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HYPERTHERM SHAPE CUTTING CONTROL

MACHINE INTERFACE MANUAL

February 2009

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Safety

Read This Manual

Read and understand this instructional manual, the cutting machine manuals, and your employer's safety practices.

Note: This product is not designed to be field serviceable. Please return to an authorized repair center for any required service.

Product Listings

MicroEdge and Voyager III



Note: This product has been designed and manufactured in accordance with CE and UL Safety Standards.

Edge TI



Note: This product has been designed and manufactured in accordance with CE and UL Safety Standards.

Please contact Hypertherm Automation for further safety listing information.



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

Read carefully all safety messages in this manual and safety labels on your machine.

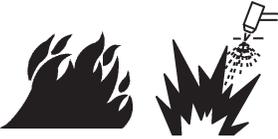
- Keep the safety labels on your machine in good condition. Replace missing or damaged labels immediately.
- Learn how to operate the machine and how to use the controls properly. Do not let anyone operate it without instruction.

- Keep your machine in proper working condition. Unauthorized modifications to the machine may affect safety and machine service life.

DANGER WARNING CAUTION

A 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.
- 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 damage to equipment if not followed correctly.



CUTTING CAN CAUSE FIRE OR EXPLOSION

Fire Prevention

- Be sure the 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 container.
- 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

Hydrogen Detonation with Aluminum Cutting

- When cutting aluminum underwater, or with the water touching the underside of the aluminum, free hydrogen gas may collect under the workpiece and detonate during plasma cutting operations.
- Install an aeration manifold on the floor of the water table to eliminate the possibility of hydrogen detonation. Refer to the Appendix section of this manual for aeration manifold details.



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.
- Never touch the torch body, workpiece or the water in a water table when the plasma system is operating.

Electric Shock Prevention

All Hypertherm 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 work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground. If you must work 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, be sure that it is correctly connected to earth ground.
- Install and ground this equipment according to the instruction manual and in accordance with national and local codes.
 - 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 cable 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 proper grounding conductor first.
 - Each Hypertherm plasma system is designed to be used only with specific Hypertherm torches. Do not substitute other torches which could overheat and present a safety hazard.



STATIC ELECTRICITY CAN DAMAGE CIRCUIT BOARDS

Use proper precautions when handling printed circuit boards.

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



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.

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.

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 upon 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 area where the equipment is used and to ensure 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 work area.
- Personal protective equipment.
- Number of welding and cutting systems in operation.
- Other site 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 site 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.
- Assure 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 ensure safe air quality.



A PLASMA ARC CAN CAUSE INJURY AND BURNS

Instant-On Torches

Plasma arc comes on 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 or local codes.
- 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.

- Gauntlet gloves, safety shoes and hat.
- Flame-retardant clothing to cover all exposed areas.
- Cuffless trousers to prevent entry of sparks and slag.
- Remove any combustibles, such as a butane lighter or matches, from your pockets before cutting.

Arc Current		Lens Shade	
		AWS (USA)	ISO 4850
Up to 100 A		No. 8	No. 11
100-200 A		No. 10	No. 11-12
200-400 A		No. 12	No. 13
Over 400 A		No. 14	No. 14

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.



GROUNDING SAFETY

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

Work Table Connect the work table to an earth ground, in accordance with appropriate national or local electrical codes.

Input Power

- Be 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, be 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. Fasten the retaining nut tightly.
- Tighten all electrical connections to avoid excessive heating.

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 or local codes.



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 or local codes.
- Never use a cylinder that is not upright and secured in place.
- Keep the protective cap in place over 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.



NOISE CAN DAMAGE HEARING

Prolonged exposure to noise from cutting or gouging can damage hearing.

- Use approved ear protection when using plasma system.
- Warn others nearby about the noise hazard.



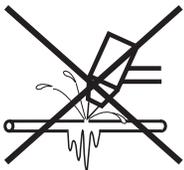
PACEMAKER AND HEARING AID OPERATION

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



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.

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, 470 Atlantic Avenue, Boston, MA 02210
9. NFPA Standard 70-1978, *National Electrical Code*, National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210
10. OSHA, *Safety and Health Standards*, 29FR 1910, U.S. Government Printing Office, Washington, D.C. 20402

WARNING LABEL

This warning label is affixed to some power supplies. It is important that the operator and maintenance technician understand the intent of these warning symbols as described. The numbered text corresponds to the numbered boxes on the label.



 www.hypertherm.com/weee

110647 Rev. A

1. Cutting sparks can cause explosion or fire.
 - 1.1 Keep flammables away from cutting.
 - 1.2 Keep a fire extinguisher nearby, and have a watchperson ready to use it.
 - 1.3 Do not cut on any closed containers.
2. The plasma arc can cause injury and burns.
 - 2.1 Turn off power before disassembling torch.
 - 2.2 Do not hold the material near cutting path.
 - 2.3 Wear complete body protection.
3. Electric shock from torch or wiring can kill. Protect yourself from electric shock.
 - 3.1 Wear insulating gloves. Do not wear wet or damaged gloves.
 - 3.2 Insulate yourself from work and ground.
 - 3.3 Disconnect input plug or power before working on machine.
4. Breathing cutting fumes can be hazardous to your health.
 - 4.1 Keep your head out of the fumes.
 - 4.2 Use forced ventilation or local exhaust to remove the fumes.
 - 4.3 Use ventilating fan to remove the fumes.
5. Arc rays can burn eyes and injure skin.
 - 5.1 Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.
6. Become trained and read the instructions before working on the machine or cutting.
7. Do not remove or paint over (cover) warning labels.

MicroEdge

Overview

The *MicroEDGE™* PC based motion control from Hypertherm Automation is specifically for the metal cutting industry. This control package provides a unique combination of flexible table configurations, expandable features and an unparalleled ease of use.

MicroEDGE utilizes our proprietary Graphical User Interface (GUI) and *SoftMotion* Technology with motion control operation of up to four axes with 24 I/O signals.

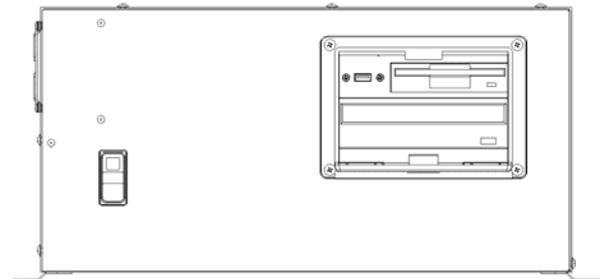
This product offers a unique approach to the motion control market by allowing custom configuration the final package by adding a PC style Monitor, Keyboard and Mouse.

Additional features such as Joystick, Speed Pots, Integrated Sensor THC, networking, CAD/CAM Software, Nesting Software provide unlimited combinations of options for increased productivity.

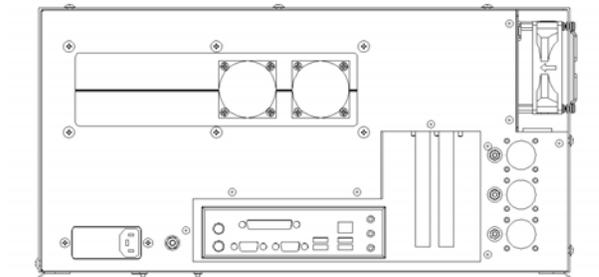


Operation and maintenance of automated equipment involves potential hazards. Personnel should take precautions to avoid injury. This equipment should only be opened by trained service personnel.

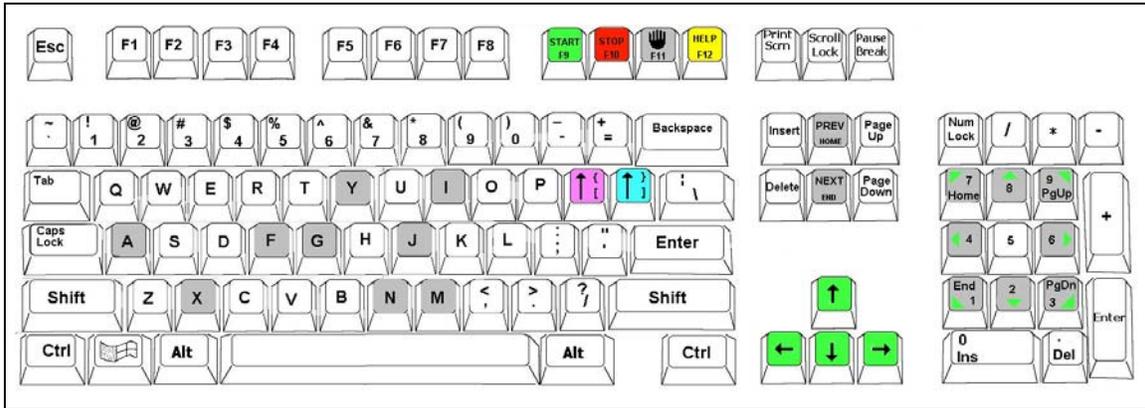
MicroEDGE™



Rear View



Keyboard Layout



Typical Keyboard Layout

Keyboard Functions

Function Keys F1-F8 are equivalent to the soft keys on the display screen.

Function Key F9 is equivalent to the START key.

Function Key F10 and Pause Key are equivalent to the STOP key.

Function Key F11 is equivalent to the MANUAL MODE key.

Function Key F12 is equivalent to the HELP key.

Arrow direction keys are used for manual motion.

The HOME key is equivalent to the PREV field key.

The END key is equivalent to the NEXT field key.

The [key is equivalent to the purple arrow shift key.

The] key is equivalent to the blue arrow shift key.

The Esc key is equivalent to the CANCEL key.

To exit the control software press Alt F4.

To switch between applications press Alt Tab.

A color coded key cap sticker set is provided to allow easy reference to the keys used by the control software.

System Requirements

Monitor Requirements (CRT or LCD)

Standard VGA capable 1240 x780 analog monitors or better with 15 pin High Density D-sub connector. Touch screen displays are also supported.

Keyboard Requirements

Standard 101/ 104 Key PS/2 or USB Compatible Keyboard

Optional Mouse Requirements

PS/2 or USB Compatible Mouse

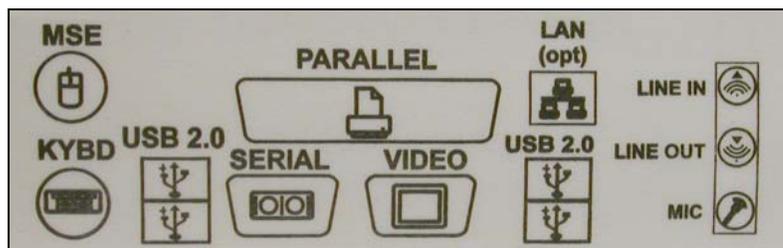
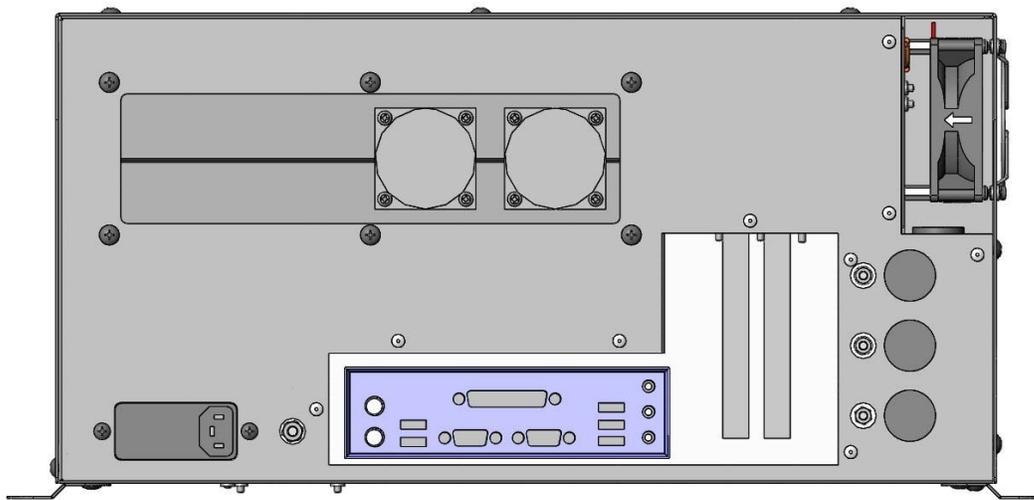
THC, Joystick & Speedpots

Optional features for two Sensor THC, one Joystick and two Speedpots are offered.

Note: Use of some monitors and other devices may require loading of a device driver for operation. Many standard device drivers are located in the C:\CABS or C:\CABS\1386 folders.

Machine Interface

The MicroEDGE shape cutting control is an extremely versatile product offering up to four configurable axes of motion, configurable I/O locations and a convenient table interface for ease of installation. The control features may also be expanded through use of optional analog and network interface cards.



The rear panel of the control has several cable connectors to connect the control to power, I/O and communication ports. These connectors are clearly labeled as to their function.

AC Input

The AC power cable is inserted into the AC power connector and plugged into a standard 3-way 110 or 220 volt outlet. The control has a universal AC input power module that allows the user to plug into either voltage without changing additional jumpers. In addition, the AC Power connector contains an integral fuse receptacle and line filter.

A remote communications link can be connected to one of the two serial ports and an external ground (PE) lug for earth grounding of the unit is also provided.

Serial Port

Please refer to the Ports Information section of the Installation Guide for additional information on configuration of Serial ports for communication. Note: Serial ports for the MicroEDGE are not optically isolated. Appropriate grounding or after market port isolator or protocol converter to add optical isolation is recommended.

I/O Configuration

The cables that connect the control to the cutting machine are attached to the I/O (Input/Output), and the DRIVE/ENCODER connectors. For the purposes of this guide Single Ended I/O is referred to as Type "P" configuration.

The information provided here is the basic information for connection of the shape cutting control to the cutting table. Each machine interface will vary slightly based on the cutting table configuration and features. Additionally, I/O pinout information may vary slightly based on the configuration of the selected I/O and their locations. Changes to the I/O configuration may be made in the password protected I/O screen. All controls are shipped with the default selection of Inputs and interface locations for the selected control Interface (I/O) configuration. Installation and service should only be performed by a qualified service technician.

I/O Connector

The I/O connector is a standard sex circular CPC connector from AMP. This connector was specifically chosen for its rugged industrial design and its metal insulation characteristics for EMI/RFI noise immunity.

In the single ended I/O scheme, a ground is provided on the I/O pin. The advantage to single ended I/O is that it takes one pin for each point versus two for the double-ended I/O scheme, thus increasing the total number of I/O points available to the user.

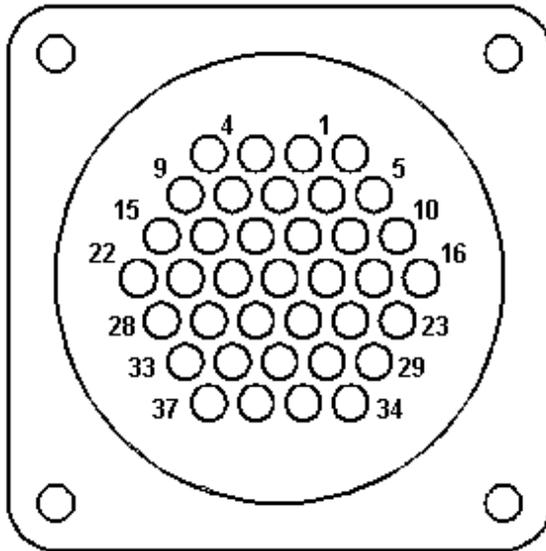
I/O Mating Connector

Connector AMP #208470-1

Backshell AMP #208945-8

Sockets (16-18 ga) AMP #66101-3

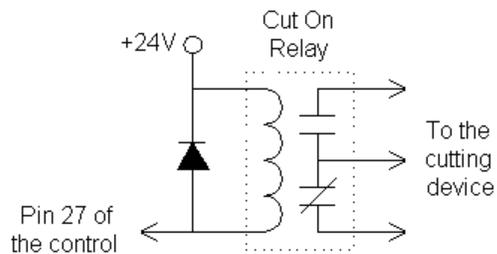
Sockets (20-24 ga) AMP #66105-3



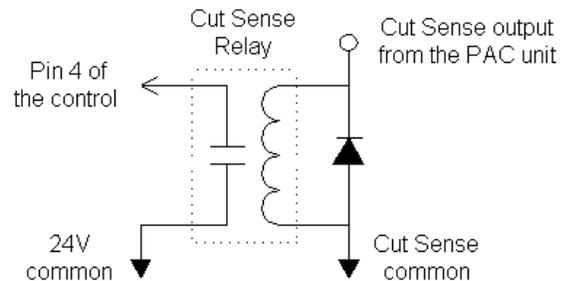
I/O Interface

Connecting single ended I/O to the control. These examples assume a +24V power supply has been connected across pins 34 and 36 of the control, or that the optional internal +24V power supply has been installed.

Output tied to external Cut On

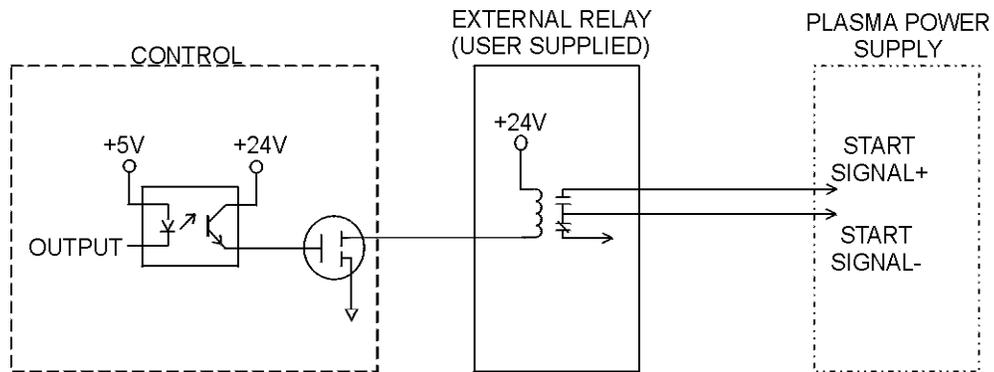


Input tied to Cut Sense Relay

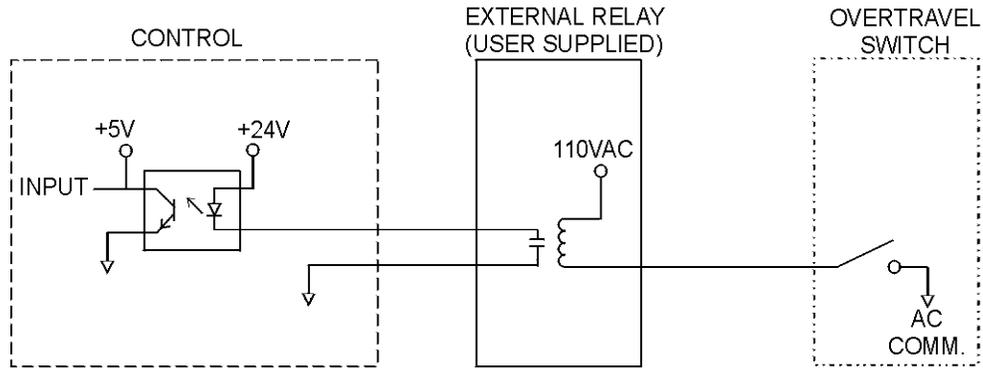


Examples of possible circuits

Output



Input



Single Ended I/O Pinout

The Single Ended I/O offers 12 outputs which are rated at 24VDC for up to 1-amp loads and 12 inputs rated for 24VDC.

Pin	I/O	Description
1	Input 1	Torch Up Sense
2	Input 2	Torch Down Sense
3	Input 3	Preheat Sense or X -Overtravel Switch
4	Input 4	Cut Sense
5	Input 5	Tracer on Path or Z Home Switch
6	Input 6	Spare or Y -Overtravel Switch
7	Input 7	Spare
8	Input 8	Spare or Remote Pause
9	Input 9	X Home Switch
10	Input 10	X Overtravel Switch or X +Overtravel Switch
11	Input 11	Y Home Switch
12	Input 12	Y Overtravel Switch or Y +Overtravel Switch
13	N/C	No Connection
14	+24 VDC	+ I/O Power Supply
15	+24 VDC	+ I/O Power Supply
16	N/C	No Connection
17	24V Common	I/O Power Supply Common
18	24V Common	I/O Power Supply Common
19	N/C	No Connection
20	N/C	No Connection
21	Output 1	Torch Up
22	Output 2	Torch Down
23	Output 3	Ignition Control
24	Output 4	Torch Height Disable/Dual Grid Control
25	Output 5	CNC/Tracer
26	Output 6	Marker Enable
27	Output 7	Cut Control
28	Output 8	Spare
29	Output 9	Spare or Low Preheat
30	Output 10	Preheat Control
31	Output 11	Key Press Indicator or Motion Indicator
32	Output 12	Spare or Plasma Select
33	I/O Shield	Chassis Ground
34	+24 VDC	+I/O Power Supply
35	+24 VDC	+I/O Power Supply
36	24 V Common	I/O Power Supply Common
37	24 V Common	I/O Power Supply Common

Drive/Encoder Connector

The Drive/Encoder connector is a reverse sex circular CPC connector from AMP. This connector was specifically chosen for its rugged industrial design and its metal insulation characteristics for EMI/RFI noise immunity.

NOTE: For optimum noise immunity, cable shields may be tied externally to the control enclosure or to the metal AMP connectors.

Drive/Encoder Mating Connector and Cable

Connector AMP #208472-1

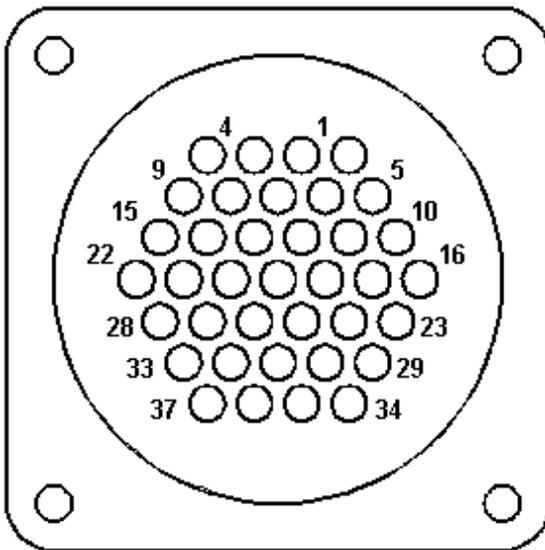
Backshell AMP #208945-8

Pins (16-18 ga) AMP #66099-3

Pins (20-24 ga) AMP #66103-3

Cabling: Use Belden # 9504 or equivalent for encoder signals

Cabling: Use Belden # 9501 or equivalent for drive signals



Axes Assignments

Axes	Axes Assignment
1 (X)	Transverse or Rail
2 (Y)	Transverse or Rail
3 (Z)	Dual Gantry, CBH, Rotate or THC
4 (W)	CBH, Tilt or THC

Drive/Encoder Pinout

Pin	Description
2	Encoder Power Supply Input (+5V)
3	Encoder Power Supply Common
4	Encoder Power Supply Shield
8	

X Axis	Y Axis	Description
4	1	Encoder Power Output
8	6	Encoder Power Common
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)
25	27	Drive Enable Out (relay contact)
37	34	Drive Power Input (+12 or +15)
33	29	Servo Output ($\pm 10V$)
32	30	Drive Power Common
36	35	Drive Power Input (-12 or -15)
20	18	Servo Output Common
19	31	Drive/Servo Shield

Drive/Encoder Pinout (For 3 and 4 Axes units)

Pin	Description
2	Encoder Power Supply Input (+5V or +12V)
3	Encoder Power Supply Common
7	Encoder Power Supply Shield

Z Axis	W Axis	Description
4	1	Encoder Power Output
8	6	Encoder Power Common
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)

MicroEdge

25	27	Drive Enable Out (relay contact)
37	34	Drive Power Input (+12 or +15)
33	29	Servo Output ($\pm 10V$)
32	30	Drive Power Common
36	35	Drive Power Input (-12 or -15)
20	18	Servo Output Common
19	31	Drive/Servo Shield

THC and Joystick Interface

MicroEdge has dedicated connectors for THC 1, THC and Joystick / Speedpots.

Series 1 PCI Analog Card

Note: The Analog Card will be designated as PCI-AIC Rev A in the Control Information Diagnostic screen.

Board Marking PCI Analog 1 Part # PCBS-0074

THC 1

Pin #	Designation	Description
1	Common	Common
2	Input 5	Nozzle Contact Sense – (Relay Contact
3	Input 5 –	Nozzle Contact Sense - (Relay Contact)
4	Output 1 +	Nozzle Contact Enable + (Relay Contact)
5	Output 1 –	Nozzle Contact Enable - (Relay Contact)
6	Analog Input 1 +	THC +
7	Analog Input 1 –	THC –
8	Output 2 +	Hold Ignition (Relay Contact)
9	Output 2 –	Hold Ignition (Relay Contact)
	Ground Stud	Shield

Mating Connector

Connector AMP #206708-1

Backshell AMP #206966-1

Sockets (20-24 ga) AMP #66105-3

Cabling: Use Belden # 9504 or equivalent

THC 2

Pin #	Designation	Description
1	Common	Common
2	Input 6 +	Nozzle Contact Sense + (Relay Contact)
3	Input 6 –	Nozzle Contact Sense – (Relay Contact)
4	Output 3 +	Nozzle Contact Enable + (Relay Contact)
5	Output 3 –	Nozzle Contact Enable – (Relay Contact)
6	Analog Input 2 +	THC +
7	Analog Input 2 –	THC –

8	Output 4 +	Hold Ignition (Relay Contact)
9	Output 4 –	Hold Ignition (Relay Contact)
	Ground Stud	Shield

Mating Connector

Connector AMP #206708-1

Backshell AMP #206966-1

Sockets (20-24 ga) AMP #66105-3

Cabling: Use Belden # 9504 or equivalent

Joystick

Pin #	Designation	Description
1	Input 1	Joystick UP
2	Input 2	Joystick DWN
3	Input 3	Joystick LT
4	Input 4	Joystick RT
5	Common	Common
6	Analog Input 3 +	Speed Pot 1
7	Analog Input 3 –	Speed Pot 1
8	Analog Input 4 +	Speed Pot 2
9	Analog Input 4 –	Speed Pot 2
	Ground Stud	Shield

Note: Joystick inputs are activated by passing the Common signal (pin 5) to the desired input.

Analog inputs for the speedpots are rated at 0 - +10VDC

Mating Connector

Connector AMP #206708-1

Backshell AMP #206966-1

Sockets (20-24 ga) AMP #66105-3

Cabling: Use Belden # 9504 or equivalent

THC and Joystick Cable Grounding

Cable shields should be tied to the external PE studs for optimum noise immunity.

Sensor THC

This section refers to following hardware configuration. *Note:* The Analog Card will be designated as Rev 0 in the Control Information Diagnostic screen.

Series 1 PCI Analog Card Part # PCBS-0074
 (Board Marking PCBS-0073)
Series 3 Voltage Divider Card Part # PCBS-0061

Instructions

If the voltage divider card has not been installed in the plasma power supply, mount the card in an accessible location away from high electrical noise areas. Wire the VDC to the appropriate signal inside the power supply as outlined in the following pinout information

Voltage Divider Card Pinout (Series 3)

Divider PCB - 2C Connector J1

Pin # Description

1 85 -265 VAC Power Input (47-63Hz)
2 285 -265 VAC Neutral Input

Mating Connector

2C Phoenix Connector – Phoenix Part # 1840366

Divider PCB - 8C Connector J2 To Control

Pin # Description

1 +24 VDC Common
2 +24 VDC
3 Nozzle Contact Sense
4 Nozzle Contact Enable
5 +24 VDC Common
6 Analog Out +
7 Analog Out –
8 E Ground

Mating Connector

8C Phoenix Connector – Phoenix Part # 1803633

Divider PCB - 5C Connector J3 to Power Supply / Table

Pin # Description

1 Ground (Chassis Ground)
2 Electrode (Plasma DC –)
3 Work (Plasma DC +)
4 NC
5 Shield (Nozzle Contact)

Mating Connector

Terminal Connections

Control & Cable Pinout for Sensor THC**I/O Configuration Type “P”**

Note: A 9C Amp connector is provided on the back of the control (I/O Type “P”) for interfacing.

Control 9C Divider J2

Analog Pin #	Description	Pin #
1	24V Common	1
2	Nozzle Contact Sense +	2
3	Nozzle Contact Sense –	3
4	Nozzle Contact Enable +	4
5	Nozzle Contact Enable –	5
6	Analog +	6
7	Analog –	7
8	Hold Ignition +	N/A (direct to power supply)*
9	Hold Ignition –	N/A (direct to power supply)*
	Ground Stud Shield	No Connection

Analog Mating Connector

Connector AMP # 206708-1

Backshell AMP #206966-1

Sockets #66105-3 (20-24 ga)

VDC Mating Connector

8C Phoenix Connector – Phoenix Part # 1803633

Cable

Belden #9505 or equivalent

* **Note:** It is recommended that the Hold Ignition input be wired to the Power Supply through an external relay for noise immunity. Please refer to Instructions from the supply manufacturer for details on connection to the Hold Ignition Input.

Calibration

Series 1 Analog Card

Note: The Series 1 Analog Card will be designated as Rev 0 in the Control Information Diagnostic screen.

Board Marking PC-012-1098 Rev. B Part # PCBS-0010-B

After the voltage divider card and control cabling have been connected, the system is ready to be calibrated for use.

Analog Offset: To adjust the Analog Offset, place a jumper on the Analog In signals on the Analog input card or at the 9C connection for the Analog Input Card located at the back of the control. The analog input voltage would then be viewed at the I/O Diagnostics screen to read any incoming voltage for the THC. If any voltage is displayed at the diagnostic screen, an Offset Voltage equal to the incoming voltage being read can be entered at the Password protected Analog I/O screen to correct for any imbalance and “zero” the incoming voltage

Example: If an incoming Analog Input Voltage is reading .1 volts, simply enter .1 at the Analog Offset and correct the imbalance.

Edge Ti

Overview

The Edge Ti shape cutting control is an extremely versatile product offering up to four configurable axes of motion, built-in Servo Amplifiers and configurable I/O. Use of built in relay contacts for I/O increases interface options and minimizes external interface components.

Hypertherm Automation PC based CNC controls for the shape cutting industry utilize our proprietary Graphical User Interface (GUI), and *SoftMotion* Technology to increase productivity, reduce operational costs while providing unsurpassed operational flexibility. The control features may be further expanded through use of integrated Sensor™ THC interface and networking

Touch Screen

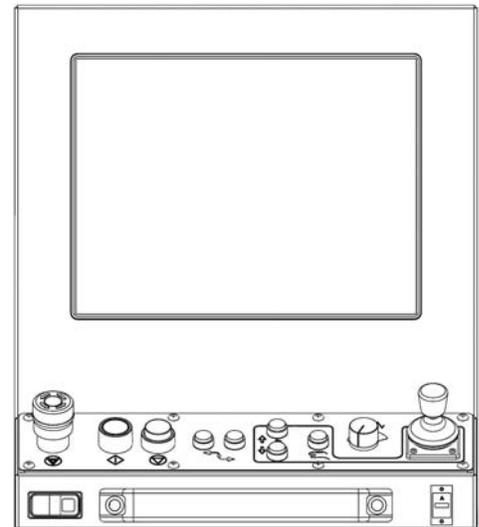
The 15" display used in the Edge Ti is a patented IntelliTouch Surface Wave technology which provides precise drift free touch accuracy and unsurpassed clarity. Pure glass construction with tiny transducers on the back of the touch screen preserves color purity and works even if scratched. There is no known wear out mechanism as there are no layers, coatings or moving parts. IntelliTouch technology has been tested by the supplier for more than 50 million touches in one location without failure.

THC, Joystick & Speedpots

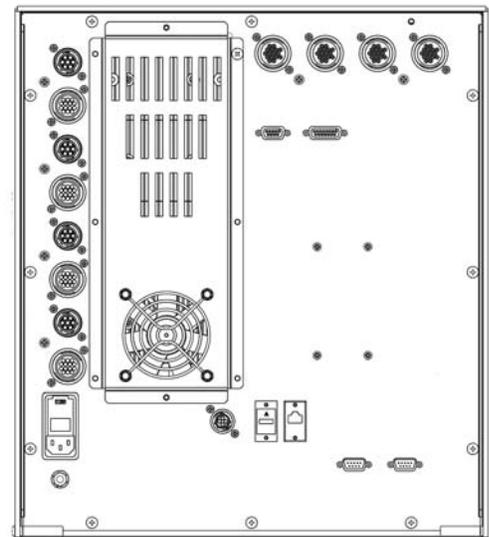
Features for Joystick and Speedpots are offered as standard. Optional features for integrated Sensor THC are available.

Note: Use of some devices such as USB memory devices may require loading of a device driver for operation. Many standard device drivers are located in the C:\CABS or D:\CABS\I386 folders.

Edge Ti™



Rear View





Operation and maintenance of automated equipment involves potential hazards. Personnel should take precautions to avoid injury. This equipment should only be opened by trained service personnel.

Machine Interface

The information provided here is the basic information for connection of the shape cutting control to the cutting table. Each machine interface will vary slightly based on the cutting table configuration and features. Additionally, I/O pinout information may vary slightly based on the configuration of the selected I/O and their locations. Changes to the I/O configuration may be made in the password protected I/O screen. All controls are shipped with a default selection of Inputs and interface locations for the selected control Interface (I/O) configuration. Installation and service should only be performed by a qualified service technician.

The rear panel of the control has several cable connectors to connect the control to power, I/O and communication ports. These connectors are clearly labeled as to their function.

AC Input

The AC power cable is inserted into the AC power connector and plugged into a standard 3-way 115 or 230 volt outlet. The AC Power connector contains an integral fuse module and line filter. AC input power can be selected by the user by changing position of the fuse module so that the selected voltage is displayed.



WARNING! Ensure proper orientation of fuse module for input power before applying power to the CNC. Component damage could occur with incorrect voltage setting.

Input Mode

Note that the inputs have two different modes that are selectable using DIP switch SW1-3. When this switch is OFF the inputs are in the sourced input mode and an external voltage source of between 12V and 24V is required to activate each input.

When DIP switch SW1-3 is ON, the inputs are all in the dry contact mode and require an external switch to common to activate the inputs. The logic states sensed by the CNC are reversed between the two input modes.

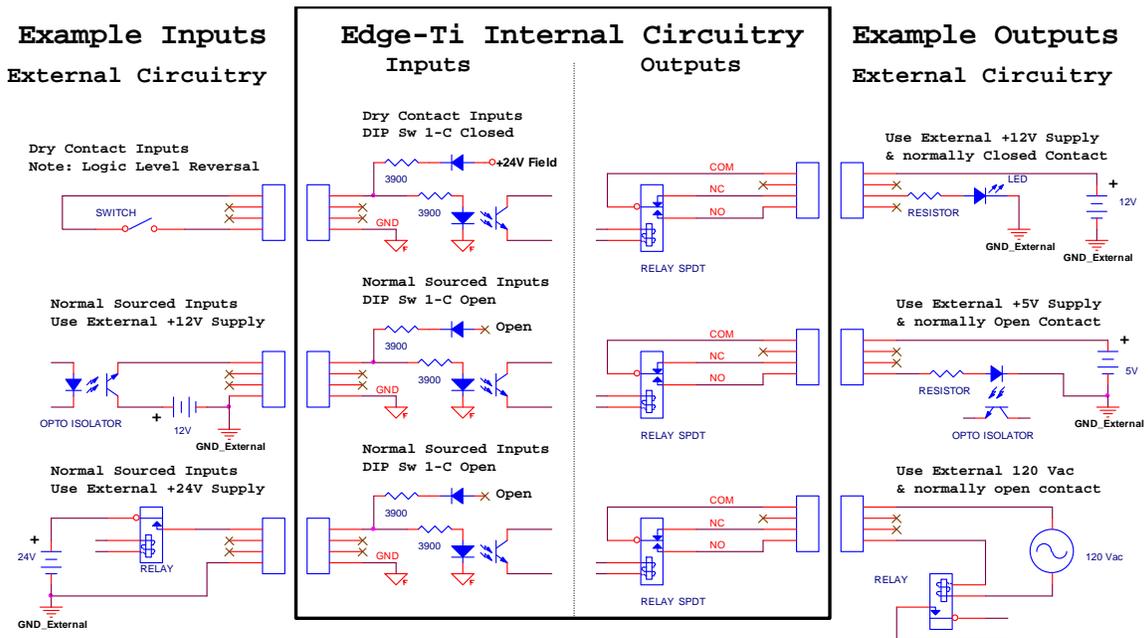
In a sourced input circuit, an inactive input will produce a logic low and an active input will produce logic high. In dry contact mode these logic levels are reversed with an inactive input producing logic high and an active input producing a logic low.

Switch SW1-3

Input Mode	SW1-3
Dry Contact	Off
12Vdc or 24Vdc Sourced	On

I/O Interface

The following illustration shows the details of connecting the I/O to common circuitry. All outputs are relay contacts rated at 1 AMP 250VAC maximum





WARNING! Do not exceed 24Vdc or 10mA into any optoisolator input. Use care to observe the correct signal polarities or damage may occur! Do not exceed 250 Vac or 1 Amp through any relay output.

I/O Pinout

Three inputs and three outputs are provided per connector

Connector I/O 1-3

<u>Pin#</u>	<u>Signal</u>
1	OUT1 Common
2	OUT1 Normally Closed
3	OUT1 Normally Open
4	OUT2 Common
5	OUT2 Normally Closed
6	OUT2 Normally Open
7	OUT3 Common
8	OUT3 Normally Closed
9	OUT3 Normally Open
10	IN1
11	IN1 Common
12	IN2
13	IN2 Common
14	IN3
15	IN3 Common
16	Cable Shield

Connector I/O 4-6

<u>Pin#</u>	<u>Signal</u>
1	OUT4 Common
2	OUT4 Normally Closed
3	OUT4 Normally Open
4	OUT5 Common
5	OUT5 Normally Closed
6	OUT5 Normally Open
7	OUT6 Common
8	OUT6 Normally Closed
9	OUT6 Normally Open
10	IN4
11	IN4 Common
12	IN5
13	IN5 Common
14	IN6
15	IN6 Common
16	Cable Shield

Connector I/O 7-9

<u>Pin#</u>	<u>Signal</u>
1	OUT7 Common
2	OUT7 Normally Closed
3	OUT7 Normally Open
4	OUT8 Common
5	OUT8 Normally Closed
6	OUT8 Normally Open
7	OUT9 Common
8	OUT9 Normally Closed
9	OUT9 Normally Open
10	IN7
11	IN7 Common
12	IN8
13	IN8 Common
14	IN9
15	IN9 Common
16	Cable Shield

Connector I/O 10-12

<u>Pin#</u>	<u>Signal</u>
1	OUT10 Common
2	OUT10 Normally Closed
3	OUT10 Normally Open
4	OUT11 Common
5	OUT11 Normally Closed
6	OUT11 Normally Open
7	OUT12 Common
8	OUT12 Normally Closed
9	OUT12 Normally Open
10	IN10
11	IN10 Common
12	IN11 (shared w/ lifter Lower limit input)
13	IN11 Common
14	IN12 (shared w/ lifter Upper limit input)
15	IN12 Common
16	Cable Shield

Shared Inputs

Note that general inputs #11 and #12 are shared with the Lifter Interface Limit Switch inputs. These inputs can only be used as general purpose inputs if they are **NOT** used by the Lifter limit switches.

If you are using the Lifter Interface and limit switches are connected to these inputs you must set DIP switches SW1-1 and SW1-2 to ON and you should not connect to inputs #11 and #12. Note that the standard Hypertherm Lifter does not use limit switches and the DIP switches SW1-1 & SW1-2 should be OFF so that inputs #11 and #12 can be used.

Switch SW1-1 and SW1-2

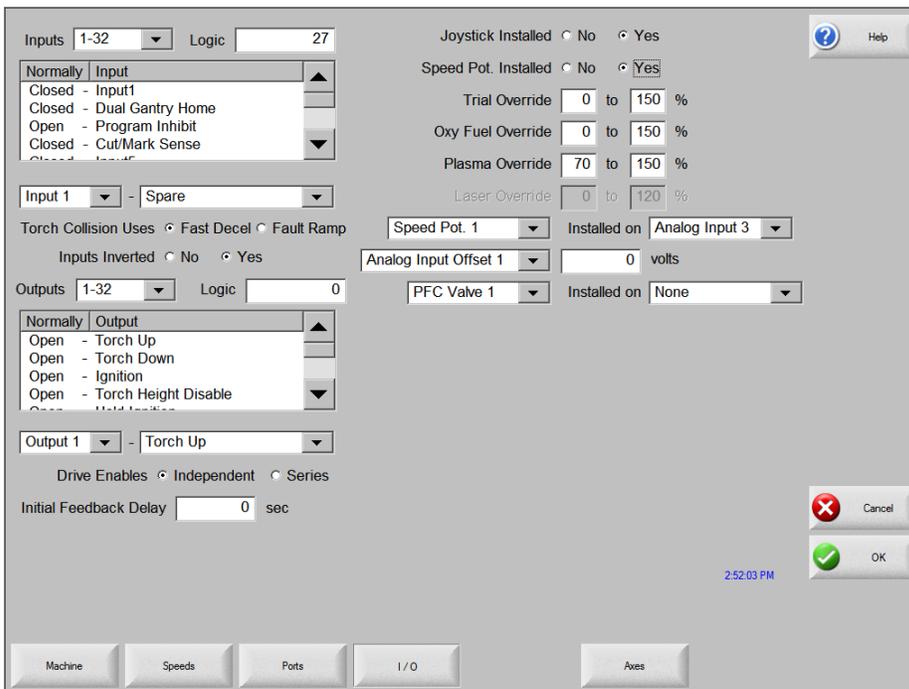
Input Mode	SW1-1	SW1-2
Lifter Limit Switch Enabled	On	On
Lifter Limit Switch Disabled	Off	Off

I/O Mating Connector

The I/O connector is a standard sex circular CPC connector from AMP Connector AMP 16C #206037-1
 Backshell AMP #206070-1
 Sockets 20-24AWG AMP #66105-3

I/O Setup Screen

The I/O setup screen is used to define inputs, outputs and their logic state.



Note: The input logic for the first twelve I/O would need to be inverted for Dry Contact Mode Inputs so that logic state is shown correctly for operational mode. An Inputs Inverted parameter has been provided for this purpose.

Front Panel I/O

Edge TI has dedicated I/O for operation of front panel switches. NOTE: For proper operation, these inputs should not be reassigned.

<u>Input #</u>	<u>Description</u>
24	Front Panel Start
25	Front Panel Stop
26	Front Panel Forward on Path
27	Front Panel Forward on Path
28	Raise Torch 1
29	Lower Torch 1
30	Front Panel Manual
31	Front Panel E-Stop

Lifter Interface

Edge Ti offers the option of an integrated Torch Height Control. The lifter interface connector is provided for this use. Lower Limit, Upper Limit and Breakaway inputs are sinking inputs to Field Common. Please refer to Sensor™ PHC manual for additional information.

Lifter Pinout (9 Pin Dsub)

<u>Pin#</u>	<u>Description</u>
1	Field +12VDC
2	Lower Limit (shared w/ general input 11)
3	Upper Limit (shared w/ general input 12)
4	Breakaway (Torch Collision)
5	Field Common
6	Field Common
7	Plate Contact -12Vdc
8	Plate Contact Sense
9	Plate Contact Common

Shared Inputs

Note that general inputs #11 and #12 are shared with the Lifter Interface Limit Switch inputs. These inputs can only be used as general purpose inputs if they are **NOT** used by the Lifter limit switches.

If you are using the Lifter Interface and limit switches are connected to these inputs you must, close DIP switches SW1-1 and SW1-2 and you should not connect to inputs #11 and #12. Note that the standard Hypertherm Lifter does not

Edge Ti

use limit switches and that the DIP switches SW1-1 & SW1-2 should be left open so that inputs #11 and #12 can be used.

Switch SW1-1 and SW1-2

Input Mode	SW1-1	SW1-2
Lifter Limit Switch Enabled	On	On
Lifter Limit Switch Disabled	Off	Off

Mating Connector

Use Hypertherm cable CABL-0207 or recommended 9 Pin Dsub (or equivalent)

Connector AMP #205204-3

Backshell Northern Technology #C88000209

Pins AMP #1-66506-0

Cabling: Use Belden # 9540 or equivalent

Plasma Interface

A plasma interface is provided as standard for Edge TI. This feature is used in conjunction with a Plasma Interface Module to provide connections at the Plasma Supply. Inputs and outputs are dry contact mode. Arc voltage is assigned to Analog Input 5. Please refer to Sensor™ PHC manual for additional information.

Plasma Interface Pinout (15 Pin Dsub)

<u>Pin#</u>	<u>Description</u>
1	Field +12VDC
9	Field +12VDC
2	Plasma Start Output (Cut Control)
10	Plasma Start Output (Cut Control)
3	Hold Ignition Output +
11	Hold Ignition Output -
4	Transfer Input + (Cut Sense)
12	Transfer Input - (Cut Sense)
5	Field Common
6	Field Common
7	Field Common
13	Field Common
14	Field Common
15	Electrode Arc Voltage (-)
8	Work Arc Voltage (+)

Mating Connector

Use Hypertherm cable CABL-0208 or recommended 15 Pin Dsub (or equivalent).

Connector AMP #205206-1

Backshell Northern Technology #C88000207

Pins AMP #1-66506-0

Cabling: Use Belden # 9541

External Interlock

An external interlock is provided to remotely disable servo power.

Interlock Pinout**Pin# Description**

1	Interlock Relay Coil (24VDC)
2	GND
3	GND
4	+24VDC (50 milliamps maximum)

Additional Notes:

1. For Servo Drive Amplifiers to operate, Pin 1 must be connected to GND Pin 2, typically through a remote mushroom type switch. If no remote switch is to be used, connect pin 1 to pin 2 with a jumper or the servo drives will not power on.
2. 24VDC is provided for use to activate the digital inputs only in the case where sourced inputs are selected, it must not be used for any other auxiliary purpose.

Mating Connector

Connector AMP #206060-1

Backshell AMP #206062-3

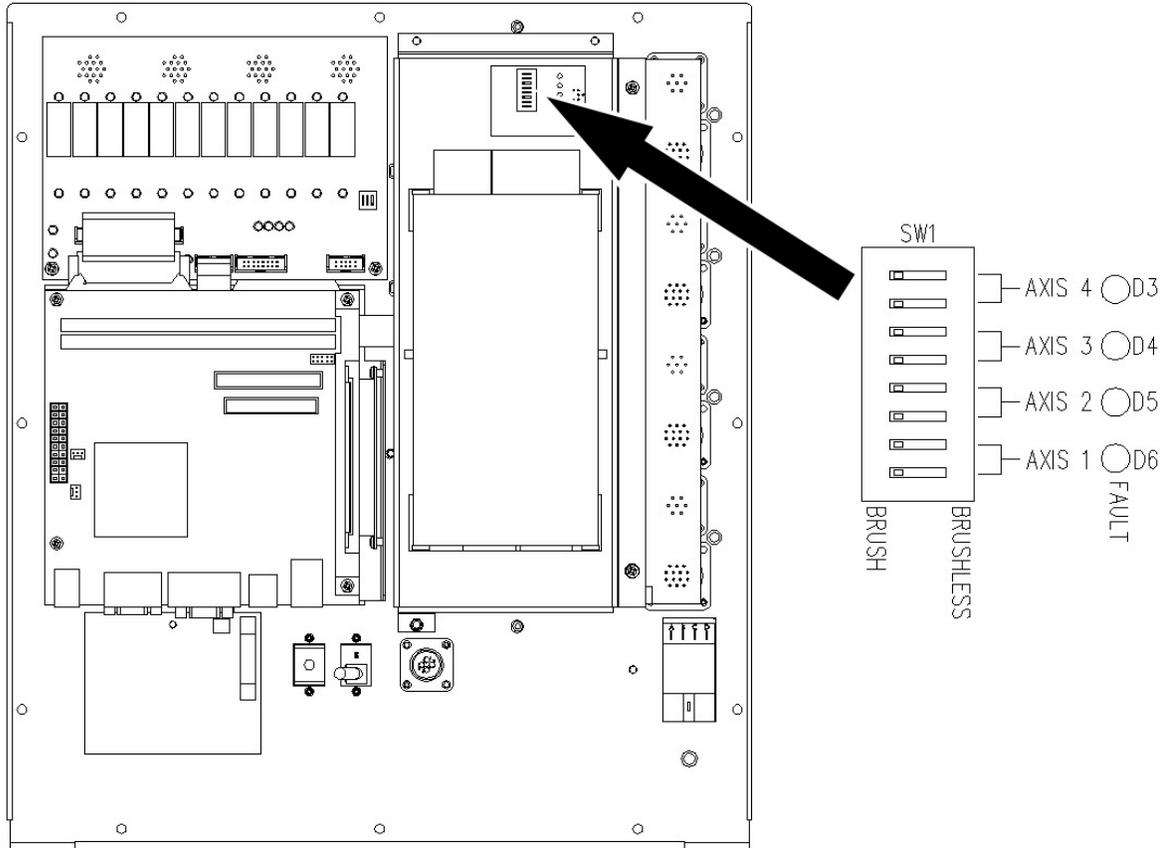
Sockets 20-24AWG AMP #66105-3

Motor Encoder Connections

Edge Ti supports DC brush and brushless motors. Switch SW1 on the drive interface can be used to select motor type being used. Please note the location and setting in the following illustration.

Drive Type selection on Axes Setup screen must be set to CURRENT mode.

Edge Ti



Motor Requirements

250 Watts (each amplifier, 1,000 watts total)

70 VDC Bus

4 Amps Continuous, 6 Amps Peak (for 2 seconds)

+5VDC differential encoders

Brushless motors also require Hall Effect sensors phased at 120 degrees

Axes Assignments

Axes	Axes Assignment
1 (X)	Transverse or Rail
2 (Y)	Transverse or Rail
3 (Z)	Dual Gantry, CBH, or THC
4 (W)	CBH, or THC

Motor Power Pinout

Pin#	Description
1	Brushless Motor-A or Brush +
2	Brushless Motor-B or Brush -
3	Brushless Motor-C
4	Brake + (24VDC, 250ma max)
5	Brake -
6	Cable Shield
7	No Connect

Additional Notes:

1. Brake output is limited to 250ma total. This output is only used on the THC vertical axis.

Drive Motor Mating Connector

Connector AMP #211399-1

Backshell AMP #206966-1

Sockets 16-18AWG AMP #66101-3

Cabling: Use Belden # 9552 or equivalent for brushed motor signals

Cabling: Use Belden # 9553 or equivalent for brushless motor signals

Encoder Pinout:

1	Encoder +5V
2	Encoder GND
3	Encoder Channel A
4	Encoder Channel A/
5	Encoder Channel B
6	Encoder Channel B/
7	Encoder Channel Z
8	Encoder Channel Z/
9	+V Hall Out (6V @ 30MA max)
10	Hall GND
11	Hall - A
12	Hall - B
13	Hall - C
14	Cable Shield

Edge Ti

Additional Notes:

1. Only 5 Volt encoders are supported.
2. Hall Sensors are used with Brushless motors only.
3. Inside the Edge Ti, dipswitches are used to select Brush or Brushless mode, 2 switches per axis. Can mix Brushed and Brushless if switches are set properly.
4. For optimum noise immunity, cable shields may be tied externally to the control enclosure.

Encoder Mating Connector

Connector AMP #206044-1

Backshell AMP #206070-1

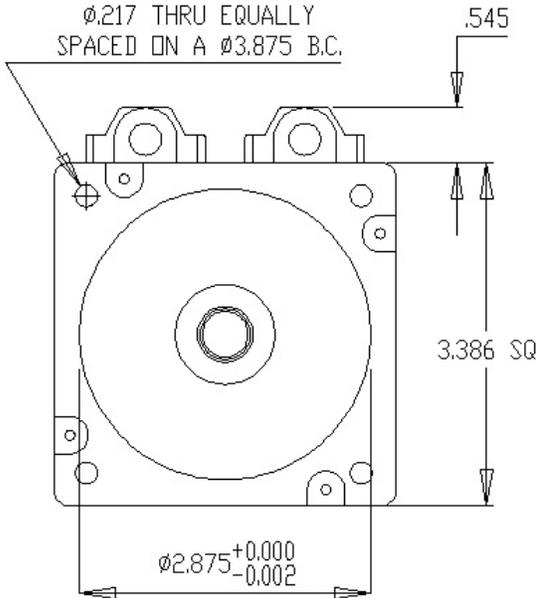
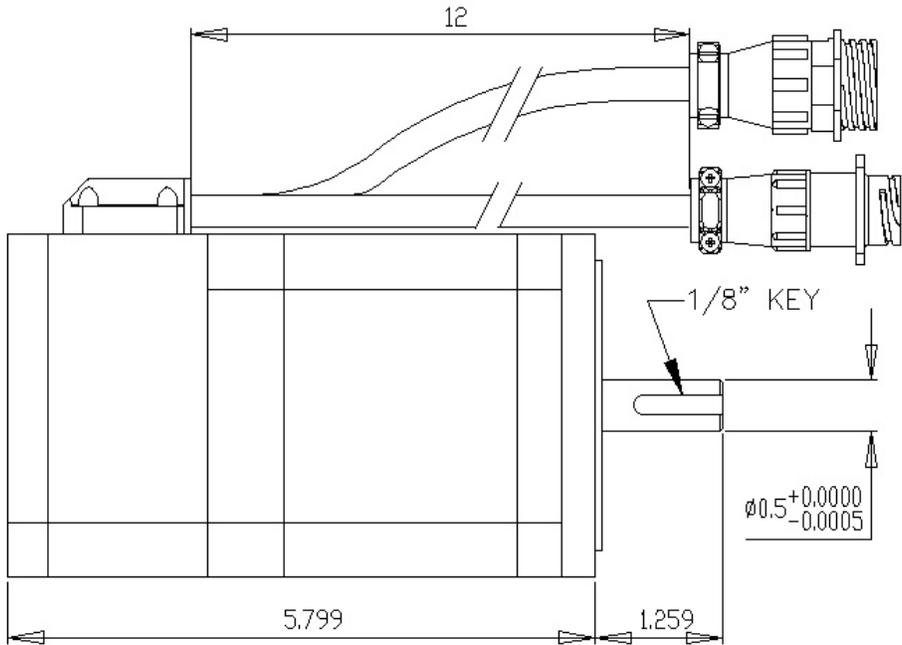
Pins (20-14AWG) AMP #66103-3

Cabling: Use Belden # 9504 or equivalent for brushed motor signals

Cabling: Use Belden # 9507 or equivalent for brushless motor signals

Reminder: Drive Type selection on Axes Setup screen must be set to CURRENT mode.

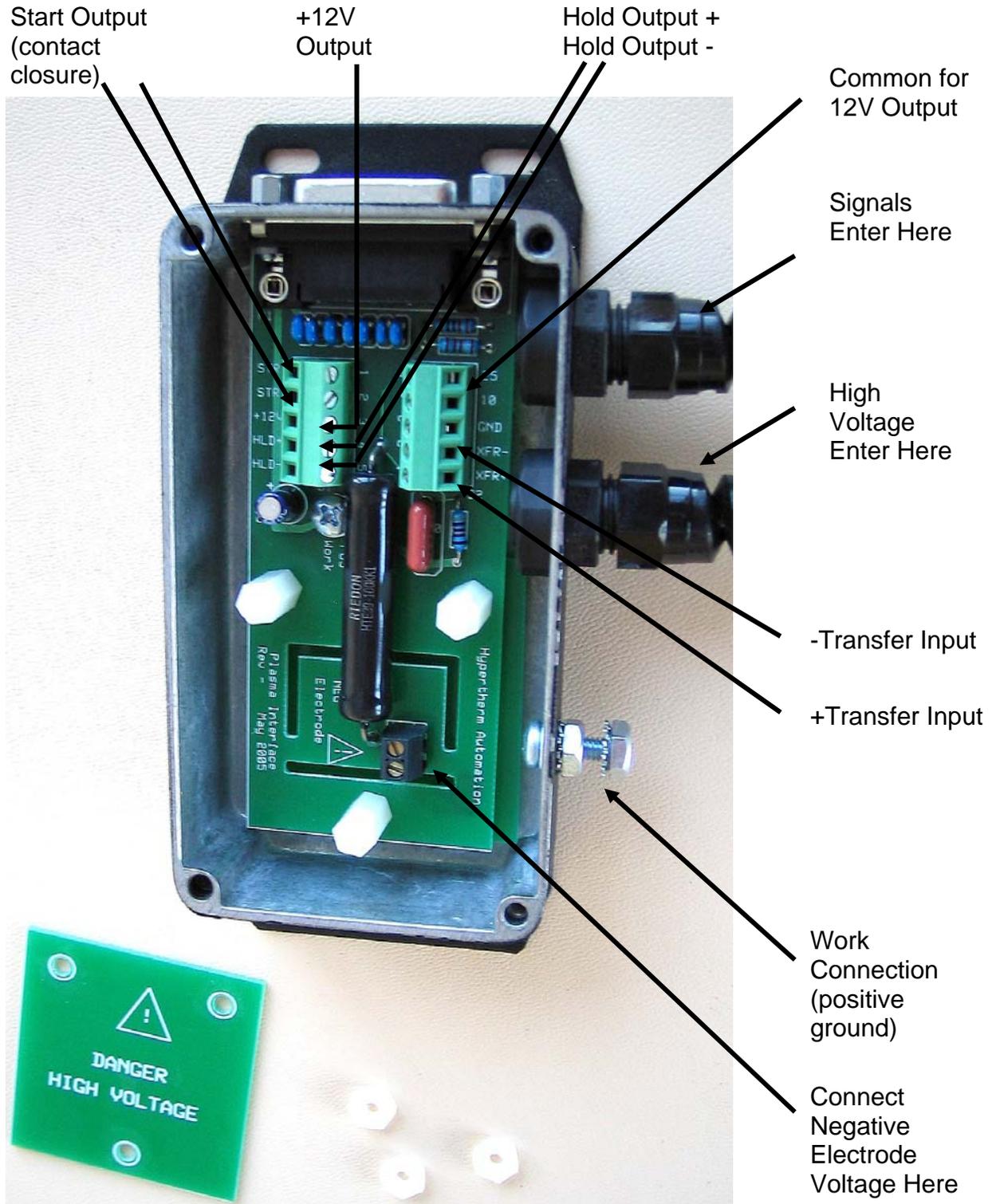
Optional Motor Information



MOTOR SPEC		
PARAMETERS	UNITS	VALUE
TORQUE CONSTANT	N-M/A	0.18
	IN-LB/A	1.56
VOLTAGE CONSTANT	V/KRPM	16
RESISTANCE	Ohm	0.14
INDUCTANCE	mH	0.45
CONT. STALL TORQUE	N-M	1.65
	IN-LB	14.6
CONT. STALL CURRENT	A	9.35
PEAK TORQUE	N-M	4.95
PEAK CURRENT	A	28.1
BACK EMF VOLTAGE	V	128
NO LOAD MAX SPEED	RPM	4000

Optional Lifter Assembly Information

Plasma Interface

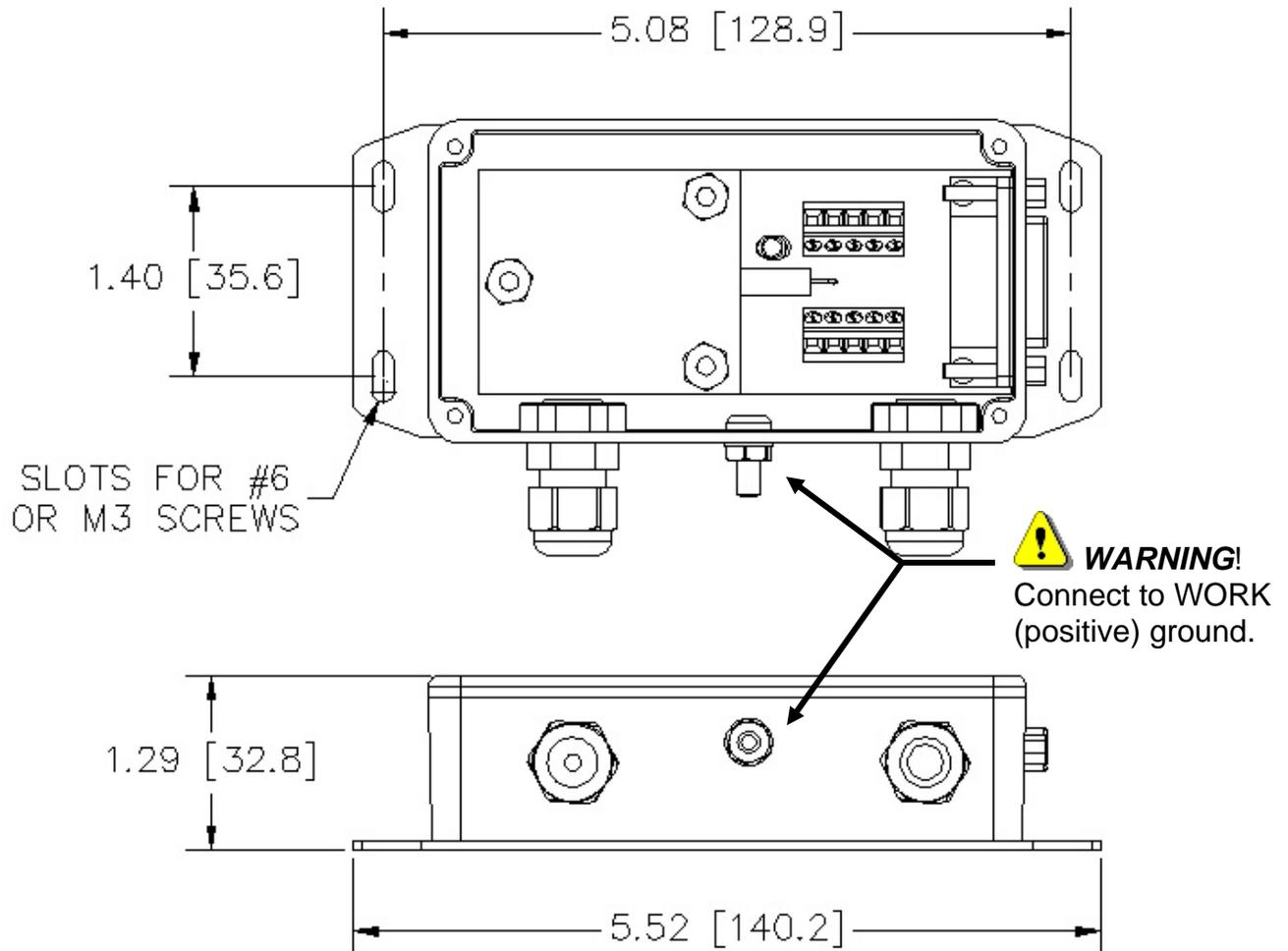


Plasma Interface Assembly Mounting

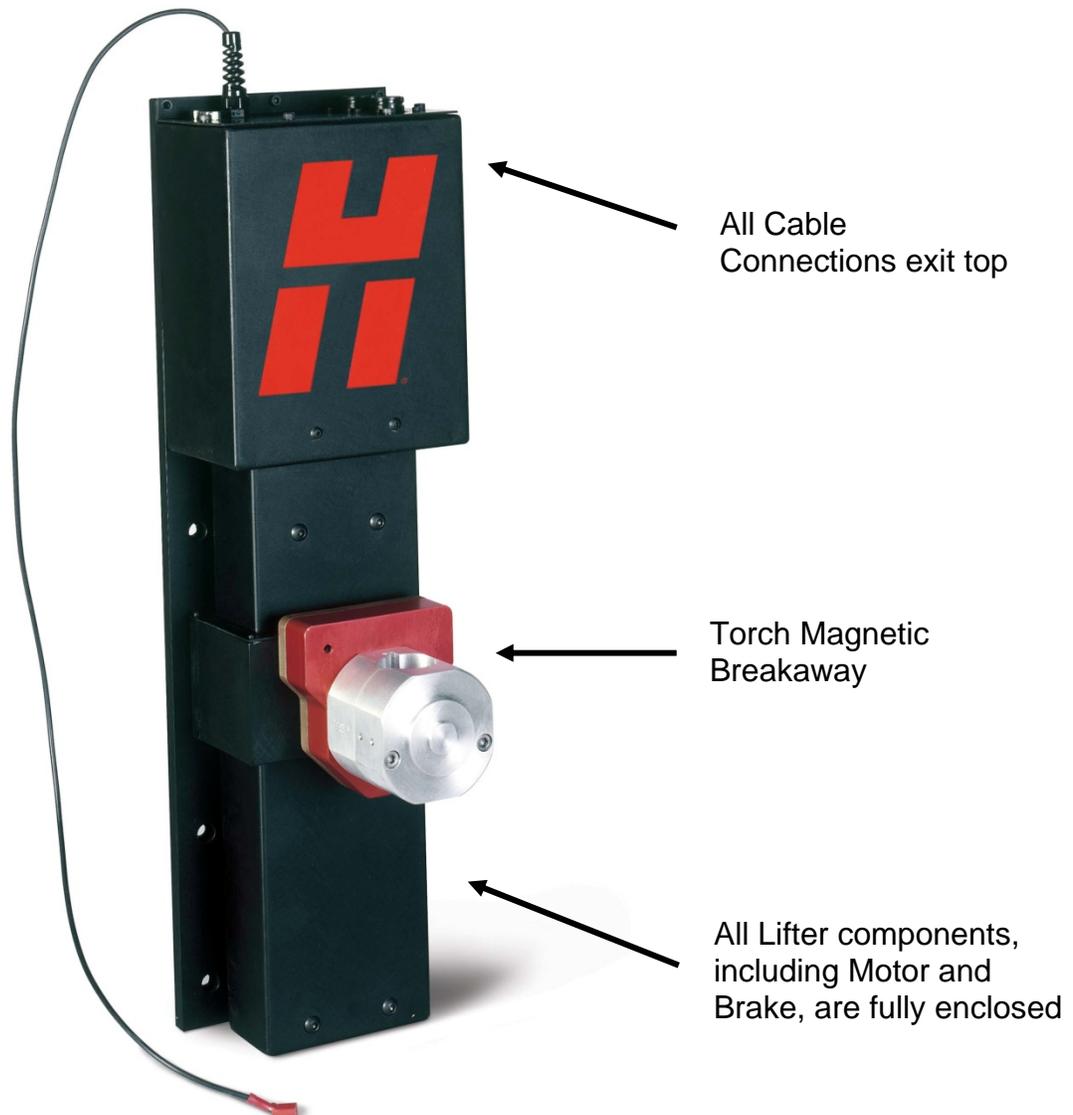
Mount the plasma interface assembly close to the plasma power supply for easy connection of arc voltage and signal wires between the units. The unit can be mounted in any position and can be mounted directly to the back or inside of the power supply. The mounting holes are sized for #6 or M3 fasteners. See Below



NOTE: For reliable operation the ground terminal must be connected to the plasma power supply positive ground. This connection provides the grounded positive arc voltage sense point.



Optional Lifter Assembly

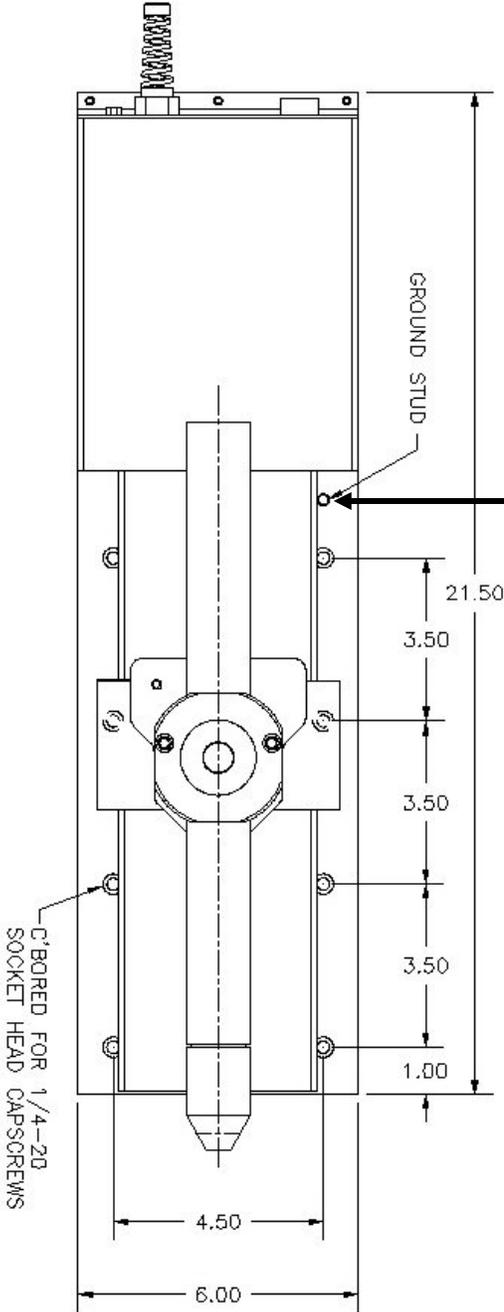
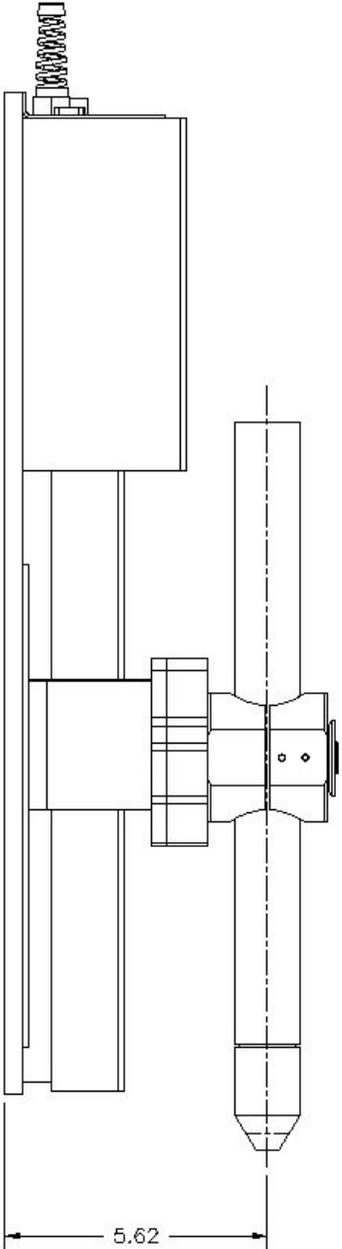


Lifter Assembly Mounting

Mount the lifter assembly on the cutting table. The lifter should be mounted to take the maximum advantage of the vertical travel range. Typically the bottom of the lifter should be between 6 and 8 inches above the cutting table. If required the torch breakaway gap set-screw can be adjusted to change the clamping force. For normal operation this adjustment is preset at the factory.



NOTE: For reliable operation the ground must be connected.



 **WARNING!**
Connect Ground
Here

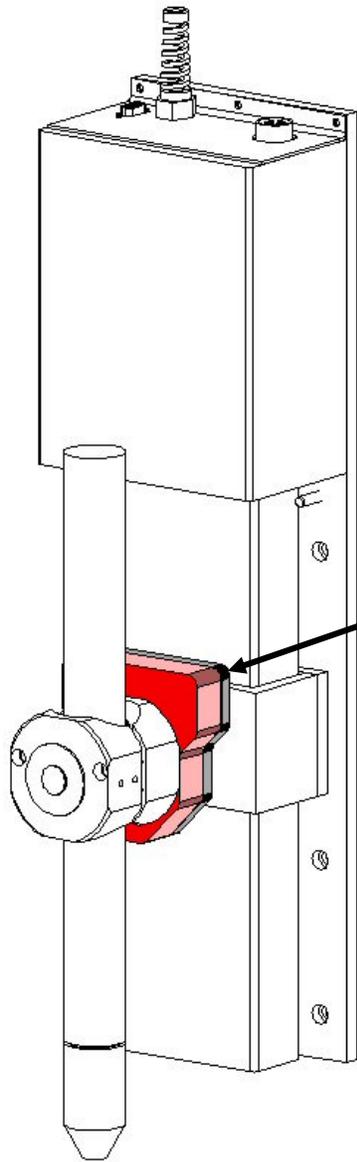
Torch Breakaway Assembly

The torch breakaway (MECO-0234) should be mounted to the lifter as shown in figure below.



CAUTION: The breakaway uses extremely strong magnets to clamp the two halves of the breakaway unit together. Extra care should be used when mating the two halves of the breakaway.

Hold the breakaway at a 45 degree angle to the mounting plate and carefully place the lower alignment pin into the mating depression on the breakaway back plate. Slowly angle the breakaway toward the back plate, being careful not to get your fingers pinched between the two halves. Once installed, it will be nearly impossible to separate the two halves without the leverage provided by the mounting block and torch.



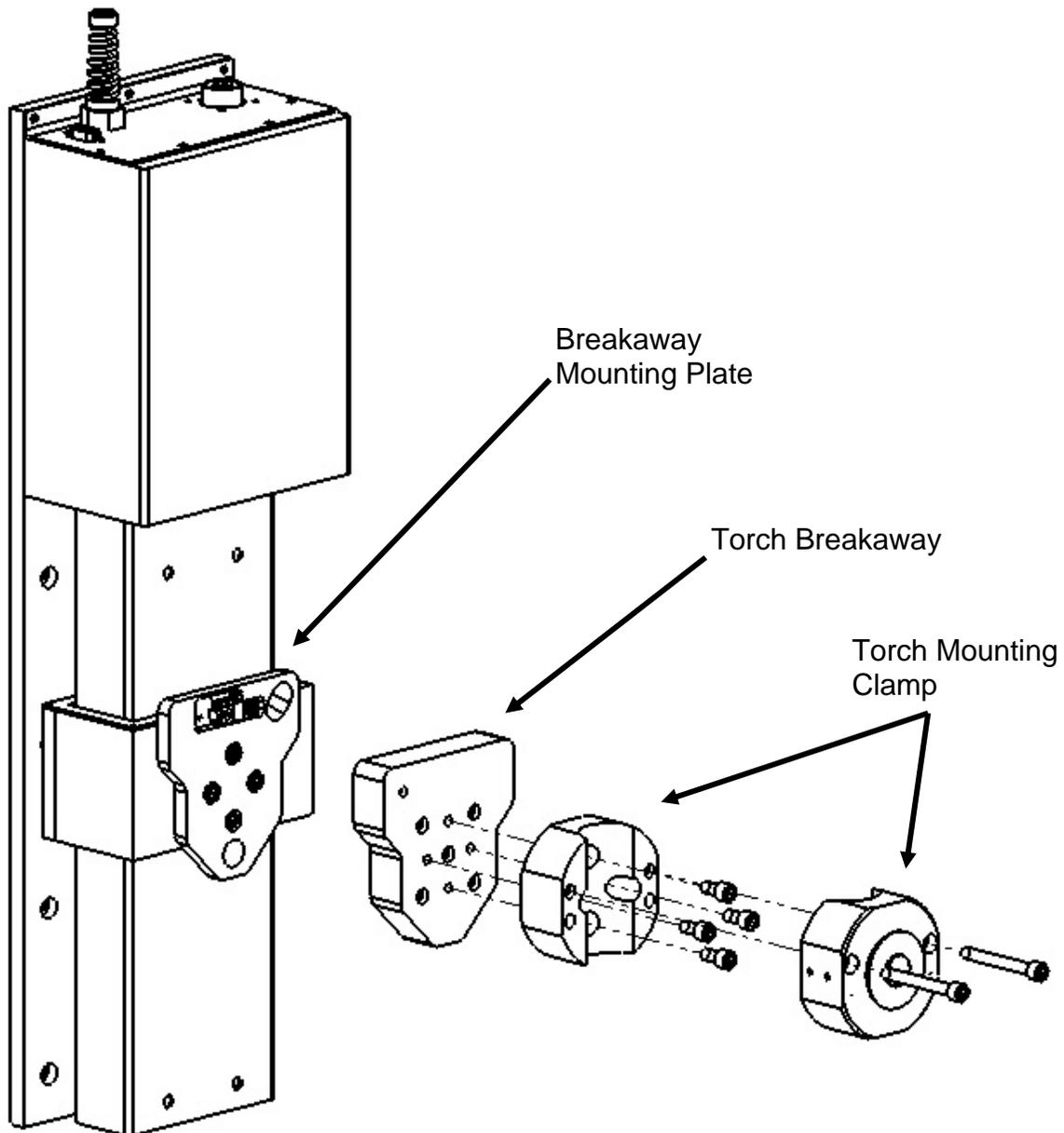
WARNING!
Pinch Point: Use Caution when mating two halves of Torch Breakaway Assembly.

Torch Mounting Block Kit

Mount the torch mounting block kit to the lifter torch breakaway assembly. See below.

The mounting blocks are available in three sizes as listed.

- PN = MECO-0108 Torch Mounting Block 1 3/4" diameter
- PN = MECO-0109 Torch Mounting Block 2" diameter
- PN = MECO-0130 Torch Mounting Block 1 3/8" diameter



Grounding Requirements



WARNING! To ensure personal safety, proper operation and to reduce electromagnetic interference (EMI), the PHC system must be properly grounded.

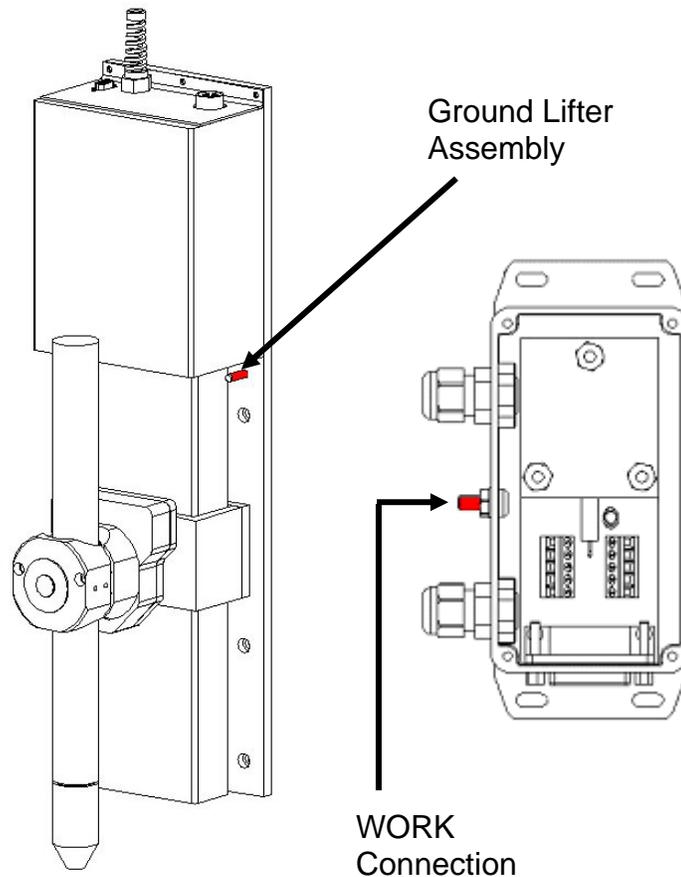
Power cord grounding

The PHC control module must be properly grounded through the power cord according to national or local electrical codes.

Protective earth ground

Install protective earth (PE) grounding cables to the PHC components as shown below. Grounding must comply with national or local electrical requirements.

Note: The PE (Ground) cables must be supplied by the customer.



Voyager III

Overview

The Voyager III™ PC based CNC control for the metal cutting industry utilizes our proprietary Graphical User Interface (GUI) and *SoftMotion* Technology. Voyager III provides the user with increased performance and greater operational flexibility utilizing a 15" touch screen display, 2.4Ghz Intel processor, proprietary operational software and a unique SERCOS/Analog machine interface. Common applications for Voyager class controls include: bevel head systems, multiple Sensor Torch Height Controls and other advanced systems requiring more than four axes for machine interfacing.

Touch Screen

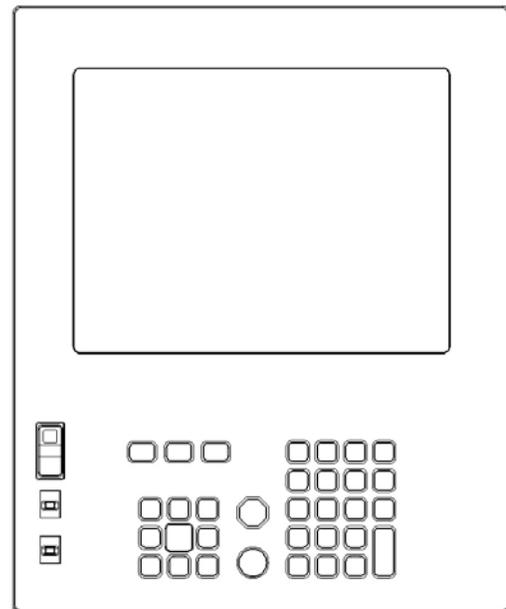
The 15" display used in the Voyager III is a patented IntelliTouch Surface Wave technology which provides precise drift free touch accuracy and unsurpassed clarity. Pure glass construction with tiny transducers on the back of the touch screen preserves color purity and works even if scratched. There is no known wear out mechanism as there are no layers, coatings or moving parts. IntelliTouch technology has been tested by the supplier for more than 50 million touches in one location without failure.

THC, Joystick & Speedpots

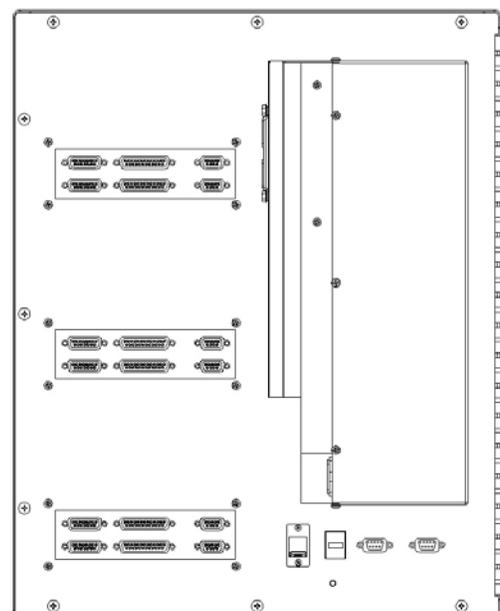
Optional features for Sensor THC, Joystick and Speedpots are offered.

Note: Use of some devices such as USB memory devices may require loading of a device driver for operation.

Voyager III™



Rear View



Voyager III

Voyager III incorporates a unique machine interface designed by Hypertherm Automation to convert SERCOS (Serial Real Time Communication) to a traditional analog interface. For those not familiar with SERCOS, it is a fiber optic communication ring for commanding motion and controlling I/O that is available from many drive suppliers.

This new interface approach allows Voyager III to offer three styles of machine interface, increasing system flexibility for wiring and features.

Interface options:

- 1) The standard configuration of Voyager III uses SERCOS internally but provides a traditional and familiar analog machine interface on the back of the CNC.
- 2) Standard SERCOS interface with a fiber optic cable connected to SERCOS amplifiers and I/O.
- 3) The new SERCOS to Analog conversion card (part # ASSY-0191) is mounted externally using fiber optic communications to the card. The card then provides a traditional analog interface output to motion amplifiers and I/O.

Each interface card offers two axes of motion, thirty-two (16/16) 24VDC positive logic inputs and outputs, plus two analog inputs for Speedpot and Sensor THCs.

The information contained in this section is intended to provide the basic information for connection of the Voyager III™ Shape Cutting Control to the cutting table. Each machine interface will vary slightly based on the cutting table configuration and features. Additionally, I/O pinout information may vary slightly based on the configuration of the selected I/O and their locations. Changes to the I/O configuration may be made in the password protected I/O screen. All controls are shipped with the default selection of Inputs and interface locations for the selected control Interface (I/O) configuration. Installation and service should only be performed by a qualified service technician. For more information regarding the I/O process definitions, please refer to the Setups section of this guide.

Setups

X Axis Orientation	<input checked="" type="radio"/> Transverse <input type="radio"/> Rail	Table Size X	<input type="text" value="48"/> in	Y	<input type="text" value="96"/> in
Up Direction	<input checked="" type="radio"/> +Y <input type="radio"/> +X <input type="radio"/> -Y <input type="radio"/> -X	Sensor THC's Installed	<input type="text" value="0"/>		
Right Direction	<input checked="" type="radio"/> +X <input type="radio"/> -X	<input type="text" value=""/>	Installed on	<input type="text" value=""/>	Analog 1
Dual Gantry Installed	<input checked="" type="radio"/> No <input type="radio"/> Yes	Ignore Torch Collision During IHS <input checked="" type="radio"/> No <input type="radio"/> Yes			
CBH Installed	<input checked="" type="radio"/> No <input type="radio"/> Yes	X and Y Motor/Encoder <input checked="" type="radio"/> Normal <input type="radio"/> Swapped			
Auto Torch Spacing	<input checked="" type="radio"/> No <input type="radio"/> Yes	Tilt Rotator Installed <input checked="" type="radio"/> No <input type="radio"/> Yes			
Dual Tilt Rotator Installed	<input checked="" type="radio"/> No <input type="radio"/> Yes	Auto Home at Power Up <input checked="" type="radio"/> No <input type="radio"/> Yes			
Follower Initially	<input checked="" type="radio"/> Off <input type="radio"/> On	SERCOS Configuration			
Scaled Rotator Motion	<input checked="" type="radio"/> No <input type="radio"/> Yes	Drive Type <input type="radio"/> Pac Sci <input type="radio"/> Indramat <input type="radio"/> Yaskawa			
Scale Factor	<input type="text" value="0"/>	<input type="radio"/> Kollmorgen <input checked="" type="radio"/> SMCC			
Dual Tilting Rotator	<input type="radio"/> No <input type="radio"/> Mode 1 <input type="radio"/> Mode 2	Update Rate <input checked="" type="radio"/> 1 mSec <input type="radio"/> 2 mSec			
Key Press Logging	<input checked="" type="radio"/> No <input type="radio"/> Yes	Baud Rate <input type="radio"/> 2 MB <input type="radio"/> 4 MB <input type="radio"/> 8 MB <input checked="" type="radio"/> 16 MB			
		Light Level <input checked="" type="radio"/> Low <input type="radio"/> Medium <input type="radio"/> High			
		Drive I/O <input type="radio"/> None <input type="radio"/> OTrav/Home Only <input checked="" type="radio"/> All I/O			
		Reco I/O at Address 50 <input checked="" type="radio"/> No <input type="radio"/> Yes			
		HPR/4070 at Address 60 <input checked="" type="radio"/> No <input type="radio"/> Yes			
		HTA I/O at Address 70 <input type="radio"/> No <input checked="" type="radio"/> Yes			
Machine	Speeds	Ports	I / O	Axes	Done

Drive Type

The manufacturer of the SERCOS style drive being used would be selected. This allows proper operation and tuning parameters to be available. SMCC is the default setting for Voyager III.

Update Rate

The update rate for the ring may be selected for motion and I/O. One millisecond is the default setting for Voyager III.

Baud Rate

Communication rate for the ring may be selected. 16 Mbaud is the default setting for Voyager III.

Light Level

The user has the ability to adjust the intensity of the light pulses used on the fiber optic ring. This feature is used to compensate for diminished signal due to issues such as ring distance. Low is the default setting for Voyager III

Drive I/O

The user may select to use I/O options directly supported on the Drive Amplifier. Options are None, Overtravel and Home Switches only or All I/O. Note: The Drive I/O will populate the general purpose I/O (both analog and digital) in order from the lowest SERCOS drive axis to the highest SERCOS drive axis. All I/O is the default setting for SMCC / Voyager III interface.

RECO I/O at Address 50

This parameter is set to Yes if the Indramat RECO I/O module is being used to expand the total number of I/O being used on the standard fiber optic ring. Note: The RECO I/O will populate the general purpose I/O (both analog and digital) following all drive I/O. The default setting for Voyager III is NO.

HTA I/O at Address 70

This parameter is set to Yes if one of the SERCOS to Analog cards is set to be used for I/O expansion.

Common Status Messages

Starting Up Drives on SERCOS Ring. Phase 1 -4

This is a status message to indicate the SERCOS ring power up and will advance through phases 1-4. Failure to reach phase 4 indicates a problem with power up. Cycle power to initiate SERCOS phase up again. If the system repeatedly fails to enable the SERCOS ring, contact your vendor for assistance.

SERCOS Ring not Running. Restart Ring?

This status message indicates the SERCOS ring is currently not running. You may see this when a command such as a motion command is requested but the RING was not enabled. Restart of the ring is recommended.

Updating SMCC software.....

After a control software update, the SERCOS to Analog card software may also be updated at restart of SERCOS ring. It is important not to interrupt this update sequence.

SERCOS Ring Not Running. Please Check Power, Status of LEDs on Drives and I/O Modules, Fiber Optic Ring Connections and SERCOS Baud Rate.

This status message indicates the SERCOS ring is not running after power up. It is recommended to check hardware and parameters then restart the ring by power cycle.

New Setups May Require Restarting SERCOS Ring to Take Effect. Restart SERCOS Ring?

When changes are made to system configuration that affect the SERCOS ring operation, you may be prompted to restart the ring. Restart of the ring is recommended.

SERCOS Drives Not Enabled and Ready. Please Check Drive are Enabled and Ready with No Errors.

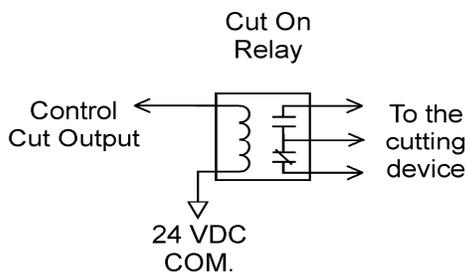
This status message indicates the SERCOS ring is not running due to a missing enable signal. First check that the Control Enable Disabled softkey is correct. The softkey should read DISABLE CONTROL. Then check status of ring hardware or external drives to ensure there are no errors displayed.

Machine Interface

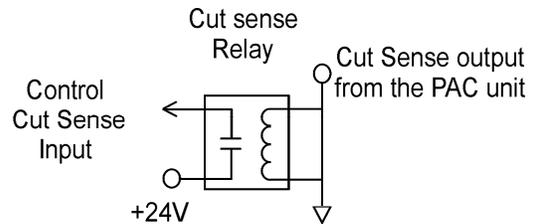
I/O Configuration Type “V” (Positive Logic Single Ended I/O)

Connecting single ended I/O to the control. The control provides +24V power on pins 22, 23 & 24 (+24 VDC) and pins 9, 10, 11 &12 (24 VDC Common) on the I/O connector.

Output tied to external Cut On

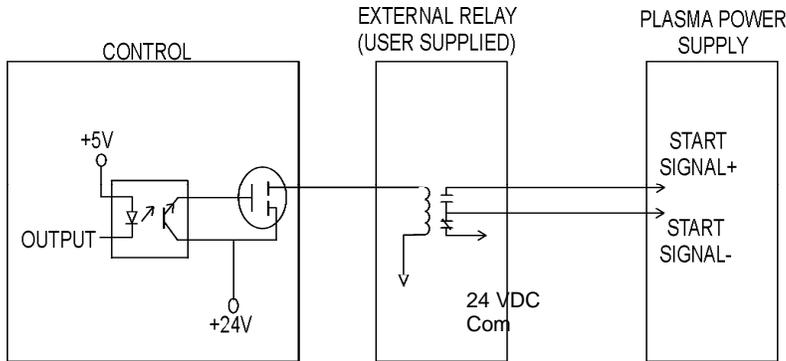


Input tied to Cut Sense Relay

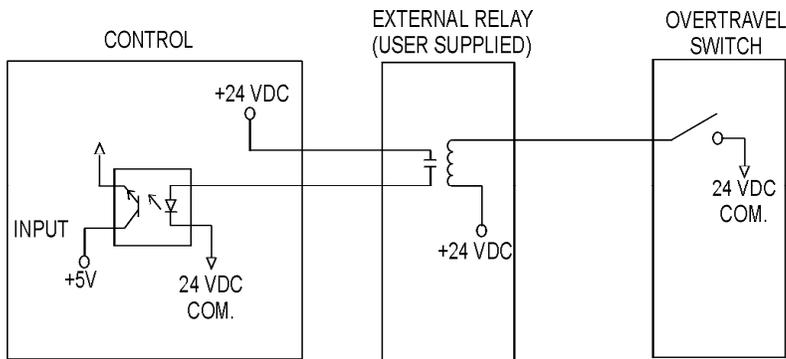


Examples of possible circuits

Output



Input



Single Ended I/O Pinout

The Single Ended I/O offers up to 48 outputs which are rated at 24VDC for up to 1-amp loads and 32 inputs rated for 24VDC as standard

I/O Connector

Pin	Description
1	Output 1
2	Output 2
3	Output 3
4	Output 4
5	Output 5
6	Output 6
7	Output 7
8	Output 8
9	+24 VDC Common
10	+24 VDC Common

- 11 +24 VDC Common
- 12 +24 VDC Common
- 13 Watchdog Contact
- 14 Input 1
- 15 Input 2
- 16 Input 3
- 17 Input 4
- 18 Input 5
- 19 Input 6
- 20 Input 7
- 21 Input 8
- 22 +24 VDC
- 23 +24 VDC
- 24 +24 VDC
- 25 Watchdog Contact

Note: Wiring pattern continues incrementally for I/O 9-16, 17- 24, 25-32, 33-40, 41-48

Mating Connector

Connector: 25C D-Sub Amp # 207464-2 or equivalent
 Backshell: Amp #748676-3 or equivalent
 Pins: Amp #5-66506-9 (20-24 AWG) or equivalent

Axes	Connector Location*	Axes Assignment
1	Axis 0	X- Transverse or Rail
2	Axis 1	Y- Transverse or Rail
3	Axis 2	Dual Gantry, CBH, Rotate or THC
4	Axis 3	CBH, Tilt or THC
5	Axis 4	Rotate or THC
6	Axis 5	Tilt or THC

Note: Markings on backdoor machine interface for Axes are zero based.

Drive/ Encoder Pinout

Pin	Description
1	Channel A Input
2	Channel B Input
3	Channel Z Input
4	Encoder Power Output (5 VDC supplied as standard)
5	Field Common
6	Servo Output ($\pm 10V$)
7	Drive Enable In (relay contact)
8	Field Common
9	Channel /A Input
10	Channel /B Input

Voyager III

- 11 Channel /Z Input
- 12 Field Common
- 13 Field Common
- 14 Servo Output Common
- 15 Drive Enable Out (relay contact)



Note: Cable Shields should be connected to chassis ground.

Drive/ Encoder Input Mating Connector

Connector: 15C D-Sub Amp # 25206-3 or equivalent

Backshell: Amp #748676-2 or equivalent

Pins: Amp #5-66506-9 (20-24 AWG) or equivalent

Note: Wiring pattern continues for additional Axes

Analog Connection Pinout

Note on analog connector: For operational flexibility, inputs and outputs have a shared logic and are provided in both positive logic (+24VDC) and negative logic (24VDC common).

In this application shared I/O means that a single I/O assignment is offered at three locations.

Example: Output 15 could be assigned as the I/O connector a Nozzle Contact Enable. Once assigned in software, this output signal would be available as:

- A positive logic output on second I/O connector Pin 20
- A positive logic output on analog connector Pin 7
- A negative logic output on analog connector Pin 8

Analog 1

Pin #	Designation	Description
1	Analog 1 +	Analog Input (0-10VDC)
2	Analog 1 -	Analog Common
3	+24VDC	
4	Duplicate Input 15	Positive logic shared input 15
5	Field Common	
6	Alternate Input 15	Negative logic shared input 15
7	Duplicate Output 15	Positive logic shared output 15
8	Alternate Output 15	Negative logic shared output 15
9	Field Common	

Note: Wiring pattern continues for Analog 2-6
Assignable shared I/O locations are 15, 16, 31, 32, 47, 48

Mating Connector

Connector: 9C D-Sub Amp # 205204-4 or equivalent

Backshell: Amp #748676-1 or equivalent

Pins: Amp #5-66506-9 (20-24 AWG) or equivalent

Sensor THC Interface**Analog 9C Divider J2**

Pin #	Description	Pin #
5	24V Common	1
6	Nozzle Contact Sense	3
8	Nozzle Contact Enable	4
1	Analog In+	6
2	Analog In-	7
Chassis	Shield	No Connection

Mating Connector

Connector: 9C D-Sub Amp # 205204-4 or equivalent

Backshell: Amp #748676-1 or equivalent

Pins: Amp #5-66506-9 (20-24 AWG) or equivalent

Cable Belden #9505 or equivalent

Note: Wiring pattern continues for Analog 2-6

The Hold Ignition Input should be wired to the Power Supply through an external relay from the I/O connector. Refer to instructions from supply manufacturer for details on connection to the Hold Ignition Input.

Voltage Divider Card Pinout (Series 3)

Part # PBS-0061

Divider PCB - 2C Connector J1**Pin # Description**

1	85 -265 VAC Power Input (47-63Hz)
2	85 -265 VAC Neutral Input

Mating Connector

2C Phoenix Connector – Phoenix Part # 1840366

Divider PCB - 8C Connector J2 to Control Analog Connector**Pin # Description**

1	+24 VDC Common
3	Nozzle Contact Sense
4	Nozzle Contact Enable
6	Analog Out +
7	Analog Out –
8	E Ground

Mating Connector

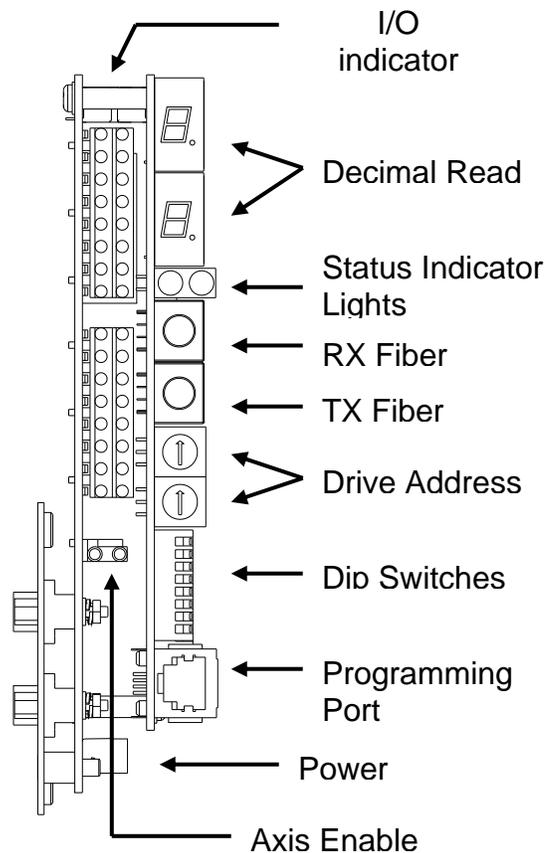
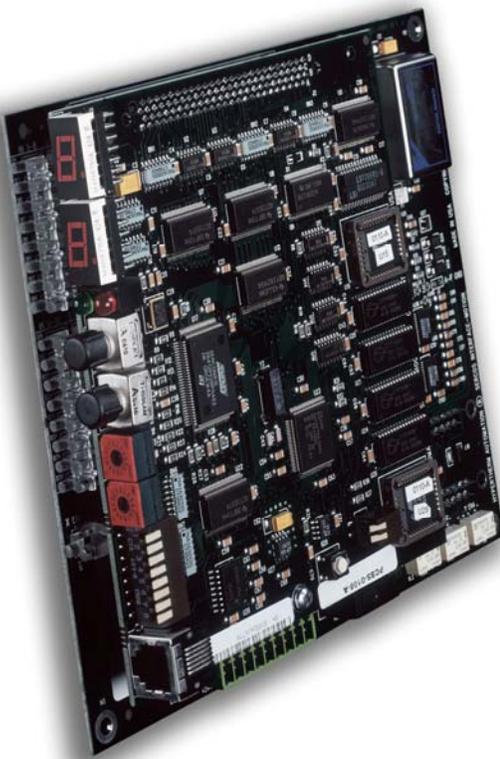
8C Phoenix Connector – Phoenix Part # 1803633

Divider PCB - 5C Connector J3 to Plasma Supply / Table

Pin # Description

- 1 Ground (Chassis Ground)
- 2 Electrode (Plasma DC -)
- 3 Work (Plasma DC +)
- 4 NC
- 5 Shield (Nozzle Contact)

SERCOS to Analog Conversion Card



Decimal Read Out

The 7 segment display indicates SERCOS ring phases status 1-4. Additionally, the 2 decimal points in the 7 segment display indicate phase condition for the SERCOS ring and are on immediately after CNC boot up and reset. They remain on until the ring is successfully phased up to phase 4. After that the decimal points remain off even if the ring drops from phase 4. With this approach, if the SERCOS ring is not running, you can determine if the ring has

ever made it to phase 4 during that power on cycle. This assumes the card has not been reset or lost power.

Status Indicator Lights

A Red and Green light are provided to indicate status of the SERCOS ring. Red indicates a Fault and Green indicates a RUN status.

Drive Address Rotary Hex Switches

Factory settings are as follows:

For Axes 1 and 2: SW1 = 0, SW2 = 1

For Axes 3 and 4: SW1 = 0, SW2 = 3

For Axes 5 and 6: SW1 = 0, SW2 = 5

For Axes 7 and 8: SW1 = 0, SW2 = 7

For Axes 9 and 10: SW1 = 0, SW2 = 9

For Axes 11 and 12: SW1 = 0, SW2 = B

Note: Markings on backdoor machine interface for Axes are zero based.

Address Rotary Hex Switches (for I/O only)

For I/O Expansion Interface (no Axes being used): SW1 = 7, SW2 = 0

Programming Port

This is for factory use only.

Dip Switch Settings

Fiber Optic Light Level:

Location SW3

Low Level (0-15 meters): 1 = OFF, 2 = OFF (Default setting)

Medium Level (15-30 meters): 1 = OFF, 2 = ON

High Level (30-45 meters): 1 = ON, 2 = OFF

Highest Level (>45 meters): 1 = ON, 2 = ON

Baud Rate:

Location SW3

16 MBAUD 3 = ON, 4 = ON (Default setting)

8 MBAUD 3 = ON, 4 = OFF

4 MBAUD 3 = OFF, 4 = ON

2 MBAUD 3 = OFF, 4 = OFF

Reserved:

Location SW3

5 = OFF, 6 = OFF, 7 = OFF, 8 = OFF

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Flash Write Jumpers:

Location SW4

1 = ON, 2 = ON

Reset Button:

SW5 – Press to reset card

Error Codes:

E1 Display Code = "Voltage or Temperature Error Detected!"

Displayed if voltage or temperature sensors on Field Interface board indicate an error. Please check power supply, wiring and connections.

E2 Display Code = "Bad Checksum for SMCC Software!"

Displayed if checksum for SERCOS Slave Flash Program is not correct. Program needs to be reloaded using the Serial Port connection.

E3 Display Code = "Wrong Interface Board Detected for Selected SERCOS Address!"

Displayed if the selected SERCOS Slave Address/SERCOS Slave mode does not match the Field Interface functionality. For example, using an HPR Field Interface with a SERCOS Slave card set to Drive Address 1-12 is not possible, since these are axes SERCOS addresses only, not peripheral I/O SERCOS addresses.

Mariner

Overview

Mariner™ offers motion control operation of up to 12 axes with 1024 I/O signals with SERCOS Interface, providing a high degree of flexibility in operation and table configurations. This control system supports Multiple Sensor Torch Height Controls, Tilt/Rotate, Dual Tilt/Rotate and Dual Transverse motion axes along with direct communication to Hypertherm's HD3070 HyDefinition Autogas Console, HD4070 HyDefinition and HPR Plasma systems. A unique Laser process screen directly integrates to Hypertherm's FASTLaser head. This product uses type "V" software.

Touch Screen

The 15" display used in the Mariner control is a patented IntelliTouch Surface Wave technology which provides precise drift free touch accuracy and unsurpassed clarity. Pure glass construction with tiny transducers on the back of the touch screen preserves color purity and works even if scratched. There is no known wear out mechanism as there are no layers, coatings or moving parts. IntelliTouch technology has been tested by the supplier for more than 50 million touches in one location without failure.

THC, Joystick and Speedpots

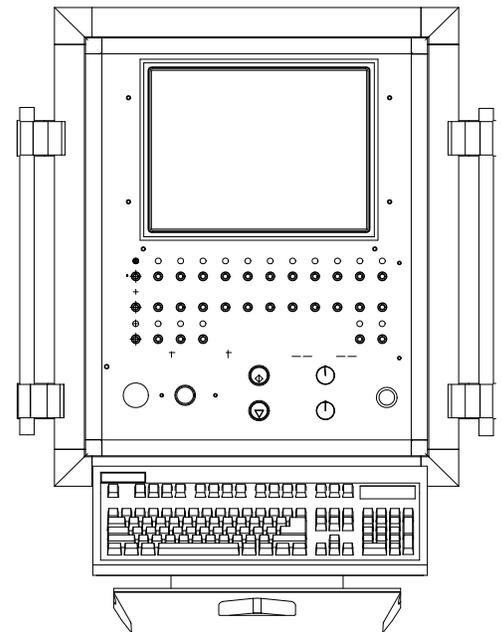
Features for Sensor THC, Joystick and Speedpots are provided as standard. Connection and operation information is provided in the Operators and Installation Guide provided with this product.

Note: Use of some devices such as USB memory devices may require loading of a device driver for operation. Many standard device drivers are located in the C:\CABS or D:\CABS\I386 folders.



Operation and maintenance of automated equipment involves potential hazards. Personnel should take precautions to avoid injury. This equipment should only be opened by trained service personnel.

Mariner™



Mariner

The Mariner Shape Cutting Control is designed with all machine interface connections passing through the pedestal mount at the base of the enclosure. Motion and I/O are supported via the fiber optic communication ring of the SERCOS Interface.

The information contained in this section is intended to provide the basic information for connection of the Mariner Shape Cutting Control to the cutting table. Each machine interface will vary slightly based on the cutting table configuration and features.

AC Input Pinout

TB connector	Description
101	110VAC or 220VAC Input (Hot)
102	110VAC or 220VAC Input (Neutral)
	AC Power Ground

Recommended Wire

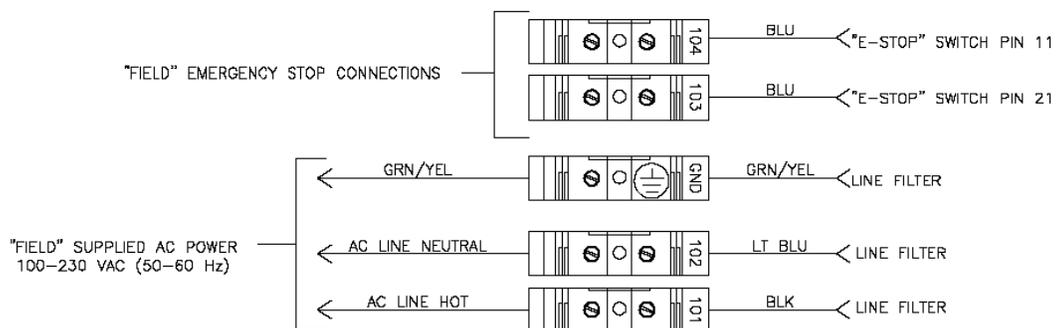
14 AWG or greater

E-Stop

The E-stop Switch provides normally open contacts rated at 20VAC/500mA minimum to 250VAC/6A maximum.

TB connector	Description
103	Contact Closure
104	Contact Closure

Diagram Location Din-02



SERCOS Motion and I/O

As noted previously, Motion and I/O are supported via the fiber optic communication ring of the SERCOS Interface. Digital and Analog I/O are supported.

Motion is controlled through address assignments for the axes. Inputs and Outputs work on a similar assignment in SERCOS and may be mapped at the I/O configuration screen.

Details for wiring the motion and I/O are specific to the specific SERCOS hardware being used. Please refer to the appropriate supplier for interfacing information.

Mariner

Printed in the USA

806290-000