

Invertig 130 DC/L

Owner's Manual



Manufacturer's Warranty

It is expressly agreed that there are no warranties, expressed or implied, made by either the Salesman, Dealer, or HTP America, Inc. on products or parts furnished hereunder, except the Manufacturer's Warranty against defective materials or workmanship as follows:

HTP America, Inc. warrants each new welding machine to be free from defects in material and workmanship under normal use and service for one year after delivery to the original purchaser. HTP America, Inc. will repair and replace, at its factory, any part or parts thereof, products to be returned to HTP America, Inc. with transportation charges prepaid and which its examination shall disclose to its satisfaction to have been thus defective. This warranty being expressly in lieu of all other warranties, expressed or implied, and all other obligations or liabilities on its part and it neither assumes nor authorizes any other person to assume for it any other liability in connection with the sale of its machines.

This warranty shall not apply to any welding machine which has been repaired or altered by unauthorized service departments in any way so as in the judgment of HTP America, Inc. to affect its stability and reliability, nor which has been subjected to misuse, negligence or accident.

HTP America, Inc. shall not be liable in any event, unless HTP America, Inc. receives notice of alleged breach of warranty within not more than 30 days after the discovery, actual or construction alleged breach of warranty specifying the claimed defect.

HTP America, Inc. has reserved the right to make change in design or add any improvements to its products at any time without incurring any obligation to install same on equipment.

This warranty is void unless warranty card is sent to HTP America, Inc. within 15 days from date of purchase.

Note:

Exclusions to Warranty:

1. The Tig Welding Torch is warranted for a period of ninety (90) Days against defects in material and workmanship.
2. The tungsten, collet, collet body, ceramic nozzles are consumable items, WHICH CARRY NO WARRANTY.

Safety Suggestions

Electric arc welding produces ultra-violet rays, which are harmful to skin and eyes. Ultra-violet radiation can penetrate lightweight clothing, reflect from light colored surfaces, and burn the skin and eyes. Wear flameproof welding gloves which are not oily or greasy. The oil or grease on the gloves may ignite. Wear a heavy, pocket-less; long sleeve shirt, cuffless trousers, and high-topped work shoes. Wear a full-face welding helmet with a number eight or darker lens and a cap. These precautions will protect eyes, hair, face, and skin from arc rays and hot material.

- To avoid fire, do not weld on wood, plastic tile, or carpeted floors. Concrete or masonry floors are safest.
- Do not weld on drums, barrels, tanks or other containers until they have been cleared as described in AWS Standard A6.01.
- Provide adequate ventilation in the welding area at all times. Do not weld on galvanized zinc, cadmium or lead beryllium materials unless POSITIVE sufficient ventilation is provided. These materials produce toxic fumes.
- Do not weld in areas close to degreasing or spraying operations. Chlorinated hydrocarbon vapors may react with the ultra-violet rays and form highly toxic phosgene gas.
- If you develop momentary eye, nose or throat irritation during welding, stop welding immediately. This is an indication that ventilation is not adequate. Do not continue to weld until ventilation is improved.
- Exposed, electrically hot conductors or other bare metal in the welding circuit, or ungrounded electrically hot equipment can fatally shock a person whose body becomes a conductor. Do not stand, sit, lie, lean on or touch a wet surface when welding.
- Frequently inspect cables for wear, cracks, and damage. Replace those with excessively worn insulation to avoid a possible lethal shock from bared cable.

For more information, refer to the following standards and comply as applicable.

1. ANSI Standard Z49.1 SAFETY IN WELDING AND CUTTING, obtainable from the American Welding Society, 2051 NW 7th St., Miami, FL 33125.
2. ANSI Standard Z87.1 SAFE PRACTICE FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018.
3. America Welding Society Standard A6.0 WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES, obtainable same as item 1.
4. NFPA STANDARD 51. OXYGEN-FUEL GAS SYSTEMS FOR WELDING AND CUTTING, obtainable from the National Fire Protection Assoc., 470 Atlantic Avenue, Boston, MA 02210.
5. NFPA Standard 51B. CUTTING AND WELDING PROCESSES, obtainable same as item 4.
6. CGA PAMPHLET P-1. SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, obtainable from the Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.
7. OSHA Standard 29 CFR, Part 1910, Subpart Q WELDING, CUTTING AND BRAZING.

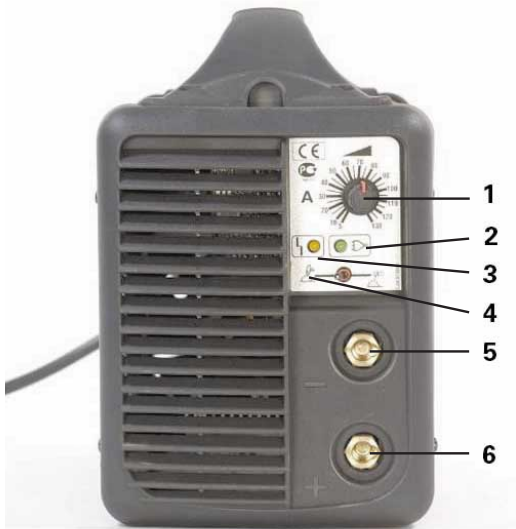


Fig 2 –
Front Panel
Controls

Electrical Connection

Your Invertig 130 DC/L requires a single-phase 230-volt power supply wired for 16 amps.

Should you remove the plug to install your own plug, the yellow-green wire is the ground wire and the blue and brown wires are the hot leads.

All electrical connections should be performed by a qualified electrician in accordance with the National Electrical Code and local codes and ordinances.

Front Panel Controls

1) Amperage Adjustment Knob

This knob determines the maximum welding amperage. The amperage on your Invertig 130 DC/L adjusts from 5 to 130 amps.

When using a remote amperage control, the amperage adjustment knob is used to limit the maximum amperage for your particular welding application. For example, when welding .060" mild steel, I adjusted the amperage knob to 80 amps. This is about 20% more power than I need for welding the .060" steel. When I depress the foot pedal completely, the maximum amperage will now be 80 amps.

Setting the machine so the maximum amperage is 80 amps vs. the maximum output of the machine of 130 amps, the pedal becomes less sensitive. More of a movement in the pedal results in a smaller variance of the amperage, making it easier to control the heat and therefore easier to control your puddle.

2) Power Indicator Lamp

This lamp is illuminated green when the On-Off switch on the back of your Invertig 130 DC/L is turned on.

3) Thermoswitch Indicator Lamp

The thermoswitch indicator lamp will light up yellow when the duty cycle of your Invertig 130 DC/L has been exceeded. When this lamp is illuminated, the machine will no longer weld because the machine has overheated. Leave the machine plugged in and turned on so the cooling fan can cool the unit down. Allow the machine to cool for 15 to 30 minutes, the thermoswitch should reset automatically and your Invertig will be ready to weld.

4) Welding Mode Switch

The welding mode switch allows you to select the welding mode of your Invertig 130 DC/L.

- A) *TIG Mode* – In the TIG welding mode, you can touch start DC TIG weld with your 130 DC/L. Simply turn the torch gas valve on, touch the tungsten to the work, and lift off
- B) *Stick Welding* – This mode is used when stick electrode welding. The electrode will always be hot. This requires the optional stick electrode holder, HTP part # 22315-ARCMTS.

5) Negative Output Receptacle

When TIG welding, this is where the TIG Torch connects to your Invertig 130 DC/L Welder. That's right, we said the TIG Torch. This is called straight polarity, with the torch negative and the work positive. When using your Invertig Welder to TIG weld, all work will be done in straight polarity.

When Stick Welding Direct Current Electrode Negative (DCEN), the optional electrode holder will be plugged into the negative output receptacle. When Stick Welding Direct Current Electrode Positive (DCEP), the ground cable will be plugged into the negative output receptacle

To install a cable into the negative output receptacle, insert the male end of the cable into the negative output receptacle and twist clockwise until snug.

6) Positive Output Receptacle

When TIG welding, this is where the ground cable connects to the front of the TIG Adapter. That's right, we said the ground cable. This is called straight polarity, with the torch negative and the work positive.

When Stick Welding Direct Current Electrode Negative (DCEN), the ground cable will be plugged into the positive output receptacle. When Stick Welding Direct Current Electrode Positive (DCEP), the electrode holder will be plugged into the positive output receptacle.

To install a cable into the positive output receptacle, insert the male end of the cable into the positive output receptacle and twist clockwise until snug.



Fig 2 –
Rear Panel
Controls

Use a flow gauge such as HTP Part #12020 or a flow meter such as the HTP Part # 12020F that is compatible with Argon cylinders and has a barbed fitting for the delivery hose. Connect the gas hose from the tig torch directly to the regulator.



Fig 4 –
55 Cu.ft
Gas Bottle

Rear Panel Controls

1) Remote Amperage Connection

This is where you will connect the foot pedal or the hand amperage control. This will allow you to remotely control the amperage of the welder.

2) On-Off Switch

This switch controls the input power to your Invertig 130 DC/L Welder. 0 is off and 1 is on.

When you turn the machine on, the power indicator lamp (#4) will be illuminated green on the front panel of the welder. This is an indication your Invertig 130 DC/L is on and ready for use. If both the yellow thermo switch light (#3) and the green power indicator light are on when you first turn the machine on; it is a good indication that you have lost a leg of your 220.

Shield Gas

TIG welding requires a shield gas of 100% Argon. A shield gas is used to keep the surrounding atmosphere from coming in contact with the molten weld puddle. The correct flow rate is enough gas to shield the molten weld puddle and protect the tungsten electrode. Any greater flow rate is a waste of shield gas. Usually, the flow rate will be set anywhere between 15 and 30 cubic feet per hour (cfh).



Fig 3 –
Flow Gauge
and Flow Meter

HTP also has available small 60 cubic foot gas bottles (Part #99900), which are ideal for use with your welder. These bottles stand approximately 30" high and weigh less than 40 pounds, making your welder very easy to move around the shop. Be sure to check with your local gas supplier about filling these tanks before ordering.

If you already have a large cylinder, you can fill the small cylinder from the large cylinder using the transfer manifold (HTP Part #99905).

Tungsten Electrodes

HTP recommends the following premium quality tungsten ground to a high quality finish for use with your Invertig 130 DC/L. All tungsten is 7" long and can be purchased individually.

2% Thoriated Tungsten (TT2) – red tip – This tungsten is the most common tungsten currently used. Generally used for DC welding of steel and stainless steel. Draw back is it has a low level radiation hazard. Offers good overall performance.

2% Ceriated Tungsten (TC2) – grey tip – 2% Ceriated is an excellent substitute for 2% thoriated tungsten and works excellent with inverter power sources such as your 130 DC/L. More popular for thinner materials because it requires less amperage to start. Offers a stable arc.

2% Lanthanated Tungsten (TL2) – blue tip – 2% lanthanated is also an excellent substitute for 2% thoriated tungsten. It offers good arc starting characteristics and longer life than 2% thoriated.

Fig 5 –
Tungsten Electrodes



Tungsten Type	Diameter			
	.040" (1.0mm)	1/16" (1.6mm)	3/32" (2.4mm)	1/8" (3.2mm)
2% Thoriated	TT2-7040	TT2-7116	TT2-7332	TT2-718
2% Ceriated	TC2-7040	TC2-7116	TC2-7332	TC2-718
2% Lanthanated	TL2-7040	TL2-7116	TL2-7332	TL2-718
Amperage	15-50	50-120	80-150	130-250

The electrode should be sharpened to a point with a fine grinding wheel. If the stone used for sharpening the electrode is not clean, contaminants could lodge in the electrode and dislodge when welding. The grinding wheel used for tungsten electrodes should not be used for any other materials. When grinding the electrode to a point, a 15 to 30 degree angle is desired. The grinding marks should run lengthwise with the point, opposed to in the direction of the diameter.

The HTP Tungsten Sharpener is an excellent tool for precisely sharpening tungsten electrodes without any fear of contamination.



Fig 6 –
HTP Tungsten
Sharpener

General Welding Parameters

Following are some “rule of thumb” welding parameters, tungsten diameters and amperage settings for welding different thicknesses of steel. Keep in mind these are general settings and the specific application may require more or less power to get the job done.

Mild Steel

Thickness	Tungsten Diameter	Machine Amperage	Welding Amperage	Filler Diameter
.030"	.040"	50	30-40	.035"
.050"	1/16"	70	45-55	.035"
.062" (1/16")	1/16"	80	55-65	1/16"
.093" (3/32")	1/16"	110	80-90	1/16"
.125" (1/8")	1/16"-3/32"	130	110-120	1/16"
.187" (3/16")*	3/32"	130	130	1/16"

* May require beveling – depends on joint

Filler Rod for TIG Welding



Fig 7 –
Tig Filler Rod

HTP offers you high quality filler rods in affordable quantities. All filler rod is packaged in 1lb airtight plastic tubes to keep your filler rod fresh and contaminant free. The tubes are completely re-sealable.

In TIG welding, the filler rod is fed into the molten puddle by hand. The choice of filler rod is extremely important as the rod must correctly match the material and alloy you will be welding. The thickness of the material to be welded determines the diameter of the filler rod.

Here are some good rules of thumb to help you select the correct filler metal:

- 1) ER70S-6 is generally used for mild steel welding.
- 2) ER70S-2 is highly recommended for welding 4130 chrome-moly tubing in many applications.
- 3) ER80S-D2 is recommended for welding 4130 chrome-moly tubing if a higher strength, less ductile weld is required. If your weld will be heat treated to obtain optimum strength, then use a filler metal which matches the chemistry of your tubing, which neither 70S-2 nor 80S-D2 wires do.
- 4) Generally speaking, use a 1/16" diameter filler rod for applications where the material is 1/8" and less. Use a 3/32" diameter rod for 1/8" and thicker.

The following Filler Rod is available from HTP in 1 lb. tubes which are tightly sealed to prevent oxidation.

Filler Rod

Part #	Material	
308L-035-1	308L Stainless Steel Wire	.035" x 36"
308L-1/16-1	308L Stainless Steel Wire	1/16" X 36"
70S6-1/16-1	ER70S-6 Steel Wire	1/16" X 36"
70S6-3/32-1	ER70S-6 Steel Wire	3/32" X 36"
70S2-1/16-1	ER70S-2 Steel Wire	1/16" X 36"
80SD2-1/16-1	ER80SD-2 Steel Wire	1/16" X 36"

Quick Set Up

- 1) Welding Mode in Tig Welding selection.
- 2) TIG Torch into Negative receptacle
- 3) Ground clamp plugged into Positive receptacle
- 4) Gas hose from tig torch connected to Regulator
- 5) 100% Argon Gas Flow to 20 CFH
- 6) Set amperage to correct setting
- 7) Touch Tungsten to work and lift off to start welding

TIG Welding with your 130 DC/HF

In order to TIG weld, install the TIG welding torch (SR9VT-12-SFC) on the machine. Generally speaking, except for very rare instances, you will TIG weld DCEN, or DC electrode negative. Plug the TIG torch into the negative output receptacle (#5) and connect the gas hose from the Tig torce directly to the regulator. Do not use Teflon tape or any other sealers, as the threads do not seal the connection. Use 100% argon shielding gas set at approximately 20 cfh. Plug the ground cable into the positive output receptacle (#6).

Setting up the Torch

Lets assume we will be welding some .060" mild steel. Selecting a 1/16" 2% Ceriated tungsten, we grind a point on the end of the tungsten (remember always grind the tungsten longitudinally, never radially). Select a 1/16" collet and insert the tungsten so the pointed end of the tungsten comes out through the slit in the collet. Next insert the collet/tungsten assembly into the threaded end of the collet body, so the pointed end of the tungsten comes out through the sized hole of the collet body. (See Fig 8) Thread the assembly into the torch head and tighten the collet body snugly by hand. Install the back cap, but do not tighten at this point. Install a #6 alumina cup on the collet body and tighten snugly by hand. Have the tungsten protruding from 2 to 3 times its diameter from the end of the cup (in this instance 1/8" to 3/16" (See Fig 9). Tighten the back cap.

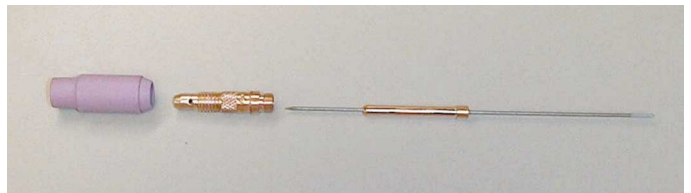


Fig 8 – Assembly order for Torch Parts



Fig 9 – Tungsten Stickout

Holding the Torch

It is recommended that you use TIG welding gloves like our BL25 gloves. These are thinner than standard welding gloves and will give you a much better “feel” and make it easier to work the filler rod. Grip the torch somewhat like a pencil, as indicated in figure 10. The torch must be positioned almost perpendicular to the work and in such a manner that the tungsten is kept 1/8" to _" off the work. The tungsten should only contact the work when starting the arc.

Turn the gas valve, which is on the torch head; on so the gas starts to flow.

Be sure the material, which you will be working on, is clamped so it will not move. Touch the tungsten to the work, depress the foot pedal, and lift the tungsten from the work. The arc will start. Once the arc is started, the tungsten should never contact the work. Use the edge of your hand and little finger to hold the torch steady.

To extinguish the arc, slowly release the foot pedal to its minimum setting. Pull the torch away from the work to extinguish the arc, and then bring the torch back to the weld area to keep the shield gas around the weld until it cools. Once both the tungsten and the weld have cooled, you can turn off the gas valve.



Fig 10 – Holding the TIG Torch

Initially, just practice moving the tungsten in a straight line, at a constant speed, and keeping it a constant distance off the work piece. Remember that Rome wasn't built in a day, so don't expect to master TIG welding in 15 minutes. PRACTICE, PRACTICE, PRACTICE.

Once you have mastered just running a bead in a straight line without adding any filler metal, the next step is to do the same thing but to add filler metal. Dip the filler metal into the molten puddle (do not try to melt the filler metal into the work) and NEVER allow the filler metal to touch the tungsten. If the filler metal comes in contact with the tungsten, or if the tungsten contacts the work, you must stop and sharpen the tungsten. Remember, practice, practice, and practice.

To make my life easier, and so I am not always stopping to sharpen tungsten, I keep a package of 10 tungsten of each diameter sharpened in the box. That way, when I need a new tungsten, I can just take a sharp one and put the contaminated one in the box. When I have used them all, I will sharpen them all at once.

Now, once you have practiced laying a bead and adding filler metal, then you can practice welding two pieces of metal together. Start with a butt weld, as this is the easiest. Master this technique before you continue to other joints. Compared to MIG welding, TIG welding is much harder and will require a lot of practice to become proficient.

Arc Welding with your Invertig 130 DC/L

You can arc weld with your Invertig 130 DC/L if you have purchased the optional electrode holder # 22315-ARCMTS. If you will be welding Electrode Negative (Straight Polarity) insert the electrode holder into the negative output receptacle and the ground cable into the positive output receptacle. If you will be welding Electrode Positive (Reverse Polarity) insert the electrode holder into the positive output receptacle and the ground cable into the negative output receptacle.

Make sure material you are welding is clean, and attach the ground cable to the workpiece. Select the correct rod type, diameter and amperage for your application. (See Fig 11)

To strike the arc, drag the electrode across the work as if you were trying to strike a match. Lift the electrode off the work slightly. If the electrode sticks to the work, give it a sharp twist to break it free. If the arc goes out after it has started, you have lifted the electrode too high off the work. Try to incline the electrode at a 10 deg to 30-deg angle from perpendicular in the direction of motion.

Set the arc force to a setting which you find fits your particular welding application.

Insert Electrode Type here (???)

Electrode Selection and Amperage Range

Electrode	Polarity	Penetration	Position	Diameter	Amperage Range																	
					40	50	60	70	80	90	100	110	120	130	140	150						
6010	EP	DEEP	ALL	3/32"																		
				1/8"																		
				5/32"																		
6011	EP	DEEP	ALL	3/32"																		
				1/8"																		
				5/32"																		
6013	EP,EN	LOW	ALL	3/32"																		
				1/8"																		
				5/32"																		
7014	EP,EN	MEDIUM	ALL	3/32"																		
				1/8"																		
				5/32"																		
7018	EP	LOW	ALL	3/32"																		
				1/8"																		
				5/32"																		
7024	EP,EN	LOW	FLAT	3/32"																		
				1/8"																		
				5/32"																		
308L	EP	LOW	ALL	3/32"																		
				1/8"																		
				5/32"																		

Fig 11 – Electrode Selection Guide

Pyrex Cup Kits

Welding is a whole lot easier when you can see what you're doing. And that is exactly what HTP's Pyrex Cup kit is designed to do! It gives you a clear, unobstructed view of the entire welding operation. What's more, this unique unit also includes our special gas saver gas lens kit. This helps save gas while, at the same time, providing a uniform, consistent gas flow that results in better gas coverage. The kit also eliminates gas turbulence which can cause weld quality problems.

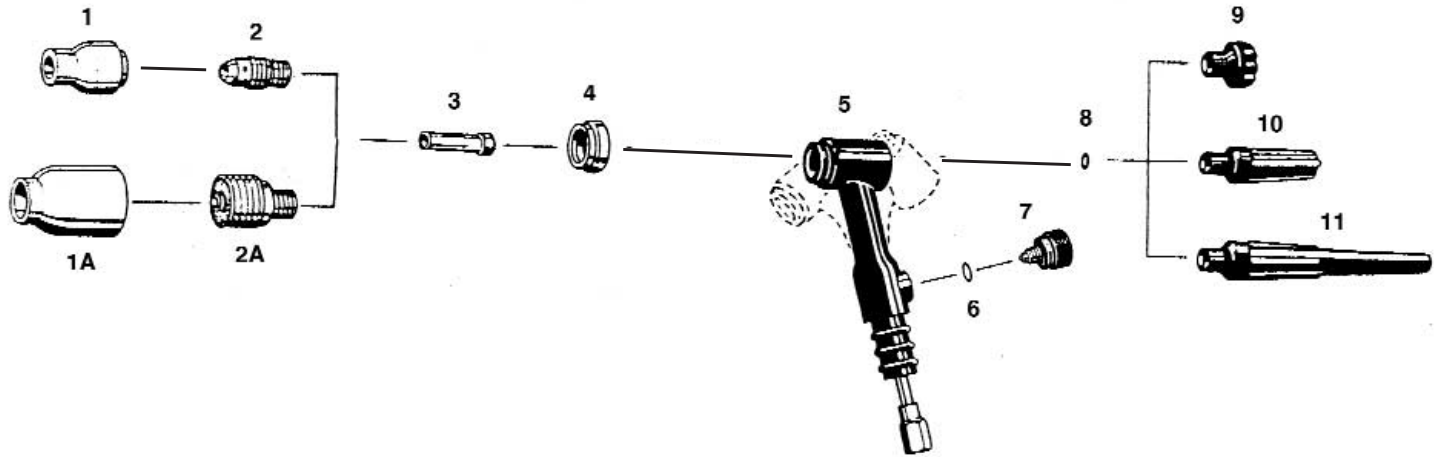


Pyrex 9 Parts

Illus #	Description	Tungsten Diameter			
		0.040"	1/16"	3/32"	1/8"
1	Heat Shield	2HSGS	2HSGS	2HSGS	2HSGS
2	Wedge Collet	PYR20C040	PYR20C116	PYR20C332	PYR20C18
3	Collet Body	PYR20CB	PYR20CB	PYR20CB	PYR20CB
4	Tungsten Adapter	PYR040TA	PYR116TA	PYR332TA	PYR18TA
5	Pyrex Cup	PYR8S	PYR8S	PYR8S	PYR8S
	Complete Kit	PYREX20-040	PYREX20-1/16	PYREX20-3/32	PYREX20-1/8



SR-9V TIG Torch Parts List



SR-9V Air-Cooled Tig Torch Parts Breakdown

Illus #	Description	Tungsten Diameter			
		0.040"	1/16"	3/32"	1/8"
Standard Configuration					
1	Alumina Nozzle	13N08	13N09	13N10	13N11
2	Collet Body	13N26	13N27	13N28	13N29
3	Collet	13N21	13N22	13N23	13N24
Gas Lens Configuration (optional)					
1A	Alumina Nozzle	53N59	53N60	53N61	53N61S
2A	Gas Lens Collet Body	45V42	45V43	45V44	45V45
3	Collet	13N21	13N22	13N23	13N24
Following parts fit all tungsten diameters					
4	Heat Shield	2GHS			
5	Torch Head	SR-9V			
	Flexible Torch Head	SR-9V FLEX			
6	O-Ring	100R			
7	Knob	100VK			
8	O-Ring	200R			
9	Short Back Cap	200S			
10	Medium Back Cap	200M			
11	Long Back Cap	200L			