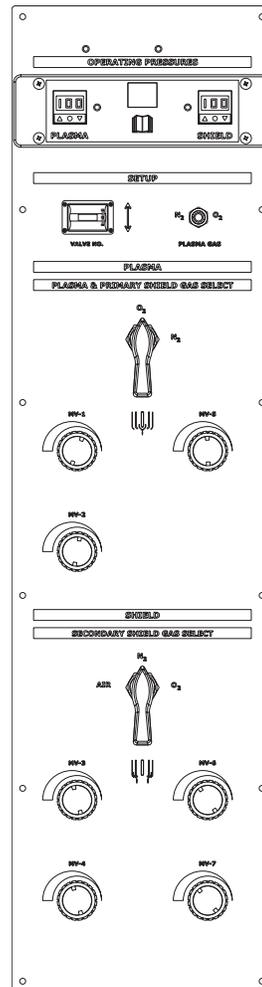


# HT4400<sup>®</sup>

## Plasma Arc Cutting System Gas Panel

**Instruction Manual**  
**804210 - Revision 1**

**Integrated Plasma System**  
**For use with the TITAN™**



**Hypertherm**  
*The world leader in  
plasma cutting technology*

**MESSER**   
**MG Systems &  
Welding, Inc.**



# **NOTICE**

Use the HT4400 instruction manual, 803580 as well as this manual, 804210, to install, operate and maintain the Titan system.

- This manual contains information to install the HT4400 with Titan Gas Panel. A parts list is also included.
- See manual 803580 for safety information, general maintenance and detailed system information.



***HT4400***  
**Gas Panel**  
**for *TITAN*<sup>™</sup>**

**Instruction Manual**  
**(P/N 804210)**

**Revision 1 March, 2002**

**Hypertherm, Inc.**  
**Hanover, NH USA**  
**[www.hypertherm.com](http://www.hypertherm.com)**

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Electromagnetic Compatibility (EMC) and Warranty - refer to manual 803580

**Safety and Grounding Requirements - Refer to HT4400 manual 803580**

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### **SPECIFICATIONS**

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#### **System Components**

See Main instruction manual 803580 for details on the system components and interconnections.

#### **System Requirements**

Table provides information about the types of gases needed, gas quality requirements and maximum flow rate and inlet pressure.

#### **Gas Panel**

This unit houses metering and solenoid valves, pressure readout LEDs and gas selection switches to choose, set and monitor plasma and shield gases. The gas console must be located within 50 ft (15.3 m) of the valve cluster.

## SPECIFICATIONS

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### System Requirements

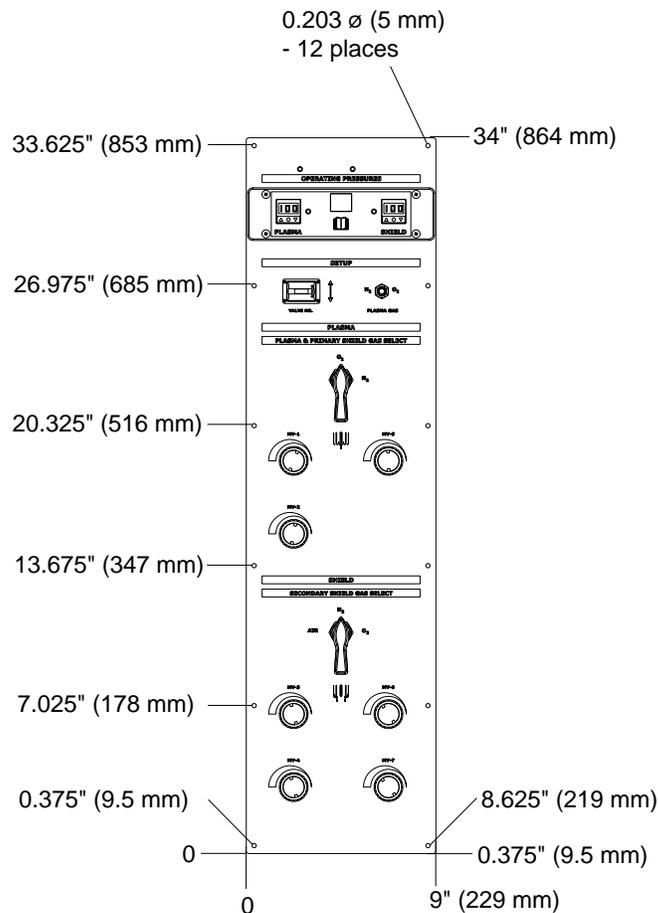
<b>Gas Requirements:</b>	
Plasma Gas Types	Oxygen, Nitrogen
Shield Gas Types	Air; Nitrogen
<b>Gas Quality:</b>	
Oxygen	99.5% pure (liquid gas recommended)
Nitrogen	99.995% pure (liquid gas recommended)
Air	99.995% pure (liquid gas recommended)
<b>Maximum Gas Flow Rates and Inlet Pressures:</b>	
Oxygen	140 scfh (3965 sclh) @ 120 psi +/- 10 psi (8.3 bar +/- 0.7 bar)
Nitrogen	250 scfh (7080 sclh) @ 120 psi +/- 10 psi (8.3 bar +/- 0.7 bar)
Air	250 scfh (5664 sclh) @ 120 psi +/- 10 psi (8.3 bar +/- 0.7 bar)

**Gas Panel – 077044**

**Dimensions and Weight:**

Width .....9" (228 mm)  
 Height .....34" (864 mm)  
 Depth .....6" (150 mm)  
 Weight .....20 lbs (9 kg)

**Gas Panel - Mounting Dimensions**





## **Section 2**

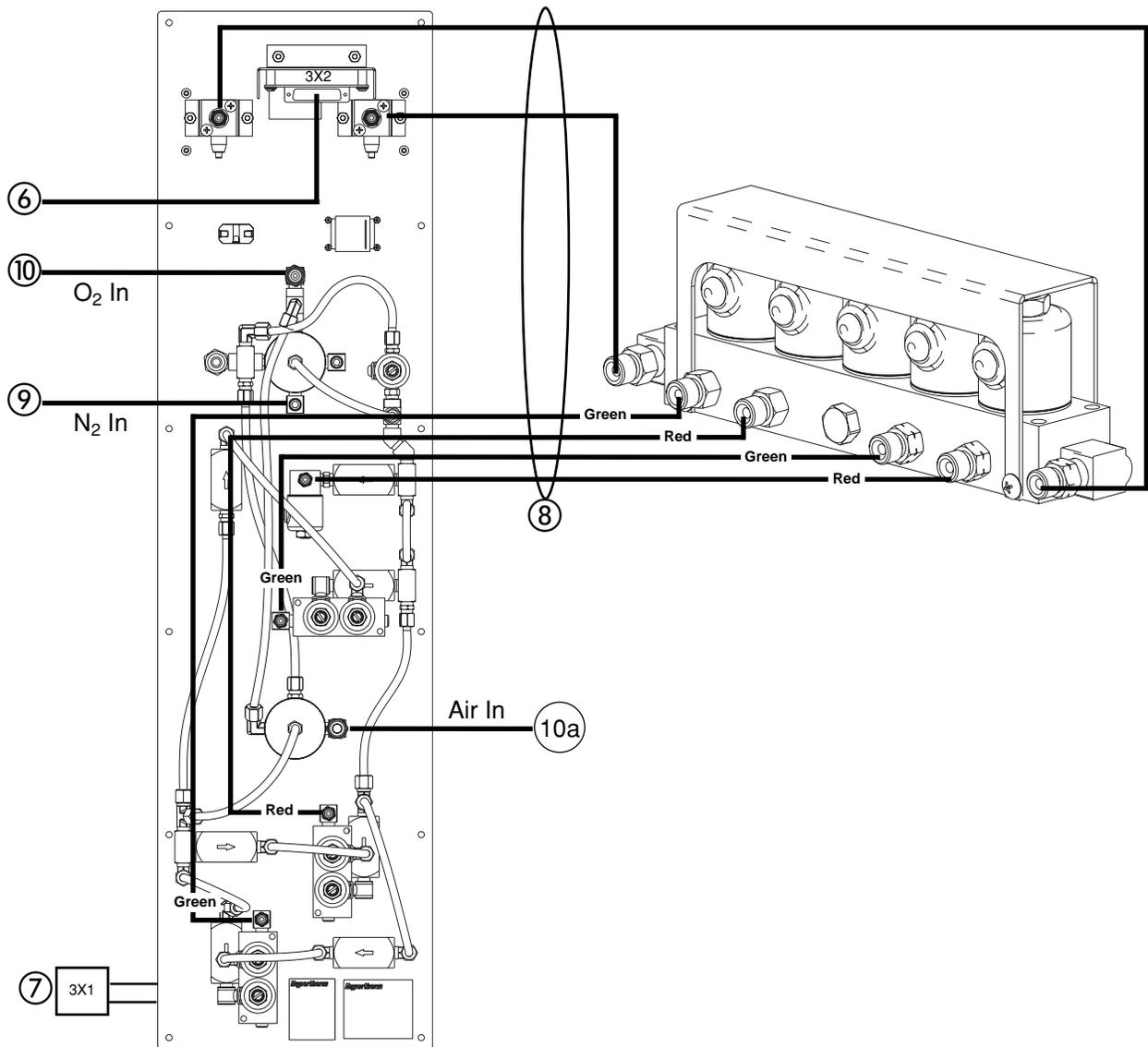
### **INSTALLATION**

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See HT4400 instruction manual 803580 *Installation* section for system requirements, component placement and safety information.

Use the diagrams on the following pages to make Titan system interconnections. See *Installation* section of the system's main instruction manual for specific information on each cable, hose or connection.

**Gas Panel Connections**

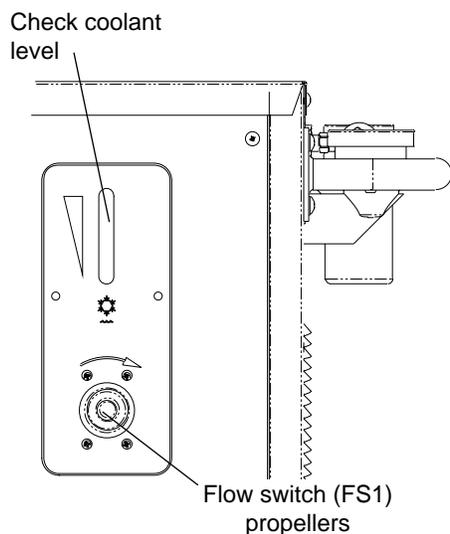
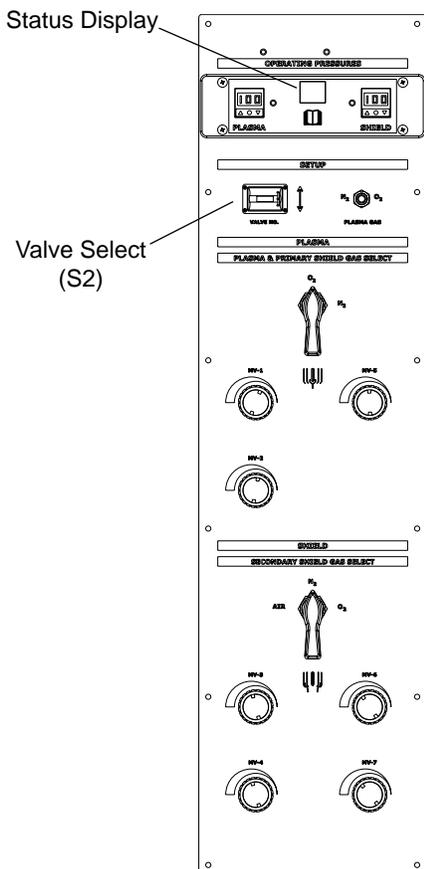


- ⑥ **Gas Panel to Power Supply**
- ⑦ **Gas Panel to Power Supply**
- ⑧ **Hoses - Gas Panel to Valve Cluster**
- ⑨ **Oxygen Hose - Gas Panel to Gas Supply**
- ⑩ **Nitrogen Hose - Gas Panel to Gas Supply**
- ⑩a **Air Hose - Gas Panel to Gas Supply**

## Post-Installation

### HT4400 Initial Startup

After installation is complete, perform the following procedure to ensure the proper performance of the HT4400 system before moving on to the Operation section of this manual. The gas panel will display error code **FS** (flow switch error) on initial startup until: all air is out of the torch coolant loop; the reservoir in the water cooler has an adequate supply of fluid. Follow the procedure below to satisfy the flow switch.



1. Verify that all installation requirements are met and that all connections are made as outlined in this section and the *Installation* section of manual 803580.
2. Verify that consumables are installed properly in the torch (see *Daily Startup* in the Operation section, if necessary).
3. Verify that the torch coolant has been added to the water cooler (see *Installation* section of manual 803580).
4. Position the valve select switch (S2) on the gas panel to either Leak Test 1 or Leak Test 2.

5. Switch the Control Power switch on the power supply ON (I).
6. Allow coolant to flow through the system. If the coolant is flowing properly, propellers on the flow switch (FS1) will be spinning rapidly.

Note: When propellers are spinning, the individual paddles cannot be seen.

If coolant stops flowing and FS is still displayed on the gas panel, turn valve select switch to RUN, and then back to Leak Test 1 or Leak Test 2. This action allows the pump to run for 30 seconds. Check coolant level.

7. After 5 minutes, switch the Control Power switch on the power supply OFF (O).
8. Position the valve select switch (S2) on the gas panel to RUN.
9. Switch Control Power switch on the power supply ON (I).

The coolant pump should continue to run and OK should be displayed on the gas panel status display.

If FS or any other error code is displayed on the gas panel other than OK, the system has a problem that needs to be fixed before daily operations can begin. See *Section 5, Maintenance*, of manual 803580 to troubleshoot.



## Section 3

### OPERATION

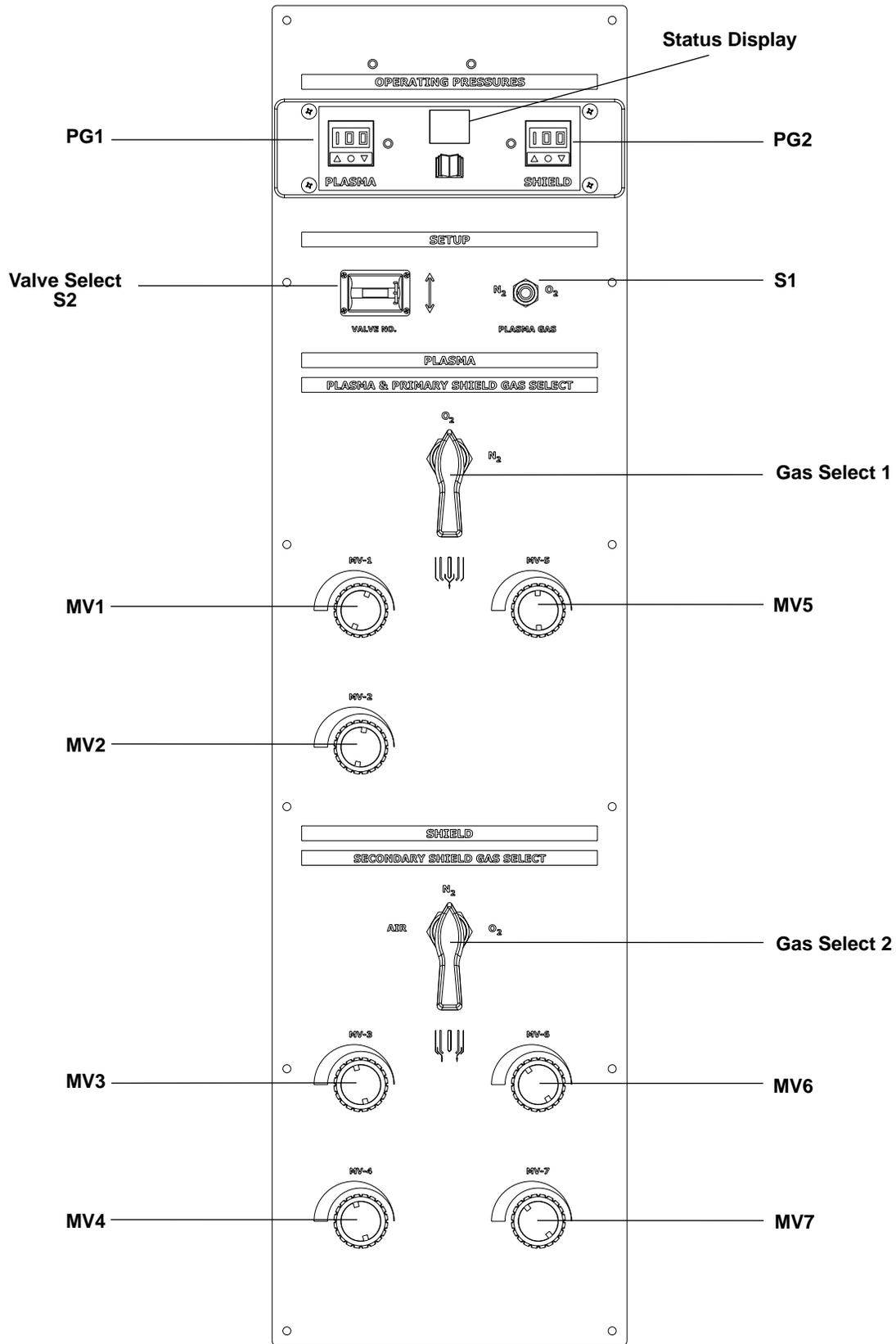
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NOTE: All cut chart information can be found in HT4400 manual 803580

# Gas Panel



## Gas Panel Controls and Indicators

<b>PG1</b>	Indicates the plasma gas pressure. Settings for the plasma gas pressures are specified in the <i>Cut Charts</i> in manual 803580, <i>Operation</i> section.
<b>S1</b>	Selects the use of either nitrogen or oxygen as the plasma cutting gas.
<b>Status Display</b>	Displays a 2 character code to report the condition of the HT4400 system. See <i>Status Display Messages on the Gas Console</i> in <i>operation</i> section of manual 803580. See also <i>Error Code Troubleshooting</i> in Section 5.
<b>PG2</b>	Indicates the shield gas pressure. Settings for the shield gas pressures are specified in the <i>Cut Charts</i> (manual 803580).
<b>MV1</b>	Adjusts the plasma gas cutflow pressure. MV1 and cutflow plasma pressures are specified in the <i>Cut Charts</i> .
<b>MV2</b>	Adjusts one of the plasma gas preflow pressures. MV2 and preflow plasma pressures are specified in the <i>Cut Charts</i> .
<b>MV3</b>	Adjusts one of the shield gas cutflow pressures. MV3 and cutflow shield pressures are specified in the <i>Cut Charts</i> .
<b>MV4</b>	Adjusts one of the shield gas preflow pressures. MV4 and preflow shield pressures are specified in the <i>Cut Charts</i> .
<b>MV5</b>	Adjusts one of the plasma gas preflow pressures. MV5 and preflow plasma pressures are specified in the <i>Cut Charts</i> .
<b>MV6</b>	Adjusts one of the shield gas cutflow pressures. MV6 and cutflow shield pressures are specified in the <i>Cut Charts</i> .
<b>MV7</b>	Adjusts one of the shield gas preflow pressures. MV7 and preflow shield pressures are specified in the <i>Cut Charts</i> .
<b>Gas Select 1</b>	Selects the plasma cutting gas (Gas 1). When the shield gas is a mixture of 2 gases, this setting represents the plasma portion of the mixture.
<b>Gas Select 2</b>	Selects the shield gas (Gas 2). When the shield gas is a mixture of 2 gases, this setting represents the non-plasma portion of the mixture.
<b>Valve Select S2</b>	Chooses the active valve to adjust. Also selects Leak Test 1, Leak Test 2, Test Preflow, and Test Cutflow.
<b>Leak Test 1</b>	See <i>Gas Console Valve Select Detail</i> in Section 5 (manual 803580).
<b>Leak Test 2</b>	See <i>Gas Console Valve Select Detail</i> in Section 5.
<b>Test Preflow</b>	See <i>Gas Console Valve Select Detail</i> in Section 5.
<b>Test Cutflow</b>	See <i>Gas Console Valve Select Detail</i> in Section 5.
<b>Run</b>	In this mode, all valves are OFF initially. <b>The valve select switch must be positioned to RUN before sending the START command to the plasma system.</b>

### Status Display Messages on the Gas Panel

The list of error codes that may appear in the Status display are explained in the *maintenance* Section of manual 803580.

## Leak Tests

			<p style="text-align: center;"><b>WARNING</b> <b>CUTTING WITH OXYGEN CAN CAUSE FIRE OR EXPLOSION</b></p>
<p><b>Cutting with oxygen as the plasma gas can cause a potential fire hazard due to the oxygen-enriched atmosphere that it creates. As a precaution, Hypertherm recommends that an exhaust ventilation system be installed when cutting with oxygen.</b></p>			

After installing the system and before adjusting plasma and shield gas levels, perform the following leak tests.

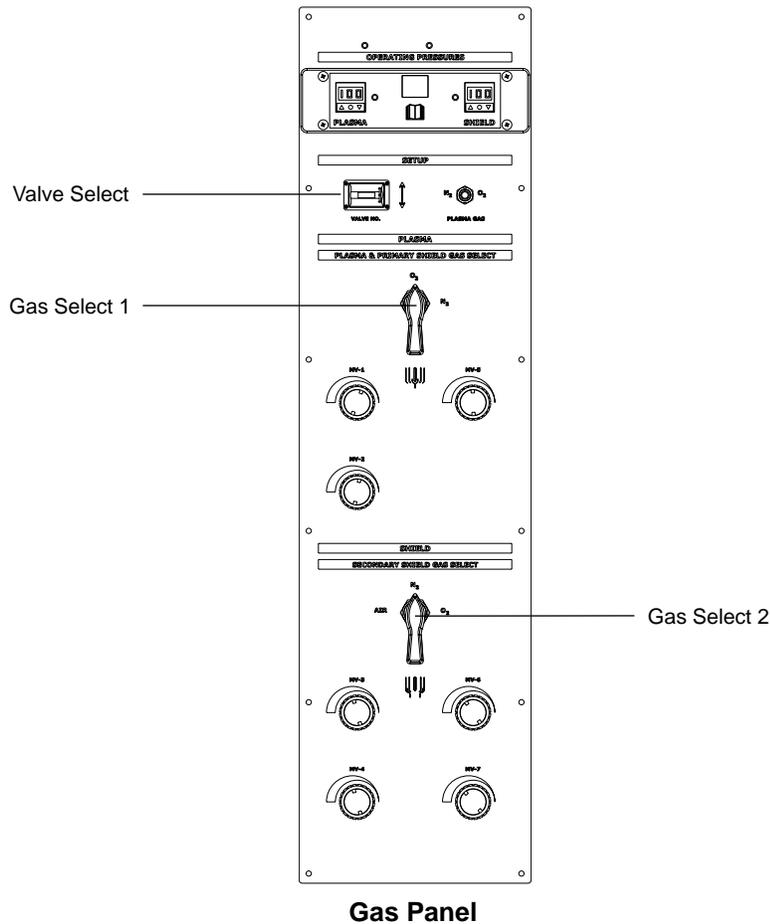
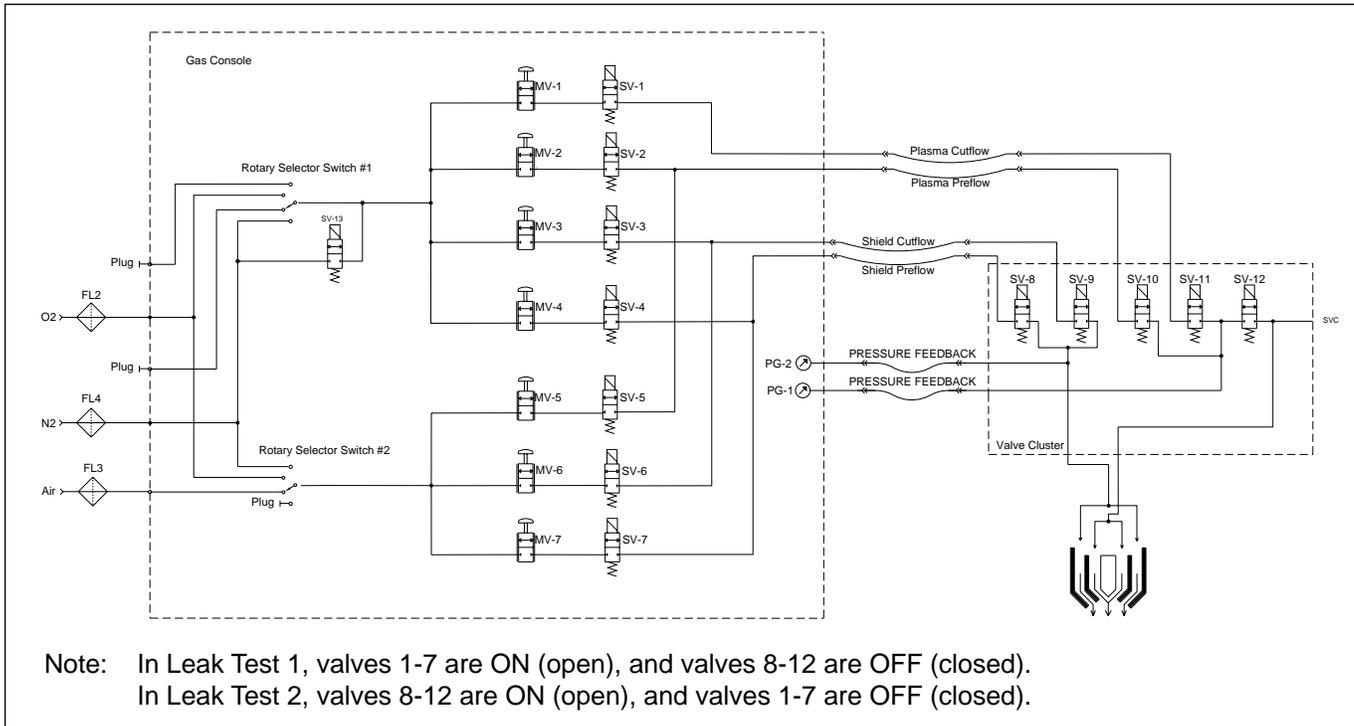
### Leak Test 1

1. Open all gas panel valves, MV1-MV7.
2. Set the Gas Select 1 lever on the gas panel to the proper plasma gas.
3. Set the Gas Select 2 lever on the gas panel to the proper shield gas.  
Note: If the shield gas is a mixture, set Gas Select 2 to the non-plasma portion of the mixture.
4. Choose Leak Test 1 on the valve select thumb-wheel switch.
5. Turn the supply gases on.
6. Turn on the power supply by positioning the CONTROL POWER circuit breaker on the rear of the power supply to the UP (I) position.
7. When the system is pressurized, turn off the supply gases and view the supply gas pressure gauge. If the system is losing pressure, troubleshoot by using the gas schematic on page 3-6.

### Leak Test 2

1. Open all gas panel valves, MV1-MV7.
2. Set the Gas Select 1 lever on the gas panel to the proper plasma gas.
3. Set the Gas Select 2 lever on the gas panel to the proper shield gas.  
Note: If the shield gas is a mixture, set Gas Select 2 to the non-plasma portion of the mixture.
4. Choose Leak Test 2 from the valve select thumb-wheel switch.
5. Turn the supply gases on.
6. Turn on the power supply by positioning the POWER circuit breaker on the rear of the power supply to the UP (I) position.
7. When the system is pressurized, turn off the supply gases and view the supply gas pressure gauge. If the system is losing pressure, troubleshoot by using the gas schematic on page 3-6.

**Gas Schematic**



## Daily Startup

Prior to startup, ensure that your cutting environment and that your clothing meet the safety requirements outlined in the Safety section of HT4400 manual 803580. See *Post-installation* in Section 2 of this manual if you are switching the power supply on for the first time.

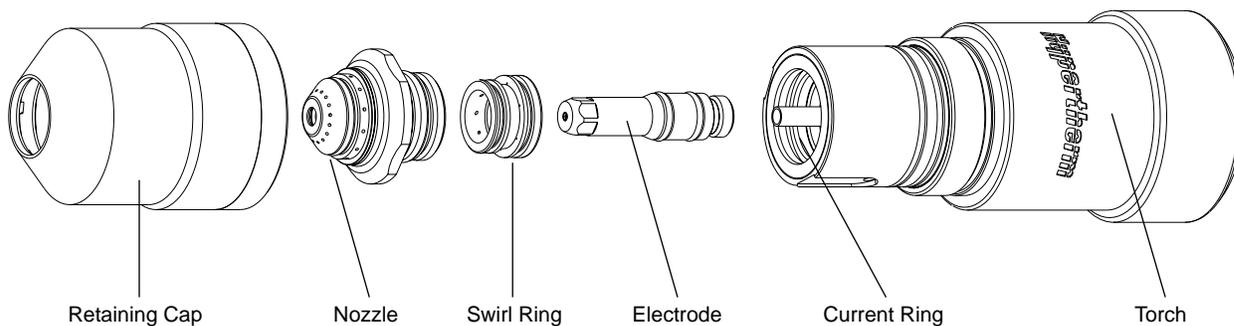


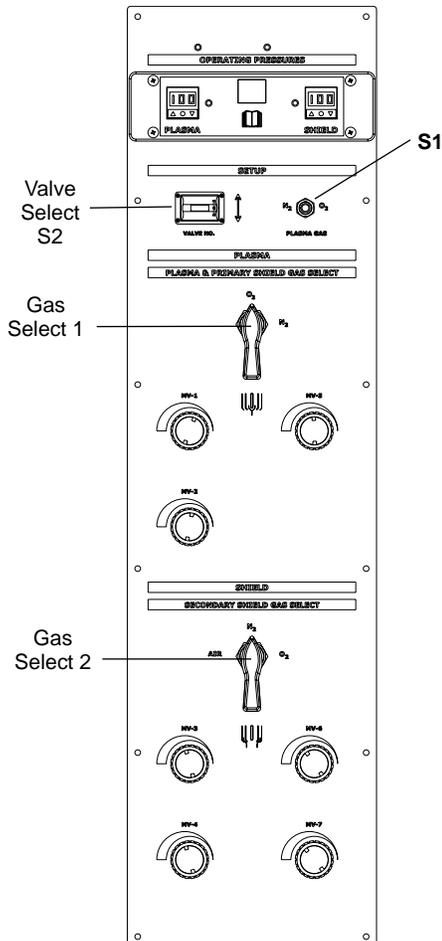
### WARNING

Before operating this system, you must read the Safety section in manual 803580 thoroughly! Turn main disconnect switch to the power supply OFF before proceeding with the following steps.

### 1. Check Torch and Consumables

- Remove the consumables from the torch and check for worn or damaged parts. See *Changing Consumable Parts* in *Operation* section of manual 803580. **Always place the consumables on a clean, dry, oil-free surface after removing. Dirty consumables can cause the torch to malfunction.**
  - Check the pit depth of the electrode. The electrode should be replaced when the depth exceeds .040 inch (1 mm). A gauge for measuring electrode pit depth can be purchased through Hypertherm. See Section 6 *Parts List* in this manual. See also *Inspect Electrode Pit Depth* in *Operation* section of manual 803580.
  - Wipe the current ring in the torch with a clean paper towel or cotton swab.
  - Refer to the *Cut Charts* to choose the correct consumables for your cutting needs.
- Replace consumable parts. Refer to *Changing Consumable Parts* in *Operation* section of manual 803580 for detailed information on replacing consumables.
- Ensure that the torch is perpendicular to the material. Refer to *Operation* section of manual 803580 for the torch alignment procedure.





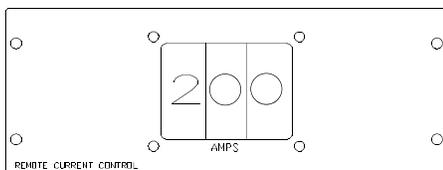
## 2. Turn Gases On

1. Turn the supply gases on.
2. Set S1 toggle switch on the gas panel to plasma gas O<sub>2</sub>, or N<sub>2</sub>.
3. Set the Gas Select 1 lever on the gas panel to the proper plasma gas.
4. Set the Gas Select 2 lever on the gas panel to the proper shield gas. Note: If the shield gas is a mixture, set Gas Select 2 to the non-plasma portion of the mixture. (e.g., If the plasma gas is O<sub>2</sub> and the shield gas is Air, set Gas Select 2 switch to Air.)
5. Set the Valve Select thumb-wheel switch (S2) to Run.

Note: See the *Cut Charts* (manual 803580) to set the plasma and shield gas pressures.

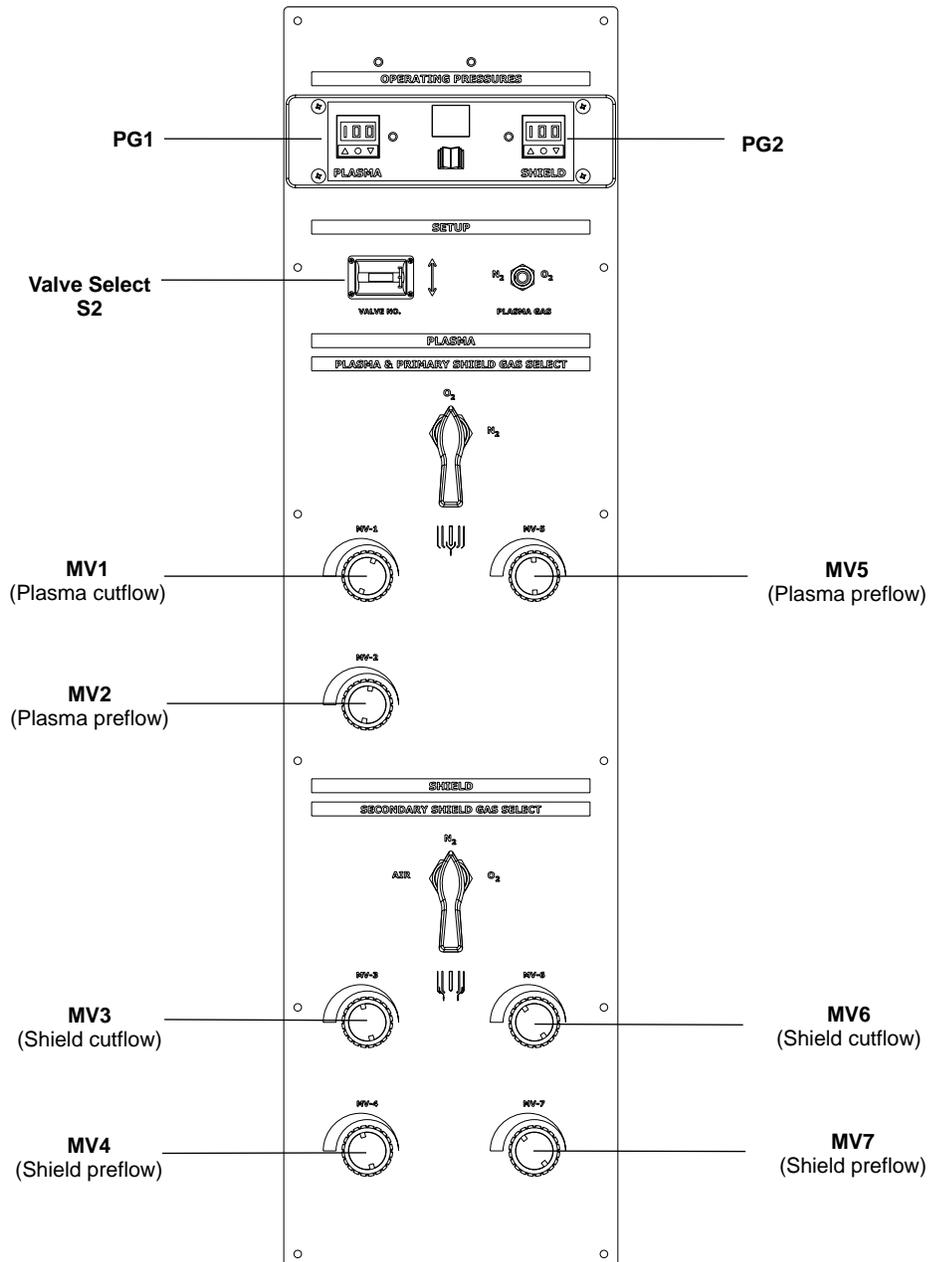
## 3. Turn Power Supply On and Adjust Current & Voltage

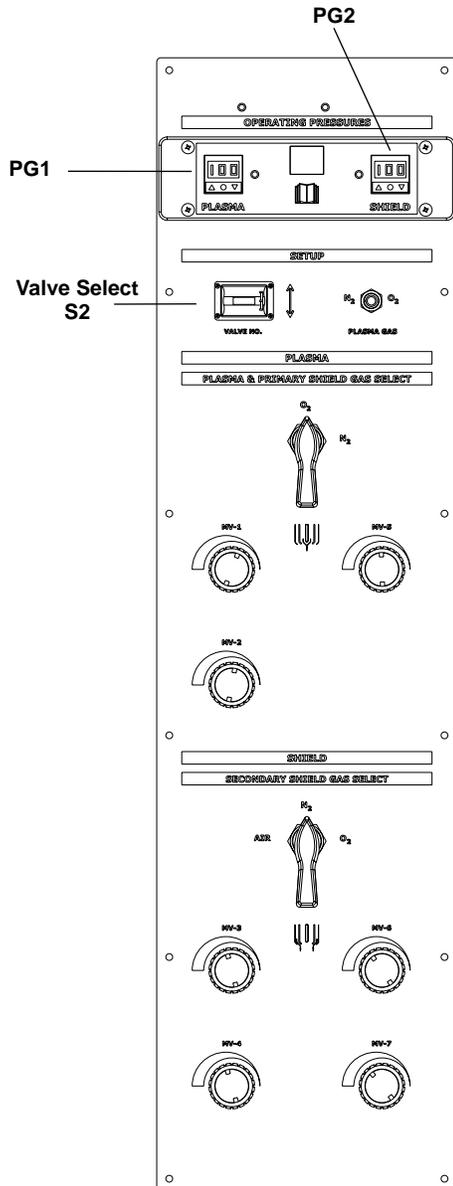
1. Turn the main disconnect switch ON.
2. Turn on the power supply by positioning the CONTROL POWER circuit breaker on the rear of the power supply to the UP position. The system will automatically purge gases and then display OK in the gas panel status display window.
3. Set the current from the machine computer interface or the remote current control panel. Set the voltage from the machine computer interface or torch-height control system. Select the arc current and arc voltage numbers from the *Cut Charts* for the type and thickness of metal to cut.



#### 4. Adjust Cutflow and Preflow Gases

1. Set the Valve Select thumb-wheel switch (S2) to MV1.
2. Turn the MV1 valve to the plasma pressure detailed in the *Cut Charts*. The pressure reading appears in the gas panel PG1 Plasma window.
3. Set the Valve Select thumb-wheel switch (S2) to MV2.
4. Turn the MV2 valve to the plasma pressure detailed in the *Cut Charts*. The pressure reading appears in the gas panel PG1 Plasma window.
5. Repeat this procedure to set metering valves M3-M7. Note that the readings for shield gas adjustments appear in gas panel PG2 Shield window.





## 5. Verify Test Preflow

1. Set the Valve Select thumb-wheel switch (S2) to Test Preflow.
2. Observe pressure readings on PG1 (plasma) and PG2 (shield). Verify that the readings are within +/- 3.0 psi (0.21 bar) of the PG1 and PG2 *Test Preflow Verify* rates specified in the *Cut Charts*.
3. If readings are not within +/- 3.0 psi (0.21 bar), repeat the preflow gas adjustments of steps 4.

## 6. Verify Test Cutflow

1. Set the Valve Select thumb-wheel switch (S2) to Test Cutflow.
2. Observe pressure readings on PG1 (plasma) and PG2 (shield). Verify that the readings are within +/- 3.0 psi (0.21 bar) of the PG1 and PG2 *Test Cutflow Verify* rates specified in the *Cut Charts*.
3. If readings are not within +/- 3.0 psi (0.21 bar), repeat the cutflow gas adjustments of steps 4.

## 7. Begin Cutting

**Note:** If you have changed consumable parts or if the power supply has been off for more than 1 hour, purge gas lines by leaving the system in Test Cutflow for one minute.

1. Set any additional cutting parameters as outlined in the *Cut Charts* (manual 803580).
2. Set Valve Select switch to Run after the test preflow and test cutflow rates have been verified.
3. The system is now ready to operate. Press the START command from the machine interface to begin the cutting sequence.

## **Section 4**

### **PARTS LIST**

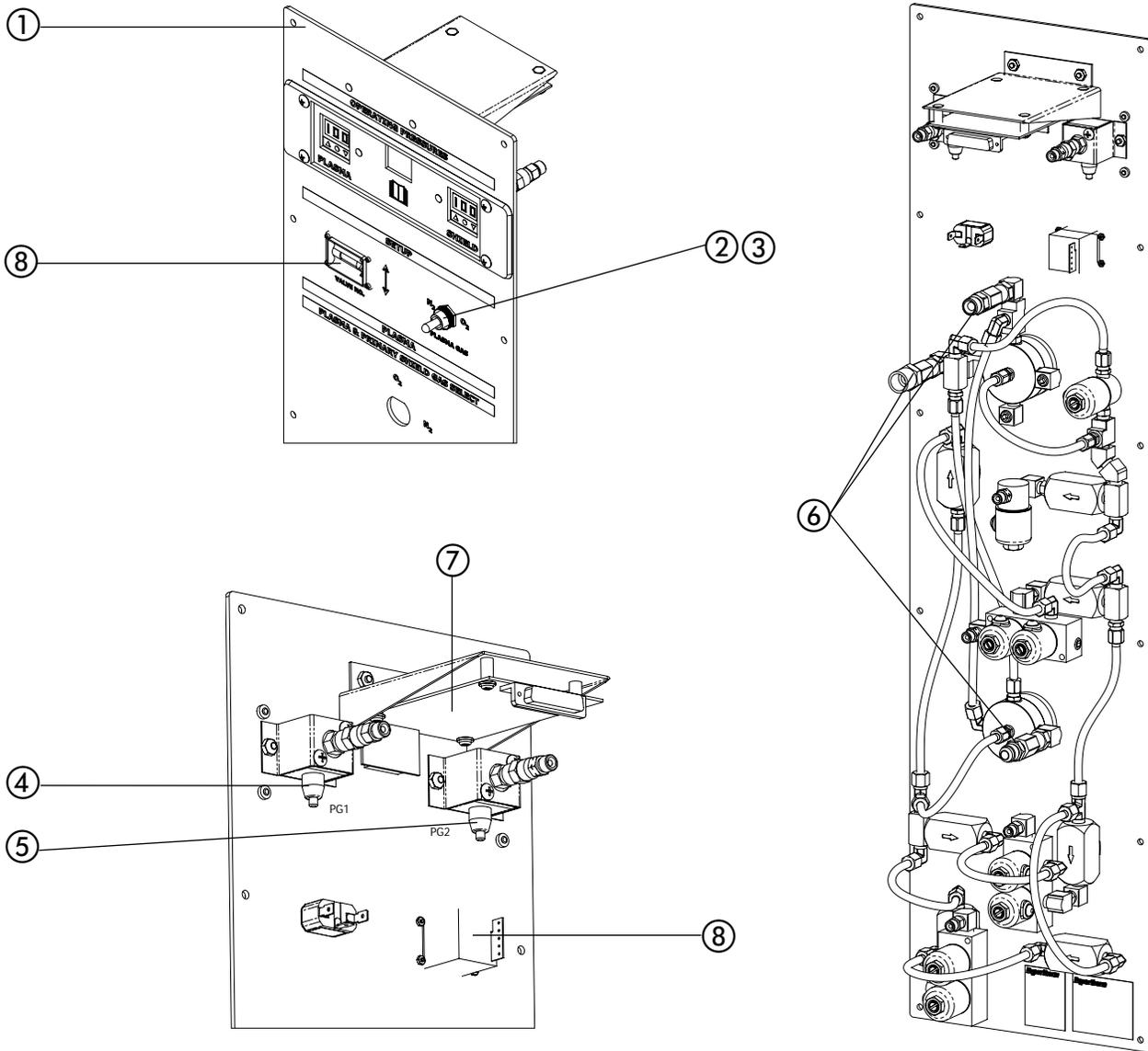
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This section provides part numbers for the the HT4400 with Titan Ignition panel.

- See *Installation* Section in the systems main manual for part numbers of hoses and interconnecting cables.
- See HT4400 instruction manual 803580 for consumable parts kits, power supply breakdown and parts for other HT4400 options.

# PARTS LIST

## Gas Panel



Item	Part Number	Description	Designator	Qty.
1	077044	HT4400 Gas Panel		
2	005156	Toggle switch: SP 10A On/Off/On	S1	1
3	008106	Nut: Toggle Switch, Dress		1
4	128512	Kit: Pressure Switch Replacement	PG2	1
5	128511	Kit: Pressure Switch Replacement	PG1	1
6	015330	Filter: 10 Micron		2
7	041638	PCB Assy: LED Display Board	PCB11	1
8	129607	Thumb-wheel Assembly	S2	1