



L I N Q Q U A N T U M · 零 开 量 子

Miniature Combination Ion Pump

Product & User Manual

Models 0.8 L/s · 2 L/s · 5 L/s | Ion pump + NEG getter

Version A1 · Date 2026-10 · Document No. LQ-UM-IP-A1-EN

All dimensions in millimetres (mm). Appearance and specifications are subject to the delivered product and its accompanying documents.



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Read this chapter in full before use

The ion pump runs at up to 5 kV and carries a strong permanent magnet. Improper handling can cause electric shock, injury or equipment damage.

! WARNING Operating voltage up to **5 kV**. Connect or disconnect the SHV cable only with the **controller switched off**; **residual charge** may remain — confirm discharge before touching.

! WARNING The HV cable has an **interlock** — never bridge or bypass it. Stop using a damaged cable or connector immediately.

! CAUTION The pump body and flange are very hot during bake-out; **do not touch until cool**.

! WARNING The magnet is a **strong permanent magnet**: people with pacemakers or other implants must not handle it; beware of **pinching**, and keep it away from steel tools, magnetic cards and electronics.

i NOTE The pump is driven by LinQ's **HV power supply (ion pump controller)**; see its user manual for controller operation.

**Before handling
the HV cable**

- 1** Switch off the HV output
- 2** Switch off the controller
- 3** Wait for **discharge**, confirm no voltage
- 4** Then connect or remove the **SHV cable**

Miniature Combination Ion Pump

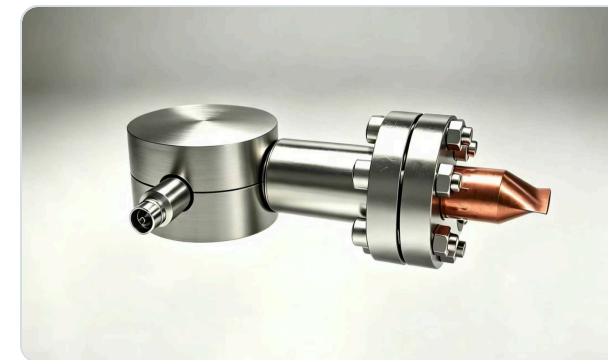
A UHV pump combining a sputter ion pump with a non-evaporable getter (NEG) — small size, high pumping speed, designed for space-constrained cold-atom systems.

Operating principle

The **NEG getter** pumps hydrogen and other active gases at high speed and does most of the pumping — and it keeps pumping **with no power applied**. The **sputter ion pump** removes the noble gases and methane the NEG cannot, and its ion current gives a **real-time pressure reading**. Together they deliver high pumping capacity from a very small package.

Structure

- 1 **Ion pump body** Sputter ion pump element
- 2 **NEG getter** Non-evaporable getter, activated during bake-out
- 3 **Magnet** Fits over the pump body, bakeable with it ($< 300\text{ }^{\circ}\text{C}$)
- 4 **SHV connector** 5 kV, to the controller HV cable
- 5 **CF flange** CF16 (0.8 and 2 L/s) · CF25 (5 L/s)



Miniature combination ion pump

0.8 / 2 / 5 L/s

Ion pumping speed (three models)

20 / 25 / 400 L/s

NEG getter pumping speed

CF16 / 25

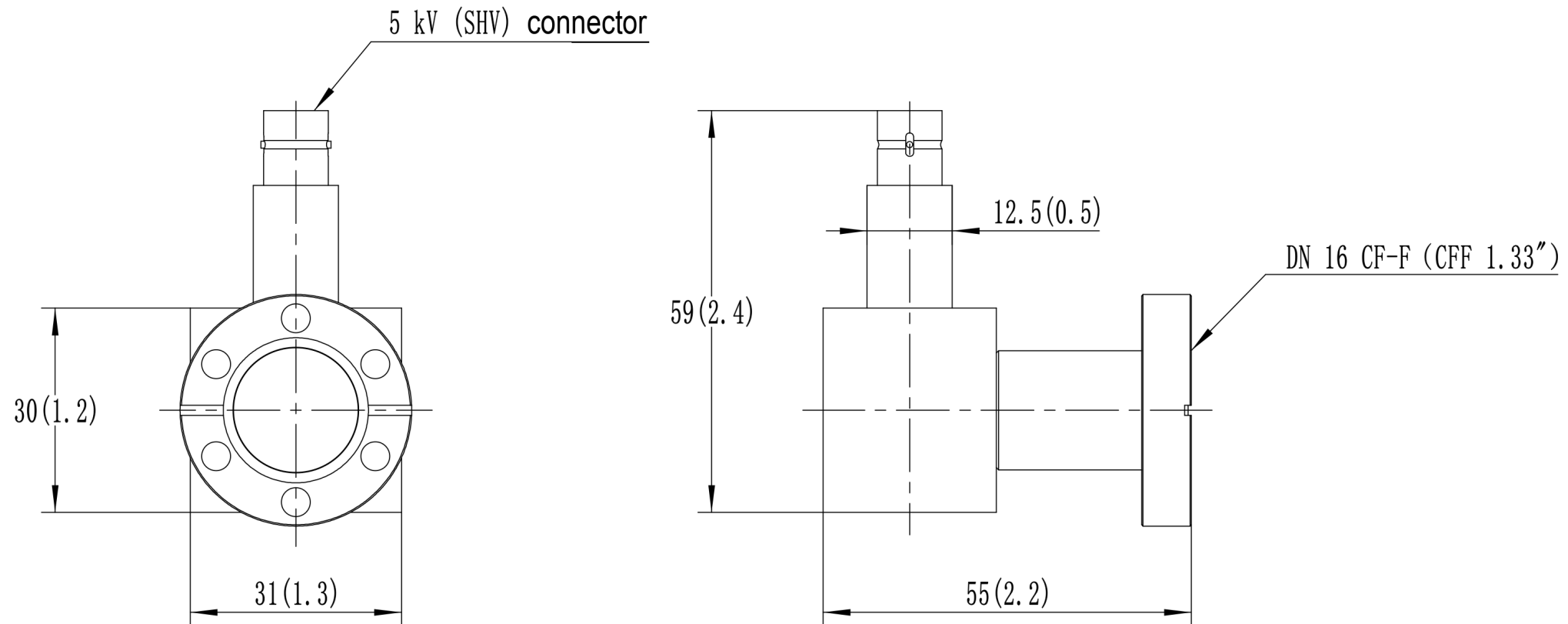
Vacuum flange

5 kV

SHV HV connector

0.8 L/s model unit: mm (inch in brackets)

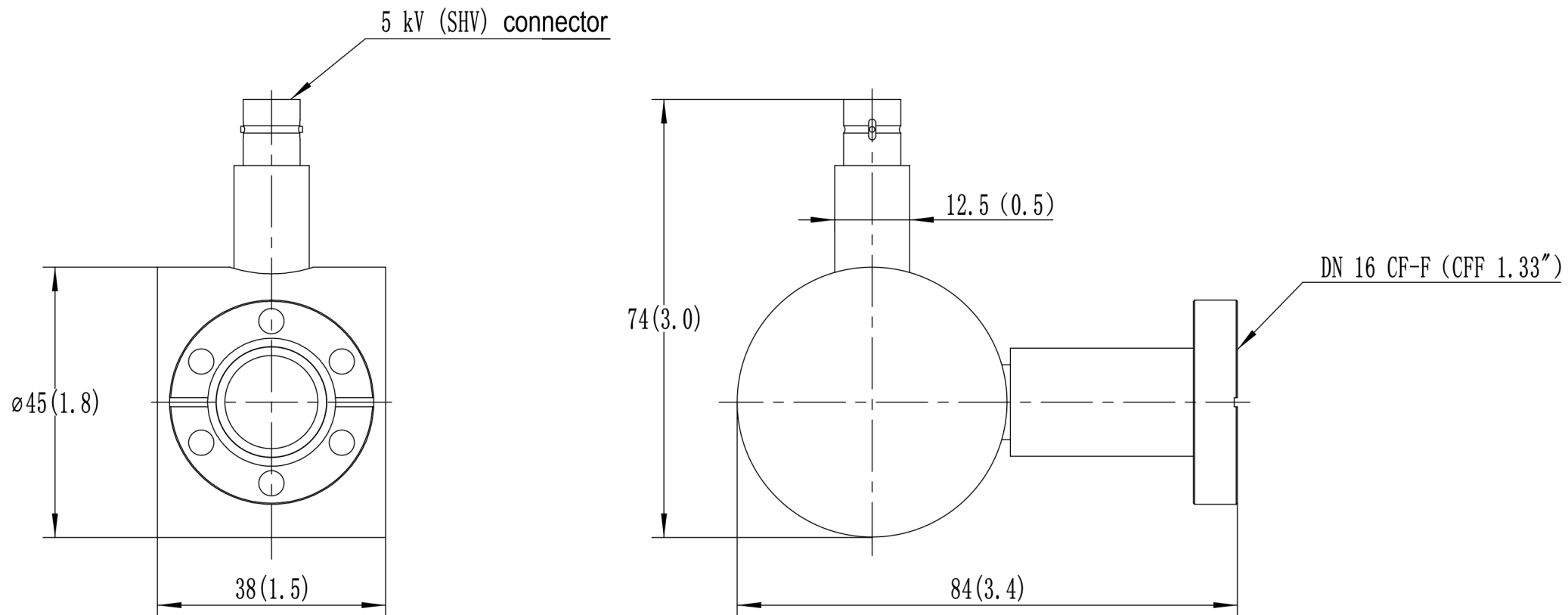
Ion pumping 0.8 L/s · NEG pumping 20 L/s · approx. 55 × 31 × 59 mm (incl. flange and HV connector) · CF16 flange



30 × 31 body section · 59 overall height (incl. SHV connector) · 55 overall length (incl. CF16 flange) · 12.5 connector neck

2 L/s model unit: mm (inch in brackets)

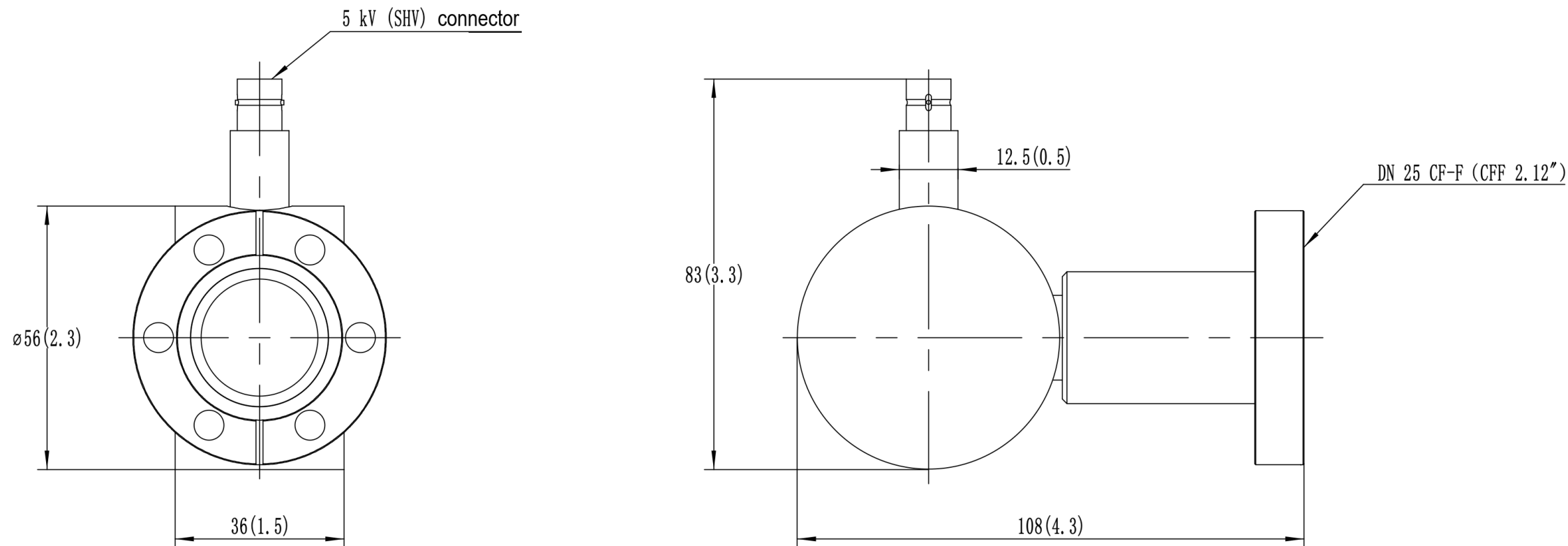
Ion pumping 2 L/s · NEG pumping 25 L/s · approx. 84 × 38 × 74 mm (incl. flange and HV connector) · CF16 flange



$\varnothing 45$ body diameter · 38 body width · 74 overall height (incl. SHV connector) · 84 overall length (incl. CF16 flange) · 12.5 connector neck

5 L/s model unit: mm (inch in brackets)

Ion pumping 5 L/s · NEG pumping 400 L/s · approx. 108 × 36 × 83 mm (incl. flange and HV connector) · CF25 flange



$\varnothing 56$ body diameter · 36 body width · 83 overall height (incl. SHV connector) · 108 overall length (incl. CF25 flange) · 12.5 connector neck

Installation steps

Make sure the vacuum system has roughing capability (turbo pumping station) before installing. Bake-out and NEG activation are covered in chapter 05.

- 1 Inspect** Check the pump body, flange knife-edge and SHV connector for damage; remove protective caps only at installation.
- 2 Flange** Connect to the vacuum system following standard CF flange practice (CF16 on the 0.8 and 2 L/s models, CF25 on the 5 L/s model).
- 3 Position** Any orientation.
- 4 Magnet** The magnet **does not need to be removed** and can be baked with the pump (max < 300 °C).
- 5 HV cable** With the controller off, connect the SHV HV cable (3 m, with interlock) and check the interlock connector is fully seated.

! **CAUTION** The SHV connector and cable are rated for 5 kV — never substitute an ordinary BNC cable.

i **NOTE** The NEG getter activates during bake-out; no separate activation equipment is needed.

i **NOTE** The pump pairs with LinQ cold-atom sources (2D-MOT, 3D-MOT, Mini-MOT) and the Double-MOT systems.

Degas and activate the NEG during system bake-out

The NEG getter activates at 180 °C, so a normal system bake-out completes activation. The magnet stays on and is baked with the pump.

Prerequisites

Turbo station running

System < 1×10^{-4} Pa

Ion pump off



CAUTION Maximum bake-out temperature < 300 °C (magnet included).



NOTE Keeping the ion pump off during bake-out prevents the pump element from saturating; the brief switch-ons degas it.



NOTE If the NEG becomes saturated, please contact LinQ engineers.

- 1 Ramp up** Heat the system slowly to the bake temperature at < 30 °C/h. During the bake keep the pressure below 1.3×10^{-4} Pa long-term and never above 1.3×10^{-3} Pa.
- 2 Bake & activate** Hold the pump body at ≥ 180 °C for 24 h; the NEG activates and the released gas is pumped away by the turbo. Keep the ion pump off, but **switch it on intermittently to degas**: at intervals of > 5 h, the voltage should reach the set value within 10 s.
- 3 Fast cool-down** After the bake, **cool quickly to room temperature** so the NEG does not saturate while cooling.
- 4 Start the ion pump** Once the pump is at room temperature, continue with chapter 06.

Starting the ion pump and daily operation

The pump is driven by LinQ's HV power supply (ion pump controller); see the controller user manual for details.

- 1 **Check vacuum** Start the ion pump only once the system is below 1×10^{-4} Pa.
- 2 **Switch on HV** Set the output voltage on the controller (2800–5000 V) and switch on the HV output.
- 3 **Start-up** Current is high at first and the voltage may sag — this is normal; the current falls as the vacuum improves.
- 4 **Hand over** Once the ion-pump current has fallen steadily, close the roughing valve and stop the turbo station; the combination pump now holds the vacuum.

Daily operation

- The controller converts ion current to a live pressure reading — no separate gauge required.
- The NEG keeps pumping with no power; vacuum holds for a while if the controller is switched off.
- If the pressure clearly worsens, see chapter 08.

! **CAUTION** Starting at too high a pressure keeps the ion pump at high current for a long time and heats it — improve the vacuum with the turbo first.

Specifications

Item	0.8 L/s	2 L/s	5 L/s
Ion pumping speed	0.8 L/s	2 L/s	5 L/s
NEG pumping speed	20 L/s	25 L/s	400 L/s
Body	30 × 31 mm	ø45 mm	ø56 mm
Dimensions	approx. 55 × 31 × 59 mm	approx. 84 × 38 × 74 mm	approx. 108 × 36 × 83 mm
Vacuum flange	CF16 (DN16, 1.33")	CF16 (DN16, 1.33")	CF25 (DN25, 2.12")
HV connector	SHV, 5 kV		

Item	Specification
Operating voltage	2800–5000 V DC (from the controller)
NEG activation	180 °C, during system bake-out
Max bake-out temperature	< 300 °C (magnet included)
Starting pressure	< 1×10 ⁻⁴ Pa
Mounting	Any orientation
Accessories	Controller; magnet; 3 m bakeable, radiation-resistant SHV HV cable with interlock

Storage, transport & common issues

Storage & transport

- The pump ships **evacuated and sealed**; keep it sealed until installation.
- A pump installed on a system keeps pumping via the NEG without power, so the system can be moved unpowered.



Need technical support?

Scan with WeChat to contact LinQ
or call +86 181 0192 5927

Symptom	Cause & remedy
Pump won't start / no current	Check the SHV cable and interlock are seated and the controller HV is on; make sure the magnet is in place.
Current stays high	System pressure too high (leak or outgassing). Improve the vacuum with the turbo, then restart; leak-check if needed.
Vacuum slowly worsens	The NEG may be approaching saturation — please contact LinQ engineers.



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Unlocking Quantum Potential from the Atom

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