

# Cut with Powermax<sup>®</sup> on an EDGE<sup>®</sup> Connect CNC

Powermax45 XP/65/85/105/125<sup>®</sup> and  
Powermax65/85/105 SYNC<sup>®</sup>

Manual Addendum

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**Hypertherm, Inc.**

21 Great Hollow Road, P.O. Box 5010  
Hanover, NH 03755 USA  
603-643-3441 Tel (Main Office)  
603-643-5352 Fax (All Departments)  
info@hypertherm.com (Main Office)

**800-643-9878 Tel (Technical Service)**

technical.service@hypertherm.com (Technical Service)

**800-737-2978 Tel (Customer Service)**

customer.service@hypertherm.com (Customer Service)

**Hypertherm México, S.A. de C.V.**

52 55 5681 8109 Tel  
52 55 5681 7978 Tel  
soporte.tecnico@hypertherm.com (Technical Service)

**Hypertherm Plasmatechnik GmbH**

Sophie-Scholl-Platz 5  
63452 Hanau  
Germany  
00 800 33 24 97 37 Tel  
00 800 49 73 73 29 Fax

**31 (0) 165 596900 Tel (Technical Service)****00 800 4973 7843 Tel (Technical Service)**

technicalservice.emeia@hypertherm.com (Technical Service)

**Hypertherm (Singapore) Pte Ltd.**

Solaris @ Kallang 164  
164 Kallang Way #03-13  
Singapore 349248, Republic of Singapore  
65 6841 2489 Tel  
65 6841 2490 Fax  
marketing.asia@hypertherm.com (Marketing)  
techsupportapac@hypertherm.com (Technical Service)

**Hypertherm Japan Ltd.**

Level 9, Edobori Center Building  
2-1-1 Edobori, Nishi-ku  
Osaka 550-0002 Japan  
81 6 6225 1183 Tel  
81 6 6225 1184 Fax  
htjapan.info@hypertherm.com (Main Office)  
techsupportapac@hypertherm.com (Technical Service)

**Hypertherm Europe B.V.**

Vaartveld 9, 4704 SE  
Roosendaal, Nederland  
31 165 596907 Tel  
31 165 596901 Fax  
31 165 596908 Tel (Marketing)  
**31 (0) 165 596900 Tel (Technical Service)**  
**00 800 4973 7843 Tel (Technical Service)**  
technicalservice.emeia@hypertherm.com (Technical Service)

**Hypertherm (Shanghai) Trading Co., Ltd.**

B301, 495 ShangZhong Road  
Shanghai, 200231  
PR China  
86-21-80231122 Tel  
86-21-80231120 Fax  
**86-21-80231128 Tel (Technical Service)**  
techsupport.china@hypertherm.com (Technical Service)

**South America & Central America: Hypertherm Brasil Ltda.**

Rua Bras Cubas, 231 – Jardim Maia  
Guarulhos, SP – Brasil  
CEP 07115-030  
55 11 2409 2636 Tel  
tecnico.sa@hypertherm.com (Technical Service)

**Hypertherm Korea Branch**

#3904. APEC-ro 17. Heaundae-gu. Busan.  
Korea 48060  
82 (0)51 747 0358 Tel  
82 (0)51 701 0358 Fax  
marketing.korea@hypertherm.com (Marketing)  
techsupportapac@hypertherm.com (Technical Service)

**Hypertherm Pty Limited**

GPO Box 4836  
Sydney NSW 2001, Australia  
61 7 3103 1695 Tel  
61 7 3219 9010 Fax  
au.sales@hypertherm.com (Main Office)  
techsupportapac@hypertherm.com (Technical Service)

**Hypertherm (India) Thermal Cutting Pvt. Ltd**

A-18 / B-1 Extension,  
Mohan Co-Operative Industrial Estate,  
Mathura Road, New Delhi 110044, India  
91-11-40521201/ 2/ 3 Tel  
91-11 40521204 Fax  
htindia.info@hypertherm.com (Main Office)  
technicalservice.emeia@hypertherm.com (Technical Service)

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# 1

## ***Introduction***

### **Purpose**

---

This addendum to the *EDGE® Connect Installation and Setup Manual (809340)* gives information to help you do the following:

- Set up Phoenix® to cut with one or more Powermax plasma power supplies.
- Use Phoenix to cut parts with one or more Powermax plasma power supplies.
- Find Powermax diagnostic information shown in Phoenix.



Some of the instructions given in this manual are only applicable when the Powermax plasma power supply is connected to the EDGE Connect CNC through the Powermax EtherCAT Interface. Refer to the [Hardware and software requirements](#) on page 6.

## Hardware and software requirements

---

A cutting system with the following equipment is necessary to use the information in this document:

- EDGE Connect CNC with Phoenix® 10.19.2 or later
- ProNest® CNC Nesting Software 13.1.4.7599 or later
- ProNest CNC Archives 1.6.0.0 or later
- Sensor™ THC torch height control
- Powermax EtherCAT Interface assembly
- One or more of the following Powermax plasma power supplies:
  - Powermax65/85/105 SYNC®
  - Powermax45 XP/65/85/105/125®



Each Powermax EtherCAT Interface supports one Powermax plasma power supply, to a maximum of four Powermax EtherCAT interfaces per EtherCAT network.

## Before you begin

---

Before you set up Phoenix to cut with a Powermax, do all of the following:

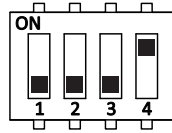
- **Review the [Hardware and software requirements](#).**
- **Connect your Powermax plasma power supply to the EDGE Connect CNC.** To use the information in this document, connect your Powermax plasma power supply to the CNC serially through the Powermax EtherCAT Interface. Refer to *Powermax EtherCAT Interface Installation for EDGE Connect* (810330) available at [www.hypertherm.com/docs](http://www.hypertherm.com/docs).



You can also connect your Powermax discretely using the procedure in the operator manual for your plasma power supply. Some of the functionality described in this manual is not available with a discrete connection.

- **Configure the EtherCAT network.** Refer to *Powermax EtherCAT Interface Installation for EDGE Connect* (810330) available at [www.hypertherm.com/docs](http://www.hypertherm.com/docs).
- **Review the following settings on the Powermax plasma power supply:**
  - **Baud rate and parity** – The factory default setting for baud rate (19200) and parity (Even) are compatible with the Powermax EtherCAT Interface.
  - **Arc voltage ratio** – Make sure that the arc voltage ratio on your Powermax plasma power supply is set to the factory default setting of 50:1. Refer to [Figure 1](#) on page 7.

**Figure 1** – The DIP switches on the voltage divider PCB are set to the factory default of 50:1.



For more information, refer to the following Field Service Bulletins:

- *Powermax45 XP Machine Interface Receptacle with Voltage Divider PCB (809940)*
- *Machine Interface Receptacle with Voltage Divider PCB (806980)*

## More Powermax information

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For Powermax technical support, refer to the manual for your Powermax plasma power supply:

- *Powermax65/85/105 SYNC Operator Manual (810470)*
- *Powermax65/85/105 SYNC Mechanized Cutting Guide (810480)*
- *Powermax45 XP Operator Manual (809240)*
- *Powermax65/85 Operator Manual (806650)*
- *Powermax105 Operator Manual (807390)*
- *Powermax125 Operator Manual (808080)*
- *Safety and Compliance Manual (80669C)*

Technical documentation is available at [www.hypertherm.com/docs](http://www.hypertherm.com/docs).

# 2

## ***Set Up a CNC with Powermax***

### **Make sure that the lifter is set up**

---

Hypertherm CNCs support the Sensor™ THC, which is an integrated Z axis that supplies linear motion and automatic voltage tracking. If you are using a Sensor THC, refer to the “Sensor THC setup” procedure in the *Torch Height Control (THC)* section of the *EDGE® Connect Installation and Setup Manual* (809340).



Set up the Sensor THC before you select a cutting tool in the Station Configuration screen or you will not see Sensor THC as a selection when assigning the cutting tool.

If you are not using a Sensor THC:

- Go to the Machine Setups screen (**Setups > Password > Machine Setups**) and set the number of **Sensor THCs** installed to **0**.
- Go to the Station Configuration screen (**Setups > Password > Station Configuration**) to select **Other** or **None** for a lifter based on your configuration.

For more information, refer to the *EDGE® Connect Installation and Setup Manual* (809340).

### **Select the tools installed and the processes used (Special Setups screen)**

---

Before you can assign your stations and get access to the necessary Process screens in Phoenix, you first need to make selections on the Special Setups screen.

1. In Phoenix, select **Setups > Password > Special Setups**.
2. Make the applicable plasma or marker selections. Refer to [Table 1](#) on page 9.



**Table 1** – Plasma process selections on the Special Setups screen

When you have...	and...	Select...
One or two torches	One cutting process	<b>Plasma 1</b>
One torch	One cutting/marking* process	<b>Plasma 1</b> <b>Marker 1*</b>
Two torches	Two cutting processes	<b>Plasma 1</b> and <b>Plasma 2</b>
Two torches	Two cutting/marking* processes	<b>Plasma 1</b> and <b>Plasma 2</b> <b>Marker 1</b> and <b>Marker 2**</b>
<p>* Powermax45 XP is the only Powermax model that supports marking.</p> <p>** You cannot assign Marker 2 without having Marker 1 also assigned. Otherwise, Marker 2 will be deleted automatically when Phoenix restarts.</p>		

**3.** Select **OK** to save your changes.

Now you can assign your stations and go to the necessary Process screens.

## Set up the stations (Station Configuration screen)

When you set up a station, Phoenix automatically customizes the Process screen, enables the cut charts, and assigns fixed-function digital I/O.

- 1.** Select **Setups > Password > Station Configuration**.
- 2.** Make the applicable selections for your cutting setup.
  - a.** To see examples of station assignments, refer to [Table 2](#).
  - b.** For more information, refer to [Station Configuration guidelines](#) on page 10.
- 3.** Select **OK** to save your changes.

**Table 2** – Example Powermax selections on the Station Configuration screen

When you have...	and...	Select...												
A single torch	One cutting process	<table border="0"> <tr> <td>Station 1:</td> <td>Station 2:</td> </tr> <tr> <td>▪ <b>Lifter:</b> Sensor THC</td> <td>▪ <b>Lifter:</b> None</td> </tr> <tr> <td>▪ <b>Plasma 1:</b> Powermax</td> <td>▪ <b>Plasma 1:</b> None</td> </tr> <tr> <td>▪ <b>Plasma 2:</b> None</td> <td>▪ <b>Plasma 2:</b> None</td> </tr> <tr> <td>▪ <b>Marker 1:</b> None</td> <td>▪ <b>Marker 1:</b> None</td> </tr> <tr> <td>▪ <b>Marker 2:</b> None</td> <td>▪ <b>Marker 2:</b> None</td> </tr> </table>	Station 1:	Station 2:	▪ <b>Lifter:</b> Sensor THC	▪ <b>Lifter:</b> None	▪ <b>Plasma 1:</b> Powermax	▪ <b>Plasma 1:</b> None	▪ <b>Plasma 2:</b> None	▪ <b>Plasma 2:</b> None	▪ <b>Marker 1:</b> None	▪ <b>Marker 1:</b> None	▪ <b>Marker 2:</b> None	▪ <b>Marker 2:</b> None
Station 1:	Station 2:													
▪ <b>Lifter:</b> Sensor THC	▪ <b>Lifter:</b> None													
▪ <b>Plasma 1:</b> Powermax	▪ <b>Plasma 1:</b> None													
▪ <b>Plasma 2:</b> None	▪ <b>Plasma 2:</b> None													
▪ <b>Marker 1:</b> None	▪ <b>Marker 1:</b> None													
▪ <b>Marker 2:</b> None	▪ <b>Marker 2:</b> None													
A single torch	One cutting and one marking* process	<table border="0"> <tr> <td>Station 1:</td> <td>Station 2:</td> </tr> <tr> <td>▪ <b>Lifter:</b> Sensor THC</td> <td>▪ <b>Lifter:</b> None</td> </tr> <tr> <td>▪ <b>Plasma 1:</b> Powermax45 XP</td> <td>▪ <b>Plasma 1:</b> None</td> </tr> <tr> <td>▪ <b>Plasma 2:</b> None</td> <td>▪ <b>Plasma 2:</b> None</td> </tr> <tr> <td>▪ <b>Marker 1:</b> Powermax45 XP*</td> <td>▪ <b>Marker 1:</b> None</td> </tr> <tr> <td>▪ <b>Marker 2:</b> None</td> <td>▪ <b>Marker 2:</b> None</td> </tr> </table>	Station 1:	Station 2:	▪ <b>Lifter:</b> Sensor THC	▪ <b>Lifter:</b> None	▪ <b>Plasma 1:</b> Powermax45 XP	▪ <b>Plasma 1:</b> None	▪ <b>Plasma 2:</b> None	▪ <b>Plasma 2:</b> None	▪ <b>Marker 1:</b> Powermax45 XP*	▪ <b>Marker 1:</b> None	▪ <b>Marker 2:</b> None	▪ <b>Marker 2:</b> None
Station 1:	Station 2:													
▪ <b>Lifter:</b> Sensor THC	▪ <b>Lifter:</b> None													
▪ <b>Plasma 1:</b> Powermax45 XP	▪ <b>Plasma 1:</b> None													
▪ <b>Plasma 2:</b> None	▪ <b>Plasma 2:</b> None													
▪ <b>Marker 1:</b> Powermax45 XP*	▪ <b>Marker 1:</b> None													
▪ <b>Marker 2:</b> None	▪ <b>Marker 2:</b> None													
Two torches	One cutting process	<table border="0"> <tr> <td>Station 1:</td> <td>Station 2:</td> </tr> <tr> <td>▪ <b>Lifter:</b> Sensor THC</td> <td>▪ <b>Lifter:</b> Sensor THC 2</td> </tr> <tr> <td>▪ <b>Plasma 1:</b> Powermax</td> <td>▪ <b>Plasma 1:</b> Powermax</td> </tr> <tr> <td>▪ <b>Plasma 2:</b> None</td> <td>▪ <b>Plasma 2:</b> None</td> </tr> <tr> <td>▪ <b>Marker 1:</b> None</td> <td>▪ <b>Marker 1:</b> None</td> </tr> <tr> <td>▪ <b>Marker 2:</b> None</td> <td>▪ <b>Marker 2:</b> None</td> </tr> </table>	Station 1:	Station 2:	▪ <b>Lifter:</b> Sensor THC	▪ <b>Lifter:</b> Sensor THC 2	▪ <b>Plasma 1:</b> Powermax	▪ <b>Plasma 1:</b> Powermax	▪ <b>Plasma 2:</b> None	▪ <b>Plasma 2:</b> None	▪ <b>Marker 1:</b> None	▪ <b>Marker 1:</b> None	▪ <b>Marker 2:</b> None	▪ <b>Marker 2:</b> None
Station 1:	Station 2:													
▪ <b>Lifter:</b> Sensor THC	▪ <b>Lifter:</b> Sensor THC 2													
▪ <b>Plasma 1:</b> Powermax	▪ <b>Plasma 1:</b> Powermax													
▪ <b>Plasma 2:</b> None	▪ <b>Plasma 2:</b> None													
▪ <b>Marker 1:</b> None	▪ <b>Marker 1:</b> None													
▪ <b>Marker 2:</b> None	▪ <b>Marker 2:</b> None													
<p>* Powermax45 XP is the only Powermax model that supports marking. Select None for <b>Marker 1</b> and <b>Marker 2</b> when using other Powermax models.</p>														

## Station Configuration guidelines

Table 2 shows common examples of station setups. More plasma power supplies can be assigned to other stations. It is important to understand the following when setting up stations:

- The EDGE Connect CNC supports a maximum of 4 Powermax EtherCAT Interfaces.
- When installing a Powermax EtherCAT interface with one or more EtherCAT plasma power supplies, make sure the XPR or HPR is before the Powermax EtherCAT interface.
- Do not mix XPR and HPR plasma power supplies on the same EtherCAT network.
- On the Station Configuration screen in Phoenix, set up the EtherCAT plasma power supplies first, starting with Station 1. Set up tools with discrete connections on remaining stations.
- It is not necessary to select Oxyfuel systems in the Station Configuration screen. Oxyfuel cut charts become available after you select Oxyfuel as a Tool Installed in the Special Setups screen (**Setups > Password > Special Setups**).

For more information, select the **Help** soft key or refer to *Station Setup* in the *EDGE Connect Installation and Setup Manual* (809340). Technical documentation is available at [www.hypertherm.com/docs](http://www.hypertherm.com/docs).

## Fixed-function digital I/O

When using a Powermax EtherCAT Interface, fixed-function digital I/O is automatically assigned after 512. Phoenix uses your selections in the Station Configuration screen to identify what value to use.



Phoenix lets you see and record fixed-function digital I/O using the I/O watch window and Oscilloscope. Refer to [page 21](#).

### Fixed-function digital inputs

- **Cut Sense** – This input tells the CNC that the torch has transferred the arc to the workpiece.
- **Nozzle Contact Sense** – This input is used during initial height sense (IHS) to find the surface of the workpiece.

### Fixed-function digital outputs

- **Cut Control** – This output starts the Plasma Start input of the Powermax. Cut Control turns on and stays on until the M08 (Cut Off) command is executed in the part program.

## Fixed-function analog input

**Powermax Arc Voltage** is a fixed-function analog input that is automatically assigned at 33 when using a Sensor THC.

# 3

## Use Phoenix to Cut with Powermax

This section tells you how to use Phoenix software to cut with one or more Powermax plasma power supplies. You can use Phoenix to cut:

- **Part programs** – Refer to [Part programs](#) on page 13.
- **Geometry without a part program** – Refer to the next paragraph.

### Geometry without a part program

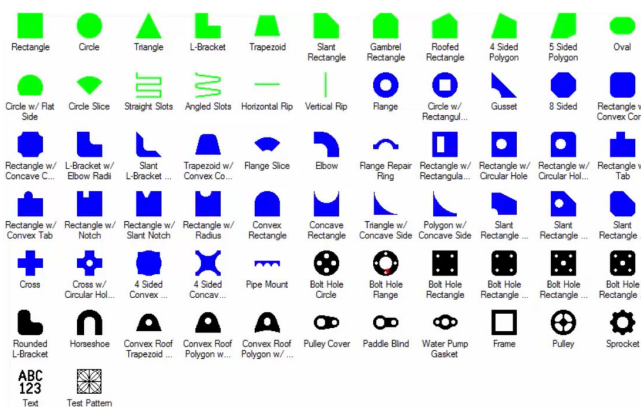
ProNest CNC is pre-installed on every EDGE Connect CNC to allow you to cut and nest geometric shapes without the need to supply your own part program.

With ProNest CNC, you can load shapes from two locations:

- **Phoenix Shape Library** of default parts (shown at the right)
- **Computer-aided design (CAD) files** (\*.dxf, \*.dwg, \*.dgn, or \*.cam) that you load into Phoenix

To use ProNest CNC, refer to Field Service Bulletin 809560 available at [www.hypertherm.com/docs](http://www.hypertherm.com/docs).

Figure 2 – Shape Library in Phoenix



## Part programs

Phoenix allows you to cut part programs with and without embedded process variables.

- To learn more about part programs, refer to the information that follows on this page.
- To cut a part program, refer to [Cut a part program](#) on page 15.

### Part programs with embedded process variables

Part programs created with Computer-Aided Manufacturing (CAM) software often contain the types of codes described below.

- |   |                |                                                                                                                                               |
|---|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <b>M36 T#</b>  | Allows the part program to select process parameters in the cut charts, where T selects the process (Plasma 1/Plasma 2 or Marker 1/Marker 2). |
| 2 | <b>M37* T#</b> | Enables a station, where T selects the station number for the Powermax.*                                                                      |
| 3 | <b>G59 5##</b> | Selects the Torch Type, Current, and Gas parameters for the material you are cutting.                                                         |
| 4 | <b>G59 6##</b> | Updates Torch Height Control variables (such as Arc Voltage, Pierce Time, Pierce Height, and Cut Height) if a Sensor THC is set up.           |

\* If your part program has an **M37** code, you must also enable the station in Program Mode from the Soft Operator Console (Soft Op Con). Refer to [page 14](#).

The example part program on the right shows process codes for a Powermax SYNC that is assigned to Station 1 with the Plasma 1 process.



There are specific G59 V5## and V6## codes for a Powermax if it is installed on different stations and using alternative processes (such as Plasma1/Plasma2 or Marker1/Marker2).

**For a complete list of specific process variables for Powermax**, refer to the *EDGE Connect Programmer Reference* (809550) available at [www.hypertherm.com/docs](http://www.hypertherm.com/docs).

#### Example of a part program with embedded process variables

(ProNest Version 13.1.4.7599)

G21

G91

M01

(Set Powermax to 85A)

(CutPro Wizard - Load Material: Mild

Steel;1219.2mm x

2438.4mm;6.mm)

**M36 T1** — 1

**M37 T1** — 2

G00X68.324Y140.729

**G59 V502 F69**

**G59 V503 F1**

**G59 V504 F85**

**G59 V505 F21**

**G59 V507 F29 G59**

**G59 V600 F128**

**G59 V601 F0.2**

**G59 V602 F120**

**G59 V603 F3.2**

**G59 V604 F120**

G43X1.7

G41

M07 HS

M51

F3560

G01X4.752Y-4.752

G02Y-125.724I-62.862J-62.862

G01X-62.862Y62.862

G01X62.862Y62.862

M50

G01X2.376Y2.376

M08


## Basic part programs without embedded process variables

Basic part programs do not contain an M37 (Station Select) code or embedded process variables (G59 codes).

### Example of a basic part program

```
G20
G91
G99 X1 Y0 I0 J0
G41
M07
G01 X0 Y5
G01 X5 Y0
G01 X0 Y-5
G01 X-5 Y0
M08
G40
```




If you have a basic part program, make sure to:

- Manually select process parameters from the cut charts in Phoenix before you cut the part.
- Enable the station in Manual Mode  on the Soft Operator Console (Soft Op Con). Refer to the next section.

## Manual Mode versus Program Mode

Before you can begin to cut, you must enable the assigned station in either Manual Mode or Program (Automatic) Mode.

On the CNC's standard Soft Op Con, select from the station modes that follow:

Station mode*	Select this mode if...	Before you select this mode...
<b>Disable Station</b> 	The station is not ready for operation.	
<b>Manual</b> 	Your part program does NOT contain an M37 (Station Select) code and the station is ready to operate. You want to jog the torch, Go to Home, or do rip cutting.	Manually select a cut chart process in Phoenix.
<b>Program (Automatic)</b> 	Your part program contains an M37 (Station Select) code and the station is ready to operate.	Enable the Program Code settings that follow on the <b>Setups &gt; Cutting</b> screen. <ul style="list-style-type: none"> <li>EIA G59 Code Override**</li> <li>Process Select Override</li> <li>EIA Kerf Override</li> <li>EIA F-Code Override</li> <li>Station Select Override</li> </ul>

\* The color of the mode you select changes from gray to green when you select it.

\*\* Enabling EIA G59 code overrides is only useful if your part program contains G59 codes. If your part program does NOT contain G59 codes, make sure to manually select a cut chart process in Phoenix.

## Cut a part program

Regardless of whether your part program contains embedded process variables, you can choose to cut with or without cutting setup guidance from the CutPro Wizard.

### Part program file types

The default file extension for Phoenix parts programs is \*.txt. Hypertherm ProNest parts have the \*.cnc extension. Refer to your CAM software for the file extension it uses and enter the extension on the Special Setups screen.



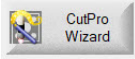
If your file is a \*.dxf, \*.dwg, \*.dgn, or \*.cam, refer to [page 12](#).

### Cut with guidance (CutPro Wizard)

Use the CutPro Wizard to cut a part program if you would like to see prompts that help you to cut your part program. The CutPro Wizard guides you to load a part, install consumables, select cut charts, and align a part to a plate.



If you do not need step-by-step guidance, refer to [Cut without guidance \(Files soft key\)](#).

1. On the Soft Op Con, select the applicable station mode (Program  or Manual ) for your part program. Refer to [page 14](#).
2. Go to the Main screen in Phoenix and select **CutPro Wizard**  on the right-side of the screen.
3. Follow the instructions and prompts on the CutPro Wizard dialogs that appear next.



### Cut without guidance (Files soft key)

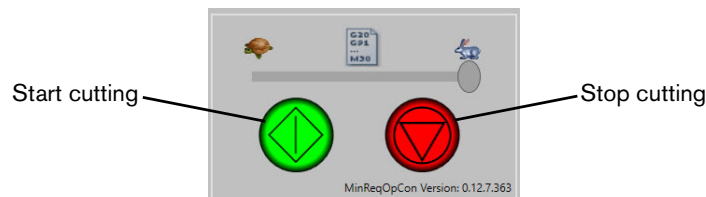
If you do not need help to cut your part program, cut the part with these steps.

1. Press (**Files > Load from Disk**) and choose the part program.



If necessary, you can override cut chart and process parameters. Refer to [page 16](#).

2. On the Soft Op Con, select the applicable station mode (Program  or Manual ) for your part program. Refer to [page 14](#).
3. Select **Start** to cut.




## Override cut chart parameters

If necessary, you can override the standard cut chart parameters on two screens:

- Cut Charts screen (**Setups > Process > Plasma 1 [or 2] > Plasma 1 [or 2] Cut Chart**)
- Process screen (**Setups > Process > Plasma 1 [or 2]**)

Before you make one-time changes to parameters on the Process screen, edit the parameters on the Cut Chart screen. Overrides made on the Cut Chart screen automatically update related values on the Process screen.

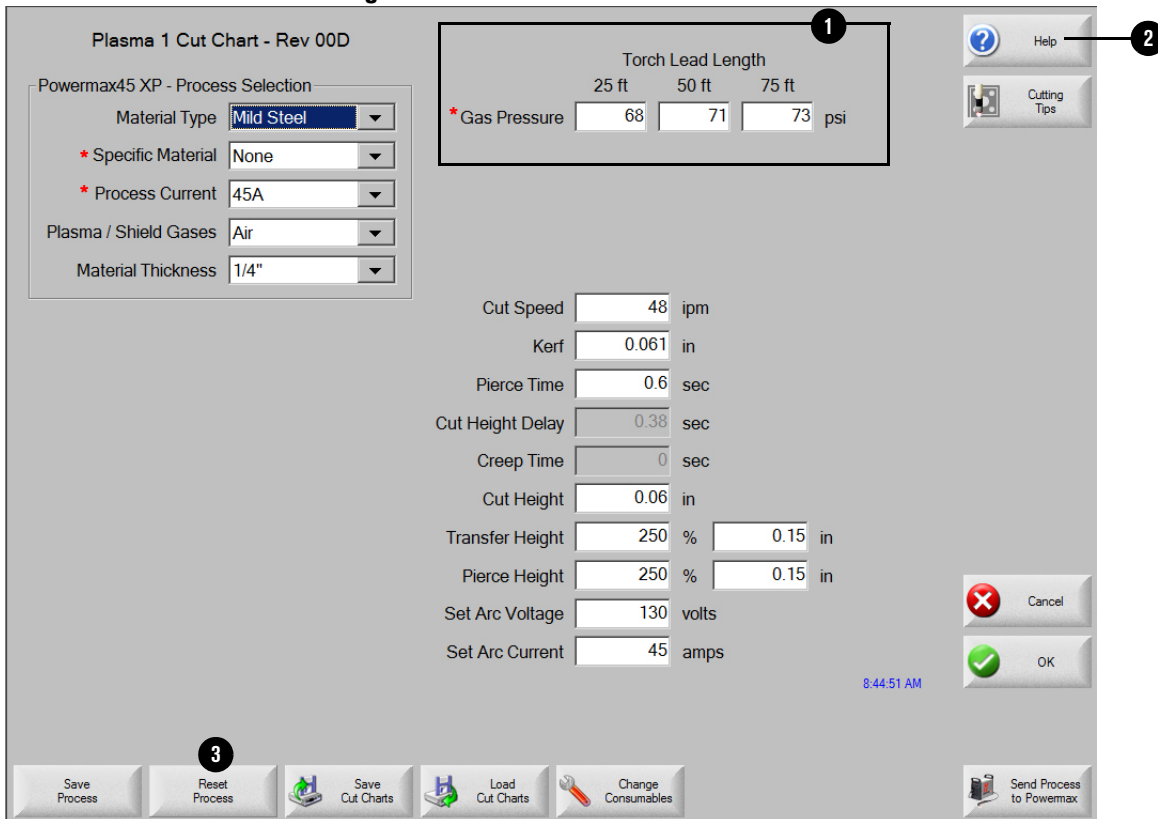
 If you are manually overriding values in an advanced part program with G59 codes, make sure that the **EIA G59 Code Override** setting is enabled in **Setups > Cutting**.

### Cut Charts screen overrides

You can override the parameters on the Cut Charts screen shown in [Figure 3](#). Powermax cut charts include editable **Gas Pressure** (psi) values **1** to use with different torch lead lengths.

For more information about specific cut chart parameters, select **Help** **2**.

**Figure 3** – Cut Charts screen for Powermax



\* Some selections are set automatically. Refer to the next page.



For Powermax SYNC, the following selections are set automatically:

- Gas Pressure
- Maximum Process Current
- Specific Material
- Cut Chart Type
  - FineCut, if you install a C MFNC cartridge
  - Gouge, if you install a G CNTL or G RMVL cartridge
  - None, if you install a standard mechanized cutting cartridge

## Change a parameter on the Cut Charts screen


1. Delete a default value and enter a new value. The override value shows in blue font.



**Creep Time** and **Cut Height Delay** cannot be edited on this screen. To edit these values, go to the Process screen.

2. Select **OK** to exit the screen.
3. Select **Yes** when asked if you want to save changes to the cut chart.

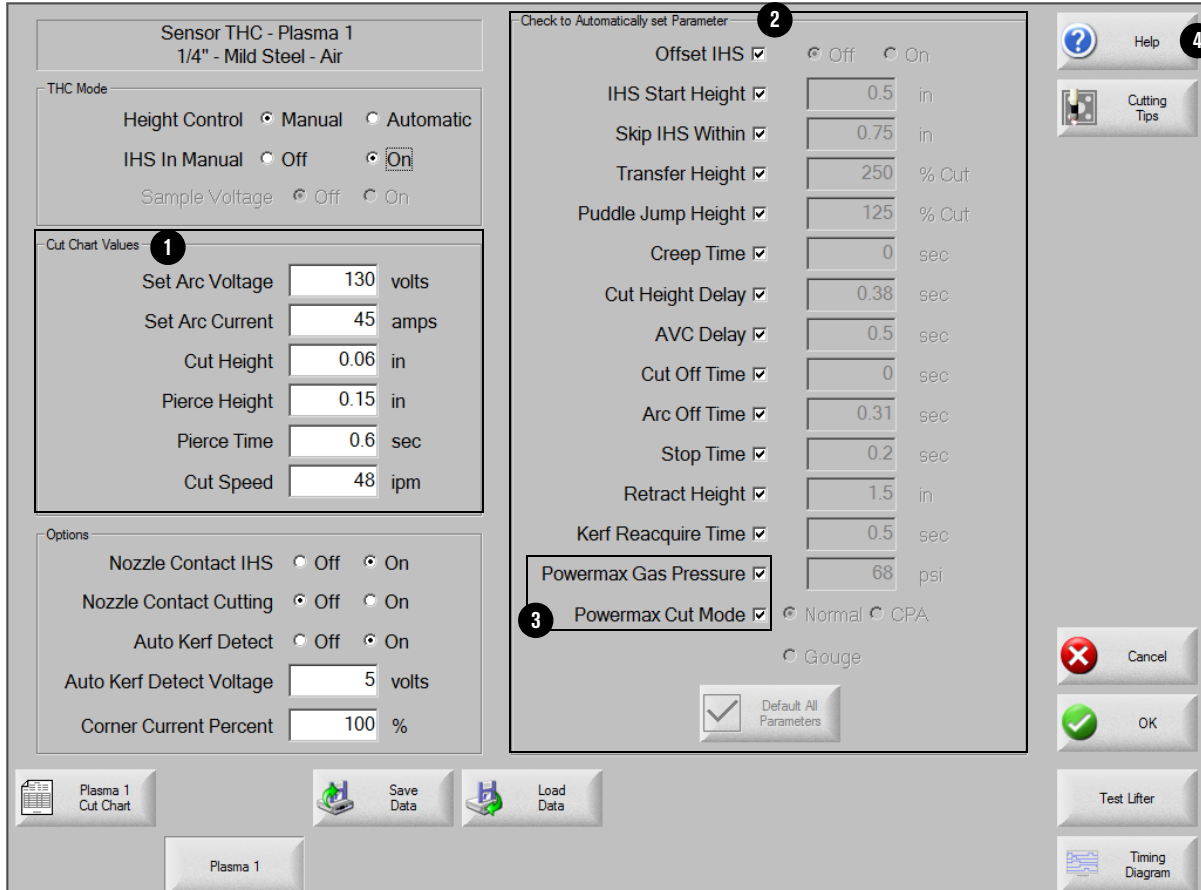
After completing steps 1-3 above, the overrides that you have just made stay in effect until the next time that you save changes to those values or load a new part program. The overrides automatically update applicable values on the Process screen.

If necessary, you can restore the factory cut chart values with the **Reset Process**  soft key. Refer to [Figure 3](#) on page 16.

## Process screen overrides

After you customize parameters on the Cut Charts screen, you can make one-time overrides to the parameters on the Process screen (refer to Figure 4).

Figure 4 – Process screen when Sensor THC is set up



Some values come directly from the cut chart ①. Other values are calculated from a combination of cut chart values and other Phoenix settings ②.

**Gas Pressure** and **Cut Mode** settings ③ are set automatically for Powermax SYNC. A gouging cartridge can only be used in **Gouge** mode, but a cutting cartridge can be used in **Normal** or **CPA** mode. In addition, the maximum **Set Arc Current** is limited by the cartridge. For more information, select **Help** ④.

To change a value that is calculated from a combination of cut chart values and Phoenix settings ②:

1. Clear the checkbox and delete the value.
2. Enter a new value. The override value shows in blue font.
3. When you are done editing the Process screen, select **OK** to save your changes and exit.



Clearing the checkbox breaks the link to the cut chart and other Phoenix settings. The override value is kept as is until you change it again on the Process screen or re-select the checkbox to put back the default value.

# 4

## ***Troubleshooting and Diagnostics***

This section tells you how to do the following:

- Check Powermax readiness.
- Set up watch windows to monitor: Input/Output, System Errors, Process Data, and Cartridge Life on SmartSYNC torches.
- See and record fixed-function digital I/O.
- See process data for Powermax.
- See Powermax system errors and failures at the CNC.
- See cartridge data (for Powermax SYNC).
- Monitor cartridge life (for Powermax SYNC).
- Monitor and do tests of gas flows.

### **Make sure that the Powermax is ready**

---

Before sending a process to the Powermax, make sure that the following conditions are satisfied:

- The Powermax plasma power supply is set to ON.
- The fieldbus is running. (If the gantry moves when you jog the torch, then the fieldbus is enabled.)
- The tool's station is enabled in Phoenix. Refer to "Enable Station I/O" in the *EDGE Connect Installation and Setup Manual* (809340).
- There are no Powermax errors.
- The hardware and software requirements on [page 6](#) are satisfied.

## Set up watch windows

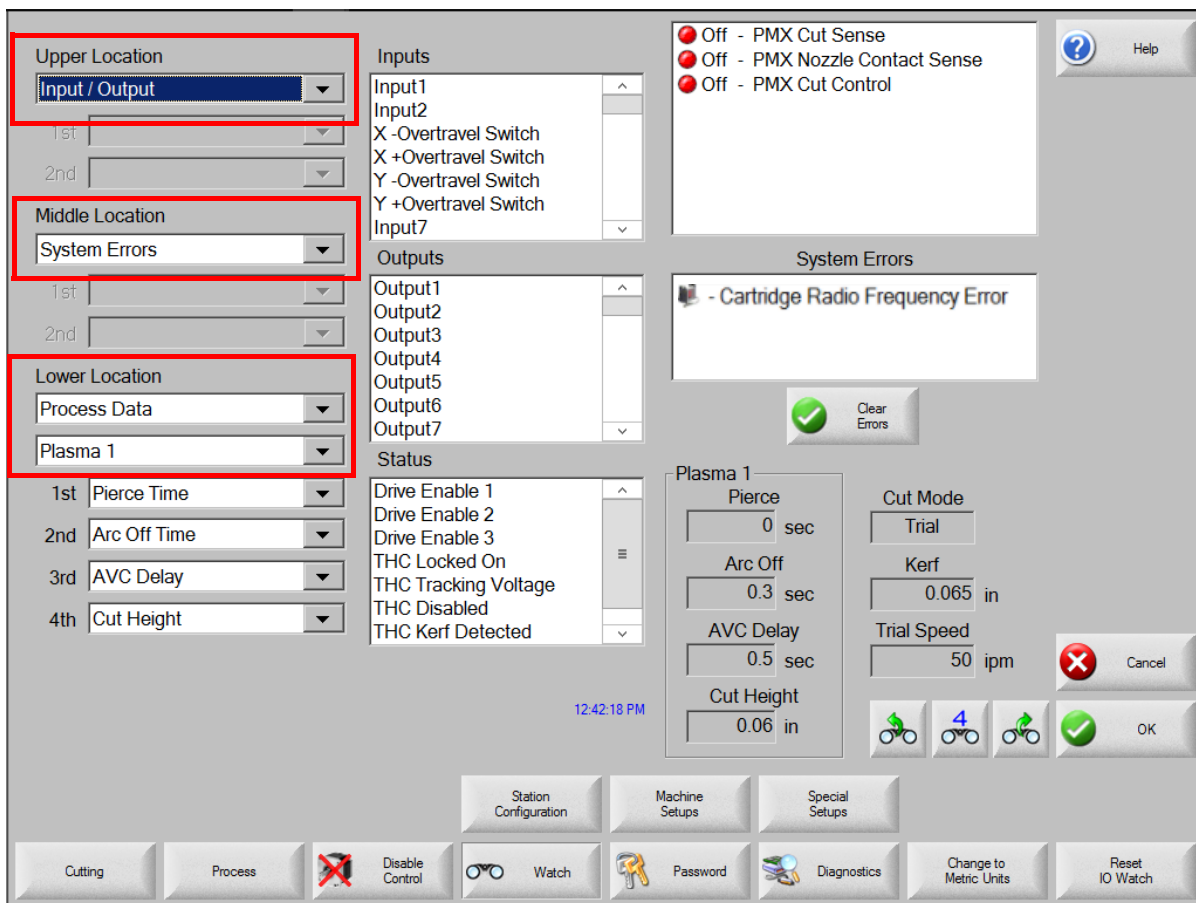
You can set up watch windows to show on the Main screen to give you feedback during cutting.

To set up a watch window, select **Setups > Watch**.

You can customize a maximum of 10 watch windows. When monitoring Powermax information from the CNC, Hypertherm recommends that you set up watch windows for:

- Input/Output
- System Errors
- Process Data
- Plasma Cartridge (Refer to [Monitor cartridge life](#) on page 28.)

**Figure 5** – Example of the Watch Window Setup screen



For more information about the Watch Window Setup screen, select **Help** .

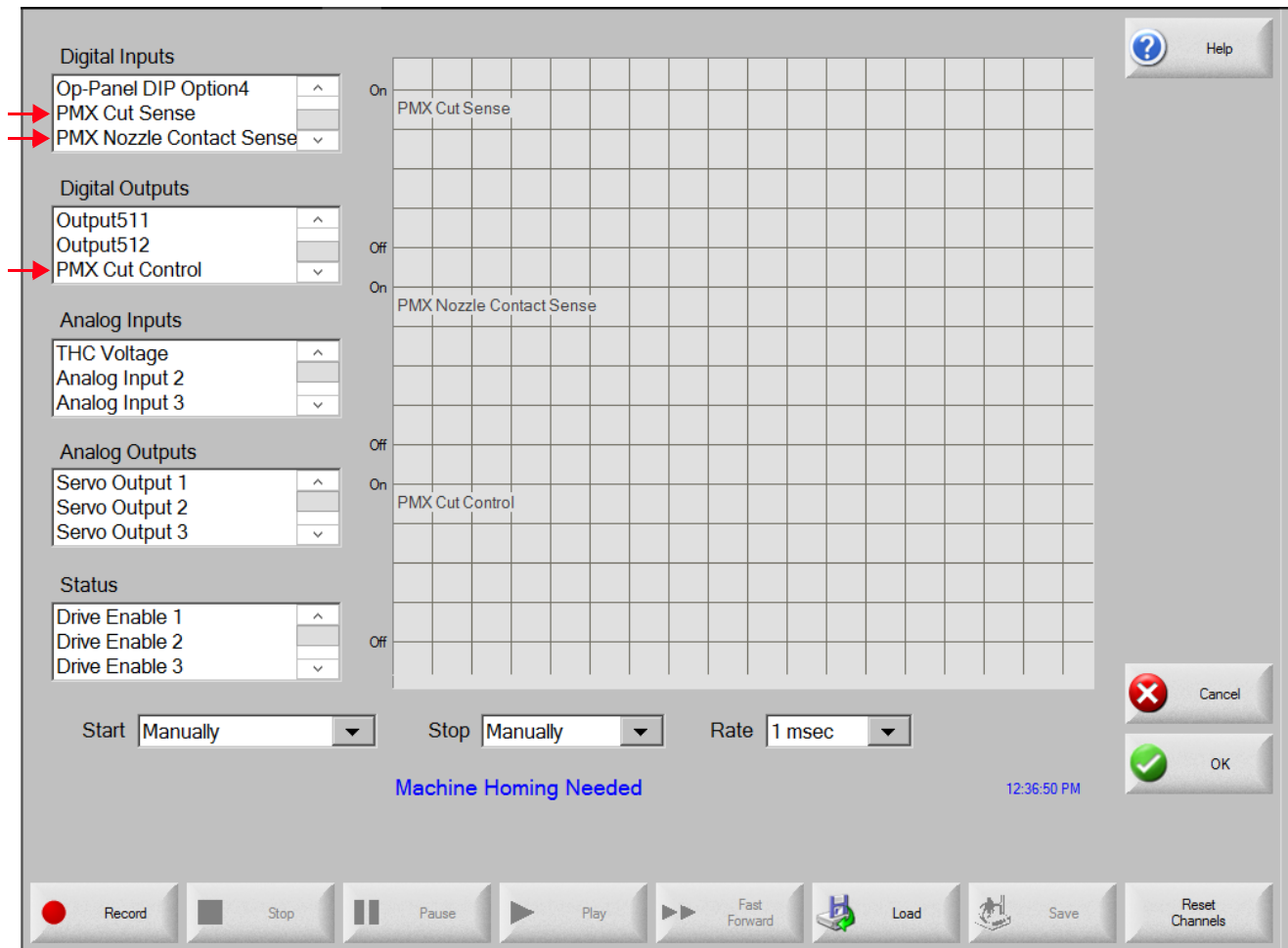
## See and record fixed-function digital I/O

The automatically assigned fixed-function I/O for Powermax are shown on [page 11](#).

There are two methods you can use to monitor fixed-function digital I/O in Phoenix.

- To set up an Input/Output watch window, go to **Setups > Watch** and refer to [Figure 5](#) on page 20.
- To make an Oscilloscope log to help you understand an issue with an input or output, go to **Setups > Diagnostics > Oscilloscope** and refer to [Figure 6](#).

**Figure 6** – Example of the Oscilloscope screen for Powermax



For more information about the Oscilloscope screen, select **Help** .

## See process data for Powermax

To see process data for Powermax, do the following:

- Set up a Process Data watch window (**Setups > Watch**). Refer to the example in [Figure 5](#) on page 20.
- Go to the Plasma Process screen (**Setups > Process > Plasma 1**).

### About the Plasma Process screen

From the Process screen, you can customize and control the plasma process.

If a Sensor THC has been set up, then the Process screen includes torch height control options as shown in [Figure 7](#).

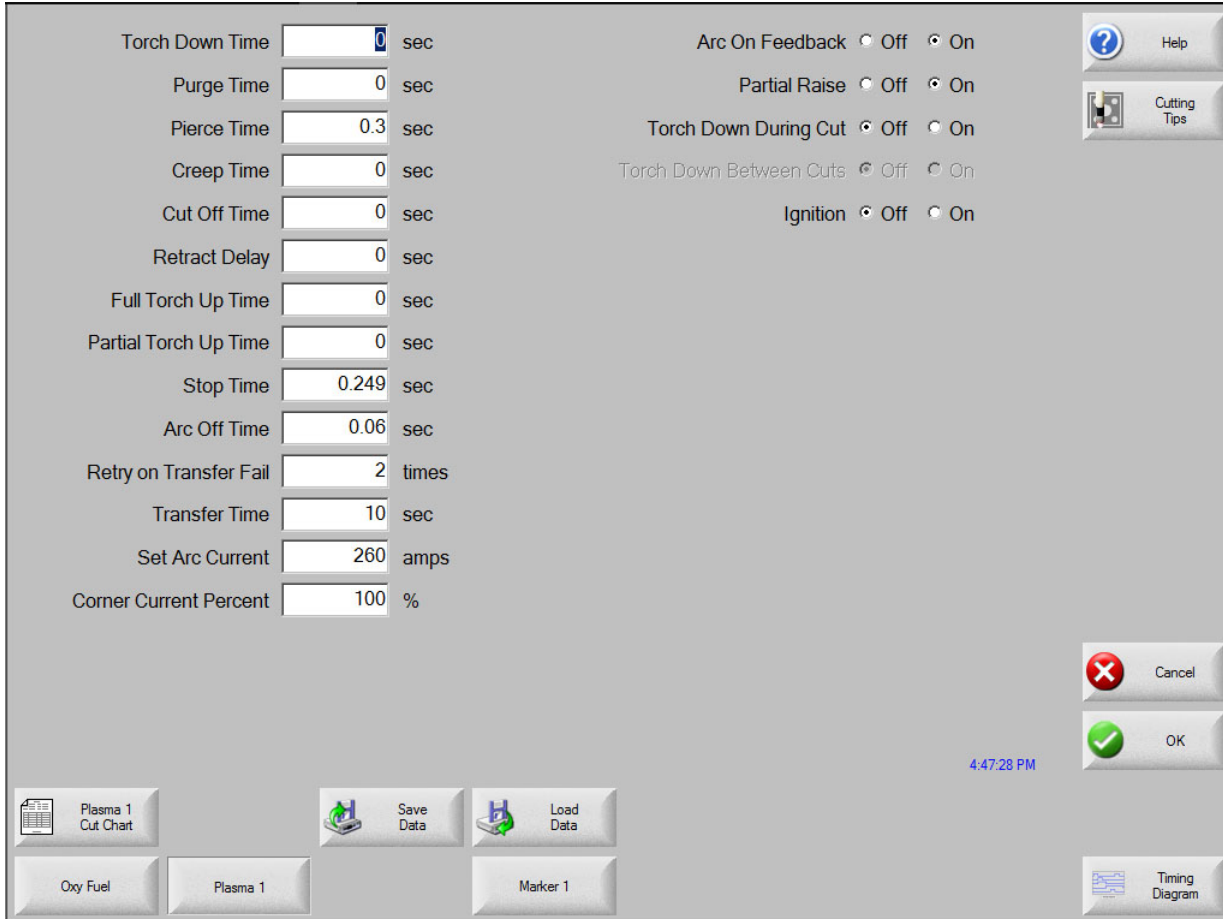
**Figure 7** – Plasma Process screen with Sensor THC

The screenshot shows the Plasma Process screen with the following sections and controls:

- Sensor THC - Plasma 1** (1/4" - Mild Steel - Air)
  - THC Mode: Height Control (Manual selected, Automatic unselected), IHS In Manual (Off selected, On unselected), Sample Voltage (Off selected, On unselected)
- Cut Chart Values**
  - Set Arc Voltage: 130 volts
  - Set Arc Current: 45 amps
  - Cut Height: 0.06 in
  - Pierce Height: 0.15 in
  - Pierce Time: 0.6 sec
  - Cut Speed: 48 ipm
- Options**
  - Nozzle Contact IHS: Off selected, On unselected
  - Nozzle Contact Cutting: Off selected, On unselected
  - Auto Kerf Detect: Off selected, On unselected
  - Auto Kerf Detect Voltage: 5 volts
  - Corner Current Percent: 100 %
- Check to Automatically set Parameter**
  - Offset IHS:  Off,  On
  - IHS Start Height:  0.5 in
  - Skip IHS Within:  0.75 in
  - Transfer Height:  250 % Cut
  - Puddle Jump Height:  125 % Cut
  - Creep Time:  0 sec
  - Cut Height Delay:  0.38 sec
  - AVC Delay:  0.5 sec
  - Cut Off Time:  0 sec
  - Arc Off Time:  0.31 sec
  - Stop Time:  0.2 sec
  - Retract Height:  1.5 in
  - Kerf Reacquire Time:  0.5 sec
  - Powermax Gas Pressure:  68 psi
  - Powermax Cut Mode:  Normal,  CPA,  Gouge
  - Default All Parameters
- Buttons and Navigation**
  - Help, Cutting Tips (top right)
  - Cancel, OK (right side)
  - Test Lifter (bottom right)
  - Timing Diagram (bottom right)
  - Plasma 1 Cut Chart, Save Data, Load Data (bottom left)
  - Plasma 1 (bottom center)

If a Sensor THC has not been set up and you have selected **Other** or **None** as the Lifter in the Station Configuration screen, then the Process screen includes fewer options. Refer to [Figure 8](#) on page 23.

**Figure 8** – Plasma Process screen without Sensor THC



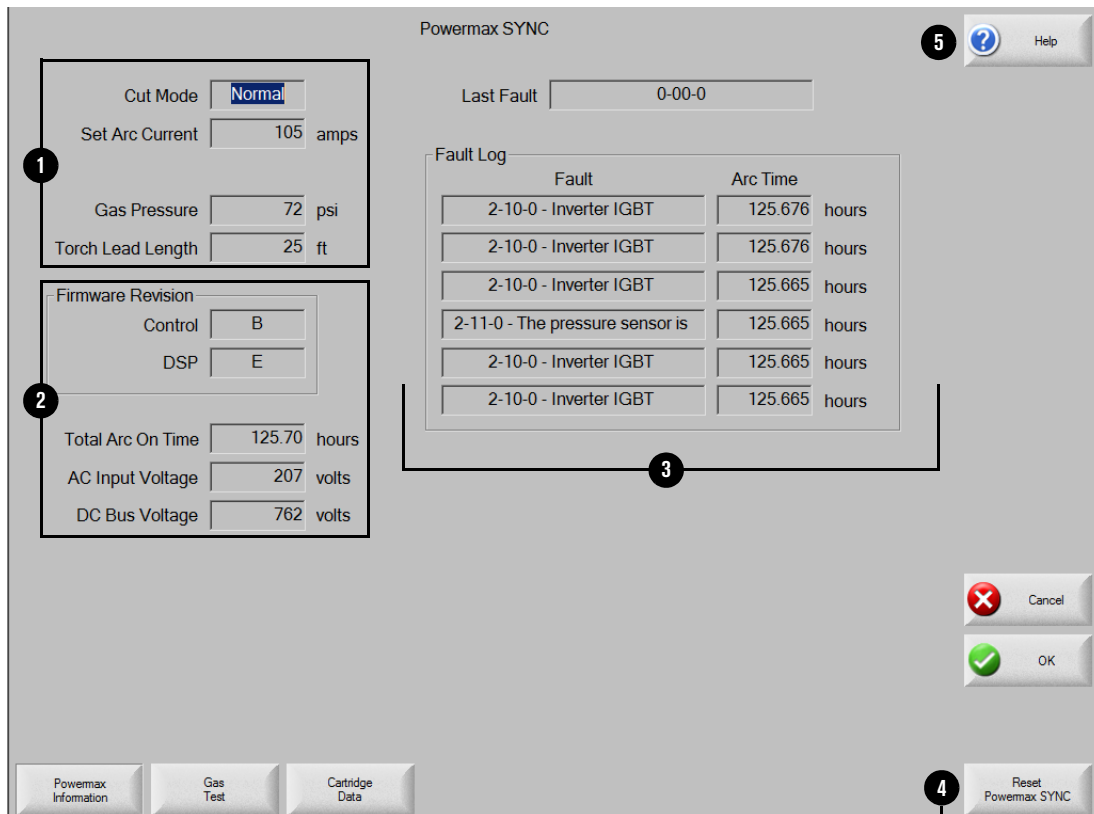
For information about changing values on the Process screen, refer to [Process screen overrides](#) on page 18.

## See Powermax information

If you have a Powermax EtherCAT Interface, the Powermax sends information to Phoenix about its current settings, firmware and current voltage, as well as recent faults.

To see Powermax System Information, select **Setups > Diagnostics > Powermax System**.

**Figure 9** – Powermax System Information screen



(Only available for Powermax SYNC)

- |                                |                                       |
|--------------------------------|---------------------------------------|
| 1 Current settings             | 4 Reset Powermax SYNC (quick restart) |
| 2 Firmware and current voltage | 5 Help                                |
| 3 Faults                       |                                       |

### Current Powermax settings ❶

The upper-left of the Powermax System Information screen (shown in [Figure 9](#)) shows the following Powermax settings:

- **Cut Mode** – The cut mode that is set by the CNC and sent to the Powermax (Normal, Continuous Pilot Arc [CPA], or Gouge).
- **Set Arc Current** – The current level (amperes) that is set by the CNC and sent to the Powermax.



- **Gas Pressure** – The gas pressure (psi) that is set by the CNC and sent to the Powermax. The CNC uses the gas pressure from the cut chart or the part program.
- **Torch Lead Length** – The CNC uses the torch lead length to determine the correct range for the gas pressure. The gas pressure and lead lengths are stored in the cut charts.

You can change some of these current settings on the Process screen. Refer to [page 18](#).

## Firmware and current voltage ②

The lower-left of the Powermax System Information screen shows information about the Powermax control and digital signal processing (DSP) firmware. Refer to [Figure 9](#) on page 24.

The following information is also shown:

- **Total Arc On Time** (hours) – The time (hours) that the Powermax has been on and producing an arc for the life of the plasma power supply.
- **AC Input Voltage** – The supply voltage as measured by the Powermax sensors.
- **DC Bus Voltage** – The internal DC voltage as measured by the Powermax sensors.

## Faults ③

The right side of the Powermax System Information screen shows recent faults. Refer to [Figure 9](#) on page 24.

Resolve faults by following the steps in the operator manual for your plasma power supply. Technical documentation is available at [www.hypertherm.com/docs](http://www.hypertherm.com/docs).

## Reset Powermax SYNC ④

When troubleshooting faults for a Powermax SYNC, you can do a quick restart of the plasma power supply from the CNC by choosing the **Reset Powermax SYNC** soft key.

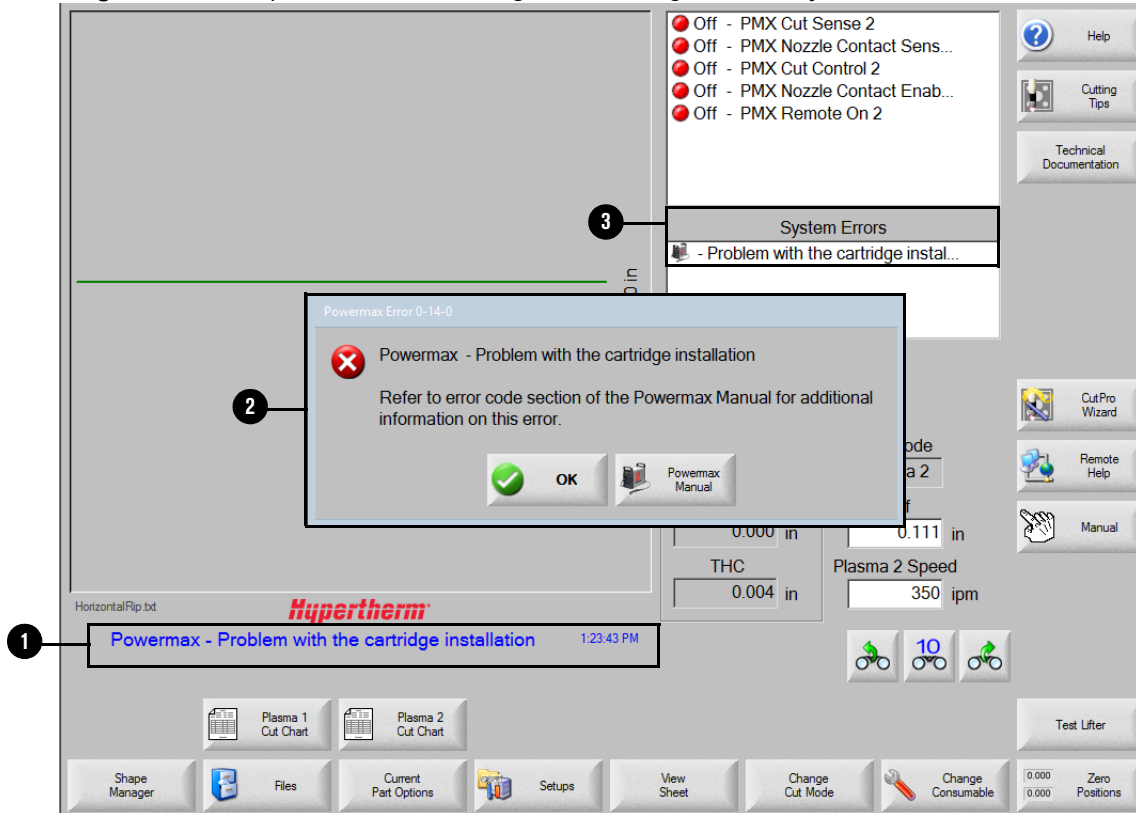
## More information ⑤

To learn more about the fields on the Powermax System Information screen, select **Help** .

## See system errors and failures at the CNC

System errors at the CNC can show in Phoenix as status messages, error dialogs, and messages in the System Errors watch window. Refer to [Figure 10](#).

**Figure 10** – Example of a status message, error dialog box, and System Errors watch window



### Status messages ❶

Status messages show as blue text below the part preview on the Main screen. These messages show in order of priority and show the sequence of events on the cutting system.

### Error dialogs ❷

Error dialogs show in Phoenix when the cutting system is not operating correctly.

Faults and errors cause the arc to stop and cutting motion to pause. This prevents damage to the cutting system, unsatisfactory cut quality, and a decline in productivity. The dialog box also shows a message when cutting is paused for an error that does not stop cutting.

### System Errors watch window ❸

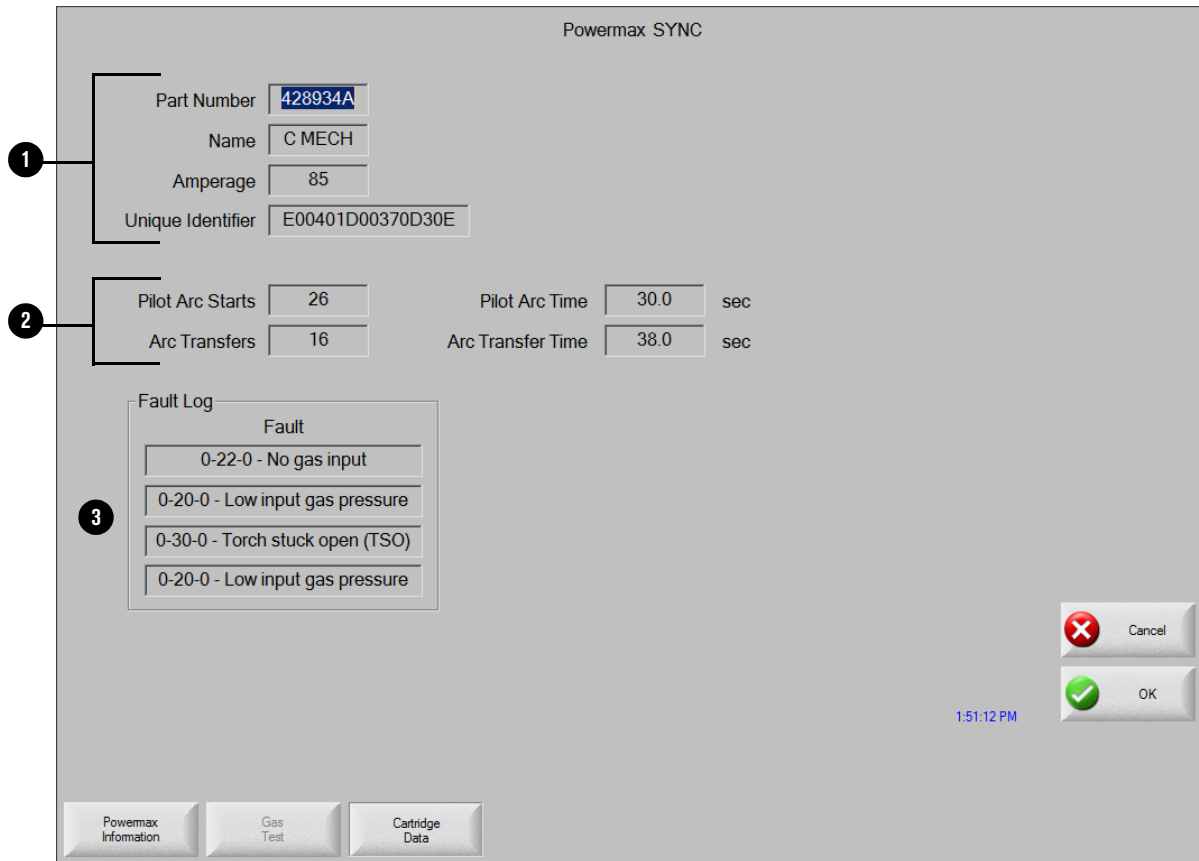
Messages in the System Errors watch window show system errors and failures. To set up the System Errors watch window, select **Setups > Watch**. Refer to [Figure 5](#) on page 20.

For more information, refer to the *EDGE Connect Installation and Setup Manual* (809340).

## See cartridge data

If you are cutting with a SmartSYNC torch on a Powermax65/85/105 SYNC system, you can see data about the cartridge that is currently installed. Select **Setups > Diagnostics > Powermax System > Cartridge Data**.

**Figure 11** – Cartridge Data screen



### Cartridge identification ❶

The upper-left of the Cartridge Data screen shows information to identify the cartridge type (including the part number to replace the cartridge). Refer to [Figure 11](#).

### Cartridge statistics ❷

On the left of the screen, you can also see data about the total usage over the life of the cartridge. You can set up a watch window to help you to monitor cartridge life. Refer to [page 28](#).

### Faults ❸

On the lower-left of the screen, you can see recent operational faults that occurred while cutting or gouging with this cartridge.

To resolve faults, refer to the operator manual for your plasma power supply. Technical documentation is available at [www.hypertherm.com/docs](http://www.hypertherm.com/docs).

### Monitor cartridge life

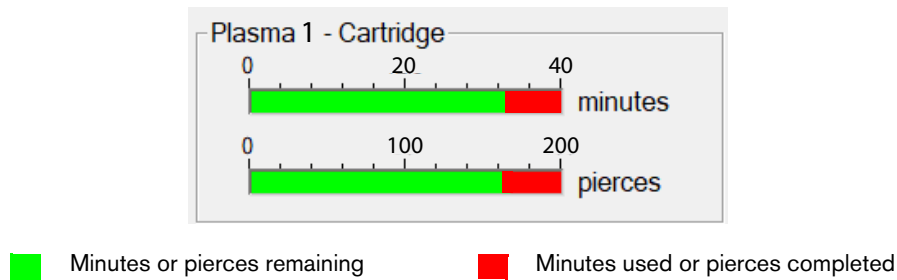
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To monitor cartridge life for Powermax SYNC, set up a Plasma Cartridge watch window in the Upper or Middle Location (**Setups > Watch**). Refer to [Set up watch windows](#) on page 20.

#### Plasma Cartridge watch window

To see a Plasma Cartridge watch window that you have set up, go to the Main screen in Phoenix.

**Figure 12** – Example of a Plasma Cartridge watch window



#### Read the estimated cartridge usage data

The Minutes gauge (top bar) in the Plasma Cartridge watch window shows the Arc Transfer Time over the life of the cartridge.

In [Figure 12](#) shown above, the maximum life of the installed cartridge is approximately 40 minutes of Arc Transfer Time.

- **Minutes used** – The red part of the Minutes gauge shows approximately how long the installed cartridge has been used for in its life in minutes.  
**Example:** The cartridge shown in [Figure 12](#) above has been used for approximately 8 minutes of Arc Transfer Time.
- **Minutes remaining** – The green bar on the Minutes gauge shows an estimate of the available Arc Transfer Time that remains on the Plasma 1 cartridge.  
**Example:** In [Figure 12](#), the green part of the Minutes gauge shows that the Plasma 1 cartridge has approximately 32 minutes of Arc Transfer Time remaining.

For information about how the estimated cartridge usage data is calculated, refer to [How cartridge life is estimated](#) on page 29.

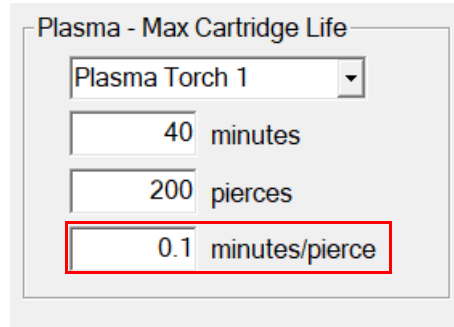
## How cartridge life is estimated

The minutes value in the Plasma Cartridge watch window is an estimate that is calculated as follows.

**minutes used (in red)** = actual cumulative Arc Transfer Time + (minutes/pierce\* x number of pierces completed)

- \* Where the **minutes/pierce** value in the above calculation is taken from the estimates that you supplied on the Change Consumables screen. Refer to [Figure 13](#).

**Figure 13** – Maximum Cartridge Life settings on the Change Consumables screen



Cartridge life can vary by cartridge type and cutting application. You must go to the Change Consumables screen to supply estimates of the **Plasma - Max Cartridge Life** values for your cartridge, unless you use enable automatic updates. Refer to [Automatically update maximum consumable life](#).

### Examples:

- If a cartridge has completed 20 pierces and used 6 minutes of Arc Transfer Time, then the red part of the Minutes gauge on the Plasma Cartridge watch window shows:  
(0.1 x 20) + 6 = 8 minutes of use.
- With a “0” in the **minutes/pierce** field, the minutes life gauge in the Plasma Cartridge watch window is only the Arc Transfer Time.
- If each pierce in a nest takes an average of “.1” minutes (or 6 seconds) away from total consumable life, then type “.1” in the **minutes/pierce** field in the Change Consumables screen (**Plasma 1 or 2 Cut Chart > Change Consumables**).

If you complete 50 pierces, then Phoenix automatically adds 5 minutes to the Arc Transfer Time that is shown as used (in red) in the Plasma Cartridge watch window.

## Automatically update maximum consumable life

Hypertherm recommends enabling the **Auto Update Max Consumable Life** option in the Special Setups screen (**Setups > Password > Special Setups**).

When enabled, this feature monitors the cartridge or consumable life beyond the user-defined setpoint on the Change Consumables screen and uses that maximum value as the new setpoint.

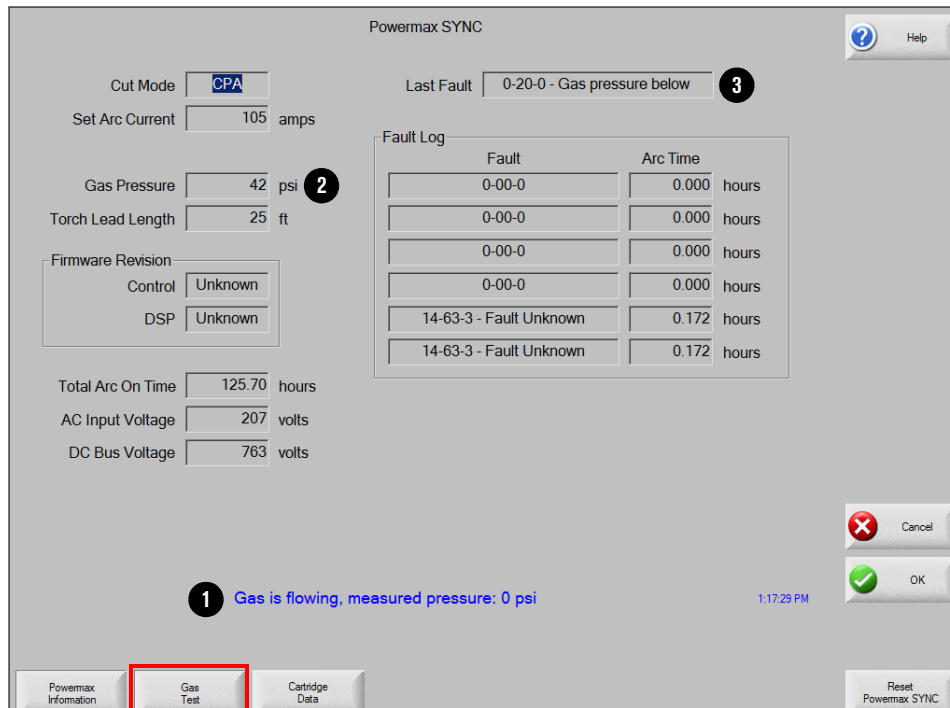
## Monitor and do tests of gas pressure

### Do a test of the gas pressure

To identify a problem with the gas pressure:

1. Select **Setups > Diagnostics > Powermax System > Gas Test**.
2. Wait while the gas flow turns ON.
3. Compare the measured gas pressure in blue text **1** with the gas pressure set by the CNC **2**. Refer to [Figure 14](#).

**Figure 14** – Gas Test screen for Powermax SYNC



If the **measured pressure 1** is out of range from the set **Gas Pressure 2**, then an error shows in the **Last Fault** field **3**.

Resolve faults by following the steps in the operator manual for your plasma power supply. Technical documentation is available at [www.hypertherm.com/docs](http://www.hypertherm.com/docs).

### Monitor gas pressure

To monitor the measured gas pressure from the Main screen in Phoenix, set up a watch window. Refer to [page 20](#).