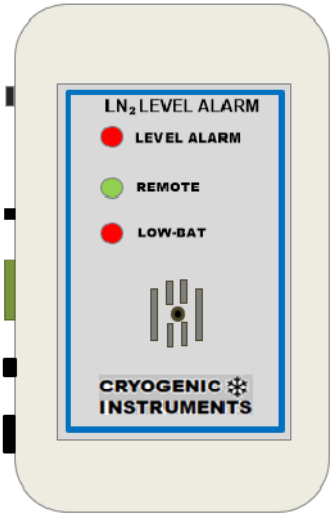
LN_2 LEVEL ALARM

9V battery operation
or
AC power with battery back-up
Including REMOTE Alarm contacts

OPERATION AND TECHNICAL MANUAL



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- SAFETY -

IMPORTANT!

The following safety guidelines for handling liquid nitrogen must be read carefully and strictly followed. While this information provides essential precautions, it is not a comprehensive guide to the use of cryogenic liquids. All personnel working with liquid nitrogen must be fully trained in proper procedures and thoroughly understand the hazards associated with cryogenic materials. Failure to follow proper safety protocols may result in serious injury or death.
Ensure that all handling, storage, and operational practices meet industry safety standards and regulatory requirements. When in doubt, consult qualified professionals or official safety documentation before working with liquid nitrogen.
Let me know if you'd like any further refinements!

HANDLING & FIRST AID:

Proper training and awareness are essential for personnel working with liquefied gases to ensure safe handling and prevent accidents. All individuals should be thoroughly instructed on the nature of these materials and follow established safety procedures.
Protective Measures
Due to their extremely low temperatures, liquefied gases can cause severe skin burns, similar to scalding from hot liquids. To minimize risk, always wear appropriate protective equipment, including:

- Goggles or face shields to safeguard against splashes
- Heavy rubber gloves that allow for quick removal
- A heavy rubber apron to prevent direct contact with cryogenic liquids
- High-top shoes to avoid accidental spills entering footwear
- Pant legs covering shoe tops for additional protection

Additionally, liquid nitrogen should only be stored and transported in approved containers, as exposure to extreme cold can cause certain materials to become brittle and shatter upon contact.
First Aid Procedures
In case of accidental exposure to liquefied gas, follow this emergency first aid steps while awaiting medical assistance:

1. For skin or eye exposure – Immediately flood affected areas with large quantities of unheated water to reduce damage. Cover frozen areas with loose, bulky, dry, and sterile dressings to protect the skin.
2. For blistered skin or possible eye injury – Seek medical attention immediately to prevent further complications.
   Following these precautions and first-aid measures ensures safer handling of cryogenic liquids and mitigates potential risks.

LIQUEFIED GAS HANDLING WARNING

Liquefied Gases, including liquid nitrogen, exist at extremely low temperatures—as low as -196°C. Direct contact with skin can cause severe cold burns, similar to thermal burns from high heat.

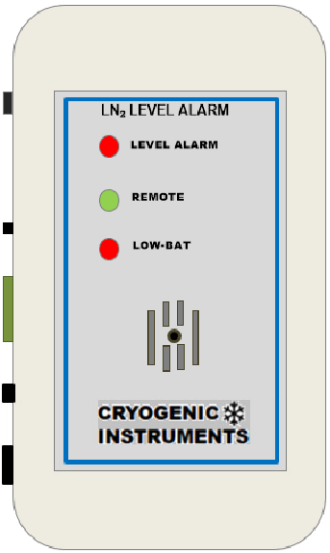
To prevent injury, never allow skin exposure to liquid nitrogen.
While liquid nitrogen itself is non-toxic, it can displace oxygen when released in an enclosed space, potentially leading to asphyxiation. Since oxygen deficiency can cause unconsciousness without warning, always check air quality before entering areas where cryogenic liquids are in use. If possible, keep a respirator on hand for added safety.

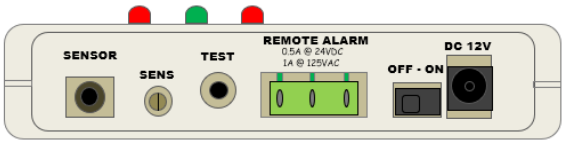
Introducing room-temperature equipment into liquid nitrogen poses additional risks due to splashing and rapid boiling. Exercise caution to avoid accidental exposure.

Anyone handling cryogenic liquids should be properly trained in safety protocols and wear protective gear, including:

- Face shields or goggles
- Insulated gloves that allow for quick removal
- Protective clothing to minimize skin exposure

- FUNCTIONALITY DETAIL –





LED'S: Provides status of current operating condition. Alarm, Battery level and Contact position

SENSOR: Input jack for thermistor sensor

SENS: Internal calibration adjustment for sensor threshold sensitivity

TEST: Pushbutton for manually testing for operational functionality

REMOTE ALARM: Relay contacts for connection to BMS (Building management system or other alarm monitoring system

ON/OFF: Power Switch

DC12V: External power supply jack for AC power supply

9V Battery: Access panel (underside) for 9V battery compartment

- BATTERY INSTALL / REPLACEMENT –

Tools & Materials Needed:

- Phillips-head screwdriver
- 9V battery
- Clean, dry cloth (optional, for wiping contacts)

Step-by-Step Instructions:

- Power Off the Device
  Ensure the unit is turned off before proceeding.
- Locate the Battery Compartment
  Turn the device upside down to find the battery compartment cover.
- Remove the Securing Screw
  Using a Phillips-head screwdriver, carefully unscrew the single screw securing the battery compartment lid.
- Open the Battery Compartment
  Gently lift or slide the battery cover away from the enclosure, exposing the battery.
- Remove the Old Battery
  Disconnect the battery from the clip or terminals, noting the orientation of the battery terminals (positive & negative).
  If necessary, wipe any dust or corrosion from the contacts.
- Install the New Battery
  Align the 9V battery with the correct polarity, attach it securely, and ensure it fits snugly in the compartment.
- Close the Battery Compartment
  Position the battery cover back into place and reinsert the screw.
- Turn the device back on and check that it functions properly.
- Remove battery if unit is to be stored for a long period of time.

The 9V battery also ensures that the level alarm remains operational during an AC power outage. The alarm will continue to function solely on battery power when AC power is unavailable.

Note: While the level alarm will operate using only the 9V battery, the REMOTE alarm contacts will remain in an Alarm state without AC power.

- INTRODUCTION -

The Level Alarm is an AC-powered, battery-backed device designed for monitoring liquid nitrogen levels in various tanks and storage units. Its battery-only mode allows flexible placement where AC power isn't available.
Optimized for high-efficiency cryogenic Dewars and storage tanks, it ensures accurate monitoring of gradual level changes. The built-in battery backup maintains operation during power outages, while remote alarm contacts enable integration with existing systems for added security.

- FEATURES -

The TEST button simulates an alarm condition, activating the LED and audible indicators. If AC power is available, the REMOTE contacts will change state, confirming proper function. The unit continuously monitors with no delay when powered by AC. REMOTE contacts also respond to alarm conditions, including low 9V battery levels, ensuring timely battery replacement for reliable backup power during outages

When operating on 9V battery power, pressing the TEST button “wakes” the unit from the power-saver mode. This initiates a 3.5 minute continuous monitoring sequence. Repeated pressing of the TEST button activates the alarms and will noticeably shorten battery life.

BATTERY LIFE: If operating on 9V battery only (no AC power), battery life is typically 9-months (280 days) using a typical 9V Lithium battery. This is the result of a proprietary power management sequence that allows the device to enter power-saving mode periodically during non-alarm monitoring condition. When an alarm occurs, the power-saving mode is inactive until the alarm is cleared. Normal operation resumes after alarm condition is cleared.

Excessive Alarm conditions will degrade the battery quickly. A continuous Alarm will deplete a new battery in about 72 hours (~3 days), whereas non-Alarm monitoring will provide 9-months of monitoring service. It is recommended to replace the battery after ANY Alarm condition when AC power was not enabled.

DIAGNOSTICS: The alarm will activate if the sensor probe is removed or experiences a short circuit. Restoring normal operation requires either plugging the probe back in or replacing it with a functional unit, which will clear the alarm condition.

LOW-BATTERY INDICATOR: A low-battery indication feature will automatically issue a sequence of audible “Chirps” and LED flashes when the battery charge drops below a safe level. Replacing the battery will automatically reset this process. Battery level is also monitored during AC powered service. Maintaining the 9V battery level is critical so the battery back-up feature will be available if AC power is lost.

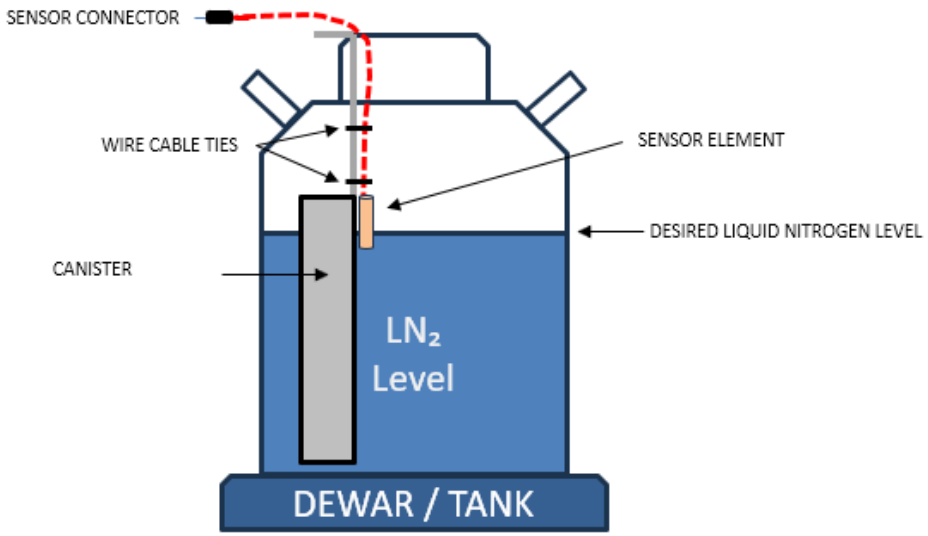
REMOTE ALARM CONTACTS: The system includes relay contacts (SPDT 1A @ 125VAC / 0.5A @ 24VDC) for remote alarm monitoring. These contacts will change state in response to any alarm condition, including liquid-level depletion, low battery, or AC power loss. They can be integrated with a Building Monitoring System (BMS), PLC, or other monitoring platforms to notify remote personnel when an alarm is triggered.

- INSTALLATION -

1. Remove sensor plug from connector terminal.
2. Attach the Sensor cable (using provided wire-ties) to an internal component of the storage system that will position the Sensor Tip at the LN_2 liquid height desired for alarm indication. A “stiffening” rod or tube may be required to properly affix and locate the sensor probe in the desired location.
3. Confirm Sensor probe installation does not impede use of the storage unit and no damage can occur to the sensor probe wire or sensor tip element during normal use.

   NOTE: the sensor probe must be positioned at the (liquid) level where an alarm condition is desired.

4. Install the 9V battery in underside battery compartment.
5. Plug in AC adapter into appropriate power outlet.
6. Locate and affix / mount the Level Alarm to an appropriate location. The level alarm unit can be mounted in any position; however, it is suggested the LED indicators be clearly visible and no objects impeding the audible alert.
7. Insert sensor connector into SENSOR jack on side of alarm module.
8. Move the power switch to the ON position.
9. If no alarm occurs (Sensor submerged), push test button for system check.



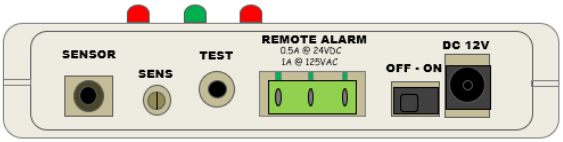
- CALIBRATION –

NOTE: Unit is pre-calibrated at the factory. Adjusting the SENS calibration trimmer is usually not necessary unless replacing sensor.

1. Once the sensor probe has been submerged in liquid nitrogen for approximately 5 minutes, turn ON power switch. Alarm may initially occur (normal sequence test) than turn OFF. If alarm continues to alert, proceed to Step-4
2. Press TEST button. This activates the sensor monitoring and allows a 3.5-minute window to perform the calibration sequence.
3. Using a small flat-blade screw-driver, slowly rotate the Sensitivity adjustment screw “counter-clockwise” until alarm sounds.
4. Slowly rotate Sensitivity adjustment “clockwise” until the point the alarm deactivates.
5. Confirm by pressing the TEST Button for an audible and visual alarm indication.

6. This completes the calibration process.

7. If Sensor probe is damaged or replaced, repeat the calibration procedure with the new sensor probe installed.



- SPECIFICATIONS -

Power Requirements:

Input Voltage:	AC100-250VAC @ 50/60hz & 9-volt DC / Battery
Battery Type:	Energizer Lithium L522*
Battery Ahr	750mAhr

** Or equivalent 9V battery*

Input Current (average):	80uA (720uW)
Alarm (max):	11mA
Monitoring (typical):	630uA (3.5min)
Power-Saver (typical):	46uA (40min)

Power management:

Monitoring mode:	3.5 minutes
Power-Saver mode*:	40 minutes

**Alarm & TEST de-activate power-saver mode timers*

Battery Life: (Energizer L522)

Alarmed (constant):	68hr's
Monitoring (no alarm):	280 days

Dimensions

(L x W x H):	
Inches:	3 1/4" x 1 1/2" x 4 3/8"
Metric:	8.3cm x 3.8cm x 11.1cm)
Weight:	7 oz. / 196g (including battery)

- TROUBLESHOOTING -

CONDITION	CAUSE	SOLUTION
Red Alarm LED and audible alert present	Sensor above liquid level,	Correct low liquid level condition.
	Sensor disconnected	Re-connect Sensor
Alarm always present	Sensor is shorted	Repair or replace Sensor
	Sensitivity control needs recalibration / adjustment	Re-adjust Sensitivity adjustment screw by slowly rotating clockwise until alarm stops.
Alarm light flashes and Intermittent audible chirp sounds	Battery depleted	Replace 9V Battery
Alarm doesn't occur immediately when probe is inadvertently removed from liquid.	Power-saving mode activated.	Press TEST button to activate monitoring sequence duration
No LED, no alarm when TEST button pressed	Power switch OFF	Confirm power switch is in ON position
	No AC power / dead battery	Plug in AC adapter power supply / Replace Battery

- MAINTENANCE-

Clean only with mild, non-abrasive cleaners.

Visually check all lights regularly to ensure proper operation.

It is recommended to TEST the system daily by pressing the TEST button.

Visually check wires and connections for signs of wear and to locate potential future problems.

Avoid exposing the unit to conditions that may cause damage or interfere with proper operation.

Use only a mild, non-abrasive household type cleaner for cleaning all surfaces of the unit.

NOTE: Remove battery if unit is to be stored for a long period of time

Intended Environment:

Indoor use only

Temperature: 10°C to 50°C
Humidity: Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C

WARRANTY

The equipment is warranted against defects in workmanship and materials for one year. Claimants must notify the factory or supplier upon discovering a defect and stop using the equipment immediately. The manufacturer may choose to correct defects in the field without requiring a return. This warranty excludes equipment damaged by abusive handling.