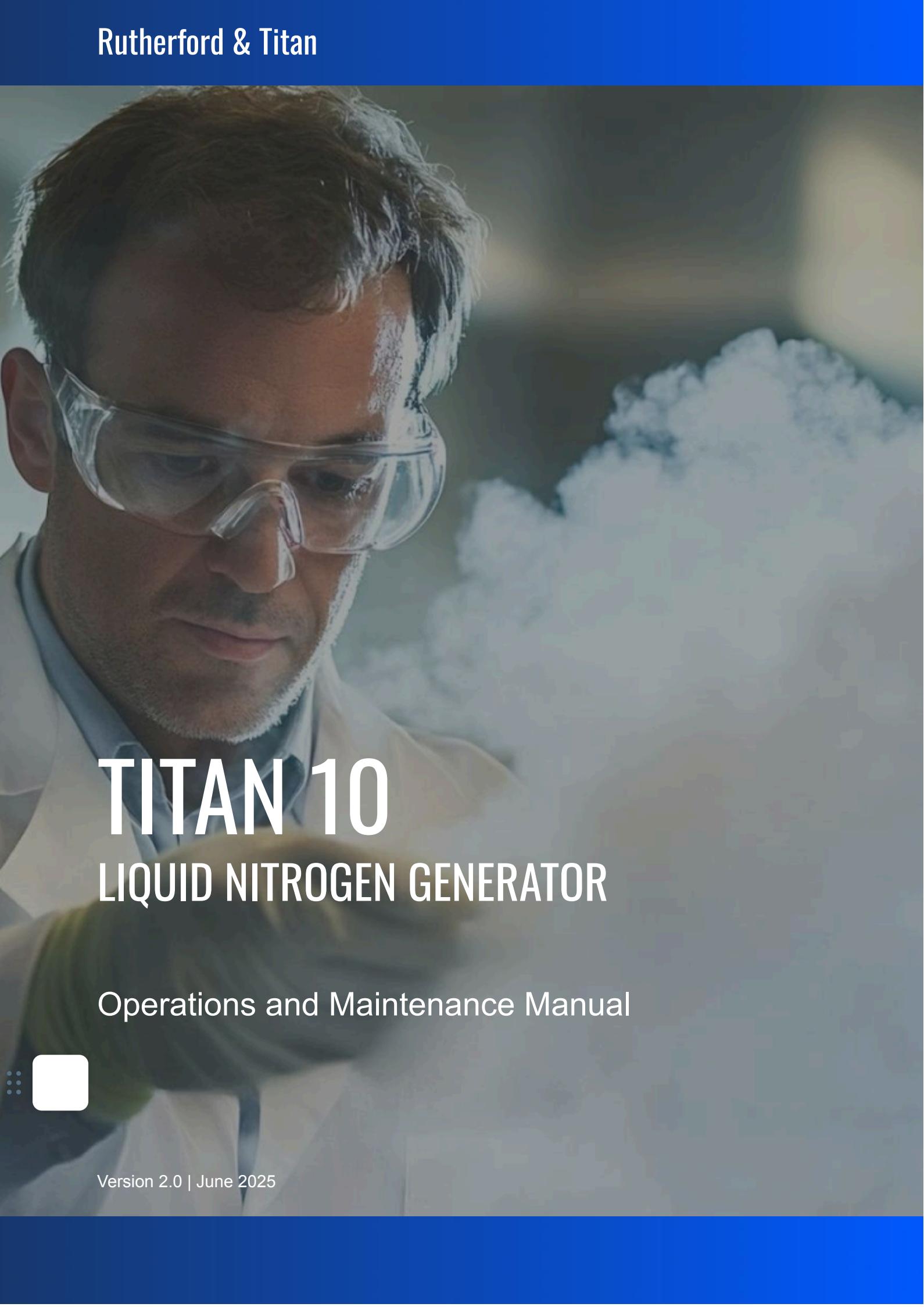


Rutherford & Titan

A close-up photograph of a man with light brown hair and a beard, wearing clear safety goggles and a light-colored lab coat. He is looking down and to his right, focused on something off-camera. In the background, there is a large, billowing cloud of white vapor or liquid nitrogen, which is very cold and can cause frostbite if touched.

# TITAN 10

## LIQUID NITROGEN GENERATOR

Operations and Maintenance Manual

Version 2.0 | June 2025



## TABLE OF CONTENTS

<b>SAFETY PRECAUTIONS &amp; WARNINGS.....</b>	<b>3</b>
General Safety.....	3
Cryogenic Safety.....	3
Electrical Safety.....	3
Pressure Safety.....	3
<b>SYSTEM OVERVIEW.....</b>	<b>3</b>
<b>SPECIFICATIONS.....</b>	<b>4</b>
Overview.....	4
Environmental Conditions.....	4
<b>UNPACKING AND CONTENTS.....</b>	<b>5</b>
<b>INSTALLATION REQUIREMENTS.....</b>	<b>6</b>
Site.....	6
Pre-Start Checklist.....	6
Environmental Control.....	6
<b>OPERATION PROCEDURES.....</b>	<b>6</b>
Startup.....	6
Internet Connectivity.....	6
<b>DISPENSING PROCEDURES.....</b>	<b>8</b>
Manual Dispense Valve.....	8
Hose Dispensing (Optional).....	8
<b>OPTIONAL HOSE CONNECTION.....</b>	<b>8</b>
<b>PERFORMANCE EXPECTATIONS.....</b>	<b>8</b>
<b>TROUBLESHOOTING GUIDE.....</b>	<b>9</b>
<b>EMERGENCY SHUTDOWN PROCEDURE.....</b>	<b>9</b>
<b>MAINTENANCE SCHEDULE.....</b>	<b>9</b>
Annual (Years 1–2) 8,000-16,000 hours.....	9
Year 3 – Major Service (30,000 Hours).....	9
<b>CLEANING AND SANITATION.....</b>	<b>10</b>
<b>PACKAGING, TRANSPORT &amp; STORAGE.....</b>	<b>10</b>
Transport.....	10
Storage.....	10
<b>INSTALLATION &amp; COMMISSIONING RECORD.....</b>	<b>11</b>
<b>16. WARRANTY.....</b>	<b>11</b>
<b>17. TECHNICAL SUPPORT CONTACT.....</b>	<b>11</b>
<b>18. CE CERTIFICATION &amp; U.S. COMPLIANCE.....</b>	<b>12</b>
<b>19. CNA-11 HELIUM COMPRESSOR OVERVIEW.....</b>	<b>12</b>
Install Note:.....	12
Service Intervals.....	12
Safety.....	12
<b>LEGAL DISCLAIMER OF LIABILITY.....</b>	<b>13</b>

# SAFETY PRECAUTIONS & WARNINGS

Before operating or servicing the RT TITAN LN2 10L, all personnel must read and fully understand the following safety guidelines.

## General Safety

- Only trained personnel should operate this equipment.
- Wear cryogenic PPE: gloves, face shield or goggles, apron, and closed-toe shoes.
- Avoid skin contact with LN2 to prevent severe frostbite.
- Install unit on level, non-slip surface with ventilation and service access.

## Cryogenic Safety

- LN2 displaces oxygen: use in well-ventilated rooms only. Failure to heed warning can result in injury or death.
- Avoid basements or confined spaces without oxygen monitoring.
- Do not store or transport units in sealed vehicles or small rooms (without proper ventilation).

## Electrical Safety

- Plug into dedicated 115V / 20A outlet.
- Use surge protection
- Never operate with damaged cords.
- Disconnect power before service.

## Pressure Safety

- Do not modify or bypass relief valves, sensors, or interlocks.
- Treat all fittings as live unless confirmed depressurized.

# SYSTEM OVERVIEW

The RT TITAN LN2 10L is a fully integrated, plug-and-play system for on-site LN2 generation using PSA technology and cryogenic cooling.

## Key Components:

- PLC Controller
- Cold Head (Cryocooler)
- Compressor
- 55L Internal Storage Dewar (40L usable)
- Closed-Loop Air-Cooled Chiller
- Manual Dispense Valve
- Optional 1/2" BSP Female Hose Port

# SPECIFICATIONS

## Overview

Feature	RT TITAN LN2 10L
Production Capacity	10L/day
Storage Capacity	35–40L usable
Output Pressure	1.5 bar g
Power Supply	115V / 60Hz / 20A
Power Consumption	1.5 kW
Dimensions	0.6m × 0.8m × 1.7m
Weight	150 kg

## Environmental Conditions

- Temperature: 5°C–32°C (Ideal: <22°C)
- Humidity: 20%–65%

## UNPACKING AND CONTENTS

Inspect packaging for damage. Notify Rutherford & Titan before removing the unit from the packaging.

Any damage has to be reported immediately, and stated on the BOL slip by the logistics provider. If this is not done correctly then all claims may be voided by the logis

Included in shipment:

- 1 × RT TITAN LN2 10L Generator
  - 1 × Mains Electrical Cable
  - 1 × User Manual
  - 1 × LN2 Dispenser Hose (if ordered)
- 

## INSTALLATION REQUIREMENTS

### Site

- Flat, hard surface
- Dedicated 115V / 20A circuit
- Unobstructed side ventilation (right-hand side if facing front)

### Pre-Start Checklist

- Verify no physical damage
- Ensure main dispense valve is closed
- Confirm surge protection installed

### Environmental Control

- Keep ambient room temp <80°F (26.7°C)
  - Ideal operation: 65–75°F (18–24°C)
-

# OPERATION PROCEDURES

## Startup

1. Plug in; unit auto-powers with PLC check.
2. Status displayed via LED bar or % screen.

## Internet Connectivity

- Ethernet or Wi-Fi required for remote diagnostics.
- Unit should remain connected for support access.

---

# DISPENSING PROCEDURES

## Manual Dispense Valve

1. Wear full cryo PPE.
2. Place vessel beneath valve.
3. Open valve fully, then 1/4 turn back.
4. Close valve after fill.

## Hose Dispensing (Optional)

1. Remove sintered diffuser.
2. Connect hose with 1/2" BSP fitting.
3. Begin fill only when system is in READY mode.
4. Close valve post-fill.

---

# OPTIONAL HOSE CONNECTION

System must read >15% full to dispense. For initial startup, allow build-up to 80%.

---

# PERFORMANCE EXPECTATIONS

- Output: Up to 10L/day
- Cool-Down: 60–90 min

- Recovery: ~5 min between draws
  - Temp Fault Limit: >80°F reduces output or causes shutdown
- 

## TROUBLESHOOTING GUIDE

Symptom	Cause	Action
No Power	Breaker or cord issue	Check connections
No LN2 Production	Warm room / Alarm	Verify <75°F, check for errors
No Dispense	Closed valve / Low level	Open valve, check % fill
Unusual Noise	Compressor issue	Contact Support

---

## EMERGENCY SHUTDOWN PROCEDURE

1. Stop dispensing
  2. Unplug power
  3. Ventilate area
  4. Contact Support (report serial, install date, issue)
- 

## MAINTENANCE SCHEDULE

### Annual (Years 1–2) 8,000-16,000 hours

- Air Inlet Filter
- Desiccant Filter
- Coalescing Water Filter
- Exhaust Silencer
- Medical Gas Filter
- Air Compressor Components

### Year 3 – Major Service (30,000 Hours)

- All above plus:

- Solenoid Valve Kit
- Air Compressor Overhaul
- Cold Head Replacement

## CLEANING AND SANITATION

- Wipe with 70% isopropyl alcohol
  - Do not spray or jet wash
  - Do not clean internal components
- 

## PACKAGING, TRANSPORT & STORAGE

### Transport

- Upright only (<5° tilt)
- Palletize with shock absorption
- Secure power cord and fittings

### Storage

- Clean, dry, 50–77°F (10–25°C)
  - Drain residual LN2
  - Unplug if long-term
-

# INSTALLATION & COMMISSIONING RECORD

Item	Details
Serial Number	
Installation Date	
Installed By	
Company	
Ambient Room Temp	
Electrical Verified	<input type="checkbox"/> Yes / <input type="checkbox"/> No
Surge Protection Used	<input type="checkbox"/> Yes / <input type="checkbox"/> No
First Power-Up Success	<input type="checkbox"/> Yes / <input type="checkbox"/> No

## 16. WARRANTY

12-month warranty from commissioning. Applies only if:

- Authorized parts used
- Installed and maintained properly
- No unauthorized service

**Submit claims in writing to:**

Email: [sales@rutherfordtitan.com](mailto:sales@rutherfordtitan.com)

Phone: 855 550 0508

## 17. TECHNICAL SUPPORT CONTACT

**Rutherford & Titan**

 [support@rutherfordtitan.com](mailto:support@rutherfordtitan.com)

 855 550 0508

 [www.rutherfordtitan.com](http://www.rutherfordtitan.com)

 9 AM – 5 PM PST, Monday–Friday

## 18. CE CERTIFICATION & U.S. COMPLIANCE

Covers LVD, Machinery Directive, EMC, PED, EN13458.

Compliant with U.S. equivalents:

- UL 61010-1, UL 508A, NFPA 70
  - OSHA 1910, ANSI B11
  - FCC Part 15, ANSI C63.4
  - ASME BPVC, CGA, NFPA 55
- 

## 19. CNA-11 HELIUM COMPRESSOR OVERVIEW

Purpose: Drives SHI cold head RD-125

Specs: 115V, 1.2–1.5kW; 117 CFM airflow; 75kg

### Install Note:

- 6–12" clearance, adequate HVAC cooling
- Avoid power inverters

### Service Intervals

- Compressor: 20,000–30,000 hrs
- Cold Head: 10,000–15,000 hrs
- Adsorber replacement critical
- Annual heat exchanger cleaning

### Safety

- Helium pressure ~235 psi
  - Do not bend flex lines below 12" radius
  - Qualified service only
  - Helium purity must be 99.9999%
-

# LEGAL DISCLAIMER OF LIABILITY

Rutherford & Titan Inc. – LN<sub>2</sub> Generation Equipment

Effective Date: [Insert Date]

Applies To: All products, services, and documentation provided by Rutherford & Titan Inc.

## **Important, please read carefully**

By purchasing, installing, or operating any equipment manufactured or supplied by Rutherford & Titan Inc., including but not limited to liquid nitrogen generators, accessories, and control systems (collectively “the Equipment”), the purchaser and all end-users (“User”) acknowledge and agree to the following terms and limitations of liability:

---

### **1. Critical Application Use Acknowledgment**

The User acknowledges that the Equipment may be used in applications involving biological sample preservation, IVF embryo storage, medical research, or clinical cryopreservation.

These applications may involve irreplaceable, high-value, or emotionally sensitive materials. Rutherford & Titan does not guarantee the integrity, survival, or performance of materials stored using the Equipment and explicitly disclaims any liability for loss or damage thereto.

---

### **2. System Limitations and User Responsibility**

The Equipment is intended for professional use only by trained personnel. It is the User’s sole responsibility to ensure:

- Installation in an appropriate, climate-controlled, and ventilated environment
- Regular inspection and servicing according to published guidelines
- Real-time monitoring of system performance and LN<sub>2</sub> levels
- Backup systems (redundant alarms, alternate storage, spare dewar capacity) are in place for mission-critical applications

Rutherford & Titan is not responsible for loss, damage, spoilage, or contamination resulting from:

- Power failures or electrical anomalies
- User negligence or improper operation
- Failure to follow service schedules or use approved parts
- Sensor or alarm malfunctions not reported in time

- Network disconnection, loss of internet service, or inability to remotely monitor
  - External environmental conditions or force majeure (e.g., fire, flood, earthquake)
- 

### 3. Limitation of Warranty and Damages

Except as expressly stated in the official Limited Warranty, all equipment is sold "AS IS" and "WITH ALL FAULTS." Rutherford & Titan disclaims any implied warranties, including merchantability or fitness for a particular purpose.

To the fullest extent permitted by applicable law:

- Rutherford & Titan shall not be liable for any direct, indirect, special, incidental, punitive, or consequential damages, including but not limited to loss of embryos, biological material, profits, data, emotional distress, or reputational harm.
  - Total liability, if any, shall not exceed the original purchase price of the Equipment.
- 

### 4. Indemnification

The User agrees to indemnify, defend, and hold harmless Rutherford & Titan Inc., its officers, employees, agents, distributors, and affiliates from any claims, demands, legal actions, or damages—including attorney fees—arising out of:

- Misuse or alteration of the Equipment
  - Failure to maintain proper environmental or alarm safeguards
  - Customer or third-party loss related to cryopreserved assets
  - Any breach of safety protocols, consent procedures, or regulatory compliance
- 

### 5. Consent & Waiver

By continuing to use the Equipment, the User expressly waives all rights to recover damages from Rutherford & Titan arising from storage failure or sample degradation and accepts full liability for ongoing equipment use, alarm management, and operational oversight.

---

### 6. Jurisdiction

This disclaimer shall be governed by and construed in accordance with the laws of the State of Texas, United States, without regard to conflict of law provisions. Any disputes shall be resolved exclusively in the courts located in Harris County, TX.

---

 **NOTICE**

If you do not agree with these terms, do not install or operate the Equipment. Return it in original packaging for refund consideration within the applicable return window. Note a refund will be at the sole discretion of Rutherford & Titan.

---



