

 **GROWTH SERIES™**

**LINCOLN®**  
**ELECTRIC**

**Cutting  
Systems**

# Torchmate 2X4 Growth Series

with **ACCUMOVE™2** Technology

## Assembly Guide

May 14, 2015

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# **GROWTH SERIES™**



## **2X4 Growth Series**

CNC Cutting Table

*pictured with optional water table  
and plasma torch*



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# Statement of Warranty

Lincoln Electric Cutting Systems equipment is designed and built with quality in mind. However, your overall satisfaction with our products generally can be increased by proper installation ... and thoughtful operation on your part.

## 30 Day guarantee

If Buyer is not satisfied with the performance of the Goods within 30 days from the date the Goods were shipped from the Seller, Buyer may return the Goods in the original carton(s) for a full refund less Shipping, Handling, Damages and Freight Charges. All sales become final after this 30 day period. Buyer should determine the satisfactory performance of the Goods by using the software, and inspecting and bench running the motors and/or accessory items. Any items to be returned for full refund must be in new, unused (except for bench testing), and saleable condition at the sole determination of the Seller. Items that, in the Seller's judgment, have been used or modified in any way, or kits that have been partially or fully completed will be subject to a restocking fee to be determined by the Seller. A return merchandise authorization number (RMA) must be obtained by the customer prior to any return. Shipments of returned items not marked with a valid RMA will be refused.

## Warranty

Electronics and motors are warranted by their manufacturer to the original purchaser for 12 months from the date of Torchmate, Inc.'s sale invoice. Mechanical components are standard industrial parts and are not warranted except by their respective manufacturers. If any of the warranted items are found by Seller to be defective, such Goods will, at Seller's option, be replaced or repaired at Seller's cost. No defective goods are to be returned without written authorization of seller. The sole purpose of the stipulated exclusive remedy shall be to provide the Buyer with free repair and replacement of defective Goods in the manner provided herein. This exclusive remedy shall not be deemed to have failed of its essential purpose so long as the Seller is willing and able to repair or replace defective Goods in the prescribed manner. The foregoing warranty is in lieu of all other warranties, express or implied, including those of merchantability or fitness for any purpose not expressly set forth herein. No affirmation of Seller, by words or action, other than as set forth in this Section shall constitute a warranty. Seller's warranty does not apply to any Goods which have been subjected to misuse, mishandling, misapplication, neglect (including but not limited to improper maintenance), accident, improper installation, modification (including by not limited to use of unauthorized parts or attachments), or adjustment or repair performed by anyone other than Seller or one of Seller's authorized agents. When returning products to Seller packaging must be adequate or all warranty is null and void. Buyer will pay for the cost of Shipping to and from the Seller for all warranty repairs.

Before returning any goods, please contact

### Lincoln Electric Cutting Systems Technical Support

Monday through Friday from 6 AM to 4 PM (06:00 to 16:00), Pacific Time Zone

Toll Free: 1-866-571-1066

International: 775-673-2200

Fax: 775-673-2206

Email: [support@torchmate.com](mailto:support@torchmate.com)



Any claim by Buyer with reference to the Goods sold hereunder shall be deemed waived by the Buyer unless submitted in writing to seller within the earlier of (i) thirty (30) days following the date Buyer discovered or by reasonable inspection should have discovered, any claimed breach of foregoing warranty, or (ii) 12 months following the date of shipment. Any cause of action for breach of the foregoing warranty shall be brought within one year from the date the alleged breach was discovered or should have been discovered, whichever occurs first.

Seller's liability (whether under the theories of breach of contract or warranty, negligence, or strict liability) for its Goods shall be limited to repairing or replacing Goods found by Seller to be defective, or at Seller's option, to refunding the purchase price of such Goods or parts thereof.

## Limitation of liability

In no event shall seller be liable for consequential damages arising out of or in connection with this agreement, including without limitation, breach of any obligation imposed on seller hereunder. Consequential damages shall include without limitation, loss of use, income or profit, or loss sustained as the result of injury (including death) to any person, or loss of or damage to property (including without limitation property handled or processed by the use of the goods). Buyer shall indemnify seller against all liability, cost or expense which may be sustained by seller on account of any such loss, damage, or injury.

## Disclaimer of consequential damages

Upon buyer's receipt of shipment, Buyer shall immediately inspect the Goods. Unless Buyer provides Seller with written notice of any claim for shortage, overcharge, or damage of Goods within ten (10) days from invoice date, such Goods shall be deemed finally inspected, checked and accepted by Buyer and no allowances shall be made thereafter. In absence of shipping and packaging instructions, Seller shall use its own discretion in the choice of carrier and method of packing. Seller shall not be responsible for insuring shipments unless specifically requested by Buyer and any insurance or special packaging so requested shall be at Buyer's expense and valuation.

## Acceptance and transportation

Title to any Goods sold and risk of loss of such Goods passes to Buyer upon delivery by Seller to carrier and any claims for losses or damages shall be made by Buyer directly with carrier.

## Title and risk of loss

A. In addition to the rights and remedies conferred upon Seller by law, Seller shall not be required to proceed with the performance of any order or contract if the Buyer is in default in the performance of any order or contract with Seller, and in case of doubt as to Buyer's financial responsibility, shipments under this order may be suspended.

## General conditions

B. No delay or omission by Seller in exercising any right or remedy provided for herein shall constitute a waiver of such right or remedy and shall not be constituted as a bar to or a waiver of any such right or remedy on any future occasion.

C. The sale of Goods shall be governed by the laws of the State of Nevada. Seller agrees to comply with all applicable laws of the United States.

The invalidity or unenforceability of any one or more phrases, sentences, or sections shall not affect the validity or enforceability of the remaining portions of this Agreement.

## Severability

## Welcome to Torchmate

**Welcome Letter** To the newest member of our Torchmate Family:

Thank You! Thank you for putting your faith and trust in Torchmate. When you purchased your Torchmate CNC Cutting System, you purchased more than just a machine. You purchased a team. The Torchmate team was built with the goal in mind of helping you get the most value out of your automation investment.

For some, this Torchmate CNC Cutting System purchase is their first endeavor into the world of automation. Others may consider themselves seasoned automation experts. No matter which category you fall into it is important that you realize that investing in a Torchmate is unlike any other machinery purchase you have made. We consider your success our success as well as your challenges our challenges.

The Torchmate product line is designed to be simple, reliable and accurate. While there is no "Easy" button on your new system, I can promise that you will get out of it what you put in. Operating any machinery is a skill and does have a learning curve.

**Call us for help**



The first and perhaps most important item we want to give you today is the Torchmate Technical Support Hotline: (866) 571-1066. This number is toll free for those within the United States. For those outside the United States, use the following telephone number: (775) 673-2200.

There is a dedicated professional support staff available Monday – Friday from 6 AM to 4 PM (06:00 to 16:00), Pacific Time Zone, to assist you in any way that they can. We pride ourselves on offering free unlimited telephone support for your machine and all we expect in return is communication, understanding and patience. We are here for you as long as you need us.

Please don't be a stranger. If you have questions or problems, call us. No matter how trivial your issue may seem it is not trivial if it cuts into your productivity. Call, Call, Call! We are here for you! Thank you again for putting your trust in us. We will do our best to not let you down.

Sincerely,

The Torchmate Technical Support Team  
Lincoln Electric Cutting Systems



## Torchmate Company History

*The year was 1979. After spending his childhood working with metal and hot rods, William (Bill) Kunz, Sr. began selling his first shape-cutting machine. He called it the "Torchmate."*

*Bill had read about pantograph flame-cutting machines in an automotive magazine, so he set out to bring this technology to hobbyists and small shop owners like himself. His fundamental idea? Find a way to lower the \$1,400 cost (a big investment 30 years ago) down to just \$400—thanks to the first Torchmate Pantograph Machine Kits.*

*Torchmate sold thousands of pantograph machines over the next 18 years, and the company's objective has remained steadfast: cutting technology should not be limited only to the metalworking elite.*

*Not content to rest on his laurels, Bill launched Torchmate's line of CNC (Computer Numerically Controlled) Cutting Machines in the late 1990s. The pantograph evolved into an automated, two-axis cutting table featuring a rugged yet precise plasma torch.*

*Following the same fundamental idea from the company's founding, the Torchmate tables brought major cost reductions, allowing plasma cutting (which had been expensively out of reach for most shops) to be widely affordable. The cut quality, increased production, and precise replication were also highly appreciated capabilities of the new machines.*

*In early 2001 and with the help of Kunz's son, Bill Jr., the company unveiled the Torchmate 2, which used an extruded aluminum gantry. It cut customer fabrication time from 40 hours down to just 16. Adding a third axis expanded functionality into the Routermate, which cuts wood, plastic, foam, and other materials using a router / drill, in 3-D.*

*Then came the Torchmate 3, with its strong aluminum-extrusion frame that assembles in less than a day—and a price point under \$10,000.*

*The most recent new Torchmate products include the large Torchmate X table and, more recently, the revolutionary new Growth Series: the expandable Torchmate 2x2, 2x4, and 4x4 CNC Systems.*

*In 2011, the Kunz' family vision was realized when Lincoln Electric, a stalwart welding machine company from Cleveland, Ohio, acquired Torchmate. To bring world-class metal cutting equipment to its customers world-wide, Torchmate will continue to create, sell, and support products in Reno, NV.*



# Technical Support

## Call, Fax, or Email

- When building the table if a question or concern arises or a part is missing, please contact Torchmate technical support.
- Technical support will also help you with operating the CNC system, and troubleshooting problems.
- Torchmate Technical support is available Monday through Friday from 6 AM to 4 PM (06:00 to 16:00) Pacific Time Zone.



Toll Free: 1-866-571-1066  
International: 775-673-2200  
Fax: 775-673-2206  
Email: support@torchmate.com

Call us for  
Consumables,  
or visit our  
web store

The screenshot shows the Lincoln Electric website's product page for Tomahawk 1000 consumables. The page features a navigation bar with links for home, about us, my account, contact us, and visit torchmate.com. A shopping cart icon in the top right corner shows 0 items in cart for a total of \$0.00. The main content area displays the Tomahawk 1000 product page, which includes a list of products for sale with their respective prices and 'Add To Cart' buttons. The products listed are: Lincoln Retaining Cap - 40,60A (LC65) Tomahawk 1000, Lincoln Nozzle (Gouging) (LC65) Tomahawk 1000, and Lincoln Nozzle (Shielded Contact) - 60A (LC65) Tomahawk 1000. A 'Top Sellers' section on the right side of the page highlights several products, including Thermal Dynamics NEW SL 1005V Automated Electrode, Thermal Dynamics Electrode, and Thermal Dynamics Tip, 60A.

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

Torchmate Growth Series

X



# Safety Information

# Safety First

Lincoln Electric Cutting Systems equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part.

## WARNING

**DO NOT INSTALL, OPERATE, OR REPAIR THIS EQUIPMENT WITHOUT READING THE SAFETY WARNINGS CONTAINED THROUGHOUT THIS MANUAL**

**Think before you act— and be careful.**

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH.  
KEEP CHILDREN AWAY.  
IF YOU WEAR A PACEMAKER, CONSULT WITH YOUR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

## Electric shock



1. ELECTRIC SHOCK can kill.
  - 1.1 The electrode and work (or ground) circuits are electrically "hot" when the power source is on. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
  - 1.2 Disconnect the power source before performing any service or repairs. When the power source is operating, voltages in excess of 250 volts are produced. This creates the potential for serious electrical shock - possibly even fatal.
  - 1.3 Insulate yourself from work and ground using dry insulation. Wear dry gloves and clothing. Take extra care when the work place is moist or damp.
  - 1.4 Always be sure the work cable makes a good electrical connection with the metal being cut or gouged. The connection should be as close as possible to the area being cut or gouged.
  - 1.5 Ground the work or metal to be cut or gouged to a good electrical (earth) ground.
  - 1.6 Maintain the plasma torch, cable and work clamp in good, safe operating condition. Repair or replace all worn or damaged parts. Replace damaged insulation.
  - 1.7 Never dip the torch in water for cooling or plasma cut or gouge in or under water.
  - 1.8 When working above floor level, protect yourself from a fall should you get a shock.
  - 1.9 Operate the pilot arc with caution. The pilot arc is capable of burning the operator, others or even piercing safety clothing.
  - 1.10 Also see Items 4.3 and 6.

2. ARC RAYS can burn.

- 2.1 Plasma Arc Rays can injure your eyes and burn your skin. The plasma arc process produces very bright ultraviolet and infrared rays. These will damage your eyes and burn your skin if you are not properly protected.
- 2.2 Use safety glasses and a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when performing or observing plasma arc cutting or gouging. Glasses, head-shield, and filter lens should conform to ANSI Z87.1 standards.

**Arc rays**



Arc Current	Minimum Shade No.	Suggested Shade No.
Less than 20A	4	4
20A-40A	5	5
40A-60A	6	6
60A-300A	8	9
300A-400A	9	12
400A-800A	10	14

- 2.3 Use suitable clothing including gloves made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.
- 2.4 Protect other nearby personnel with suitable non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

3. FUMES AND GASES can be dangerous.

- 3.1 Plasma cutting or gouging may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When cutting or gouging, keep your head out of the fumes. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone.
- 3.2 Use an air-supplied respirator if ventilation is not adequate to remove all fumes and gases.
- 3.3 When plasma cutting or gouging on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required.
- 3.4 Additional precautions are also required when cutting (zinc) galvanized steel or materials containing or coated with any of the following:

**Fumes, gases, and dust**



## Safety First (continued)

Antimony	Beryllium	Cobalt	Manganese	Selenium
Arsenic	Cadmium	Copper	Mercury	Silver
Barium	Chromium	Lead	Nickel	Vanadium

- 3.5 The operation of plasma cutting or gouging fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment, and the specific procedure and application involved. Worker exposure levels should be checked upon installation and periodically thereafter to be certain levels are within applicable OSHA PEL and ACGIH TLV limits. For information on how to test for fumes and gases in your work place, refer to publications section of this manual.
- 3.6 Do not use plasma cutting or gouging equipment in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products. Remove all sources of these vapors.
- 3.7 Gases used for plasma cutting and gouging can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.
- 3.8 Read and understand the manufacturer's instructions for this equipment and follow your employer's safety practices.
- 3.9 This product, when used for cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects
- 3.10 Some dust created by routing, sawing, grinding, drilling, and other construction activities contains chemicals known to cause cancer, birth defects or other reproductive harm. Avoid prolonged contact with this dust. Wear protective clothing and wash exposed areas with soap and water. Allowing dust to get into your mouth, eyes, or lay on the skin may promote absorption of harmful chemicals.

Some examples of these chemicals are:

- Lead from lead-based paint.
- Crystalline silica from bricks and cement and other masonry products.
- Arsenic and chromium from chemically-treated lumber (CCA).

- 3.11 Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.

### Fire or Explosion



4. Cutting flame and sparks can cause FIRE OR EXPLOSION.
  - 4.1 Fire and explosion can be caused by hot slag, sparks, oxygen fueled cutting flame, or the plasma arc.
  - 4.2 Have a fire extinguisher readily available. Provide a fire watch when working in an area where fire hazards may exist.

- 4.3 When not cutting or gouging, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
- 4.4 Be sure there are no combustible or flammable materials in the workplace. Any material that cannot be removed must be protected.
  - 4.4.1 Sparks and hot materials from cutting or gouging can easily go through small cracks and openings to adjacent areas.
  - 4.4.2 Avoid cutting or gouging near hydraulic lines.
  - 4.4.3 Do not cut or gouge tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned." For information purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).
  - 4.4.4 Vent hollow castings or containers before heating, cutting or gouging. They may explode.
- 4.5 Do not add fuel to engine driven equipment near an area where plasma cutting or gouging is being done.
- 4.6 Connect the work cable to the work as close to the cutting or gouging area as practical. Work cables connected to the building framework or other locations away from the cutting or gouging area increase the possibility of the current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.
- 4.7 Hydrogen gas may be formed and trapped under aluminum work pieces when they are cut underwater or while using a water table. DO NOT cut aluminum alloys underwater or on a water table unless the hydrogen gas can be eliminated or dissipated. Trapped hydrogen gas that is ignited will cause an explosion.
- 4.8 Read and follow NFPA 51B "Standard for Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, Ma 022690-9101.
- 5. **CYLINDER may EXPLODE if damaged.**
  - 5.1 Use only compressed gas cylinders containing the correct gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc., should be suitable for the application and maintained in good condition.
  - 5.2 Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
  - 5.3 Cylinders should be located:
    - Away from areas where they may be struck or subjected to physical damage.
    - A safe distance from plasma cutting or gouging, arc welding operations and any other source of heat, sparks, or flame.

### Cylinder Explosion



## Safety First (continued)

- 5.4 Never allow any part of the electrode, torch or any other electrically "hot" parts to touch a cylinder.
- 5.5 Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- 5.6 Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.
- 5.7 Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.

### Electrical power



- 6. FOR ELECTRICALLY powered equipment.
  - 6.1 Turn off input power using the disconnect switch at the fuse box before working on the equipment.
  - 6.2 Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.
  - 6.3 Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

### Plasma arc



- 7. PLASMA ARC can injure.
  - 7.1 Keep your body away from nozzle and plasma arc.
  - 7.2 Operate the pilot arc with caution. The pilot arc is capable of burning the operator, others or even piercing safety clothing.

### Electric and magnetic fields



- 8. ELECTRIC AND MAGNETIC FIELDS may be dangerous
  - 8.1 Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Cutting or gouging current creates EMF fields around torch cables and cutting machines.
  - 8.2 EMF fields may interfere with some pacemakers, so operators having a pacemaker should consult their physician before cutting or gouging.
  - 8.3 Exposure to EMF fields during cutting or gouging may have other health effects which are now not known.
  - 8.4 All operators should use the following procedures in order to minimize exposure to EMF fields from the cutting or gouging circuit:
    - 8.4.1 Route the torch and work cables together - Secure them with tape when possible.
    - 8.4.2 Never coil the torch cable around your body.
    - 8.4.3 Do not place your body between the torch and work cables. If the torch cable is on your right side, the work cable should also be on your right side.



- 8.4.4 Connect the work cable to the workpiece as close as possible to the area being cut or gouged.
- 8.4.5 Do not work next to cutting power source.

9. AUTOMATIC OPERATION

- 9.1 Any CNC machine may begin to operate automatically without warning. Only a trained individual familiar with the software, machine, and computer system should operate this equipment.
- 9.2 Keep the immediate area around the CNC machine clear of materials that may cause interference. Keep area clear of bystanders.
- 9.3 All untrained persons should not work on or near a CNC machine. Do not leave the CNC machine unattended while power is on to any electronics.

**Automatic operation**



10. NOISE

- 10.1 Noise can cause permanent hearing loss. CNC operation, plasma arc cutting, plate marking, routing, and drilling can cause noise levels that exceed safe limits. You must protect your ears from loud noise to prevent permanent loss of hearing.
  - 10.1.1 To protect your hearing from loud noise, wear protective ear plugs and/or ear muffs. Protect others in the workplace.
  - 10.1.2 Noise levels should be measured to be sure the decibels (sound) do not exceed safe levels.
- 10.2 For information on how to test for noise refer to the publications section of this manual.

**Noise**



11. HEAVY PARTS

- 11.1 Parts of CNC machines are heavy. Also, material you are cutting may be heavy. Use caution when lifting or moving them. To avoid injury, get someone to help you, or use a mechanical lifter. When using a mechanical lifter, follow all the manufacturer's safety guidelines.
- 11.2 Review the Occupational Safety & Health Administration (OSHA) technical manual Sect. 7, Ch 1.5. See the publications section that follows.

**Heavy parts**



12. FLYING DEBRIS

- 12.1 Metal cutting and marking operations create waste that can fragment and fly. Make sure you have proper eye protection and that everyone close to the CNC operations has proper eye protection, too.
- 12.2 Review the ANSI Z87.1 requirements. See the publications section for additional information.

**Flying debris**



## Safety First (continued)

### Pinch & crush points



#### 13. PINCH AND CRUSH POINTS

- 13.1 Pinch and crush points are those normally moving parts of machinery, like CNC machines, that can pinch, capture, crush, or sever parts of your body. Be aware of hazardous pinch and crush points.
- 13.2 Don't repair or adjust the machine with the controls on.
- 13.3 When the end of a CNC machine's travel creates a "hard stop," it creates a crush point. Keep fingers and hands away from this.
- 13.4 Do not stack or store any additional items in contact with the machine. These could create additional pinch or crush points, or could create a falling hazard.

### Rotary Tools



#### 14. SHARP ROTARY TOOLS

- 14.1 Routing and drilling use high-speed rotating bits and cutters with sharp edges. Keep clear of bits when in use.
- 14.2 Turn the router, spindle, or drill off when changing bits. Be careful of the sharp edges.

### Hot Material



#### 15. HOT MATERIAL

- 15.1 Plasma cutting uses an electric arc that can reach temperatures of 45,000°F (25,000°C). Oxygen-fuel cutting flames can be up to 6,330°F (3,500°C). Any parts and scrap will be very hot after cutting. Use extreme care.
- 15.2 Use tongs and wear protective gloves when handling recently cut material. Also, consider other devices for safe hot material handling.
- 15.3 It is safest to let material cool completely before handling.

### Mechanical Drives



#### 16. MECHANICAL DRIVES

- 16.1 High-speed mechanical drives made of gears, belts, and or drive screws are used by CNC machines. Keep clear of them during operation.
- 16.2 Do not attempt to service, adjust, or otherwise touch these components while the machine is on.
- 16.3 Secure any loose clothing and cables to prevent entanglement.

### Pressurized Air Lines



#### 17. AIR LINES UNDER PRESSURE

- 17.1 Some tools use compressed air or gases. Often flexible tubing (lines) bring the high-pressure air or gas to the machine. Inspect these lines periodically. Repair or replace damaged lines.
- 17.2 Hot sparks, flying debris, other objects, or vehicles can melt, burn, or puncture these lines. Check them for punctures, burns, or other damage or defects that could cause failure.
- 17.3 Check the routing of the lines to keep them away from traffic and from underfoot.

Refer to the following standards or their latest revisions for more information:

- OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
- ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING, obtainable from the American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126
- NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
- ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018
- ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018
- AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES, obtainable from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126
- NFPA Standard 51, OXYGEN-FUEL GAS SYSTEMS FOR WELDING, CUTTING AND ALLIED PROCESSES, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
- NFPA Standard 70, NATIONAL ELECTRICAL CODE, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
- NFPA Standard 51B, CUTTING AND WELDING PROCESSES, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
- CGA Pamphlet P-1, SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, obtainable from the Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202
- CSA Standard W117.2, CODE FOR SAFETY IN WELDING AND CUTTING, obtainable from the Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3
- NWSA booklet, WELDING SAFETY BIBLIOGRAPHY obtainable from the National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103
- ANSI Standard Z88.2, PRACTICE FOR RESPIRATORY PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018

## Other Important Publications

# Technical Support

## Call, fax, or email

- When making the connections and setting up the table if a question or concern arises or a part seems to be missing, please contact Torchmate technical support.
- Technical support will also help you with operating the CNC system, and troubleshooting problems.
- Torchmate technical support is available Monday through Friday, from 6 AM to 4 PM (06:00 to 16:00), Pacific Time Zone.



Toll Free: 1-866-571-1066  
 International: 775-673-2200  
 Fax: 775-673-2206  
 Email: [support@torchmate.com](mailto:support@torchmate.com)

Call us for Consumables, or visit our web store

The screenshot shows the website interface for Lincoln Electric's Cutting Systems. The main navigation bar includes 'home', 'about us', 'my account', 'contact us', and 'visit torchmate.com'. The page title is 'Tomahawk 1000' under the 'Lincoln Plasma Consumables' category. A sidebar on the left lists various product categories like 'Lincoln Protective Gear' and 'Thermal Dynamics Plasma'. The main content area displays a grid of product listings for 'Tomahawk 1000' consumables, including 'Lincoln Retaining Cap - 40, 60A (LC65) Tomahawk 1000', 'Lincoln Nozzle (Gouging) (LC65) Tomahawk 1000', and 'Lincoln Nozzle (Shielded Contact) - 60A (LC65) Tomahawk 1000'. Each listing includes a diagram of the part, a price, and an 'Add To Cart' button. A 'Top Sellers' section on the right highlights 'Thermal Dynamics NEW SL100SV Automated Electrode P/N 9-8232' for \$8.99 and 'Thermal Dynamics Electrode, P/N: 9-8215' for \$8.03.

# Receiving and Preparation

# Preparations before assembly

When installing a Torchmate CNC Cutting System in your workshop, there are preparations you can make to influence the productivity and ease of use of the machine—as well as the safety of the operator. The main factors to prepare for include the physical layout and placement of the machine in the shop and the availability of power, compressed gas or air (or both), and ventilation.

- Space**
- When preparing to install the Torchmate CNC Cutting System, provide sufficient space for efficient operation. This includes considering the room to safely load and unload the material being cut, and storage for the raw materials and finished products.
  - If your system is too far from your material storage or from the stations where additional operations may be performed, it reduces your overall efficiency. A good goal is to arrange a balance between space and efficiency.
  - Consider placing the equipment in an area that can handle any expansion, as needed.

- Electrically powered modules**
- The following components of the system must be supplied with power.
    - CNC Control box
    - Plasma power supply (separate purchase)
    - Computer (separate purchase)
    - Air compressor (separate purchase)
    - Oxyfuel / plate marker relay box (optional)

- Power distribution panel circuits**
- Always consult with your electrical service provider or a qualified electrician to ensure that each circuit meets the equipment's requirements for power and EMI—and is safe to operate.

- Grounding**
- Many pieces of shop equipment can generate enough high frequency electromagnetic and radio waves to interfere with the operation of the CNC Control box or the computer or both. Consider installing a ground rod near the Torchmate CNC Cutting System to help reduce electromagnetic interference (EMI).
  - Always consult with your electrical service provider or a qualified electrician regarding electrical code requirements in your local area for grounding rods and other measures you can take to reduce EMI.

For additional information, see:

[http://www.torchmatesupport.com/help/EMI Reduction.zip](http://www.torchmatesupport.com/help/EMI%20Reduction.zip)

- Plasma operations and the oxyfuel processes require compressed gas supplies. These may require the placement of gas cylinders, regulators, and lines in the space near the CNC cutting system.
- Leave adequate space for moving empty and replacement cylinders and for safe placement of pressurized and flammable gases well away from the operation of the cutting torch.
- Recognize that smoke and dust are created by the cutting processes. Plan to remove it and to provide a supply of clean air.

## Compressed air and gas

## Fumes



The Lincoln Electric Modular Extraction Hood removes dust and smoke.



The Lincoln Electric Mobile Welding Fume Extractor with Filtration can also be positioned near the cutting area.

- If you know the types of materials and the thicknesses you will be cutting, you can plan to keep a good stock of consumables on hand. This will avoid machine downtime and the scramble to obtain replacement consumables on short notice.
- To order consumables, just call Torchmate Parts Support—or visit our store website.

## Consumables



Toll Free: 1-866-571-1066  
 International: 775-673-2200  
 Fax: 775-673-2206  
 Email: [parts@torchmate.com](mailto:parts@torchmate.com)  
[www.TorchmateStore.com](http://www.TorchmateStore.com)

# Receiving your shipment

Your Torchmate 2X4 Growth Series CNC Cutting System will arrive in a shipping crate. If you ordered the optional water table, you will receive two crates. Please take the time to check your shipment as soon as it arrives. Inspect carefully for freight damage. Check for missing parts. Contact Torchmate Technical Support for any issues or concerns.

## Receiving shipping crates and cartons

- Your 2X4 Growth Series CNC Cutting System is carefully packaged and should arrive in good condition. However, even with the best of precautions, damage during shipping can happen. You can ensure your new product will be ready to use as soon as possible, if you inspect it immediately when it arrives.

## Inspect for shipping damage

- Check the crates. If you find any damage, inform the freight company, and contact Torchmate Technical Support.
- As soon as possible after delivery, carefully inspect your shipment. Look for dented, bent, or broken parts. Immediately contact Torchmate Technical Support if any damage is found.

## Crates and weights



- The crate containing the cutting table components weighs about 315 lbs. The optional crate containing the water table components weighs about 290 lbs.
- Take care to observe safety procedures when moving and unpacking these crates.

## Check for missing parts

- Check that all parts have arrived and that your shipment is complete as soon as possible using the parts checklists on the following pages. If you have purchased the optional water table, check these parts as well. Although we carefully pack your shipment, there is a small possibility that some component or quantity does not correspond to the parts list.
- The parts checklist that follows is arranged in the order of assembly.

## Technical Support



- Contact Torchmate Technical Support should you find any damage or missing parts. The sooner you call, the sooner any problems can be resolved.
- If you are not sure about something, call us.
- If you have a question about something, call us.

### TECHNICAL SUPPORT

Toll Free: 1-866-571-1066

International: 775-673-2200

Fax: 775-673-2206







Email: [support@torchmate.com](mailto:support@torchmate.com)



## Parts checklist












On the next few pages, the parts included in your Torchmate 2X4 Growth Series CNC Cutting System shipment are listed in the order you assemble them. To make it easier to complete the assembly of your cutting system, you can lay out the received parts in this order as you check them against this list.

### Parts for the A-steps














<input checked="" type="checkbox"/>	Qty.	Part	Description	Part Number	Step
	1		GS 4' side set, assembled (1 set = left and right)	TMS-180-1000-05	A1
	12		Screw, BSCS, 5/16"–18 X 7/8" T-bolt	TMS-410-0216-14	A1
	12		T-nut, 5/16"–18, steel, black plated	TMS-414-3101-16	A1
	2		Aluminum cross-member, 2' Wide GS	TMS-180-0002-08	A2
	1		GS 2' gantry, assembled	TMS-180-1000-01	A3
	4		Screw, BSCS, 3/8"–16 X 1/2"	TMS-410-0318-08	A6

## Parts checklist (continued)

### Parts for the B-steps

<input checked="" type="checkbox"/>	Qty.	Part	Description	Part Number	Step
	1		CNC controller, Accumove2	BK1250-200000	B1
	1		24V 6.67A DC power supply, Accumove2	TMS-400-0003-02	B1
	1		AC power cable	TMS-402-0069-01	B1
	1		Ethernet crossover cable, red, 5 ft	TMS-103-5000-07	B1
	1		Laptop or PC with Microsoft Windows 8, Windows 7, Vista, or XP	(separate purchase)	B1
	3		Cable, motor, XLR / Molex, 25 ft	TMS-402-0010-01	B2
	1		USB flash drive: VMD software and owners manuals.	TMS-100-1000-01	B3
	4		99R6 ball bearings	TMS-432-0010-01	B9
	4		Screw, BSCS, 3/8"-16 X 1	TMS-410-0218-16	B9
	4		Nut, Nylock, 3/8"-16 steel, zinc-plated	TMS-414-0201-18	B9
	16		Washer, flat, 3/8", steel, cadmium-plated	TMS-413-0406-18	B9

Parts for the C-steps  
(optional)

<input checked="" type="checkbox"/>	Qty.	Part	Description	Part Number	Step
	2		GS water table side—long with cutout	TMS-180-0001-05	C1
	2		GS water table side backplate—long	TMS-180-0001-06	C1
	12		Screw, BSCS, 10–32 X ½"	TMS-410-0511-08	C1
	12		Nut, Nylock, 10–32, steel, zinc plated	TMS-414-0201-11	C1
	4		GS water table leg—corner leg	TMS-180-0001-28	C2
	2		GS water table leg—side leg	TMS-180-0001-29	C2
	6		¾"-16 stud, leveling foot	TMS-448-0001-01	C2
	69		Screw, BSCS, ⅝"-18 X ⅝"	TMS-410-0216-10	C3, C4, & C5
	69		Nut, Nylock, hex, ⅝"-18, steel, zinc-plated	TMS-414-0201-16	C3, C4, & C5
	2		GS water table side—long	TMS-180-0001-07	C4
	2		GS water table side—short	TMS-180-0001-08	C4
	1		GS water table cross member 30	TMS-180-0005-01	C5
	1		GS Water pan - 2X2	TMS-180-0002-02	C6
	1		GS water pan - 2x4	TMS-180-0001-17	C6
	1		GS water pan edge - 2x4	TMS-180-0001-18	C6
	1		GS silicone sealant, tube	TMS-180-1001-01	C6

## Parts checklist (continued)



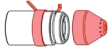





### Parts for the C-steps (continued) (optional)

<input checked="" type="checkbox"/>	Qty.	Part	Description	Part Number	Step
	1		TFP-AR small table $\frac{3}{4}$ " plumbing (water release valve)	TMS-459-0010-01	C7
	1		PTFE thread-sealant tape (recommended)	<i>(separate purchase)</i>	C6
<b>N.A.</b>	11		Slats— $30\frac{1}{2}$ " X (3" to 4") X $\frac{3}{16}$ "	<i>Customer supplied (you will cut these)</i>	C8
	4		Screw, BSCS, $\frac{1}{4}$ "-20 X $\frac{3}{4}$ "	TMS-410-0214-12	C8
	4		Washer, flat $\frac{1}{4}$ " washer, steel, zinc-plated	TMS-413-0001-16	C8







### Parts for the D-steps

	Qty.	Part	Description	Part Number	Step
	1		Tooling bracket, Accumove2 lifter	TMS-180-0150-02	D1
	2				D1
	2				D1
	1		Height Control Lifter, Accumove2	TMS-101-1100-02	D2
	4		Screw, SCS, $\frac{5}{16}$ "-18 X 1.0" lg, hex drive	TMS-410-0016-16	D2
	1		Plasma cutter power supply unit	Purchased separately	D3
	1		CNC Interface cable	Supplied with plasma cutter	D3
	1		Height Control VFC	TMS-101-1100-01	D4
	1		Arc Voltage/Ohmic Cable	TMS-101-1109-01	D5

**Parts for the D-steps**  
*Continued*

	Qty.	Part	Description	Part Number	Step
	1		Height control cable	TMS-103-5000-01	D5
	1		Chassis ground wire	From your toolbox	D5?
	1		Ohmic Cap (torch consumable stack)	Depends on plasma power unit	D5
	1		Raw arc voltage cable (included with CNC Interface cable for Lincoln Electric plasma power units)	Depends on plasma power unit	D5
	1		Quick connect crimp terminal (female)	From your toolbox	D5
	1		Terminal Block Plug 2Pos Str 5.08mm	TMS-403-0076-01	D6
	1		Input Cable, Accumove, Torchmate Pro	TMS-103-5000-03	D6
	10		20 gauge twist-on wire nut connectors	From your toolkit	D6

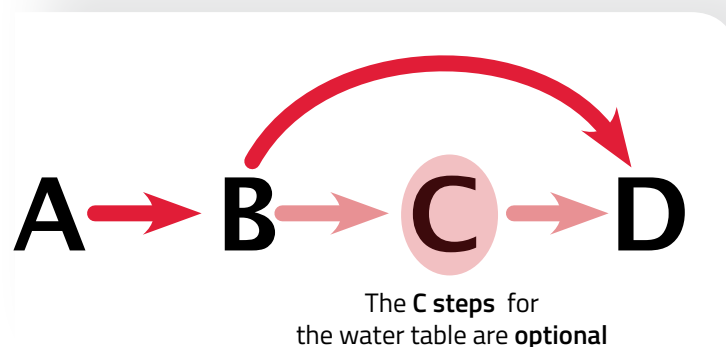
**Additional required equipment and tools**

<input checked="" type="checkbox"/>	Qty.	Part	Description	Part Number
	1		3/8" wrench	(from your toolkit)
	1		1/2" wrench	(from your toolkit)
	1		7/16" wrench	(from your toolkit)
	1		5/32" to 1/4" hex key set	(from your toolkit)
	1		Tape measure	(from your toolkit)
	1		Battery (UPS) power for computer —with surge protection	(recommended separate purchase)

## Step-by-step setup

The instructions presented here are arranged to be as simple as A–B–C–D: step-by-step. Assemble the cutting table, Bind the Accumove2 controller to the table through the VMD software, Couple the cutting table to the (optional) water table, and Deploy the selected tools. Each step presents a list of components and parts, instructions for the step, and an illustration.

- A-B-C-D steps**
- **A steps—Assembling** of the cutting table. This includes:
    - Mechanically assembling the table sides and the gantry
    - Performing the first set of adjustments.
  - **B steps—Binding** the cutting table to the Accumove2 CNC controller. This involves:
    - Establishing communication
    - Connecting the motor cables
    - Installing the VMD software
    - Using the controller dynamically to adjust the table to get it square and tight
  - **C steps—Coupling** the cutting table to the water table (optional) is next. In addition to providing support for the workpiece being cut, the water table safely eliminates nearly all of the sparks, dust, and smoke during cutting. It requires the following set of steps:
    - Assemble the water table
    - Cut material support slats
    - Mount, square, and tighten the cutting table on the water table
  - **D steps—Deploy** the selected tooling. The steps here vary by tool type:
    - Mount the tool
    - Run the cable(s), gas lines, etc.
    - Set up the tool in the VMD software



- On previous pages you were provided a parts list, organized to help you receive parts. The location, in terms of the numbered steps that follow, were also listed so you can quickly locate the step that uses a particular part.
- Each of the assembly steps that follow provides its own list of parts or components, including the quantity required for that step.
- Should you require additional quantities of any part, please contact Torchmate Technical Support.
  - Torchmate Technical support is available Monday through Friday from 6 AM to 4 PM (06:00 to 16:00), Pacific Time Zone.

## List parts and components

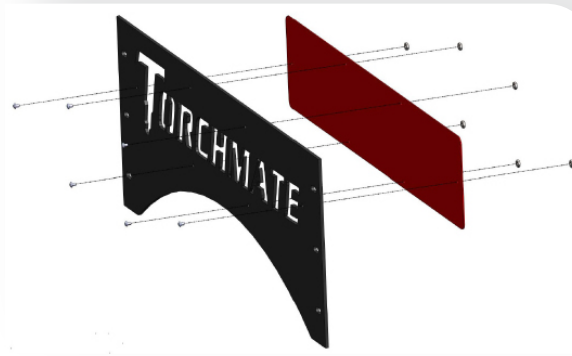
Toll Free: 1-866-571-1066  
 International: 775-673-2200  
 Fax: 775-673-2206  
 Email: [parts@torchmate.com](mailto:parts@torchmate.com)



- Detailed instructions are provided for each assembly step.
- If you ever find the instructions unclear, please contact Torchmate Technical Support and let us know, so that we can not only give you immediate assistance, but so that we can also make improvements to the instructions.
- For each step in the assembly, illustrations will guide you. For some illustrations, additional close up views are provided.
- The assembly action is often illustrated with an exploded-diagram.
  - For example, the following illustration shows two parts being assembled using screws and nuts:

## Written instructions

## Illustrations



# Technical Support

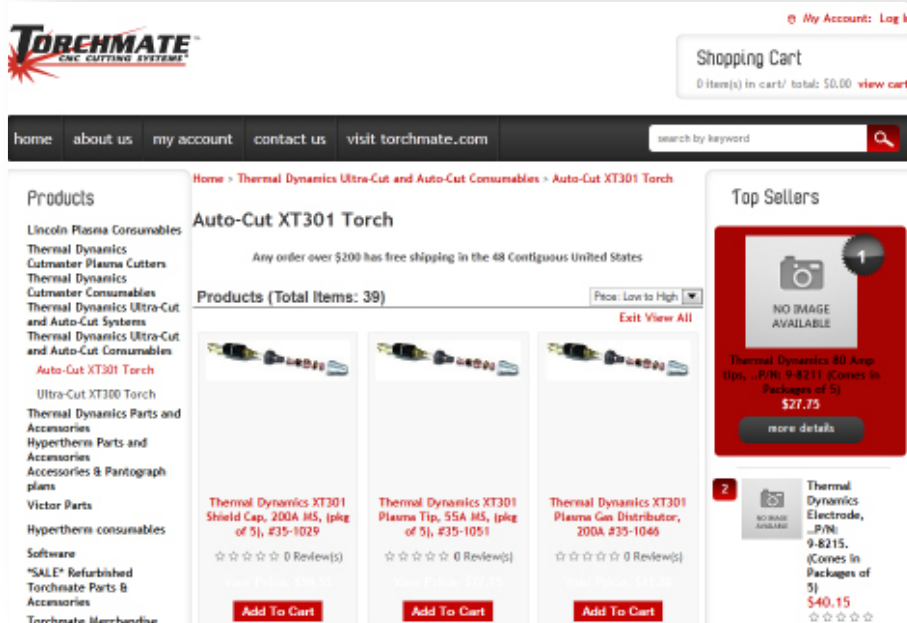
## Call, Fax, or Email

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# Assembling the cutting table

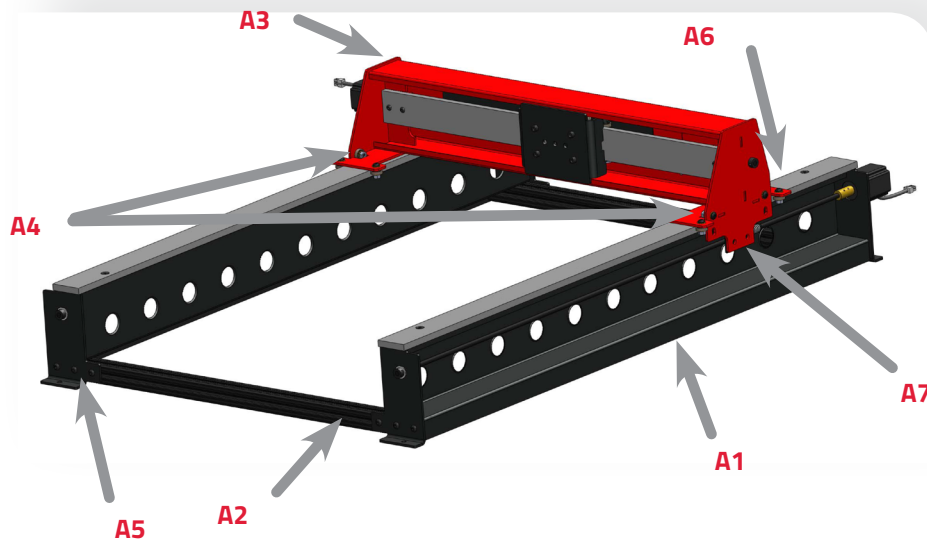
## Assembly overview

In the following steps, you will assemble the Torchmate 2X4 Growth Series CNC Cutting System table. It precisely controls the motion of the torch or other tools. Seven steps are required for Assembly. Additional steps will be used to bind the controller to the table and complete the adjustment for level and square. If you purchased the optional water table, you will find the instructions for assembling the water table and mounting the cutting table on it following this section.

### Basic assembly steps

- The cutting table is assembled in a series of easy **A-steps**.
  - **Step A1:** Prepare the table sides
  - **Step A2:** Assemble the table frame
  - **Step A3:** Install the gantry
  - **Step A4:** Check / adjust vertical bearings
  - **Step A5:** Adjust the first cross-member
  - **Step A6:** Adjust the second cross-member
  - **Step A7:** Link the gantry to the drive screws
- The **B-steps** follow and bind the controller to the cutting table, allowing for additional squaring and leveling.
- The **C-steps** are optional. You use them if you have the water table option.
- The **D-steps** are for wiring and mounting the plasma cutter and other tools. Depending on the tools purchased, there will be more or fewer additional tool-mounting and configuration steps.

### A-step locations



**125 lbs**  
**57 kg**



- The completed CNC cutting table is sturdy and heavy-duty, so that it can precisely and accurately move the torch, support your material, and support the weight of the water in the water table reservoir.
- After being removed from the crate, the combined weight is 280 lbs (125 kg), before adding water.
- Whether full or empty of water, do **NOT** drag the cutting table when moving it to a new location.
  - If you drag the CNC cutting table / water table, you can damage it and get it out of square.
- Do **NOT** try to move the cutting table without help. When you must re-position the CNC cutting table / water table or move it to a new location, drain all the water and use the proper equipment to carefully lift it.

**Weight of completed CNC cutting table**



**280 lbs**  
**127 kg**






**Weight of the completed CNC cutting table with optional water table (before adding water)**

## Step A1: Prepare table sides

The sides of your Torchmate 2x4 Growth Series CNC Cutting System are pre-assembled with a drive-screw, motor, and steel rails. The cross-members are extruded aluminum channels which are held to the sides with T-nuts. Here you will prepare sides by adding the T-nuts. In the next step you will add the cross-members.

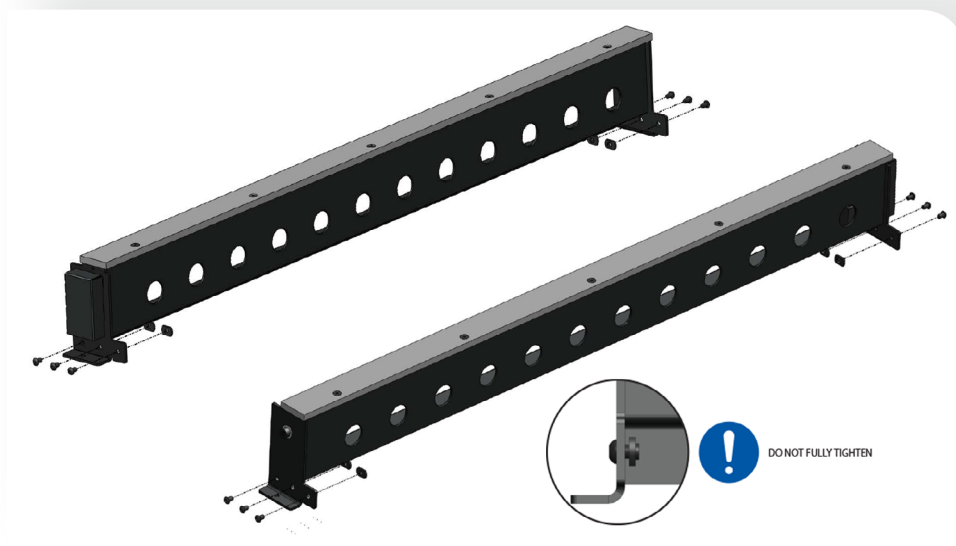
### Required parts / components

Qty	Part	Description	Part #
1		GS 4' side set, assembled, (L / R set)	TMS-180-1000-05
12		Screw, BSCS, 5/16"-18 X 7/8" T-bolt	TMS-410-0216-14
12		T-nut, 5/16"-18, steel, black plated	TMS-414-3101-16

### Instructions



- On each end of each pre-assembled side, insert three 5/16"-18 X 7/8" button head screws through the holes from the outside.
- Fasten a 5/16"-18 T-nut to each screw.
- Leave the nuts loose on the screws.
- The T-nuts should be positioned so that the flanges (raised portions) face away from the screws.
- Do not fully tighten the screws.

### Illustration



## Step A2: Assemble table frame

The Torchmate 2x4 Growth Series CNC Cutting System table uses extruded aluminum cross-members attached to the sides with T-nuts. Here you will create the initial linking of the sides with the cross-members. The final adjustment for squareness is completed at a later step.

Qty	Part	Description	Part #
2		Aluminum Cross Member - 2' Wide GS	TMS-180-0002-08
2		Assembled table side components	From Step A1

Required parts / components

- Perform this assembly on a flat, level surface.
- Slide the cross-members onto the T-nuts on the pre-assembled sides. There are channels in the extruded aluminum cross members for the T-nuts to slide into.
  - When the T-nuts are tightened, they will hold table securely.
  - The T-nuts will be adjusted and fully tightened later, so for now, tighten them only lightly.
- Attach both cross members to one side, then slide the other side on and lightly tighten.



Instructions



Illustration

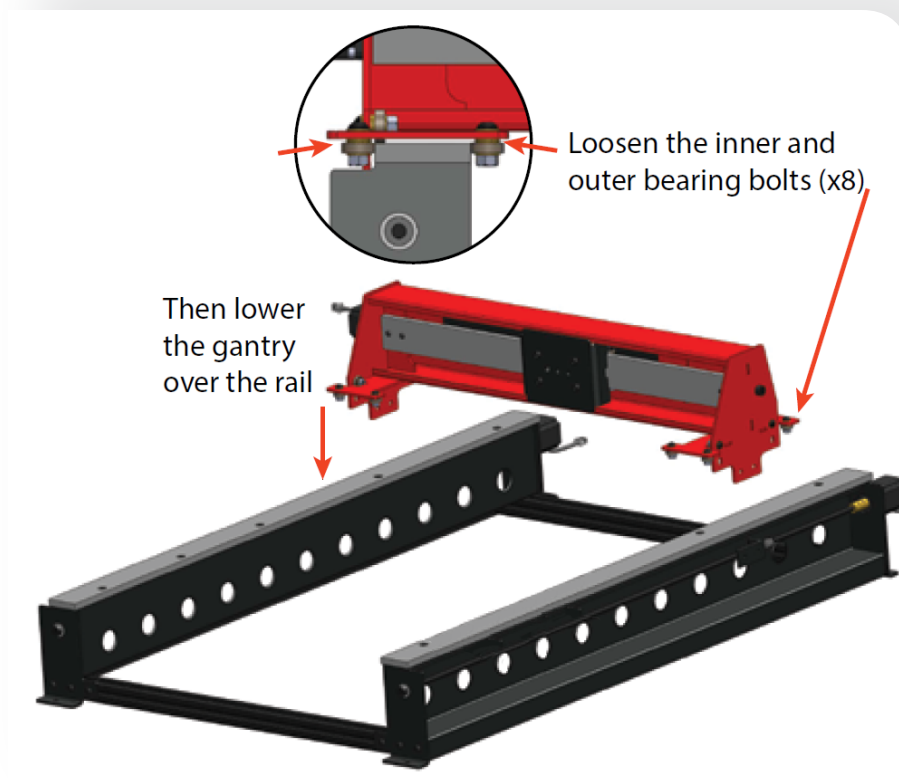
## Step A3: Install the gantry

Like the sides of the Torchmate 2x4 Growth Series CNC Cutting System table, the full gantry is pre-assembled with a drive-screw, motor, and steel rail. In this step, you will set the gantry on the side rails.

Required parts / components	Qty	Part	Description	Part #
	1		GS 2' gantry, assembled	TMS-180-1000-01
	1		Assembled frame components	From Step A2


- Instructions**
- Loosen the inner and outer bearings so that they can be moved outward to give clearance for the rail.
  - Set the gantry onto the sides over the rails. Make sure the vertical bearings are taking the weight of the gantry and that it is free to move.
    - Ensure that the gantry's tool-mounting plate faces away from the motors on the end of the two sides.

### Illustration



## Step A4: Check / adjust vertical bearings

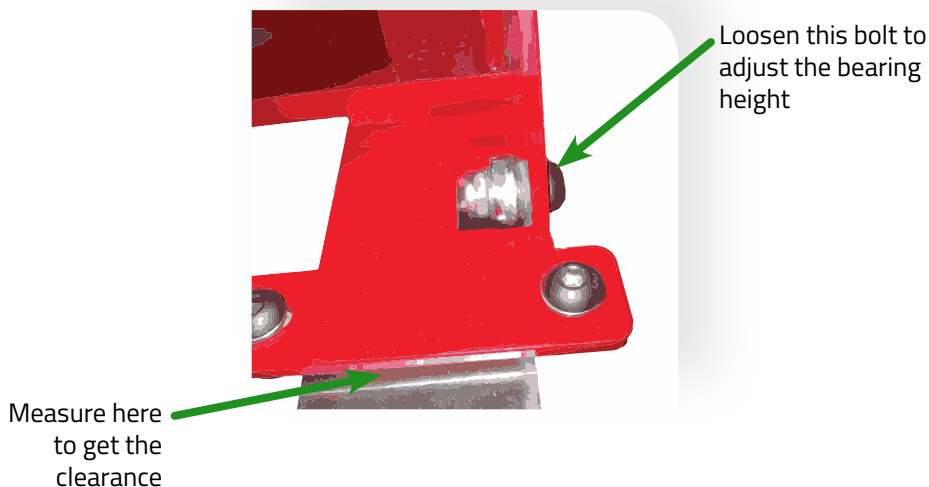
The smooth motion of the Torchmate 2x4 Growth Series CNC Cutting System gantry is managed by the four vertical bearings that carry the gantry's weight. In this step you check the gantry's clearance above the side rails and adjust its height, if necessary, by moving the vertical bearings.

Qty	Part	Description	Part #
1		Assembled cutting table	From Step A3

Required parts / components

- Measure the front and back clearances between each gantry end and the rails (four total measurements).
  - A clearance of approximately  $\frac{1}{8}$ " is desired.
  - Hint: The thickness of a new penny and a new dime (0.114 in.) or two new pennies (0.122 in.) is a good beginning clearance.
- Loosen and adjust each vertical bearing, as necessary, to achieve an equal clearance of approximately  $\frac{1}{8}$ " at each location.
- Tighten the vertical bearings fully.
  - Note: the vertical bearings may require further adjustment in a later step.

Instructions




Illustration

## Step A5: Adjust the first cross-member

With the gantry positioned on your Torchmate 2x4 Growth Series CNC Cutting System table, you can now begin to adjust the table's squareness and begin to tighten the cross-members. Squaring is essential for smooth and accurate gantry operation.

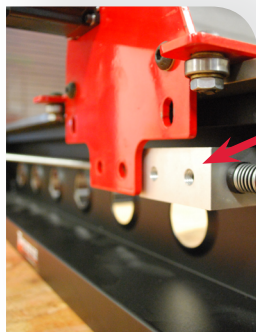
### Required parts / components

Qty	Part	Description	Part #
1		Assembled cutting table	From Step A4

### Instructions

- Move the gantry to one end of the table, until it reaches the stops.
- On each side rail, rotate the drive screw to move the aluminum brackets. Align the bracket holes with the gantry holes.
- If there is a gap between the bracket and the gantry, slide the sides outward in the cross-member channel until the gantry and bracket just touch with no pressure.
- If there is tightness between the bracket and the gantry, slide the sides inward in the cross-member channel until the gantry and bracket just touch with no pressure.
- Tighten one of the T-bolts on each end of the adjusted cross-member.

### Illustration

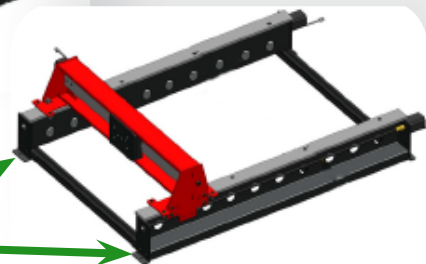


With the gantry at its stop and the bracket holes aligned with the gantry holes, check between the gantry and bracket for a gap or for tightness. They should just touch on both sides, with no pressure.

If a gap,  
slide outward



If tight,  
slide inward

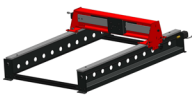



When adjusted, tighten one T-bolt  
at each end of the cross member



## Step A6: Adjust the second cross-member

With the gantry secured to your Torchmate 2x4 Growth Series CNC Cutting System table, you can now adjust the table's squareness and securely tighten the cross-members. When squared, the gantry will operate smoothly and accurately.

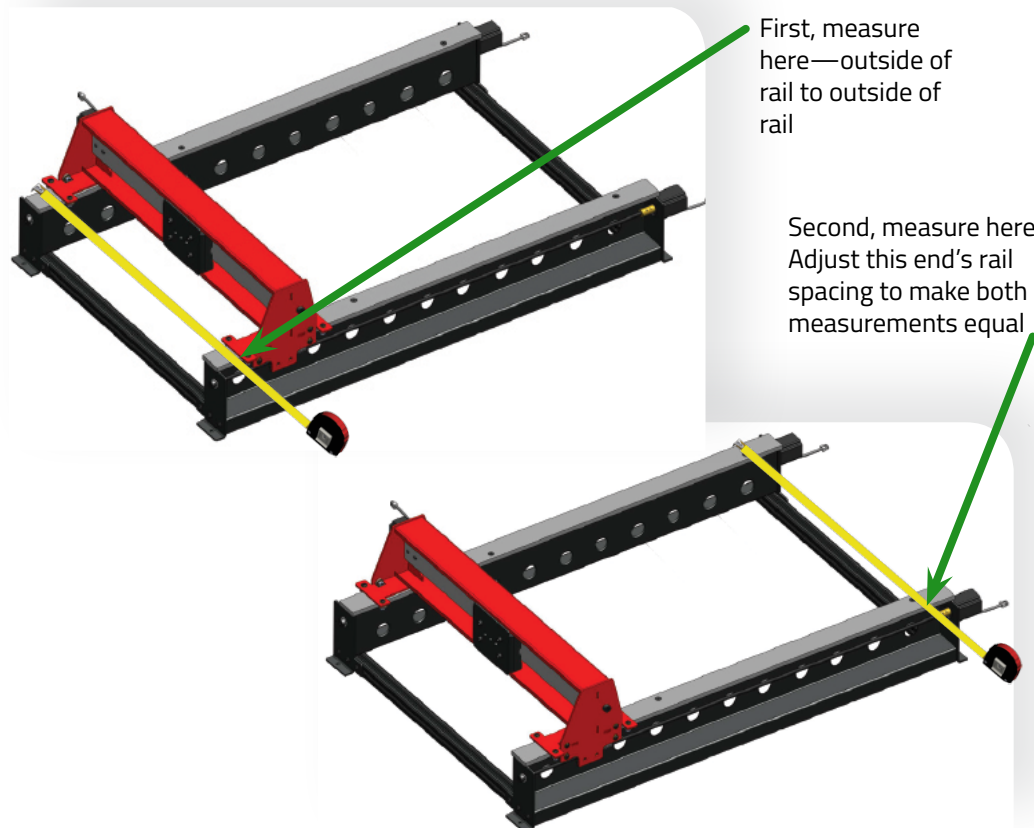
Qty	Part	Description	Part #
1		Assembled cutting table	From Step A5
1		Tape measure	(From your toolbox)

Required parts / components

### Instructions

- Measure the distance between the outside edges of the rails at the gantry end.
- Measure the distance between the outside edges of the rails at the other (non-gantry) end.
- Adjust side rails in the cross-members at the other (non-gantry) end to make both measurements the same.
- Re-check the measurements, and make diagonal (corner to corner) measurements to ensure the table is square.
- Tighten all T-bolts on both cross-members.



### Illustration



## Step A7: Link the gantry to the drive screws

Your Torchmate 2x4 Growth Series CNC Cutting System achieves accuracy and precision in cutting complex shapes because it uses anti-backlash nuts, which minimize backlash (play) on its drive screws. Here you will attach the gantry to the side rail drive screw brackets.

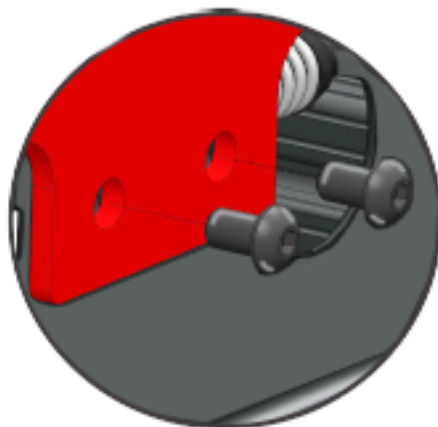
### Required parts / components

Qty	Part	Description	Part #
1		Squared cutting table	From Step 6
4		Screw, BSCS, 3/8"-16 X 1/2"	TMS-410-0318-08

### Instructions

- Check that you can bolt the gantry to the aluminum bracket without applying vertical force.
  - If the holes do not align vertically, adjust the gantry clearance by re-positioning the vertical bearings.
  - The bearings should support the entire weight of the gantry, leaving the drive screw free to rotate without any binding.
- Attach the gantry to the aluminum anti-backlash drive screw brackets on both sides of the table using button head screws.
- Fully tighten the screws to secure the gantry to the table.
- **Note:** With the gantry linked to the drive screws, only move the gantry using software jogging or programmed motor control. Don't try to move the gantry by hand.

### Illustration



**Use button head screws to attach the gantry to the spring-loaded, anti-backlash nut.**

# Binding the Accumove™ 2

# Overview of wiring

For adjusting the 2x4 Growth Series CNC Cutting System table, you only need a minimal setup for the Torchmate Accumove2. Establish communications between the controller and the computer, load the software, and run the X and Y motor cables from the table to the controller. Later, you will see how to connect a typical plasma cutter and other tools.

- Summary**
- The Accumove2 controller is the destination for the table's motor cables and the computer's Ethernet crossover cable. The cable ends are ready to plug in to the back of the box.
  - The Accumove2 box should be located so that it is not exposed to cutting spatter (or splashing from a water table), and so that the motor cables do not need to be coiled.
  - Coiled cables can introduce troublesome noise into the electronic signals and should be avoided.

Illustration of initial wiring needed for table adjustment

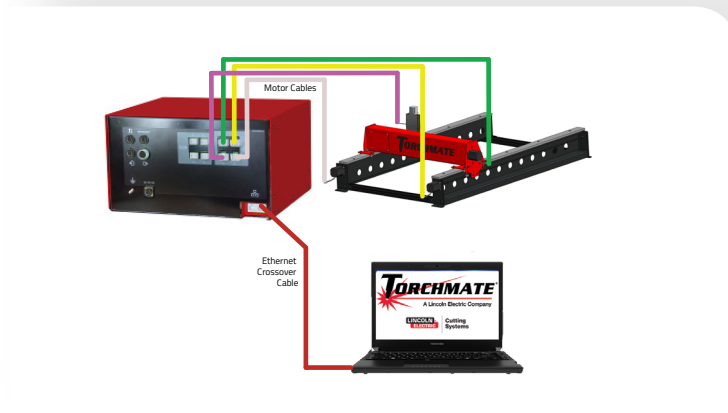
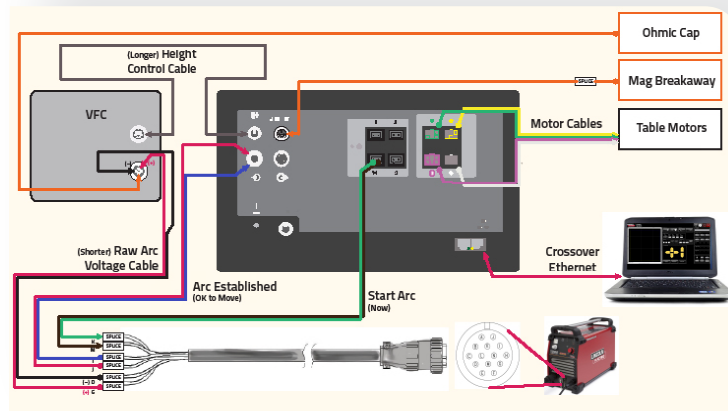







Illustration of wiring needed later for typical table operation



## Step B1: Run crossover Ethernet cable

Using an Ethernet cable connection, the Torchmate Accumove2 receives commands from the VMD (CAM) software that runs on the laptop (or PC). To make it easy to begin operations, an Ethernet crossover cable (red) is provided that requires no other network devices to establish communication.

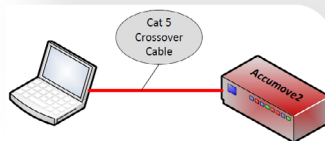
Qty	Part	Description	Part #
1		Accumove2	BK1250-200000
1		24V 6.67A DC power supply,	TMS-400-0003-02
1		AC power cable	TMS-402-0069-01
1		Laptop or PC with Microsoft Windows 8, Windows 7, Vista, or XP	<i>(separate purchase)</i>
1		Crossover Ethernet cable	TMS-103-5000-07

Required parts / components

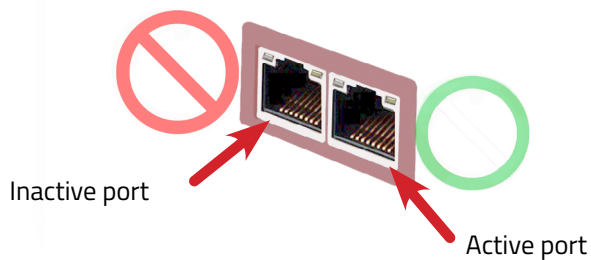
- The Accumove2 CNC controller comes with a power supply and a red crossover Ethernet communication cable.
  - **NOTE: A regular Ethernet cable cannot be used in place of the crossover cable,** because the wires arrive in a different order on the connectors. Be sure to **use the red crossover** Ethernet cable to connect directly from the computer to the Accumove2 CNC controller.
- Run the red crossover cable from the computer's Ethernet port to the active (right-hand) port on the Accumove2 CNC controller box. The left-hand port is inactive for connecting to the laptop (or PC).

Instructions

Direct connection with the crossover cable



Illustrations






Only use the right-hand Ethernet port on the Accumove2 controller

## Step B2: Run motor cables

The three motors that move the gantry and the torch (or other tool) upon the gantry receive their power and control signals from the Accumove2 box. You will connect the motor cables using the color-codes on the cable ends.

### Required parts / components

Qty	Part	Description	Part #
1		Squared cutting table	From Step A7
1		Accumove with Ethernet cable	From Step B1
4		Cables, motor, Molex / XLR, 25 ft	TMS-402-0010-01

### Instructions

- Connect the motors to the Compact CNC Controller box with the 25 ft. motor cables. They have color coded ends and should be connected as illustrated.
  - The purple color coded wire for the Z-axis torch lifter motor will be connected in part D.
- The cables should "click" into place.
- To avoid electronic noise, be careful not to crimp the wire, especially near the connectors at either end, and avoid coiling or crossing the wires.
- IMPORTANT:** *Never connect a motor cable while the Accumove2 is powered on. This will cause irreversible damage to the Accumove2.*

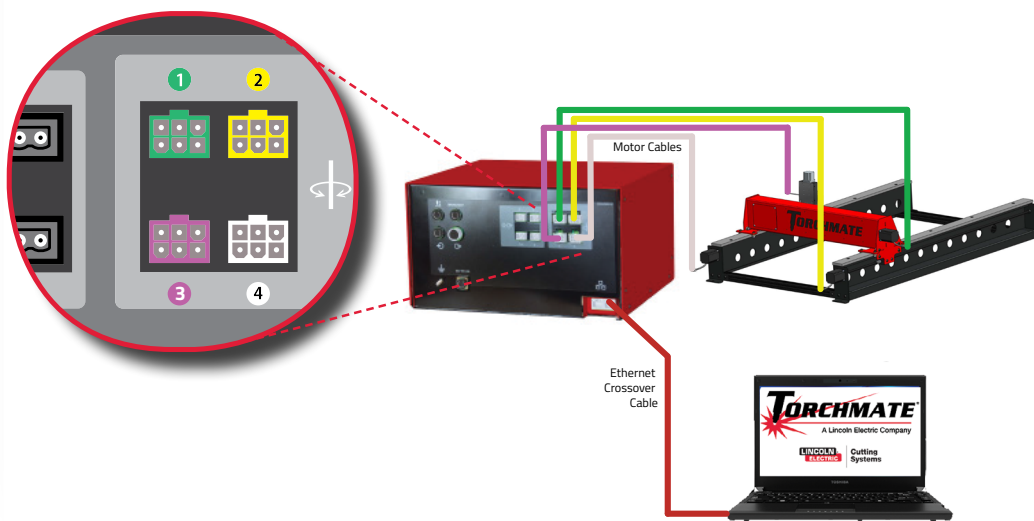
Connect motor cables in the indicated order:

1 green  
= gantry

2 yellow  
= rail

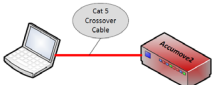

3 purple  
= Z-axis / AVHC

4 white  
= rail



## Step B3: Install the VMD software

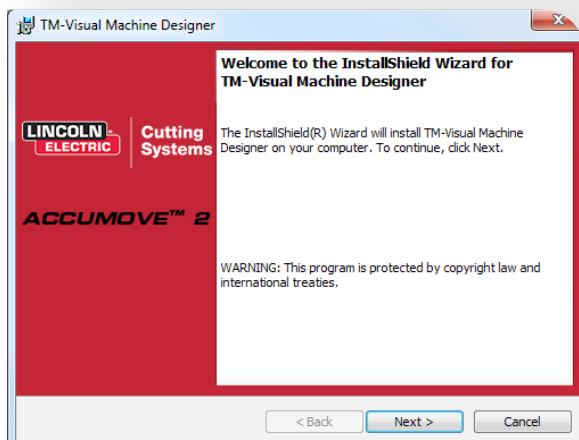
The VMD software controls the table. The laptop (or desktop) computer that runs Torchmate VMD software sends commands to the Accumove2, which then sends signals to the table's motors and also (typically) to the plasma cutter to fire the torch. The software must be installed on the computer from the USB flash drive.

Qty	Part	Description	Part #
1		Laptop or PC connected to Accumove2	From Step B1
1		USB flash drive: Driver software and owners manuals.	TMS-100-1000-01

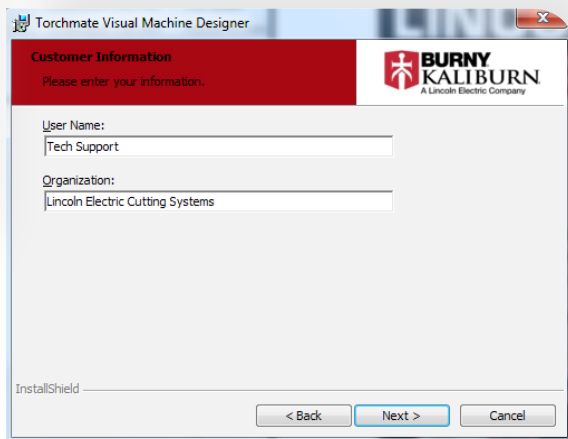
Required parts / components

- Insert the USB Flash drive into one of the computer's USB ports.
- Launch the installer: **TM-VMD Setup-v1.0.0.0-vmd-22.exe**.
  - The installer copies the software onto your computer and continues the installation.
- To complete the installation, click the radio button that accepts the **End User License Agreement (EULA)**.
- Under **Customer Information**, enter a **User Name** and **Organization**, then click **Next**.
- For the **Destination Location**, accept the default, and click **Next**.
- When the installer completes, click the **Finish** button. The program's icon will be in the operating system's Start menu or screen.
- You can now remove and store the USB flash drive.

Instructions




Installation screens



## Step B4: Set the IP address

For security, the Accumove2 controller restricts its communication to only a computer with a known (static) IP address running the Accumove2 software. The controller itself also uses a static address.

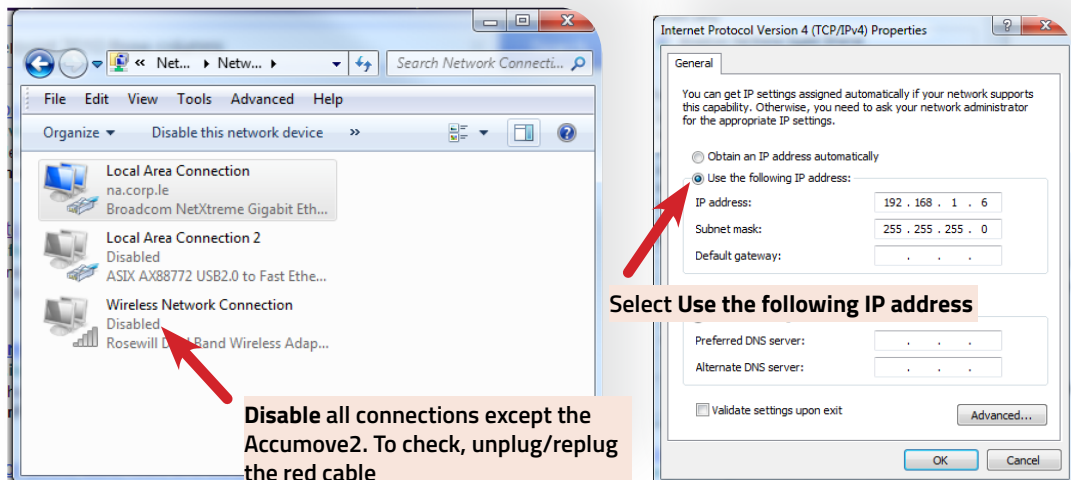
### Required parts / components

Qty	Part	Description	Part #
1		Computer with VMD software and Accumove2	From Step B3

### Instructions

- The first time you use the Accumove2, its IP address is pre-set to 192.168.1.7 and it also requires the computer to use 192.168.1.6. After installing the crossover cable, set the computer's address.
  - From your computer's Control Panel, open the **Network and Sharing** control panel. On the left side, select **Change Adapter Settings**.
  - In the Network Connections window, disable all connections except for the wired crossover cable connection by right clicking on the icon(s) and selecting **Disable**.
  - Right click on the crossover connection and select **Properties**. Select **Internet protocol version 4 (TCP/IPv4)**. Select the **Properties** button below the list.
  - Select **Use the following IP address**. Enter **192.168.1.6** in the IP address field. Press the **Tab** key to fill in the Subnet mask. Click **OK** to save.
- Power on the Accumove2, then start the VMD software.

### Installation screens




**Disable all connections except the Accumove2. To check, unplug/replug the red cable**

**Select Use the following IP address**



## Step B5: Set the initial datum and log on to VMD

So that the VMD can begin communicating position information with the Accumove2, the first requirement is to set the initial location as the machine's temporary datum. This will be reset to the actual machine datum after the configuration file is loaded. The VMD software protects your machine setup and use by requiring a user name and password to log on.

Qty	Part	Description	Part #
1		Computer and Accumove2 with crossover cable, and IP address	From Step B4

Required parts / components

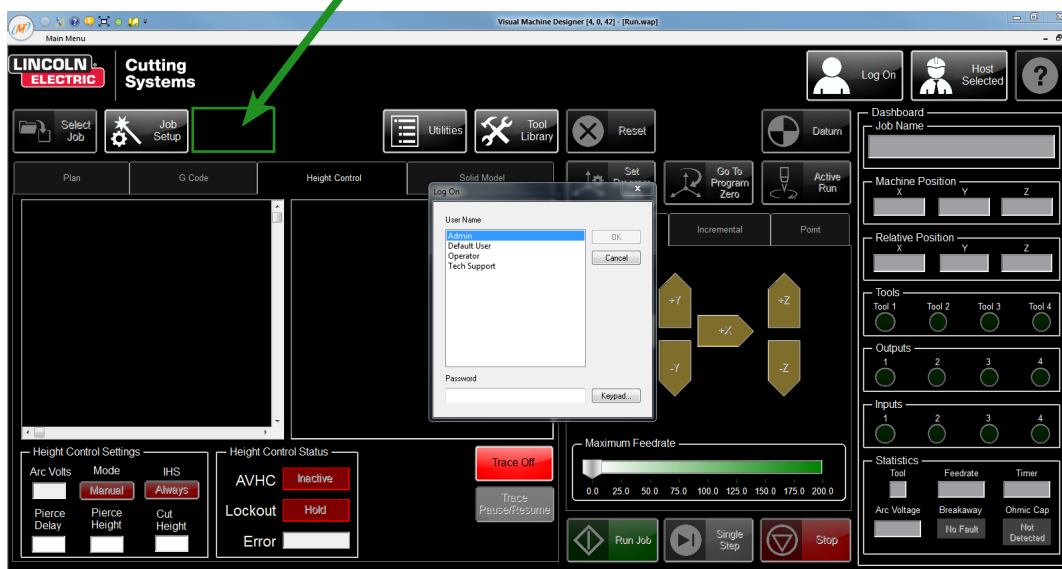
- **IMPORTANT:** *Never connect or disconnect a motor cable while the Accumove2 is powered on. This will cause irreversible damage to the Accumove2.*
- If you haven't powered on the Accumove2 and started the VMD software, perform these steps. Until the Accumove2 completes its start up process, you may see a "Not Connected" screen which should soon disappear.
- A notice box requests "Please switch the drives on." Click **Hide**. The drives are automatically switched on when the table **Datum** is set in a later step.
- Click the **Log On** button to bring up the log on screen. Select the **Admin** user name and enter the password for that name. When the Accumove2 is first powered up, the default password for the Admin user is "1234." This may be changed to protect the Accumove2 from configuration changes by unauthorized personnel.
  - The **Operator** user name requires no password by default, but this may be changed.
- When the **Admin** user log on is completed, you will see a new button on the **Run** screen labeled **Machine Settings**.

Instructions



The **Machine Settings** button will appear here


User name / password screens



## Step B6: Load configuration file for table

The configuration for each type of table and each type of tool is saved in a configuration file. Here we will find the file for this table and tool combination and load it.

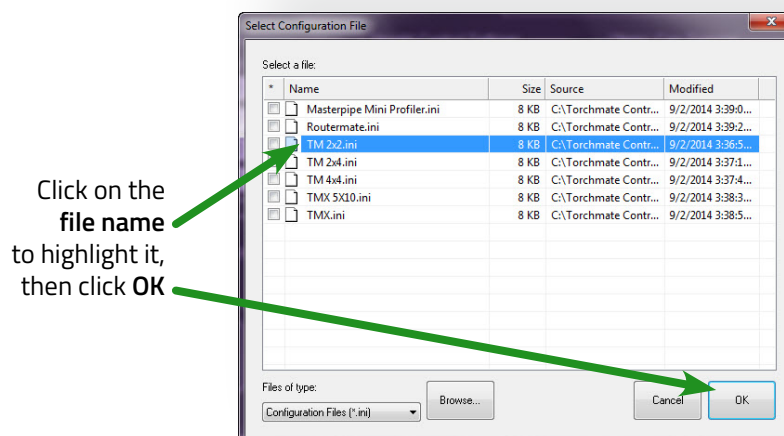
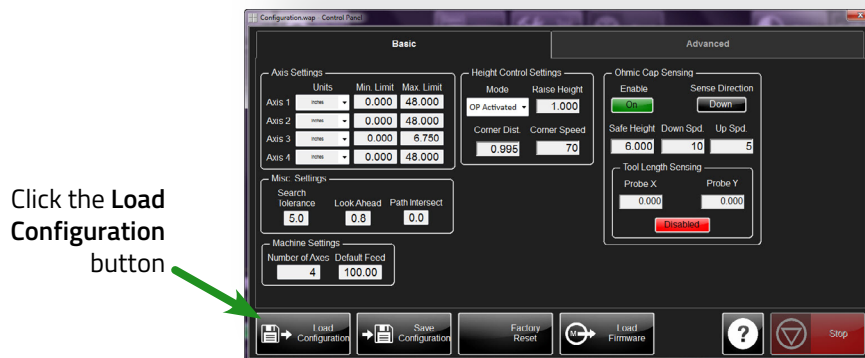
Required parts / components

Qty	Part	Description	Part #
1		GS Table, computer and Accumove2 (logged in)	From Step B5

### Instructions


- Click on the **Machine Settings** button to display the Configuration control panel, then click the **Load Configuration** button.
- Select the your machine's configuration file, and click **OK**.
  - Unless your table is reconfigured, you will not need to change any of the settings.
  - When you install the VMD software, the standard configuration files for Torchmate tables are placed in the **C:\Torchmate Controller Data\Configurations** folder. After any custom configurations are performed on your table, the new configuration can be saved for future use, but for now, the standard configuration is all that is needed.

### Illustrations



## Step B7: Setting and resetting the table's datum

The Accumove2 calculates all position offsets and speeds by referring to a 3-axis zero point. This point is referred to as the table's "datum." Without its datum, your table cannot operate, so it must be set whenever the Accumove2 is powered on. Setting the table's datum tells the Accumove2 to use the current X, Y, and Z coordinates as the zero point for each of the axes (0, 0, 0). On power up, set the datum to the current position (to enable movement), then move to the desired zero position using the jog buttons, then reset the datum.

Qty	Part	Description	Part #
1		GS Table, computer and Accumove2 (configuration file loaded)	From Step B5

Required parts / components

- The jog buttons on the run screen appear dark yellow until the drives are enabled by setting the datum. Click the **Datum** button to enable the jog buttons.
- If the table's gantry is not already at the table's zero X-position limit, it will need to be jogged there. At this point in the setup and adjustment of the table, the tool's Y-position on the gantry is not critical, but jogging to the table's zero Y-position limit is good practice.
- Accumove2 is designed to operate in the +X / +Y quadrant. For safety, it limits motion in the other three quadrants to a very slow speed. Be patient and bring the table to the desired zero X- and zero Y-position.
- Click the **Datum** button again. Whenever the button is clicked, the current position becomes the datum with the coordinates of (0, 0, 0) in 3 dimensions.
  - Setting the datum will be done again once the Z-axis is installed, and every time the Accumove2 is powered on.
  - Remember to return the tool to the datum position before turning off the Accumove2 to make setting the datum easier at the next start up.

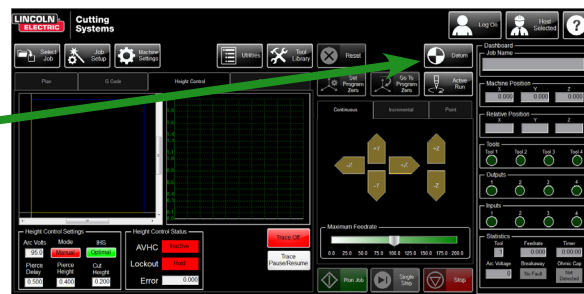
Instructions

- / + slow	+ / + fast
- / - slow	+ / - slow

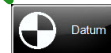
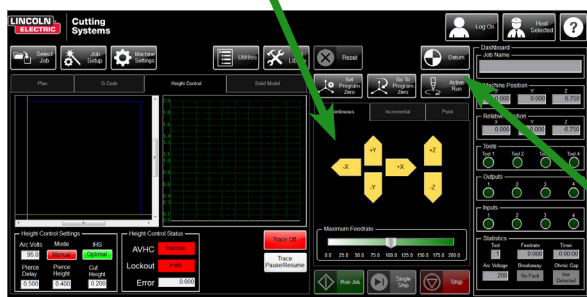


Click **Datum** to enable the jog buttons

Jog to the zero position with the **jog** buttons



Illustrations




Click **Datum** again to re-set the datum

## Step B8: Jog gantry to set side bearings

Once the VMD software is installed and configured, the table can be moved under software control. This step positions the inner and outer side bearings using the motion of the gantry, and it checks for any movement problems as adjusted at normal speeds.

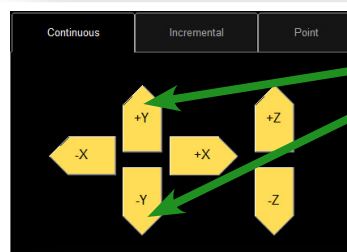
### Required parts / components

Qty	Part	Description	Part #
1		Laptop or PC, Accumove2, and wired CNC Cutting table	From Steps B7

### Instructions

- The nuts holding the inner and outer gantry side bearings should be loose enough to move with a little pressure, but not so loose they "rattle." The gantry should still be at one end.
- At each rail, move the inner and outer bearings toward the rail so they just touch the rails.
- Open the VMD software and click the **Configuration** button. **Datum** the table, and load the correct configuration file. See Step B6 and B7.
- Click the **Home** button. Click the **Job Setup** button.
- Click the **-Y** and **+Y arrow** buttons to move the gantry from one end of the table to the other. As the bearings have not been tightened, they will self-adjust during the movement.
- Use the jog **Arrow** buttons to move the gantry to the other end of the table. The arrows are sensitive to their touched position. Touching and sliding toward the tip increases speed, while touching and sliding toward the center of the arrows decreases speed.
- If there are any clearance issues with the side bearings, they will self-adjust.
- Without moving the side bearings from where they self-adjusted, tighten the inner and outer side bearings at each end of the gantry.

### Illustration



Use the Y-axis arrow keys to jog the gantry to each end of the table

If the gantry binds, contact  
Torchmate  
Technical Support



#### TECHNICAL SUPPORT

Toll Free: 1-866-571-1066





International: 775-673-2200

Fax: 775-673-2206

Email: [support@torchmate.com](mailto:support@torchmate.com)

## Step B9: Add underside bearings (optional)

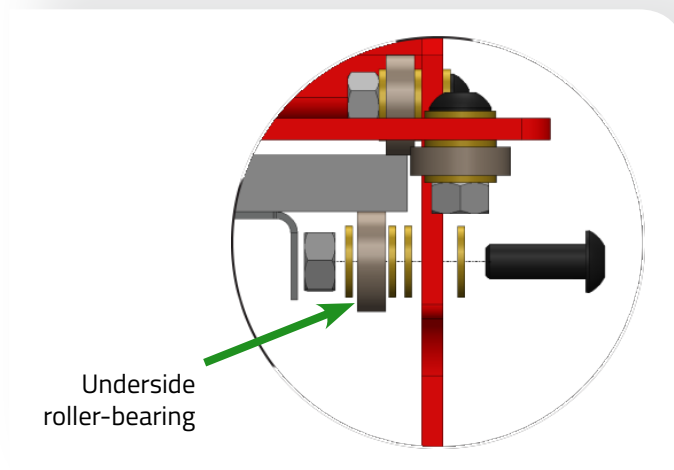
If a routing tool is mounted on the Torchmate 2x4 Growth Series CNC Cutting System table, you can help prevent the gantry from being lifted from the rails during routing by installing underside roller bearings. The top and side bearings are pre-installed on the gantry, but you must add the underside bearings for routing configurations.

Qty	Part	Description	Part #
1		Assembled side and gantry components	From Step B8
4		99R6 ball bearings	TMS-432-0010-01
4		Screw, BSCS, 3/8" – 16 X 1	TMS-410-0218-16
4		Nut, Nylock, 3/8" – 16 steel, zinc-plated	TMS-414-0201-18
16		Washer, flat, 3/8", steel, cadmium-plated	TMS-413-0406-18

Required parts / components

- For use in routing applications, assemble four roller bearings on the underside of the gantry, two on each side. Each assembly includes: a button head screw, four washers, a roller bearing, and a hex nut.
- Pass the screw through one washer, then through the gantry. On the inside of the gantry, place two washers on the screw, followed by the bearing, another washer, and the hex nut.
- Position the roller bearings so that they make only light contact with the underside of the rails when moved through the full gantry travel, and then tighten them fully.

Instructions

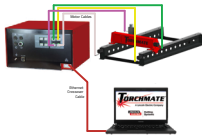


Illustration

## Step B10: Test jog gantry at high speed

The Torchmate 2X4 Growth Series CNC Cutting System table should now be ready for operation. This step tests for any binding or problems with moving the gantry at fully adjusted operational speeds.

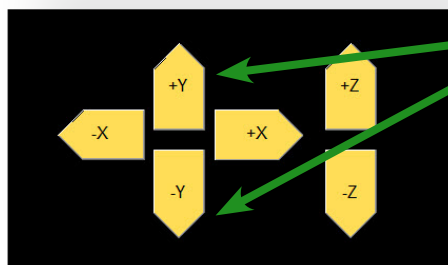
### Required parts / components

Qty	Part	Description	Part #
1		GS Table, computer and Accumove2 (with side bearings set)	From Steps B8 or B9

### Instructions

- Open the VMD software and click the **Configuration** button. **Datum** the table, and load the correct configuration file. See Step B7 for configuration file loading.
- Click the **Home** button. Click the **Job Setup** button.
- Click the **-Y** and **+Y** buttons to move the gantry from one end of the table to the other. Because the side bearings have not been tightened down, they should adjust their position during the movement.
  - The gantry should move freely. If so, tighten the bearing nuts, maintaining and re-checking the bearing positions.
- Select **Fast** jogging speed by clicking the arrow and dragging toward the arrowhead.
  - Closely observe and listen while the gantry moves.
  - If there is any binding or if the motors are “fighting” each other, stop the test and contact Torchmate Technical Support.

### Illustration



Use the Y-axis arrow keys to jog the gantry to each end of the table

If the gantry binds, contact Torchmate Technical Support



#### TECHNICAL SUPPORT

Toll Free: 1-866-571-1066

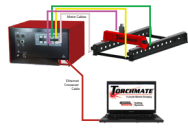
International: 775-673-2200

Fax: 775-673-2206

Email: [support@torchmate.com](mailto:support@torchmate.com)

## Typical additional wiring steps

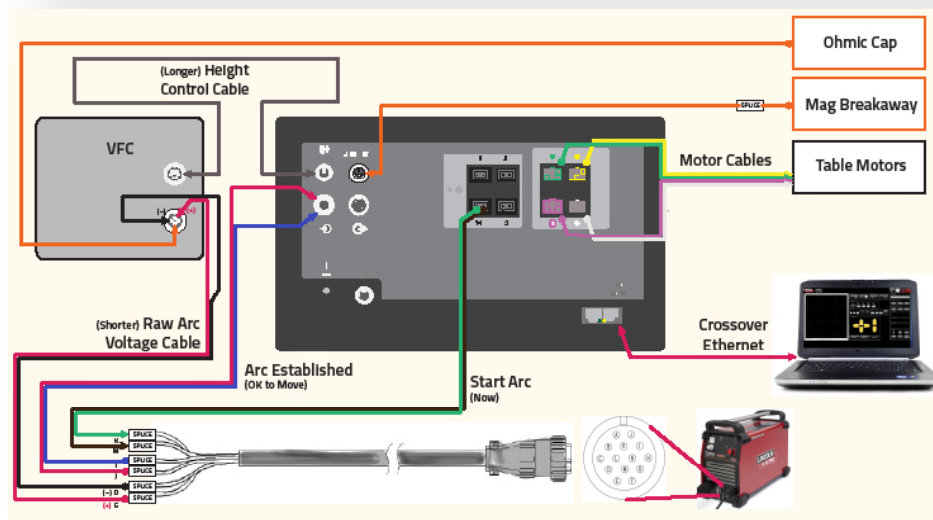
The Torchmate 2X4 Growth Series CNC Cutting System table is most frequently used with a plasma cutter. This general discussion describes the additional connections that prepare the table for plasma cutting.

Qty	Part	Description	Part #
1		GS Table, computer and Accumove2 (tested at high speed)	(multiple)

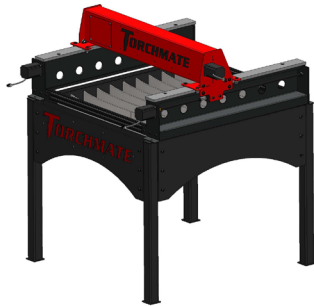
Required parts / components

- See section D - Deploying Tools. If you are adding a plasma cutter, you will:
  - Mount and attach the torch to the gantry
    - Route the z-axis motor cable and the ohmic sensing wire through the cable carrier and connect them to the motor and the ohmic cap.
    - Connect the (optional) magnetic breakaway cable
  - Connect the height control cable between the VFC unit and the Accumove2.
  - Connect the torch relay wires in the plasma cutter's CNC cable to the Accumove2.
  - Make the connections from the plasma cutter's CNC cable to the VFC unit and also to the Accumove2.
  - Connect ground wires to the VFC unit and to the Accumove2.
  - Run the torch lead from the plasma cutter to the gantry torch mount. Keep the torch lead as far as possible from the motor cables to reduce EMI.
  - Provide the plasma power supply with appropriate power and air/gas connections.
  - Run the work lead to the workpiece.
- Note:** Electrical noise in a busy shop can be a problem for table operation. If you are advised to install a direct earth/ground rod-to-table cable, consult a qualified electrical worker to ensure code compliance. Refer to our [EMI Reduction](#) information.
- If you are adding other types of tools, consult the manuals that accompany those tools for mounting and configuration instructions.

Instructions



Torch connections





# Coupling the water table (optional)

## Assemble the (optional) 2X4 water table

In the following steps, you will assemble the water table if you purchased this option. The water table supports the CNC cutting table, supports the workpiece being cut, and safely eliminates nearly all of the sparks, dust, and smoke during cutting. Eight steps are required to complete the water table assembly.

---

- Assembly steps**
- The 2X4 water table is assembled in a series of easy steps.
  - Step C1: Assemble the two end panels
  - Step C2: Add a leveling foot to each leg
  - Step C3: Attach legs to each end panel
  - Step C4: Connect the end panel with legs to the side panels
  - Step C5: Seal the water pan edge to the water pan bed
  - Step C6: Install the drain valve and place the pan within the table
  - Step C7: Add the material support slats.
    - (Note: these slats are components you will cut to fit from local material, and are not included in your shipment.)
  - Step C8: Secure the cutting table to the water table
- Required space**
- The completed water table is compact and can easily be assembled for use in a small space. Its dimensions are: 37 $\frac{5}{16}$ " X 61 $\frac{3}{4}$ " X 30 $\frac{5}{16}$ "
  - When planning for the table's location, consider access to power for the plasma cutter (208V or 230V / 1 or 3 phase / 50 or 60 Hz), power for the computer and CNC controller (120 V), access to compressed air (and/or recommended gas), and how to obtain (and drain) the water.

**155 lbs**  
**71 kg**



- The completed water table is sturdy and heavy-duty, so that it can safely support the material you cut.
- With the cutting table installed, the table is even heavier: close to 280 lbs (127 kg).
- To prevent damage to the table and to maintain its square alignment, never drag it.
- When you need to re-position the water table, or move it to a new location, drain all the water and get help lifting it.

**Weight of completed water table**







**Completed water table**

## Step C1: Assemble the two end panels

The first step in water table assembly is attaching together the two plates that make up the water table's end panels. Each plate is held on with six screws and locking nuts.

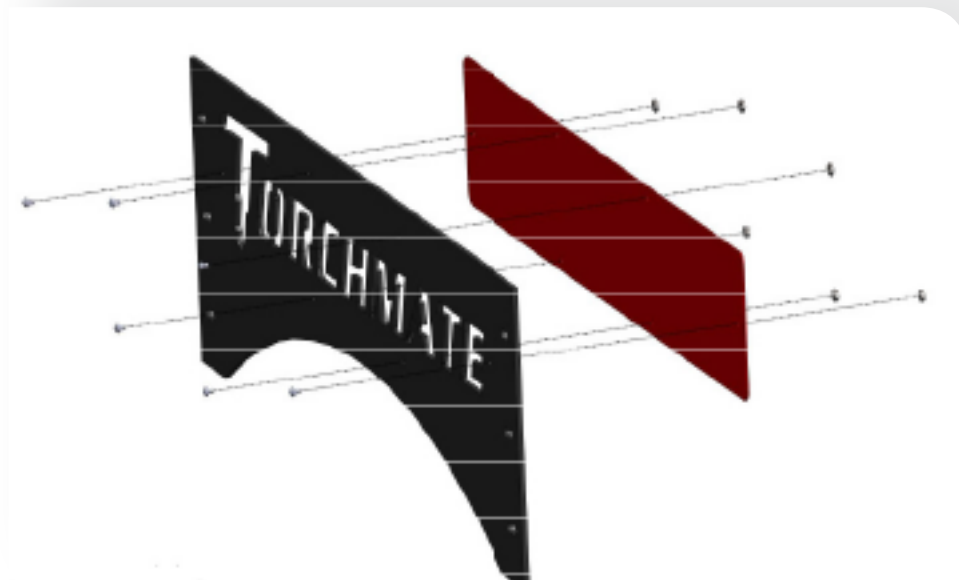
Required parts / components

Qty	Part	Description	Part #
2		GS water table side-long with cutout	TMS-180-0001-05
2		GS water table side backplate-long	TMS-180-0001-06
12		Screw, BSCS, 10-32 X 1/2"	TMS-410-0511-08
12		Nut, Nylock, 10-32, steel, zinc plated	TMS-414-0201-11

### Instructions




- Attach the **Side Panel Back Plate** to the **'Torchmate' Cut Side** using six **#10-32 Button Head Cap Screws** and six **#10-32 Hex Nuts**.
- Repeat this assembly for both cut sides.
- Fully tighten the nuts to the screws.

### Illustration



## Step C2: Add a leveling foot to each leg

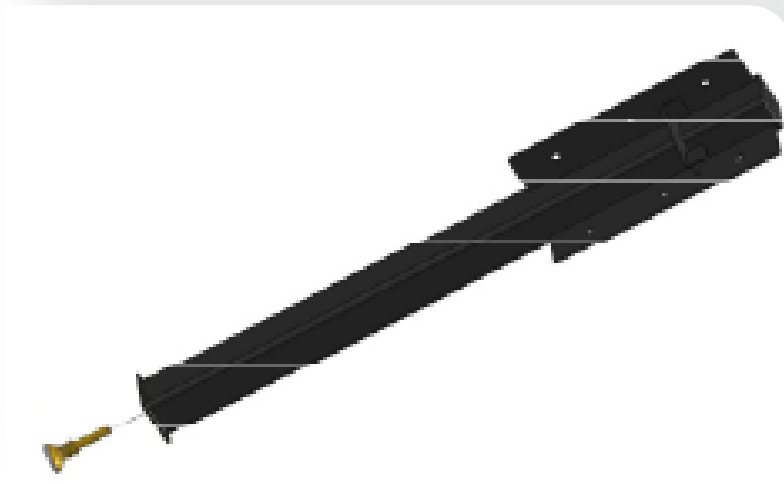
The second step in water table assembly is to attach a leveling foot to each of the four legs. The leveling feet are used to level the table when the floor is uneven. Each leg will be adjusted individually before filling the table with water.

Qty	Part	Description	Part #
4		GS water table leg - corner leg	TMS-180-0001-28
2		GS water table leg - side leg	TMS-180-0001-29
6		$\frac{3}{8}$ " - 16 stud leveling foot	TMS-448-0001-01

Required parts / components

- On each Corner Leg attach one  $\frac{3}{8}$ " Leveling Foot into the bottom base plate.
- Repeat for each side leg.
- The leveling feet will be adjusted once the table is fully assembled and in position.

Instructions







Illustration

## Step C3: Attach legs to each end panel

In the third step, you attach the legs to both end panels. Because adjustments may be required later, you only partly tighten the screws now.

### Required parts / components

Qty	Part	Description	Part #
2		Assembled end panel component	From Step C1
4		Assembled corner leg component	From Step C2
12		Screw, BSCS, $\frac{5}{16}$ " – 18 X $\frac{5}{8}$ "	TMS-410-0216-10
12		Nut, Nylock, hex, $\frac{5}{16}$ " – 18, steel, zinc-plated	TMS-414-0201-16







- Instructions**
- Attach one assembled cut out side from **Step 1** to two assembled legs from **Step 2** using six  $\frac{5}{16}$ " – 18 x  $\frac{5}{8}$ " **Button Head Cap Screws** and six  $\frac{5}{16}$ " – 18 **Hex Nuts**
  - The side panels are slotted to be adjusted once the cutting table is attached.
  - Repeat this assembly for the second cut out side.
  - Do not fully tighten the cap screws.

### Illustration



## Step C4: Connect the side legs and side panels

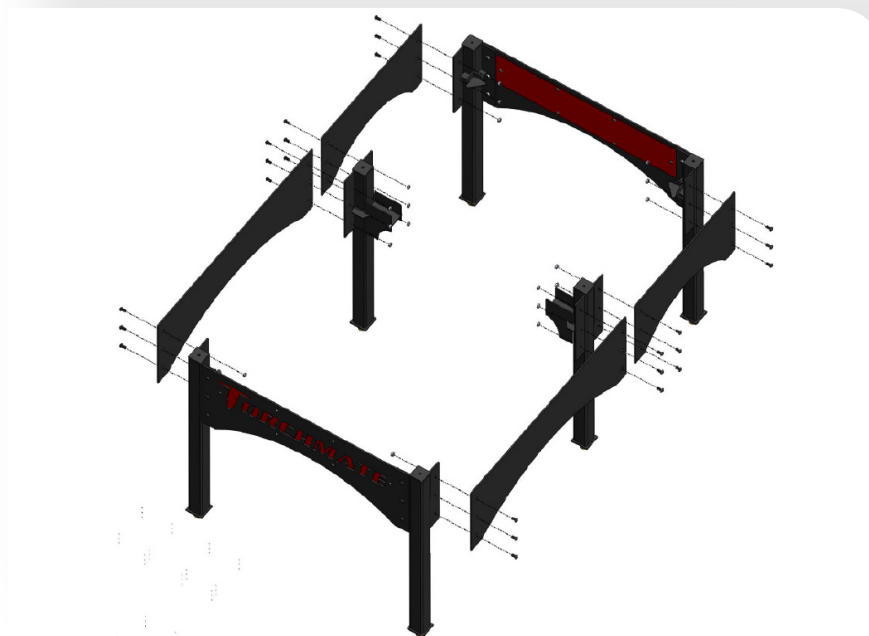
In the fourth step, you will attach the side legs and panels to the corner legs and end panel assemblies. Because adjustments may be required, you'll only partly tighten the screws.

Qty	Part	Description	Part #
2		Assembled end panel/leg component	From Step 3
2		GS water table leg-side	From Step 2-wt
2		GS water table side-long	TMS-180-0001-07
2		GS water table side-short	TMS-180-0001-08
24		Screw, BSCS, $\frac{5}{16}$ "-18 X $\frac{5}{8}$ "	TMS-410-0216-10
24		Nut, Nylock, hex, $\frac{5}{16}$ "-18, steel, zinc-plated	TMS-414-0201-16

Required parts / components

- Complete assembly of the legs and sides of the water table frame. Attach the side panels (short and long) to the side legs and end panel/corner leg components using  $\frac{5}{16}$ "-18 X  $\frac{5}{8}$ " button head cap screws, and  $\frac{5}{16}$ "-18 hex nuts.
- The panels are slotted for adjustment after the cutting table is attached.
- Do not fully tighten the cap screws.

Instructions





Illustration

## Step C5: Insert cross-member into frame

In the fifth step, you add the cross-member to the basic water table frame (legs and side panels). This cross-member helps to support the weight of the water pan, the slats, and the work material itself. The cross-member simply drops into place.

Required parts / components

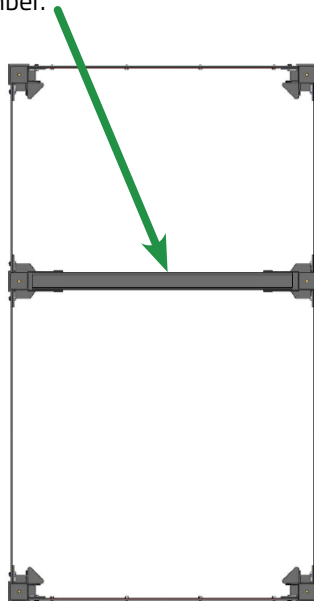
Qty	Part	Description	Part #
1		Assembled panel and leg components	From Step C4
1		GS water table cross member 30	TMS-180-0005-01

Instructions

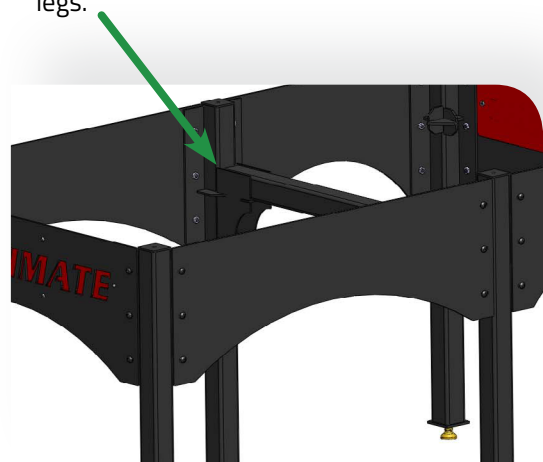
- Insert the cross-member into the support channels welded into the side legs. These will support the cross-member and the weight it carries.
- No attaching hardware is required.
- Note: the slotted side panels will be adjusted after the cutting table is placed upon the water table. Do not fully tighten the cap screws at this time.

Illustrations

This overhead view of the water table's legs and sides shows where to add the cross-member.



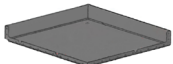
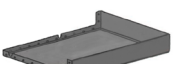




The cross-member is retained by the welded support channels in the side legs.





## Step C6: Seal the edge to the water pan bed

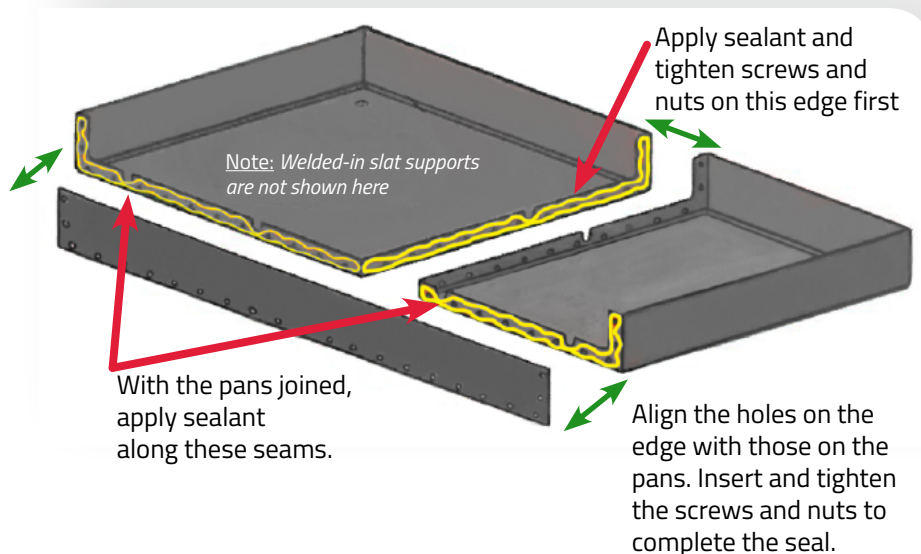
The 2x4 Growth Series water pan bed, which holds the water, is built in multiple pieces so that during "growth" to the larger sized water tables, the existing pans can continue to be used. The sixth step attaches the pans and edge as well as seals the water pans.

Qty	Part	Description	Part #
1		GS water pan, 2x2	TMS-180-0002-02
1		GS water pan, 2x4	TMS-180-0001-17
1		GS water pan edge, 2x4	TMS-180-0001-18
35		Screw, BSCS, 5/16" - 18 X 5/8"	TMS-410-0216-10
35		Nut, Nylock, hex, 5/16" - 18, steel, zinc-plated	TMS-414-0201-16
1		GS silicone sealant, tube	TMS-180-1001-01

Required parts / components

- Apply a generous, continuous, double-bead of silicone sealant to the mating surfaces of the water pan beds and edge. Avoid gaps in the sealant, which may cause leakage.
- Attach the water pans together and then add the edge with screws and nuts. Don't tighten so much as to squeeze out all the sealant.
- Trim off the excess sealant after it has thoroughly set.

Instructions







Illustration

## Step C7: Install the drain valve and pan

In step seven, you install the drain valve in the water pan, and then set the pan into the table frame. The pan will be filled with water after the cutting table is added.

### Required parts / components

Qty	Part	Description	Part #
1		Assembled water table frame	From Step C5
1		Assembled water pan	From Step C6
1		TFP-AR small table 3/4 plumbing (water release valve)	TMS-459-0010-01
1		PTFE thread-sealant tape (recommended)	(separate purchase)

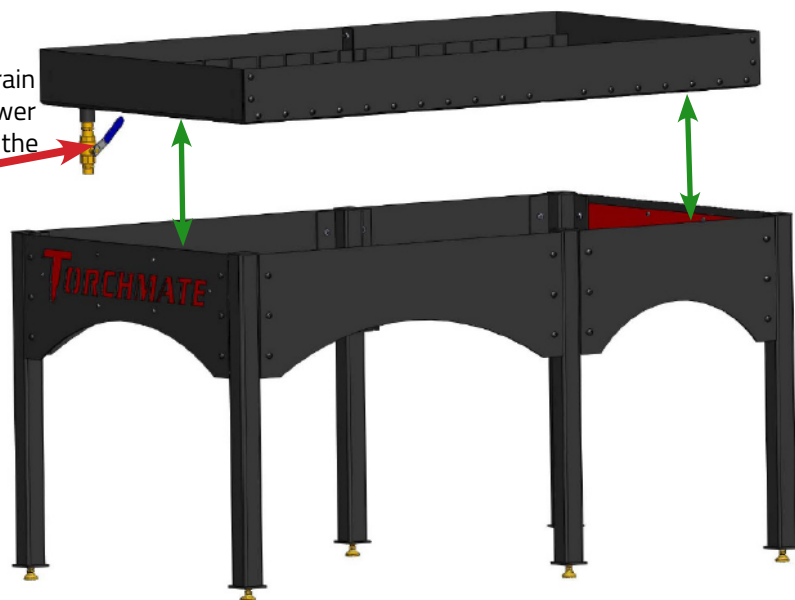
### Instructions



- Wrap PTFE tape around the valve threads and tighten the water release valve into the water pan.
- Get some help, as the pan is heavy. Carefully lower the pan into the table frame assembled in Step 5. The pan simply rests in the frame.
- You may connect a hose or other plumbing to the drain valve so that you may dispose of the table's water appropriately, as necessary.



### Illustration

Install the drain valve and lower the pan into the frame



## Step C8: Add the material support slats

The 2x4 water table provides a heavy-duty support system for the material being cut using slats that you supply (and replace from time to time) from local material. Placed on edge, with a slight curvature, the slats develop the strength required to provide durable, long lasting service. Sparks, debris, and smoke from the cutting process are minimized because of the open access to the water surface between the slats.

Qty	Part	Description	Part #
1		Assembled water table with pan	From Step C7
19		Material support slats 30½" x (3 to 4)" x ¾"	<i>(Obtain slats locally—not supplied)</i>

Required parts / components

- Cut nineteen material support slats from ¾" thickness material. Make them 30½" long and between 3" and 4" wide. (This material is not supplied with your water table.)
- 3" to 4" high slats may be used. A 4" high slat will place the material at the top of the water table. A lower slat height allows greater control over water contact with the cut material.
- Insert the slats into the slat support brackets in the pan. The offset in the brackets creates a curve in the slats, which increases their strength and weight-bearing capacity.
- Over time, you will replace slats. This is normal.

Instructions

The material to be cut will rest directly on the slats







Illustration

## Step C8: Secure cutting table to water table

Finally, in the eighth step, you mount the cutting table onto the water table. Because the cutting table is heavy, have someone available to help lift it. After mounting it securely, check the table's squareness by measurement and by high-speed jogging.

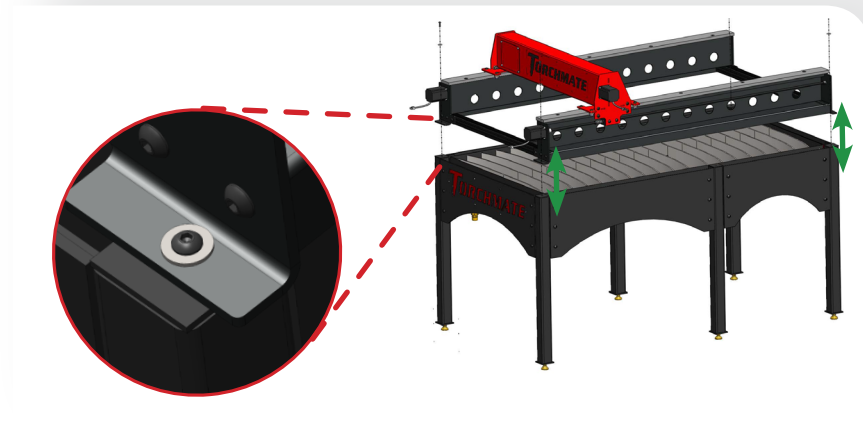
### Required parts / components

Qty	Part	Description	Part #
1		Cutting table	From Step A14
1		Water Table	From Step C8
4		Screw, BSCS, 1/4"-20 X 3/4"	TMS-410-0214-12
4		Washer, flat 1/4" washer, steel, zinc-plated	TMS-413-0001-16

### Instructions

- Attach the cutting table to the water table's legs. The legs have threaded holes. Use button-head cap-screws and flat washers.
- Check that the table is square and level. Adjust the leveling feet, as needed. Refer to Step A5 of the cutting table installation for the beginning steps of the squaring procedure.
- With the table square and level, fully tighten all screws.
- Fill the water pan with water and check for leaks.

### Illustration



# Deploying the Plasma Cutter

## Cutting tools for Growth Series™ tables

The Growth Series tables with Accumove2 Technology include an AVHC control and Z-axis lifter station for plasma cutting. The steps that follow illustrate the mounting and wiring for a plasma cutter and AVHC. It is optional to use a variety of different types of tools to preform other CNC cutting or engraving operations. For instructions on how to mount and configure other tool options, refer to the manuals supplied with them.

### Intelligent AVHC for plasma

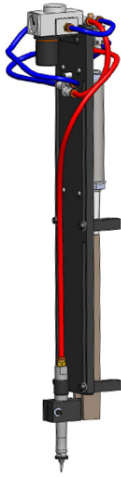
- Approximately 95% of Growth Series customers use their equipment for cutting metal plate and this number seems to be growing. With this in mind, the Growth Series CNC tables with Accumove2 Technology come with an advanced system for achieving high quality cutting, with intelligent Arc Voltage Height Control.
- The details of the Intelligent AVHC will be discussed in the next section.

### Intelligent AVHC components



### Other tooling options

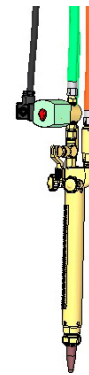
- There are a number of tooling options that can be added to the Growth Series CNC tables, so that you can increase the versatility of your machine.
- Some of these options can be mounted at the same time as the plasma AVHC, but others cannot. Consult with your sales representative to review the options that best suit your needs.
- Each of the other tooling options includes detailed instructions on how to mount and configure that option for use on your Growth Series table. If you have purchased one of these options, refer to the included Installation Guide during installation.
- As always, if you have any difficulties, please call Torchmate Technical Support.



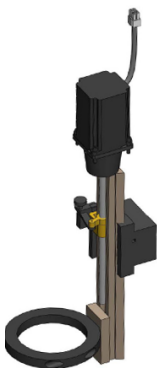
- The plate marker option is a CNC controlled, pneumatically operated tool that strikes the plate with a hardened tip. Each strike by the tool upon the plate produces a small crater or indent, and by producing a series or array of these, you can create text, outline, and fill effects on many surfaces.
- For some types of jobs, you may want to use a mounting option for the plate marker that allows both the plate marker and the plasma cutter to be mounted at the same time. Consult with your Torchmate Sales representative for more information about the availability of dual tool mounting.
- Review the installation manual that comes with the plate marker for detailed instructions.

### Plate Marker

- With special optional mounting adapters, an oxy-fuel torch may be installed upon your Growth Series CNC table to facilitate cutting heavier plate than plasma can cut.
- Review the installation manual that comes with the oxy-fuel torch for detailed instructions on setup and configuration.



### Oxy-fuel



- With special optional mounting adapters, a router z-axis and motor may be installed upon your Growth Series CNC table to enable three-dimensional routing of wood, plastic, and foam, and the light-duty machining of metals and composites.
- Review the installation manual that comes with the router tool option for detailed instructions on setup and configuration.

### Router Z-axis

## Features of the Accumove2 AVHC

The Growth Series tables with Accumove2 Technology includes an intelligent AVHC system to produce cuts with a high quality level. Other than good quality consumables, the primary factor governing cut quality is the length of the plasma arc. Standard arc lengths are published for each plasma cutter and the AVHC system uses the arc voltage measuring technique to control the height of the torch above the material being cut.

### AVHC components

- The AVHC system consists of:
  - A motor driven Z-axis that raises and lowers the torch under control of the Accumove2
  - An ohmic cap sensor for finding the “zero height” of the torch prior to starting an arc
  - A VFC electronics box that measures the arc voltage when the arc has started and sends a signal to the Accumove2 indicating that voltage.
  - An optional magnetic breakaway sensor to protect the torch from collisions with tipped up parts
  - Cables to connect the components to the Accumove2, the sensors, and the plasma power unit

### What is arc voltage?

- Plasma cutters are designed to produce a constant electrical current in the plasma arc. If the distance between the torch and the workpiece is longer, a higher voltage must be used to maintain the current than if the distance is shorter (because of the resistance of the air).
- Cut bevel is created when the arc length is either too long or too short or the torch travel speed is too fast or too slow.
  - The optimum arc length for a given material type, thickness, and amperage (current), will produce the best quality. The cut charts supplied with the plasma cutter give the preferred starting point for determining the optimum arc length.
  - In the Growth Series with Accumove2 Software manual, you will find instructions for fine tuning the cutting speed for a given arc length and amperage.
- Using sophisticated computations, the Accumove2 adjusts the speed and torch height at various points along curves and at corners to compensate for the changes in effective arc length that happen in those parts of the cuts, to achieve greater quality and reliability.

### Ohmic cap sensing

- Before an arc is initiated by the Accumove, the AVHC must raise the torch tip to the recommended pierce height (typically some distance greater than the established cutting arc length). Because of the non-uniformity of the material being cut, this pierce height is measured by using an ohmic cap to sense the zero distance.
- To determine the position of the material, the AVHC lowers the torch until the torch cap just touches the material. A wire connect between the VFC and the cap lets the VFC know when the cap touches the material and completes it's circuit.
- Following this, the Accumove2 raises the torch to the level of the initial pierce height. This height is also found in the plasma cutter's cut charts.



- The VFC box, placed close to the plasma power unit to minimize EMI interference, measures the voltage the unit is producing to achieve it's set amperage, The VFC transforms the voltage to a signal that has greater noise-immunity and sends it to the Accumove2. The Accumove2 then sends signals to the Z-axis motor to adjust the torch height.
- Because of the industrial environment of the typical CNC plasma cutting table, electronic noise, especially Electromagnetic Interference (EMI) can disrupt the operation of the controllers and other electronics leading to problems in achieving optimal cut quality. The VFC unit has been designed to reduce the effect of any EMI present in your shop environment.
- For more information on what you can do to reduce EMI effects and ensure the highest cut quality for your Growth Series with Accumove2 Technology CNC system, please find the file **EMI Reduction.pdf** on the **Torchmate / Lincoln Electric Cutting Systems USB Flash Drive** supplied with your system, or download it from this web location:  
[http://www.torchmatesupport.com/help/EMI\\_Reduction.zip](http://www.torchmatesupport.com/help/EMI_Reduction.zip)

## What is the VFC?



## AVHC, VFC, and cables





- A magnetic breakaway is an available option for your AVHC torch holder. The torch is held securely to the Z-axis carriage on the lifter station by magnetic force. If the torch encounters an obstacle and collides with it, rather than breaking the torch body, the collision overcomes the magnetic force and the torch body breaks away from its mounting. This feature has saved countless torch replacements.
- In addition, a sensor switch in the magnetic breakaway signals the Accumove2 to stop all table movements and turn off the plasma power unit's current.

## Magnetic breakaway

## Step D1: Attach the tool mounting bracket to the tool mounting plate

Use of the right-angle tool mounting bracket allows the plasma torch to achieve full travel in Y-axis direction. If this full travel is not required, the use of the right-angle bracket may be omitted. Approximately *XX* inches of travel overall in the Y-axis direction is sacrificed by attaching the height control directly to the tool mounting plate.

Required parts / components

Qty	Part	Description	Part #
1		Laptop or PC, Accumove <sup>2</sup> , and wired CNC Cutting table	From Step B10
1			
2			
2			

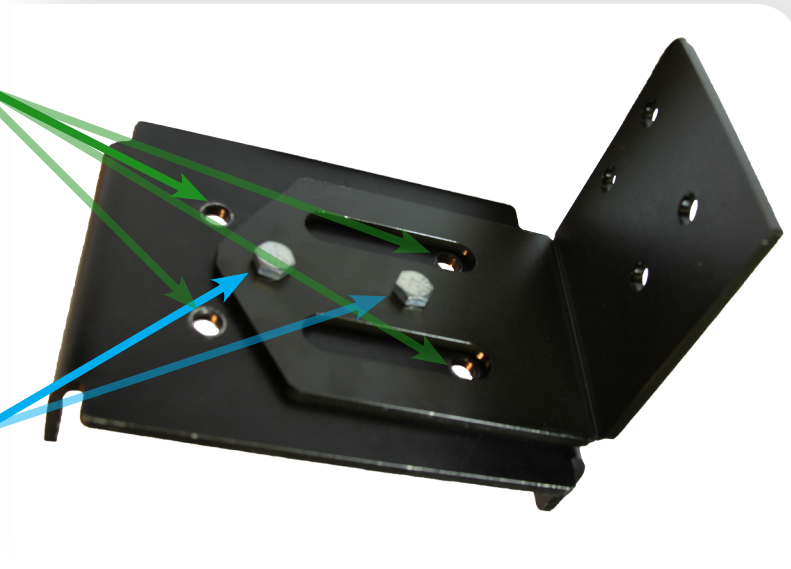
### How to install the right angle tool mounting plate

- The standard tool mounting plate is attached to the gantry. To mount the tool mounting bracket to the plate follow these steps:
  - Remove the tool mounting plate from the gantry.
  - Use the 4 screws and nuts to attach the tool mounting bracket to the tool mounting plate. Insert the screws through the front of the lifter station, then through the mounting plate. The nuts will be behind the mounting plate.
  - Tighten the nuts securely.
  - Re-mount the tool mounting plate (with the bracket) to the gantry.

Remove the four bolts to remove the tool mounting plate from the gantry

Bolt the bracket to the plate with the bolts and locknuts.

Then re-mount the plate on the gantry.



Illustration


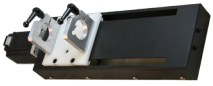
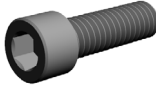
- Use of the tool mounting bracket is only required if the full 24" of travel is required on the Y-axis. The plasma height control Z-axis may be attached directly to the tool mounting plate.
  - Approximately  $\frac{1}{4}$ " is lost in Y-axis travel (along the rails) by direct mounting, leaving approximately 23 $\frac{3}{4}$ " of travel.
  - Slightly more than 1" is lost in Y-axis travel by direct mounting if the (optional) magnetic breakaway is used, leaving just less than 23" of travel.

### Optional direct use of the tool mounting plate

## Step D2: Mount the AVHC lifter

Mount the Arc Voltage Height Control (AVHC) machine torch lifter station to the tool-mounting bracket (or directly to the tool mounting plate) on the Growth Series gantry using the included hardware.

### Required parts / components

Qty	Part	Description	Part #
1		Laptop or PC, Accumove <sup>2</sup> , and wired CNC Cutting table	From Step D1
1		Height Control Lifter, ACCUMOVE	TMS-101-1100-02
4		Screw, SCS, 5/16" - 18 X 1.0" lg, hex drive	TMS-410-0016-16

### How to install the lifter station

- The tool mounting plate is attached to the gantry, and in most cases it supports a tool mounting bracket.
- To mount the AVHC Z-axis lifter to the tool mounting bracket:
  - Insert the 4 screws through the back of the bracket and into the threaded holes in the back of the lifter station.
  - There is adjustment available for the height in the lifter station slots. Mount the Z-axis lifter station as high above the cutting surface as possible.
- To mount the AVHC Z-axis lifter to the tool mounting plate:
  - Remove the tool mounting plate from the gantry, by removing the four securing screws. Retain these screws.
  - Insert the 4 supplied screws through the back of the bracket and into the threaded holes in the back of the lifter station.
  - Re-mount the tool mounting plate (with the AVHC) to the gantry.
- Insert the torch body into the mounting clamps and adjust the height of the torch body, and tighten the levers.



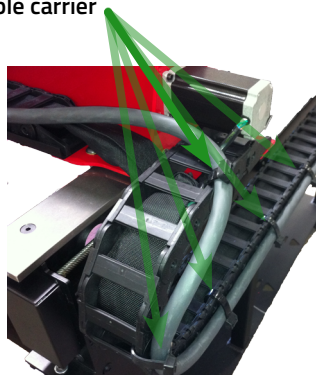
Illustration

There are six threaded mounting holes in a rectangular array on the back of the Z-axis lifter. Use the four holes that are closest to the end of the Z-axis lifter to mount it to the tool mounting bracket or tool mounting plate.

- Run the cables for the torch power, z-axis motor, the ohmic cap, and the (optional) magnetic breakaway using the cable carrier.
- You may help reduce EMI effects by separating the motor signal cables from the torch power cables, by running the torch power cable on the outside of the cable carriers.

### Connect the cables



Use cable-ties to run the torch power cable outside the cable carrier



## Step D3: Prepare the plasma cutter

The plasma cutter works with CNC systems like Accumove2 because it can produce signals indicating its state for the CNC system, and respond to signals when the CNC system tells it to start and stop cutting. All these signals go through the CNC interface cable on Lincoln Electric plasma cutters. Other plasma cutters must use additional wiring. These cables must be prepared for connection to the Accumove2 and VFC. Other preparation involves power and air / gas supplies

### Required parts / components

Qty	Part	Description	Part #
1		Plasma cutter power supply unit	<i>Purchased separately</i>
1		CNC Interface cable	<i>Supplied with plasma cutter</i>

### Verify power and compressed gas/air availability and quality

- The quality of the power and compressed air / gas you provide for your plasma power unit has a direct and immediate effect on the quality of the cuts you make.
- Check the documentation for your plasma power unit model and verify that you have met the requirements for power and compressed gas / air.
  - If you have an air compressor, remember to follow the recommended maintenance for ensuring that the air is dry and clean.
  - Make sure the voltage and amperage of your electrical service are stable and within the required specifications. Consult with qualified electrical personnel or your power service company.

### Making wire splices to the CNC cable and other cables

- Several wire-to-wire device connections are required to complete the wiring, for instance connections for the ohmic cap wire, the (optional) magnetic breakaway wires, Start Arc wires, OK to Move wires, and the raw arc voltage wires can be made by wire splicing. There are several methods that are suitable:
  - 20 gauge twist-on wire nut connectors (typically gray or blue)
  - Crimp-on butt splice connectors (be sure to use the proper size connector and the proper crimping tool)
  - Solder joints with shrink wrap
- If the CNC cable ends have lug connectors, clip these connectors off and remove about 3/8" of insulation for use in making your connections.



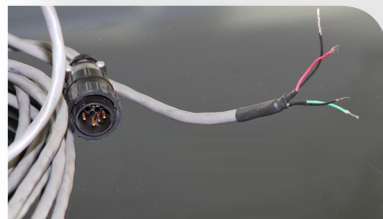
- The Lincoln Electric plasma power units have a specially designed CNC cable that directly supports the use of raw arc voltage for controlling the torch height. This cable simplifies wiring for the Accumove2.
- For other plasma power units, the raw arc voltage signal is frequently not available on the CNC cable.
  - If you purchased one of these units with your Torchmate Growth Series CNC System, the factory will have installed the necessary raw arc voltage cable before shipping.
  - If your plasma power unit was not part of the package, you will have to install the cable for the raw arc voltage in order to complete the setup. Call Torchmate Technical Support and give them the make and model of your plasma power unit. They will provide the information you will need to make the connection.

## Differences between plasma power units



The connector may be mounted at a very different angle, so be sure to check the markings on the connector before making any wiring changes that require identifying the cable letters

## Pinouts on the Lincoln Electric plasma power unit



## CNC interface cables for other types of plasma power units

The CNC cable may not include raw arc voltage wires. These will be added as a separate cable either at the Torchmate factory, or, if your plasma cutter was not part of your system order, by your shop during assembly. Call Torchmate Technical Support for specific instructions for your model plasma cutter.




- Torchmate Technical support is available Monday through Friday from 6 AM to 4 PM (06:00 to 16:00, Pacific Time Zone).



Toll Free: 1-866-571-1066  
 International: 775-673-2200  
 Fax: 775-673-2206  
 Email: [support@torchmate.com](mailto:support@torchmate.com)

## Step D4: Place the VFC unit

The Accumove VFC unit processes the raw arc voltage signal from the plasma power unit and the ohmic cap sense signal from the torch tip. It relays the processed signals to the Accumove 2. Electromagnetic Interference (EMI) problems are reduced when the arc voltage cable is kept short by locating the Accumove VFC close to the plasma power unit.

Required parts / components	Qty	Part	Description	Part #
	1		Plasma cutter power supply unit	<i>Purchased separately</i>
	1		CNC Interface cable	<i>Supplied with plasma cutter</i>
	1		Height Control VFC	TMS-101-1100-01

### Inspect the VFC unit

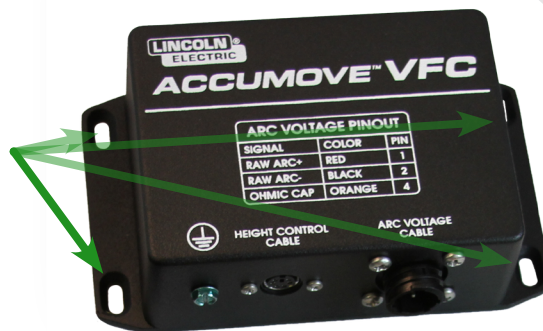
- The Accumove VFC unit is a small electronics enclosure that supports three connections. No external power connection is needed.
- The three connections are:
  - Arc voltage cable connector (connects to the plasma power unit and also to the ohmic cap on the torch tip)
  - Height control cable connector (connects to the Accumove2)
  - Ground wire screw terminal
- The enclosure has mounting flanges and 4 holes for mounting.

### Mount the VFC unit

- Select a suitable location for mounting the Accumove VFC unit. It should be close to the plasma power unit to keep the raw arc voltage wires short. The benefit of this is it reduces EMI problems.
- EMI is an important consideration for producing high quality cutting with your CNC system. For more information on EMI, download the PDF document from this web location: [http://www.torchmatesupport.com/help/EMI Reduction.zip](http://www.torchmatesupport.com/help/EMI%20Reduction.zip)

### Mount the Accumove VFC securely

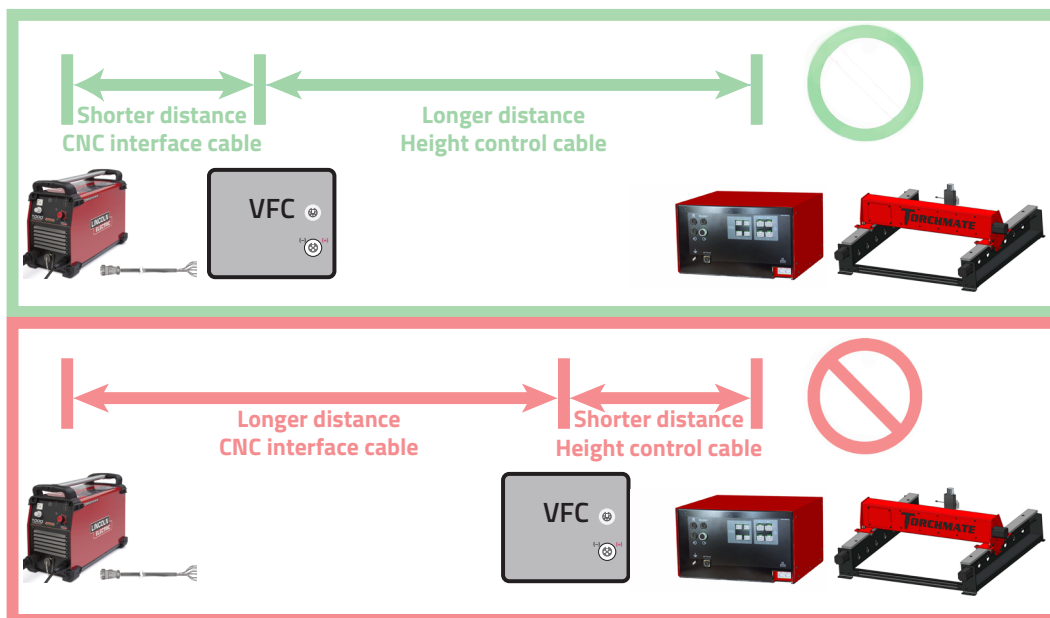
Use the mounting holes





- To reduce the length of the raw arc voltage wires, you can trim the entire CNC interface cable so that it just reaches the Accumove VFC unit








Trim the CNC interface cable



Locate the Accumove VFC near the plasma power unit to trim the length of the raw arc voltage cable

## Step D5: Connect the VFC unit

The Accumove VFC unit processes the raw arc voltage signal from the plasma power unit and the ohmic cap sense signal from the torch tip. It relays the processed signals to the Accumove 2. Electromagnetic Interference (EMI) problems are reduced when the arc voltage cable is kept short by locating the Accumove VFC close to the plasma power unit.

Required parts / components	Qty	Part	Description	Part #
	1		Mounted Accumove VFC	From Step D4
	1		Arc Voltage/Ohmic Cable	TMS-101-1109-01
	1		Height control cable	TMS-103-5000-01
	1		Chassis ground wire	<i>From your toolbox</i>
	1		Ohmic Cap (torch consumable stack)	<i>Depends on plasma power unit</i>
	1		Trimmed CNC Interface cable or raw arc voltage cable	<i>Depends on plasma power unit</i>
	1		Quick connect crimp terminal (female)	<i>From your toolbox</i>

### Attach the Accumove VFC cables

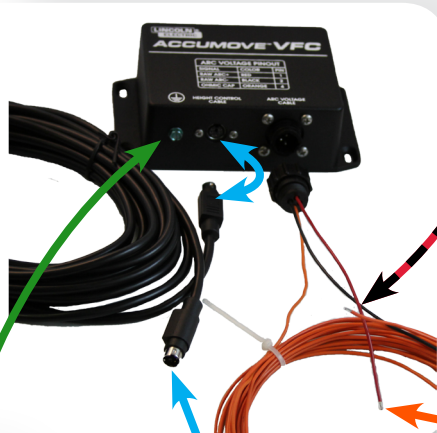
- The arc voltage / ohmic cable is keyed. Push the connector into its Accumove VFC socket and use the threaded ring to secure it.
- The height control cable is keyed. Push the connector into its Accumove VFC socket.
- Connect a ground wire to the green screw terminal. Run the ground wire to the Accumove ground post.

### Splice the cables

- Uncoil the long orange wire from the arc voltage cable connector and run this to the table, through the cable carriers to the torch, and
- Splice the red and black wires from the arc voltage cable to the arc voltage wires in the Lincoln Electric CNC interface cable (red [+] goes to G [+] and black [-] goes to D [-]).
  - If a non-Lincoln Electric plasma power unit was supplied with your CNC system, splice to the installed raw arc voltage cable. It will be a separate wire from the CNC interface cable. Observe the polarity (red is positive, black is negative).
  - Consult with Torchmate Technical Support if your plasma power unit was obtained from a different source. You will receive instructions for your make and model of plasma power unit for connecting your own raw arc voltage cable. Splice this cable to the red and black wires of from the Accumove VFC observing the polarity.
- **IMPORTANT NOTE:** Observe the polarity of the arc voltage when making the splice.
- Connect the height control cable to the keyed socket on the Accumove2.

Splice the red and black wires to the plasma power unit's raw arc voltage wires. Be sure to observe polarity.

Splice and connect the cables



Run the orange wire to the ohmic sensing cap using a quick connect crimp terminal



Run the ground wire from the VFC to the Accumove2 ground terminal





Run the height control cable from the VFC to the Accumove2 height control port



## Step D6a: Wiring for Lincoln Electric plasma cutters

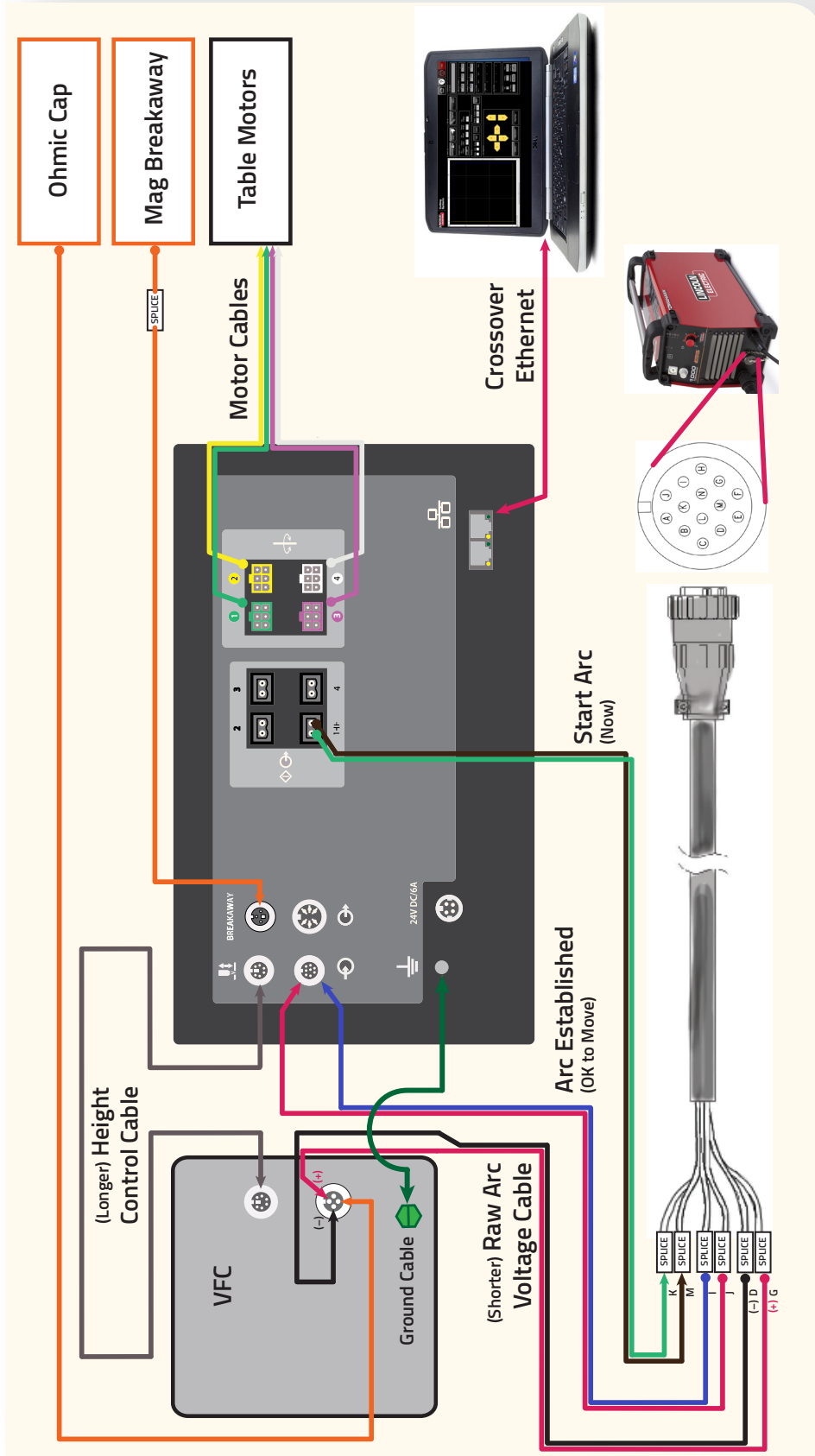
Wiring for Lincoln Electric plasma cutters is simplified because all connections to the plasma cutter are contained in the CNC cable. The additional wiring steps are based on the diagram on the following page.

### Required parts / components

Qty	Part	Description	Part #
1		Height Control VFC, ACCUMOVE	From Step D5
1		Terminal Block Plug 2POS STR 5.08MM	TMS-403-0076-01
1		Input Cable, ACCUMOVE, TORCHMATE PRO	TMS-103-5000-03
10		20 gauge twist-on wire nut connectors	<i>From your toolkit not supplied</i>

### Run and connect the wires

- Run the torch and work leads from the table to the plasma power unit, then make the CNC cable connections to the VFC and Accumove2.
  - Connect the I and J wires for Arc Established [OK to Move] to the Accumove Input cable.
  - Connect the K and M wires to the #1 output terminals on the Accumove2 [Start Arc (Now)]. Use the Terminal block and 22-gauge wire (not supplied).
  - Connect the (-)D and (+)G cables to the VFC black (-) and red (+) cables. Be sure to observe the correct polarity on this [Raw Arc Voltage] signal.
  - Run the height control cable from the VFC to the Accumove. the wiring components for the control of the torch and control of the AVHC unit. Both ends of this cable are the same. It's best to position the VFC close to the plasma power unit and well away from the Accumove2 in order to minimize EMI problems.
  - Run the Ohmic cap cable from the torch lead the VFC using the orange wire.
  - Optionally, run the wire from the magnetic breakaway sensor to the Accumove2 Breakaway port.








Use this wiring diagram for Lincoln Electric plasma cutters

## Step D6b: Wiring for non-Lincoln Electric plasma cutters

Wiring for Lincoln Electric plasma cutters is simplified because all connections to the plasma cutter are contained in the CNC cable. The additional wiring steps are based on the diagram on the following page.

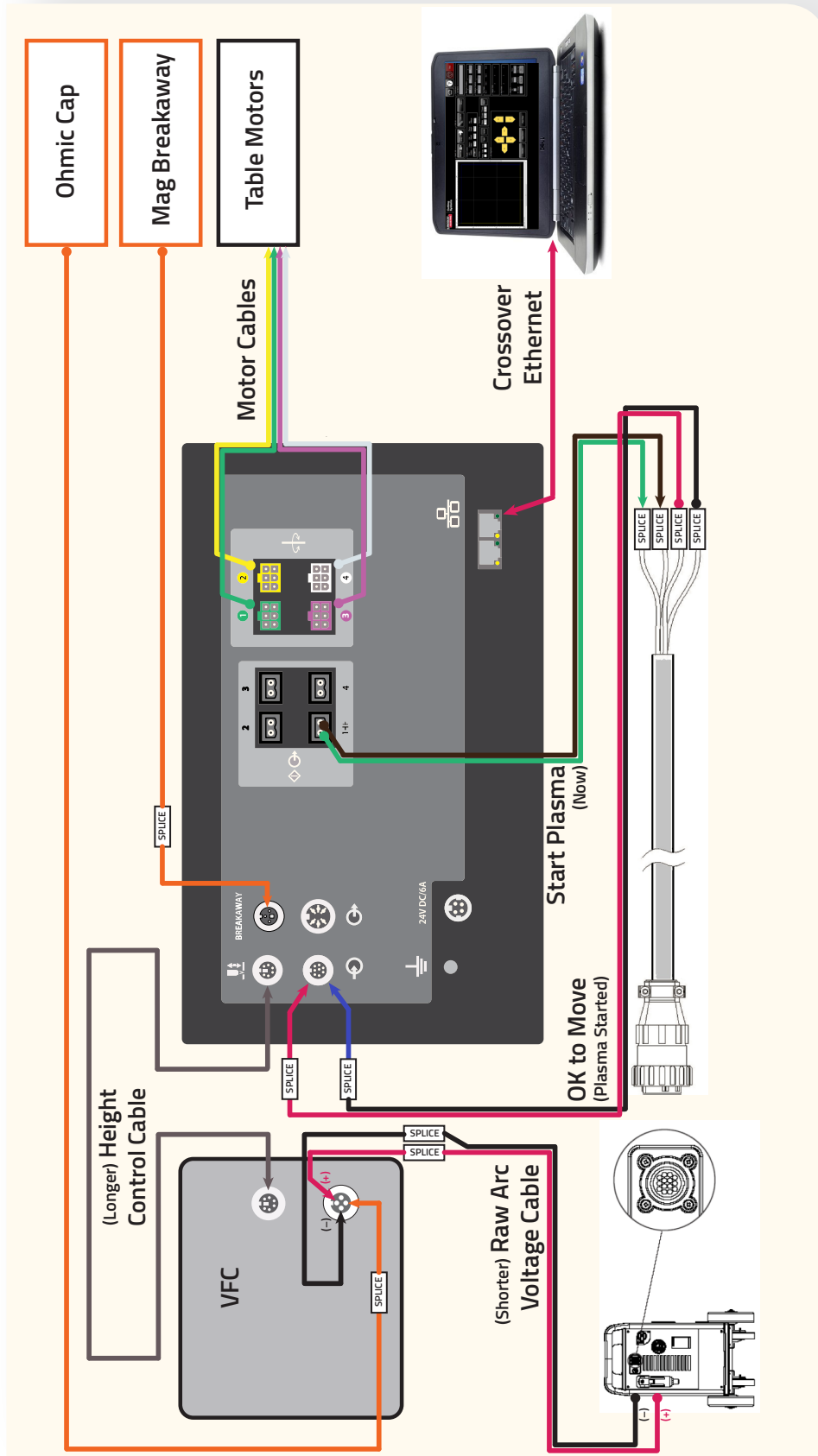
### Required parts / components

Qty	Part	Description	Part #
1		Height Control VFC, ACCUMOVE	TMS-101-1100-01
1		Height Control Cable, ACCUMOVE	TMS-103-5000-01
1		Arc Voltage Ohmic Sense Cable, Height Control	TMS-101-1109-01
1		Terminal Block Plug 2POS STR 5.08MM	TMS-403-0076-01
1		Input Cable, ACCUMOVE, TORCHMATE PRO	TMS-103-5000-03

### Run and connect the wires

- Run the torch and work leads from the table to the plasma power unit, then make the CNC cable connections to the VFC and Accumove2.
  - Connect the #12 (Red) and #14 (Black) for Arc Established [OK to Move] to the Accumove Input cable.
  - Connect the #3 (Green) and #4 (Black) wires to the #1 output terminals on the Accumove2 [Start Arc (Now)]. Use the Terminal block and 22-gauge wire (not supplied).
  - Connect the (-)D and (+)G cables to the VFC black (-) and red (+) cables. Be sure to observe the correct polarity on this [Raw Arc Voltage] signal.
    - Refer to your plasma power unit manual for the location of the Raw Arc Voltage signal.
    - Contact **Torchmate Technical Support** for assistance with this step. Provide the brand and model number of your plasma power unit and ask for instructions on connecting your VFC to the Raw Arc Voltage. Call Monday through Friday from 6 AM to 4 PM (06:00 to 16:00), Pacific Time Zone:
 

Toll Free: 1-866-571-1066, International: 775-673-2200,  
Fax: 775-673-2206, Email: [support@torchmate.com](mailto:support@torchmate.com)
- Run the height control cable from the VFC to the Accumove. the wiring components for the control of the torch and control of the AVHC unit. Both ends of this cable are the same. It's best to position the VFC close to the plasma power unit and well away from the Accumove2 in order to minimize EMI problems.
- Run the Ohmic cap cable from the torch lead the VFC using the orange wire.
- Optionally, run the wire from the magnetic breakaway sensor to the Accumove2. Breakaway port.



Use this wiring diagram for plasma cutters not made by Lincoln Electric





# Maintenance and Parts

## Growth Series care and maintenance

Although your Growth Series table may be brand new and shiny, it won't stay that way for long unless you take care of it. But, more important than how it looks is how well it performs, yet the number one maintenance item that will keep your Growth Series machine running well is keeping it clean and free of rust.

### Keeping the machine clean

- The shop can be a place where cutting and welding generate smoke, fumes, spatter, and metal dust that can accumulate on your machine.
  - When you see it beginning to build up on the rails, under where the bearings roll or around the motors or electronics, take the time to wipe it away.
  - A light spray of your favorite metal care product, followed a wipe down will help protect your machine from rust as well as grit and grime.

### Lubricate

- The moving mechanical parts, such as bearings and lead screws should never be cleaned with solvent-based lubricant / water displacement products.
  - For proper lubrication, use a light machine oil.
  - A few drops of oil on a frequent and regular basis is much better than a heavy dose only occasionally.

### Inspect and tighten

- Some components, such as set screws can become loose over time.
  - Every time the table is used, it should be inspected before and during operation for any signs of vibration or looseness.
  - On 2X4 and 4X4 Growth Series machines, there are belts and pulleys that should be inspected for true running. The pulleys also have set screws, and if they become loosened, the belts may not run true and can become frayed or damaged, causing a loss of accuracy and reliability. These pulleys are located under the motor covers (only on 2x4 and 4X4 models).
  - If you find a set screw that is difficult for you to service, and yet continues to come loose, ask your Torchmate Technical Support Help Desk if you can put a drop of thread sealant on the set screw threads.



Toll Free: 1-866-571-1066  
International: 775-673-2200  
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Email: [support@torchmate.com](mailto:support@torchmate.com)

- A typical nylon scrubbing pad, moistened with some metal care lubricant can quickly remove light amounts of corrosion and dirt from the rails, and help to protect the rails which are in regular use.
  - Use the lubricant cleaner sparingly, but leave a light film on the rails to keep dust and moisture from accumulating on the rails.
  - This is particularly important in a damp or humid climate, or where condensation is normally found on metal parts.
  - Avoid the use of steel-wool, as the fine steel fibers can come free from the pad and get inside the moving parts, the electronic connectors, or the electronics boxes.

## Cleaning the rails

## Recommended 2X4 spare and replacement parts

Use the following list as a reference when ordering parts from our parts department. You'll find it helpful and so will our staff.

### Spare and replacement parts

- Recommended parts:


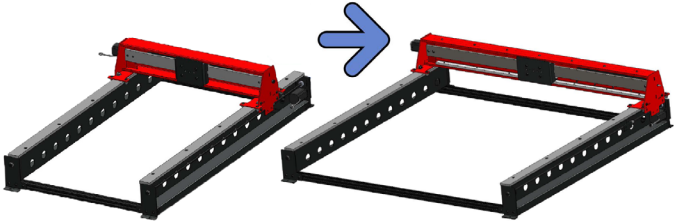
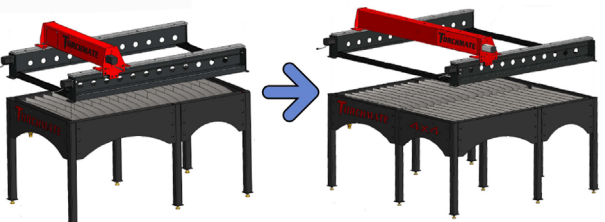
Qty	Part	Description	Part #
1		XLR motor cable, 25' Replace as necessary due to cuts, pinches, and burns	TMS-402-0010-01
1		Anti-backlash drive nut for 2' gantry	TMS-180-0004-02
1		Anti-backlash drive nut for 4' sides	TMS-180-0004-05
1		60-tooth pulley	TMS-180-0004-17
1		30-tooth pulley	TMS-180-0004-22
1		4' side timing belt	TMS-180-0004-19
1		Stepper motor NEMA 23, 390 oz-in, XLR	TMS-404-0023-06
1		Acetal flanged sleeve bearing for 3/8" shaft	TMS-432-0011-01
1		Acetal thrust washer for 1/2" shaft	TMS-432-0008-01
1		1/4" shaft collar	TMS-433-0012-01
4		99R6 ball bearings	TMS-432-0010-01
1		Replacement torch mounting sleeve or torch head.	depends on torch model

### Order spare parts

- These can be easily ordered through the [TorchmateStore.com](http://TorchmateStore.com) website or by calling 866-571-1066.

## Upgrade parts for the Growth Series 2X4

When it's time to grow your GS 2X4 to a 4X4 or to add a water table, use the following part number guide when you call our sales department.

For this upgrade	Order this part number	
To add a 2X4 water table to your 2X4 table-top machine	TMS-041-0204-03	
To grow a 2x4 table-top machine to 4x4	TMS-045-0404-02	
To grow a 2x2 machine with water table to 4x4	TMS-045-0404-02 and TMS-045-0404-04	

For these and other growth combinations, please contact the Torchmate sales offices:  
866-571-1066.

**Torchmate sales**

Also, spare parts and consumables can be ordered by contacting the Torchmate Support Department at the same number or by visiting:

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

 **GROWTH SERIES™**



Toll Free: 1-866-571-1066  
International: 775-673-2200  
Fax: 775-673-2206  
Email: [support@torchmate.com](mailto:support@torchmate.com)