzle and sample environment!



### Liquid Nitrogen Dewar (with Auto Fill):

- 40 liters liquid nitrogen outer nitrogen main reservoir
- 10 liter liquid nitrogen inner gas generator reservoir allowing virtual infinite run time at set temperature
- Refill while operating- virtual infinite run time
- Vacuum insulated dewar with internal charcoal cryopump vacuum maintenance system
- High efficiency superinsulated aluminum/fiberglass design with safety pressure reliefs



### Model 32 Autotune temperature controller:

- 24 bits digital resolution
- Dual loop control, 50 watts and 10 watts
- Dual PID control loops
- 3 term PID control with table mode and autotune
- Two multi temperature sensor inputs
- RS232 and IEEE-488.2 (GPIB) computer interfaces
- Fully integrated and tested with system



### Dual channel) level controller for nitrogen generator and main reservoir:

- Digital readout of gas generator volume
- Automatic refill valve: automatic filling between reservoir and gas generator reservoir



### Electronic Flow Controller:

- Controller for quick accurate flow settings
- Gas generator flow heater assembly
- Auto shut-off safety feature on low level



### Instrumentation Mounting:

- Electronics mounted in standard 19 inch rack

### Liquid Nitrogen Autofill System:

- For automatic filling and monitoring between storage dewar and main reservoir of system

### Optional Items:

- X-Y-Z Nozzle Support Stand
- Roller Base for Cryocool LN3 Dewar

## CRYOCOOL LN-3 FLOW RATE

Variable Flow Control  
Fast Cooldown  
Instant Start  
Controllable Cooling/Heating Times

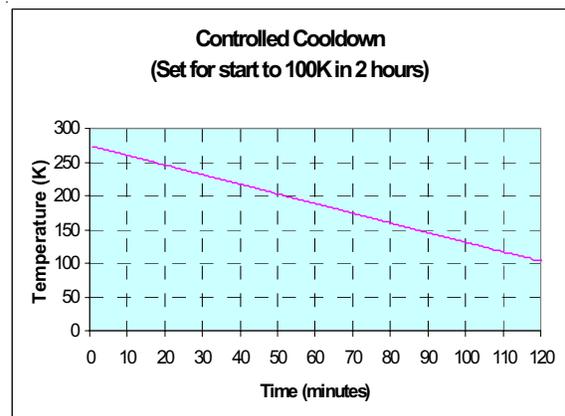
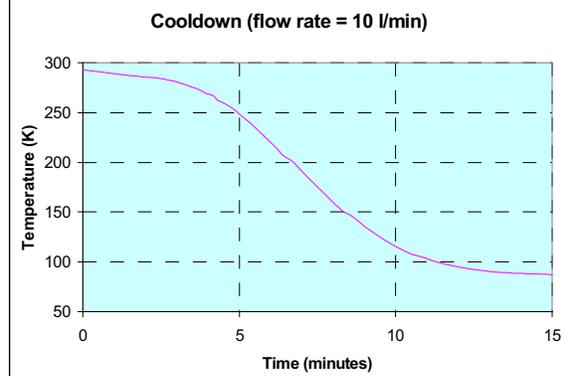
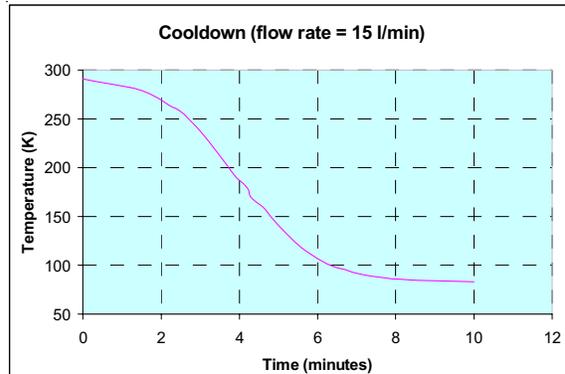
- Continuously variable flow rate from 0 to 15 l/min
- Accurate and repeatable flow settings
- Immediate response and start
- Electronic flow power supply with digital indicator
- Constant flow rate without complicated feedback controller
- Accurate and repeatable flow settings:  
"What you set is what you get!"
- Automatic control of cooling and heating rates

The constant flow rate is 'set and forget' and does not require adjustment or a complicated feedback flow controller. The cold stream flow rate is directly proportional to the current sent into a heater located in the nitrogen gas generator container. To adjust the flow rate simply turn the voltage setting knob on the front panel of the power supply.

The flow rate can be linearly adjusted from near 0 to 15 gas liters per minute. There is no need to try to make simultaneous balancing adjustments of a shield gas flow. Shield gas type coolers cannot provide for easy adjustment of the flow rate because the shield gas flow velocity and the cold flow velocity must always be matched or turbulence and icing occur!

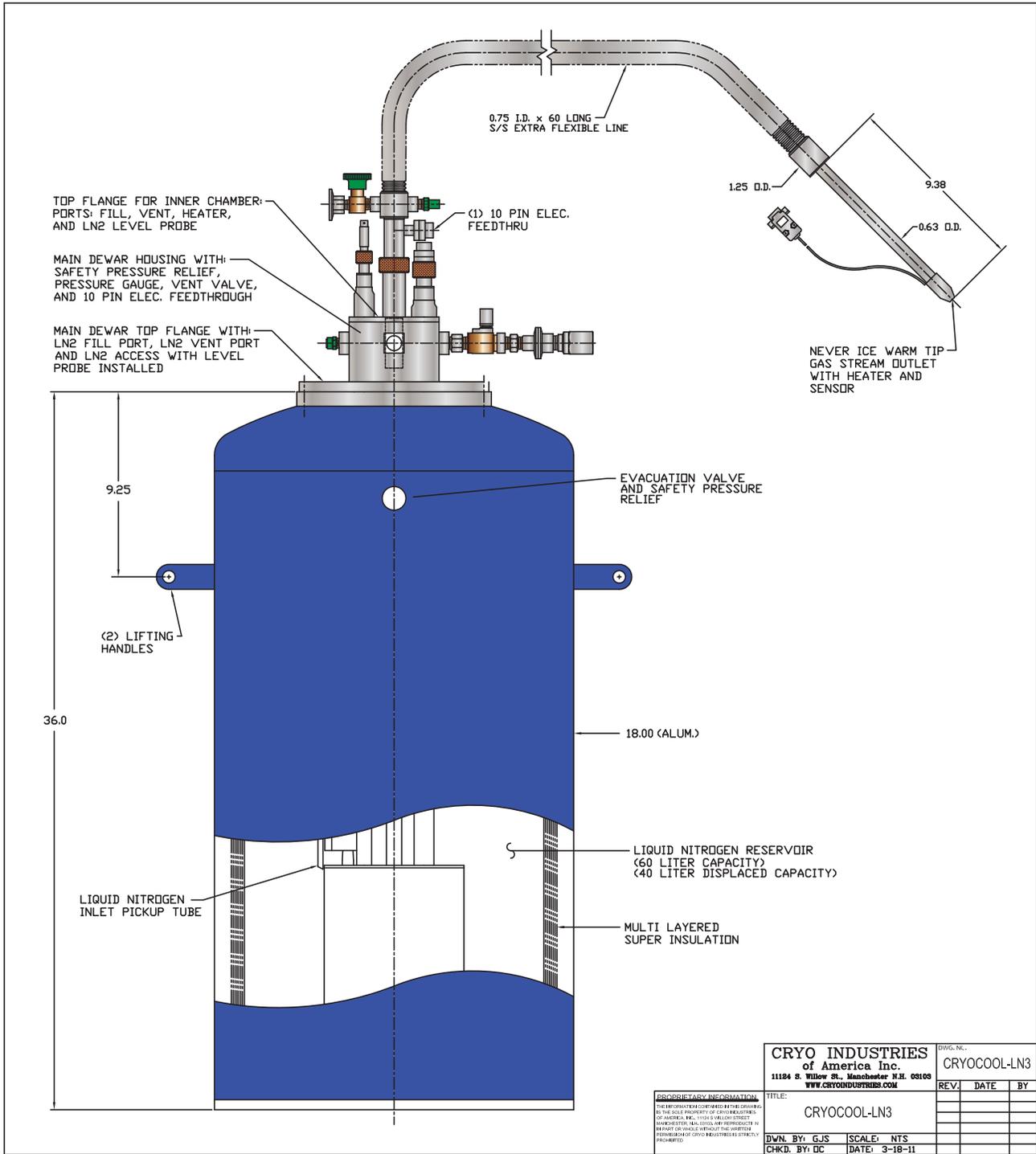
To fast flash cool crystals for higher quality freezing simply turn the power supply voltage setting knob. The flow can be increased immediately to 15 l/min. After cooling, just turn the knob to reduce the flow to 5-6 l/min for efficient steady state operation.

### 100K in 10 minutes from a warm start

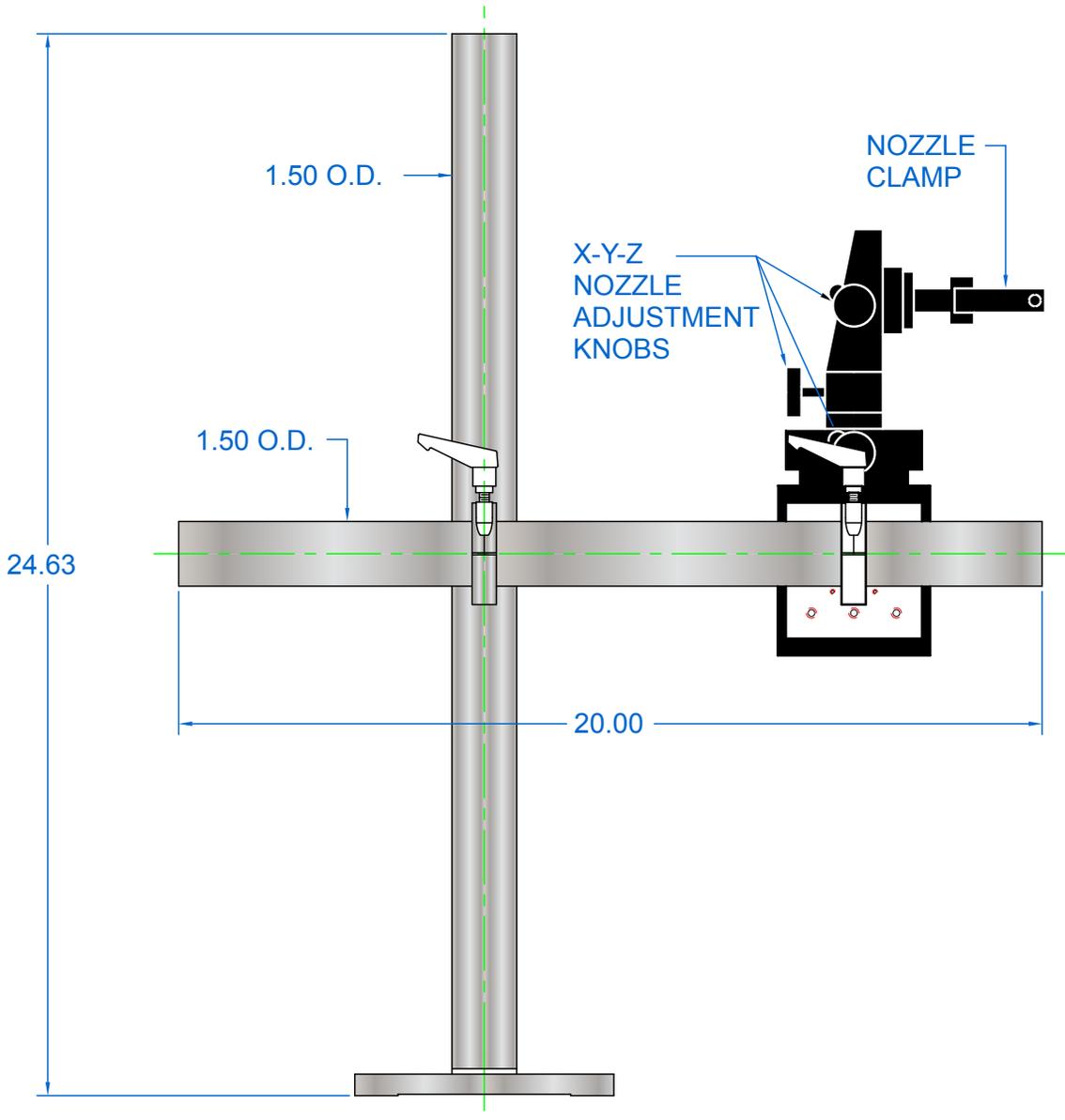


Controlled Cooldown:  
Graph shows cooldown set to slow cool for fragile crystal. Rate set to take 2 hours to cool from 275K to 100K  
Control the rate of heating or cooling

## CRYOCOOL-LN3 SYSTEM



**OPTIONAL CRYOCOOL STAND**



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TITLE:

**CRYOCOOL-STAND**