Hypertherm®

HPR130XD®, HPR260XD®, and HPR400XD® EtherCAT® and VDC3 Board Installation

Field Service Bulletin

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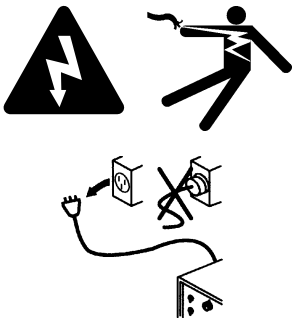
Introduction

⚠ WARNING



ELECTRIC SHOCK CAN KILL

Disconnect electrical power before performing any maintenance.

All work requiring removal of the plasma power supply cover must be performed by a qualified technician.

See the *Safety and Compliance Manual* (80669C) for more safety precautions.

⚠ CAUTION

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.

Purpose

EtherCAT communications between an HPRXD® plasma power supply and an EDGE® Connect computer numerical controller (CNC) require an EtherCAT plasma interface board. Arc voltage feedback to the CNC from the plasma power supply requires a voltage divider board/VDC3 board. You install both boards in the plasma power supply.

If the plasma power supply already has a VDC3 board installed, **remove the existing VDC3 board**. Only use the VDC3 board supplied in the kit.

This Field Service Bulletin describes how to install an EtherCAT plasma interface board and a VDC3 board in an HPR130XD, HPR260XD, and HPR400XD plasma power supply, and how to make all the necessary cable and wire connections.

Two kits are available:

- HPR130XD/HPR260XD Interface EtherCAT Adapter (kit 428489)
- HPR400XD Interface EtherCAT Adapter (kit 428447)

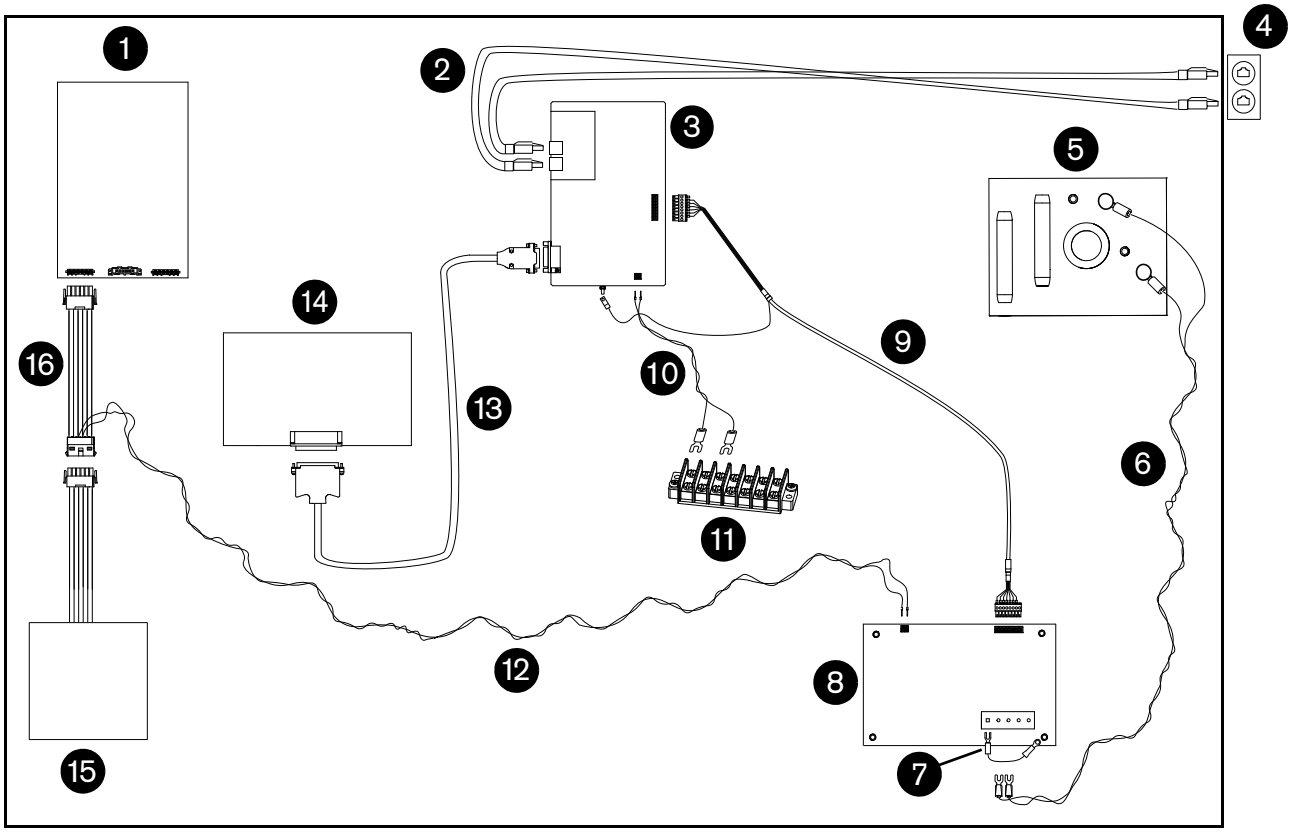
This Field Service Bulletin includes instructions for both kits.

- For kit 428489 instructions, see *Install kit 428489 in an HPR130XD or HPR260XD* on page 9.
- For kit 428447 instructions, see *Install kit 428447 in an HPR400XD* on page 28.

Diagram of board, cable, and wire connections

See *Figure 1* for an overview of the board, cable, and wire connections inside the plasma power supply.

Figure 1 – Connections inside the plasma power supply



1 Board: power distribution

2 Cables: EtherCAT RJ45 CAT5E double-shielded (223508 or 223672)

3 Board: HPR EtherCAT plasma interface (229829)

4 Connectors: bulkhead EtherCAT cable (208367)

5 Board: I/O

6 Wires: arc voltage

7 Cable: VDC3 board ground strap (223713)

8 Board: VDC3 (141511)

9 Cable: VDC3 board (223479)

10 Wires: remote ON/OFF (229833)

11 Terminal board 2 (TB2)

12 Wires: VDC3 board 120 VAC (229833)

13 Cable: HPR EtherCAT plasma interface board (223478)

14 Board: control

15 Transformer: control

16 Harness: VDC3 120 VAC (229833)

Part numbers are shown for parts included in the kits. For more information about parts included in the kits, see page 7 and page 8.

Tools and materials needed

- 9.5 mm (3/8-inch) socket wrench or nut driver
- 6.4 mm (1/4-inch) socket wrench or nut driver
- #2 Phillips® screwdriver
- 3.2 mm (1/8-inch) blade screwdriver
- 8 mm (5/16-inch) drill bit
- 28.5 mm (1-1/8-inch) step drill or sheet metal punch
- Measuring tape

Kit 428489 contents (HPR130XD and HPR260XD plasma power supplies)

Part number	Description	Quantity
229829	Board: HPR EtherCAT plasma interface	1
141511	Board: VDC3	1
101450	Cover: HPR EtherCAT plasma interface board	1
101451	Enclosure: HPR EtherCAT plasma interface board	1
108844	Bushing (grommet): 1 inch, black	1
075386	Machine screw: 6-32 X 1/2-inch	6
075241	Machine screw: 1/4-20 X 1/2-inch	2
075404	Machine screw: 6-32 X 1/4-inch	7
075751	Nut: 6-32	1
223713	Cable: VDC3 board ground strap	1
223478	Cable: HPR EtherCAT plasma interface board	1
223479	Cable: VDC3 board	1
223672	Cable: EtherCAT RJ45 CAT5E double-shielded, 2.5 m (8 ft)	2
229833	Harness: VDC3 120 VAC and remote ON/OFF wires	1
208366	Connector: inline EtherCAT RJ45 CAT5E cable	1
208367	Connector: bulkhead EtherCAT RJ45 CAT5E cable	2
108866	Cover: bulkhead connector, vinyl	2
343003	Cable tie: 98.43 mm (3-7/8 inch)	2
343013	Cable tie base: 25.4 mm X 25.4 mm (1 inch X 1 inch)	2
343005	Cable tie, nylon: 187.96 mm (7-2/5 inch)	2

For kit 428489 instructions, see *Install kit 428489 in an HPR130XD or HPR260XD* on page 9.

Kit 428447 contents (HPR400XD plasma power supply)

Part number	Description	Quantity
229829	Board: HPR EtherCAT plasma interface	1
141511	Board: VDC3	1
101450	Cover: HPR EtherCAT plasma interface board	1
101451	Enclosure: HPR EtherCAT plasma interface board	1
002566	Electrical insulation: VDC3 board	1
101432	Bracket: VDC3 board	1
075241	Machine screw: 1/4-20 X 1/2-inch	2
075386	Machine screw: 6-32 X 1/2-inch	8
075404	Machine screw: 6-32 X 1/4-inch	7
075485	Machine screw: 10-32 X 3/8-inch	3
075751	Nut: 6-32	1
108844	Bushing (grommet): 1 inch, black	2
223713	Cable: VDC3 board ground strap	1
223478	Cable: HPR EtherCAT plasma interface board	1
223479	Cable: VDC3 board	1
223508	Cable: EtherCAT RJ45 CAT5E double-shielded, 1.5 m (5 ft)	2
229833	Harness: VDC3 120 VAC and remote ON/OFF wires	1
208366	Connector: inline EtherCAT RJ45 CAT5E cable	1
208367	Connector: bulkhead EtherCAT RJ45 CAT5E cable	2
108866	Cover: bulkhead connector, vinyl	2
343003	Cable tie: 98.43 mm (3-7/8 inch)	2
343013	Cable tie base: 25.4 mm X 25.4 mm (1 inch X 1 inch)	2
343005	Cable tie, nylon: 187.96 mm (7-2/5 inch)	2

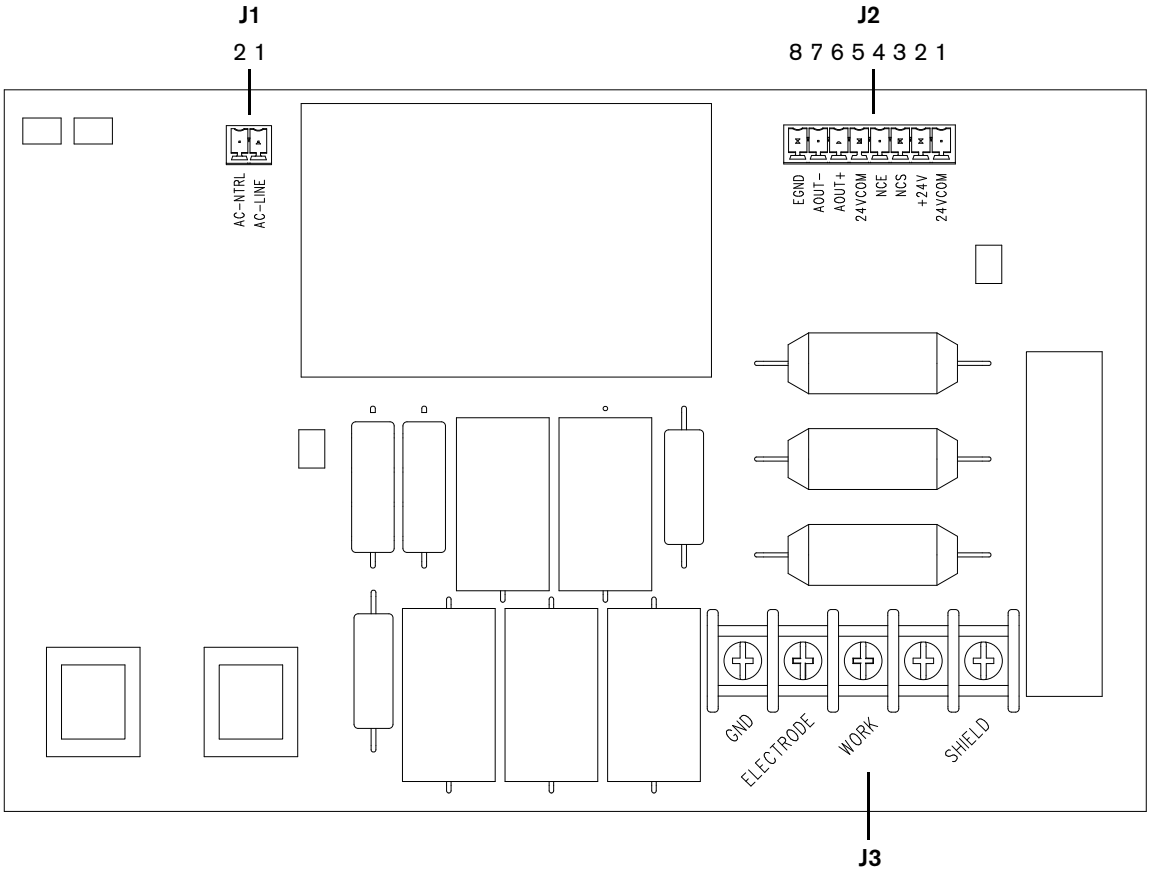
For kit 428447 instructions, see *Install kit 428447 in an HPR400XD* on page 28.

Install kit 428489 in an HPR130XD or HPR260XD

Install the VDC3 board (141511)

If the plasma power supply already has a VDC3 board installed, **remove the existing VDC3 board**. Only use the VDC3 board supplied in the kit.

Figure 2 – VDC3 board

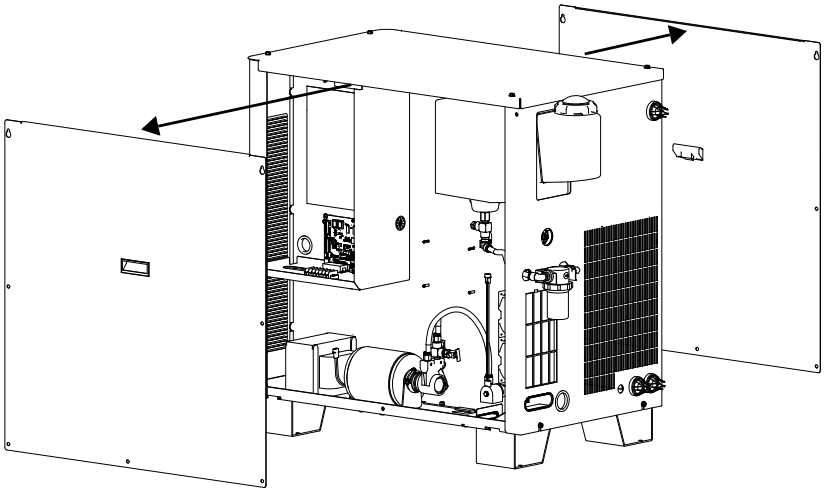


J1 120 VAC wires connector

J2 VDC3 board cable connector

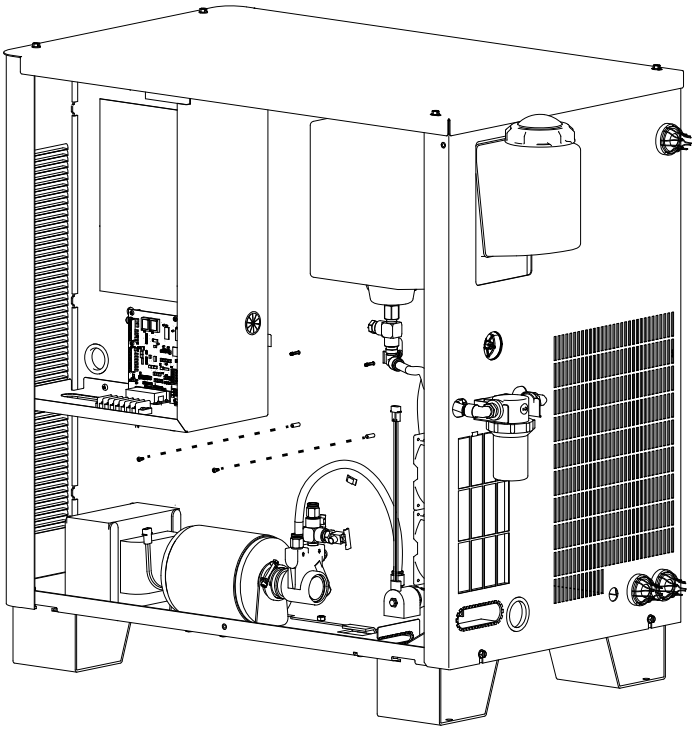
J3 Arc voltage wires connector

1. Remove the panels from the right and left sides of the plasma power supply.

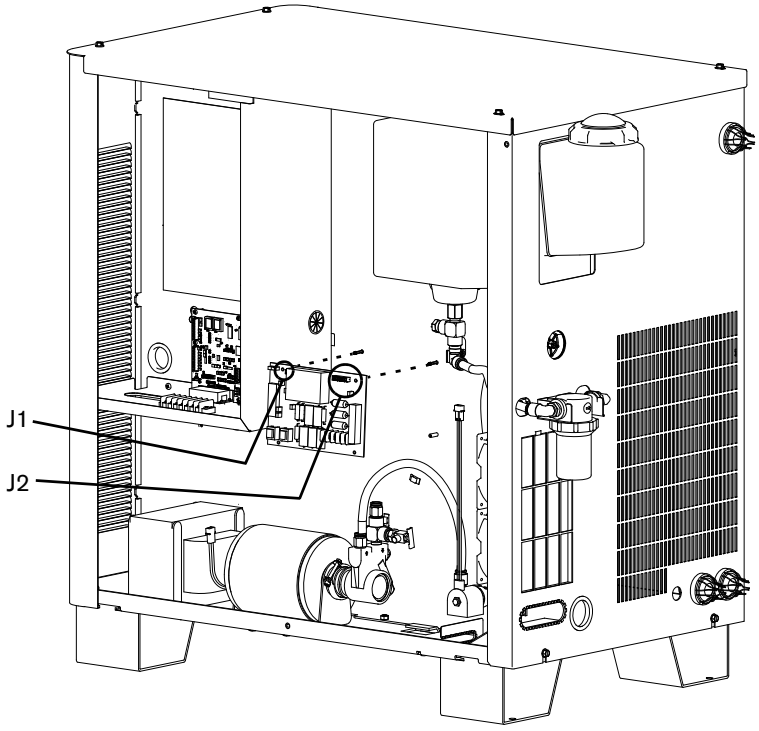


Only the HPR130XD plasma power supply is shown, but the procedure is the same for the HPR260XD plasma power supply.

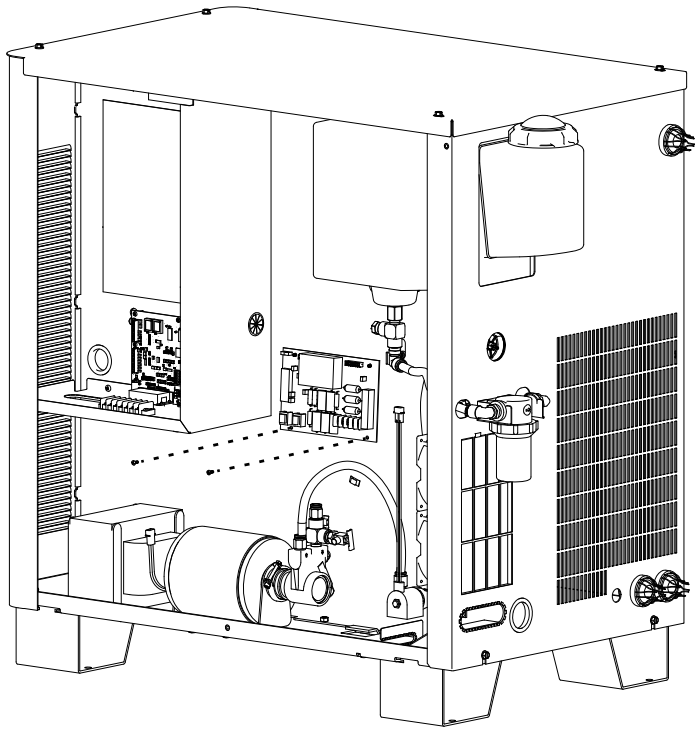
2. On the right side of the plasma power supply, remove the two 6-32 X 3/8-inch screws from the center panel.



3. Connect the VDC3 board to the top 2 studs on the center panel, **with J1 and J2 on the top**.

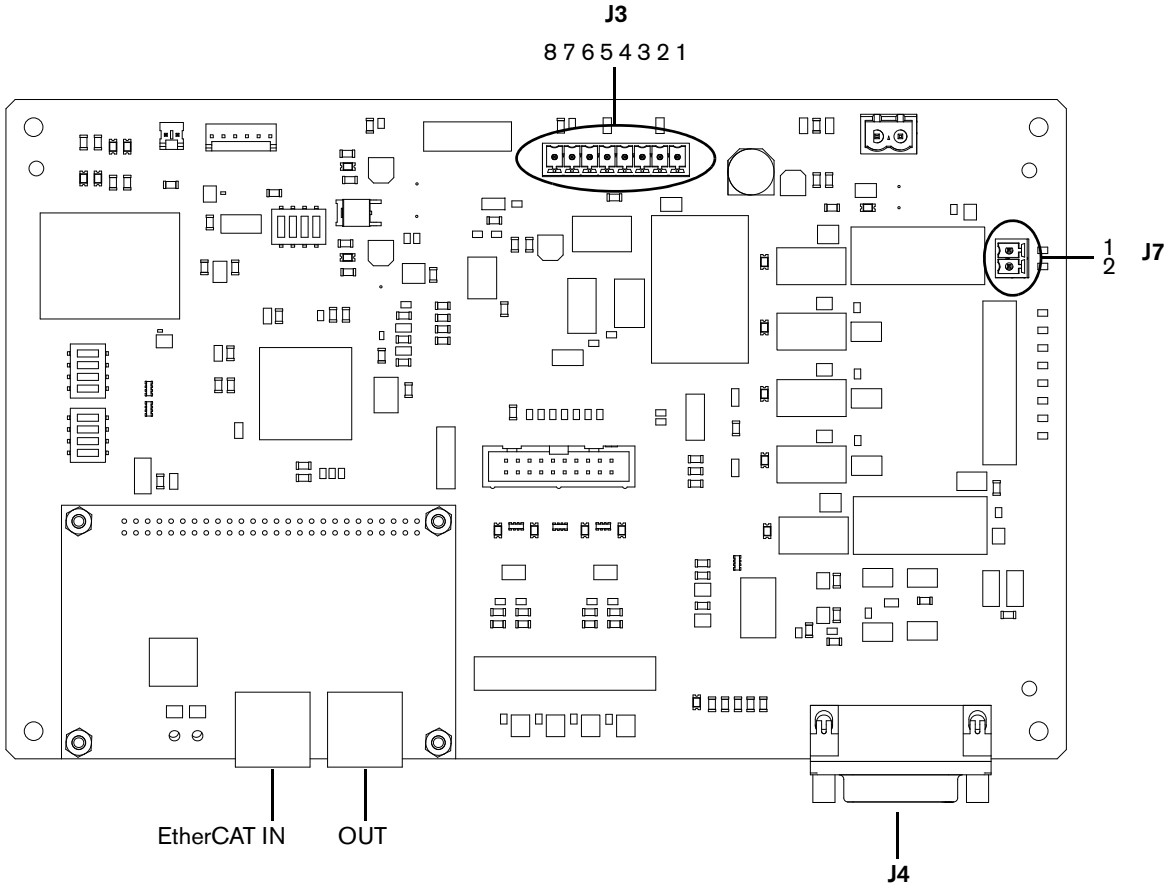


4. Use the two 6-32 X 3/8-inch screws to attach the VDC3 board to the bottom 2 studs. Tighten the screws to a torque of 9.2 kg·cm (8.0 in·lb). If needed, use 2 of the 6-32 X 1/2-inch screws (075386) included in this kit.



Install the HPR EtherCAT plasma interface board (229829)

Figure 3 – HPR EtherCAT plasma interface board



J3 VDC3 board cable connector

J4 HPR EtherCAT plasma interface board cable connector

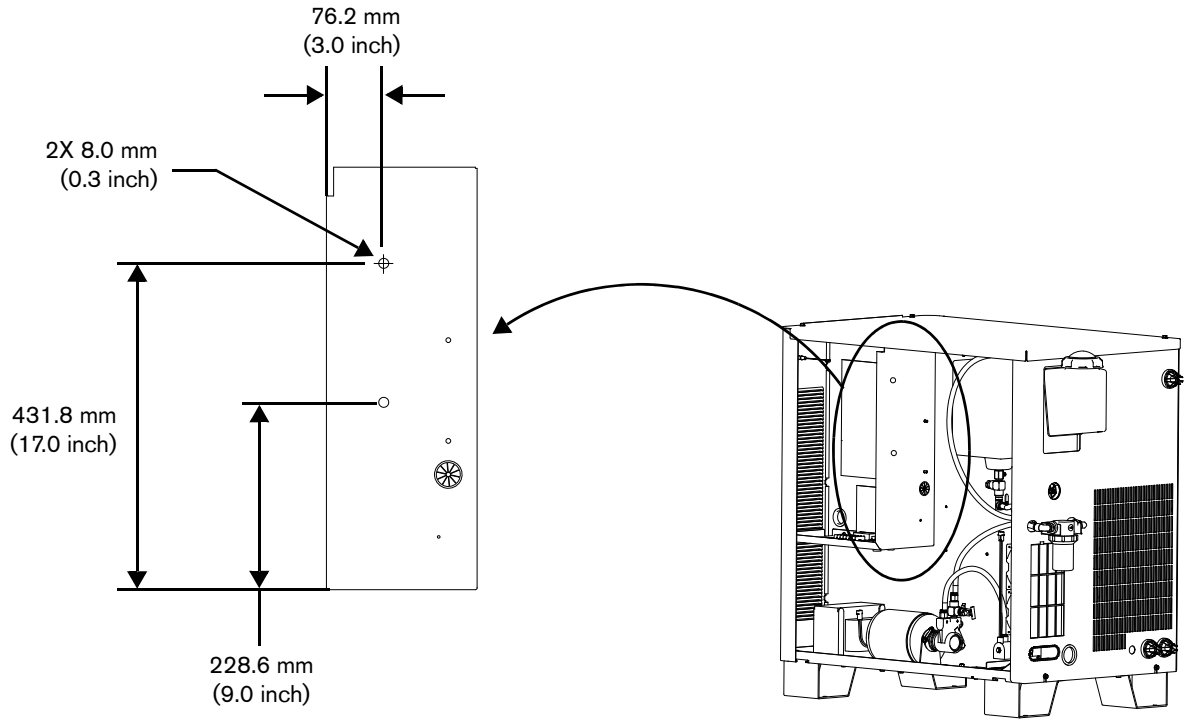
J7 Remote ON/OFF wire connectors

EtherCAT IN

EtherCAT OUT

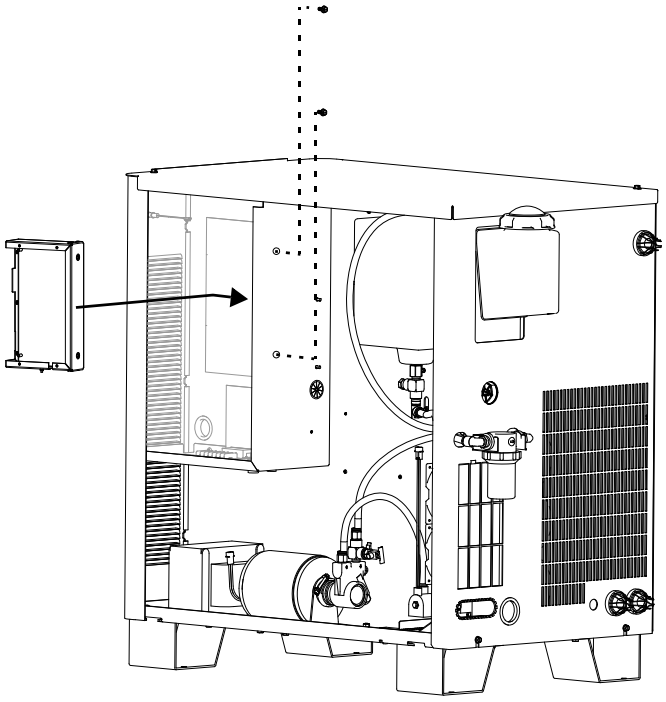
1. Drill 2 holes through the side panel of the control box using the specifications in *Figure 4*.

Figure 4



Only the HPR130XD plasma power supply is shown, but the procedure is the same for the HPR260XD plasma power supply.

2. Attach the board enclosure (101451) to the inside of the control box panel using two 1/4-20 X 1/2-inch screws (075241). Tighten to a torque of 69.1 kg·cm (60.0 in·lb).

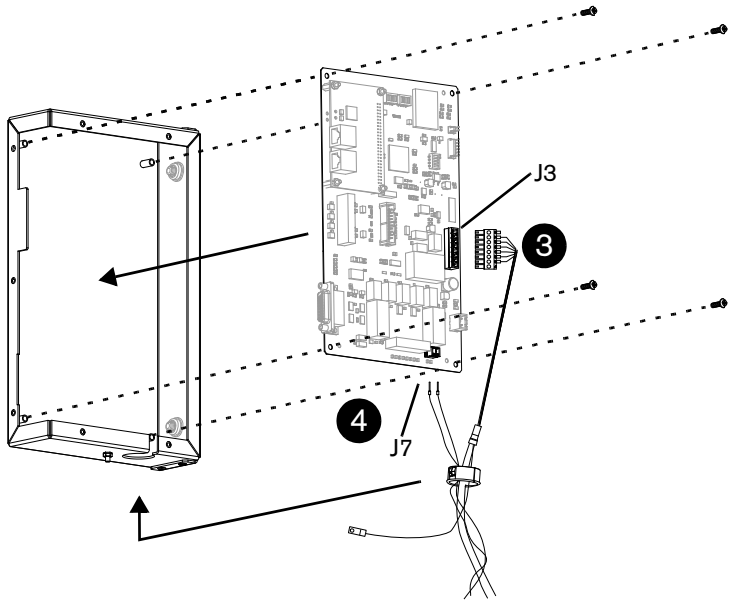


3. Connect the 6-wire end of the VDC3 board cable (223479) to J3 on the HPR EtherCAT plasma interface board. See the figure at right.

4. Connect the pins on the remote ON/OFF wires (229833) to J7 on the HPR EtherCAT plasma interface board.

5. Put the HPR EtherCAT plasma interface board (229829) on the 4 studs in the enclosure bottom.

6. Put the VDC3 board cable and remote ON/OFF wires in the slot on the side of the enclosure bottom.

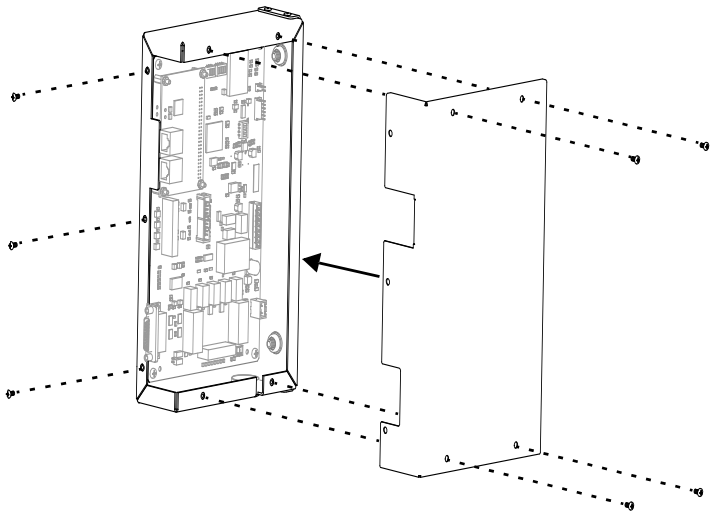


7. Use four 6-32 X 1/2-inch screws (075386) to attach the HPR EtherCAT plasma interface board to the 4 studs in the enclosure bottom. Tighten the screws to a torque of 9.2 kg·cm (8.0 in·lb).

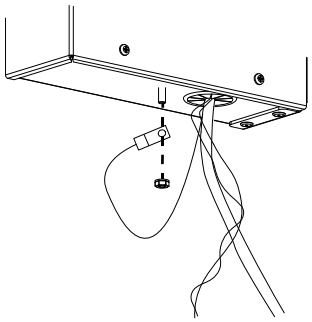
8. Put the VDC3 board cable and remote ON/OFF wires in the grommet (108844).

9. Put the grommet in the hole in the enclosure bottom.

10. Use seven 6-32 X 1/4-inch screws (075404) to install the board cover (101450). Tighten the screws to a torque of 9.2 kg·cm (8.0 in·lb).



11. Use a 6-32 nut (075751) to attach the drain wire from the VDC3 board cable to the enclosure's ground stud. Tighten the nut to a torque of 9.2 kg·cm (8.0 in·lb).



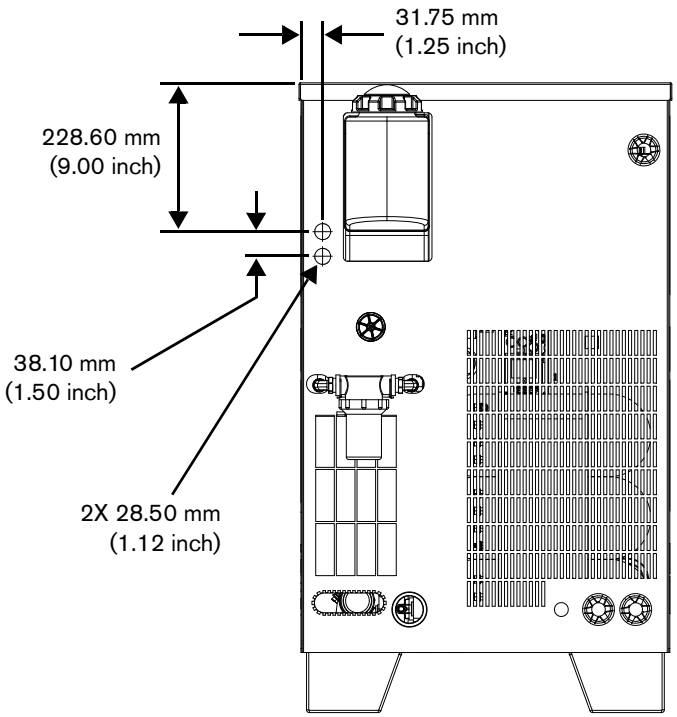
Install the EtherCAT cable connectors (208366 and 208367)

⚠ CAUTION

The bulkhead connectors ground the EtherCAT cables, minimizing high-frequency noise that causes communication errors and system instability. Make sure that you install the bulkhead connectors as instructed.

1. Drill 2 holes through the rear panel of the plasma power supply using the specifications in *Figure 5*.

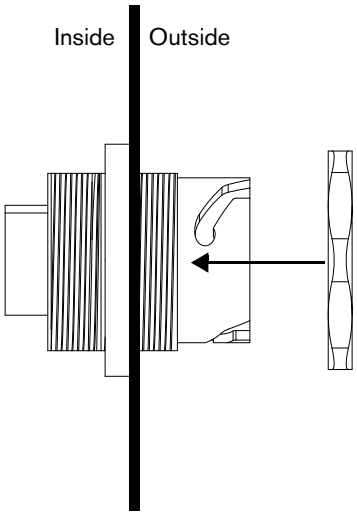
Figure 5



Only the HPR130XD plasma power supply is shown, but the procedure is the same for the HPR260XD plasma power supply.

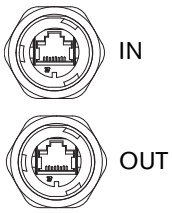
2. Remove the nut and gasket from one of the bulkhead EtherCAT cable connectors (208367).
3. Discard the gasket.
4. Hold the connector in your left hand, aligned as shown in *Figure 6* on page 17, and hold the nut in your right hand.
5. Put the connector in the hole on the inside of the plasma power supply, and attach it with the nut on the outside of the plasma power supply. See *Figure 6* on page 17. Tighten to a torque of 23 kg·cm (20 in·lb).

Figure 6



6. Repeat these steps to install the other connector.

7. Make and put an IN label adjacent to the top connector and an OUT label adjacent to the bottom connector.



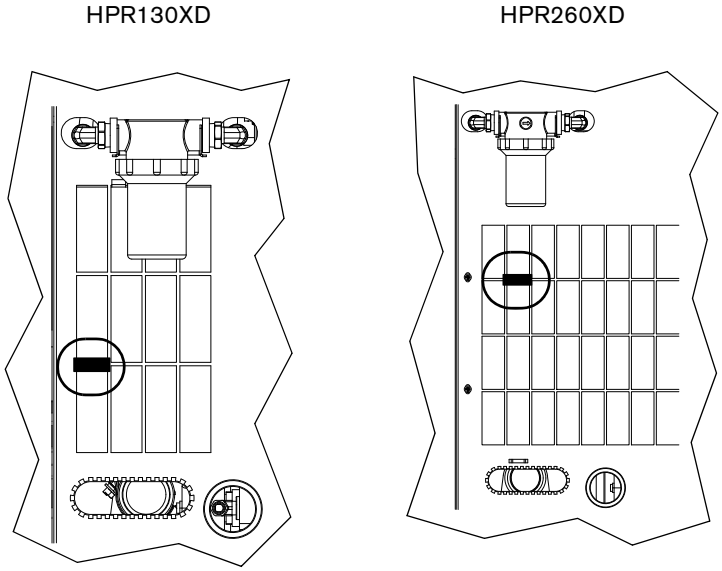
8. Put a bulkhead connector cover (108866) on each of the bulkhead connectors to keep metal dust and other material out of the connectors.

When you remove a cover to connect an EtherCAT cable, make sure you keep the cover for future use.

9. Use two 187.96 mm (7.4 inch) cable ties (343005) to attach the inline EtherCAT cable connector (208366) to the rear panel of the plasma power supply. See *Figure* 7.

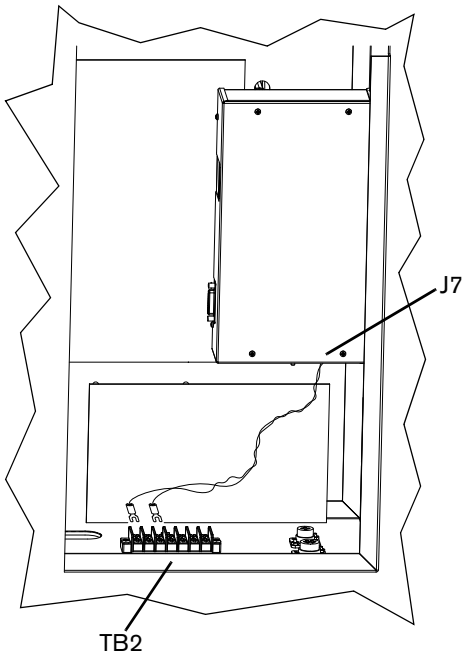
You will use the inline EtherCAT cable connector if you have multiple plasma power supplies and want to remove this plasma power supply from the network. Refer to *Diagnostics and Troubleshooting* in the *EDGE® Connect Installation and Setup Manual (809340)* for more information.

Figure 7



Connect the HPR EtherCAT plasma interface board

1. Attach the spade connectors of the remote ON/OFF wires (229833) from the HPR EtherCAT plasma interface board enclosure to TB2. See *Table 1* for the pinouts.



There are other wires already attached to locations 1 and 3 on TB2. Attach the wires on top of the existing wires.

Table 1 – Pinouts for J7 on the EtherCAT board to TB2

J7 on the EtherCAT board			TB2	
Pin no.	**Wire color**	**Signal**	**Location**	**Signal**
1	Red	ON/OFF	1	ON/OFF
2	White	ON/OFF	3	ON/OFF

2. Connect the 7-wire end of the VDC3 board cable from the HPR EtherCAT plasma interface board enclosure to J2 on the VDC3 board. See *Table 2* for the pinouts.

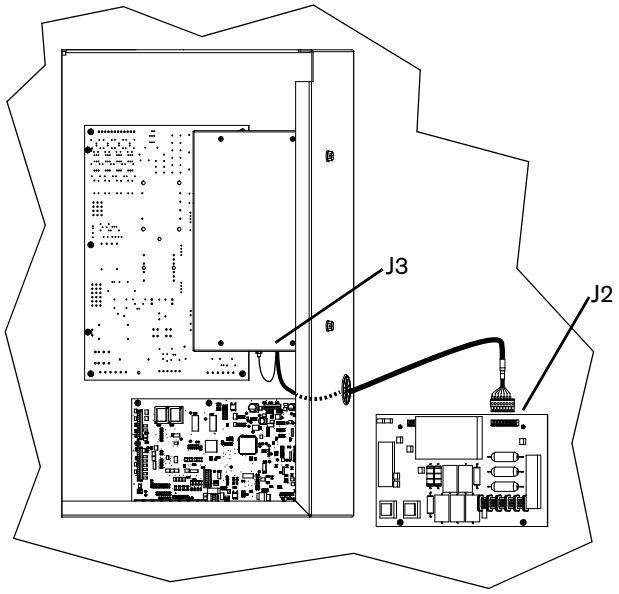


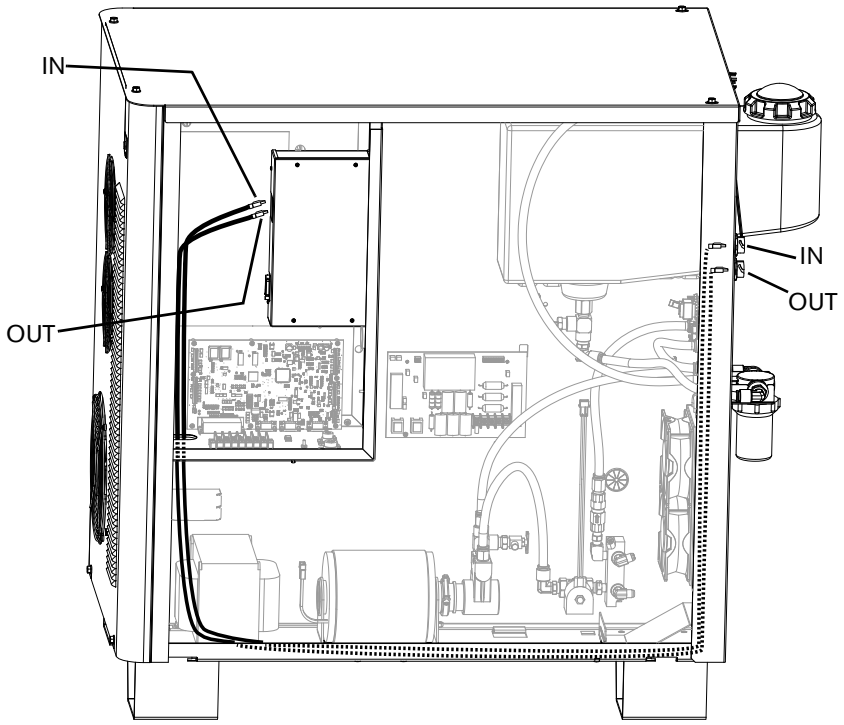
Table 2 – Pinouts for J3 on the EtherCAT board to J2 on the VDC3 board

J3 on the EtherCAT board		J2 on the VDC3 board	
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Not connected	1	Not connected
2	+24 VDC (input)	2	+24 VDC (out)
3	Nozzle contact sense (input)	3	Nozzle contact sense (output)
4	Nozzle contact enable (output)	4	Nozzle contact enable (input)
5	24 VDC common	5	24 VDC common
6	+ Analog out (input)	6	+ Analog out
7	- Analog out (analog common)	7	- Analog out (analog common)
8	Not connected (drain wire connected to ground stud)	8	EMI chassis ground (cable shield)

3. Using 2 EtherCAT RJ45 CAT5E double-shielded cables (223672 or 223508), connect one end of each cable to each of the EtherCAT connectors on the HPR EtherCAT plasma interface board. See *Figure 8* on page 21.

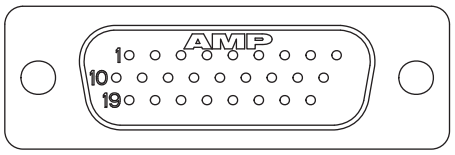
4. Route the 2 EtherCAT RJ45 CAT5E double-shielded cables as shown in *Figure 8* on page 21, and connect them to the bulkhead EtherCAT cable connectors inside the plasma power supply.

Figure 8



Use 1 cable to connect IN on the HPR EtherCAT plasma interface board to the IN connector, and 1 cable to connect OUT on the HPR EtherCAT plasma interface board to the OUT connector.

5. Connect the 26-pin male end of the HPR EtherCAT plasma interface board cable (223478) to J4 on the HPR EtherCAT plasma interface board. See *Figure 9* on page 22.



6. Connect the 37-pin female end of the cable to J300 on the control board. See *Figure 9*.

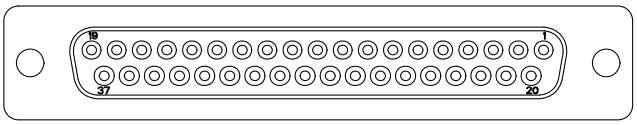


Figure 9

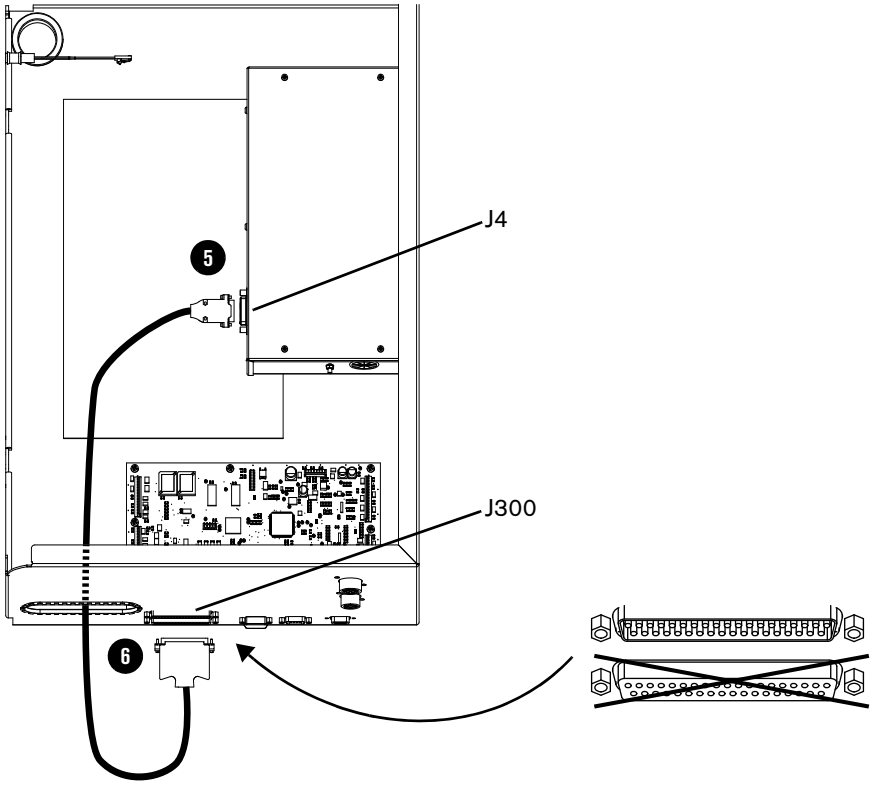


Table 3 – Pinouts for J4 on the EtherCAT board to J300 on the control board

J4 on the EtherCAT board		J300 on the control board	
Pin no.	**Signal**	**Pin no.**	**Signal**
1	RS422 RX- (input)	2	RS422 TX- (output)
2	RS422 RX+ (input)	21	RS422 TX+ (output)
3	RS422 TX- (output)	1	RS422 RX- (input)
4	RS422 TX+ (output)	20	RS422 RX+ (input)
5	RS422 Common	3	RS422 Common
6	Field Common 1	18	Power Common 1
7	Field Common 2	36	Power Common 2
8	Plasma Connected +24 V (input)	37	CNC +24 V (output)
9	Not connected		
10	Motion In (input)	4	Motion1-E
11	Motion +24 V	23	Motion1-C
12	Error In (input)	5	Error-E
13	Error +24 V	24	Error-C
14	RD Err In (input)	6	RDErr-E
15	RD Err +24 V	25	RDErr-C
16	Not Ready In (input)	7	NotReady-E
17	Not Ready +24 V	26	NotReady-C
18	Not connected		
19	Corner Out B	12	Corner -
20	Corner Out A	31	Corner +
21	Pierce Out B	13	Pierce -
22	Pierce Out A	32	Pierce +
23	Hold Out B	14	Hold -
24	Hold Out A	33	Hold +
25	Start Out B	15	Start -
26	Start Out A	34	Start +

Connect and ground the VDC3 board

J2 on the VDC3 board is already connected. You connected it when you connected the HPR EtherCAT plasma interface board.

1. To connect J1, disconnect the connector from J4 on the power distribution board as shown in the figure at right.
2. Connect the connector to the female end of the VDC3 120 VAC harness (229833).

   The female end of the VDC3 120 VAC harness is labeled XFMR.

3. Connect the male end of the VDC3 120 VAC harness (229833) to J4 of the power distribution board.

   The male end of the VDC3 120 VAC harness is labeled PWR DIST.

4. Connect the pins of the twisted pair wires of the VDC3 120 VAC harness to J1 on the VDC3 board. See *Table 4* for the pinouts.

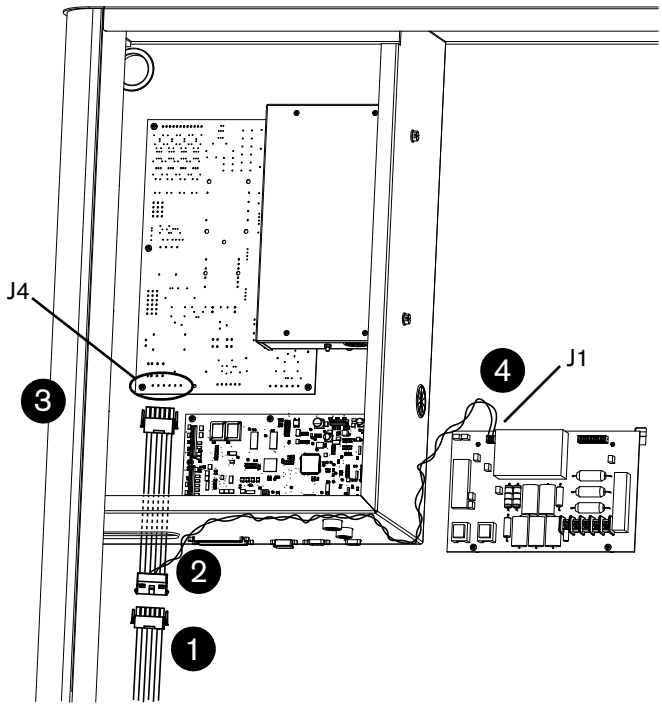
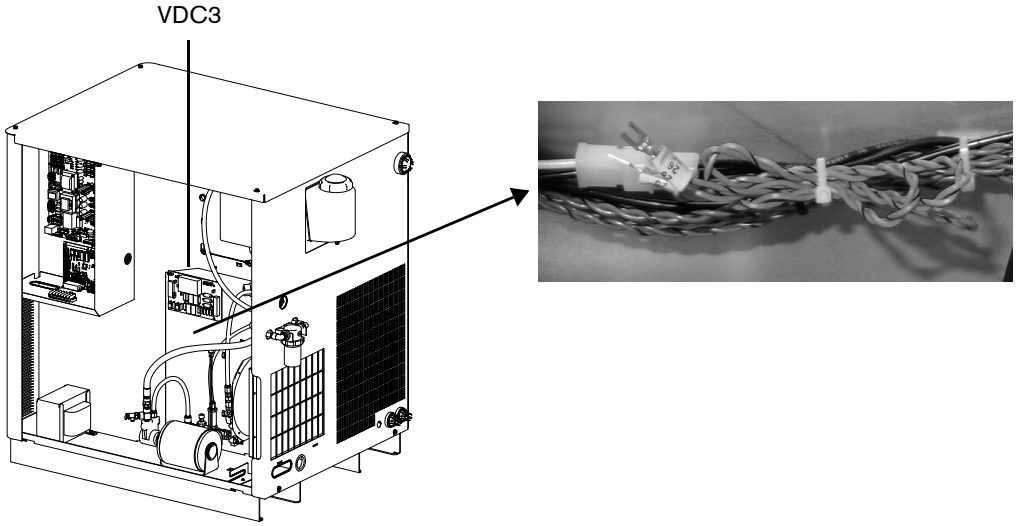


Table 4 – Pinouts for the VDC3 120 VAC harness wires to J1

Wires of the VDC3 120 VAC harness			J1 on the VDC3 board	
Wire no.	**Color**	**Signal**	**Pin no.**	**Signal**
3	White	120 VAC return	1	120 VAC
4	Red	120 VAC hot	2	120 VAC neutral

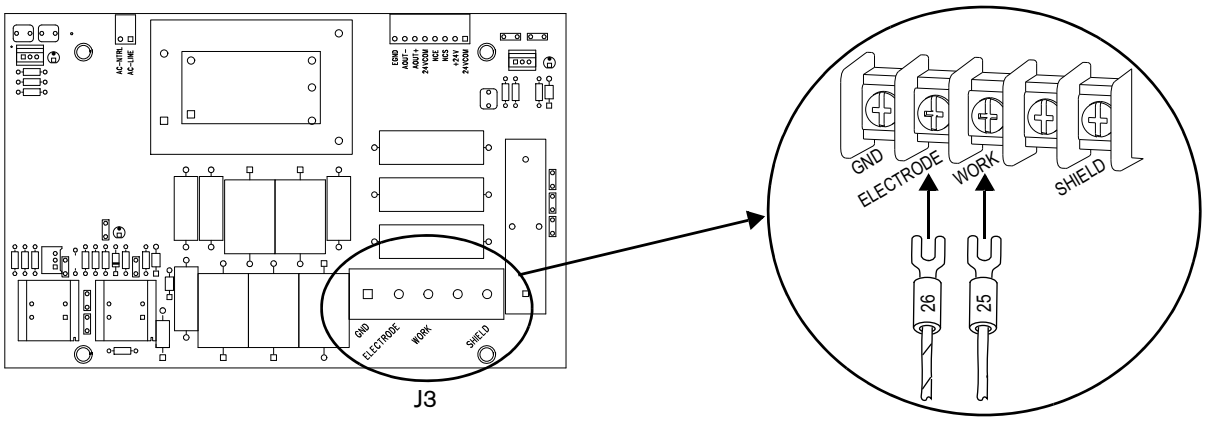
5. To connect J3, cut the cable tie on the yellow and yellow/black arc voltage wires bundled below the VDC3 board. They are labeled 25 and 26.



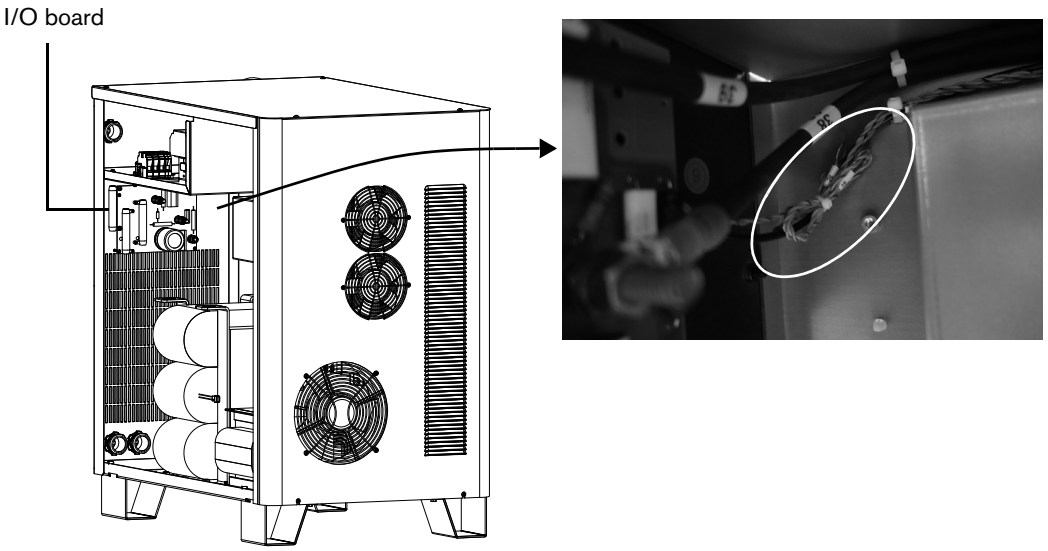
6. Attach the spade connector of the yellow 25 wire to the J3-WORK terminal on the VDC3 board. See *Figure 10*.

7. Attach the spade connector of the yellow/black 26 wire to the J3-ELECTRODE terminal on the VDC3 board. See *Figure 10*.

Figure 10



8. Cut the cable tie on the yellow and yellow/black arc voltage wires bundled near the I/O board on the left side of the plasma power supply. They are labeled 25 and 26.

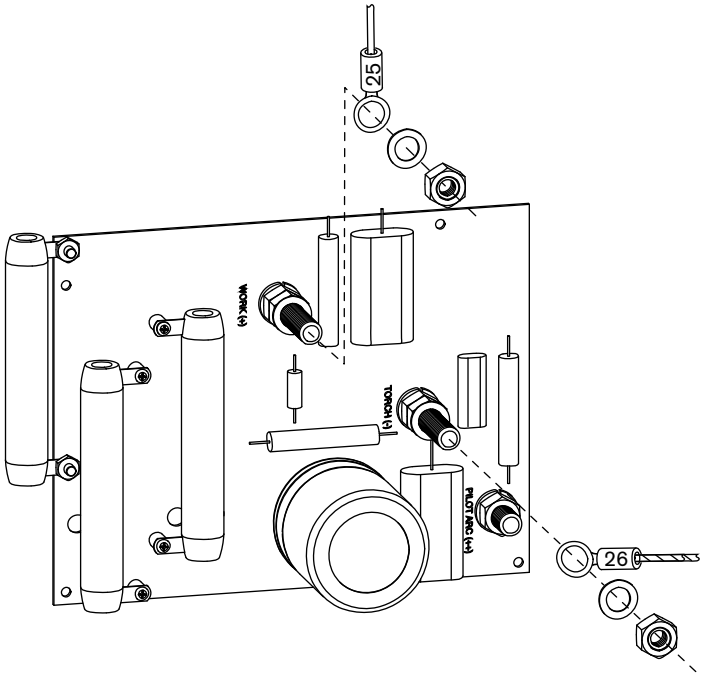


9. Attach the ring connector on the yellow 25 wire to the bolt on the I/O board labeled WORK (+). See *Figure 11* on page 27.

10. Attach the ring connector on the yellow/black 26 wire to the bolt on the I/O board labeled TORCH (-). See *Figure 11* on page 27.

Other wires are already attached to the bolts on the I/O board. Attach the arc voltage wires on top of the existing wires.

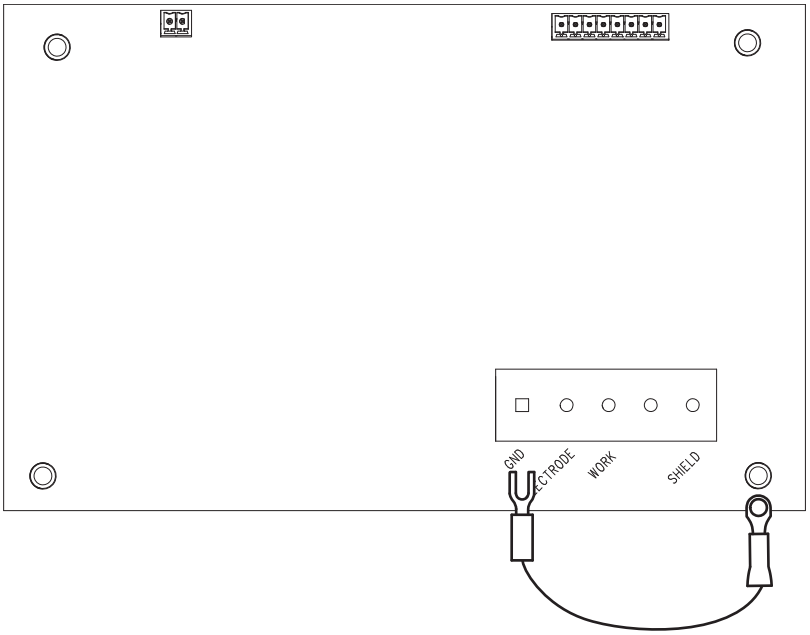
Figure 11



11. To ground the VDC3 board, attach the spade connector of the VDC3 board ground strap cable (223713) to GND, as shown in the figure at right.

12. Attach the ring connector to the stud on the lower right side of the VDC3 board. Use the screw you used to attach the VDC3 board to the center panel of the plasma power supply.

13. Tighten the screw to a torque of 9.2 kg·cm (8.0 in·lb).



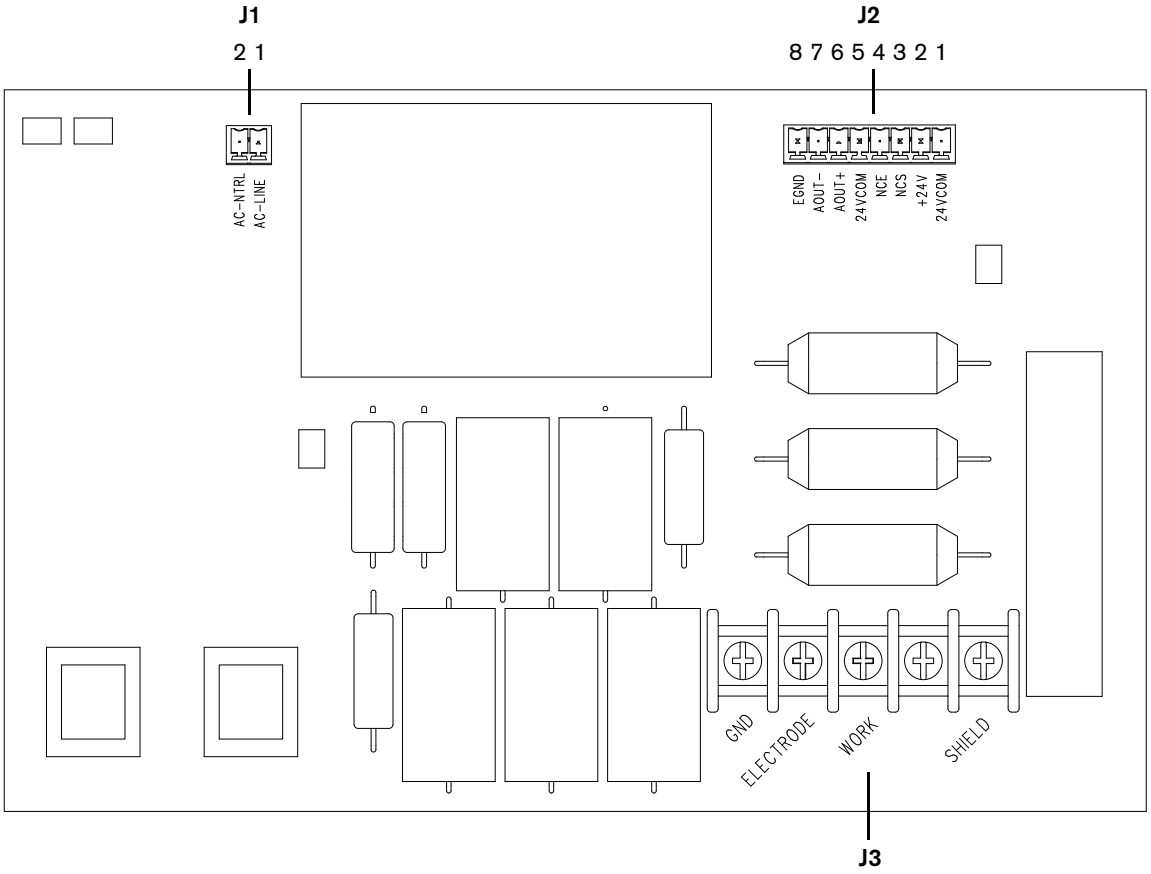
Kit 428489 installation is complete. For information about the EtherCAT and VDC3 board LEDs, see *Guide to board LEDs* on page 47.

Install kit 428447 in an HPR400XD

Install the VDC3 board (141511)

If the plasma power supply already has a VDC3 board installed, **remove the existing VDC3 board**. Only use the VDC3 board supplied in the kit.

Figure 12 – VDC3 board



J1 120 VAC wires connector

J2 VDC3 board cable connector

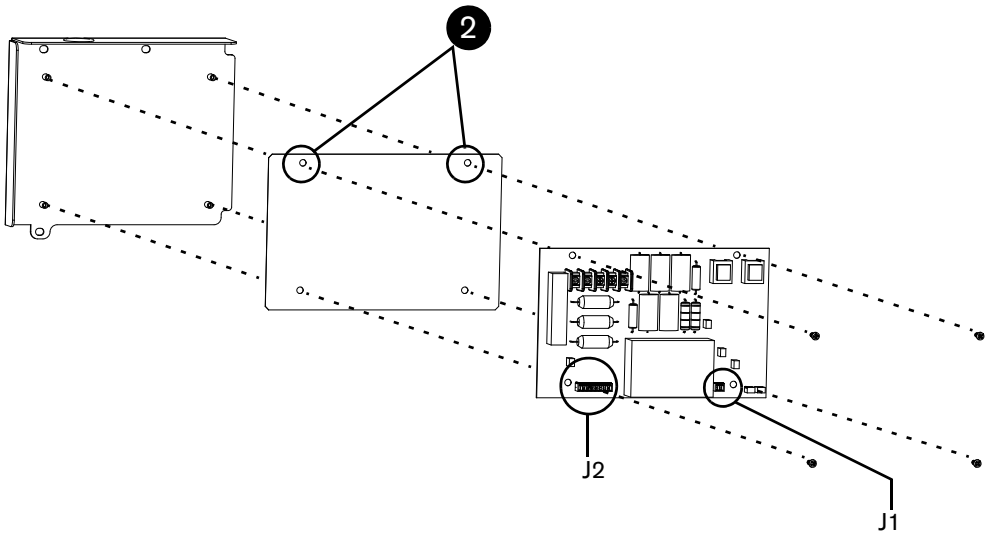
J3 Arc voltage wires connector

1. Remove the sheet that covers the adhesive on the back of the electrical insulation (002566).
2. With the adhesive pointing toward the VDC3 board bracket (101432), align the holes on the electrical insulation with the 4 studs on the bracket, with the holes closest to the edge of the electrical insulation on top. See *Figure 13* on page 29.
3. Bond the insulator with the bracket. See *Figure 13* on page 29.

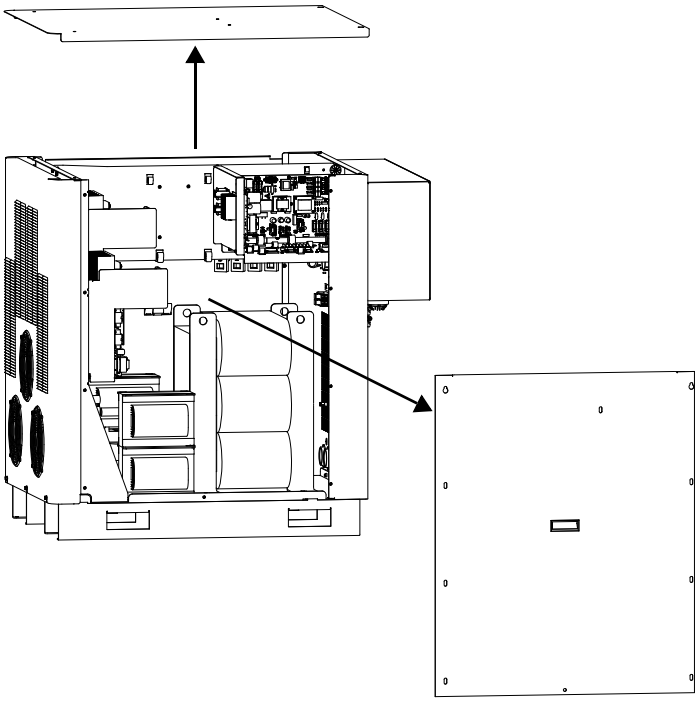
4. Put the VDC3 board on the 4 studs on the bracket, **with J1 and J2 on the bottom**. See *Figure 13*.

5. Use four 6-32 X 1/2-inch screws (075386) to attach the VDC3 board to the 4 studs. Tighten the screws to a torque of 9.2 kg·cm (8.0 in·lb). See *Figure 13*.

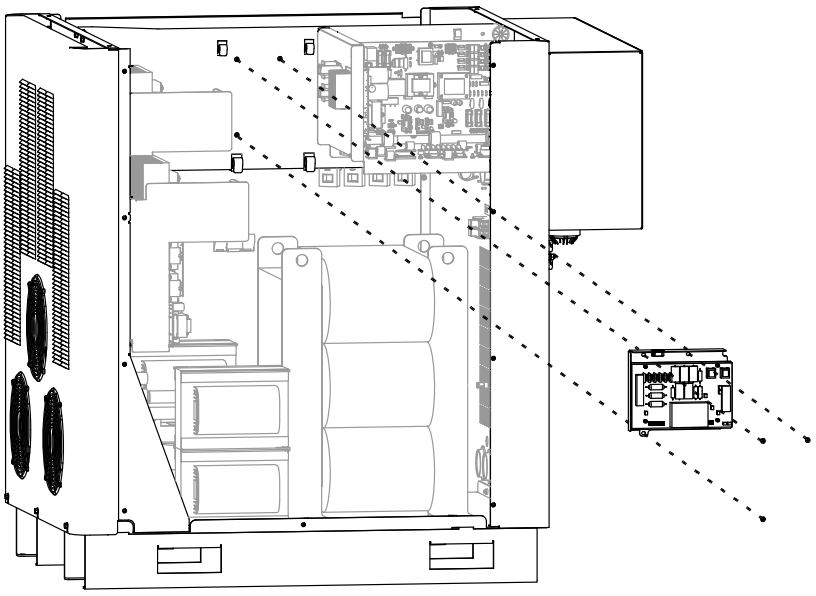
Figure 13



6. Remove the panels from the top and right side of the plasma power supply.

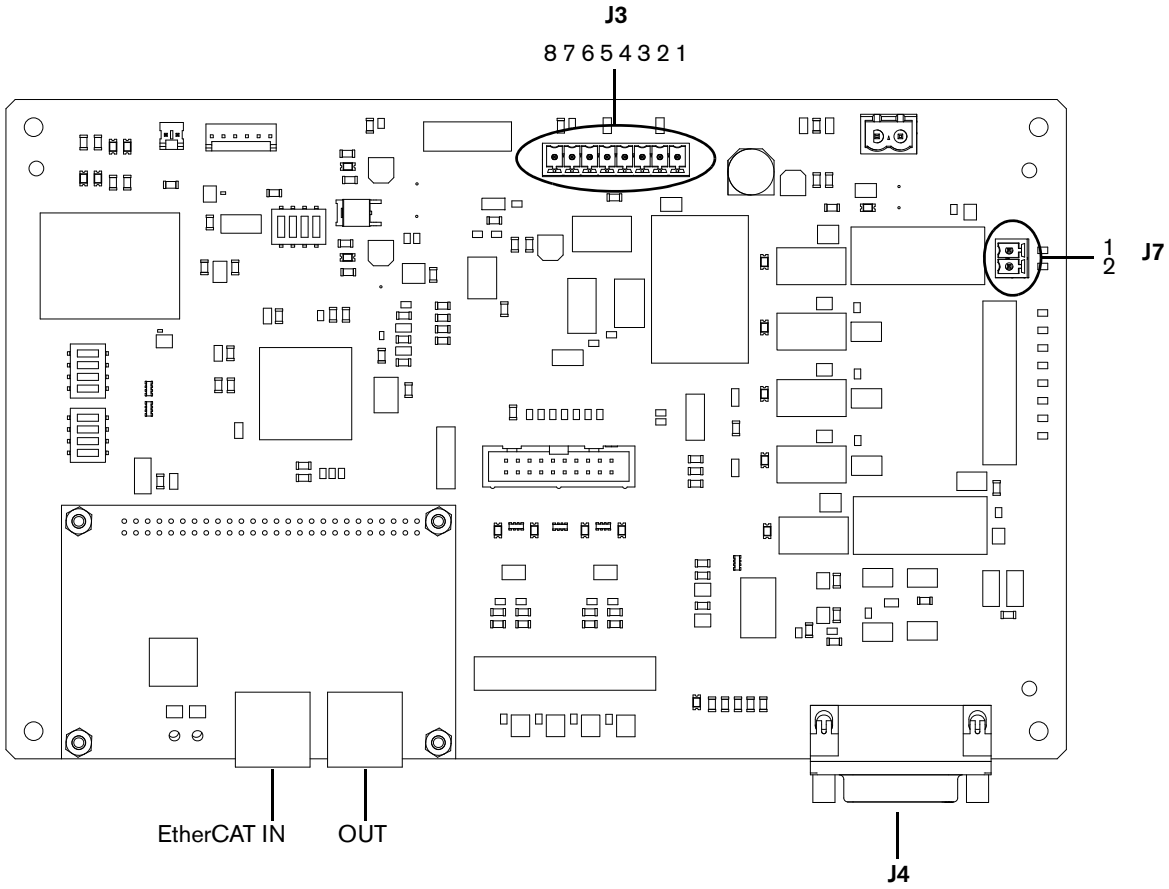


7. Use three 10-32 X 3/8-inch screws (075485) to attach the VDC3 board to the center panel of the plasma power supply. Tighten the screws to a torque of 34.6 kg·cm (30.0 in·lb).



Install the HPR EtherCAT plasma interface board (229829)

Figure 14 – HPR EtherCAT plasma interface board



J3 VDC3 board cable connector

J4 HPR EtherCAT plasma interface board cable connector

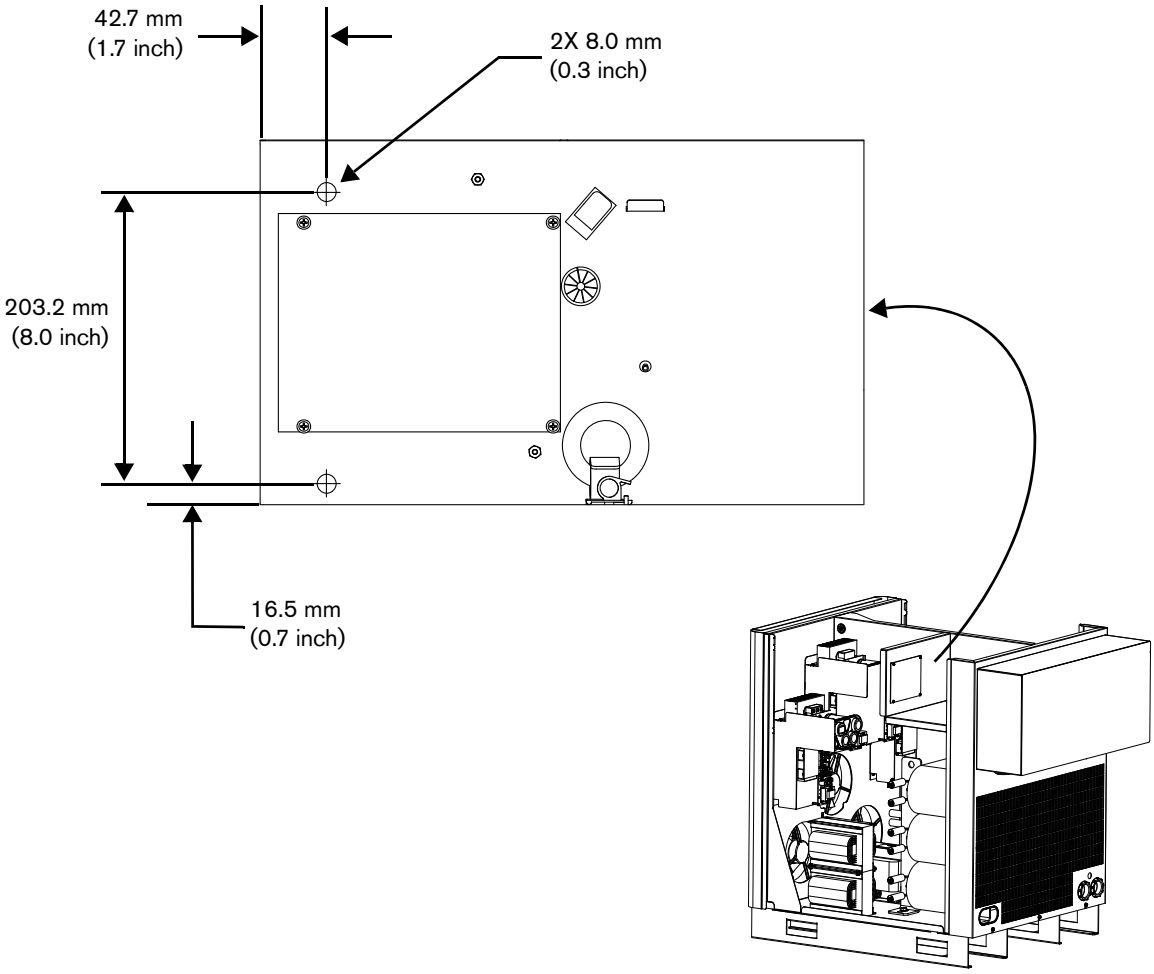
J7 Remote ON/OFF wire connectors

EtherCAT IN

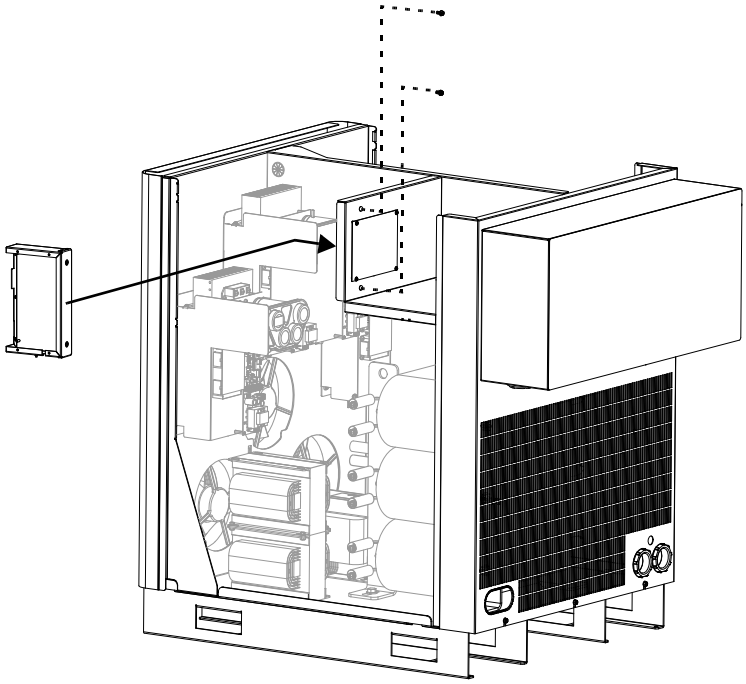
EtherCAT OUT

1. Drill 2 holes through the side panel of the control box using the specifications in *Figure 15*.

Figure 15



2. Attach the board enclosure (101451) to the inside of the control box panel using two 1/4-20 X 1/2-inch screws (075241). Tighten to a torque of 69.1 kg·cm (60.0 in·lb).

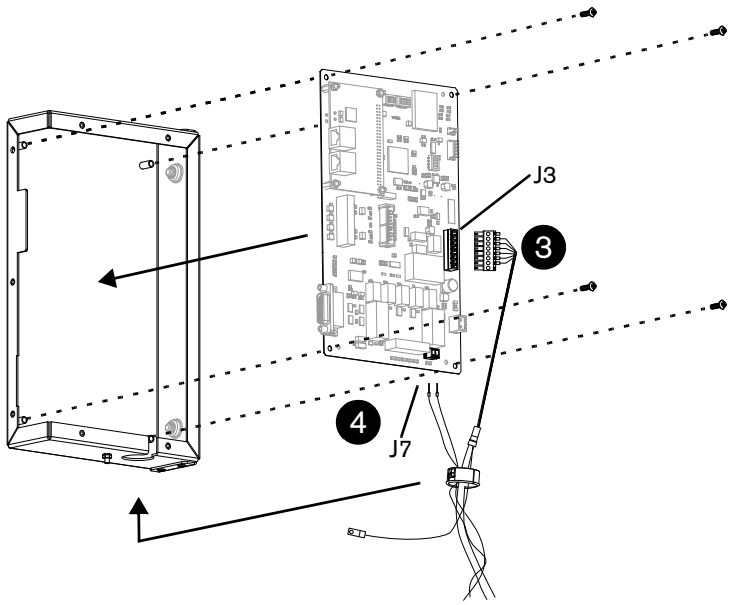


3. Connect the 6-wire end of the VDC3 board cable (223479) to J3 on the HPR EtherCAT plasma interface board.

4. Connect the pins on the remote ON/OFF wires (229833) to J7 on the HPR EtherCAT plasma interface board.

5. Put the HPR EtherCAT plasma interface board (229829) on the 4 studs in the enclosure bottom.

6. Put the VDC3 board cable and remote ON/OFF wires in the slot on the side of the enclosure bottom.

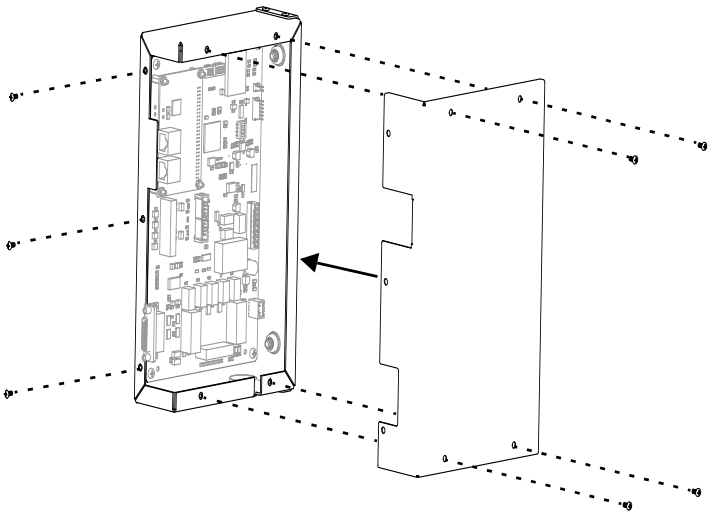


7. Use four 6-32 X 1/2-inch screws (075386) to attach the HPR EtherCAT plasma interface board to the 4 studs in the enclosure bottom. Tighten the screws to a torque of 9.2 kg·cm (8.0 in·lb).

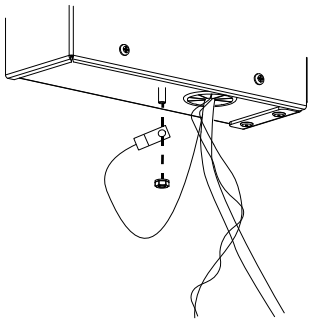
8. Put the VDC3 board cable and remote ON/OFF wires in the grommet (108844).

9. Put the grommet in the hole in the enclosure bottom.

10. Use seven 6-32 X 1/4-inch screws (075404) to install the board cover (101450). Tighten the screws to a torque of 9.2 kg·cm (8.0 in·lb).



11. Use a 6-32 nut (075751) to attach the drain wire from the VDC3 board cable to the enclosure's ground stud. Tighten the nut to a torque of 9.2 kg·cm (8.0 in·lb).



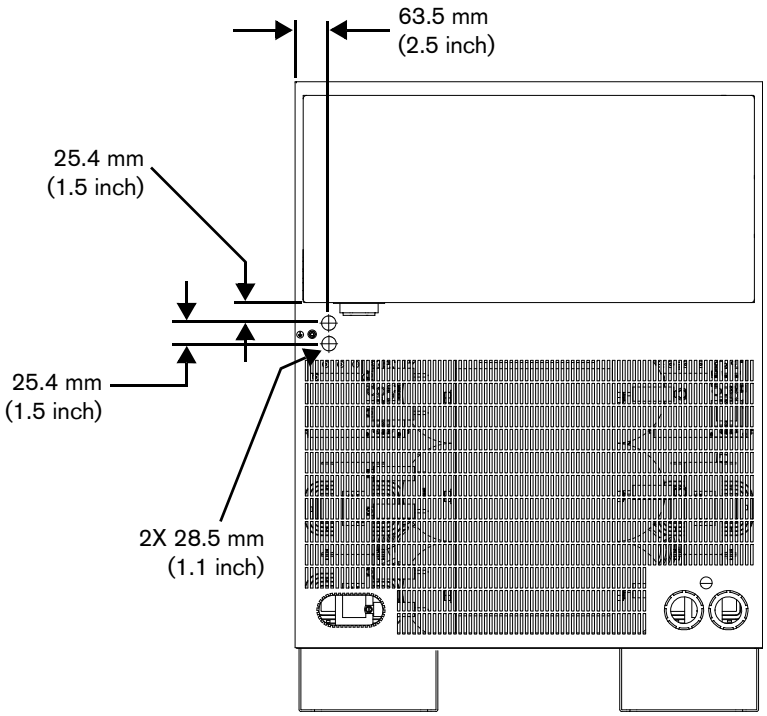
Install the EtherCAT cable connectors (208366 and 208367)

⚠ CAUTION

The bulkhead connectors ground the EtherCAT cables, minimizing high-frequency noise that causes communication errors and system instability. Make sure that you install the bulkhead connectors as instructed.

1. Drill 2 holes through the rear panel of the plasma power supply using the specifications in *Figure 16*.

Figure 16

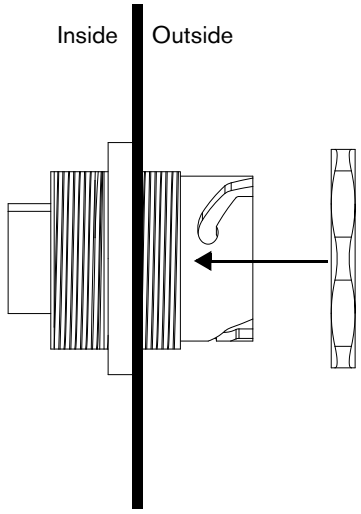


2. Remove the nut and gasket from one of the bulkhead EtherCAT cable connectors (208367).
3. Discard the gasket.

4. Hold the connector in your left hand, aligned as shown in *Figure 17*, and hold the nut in your right hand.

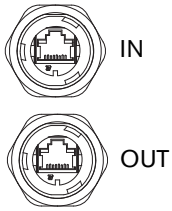
5. Put the connector in the hole on the inside of the plasma power supply, and attach it with the nut on the outside of the plasma power supply. See *Figure 17*. Tighten to a torque of 23 kg·cm (20 in·lb).

Figure 17



6. Repeat these steps to install the other connector.

7. Make and put an IN label adjacent to the top connector and an OUT label adjacent to the bottom connector.



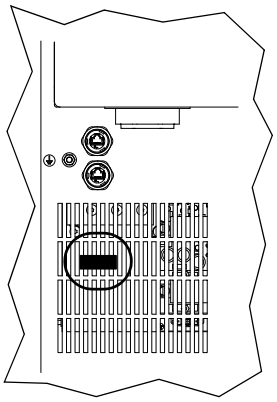
8. Put a bulkhead connector cover (108866) on each of the bulkhead connectors to keep metal dust and other material out of the connectors.

When you remove a cover to connect an EtherCAT cable, make sure you keep the cover for future use.

9. Use two 187.96 mm (7.4 inch) cable ties (343005) to attach the inline EtherCAT cable connector (208366) to the rear panel of the plasma power supply. See *Figure 18*.

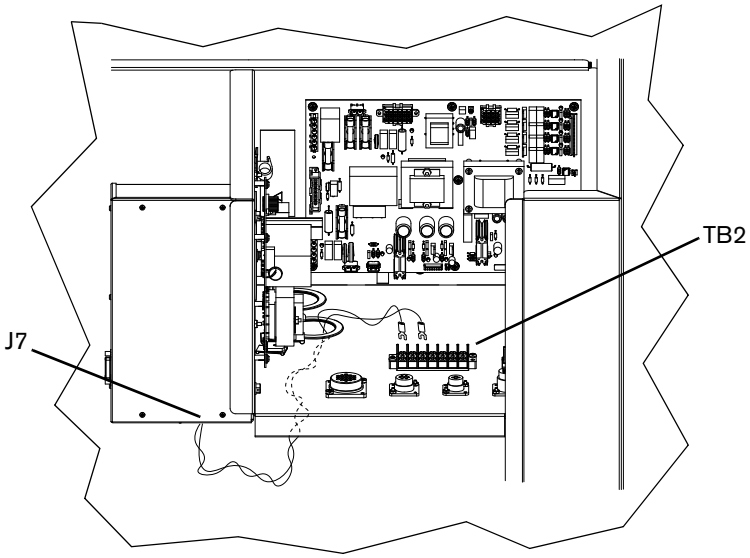
You will use the inline EtherCAT cable connector if you have multiple plasma power supplies and want to remove this plasma power supply from the network. Refer to *Diagnostics and Troubleshooting* in the *EDGE® Connect Installation and Setup Manual (809340)* for more information.

Figure 18



Connect the HPR EtherCAT plasma interface board

1. Attach the spade connectors of the remote ON/OFF wires (229833) from the HPR EtherCAT plasma interface board enclosure to TB2. See *Table 5* on page 38 for the pinouts.



There are other wires already attached to locations 1 and 3 on TB2. Attach the wires on top of the existing wires.

Table 5 – Pinouts for J7 on the EtherCAT board to TB2

J7 on the EtherCAT board			TB2	
Pin no.	**Wire color**	**Signal**	**Location**	**Signal**
1	Red	ON/OFF	1	ON/OFF
2	White	ON/OFF	3	ON/OFF

2. Connect the 7-wire end of the VDC3 board cable from the HPR EtherCAT plasma interface board enclosure to J2 on the VDC3 board. See *Table 6* for the pinouts.

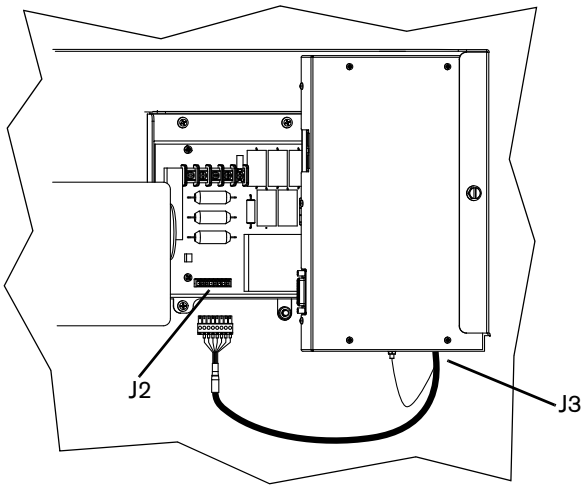


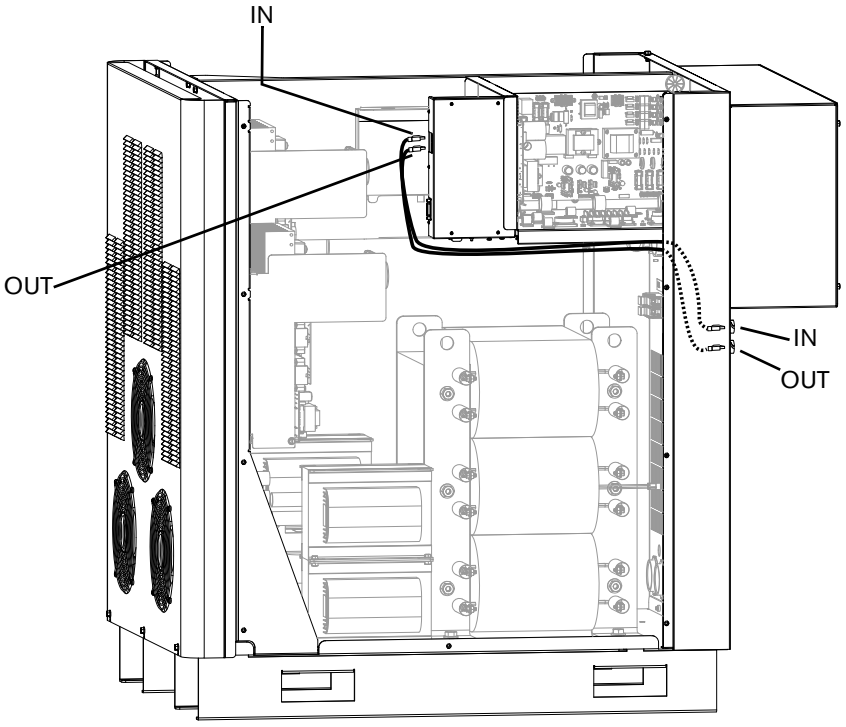
Table 6 – Pinouts for J3 on the EtherCAT board to J2 on the VDC3 board

J3 on the EtherCAT board		J2 on the VDC3 board	
Pin no.	**Signal**	**Pin no.**	**Signal**
1	Not connected	1	Not connected
2	+24 VDC (input)	2	+24 VDC (out)
3	Nozzle contact sense (input)	3	Nozzle contact sense (output)
4	Nozzle contact enable (output)	4	Nozzle contact enable (input)
5	24 VDC common	5	24 VDC common
6	+ Analog out (input)	6	+ Analog out
7	- Analog out (analog common)	7	- Analog out (analog common)
8	Not connected (drain wire connected to ground stud)	8	EMI chassis ground (cable shield)

3. Using 2 EtherCAT RJ45 CAT5E double-shielded cables (223672 or 223508), connect one end of each cable to each of the EtherCAT connectors on the HPR EtherCAT plasma interface board. See *Figure 19*.

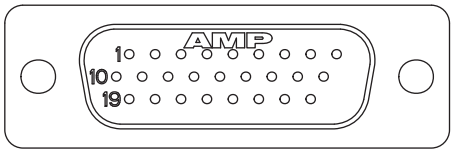
4. Route the 2 EtherCAT RJ45 CAT5E double-shielded cables as shown in *Figure 19*, and connect them to the bulkhead EtherCAT cable connectors inside the plasma power supply.

Figure 19



Use 1 cable to connect IN on the HPR EtherCAT plasma interface board to the IN connector, and 1 cable to connect OUT on the HPR EtherCAT plasma interface board to the OUT connector.

5. Connect the 26-pin male end of the HPR EtherCAT plasma interface board cable (223478) to J4 on the HPR EtherCAT plasma interface board. See *Figure 20* on page 40.



6. Connect the 37-pin female end of the cable to J300 on the control board. See *Figure 20*.

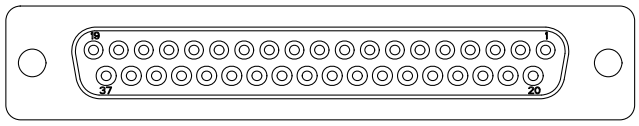


Figure 20

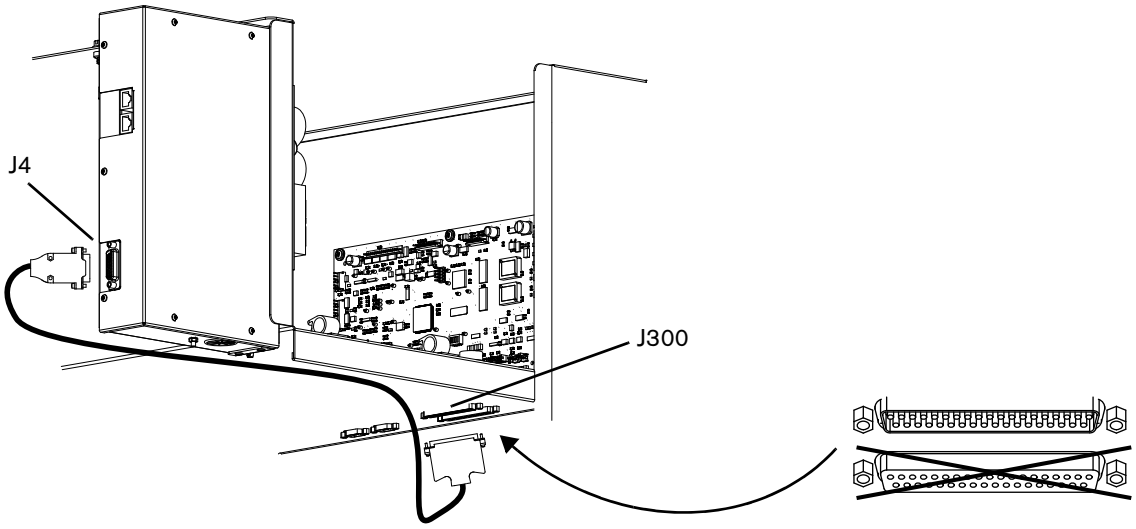
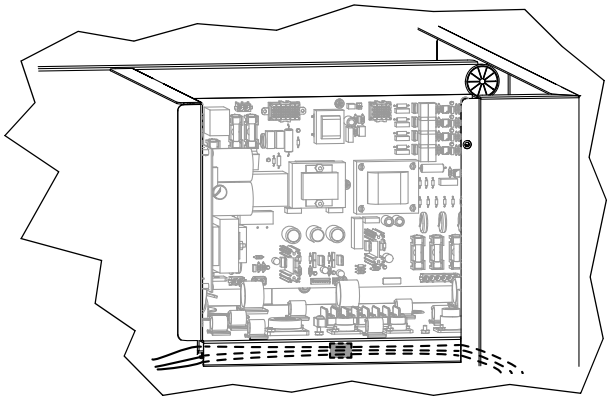


Table 7 – Pinouts for J4 on the EtherCAT board to J300 on the control board

J4 on the EtherCAT board		J300 on the control board	
Pin no.	**Signal**	**Pin no.**	**Signal**
1	RS422 RX- (input)	2	RS422 TX- (output)
2	RS422 RX+ (input)	21	RS422 TX+ (output)
3	RS422 TX- (output)	1	RS422 RX- (input)
4	RS422 TX+ (output)	20	RS422 RX+ (input)
5	RS422 Common	3	RS422 Common
6	Field Common 1	18	Power Common 1
7	Field Common 2	36	Power Common 2
8	Plasma Connected +24 V (input)	37	CNC +24 V (output)
9	Not connected		
10	Motion In (input)	4	Motion1-E
11	Motion +24 V	23	Motion1-C
12	Error In (input)	5	Error-E
13	Error +24 V	24	Error-C
14	RD Err In (input)	6	RDErr-E
15	RD Err +24 V	25	RDErr-C
16	Not Ready In (input)	7	NotReady-E
17	Not Ready +24 V	26	NotReady-C
18	Not connected		
19	Corner Out B	12	Corner -
20	Corner Out A	31	Corner +
21	Pierce Out B	13	Pierce -
22	Pierce Out A	32	Pierce +
23	Hold Out B	14	Hold -
24	Hold Out A	33	Hold +
25	Start Out B	15	Start -
26	Start Out A	34	Start +

7. Bond a cable tie base (343013) to the inside edge of the control box panel. See *Figure 21*.
8. Put a 98.43 mm (3-7/8 inch) cable tie (343003) in the cable tie base.
9. Put the 2 EtherCAT RJ45 CAT5E double-shielded cables and the HPR EtherCAT plasma interface board cable in the cable tie and then connect the ends of the cable tie.

Figure 21



Connect and ground the VDC3 board

J2 on the VDC3 board is already connected. You connected it when you connected the HPR EtherCAT plasma interface board.

1. To connect J1, disconnect the connector from J4 on the power distribution board as shown in the figure at right.
2. Connect the connector to the female end of the VDC3 120 VAC harness (229833).

   The female end of the VDC3 120 VAC harness is labeled XFMR.

3. Connect the male end of the VDC3 120 VAC harness (229833) to J4 of the power distribution board.

   The male end of the VDC3 120 VAC harness is labeled PWR DIST.

4. Connect the pins of the twisted pair wires of the VDC3 120 VAC harness to J1 on the VDC3 board. See *Table 8* on page 43 for the pinouts.

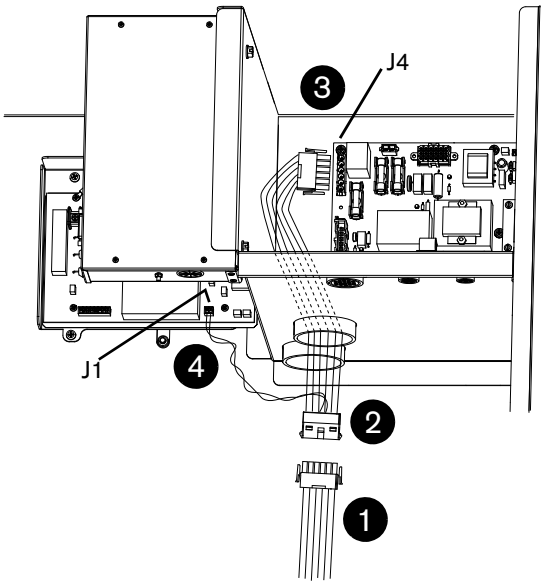
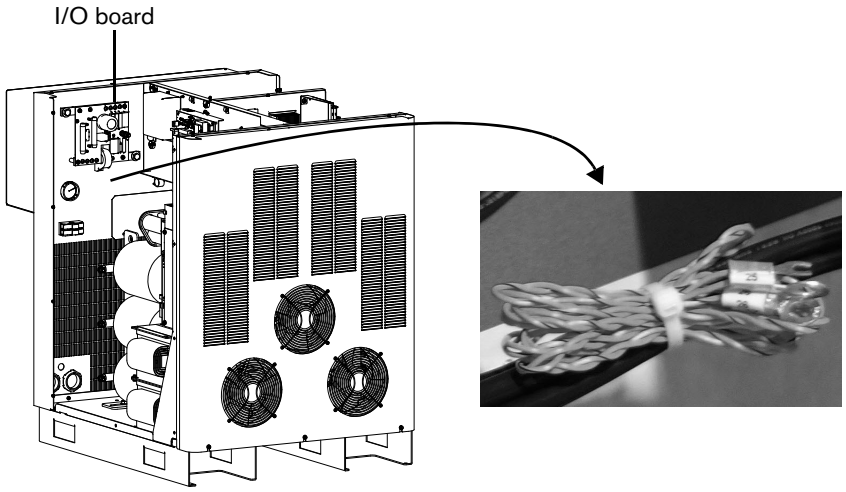


Table 8 – Pinouts for the VDC3 120 VAC harness wires to J1

Wires of the VDC3 120 VAC harness			J1 on the VDC3 board	
Wire no.	**Color**	**Signal**	**Pin no.**	**Signal**
3	White	120 VAC return	1	120 VAC
4	Red	120 VAC hot	2	120 VAC neutral

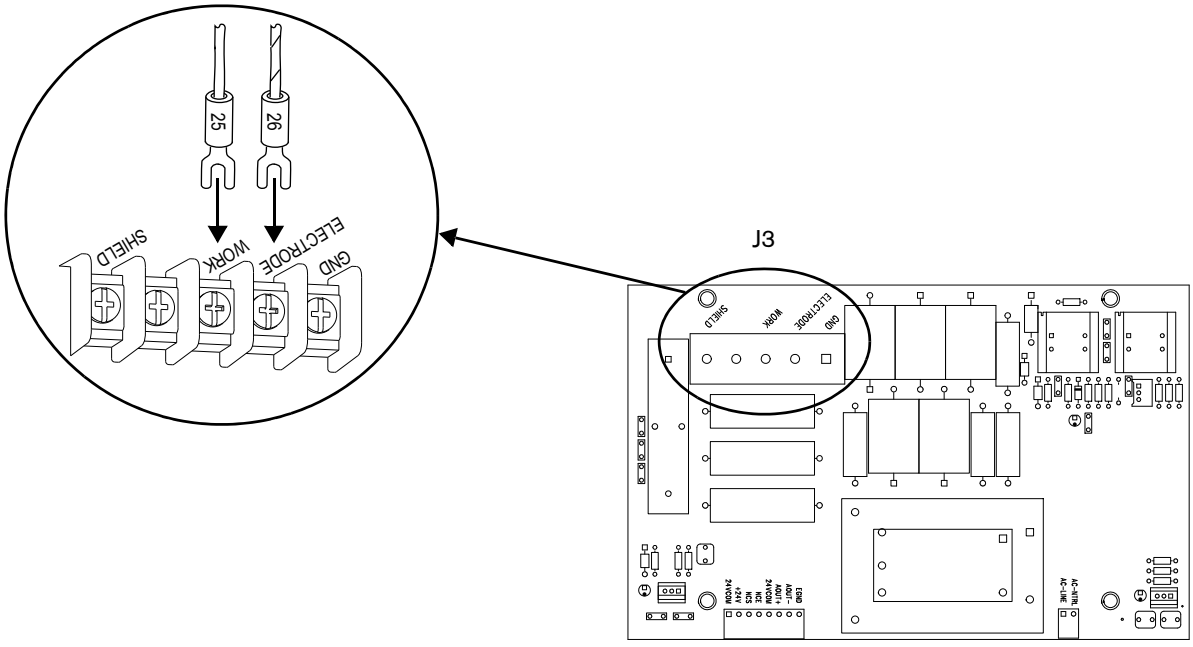
5. To connect J3, cut the cable tie on the yellow and yellow/black arc voltage wires bundled below the I/O board on the left side of the plasma power supply. They are labeled 25 and 26.



6. Attach the spade connector of the yellow 25 wire to the J3-WORK terminal on the VDC3 board. See *Figure 22* on page 44.

7. Attach the spade connector of the yellow/black 26 wire to the J3-ELECTRODE terminal on the VDC3 board. See *Figure 22* on page 44.

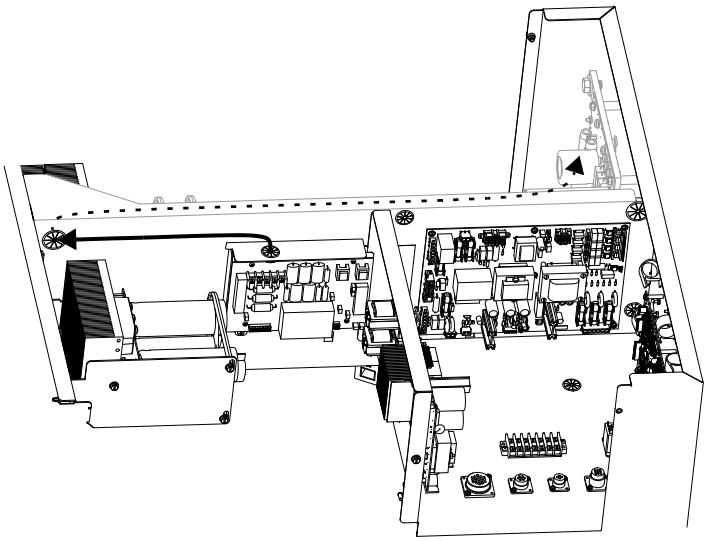
Figure 22



8. Put the wires in a grommet (108844), and then put the grommet in the hole in the top of the VDC3 board bracket. See *Figure 23*.

9. Route the wires as shown in *Figure 23*.

Figure 23

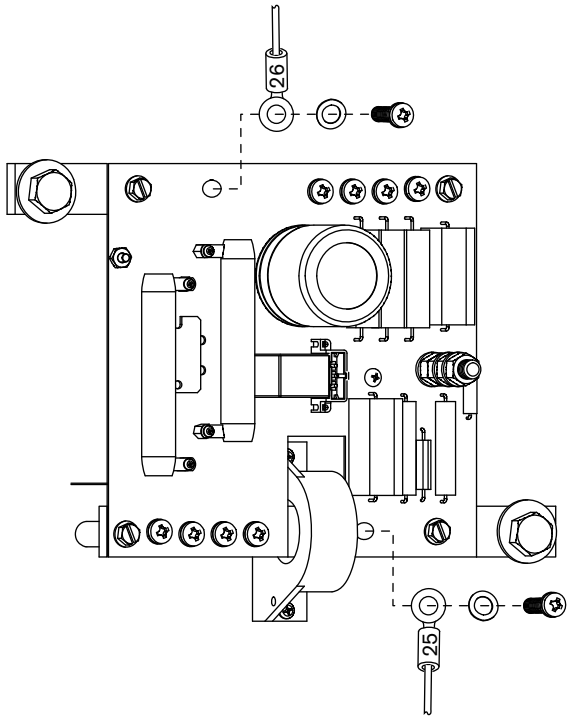


10. Attach the ring connector on the yellow 25 wire to the bolt on the I/O board labeled WORK (+). See *Figure 24*.

11. Attach the ring connector on the yellow/black 26 wire to the bolt on the I/O board labeled TORCH (-). See *Figure 24*.

Other wires are already attached to the bolts on the I/O board. Attach the arc voltage wires on top of the existing wires.

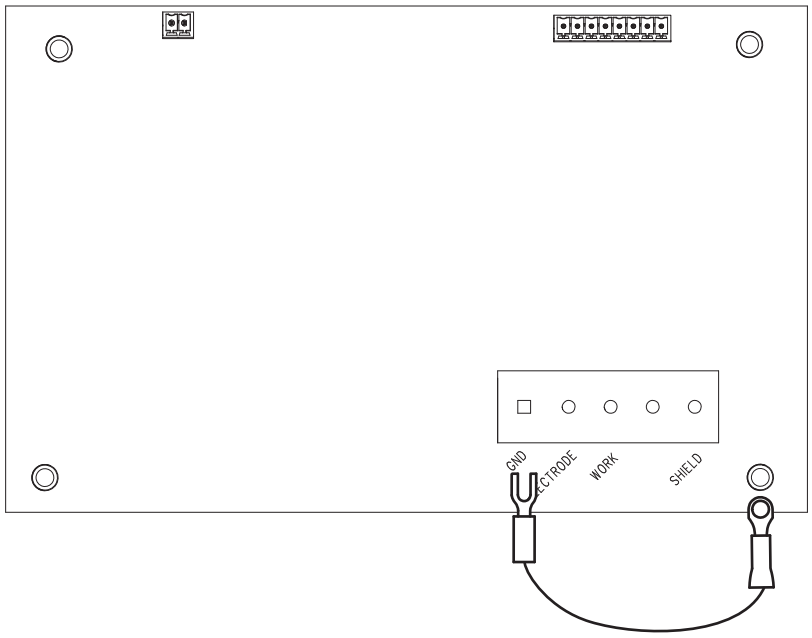
Figure 24



12. To ground the VDC3 board, attach the spade connector of the VDC3 board ground strap cable (223713) to GND as shown in the figure at right.

13. Attach the ring connector to the stud on the lower right side of the VDC3 board. Use the screw you used to attach the VDC3 board to the center panel of the plasma power supply.

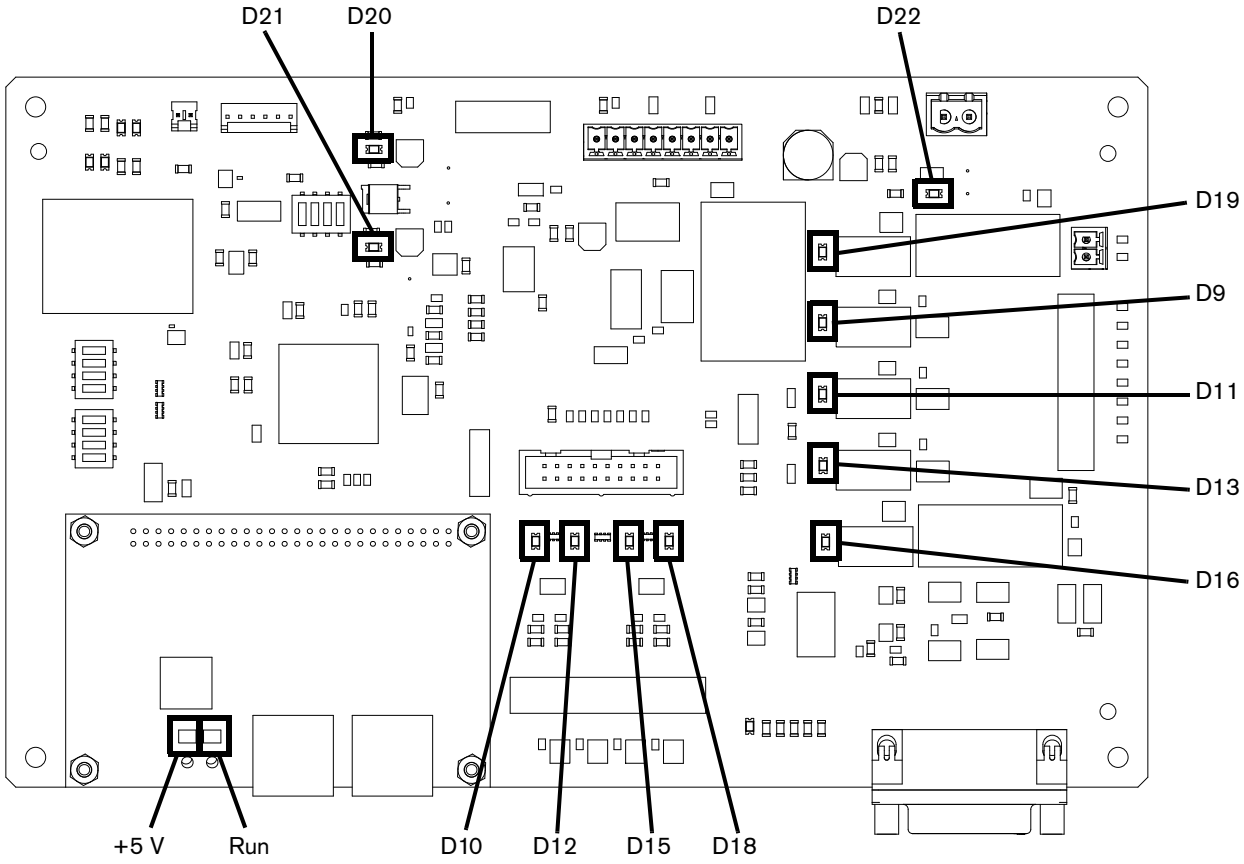
14. Tighten the screw to a torque of 9.2 kg·cm (8.0 in·lb).



Kit 428447 installation is complete. For information about the EtherCAT and VDC3 board LEDs, see *Guide to board LEDs* on page 47.

Guide to board LEDs

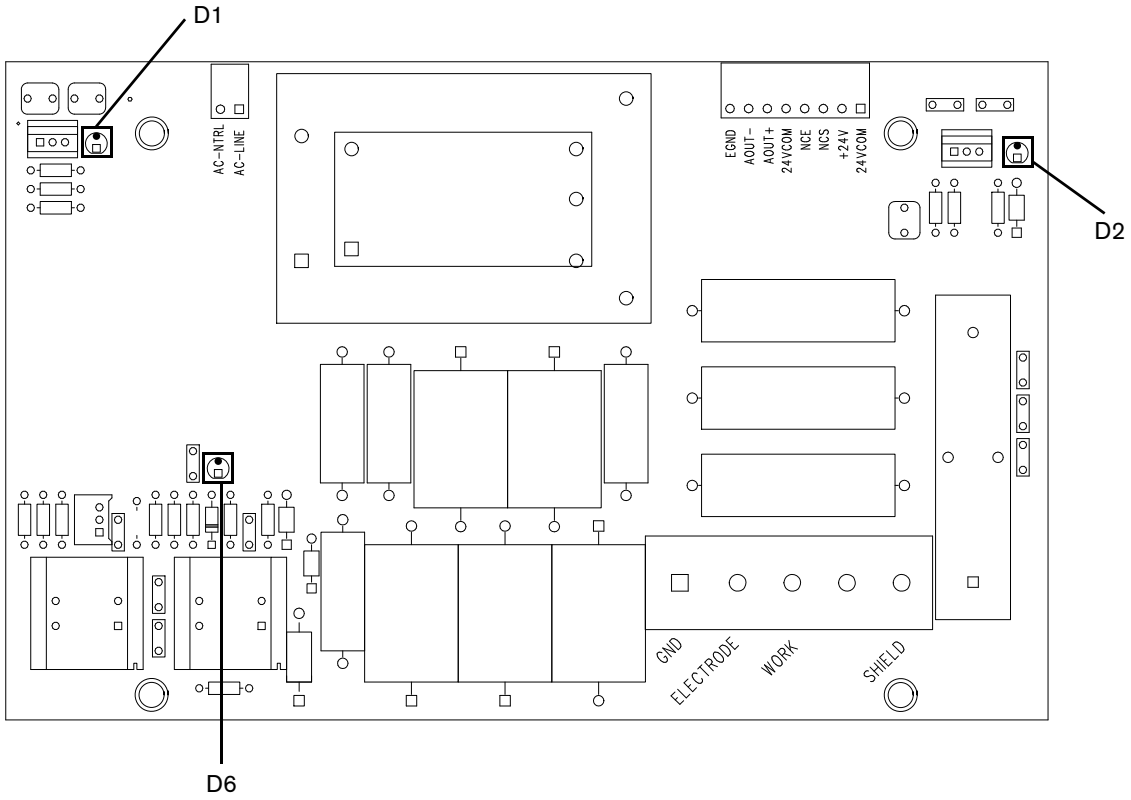
HPR EtherCAT plasma interface board LEDs



LED	Signal
+5 V	+5 V
Run	EtherCAT network status
D9	Corner (output)
D10	Transfer Motion (input)
D11	Pierce (output)
D12	HPR Error (input)
D13	Hold (output)

LED	Signal
D15	Rampdown Error (input)
D16	Start (output)
D18	Not Ready for Start (input)
D19	Remote On (output)
D20	+5 V
D21	+3.3 V
D22	24 V

VDC3 board LEDs



LED	Signal
D1	Power
D2	Shield Relay
D6	Ohmic Contact