

VISIPORT®
BY T2K
Model VP220.C/C2

Operating Instructions
Bedienungsanweisung
使用説明書



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Section 1 Pre-Installation Instructions

This section covers the following topics:

- » Parts and Equipment List
- » Before You Begin Assembly
- » Safety Information
- » Warranty Information

Section 1.1, Parts and Equipment List

Unpack all Visiport® components carefully and verify that you have the following items:

1. Visiport® base assembly, including unit, Disc assembly, or DLC (Diamond-like carbon) coated Disc assembly (if ordered), and Hub Cap. Shipped assembled screws.
2. Standard VHB Mounting plate with O-ring (Units with VP220.C.V designation) , or Urethane+VHB Mounting plate with O-ring (Units with VP220.C.E designation)

For transport, the Mounting Plate is lightly attached to the base assembly with 2 screws. After installation, dispose of these screws. For the final attachment of the base assembly to the Mounting Plate, please use the nylon-coated screws provided (see Item 6).

(Mounting Plate not supplied with units having the VP220.C.D or M designation.)

3. Terminal Box with on/off toggle switch

(This part is not supplied with units having the VP220.C.X designation.)

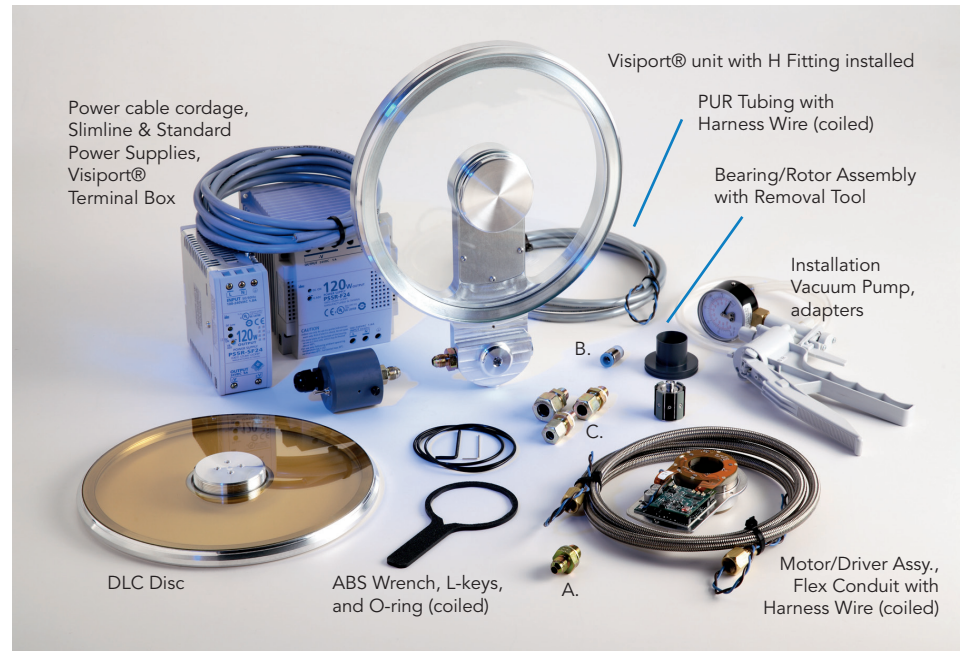
4. Conduit for unit aspiration and wire harness protection. T2K-supplied options are:

A. Stainless steel wire braid over PTFE tubing with ½-20 throw nuts. Designed to be used with H Fitting. Supplied with matched 2-conductor harness. Length is specified by customer.

B. Polyurethane tubing supplied with matched 2-conductor harness. Designed to be used with N Fitting. Length is specified by customer.

5. Power cable cordage. Length is specified by customer.
6. Tool kit & small parts bag including ABS Wrench, L-Key wrench, silicone sealant with 16 gauge dispensing tip, B¼ plug fittings with PVC seal (2), nylon-coated screws (7), extra disc & motor screws.
7. Installation Vacuum Pump with adapters (purchased separately as P/N 2209001)
8. Power Supply; optional UL508 compliant, DIN-rail mountable power source for machines without a 5 amp, 24VDC circuit (purchased separately as P/N PS24-120 or PS24-120S)

(For replacement part numbers and descriptions, please refer to Section 4.)



Section 1.2, Before You Begin Assembly

Before beginning the installation of this product, please read this manual. The Visiport® installation process is straight forward. Determine the best location on the machine for the spin window, terminal box and conduit. Careful attention to instruction details will ensure a successful installation and many hours of trouble free operation. Almost all installation problems result from the following:

1. Failure to adequately clean the window surface to receive the Visiport® installation.
2. Failure to replace used, contaminated polycarbonate windows for Visiport® installation.
3. Contamination of the bonding set adhesive from fingerprints or premature exposure of VHB.
4. Attempts to install Visiport® on “siliconized” or hard coated polycarbonate windows, or windows with a film overlay.
5. Failure to install O-ring seals, nylon-dipped screws, or to apply silicon rubber around the Visiport® base.
6. Machine tool windows that are not flat or rigidly mounted into the enclosure.
7. Improper or inadequate electrical connections.

For additional information or clarification of these instructions, or for assistance with any aspect of your Visiport® spin window system, please contact T2K or your vendor.

Section 1.3, Safety Information

1. The Visiport® Model VP220.C is designed to be mounted on a windows of machine tools with fully enclosed work area where metalworking fluids are used for lubrication.
2. Visiport® units rotate at up to 2.200 rpm. Even after turning off the power, the Disc Assembly (spin disc) will rotate for some time. (Green LED will remain lit due to inducted current.)
3. Turn off power to the spin window when performing service or entering the machine cabin. Do not touch or otherwise allow any body contact with the spin disc until rotation has ceased. Wear eye protection at all times when exposed to rotating spin disc.
4. Never operate the Visiport® without the spin disc installed, as this exposes underlying Bearing Assembly to metalworking fluids that may lead to premature destruction of the bearings.
5. Do not install a Visiport® spin window into a cutout unless the spin window has been bonded to a substrate at T2K.
6. Replace all spin discs that have been chipped, struck, cracked, dropped, or damaged in any way. This includes spin discs that show signs of etched metal from acidic or corrosive coolant and disc glass which exhibits unusual wear from chip bombardment. **Do not operate the Visiport® until a new spin disc has been installed.**
7. Spin windows augment safety programs! Without the viewing benefits of spin windows, a machine operator may be tempted to bypass the machine tool interlock to get a look inside a machine cabin. Be safe. Install spin windows.

Section 1.4, Warranty Information

Visiport® components are warranted to be free from defects in materials and workmanship for six months. Components which fail within this period of time will be replaced without charge.

Abrasion to the spin disc is not covered by this warranty, nor is any other damage to the glass subsequent to its intact arrival due to drops, tool impacts, or other events arising from normal operation or mishandling.

Diamond-Like-Carbon (DLC) coated glass discs are much more resistant to scratching from chip activity than those made from standard uncoated chemically strengthened float glass, but are not any more resistant to breakage from impacts due to droppage or projectiles.

Visiport® systems are not designed for use in graphite machining applications.

Failure of system or components from misuse, improper electrical connections or hookup, improper air supply pressure or hookup, or failure to observe the restrictions set forth in these Operating Instructions is not covered by warranty. Failure of parts and/or components due to improper installation is not covered by warranty.

Freight costs for any items sent to T2K for warranty evaluation or repair are at the customer's cost. A Returned-Goods-Authorization (RGA) number, issued by T2K, is required in order to return units to T2K. Items sent to T2K without such an RGA will not be accepted. Decisions over parts and/or components subject to warranty, and the replacement or repair such parts is at the sole discretion of T2K.



This section covers the following topics:

- » Window Substrates
- » Surface Preparation
- » Preparing Installation Layout
- » Standard Bonding Method (Code V)
- » Bolt-on Method (Code D)
- » Deprecated Method (Code M)

Section 2.1, Window Substrates

Machine tool windows generally fall into one of two major substrate categories: With adequate preparation, Visiport® systems can be installed on either type of machine tool window, assuming there are of the necessary size and clearance.

2.1.1 Polycarbonate Windows

The first window substrate type is composed of polycarbonate plastic sheets. Polycarbonate (PC) is a relatively inexpensive, impact-resistant, optically clear plastic. It is often sold under trade names such as Lexan, Makrolon, Tuffak, and Hyzod.

Polycarbonate window material for spin window installations must be new and absolutely free of dirt and oily substances. **Used, scratched, or oil-contaminated polycarbonate mounting surfaces must not be used**, as they no longer provide suitable surfaces for viewing, proper O-ring sealing, or for adhesion of bonded installations. Used, scratched, or oil-contaminated windows should be replaced prior to or together with Visiport® installation.¹

If purchasing your own replacement window material, do not substitute acrylic sheet (Plexiglas®) for polycarbonate. Acrylic has much lower impact resistance than new polycarbonate. Similarly, do not substitute polycarbonate sheets with thicknesses thinner than the manufacturers' originally supplied material.

Due to improvements in the understanding of how polycarbonate can become brittle with time exposure to metalworking fluids, it is recommended that the polycarbonate window be treated as a wear item on a machine tool that should be replaced periodically according to manufacturers' recommendations.

For a technical overview of this issue, you can visit <http://www.vde.de>. Search for the key word "polycarbonate" to get an English language article on research into polycarbonate embrittlement in machine tool applications.

1. T2K can provide assistance with window replacement for both polycarbonate and custom composite construction machine tool safety windows, as well as provide pre-mounting of spin windows to save you time. Contact T2K or your distributor for details.

2.1.2 Machine Tool Safety Windows

These window substrates are primarily composed of polycarbonate for impact-resistance, but are built up of multiple layers and combine polycarbonate with glass on the inside surface of the window to provide scratch resistance to chip activity.

This composite construction frequently is mounted into a metal frame, and sometimes completely encapsulates the polycarbonate layer with glass, frame, and a layer of plastic film on the outside surface to completely protect the polycarbonate impact layer from exposure to metalworking fluids. Such encapsulation is designed to extend the service life of the window.

Machine tool windows manufactured to comply with European safety regulations will typically be marked with the applicable impact class requirement the window is designed for and year of manufacture.

Section 2.2, Surface Preparation

Cleanliness is foremost. Avoid touching clean surfaces. Wash your hands to prevent transferring oils or dirt to bonding surfaces.

Bonding sets are factory installed and protected with backing material. Do not touch the bonding set. Even with the backing in place, contamination from the bonding set edges can migrate onto contact surfaces if backing edges are rolled up or wrinkled. **Do not remove the transfer paper from the bonding adhesive until directed to do so, just prior to use of the mounting plate.**

An absolutely clean surface should pass a water break test. Use only clean (preferably distilled) water for this test. On a clean surface, water will sheet and uniformly adhere to a clean surface without beading or forming rivulets.

Section 2.2.1, Cleaning New Windows

Clean thoroughly with 50% water and 50% isopropyl alcohol solution. This may require that you dilute store-bought alcohol with distilled water. The decrease in alcohol concentration will lower the rate of evaporation and improve your cleaning efforts.

Section 2.2.2, Cleaning Used Windows

This procedure is for Machine Tool Safety Windows having glass as the mounting surface only. For the reasons explained in Section 2.1, mounting on polycarbonate material that has already been used is not possible!

- » Wipe off excess contamination.
- » Use detergent and water. Wipe clean with water soaked rags.
- » Wipe window surface with common window cleaner and clean wipes.
- » Prepare surface with 50% water and 50% isopropyl alcohol solution.

Section 2.2.3, Flatness Requirements

The surface of the mounting area must be flat within 0.3-mm or 0.012". If the mounting surface is not flat, O-ring sealing can be compromised in direct-mounts and bonded mounts may begin to delaminate and leak due to the mechanical forces involved.

Section 2.3, Preparing Installation Layout

Use a marker to make a vertical reference line (Sharpie® brand or similar). This line should extend down through the center of the intended installation location, and be located outside on the operator's side of the window, so that it is visible (through the window) from the machine side where the Visiport® will be installed.

For best results, choose a mounting location for the unit that optimizes the operator's field of view, but places the unit as far away from the coolant stream as possible.

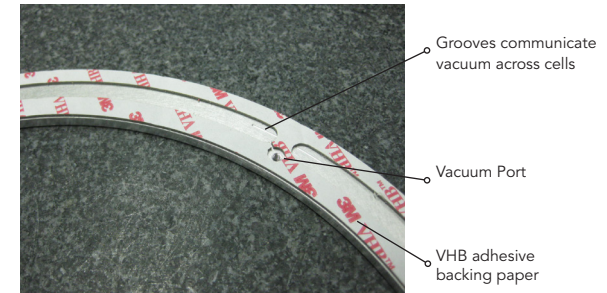
Section 2.4, Standard Bonding Method (Code V)

This method applies to units sold with configurations including the letter Code V, which uses VHB acrylic adhesive pre-applied to a subplate that will be permanently affixed to the machine tool window. This is the standard installation method.

Section 2.4.1, VHB Mounting Plate Installation Procedure

1. Remove the hub cap, and glass disc. Set aside in a safe location.
2. Remove Mounting Plate Assembly from the Base. Insert the 2 transport screws into side opposite VHB adhesive in order to hold the Mounting Plate Assembly.
3. Strip off the backing from the bonding set. Do not touch exposed bonding surfaces.
4. Visually align Mounting Plate assembly to reference marks. The orientation of mounting is vertical and aligned with the label text. Holding the Mounting Plate assembly by the transport screws and/or edges, slowly press into place.
Once applied, the VHB adhesive cannot be repositioned.
5. With pressure applied from the opposite side, press the Visiport® firmly into place.
It is very important that the adhesive carrier be bonded to the substrate completely around the entire periphery of the unit in order to accomplish the gasketing function, as well as the adhesive function, of the bondset material.²

2. Installation without an Installation Vacuum Pump requires a "wetting out" period for the VHB adhesive material of u2p to 72 hours.



6. For installers using the optional Installation Vacuum Pump, P/N 2209001³ :

Thread the 4-40 adapter tip into the vacuum port⁴ firmly enough to prevent a leak. Pump vacuum to 68 cm Hg and maintain vacuum for 30 minutes. Pump handle periodically to maintain vacuum, as gradual vacuum loss in pump is normal. A good bond has been achieved when the color of the VHB adhesive has turned uniformly to a slightly darker gray. Bleed vacuum and remove pump after 30 minutes.

7. Apply a small bead of supplied silicon rubber to seal around the entire circumference of the Mounting Plate Assembly. Form a uniform 3.5 mm / 0.150" bead of sealant between the Mounting Plate Assembly and the machine window, completely filling the chamfer around the Plate. (Cut tip applicator back at 45° angle to easily apply correct bead size.) The sealant provides protection from the dyes typically found in water soluble coolants. Carefully remove excess material if needed. Sealant should fully cure in 12 hours.
Failure to apply the silicon rubber will void the manufacturers warranty.
8. Install O-ring into the Base.
9. While holding the Base against the Mounting Plate Assembly, insert the 6 nylon-coated screws and fasten crosswise until hand-tight.
10. Install Disc Assembly and Hub Cap according to the instructions to be found in Section 4.2.2, Disc Installation and Rotation Test.

Section 2.5, Bolt-on Method (Code D)

This method applies to units sold with configurations including the letter Code D, which requires a bolt-hole pattern be drilled through the polycarbonate (PC) window. The unit is bolted onto the window from the outside using bolts and fender washers, and sealed by compressing an O-ring between the unit and the machine window.

Because of varying material thicknesses, T2K does not provide screws or washers. The minimum engagement of screws into the Base of the Visiport® should be 6-mm / 0.250". The 6 mounting holes in the Visiport® VP220.C Base have metric M4 threads.

The Visiport® base can be mounted to polycarbonate (PC) machine tool windows by drilling 6 each 0.166"/4.2mm diameter holes through the substrate, copying the hole pattern in the base. The O-ring in the base prevents metalworking fluids from entering the inside of the unit base.

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- 3 For best long-term results, T2K highly recommends the use of the Installation Vacuum Pump, available through your distributor or from T2K.
 - 4 Vacuum port location is on non-adhesive side of mounting plate at threaded mounting hole indicated by notch cut-out on adhesive carrier (1 o'clock position).

Section 2.5.1, Bolt-on Installation Procedure

1. Remove the hub cap, glass disc, and O-ring from Base. Set aside in a safe location.
2. Position the Base and drill, using a 3.25mm or #30 size drill, a hole that will become one of the top mounting holes through the PC substrate.
3. Insert a pin or second drill to maintain position and carefully drill the remaining 5 holes to a depth of 2-3 mm / 0.125".
4. Finish drill 6 holes through with 4.2mm / #19 drill. Remove burrs.
5. Install O-ring into the Base.
6. While holding the Base against the window, insert the 6 nylon-coated screws and fasten crosswise until hand-tight. Use of washers under the screw heads is recommended.
7. Install Disc/Drive Assembly and Hub Cap according to the instructions to be found in Section 4.2.2, Disc Installation and Rotation Test.

Section 2.6, Deprecated Method (Code M)

This method applies to units sold with configurations including the letter Code M, which uses VHB acrylic adhesive pre-applied to the base of the Visiport® system, instead of the recommended subplate, to affix the unit permanently to the machine tool window.

This is referred to as a deprecated installation method, as it is only recommended to users who have machines that cannot accommodate a mounting plate installation due an insufficient amount of clearance on the inside surface of the machine tool window intended for the installation.

For customers maintaining Visiport® systems installed with Code M mountings that do not appear to have these constraints, it is possible to convert the installation type to either a Code D or recommended Code V mounting, depending upon the machine tool window material involved.

Section 2.6.1, Direct Bond Installation Procedure

1. Remove the hub cap, and glass disc. Set aside in a safe location.
2. Strip off the backing from the bonding set. Do not touch exposed bonding surfaces.
3. Visually align unit base to reference marks. The orientation of mounting is vertical and aligned with the label text. Holding the unit base carefully at the edges, slowly press into place. **Once applied, the VHB adhesive cannot be repositioned.**
4. With pressure applied from the opposite side, press the Visiport® firmly into place. **It is very important that the adhesive carrier be bonded to the substrate completely around the entire periphery of the unit in order to accomplished the gasketing function, as well as the adhesive function, of the bondset material.⁵**

⁵ Installation without an Installation Vacuum Pump requires a "wetting out" period for the VHB adhesive material of up to 72 hours.



5. For installers using the optional Installation Vacuum Pump, P/N 2209001⁶ :

Thread the 4-40 adapter tip into the vacuum port⁷ firmly enough to prevent a leak. Pump vacuum to 68 cm Hg and maintain vacuum for 30 minutes. Pump handle periodically to maintain vacuum, as gradual vacuum loss in pump is normal. A good bond has been achieved when the color of the VHB adhesive has turned uniformly to a slightly darker gray. Bleed vacuum and remove pump after 30 minutes.

6. Apply a small bead of supplied silicon rubber to seal around the entire circumference of the unit base. Form a uniform 3.5 mm / 0.150" bead of sealant between the unit base and the machine window. (Cut tip applicator back at 45° angle to easily apply correct bead size.) The sealant provides protection from the dyes typically found in water soluble coolants. Carefully remove excess material if needed. Sealant should fully cure in 12 hours.
Failure to apply the silicon rubber will void the manufacturers warranty.
7. Install Disc Assembly and Hub Cap according to the instructions to be found in Section 4.2.2, Disc Installation and Rotation Test.

Section 2.6.2, Auxiliary Bolting of Direct Bond (Code M)

This auxiliary attachment method is for customers that desire bolt-on mounting of the Visiport®, in addition to attachment with the VHB adhesive. This method is detailed here only as a guide.

T2K DOES NOT WARRANT FAILURES OR BREAKAGE OF COMPONENTS FROM INSTALLATION FAILURE USING THIS OR ANY OTHER ATTACHMENT METHOD.

Attachment of Visiport® units to the window using bolts is not recommended for several reasons:

1. T2K has reservations about any method of installation that requires the user to put a hole into the window, regardless of size. Any size hole in the window promotes the invasion of metalworking fluids. Now that data regarding the embrittlement of polycarbonate windows over time has documented the need to maximize attention to the machine tool window to maintain safety, T2K recommends that purely adhesive based methods be used to attach your Visiport®.
2. Testing of VHB adhesion using all type of window substrates, including siliconized polycarbonate sometime sold as mar- or scratch-resistant materials⁸, demonstrates the effectiveness of VHB when used as directed. Reasons for bonding failure are explained in detail elsewhere in this manual, but generally result from lack of proper surface preparation.
3. T2K does not provide warranty for components damaged through the use of this bonding method.

⁶ For best long-term results, T2K highly recommends the use of the Installation Vacuum Pump, available through your distributor or from T2K.

⁷ Vacuum port location is on non-adhesive side of mounting plate at threaded mounting hole indicated by notch cut-out on adhesive carrier (1 o'clock position).

⁸ Mar-resistant Mar-resistant polycarbonate is not recommended

For siliconized polycarbonate windows, customers have the option to install the Visiport® with M4 button head screws and fender washers. Due to varying thicknesses of polycarbonate windows, customers must measure and calculate the required screw length by using the formula provided in Section 2.6.1.

1. Align the drill template (available by special order from T2K) to the machine window so that it is square to the window frame.
2. Temporarily tape or otherwise secure the template into drill position.
3. Drill 6 each 4.0 mm holes on 8.925"/227 mm diameter between centers.
4. Temporarily install the three M4 set screws from the kit. Insert the set screws by hand, with the socket end facing out, equally spaced at 120°, about 2 turns into the Visiport® base. These set screws are only used for alignment of the spin window.
5. Align the 4-40 screw hole at the top of the center base section and the fitting in the bottom of the center base section to the vertical reference line on the far side of the window.
6. Strip off the backing from the bonding set. Do not touch exposed bonding surfaces.
7. Hold the Visiport® by the edges, and slowly guide the M4 studs into the drilled mounting holes with the center base from the center to the ring at the six o'clock position, i.e., pointing down.
8. Press the Visiport® firmly into place.
9. Remove the temporary locating studs and replace with the proper length M4 screws.
10. Apply Loctite and tighten these mounting screws in proper torque sequence to gradually draw the Visiport® to the machine window. Torque to 0.6 Nm (6 inch lb.)
11. You should be able to see areas where the bond has not yet been properly made. Unless the machine window is bowed or twisted, the adhesive will "wet out" properly in 72 hours. (For reference, 50% of final bond strength is achieved in 60 minutes, 90% within 24 hours, and 100% in 72 hours.)
12. Optional Step: In order to accelerate the wetting out process, T2K offers a hand-held vacuum pump. For more information or to order, contact customer service about P/N 2209001.
13. Important: Apply a small bead of supplied silicon rubber around the entire circumference of the Visiport® to form a seal between the Visiport® base and the machine window. The silicone provides the bonding interface protection from coolant and oil. Failures in bonding due to failure to apply the silicon rubber are not covered by the manufacturer's warranty.



Section 2.6.3, Determining Screw Lengths for Auxiliary Method

Screw Length in millimeters:

$$\text{Length} = (t + k) + 2$$

t = Polycarbonate Thickness (recommended minimum 10 mm)

k = Thread Engagement (min. 4 mm - max. 8 mm)

1 mm VHB adhesive + 1 mm Washer = 2 mm

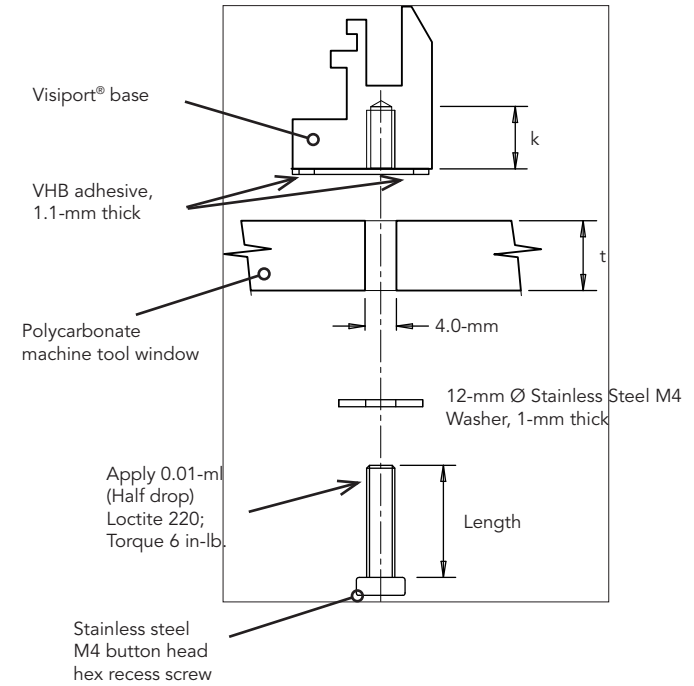
Example: Length = (10 + 4) + 2 = 16 mm

Standard Metric screw length available:

12 mm, 14 mm, 16 mm, 20 mm, 25 mm, 30 mm

Custom screw lengths are rarely required.

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Section 3 Connections for DC Power

This section covers the following topics:

- » Electrical Hookup
- » Installing the Terminal Box (bulkhead assembly)
- » Installing Wiring & Aspiration Conduit
- » Power Supplies
- » Air Hookup (optional)

Section 3.1, Electrical Hookup

3.1.1 Correct sources of power

The power cable should be connected to the 24 VDC auxiliary power source on your machine or a dedicated 24 VDC power supply. The power supply output must be regulated to +/-1 volt and capable of dedicating 5 amps to each installed Visiport® spin window on a continuous basis. While a Visiport® operating under no load will draw as little as 150 mA, a Visiport® working under full load can draw over 4.8 amps of power to return to its programmed speed. Visiport® spin window systems are engineered to run continuously, so that they are operating at full speed whenever coolant is present.

3.1.2 Caution against interrupted system operation

Visiport® spin window systems should not be connected to interrupted power sources, or started and stopped repeatedly with each tool change, for example. Connecting incorrectly in this way will cause the spin disc rpm's to constantly load the motor driver while it spins up to full speed. This prevents effective removal of coolant, adversely impacts bearing wear, and shortens the life of the motor driver electronics. **Motor failures on installations with interrupted operation are not covered under warranty.**

Section 3.2, Installing the Terminal Box

3.2.1 Locating the Terminal Box

The Terminal Box, when used, must be installed on the outside of the machine and protected against exposure to chips, coolants, lubricants, and all other metalworking or shop fluids. **Damage to the Terminal Box from exposure to coolant or metal chips is not covered under warranty.**

Certain installations performed by machine tool builders may be wired directly into the machine control, and powered through a shared or dedicated 24 Volt circuit, and therefore may not be equipped with the standard Terminal Box.

Visiport® systems sold without the Terminal Box are indicated by configuration Code X on the product label. Please refer to the manufacturer's documentation for electrical hookup details in this case.



The Terminal Box is commonly installed on the top of the machine door or adjacent to the CNC control of the machine for easy access. Optimum location of the Terminal Box is up to the customer. If a different location is desired, the length of the electrical conduit must be sufficient to accommodate door motion.

The customer should consider ease of installation, location of power supply, and aesthetics when positioning the Terminal Box. Ensure that the Terminal Box will not interfere with the opening and closing of the machine door or window. Test the distance between the Terminal Box and the intended installation location of the Visiport®.

To test that the location of the terminal box easily reaches where the Visiport® will be bonded to the window, temporarily attach one end of the conduit to the terminal base fitting in the machine and extending the rest of the conduit along the path to which the conduit will be secured.

The other unsecured end of the conduit should reach the installation point for the terminal box, allowing for the correct fitting orientation.

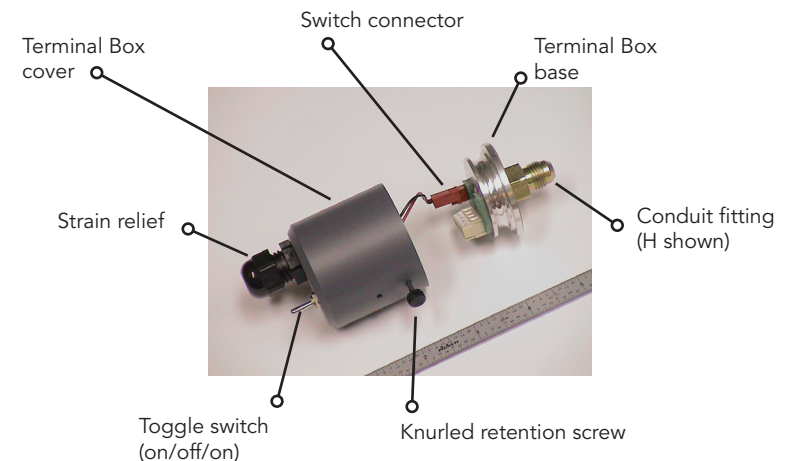
Optional fittings are available from T2K to convert the axial orientation of the standard exit fittings to a 90° orientation, to route the conduit through a bulkhead connector, or to provide other customized approaches to exiting the conduit from the machine cabin. Contact T2K for details.

3.2.2 Terminal Box Installation Procedure

Please use safety glasses to prevent injury before proceeding with installation of the Terminal Box.

To install the Terminal Box, proceed as follows:

1. Mark the desired mounting position on the exterior of the machine cabin.
2. Drill a 25-mm (1.00") Ø hole through the sheet metal. This will be used to pass the wire harness from the inside of the machine to the outside through the fitting in the bottom of the terminal box.
3. Deburr both sides of sheet metal to allow proper seating of the Terminal Box.
4. Loosen the knurled retention screw on the Terminal Box and remove the cover. Set aside.
5. Detach the switch connector from the terminal base and remove the threaded fitting from the bottom of the terminal base.
6. Strip off the adhesive backing paper from the bottom of terminal base and set aside within easy reach of the previously drilled hole in the enclosure, making sure not to allow any objects to come into contact with the exposed adhesive.
7. Insert the terminal base fitting into the previously drilled hole from the inside of the enclosure, and carefully thread the terminal base onto the fitting a couple of turns, without touching the adhesive to the machine enclosure.
8. Once the threads have become securely engaged, press the terminal base down onto the machine enclosure. This adhesive ring will provide a seal to prevent metalworking fluids from exiting the machine through the hole drilled into the enclosure.
9. Secure the terminal base to the machine enclosure by completely threading the fitting into the terminal base.



The terminal box assembly is not completed until the following section, regarding installation of the conduit. If the conduit will be installed at a later time, replace the cover and secure the knurled retention screw.

3.2.3 Thread Convention for Terminal Box Base

On Visiport® units shipped from the factory with model configuration code H, indicating an H fitting, the aluminum base ships with threads to accommodate 1/2"-20 fittings. On units having unit configuration Codes F or N, and for units shipped with metric EO fittings, the aluminum base ships with threads to accommodate G-1/4 fittings. This threading is identical to the threads found on the three wiring exit ports on the Visiport® base.

Section 3.3, Installing Wiring & Aspiration Conduit

3.3.1 Color Convention for Wire Harness and Other Electrical Components

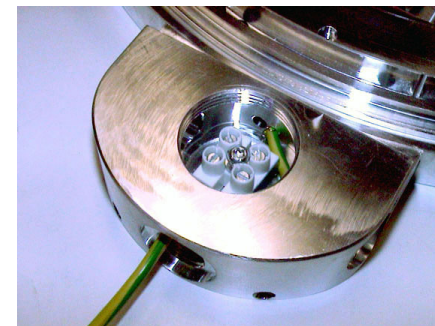
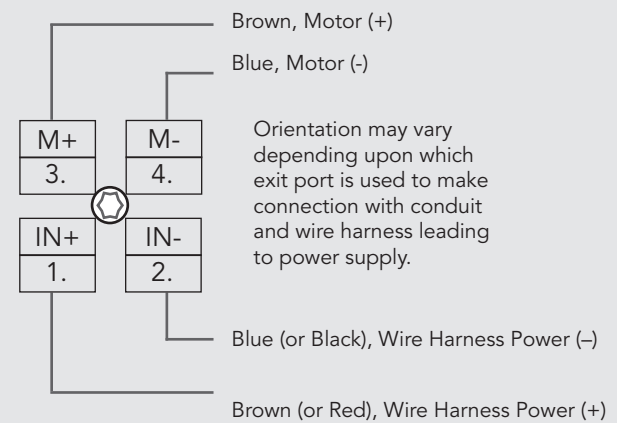
If you ordered a wire harness from T2K with North American wire colors (Red, Black) rather than Harmonized wire colors (Brown, Blue), substitute Red for diagrams and illustrations showing a Brown wire, and Black for for Blue wire. (Warm for warm color, cold for cold color).

3.3.2 Connecting Conduit to Unit Base

1. Remove the Universal Connection Block (UCB) Cover by using a 5/16" or 8-mm Hex Key.
2. The Brown and Blue wires from the Visiport® motor pigtail are already threaded through the base and are connected to the terminal block. It is not necessary to disconnect the motor pigtail wires.
3. The Visiport® is designed for left, right, or bottom wire harness exit. Simply install the fitting type desired into the threaded port corresponding to the desired exit direction. Take into account the orientation of the Visiport® as installed on the machine window. Fitting options include the H-Fitting (for 1/2"-20 flex conduit), N-Fitting (for 8-mm PUR tubing), or G-Fitting (EO-type for use with metric steel tubing).
4. After the fitting is secure, thread the wire harness through the fitting into the base, and install each wire into its color matched terminal. Push the wire harness, already threaded into the conduit, through the fitting and into the UCB cavity. Attached the wires to the cartridge terminal block, connecting brown to IN+ and blue to IN- as pictured below.
5. Proceed to step 6 unless you require a protective earthing (PE) terminal in the Visiport® unit.

Insert grounding wire into the grounding hole provided inside the UCB Cavity to the left of the motor pigtail entry hole.
6. Replace the UCB Cover, ensuring O-ring is installed, and complete assembly of the conduit or tubing into the fitting to create a watertight seal against metalworkign fluids.

UCB Terminal block wiring schematic



3.3.3 Connecting Conduit to Terminal Box

This procedure assumes that the wire harness has been threaded through and installed into the conduit type chosen (Flex conduit, PUR tubing, or solid pipe) and that the electrical connection of the harness to the Visiport base inside the UCB cavity has been made per Section 3.3.2.

1. Re-attach the keyed switch connector to the 2-pin header on the aluminum terminal base.
2. Push the conduit wire harness from inside the machine through the terminal box fitting (H, N, or G) and temporarily connect the conduit to the fitting for ease of wiring. At the terminal block, connect the two wire harness wires to M+ and M- as pictured.
3. Loosen the black strain relief fitting at the top of the terminal box and insert the power cable through the top of the strain relief far enough that the wires can be easily connected to IN+ and IN- at the terminal block as pictured.
4. If a PE connection is required, secure the yellow/green striped conductor of the power cable cordage, and the customer supplied wire harness segment attached in 3.3.2, together using a wire nut (not supplied) of the appropriate size for two 16-18 gage wires.
5. Back off any excess power cable cordage through the strain relief, so that there is enough uninsulated wire inside the terminal box to coil inside properly, and without risk of pulling them out of the terminal strip.
6. Place the PVC plastic terminal box cover back onto the aluminum terminal box base. Tighten the jnurled securing screw and power cable strain relief. Tighten all flex conduit and solid pipe fitting connections using two wrenches.
7. Hoop up power cable to the machine 24 VDC power source, or T2K optional powerr supply, with the Brown power cable conductor to Power (+) and the Blue power cable conductor to Power (-). Turn on power using toggle switch.
8. With no coolant load, the Visiport® should ramp up to full speed within several seconds. It is normal for the electronics to “seek” the preset 2150 rpm speed and appear to oscillate during the start=up, especially under conditions where coolant or other metalworking fluids are present.

If Visiport® disc does not rotate, set toggle switch to off and then switch back to the on position. If disk still does not rotate, double-check all electrical connections, and check for continuity and 24 VDC at the power supply, at the terminal box, and at the unit base UCB.

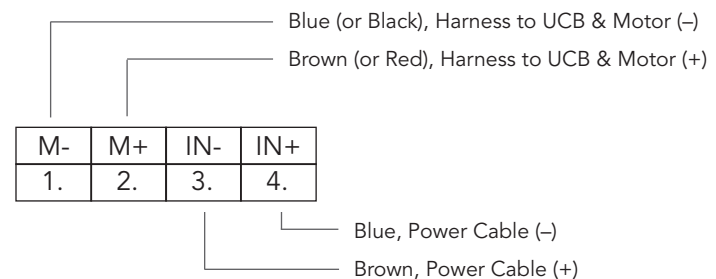
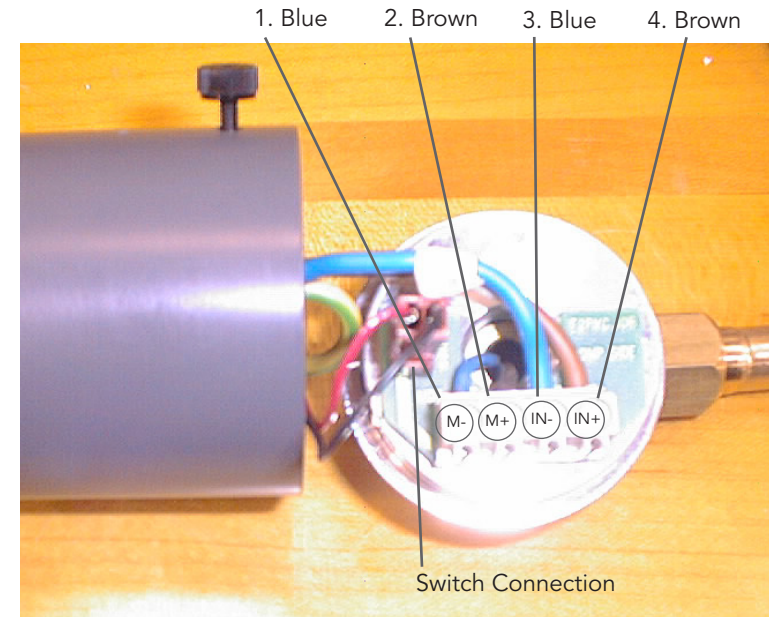
The circuit onto which the Visiport is connected must be capable of delivering 5 amps for each installed unit for in-rush current at start-up and for performance under maximum coolant load.

Section 3.4, Power Supplies

3.4.1 Dedicated Power Supply Option

Due to the fact that the power requirements of a Visiport® spin windows system exceed the amount of 24 volt direct current available on the circuitry of most machine tool providers, T2K offers customers the option to purchase a compatible power supply tested to reliably power

Terminal Box wiring schematic
(as pictured, from left to right)



Visiport® spin window systems.

T2K offers regular and slimline 120 Watt UL508 de-rating power supplies that are easy to install and use, with TÜV and UL approvals for easy integration and end-customer use.

Specifications:

- » Universal AC input: 85 - 265 VAC
- » DC Input: 84 - 350 VDC
- » DC on and DC low LED indicators
- » Over current protection, auto reset
- » Over voltage protection, shut down
- » Output at 24VDC: 5A +/-10%V
- » Line regulation 0.4% max, Load regulation 1.5% max
- » DIN rail or surface panel mounting
- » Approvals: EN61204-3 EMI Class B & EMS Industrial, UL508, IEC/EN60950, UL1604, TÜV, UL Listing, c-UL

If using your own power supply, please install a UL508 power supply of comparable specifications. If you have any questions about supplying your Visiport® with power, contact T2K, your machine tool dealer, or a qualified electrician.

Section 3.5, Air Hookup (optional)

Supplying pressurized outside air to the Visiport® is not strictly required, assuming the conduit used to install the unit is sufficiently short to allow ambient air to aspirate the unit and prevent fogging between the glass disc and the machine window.

Installed using the standard bonding method, there is no need to put holes into the machine tool window for Visiport® installation, but that also means there is no egress to outside air except by use of the conduit used to exit the power wires from the machine cabin through the Terminal Box.

When using long runs of conduit, or where the conduit may be kinked or bent due to routing issues or damage from other machine tool components, one of the two unused wire exit ports may be used to connect a low pressure air line to the Visiport® unit.

Additionally, an air line can be connected to overcome excessive amounts of coolant being drawn into the unit on high pressure coolant systems, where the angle or deflection of coolant exceeds the normal drainage of coolant drawn into the viewing zone of the unit over time due to rotation of the disc. As the Visiport® uses a non-contact lamellar seal, some collection of small amounts of coolant inside the unit are normal and its residue is easily removed during normal disc cleaning maintenance.

#



Section 4 Operation and Maintenance

This section covers the following topics:

- » Operating Principle
- » Motor Driver Functionality
- » Maintenance and Troubleshooting
- » Replacement Parts
- » Customer Support

Section 4.1, Operating Principle

The Disc of the Visiport® unit is driven by a brushless DC motor and driver and reaches a no-load speed of approximately 2,200 rpm. The rotation of the Disc creates a centrifugal force that slings off coolant and chips.

To function properly, the Visiport® must always be rotating at a minimum effective speed when a machine is in use. Do not connect the Visiport® in such a way as to interrupt and restart the unit on the tool change, as this will cause the unit to wind up under power diminish the life of the bearings and driver electronics.

Section 4.2, Motor Driver Functionality

Visiport® units of the C Model type are currently available with one of two different motor driver electronic sets. The Visiport® VP220.C uses an analog driver with a four LEDs to display status information and an optical switch to supplement other forms of unit actuation. The Visiport® VP220.C2 uses a digital controller to more fully use supply amperage and maintain rpm level to within 0.5% of programmed speed. The details of each motor driver's operation and function of status LEDs is detailed in the following 2 sections.

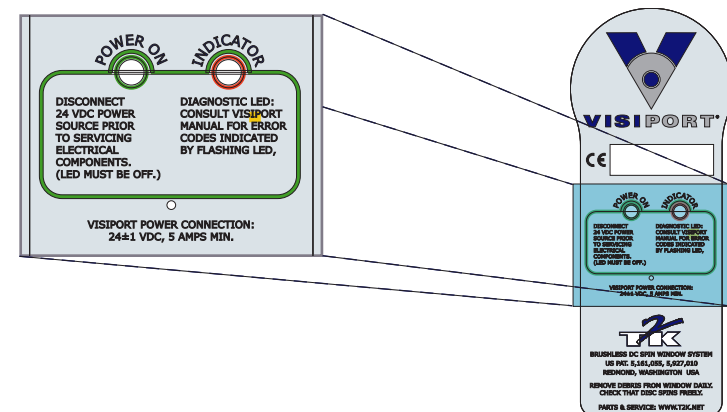
4.2.1 Visiport® Model VP220.C2 Motor Driver

When the unit is first turned on, it does not start until the power supply voltage of direct current is sensed at the required minimum, at which time the Green Power LED is turned on. The Green Power Led remains lit whenever the input supply voltage is within 2 volts of the nominal 24 volts DC required. Outside this range, the Green Power LED goes into a blinking mode.

The Red LED indicates the status of the motor and motor driver. When the Red Status LED is unlit, all functions are normal. The Red Status LED goes into a blinking mode in two situations.

The first situation is when amperage draw is consistently too high, which indicates excessive load. This is usually due to a blockage or chip accumulation in the labyrinth of the disc seal between the disc assembly and the base of the unit. Maintenance to clear or clean away blockages and chip accumulations is required to restore the unit to proper function. Failure to clean the unit could lead to motor failure. The second situation is when the motor temperature sensor determines the motor is close to overheating.

C2 Model: LED locations



When the motor is operated under excessive load, it is protected by both a current limiting circuit and over temperature protection. Current Limiting can be observed when the spin window begins to slow down under excessive load. If the motor continues to operate under such a load, the operating temperature of the motor's windings will tend to increase.

At a winding temperature of 150°C, the motor will be shut down and the disc will cease to rotate. After the over-temperature shutdown, the winding must be allowed to cool to below 130°C and restarted by switching the unit off at the toggle switch or the CNC control. The Red Status LED remains when the motor over-temperature sensor determines that the overheating temperature has been reached, and has shut off the motor.

The red LED also lights when a blockage preventing disc motion has been sensed, or when a commutation error has occurred. Both of these situations will lead the driver to shut down the unit in order to protect the motor and electronics.

4.2.2 Visiport® Model VP220.C Motor Driver

When the unit is first turned on, it does not start until the power supply voltage is sensed at the required minimum, at which time the Green Power LED is turned on whenever the input power supply is present.

Three multipurpose LEDs are turned on according to operation mode. During the brief power on reset period, only the Red LED is turned on. After the power-on reset period, all three status LEDs (Green, Yellow, and Red) are turned on in sequence.

When one or multiple alarm conditions occur or the photo-optic light sensor is flashed once, the unit is in STOP/ALARM mode. The unit can be reset or restarted by flashing the ambient light sensor once again.

The three LEDs display current/torque level, and are turned on when the following conditions are met:

- » Green is lit when operating under 20 oz-in of torque.
- » Yellow is lit when operating from 20 to 40 oz-in of torque.
- » Red is lit when operating over 40 oz-in of torque. This is considered excessive load.

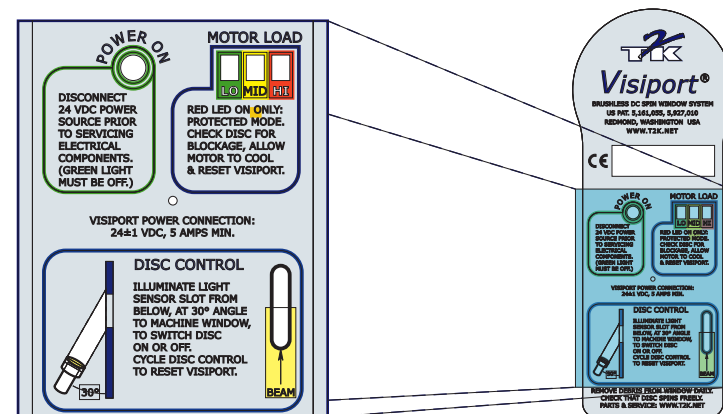
Momentary Red light indications are normal and do not indicate a problem.

If unit has otherwise been running normally, a Red light showing excessive load indications for an extended period of seconds through a constant display indicates a blockage or chip accumulation in the labyrinth of the disc seal between the disc assembly and the base of the unit. Maintenance to clear or clean away blockages and chip accumulations is required to restore the unit to proper function. Failure to clean the unit could lead to motor failure.

When the motor is operated under excessive load, it is protected by both a current limiting circuit and over temperature protection. Current Limiting can be observed by the fact that the spin window begins to slow down under excessive load. If the motor continues to operate at the constant Red light level, the operating temperature of the motor's windings will tend to increase.

At a winding temperature of 150°C, the motor will be shut down and the disc will cease to rotate. After the over-temperature shutdown, the winding must be allowed to cool to below 130°C and restarted by flashing a light at the sensor or by switching the unit off and then on again at either the unit toggle switch or the machine CNC control, as the Visiport® unit is normally actuated.

C Model: LEDs and photo-optic light sensor locations



Section 4.3, Maintenance and Troubleshooting

4.2.1 General Maintenance

During normal operation small chips and jelled metalworking fluid residues can accumulate in the labyrinth of the seal. This can lead to malfunctions.

Therefore, it is highly recommended that the Visiport® unit be cleaned on a regular (weekly) basis to avoid the following possible conditions:

- » Disc does not spin well when spun by hand (without power)
- » Disc does not readily gain speed when power is turned on
- » Grinding noise when in use
- » Splatter on the Visiport®-protected portion of the machine window
- » Readily visible coolant remains inside the Visiport®

4.2.2 Disc Removal and Cleaning Procedure

It only takes a few minutes to clean your Visiport® to insure continued maximum functionality!

Before following the few simple steps below, make sure your machine tool is turned off!

Be Safe! Please wear appropriate hand and eye protection whenever entering the cabin of your machine to perform cleaning and maintenance.

1. Turn off power to the Visiport® at the Terminal Box toggle switch or with the optic switch.
2. Inspect the Disc glass for cracks, impacts, or other damage prior to handling.
3. Clean Disc and Hub Cap to remove contaminants (fluid and chips) from part surfaces.
4. Unscrew the Hub Cap by hand while holding onto the Disc.
5. While holding the Disc securely to keep it from dropping, remove 4 each Torx screws holding the Disc hub to the Bearing/Rotor assembly with the supplied 4-40 Torx wrench.
6. Pull Disc assembly off the Bearing Rotor assembly and set aside.
7. Use a rag or wipes to remove any visible contamination from Base labyrinth and inside surface of Disc. Wipe any metalworking fluids and residue from machine window and from Base.



4.2.3 Disc Installation and Rotation Test

1. Insert the Torx wrench into one of the holes in the Disc Hub to align the holes of the Hub to the holes of the Bearing/Rotor assembly. Rotate Disc slightly as needed while pushing Disc lightly against the Rotor.
2. Re-install the 4 Torx screws and tighten securely in crosswise pattern.
3. Hold Disc by hand and install Hub Cap hand tight, ensuring O-ring seal is in place.
4. Before returning air to the unit, check free rotation by spinning Disc by hand. Disc should run easily and without scratching or scraping noises.

Section 4.4, Replacement Parts

See Exploded view on next page.

1	220C100	Base Assembly
2	220B200	Rotor/Bearing Assembly
3	220B300	Motor/Driver Assembly
4	220C500	Disc Assembly, VP220.C
5	220C5005	Hub Cap
6	220BUCB	Cover, Unit Connection Box
7	220CVMPA	Mounting Plate Assembly, VP220.C
7 Flag	220A700	Terminal Box
	2209001	Installation Vacuum Pump (not pictured)
	1X2176N	MPA O-ring, Nitrile (pictured w/o number between base and MPA)

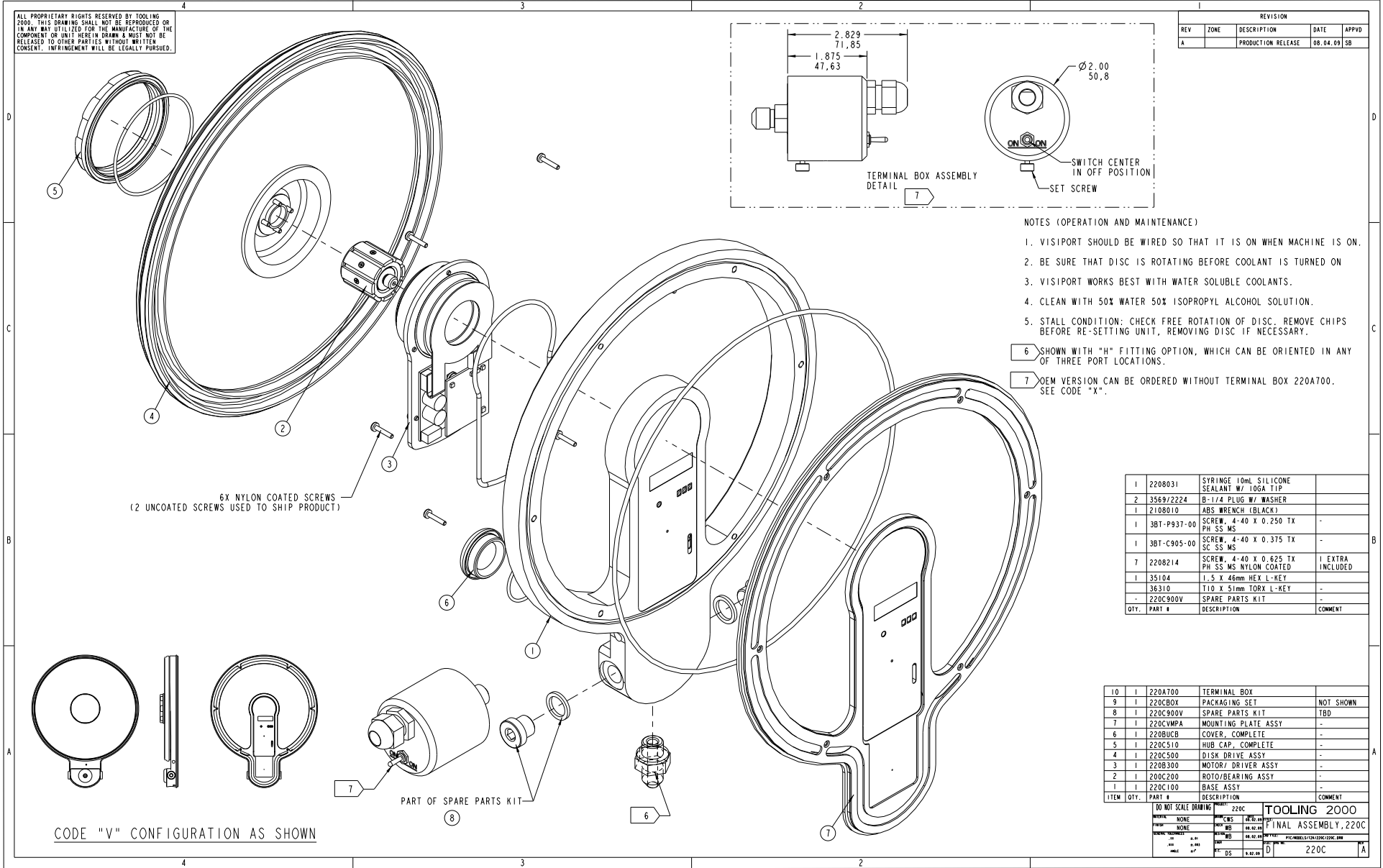
Section 4.5, Addendum

Section 4.6, Customer Support

Contact your distributor of T2K for parts and technical information.

T2K is available on the web at www.t2k.net, where you can find installation instructions, drawing, and knowledge base articles.

T2K Customer Support can also be reached via telephone at the numbers on the back cover, or through e-mail at support@t2k.net.



Exploded View

See Section 4.3 Replacement Parts for a part number listing.





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