3DTEK 7.5 kW CNC Vacuum Pump

Installation and Safe Use

CAUTION

- Electrical safety — This is a three-phase pump requiring a 380–415 V AC supply. Do not attempt to operate it on a single-phase supply or outside this voltage range. The pump must be installed by a licensed electrician. Electrical repairs and servicing must also be carried out only by a licensed electrician. Before servicing, isolate and lock out the electrical supply.
- Hot surfaces and exhaust — The pump and outlet become hot during operation, and discharged air can cause burns. Do not touch the pump or outlet until they have cooled.
- Strong suction — Do not operate the pump with an exposed or accessible inlet. The supplied inlet filter and all inlet pipework must be securely fitted before operation. **Keep all body parts and objects clear of the inlet and outlet**. Do not cover either opening with your hand or use your hand to check airflow. Strong suction at the inlet can cause serious injury.
- Clean air only — Only clean air may enter the inlet filter or the pump. Do not allow liquids, coolants, solvents, paints, spray mist, overspray, dust, chips, or any other contaminants to enter either. The inlet filter is the final protection for the pump; it is not intended to collect these materials.

Retain records demonstrating installation, commissioning, and maintenance in accordance with this guide. These may be requested when assessing a warranty claim. Our warranty excludes damage caused by failure to follow these instructions. This does not limit rights under the Australian Consumer Law.

Installation

All supplied inlet filters, vacuum relief valves, exhaust mufflers, pipework, and fittings must be installed before the pump is operated.

Location and access

Install the pump in a well-ventilated location where it can be safely cleaned, inspected, and serviced. Leave sufficient space to remove and maintain the filter and to access and adjust the vacuum relief valve. Maintain adequate free airflow around the pump and motor for cooling. Keep cooling air inlets and outlets unobstructed, and position the pump so hot exhaust air can disperse without being drawn back into the cooling inlet.

Securely mount the pump before operation. Do not operate it resting directly on the ground. As a minimum, secure it to a mounting plate that extends beneath the pump’s entire footprint. Vibration-damping mounts are recommended.

Do not install the pump in a confined space. Installation beneath the CNC machine is not recommended, as it can restrict cooling airflow and access for cleaning and servicing.

The pump expels hot air at high velocity. Provide a safe, unrestricted path for exhaust air, directed away from people and objects.

Operate the pump with the supplied exhaust muffler fitted to reduce noise and the risk of hearing damage. Do not operate the pump with the muffler removed.

Inlet filter

Install the supplied inlet filter at the pump, as close to the pump inlet as possible, using the supplied fittings. Position the relief-valve connection between the filter outlet and the pump inlet. Ensure all connections are secure. Do not operate the pump without the filter fitted.

Vacuum relief valve

Connect the supplied vacuum relief valve to a branch of the inlet line between the main filter outlet and the pump inlet, as close to the pump inlet as possible. The valve admits air under excessive vacuum; it is not an exhaust pressure-relief valve. Do not block or disable it.

Keep the relief valve's air intake and the surrounding area clear of dust, chips, and debris. Do not cover or obstruct the intake. Do not fit an isolating valve between the relief connection and the pump.

Electrical controls and protection

A licensed electrician must connect the pump to a 380–415 V AC three-phase supply through a correctly rated three-phase motor starter comprising **a contactor and protection against both phase**

loss and thermal overload, together with suitable circuit protection. The protection must disconnect the motor on a detected phase-loss or overload fault. Ratings and settings must suit the motor nameplate, starting method, and applicable electrical requirements.

- **Protective earth:** Connect the protective earth conductor to the identified earth screw on the motor body inside the electrical terminal box. Remove the identification tag from the earth screw before connecting the conductor using an appropriate terminal. Retain the earth screw and connection hardware, and secure the connection.
- **Cable selection:** The electrician must select a cable cross-section suitable for the motor's nameplate current, cable length, and installation conditions, allowing for voltage drop during starting and normal operation. When upgrading or replacing a pump, the existing cable must be reassessed and upgraded if necessary.
- **Cable restraint:** Secure power cables with separate cable restraints so that pulling or movement cannot place strain on the motor terminals. Do not rely on the cable gland alone for strain relief.
- **Motor protection:** A contactor alone does not provide phase-loss or thermal overload protection. Phase loss and sustained overload are two major causes of motor damage, so both forms of protection are essential.

Commissioning

Check rotation direction

Check the pump's direction of rotation immediately on the first test start during commissioning. Where fitted, the direction arrow is on the rear of the motor, over the motor cooling fan cage. Also confirm that air is drawn into the pump inlet and discharged through the exhaust. Do not allow continued operation until correct rotation and airflow have been confirmed.

CAUTION: Keep all body parts and objects clear of the pump inlet and outlet. Do not cover either opening with your hand or use your hand to check airflow. Strong suction at the inlet can cause injury. The outlet and discharged air can be hot enough to cause burns.

Adjust and test the relief valve

Remove the vacuum relief valve cover to access the spring-loaded adjustment nut. Turn the nut clockwise to increase the vacuum level at which the valve opens. Adjust it so there is minimal bypass airflow during normal operation, but air flows through the valve when all vacuum table zone valves are closed. Refit the cover after adjustment. Maintaining vacuum within the -40 kPa gauge limit takes priority over minimising bypass airflow.

The valve and fittings must provide the required protective airflow within the -40 kPa gauge limit. Confirm performance during commissioning with all table valves closed. A valve that opens but admits insufficient air does not provide adequate protection.

Daily startup

1. Check the filter before the first start each day. It must be perfectly clean, undamaged, and securely fitted. If contamination or damage is found, do not operate the pump; follow Cleaning and filter maintenance below.
2. Check the pipework and connections. Ensure the pump and surrounding area are clear of dust, chips, and debris, and the relief-valve air intake, cooling openings, and exhaust path are clear.
3. Confirm normal vacuum and secure workpiece holding before machining.

Weekly relief valve check

1. With the pump running, briefly close all vacuum table valves in the system while monitoring the pump-inlet vacuum gauge.
2. Confirm that the relief valve opens automatically to admit bypass air to the pump inlet. Keep hands and loose items away from the bypass inlet and hot surfaces.
3. Stop the pump immediately if the valve does not open or the gauge becomes more negative than -40 kPa. Do not leave the pump running with all table valves closed if bypass airflow is not established. Correct the fault before use.
4. After a successful check, reopen the required table valves and confirm adequate workpiece holding before machining.

Operation

Vacuum limit

For sustained operation, limit vacuum at the pump inlet to 40 kPa below atmospheric pressure (-40 kPa gauge). The reading must not become more negative than -40 kPa; for example, -50 kPa exceeds this limit.

Apply this limit throughout normal machining runs. No permitted duration for operation at a deeper vacuum is specified in this guide; do not assume that operation beyond the limit is safe for a short period. This pressure limit does not replace adequate cooling airflow or protection against overheating. Confirm adequate workpiece holding at the permitted vacuum before machining.

Starting frequency

Do not exceed six starts in any rolling 60-minute period. When starting the pump multiple times per hour, running and rest periods should be equal.

Hot surfaces and exhaust

Do not:

- Block the exhaust manifold or restrict exhaust airflow.
- Place objects close to the exhaust outlet or in the path of hot exhaust air.
- Touch the pump surface during operation or before it has cooled. Hot surfaces and exhaust air can cause burns.

Fault conditions — stop use

Stop the pump and do not resume use if it develops unusual noise, vibration, overheating, or repeated protection trips. Identify and correct the cause before restarting.

Restarting

Allow the pump to come to a complete stop before restarting. Following a phase-loss or overload trip, identify and correct the cause and allow the motor to cool before resetting the protection. Do not repeatedly reset a tripping protection device.

Maintenance

Isolation

Before cleaning or servicing, stop the pump, isolate and lock out the electrical supply, safely release trapped vacuum, and allow hot surfaces to cool.

Cleaning and filter maintenance

Keep the pump and surrounding area clear of dust, chips, and debris. Do not allow material to accumulate on the motor, cooling fins, ventilation openings, or around the exhaust. Isolate the pump and allow it to cool before cleaning.

Routine filter inspection and cleaning may be performed by trained operators. With the pump isolated and the vacuum released, inspect the element, housing, and seals for contamination, blockage, damage, or collapse. **The filter is the final protection for the pump** and is not intended or expected to collect material during normal operation. Any contamination indicates a failure upstream, on the CNC/table side of the filter. Identify and correct the cause before operating the pump. Clean or replace a contaminated element, and replace any damaged or collapsed element. Reassemble and secure the housing before starting.

There is no further protection between the inlet filter and the pump. Debris from a failed filter can enter and damage the pump. If an element collapses, tears, or sheds material, stop and isolate the pump. Inspect and clean the downstream pipework and assess the pump for contamination before returning it to service.

Filter elements are not designed to be washed. Any cleaning must be carried out very carefully, without heavy shock or compressed air. If a filter requires heavy cleaning, replace it instead. Identify and correct the upstream cause of any contamination before operating the pump.