

HyPro2000™ Quick Disconnect MAX200 Torch Upgrade

Field Service Bulletin

807510 – Revision 1 – September 2013

Hypertherm®

Hypertherm, Inc.

Etna 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 Email)

800-643-9878 Tel (Technical Service)

technical.service@hypertherm.com (Technical Service Email)

800-737-2978 Tel (Customer Service)

customer.service@hypertherm.com (Customer Service Email)

866-643-7711 Tel (Return Materials Authorization)

877-371-2876 Fax (Return Materials Authorization)

return.materials@hypertherm.com (RMA email)

Hypertherm Plasmatechnik GmbH

Technologiepark Hanau

Rodenbacher Chaussee 6

D-63457 Hanau-Wolfgang, Deutschland

49 6181 58 2100 Tel

49 6181 58 2134 Fax

49 6181 58 2123 (Technical Service)

Hypertherm (S) Pte Ltd.

82 Genting Lane

Media Centre

Annexe Block #A01-01

Singapore 349567, Republic of Singapore

65 6841 2489 Tel

65 6841 2490 Fax

65 6841 2489 (Technical Service)

Hypertherm (Shanghai) Trading Co., Ltd.

Unit 301, South Building

495 ShangZhong Road

Shanghai, 200231

PR China

86-21-60740003 Tel

86-21-60740393 Fax

Hypertherm Europe B.V.

Vaartveld 9

4704 SE

Roosendaal, Nederland

31 165 596907 Tel

31 165 596901 Fax

31 165 596908 Tel (Marketing)

31 165 596900 Tel (Technical Service)

00 800 4973 7843 Tel (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

Hypertherm Brasil Ltda.

Rua Bras Cubas, 231 – Jardim Maia

Guarulhos, SP – Brasil

CEP 07115-030

55 11 2409 2636 Tel

55 11 2408 0462 Fax

Hypertherm México, S.A. de C.V.

Avenida Toluca No. 444, Anexo 1,

Colonia Olivar de los Padres

Delegación Álvaro Obregón

México, D.F. C.P. 01780

52 55 5681 8109 Tel

52 55 5683 2127 Fax

Hypertherm Korea Branch

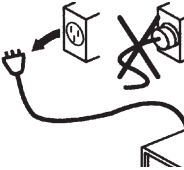
#3904 Centum Leaders Mark B/D,

1514 Woo-dong, Haeundae-gu, Busan

Korea, 612-889

82 51 747 0358 Tel

82 51 701 0358 Fax

		DANGER ELECTRIC SHOCK CAN KILL
		Disconnect electrical power before performing any maintenance. All work requiring removal of the power supply cover must be performed by a qualified technician. See the Safety Section of the system's Manual for more safety precautions.

Introduction

Purpose

This document describes the steps necessary to upgrade a MAX200 system with the HyPro2000 torch.

Required tools

5/16 inch, 3/8 inch, 7/16 inch(2), 1/2 inch, open end wrench, 2 inch spanner wrench, and electrical tape.

Noise levels

Acceptable noise levels as defined by national and local codes may be exceeded by this plasma system. Always wear proper ear protection when cutting or gouging. Any noise measurements taken are dependant on the specific environment in which the system is used. See also *Noise can damage hearing* in the *Safety* section of this manual. Specific information by product can be found in the Hypertherm downloads library at:

<https://www.hypertherm.com/Xnet/library/DocumentLibrary.jsp>

Select the product you are looking for from the Product Type drop down menu, choose "Regulatory" from the Category drop down menu, and choose "Acoustical Noise Data Sheets" from the Sub Category drop down menu. Hit Submit.

The Hypro2000 machine torch specifications:

Maximum cutting thickness..... 2 inches
Maximum current at 100% duty cycle..... 200 amps
Plasma Gas Flows:
Air30 lpm (64 scfh)
N₂.....36 lpm (76 scfh)
O₂23 lpm (49 scfh)
Shield Gas Flow..... 200 scfh (Air)
Water Coolant Flow Rate..... 0.8 gpm
Weight (torch with consumables and quick disconnect receptacle)..... 1.32 kg (2.9 lbs)
Torch Voltage Rating..... 300 V
Maximum Torch Lead Length..... 100 ft

Note: This torch conforms to the requirements referenced in IEC 60974-7

Kit contents — 228908

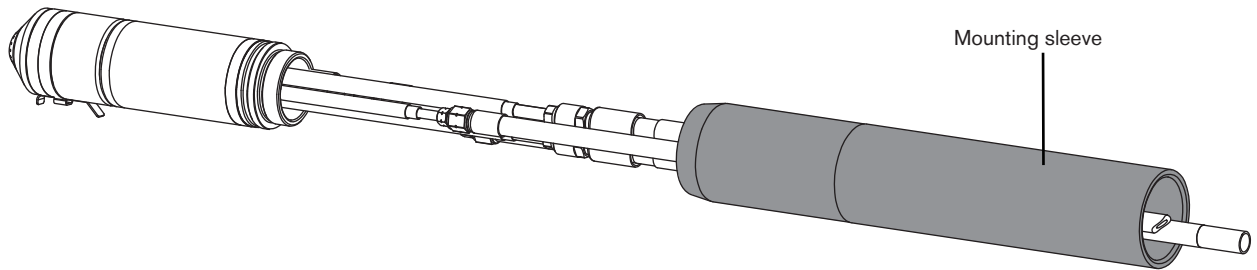
<u>Part Number</u>	<u>Description</u>	<u>Quantity</u>
024888	Hose: Plasma extension	1
026009	O-ring: 0.208 in x 0.070 in	10
027055	Silicone lubricant	1
044026	O-ring: 1.239 in x 0.070 in	2
046065	Insulator: pilot arc insulator	1
024249	Insulator: coolant line	1
058224	O-ring: 1.734 in x 0.139 in	1
104119	Consumable tool	1
220052	Seal: torch quick-disconnect	1
420044	Nozzle: 200 amp	2
220913	Quick-disconnect receptacle	1
228907	Torch assembly (with 200 amp consumables installed)	1
220937	Electrode: 200 amp	2
220942	Torch mounting sleeve: 1-3/4 in outside diameter	1
220943	Torch mounting sleeve: 2 in outside diameter	1
807510	Field service bulletin: HyPro2000, MAX200 Torch Upgrade	1
880850	Torch brochure: HyPro2000, MAX200 Torch Upgrade	1

**HyPro2000 torch retrofit kit/ MAX200**

Torch and quick-disconnect receptacle Installation

Remove the old MAX200 torch

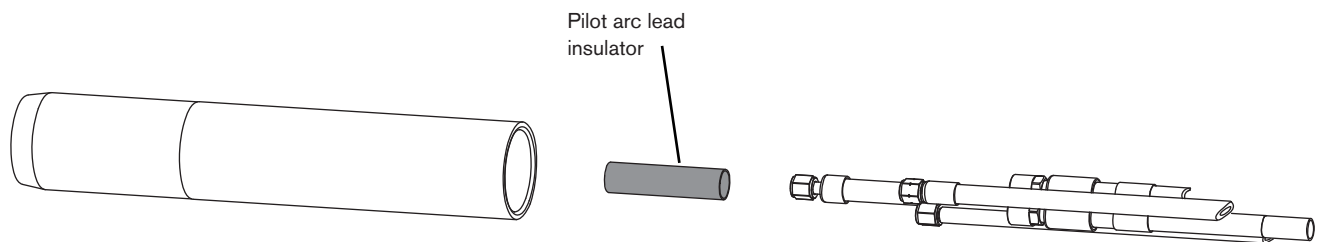
1. Remove the existing torch and mounting sleeve from the lifter.
2. Unscrew the mounting sleeve and slide it up to expose the hose fittings.



3. Disconnect all the hoses and the pilot arc connection from the old torch and remove the sleeve. Always use 2 wrenches to loosen or tighten the fittings.



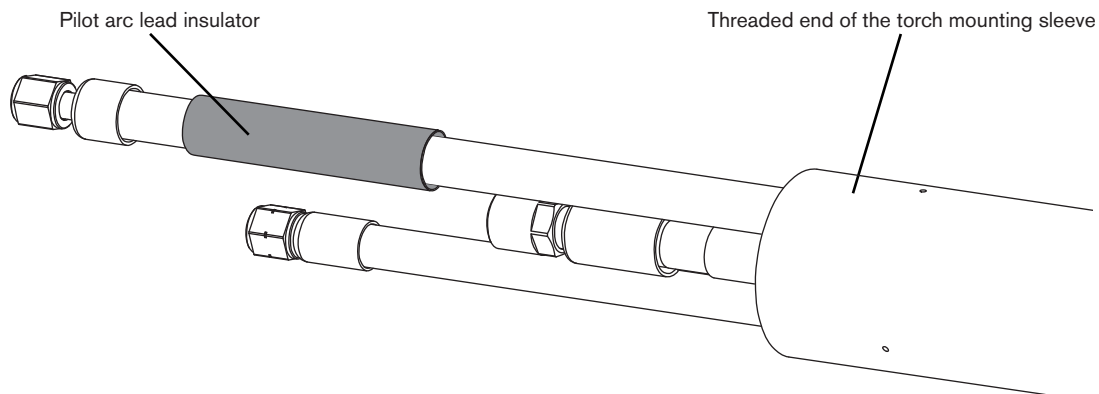
4. Remove and discard the mounting sleeve and the pilot arc lead insulator.



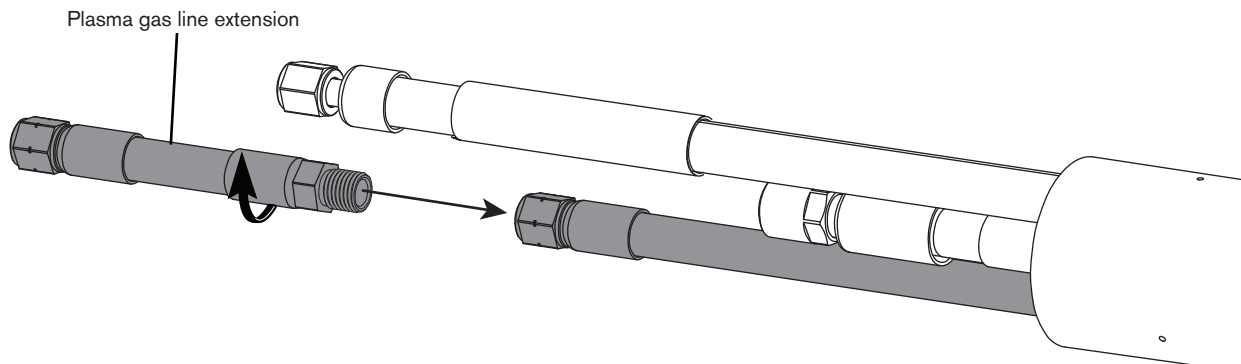
5. Inspect all hoses and wires for damage.

HyPro2000 torch installation

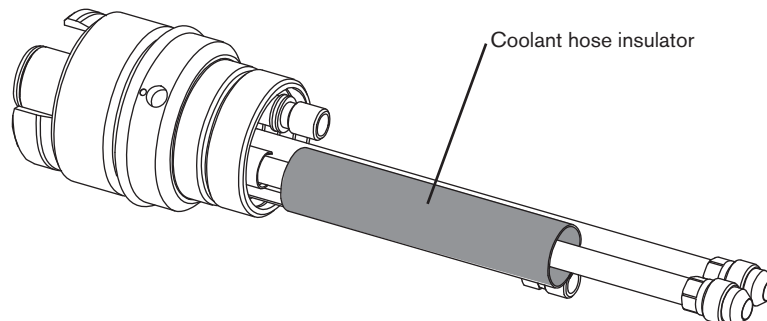
1. Slide the HyPro2000 torch mounting sleeve over the leads (with the threaded end closest to the torch) and install the pilot arc lead insulator onto the pilot arc lead (dark blue hose).



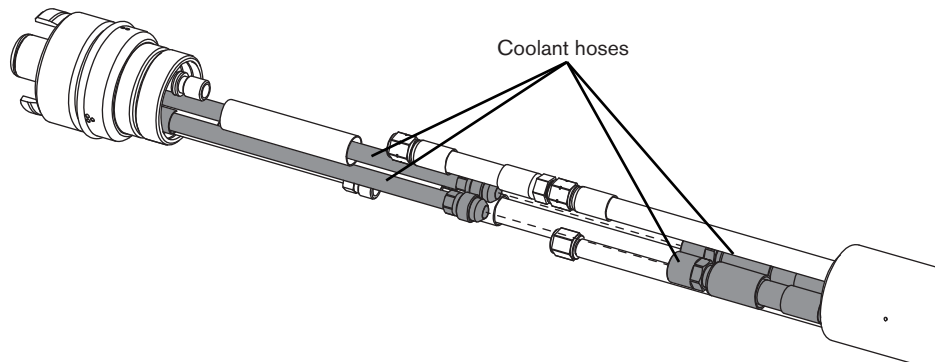
2. Install the plasma gas line extension to the red plasma hose (Note: Left handed threads).



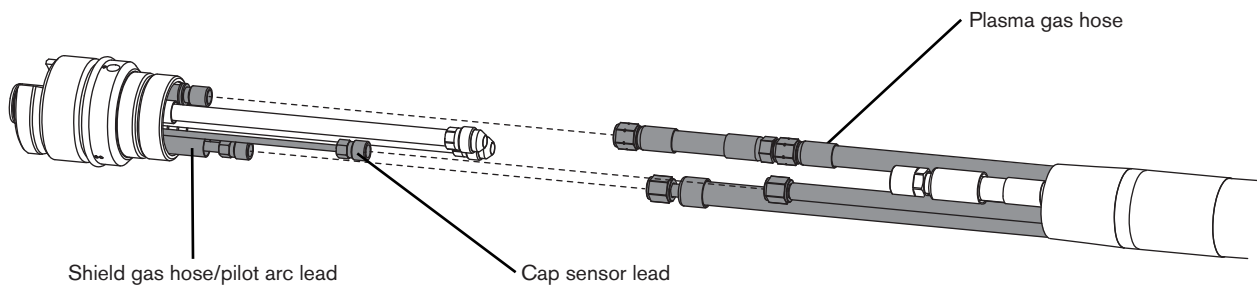
3. Connect the torch quick-disconnect receptacle to the torch leads.
 - 3a. The coolant hose insulator is on the coolant return (red) line of the torch quick disconnect when shipped. Make sure it is in place before making any connections.



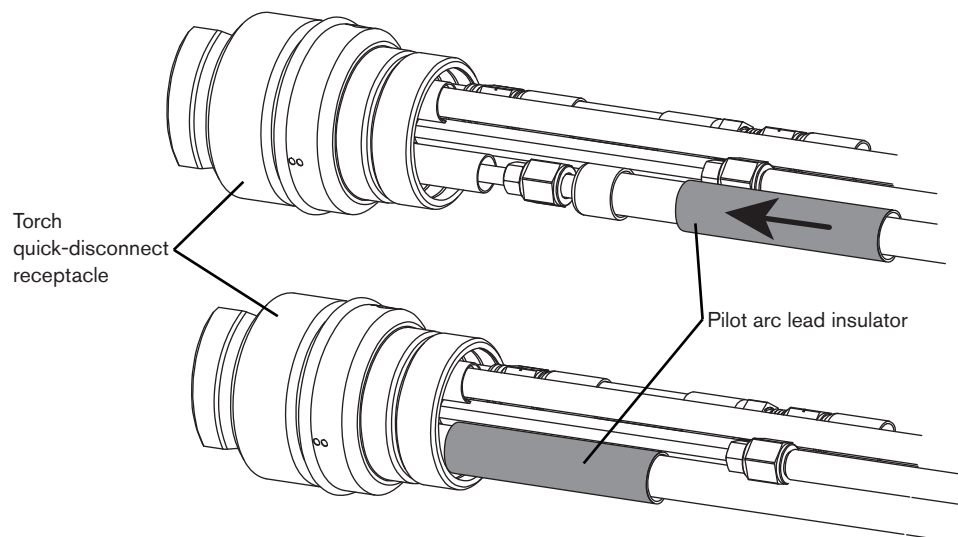
- 3b. Connect the green and red coolant hoses to the fitting on the torch quick-disconnect receptacle with the corresponding color.



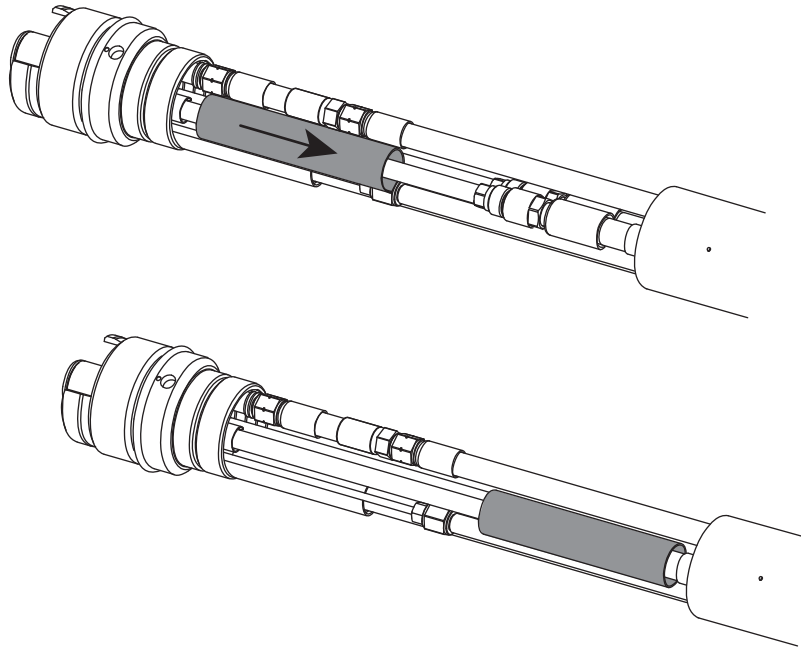
- 3c. Connect the cap sensor lead, the plasma gas hose, and the shield gas/pilot arc lead to the torch quick-disconnect assembly.



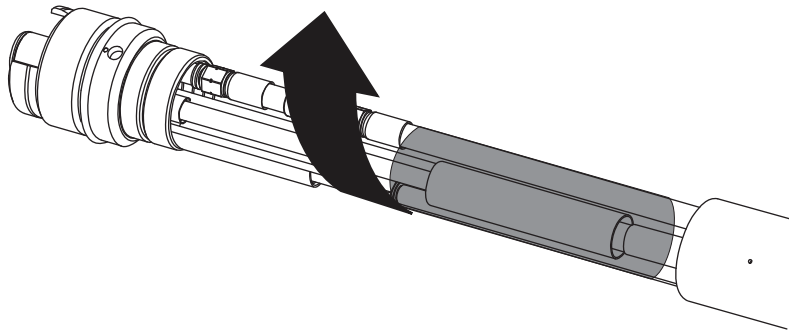
4. Slide the pilot arc lead insulator over the blue shield gas/pilot arc lead until it contacts the bottom of the torch quick-disconnect receptacle.



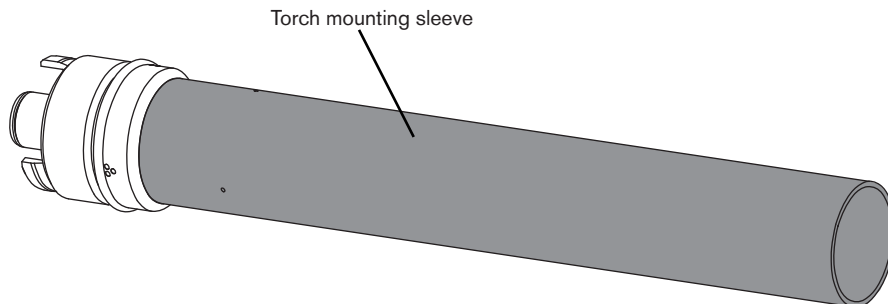
5. Slide the coolant hose insulator over the fittings.



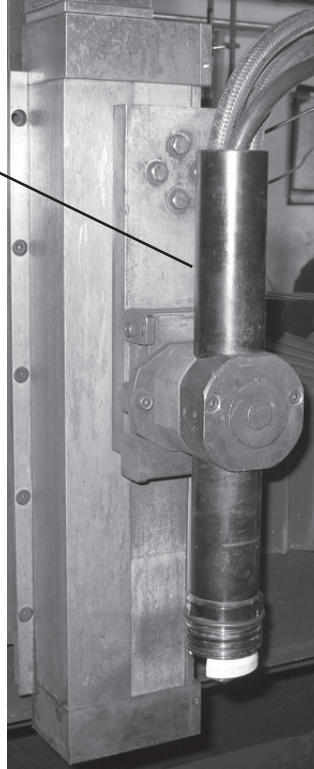
6. Secure the coolant hose insulator in place by wrapping electrical tape around the lead set.



7. Slide the torch mounting sleeve over the fittings and screw it onto the torch quick-disconnect receptacle.



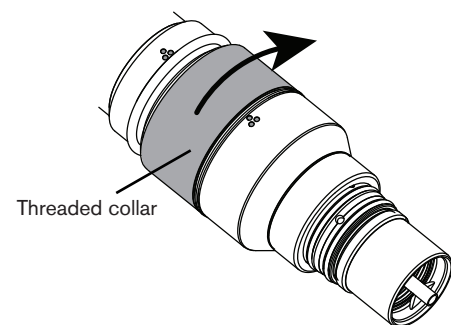
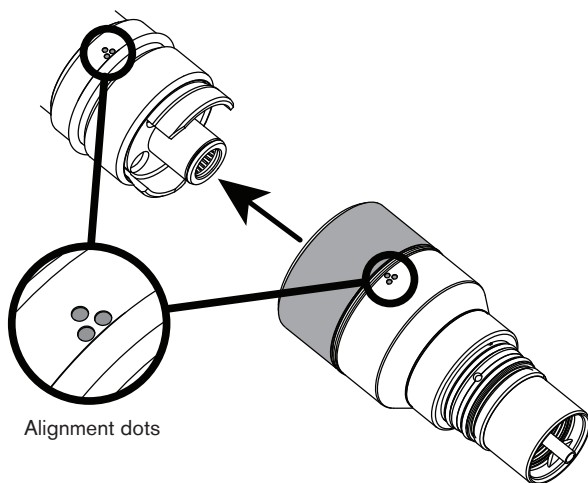
8. Install the torch mounting sleeve onto the lifter.



9. Install the torch onto the quick-disconnect receptacle.

9a. Align any of the matching dots on the torch and quick-disconnect receptacle, and slide the torch into the receptacle. 3 triangular dots are shown below, but there are also single dots that match and double dots that match.

9b. Turn the threaded collar on the torch clockwise until it is tight.



10. Verify that there are no leaks at any of the connections.

Daily start-up

Prior to start-up, ensure that your cutting environment and that your clothing meet the safety requirements outlined in the *Safety* section of the system's instruction manual.

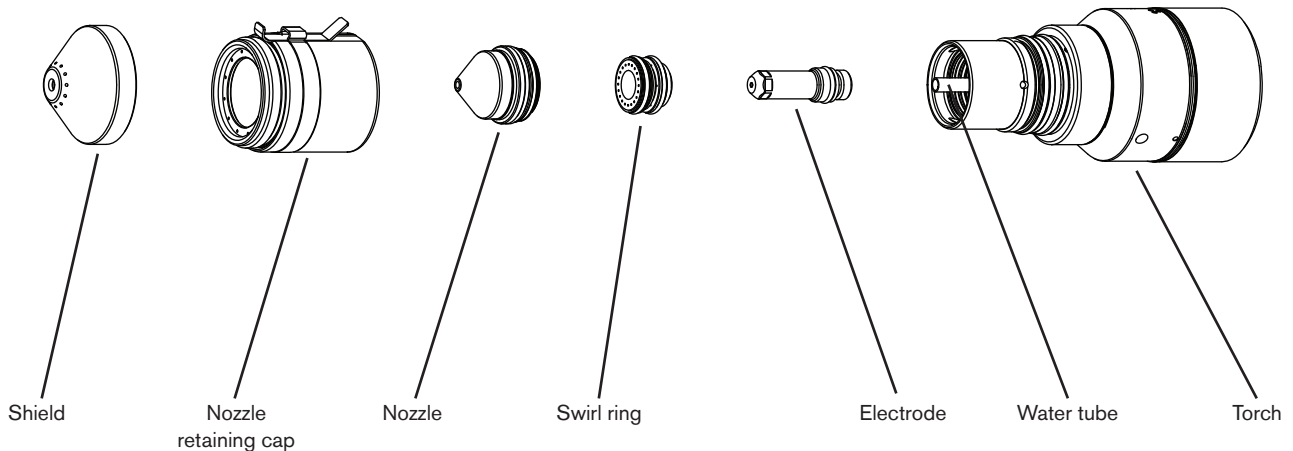
Check torch



WARNING

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

1. Turn OFF the main disconnect switch to the power supply.
2. Remove the consumables from the torch and check for worn or damaged parts. **Always place the consumables on a clean, dry, oil-free surface after removing. Dirty consumables can cause the torch to malfunction.**
 - Refer to *Install consumables* on the next page for details.
 - Refer to the *Cut charts* to choose the correct consumables for your cutting needs.
3. Ensure that the torch is perpendicular to the workpiece.



Install consumables



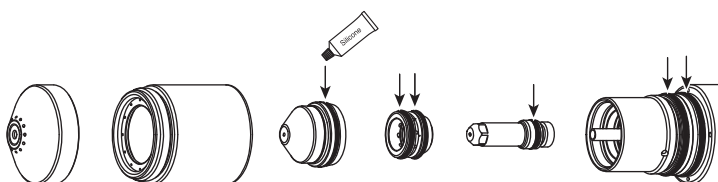
WARNING

Always disconnect power to the power supply before inspecting or changing torch consumable parts. Use gloves when removing consumables. The torch might be hot.

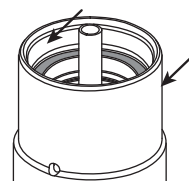
Install consumables

Check the consumable parts daily for wear before cutting. Before removing consumables, bring the torch to the edge of the cutting table, with the torch lifter raised to its highest point to prevent the consumables from dropping into the water of the water table.

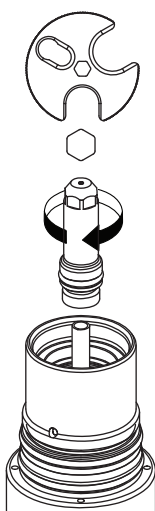
Note: Do not overtighten parts! Only tighten until mating parts are seated.



Apply a thin film of silicone lubricant on each o-ring. The o-ring should look shiny, but there should not be any excess or built-up grease.

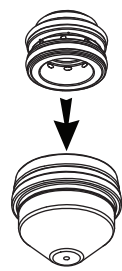


Wipe the internal and external surfaces of the torch with a clean cloth or paper towel.

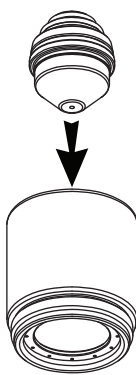


Tool: 104119

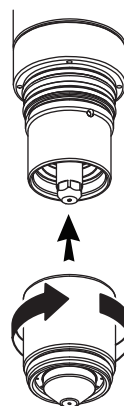
1. Install the electrode into the torch head



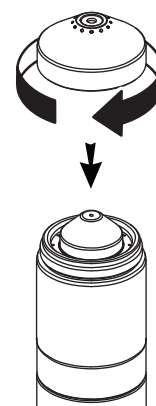
2. Install the swirl ring into the nozzle



3. Install the nozzle and swirl ring into the nozzle retaining cap



4. Install the nozzle retaining cap onto the torch head



5. Install the shield onto the nozzle retaining cap

Preventive Maintenance

The following torch, torch leads, torch coolant and power supply preventive maintenance checks are suggested to keep your system in top running condition:

Interlocks

All interlocks should function correctly. Inspect all interlocks to be sure none have been jumped/bypassed.

Torch and Torch Leads

Always inspect the torch consumable parts and torch main body before cutting. Worn or damaged parts can cause gas and water leaks which can affect the cut quality. Check for pitting and burn marks on the consumable parts and replace if necessary. See Changing Consumable Parts on the previous page of this document.

The torch leads should be checked weekly for cracking and damage.

Torch Coolant

A standard mixture of propylene glycol (30%), deionized water (69.9%) and benzotriazole (0.1 %) is recommended. See Appendix B in your MAX200 Instruction manual (800980) for Torch Coolant Requirements and the Material Safety Data Sheets on propylene glycol and benzotriazole for data on safety, handling, and storage.

Gas system

Check incoming pressures and all fittings for leaks.

Power Supply

Inspect the power supply regularly. How often the following maintenance occurs is dependent on multiple factors, but all of the maintenance items should be done annually at a minimum.

- Check the exterior for any damage. If there is damage, ensure it does not affect safe operation of the power supply.
- Remove covers and inspect the interior. Check wiring harnesses and connections for wear and damage. Check for loose connections and look for areas of discoloration due to overheating.
- Inspect the coolant filter element at the rear of the power supply. The flow of coolant will slow down if the filter element becomes excessively dirty. Low coolant flow will cause the flow switch to open (turn off) and make the coolant flow interlock LED illuminate. The filter becomes a brownish color when dirty. Replace the filter element (027005) when it starts to change color.
- For power supplies manufactured after June 1996:
Inspect the air filter in the front panel of the power supply regularly by removing the access cover and lifting the filter out. How often the filter is inspected depends on the conditions of the particular work site. Replace the filter (027441) when it is dirty.
- Every 6 months, flush the power supply of its torch coolant and replace with new coolant (028872).

Note: See the parts replacement schedule on the next page

MAX200 Service Parts Replacement Schedule

228956 – annual preventive maintenance parts kit. The kit includes all the parts in the shaded boxes below.

Time line	Component	Part number	Quantity
Every 6 months or 300 arc hours	Coolant filter element Coolant solution 70/30	027005 028872	1 8
Every 12 months or 600 arc hours	Coolant filter element Coolant solution 70/30 Main contactor HyPro2000 quick disconnect torch Pilot arc relay DC ON lamp lens Bulb: DC ON lamp Kit: HyPro torch (includes o-rings, bullet plugs, and a water tube)	027005 028872 003248 220921 003021 005089 005168 228780	1 8 1 1 1 1 1 1

Arc voltage

The arc voltage settings (v) shown in the cut charts may need to be adjusted to produce the correct cutting height. Physically measuring the height after stopping the torch is preferred, but visual inspection during a cut is acceptable. Over the life of a consumable set it will also be necessary to periodically adjust the arc voltage (v) up 1 to 2 volts at a time to maintain the proper torch height and to achieve the maximum life from the consumables.

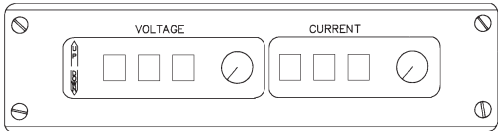
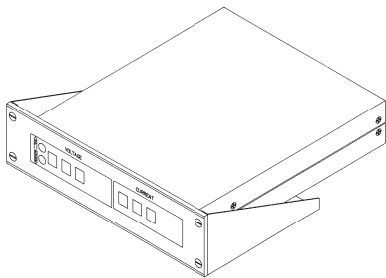
Cut charts

The following *Cut charts* show the consumable parts, cutting speeds, gas pressures, and the current settings required for each process.

The numbers shown in the *Cut charts* are recommended to provide high-quality cuts with minimal dross. Because of differences between installations and material composition, adjustments may be required to obtain desired results.

Digital remote

Hypertherm has produced a few versions of the digital remote. Some versions increase and decrease in 10 amp increments, and some increase and decrease in 20 amp increments. If you have a digital remote that increases and decreases by 20 amps, set the digital remote to 40 amps for the 50 amp process and 120 amps for the 130 amp process and reduce cut speeds by approximately 10%.



Flow rate tables

Flow rate tables are provided for each cutting process. The data in the tables can be used to estimate gas usage. Examples and definitions are provided below.

Flow rates – lpm/scfh		
	N ₂	Air
Test	26 / 56	123 / 220
Run	31 / 65	123 / 220

31 = lpm (liters per minute)

65 = scfh (standard cubic feet per hour)

Estimated kerf width compensation

The widths in the chart below are for reference. Differences between installations and material composition may cause actual results to vary from those shown in the tables.

Metric

Process	Thickness (mm)												
Mild steel	3	4	6	8	10	12	15	20	25	32	38	44	50
50 A Air/Air	1.2	1.4	–	–	–	–	–	–	–	–	–	–	–
130 A O ₂ /Air	1.9	2.0	2.3	2.6	2.8	3.1	3.5	4.1	4.7	–	–	–	–
130 A Air/Air	2.0	–	2.2	–	2.4	2.5	2.7	3.0	3.3	–	–	–	–
200 A O ₂ /Air	–	–	3.0	3.2	3.4	3.6	3.9	4.4	4.9	5.6	6.2	6.8	7.4
200 A Air/Air	–	–	2.2	–	2.9	3.1	3.4	3.9	4.4	5.1	5.7	–	6.8
Stainless steel													
50 A Air/Air	1.7	1.6	–	–	–	–	–	–	–	–	–	–	–
200 A N ₂ /Air	–	–	2.7	2.8	2.9	3.0	3.2	3.4	3.6	4.0	4.2	4.4	–
Aluminum													
50 A Air/Air	1.7	1.7	–	–	–	–	–	–	–	–	–	–	–
200 A N ₂ /Air	–	–	3.7	3.8	3.8	3.9	4.0	4.2	4.5	4.8	5.0	–	–

English

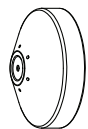
Process	Thickness (in.)									
Mild steel	0.135	0.25	0.375	0.5	0.625	0.75	1.0	1.25	1.5	2.0
50 A Air/Air	0.051	0.056	–	–	–	–	–	–	–	–
130 A O ₂ /Air	0.078	0.092	0.108	0.125	0.141	0.157	0.189	–	–	–
130 A Air/Air	0.081	0.087	0.084	0.102	0.109	0.116	0.130	–	–	–
200 A O ₂ /Air	–	0.120	0.133	0.145	0.158	0.170	0.195	0.220	0.245	0.295
200 A Air/Air	–	0.088	0.114	0.126	0.138	0.150	0.175	0.199	0.223	0.272
Stainless steel										
50 A Air/Air	0.064	0.061	–	–	–	–	–	–	–	–
200 A N ₂ /Air	–	–	0.114	0.120	0.126	0.132	0.143	0.155	0.167	–
Aluminum										
50 A Air/Air	0.065	0.065	–	–	–	–	–	–	–	–
200 A N ₂ /Air	–	–	0.150	0.155	0.160	0.166	0.176	0.187	0.198	–

Mild steel

Air Plasma / Air Shield

50 A Cutting

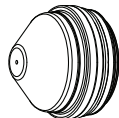
Flow rates – lpm/scfh		
	Air (Plasma)	Air (Shield)
Test	25 / 53	86 / 182
Run	19 / 40	86 / 182



220532



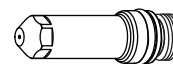
220936
220935
(No IHS tab)



220890



220529



220528

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		mm	Volts	mm	mm/m	mm	factor %	seconds
60	75	40	0.5	120	1.5	9525	1.5	100	0.0
			0.8			8635			0.1
			1.0	115		8255			
			1.2	125	1.8	7620	1.8		
			1.5	108		7365			
			2.0	110		6985			
			2.5	112	2.0	4570	2.0		
			3.0	118		2795			
			4.0	122	2.3	1905	3.5	150	0.3
			6.0	125	2.5	1525	3.8		0.5

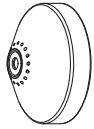
English

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run			Volts	in	ipm	in	factor %	seconds
60	75	40	0.018	120	0.06	375	0.06	100	0.0
			0.024	125		350			
			0.030	120		340			
			0.036	115		325			
			0.048	125	0.07	300	0.07		
			0.060	108		290			
			0.075	110		275			
			0.105	112	0.08	180	0.08	0.2	
			0.135	118		110			
			0.188	122	0.09	75	0.14	150	0.3
			0.250	125	0.10	60	0.15		0.5

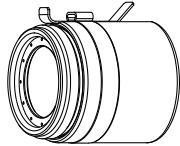
If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 5 psi (0.35 bar) for every 25 feet of added length.

Mild steel
Air Plasma / Air Shield
130 A Cutting

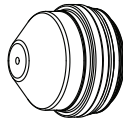
Flow rates – lpm/scfh		
	Air (Plasma)	Air (Shield)
Test	41 / 87	78 / 165
Run	35 / 74	78 / 165



220536



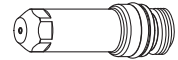
220936
220935
(No IHS tab)



220892



220488



220487

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		mm	Volts	mm	mm/m	mm	factor %	seconds
45	65	36	3	140	3.0	5080	6.0	200	0.2
			4			3810			0.3
			6	143	3.6	3430	7.2		0.5
			10	148	4.1	2540	8.2		
			12	150		1905		0.8	
			15	155	4.6	1145	9.2	1.2	
			20	158		890	10.6		
			25	169		380	Edge Start		
			32	176	5.1	255			

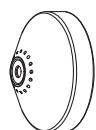
English

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run			Volts	in	ipm	in	factor %	seconds
45	65	36	10 Ga	140	0.12	200	0.24	200	0.2
			3/16			150			0.3
			1/4	143	0.14	135	0.28		0.5
			3/8	148	0.16	100	0.32		
			1/2	150		75		0.36	0.8
			5/8	155	0.18	45	0.41		
			3/4	158		35			
			1.0	169	15	Edge Start			
			1-1/4	176	0.20				10

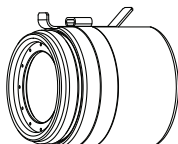
If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 5 psi (0.35 bar) for every 25 feet of added length.

Mild steel
O₂ Plasma / Air Shield
130 A Cutting

Flow rates – lpm/scfh		
	O ₂	Air
Test	20 / 43	84 / 178
Run	19 / 41	84 / 178



220536



220936
220935
(No IHS tab)



220892



220488



220487

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		mm	Volts	mm	mm/m	mm	factor %	seconds
18	43	41	3	123	2.5	5080	5.0	200	0.3
			4	124	2.8	3810	5.6		0.4
			6	125		3430			
			10	128	3.0	2285	6.0		0.5
			12	132		1905			0.6
			15	135	3.8	1145	7.6		0.9
			20	142		890			1.1
			25	158	4.1	380	8.2		2.0
			32	161	4.6	255	Edge Start		

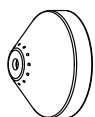
English

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run			Volts	in	ipm	in	factor %	seconds
18	43	41	10 Ga	122	0.10	200	0.20	200	0.3
			3/16	123	0.11	150	0.22		0.4
			1/4	127		135			
			3/8	130	0.12	90	0.24		0.5
			1/2	133		75			0.6
			5/8	140	0.15	45	0.30		0.9
			3/4	142		35			1.1
			1.0	154	0.16	15	0.32		2.0
			1-1/4	158	0.18	10	Edge Start		

If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 2 psi (0.14 bar) for every 25 feet of added length.

Mild steel
Air Plasma / Air Shield
200 A Cutting

Flow rates – lpm/scfh		
	Air (Plasma)	Air (Shield)
Test	30 / 64	94 / 200
Run	30 / 64	94 / 200



420045



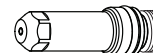
220936
220935 (No IHS tab)



420044



220488



220937

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run			Volts	mm	mm/m	mm	factor %	seconds
30	48	45	6	133	1.0	4825	3.0	300	0.4
			8	136	1.3	4570	3.9		0.6
			10	140	2.5	3050	5.0	200	0.9
			12	145	3.3	2540	6.6		1.2
			15	150	4.8	1780	9.6		1.3
			20	154		1525			1.5
			25	162	6.4	890	11.5	180	2.2
			32	168		635	Edge Start		
			38	174		455			
			44	182		255			
			50	194		150			

English

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run			in	Volts	in	ipm	in	factor %
30	48	45	1/4	133	0.04	190	0.12	300	0.4
			5/16	136	0.05	180	0.15		0.6
			3/8	140	0.10	120	0.20	200	0.9
			1/2	145	0.13	100	0.26		1.2
			5/8	150	0.19	70	0.38		1.3
			3/4	154		60			1.5
			7/8	158		50			1.7
			1.0	162	0.25	35	0.45	180	2.2
			1-1/4	168		25	Edge Start		
			1-1/2	174		18			
			1-3/4	182		10			
			2.0	194		6			

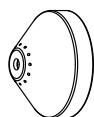
If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 5 psi (0.35 bar) for every 25 feet of added length.

Mild steel

 O₂ Plasma / Air Shield

200 A Cutting

Flow rates – lpm/scfh		
	O ₂	Air
Test	23 / 49	94 / 200
Run	23 / 49	94 / 200



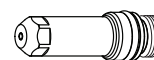
420045


 220936
220935 (No IHS tab)


420044



220488



220937

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		mm	Volts	mm	mm/m	mm	factor %	seconds
20	38	45	6	112	2.0	4700	4.0	200	0.5
			8	116		3950			0.6
			10	120	3.3	3050	6.6		0.7
			12	124	3.6	2540	7.2		0.9
			15			1905			1.1
			20			1525			1.3
			25	132	3.3	840	6.6		2.0
			32	136	4.6	710	Edge Start		
			38	142		430			
			44	149		305			
			50	157		180			

English

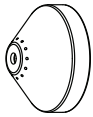
Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run			Volts	in	ipm	in	factor %	seconds
20	38	45	1/4	112	0.08	185	0.16	200	0.5
			3/8	120	0.13	120	0.26		0.7
			1/2	124	0.14	100	0.28		0.9
			5/8			75			1.1
			3/4	128		60	1.3		
			7/8	130	0.13	50	0.26	1.5	
			1.0	132		33		2.0	
			1-1/4	136	0.18	28	Edge Start		
			1-1/2	142		17			
			1-3/4	149		12			
			2.0	157		7			

If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 2 psi (0.14 bar) for every 25 feet of added length.

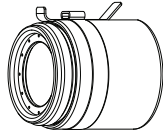
Mild steel – 3 inch under water

O₂ Plasma / Air Shield
200 A Cutting

Flow rates – lpm/scfh		
	O ₂	Air
Test	23 / 49	94 / 200
Run	23 / 49	94 / 200



420045



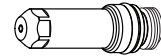
220936
220935 (No IHS tab)



420044



220488



220937

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		mm	Volts	mm	mm/m	mm	factor %	seconds
20	38	45	6	112	2.0	4190	4.0	200	0.5
			8	116		3600			0.6
			10	120	3.3	2795	6.6		0.7
			12	124	3.6	2290	7.2		0.9
			15	124		1525			1.1
			20	128		380			1.5
			25	132	3.3	510	6.6		2.0

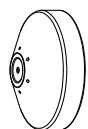
English

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		in	Volts	in	ipm	in	factor %	seconds
20	38	45	1/4	112	0.08	165	0.16	200	0.5
			3/8	120	0.13	110	0.26		0.7
			1/2	124	0.14	90	0.28		0.9
			5/8	124		60			1.1
			3/4	128		15			1.5
			7/8	130	0.13	17	0.26		1.8
			1.0	132	0.12	20	0.24		2.0

If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 2 psi (0.14 bar) for every 25 feet of added length.

Stainless steel
Air Plasma / Air Shield
50 A Cutting

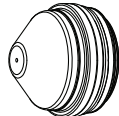
Flow rates – lpm/scfh		
	Air (Plasma)	Air (Shield)
Test	25 / 53	86 / 182
Run	19 / 40	86 / 182



220532



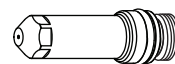
220936
220935
(No IHS tab)



220890



220529



220528

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		mm	Volts	mm	mm/m	mm	factor %	seconds
60	75	40	0.5	103	1.5	7620	1.5	100	0.0
			0.8	104		6730			0.1
			1.0	105		6350			
			1.2	106	1.8	5715	1.8		
			1.5	107		4825			
			2.0	109		4190			
			2.5	118	2.0	3175	2.0	0.2	
			3.0			2160		0.3	
			4.0	121	2.3	1400	3.5	150	0.4
			6.0	125	2.5	1145	3.8		0.5

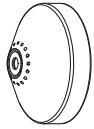
English

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run			in	Volts	in	ipm	in	factor %
60	75	40	0.018	103	0.06	300	0.06	100	0.0
			0.024			275			0.1
			0.030	104		265			
			0.036	105		250			
			0.048	106	0.07	225	0.07		
			0.060	107		190			
			0.075	109		165			
			0.105	118	0.08	125	0.08	0.2	
			0.135	119		85		0.3	
			0.188	124	0.09	55	0.14	150	0.4
			0.250	126	0.10	45	0.15		0.5

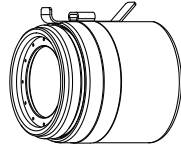
If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 5 psi (0.35 bar) for every 25 feet of added length.

Stainless steel
Air Plasma / Air Shield
130 A Cutting

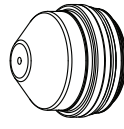
Flow rates – lpm/scfh		
	Air (Plasma)	Air (Shield)
Test	41 / 87	78 / 165
Run	35 / 74	78 / 165



220536



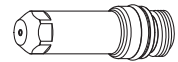
220936
220935
(No IHS tab)



220892



220488



220487

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		mm	Volts	mm	mm/m	mm	factor %	seconds
45	65	36	6	148	3.6	2540	7.2	200	0.5
			10		4.1	1780	8.2		0.8
			12	150		1270			
			15	160	4.6	760	Edge Start		
			20	162		510			

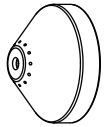
English

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time	
Test	Run		in	Volts	in	ipm	in	factor %	seconds	
45	65	36	1/4	148	0.14	100	0.28	200	0.5	
			3/8		0.16	70	0.32		0.8	
			1/2	150		50				
			5/8	160	0.18	30	Edge Start			
			3/4	162		20				

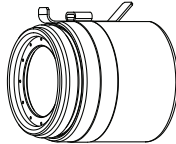
If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 5 psi (0.35 bar) for every 25 feet of added length.

Stainless steel
Air Plasma / Air Shield
200 A Cutting

Flow rates – lpm/scfh		
	Air (Plasma)	Air (Shield)
Test	30 / 64	94 / 200
Run	30 / 64	94 / 200



420045



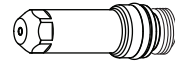
220936
220935
(No IHS tab)



420044



220488



220937

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run			mm	Volts	mm	mm/m	mm	factor %
30	48	45	5	140	2.8	5840	4.2	150	0.4
			6	142	3.0	5080	4.5		0.5
			10		3.3	4065	5.0		
			12	143		2795	6.6	200	0.8
			15	148	4.1	2160	8.2		1.0
			20	152	4.8	1525	9.6		
			25	160	5.6	1015	Edge Start		
			32	168		510			
			38	186		305			

English

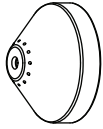
Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run						in	Volts	
30	48	45	3/16	140	0.11	230	0.17	150	0.4
			1/4	142	0.12	200	0.18		
			3/8		0.13	160	0.20		0.5
			1/2	143		110	0.26	200	0.8
			5/8	148	0.16	85	0.32		
			3/4	152	0.19	60	0.38		1.0
			7/8	158	0.21	50	0.42		1.2
			1.0	160	0.22	40	Edge Start		
			1-1/4	168		20			
			1-1/2	186		12			

If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 5 psi (0.35 bar) for every 25 feet of added length.

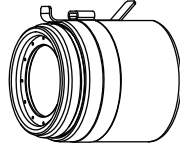
Stainless steel

N₂ Plasma / Air Shield
200 A Cutting

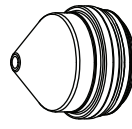
Flow rates – lpm/scfh		
	N ₂	Air
Test	36 / 76	94 / 200
Run	36 / 76	94 / 200



420045



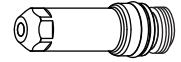
220936
220935
(No IHS tab)



420044



220529



020415

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		mm	Volts	mm	mm/m	mm	factor %	seconds
45	59	45	5	143	2.8	5840	4.2	150	0.4
			6	145	3.0	5080	4.5		0.5
			10	147	3.3	4065	5.0		200
			12	150		2795	6.6	1.0	
			15	155	4.1	1905	8.2	1.3	
			20	160	4.8	1525	9.6	Edge Start	
			25	172	6.4	890	12.8		
			32	176		635			
			38	178		380			

English

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run			Volts	in	ipm	in	factor %	seconds
45	59	45	3/16	143	0.11	230	0.17	150	0.4
			1/4	145	0.12	200	0.18		
			3/8	147	0.13	160	0.20		0.5
			1/2	150		110	0.26		
			5/8	155	0.16	75	0.32	200	0.8
			3/4	160	0.19	60	0.38		
			7/8	168		40			1.2
			1.0	172	0.25	35	0.50		1.3
			1-1/4	176		25	Edge Start		
			1-1/2	178		15			

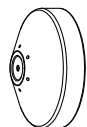
If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 5 psi (0.35 bar) for every 25 feet of added length.

Aluminum

Air Plasma / Air Shield

50 A Cutting

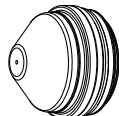
Flow rates – lpm/scfh		
	Air (Plasma)	Air (Shield)
Test	25 / 53	86 / 182
Run	19 / 40	86 / 182



220532



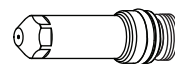
220936
220935
(No IHS tab)



220890



220529



220528

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		mm	Volts	mm	mm/m	mm	factor %	seconds
60	75	40	0.5	108	1.5	8000	3.0	200	0.0
			0.8			7495			0.1
			1.0	111	1.8	7110	3.6		0.2
			1.2	112		5840			
			1.5	115		4955			
			2.0	118	2.0	4065	4.0		0.3
			2.5	120		3050			
			3.0	122		2540			
			4.0	124	2.3	1905	4.6		0.4
			6.0	132	2.5	1270	5.0		0.5

English

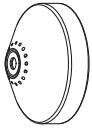
Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run			in	Volts	in	ipm	in	factor %
60	75	40	0.018	108	0.06	325	0.12	200	0.0
			0.020			315			
			0.024			305			
			0.030	110		295			0.1
			0.036	111	0.07	280	0.14		0.2
			0.048	112		230			
			0.060	115		195			
			0.075	118	0.08	160	0.16		0.3
			0.105	120		120			
			0.125	123		100			
			0.188	125	0.09	75	0.18		0.4
			0.250	132	0.10	50	0.20		0.5

If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 5 psi (0.35 bar) for every 25 feet of added length.

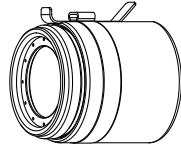
Aluminum

Air Plasma / Air Shield
130 A Cutting

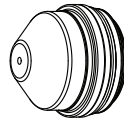
Flow rates – lpm/scfh		
	Air (Plasma)	Air (Shield)
Test	41 / 87	78 / 165
Run	35 / 74	78 / 165



220536



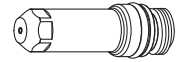
220936
220935
(No IHS tab)



220892



220488



220487

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		mm	Volts	mm	mm/m	mm	factor %	seconds
45	65	36	6	151	2.8	2285	5.6	200	0.2
			10	155	3.0	1525	6.0		0.3
			12	157		1145			0.5
			15	161	3.3	1015	6.6		0.8
			20	165	3.6	760	7.2		1.3
			25	173	4.0	510	Edge Start		

English

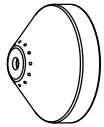
Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		in	Volts	in	ipm	in	factor %	seconds
45	65	36	1/4	151	0.11	90	0.22	200	0.2
			3/8	155	0.12	60	0.24		0.3
			1/2	157		45			0.5
			5/8	161	0.13	40	0.26		0.8
			3/4	165	0.14	30	0.28		1.3
			1.0	173	0.16	20	Edge Start		

If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 5 psi (0.35 bar) for every 25 feet of added length.

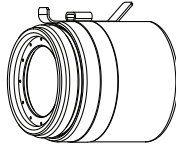
Aluminum

Air Plasma / Air Shield
200 A Cutting

Flow rates – lpm/scfh		
	Air (Plasma)	Air (Shield)
Test	30 / 64	94 / 200
Run	30 / 64	94 / 200



420045



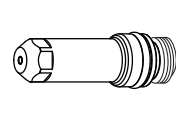
220936
220935
(No IHS tab)



420044



220488



220937

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run						mm	Volts	
30	48	45	5	143	2.5	5840	5.0	200	0.5
			6	145	3.3	5080	6.6		
			10	147		4065			
			12	152	3.8	3175	7.6		0.8
			15	158	4.1	2415	8.2		
			20	163	4.8	1780	9.6		
			25	176	5.6	1015	Edge Start		
			32	184		510			
			38	192		305			

English

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time		
Test	Run		in	Volts	in	ipm	in	factor %	seconds		
30	48	45	3/16	143	0.10	230	0.20	200	0.5		
			1/4	145	0.13	200	0.26				
			3/8	147		160					
			1/2	152	0.15	125	0.30			0.8	
			5/8	158	0.16	95	0.32				
			3/4	163	0.19	70	0.38				1.0
			7/8	170	0.21	50	0.42				1.2
			1.0	176	0.22	40	Edge Start				
			1-1/4	184		20					
			1-1/2	192		12					

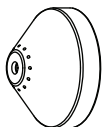
If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 5 psi (0.35 bar) for every 25 feet of added length.

Aluminum

N₂ Plasma / Air Shield

200 A Cutting

Flow rates – lpm/scfh		
	N ₂	Air
Test	36 / 76	94 / 200
Run	36 / 76	94 / 200



420045



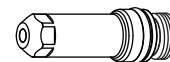
220936
220935
(No IHS tab)



420044



220529



020415

Metric

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time
Test	Run		mm	Volts	mm	mm/m	mm	factor %	seconds
45	59	45	5	148	3.3	5840	5.0	150	0.5
			6	150		5080			
			10			4065			
			12	157		2795	6.6	200	
			15	163	4.1	2415	8.2		0.8
			20	172	4.8	1525	9.6		1.0
			25	184	6.4	1015	Edge Start		
			32	194		510			
			38	198		305			

English

Plasma Gas (psi)		Shield Gas (psi)	Material Thickness	Arc Voltage	Torch-to-Work Distance	Cutting Speed	Initial Pierce Height		Pierce Delay Time	
Test	Run		in	Volts	in	ipm	in	factor %	seconds	
45	59	45	3/16	148	0.13	230	0.20	150	0.5	
			1/4	150		200				0.26
			3/8			160				
			1/2	157		110	200	0.8		
			5/8	163	0.16	95			0.32	
			3/4	172	0.19	60			0.38	1.0
			7/8	178	0.25	50			0.50	
			1.0	184		40	Edge Start			
			1-1/4	194		20				
			1-1/2	198		12				

If the torch leads are longer than 50 feet, increase the plasma test and the shield pressures by 5 psi (0.35 bar) for every 25 feet of added length.

