MicroEDGE® Pro

Shape cutting control

HyPath
Picopath
SERCOS II
SERCOS III

Instruction manual

807290 – Revision 4

Hypertherm®

MicroEDGE Pro

Shape cutting control

Instruction Manual

807290

Revision 4 – January 2016

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CONTENTS

Section 1

SAFETY

In this section:

RECOGNIZE SAFETY INFORMATION

The symbols shown in this section are used to identify potential hazards. When you see a safety symbol in this manual or on your machine, understand the potential for personal injury, and follow the related instructions to avoid the hazard.

FOLLOW SAFETY INSTRUCTIONS

Carefully read all safety messages in this manual and safety labels on your machine.

- Keep the safety labels on your machine in good condition. Replace missing or damaged labels immediately.
- Learn how to operate the machine and how to use the controls properly. Do not let anyone operate it without instruction.
- Keep your machine in proper working condition. Unauthorized modifications to the machine may affect safety and machine service life.

DANGER WARNING CAUTION

American National Standards Institute (ANSI) guidelines are used for safety signal words and symbols. The signal word DANGER or WARNING is used with a safety symbol. DANGER identifies the most serious hazards.

- DANGER and WARNING safety labels are located on your machine near specific hazards.
- DANGER safety messages precede related instructions in the manual that will result in serious injury or death if not followed correctly.
- WARNING safety messages precede related instructions in this manual that may result in injury or death if not followed correctly.
- CAUTION safety messages precede related instructions in this manual that may result in minor injury or damage to equipment if not followed correctly.

INSPECT EQUIPMENT BEFORE USING

All cutting equipment must be inspected as required to make sure it is in safe operating condition. When found to be incapable of reliable and safe operation, the equipment must be repaired by qualified personnel prior to its next use or withdrawn from service.

RESPONSIBILITY FOR SAFETY

The person or entity responsible for the safety of the workplace must:

- Make sure that operators and their supervisors are trained in the safe use of their equipment, the safe use of the process, and emergency procedures.
- Make sure that all hazards and safety precautions identified herein are communicated to and understood by workers before the start of work.
- Designate approved cutting areas and establish procedures for safe cutting.
- Be responsible for authorizing cutting operations in areas not specifically designed or approved for such processes.
- Make sure that only approved equipment, such as torches and personal protective equipment, are used.
- Select contractors who provide trained and qualified personnel, and who have awareness of the risks involved, to do cutting.
- Tell contractors about flammable materials or hazardous conditions that are specific to the site, or hazardous conditions that they may not be aware of.
- Make sure that the quality and quantity of air for ventilation is such that personnel exposures to hazardous contaminants are below the allowable limits.
- Make sure that ventilation in confined spaces is sufficient to allow adequate oxygen for life support, to prevent accumulation of asphixiants or flammable explosive mixtures, to prevent oxygen-enriched atmospheres, and to keep airborne contaminants in breathing atmospheres below allowable limits.

A PLASMA ARC CAN DAMAGE FROZEN PIPES

Frozen pipes may be damaged or can burst if you attempt to thaw them with a plasma torch.

STATIC ELECTRICITY CAN DAMAGE PRINTED CIRCUIT BOARDS

Use proper precautions when handling printed circuit boards:

- Store printed circuit boards in anti-static containers.
- Wear a grounded wrist strap when handling printed circuit boards.

GROUNDING SAFETY

Work lead Attach the work lead securely to the workpiece or the cutting table with good metal-to-metal contact. Do not connect it to the piece that will fall away when the cut is complete.

Cutting table Connect the cutting table to an earth ground, in accordance with appropriate national and local electrical regulations.

Input power

- Make sure to connect the power cord ground wire to the ground in the disconnect box.
- If installation of the plasma system involves connecting the power cord to the power supply, make sure to connect the power cord ground wire properly.
- Place the power cord's ground wire on the stud first, then place any other ground wires on top of the power cord ground. Tighten the retaining nut.
- Tighten all electrical connections to avoid excessive heating.

ELECTRICAL HAZARDS

- Only trained and authorized personnel may open this equipment.
- If the equipment is permanently connected, turn it off, and lock out/tag out power before the enclosure is opened.
- If power is supplied to the equipment with a cord, unplug the unit before the enclosure is opened.
- Lockable disconnects or lockable plug covers must be provided by others.
- Wait 5 minutes after removal of power before entering the enclosure to allow stored energy to discharge.
- If the equipment must have power when the enclosure is open for servicing, arc flash explosion hazards may exist. Follow **all** local requirements (NFPA 70E in the USA) for safe work practices and for personal protective equipment when servicing energized equipment.
- Prior to operating the equipment after moving, opening, or servicing, make sure to close the enclosure and make sure that there is proper earth ground continuity to the enclosure.
- Always follow these instructions for disconnecting power before inspecting or changing torch consumable parts.

ELECTRIC SHOCK CAN KILL

Touching live electrical parts can cause a fatal shock or severe burn.

- Operating the plasma system completes an electrical circuit between the torch and the workpiece. The workpiece and anything touching the workpiece are part of the electrical circuit.
- In machine torch applications, never touch the torch body, workpiece, or water in a water table when the plasma system is operating.

Electric shock prevention

All plasma systems use high voltage in the cutting process (200 to 400 VDC are common). Take the following precautions when operating this system:

- Wear insulated gloves and boots, and keep your body and clothing dry.
- Do not stand, sit, or lie on – or touch – any wet surface when using the plasma system.
- Insulate yourself from the work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground. If you must cut in or near a damp area, use extreme caution.
- Provide a disconnect switch close to the power supply with properly sized fuses. This switch allows the operator to turn off the power supply quickly in an emergency situation.
- When using a water table, make sure that it is correctly connected to an earth ground.
- Install and ground this equipment according to the instruction manual and in accordance with national and local regulations.
- Inspect the input power cord frequently for damage or cracking of the cover. Replace a damaged power cord immediately. **Bare wiring can kill.**
- Inspect and replace any worn or damaged torch leads.
- Do not pick up the workpiece, including the waste cutoff, while you cut. Leave the workpiece in place or on the workbench with the work lead attached during the cutting process.
- Before checking, cleaning, or changing torch parts, disconnect the main power or unplug the power supply.
- Never bypass or shortcut the safety interlocks.
- Before removing any power supply or system enclosure cover, disconnect electrical input power. Wait 5 minutes after disconnecting the main power to allow capacitors to discharge.
- Never operate the plasma system unless the power supply covers are in place. Exposed power supply connections present a severe electrical hazard.
- When making input connections, attach a proper grounding conductor first.
- Each plasma system is designed to be used only with specific torches. Do not substitute other torches, which could overheat and present a safety hazard.

CUTTING CAN CAUSE FIRE OR EXPLOSION

Fire prevention

- Make sure the cutting area is safe before doing any cutting. Keep a fire extinguisher nearby.
- Remove all flammables within 35 feet (10 m) of the cutting area.
- Quench hot metal or allow it to cool before handling or before letting it touch combustible materials.
- Never cut containers with potentially flammable materials inside – they must be emptied and properly cleaned first.
- Ventilate potentially flammable atmospheres before cutting.
- When cutting with oxygen as the plasma gas, an exhaust ventilation system is required.

Explosion prevention

- Do not use the plasma system if explosive dust or vapors may be present.
- Do not cut pressurized cylinders, pipes, or any closed containers.
- Do not cut containers that have held combustible materials.

WARNING
Explosion Hazard
Argon-Hydrogen and Methane

Hydrogen and methane are flammable gases that present an explosion hazard. Keep flames away from cylinders and hoses that contain methane or hydrogen mixtures. Keep flames and sparks away from the torch when using methane or argon-hydrogen plasma.

WARNING
Explosion Hazard
Underwater Cutting with Fuel Gases Containing Hydrogen

- Do not cut underwater with fuel gases containing hydrogen.
- Cutting underwater with fuel gases containing hydrogen can result in an explosive condition that can detonate during plasma cutting operations.

WARNING
Explosion Hazard
Hydrogen Detonation with Aluminum Cutting

When you use a plasma torch to cut aluminum alloys under water or on a water table, a chemical reaction between the water and the workpiece, parts, fine particles, or molten aluminum droplets generates significantly more hydrogen gas than occurs with other metals. This hydrogen gas may get trapped under the workpiece. If exposed to oxygen or air, the plasma arc or a spark from any source can ignite this trapped hydrogen gas, causing an explosion that may result in death, personal injury, loss of property, or equipment damage.

Consult with the table manufacturer and other experts prior to cutting aluminum to implement a risk assessment and mitigation plan that eliminates the risk of detonation by preventing hydrogen accumulation.

Also, make sure that the water table, fume extraction (ventilation), and other parts of the cutting system have been designed with aluminum cutting in mind.

Do not cut aluminum alloys underwater or on a water table unless you can prevent the accumulation of hydrogen gas.

Note: With proper mitigation, most aluminum alloys can be plasma cut on a water table. An exception is aluminum-lithium alloys. **Never cut aluminum-lithium alloys in the presence of water.** Contact your aluminum supplier for additional safety information regarding hazards associated with aluminum-lithium alloys.

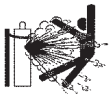
MACHINE MOTION CAN CAUSE INJURY

When an original equipment manufacturer (OEM) makes a cutting system by combining Hypertherm equipment with other equipment, the end-use customer and the OEM are responsible for providing protection against the hazardous moving parts of this cutting system. However, we advise the following to prevent operator injury and equipment damage:

- Read and follow the instruction manual provided by the OEM.
- Maintain a restricted-access area larger than the maximum movement range of the cutting system's moving parts.
- Where there is a risk of collision, do not allow personnel or equipment near the cutting system's moving parts.
- Avoid accidental contact with the CNC touchscreen or joystick. Accidental contact can activate commands and result in unintended motion.
- Do not service or clean the machinery during operation.
- If servicing is required, enable the safety interlock or disconnect and lock out/tag out power to disable the motors and prevent motion.
- Allow only qualified personnel to operate, maintain, and service the machinery.

COMPRESSED GAS EQUIPMENT SAFETY

- Never lubricate cylinder valves or regulators with oil or grease.
- Use only correct gas cylinders, regulators, hoses, and fittings designed for the specific application.
- Maintain all compressed gas equipment and associated parts in good condition.
- Label and color-code all gas hoses to identify the type of gas in each hose. Consult applicable national and local regulations.



GAS CYLINDERS CAN EXPLODE IF DAMAGED

Gas cylinders contain gas under high pressure. If damaged, a cylinder can explode.

- Handle and use compressed gas cylinders in accordance with applicable national and local regulations.
- Never use a cylinder that is not upright and secured in place.
- Keep the protective cap in place over the valve except when the cylinder is in use or connected for use.
- Never allow electrical contact between the plasma arc and a cylinder.
- Never expose cylinders to excessive heat, sparks, slag, or open flame.
- Never use a hammer, wrench, or other tool to open a stuck cylinder valve.

TOXIC FUMES CAN CAUSE INJURY OR DEATH

The plasma arc by itself is the heat source used for cutting. Accordingly, although the plasma arc has not been identified as a source of toxic fumes, the material being cut can be a source of toxic fumes or gases that deplete oxygen.

The fumes produced vary depending on the metal that is cut. Metals that may release toxic fumes include, but are not limited to, stainless steel, carbon steel, zinc (galvanized), and copper.

In some cases, the metal may be coated with a substance that could release toxic fumes. Toxic coatings include, but are not limited to, lead (in some paints), cadmium (in some paints and fillers), and beryllium.

The gases produced by plasma cutting vary based on the material to be cut and the method of cutting, but may include ozone, oxides of nitrogen, hexavalent chromium, hydrogen, and other substances if such are contained in or released by the material being cut.

Caution should be taken to minimize exposure to fumes produced by any industrial process. Depending on the chemical composition and concentration of the fumes (as well as other factors, such as ventilation), there may be a risk of physical illness, such as birth defects or cancer.

It is the responsibility of the equipment and site owner to test the air quality in the cutting area and to make sure that the air quality in the workplace meets all local and national standards and regulations.

The air quality level in any relevant workplace depends on site-specific variables such as:

- Table design (wet, dry, underwater).
- Material composition, surface finish, and composition of coatings.
- Volume of material removed.
- Duration of cutting or gouging.
- Size, air volume, ventilation, and filtration of the workplace.
- Personal protective equipment.
- Number of welding and cutting systems in operation.
- Other workplace processes that may produce fumes.

If the workplace must conform to national or local regulations, only monitoring or testing done at the site can determine whether the workplace is above or below allowable levels.

To reduce the risk of exposure to fumes:

- Remove all coatings and solvents from the metal before cutting.
- Use local exhaust ventilation to remove fumes from the air.
- Do not inhale fumes. Wear an air-supplied respirator when cutting any metal coated with, containing, or suspected to contain toxic elements.
- Make sure that those using welding or cutting equipment, as well as air-supplied respiration devices, are qualified and trained in the proper use of such equipment.
- Never cut containers with potentially toxic materials inside. Empty and properly clean the container first.
- Monitor or test the air quality at the site as needed.
- Consult with a local expert to implement a site plan to make sure air quality is safe.

A PLASMA ARC CAN CAUSE INJURY AND BURNS

Instant-on torches

- A plasma arc ignites immediately when the torch switch is activated.

The plasma arc will cut quickly through gloves and skin.

- Keep away from the torch tip.
- Do not hold metal near the cutting path.
- Never point the torch toward yourself or others.

ARC RAYS CAN BURN EYES AND SKIN

Eye protection Plasma arc rays produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.

- Use eye protection in accordance with applicable national and local regulations.
- Wear eye protection (safety glasses or goggles with side shields, and a welding helmet) with appropriate lens shading to protect your eyes from the arc's ultraviolet and infrared rays.

Skin protection Wear protective clothing to protect against burns caused by ultraviolet light, sparks, and hot metal.

- Wear gauntlet gloves, safety shoes, and hat.
- Wear flame-retardant clothing to cover all exposed areas.
- Wear cuffless trousers to prevent entry of sparks and slag.

Also, remove any combustibles, such as a butane lighter or matches, from your pockets before cutting.

Cutting area Prepare the cutting area to reduce reflection and transmission of ultraviolet light:

- Paint walls and other surfaces with dark colors to reduce reflection.
- Use protective screens or barriers to protect others from flash and glare.
- Warn others not to watch the arc. Use placards or signs.

Arc current	Minimum protective shade number (ANSI Z49.1:2012)	Suggested shade number for comfort (ANSI Z49.1:2012)	OSHA 29CFR 1910.133(a)(5)	Europe EN168:2002
Less than 40 A	5	5	8	9
41 A to 60 A	6	6	8	9
61 A to 80 A	8	8	8	9
81 A to 125 A	8	9	8	9
126 A to 150 A	8	9	8	10
151 A to 175 A	8	9	8	11
176 A to 250 A	8	9	8	12
251 A to 300 A	8	9	8	13
301 A to 400 A	9	12	9	13
401 A to 800 A	10	14	10	N/A

PACEMAKER AND HEARING AID OPERATION

Pacemaker and hearing aid operation can be affected by magnetic fields from high currents.

Pacemaker and hearing aid wearers should consult a doctor before going near any plasma arc cutting and gouging operations.

To reduce magnetic field hazards:

- Keep both the work lead and the torch lead to one side, away from your body.
- Route the torch leads as close as possible to the work lead.
- Do not wrap or drape the torch lead or work lead around your body.
- Keep as far away from the power supply as possible.

NOISE CAN DAMAGE HEARING

Cutting with a plasma arc can exceed acceptable noise levels as defined by local regulations in many applications. Prolonged exposure to excessive noise can damage hearing. Always wear proper ear protection when cutting or gouging, unless sound pressure level measurements taken at the site have verified personal hearing protection is not necessary per relevant international, regional, and local regulations.

Significant noise reduction can be obtained by adding simple engineering controls to cutting tables such as barriers or curtains positioned between the plasma arc and the workstation, and/or locating the workstation away from the plasma arc. Implement administrative controls in the workplace to restrict access and limit operator exposure time, and screen off noisy areas and/or take measures to reduce reverberation in cutting areas by putting up noise absorbers.

Use ear protectors if the noise is disruptive or if there is a risk of hearing damage after all other engineering and administrative controls have been implemented. If hearing protection is required, wear only approved personal protective equipment such as ear muffs or ear plugs with a noise reduction rating appropriate for the situation. Warn others near the cutting area of possible noise hazards. In addition, ear protection can prevent hot splatter from entering the ear.

DRY DUST COLLECTION INFORMATION

In some workplaces, dry dust can represent a potential explosion hazard.

The U.S. National Fire Protection Association's NFPA standard 68, "Explosion Protection by Deflagration Venting," provides requirements for the design, location, installation, maintenance, and use of devices and systems to vent combustion gases and pressures after any deflagration event. Consult with the manufacturer or installer of any dry dust collection system for applicable requirements before you install a new dry dust collection system or make significant changes in the process or materials used with an existing dry dust collection system.

Consult your local "Authority Having Jurisdiction" (AHJ) to determine whether any edition of NFPA standard 68 has been "adopted by reference" in your local building codes.

Refer to NFPA standard 68 for definitions and explanations of regulatory terms such as deflagration, AHJ, adopted by reference, the Kst value, deflagration index, and other terms.

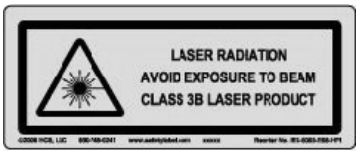
Note 1 – Unless a site-specific evaluation has been completed that determines that none of the dust generated is combustible, then NFPA standard 68 requires the use of explosion vents. Design the explosion vent size and type to conform to the worst-case Kst value as described in Annex F of NFPA standard 68. NFPA standard 68 does not specifically identify plasma cutting or other thermal cutting processes as requiring deflagration venting systems, but it does apply these new requirements to all dry dust collection systems.

Note 2 – Users should consult and comply with all applicable national, state, and local regulations. Publications do not intend to urge action that is not in compliance with all applicable regulations and standards, and this manual may never be construed as doing so.

LASER RADIATION

Exposure to the laser beam from a laser pointer can result in serious eye injury. Avoid direct eye exposure.

On products that use a laser pointer for alignment, one of the following laser radiation labels has been applied on the product near where the laser beam exits the enclosure. The maximum output (mV), wavelength emitted (nM), and, if appropriate, pulse duration are also provided.



Additional laser safety instructions:

- Consult with an expert on local laser regulations. Laser safety training may be required.
- Do not allow untrained persons to operate the laser. Lasers can be dangerous in the hands of untrained users.
- Do not look into the laser aperture or beam at any time.
- Position the laser as instructed to avoid unintentional eye contact.
- Do not use the laser on reflective workpieces.
- Do not use optical tools to view or reflect the laser beam.
- Do not disassemble or remove the laser or aperture cover.
- Modifying the laser or product in any way can increase the risk of laser radiation.
- Use of adjustments or performance of procedures other than those specified in this manual may result in hazardous laser radiation exposure.
- Do not operate in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust.
- Use only laser parts and accessories that are recommended or provided by the manufacturer for your model.
- Repairs and servicing **must** be performed by qualified personnel.
- Do not remove or deface the laser safety label.

ADDITIONAL SAFETY INFORMATION

1. ANSI Standard Z49.1, Safety in Welding and Cutting, American Welding Society, 550 LeJeune Road, P.O. Box 351020, Miami, FL 33135
2. ANSI Standard Z49.2, Fire Prevention in the Use of Cutting and Welding Processes, American National Standards Institute, 1430 Broadway, New York, NY 10018
3. ANSI Standard Z87.1, Safe Practices for Occupation and Educational Eye and Face Protection, American National Standards Institute, 1430 Broadway, New York, NY 10018
4. AWS F4.1, Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances, American Welding Society, 550 LeJeune Road, P.O. Box 351040, Miami, FL 33135
5. AWS F5.2, Recommended Safe Practices for Plasma Arc Cutting, American Welding Society, 550 LeJeune Road, P.O. Box 351040, Miami, FL 33135
6. CGA Pamphlet P-1, Safe Handling of Compressed Gases in Cylinders, Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202
7. CSA Standard W117.2, Code for Safety in Welding and Cutting, Canadian Standards Association Standard Sales, 178 Rexdale Boulevard, Rexdale, Ontario M9W 1R3, Canada
8. NFPA Standard 51B, Cutting and Welding Processes, National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471
9. NFPA Standard 70, National Electrical Code, National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471
10. OSHA, Safety and Health Standards, 29FR 1910 U.S. Government Printing Office, Washington, D.C. 20402
11. AWS Safety and Health Fact Sheets, American Welding Society, 550 LeJeune Road, P.O. Box 351040, Miami, FL 33135, www.aws.org/technical/facts/

Introduction

Hypertherm maintains a global Regulatory Management System to ensure that products comply with regulatory and environmental requirements.

National and local safety regulations

National and Local safety regulations shall take precedence over any instructions provided with the product. The product shall be imported, installed, operated and disposed of in accordance with national and local regulations applicable to the installed site.

Certification test marks

Certified products are identified by one or more certification test marks from accredited testing laboratories. The certification test marks are located on or near the data plate.

Each certification test mark means that the product and its safety-critical components conform to the relevant national safety standards as reviewed and determined by that testing laboratory. Hypertherm places a certification test mark on its products only after that product is manufactured with safety-critical components that have been authorized by the accredited testing laboratory.

Once the product has left the Hypertherm factory, the certification test marks are invalidated if any of the following occurs:

- The product is modified in a manner that creates a hazard or non-conformance with the applicable standards.
- Safety-critical components are replaced with unauthorized spare parts.
- Any unauthorized assembly, or accessory that uses or generates a hazardous voltage is added.
- There is any tampering with a safety circuit or other feature that is designed into the product as part of the certification, or otherwise.

CE marking constitutes a manufacturer's declaration of conformity to applicable European directives and standards. Only those versions of Hypertherm products with a CE Marking located on or near the data plate have been tested for compliance with the European Low Voltage Directive and the European EMC Directive. EMC filters needed to comply with the European EMC Directive are incorporated within versions of the power supply with a CE Marking.

Certificates of compliance for Hypertherm products are available from the Downloads Library on the Hypertherm web site at https://www.hypertherm.com.

Differences in national standards

Nations may apply different performance, safety or other standards. National differences in standards include, but are not limited to:

- Voltages
- Plug and cord ratings
- Language requirements
- Electromagnetic compatibility requirements

These differences in national or other standards may make it impossible or impractical for all certification test marks to be placed on the same version of a product. For example, the CSA versions of Hypertherm's products do not comply with European EMC requirements, and therefore do not have a CE marking on the data plate.

Countries that require CE marking or have compulsory EMC regulations must use CE versions of Hypertherm products with the CE marking on the data plate. These include, but are not limited to:

- Australia
- New Zealand
- Countries in the European Union
- Russia

It is important that the product and its certification test mark be suitable for the end-use installation site. When Hypertherm products are shipped to one country for export to another country; the product must be configured and certified properly for the end-use site.

Safe installation and use of shape cutting equipment

IEC 60974-9, titled Arc Welding Equipment – Installation and use, provides guidance in the safe installation and use of shape cutting equipment and the safe performance of cutting operations. The requirements of national and local regulations shall be taken into consideration during installation, including, but not limited to, grounding or protective earth connections, fuses, supply disconnecting device, and type of supply circuit. Read these instructions before installing the equipment. The first and most important step is the safety assessment of the installation.

The safety assessment must be performed by an expert, and determines what steps are necessary to create a safe environment, and what precautions should be adopted during the actual installation and operation.

Procedures for periodic inspection and testing

Where required by local national regulations, IEC 60974-4 specifies test procedures for periodic inspection and after repair or maintenance, to ensure electrical safety for plasma cutting power sources built in conformity with IEC 60974-1. Hypertherm performs the continuity of the protective circuit and insulation resistance tests in the factory as non-operating tests. The tests are performed with the power and ground connections removed.

Hypertherm also removes some protective devices that would cause false test results. Where required by local national regulations, a label shall be attached to the equipment to indicate that it has passed the tests prescribed by IEC 60974-4. The repair report shall indicate the results of all tests unless an indication is made that a particular test has not been performed.

Qualification of test personnel

Electrical safety tests for shape cutting equipment can be hazardous and shall be carried out by an expert in the field of electrical repair, preferably someone also familiar with welding, cutting, and allied processes. The safety risks to personnel and equipment, when unqualified personnel are performing these tests, may be much greater than the benefit of periodic inspection and testing.

Hypertherm recommends that only visual inspection be performed unless the electrical safety tests are specifically required by local national regulations in the country where the equipment is installed.

Residual current devices (RCDs)

In Australia and some other countries, local codes may require the use of a Residual Current Devices (RCD) when portable electrical equipment is used in the workplace or at construction sites to protect operators from electrical faults in the equipment. RCDs are designed to safely disconnect the mains electrical supply when an imbalance is detected between the supply and return current (there is a leakage current to earth). RCDs are available with both fixed and adjustable trip currents between 6 to 40 milliamperes and a range of trip times up to 300 milliseconds selected for the equipment installation, application and intended use. Where RCDs are used, the trip current and trip time on RCDs should be selected or adjusted high enough to avoid nuisance tripping during normal operation of the plasma cutting equipment and low enough in the extremely unlikely event of an electrical fault in the equipment to disconnect the supply before the leakage current under a fault condition can pose a life threatening electrical hazard to operators.

To verify that the RCDs continue to function properly over time, both the trip current and the trip time should be tested periodically. Portable electrical equipment and RCDs used in commercial and industrial areas in Australia and New Zealand are tested to the Australian standard AS/NZS 3760. When you test the insulation of plasma cutting equipment to AS/NZS 3760, measure the insulation resistance according to Appendix B of the standard, at 250 VDC with the power switch in the ON position to verify proper testing and to avoid the false failure of the leakage current test. False failures are possible because the metal oxide varistors (MOVs) and electromagnetic compatibility (EMC) filters, used to reduce emissions and protect the equipment from power surges, may conduct up to 10 milliamperes leakage current to earth under normal conditions.

If you have any questions regarding the application or interpretation of any IEC standards described here, you are required to consult with an appropriate legal or other advisor familiar with the International Electrotechnical standards, and shall not rely on Hypertherm in any respect regarding the interpretation or application of such standards.

Higher-level systems

When a system integrator adds additional equipment; such as cutting tables, motor drives, motion controllers or robots; to a Hypertherm plasma cutting system, the combined system may be considered a higher-level system. A higher-level system with hazardous moving parts may constitute industrial machinery or robotic equipment, in which case the OEM or end-use customer may be subject to additional regulations and standards than those relevant to the plasma cutting system as manufactured by Hypertherm.

It is the responsibility of the end-use customer and the OEM to perform a risk assessment for the higher-level system, and to provide protection against hazardous moving parts. Unless the higher-level system is certified when the OEM incorporates Hypertherm products into it, the installation also may be subject to approval by local authorities. Seek advice from legal counsel and local regulatory experts if you are uncertain about compliance.

External interconnecting cables between component parts of the higher level system must be suitable for contaminants and movement as required by the final end use installation site. When the external interconnecting cables are subject to oil, dust, water, or other contaminants, hard usage ratings may be required.

When external interconnecting cables are subject to continuous movement, constant flexing ratings may be required. It is the responsibility of the end-use customer or the OEM to ensure the cables are suitable for the application. Since there are differences in the ratings and costs that can be required by local regulations for higher level systems, it is necessary to verify that any external interconnecting cables are suitable for the end-use installation site.

Introduction

The Hypertherm Environmental Specification requires RoHS, WEEE and REACH substance information to be provided by Hypertherm's suppliers.

Product environmental compliance does not address the indoor air quality or environmental release of fumes by the end user. Any materials that are cut by the end user are not provided by Hypertherm with the product. The end user is responsible for the materials being cut as well as for safety and air quality in the workplace. The end user must be aware of the potential health risks of the fumes released from the materials being cut and comply with all local regulations.

National and local environmental regulations

National and local environmental regulations shall take precedence over any instructions contained in this manual.

The product shall be imported, installed, operated and disposed of in accordance with all national and local environmental regulations applicable to the installed site.

The European Environmental regulations are discussed later in The WEEE Directive.

The RoHS directive

Hypertherm is committed to complying with all applicable laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive that restricts the use of hazardous materials in electronics products. Hypertherm exceeds RoHS Directive compliance obligations on a global basis.

Hypertherm continues to work toward the reduction of RoHS materials in our products, which are subject to the RoHS Directive, except where it is widely recognized that there is no feasible alternative.

Declarations of RoHS Conformity have been prepared for the current CE versions of Powermax plasma cutting systems manufactured by Hypertherm. There is also a "RoHS mark" on the Powermax CE versions below the "CE Marking" on the data plate of CE versions of Powermax series units shipped since 2006. Parts used in CSA versions of Powermax and other products manufactured by Hypertherm that are either out of scope or exempt from RoHS are continuously being converted to RoHS compliance in anticipation of future requirements.

Proper disposal of Hypertherm products

Hypertherm plasma cutting systems, like all electronic products, may contain materials or components, such as printed circuit boards, that cannot be discarded with ordinary waste. It is your responsibility to dispose of any Hypertherm product or component part in an environmentally acceptable manner according to national and local codes.

- In the United States, check all federal, state, and local laws.
- In the European Union, check the EU directives, national, and local laws. For more information, visit www.hypertherm.com/weee.
- In other countries, check national and local laws.
- Consult with legal or other compliance experts when appropriate.

The WEEE directive

On January 27, 2003, the European Parliament and the Council of the European Union authorized Directive 2002/96/EC or WEEE (Waste Electrical and Electronic Equipment).

As required by the legislation, any Hypertherm product covered by the directive and sold in the EU after August 13, 2005 is marked with the WEEE symbol. This directive encourages and sets specific criteria for the collection, handling, and recycling of EEE waste. Consumer and business-to-business wastes are treated differently (all Hypertherm products are considered business-to-business). Disposal instructions for the CE versions of Powermax plasma systems can be found at www.hypertherm.com/weee.

The URL is printed on the symbol-only warning label for each of these CE version Powermax series units shipped since 2006. The CSA versions of Powermax and other products manufactured by Hypertherm are either out of scope or exempt from WEEE.

The REACH regulation

The REACH regulation (1907/2006), in force since June 1, 2007, has an impact on chemicals available to the European market. The REACH regulation requirements for component manufacturers states that the component shall not contain more than 0.1% by weight of the Substances of Very High Concern (SVHC).

Component manufacturers and other downstream users, such as Hypertherm, are obligated to obtain assurances from its suppliers that all chemicals used in or on Hypertherm products will have a European Chemical Agency (ECHA) registration number. To provide chemical information as required by the REACH regulation, Hypertherm requires suppliers to provide REACH declarations and identify any known use of REACH SVHC. Any use of SVHC in amounts exceeding 0.1% w/w of the parts has been eliminated. The MSDS contains a full disclosure of all substances in the chemical and can be used to verify REACH SVHC compliance.

The lubricants, sealants, coolants, adhesives, solvents, coatings and other preparations or mixtures used by Hypertherm in, on, for, or with its shape cutting equipment are used in very small quantities (except the coolant) and are commercially available with multiple sources that can and will be replaced in the event of a supplier problem associated with REACH Registration or REACH Authorization (SVHCs).

Proper handling and safe use of chemicals

Chemical Regulations in the USA, Europe, and other locations require that Material Safety Data Sheets (MSDS) be made available for all chemicals. The list of chemicals is provided by Hypertherm. The MSDS are for chemicals provided with the product and other chemicals used in or on the product. MSDS can be downloaded from the Downloads Library on the Hypertherm web site at https://www.hypertherm.com. On the Search screen, insert MSDS in the document title and click on Search.

In the USA, OSHA does not require Material Safety Data Sheets for articles such as electrodes, swirl rings, retaining caps, nozzles, shields, deflectors and other solid parts of the torch.

Hypertherm does not manufacture or provide the materials that are cut and has no knowledge whether the fumes released from materials that are cut will pose a physical hazard or health risk. Please consult with your supplier or other technical advisor if you need guidance concerning the properties of the material you will cut using a Hypertherm product.

Fumes emission and air quality

Note: The following information on air quality is intended for general information only and should not be used as a substitute for reviewing and implementing applicable government regulations or legal standards in the country where the cutting equipment will be installed and operated.

In the USA, the National Institute for Occupational Safety and Health (NIOSH) Manual of Analytical Methods (NMAM) is a collection of methods for sampling and analyzing contaminants in workplace air. Methods published by others, such as OSHA, MSHA, EPA, ASTM, ISO or commercial suppliers of sampling and analytical equipment, may have advantages over NIOSH methods.

For example, ASTM Practice D 4185 is a standard practice for the collection, dissolution, and determination of trace metals in workplace atmospheres. The sensitivity, detection limit, and optimum working concentrations for 23 metals are listed in ASTM D 4185. An industrial hygienist should be used to determine the optimum sampling protocol, considering analytical accuracy, cost, and optimum sample number. Hypertherm uses a third party industrial hygienist to perform and interpret air quality testing results taken by air sampling equipment positioned at operator stations in Hypertherm buildings where plasma cutting tables are installed and operated.

Where applicable, Hypertherm also uses a third party industrial hygienist to obtain air and water permits.

If you are not fully aware and up to date on all applicable government regulations and legal standards for the installation site, you should consult a local expert prior to purchasing, installing, and operating the equipment.

Introduction

Hypertherm's CE-marked equipment is built in compliance with standard EN60974-10. The equipment should be installed and used in accordance with the information below to achieve electromagnetic compatibility.

The limits required by EN60974-10 may not be adequate to completely eliminate interference when the affected equipment is in close proximity or has a high degree of sensitivity. In such cases it may be necessary to use other measures to further reduce interference.

This cutting equipment is designed for use only in an industrial environment.

Installation and use

The user is responsible for installing and using the plasma equipment according to the manufacturer's instructions.

If electromagnetic disturbances are detected then it shall be the responsibility of the user to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing the cutting circuit, see *Earthing of the workpiece*. In other cases, it could involve constructing an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases, electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

Assessment of area

Before installing the equipment, the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

a. Other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the cutting equipment.

b. Radio and television transmitters and receivers.

c. Computer and other control equipment.

d. Safety critical equipment, for example guarding of industrial equipment.

e. Health of the people around, for example the use of pacemakers and hearing aids.

f. Equipment used for calibration or measurement.

g. Immunity of other equipment in the environment. User shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures.

h. Time of day that cutting or other activities are to be carried out.

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

Methods of reducing emissions

Mains supply

Cutting equipment must be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply.

Consideration should be given to shielding the supply cable of permanently installed cutting equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the cutting mains supply so that good electrical contact is maintained between the conduit and the cutting power source enclosure.

Maintenance of cutting equipment

The cutting equipment must be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the cutting equipment is in operation. The cutting equipment should not be modified in any way, except as set forth in and in accordance with the manufacturer's written instructions. For example, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

Cutting cables

The cutting cables should be kept as short as possible and should be positioned close together, running at or close to the floor level.

Equipotential bonding

Bonding of all metallic components in the cutting installation and adjacent to it should be considered.

However, metallic components bonded to the workpiece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode (nozzle for laser heads) at the same time.

The operator should be insulated from all such bonded metallic components.

Earthing of the workpiece

Where the workpiece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, for example, ship's hull or building steel work, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitances selected according to national regulations.

Note: The cutting circuit may or may not be earthed for safety reasons. Changing the earthing arrangements should only be authorized by a person who is competent to assess whether the changes will in crease the risk of injury, for example, by allowing parallel cutting current return paths which may damage the earth circuits of other equipment. Further guidance is provided in IEC 60974-9, Arc Welding Equipment, Part 9: Installation and Use.

Screening and shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire plasma cutting installation may be considered for special applications.

Attention

Genuine Hypertherm parts are the factory-recommended replacement parts for your Hypertherm system. Any damage or injury caused by the use of other than genuine Hypertherm parts may not be covered by the Hypertherm warranty, and will constitute misuse of the Hypertherm Product.

You are solely responsible for the safe use of the Product. Hypertherm does not and cannot make any guarantee or warranty regarding the safe use of the product in your environment.

General

Hypertherm Inc. warrants that its Products shall be free from defects in materials and workmanship for the specific periods of time set forth herein and as follows: if Hypertherm is notified of a defect (i) with respect to the plasma power supply within a period of two (2) years from the date of its delivery to you, with the exception of Powermax brand power supplies, which shall be within a period of three (3) years from the date of delivery to you, and (ii) with respect to the torch and leads within a period of one (1) year from its date of delivery to you, with the exception of the HPRXD short torch with integrated lead, which shall be within a period of six (6) months from the date of delivery to you, and with respect to torch lifter assemblies within a period of one (1) year from its date of delivery to you, and with respect to Automation products one (1) year from its date of delivery to you, with the exception of the EDGE Pro CNC, EDGE Pro Ti CNC, MicroEDGE Pro CNC, and ArcGlide THC, which shall be within a period of two (2) years from the date of delivery to you, and (iii) with respect to HyIntensity fiber laser components within a period of two (2) years from the date of its delivery to you, with the exception of laser heads and beam delivery cables, which shall be within a period of one (1) year from its date of delivery to you.

This warranty shall not apply to any Powermax brand power supplies that have been used with phase converters. In addition, Hypertherm does not warranty systems that have been damaged as a result of poor power quality, whether from phase converters or incoming line power. This warranty shall not apply to any product which has been incorrectly installed, modified, or otherwise damaged.

Hypertherm provides repair, replacement or adjustment of the Product as the sole and exclusive remedy, if and only if the warranty set forth herein properly is invoked and applies. Hypertherm, at its sole option, shall repair, replace, or adjust, free of charge, any defective Products covered by this warranty which shall be returned with Hypertherm's prior authorization (which shall not be unreasonably withheld), properly packed, to Hypertherm's place of business in Hanover, New Hampshire, or to an authorized Hypertherm repair facility, all costs, insurance and freight pre paid by the customer. Hypertherm shall not be liable for any repairs, replacement, or adjustments of Products covered by this warranty, except those made pursuant to this paragraph and with Hypertherm's prior written consent.

The warranty set forth above is exclusive and is in lieu of all other warranties, express, implied, statutory, or otherwise with respect to the Products or as to the results which may be obtained therefrom, and all implied warranties or conditions of quality or of merchantability or fitness for a particular purpose or against infringement. The foregoing shall constitute the sole and exclusive remedy for any breach by Hypertherm of its warranty.

Distributors/OEMs may offer different or additional warranties, but Distributors/OEMs are not authorized to give any additional warranty protection to you or make any representation to you purporting to be binding upon Hypertherm.

Patent indemnity

Except only in cases of products not manufactured by Hypertherm or manufactured by a person other than Hypertherm not in strict conformity with Hypertherm's specifications and in cases of designs, processes, formulae, or combinations not developed or purported to be developed by Hypertherm, Hypertherm will have the right to defend or settle, at its own expense, any suit or proceeding brought against you alleging that the use of the Hypertherm product, alone and not in combination with any other product not supplied by Hypertherm, infringes any patent of any third party. You shall notify Hypertherm promptly upon learning of any action or threatened action in connection with any such alleged infringement (and in any event no longer than fourteen (14) days after learning of any action or threat of action), and Hypertherm's obligation to defend shall be conditioned upon Hypertherm's sole control of, and the indemnified party's cooperation and assistance in, the defense of the claim.

Limitation of liability

In no event shall Hypertherm be liable to any person or entity for any incidental, consequential direct, indirect, punitive or exemplary damages (including but not limited to lost profits) regardless of whether such liability is based on breach of contract, tort, strict liability, breach of warranty, failure of essential purpose, or otherwise, and even if advised of the possibility of such damages.

National and local codes

National and local codes governing plumbing and electrical installation shall take precedence over any instructions contained in this manual. In no event shall Hypertherm be liable for injury to persons or property damage by reason of any code violation or poor work practices.

Liability cap

In no event shall Hypertherm's liability, if any, whether such liability is based on breach of contract, tort, strict liability, breach of warranties, failure of essential purpose or otherwise, for any claim, action, suit or proceeding (whether in court, arbitration, regulatory proceeding or otherwise) arising out of or relating to the use of the Products exceed in the aggregate the amount paid for the Products that gave rise to such claim.

Insurance

At all times you will have and maintain insurance in such quantities and types, and with coverage sufficient and appropriate to defend and to hold Hypertherm harmless in the event of any cause of action arising from the use of the products.

Transfer of rights

You may transfer any remaining rights you may have hereunder only in connection with the sale of all or substantially all of your assets or capital stock to a successor in interest who agrees to be bound by all of the terms and conditions of this Warranty. Within thirty (30) days before any such transfer occurs, you agree to notify in writing Hypertherm, which reserves the right of approval. Should you fail timely to notify Hypertherm and seek its approval as set forth herein, the Warranty set forth herein shall be null and void and you will have no further recourse against Hypertherm under the Warranty or otherwise.

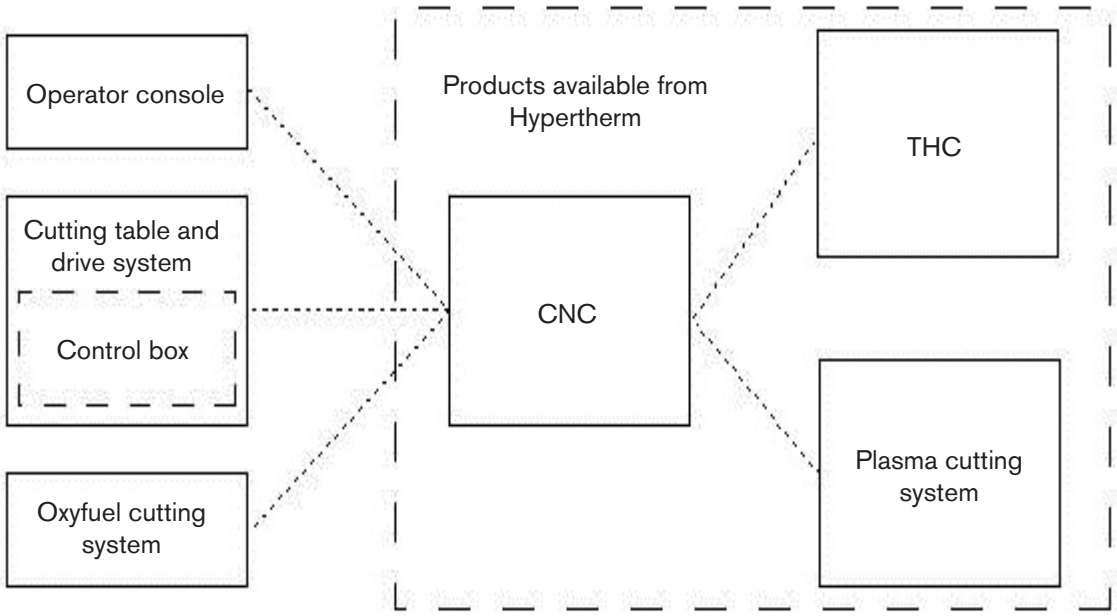
Section 1

SPECIFICATIONS

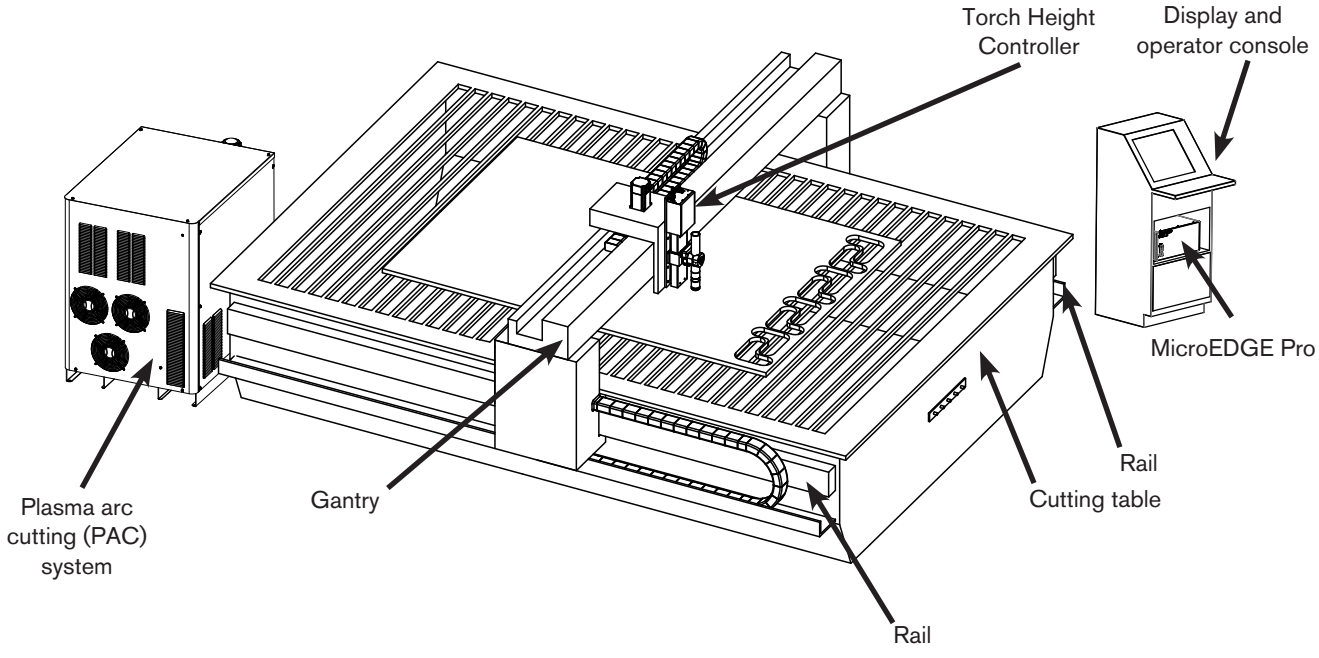
In this section:

Main features of an automated cutting system

The following diagram illustrates the relationship between the components of an automated cutting system. The following sections describe these components and their relationships more fully.



Components of an Automated Cutting System



Shape cutting system configured with a MicroEDGE Pro CNC

CNC

The computerized numerical control (CNC) reads part programs and communicates with the other components of the shape cutting system. It controls what parts (shapes) are cut from the material.

Refer to the sections in this manual for more detailed information about the hardware features of the MicroEDGE Pro CNC. Refer to the following Phoenix™ software manuals for detailed information on the software that operates on the MicroEDGE Pro CNC:

- Installation and Setup Manual (806410)
- Operator's Manual (806400)
- Programmer's Reference (806240)

Cutting table

The cutting table is the frame that supports the plate of material from which parts are cut. A typical cutting table has two rails that run the length of the table on either side and form the track for the gantry. The gantry rides along these rails and spans the width of the table. A torch height controller (THC) is attached to the gantry and provides the vertical movement of the cutting torch.

The horizontal motion of the gantry and torch station, and the vertical motion of the torch on the THC provide the three axes that are necessary for controlling the torch's position on the plate. Additional equipment can be added to the cutting table to permit beveling and other types of cutting.

Hypertherm does not manufacture cutting tables. For more information on the cutting table in your system, refer to the manual that the table manufacturer supplied.

Plasma arc cutting (PAC) system

The cutting tool is the heart of any cutting system and may be a plasma, oxyfuel, laser, or waterjet system. The cutting system controls key parameters, such as the plasma gas and assist gases, and controls how they are mixed.

Your cutting system may include a Hypertherm plasma system. Refer to the appropriate manual for additional information. Electronic (PDF) versions of many Hypertherm manuals are available on the CNC.

If your plasma supply or cutting system is manufactured by another company, refer to the appropriate manual.

Control box

The control box (supplied by the table manufacturer) contains terminal blocks that route power and control signals to the subsystems of the cutting system. The control box may also contain the drive amplifiers that amplify control signals from the CNC to the motors for motion.

Drive system

The speed, smoothness, and accuracy of the cuts are determined by the combination of the CNC, encoders, drive amplifiers, THC, gears, rails, servo motors, and how well they are integrated (tuned) by the table manufacturer. The MicroEDGE Pro is typically used with drives and motors selected by the table manufacturer.

For more information on the drive system for your cutting system, refer to the manual supplied by the table manufacturer.

Torch height control (THC)

The THC controls the distance between the torch and the workpiece (plate), also know as the standoff. This standoff is usually defined by height or voltage.

If a Hypertherm THC has been configured as part of your system, consult one of the following manuals for more information about installing and using it:

- Sensor™ PHC (806150)
- Sensor™ THC (806400, 806410, and 806420)
- Command® THC (802780)
- ArcGlide® THC (806450)

If your THC is manufactured by another company, refer to the manual supplied by the table manufacturer.

Oxyfuel torch

Automated cutting systems can also be configured with oxyfuel torches by adding an oxygen height control (OHC). If the Hypertherm Sensor OHC is configured in your system, refer to the Sensor OHC manual (MANU-0044) for information about installation and operation. For other devices, refer to the appropriate manual.

Refer to the manual supplied by the table manufacturer for more information about an oxyfuel torch.

Marker

A marker can be any device or process that marks a plate rather than piercing or cutting it. If the Hypertherm ArcWriter is configured in your system, refer to the ArcWriter manual (802520) for information about installation and operation. Any HPR plasma system can also be used for marking. See the appropriate HPR manual for more information. For other devices or processes, refer to the appropriate manual.

Overview of MicroEDGE Pro

The controller is a PC-based CNC that uses Hypertherm's Phoenix software to control one or more cutting or marking systems.

Common features

The HyPath, Picopath, and SERCOS II and SERCOS III models of the MicroEDGE Pro CNC are configured with the following types of communication ports:

- Serial (2 RS-232 and 2 RS-422)
- Ethernet (1)
- Hypernet (1)
- USB (5)
- Networking for part program download or remote diagnostic utilities
- Remote on/off interface

For more information about MicroEDGE Pro features, see *System Specifications*, in this section.

System options

MicroEDGE Pro features can be expanded with the addition of the following options that are available from Hypertherm or your system integrator:

- LCD touchscreen monitor (with 1024 x 768 resolution and 4:3 aspect ratio) and 2 m (6 ft) cables for power, USB, and VGA
- Touchscreen extension cable of up to 50 m (160 ft) for keyboard, video, and mouse
- Multiple drive axes
- Sensor THC or ArcGlide THC interface
- Analog joystick and speedpot interface
- Wireless card for Ethernet LAN

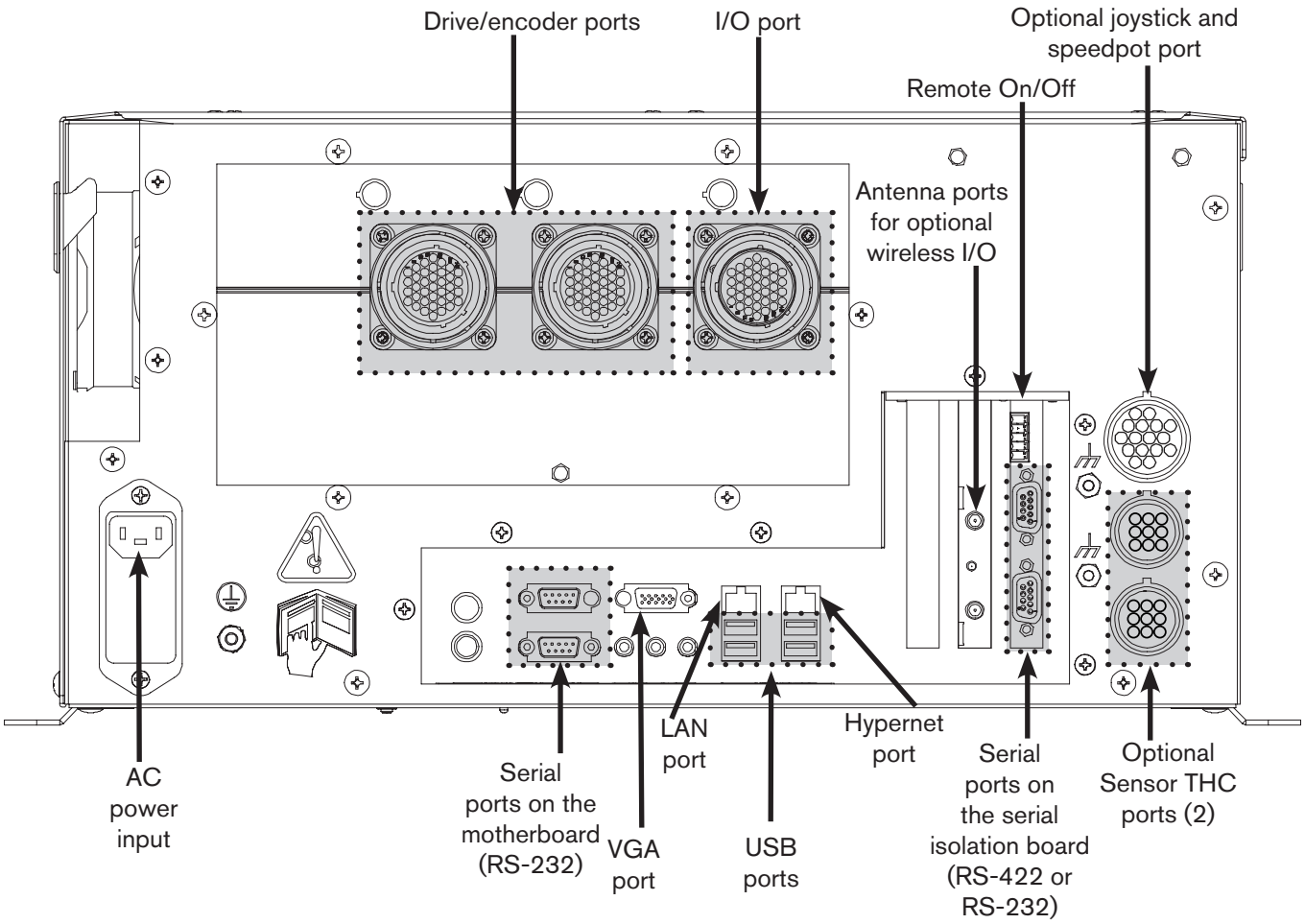
Front view of the MicroEDGE Pro CNC (all models)

Rear panel

The rear panel of the CNC has cable connectors for power, motion control feedback, I/O, and communication ports. These connectors are clearly labeled with their function. There are four configurations available: HyPath, Picopath, SERCOS II, and SERCOS III.

For more information about the electrical installation of the MicroEDGE Pro CNC, see *Section 3, Installation*.

Note: The rear panel shown below is for reference only. The rear panel on individual CNC units depends on which configuration is ordered.



Rear panel of the Picopath MicroEDGE Pro CNC

System specifications

System Features				
Processor	Intel® Processor			
Operating system	Windows® XPe™			
Software	Phoenix version 9.7.1 or later			
LAN ports	1 Ethernet port for general use			
Hypernet port	1 for communication with Hypernet-enabled systems			
USB ports	5 USB 2.0 ports			
Serial ports	4 (2 RS-232 and 2 isolated RS-232/RS-422 configurable ports) with D-sub 9-pin connectors			
VGA port	1 standard 15-pin port for monitor			
Onboard monitoring devices	Hardware monitoring, including fan, CPU, temperature, voltage, POST display			
Hard drive	SATA drive			
THC support	2 Sensor THCs or 4 ArcGlide THCs (over Hypernet or discrete connections)			
Certification	cCSAus, CE GOST-TR, c-Tick, UkrSEPRO			
Configuration	**HyPath**	**Picopath**	**SERCOS II**	**SERCOS III**
Number of I/O	24/24	12/12	512/512	512/512
I/O type	Input: positive logic Output: contact closure	Input and output: Negative logic	Fiber optic ring	Ethernet
Axes available	2-4	2-4	2-12	2-12
Power				
AC input	Voltage: 100 VAC to 240 VAC Current: 1.3 A at 100 VAC / 0.6 A at 240 VAC Frequency: 50/60Hz			
Slow blow fuse	2 A, 250 VAC			
	HyPath	**Picopath**	**SERCOS II**	**SERCOS III**
DC available for I/O	24 V at 1.5 A	24 V at 1.5 A	–	–
Transient over-voltage at mains installation	Category II			
Environmental				
Temperature	0°C to 40°C (32°F to 104°F)			
Humidity	50% relative humidity at 40°C (104°F), 90% relative humidity at 20°C (68°F)			
Ingress protection	IP2X according to IEC 60529. Protect the equipment from exposure to excessive moisture.			
Altitude	Operational up to 2,000 m (6,561.68 feet)			
Environmental pollution degree	Level 2			
Mechanical				
Height	238 mm (9.38 in.)			
Width	463 mm (18.22 in.)			
Depth	332 mm (13.08 in.)			
Weight	15.9 kg (35 lbs)			

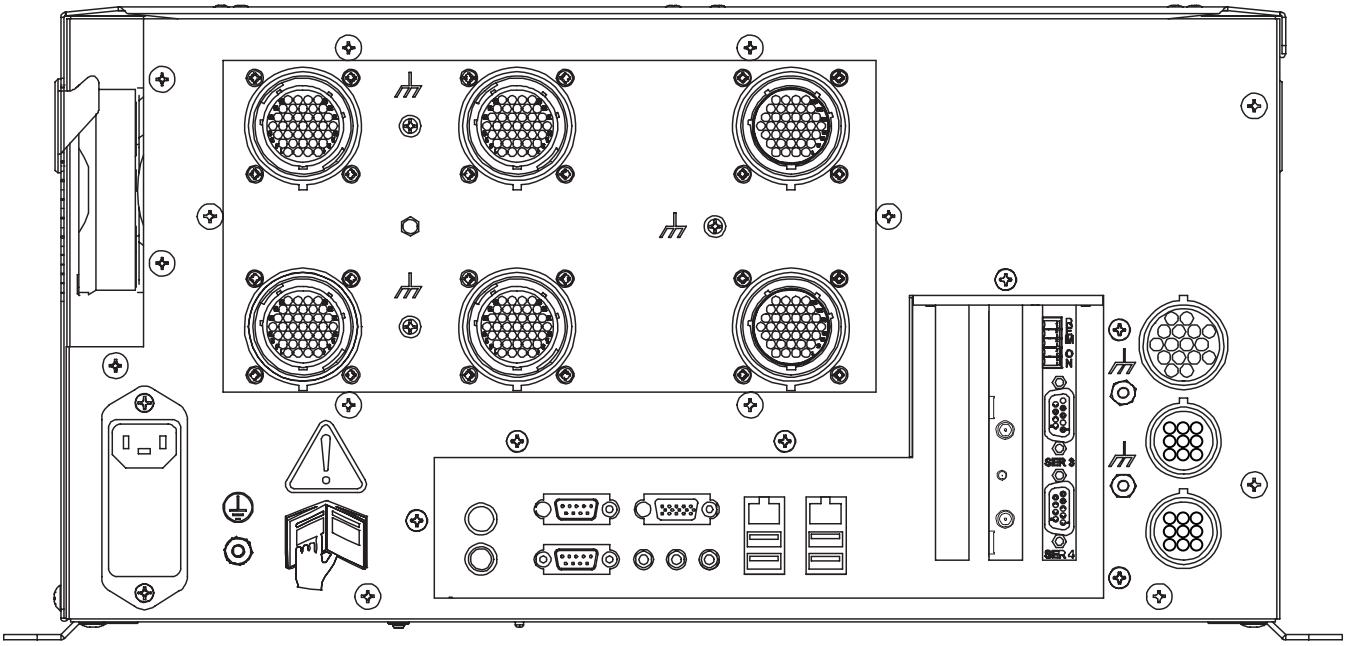
Machine interface configurations

The CNC machine interface is the connection from the CNC to devices on the cutting table to achieve command motion and to send or receive operational signals (I/O). The selection of a machine interface is based on the total number of axes (motors) and I/O that you need for your application and that are supported by the CNC software. In addition to the number of I/O signals required, the style of I/O should be considered to understand what devices and ratings you need to operate external devices on the table, such as a Cut On signal or lifter station.

HyPath configuration

The HyPath interface is available in multiple configurations. The basic system offers 2 to 4 axes with 24 inputs and 24 outputs. The following table lists configuration options

Part Number	Number of Axes	Number of I/O	Integrated Sensor THC	Wireless	Analog
090118	2	24/24	No	Yes	No
090119	3	24/24	No	Yes	No
0990120	4	24/24	No	Yes	No
090121	2	24/24	2	Yes	Yes
090122	3	24/24	2	Yes	Yes
090123	4	24/24	2	Yes	Yes



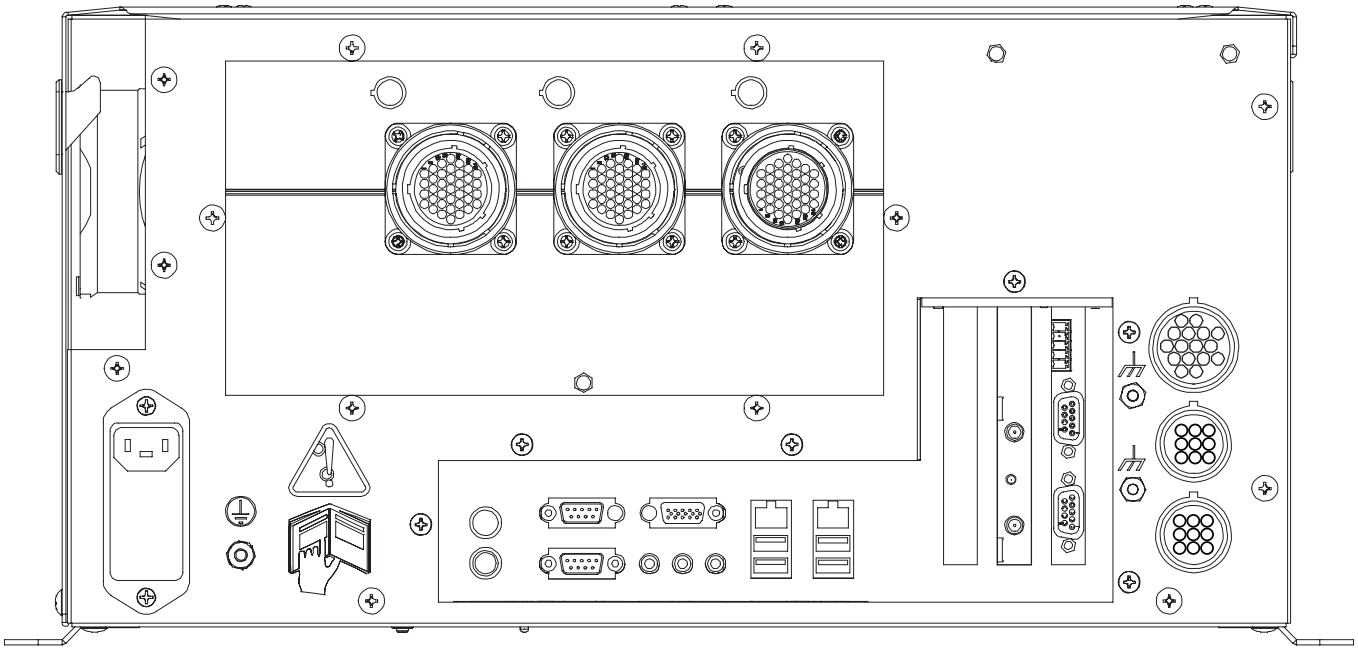
Rear panel of 090123

Picopath configuration

The Picopath Interface offers 2 to 4 axes of motion control with 12 inputs and 12 outputs. This interface can be used to retrofit an existing system with a compatible Picopath interface.

The Picopath interface can be configured to supply encoder power at 5 VDC, 12 VDC, or to supply externally supplied (standalone) voltage encoders. See the circuit example in the *Installation* section that shows the Picopath I/O connections.

Part Number	Number of Axes	Number of I/O	Integrated Sensor THC	Wireless	Analog
090124	2	12/12	NO	No	No
090125	2	12/12	2	No	Yes
090126	2	12/12	NO	Yes	No
090127	2	12/12	2	Yes	Yes
090128	3	12/12	No	No	No
090129	3	12/12	2	No	Yes
090130	3	12/12	NO	Yes	No
090131	3	12/12	2	Yes	Yes
090132	4	12/12	No	No	No
090133	4	12/12	2	No	Yes
090134	4	12/12	No	Yes	No
090135	4	12/12	2	Yes	Yes



Rear panel of 090135

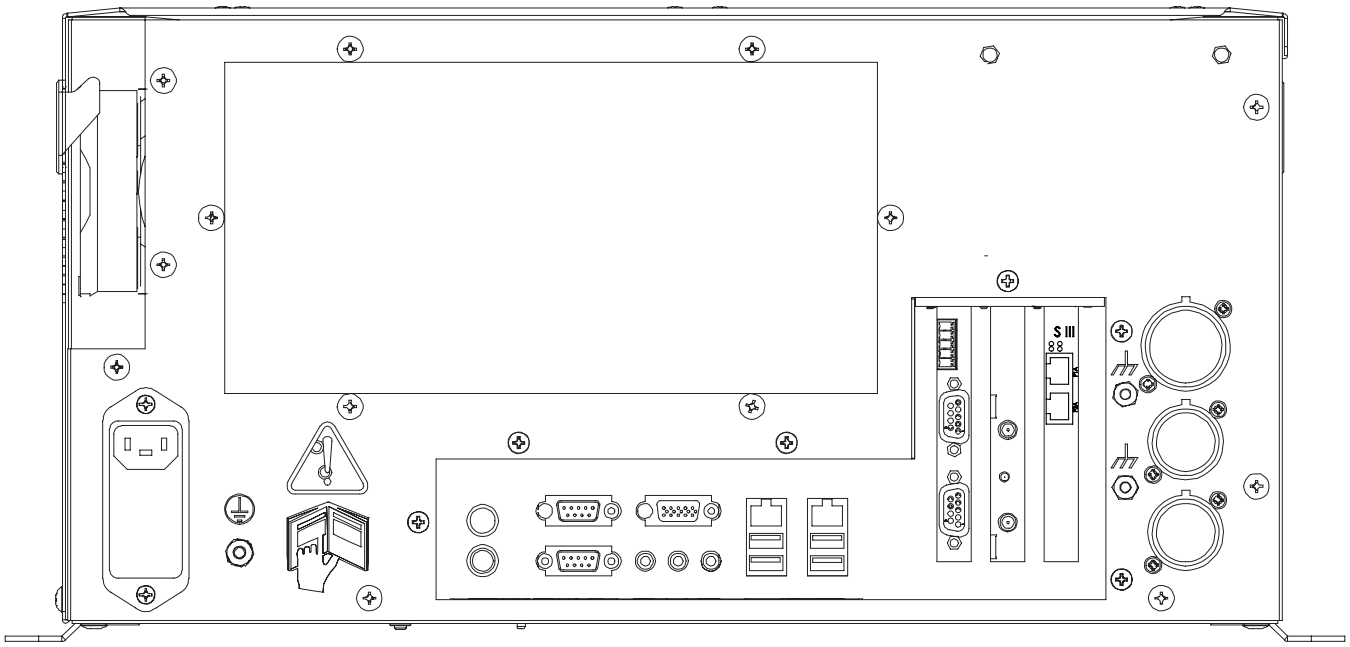
SERCOS II configuration

SERCOS (SErial Real time COmmunication System) servo drive interface communicates with the drive amplifiers using a fiber optic ring. SERCOS II replaces the traditional +/- 10 VDC analog output motion control card (MCC) with a fiber optic driver card. This configuration allows you to expand your system and accommodate 12 axes and 512 I/O.

Notes:

- Multiple THC connections are available, as a function of SERCOS II.
- SERCOS II compatible (digital) drives must be used with this configuration.
- All SERCOS II MicroEDGE Pro configurations offer 512 I/O and wireless networking.

Part Number	Number of Axes	Wireless
090107	2	Yes
090108	3	Yes
090109	4	Yes
090110	5	Yes
090111	6	Yes
090112	7	Yes
090113	8	Yes
090114	9	Yes
090115	10	Yes
090116	11	Yes
090117	12	Yes



Rear panel for all SERCOS II models

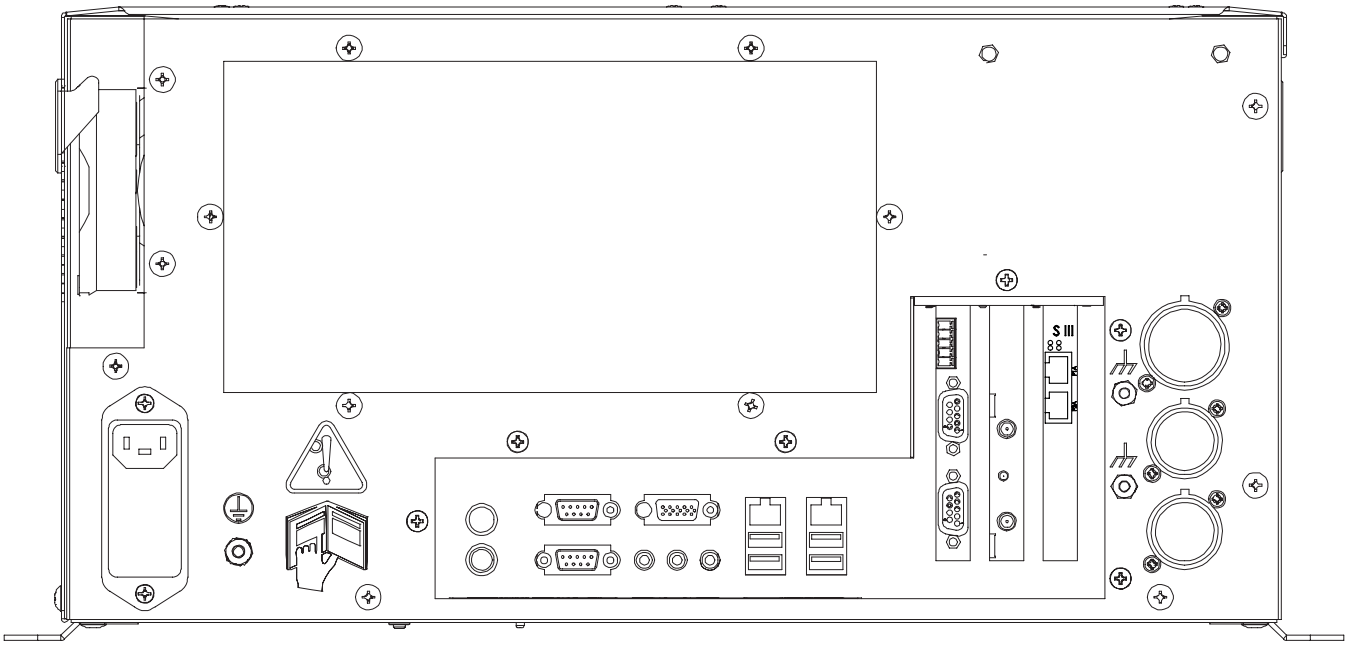
SERCOS III configuration

SERCOS stands for SErial Real time COmmunication System servo drive interface. This approach to communication with the drive amplifiers uses Ethernet and replaces the traditional +/- 10 VDC analog output motion control card (MCC) with a driver card that manages SERCOS III, real-time transmissions and allows you to expand your system to accommodate up to 12 axes and 512 I/O.

Notes:

- Multiple THC connections are available, as a function of SERCOS III.
- SERCOS III compatible (digital) drives must be used with this configuration.
- All SERCOS III MicroEDGE Pro configurations offer 512 I/O and wireless networking.

Part Number	Number of Axes	Wireless
090172	2	Yes
090173	3	Yes
090174	4	Yes
090175	5	Yes
090176	6	Yes
090177	7	Yes
090178	8	Yes
090179	9	Yes
090180	10	Yes
090181	11	Yes
090182	12	Yes



Rear panel for all SERCOS III models

Integrated Sensor THC

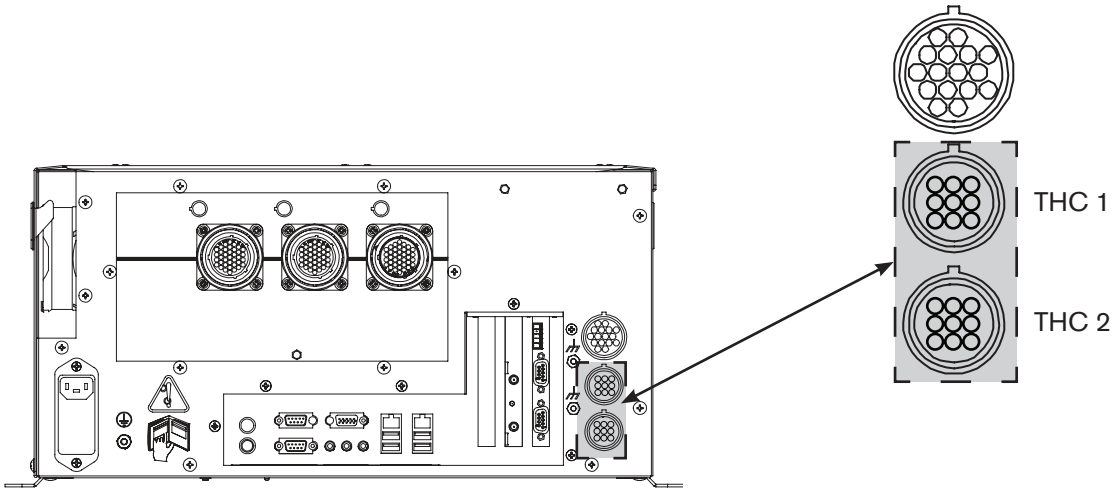
If your MicroEDGE Pro configuration includes the optional integrated Sensor THC, the CNC includes an analog input for the HyPath and Picopath configuration and the following printed circuit boards (PCBs):

- Analog PCB (141125) for 1 to 2 Sensor THCs
- Breakout PCB (141210) for 1 to 2 Sensor THCs, 1 joystick, and 1 to 2 speedpots
- VDC 3 PCB (141201) for 1 Sensor THC

For more information, see Installation.

Refer to the following Phoenix software manuals for detailed information on the software that operates on the MicroEDGE Pro CNC:

- Installation and Setup Manual (806410)
- Operator's Manual (806400)
- Programmer's Reference (806420)



Sensor THC connectors (THC 1 and THC 2)

Secondary enclosure requirements

If the MicroEDGE Pro CNC is installed in a secondary enclosure, the secondary enclosure must maintain the environmental specifications for operation that are listed in System specifications in this section. In particular, the temperature within the primary MicroEDGE Pro enclosure must not exceed 60°C (140°F).

The addition of auxiliary cooling may be required to insure that the internal temperature of the MicroEDGE Pro enclosure remains within the system specification.

Interior temperature

During operation, the temperature of the utility PCB (141194, 141222, 141256, 141307) within the enclosure must remain below 60°C (140°F).

The temperature of the utility PCB is reported on the Control Information screen in Phoenix software. The utility PCB temperature can also be displayed in the Watch Window. To add this temperature monitor to the Watch Window:

1. From the Main screen, choose **Setups** > **Watch**.
2. Select Temperature from the Lower Location dropdown list.
3. Choose **OK**.

Air circulation

A space of 5 cm (2 in.) must be maintained on the top and on all sides between the primary and secondary enclosures to allow air to circulate adequately around the MicroEDGE Pro chassis.

AC input

The range for AC power entering the enclosure must be maintained within 50/60Hz, 100 – 240 VAC.

Symbols and marks

Your product may have one or more of the following markings on or near the data plate. Due to differences and conflicts in national regulations, not all marks are applied to every version of a product.

S mark

The S mark indicates that the power supply and torch are suitable for operations carried out in environments with increased hazard of electrical shock according to IEC 60974-1.

CSA mark

Products with a CSA mark meet the United States and Canadian regulations for product safety. The products were evaluated, tested, and certified by CSA-International. Alternatively, the product may have a mark by one of the other Nationally Recognized Testing Laboratories (NRTL) accredited in both the United States and Canada, such as UL or TÜV.

CE mark

The CE marking signifies the manufacturer's declaration of conformity to applicable European directives and standards. Only those versions of products with a CE marking located on or near the data plate have been tested for compliance with the European Low Voltage Directive and the European Electromagnetic Compatibility (EMC) Directive. EMC filters needed to comply with the European EMC Directive are incorporated within versions of the product with a CE marking.

Eurasian Customs Union (CU) mark

CE versions of products that include an EAC mark of conformity meet the product safety and EMC requirements for export to Russia, Belarus, and Kazakhstan.

GOST-TR mark

CE versions of products that include a GOST-TR mark of conformity meet the product safety and EMC requirements for export to the Russian Federation.

C-Tick mark

CE versions of products with a C-Tick mark comply with the EMC regulations required for sale in Australia and New Zealand.

CCC mark

The China Compulsory Certification (CCC) mark indicates that the product has been tested and found compliant with product safety regulations required for sale in China.

UkrSEPRO mark

The CE versions of products that include a UkrSEPRO mark of conformity meet the product safety and EMC requirements for export to the Ukraine.

Serbian AAA mark

CE versions of products that include a AAA Serbian mark meet the product safety and EMC requirements for export to Serbia.

Section 2

INSTALLATION

In this section:

Upon receipt

1. Verify that all the system components on your order have been received. Contact your supplier if any items are missing.
   - MicroEDGE Pro CNC
   - AC power input cable (North America)
   - AC power input cable connector (all other regions)
   - Joystick and speedpot adapter cable for analog option
   - MicroEDGE Pro CNC instruction manual
   - Phoenix software instruction manuals (3)
2. Inspect the system components for any physical damage that may have occurred during shipping. If there is evidence of damage, refer to *Claims.* All communications regarding claims must include the model number and serial number located on the back of the CNC.

Claims

Claims for damage during shipment – If your unit was damaged during shipment, you must file a claim with the carrier. Hypertherm will furnish you with a copy of the bill of lading upon request. If you need additional assistance, call Customer Service listed in the front of this manual, or your authorized Hypertherm distributor.

Claims for defective or missing merchandise – If any of the merchandise is defective or missing, contact your supplier. If you need additional assistance, call Hypertherm Customer Service (listed in the front of this manual) or your authorized Hypertherm distributor.

Installation requirements

All installation and service of electrical systems must conform to national and local electrical codes. This work should be performed only by qualified personnel.

Direct any technical questions to your authorized Hypertherm distributor or the nearest Hypertherm Technical Service Department (listed in the front of this manual).

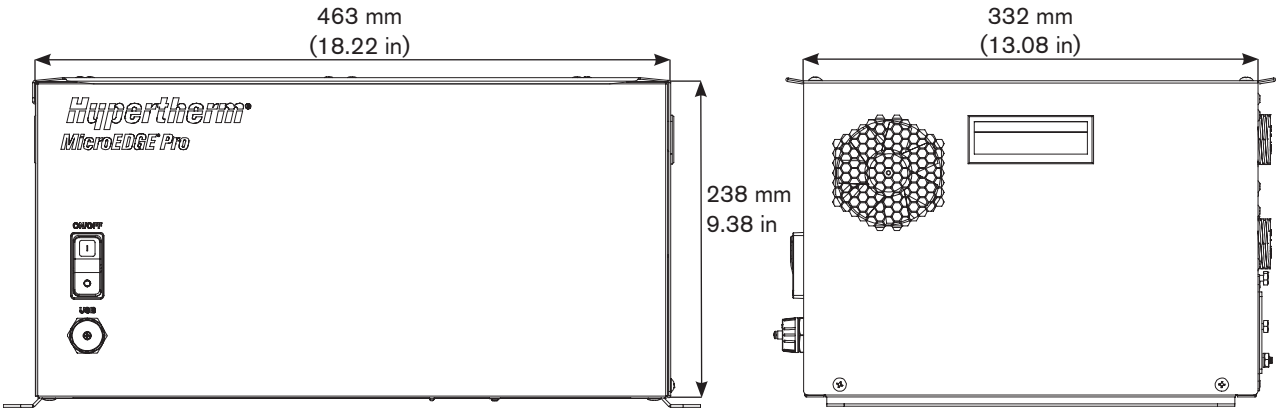
Placement of system components

- Place all system components in position prior to making electrical and interface connections.
- Ground all system components to earth. See *Recommended grounding and shielding practices* in this section for details.
- Insure that the forced air ventilation opening is not blocked.
- Do not restrict operator access to the AC power connector for connection and disconnection of the power cord. The AC power connector is the primary means for disconnection of power to the equipment.

Mounting the CNC

Before you configure the MicroEDGE Pro CNC, mount all system components using the appropriate instructions.

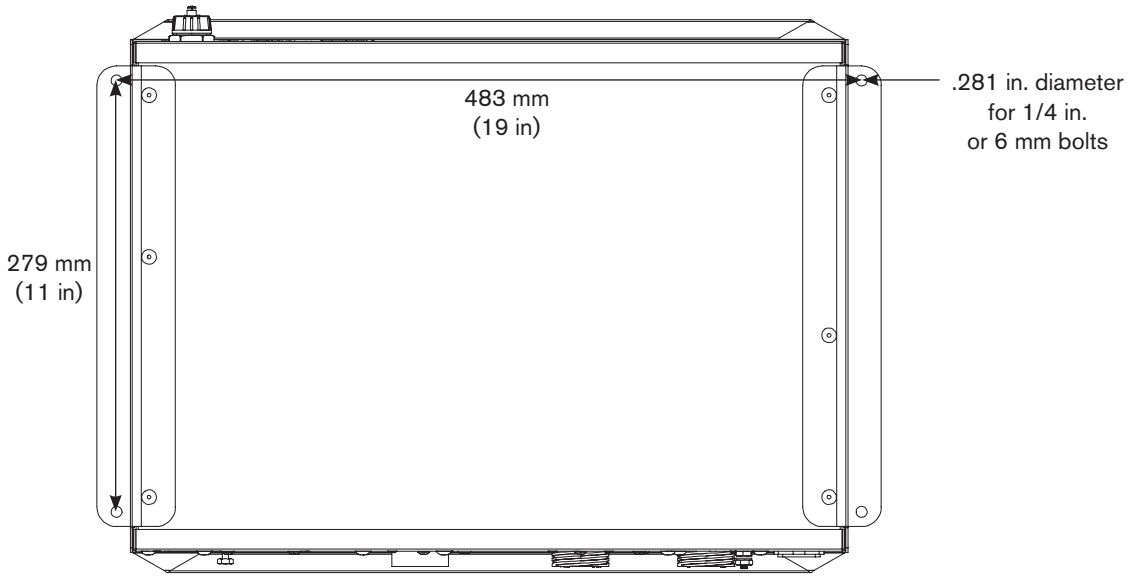
Do not allow the system components to lie unsecured on top of cabinets or on the floor.



Front and Side Views of the MicroEDGE Pro CNC

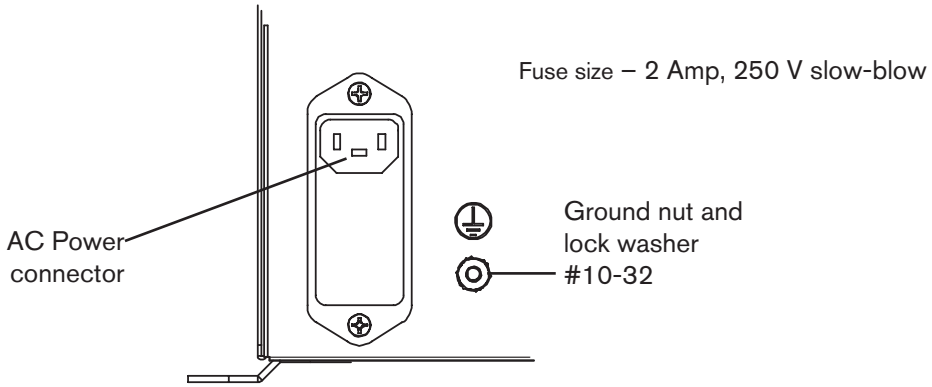
Mounting hole patterns on the bottom of the CNC

If you are upgrading from a MicroEDGE CNC to a MicroEDGE Pro, the mounting bolt patterns are the same on both systems.



MicroEDGE Pro mounting pattern

AC power

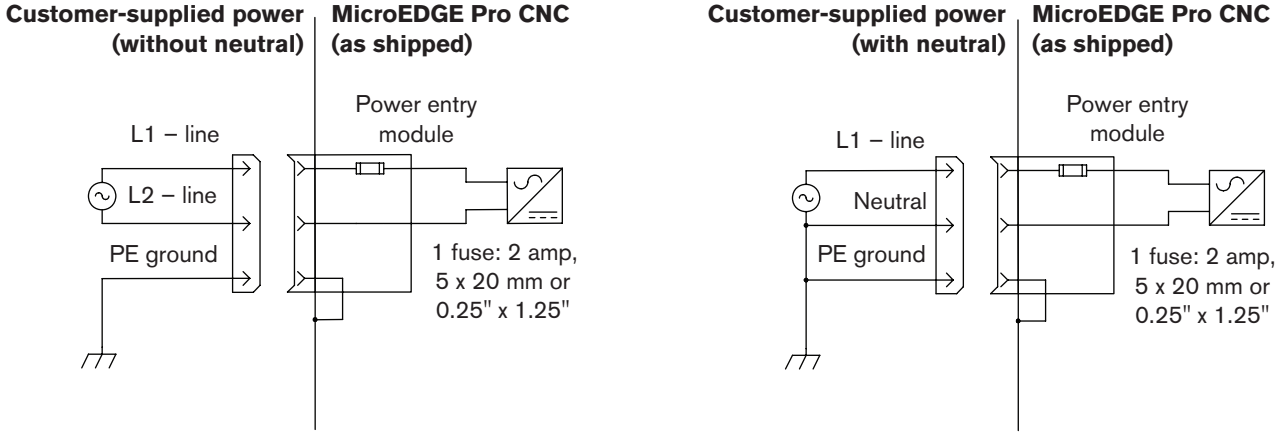


Power cable

An AC power cable is standard equipment for North America, and is shipped with the MicroEDGE Pro CNC. For other regions, the CNC is shipped with a power connector only to allow you to create a connector and cable combination that meet the requirements of local code and power connections.

To create a power cable, use the plug (108842) that ships with the MicroEDGE Pro CNC and connect a 3-wire cable for line, neutral, and ground signals according to local electrical codes. For more electrical specifications, see the Power section of the System Specifications table in the *Specifications* section. Also see the drawings below for examples.

Note: The fuse block is universal and holds 1 fuse to comply with local electrical codes

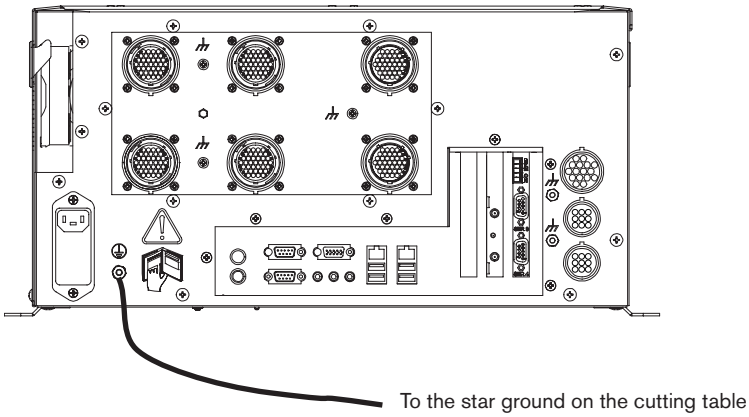


VAC input wiring examples

Chassis grounding

The CNC must be properly grounded according to national and local electrical codes for safe operation. Use a number 6 AWG (13 mm^2) wire between the ground stud on the rear of the CNC to the cutting table as shown below.

 	**WARNING** **ELECTRICAL SHOCK CAN KILL**
This ground connection must be wired to insure safe and reliable operation.	



Ground cable on the CNC

Interface ports

Hypernet interface

The Hypernet interface allows a Hypernet connection to a Hypernet-enabled system, such as the ArcGlide THC.

LAN interface

The RJ-45 Ethernet interface allows the MicroEDGE Pro to connect to a local area network (LAN) for downloading parts and using Remote Help.

For more information on LAN setup, see the *Phoenix Software Installation and Setup Manual.*

USB interface (5)

The USB 2.0 ports can be used to load programs or connect a USB keyboard, mouse, or touchscreen.

Serial ports (4)

The MicroEDGE Pro has 4 serial ports that use D-sub 9-pin connectors.

Two RS-232 serial ports (COM 1 and COM 2) are located on the motherboard.

Two more serial ports (COM 3 and COM 4) are located on all versions of the serial isolation board:

- 141222 for 4-axis HyPath and Picopath
- 141256 for 2-axis Picopath
- 141194/141307 for SERCOS II and SERCOS III

Transmission rate is up to 115K Baud. Both ports are preset with RS-422 as the default but both can be configured for RS-232. For more information, see *Serial port configuration* in this section and in the *Maintenance and Diagnostics* section.

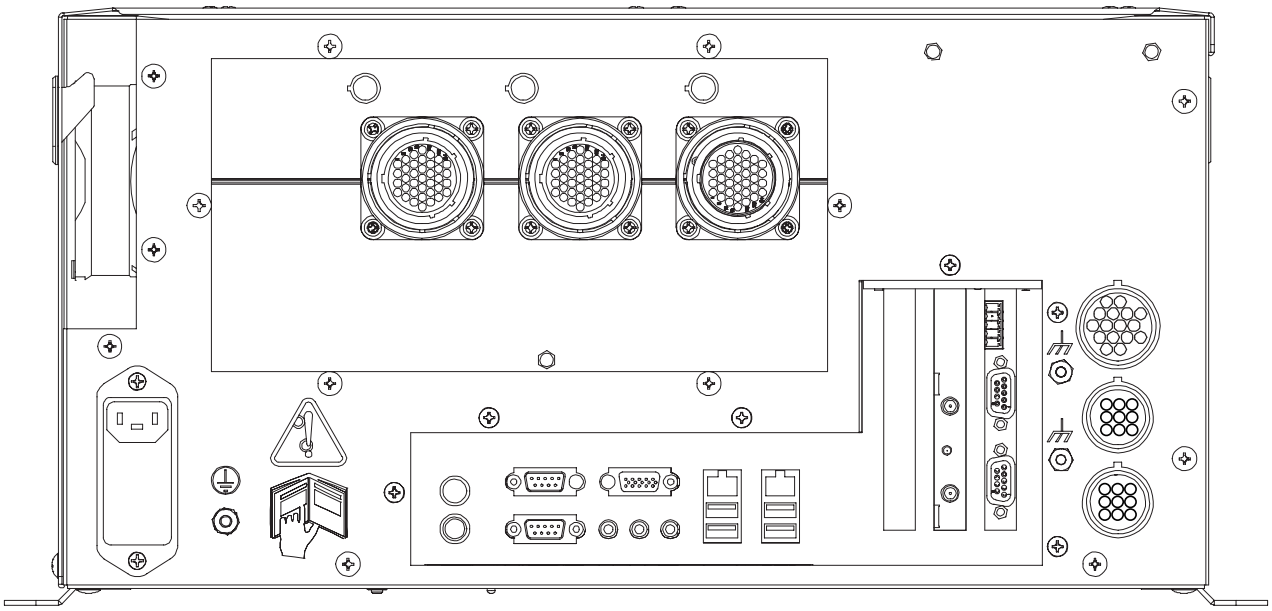
VGA Port 1

The VGA port allows connection of an video monitor (touchscreen, LCD, or CRT).

Picopath connections

Picopath I/O connections

I/O assignments are made in the Phoenix software on the Machine Setups > I/O screen. For more information, see the *Phoenix Software Installation and Setup Manual.*



Rear view of the MicroEDGE Pro CNC with Picopath I/O configuration

Picopath I/O offers:

- 12 negative logic inputs rated at 24 VDC
- 12 negative logic outputs, rated at 24 VDC for up to 1 A loads
- 24 VDC field power supply on the Picopath PCB with a total usage of 1.5 A

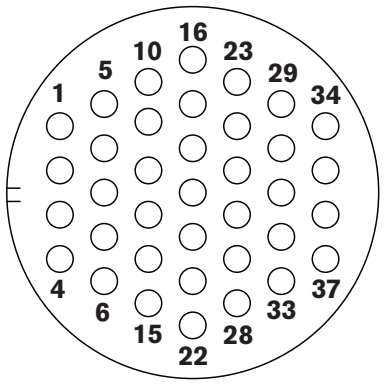
Picopath I/O connector

Use the following information to create Picopath I/O cables.

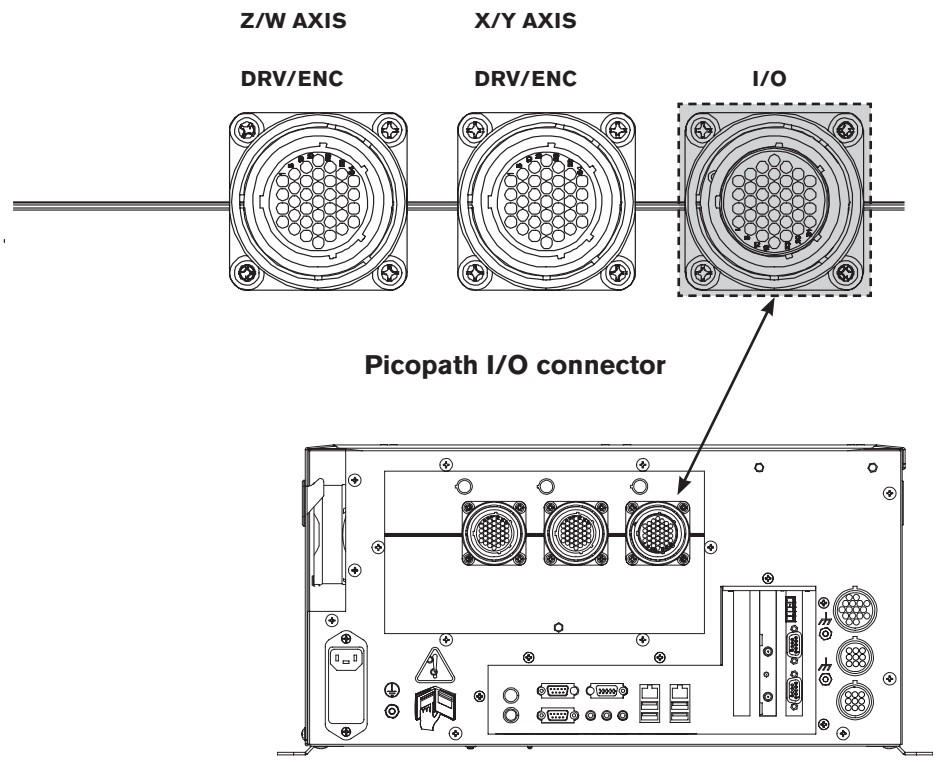
The Picopath I/O mating connector is a 37-pin circular connector:

- Cable connector: AMP #208470-1
- Sockets contacts: AMP 66101-3 (16–18 ga), AMP 66105-3 (20–24 ga)
- Hypertherm kit: 228490

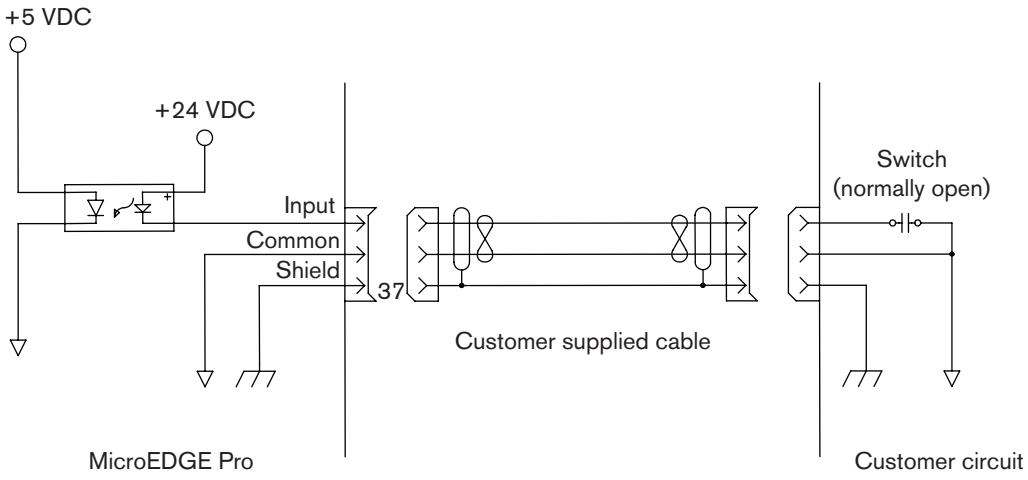
Pin no.	Signal
1	Input 1
2	Input 2
3	Input 3
4	Input 4
6	Input 6
8	Input 8
9	Input 9
10	Input 10
11	Input 11
12	Input 12
13	N/C
14	+24 VDC
15	+24 VDC
16	N/C
17	24 V Common
18	24 V Common
19	N/C
20	N/C
21	Output 1
22	Output 2
23	Output 3
24	Output 4
25	Output 5
26	Output 6
27	Output 7
28	Output 8
29	Output 9
30	Output 10
31	Output 11
32	Output 12
33	I/O Shield
34	+24 VDC
35	+24 VDC
36	24 V Common
37	24 V Common



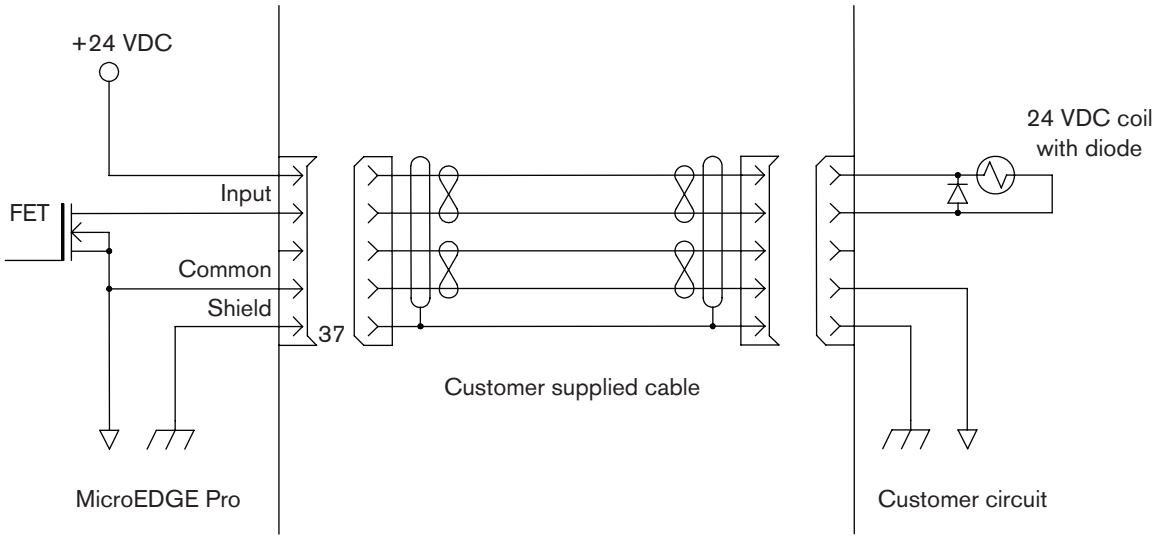
Picopath I/O connector J8



Picopath I/O circuit examples



Input – CNC sinking



Output, 24 VDC coil – CNC sinking

Picopath drive/encoder connectors

Picopath axis assignments are made in Phoenix software on the Machine Setups > Axis screen. For more information, see the *Phoenix Software Installation and Setup Manual*.

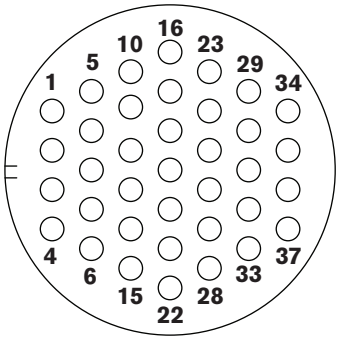
Use the following information to create Picopath drive/encoder cables.

The Picopath drive/encoder mating connector is a 37-pin, circular connector:

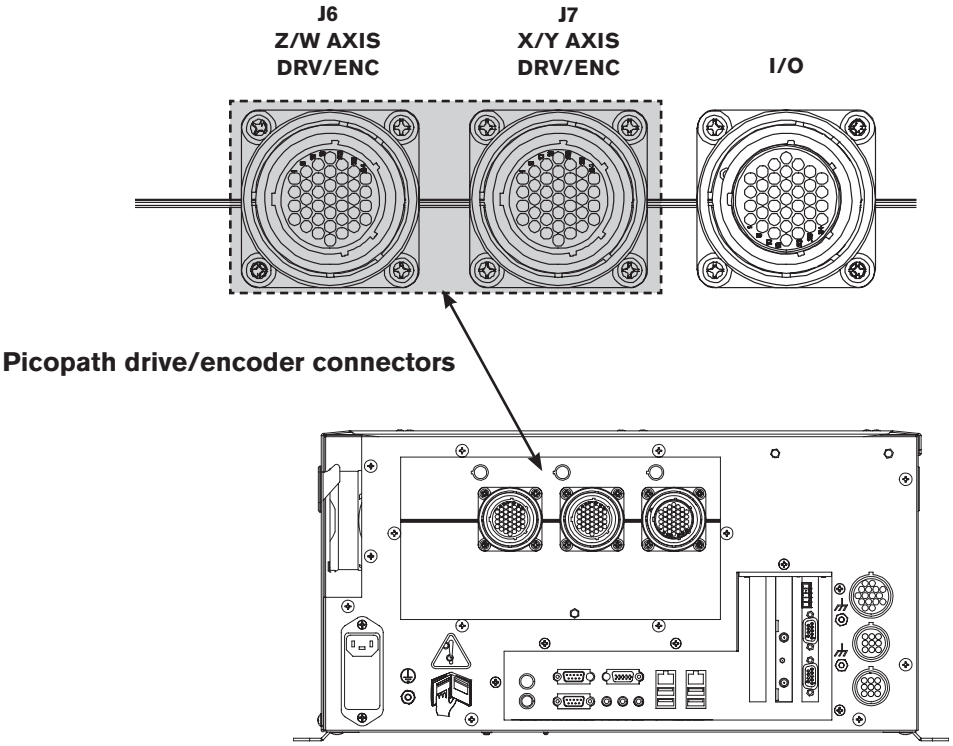
- Cable connector: AMP #208472-1
- Pin contacts: AMP 66099-3 (16–18 ga), AMP 66103-3 (20–24 ga)
- Cabling: Belden # 9504 or equivalent for encoder signals
- Cabling: Belden # 9501 or equivalent for drive signals
- Hypertherm kit: 228489

Notes:

- Enable individual drives for each axis for proper operation.
- Connect cable shields to the metal shell of the connector for optimum noise immunity and to keep signal commons separate from the ground.



Picopath drive/encoder connector J6 and J7



Picopath drive/encoder connectors

Picopath pin-outs for servo drive connectors

Connector J6		
Pin no. for Z Axis	**Pin no. for W Axis**	**Signal**
2	2	+5 VDC or +12 VDC sourced for encoder power
3	3	Encoder power common
4	1	Encoder power output (available if needed)
7	7	Encoder power shield
8	6	Encoder power common (available if needed)
9	5	Encoder channel A input
14	11	Encoder channel /A Input
15	10	Encoder channel B Input
21	17	Encoder channel /B Input
22	16	Encoder channel Z Input
28	23	Encoder channel /Z Input
13	12	Encoder shields
24	26	Drive enable in (relay contact closure)
25	27	Drive enable out (relay contact closure)
37	34	Drive power input (+12 VDC or +15 VDC)
33	29	Servo output (± 10 VDC)
32	30	Drive power common
36	35	Drive power input (-12 VDC or -15 VDC)
20	18	Servo output common
19	31	Drive/servo shield

Connector J7		
Pin no. for X Axis	**Pin no. for Y Axis**	**Signal**
2	2	+5 VDC or +12 VDC sourced for encoder power
3	3	Encoder power common
4	1	Encoder power output (available if needed)
7	7	Encoder power shield
8	6	Encoder power common (available if needed)
9	5	Encoder channel A input
14	11	Encoder channel /A Input
15	10	Encoder channel B Input
21	17	Encoder channel /B Input
22	16	Encoder channel Z Input
28	23	Encoder channel /Z Input
13	12	Encoder Shields
24	26	Drive enable in (relay contact closure)
25	27	Drive enable out (relay contact closure)
37	34	Drive power input (+12 VDC or +15 VDC)
33	29	Servo output (± 10 VDC)
32	30	Drive power common
36	35	Drive power input (-12 VDC or -15 VDC)
20	18	Servo output common
19	31	Drive/servo shield

Note: See the jumpers on the Picopath 4-axis backdoor interface board to select one of the following:

- 5 VDC sourced encoder power (default).
- 12 VDC sourced encoder power.
- Customer supplied encoder and field power.

For more information, see *Maintenance and Diagnostics*.

Encoder voltage options on the Picopath interface

The Picopath interface in the MicroEDGE Pro is similar to and compatible with the Picopath interface in an EDGE or MicroEDGE CNC except that the MicroEDGE Pro Picopath interface provides jumper settings that allow the user to select how the field power supply voltages are routed on the board.

The jumper is set to 5 VDC sourced encoder power in the factory and uses the MicroEDGE Pro internal field power supply to power the encoder, analog, and 24 I/O circuits.

The drive/encoder and I/O connections on the back of the Picopath interface provide voltages that you can use to power an external encoder, provide analog power to a drive, or provide DC power for the cutting system's I/O.

Encoder power is frequently used in DC drive systems because the motors' encoder is usually wired directly to the drive/encoder connector of the CNC. Most modern encoders use 5 VDC for power while older cutting systems use 12 VDC for encoder power. The jumper blocks on the MicroEDGE Pro Picopath interface allow you to replace an older CNC with the MicroEDGE Pro CNC without having to replace encoders or to rewire the drive circuit of the cutting system.

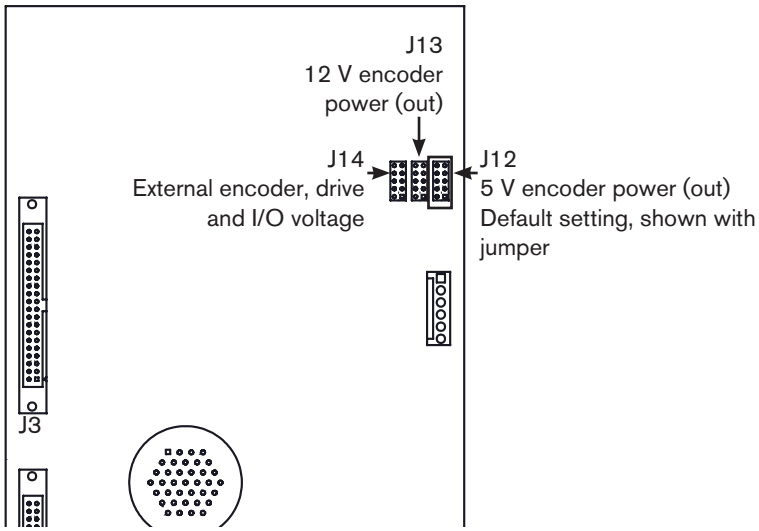
Encoder jumper options

The encoder jumper blocks allow you to chose between 5 V encoders, 12 V encoders, or to supply external voltages to the MicroEDGE Pro. The jumper must be installed on one of these encoder jumper blocks.

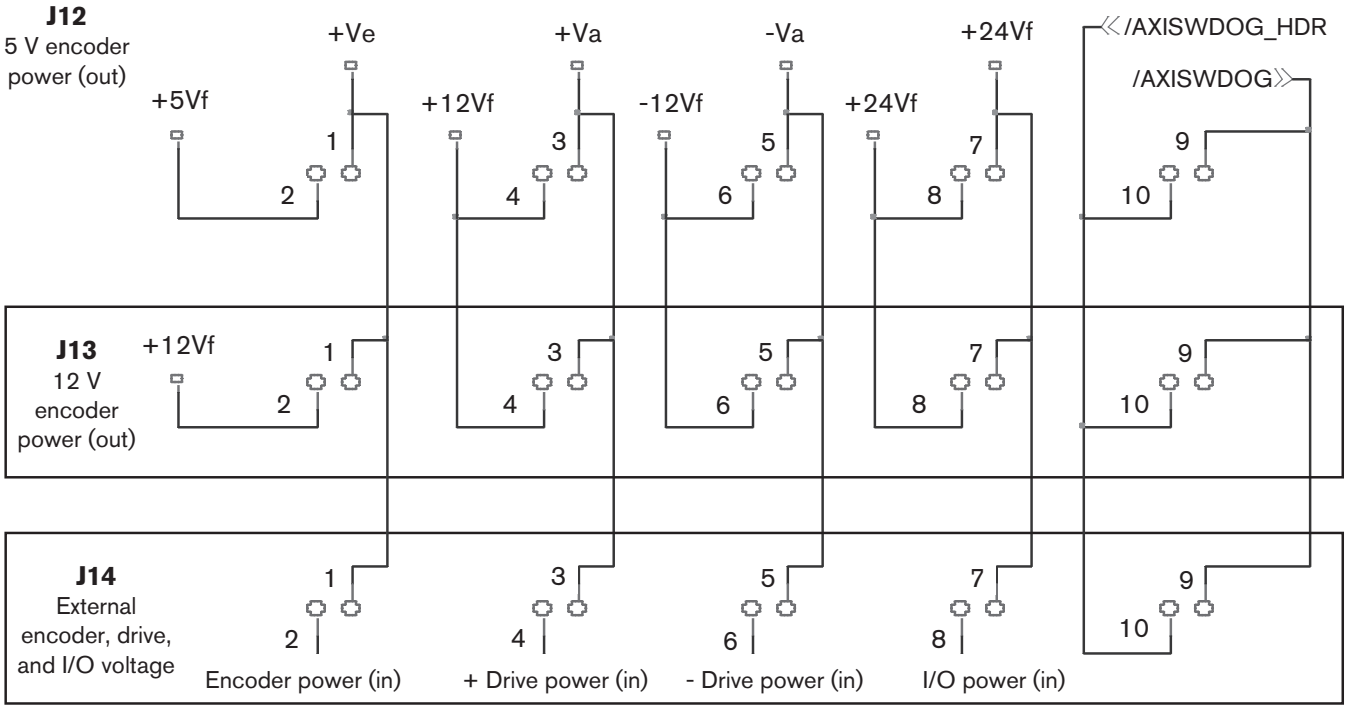
5 V sourced encoders use the MicroEDGE Pro internal field power supply to provide 5 VDC on pin 2 of each drive/encoder connector to power an external encoder. It also puts 5 VDC on the pull-up resistor for each encoder input signal. This voltage should match the signal voltage of the encoder channels.

12 V sourced encoders use the MicroEDGE Pro internal field power supply to provide 12 VDC on pin 2 of each drive/encoder connector to power an external encoder. It also puts 12 VDC on the pull-up resistor for each encoder input signal. This voltage should match the switching voltage of the motor's encoder.

External encoder voltage provides the MicroEDGE Pro with field power to supply encoder power (5 VDC or 12 VDC), voltage on the pull-up resistor on the encoder channel, drive analog power (+/- 12 VDC), and I/O power (24 VDC) to the Picopath interface. This option is common when a MicroEDGE Pro CNC is replacing a CNC that did not have an internal field power supply (D80).



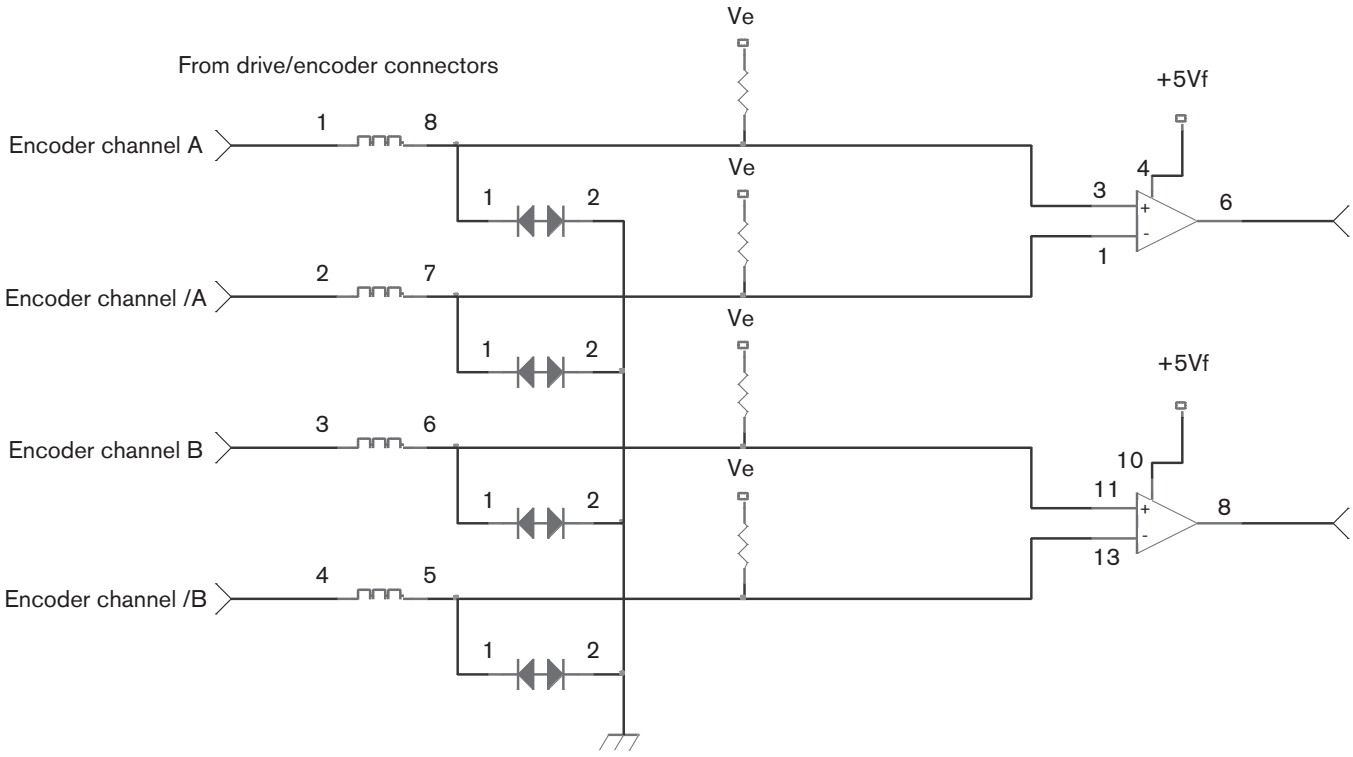
Encoder jumper blocks on the Picopath interface



Circuit layout of the jumper blocks

The following illustration shows an encoder circuit in which the jumper setting puts voltage on Ve which supplies voltage to the pull-up resistor on the encoder channels. The Ve voltage should equal the voltage on the encoder channel.

Refer to the instruction manual for your encoder to verify the encoder channel voltage or contact your table supplier.



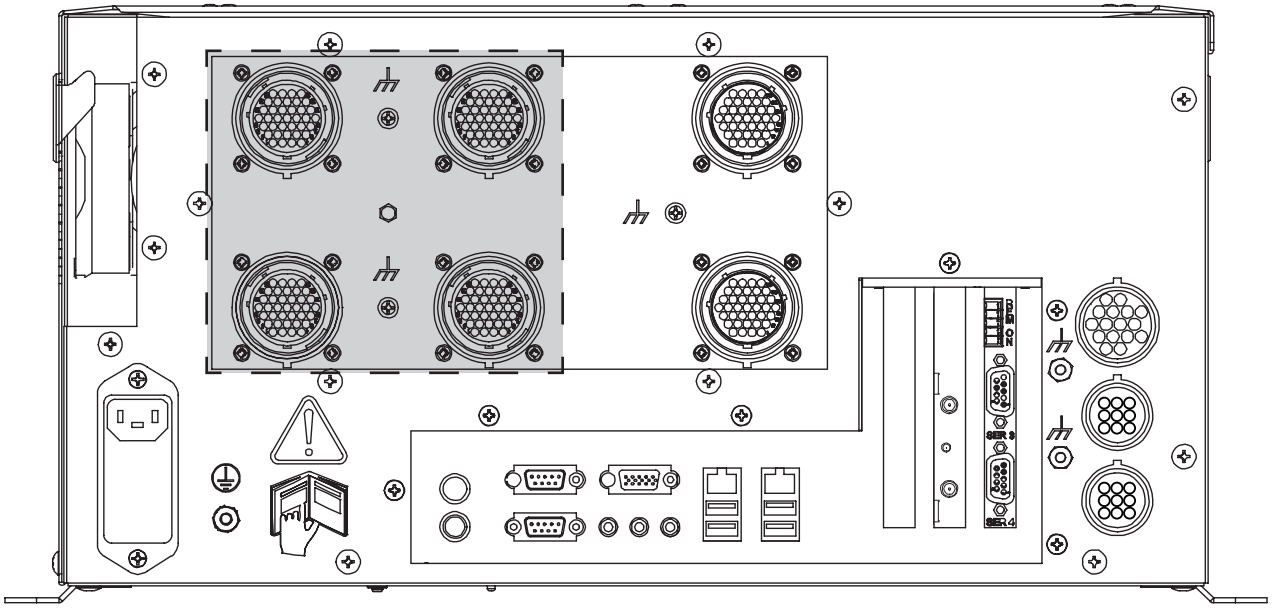
Encoder circuit with jumper settings for voltage on encoder channels

HyPath connections

HyPath I/O

The HyPath I/O PCB provides 24 inputs and 24 outputs through four circular plastic connectors (CPCs), each containing 6 inputs and 6 outputs.

HyPath I/O assignments are made in Phoenix software, on the I/O Setup screen. For more information, see the *Phoenix Software Installation and Setup Manual*.



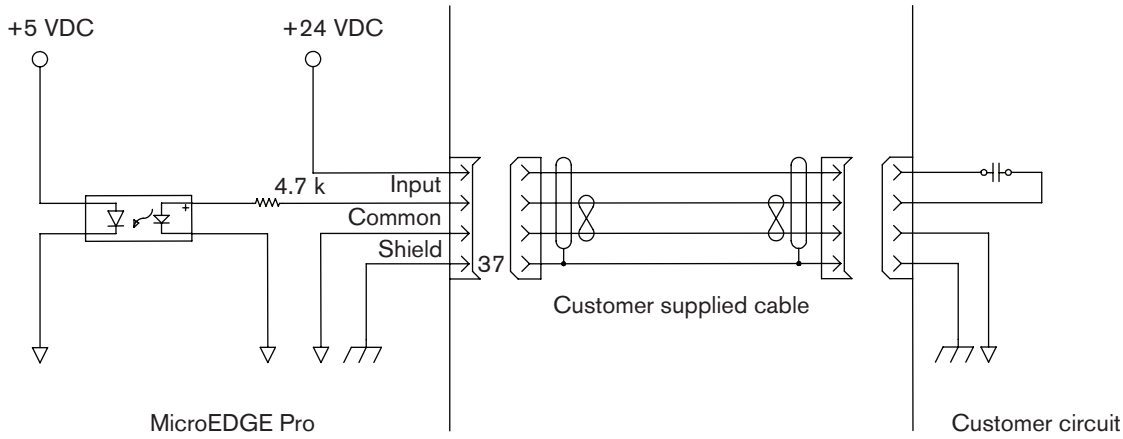
View of the MicroEDGE Pro CNC with HyPath 24 I/O, 4-axis servo configuration and 2 Sensor THCs

HyPath inputs

- Use positive logic that requires a positive voltage to activate the input.
- Are opto-coupled and have a range of +4.7 V minimum to +32 V maximum. Internal series resistor = 4.7 K Ohm.
- +24 VDC field power supply on the HyPath and 4-axis servo PCB with a total external usage of 1.5 A.

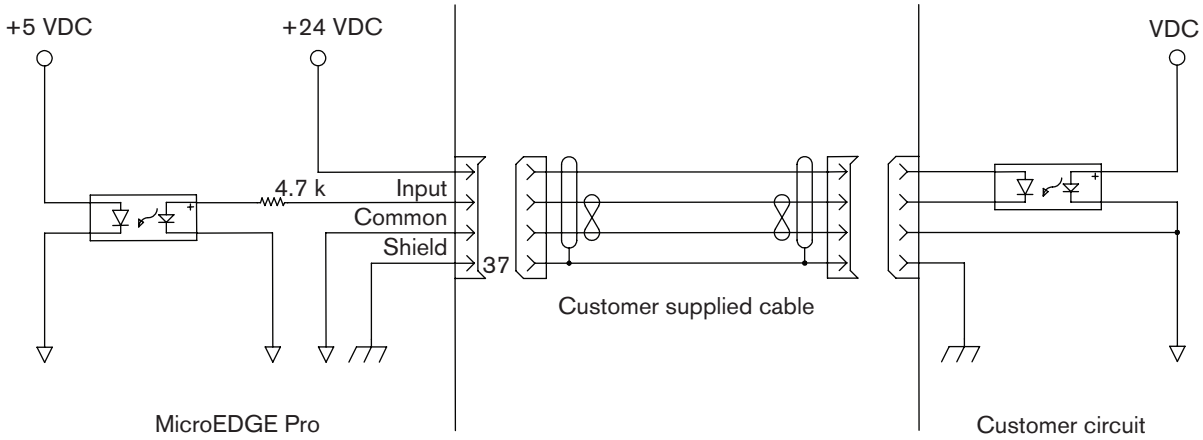
HyPath input circuit examples

- Connection to a limit switch, a push-button switch, a home switch, a station select switch (toggle switch), a relay contact, or an emergency-stop button



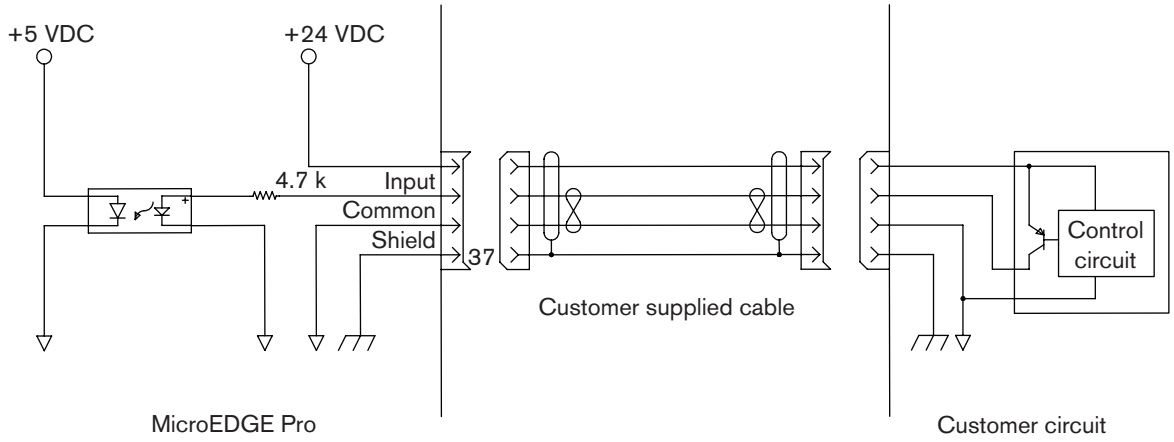
Customer-supplied, normally open switch

- Connection to an opto-isolator, typically found in a THC and a plasma supply.



Customer-supplied opto-isolator switch

- Typical connection to a PNP-style proximity sensor input (PNP)



Customer supplied proximity switch – PNP sourced

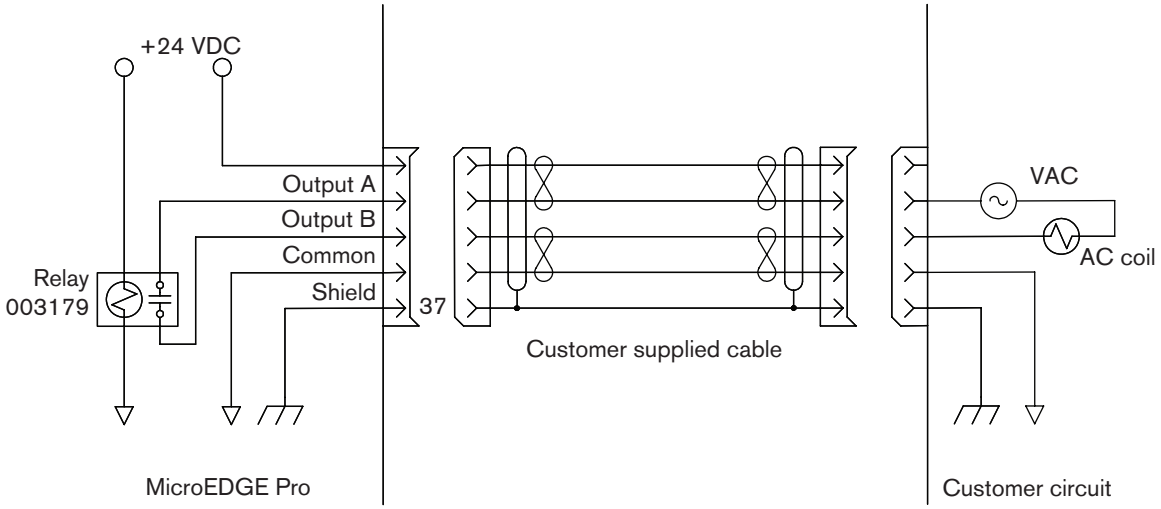
HyPath outputs

- Use relay contact closure (003179). The relay outputs are normally open contacts. Outputs can be set to normally closed by setting the output logic in the I/O screen in the Phoenix software.
- 5 V to 32 V switching voltage; 5 A continuous-resistive load; 2 A continuous-inductive load.

HyPath output circuit examples

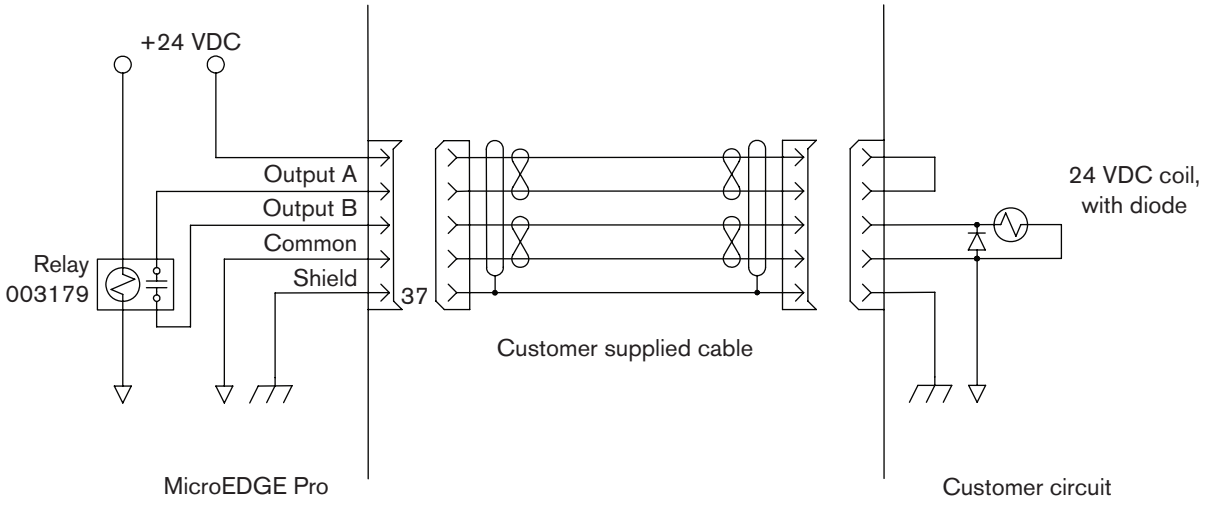
Connection to a relay coil (1a, 1b, and 1c). Notice that the commons are connected together and a diode (supplied by the customer) is used between DC coil connections.

1a.



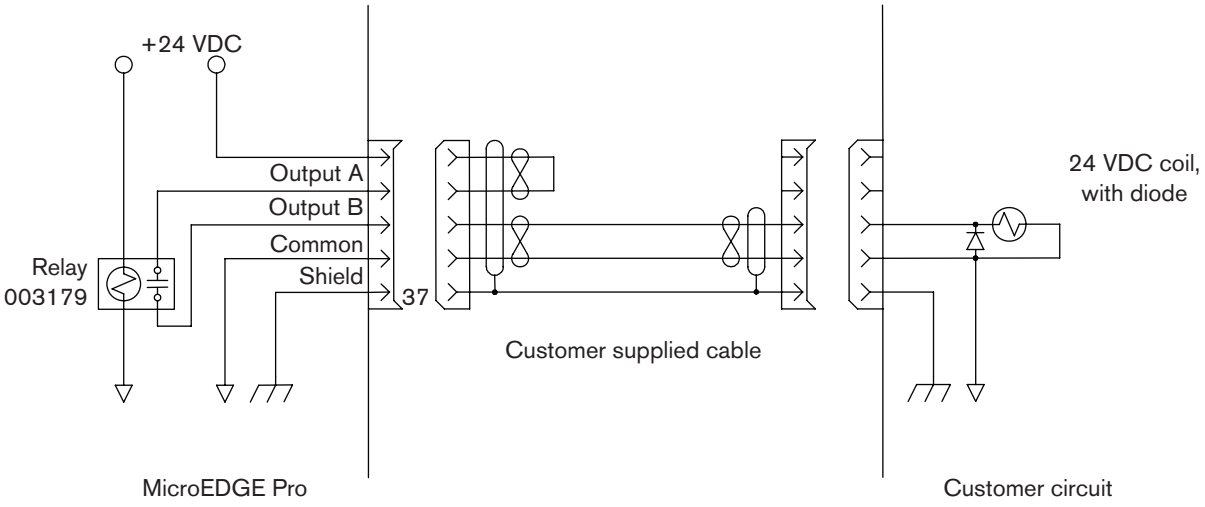
AC coil – supplied by customer

1b.



24 VDC coil – CNC sourced

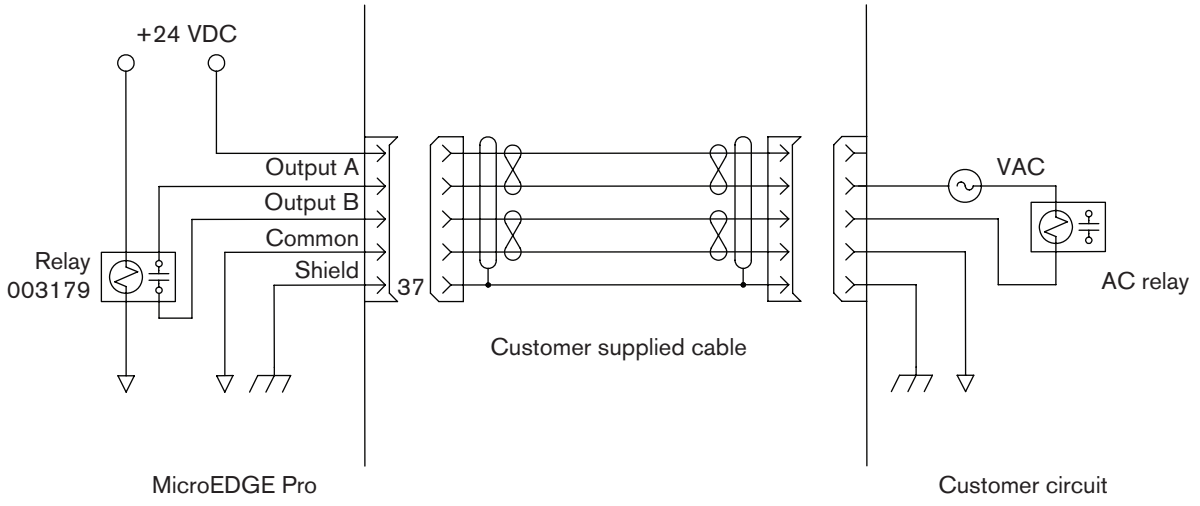
1c.



24 VDC coil – CNC sourced

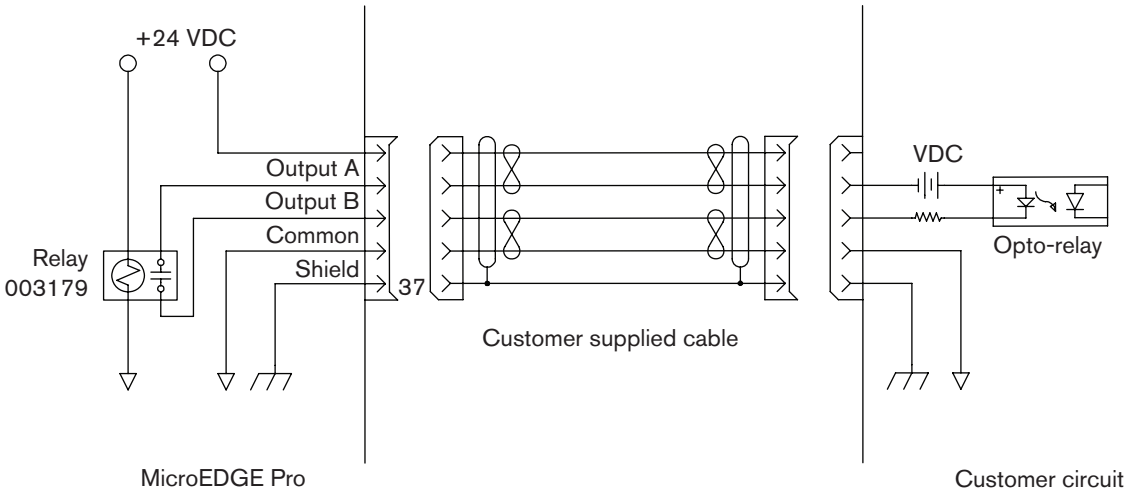
Connection to a relay coil (2a and 2b). The field voltage is supplied by the customer.

2a.



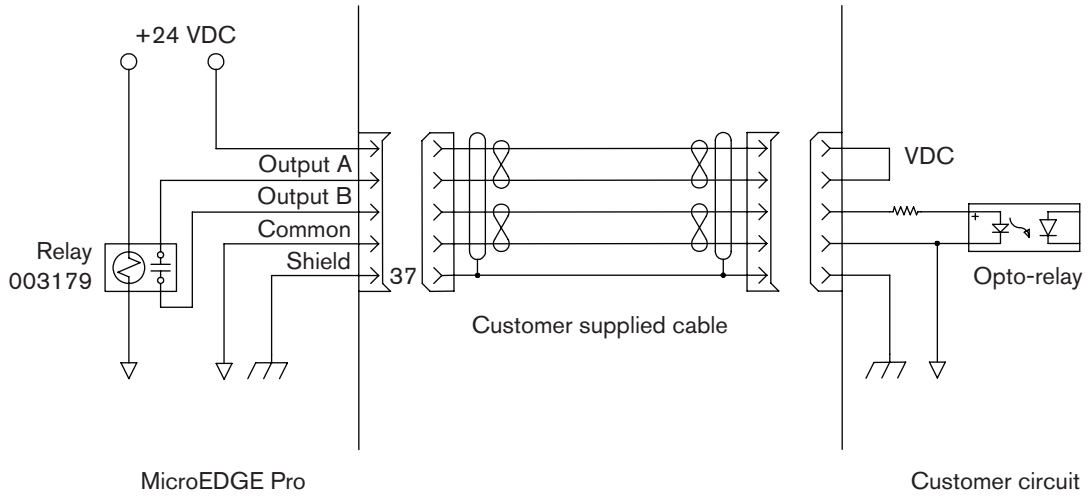
AC relay – supplied by customer

2b.



Opto-relay – supplied by customer

3. Typical connection to an opto-isolator. The input is typical for a THC or PAC System.



Opto-relay – CNC sourced

HyPath I/O connectors

Notes:

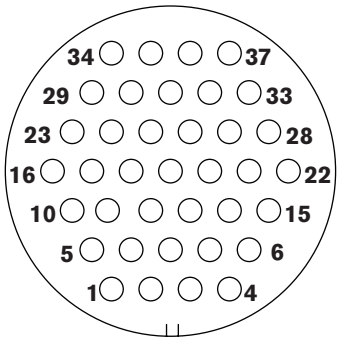
- Isolate all external commons from the chassis ground.
- If external voltage is used to activate I/O, connect the external source's common to the internal +24 V common.
- HyPath systems have the I/O for each connector printed above the connectors.

Use the following information to create HyPath I/O cables.

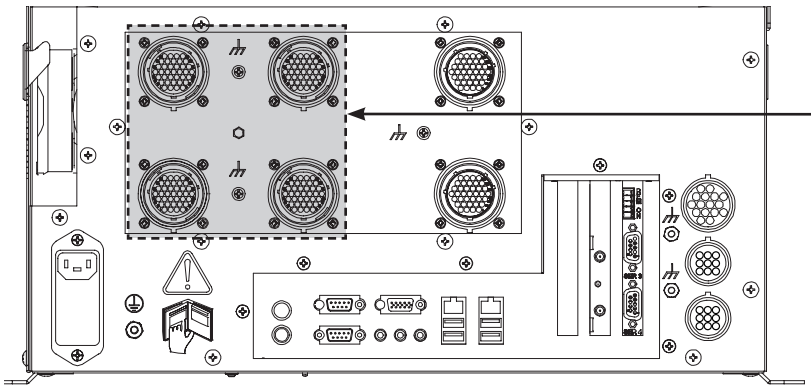
The HyPath I/O mating connector is a 37-pin, circular connector:

- Cable connector: AMP 206305-1
- Pin contacts: AMP 66098 (16–18 AWG), AMP 66331 (20–24 AWG)
- Hypertherm kit: 228492

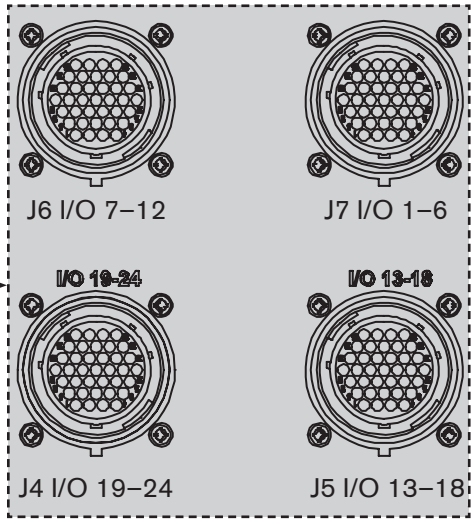
The following pages provide additional specifications and pinout information for the HyPath interface boards.



HyPath I/O connector



Location of the I/O connectors



HyPath I/O connectors

HyPath I/O pin-outs

Connector J7 – I/O 1 to 6			
Pin no.	**Inputs**	**Pin no.**	**Outputs**
1	+24 VDC Source	19	+24 VDC Source
2	Input 1	20	Output 1A
3	Common	21	Output 1B
4	+24 VDC Source	22	+24 V Field
5	Input 2	23	Output 2A
6	Common	24	Output 2B
7	+24 VDC Source	25	+24 V Field
8	Input 3	26	Output 3A
9	Common	27	Output 3B
10	+24 VDC Source	28	+24 V Field
11	Input 4	29	Output 4A
12	Common	30	Output 4B
13	+24 VDC Source	31	+24 V Field
14	Input 5	32	Output 5A
15	Common	33	Output 5B
16	+24 VDC Source	34	+24 V Field
17	Input 6	35	Output 6A
18	Common	36	Output 6B
		37	Shield

Connector J6 – I/O 7 to 12			
Pin no.	**Inputs**	**Pin no.**	**Outputs**
1	+24 VDC Source	19	+24 VDC Source
2	Input 7	20	Output 7A
3	Common	21	Output 7B
4	+24 VDC Source	22	+24 V Field
5	Input 8	23	Output 8A
6	Common	24	Output 8B
7	+24 VDC Source	25	+24 V Field
8	Input 9	26	Output 9A
9	Common	27	Output 9B
10	+24 VDC Source	28	+24 V Field
11	Input 10	29	Output 10A
12	Common	30	Output 10B
13	+24 VDC Source	31	+24 V Field
14	Input 11	32	Output 11A
15	Common	33	Output 11B
16	+24 VDC Source	34	+24 V Field
17	Input 12	35	Output 12A
18	Common	36	Output 12B
		37	Shield

Connector J5 – I/O 13 to 18			
Pin no.	**Inputs**	**Pin no.**	**Outputs**
1	+24 VDC Source	19	+24 VDC Source
2	Input 13	20	Output 13A
3	Common	21	Output 13B
4	+24 VDC Source	22	+24 V Field
5	Input 14	23	Output 14A
6	Common	24	Output 14B
7	+24 VDC Source	25	+24 V Field
8	Input 15	26	Output 15A
9	Common	27	Output 15B
10	+24 VDC Source	28	+24 V Field
11	Input 16	29	Output 16A
12	Common	30	Output 16B
13	+24 VDC Source	31	+24 V Field
14	Input 17	32	Output 17A
15	Common	33	Output 17B
16	+24 VDC Source	34	+24 V Field
17	Input 18	35	Output 18A
18	Common	36	Output 18B
		37	Shield

Connector J4 – I/O 19 to 24			
Pin no.	**Inputs**	**Pin no.**	**Outputs**
1	+24 VDC Source	19	+24 VDC Source
2	Input 19	20	Output 19A
3	Common	21	Output 19B
4	+24 VDC Source	22	+24 V Field
5	Input 20	23	Output 20A
6	Common	24	Output 20B
7	+24 VDC Source	25	+24 V Field
8	Input 21	26	Output 21A
9	Common	27	Output 21B
10	+24 VDC Source	28	+24 V Field
11	Input 22	29	Output 22A
12	Common	30	Output 22B
13	+24 VDC Source	31	+24 V Field
14	Input 23	32	Output 23A
15	Common	33	Output 23B
16	+24 VDC Source	34	+24 V Field
17	Input 24	35	Output 24A
18	Common	36	Output 24B
		37	Shield

HyPath 4-axis servo connectors

The HyPath 4-axis servo PCB provides the drive and encoder connections for up to 4 independent servo axes. The board provides two circular connectors. Each connector provides connections for two independent servo axes.

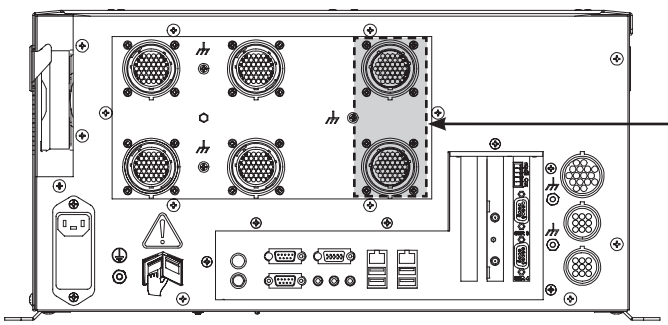
Axis assignments are made in Phoenix software on the Axes screen. For more information, see the *Phoenix Software Installation and Setup Manual*.

HyPath servo connector

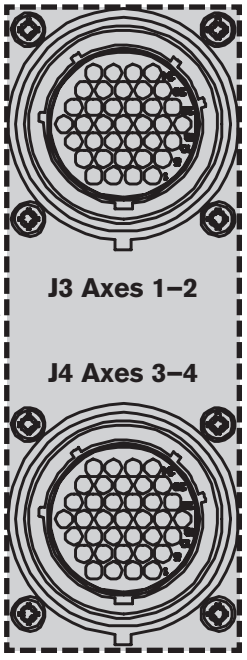
Use the following information to create HyPath servo cables.

The HyPath servo connector is a 37-pin, circular connector:

- Cable connector: AMP 206150-1
- Socket contacts: AMP 164164 (16–18 AWG), AMP 164163 (20–24 AWG)
- Hypertherm kit: 228491



Location of the 4-axis servo connectors

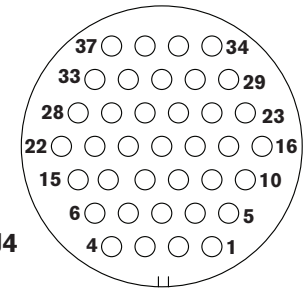


HyPath servo connectors

Drive/Encoder pin-outs

Notes:

- Z Channel is the marker pulse channel which is 1 pulse/revolution.
- Not all axes may be available. Verify how many axes are available on your CNC in the Diagnostics > Control Information screen in Phoenix software.

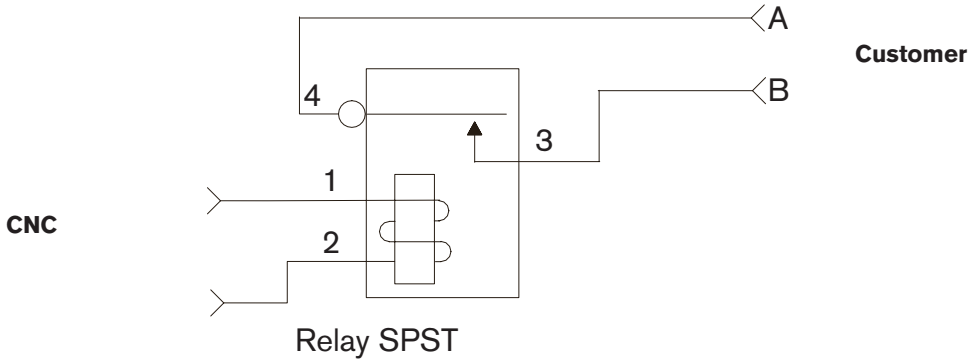


HyPath servo connectors J3, J4

Connector J3 (Axes 1 and 2)		
Pin no. for Axis 1	**Pin no. for Axis 2**	**Signal**
1	20	Axis shield
2	21	Encoder +5 V out
3	22	Encoder common
4	23	Encoder +12 V out
5	24	Encoder common
6	25	Encoder +24 V out
7	26	Encoder common
8	27	Encoder Axis A
9	28	Encoder Axis A\
10	29	Encoder Axis B
11	30	Encoder Axis B\
12	31	Encoder Axis Z
13	32	Encoder Axis Z\
14	33	Axis enable A
15	34	Axis enable B
16	35	Axis servo output
17	36	Analog common
18	37	Axis shield
19		Shield

Connector J4 (Axes 3 and 4)		
Pin no. for Axis 3	**Pin no. for Axis 4**	**Signal**
1	20	Axis shield
2	21	Encoder +5 V out
3	22	Encoder common
4	23	Encoder +12 V out
5	24	Encoder common
6	25	Encoder +24 V out
7	26	Encoder common
8	27	Encoder Axis A
9	28	Encoder Axis A\
10	29	Encoder Axis B
11	30	Encoder Axis B\
12	31	Encoder Axis Z
13	32	Encoder Axis Z\
14	33	Axis enable A
15	34	Axis enable B
16	35	Axis servo output
17	36	Analog common
18	37	Axis shield
19		Shield

The following illustration shows the axis-enable relay contacts for each axis on the 4-axis servo board.



HyPath 4-axis servo – axis enable output relay contacts

Analog connections

The MicroEDGE Pro CNC includes connectors for the Sensor THC, as well as a joystick and speedpot so that a table manufacturer can add these features.

Sensor THC connector

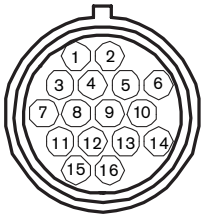
In configurations with integrated Sensor THCs, the MicroEDGE Pro has dedicated connectors for THC 1, and THC 2.

Notes:

- Analog inputs for the speed pots are rated at 0 to +10 VDC.
- Connect cable shields to the external PE studs for optimum noise immunity.
- The Series 1 PCI analog card is named PCI-AIC Rev X on the CNC Information Diagnostic screen in the Phoenix software

THC connector:

- Cable connector: AMP 206708-1
- Pin contacts: AMP 65105-3
- Cabling: Belden # 9540 or equivalent for encoder signals
- Hypertherm kit: 228495



Joystick and speedpot interface

THC 1 interface

THC 2 interface

Pin-outs for Integrated Sensor THC 1 and 2 connectors		
Pin no.	**CNC I/O configuration**	**Signal**
1	Common	Common
2	Input +	Nozzle Contact Sense + (relay contact)
3	Input -	Nozzle Contact Sense - (relay contact)
4	Output +	Nozzle Contact Enable + (relay contact)
5	Output -	Nozzle Contact Enable - (relay contact)
6	Analog input +	THC +
7	Analog input -	THC -
8	Output +	Hold Ignition (relay contact)
9	Output -	Hold Ignition (relay contact)
	Connector ground	Shield

THC cables

The following tables provide the pin-out details for the connectors on the Sensor THC amplifier, the MicroEDGE Pro CNC, and the voltage divider board (VDC3). Use these tables to manufacture the cables that connect these devices in your configuration.

Pin-outs for voltage divider board 3 (VDC3) connectors

J1 Power connector on VDC3	
Pin no.	**Signal**
1	120 VAC line
2	120 VAC neutral

J3 Field connector on VDC3 (black terminal strip)	
Pin no.	**Signal**
1	EMI chassis ground*
2	Electrode (connection to negative connection inside plasma system)
3	Work (connection to the positive connection inside of the plasma system)
4	No connection
5	Ohmic contact wire connection

* This pin is not connected under normal conditions. If your cutting system has excess noise with this configuration, connect the pin to an adjacent metal chassis.

Pin-out for the cable between J2 on VDC3 and THC 1 on the CNC			
J2 I/O Connector on VDC3		**THC 1 Connector on the CNC**	
Pin no.	**Signal**	**Pin no.**	**Outputs**
1	24 VDC common (out)	1	24 VDC Common (in)
2	+24 VDC (out)	2	Nozzle Contact Sense +
3	Nozzle contact sense (output)	3	Nozzle Contact Sense -
4	Nozzle contact enable (input)	4	Nozzle Contact Enable +
5	24 VDC common (out)	5	Nozzle Contact Enable -
6	+ Analog out	6	+ Analog in
7	- Analog out (analog common)	7	- Analog in
8	Chassis ground (cable shield)	–	–
		8	Hold +
		9	Hold -

Joystick and speedpot connector

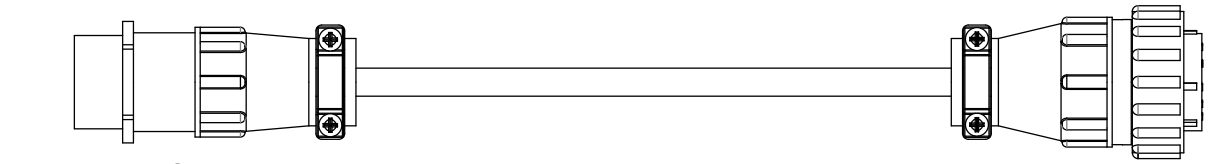
- Cable connector: AMP 206037-1
- Pin contacts: AMP 65105-3
- Cabling: Belden # 8308 or equivalent for encoder signals
- Hypertherm kit: 228837

Pin-outs for joystick and speedpot connector

Pin no.	Signal
1	Joystick up
2	Joystick down
3	Joystick left
4	Joystick right
5	Common
6	10 V reference
7	Speed pot 1+
8	Speed pot 1-
9	Common
10	10 V reference
11	Speed pot 2+
12	Speed pot 2-
13	Common
14	Common
15	Common
16	Common

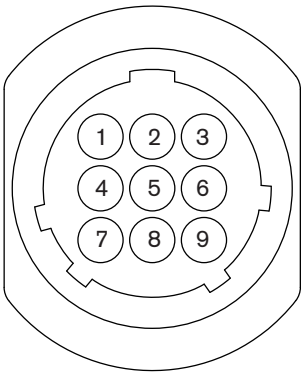
Joystick and speedpot cable adapter for MicroEDGE CNC (223252)

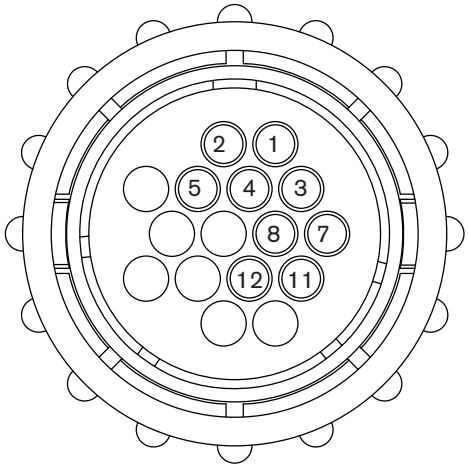
If the MicroEDGE Pro CNC is replacing a Hypertherm MicroEDGE CNC, an adapter cable is required to allow the cable for the MicroEDGE joystick and speedpot to connect to the MicroEDGE Pro.



Side A
Connect to the MicroEDGE joystick and speedpot cable

Side B
Connect to the MicroEDGE Pro joystick and speedpot connector



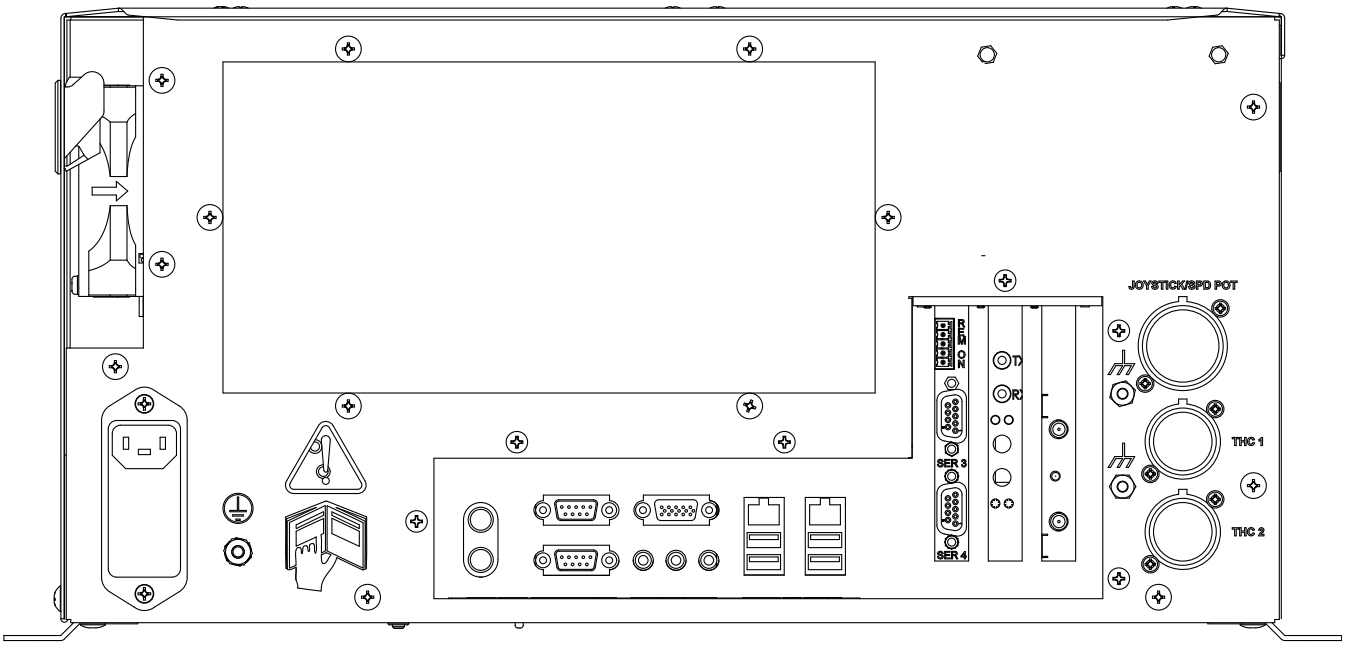


Side A Pin no.	Wire color	Signal	Side B Pin no.*
1	Black	Joystick up	1
2	White	Joystick down	2
3	Red	Joystick left	3
4	Green	Joystick right	4
5	Brown	Common	5
6	Blue	Speed pot 1+	7
7	Orange	Speed pot 1-	8
8	Yellow	Speed pot 2+	11
9	Purple	Speed pot 2-	12

*On Side B, there are no connections on pins 6, 10 and 13 to 16.

SERCOS II I/O configuration

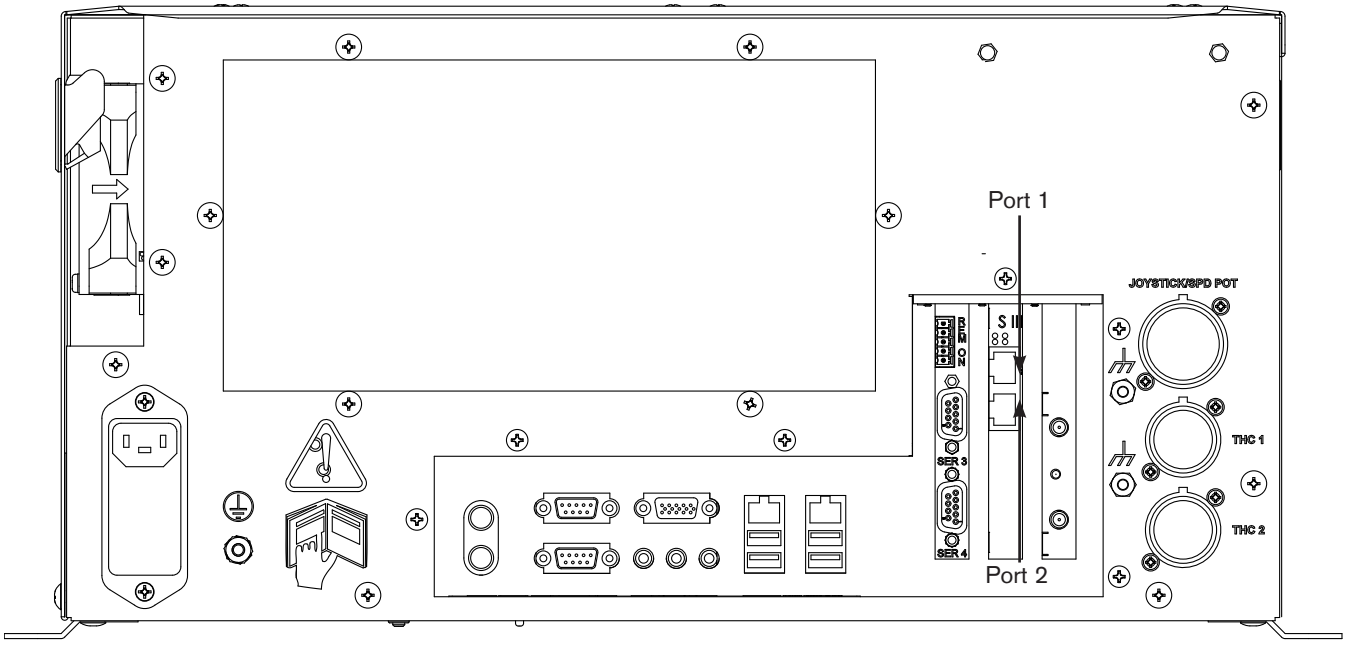
The MicroEDGE Pro SERCOS II I/O configuration conforms to the SERCOS II standard. The full details of this specification cannot be addressed in this manual. For complete SERCOS technology and specifications, refer to: http://www.sercos.com.



Rear view of the SERCOS II MicroEDGE Pro CNC

SERCOS III I/O configuration

The MicroEDGE Pro SERCOS III I/O configuration conforms to the SERCOS III standard. The full details of this specification cannot be addressed in this manual. Refer to the *Phoenix Software V9 Series Installation and Setup Guide* (806410) for instructions about how to set up your EDGE Pro SERCOS III CNC. For complete information about SERCOS technology and specifications, refer to: http://www.sercos.com.

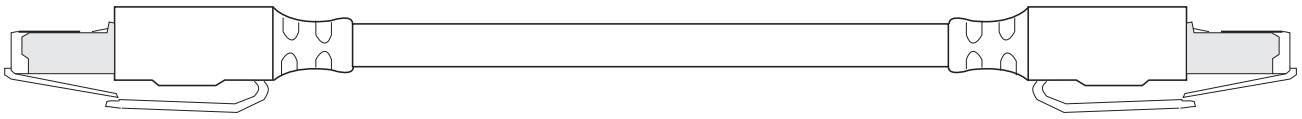


Rear view of the SERCOS III MicroEDGE Pro CNC

SERCOS III Cable

A shielded Cat-5e Ethernet cable connects the SERCOS III I/O interface on the rear of the CNC enclosure to the drive amplifier cabinet. A minimum of one cable is required for this connection to create a single SERCOS III line that connects Port 1 (P1) on the CNC and all the SERCOS III drives in the drive amplifier cabinet.

To create a SERCOS III ring that will provide communication redundancy and security, connect a second cable between Port 2 (P2) on the CNC and the drive amplifier cabinet.



Part number	Length	Part number	Length
223212	3.0 m (10 ft)	223099	23.0 m (75 ft)
223222	6.0 m (20 ft)	223100	30.5 m (100 ft)
223119	7.5 m (25 ft)	223101	45.5 m (150 ft)
223223	10.5 m (35 ft)	223102	61.0 m (200 ft)
223008	15.0 m (50 ft)		

Serial port configuration

The serial ports in the MicroEDGE Pro are designed to operate with a standard 9-pin serial port connector. The following list provides specifications for these ports. For more information, see the *Phoenix Software Installation and Setup* manual.

Serial isolation specifications (see Machine Setups > Ports In Phoenix software)	
Channel Type	Optically isolated RS-422 or RS-232
Information Code	ASCII
Baud Rate	User-selectable up to 115.2K baud
Number of Start Bits	1
Number or Stop Bits	1
Word Length	User-selectable 7 or 8 bits
Parity	User-selectable none, even or odd
Data Synchronization	XON (Control-Q) / XOFF (Ctrl/S)
Time Out	User-selectable in one-second increments
Transmit Delay	User-selectable in 0.01-second increments
Rear Panel Connector	IBM-PC/AT compatible 9-pin D-type female

Serial ports 1 and 2

The default configuration for serial ports 1 and 2 on the motherboard is RS-232. These ports cannot be reconfigured.

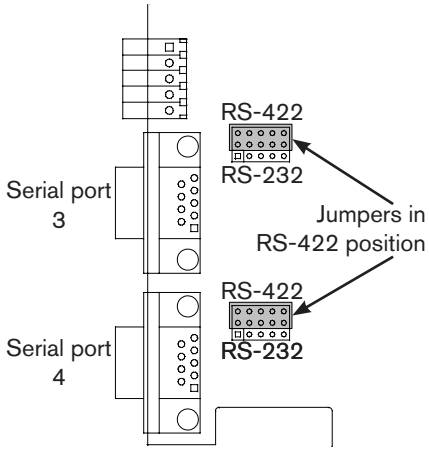
Serial ports 3 and 4

Both serial ports on the following boards are shipped in the RS-422 wiring configuration:

- HyPath and Picopath 4-axis MCC, utility, and serial isolation board (141222)
- Picopath 2-axis MCC, utility, and serial isolation board (141256)
- SERCOS II and SERCOS III utility and serial isolation board (141194/141307)

To change either port to an RS-232 configuration, you must find the jumper for the appropriate port and move the jumper from the RS-422 position to the RS-232 position. These positions are clearly marked on the board.

Configure the port for RS-232 operation before connecting RS-232 compatible devices.



CNC RS-422 DB-9 Pin-out		
Pin no.	**Signal Name**	**Description**
1	Shield	Chassis ground
2	TxD-	Transmit data - to external device
3	RxD-	Receive data - from external device
4	TxD+	Transmit data + to external device
5	Common	Ground
6		No connection
7	RxD+	Receive data + from external device
8		No connection
9		No connection

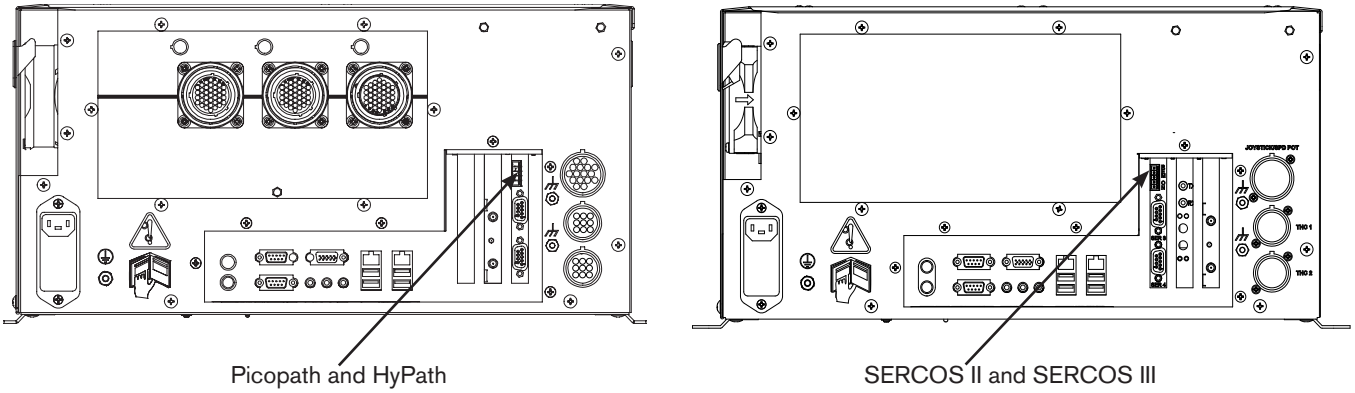
CNC RS-232 DB-9 Pin-out (reference only)		
Pin no.	**Signal Name**	**Description**
1	Shield	Chassis ground
2	TxD	Transmit data to external device
3	RxD	Receive data from external device
4		No connection
5	Common	Ground
6		No connection
7		No connection
8		No connection
9		No connection

Remote on/off cable

Hypertherm does not supply a cable that connects to the remote on/off connector on the following boards:

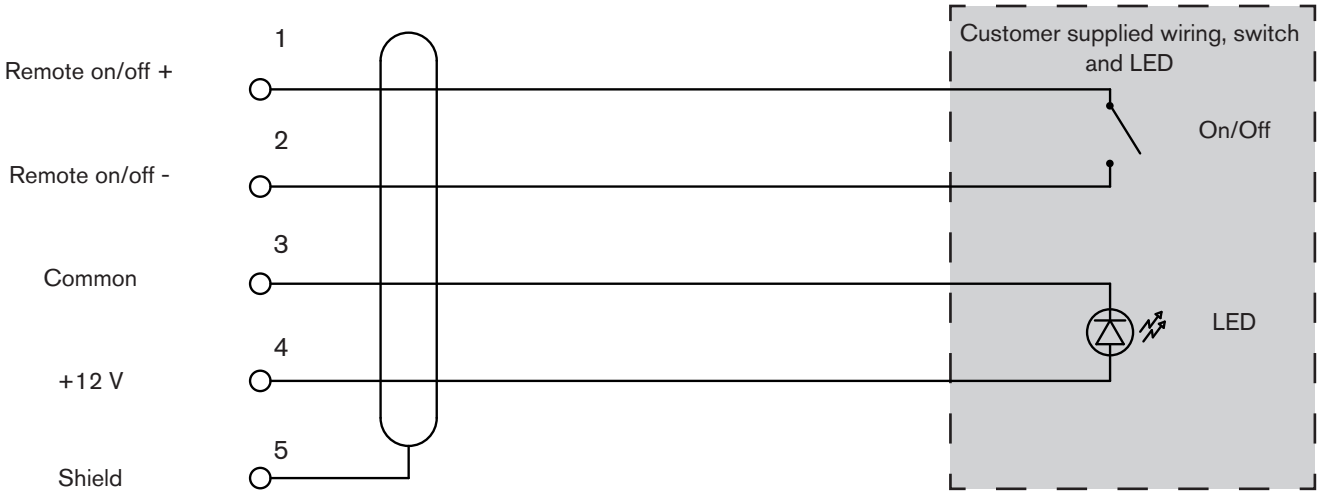
- 141222 for 4-axis HyPath and Picopath
- 141256 for 2-axis Picopath
- 141194/141307 for SERCOS II and SERCOS III

However, Hypertherm provides the cable connector which shipped with the system in the remote on/off port, as shown in the following illustrations. You can use this connector to terminate a custom-built cable of the appropriate length.



Location of the remote on/off connector on the MicroEDGE Pro

To build the remote on/off cable, remove the connector from the port and attach purchased wires, a switch, and an LED. Use the circuit diagram below for details.



Circuit diagram for the remote on/off cable

Wireless network card

The MicroEDGE Pro supports an optional wireless network card for part downloads, Remote Help, and other network tasks. The wireless network card is installed in PCI slot 2 on the motherboard. Two antennas extend from the card on the back of the MicroEDGE Pro. Unfold and adjust the antennas to a 45 degree angle.

When the MicroEDGE Pro is installed within a secondary enclosure, the antennas may be extended up to 3 m (10 ft) from the wireless network card. When using the 3 m antenna extension cables (223251), only 2.4 GHz frequency can be used at the router or access point.

Preparing to install the antenna

Follow these guidelines before mounting the antennas on a secondary CNC enclosure:

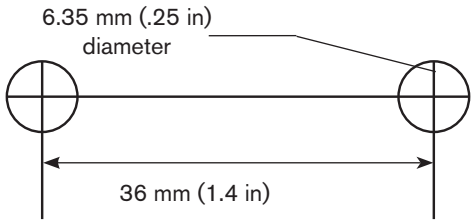
- The antennas must exit to room air, preferably without metallic obstructions blocking signal transmission (such as equipment cabinets, circuit breaker panels, transformers, etc).
- Antennas should not be located near the floor.
- Use a plastic protective barrier if necessary to prevent accidental bumping of antenna orientation.
- When mounting the antennas on a secondary CNC enclosure, you will need to drill two holes to accommodate the threaded, bulkhead-mount antenna connectors. Be sure the connectors make contact with the metal on the enclosure, or use a lock washer to penetrate any coating on the enclosure. Metal-to-metal contact ensures that the antennas are grounded to the chassis.
- The antenna connections are not waterproof.

Installing the antenna

Before you begin the antenna installation:

- Make sure not to twist or kink the extension cables.
- The extension cables should reside entirely inside the enclosure. Only the antenna itself should be on the outside of the enclosure.
- Route the cable away from noise generating sources such as power supplies, motor amplifiers, and AC circuits.
- Use a service loop of at least 10 cm (4 in.) diameter to coil excess coaxial antenna cable.

1. After selecting a suitable antenna mounting location, drill two 6.35 mm (.25 in.) holes into the secondary CNC enclosure as shown below (drawing not to scale). Remove any burrs inside and outside.

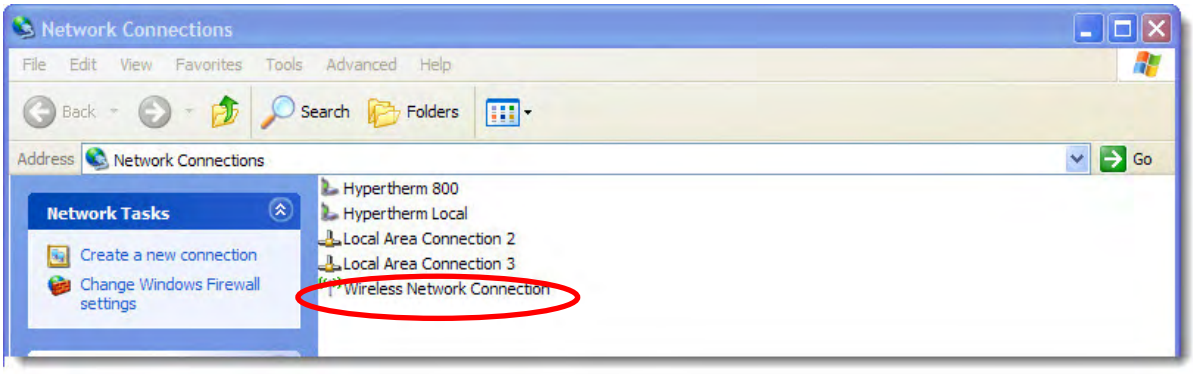


2. Thread each bulkhead-mount antenna base through a hole and secure with a lock washer and nut. Be sure the antenna base makes contact with unpainted metal on the enclosure to ensure proper grounding.
3. Connect the antennas to the bases and point them skyward.
4. Connect the cables to the coaxial connectors on the wireless network card. Be sure to avoid twisting or kinking the cables. The entire extension cable should be within the CNC enclosure. Only the antennas are mounted on the outside of the enclosure.
5. Restore AC power to the CNC.

Checking the wireless network in Windows

The MicroEDGE Pro comes from the factory with the wireless network card drivers installed. To check the wireless network in Windows:

1. Turn on the MicroEDGE Pro.
2. Choose Setups>Password and enter the Special Setups password.
3. Choose System>Network Tools. The Network Connections dialog opens showing all network connections.

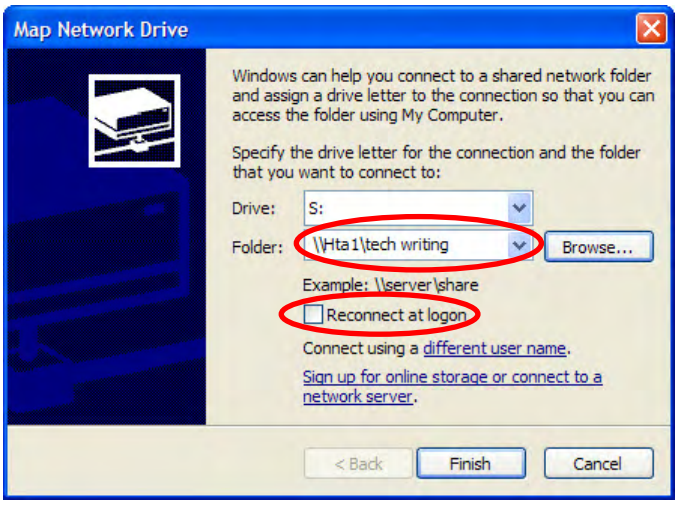


Mapping a network drive

Phoenix requires a network drive to be defined in Windows. After you define the network drive, you can add it as a folder in Phoenix.

Before you begin, connect a USB keyboard to the MicroEDGE Pro.

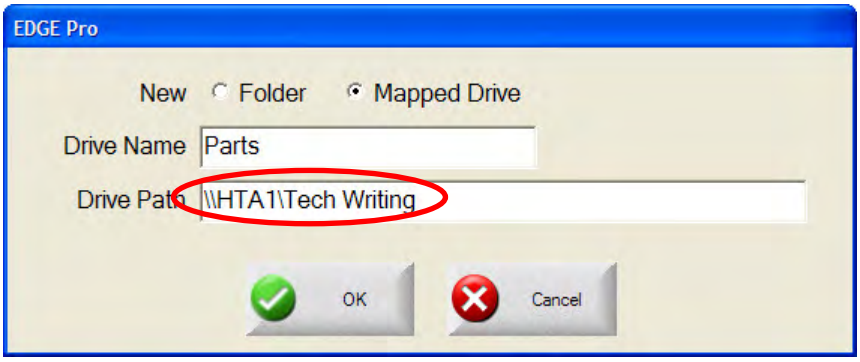
1. Press Alt+F4 to exit the Phoenix software.
2. Choose Start Menu>Windows Explorer>Tools>Map Network Drive.
3. Choose a drive letter, then the folder. Make note of the folder path. When you connect to the folder in Phoenix, you will need to enter the folder path.
4. Choose Reconnect at Logon.
5. Choose Finish to save the mapped network drive.



Adding a folder in Phoenix

Note: The Add Folders feature must be enabled in the Special Setups screen before you can perform these steps.

1. Restart the Phoenix software.
2. From the Main Screen, choose the Files soft key.
3. Double-click the blue message to add a folder.
4. In the dialog, choose Mapped Drive.
5. Enter a Drive Name. This is the name that appears in the Load Files list.
6. Enter the actual path to the drive, not a drive letter. The drive path is formatted \\servername\foldername.
7. Choose OK.



Section 3

OPERATION

In this section:

Operating the CNC

Phoenix software runs on the Hypertherm computer numerical controls (CNCs) including the EDGE® Pro and MicroEDGE® Pro. Phoenix supports either a touch screen or LCD display with a USB-connected keyboard and mouse for entering information and navigating the software. For more information, see the *Phoenix Software Operator's Manual*.

For more information about the components of your cutting system that are supplied by your table manufacturer, refer to the manuals supplied by the manufacturer

Operator console

An optional operator console provided by an OEM or a system integrator powers up the CNC and controls machine motion such as station selection, raising or lowering the cutting tool, and positioning the cutting tool before starting a part program.

Touch screen LCD

The Phoenix software is designed for touch screens with 1024 x 768 resolution and a 4:3 aspect ratio. When your CNC is equipped with a touch screen, you can enter data into the software by touching the window controls and fields. Any field that requires data input automatically displays an onscreen keypad when you touch it.

LCD display

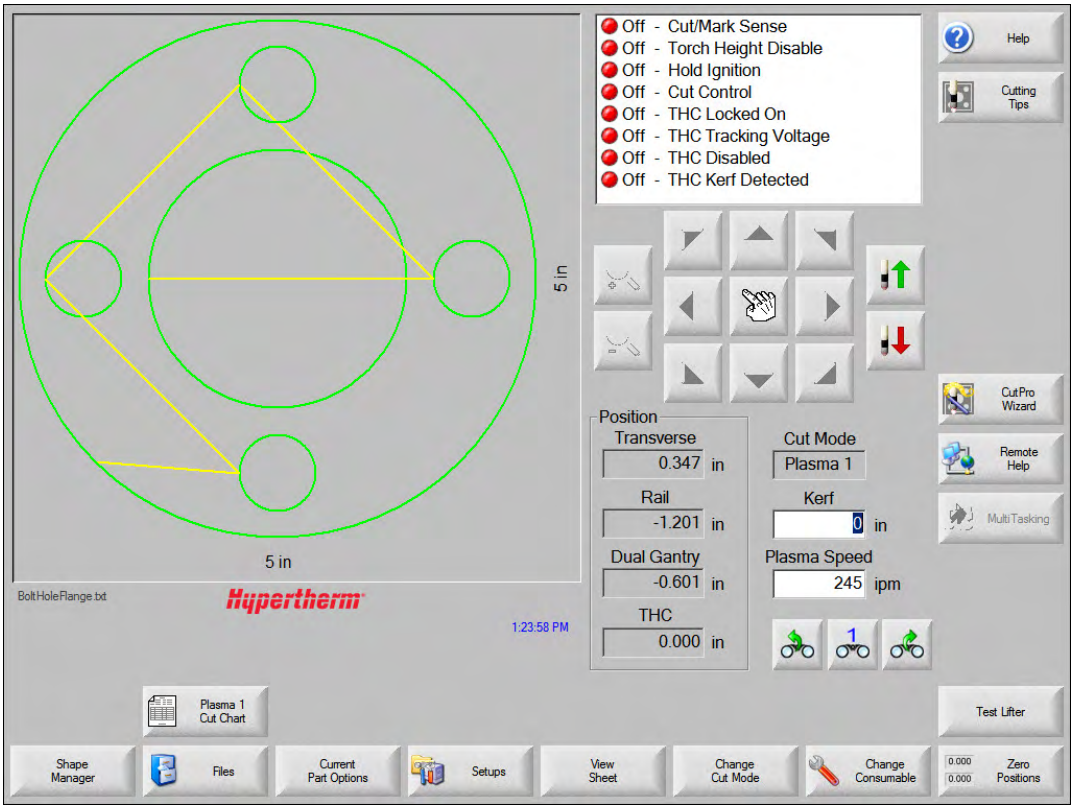
The MicroEDGE Pro can support an LCD display and requires 1024 x 768 resolution with a 4:3 aspect ratio.

Screen navigation

The keys located at the bottom of the screen in the software are called soft keys. The soft keys correspond to function keys on a PC keyboard. OK and Cancel soft keys let you save or cancel changes that you make in a screen.

Refer to the *Phoenix Software Operator's Manual* for more details.

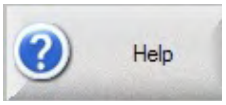
Note: The features shown on each screen vary depending on the user level (Beginner, Intermediate, or Advanced) and the features enabled on the Special Setups and Station Configuration screens. This manual assumes the CNC is in Advanced Mode and shows all features with an example machine configuration.



Phoenix Main screen

Help

Choose the Help soft key to display information about each screen.



Choose the OK soft key to exit the Help screen and return to the control screen.

The Show Bookmarks soft key opens the navigation pane. On a keyboard, press Ctrl+F to use full text search.

View additional manuals

The Help screen may also display buttons for other types of information, for example:

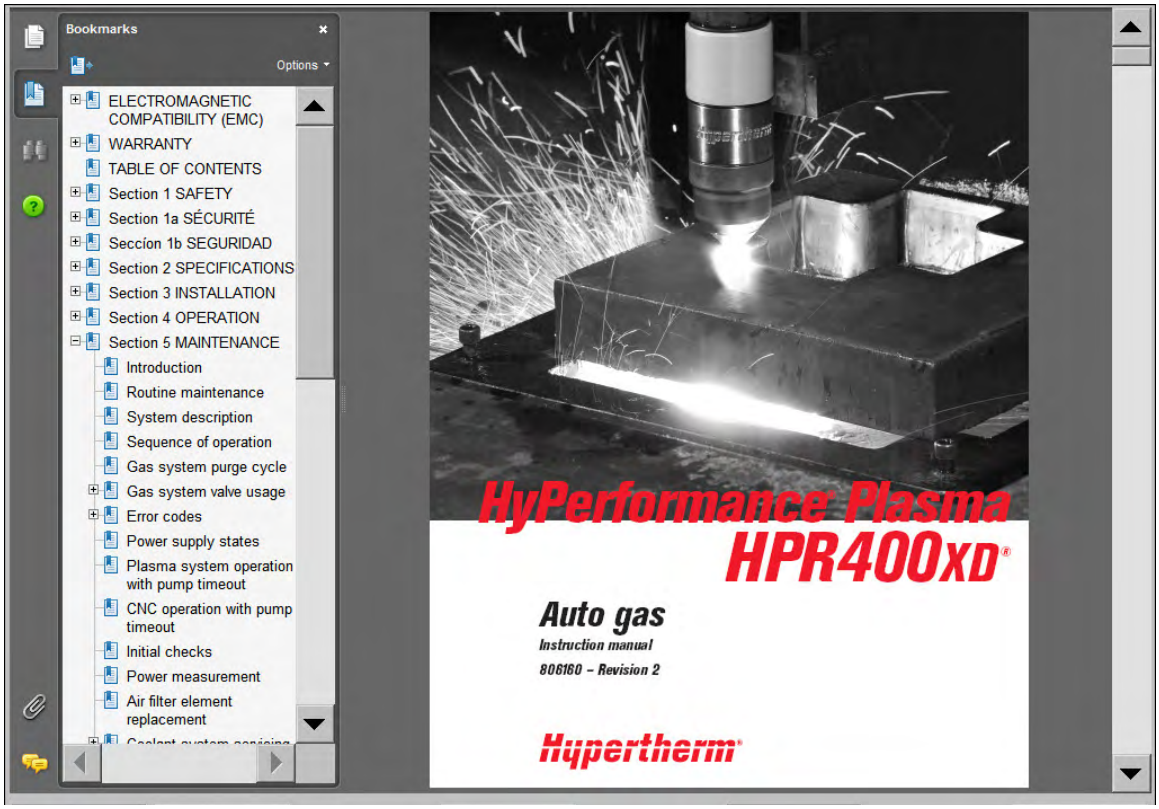
- Manuals for the Hypertherm equipment installed with your CNC, such as plasma systems or torch height controls.
- Manuals for equipment provided by your table manufacturer.

Choose any of these buttons to view this additional information.

Show bookmarks

Choose the Show Bookmarks soft key on the Help screen to view the list of Help topics. Click on a topic in the list to view it.

Note: If you are operating the MicroEDGE Pro with a keyboard, use the Page Up/Page Down keys to scroll through the document on screen.



Automated operations

The Phoenix software includes two wizards that automate plate alignment and part cutting operations.

Align Wizard

The Align Wizard automates several tasks including aligning a nest on a plate, adjusting for a skewed plate, and positioning the torch at the program start location.

To start the Align Wizard, choose Shape Library on the Main screen, then choose Shape Wizard, Shape Options, Align. The Align Wizard may launch automatically. If not, choose the Align Wizard soft key.

For more information, see *Align Wizard* in the *Arranging Parts* chapter of the *Phoenix Software Operator's Manual*.

CutPro Wizard

The CutPro Wizard automates common cutting tasks including loading a part or nest, selecting the cutting process, aligning the part or nest on the plate, and starting the program.

The CutPro Wizard may launch automatically when you start the CNC. If not, choose the CutPro Wizard soft key on the Main screen to start the wizard. For more information on the CutPro wizard see the Cutting Parts chapter.

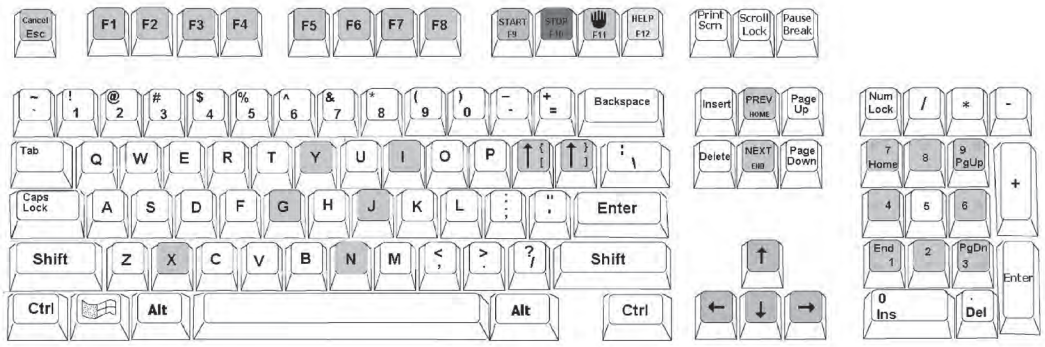
Using Phoenix without a touch screen

Phoenix software supports using a built-in keypad or a USB, PC keyboard to perform functions and data entry in the Phoenix software.

PC keyboard

Hypertherm CNCs can support a USB, PC keyboard. You can use a keyboard to perform functions and data entry in the Phoenix software.

A label (210047) is included with the MicroEDGE Pro to modify a PC keyboard to use with Phoenix software, as shown in the following illustration.



Updating Phoenix software

Hypertherm provides regular updates to the Phoenix software. You can download the most current software from the website www.hypertherm.com. Choose Products > Controls for Automation > Software to open the Phoenix Software Update Downloads page. On this page you can download:

- Phoenix software update (update.exe)
- Phoenix Help file (Help.exe)
- Cut charts (CutChart.exe)

Follow the instructions on the web page to download the updates in your language.

Before you update the Phoenix software, follow these guidelines:

- Back up your system files: On the Main screen, choose Files > Save to Disk > Save System Files to Disk. See the section Saving System Files in Chapter 11 Diagnostics and Troubleshooting for more information.
- Copy the files that you download from Hypertherm.com to the root folder of a USB memory stick.
- Be prepared to restart the CNC after you have updated the software.

Updating the software

1. At the CNC, plug the memory stick that contains the file update.exe into a USB port.
   Note: Verify that update.exe resides in the root folder of the memory stick.
2. On the Main screen, choose Setups > Password. If you are not using a keyboard, double-tap the screen to display an onscreen keyboard.
3. Enter updatesoftware (all lower case, one word) and choose Enter. The Phoenix software automatically reads the memory stick and installs the new software.

Updating the Help

1. At the CNC, plug the memory stick that contains the file Help.exe into a USB port.
   Note: Verify that Help.exe resides in the root folder of the memory stick.
2. On the Main screen, choose Setups >Password. If you are not using a keyboard, double-tap the screen to display an onscreen keyboard.
3. Enter updatehelp (all lower case, one word) and choose Enter. The Phoenix software automatically reads the memory stick and installs the new help file.

Updating the cut charts

Hypertherm provides cut charts in two different file types: .fac and .usr. The .fac files are the factory-default cut charts. These cut charts cannot be changed. The .usr cut charts contain any changes you have made to a cut chart and saved with the Save Process soft key.

The cut chart update file (CutChart.exe) contains both .fac and .usr cut chart files. The update automatically overwrites all of .usr cut charts. Before installing the update, back up your modified cut charts.

Hypertherm recommends saving modified cut charts as custom cut charts. When you create a custom cut chart, Phoenix creates a .usr file with a unique name. This prevents the custom cut charts from being overwritten by the .usr files in CutChart.exe. See the *Phoenix Software Operator's Manual* for instructions.

To back up modified cut charts:

1. At the CNC, plug a memory stick into a USB port.
2. On the Main screen, choose one of the cut chart soft keys, such as Plasma 1 Cut Chart.
3. Choose the Save Cut Charts soft key. Phoenix copies all the cut charts associated with the Plasma 1 Torch Type onto the memory stick.

To update the cut charts:

1. At the CNC, plug the memory stick that contains the file CutChart.exe into a USB port.
   Note: Verify that CutChart.exe resides in the root folder of the memory stick.
2. On the Main screen, choose Process, and choose one of the cut chart soft keys such as Plasma 1 Cut Chart.
3. Choose the Load Cut Charts soft key, then choose Yes when prompted to load cut charts from the memory stick. Phoenix extracts the cut charts and copies them to the hard drive.
4. If you have modified cut charts to copy back onto the hard drive, you will need to exit Phoenix and use Windows® Explorer to copy your .usr files back onto the hard drive. The cut chart folder is c:\Phoenix\CutCharts.

Section 4

MAINTENANCE AND DIAGNOSTICS

In this section:


DANGER

ELECTRIC SHOCK CAN KILL

Disconnect electrical power before performing any maintenance.

See the *Safety* section in this manual for more safety precautions.

Introduction

Hypertherm assumes that the service personnel who perform troubleshooting testing are high-level electronic service technicians who have worked with high-voltage electro-mechanical systems. Knowledge of final isolation troubleshooting techniques is also assumed.

In addition to being technically qualified, maintenance personnel must perform all testing with safety in mind. For more information, refer to the Safety section for operating precautions and warning formats.

Diagnostic tests

Note: Test kits are required to perform the following diagnostic tests.

Machine interface tests

If you are using a MicroEDGE Pro CNC, you can perform diagnostic tests with the following connectors and Phoenix software to test the interface ports on the CNC (228831):

- Serial interface RS-232 on the motherboard
- Serial interface RS-422 on the serial isolation board
- Ethernet and Hypernet
- USB

Note: This is the only kit needed for SERCOS II and SERCOS III systems and it is included in the HyPath and Picopath kits.

The HyPath version of the MicroEDGE Pro CNC offers the following, additional testers (228832):

- I/O (2)
- Axes
- THC
- Joystick and speedpot

The Picopath version of the MicroEDGE Pro CNC offers the following, additional testers (228833):

- I/O (2)
- Axes
- THC
- Joystick and speedpot

To begin an interface test:

1. From the Main screen, select Setups, Diagnostics, Machine Interface.
2. Enter the Machine password.
3. On the Machine Interface screen, choose the connector you want to test on the image of the CNC.
4. Follow the instructions in the sections below and on the screen.

Machine interface test screen

Serial test

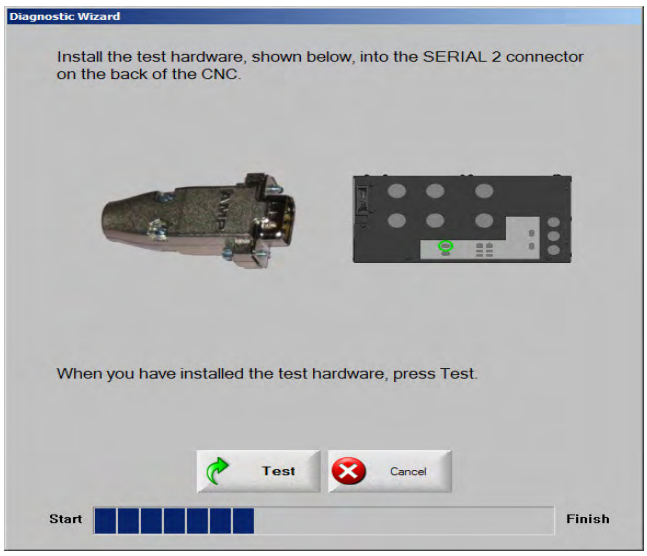
The MicroEDGE Pro is equipped with four serial ports. Serial 1 and 2 support RS-232 communications. Serial 3 and 4 support RS-422 or RS-232 communications.

Conduct this test if:

- Processes or information communicated through the serial port are not operating properly.
- The CNC is unable to download files through the serial port.
- The serial link to the plasma supply fails.

To test serial communications:

1. On the Machine Interface screen, choose the serial port you want to test.
2. On the CNC, plug the serial test hardware into the port you selected.
3. On the Machine Interface screen, press Test. A message informs you if the test is successful.



In the event of a test failure, contact your OEM or system integrator with the following information:

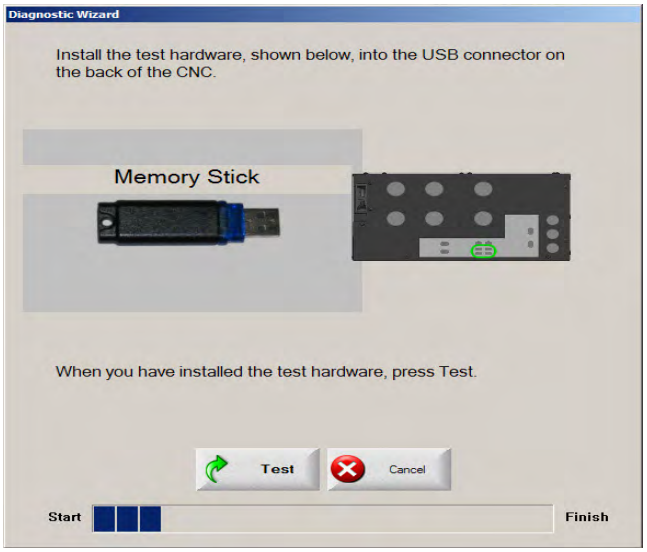
- Serial 1 or 2 failure: replace motherboard.
- Serial 3 or 4 failure: replace serial isolation card.

USB test

Conduct this test if the memory stick is not shown as an option when you try to load part programs or update cut charts, software, or help. Use this test to check all the USB ports: the four on the back and the one on the front of the CNC.

To test the USB port:

1. On the Machine Interface screen, choose a USB port.
2. Follow the instructions on the screen to insert the memory stick in the USB port on the back of the CNC.



3. On the Machine Interface screen, press Test. A message informs you if the test is successful.
4. Repeat the test on the remaining USB ports.

If the test fails on multiple USB ports, contact your OEM or system integrator to replace the motherboard.

I/O test

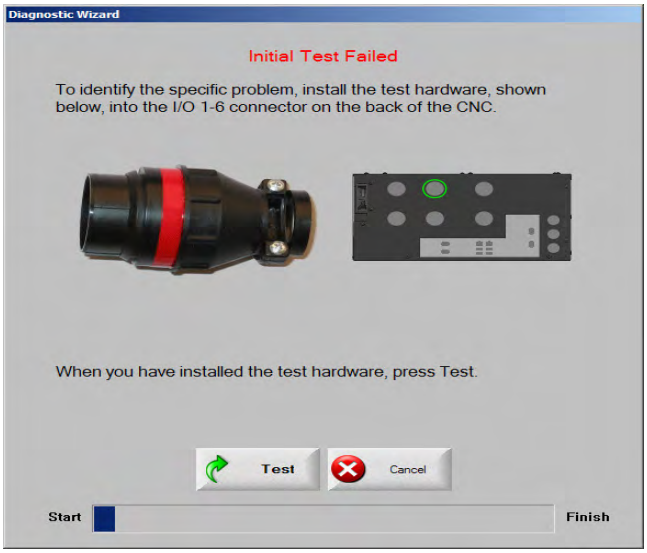
Conduct this test if:

- An I/O point is malfunctioning.
- You need to eliminate CNC I/O operation as a problem in the system.
- A continuous fault is occurring, such as a limit switch that is not turning on or clearing.

To test I/O:

1. On the Machine Interface screen, choose the I/O port you want to test.
2. Follow the instructions on the screen to connect the Picopath (white) or HyPath (green) test plug into the I/O port you selected on the back of the MicroEDGE Pro.

3. On the Machine Interface screen, press Test. A message informs you if the test is successful.
4. If the test fails, follow the instructions on the screen to connect the second Picopath (orange) or HyPath (red) test plug to isolate the I/O point that is causing the problem.



5. On the Machine Interface screen, press Test. The screen reports the number of the failed input or output.
6. Contact your OEM or system integrator with the following information:

Picopath:

- Rewire the I/O to a free I/O point and reassign the I/O function in the Phoenix software.

HyPath:

- If an input has failed, rewire the input to a free input point, then reassign the input function in the Phoenix software.
- If an output has failed, you can remove a relay from a spare output and swap it with the relay at the failed output. No rewiring is required.

Axis test

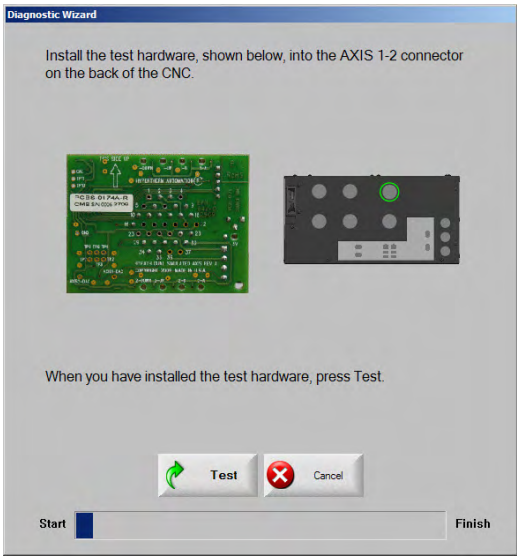
	WARNING!
To prevent motion on the table, disconnect all axis cables from the CNC before conducting this test.	

This test verifies axis operation. Conduct this test if there is:

- A runaway axis
- No motion
- Erratic motion
- A high number of position errors
- Multiple parts are not cut the correct size

To test an axis:

1. On the Machine Interface screen, choose the axis port you want to test.



2. Follow the instructions on the screen to connect the HyPath (green) or Picopath (blue) axis simulator board to the CNC axis port you selected.
3. On the Machine Interface screen, choose Test. A message informs you if the test is successful.

If the test fails, contact your OEM or system integrator to check or replace these parts in the following order:

1. 4-axis servo field interface
2. Ribbon cable
3. MCC card

THC test

	WARNING!
To prevent motion on the table, disconnect all axis cables from the CNC before conducting this test.	

Conduct this test if:

- Nozzle contact is not functioning properly. For example, IHS using ohmic contact is not sensing the plate or is not accurate, the torch is running into the plate during cutting without retracting, or the torch is firing in the air.
- Arc voltage feedback is not functioning properly.
- The torch is rising off the plate or driving into the plate during the first part of a cut after piercing.

To test a THC port:

1. On the Machine Interface screen, choose the THC port you want to test.
2. Follow the instructions on the screen to connect the THC test cable to the THC port you selected and to the Axis 1 – 2 port (Hypath) or X/Y port (Picopath). Use the blue tester for HyPath and the yellow tester (not shown) for Picopath.

3. On the Machine Interface screen, choose Test. A message informs you if the test is successful.

If the test fails, contact your OEM or system integrator to check or replace these parts in the following order:

1. Analog field interface card
2. Ribbon cable
3. Analog input card

LAN and Hypernet tests

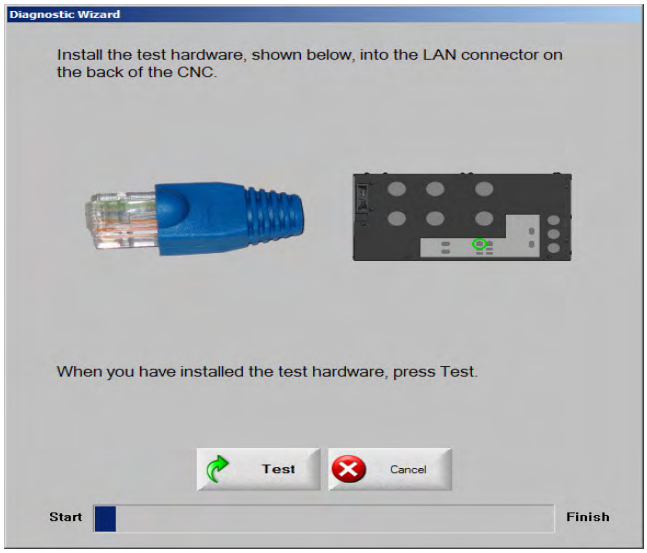
The LAN and Hypernet tests both use the same tester.

Conduct this test if:

- The CNC is not communicating to the ArcGlide or plasma system.
- The CNC is not communicating to the local area network.

To test a LAN port:

1. On the Machine Interface screen, choose the LAN or Hypernet port.
2. Follow the instructions on the screen to plug in the tester.



3. On the Machine Interface screen, choose Test. A message informs you if the test is successful.

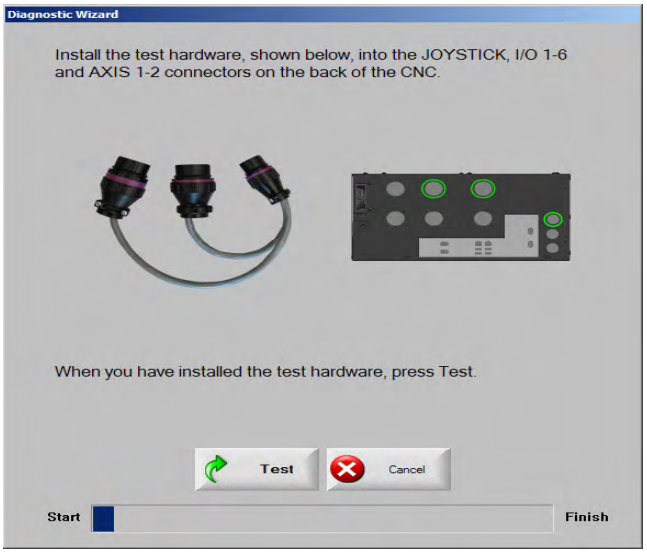
If either test fails, contact your OEM or system integrator to replace the motherboard.

Joystick and speedpot test

	WARNING!
To prevent motion on the table, disconnect all axis cables from the CNC before conducting this test.	

To test the joystick and speedpot port:

1. On the Machine Interface screen, choose the joystick/speedpot port.
2. Follow the instructions on the screen to connect the HyPath (purple) tester to the Joystick/Speedpot port, Axis 1-2 port and the I/O 1-6 port.
   For a Picopath system, connect the brown tester to the Joystick/Speedpot port, the X/Y port and the I/O port.



3. On the Machine Interface screen, choose Test. A message informs you if the test is successful.

If the test fails, contact your OEM or system integrator to check or replace these parts in the following order:

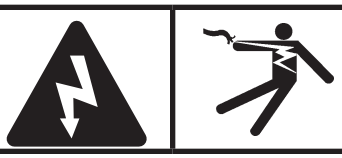
1. Analog field interface card
2. Ribbon cable
3. Analog interface card

Troubleshooting

Introduction

Hypertherm assumes that the service personnel performing the troubleshooting are high-level electronic service technicians who have worked with high-voltage electro-mechanical systems. Knowledge of final isolation troubleshooting techniques is also assumed.

In addition to being technically qualified, maintenance personnel must perform all tests with safety in mind. Refer to the *Safety* section for operating precautions and warning formats.



DANGER
ELECTRIC SHOCK CAN KILL

- **Disconnect electrical power before performing any maintenance**
- **Only qualified personnel can work inside the CNC cabinet with AC power connected**
- **See the Safety section in this manual for more safety precautions**

WARNING
MOVING PARTS CAN CAUSE DAMAGE AND INJURY

Before using the "Drive Diagnostics" screen, disconnect the motor drive mechanics responsible for table and component movement to avoid unexpected machine motion, which can cause personal injury. Use extreme caution when selecting the TEST THC button or the TEST ALL button on the "Drive Diagnostics" screen, to avoid damage to the THC and motors.

Caution: **The CNC must be turned OFF whenever a cable is removed or reconnected.**

MicroEDGE Pro troubleshooting tables

The following tables provide information about problems that an operator might encounter during operation.

Symptoms / Indications	Corrective Action
Power up CNC does not power up when the ON/OFF button is pressed	1. Verify that the power cord is plugged into the back of the CNC. 2. Verify that the wall circuit breaker is active. 3. Verify that the fuse in the power entry module is not blown. Replace if necessary (008872). 4. Open the CNC enclosure and verify that the D6 AC lamp is lit on the power distribution board. Dim = 120 VAC is present; bright = 220 VAC is present. If lamp is not lit, replace the surge board or the power entry harness (229248). See *Power distribution board* in this section. 5. Verify the connections for the ON / OFF button on the front panel. 6. Verify the green LED light on the motherboard is lit. This LED indicates power is getting to the motherboard. If it is not lit, replace the ATX power supply (229403), or contact your table manufacturer for additional troubleshooting. 7. Verify that the green and white wires from the utility and serial isolation board (141222 – 4-axis HyPath and Picopath, 141256 – 2-axis Picopath, 141194/141307 – SERCOS II and SERCOS III) are connected to the motherboard. 8. Contact your table manufacturer.
Display The power switch is on and lit, but the screen remains black	1. Verify that the AC power connections are plugged into the display. 2. Verify the VGA cable connection is plugged into the display and the 15-pin VGA on the rear of the CNC.
Field power failure “Field power failure” error message is posted on the CNC	1. Verify that the cable between the utility and serial isolation board (141222, 141256, or 141194/141307) and the power distribution board (141153) is connected at both ends. 2. Verify that the LEDs on the power distribution board are illuminated. 3. If the LEDs on the power distribution board are not illuminated, replace the board.

Symptoms / Indications	Corrective Action
Input failure ▪ An input point is in an unexpected state or fails to change state ▪ The table is not performing as set up when reaching limit switches ▪ A continuous fault is occurring and won't clear	**For HyPath interfaces with the test kit (228832):** See the *Diagnostics tests* section, earlier in this manual. **For HyPath interfaces without the test kit:** 1. Go to the Setups > Diagnostics > I/O > Enter Machine password. 2. Exercise the input device on the table and verify that the state of the input reacts on the CNC screen. If the screen reflects that the input state is not changing, replace the 24 I/O board. 3. Verify that input logic changes with multimeter. 4. If the state of the input is still not changing, move and reconfigure the I/O on the controller. **For Picopath interfaces with the test kit (228833):** See the *Diagnostics tests* section, earlier in this manual. **For Picopath interfaces without the test kit:** 1. Go to the Setups > Diagnostics > I/O > Enter Machine password. 2. Exercise the input device on the table and verify that the state of the input reacts on the CNC screen. If the screen reflects that the input state is not changing, replace the Picopath interface board (141122 – 4 axis, 141154 – 2 axis) 3. Verify that input logic changes with multimeter. 4. If the state of the input is still not changing, move and reconfigure the I/O on the controller.
Output failure ▪ An output point is in an unexpected state or fails to change state ▪ A continuous fault is occurring and won't clear	**For HyPath interfaces with the test kit (228832):** See the *Diagnostics tests* section, earlier in this manual. **For HyPath interfaces without the test kit:** 1. Power off the table and disconnect interface cables from the back of the CNC. 2. Go to the Setups > Diagnostics > I/O > Enter Machine password. 3. Exercise the output through the CNC to see if the output reacts as expected. If an output point fails, replace the failed output relay with an unused relay or a replacement relay (003179) OR replace the 24 I/O board and retest. 4. If the retest fails, replace the MCC board and retest. 5. If the retest fails, replace the ribbon cable (223232) and retest outputs 1–24. 6. If the retest fails again, the problem is with the table component and should be repaired or replaced as necessary.

Symptoms / Indications	Corrective Action
Output failure, continued	**For Picopath interfaces with the test kit (228833):** See the *Diagnostics tests* section, earlier in this manual. **For Picopath interfaces without the test kit:** 1. Go to the Setups > Diagnostics > I/O > Enter Machine password. 2. Exercise the output through the CNC to see if the output reacts as expected. If an output point fails, replace and retest in this order: ▪ Picopath interface board ▪ Picopath MCC board ▪ Picopath I/O ribbon cable (223232) 3. If the output point still fails, a table component has failed and should be repaired or replaced.
Hypernet Communications with components connected to the HyperNet are not working properly.	See the *Diagnostics tests* section, earlier in this manual.
LAN connection ▪ Downloading part programs over the LAN are not working properly ▪ Previously mapped network drives are not shown when trying to load a part program	See the *Diagnostics tests* section, earlier in this manual.

Symptoms / Indications	Corrective Action
Motion issues ▪ Erratic motion ▪ An axis “runs away” ▪ No motion is observed ▪ There is a high number of position errors ▪ Parts may not be to tolerance	**For HyPath interfaces with the test kit (228832):** See the *Diagnostics tests* section, earlier in this manual. **For HyPath interfaces without the test kit:** 1. To prevent damage to the table and components, remove all motors from the rack or couplers. 2. Go to Setups > Diagnostics > Drives and Motors > Enter Machine password. 3. Enter: ▪ A Pulse Type of “Single” ▪ A Pulse Direction “Alternating” ▪ A Pulse Magnitude of 1 V ▪ A Pulse Duration of 0.5 seconds Choose the Test Transverse and Test Rail buttons, one at a time and verify that motors move in both directions for each test. If there is no movement in any of the axes, in any direction, check the table setup. If motion is observed properly in all directions, proceed to step 4. 4. If there is no movement in one of the directions, take note of which motor it is. In the back of the CNC, switch the Axis 1–2 and Axis 3–4 cables, and re-run the test in step 2 (for 2 axis systems, you must switch the motors physically). If the problem stays with the motor, replace the affected motor and/or drive amplifier. If the problem changes motors, replace the following components, one at a time and re-run the tests in steps 2 and 3 after each replacement: ▪ Servo board ▪ MCC ▪ Ribbon cable (223231) 5. Re-run step 3, taking care to observe the transverse and rail position indicators. If these indicators are moving in a repeatable manner, all components are working as expected and the table should be tuned. If one or more of the indicators are not responding when the table is moving, take note of which indicator is not responding properly and proceed to step 4.

Symptoms / Indications	Corrective Action
Motion issues, continued	**For Picopath interfaces with the test kit (228833):** See the *Diagnostics tests* section, earlier in this manual. **For 3 and 4 axis Picopath interfaces without the test kit:** 1. To prevent damage to the table and components, remove all motors from the rack or couplers. 2. Go to Setups > Diagnostics > Drives and Motors > Enter Machine password. 3. Enter: ▪ A Pulse Type of “Single” ▪ A Pulse Direction “Alternating” ▪ A Pulse Magnitude of 1 V ▪ A Pulse Duration of 0.5 seconds Choose the Test Transverse and Test Rail buttons, one at a time and verify that motors move in both directions for each test. If there is no movement in any of the axes, in any direction, check the table setup. If motion is observed properly in all directions, proceed to step 4. 4. If there is no movement in one of the directions, take note of which motor it is. In the back of the CNC, switch the Axis X/Y and Axis W/Z cables, and re-run the test in step 2. If the problem stays with the motor, replace the affected motor and/or drive amplifier. If the problem changes motors, replace the following components, one at a time and re-run the tests in steps 2 and 3 after each replacement: ▪ Servo board ▪ MCC ▪ Ribbon cable (223231) 5. Re-run step 3, taking care to observe the transverse and rail position indicators. If these indicators are moving in a repeatable manner, all components are working as expected and the table should be tuned. If one or more of the indicators are not responding when the table is moving, take note of which indicator is not responding properly and proceed to step 4.

Symptoms / Indications	Corrective Action
Motion issues, continued	**For a 2 axis Picopath interface without the test kit:** 1. To prevent damage to the table and components, remove all motors from the rack or couplers. 2. Go to Setups > Diagnostics > Drives and Motors > Enter Machine password. 3. Enter: ▪ A Pulse Type of “Single” ▪ A Pulse Direction “Alternating” ▪ A Pulse Magnitude of 1 V ▪ A Pulse Duration of 0.5 seconds Choose the Test Transverse and Test Rail buttons, one at a time and verify that motors move in both directions for each test. If there is no movement in any of the axes, in any direction, check the table setup. If motion is observed properly in all directions, proceed to step 4. 4. If there is no movement in one of the directions, take note of which motor it is. Switch the two motors physically and re-run the test in step 2. If the problem stays with the motor, replace the affected motor and/or drive amplifier. If the problem changes motors, replace the following components, one at a time and re-run the tests in steps 2 and 3 after each replacement: ▪ Servo board ▪ MCC ▪ Ribbon cable (223231) 5. Re-run step 3, taking care to observe the transverse and rail position indicators. If these indicators are moving in a repeatable manner, all components are working as expected and the table should be tuned. If one or more of the indicators are not responding when the table is moving, take note of which indicator is not responding properly and proceed to step 4.
THC ▪ Nozzle contact is not functioning properly ▪ IHS using Ohmic contact is not sensing the plate properly ▪ Torch is firing in the air ▪ Torch is running into the plate without retracting ▪ Arc voltage feedback is not functioning as expected	See the *Diagnostics tests* section, earlier in this manual.

Symptoms / Indications	Corrective Action
Serial communication issues ▪ Processes and information communicated through the serial ports are not operating properly ▪ PS link fail messages are occurring ▪ Unable to download files over a configured Serial port ▪ HPR-link fail messages are occurring when using serial communications to the HPR	See the *Diagnostics tests* section, earlier in this manual.
USB issues The CNC is not recognizing a memory stick, mouse, keyboard or other device in a USB port.	See the *Diagnostics tests* section, earlier in this manual.
Cut quality Cut quality, plasma performance, or both are not as expected.	Choose the “Cutting Tips” button on the main screen and follow the on-screen instructions to improve cut quality. Contact your table manufacturer for additional troubleshooting.

Symptoms / Indications	Corrective Action
CNC temperature CNC feels excessively warm.	1. Verify that the fan is running. If it is running slowly, clean the fan. 2. If the fan is not running: ▪ Verify that the internal harness is connected from the fan to the ATX power supply. ▪ Replace the fan (229417) 3. If the external fan is running and the CNC is still excessively warm, open the top panel of the CNC and verify that the internal fan is running. If the fan is not running, replace the internal fan (229417).
CNC is slow ▪ CNC is loading files slower than when it was first installed. ▪ Performance has slowed down over time.	1. Press Setups > Password > Enter Special Password > System. 2. If all five CNC performance information numbers on the screen are in BLUE, the CNC is performing as designed. 3. If any of the five numbers on the screen are in RED, the CNC is operating more slowly than is needed for peak performance. ▪ Restart the CNC. After 5 minutes, re-enter the Setups > Password > Enter Special Password > System screen and recheck the numbers. If the five numbers are in BLUE, the CNC is operating as expected. ▪ If any of the five numbers are RED: There may be other programs that are running in the CNC beside Phoenix that are negatively affecting performance. Close those programs. Contact your table manufacturer for additional troubleshooting.

Wireless troubleshooting

Follow these guidelines if you are experiencing problems using the wireless network on your CNC.

- The wireless network card requires a bus mastering slot on the motherboard. On the MicroEDGE Pro motherboard (141110), PCI slot 1 is *not* a bus mastering slot. Make sure the wireless card is installed in PCI slot 2 or 3.

- The wireless network card conforms to 802.11N and 802.11G standards and connects to either wireless G or N local are network (LAN). It provides wireless G or better performance for part program downloads, remote help, or other network tasks.

  - An 802.11G wireless network can operate at reasonable speeds up to 38 m (125 ft) from the wireless router or access point, even if the path between the CNC and the access point is obstructed with a wall or door.

  - An 802.11N wireless network can operate at reasonable speeds up to 70 m (230 ft) from the wireless router or access point. However, 802.11N requires a clear line of sight between antennas.

  - When in doubt, use the 802.11G wireless network connection.

  Note: The network must be set to broadcast its SSID for it to be visible as a connection.

- Make sure the wireless network card appears in the Windows Device Manager under the “Network Adapters” heading, and does not have a yellow ! or ? next to it.

- Use the Windows Network Connections Manager to locate your router or wireless network access point. Choose Start, Settings, Network Connections.

- If the network connection wizard does not list any company wireless networks, check the network availability using a Windows XP laptop or other wi-fi device to verify the router or access point connection is available at that physical location.

- Signal strength diminishes with distance. A wireless network connection does not require 100% signal strength to be effective (shown as four solid bars on the screen). If the Network Connections Manager shows two or three signal strength bars, the network connection is reasonable.

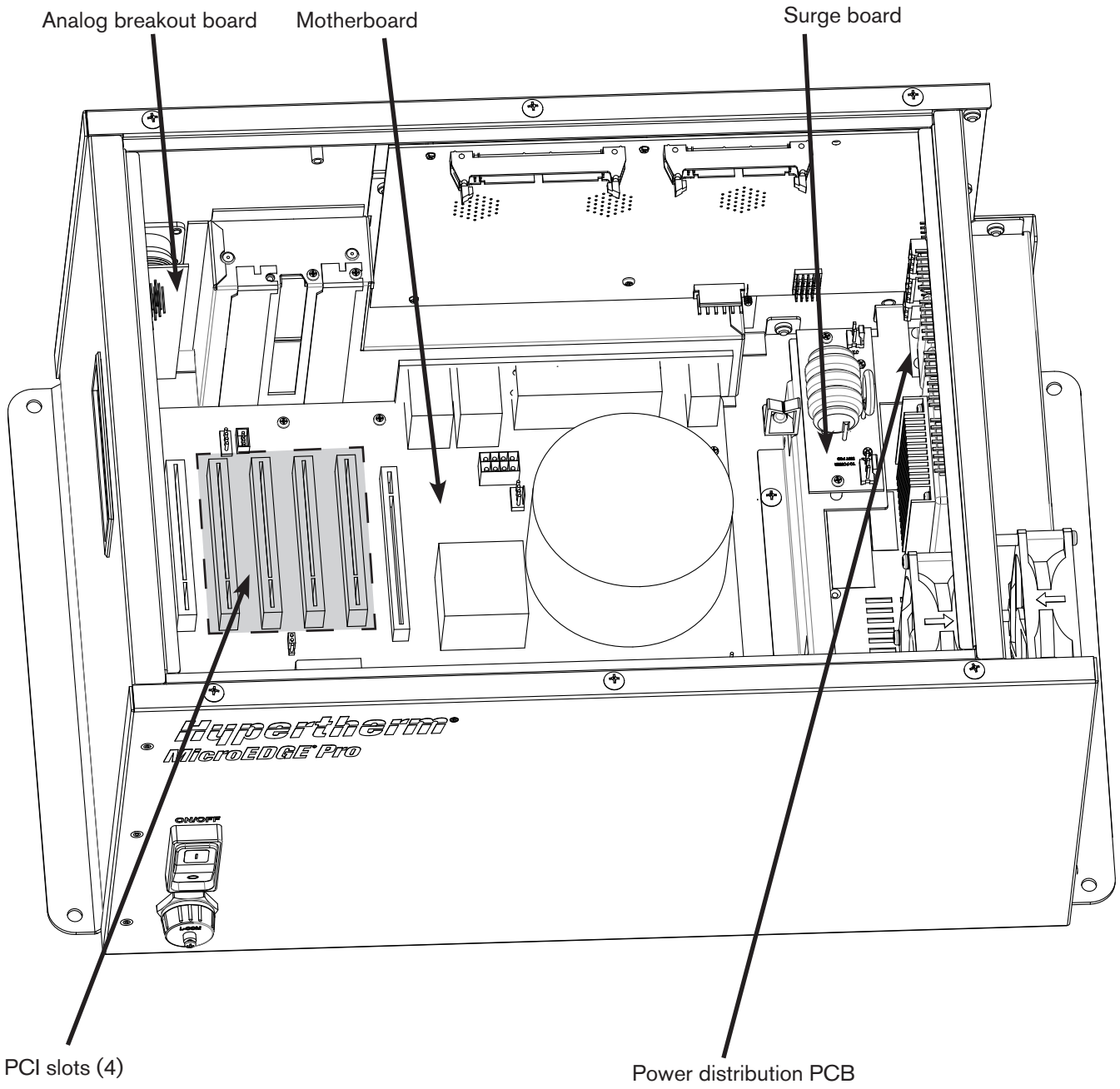
- If the connection speed frequently dips below 24 Mbs or signal strength dips below two bars, move the wireless router or access point closer to the CNC, or add another access point closer to the CNC.

- For best network performance, minimize the number of clients on the wireless network.

- Avoid connecting slower wireless devices to the network (for example, 802.11B devices) as the entire network may downshift to that level of performance.

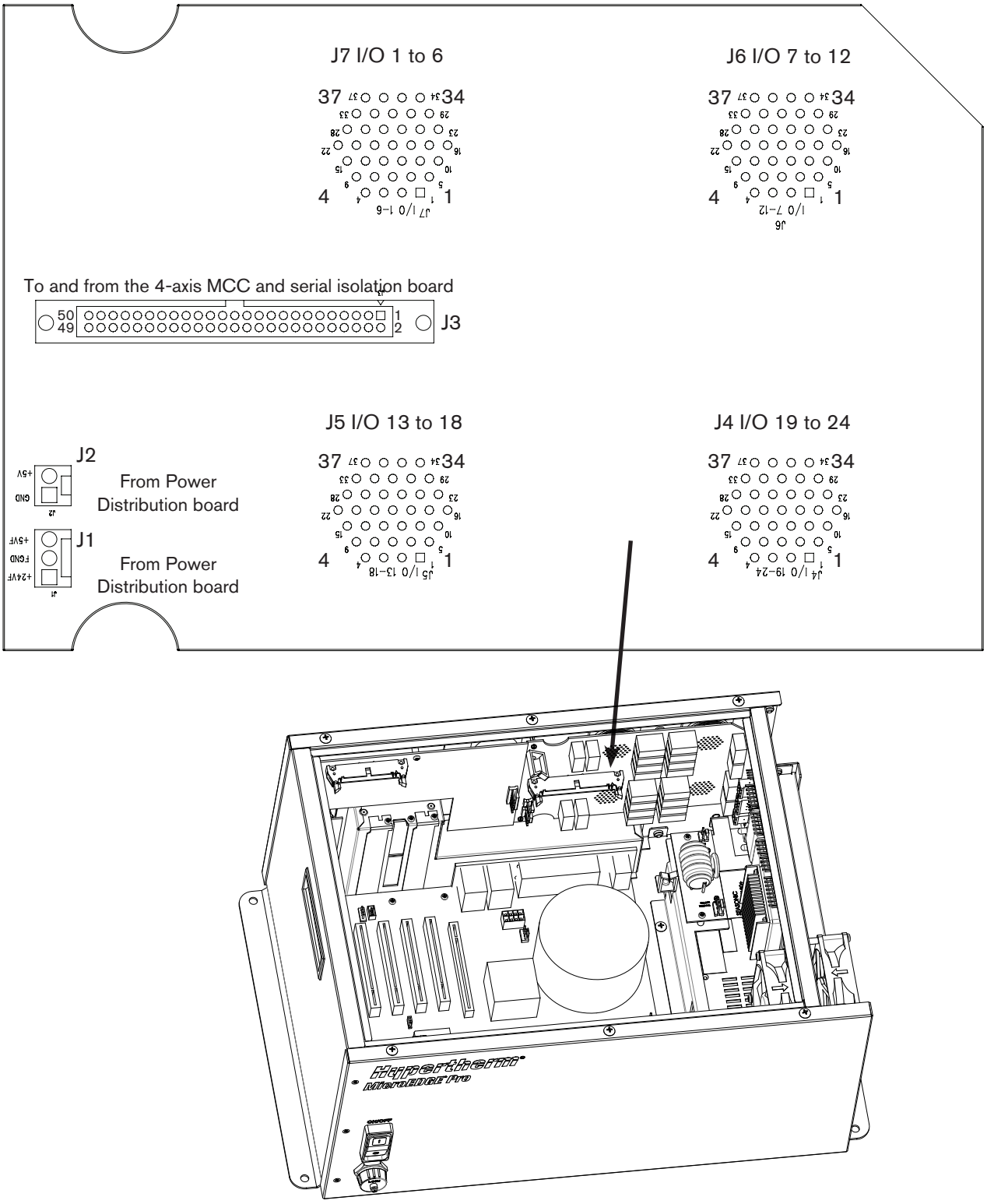
Component locations and information

The following pages provide details about the major components of the MicroEDGE Pro. Refer to *Section 6 Parts* for the corresponding replacement kits and part numbers.



Internal view of the MicroEDGE Pro CNC

HyPath 24 I/O board (141070)



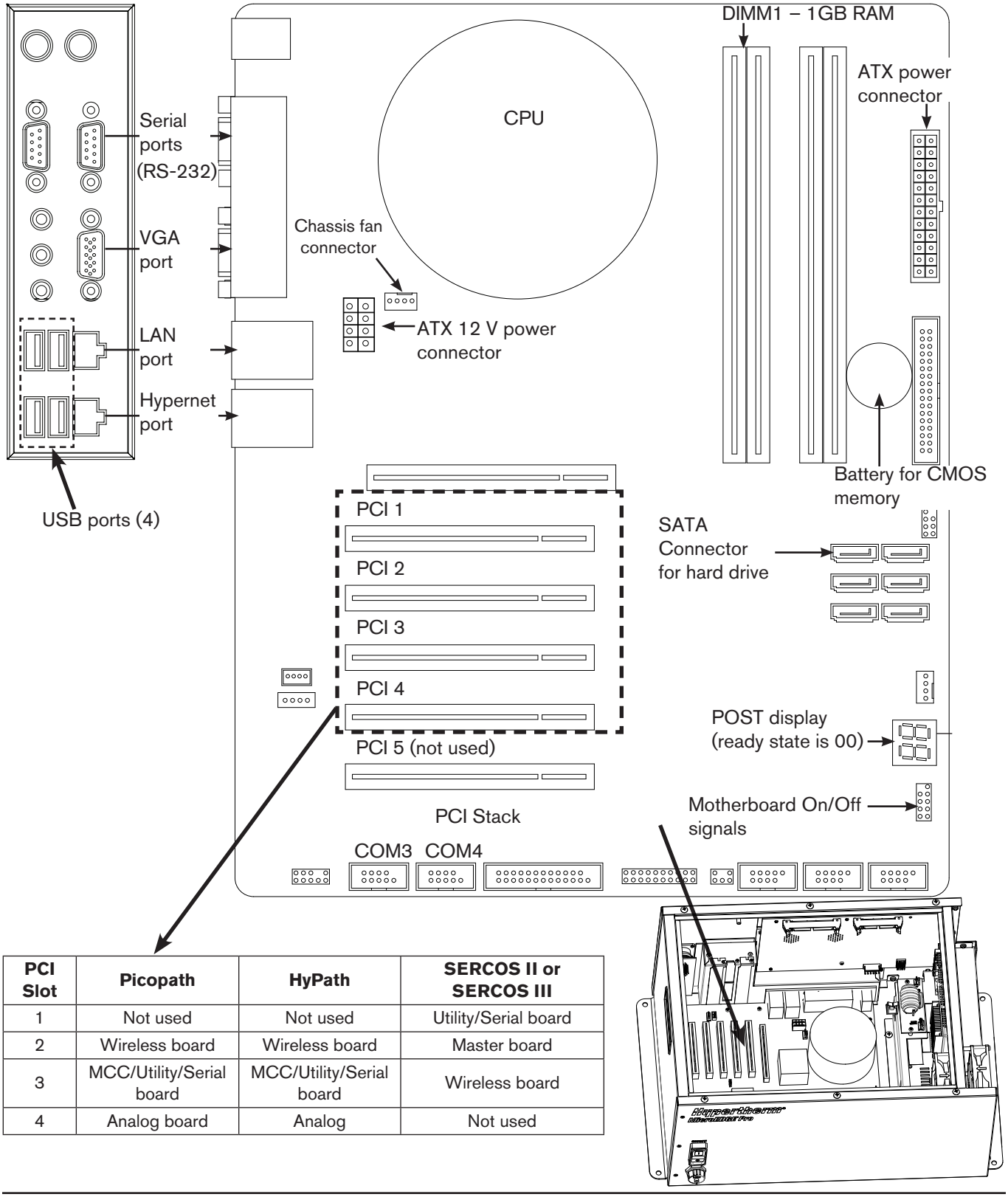
Connector J1 (From power distribution board)	
Pin no.	**Signal**
1	+24 V
2	Field ground
3	+5 V

Connector J2 (From power distribution board)	
Pin no.	**Signal**
1	Ground
2	+5 V

Connector J3 (To and from MCC and serial isolation board)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Input 1	26	Output 13
2	Output 1	27	Input 14
3	Input 2	28	Output 14
4	Output 2	29	Input 15
5	Input 3	30	Output 15
6	Output 3	31	Input 16
7	Input 4	32	Output 16
8	Output 4	33	Input 17
9	Input 5	34	Output 17
10	Output 5	35	Input 18
11	Input 6	36	Output 18
12	Output 6	37	Input 19
13	Input 7	38	Output 19
14	Output 7	39	Input 20
15	Input 8	40	Output 20
16	Output 8	41	Input 21
17	Input 9	42	Output 21
18	Output 9	43	Input 22
19	Input 10	44	Output 22
20	Output 10	45	Input 23
21	Input 11	46	Output 23
22	Output 11	47	Input 24
23	Input 12	48	Output 24
24	Output 12	49	Ground
25	Input 13	50	Ground

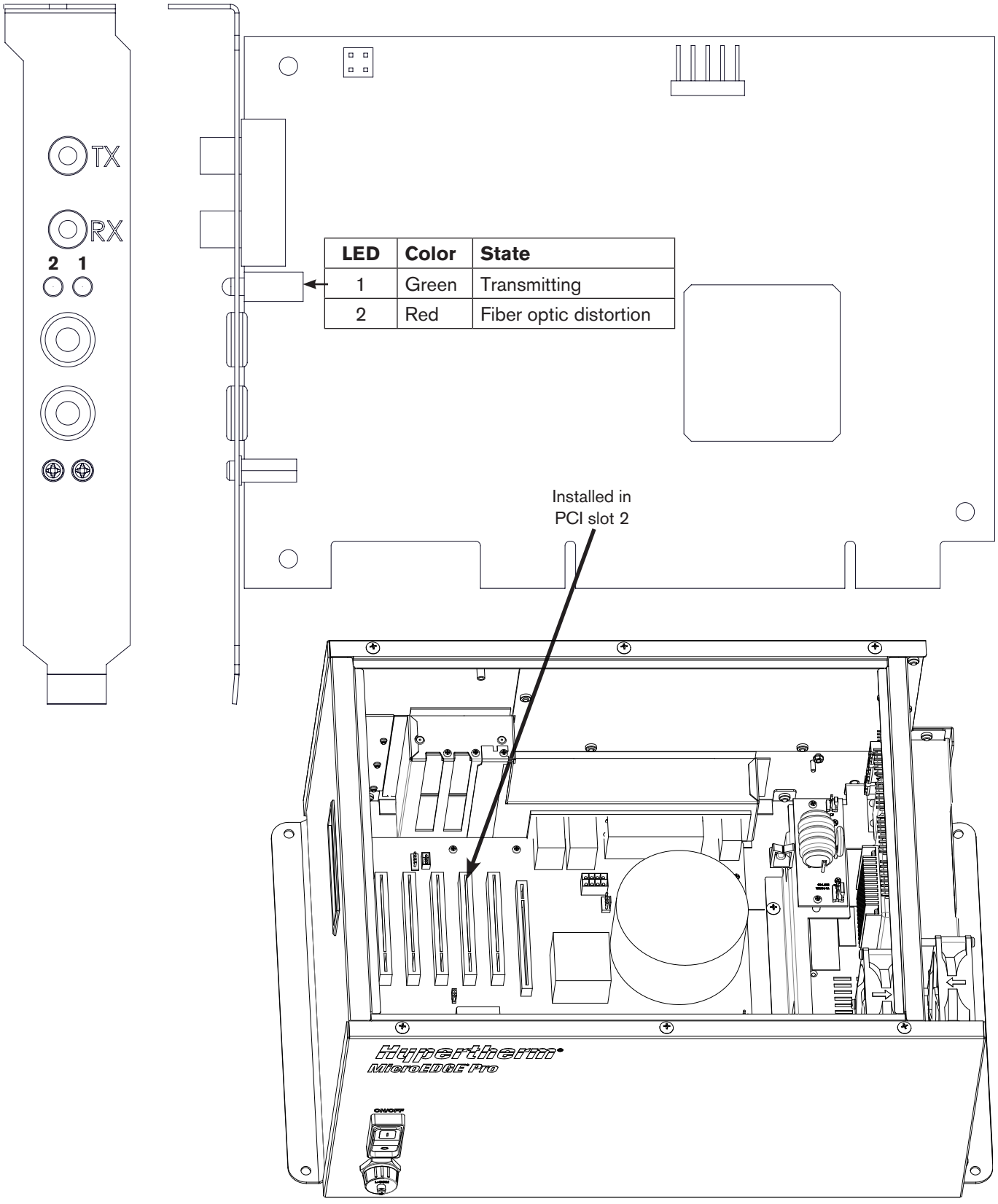
Connector J4 (I/O 19–24), J5 (I/O 13–18), J6 (I/O 7–12), J7 (I/O 1–6)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	+24 V Field	20	Output 19A, 13A, 7A, 1A
2	Input 19, 13, 7, 1	21	Output 19B, 13B, 7B, 1B
3	Common	22	+24V Field
4	+24 V Field	23	Output 20A, 14A, 8A, 2A
5	Input 20, 14, 8, 2	24	Output 20B, 14B, 8B, 2B
6	Common	25	+24 V Field
7	+24 V Field	26	Output 21A, 15A, 9A, 3A
8	Input 21, 15, 9, 3	27	Output 21B, 15B, 9B, 3B
9	Common	28	+24 V Field
10	+24 V Field	29	Output 22A, 16A, 10A, 4A
11	Input 22, 16, 10, 4	30	Output 22B, 16B, 10B, 4B
12	Common	31	+24 V Field
13	+24 V Field	32	Output 23A, 17A, 11A, 5A
14	Input 23, 17, 11, 5	33	Output 23B, 17B, 11B, 5B
15	Common	34	+24 V Field
16	+24 V Field	35	Output 24A, 18A, 12A, 6A
17	Input 24, 18, 12, 6	36	Output 24B, 18B, 12B, 6B
18	Common	37	Shield
19	+24 V Field		

Motherboard (141110)



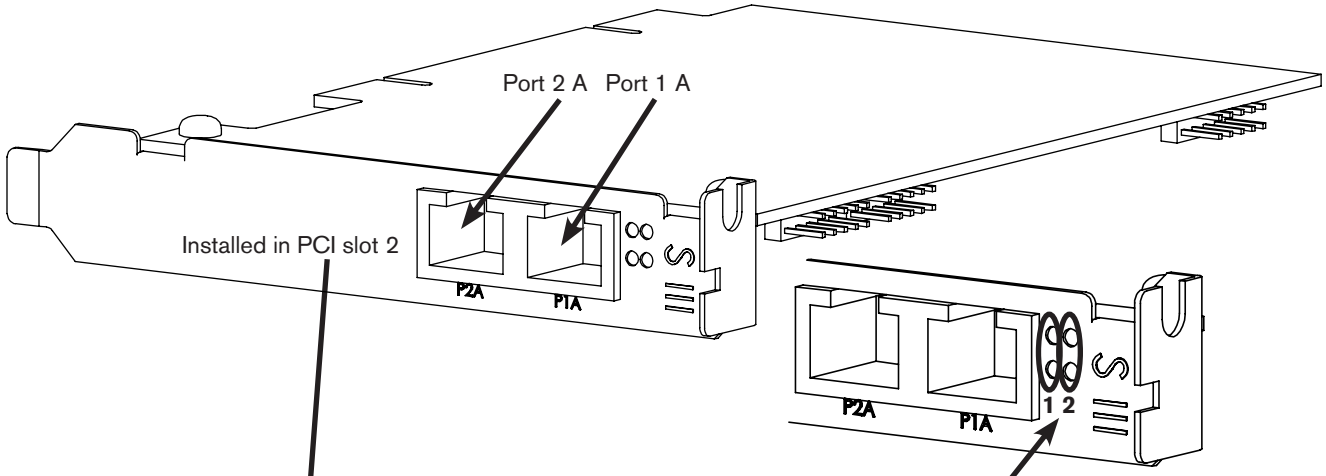
PCI Slot	Picopath	HyPath	SERCOS II or SERCOS III
1	Not used	Not used	Utility/Serial board
2	Wireless board	Wireless board	Master board
3	MCC/Utility/Serial board	MCC/Utility/Serial board	Wireless board
4	Analog board	Analog	Not used

SERCOS II master board (141116)

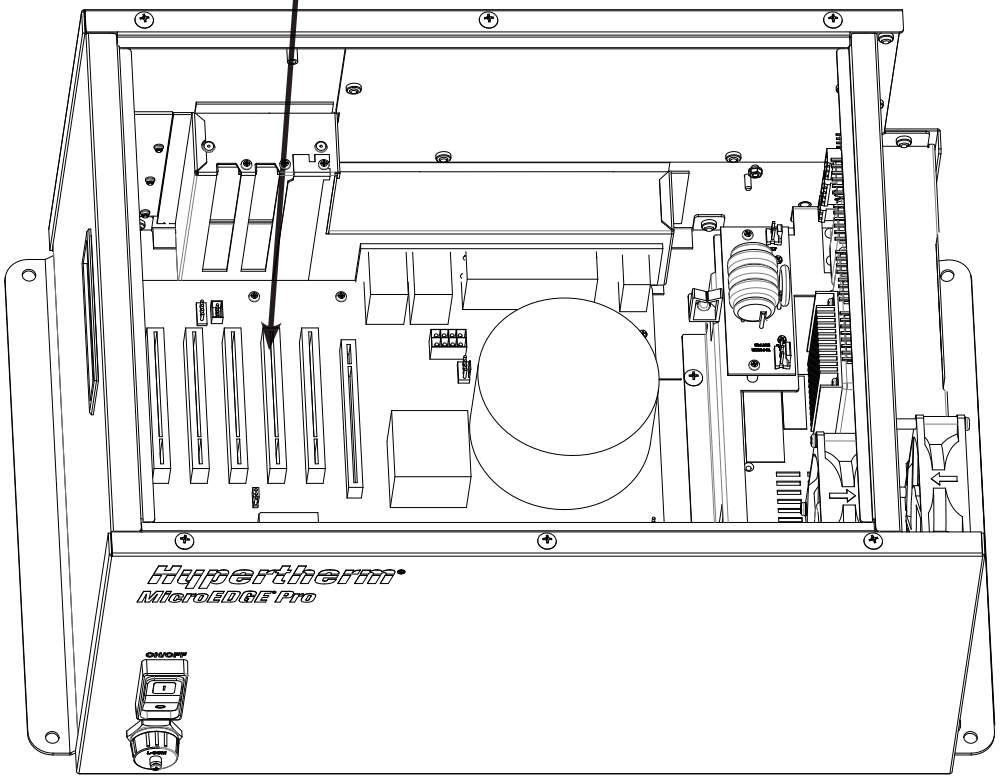


LED	Color	State
1	Green	Transmitting
2	Red	Fiber optic distortion

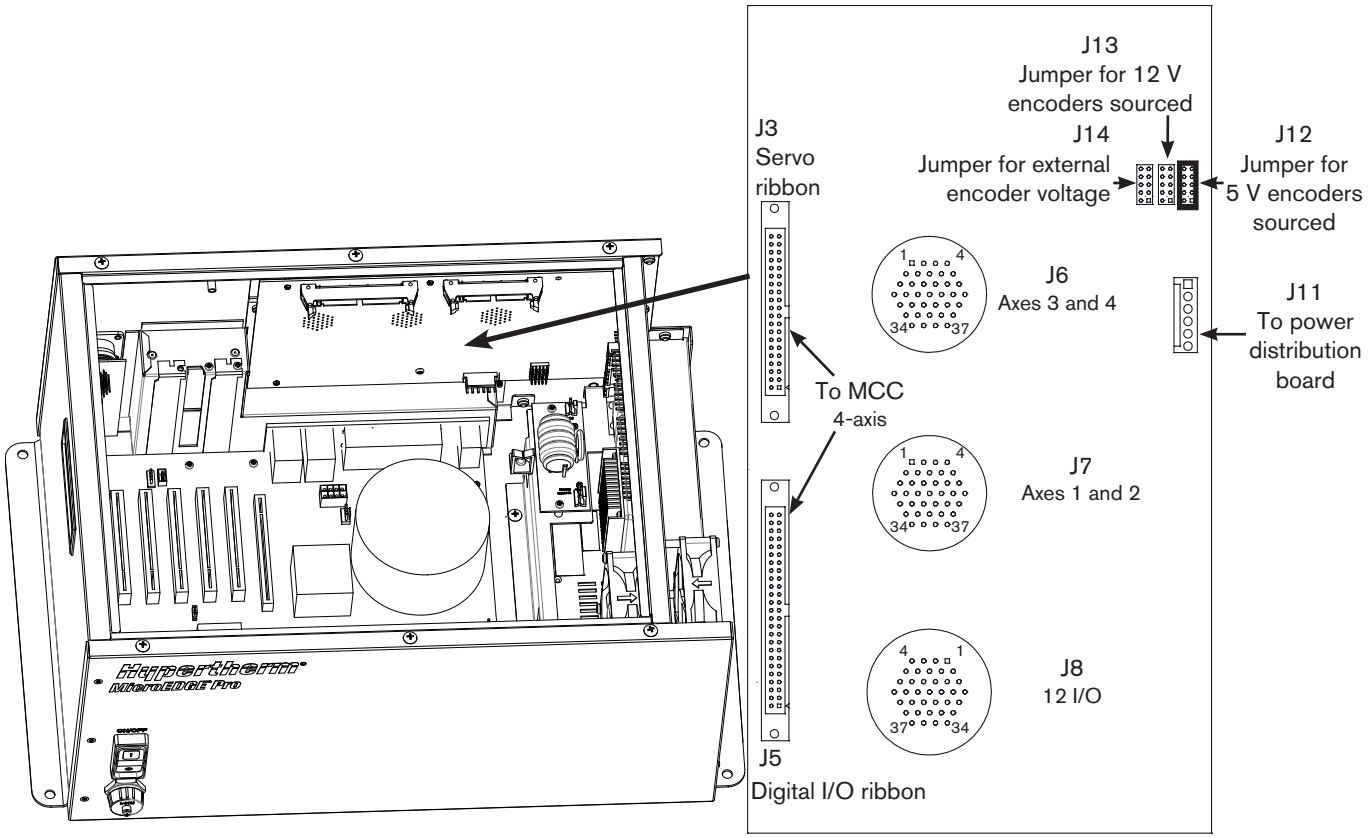
SERCOS III master board (141310)



Port		LED color and state
1	Port 1A	Green = linked
2	Port 2A	Yellow = transmitting



Picopath 4-axis servo board (141122)



Connector J3 (Servo)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	/Axis 1 enable	21	Not connected
2	/Axis 2 enable	22	Not connected
3	/Axis 3 enable	23	Not connected
4	/Axis 4 enable	24	Not connected
5	Not connected	25	Not connected
6	Not connected	26	Ground
7	/Watchdog enable	27	Ground
8	Axis 1A	28	Analog common
9	Axis 1B	29	Axis 1 analog
10	Axis 1Z	30	Axis 2 analog
11	Axis 2A	31	Axis 3 analog
12	Axis 2B	32	Axis 4 analog
13	Axis 2Z	33	Not connected
14	Axis 3A	34	Not connected
15	Axis 3B	35	Ground
16	Axis 3Z	36	+5 V
17	Axis 4A	37	+5 V
18	Axis 4B	38	+12 V
19	Axis 4Z	39	-12 V
20	Not connected	40	Ground

Connector J5 (I/O 1–12)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Input 1	26	Not connected
2	Output 1	27	Not connected
3	Input 2	28	Not connected
4	Output 2	29	Not connected
5	Input 3	30	Not connected
6	Output 3	31	Not connected
7	Input 4	32	Not connected
8	Output 4	33	Not connected
9	Input 5	34	Not connected
10	Output 5	35	Not connected
11	Input 6	36	Not connected
12	Output 6	37	Not connected
13	Input 7	38	Not connected
14	Output 7	39	Not connected
15	Input 8	40	Not connected
16	Output 8	41	Not connected
17	Input 9	42	Not connected
18	Output 9	43	Not connected
19	Input 10	44	Not connected
20	Output 10	45	Not connected
21	Input 11	46	Not connected
22	Output 11	47	Picopath ID (0=True) HyPath ID (NC=1=False)
23	Input 12	48	Not connected
24	Output 12	49	Not connected
25	Not connected	50	Ground

Connector J6 (Axes 3 and 4, Z and W)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Encoder voltage	20	Analog common
2	Encoder voltage	21	Axis 3 (Z), encoder B\
3	Encoder common	22	Axis 3 (Z), encoder Z
4	Encoder voltage	23	Axis 4 (W), encoder Z\
5	Axis 4 (W), encoder A	24	Axis 3 (Z), enable in
6	Encoder common	25	Axis 3 (Z), enable out
7	Ground	26	Axis 4 (W), enable in
8	Encoder common	27	Axis 4 (W), enable out
9	Axis 3 (Z), encoder A	28	Axis 3 (Z), encoder Z\
10	Axis 4 (W), encoder B	29	Axis 4 (W), reference+
11	Axis 4 (W), encoder A\	30	Analog common
12	Ground	31	Ground
13	Ground	32	Analog common
14	Axis 3 (Z), encoder A\	33	Axis 3 (Z), reference+
15	Axis 3 (Z), encoder B	34	Analog voltage +
16	Axis 4 (W), encoder Z	35	Analog voltage -
17	Axis 4 (W), encoder B\	36	Analog voltage -
18	Analog common	37	Analog voltage +
19	Ground		

Connector J7 (Axes 1 and 2, X and Y)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Encoder voltage	20	Analog common
2	Encoder voltage	21	Axis 1 (X), encoder B\
3	Encoder common	22	Axis 1 (X), encoder Z
4	Encoder voltage	23	Axis 2 (Y), encoder Z\
5	Axis 2 (Y), encoder A	24	Axis 1 (X), enable in
6	Encoder common	25	Axis 1 (X), enable out
7	Ground	26	Axis 2 (Y), enable in
8	Encoder common	27	Axis 2 (Y), enable out
9	Axis 1 (X), encoder A	28	Axis 1 (X), encoder Z\
10	Axis 2 (Y), encoder B	29	Axis 2 (Y), reference+
11	Axis 2 (Y), encoder A\	30	Analog common
12	Ground	31	Ground
13	Ground	32	Analog common
14	Axis 1 (X), encoder A\	33	Axis 1 (X), reference+
15	Axis 1 (X), encoder B	34	Analog voltage +
16	Axis 2 (Y), encoder Z	35	Analog voltage -
17	Axis 2 (Y), encoder B\	36	Analog voltage -
18	Analog common	37	Analog voltage +
19	Ground		

Connector J8 (12 I/O)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Input 1	20	Watchdog contact B
2	Input 2	21	Output 1
3	Input 3	22	Output 2
4	Input 4	23	Output 3
5	Input 5	24	Output 4
6	Input 6	25	Output 5
7	Input 7	26	Output 6
8	Input 8	27	Output 7
9	Input 9	28	Output 8
10	Input 10	29	Output 9
11	Input 11	30	Output 10
12	Input 12	31	Output 11
13	Not connected	32	Output 12
14	+24 V	33	Shield
15	+24 V	34	+24 V
16	Not connected	35	+24 V
17	Common	36	Common
18	Common	37	Common
19	Watchdog contact A		

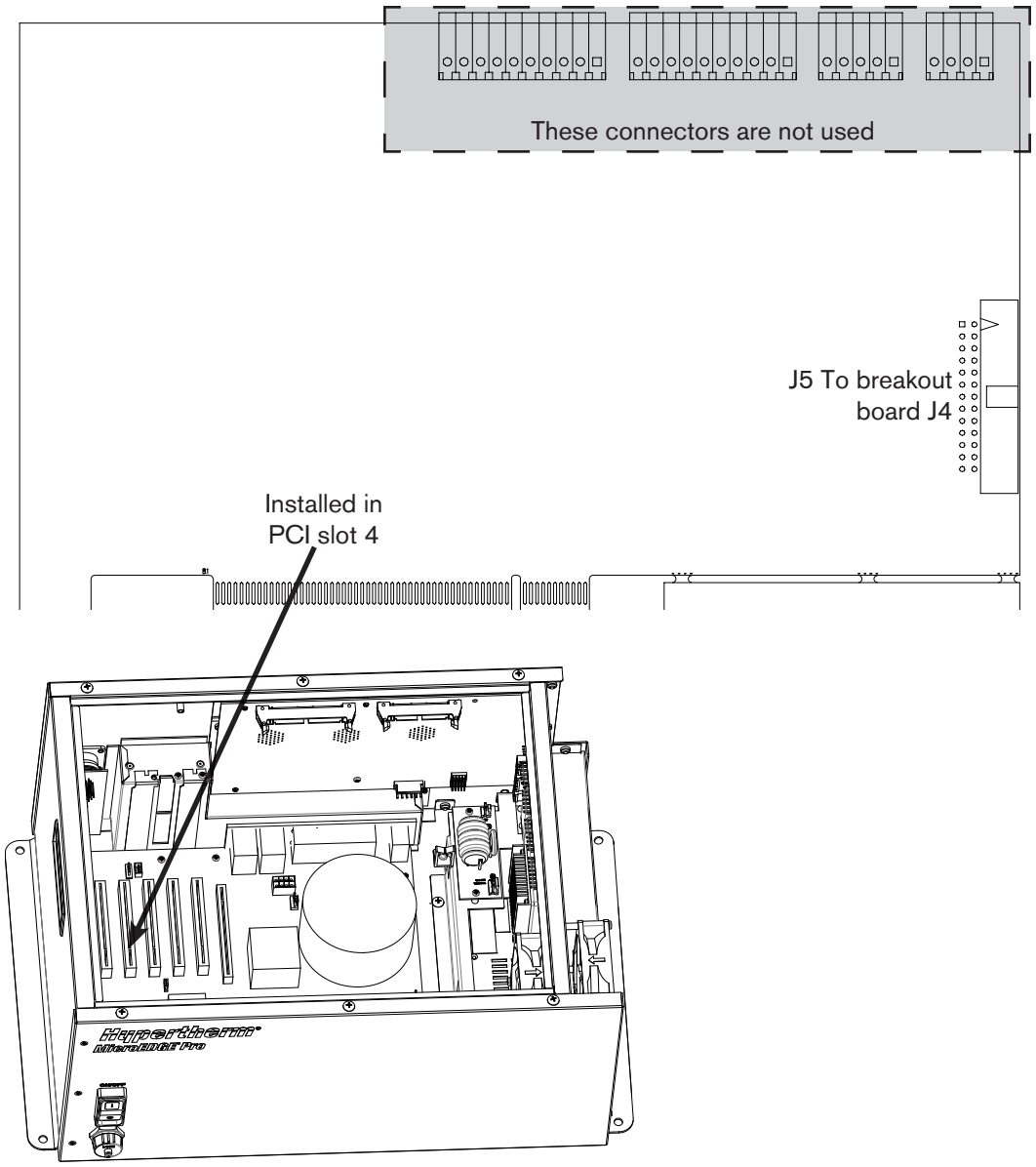
Connector J11 (To power distribution board)	
Pin no.	**Signal**
1	Field ground
2	+24 V
3	+5 V
4	-12 V
5	+12 V
6	Field ground

Connector J12 (Jumper for 5 V encoder sourced)	
Pin no.	**Signal**
1	+Ve
2	+5 Vf
3	+Va
4	+12 Vf
5	-Va
6	-12 Vf
7	+24 V
8	+24 Vf
9	/Axis watchdog
10	/Axis watchdog hdr

Connector J13 (Jumper for 12 V encoders sourced)	
Pin no.	**Signal**
1	+Ve
2	+12 Vf
3	+Va
4	+12 Vf
5	-Va
6	-12 Vf
7	+24 V
8	+24 Vf
9	/Axis watchdog
10	/Axis watchdog hdr

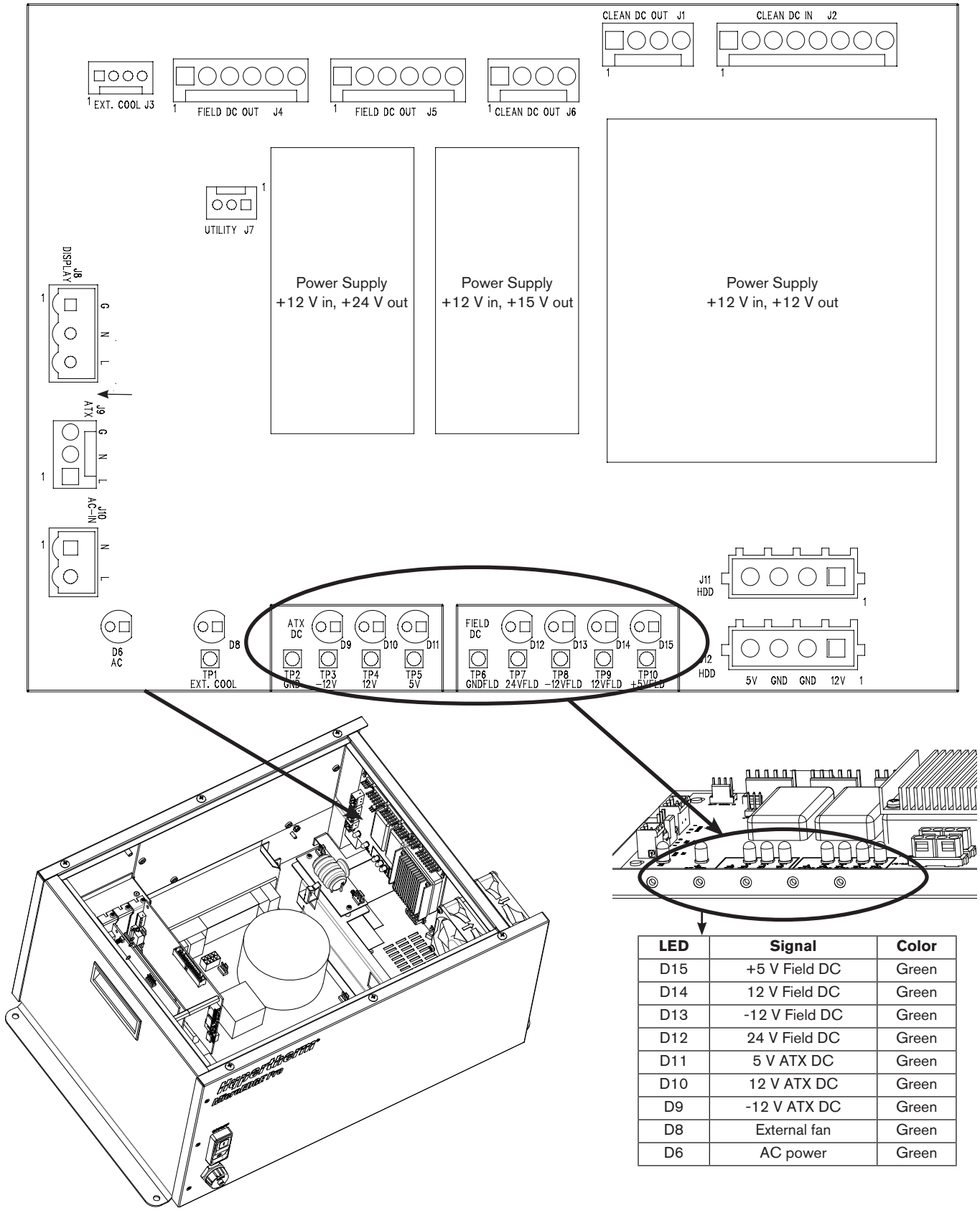
Connector J14 (Jumper for external encoder voltage)	
Pin no.	**Signal**
1	+Ve
2	Not connected
3	+Va
4	Not connected
5	-Va
6	Not connected
7	+24 V
8	Not connected
9	/Axis watchdog
10	/Axis watchdog hdr

Analog board (141125)



Connector J5	
Pin no.	**Signal**
1	Common
2	THC1 Nozzle Contact Sense + (Relay Contact)
3	THC1 Nozzle Contact Sense - (Relay Contact)
4	THC1 Nozzle Contact Enable + (Relay Contact)
5	THC1 Nozzle Contact Enable - (Relay Contact)
6	THC1 Arc Volts +
7	THC1 Arc Volts -
8	THC1 Hold Ignition (Relay Contact)
9	THC1 Hold Ignition (Relay Contact)
10	THC2 Nozzle Contact Sense + (Relay Contact)
11	THC2 Nozzle Contact Sense - (Relay Contact)
12	THC2 Nozzle Contact Enable + (Relay Contact)
13	THC2 Nozzle Contact Enable - (Relay Contact)
14	THC2 Arc Volts +
15	THC2 Arc Volts -
16	THC2 Hold Ignition (Relay Contact)
17	THC2 Hold Ignition (Relay Contact)
18	10 V Reference
19	Joystick up
20	Joystick down
21	Joystick left
22	Joystick right
23	Speedpot 1+
24	Speedpot 1-
25	Speedpot 2+
26	Speedpot 2-

Power distribution board (141153)



LED	Signal	Color
D15	+5 V Field DC	Green
D14	12 V Field DC	Green
D13	-12 V Field DC	Green
D12	24 V Field DC	Green
D11	5 V ATX DC	Green
D10	12 V ATX DC	Green
D9	-12 V ATX DC	Green
D8	External fan	Green
D6	AC power	Green

Connector J1 (Clean DC out)	
Pin no.	**Signal**
1	+5 V-Fused
2	-12 V-Fused
3	+12 V-Fused
4	Ground

Connector J2 (Clean DC in)	
Pin no.	**Signal**
1	+5 V
2	+12 V
3	+12 V
4	+12 V
5	-12 V
6	Ground
7	Ground
8	Ground

Connector J4 (Field DC out)	
Pin no.	**Signal**
1	Ground
2	+24 V
3	+5 V
4	-12 V
5	+12 V
6	Ground

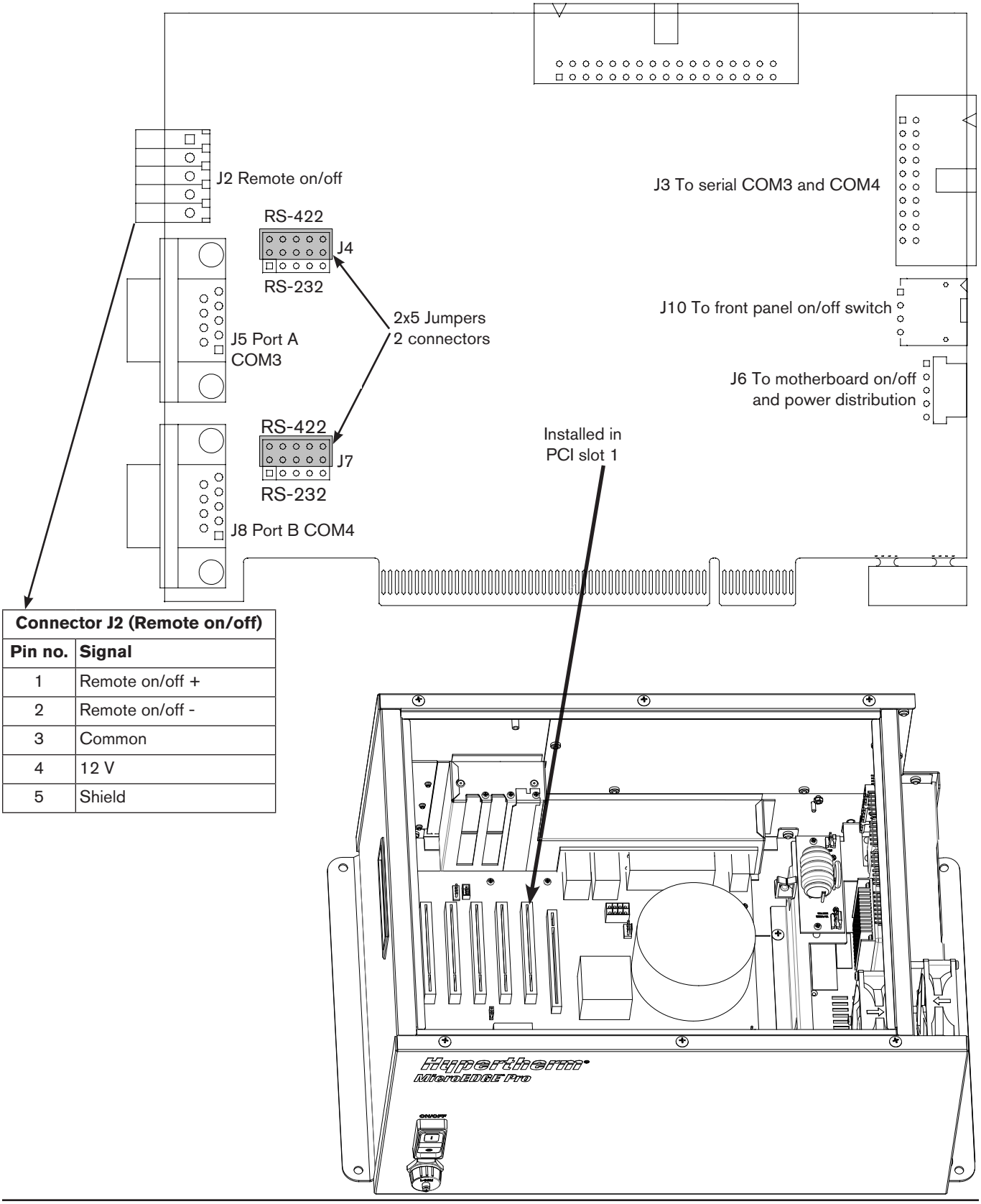
Connector J5 (Field DC out)	
Pin no.	**Signal**
1	Ground
2	+24 V
3	+5 V
4	-12 V
5	+12 V
6	Ground

Connector J6 (Clean DC out)	
Pin no.	**Signal**
1	+5 V-Fused
2	-12 V-Fused
3	+12 V-Fused
4	Ground

Connector J7 (Utility)	
Pin no.	**Signal**
1	Fan disable
2	Field Power Good
3	Ground

Connector J2 and J11 (HDD)	
Pin no.	**Signal**
1	+5V
2	Ground
3	Ground
4	12 V

SERCOS II and SERCOS III serial isolation and utility board (141194/141307)



Connector J2 (Remote on/off)	
Pin no.	**Signal**
1	Remote on/off +
2	Remote on/off -
3	Common
4	12 V
5	Shield

Connector J3 (To Serial COM3 and COM4)	
Pin no.	**Signal**
1	Ground
2	DR_A
3	/RXD_INA
4	TS_A
5	TXD_OUTA
6	TS_A
7	DR_A
8	Ground
9	Ground
10	Not connected
11	Ground
12	DR_B
13	/RXD_INB
14	TS_B
15	TXD_OUTB
16	TS_B
17	DR_B
18	Ground
19	Ground
20	Not connected

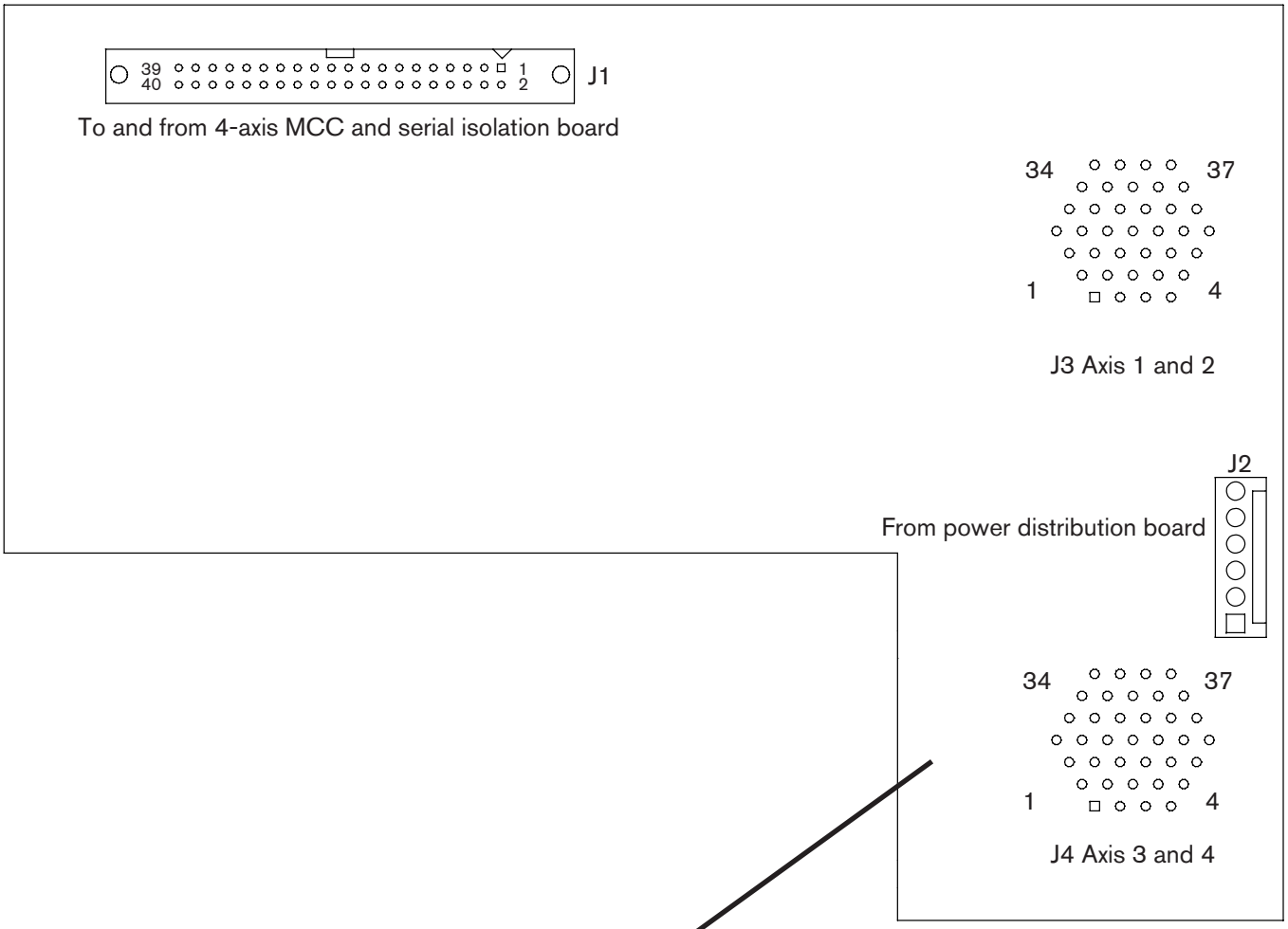
Connector J5 (Serial port A, COM3)	
Pin no.	**Signal**
1	Not connected
2	Transmit A-
3	Receive A-
4	Transmit A+
5	Signal ground 1
6	Not connected
7	Receive A+
8	Not connected
9	Not connected

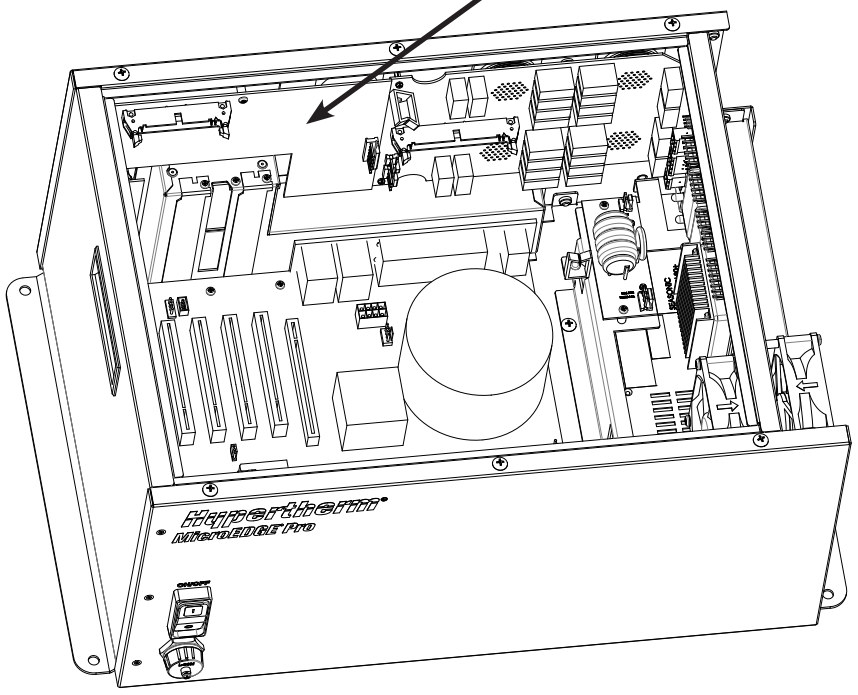
Connector J6 (To motherboard on/off and power distribution)	
Pin no.	**Signal**
1	Field power
2	Fan
3	Ground
4	Motherboard on/off 2
5	Motherboard on/off 1

Connector J8 (Serial port B, COM4)	
Pin no.	**Signal**
1	Not connected
2	Transmit B-
3	Receive B-
4	Transmit B+
5	Signal ground 2
6	Not connected
7	Receive B+
8	Not connected
9	Not connected

Connector J10 (To front panel on/off switch)	
Pin no.	**Signal**
1	Ground
2	12 V
3	Motherboard on/off 2
4	Motherboard on/off 1

HyPath 4-axis servo board (141197)





Connector J1 (To and from MCC and serial isolation boards)	
Pin no.	**Signal**
1	/Axis 1 enable
2	/Axis 2 enable
3	/Axis 3 enable
4	/Axis 4 enable
5	Not connected
6	Not connected
7	/Watchdog enable
8	Axis 1A
9	Axis 1B
10	Axis 1Z
11	Axis 2A
12	Axis 2B
13	Axis 2Z
14	Axis 3A
15	Axis 3B
16	Axis 3Z
17	Axis 4A
18	Axis 4B
19	Axis 4Z
20	Not connected
21	Not connected
22	Not connected
23	Not connected
24	Not connected
25	Not connected
26	Ground
27	Ground enable
28	Analog common
29	Axis 1 analog
30	Axis 2 analog
31	Axis 3 analog
32	Axis 4 analog
33	Not connected
34	Not connected
35	Ground
36	Logic +5 V
37	Logic +5 V
38	Logic +12 V
39	Logic -12 V
40	Ground

Connector J2 (From power distribution board)	
Pin no.	**Signal**
1	Field ground
2	+24 V
3	+5 V
4	-12 V
5	+12 V
6	Field ground

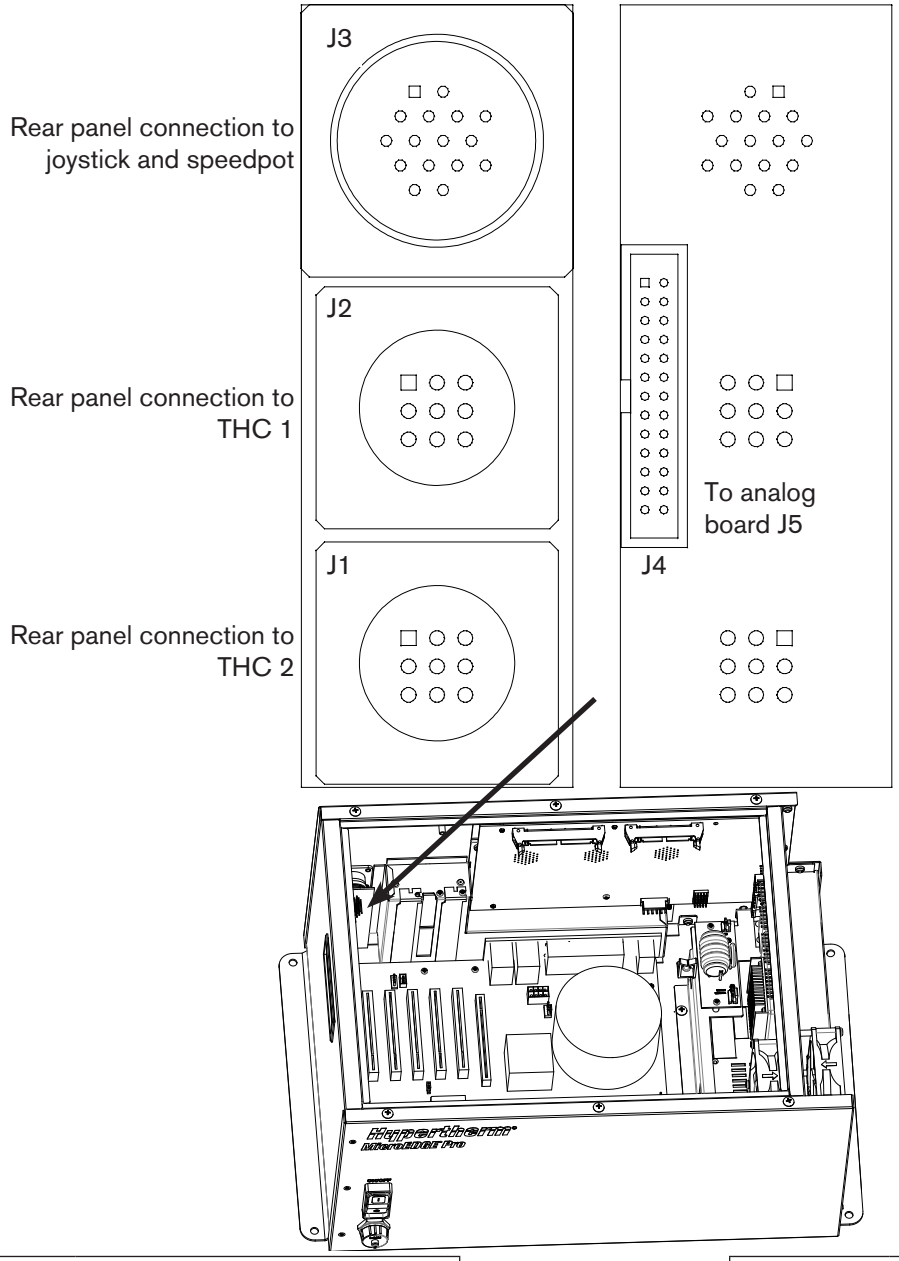
Connector J3 and J4

Axis A Pins = Axis 1, Axis 3

Axis B Pins = Axis 2, Axis 4

Pin no. for A Axis	Signal	Pin no. for B Axis
1	Axis shield	20
2	Encoder +5 V out	21
3	Encoder common	22
4	Encoder +12 V out	23
5	Encoder common	24
6	Encoder +24 V out	25
7	Encoder common	26
8	Encoder Axis A	27
9	Encoder Axis A\	28
10	Encoder Axis B	29
11	Encoder Axis B\	30
12	Encoder Axis Z	31
13	Encoder Axis Z\	32
14	Axis enable A	33
15	Axis enable B	34
16	Axis DAC output	35
17	Analog common	36
18	Shield	37
19	Cable shield	

CPC analog breakout board (141210)



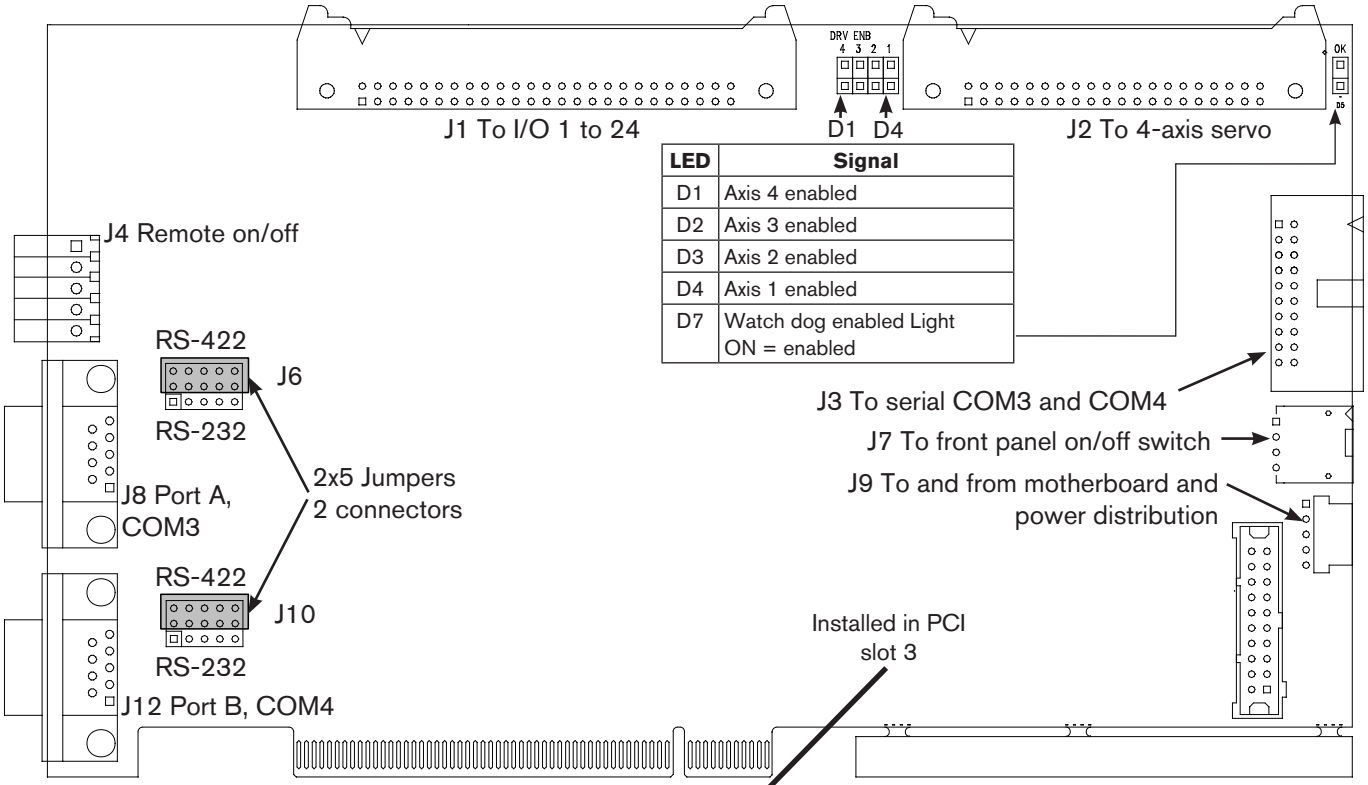
Connector J1 (THC 2)	
Pin no.	**Signal**
1	Common
2	Nozzle Contact Sense +
3	Nozzle Contact Sense -
4	Nozzle Contact Enable A +
5	Nozzle Contact Enable B -
6	Arc Volts +
7	Arc Volts -
8	Hold Ignition A
9	Hold Ignition B

Connector J2 (THC 1)	
Pin no.	**Signal**
1	Common
2	Nozzle Contact Sense +
3	Nozzle Contact Sense -
4	Nozzle Contact Enable A +
5	Nozzle Contact Enable B -
6	Arc Volts +
7	Arc Volts -
8	Hold Ignition A
9	Hold Ignition B

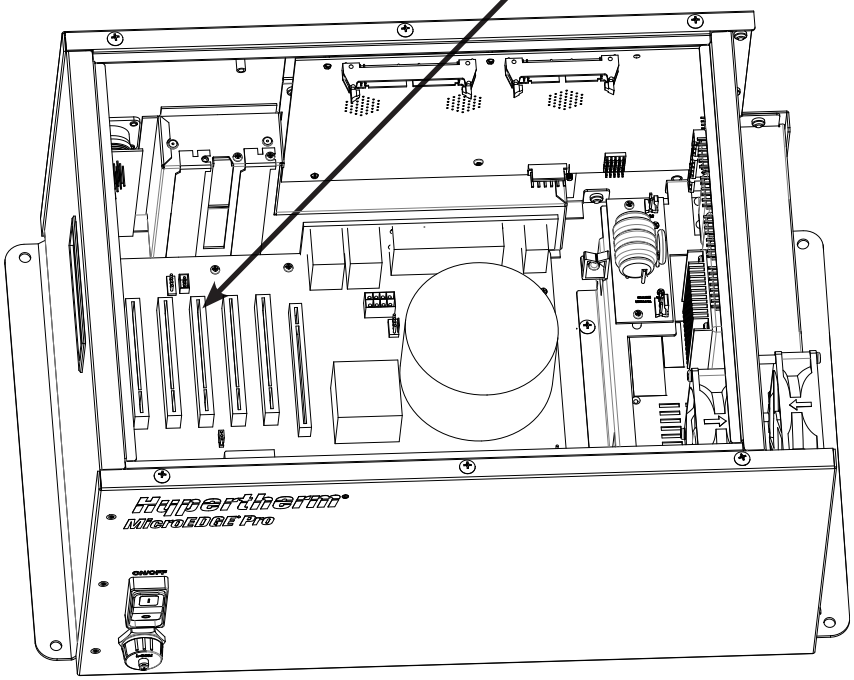
Connector J3 (Rear panel connection to joystick and speedpot)	
Pin no.	**Signal**
1	Joystick up
2	Joystick down
3	Joystick left
4	Joystick right
5	Common
6	10 V reference
7	Speed pot 1+
8	Speed pot 1-
9	Common
10	10 V reference
11	Speed pot 2+
12	Speed pot 2-
13	Common
14	Common
15	Common
16	Common

Connector J4 (To analog board J5)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Common	14	THC 2 Arc Volts +
2	THC 1 Nozzle Contact Sense +	15	THC 2 Arc Volts -
3	THC 1 Nozzle Contact Sense -	16	THC 2 Hold Ignition A
4	THC 1 Nozzle Contact Enable A +	17	THC 2 Hold Ignition B
5	THC 1 Nozzle Contact Enable B -	18	10 V reference
6	THC 1 Arc Volts +	19	Joystick up
7	THC 1 Arc Volts -	20	Joystick down
8	THC 1 Hold Ignition A	21	Joystick left
9	THC 1 Hold Ignition B	22	Joystick right
10	THC 2 Nozzle Contact Sense +	23	Speed pot 1+
11	THC 2 Nozzle Contact Sense -	24	Speed pot 1-
12	THC 2 Nozzle Contact Enable A +	25	Speed pot 2+
13	THC 2 Nozzle Contact Enable B -	26	Speed pot 2-

HyPath and Picopath 4-axis MCC, utility, and serial isolation board (141222)



LED	Signal
D1	Axis 4 enabled
D2	Axis 3 enabled
D3	Axis 2 enabled
D4	Axis 1 enabled
D7	Watch dog enabled Light ON = enabled



Connector J1 (I/O 1 – 24)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Input 1	26	Output 13
2	Output 1	27	Input 14
3	Input 2	28	Output 14
4	Output 2	29	Input 15
5	Input 3	30	Output 15
6	Output 3	31	Input 16
7	Input 4	32	Output 16
8	Output 4	33	Input 17
9	Input 5	34	Output 17
10	Output 5	35	Input 18
11	Input 6	36	Output 18
12	Output 6	37	Input 19
13	Input 7	38	Output 19
14	Output 7	39	Input 20
15	Input 8	40	Output 20
16	Output 8	41	Input 21
17	Input 9	42	Output 21
18	Output 9	43	Input 22
19	Input 10	44	Output 22
20	Output 10	45	Input 23
21	Input 11	46	Output 23
22	Output 11	47	Input 24
23	Input 12	48	Output 24
24	Output 12	49	/HyPath ID
25	Input 13	50	Ground

Connector J2 (4-axis servo)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	/Axis 1 enable	21	Not connected
2	/Axis 2 enable	22	Not connected
3	/Axis 3 enable	23	Not connected
4	/Axis 4 enable	24	Not connected
5	Not connected	25	Not connected
6	Not connected	26	Logic ground
7	/Watchdog enable	27	Logic ground
8	Axis 1A	28	Analog common
9	Axis 1B	29	Axis 1 analog out
10	Axis 1Z	30	Axis 2 analog out
11	Axis 2A	31	Axis 3 analog out
12	Axis 2B	32	Axis 4 analog out
13	Axis 2Z	33	Not connected
14	Axis 3A	34	Not connected
15	Axis 3B	35	Logic ground out
16	Axis 3Z	36	Logic +5 V
17	Axis 4A	37	Logic +5 V
18	Axis 4B	38	Logic +12 V
19	Axis 4Z	39	Logic -12 V
20	Not connected	40	Logic ground

Connector J3 (To serial COM3 and COM4)	
Pin no.	**Signal**
1	Ground
2	DR_A
3	/RXD_INA
4	TS_A
5	TXD_OUTA
6	TS_A
7	DR_A
8	Ground
9	Ground
10	Not connected
11	Ground
12	DR_B
13	/RXD_INB
14	TS_B
15	TXD_OUTB
16	TS_B
17	DR_B
18	Ground
19	Ground
20	Not connected

Connector J4 (Remote on/off)	
Pin no.	**Signal**
1	Remote on/off +
2	Remote on/off -
3	Common
4	12 V
5	Shield

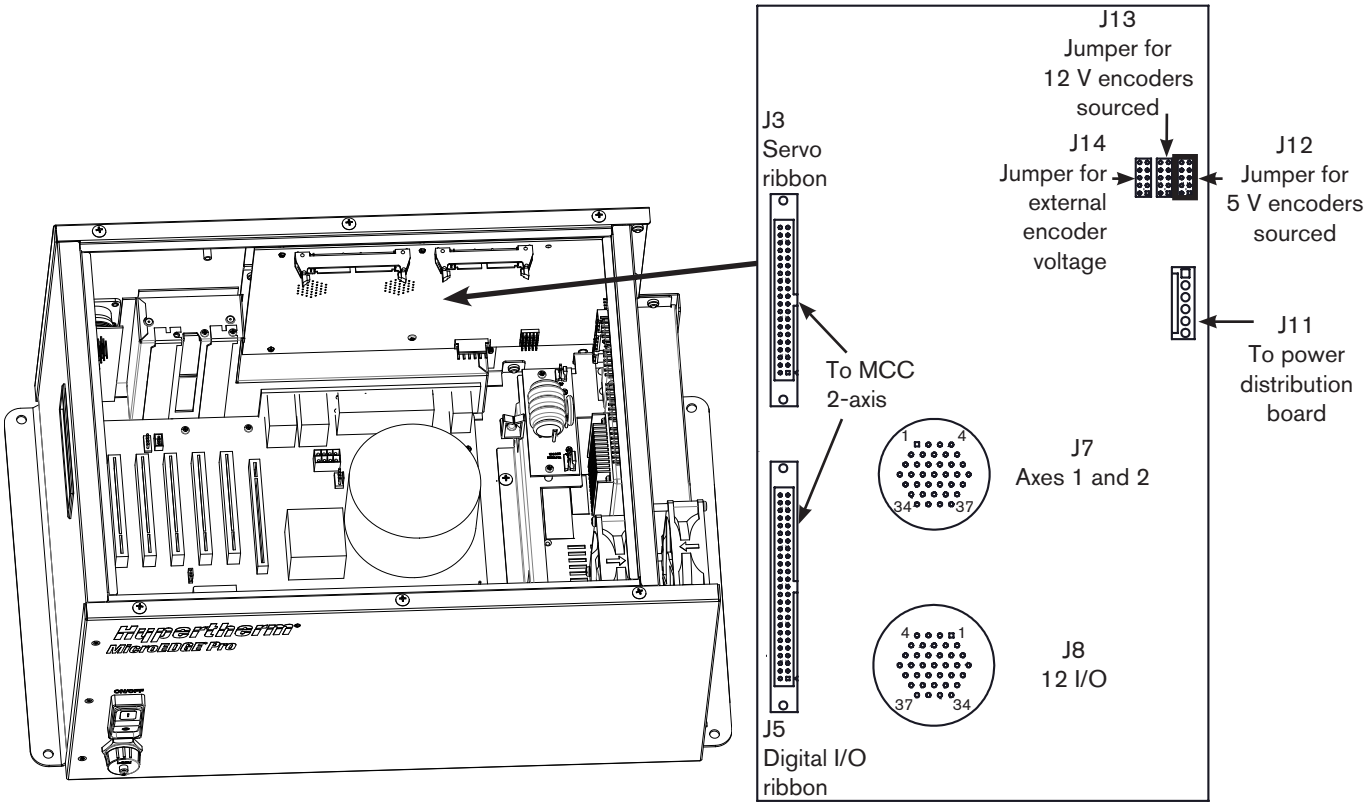
Connector J7 (To front panel on/off switch)	
Pin no.	**Signal**
1	Ground
2	12 V
3	Motherboard on/off 2
4	Motherboard on/off 1

Connector J8 (Serial port A, COM3)	
Pin no.	**Signal**
1	Not connected
2	Transmit A-
3	Receive A-
4	Transmit A+
5	Signal ground 1
6	Not connected
7	Receive A+
8	Not connected
9	Not connected

Connector J9 (To and from motherboard and power distribution)	
Pin no.	**Signal**
1	Field power
2	Not connected
3	Ground
4	Motherboard on/off 2
5	Motherboard on/off 1

Connector J12 (Serial port B, COM4)	
Pin no.	**Signal**
1	Not connected
2	Transmit B-
3	Receive B-
4	Transmit B+
5	Signal ground 2
6	Not connected
7	Receive B+
8	Not connected
9	Not connected

Picopath 2-axis servo board (141254)



Connector J3 (Servo)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	/Axis 1 enable	21	Not connected
2	/Axis 2 enable	22	Not connected
3	Not connected	23	Not connected
4	Not connected	24	Not connected
5	Not connected	25	Not connected
6	Not connected	26	Ground
7	/Watchdog enable	27	Ground
8	Axis 1A	28	Analog common
9	Axis 1B	29	Axis 1 analog
10	Axis 1Z	30	Axis 2 analog
11	Axis 2A	31	Not connected
12	Axis 2B	32	Not connected
13	Axis 2Z	33	Not connected
14	Not connected	34	Not connected
15	Not connected	35	Ground
16	Not connected	36	+5 V
17	Not connected	37	+5 V
18	Not connected	38	+12 V
19	Not connected	39	-12 V
20	Not connected	40	Ground

Connector J5 (I/O 1 – 12)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Input 1	26	Not connected
2	Output 1	27	Not connected
3	Input 2	28	Not connected
4	Output 2	29	Not connected
5	Input 3	30	Not connected
6	Output 3	31	Not connected
7	Input 4	32	Not connected
8	Output 4	33	Not connected
9	Input 5	34	Not connected
10	Output 5	35	Not connected
11	Input 6	36	Not connected
12	Output 6	37	Not connected
13	Input 7	38	Not connected
14	Output 7	39	Not connected
15	Input 8	40	Not connected
16	Output 8	41	Not connected
17	Input 9	42	Not connected
18	Output 9	43	Not connected
19	Input 10	44	Not connected
20	Output 10	45	Not connected
21	Input 11	46	Not connected
22	Output 11	47	Picopath ID (0=True) HyPath ID (NC=1=False)
23	Input 12	48	Not connected
24	Output 12	49	Not connected
25	Not connected	50	Ground

Connector J7 (Axes 1 and 2, X and Y)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Encoder voltage	20	Analog common
2	Encoder voltage	21	Axis 1 (X), encoder B\
3	Encoder common	22	Axis 1 (X), encoder Z
4	Encoder voltage	23	Axis 2 (Y), encoder Z\
5	Axis 2 (Y), encoder A	24	Axis 1 (X), enable in
6	Encoder common	25	Axis 1 (X), enable out
7	Ground	26	Axis 2 (Y), enable in
8	Encoder common	27	Axis 2 (Y), enable out
9	Axis 1 (X), encoder A	28	Axis 1 (X), encoder Z\
10	Axis 2 (Y), encoder B	29	Axis 2 (Y), reference+
11	Axis 2 (Y), encoder A\	30	Analog common
12	Ground	31	Ground
13	Ground	32	Analog common
14	Axis 1 (X), encoder A\	33	Axis 1 (X), reference+
15	Axis 1 (X), encoder B	34	Analog voltage +
16	Axis 2 (Y), encoder Z	35	Analog voltage -
17	Axis 2 (Y), encoder B\	36	Analog voltage -
18	Analog common	37	Analog voltage +
19	Ground		

Connector J8 (12 I/O)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Input 1	20	Watchdog contact B
2	Input 2	21	Output 1
3	Input 3	22	Output 2
4	Input 4	23	Output 3
5	Input 5	24	Output 4
6	Input 6	25	Output 5
7	Input 7	26	Output 6
8	Input 8	27	Output 7
9	Input 9	28	Output 8
10	Input 10	29	Output 9
11	Input 11	30	Output 10
12	Input 12	31	Output 11
13	Not connected	32	Output 12
14	+24 V	33	Shield
15	+24 V	34	+24 V
16	Not connected	35	+24 V
17	Common	36	Common
18	Common	37	Common
19	Watchdog contact A		

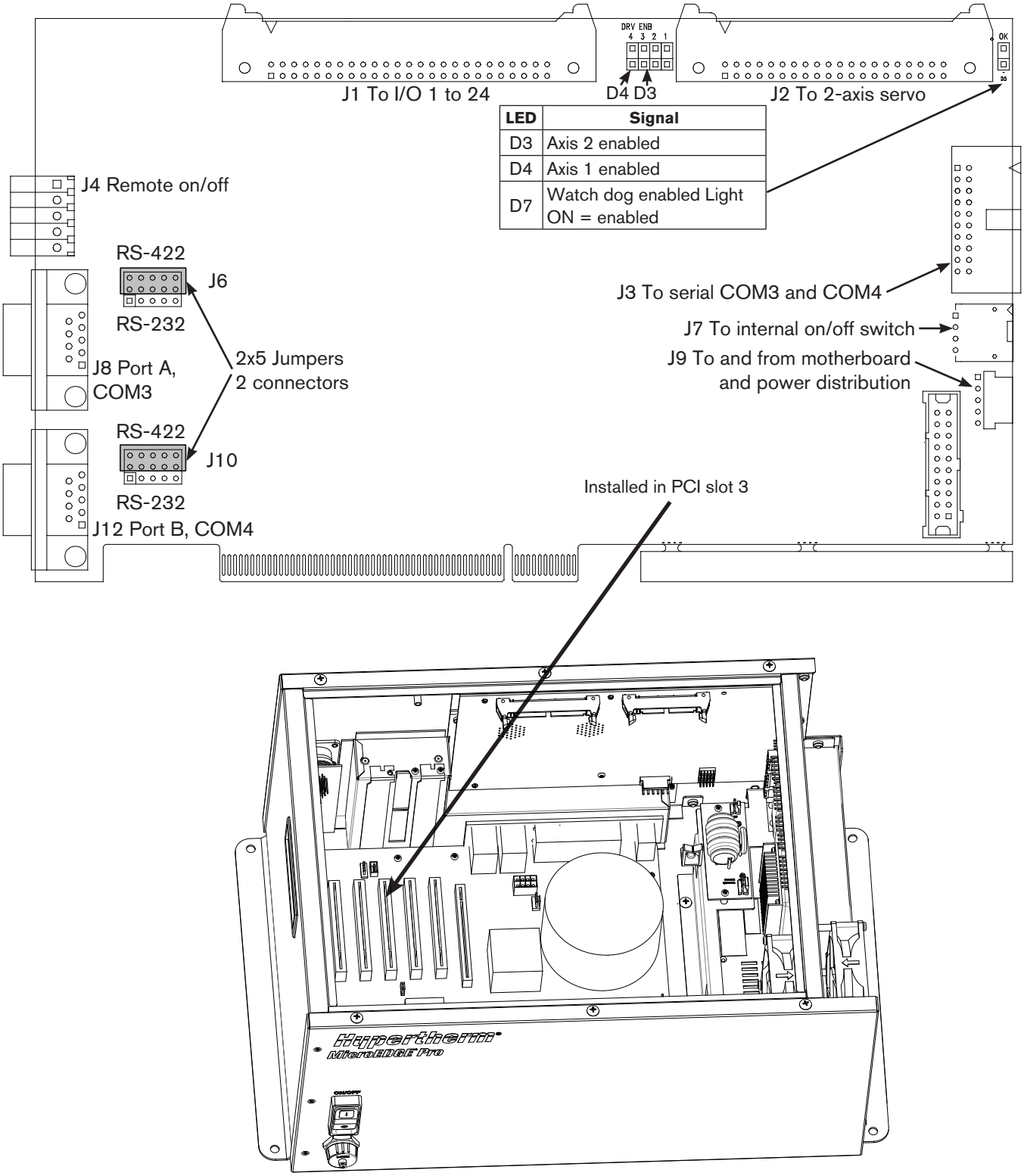
Connector J11 (To power distribution board)	
Pin no.	**Signal**
1	Field ground
2	+24 V
3	+5 V
4	-12 V
5	+12 V
6	Field ground

Connector J12 (Jumper for 5 V encoders sourced)	
Pin no.	**Signal**
1	+Ve
2	+5 Vf
3	+Va
4	+12 Vf
5	-Va
6	-12 Vf
7	+24 V
8	+24 Vf
9	/Axis watchdog
10	/Axis watchdog hdr

Connector J13 (Jumper for 12 V encoders sourced)	
Pin no.	**Signal**
1	+Ve
2	+12 Vf
3	+Va
4	+12 Vf
5	-Va
6	-12 Vf
7	+24 V
8	+24 Vf
9	/Axis watchdog
10	/Axis watchdog hdr

Connector J14 (Jumper for external encoder voltage)	
Pin no.	**Signal**
1	+Ve
2	Not connected
3	+Va
4	Not connected
5	-Va
6	Not connected
7	+24 V
8	Not connected
9	/Axis watchdog
10	/Axis watchdog hdr

Picopath 2-axis MCC, utility, and serial isolation board (141256)



Connector J1 (I/O 1 – 12)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Input 1	26	Not connected
2	Output 1	27	Not connected
3	Input 2	28	Not connected
4	Output 2	29	Not connected
5	Input 3	30	Not connected
6	Output 3	31	Not connected
7	Input 4	32	Not connected
8	Output 4	33	Not connected
9	Input 5	34	Not connected
10	Output 5	35	Not connected
11	Input 6	36	Not connected
12	Output 6	37	Not connected
13	Input 7	38	Not connected
14	Output 7	39	Not connected
15	Input 8	40	Not connected
16	Output 8	41	Not connected
17	Input 9	42	Not connected
18	Output 9	43	Not connected
19	Input 10	44	Not connected
20	Output 10	45	Not connected
21	Input 11	46	Not connected
22	Output 11	47	Not connected
23	Input 12	48	Not connected
24	Output 12	49	/HyPath ID
25	Not connected	50	Ground

Connector J2 (2-axis servo)			
Pin no.	**Signal**	**Pin no.**	**Signal**
1	/Axis 1 enable	21	Not connected
2	/Axis 2 enable	22	Not connected
3	Not connected	23	Not connected
4	Not connected	24	Not connected
5	Not connected	25	Not connected
6	Not connected	26	Logic ground
7	/Watchdog enable	27	Logic ground
8	Axis 1A	28	Analog common
9	Axis 1B	29	Axis 1 analog out
10	Axis 1Z	30	Axis 2 analog out
11	Axis 2A	31	Not connected
12	Axis 2B	32	Not connected
13	Axis 2Z	33	Not connected
14	Not connected	34	Not connected
15	Not connected	35	Logic ground out
16	Not connected	36	Logic +5 V
17	Not connected	37	Logic +5 V
18	Not connected	38	Logic +12 V
19	Not connected	39	Logic -12 V
20	Not connected	40	Logic ground

Connector J3 (To Serial COM3 and COM4)	
Pin no.	**Signal**
1	Ground
2	DR_A
3	/RXD_INA
4	TS_A
5	TXD_OUTA
6	TS_A
7	DR_A
8	Ground
9	Ground
10	Not connected
11	Ground
12	DR_B
13	/RXD_INB
14	TS_B
15	TXD_OUTB
16	TS_B
17	DR_B
18	Ground
19	Ground
20	Not connected

Connector J4 (Remote on/off)	
Pin no.	**Signal**
1	Remote on/off +
2	Remote on/off -
3	Common
4	12 V
5	Shield

Connector J7 (To front panel on/off switch)	
Pin no.	**Signal**
1	Ground
2	12 V
3	Motherboard on/off 2
4	Motherboard on/off 1

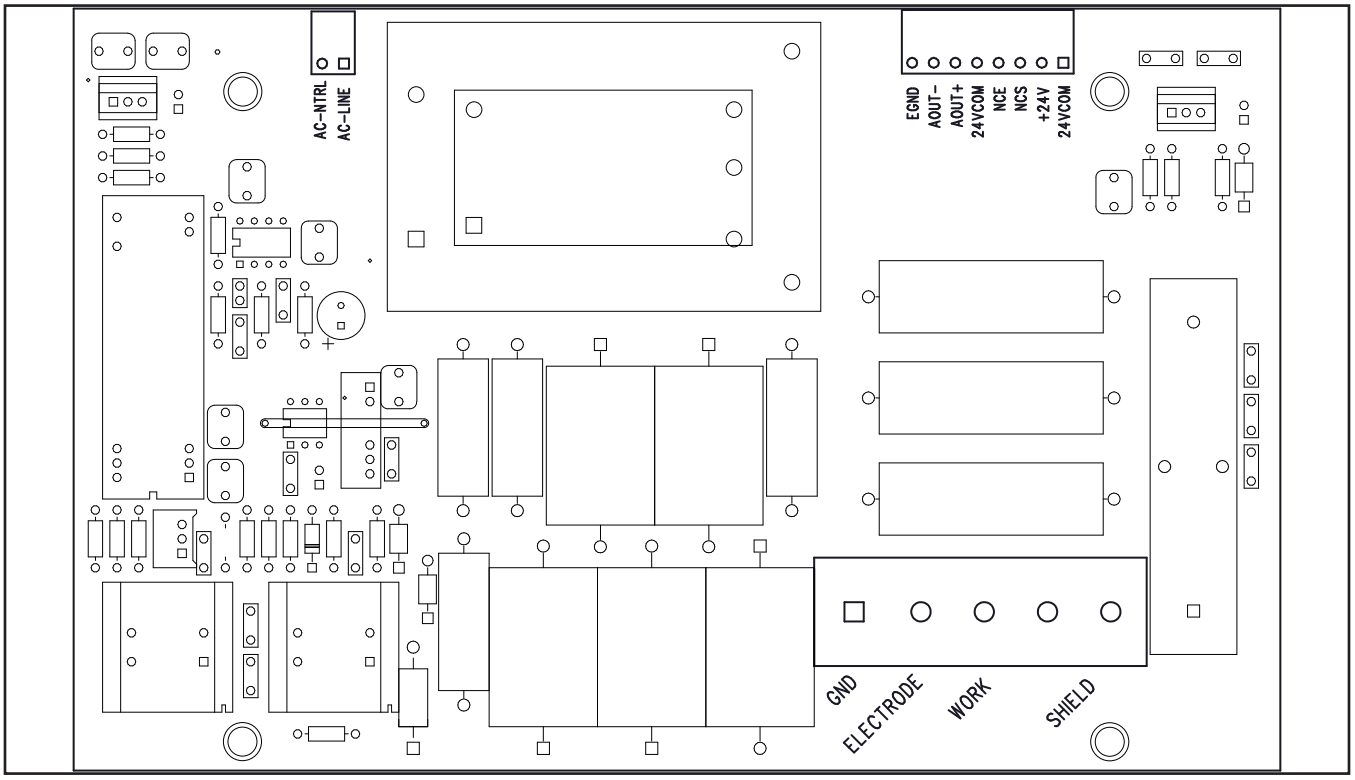
Connector J8 (Serial port A, COM3)	
Pin no.	**Signal**
1	Not connected
2	Transmit A-
3	Receive A-
4	Transmit A+
5	Signal ground 1
6	Not connected
7	Receive A+
8	Not connected
9	Not connected

Connector J9 (To and from Motherboard and power distribution)	
Pin no.	**Signal**
1	Field power
2	Not connected
3	Ground
4	Motherboard on/off 2
5	Motherboard on/off 1

Connector J12 (Serial port B, COM4)	
Pin no.	**Signal**
1	Not connected
2	Transmit B-
3	Receive B-
4	Transmit B+
5	Signal ground 2
6	Not connected
7	Receive B+
8	Not connected
9	Not connected

VDC for integrated Sensor THC (141201)

If your cutting system includes an integrated Sensor THC, you must install 1 of these VDC boards in each plasma system in your cutting system.



VDC3 board

Pin number	Signal	Pin number	Signal
J1 – AC power inlet		**J3 – Torch connection**	
1	120 VAC line	1*	EMI chassis ground
2	120 VAC neutral	2	Electrode
J2 – THC I/O		3	Work
1	24 VDC common (out)	4	No connection
2	+24 VDC (out)	5	Torch tip shield
3	Nozzle contact sense (output)		
4	Nozzle contact enable (input)		
5	24 VDC common (out)		
6	+ Analog out		
7	- Analog out (analog common)		
8	EMI chassis ground (cable shield)		

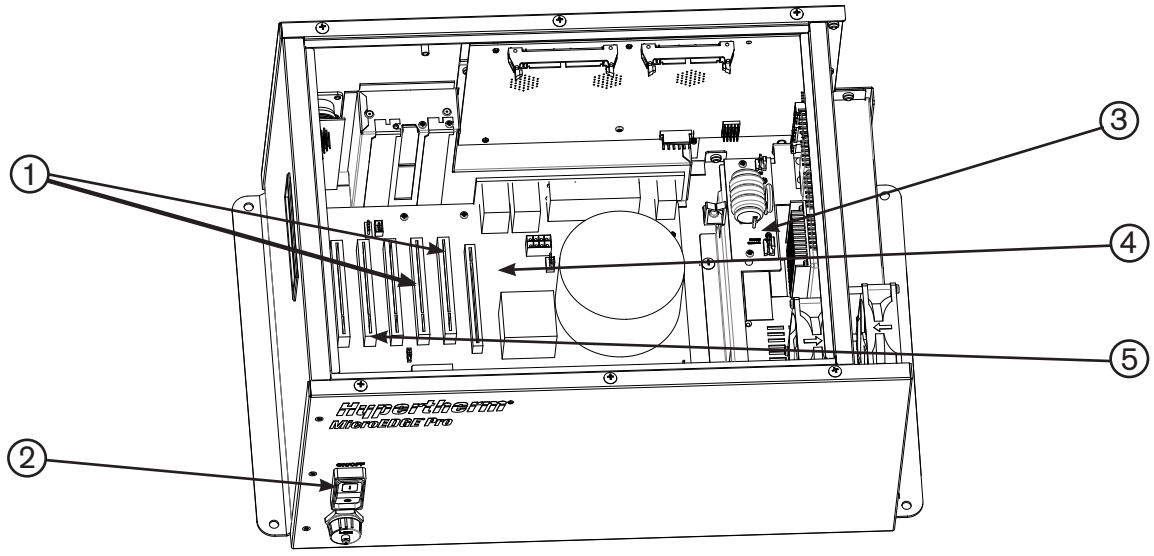
* This pin is not connected under normal conditions. If your cutting system has excess noise with this configuration, connect the pin to an adjacent metal chassis.

Section 5

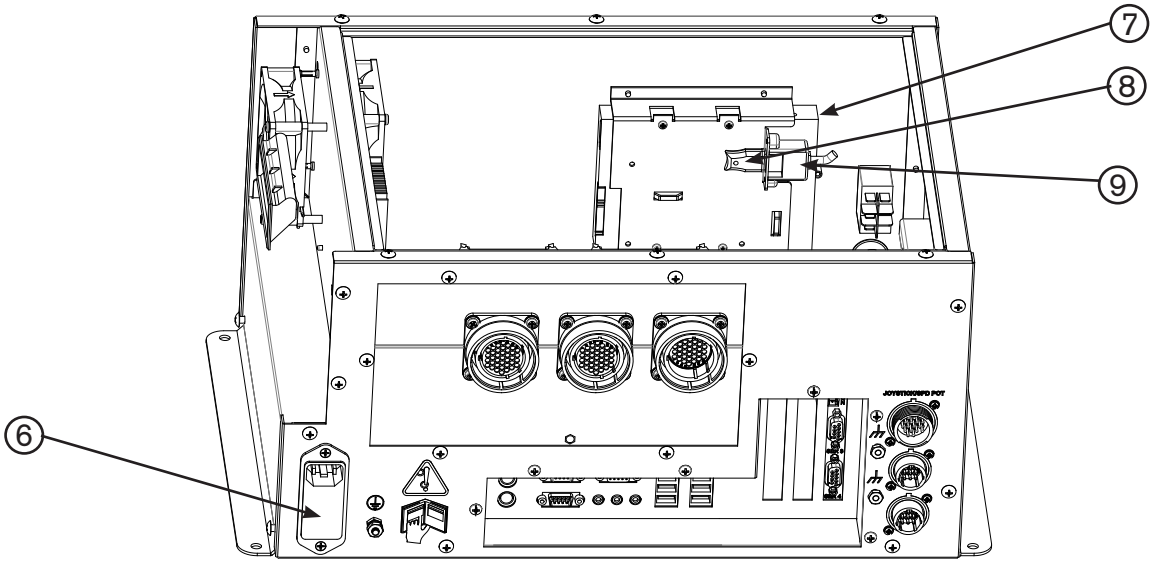
PARTS LIST

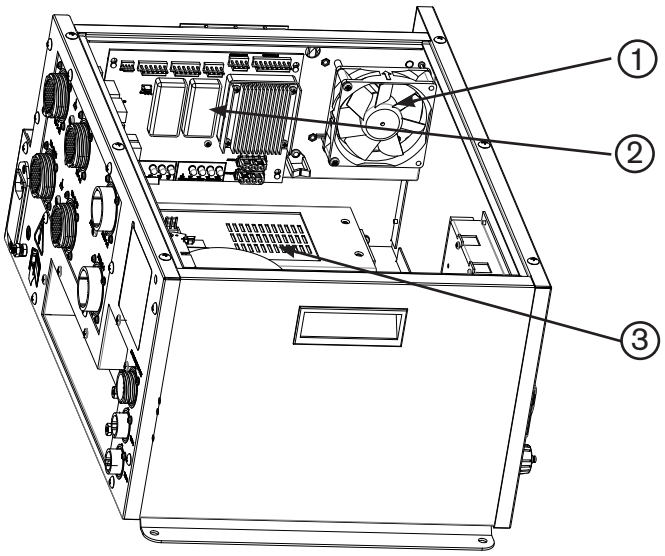
In this section:

Common MicroEDGE Pro parts

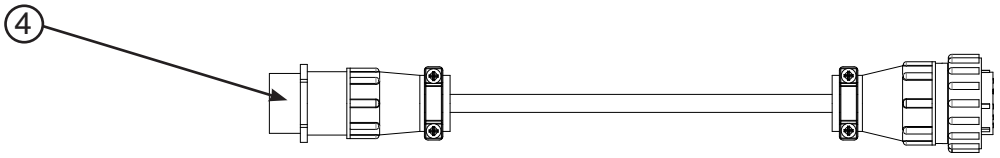


Item	Part No.	Description	Qty.
1	228836	Kit: Wireless card and extension cable (141223)	1
2	228825	Kit: Power switch	1
3	228812	Kit: 230 V surge board (141134)	1
4	228820	Kit: Mother board (141110)	1
5	228822	Kit: Analog board (141125)	1
6	228824	Kit: AC input module	1
7	228814	Kit: Hard drive, 250 GB, SATA	1
8	228813	Kit: Hasp hardware key	1
9	228823	Kit: USB cable, external panel mount, and internal HASP	1

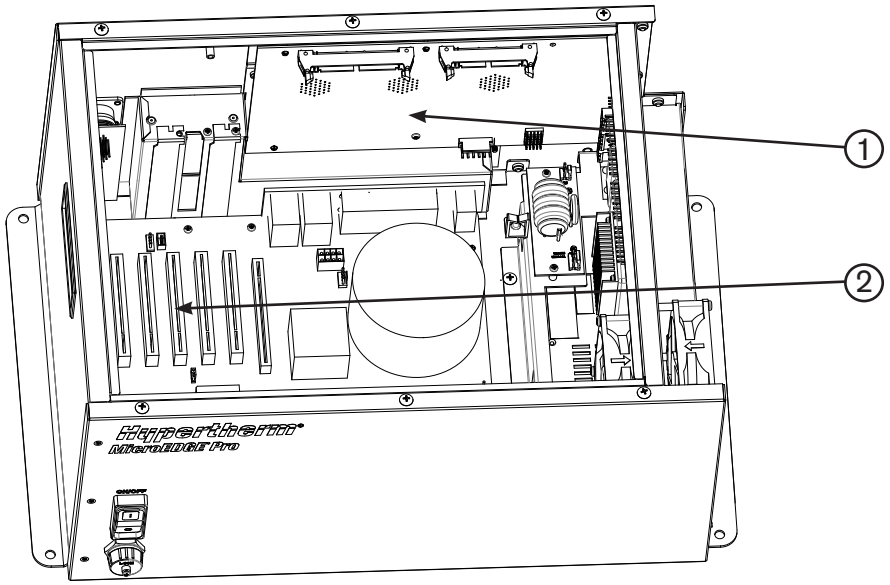




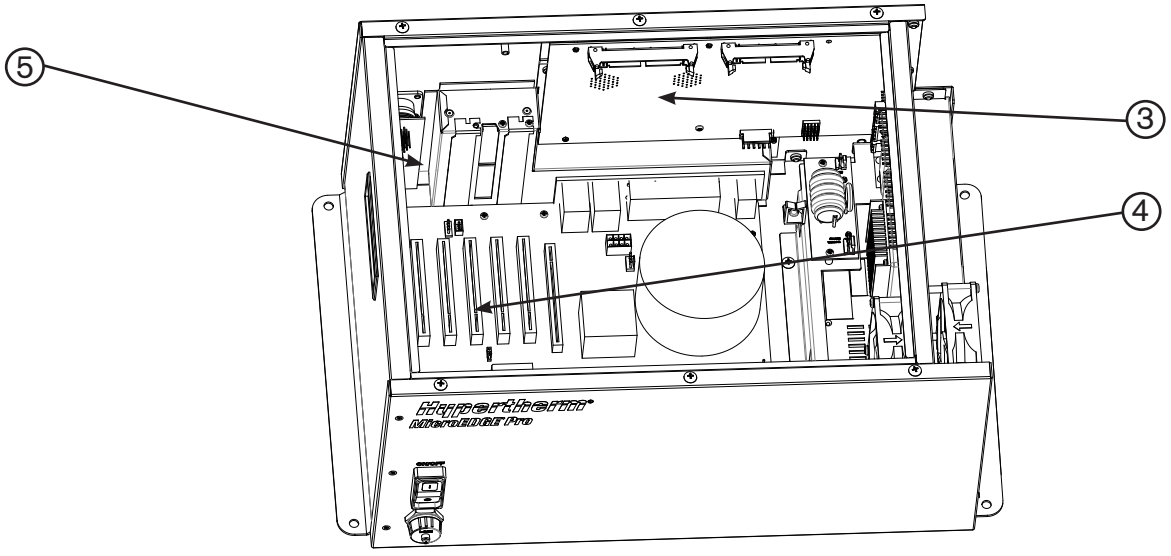
Item	Part No.	Description	Qty.
1	228826	Kit: Sub chassis fan, 12 V, internal or external (229417)	1
2	228815	Kit: Power distribution PCB (141153)	1
3	228827	Kit: ATX 1U 400 W power supply (229403)	1
4	223252	Kit: MicroEDGE adapter cable	1
	108834	Connector: Remote on/off connector (not shown)	1



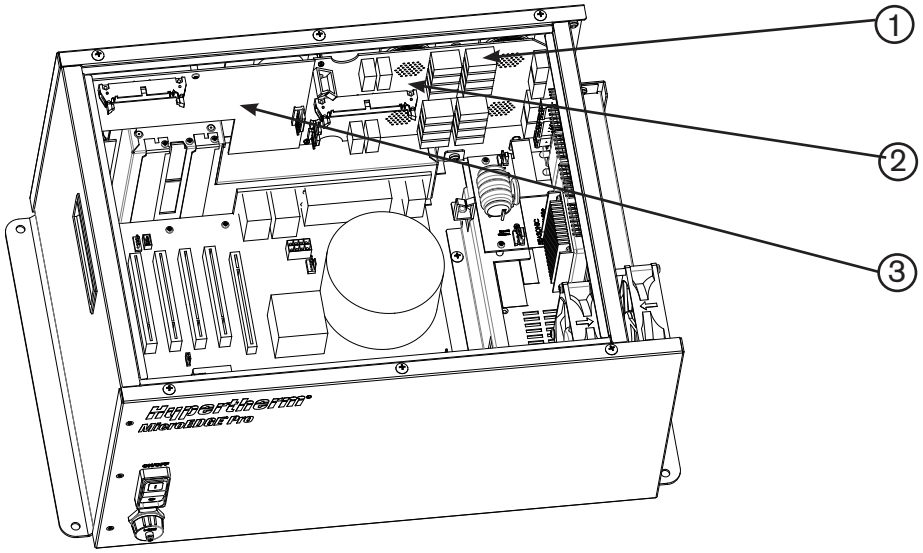
Picopath MicroEDGE Pro parts



Item	Part No.	Description	Qty.
1	228834	Kit: Picopath 4-Axis servo, 5 V encoder PCB (141122)	1
2	228817	Kit: 4-axis MCC, serial isolation, and utility PCB (141222)	1
3	228839	Kit: Picopath 2-axis servo, 5 V encoder PCB (141254)	1
4	228838	Kit: Picopath 2-axis MCC, serial isolation, and utility PCB (141256)	1
5	228847	Kit: CPC analog breakout PCB (141210)	1

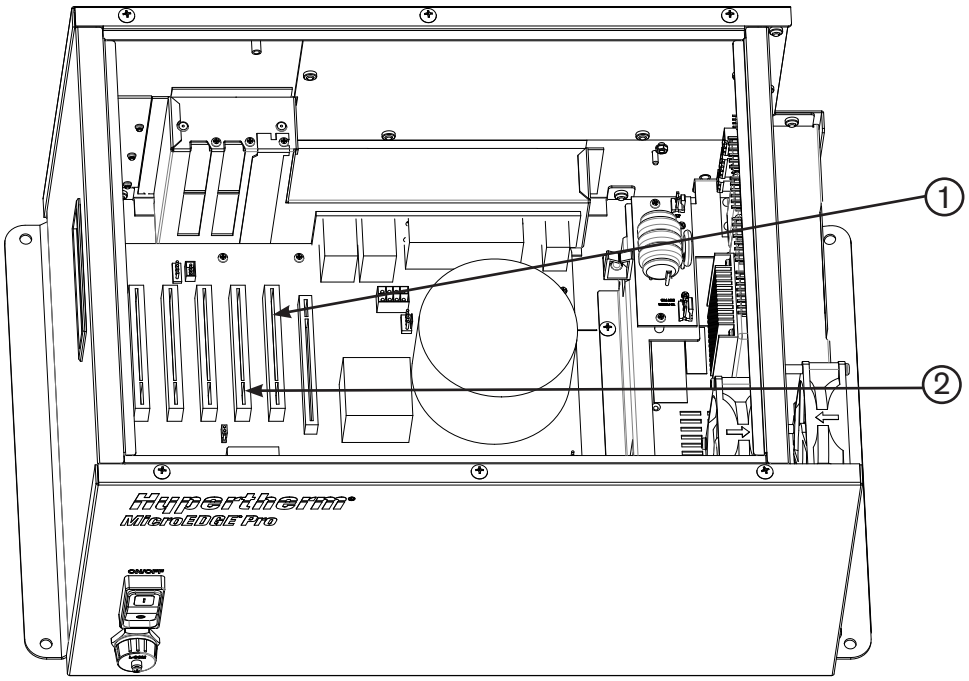


HyPath MicroEDGE Pro parts



Item	Part No.	Description	Qty.
1	003179	Relay contact	1
2	228819	Kit: 24 I/O PCB (141070)	1
3	228818	Kit: HyPath 4-axis servo board (141197)	1

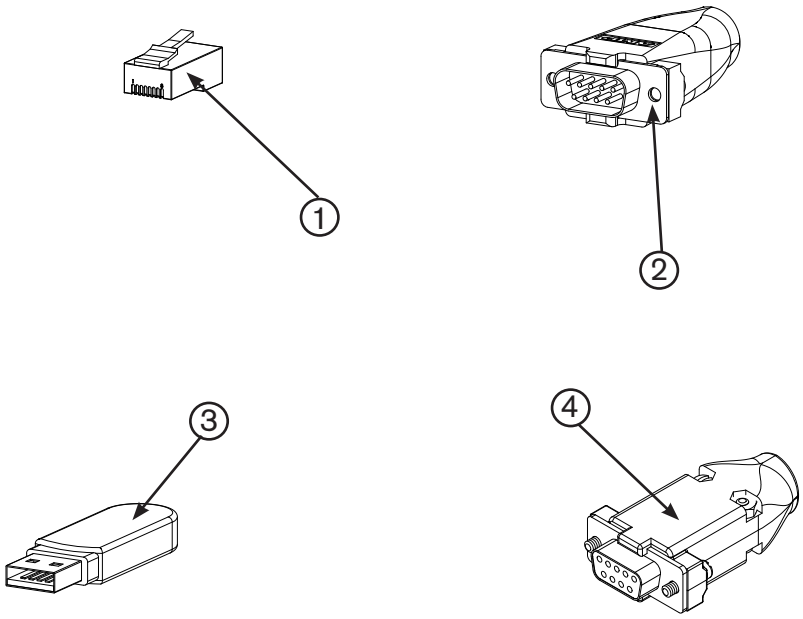
SERCOS II and SERCOS III MicroEDGE Pro parts



Item	Part No.	Description	Qty.
1	228816	Kit: Serial isolation and utility PCB (SERCOS II and SERCOS III) (141194/141307)	1
2	228821	Kit: SERCOS II PCI master (SERCOS II configuration only) (141116)	1
	428072	Kit: SERCOS III PCI master (SERCOS III configuration only) (141310)	1

Common test plugs

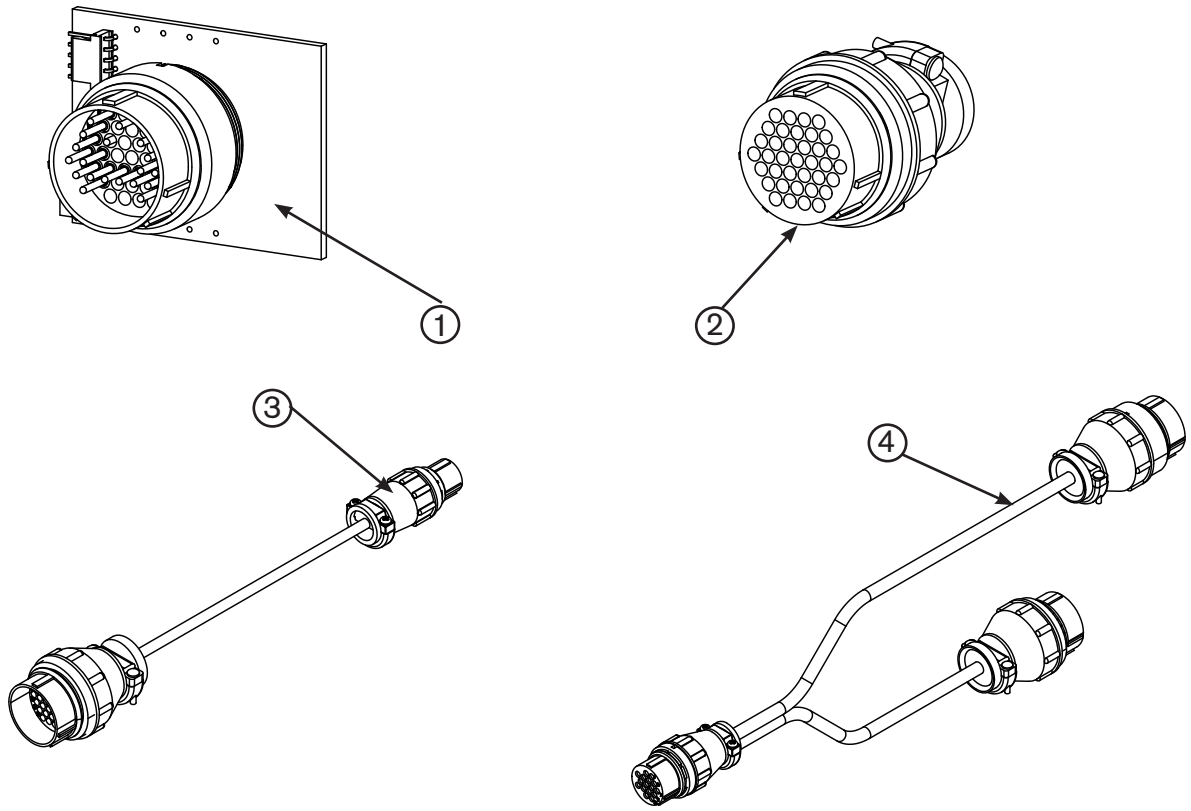
The following testers are used for diagnostic testing on all models of the MicroEDGE Pro CNC.



Item	Part No.	Description
	228831	**Tester kit: Common plugs**
1		Tester for Hypernet or network
2		Tester for RS-422 serial port on the serial isolation boards
3		Tester for USB
4		Tester for RS-232 serial port on the motherboard

Picopath test plugs

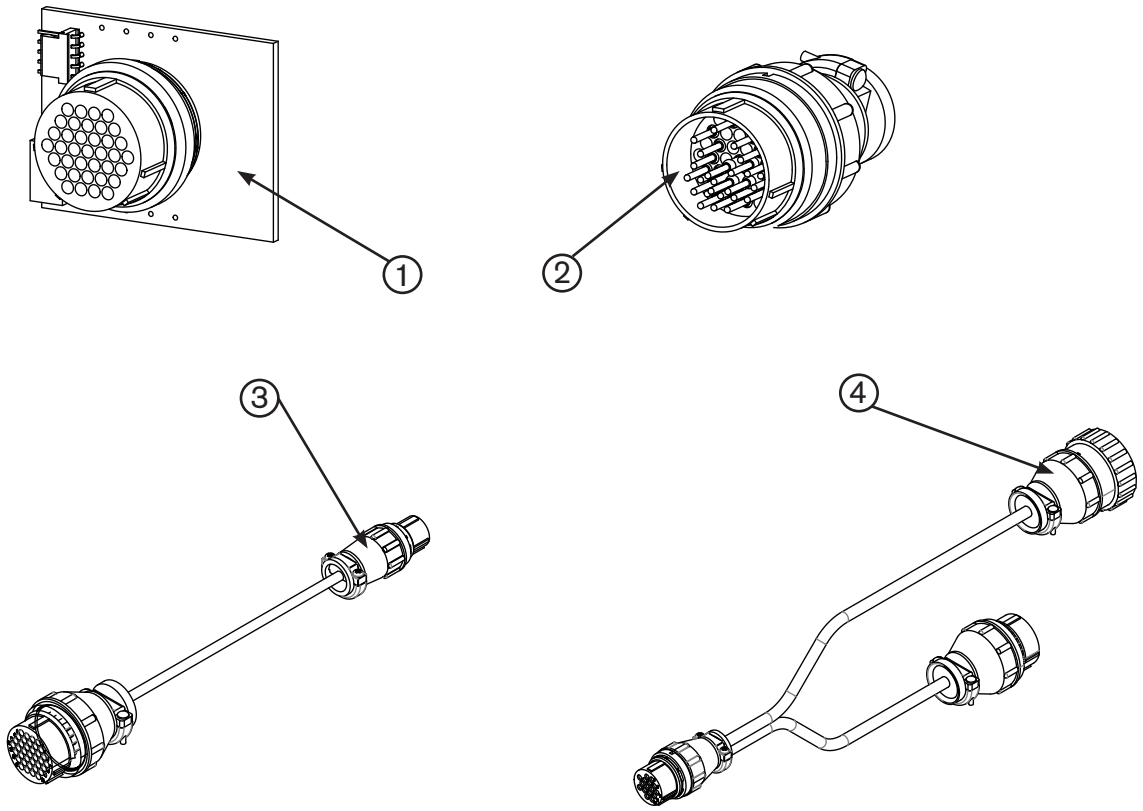
The following testers are used for diagnostic testing on Picopath models of the MicroEDGE Pro CNC.



Item	Part No.	Description
	228833	**Tester kit: Picopath plugs**
1		Tester for Picopath axes
2		Tester for Picopath I/O (white stripe)
		Tester for Picopath I/O (orange stripe)
3		Tester for THC (Picopath)
4		Tester for Picopath joystick and speedpot (brown stripe)

HyPath test plugs

The following testers are used for diagnostic testing on HyPath models of the MicroEDGE Pro CNC.



Item	Part No.	Description
	228832	**Tester kit: HyPath plugs**
1		Tester for HyPath axes
2		Tester for HyPath I/O (green stripe)
		Tester for HyPath I/O (red stripe)
3		Tester for THC (HyPath)
4		Tester for HyPath joystick and speedpot (purple stripe)

Cable connector kits

The following table lists the part numbers for cable connector kits that can be ordered from Hypertherm to create cables for the MicroEDGE Pro.

Part No.	Description	Qty
228492	Connector kit: HyPath I/O	1
228491	Connector kit: HyPath 4-axis servo connector	1
228490	Connector kit: Picopath I/O	1
228489	Connector kit: Picopath drive/encoder	1
228495	Connector kit: THC	1
228837	Connector kit: Joystick and speedpot	1

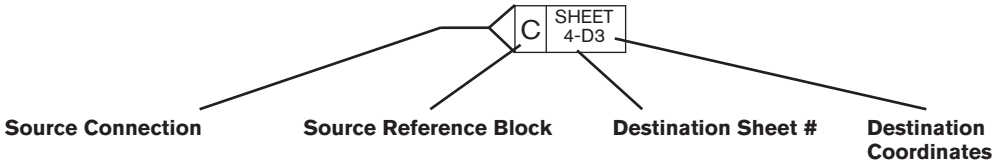
Section 6

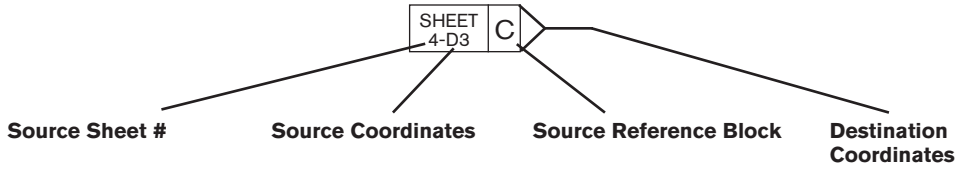
WIRING DIAGRAMS

Introduction

This section contains the wiring diagrams for the system. When tracing a signal path or referencing with the *Parts List* or **Troubleshooting** sections, please be aware of the following format to assist you in understanding the wiring diagrams' organization:

- Sheet numbers are located in the lower right-hand corner.
- Page-to-page referencing is done in the following manner:

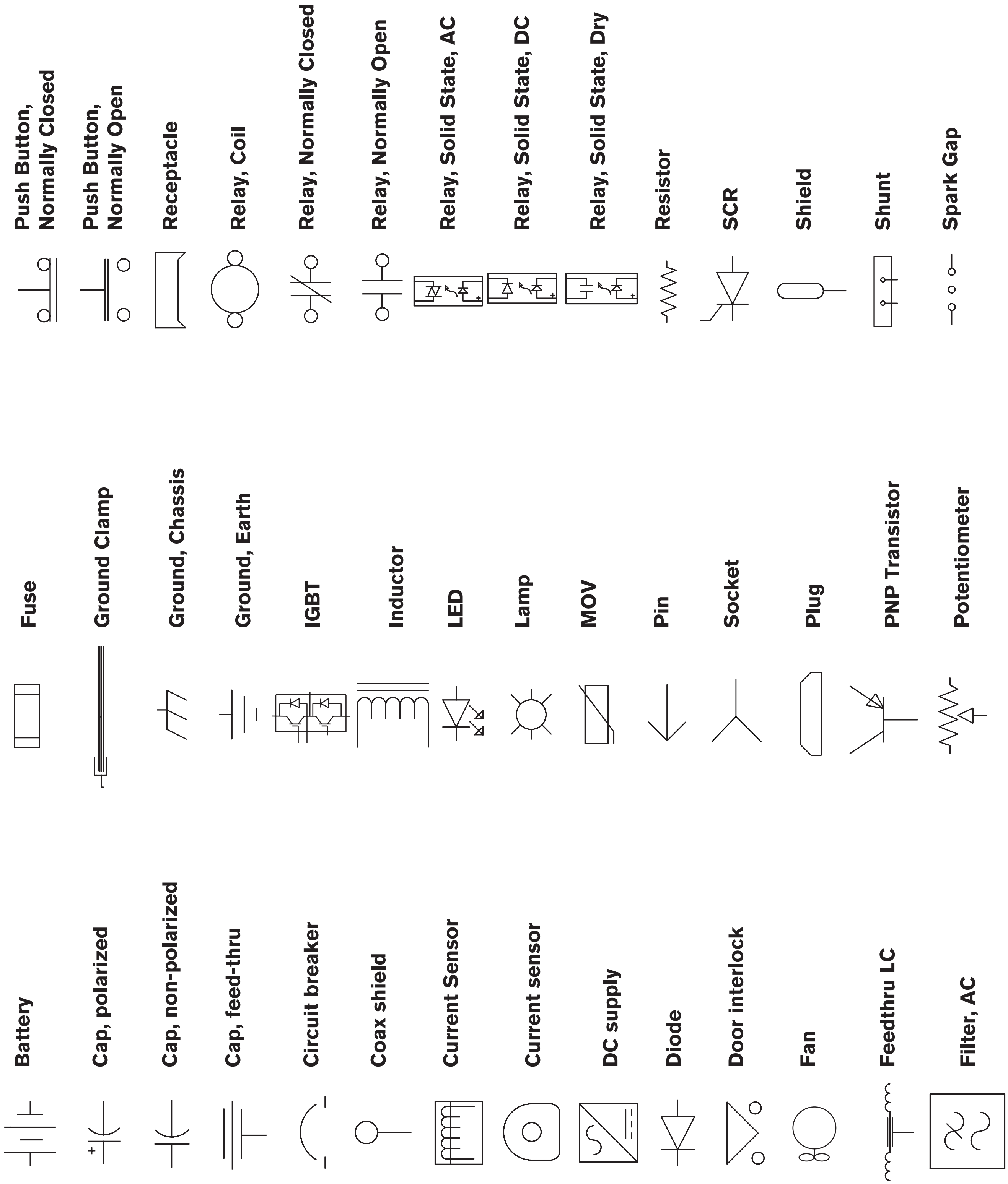




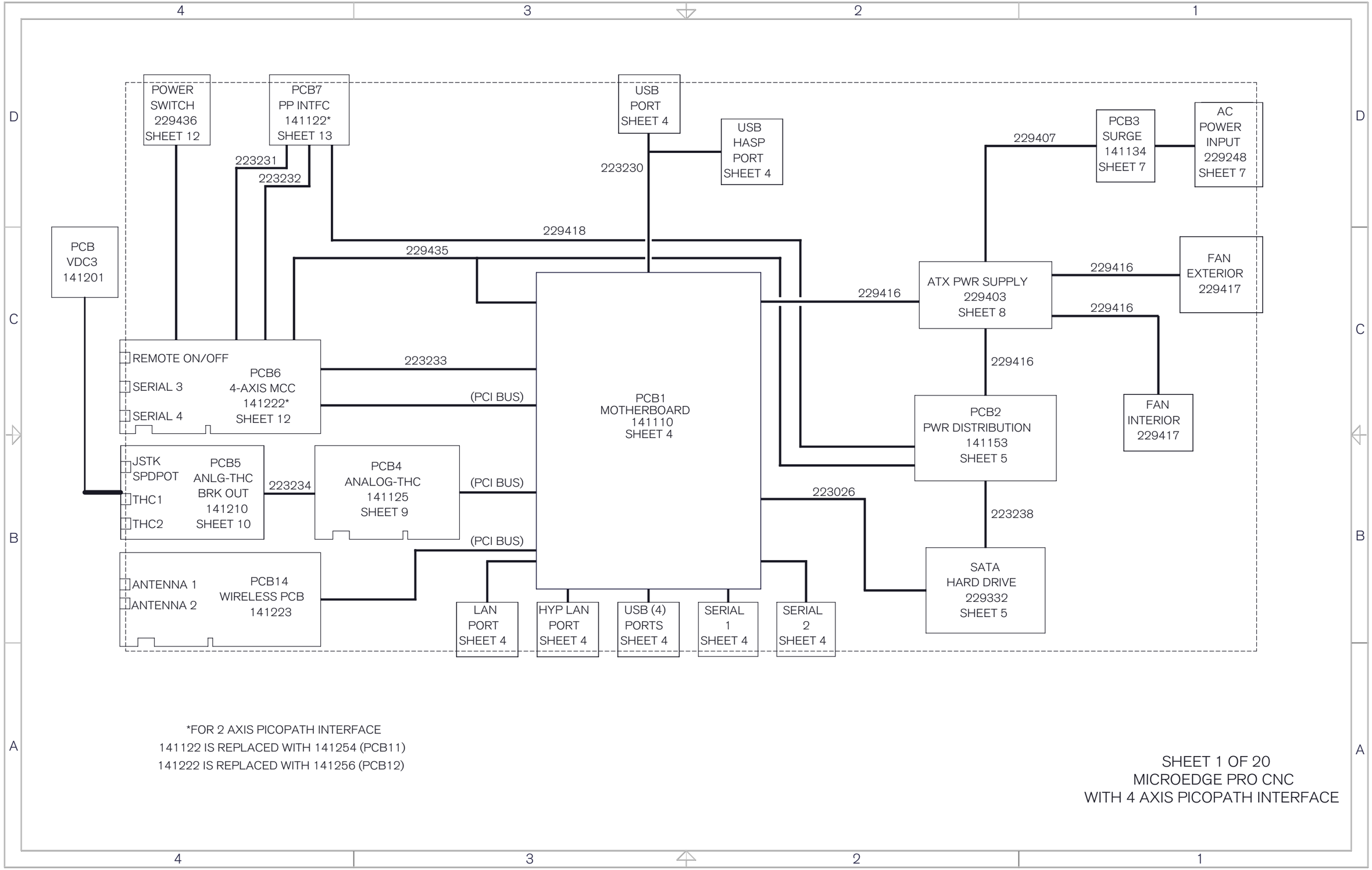
Destination and **Source Coordinates** refer to letters A–D on the Y-axis of each sheet and numbers 1–4 on the X-axis of each sheet. Lining up the coordinates will bring you to the source or destination blocks (similar to a road map).

Wiring diagram symbols

Wiring diagram symbols and their identification precede the system wiring diagrams in this section.


Battery
Cap, polarized
Cap, non-polarized
Cap, feed-thru
Circuit breaker
Coax shield
Current Sensor
Current sensor
DC supply
Diode
Door interlock
Fan
Feedthru LC
Filter, AC
Fuse
Ground Clamp
Ground, Chassis
Ground, Earth
IGBT
Inductor
LED
Lamp
MOV
Pin
Socket
Plug
PNP Transistor
Potentiometer
Push Button, Normally Closed
Push Button, Normally Open
Receptacle
Relay, Coil
Relay, Normally Closed
Relay, Normally Open
Relay, Solid State, AC
Relay, Solid State, DC
Relay, Solid State, Dry
Resistor
SCR
Shield
Shunt
Spark Gap

Switch, Flow
Switch, Level, Normally Closed
Switch, Pressure, Normally Closed
Switch, Pressure, Normally Open
Switch, 1 Pole, 1 Throw
Switch, 1 Pole, 2 Throw
Switch, 1 Pole, 1 Throw, Center Off
Switch, Temperature, Normally Closed
Switch, Temperature, Normally Open
Terminal Block
3
2
1
Time Delay Closed, NC/Off
Time Delay Open, NO/Off
Time Delay Open, NC/On
Time Delay Closed, NO/Off
Transformer
Transformer, Air Core
Transformer Coil
Triac
VAC Source
Valve, Solenoid
Voltage Source
Zener Diode
Torch Symbols
Electrode
Nozzle
Shield
Torch
Torch, HyDefinition™



*FOR 2 AXIS PICOPATH INTERFACE
141122 IS REPLACED WITH 141254 (PCB11)
141222 IS REPLACED WITH 141256 (PCB12)

SHEET 1 OF 20
MICROEDGE PRO CNC
WITH 4 AXIS PICOPATH INTERFACE

POWER SWITCH 229436 SHEET 12

PCB9 HP SERVO 141197 SHEET 15

PCB8 HP I/O 141070 SHEET 14

USB PORT SHEET 4

USB HASP PORT SHEET 4

223231

223232

223230

229420

229421

229418

229435

229407

PCB3 SURGE 141134 SHEET 7

AC POWER INPUT 229248 SHEET 7

PCB VDC3 141201

229416

ATX PWR SUPPLY 229403 SHEET 8

229416

FAN EXTERIOR 229417

229416

REMOTE ON/OFF

SERIAL 3

SERIAL 4

PCB6 4-AXIS MCC 141222 SHEET 12

223233

(PCI BUS)

PCB1 MOTHERBOARD 141110 SHEET 4

229416

PCB2 PWR DISTRIBUTION 141153 SHEET 5

FAN INTERIOR 229417

JSTK

SPDPOT

THC1

THC2

PCB5 ANLG-THC BRK OUT 141210 SHEET 10

223234

PCB4 ANALOG-THC 141125 SHEET 9

(PCI BUS)

223026

223238

(PCI BUS)

ANTENNA 1

ANTENNA 2

PCB14 WIRELESS PCB 141223

SATA HARD DRIVE 229332 SHEET 5

LAN PORT SHEET 4

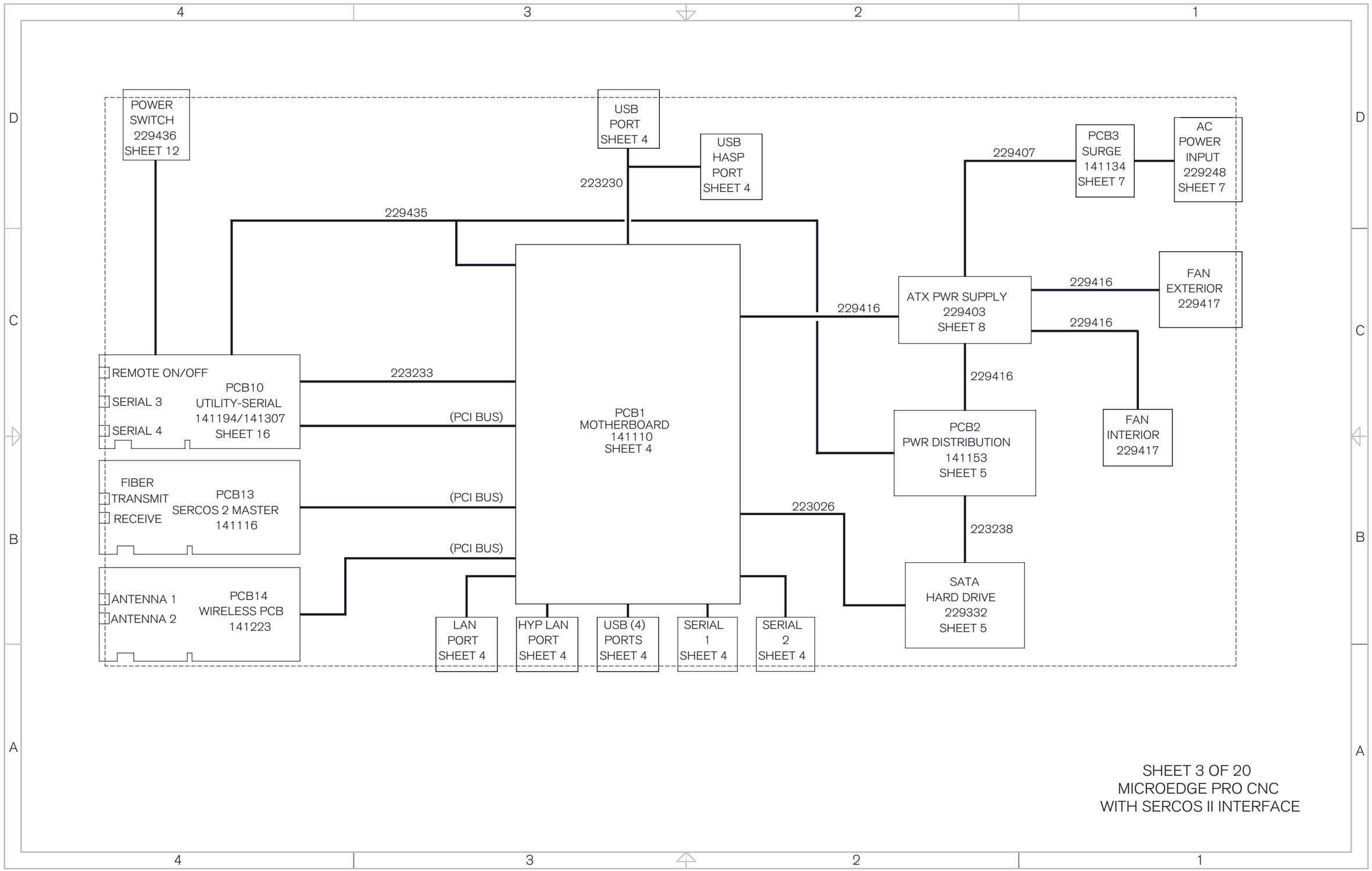
HYP LAN PORT SHEET 4

USB (4) PORTS SHEET 4

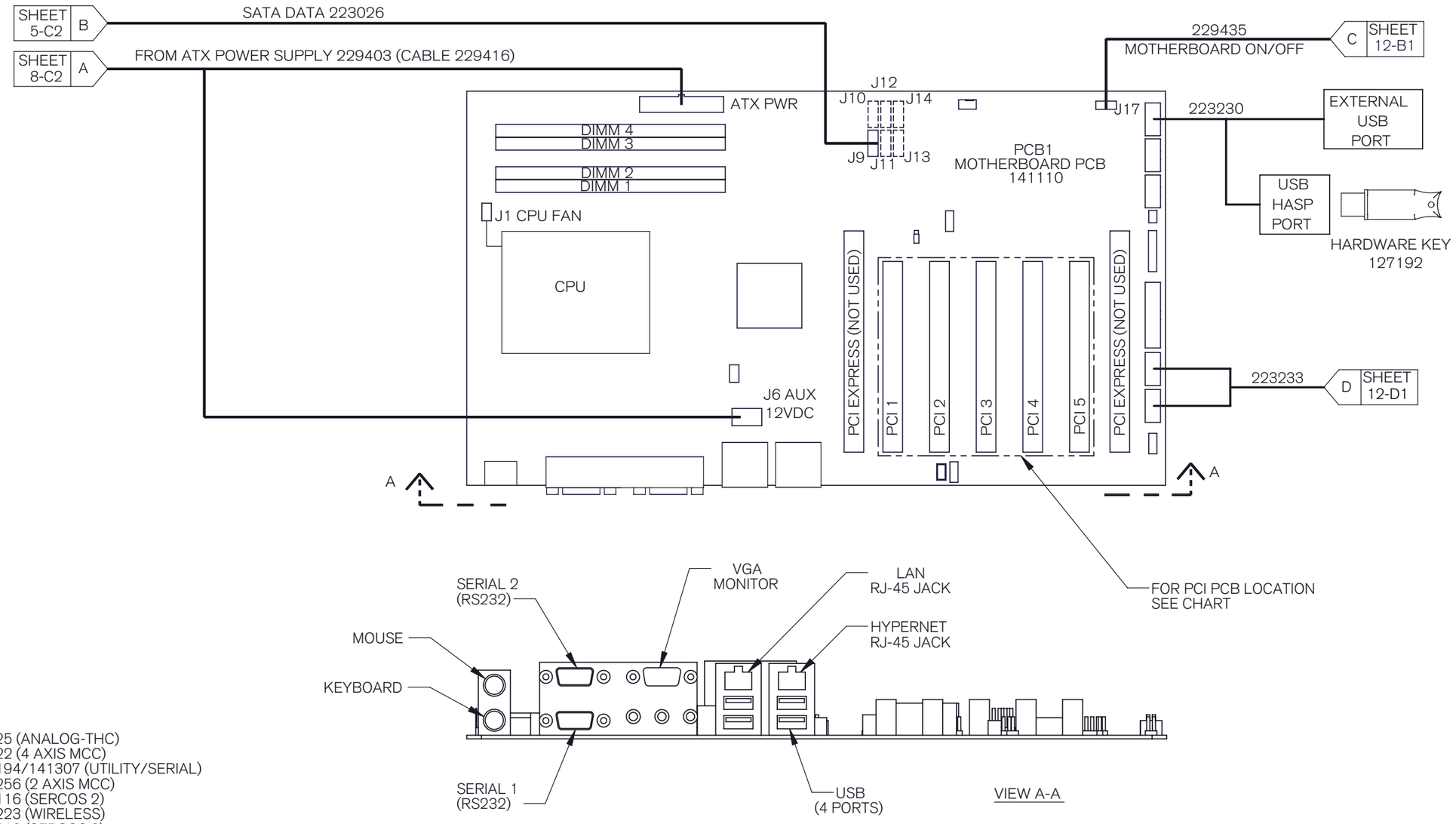
SERIAL 1 SHEET 4

SERIAL 2 SHEET 4

SHEET 2 OF 20
MICROEDGE PRO CNC
WITH HYPATH INTERFACE



SHEET 3 OF 20
MICROEDGE PRO CNC
WITH SERCOS II INTERFACE



PCB4= 141125 (ANALOG-THC)
PCB6= 141222 (4 AXIS MCC)
PCB10= 141194/141307 (UTILITY/SERIAL)
PCB12= 141256 (2 AXIS MCC)
PCB13= 141116 (SERCOS 2)
PCB14= 141223 (WIRELESS)
PCB15= 141310 (SERCOS 3)

CNC TYPE						
PCI SLOT	PICOPATH	PICOPATH W/ THC	HYPATH	HYPATH W/ THC	SERCOS 2	SERCOS 3
PCI 1	NOT USED	NOT USED	NOT USED	NOT USED	PCB10	PCB10
PCI 2	PCB14	PCB14	PCB14	PCB14	PCB13	PCB15
PCI 3	PCB6 or PCB12	PCB6 or PCB12	PCB6 or PCB12	PCB6 or PCB12	PCB14	PCB14
PCI 4	NOT USED	PCB4	NOT USED	PCB4	NOT USED	NOT USED
PCI 5	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED

SHEET 4 OF 20
MOTHERBOARD PCB

SEE SHEET 6 FOR HYPATH, PICOPATH
SERCOS HAS NO CONNECTIONS HERE

FIELD PWR
TO BACK DOOR INTERFACE

CLEAN PWR
TO BACK DOOR INTERFACE

229416 ATX PWR SUPPLY → D SHEET 8-C2

J2: 1 +5V, 2 +12V, 3 +12V, 4 +12V, 5 -12V, 6 GROUND, 7 GROUND, 8 GROUND
RED, YEL, YEL, YEL, BLU, BLK, BLK, BLK

J1: 1 +5V, 2 -12V, 3 +12V, 4 GROUND
J6: 1 +5V, 2 -12V, 3 +12V, 4 GROUND

J4: 1 GROUND FLD, 2 +24V FLD, 3 +5V FLD, 4 -12V FLD, 5 +12V FLD, 6 GROUND FLD
J5: 1 GROUND FLD, 2 +24V FLD, 3 +5V FLD, 4 -12V FLD, 5 +12V FLD, 6 GROUND FLD

J3: 1 +24V, 2 FAN XLOCK 2, 3 FAN XLOCK 1, 4 GROUND

J7: 1 FAN DISABLE, 2 /FLD PWR GD, 3 GROUND
BLU, YEL, BLK

SHEET 12-B1 → P

223026
SATA DATA → B SHEET 4-D2

PCB2
POWER DISTRIBUTION PCB
(WITH INTEGRATED FIELD POWER SUPPLIES)
141153

J11: 1 +12V, 2 GROUND, 3 GROUND, 4 +5V
RED, BLK, BLK, YEL

SATA HARD
DRIVE
(PROGRAMMED)
229332

223238
SATA POWER

ATX DC PWR

D6 AC
D8 EXT. FAN
D9 -12V
D10 +12V
D11 +5V

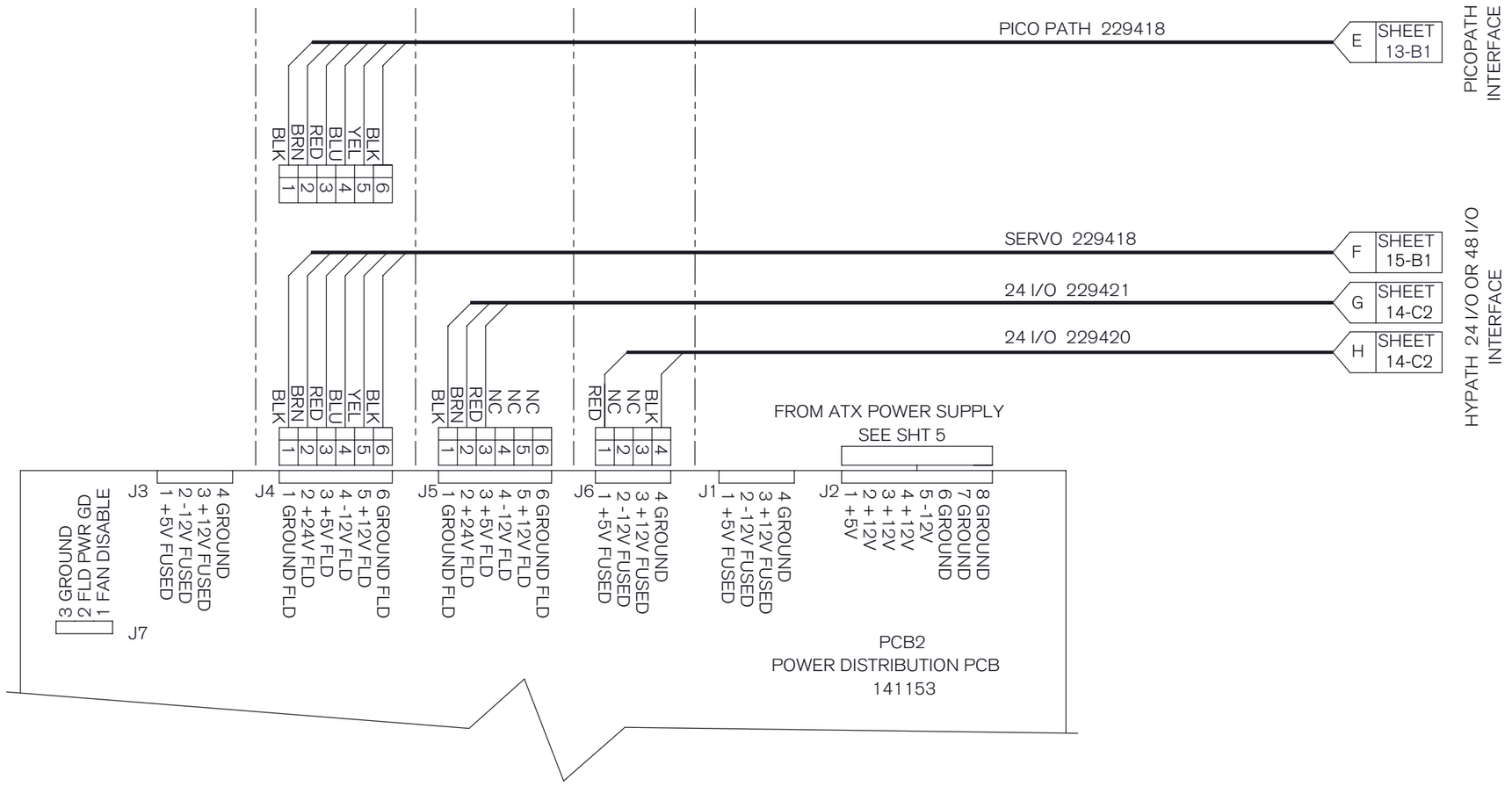
FIELD DC PWR

D12 +24V FLD
D13 -12V FLD
D14 +12V FLD
D15 +5V FLD

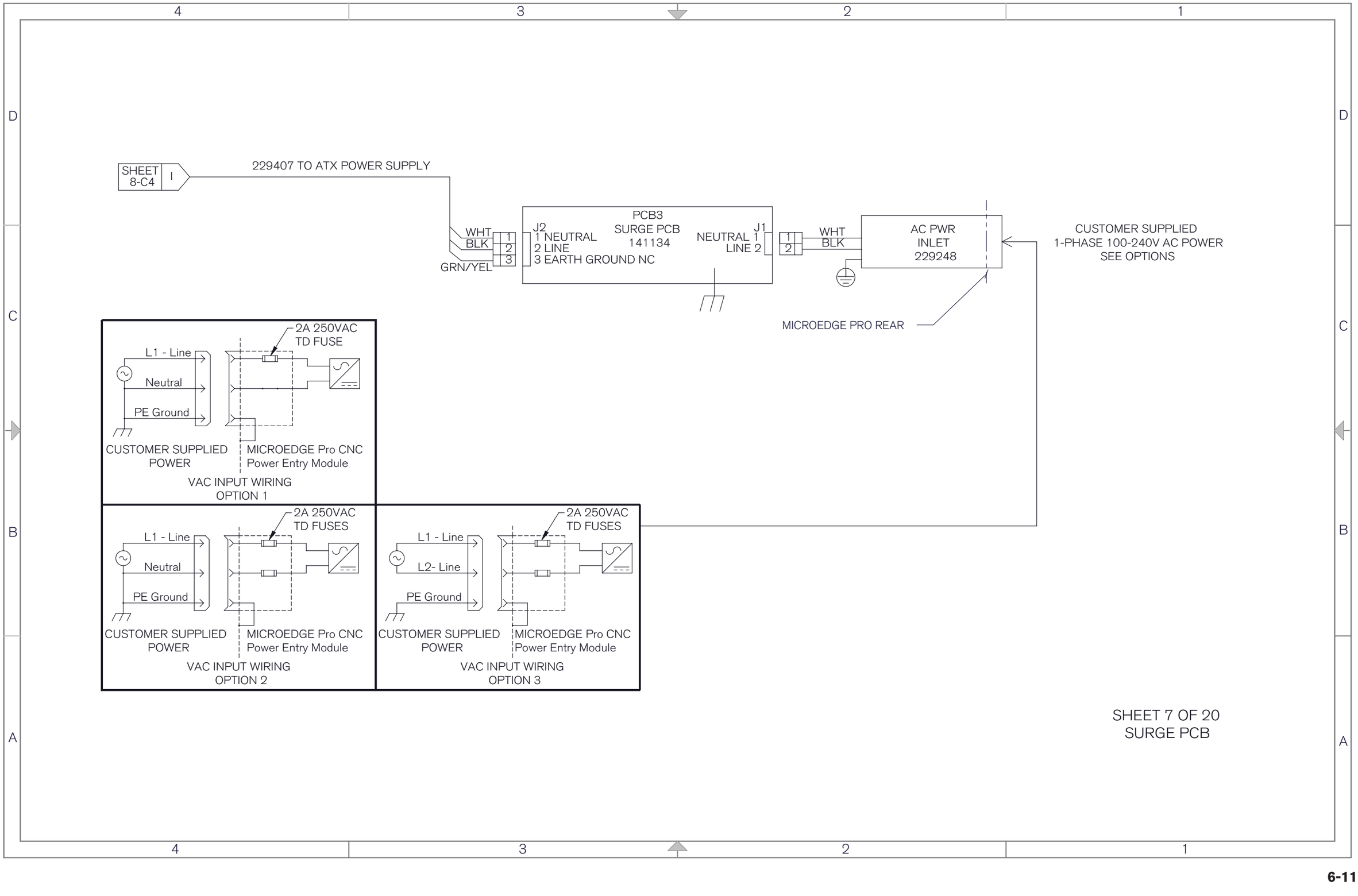
J8: 1 EARTH GROUND, 2 NEUTRAL/L2, 3 LINE/L1
J9: 1 EARTH GROUND, 2, 3 NEUTRAL/L2, 4 LINE/L1
J10: 1 NEUTRAL/L2, 2 LINE/L1

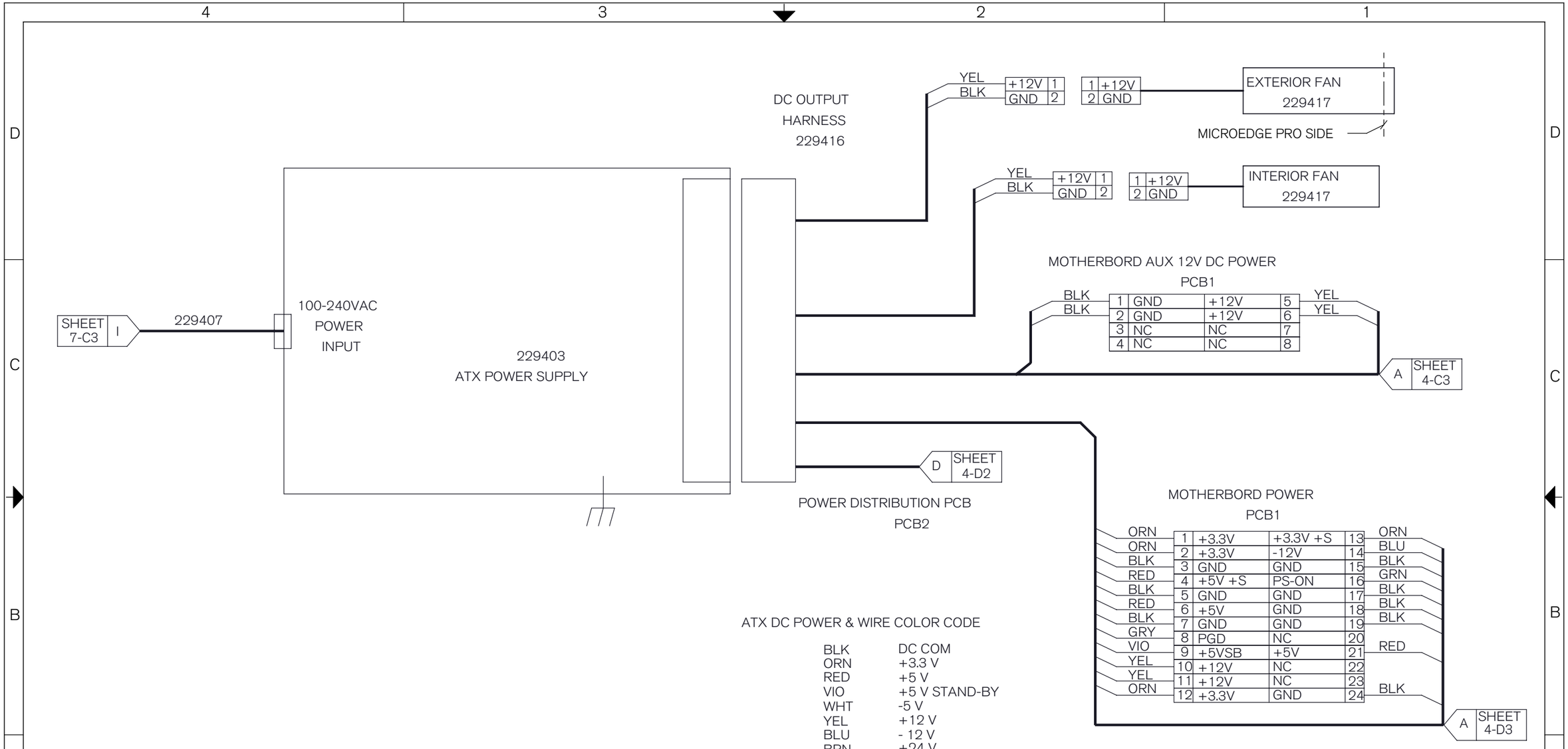
J12: 1 +12V, 2 GROUND, 3 GROUND, 4 +5V

SHEET 5 OF 20
POWER DISTRIBUTION PCB



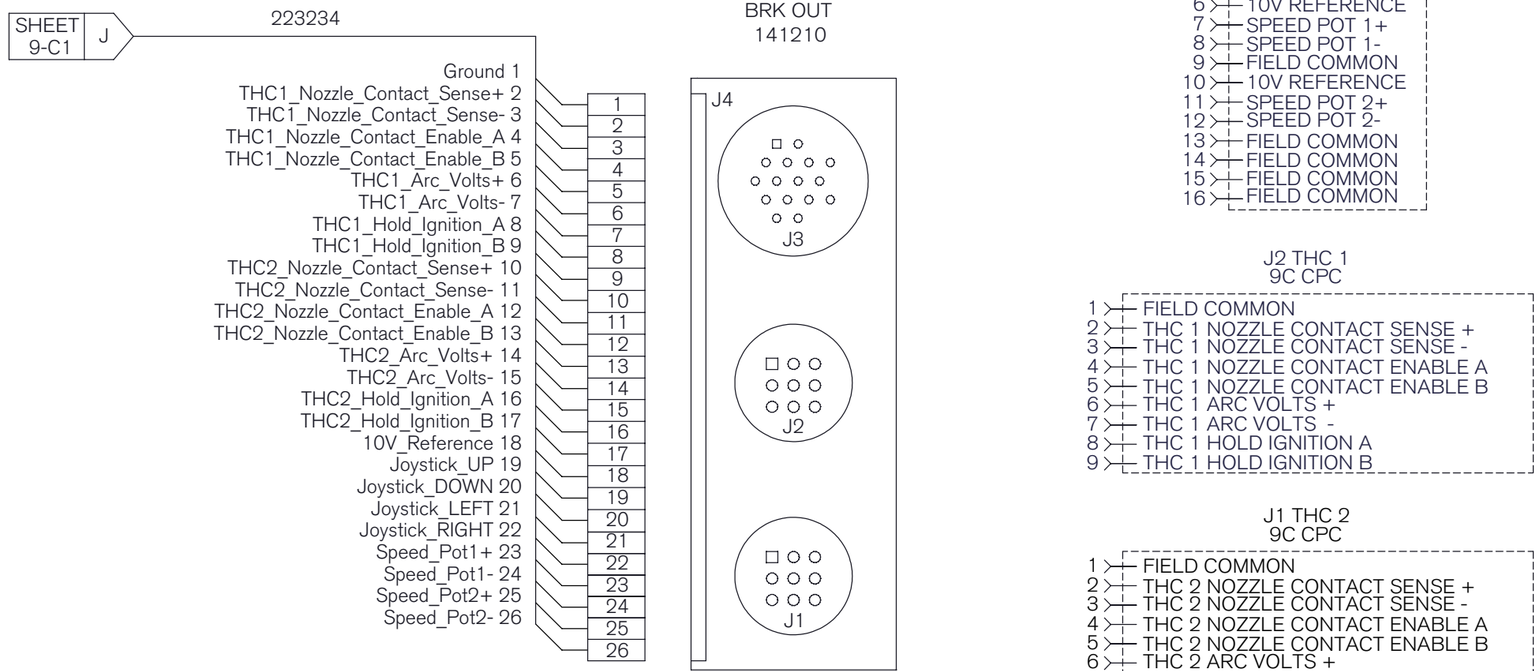
SHEET 6 OF 20
POWER DISTRIBUTION PCB


4
3
2
1
D
C
B
A
SHEET 8-C4
I
229407 TO ATX POWER SUPPLY
WHT
BLK
GRN/YEL
1
2
3
J2
1 NEUTRAL
2 LINE
3 EARTH GROUND NC
PCB3
SURGE PCB
141134
J1
NEUTRAL 1
LINE 2
1
2
WHT
BLK
AC PWR
INLET
229248
CUSTOMER SUPPLIED
1-PHASE 100-240V AC POWER
SEE OPTIONS
MICROEDGE PRO REAR
2A 250VAC
TD FUSE
L1 - Line
Neutral
PE Ground
CUSTOMER SUPPLIED
POWER
MICROEDGE Pro CNC
Power Entry Module
VAC INPUT WIRING
OPTION 1
2A 250VAC
TD FUSES
L1 - Line
Neutral
PE Ground
CUSTOMER SUPPLIED
POWER
MICROEDGE Pro CNC
Power Entry Module
VAC INPUT WIRING
OPTION 2
2A 250VAC
TD FUSES
L1 - Line
L2- Line
PE Ground
CUSTOMER SUPPLIED
POWER
MICROEDGE Pro CNC
Power Entry Module
VAC INPUT WIRING
OPTION 3
SHEET 7 OF 20
SURGE PCB

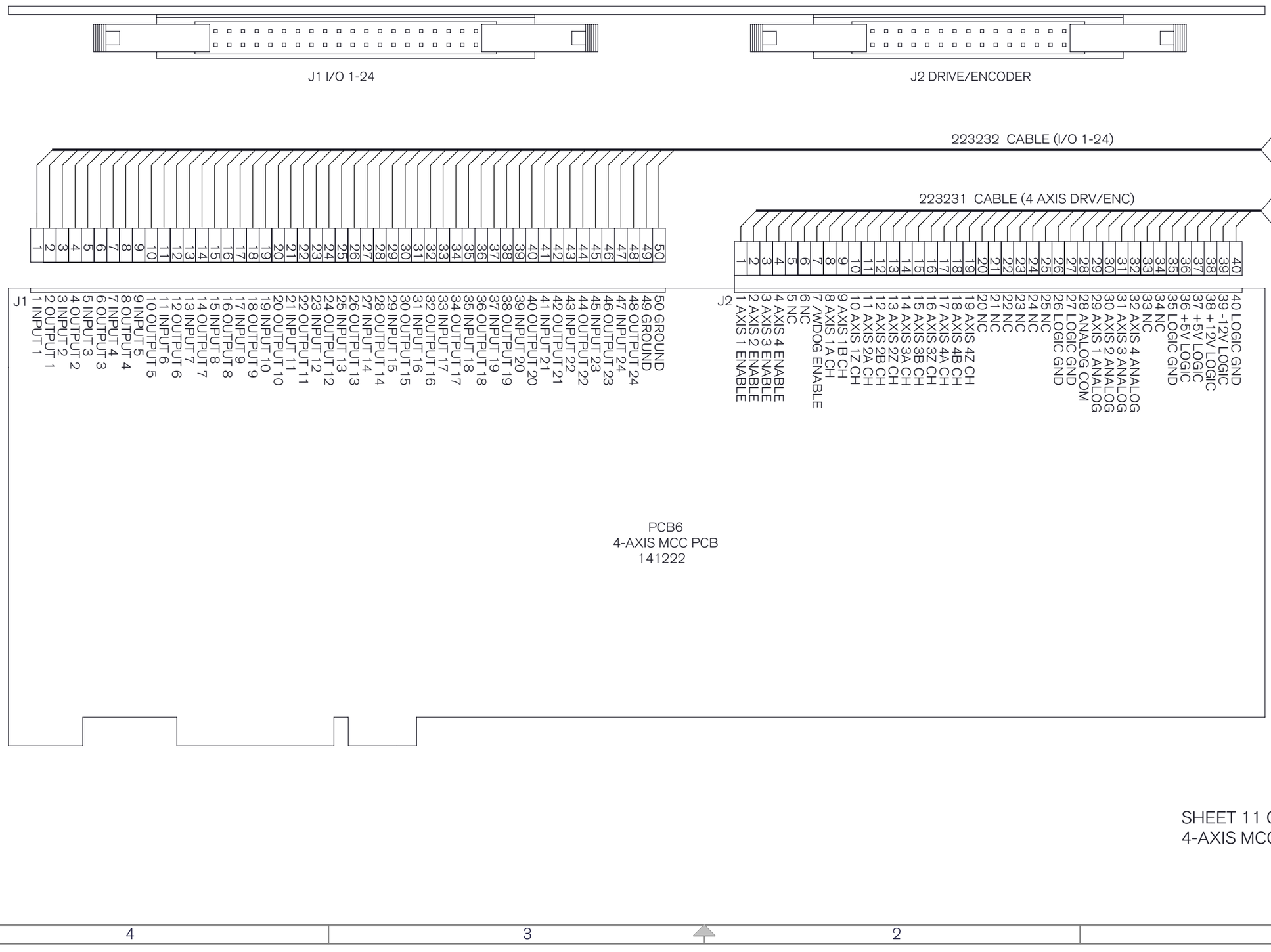


SHEET 8 OF 20
ATX POWER SUPPLY

NOT USED
J1
J2
J3
J4
J5
PCB4
ANALOG-THC PCB
141125
Ground 1
THC1_Nozzle_Contact_Sense+ 2
THC1_Nozzle_Contact_Sense- 3
THC1_Nozzle_Contact_Enable_A 4
THC1_Nozzle_Contact_Enable_B 5
THC1_Arc_Volts+ 6
THC1_Arc_Volts- 7
THC1_Hold_Ignition_A 8
THC1_Hold_Ignition_B 9
THC2_Nozzle_Contact_Sense+ 10
THC2_Nozzle_Contact_Sense- 11
THC2_Nozzle_Contact_Enable_A 12
THC2_Nozzle_Contact_Enable_B 13
THC2_Arc_Volts+ 14
THC2_Arc_Volts- 15
THC2_Hold_Ignition_A 16
THC2_Hold_Ignition_B 17
10V_Reference 18
Joystick_UP 19
Joystick_DOWN 20
Joystick_LEFT 21
Joystick_RIGHT 22
Speed_Pot1+ 23
Speed_Pot1- 24
Speed_Pot2+ 25
Speed_Pot2- 26
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
223234
J
SHEET
10-C3
SHEET 9 OF 20
ANALOG THC PCB



SHEET 10 OF 20
ANALOG THC BREAK OUT PCB



SHEET 11 OF 20
4-AXIS MCC PCB

SEE SHEET 11

223233

D SHEET 4-C1

J1

J2

J3

GROUND 1 — 1
DR_A 2 — 2
/RXD_INA 3 — 3
TS_A 4 — 4
/TXD_OUTA 5 — 5
TS_A 6 — 6
DR_A 7 — 7
GROUND 8 — 8
GROUND 9 — 9
N/C 10 — 10
GROUND 11 — 11
DR_B 12 — 12
/RXD_INB 13 — 13
TS_B 14 — 14
/TXD_OUTB 15 — 15
TS_B 16 — 16
DR_B 17 — 17
GROUND 18 — 18
GROUND 19 — 19
N/C 20 — 20

J4 REMOTE ON/OFF
5C RECT

1 REMOTE ON/OFF +
2 REMOTE ON/OFF -
3 COMMON
4 +12V
5 CHASSIS/SHLD

J4 (REMOTE ON/OFF)

J8 SERIAL 3
9C DSUB

1 NC
2 TXDA-
3 RXDA-
4 TXDA+
5 GROUND
6 NC
7 RXDA+
8 NC
9 NC

J8 (SERIAL 3)

RS422 J6 RS232

PCB6
4-AXIS MCC PCB
141222

J12 SERIAL 4
9C DSUB

1 NC
2 TXDB-
3 RXDB-
4 TXDB+
5 GROUND
6 NC
7 RXDB+
8 NC
9 NC

J12 (SERIAL 4)

RS422 J10 RS232

MICROEDGE PRO REAR

J7

GROUND 1
+12 V 2
MOTHERBOARD ON/OFF2 3
MOTHERBOARD ON/OFF1 4

1 BLK
2 YEL
3 GRN
4 WHT

POWER SWITCH
229436

J9

FIELD PWR 1
N/C 2
GROUND 3
MOTHERBOARD ON/OFF2 4
MOTHERBOARD ON/OFF1 5

1 YEL
2 BLU
3 BLK
4 GRN
5 WHT

229435

TO POWER DISTRIBUTION PCB — P SHEET 5-C4

TO MOTHERBOARD — C SHEET 4-D1

SHEET 12 OF 20
4-AXIS MCC PCB

223232 CABLE (I/O 1-24)

K SHEET 11-C4

223231 CABLE (4 AXIS DRV/ENC)

L SHEET 11-C2

J5

1	OUTPUT 1
2	OUTPUT 2
3	INPUT 2
4	OUTPUT 2
5	INPUT 3
6	OUTPUT 3
7	INPUT 4
8	OUTPUT 4
9	INPUT 5
10	OUTPUT 5
11	INPUT 6
12	OUTPUT 6
13	INPUT 7
14	OUTPUT 7
15	INPUT 8
16	OUTPUT 8
17	INPUT 9
18	OUTPUT 9
19	INPUT 10
20	OUTPUT 10
21	INPUT 11
22	OUTPUT 11
23	INPUT 12
24	OUTPUT 12
25	NC
26	NC
27	NC
28	NC
29	NC
30	NC
31	NC
32	NC
33	NC
34	NC
35	NC
36	NC
37	NC
38	NC
39	NC
40	NC
41	NC
42	NC
43	NC
44	NC
45	NC
46	NC
47	GROUND
48	NC
49	NC
50	GROUND

J3

1	AXIS 1 ENABLE
2	AXIS 2 ENABLE
3	AXIS 3 ENABLE
4	AXIS 4 ENABLE
5	NC
6	NC
7	/WDOG ENBL
8	AXIS 1A CH
9	AXIS 1B CH
10	AXIS 1Z CH
11	AXIS 2A CH
12	AXIS 2B CH
13	AXIS 2Z CH
14	AXIS 3A CH
15	AXIS 3B CH
16	AXIS 3Z CH
17	AXIS 4A CH
18	AXIS 4B CH
19	AXIS 4Z CH
20	NC
21	NC
22	NC
23	NC
24	NC
25	NC
26	LOGIC GND
27	LOGIC GND
28	ANALOG COM
29	AXIS 1 ANALOG
30	AXIS 2 ANALOG
31	AXIS 3 ANALOG
32	AXIS 4 ANALOG
33	NC
34	NC
35	LOGIC GND
36	+5V LOGIC
37	+5V LOGIC
38	+12V LOGIC
39	-12V LOGIC
40	LOGIC GND

J8 I/O 1-12

1	INPUT 1
2	INPUT 2
3	INPUT 3
4	INPUT 4
5	INPUT 5
6	INPUT 6
7	INPUT 7
8	INPUT 8
9	INPUT 9
10	INPUT 10
11	INPUT 11
12	INPUT 12
13	NC
14	+24VDC
15	+24VDC
16	NC
17	24V COM
18	24V COM
19	WDOG RELAY A
20	WDOG RELAY B
21	OUTPUT 1
22	OUTPUT 2
23	OUTPUT 3
24	OUTPUT 4
25	OUTPUT 5
26	OUTPUT 6
27	OUTPUT 7
28	OUTPUT 8
29	OUTPUT 9
30	OUTPUT 10
31	OUTPUT 11
32	OUTPUT 12
33	SHIELD
34	+24VDC
35	+24VDC
36	24V COM
37	24V COM

J7 AXIS X & Y DRV/ENC

1	ENCODER PWR
2	ENCODER PWR
3	ENC PWR COM
4	ENCODER PWR
5	Y AXIS A CH
6	ENC PWR COM
7	EARTH GND
8	ENC PWR COM
9	X AXIS A CH
10	Y AXIS B CH
11	Y AXIS A\ CH
12	EARTH GND
13	EARTH GND
14	X AXIS A\ CH
15	X AXIS B CH
16	Y AXIS Z CH
17	Y AXIS B\ CH
18	Y ANALOG COM
19	EARTH GND
20	X ANALOG COM
21	X AXIS B\ CH
22	X AXIS Z CH
23	Y AXIS Z\ CH
24	X DRV ENBL IN
25	X DRV ENBL OUT
26	Y DRV ENBL IN
27	Y DRV ENBL OUT
28	X AXIS Z\ CH
29	Y REFERENCE+
30	Y ANALOG COM
31	EARTH GND
32	X ANALOG COM
33	X REFERENCE +
34	X ANALOG V+
35	Y ANALOG V-
36	X ANALOG V-
37	X ANALOG V+

J6 AXIS Z & W DRV/ENC

1	ENCODER PWR
2	ENCODER PWR
3	ENC PWR COM
4	ENCODER PWR
5	W AXIS A CH
6	ENC PWR COM
7	EARTH GND
8	ENC PWR COM
9	Z AXIS A CH
10	W AXIS B CH
11	W AXIS A\ CH
12	EARTH GND
13	EARTH GND
14	Z AXIS A\ CH
15	Z AXIS B CH
16	W AXIS Z CH
17	W AXIS B\ CH
18	W ANALOG COM
19	EARTH GND
20	Z ANALOG COM
21	Z AXIS B\ CH
22	Z AXIS Z CH
23	W AXIS Z\ CH
24	Z DRV ENBL IN
25	Z DRV ENBL OUT
26	W DRV ENBL IN
27	W DRV ENBL OUT
28	Z AXIS Z\ CH
29	W REFERENCE +
30	W ANALOG COM
31	EARTH GND
32	Z ANALOG COM
33	Z REFERENCE +
34	W ANALOG V+
35	W ANALOG V-
36	Z ANALOG V-
37	Z ANALOG V+

PCB7
PICOPATH 4-AXIS INTERFACE PCB
141122

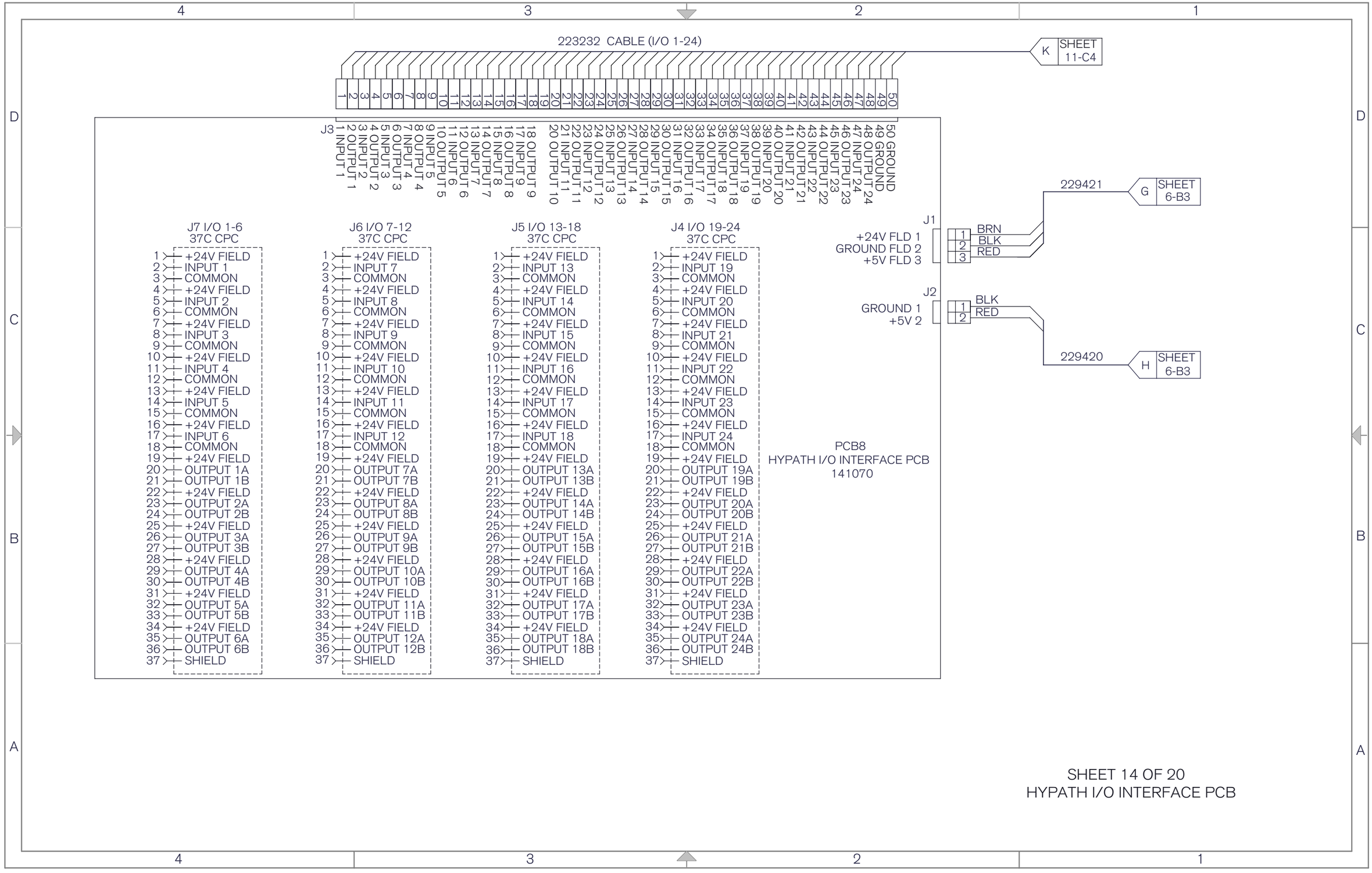
J11

GROUND FLD 1	1	BLK
+24V FLD 2	2	BRN
+5V FLD 3	3	RED
-12V FLD 4	4	BLU
+12V FLD 5	5	YEL
GROUND FLD 6	6	BLK

229418

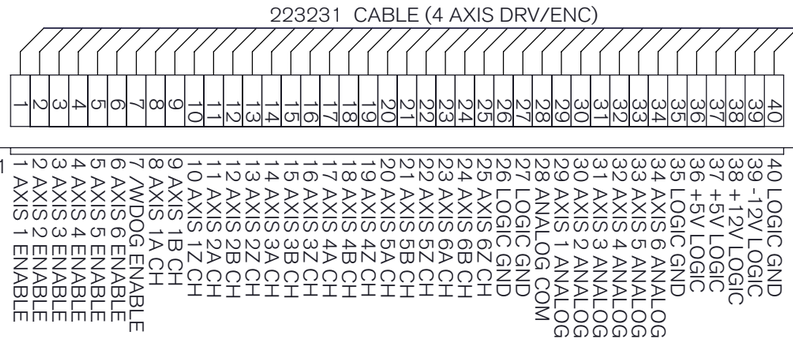
E SHEET 6-C4

SHEET 13 OF 20
PICOPATH 4-AXIS INTERFACE


223232 CABLE (I/O 1-24)
K SHEET 11-C4
J3
1 INPUT 1
2 OUTPUT 1
3 INPUT 2
4 OUTPUT 2
5 INPUT 3
6 OUTPUT 3
7 INPUT 4
8 OUTPUT 4
9 INPUT 5
10 OUTPUT 5
11 INPUT 6
12 OUTPUT 6
13 INPUT 7
14 OUTPUT 7
15 INPUT 8
16 OUTPUT 8
17 INPUT 9
18 OUTPUT 9
19 INPUT 10
20 OUTPUT 10
21 INPUT 11
22 OUTPUT 11
23 INPUT 12
24 OUTPUT 12
25 INPUT 13
26 OUTPUT 13
27 INPUT 14
28 OUTPUT 14
29 INPUT 15
30 OUTPUT 15
31 INPUT 16
32 OUTPUT 16
33 INPUT 17
34 OUTPUT 17
35 INPUT 18
36 OUTPUT 18
37 INPUT 19
38 OUTPUT 19
39 INPUT 20
40 OUTPUT 20
41 INPUT 21
42 OUTPUT 21
43 INPUT 22
44 OUTPUT 22
45 INPUT 23
46 OUTPUT 23
47 INPUT 24
48 OUTPUT 24
49 GROUND
50 GROUND
J7 I/O 1-6
37C CPC
1 +24V FIELD
2 INPUT 1
3 COMMON
4 +24V FIELD
5 INPUT 2
6 COMMON
7 +24V FIELD
8 INPUT 3
9 COMMON
10 +24V FIELD
11 INPUT 4
12 COMMON
13 +24V FIELD
14 INPUT 5
15 COMMON
16 +24V FIELD
17 INPUT 6
18 COMMON
19 +24V FIELD
20 OUTPUT 1A
21 OUTPUT 1B
22 +24V FIELD
23 OUTPUT 2A
24 OUTPUT 2B
25 +24V FIELD
26 OUTPUT 3A
27 OUTPUT 3B
28 +24V FIELD
29 OUTPUT 4A
30 OUTPUT 4B
31 +24V FIELD
32 OUTPUT 5A
33 OUTPUT 5B
34 +24V FIELD
35 OUTPUT 6A
36 OUTPUT 6B
37 SHIELD
J6 I/O 7-12
37C CPC
1 +24V FIELD
2 INPUT 7
3 COMMON
4 +24V FIELD
5 INPUT 8
6 COMMON
7 +24V FIELD
8 INPUT 9
9 COMMON
10 +24V FIELD
11 INPUT 10
12 COMMON
13 +24V FIELD
14 INPUT 11
15 COMMON
16 +24V FIELD
17 INPUT 12
18 COMMON
19 +24V FIELD
20 OUTPUT 7A
21 OUTPUT 7B
22 +24V FIELD
23 OUTPUT 8A
24 OUTPUT 8B
25 +24V FIELD
26 OUTPUT 9A
27 OUTPUT 9B
28 +24V FIELD
29 OUTPUT 10A
30 OUTPUT 10B
31 +24V FIELD
32 OUTPUT 11A
33 OUTPUT 11B
34 +24V FIELD
35 OUTPUT 12A
36 OUTPUT 12B
37 SHIELD
J5 I/O 13-18
37C CPC
1 +24V FIELD
2 INPUT 13
3 COMMON
4 +24V FIELD
5 INPUT 14
6 COMMON
7 +24V FIELD
8 INPUT 15
9 COMMON
10 +24V FIELD
11 INPUT 16
12 COMMON
13 +24V FIELD
14 INPUT 17
15 COMMON
16 +24V FIELD
17 INPUT 18
18 COMMON
19 +24V FIELD
20 OUTPUT 13A
21 OUTPUT 13B
22 +24V FIELD
23 OUTPUT 14A
24 OUTPUT 14B
25 +24V FIELD
26 OUTPUT 15A
27 OUTPUT 15B
28 +24V FIELD
29 OUTPUT 16A
30 OUTPUT 16B
31 +24V FIELD
32 OUTPUT 17A
33 OUTPUT 17B
34 +24V FIELD
35 OUTPUT 18A
36 OUTPUT 18B
37 SHIELD
J4 I/O 19-24
37C CPC
1 +24V FIELD
2 INPUT 19
3 COMMON
4 +24V FIELD
5 INPUT 20
6 COMMON
7 +24V FIELD
8 INPUT 21
9 COMMON
10 +24V FIELD
11 INPUT 22
12 COMMON
13 +24V FIELD
14 INPUT 23
15 COMMON
16 +24V FIELD
17 INPUT 24
18 COMMON
19 +24V FIELD
20 OUTPUT 19A
21 OUTPUT 19B
22 +24V FIELD
23 OUTPUT 20A
24 OUTPUT 20B
25 +24V FIELD
26 OUTPUT 21A
27 OUTPUT 21B
28 +24V FIELD
29 OUTPUT 22A
30 OUTPUT 22B
31 +24V FIELD
32 OUTPUT 23A
33 OUTPUT 23B
34 +24V FIELD
35 OUTPUT 24A
36 OUTPUT 24B
37 SHIELD
PCB8
HYPATH I/O INTERFACE PCB
141070
J1
+24V FLD 1
GROUND FLD 2
+5V FLD 3
1 BRN
2 BLK
3 RED
229421
G SHEET 6-B3
J2
GROUND 1
+5V 2
1 BLK
2 RED
229420
H SHEET 6-B3
SHEET 14 OF 20
HYPATH I/O INTERFACE PCB

223231 CABLE (4 AXIS DRV/ENC)

L SHEET 11-C2



PCB9
HYPATH 4-AXIS SERVO PCB
141197

J3 AXIS 1 & 2 DRV/ENC

1	AXIS 1 SHIELD
2	+5V OUT
3	ENC COMMON
4	+12V OUT
5	ENC COMMON
6	+24V OUT
7	ENC COMMON
8	AXIS 1A CH
9	AXIS 1A\ CH
10	AXIS 1B CH
11	AXIS 1B\ CH
12	AXIS 1Z CH
13	AXIS 1Z\ CH
14	AXIS 1 ENABLE A
15	AXIS 1 ENABLE B
16	AXIS 1 DAC OUT
17	ANALOG COMMON
18	AXIS 1 SHIELD
19	SHIELD
20	AXIS 2 SHIELD
21	+5V OUT
22	ENC COMMON
23	+12V OUT
24	ENC COMMON
25	+24V FIELD
26	ENC COMMON
27	AXIS 2A CH
28	AXIS 2A\ CH
29	AXIS 2B CH
30	AXIS 2B\ CH
31	AXIS 2Z CH
32	AXIS 2Z\ CH
33	AXIS 2 ENABLE A
34	AXIS 2 ENABLE B
35	AXIS 2 DAC OUT
36	ANALOG COMMON
37	AXIS 2 SHIELD

J4 AXIS 3 & 4 DRV/ENC

1	AXIS 3 SHIELD
2	+5V OUT
3	ENC COMMON
4	+12V OUT
5	ENC COMMON
6	+24V OUT
7	ENC COMMON
8	AXIS 3A CH
9	AXIS 3A\ CH
10	AXIS 3B CH
11	AXIS 3B\ CH
12	AXIS 3Z CH
13	AXIS 3Z\ CH
14	AXIS 3 ENABLE A
15	AXIS 3 ENABLE B
16	AXIS 3 DAC OUT
17	ANALOG COMMON
18	AXIS 3 SHIELD
19	SHIELD
20	AXIS 4 SHIELD
21	+5V OUT
22	ENC COMMON
23	+12V OUT
24	ENC COMMON
25	+24V FIELD
26	ENC COMMON
27	AXIS 4A CH
28	AXIS 4A\ CH
29	AXIS 4B CH
30	AXIS 4B\ CH
31	AXIS 4Z CH
32	AXIS 4Z\ CH
33	AXIS 4 ENABLE A
34	AXIS 4 ENABLE B
35	AXIS 4 DAC OUT
36	ANALOG COMMON
37	AXIS 4 SHIELD

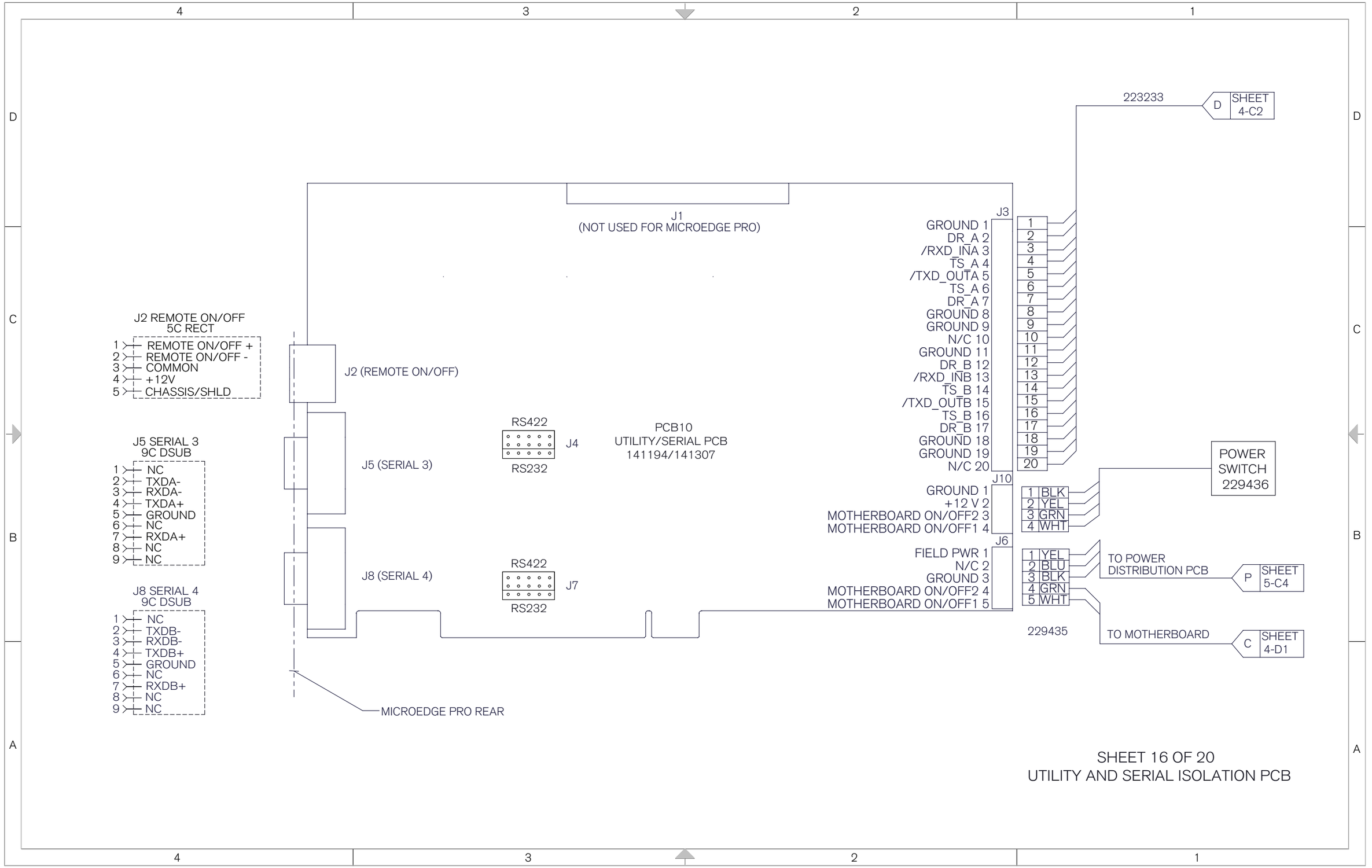
229418

F SHEET 6-B4

J2

GROUND FLD 6	6	BLK
+12V FLD 5	5	YEL
-12V FLD 4	4	BLU
+5V FLD 3	3	RED
+24V FLD 2	2	BRN
GROUND FLD 1	1	BLK

SHEET 15 OF 20
HYPATH 4-AXIS SERVO PCB


4
3
2
1
D
C
B
A
223233
D
SHEET
4-C2
J1
(NOT USED FOR MICROEDGE PRO)
J3
GROUND 1
DR_A 2
/RXD_INA 3
TS_A 4
/TXD_OUTA 5
TS_A 6
DR_A 7
GROUND 8
GROUND 9
N/C 10
GROUND 11
DR_B 12
/RXD_INB 13
TS_B 14
/TXD_OUTB 15
TS_B 16
DR_B 17
GROUND 18
GROUND 19
N/C 20
J2 REMOTE ON/OFF
5C RECT
1 REMOTE ON/OFF +
2 REMOTE ON/OFF -
3 COMMON
4 +12V
5 CHASSIS/SHLD
J2 (REMOTE ON/OFF)
J5 SERIAL 3
9C DSUB
1 NC
2 TXDA-
3 RXDA-
4 TXDA+
5 GROUND
6 NC
7 RXDA+
8 NC
9 NC
J5 (SERIAL 3)
RS422
RS232
J4
PCB10
UTILITY/SERIAL PCB
141194/141307
J8 SERIAL 4
9C DSUB
1 NC
2 TXDB-
3 RXDB-
4 TXDB+
5 GROUND
6 NC
7 RXDB+
8 NC
9 NC
J8 (SERIAL 4)
RS422
RS232
J7
MICROEDGE PRO REAR
J10
GROUND 1
+12 V 2
MOTHERBOARD ON/OFF2 3
MOTHERBOARD ON/OFF1 4
1 BLK
2 YEL
3 GRN
4 WHT
POWER
SWITCH
229436
J6
FIELD PWR 1
N/C 2
GROUND 3
MOTHERBOARD ON/OFF2 4
MOTHERBOARD ON/OFF1 5
1 YEL
2 BLU
3 BLK
4 GRN
5 WHT
TO POWER
DISTRIBUTION PCB
P
SHEET
5-C4
229435
TO MOTHERBOARD
C
SHEET
4-D1
SHEET 16 OF 20
UTILITY AND SERIAL ISOLATION PCB

223232 CABLE (I/O 1-24)

N SHEET 18-C4

223231 CABLE (2 AXIS DRV/ENC)

O SHEET 18-C2

J5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1 OUTPUT 1	2 OUTPUT 2	3 INPUT 2	4 OUTPUT 3	5 INPUT 3	6 OUTPUT 4	7 INPUT 4	8 OUTPUT 5	9 INPUT 5	10 OUTPUT 6	11 INPUT 6	12 OUTPUT 7	13 INPUT 7	14 OUTPUT 8	15 INPUT 8	16 OUTPUT 9	17 INPUT 9	18 OUTPUT 10	19 INPUT 10	20 OUTPUT 11	21 INPUT 11	22 OUTPUT 12	23 INPUT 12	24 NC	25 NC	

26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	
26 NC	27 NC	28 NC	29 NC	30 NC	31 NC	32 NC	33 NC	34 NC	35 NC	36 NC	37 NC	38 NC	39 NC	40 NC	41 NC	42 NC	43 NC	44 NC	45 NC	46 NC	47 GROUND	48 NC	49 NC	50 GROUND	

J3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1 AXIS 1 ENABLE	2 AXIS 2 ENABLE	3 NC	4 NC	5 NC	6 NC	7 /WDOG ENBL	8 AXIS 1A CH	9 AXIS 1B CH	10 AXIS 1Z CH	11 AXIS 2A CH	12 AXIS 2B CH	13 AXIS 2Z CH	14 NC	15 NC	16 NC	17 NC	18 NC	19 NC	20 NC	21 NC	22 NC	23 NC	24 NC	25 NC	

26	27	28	29	30	31	32	33	34	35	36	37	38	39	40											
26 LOGIC GND	27 LOGIC GND	28 ANALOG COM	29 AXIS 1 ANALOG	30 AXIS 2 ANALOG	31 NC	32 NC	33 NC	34 NC	35 LOGIC GND	36 +5V LOGIC	37 +5V LOGIC	38 +12V LOGIC	39 -12V LOGIC	40 LOGIC GND											

J8 I/O 1-12

1	INPUT 1
2	INPUT 2
3	INPUT 3
4	INPUT 4
5	INPUT 5
6	INPUT 6
7	INPUT 7
8	INPUT 8
9	INPUT 9
10	INPUT 10
11	INPUT 11
12	INPUT 12
13	NC
14	+24VDC
15	+24VDC
16	NC
17	24V COM
18	24V COM
19	WDOG RELAY A
20	WDOG RELAY B
21	OUTPUT 1
22	OUTPUT 2
23	OUTPUT 3
24	OUTPUT 4
25	OUTPUT 5
26	OUTPUT 6
27	OUTPUT 7
28	OUTPUT 8
29	OUTPUT 9
30	OUTPUT 10
31	OUTPUT 11
32	OUTPUT 12
33	SHIELD
34	+24VDC
35	+24VDC
36	24V COM
37	24V COM

J7 AXIS X & Y DRV/ENC

1	ENCODER PWR
2	ENCODER PWR
3	ENC PWR COM
4	ENCODER PWR
5	Y AXIS A CH
6	ENC PWR COM
7	EARTH GND
8	ENC PWR COM
9	X AXIS A CH
10	Y AXIS B CH
11	Y AXIS A\ CH
12	EARTH GND
13	EARTH GND
14	X AXIS A\ CH
15	X AXIS B CH
16	Y AXIS Z CH
17	Y AXIS B\ CH
18	Y ANALOG COM
19	EARTH GND
20	X ANALOG COM
21	X AXIS B\ CH
22	X AXIS Z CH
23	Y AXIS Z\ CH
24	X DRV ENBL IN
25	X DRV ENBL OUT
26	Y DRV ENBL IN
27	Y DRV ENBL OUT
28	X AXIS Z\ CH
29	Y REFERENCE+
30	Y ANALOG COM
31	EARTH GND
32	X ANALOG COM
33	X REFERENCE +
34	X ANALOG V+
35	Y ANALOG V-
36	X ANALOG V-
37	X ANALOG V+

PCB11
PICOPATH 2-AXIS INTERFACE PCB
141254

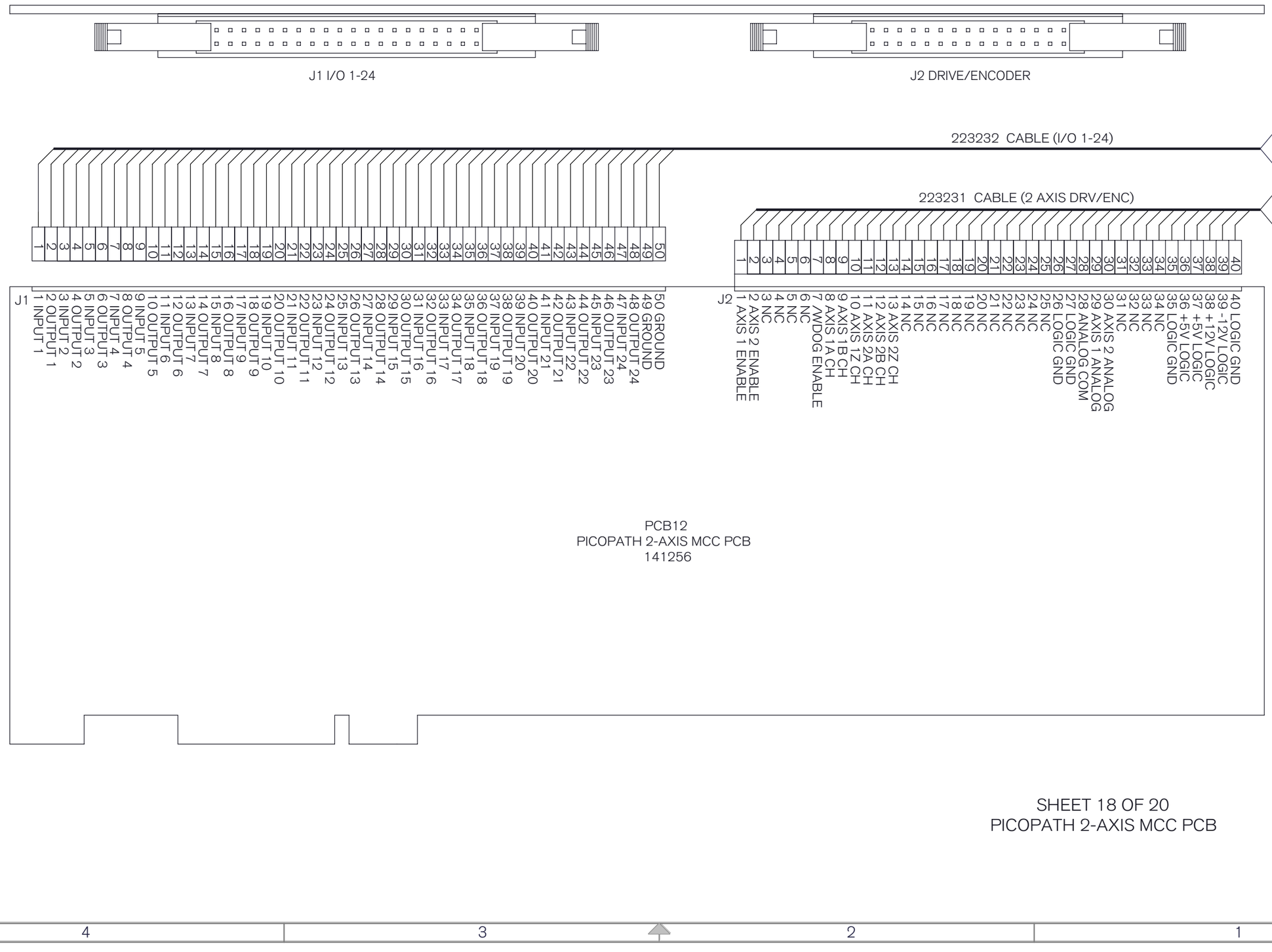
J11

GROUND FLD 1	1	BLK
+24V FLD 2	2	BRN
+5V FLD 3	3	RED
-12V FLD 4	4	BLU
+12V FLD 5	5	YEL
GROUND FLD 6	6	BLK

E SHEET 6-B4

229418

SHEET 17 OF 20
PICOPATH 2-AXIS INTERFACE PCB


J1 I/O 1-24
J2 DRIVE/ENCODER
223232 CABLE (I/O 1-24)
N
SHEET 17-D4
223231 CABLE (2 AXIS DRV/ENC)
O
SHEET 17-D2
J1
1 INPUT 1
2 OUTPUT 1
3 INPUT 2
4 OUTPUT 2
5 INPUT 3
6 OUTPUT 3
7 INPUT 4
8 OUTPUT 4
9 INPUT 5
10 OUTPUT 5
11 INPUT 6
12 OUTPUT 6
13 INPUT 7
14 OUTPUT 7
15 INPUT 8
16 OUTPUT 8
17 INPUT 9
18 OUTPUT 9
19 INPUT 10
20 OUTPUT 10
21 INPUT 11
22 OUTPUT 11
23 INPUT 12
24 OUTPUT 12
25 INPUT 13
26 OUTPUT 13
27 INPUT 14
28 OUTPUT 14
29 INPUT 15
30 OUTPUT 15
31 INPUT 16
32 OUTPUT 16
33 INPUT 17
34 OUTPUT 17
35 INPUT 18
36 OUTPUT 18
37 INPUT 19
38 OUTPUT 19
39 INPUT 20
40 OUTPUT 20
41 INPUT 21
42 OUTPUT 21
43 INPUT 22
44 OUTPUT 22
45 INPUT 23
46 OUTPUT 23
47 INPUT 24
48 OUTPUT 24
49 GROUND
50 GROUND
J2
1 AXIS 1 ENABLE
2 AXIS 2 ENABLE
3 NC
4 NC
5 NC
6 NC
7 /WDOG ENABLE
8 AXIS 1A CH
9 AXIS 1B CH
10 AXIS 1Z CH
11 AXIS 2A CH
12 AXIS 2B CH
13 AXIS 2Z CH
14 NC
15 NC
16 NC
17 NC
18 NC
19 NC
20 NC
21 NC
22 NC
23 NC
24 NC
25 NC
26 LOGIC GND
27 LOGIC GND
28 ANALOG COM
29 AXIS 1 ANALOG
30 AXIS 2 ANALOG
31 NC
32 NC
33 NC
34 NC
35 LOGIC GND
36 +5V LOGIC
37 +5V LOGIC
38 +12V LOGIC
39 -12V LOGIC
40 LOGIC GND
PCB12
PICOPATH 2-AXIS MCC PCB
141256
SHEET 18 OF 20
PICOPATH 2-AXIS MCC PCB

SEE SHEET 18

223233

D SHEET 4-C2

J1

J2

J3

GROUND 1 — 1
DR_A 2 — 2
/RXD_INA 3 — 3
TS_A 4 — 4
/TXD_OUTA 5 — 5
TS_A 6 — 6
DR_A 7 — 7
GROUND 8 — 8
GROUND 9 — 9
N/C 10 — 10
GROUND 11 — 11
DR_B 12 — 12
/RXD_INB 13 — 13
TS_B 14 — 14
/TXD_OUTB 15 — 15
TS_B 16 — 16
DR_B 17 — 17
GROUND 18 — 18
GROUND 19 — 19
N/C 20 — 20

J4 REMOTE ON/OFF
5C RECT

1 REMOTE ON/OFF +
2 REMOTE ON/OFF -
3 COMMON
4 +12V
5 CHASSIS/SHLD

J4 (REMOTE ON/OFF)

J8 SERIAL 3
9C DSUB

1 NC
2 TXDA-
3 RXDA-
4 TXDA+
5 GROUND
6 NC
7 RXDA+
8 NC
9 NC

J8 (SERIAL 3)

RS422 J6 RS232

PCB12
PICOPATH 2-AXIS MCC PCB
141256

J12 SERIAL 4
9C DSUB

1 NC
2 TXDB-
3 RXDB-
4 TXDB+
5 GROUND
6 NC
7 RXDB+
8 NC
9 NC

J12 (SERIAL 4)

RS422 J10 RS232

MICROEDGE PRO REAR

J7

GROUND 1 — 1 BLK
+12 V 2 — 2 YEL
MOTHERBOARD ON/OFF2 3 — 3 GRN
MOTHERBOARD ON/OFF1 4 — 4 WHT

POWER SWITCH 229436

J9

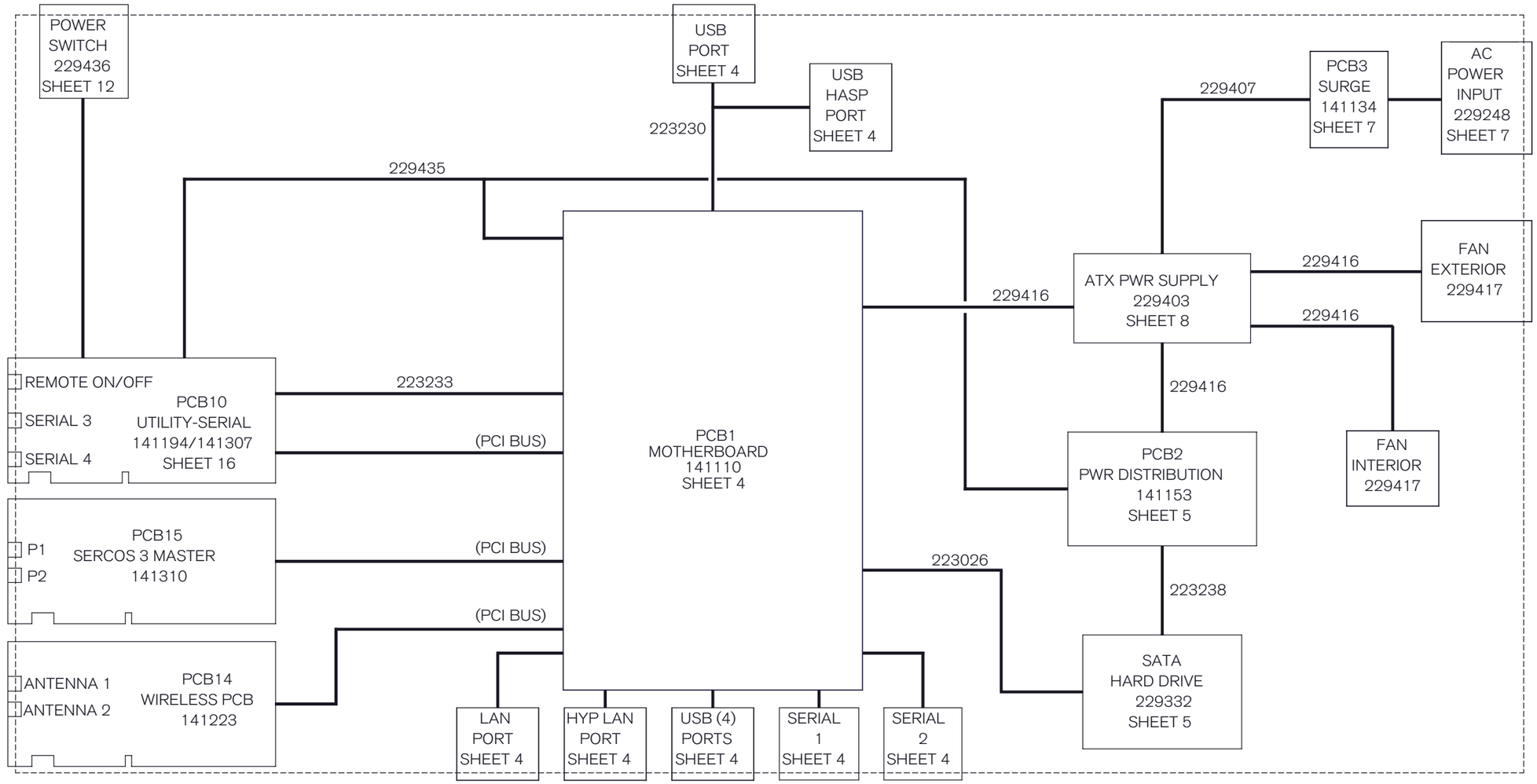
FIELD PWR 1 — 1 YEL
N/C 2 — 2 BLU
GROUND 3 — 3 BLK
MOTHERBOARD ON/OFF2 4 — 4 GRN
MOTHERBOARD ON/OFF1 5 — 5 WHT

229435

TO POWER DISTRIBUTION PCB — P SHEET 5-C4

TO MOTHERBOARD — C SHEET 4-D2

SHEET 19 OF 20
PICOPATH 2-AXIS MCC PCB



SHEET 20 OF 20
MICROEDGE PRO CNC
WITH SERCOS III INTERFACE