Ace Photochemical U.V. Power Supplies & Mercury Vapor Lamps

Components: Power Supply, Lamp
(120V or 230V standard power outlet, 50 or 60 Hz)
Reactor System, Cooling water source

CAUTION: *U.V. radiation is EXTREMELY dangerous. Use proper safety precautions. U.V. lamp surfaces get extremely hot (600°C+). Use in water-cooled well for maximum safety. U.V. lamps can, even in water-cooled wells, generate unsafe amounts of ozone. Use in well-ventilated area, or in fume hood.*

Assembly & Startup: (450 watt size)*

1. Connect six-foot long, two-prong cord supplied with Lamp to the lamp via pin jacks; color match NOT important!
2. Plug 2 prong male plug from lamp into front square outlet on Power Supply, labeled “450 Watt”.
3. Plug six-foot, three-prong power cord of the Power Supply, in rear, into standard 120 volt, 60 Hz, 15 amp. minimum power outlet.
4. If using an Immersion well, connect inlet and outlet lines. It is important to turn the water flow on immediately before turning lamp on so as NOT to get the well too cool, this can cause a problem in starting the lamp. (Running the lamp below room temperature can shorten the life of the lamp. For cryogenic work, we recommend using our 7858 Immersion Well). When the lamp is turned on, it takes 5-10 minutes for the lamp to reach full power. At this point, adjust exit well water flow to maintain water temperature within a range of 20°C to 50°C. We recommend using an ACE 12168 water flow monitor with a solenoid valve connection for safety in the event well water stops flowing or if power is interrupted. The power cut-off will shut down the lamp and not relight until unit is reset. For optimum lamp and well performance, use a recirculating chiller in conjunction with ACE 12168 water flow monitor.

   SAFETY is paramount. ***Do not operate lamp in the open*** where it can be viewed with the naked eye. Run reaction in a hood with the glass covered, in a bench cabinet, covered with aluminum foil or in an ACE Photochemical Safety Reaction Cabinet, Catalog No. 7836-20.
5. Flip front toggle power switch "UP" to turn power supply ON. Pilot light mounted above switch will light showing main power available. U.V. Lamp should light. If lamp does not light, use tickler push button switch mounted between pilot light and secondary fuse holder. Push tickler button in and out rapidly to start lamp. (This develops high voltage spikes which aid in starting stubborn lamps).

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Troubleshooting in the event lamp does not light

Some lamps will not light because they are too cold. If well water is too cold and is allowed to cool well prior to starting the lamp, the lamp may not fire. Well water is not for cooling the lamp but rather to remove only some of the lamps heat so as to prevent a thermal reaction. The lamp should be at room temperature to assure proper operation. This is most evident when attempting to relight the lamp while still hot. Also, the lamp surface should never touch the cooled surface of the well; i.e., the reason for the washers at top and bottom of lamp. If this occurs, the lamp may light, but the mercury will not vaporize properly and thus you will not get consistent UV output. Lamps having been operating over 1000 hours may have a problem lighting because of anode deterioration or they develop leaks and lose the gaseous atmosphere.

ACE does offer a one year warranty from date of shipment. ACE will scrutinize for obvious damage from misuse.

U.V. POWER SUPPLY "QUICK TEST":

CAUTION: The following tests should be performed by electrical/technical personnel.

All U.V. Power Supplies are constant current regulating transformers, therefore, test with digital multimeters without using a lamp. See SPECIFICATION SHEET for values in test.

A. OPEN CIRCUIT TEST (O.C.) IN AC VOLTS.
B. SHORT CIRCUIT TEST (S.C.) IN AC AMPS.

NOTE: *Test using meter probes at the square outlet on power supply, I.E., lamp output.*

GENERAL COMMENTS:

A. Fuse located in middle of Power Supply between power switch and square outlet, is the main fuse and should be 10 ampere rated.

B. Fuse above square outlet is the secondary fuse and should be 6 ampere rated.

C. Wattage of Power Supplies are matched to wattage of Lamps. Thus, a 450 watt Power Supply cannot be used with a 200 watt Lamp, or a 550 watt Lamp, etc.

D. Theory of Operation*: Power Supply automatically controls the lamp by being a constant current reactor ballast, delivering approximately 3.8 amperes. Before light goes on, a high open circuit voltage is developed across lamp (approx. 325, volts AC) which breaks the lamp down to light. The open circuit voltage drops to about 25 volts AC at a current of 4 amps. This begins to heat up the lamp gases. When the lamp surface temperature approaches the 600°+C range, the voltage rises to approx. 135 volts and is still 3.8 amps. The lamps internal impedance and the constant current ballast provides self regulation. A periodic check of the voltage and lamp current is recommended. A 400. VAC full scale analog meter and an AC 10 ampere F.S. analog meter is also recommended. Check with an Electronics Technician or contact ACE Electronics Dept. for additional details.

* *See attached "U.V. Power Supply/Lamp Specification Sheet" for appropriate values.*

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U.V. Power Supply/Lamp

Specification Sheet

Power Supply Catalog Number	Power Supply Input	Volts		Amps	Use with ACE U.V. Lamp Number	Hanovia Lamp Model Number	U.V. Lamp Nominal Wattage	U.V. Lamp Nominal AC Voltage	U.V. Lamp Nominal AC Amps
7830-50[a]	120V, 60 Hz	240	/	1.3	7825-30	608A036	100	100	1.1
7830-52	120V, 60 Hz	240	/	1.3	7825-30	608A036	100	100	1.1
7830-51*[a]	230V, 50 Hz	240	/	1.3	7825-30	608A036	100	100	1.1
7830-53*	230V, 50 Hz	240	/	1.3	7825-30	608A036	100	100	1.1
7830-54[a]	120V, 60 Hz	280	/	2.2	7825-32	PC201.050	200	130	1.9
7830-56	120V, 60 Hz	280	/	2.2	7825-32	PC201.050	200	130	1.9
7830-58[a]	120V, 60 Hz	325	/	4.3	7825-34	PC451.050	450	135	3.8
7830-58[a]	120V, 60 Hz	325	/	4.3	7825-35	L5337.000	450	135	3.8
7830-58[a]	120V, 60 Hz	325	/	4.3	7883-14	679A0100	450	135	3.8
7830-59*[a]	230V, 50 Hz	325	/	4.3	7825-34	PC451.050	450	135	3.8
7830-59*[a]	230V, 50 Hz	325	/	4.3	7825-35	L5337.000	450	135	3.8
7830-59*[a]	230V, 50 Hz	325	/	4.3	7883-14	679A0100	450	135	3.8
7830-60	120V, 60 Hz	325	/	4.3	7825-34	PC451.050	450	135	3.8
7830-60	120V, 60 Hz	325	/	4.3	7825-35	L5337.000	450	135	3.8
7830-60	120V, 60 Hz	325	/	4.3	7883-14	679A0100	450	135	3.8
7830-61*	230V, 50 Hz	325	/	4.3	7825-34	PC451.050	450	135	3.8
7830-61*	230V, 50 Hz	325	/	4.3	7825-35	L5337.000	450	135	3.8
7830-61*	230V, 50 Hz	325	/	4.3	7883-14	679A0100	450	135	3.8
7830-62[a]	120V, 60 Hz	300	/	5.0	7825-36	673A0360	550	145	4.4
7830-64	120V, 60 Hz	300	/	5.0	7825-36	673A0360	550	145	4.4
7830-70[a]	230V, 60 Hz	500	/	5.5	7825-40	PC122.121	1200	285	4.7
7830-70[a]	230V, 60 Hz	500	/	5.5	7898-20	PC122.121	1200	285	4.7
7830-71	230V, 60 Hz	500	/	5.5	7825-40	PC122.121	1200	285	4.7
7830-71	230V, 60 Hz	500	/	5.5	7898-20	PC122.121	1200	285	4.7
7830-87*[a]	230V, 50 Hz	500	/	5.5	7825-40	PC122.121	1200	285	4.7
7830-87*[a]	230V, 50 Hz	500	/	5.5	7898-20	PC122.121	1200	285	4.7
7830-89*	230V, 50 Hz	500	/	5.5	7825-40	PC122.121	1200	285	4.7
7830-89*	230V, 50 Hz	500	/	5.5	7898-20	PC122.121	1200	285	4.7
7900-71	230V, 60 Hz	500	/	5.5	7825-40	PC122.121	1200	285	4.7
7900-71	230V, 60 Hz	500	/	5.5	7898-20	PC122.121	1200	285	4.7
7900-74*	230V, 50 Hz	500	/	5.5	7825-40	PC122.121	1200	285	4.7
7900-74*	230V, 50 Hz	500	/	5.5	7898-20	PC122.121	1200	285	4.7

**Shaded listing are for foreign use* *[a]Uncased power supply*

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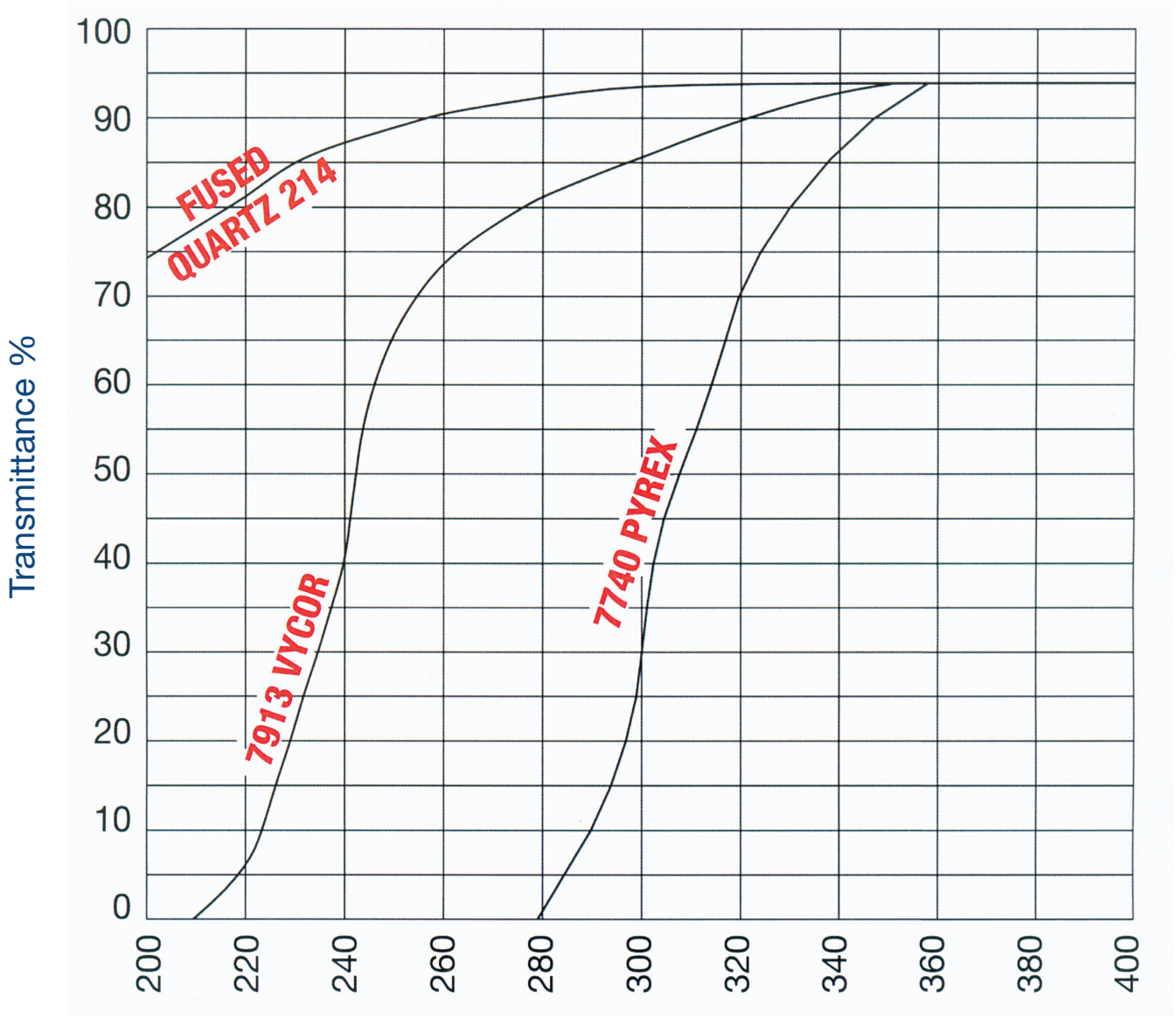
General U.V. Transmittance Graph

Common Reactor Material Loss Per Approx. 2mm Wall Thickness



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The Quartz Mercury Arc

By William T. Anderson Jr. PhD.

The electric arc reaches its peak of attainment in the quartz mercury arc. The visible and ultraviolet radiations are all emitted by the ionized mercury vapor, a condition which permits attainment of the highest arc efficiency.

The natural efficiency of the quartz mercury arc in converting electrical energy into ultraviolet light is enhanced by a predominance of ultraviolet in the light emitted by ionized mercury. Considering the range of light wave lengths transmitted by the quartz, namely, from 1,850 A.U. in the short ultraviolet to 40,000 A.U. in the long infra-red, 28 percent of the emitted energy is in the ultraviolet, an amount greater than that obtainable by any other arc or light source.

The luminous efficiency of the quartz mercury arc is about 5 candle power per watt of input as compared to 3 candle power per watt for the impregnated flame carbon arc, and 1 candle power per watt for the solid core non-impregnated carbon arc. The quartz mercury arc is, therefore, a very efficient source of visible light.

Because of the high efficiency and predominance of ultraviolet in its spectrum, the quartz mercury arc produces an intensity of ultraviolet radiation which can be equaled by other artificial light sources only by the expenditure of four or more times the electrical energy. With regard to power consumption, the quartz mercury arc is the most economical artificial light source known.

In practice, the mercury arc must be enclosed in an evacuated envelope of quartz which can transmit the ultraviolet radiations and can withstand the temperature changes to which it must submit. Glass does not transmit ultraviolet nor can it withstand the temperatures encountered in the arc tube. Thus fused quartz serves in a dual role, and is indispensable to the existence of the arc.

Quartz mercury arcs slowly deteriorate with use, though the deterioration does not materially affect the spectrum of the lamp. An old burner which has been properly cleaned and is not blackened because of a poor vacuum gives the same spectrum as a new lamp. The decrease in the light produced is almost entirely due to changes in the quartz. The arc itself produces as much light as formerly, but the quartz envelope has decreased in transparency and will not let as much of the light pass out. The resulting decrease in intensity affects both the short and long ultraviolet and the visible portions of the spectrum in a nearly equal measure.

The greatest rate of decrease in the intensity of a new lamp occurs during its first few hours of operation. Since all lamps are given several hours of operating tests in the laboratory prior to stocking and shipment, the initial drop in intensity has occurred prior to shipment. The subsequent decrease in intensity is very much slower.

Deterioration may be hastened by outside causes, such as improper operation, handling, and cleansing. These factors may produce changes which affect greatly the spectral energy distribution, so that the relative intensity of various portions of the spectrum vary with age. It is especially important that only pure liquids which leave no residue on evaporation be employed in washing burners. Many a good burner has been completely ruined through failure to observe this precaution.

The properly aged quartz mercury arc lamp exceeds other light sources of like current consumption in the intensity of its ultraviolet radiation. Indeed, the great majority of the energy measurements which have been made and reported in the literature have employed partially aged quartz mercury arc lamps.

The operation of the quartz mercury arc is extremely simple. With the exception of occasional washing of the burner, no adjustments of any kind are required. A large number of lamps have been in operation five years and more, without the burner having been once removed from its mounting. The quartz mercury arc is a convenient light source.

Since the arc is completely enclosed, there are no fumes or sparks. While there is excessive heat, many quartz mercury arcs are operated unattended overnight in chemical laboratories without anxiety on the part of their owners. The quartz mercury arc is a carefree light source*.

WARNING: *When quartz lamps are inserted in water cooled wells, danger can exist if the cooling source is lost; hence a safety cut-off system should be employed especially if operated unattended.*

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Spectral Energy Distribution

Of Radiated Mercury Lines In Ace-Hanovia Medium Pressure U.V. Vapor Arc Lamps

Lamp Cat. No.	7825-30	7825-32	7825-34	7825-35	7825-36	7825-40
	—	—	7883-14	—	—	7898-20
Lamp Watts	100	200	450	450	550	1200
Lamp Volts	100	125	135	135	145	285
Lamp Amps	1.2	1.9	3.8	3.8	4.4	4.7
Arc-Length (inches)	2.9	4.5	4.5	11.0	4.5	12
Mercury Lines (angstroms)		RADIATED ENERGY IN WATTS				
13673 (infrared)	0.65	1.0	2.6	2.6	4.6	10.15
11287	0.62	1.3	3.3	3.3	3.8	6.93
10140	0.85	1.8	10.5	10.5	12.2	31.60
5780 (yellow)	1.55	3.4	20.0	20.0	23.0	69.35
5461 (green)	1.35	3.0	24.5	24.5	28.2	40.52
4358 (blue)	1.08	2.6	20.2	20.2	23.3	53.00
4045 (violet)	0.75	1.6	11.0	11.0	12.7	24.20
3660 (U-V) **A**	1.40	3.1	25.6	25.6	30.1	97.10
3341 **A**	0.13	0.36	2.4	2.4	2.8	6.93
3130 **B**	1.02	2.3	13.2	13.2	15.0	50.6
3025 **B**	0.41	0.86	7.2	7.2	8.2	32.9
2967 **B**	0.32	0.48	4.3	4.3	5.0	15.2
2894 **B**	0.10	0.20	1.6	1.6	1.8	4.41
2804 **B**	0.12	0.30	2.4	2.4	2.8	13.9
2753 **B**	0.06	0.14	0.7	0.7	0.8	4.2
2700 **B**	0.07	0.14	1.0	1.0	1.2	4.85
2652 **B**	0.30	0.64	4.0	4.0	4.6	27.80
2571 **B**	0.11	0.20	1.5	1.5	1.8	6.30
2537 (reversed)* **C**	0.34	1.10	5.8	5.8	5.0	24.1
2482 **C**	0.10	0.20	2.3	2.3	2.6	10.15
2400 **C**	0.05	0.20	1.9	1.9	2.2	7.30
2380 **C**	0.03	0.12	2.3	2.3	2.6	8.40
2360 **C**	0.02	0.08	2.3	2.3	1.8	6.20
2320 **C**	0.02	0.03	1.5	1.5	2.4	7.65
2224 **C**	0.04	0.03	3.7	3.7	4.2	9.20
TOTAL WATTS	11.49	25.18	175.9	175.9	202.7	572.9

*2537 line is reversed in medium pressure U.V. vapor quartz lamps. Most of the energy is absorbed or reflected inward by the quartz.

Note: Measurement set-up of the above Lamps. Empirical data was derived by suspending the lamp in open air with no forced air cooling and no reflector. Line data values indicate energy being radiated from the lamp's quartz surface.

In order to find the intensity, in micro-watts per square centimeter of any line for the below indicated distances:

- 0.5 meter (50 cm or 20") on line bisecting center of lamp, multiply the above table watt value for line by 38.4 for lamps 500 watt or less, by 57 for the 1200 watt lamps.
- 1.0 meter (100 cm or 40") multiply watt value for line by 10.87 for all above lamps shown in table.

For ACE photochem assembly watt densities, refer to "the rule of thumb method" included in this literature packet.

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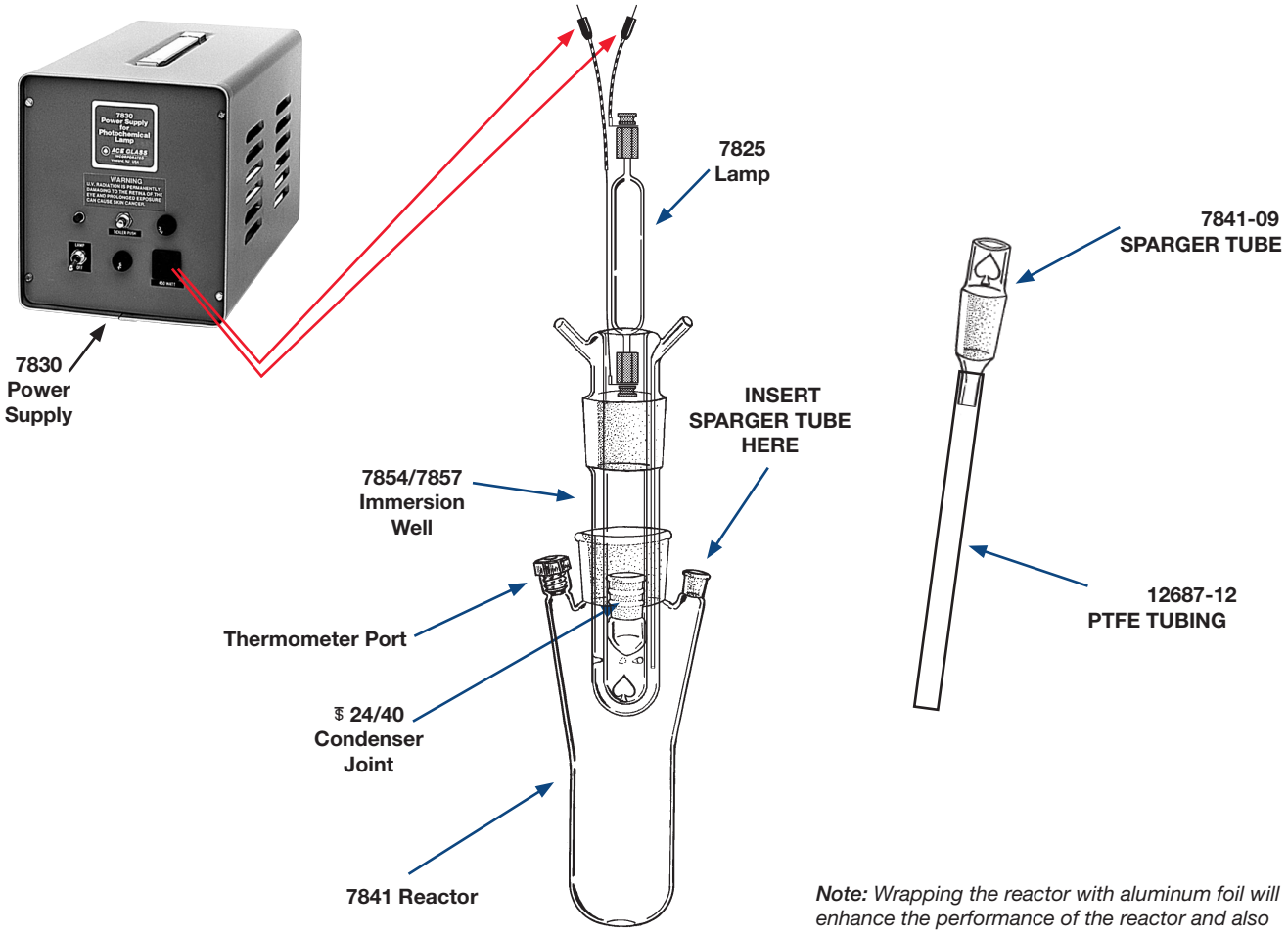
Assembly Instructions
For 7840 Reaction Assembly



Note: *Wrapping the reactor with aluminum foil will enhance the performance of the reactor and also protect from viewing the light.*

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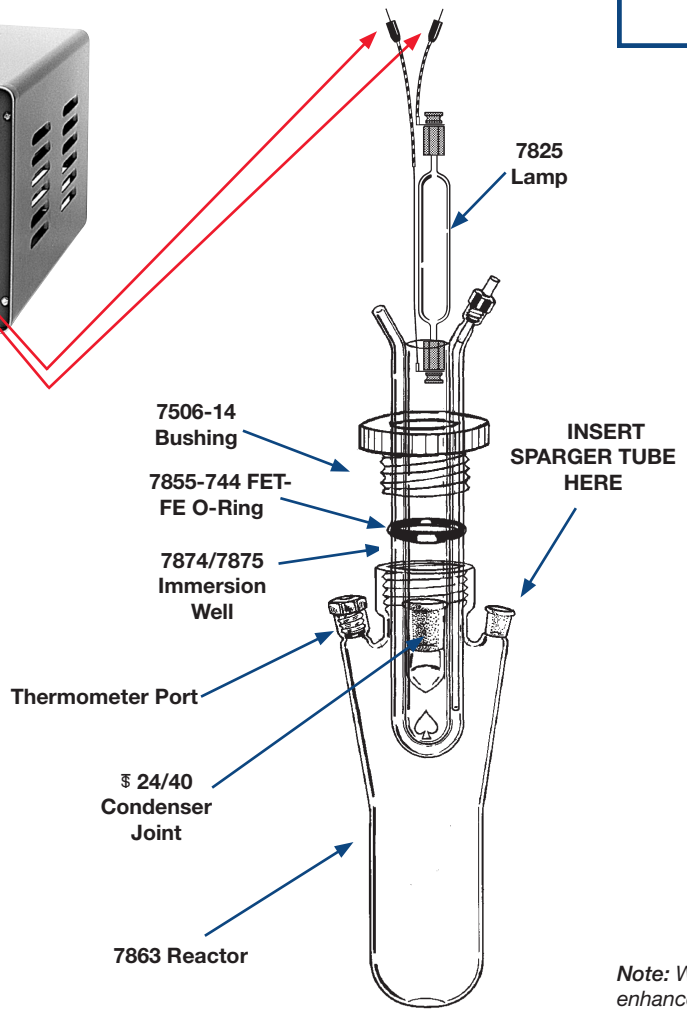
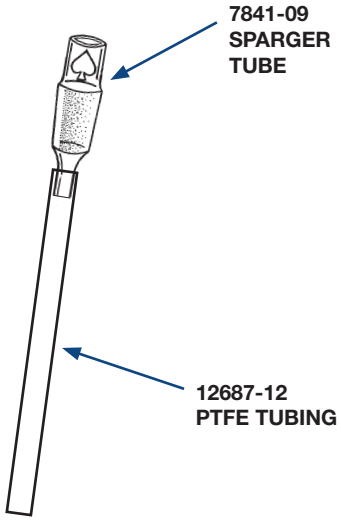
Assembly Instructions
For 7861 Reaction Assembly





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Helpful Hints for UV Lamp Operation

1. Never view lamp without UV & visible light protection for the eyes and skin.
2. The lamp assembly should be operated in a “Hood” or well ventilated area (at least a 10% exchange rate). Ace recommends the use of 7836-20 Safety Cabinet when operating outside of hood.
3. Lamp wattage must match power supply wattage. A mismatch can cause premature burnout of lamp or prevent lamp from operating properly.
4. Never run water cooled well* without a water flow. For safety, a Water-Flo Power Cut-Off System, like ACE 12168, should be used.*Note! Lamp can be operated in open with safety precautions.
5. Do not handle lamp or lead wires when power supply to lamp is powered ON.
6. Never handle lamp with bare hands. This could cause surface contamination and result in reduced transmission. If this occurs, wash lamp with mild soap and water, rinse with distilled water or Isopropyl alcohol. Dry before use.
7. UV medium pressure lamps will not light due to being too “HOT” from operating need approximately 15 minute cool-down), or too “cold” (well below room ambient). If too cold, shut water off, allow lamp to warm to ambient and restart. Be aware it takes 10-15 minutes for lamp to reach full output. It is important to have at least 3 mm clearance between lamp and cooled surface. During operation, adjust water flow so immersion well exit water is at room temperature (20°C) to a maximum of 50°C. Since the lamp surface temperature needs to be around 700 to 800°C for maximum output, adjustments to the water flow may be necessary to maintain optimum conditions; it may even be necessary to use a chiller for reproducible conditions. Monitor water temperature to assure you don't get a thermal reaction due to excessive temperature rise, or too cold , below 20°C, causing a shorter lamp life.
8. Since running the lamp exit water below 20°C can shorten lamp life and cause the vessel cooling chiller to be less efficient, for cryogenic work, we recommend using our 7858 insulated Immersion Well (with 60/40inner joint for standard taper jointed vessels). The 220 mm length is used for 250 mL and 500 mL vessels; the 290 mm is used for the 1000 mL capacity vessel. Inquire about the 7876-50, 415 mm well for vessels using a #50 Ace-Thred in place of standard taper joint for cryogenic temperatures. The 7876-50 will fit all three standard threaded vessels. In some experiments your test solution might need to be controlled well above 50°C; we also recommend using this type vacuum insulated well to help your vessel heating system be more efficient. This allows your exit well water to be controlled at 25°C more efficiently and improves your lamp life. Note! The three inner tubes offered in 7858 and 7876 wells are selected to determine wavelength transmission.
9. Lamp and well quartz surfaces should always look “crystal clear” when at room temperature, new or used. Borosilicate surfaces will not look as clear due to their composition.
10. When using a quartz well, if the need arises to eliminate the shorter wavelengths, use 7835 Absorption sleeves. Sleeves can be used with 450 watts lamps and smaller. Simply insert sleeve between lamp and well inner surface. Refer to graph in catalog

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11. The borosilicate (Pyrex) 7857 & 7875 Wells are for cost savings when the longer 340µ and longer wavelengths only are needed.
12. The 7825-35, 450W 11" arc length lamp is usually used with the one liter size vessels. The standard 5" size 450W lamp can be used with all size vessels.
13. Normal lamp life ranges between 600-1200 hours.
14. The lamp spectral output decreases very gradually over its life, depending on the condition of the quartz tube. A smoky or foggy "look" to the lamp indicates aging of the quartz tube, a normal deterioration. This smoky look to the well or lamp quartz reduces UV transmission and if lack of reaction is a problem, cleaning and/or replacing them is recommended.
15. To test the power supply for optimum performance, do the "Quick" (no lamp) test for eliminating the power supply as the culprit in poor lamp output; refer to the specifications sheet for nominal values.
16. A lamp "Blackened" internally over time indicates slow leaking of the gases, probably at the electrode seals; covered under the one-year warranty only.
17. A lamp "Silvery" internally over time indicates operation under short cycled ON condition or low temperature lamp surface, less than 600°C, due to excessive cooling. NOT covered under one-year warranty.
18. If lamp "looks good" but will not light, it might be too hot or cold. If lamp is around room temperature and will not light, it may have had a fast leak and lost its internal gases. This would be covered under the one-year warranty unless lamp is broken.
19. Quartz well also age or become coated with minerals over time and use and should be cleaned when crystal look diminishes. Use clear filtered demineralized tap water for cooling. Use distilled or demineralized (deionized) water in re-circulation chillers. The exit well water temperature of 25°C is ideal for maximum lamp life.
20. The AC voltage across lamp when operating and stabilized (heated up about 5 minutes) for the 450 watt lamp is approximately 135V ± 10%, determined by the lamp design specs and tolerance.
21. The AC current through the lamp when stabilized for the 450 watt lamp is approximately 3.8 amperes, determined by the power supply design specs and tolerances.
22. Some lamps have an electrode contact "Burn" problem, a manufacturing defect which is covered under the one-year warranty, regardless of the amount of hours of use on it.
23. All lamps have a serial number decal on the quartz surface for manufacturing and sales tracking purposes. Also included is a part or model number for identification.

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PHOTOCHEMICAL INFORMATION

Using “House” Tap Water for Well Cooling

House or normal cold tap water should be filtered with a good sediment or water purifier to demineralize elements like calcium and iron. These minerals can build-up on your well walls, reducing UV transmission.

A water pressure regulator should also be used. An “off the shelf” in line, adjustable type, mfg. by Watts® can be purchased from your local plumbing supply house. A range of 3-50 psi and a setting of 20 psi is sufficient. Most “house” water systems range 50-70 psi, much too high for this application. When using a water valve, adjust the flow rate to maintain the desired temperature of *EXIT* well water. Normal flow rates are in the .5 to 1 liter per minute range, keeping the *EXIT* well water between 20-30°C range for maximum lamp life. The lamp is usually warmed-up in 5-10 minutes. Monitor flow rate and temperature periodically to assure proper range of values. Tap water temperature during different seasons of the year will effect the flow rate to maintain ideal temperature of the exit well water.

Utilizing a recirculator chiller can eliminate all of these variables and using deionized water will take care of the mineral build-up on your well. Water conservation is also a positive when using a chiller.

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PHOTOCHEMICAL INFORMATION

Operating an Ultraviolet (UV) Medium Pressure Quartz Mercury Lamp Outside of a Water Cooled or Air Cooled Well

UV lamp surfaces stabilize in the 600-800°C range when heated up and operating properly, if in a well or in open air. Forced air cooling of the lamps quartz surface causes the lamp to prematurely fail and would ***NOT*** be covered under the one year warranty. A silvery metalization of the interior quartz bulb of the lamp indicates this problem. If you need to radiate an object area, for safety and reliability, a water cooled well (Ace #7874-35) e.g., is recommended. A single walled well (7892-40) used with sufficient air flow blowing on the outside well surface is another means of securing the lamp. Heat dissipated by the water cooled or air cooled well is needed to keep the electrode connections to the lamps quartz bulb from surpassing 200°C for good lamp life.

A reflector system, not using a well, is available to mount a 450 watt lamp (7883-14) on a reflector (7883-02) for radiating an object area surface. Forced air cooling can only be directed in the direction of the back of the reflector and on the sample being radiated, ***NOT*** along the length of the lamp or inside the reflector. To extend lamp life when using a reflector, two small cooling hoses or tubing (3mm I.D.) with the outlets directed and blowing nitrogen on each electrode insulator vent hole will keep the lamp ends cool while the lamp bulb remains hot. A .5 CFM flow rate should be sufficient for both outlets. Tubing made of copper for durability and stable mounting should be used. Secure both tubing outlets as not to touch the actual electrodes. Using nitrogen for cooling would be best to deter the generation of ozone (O_3).

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Photochemical Accessories

WATER FLOW MONITOR *J-Kem Model WFM-120*

J-Kem monitor precisely measures the flow of water through a condenser, bath or a photochemical reactor. Upon interruption or if the flow drops below an operator set rate, power to the monitored equipment is cutoff. Manual power reset. Inclusion of a 12168-10 shut-off valve and either a 12169-01 audible alarm or a 12169-05 digital alarm is recommended.

J-Kem Model	Description	Flow Rate, LPM	Qty	Order Code
WFM-01	Flow Sensor	0.1 to 2.5	1	**12168-01**
WFM-02	Flow Sensor	1 to 10	1	**12168-02**
WFM-03	Flow Sensor	2 to 30	1	**12168-03**
—	Shut-Off Valve	—	1	**12168-10**
WFM-120	Water Flow Monitor	—	1	**12168-120**
WFM-230	Water Flow Monitor		1	**12168-230**

LAB SAFETY CONTROLLER *J-Kem Model LS-120*

Combines all the features of the digital temperature monitor and the water-flow monitor into a single versatile instrument. Plug any piece of equipment into the monitor, then if the water flow rate falls below the set level, or if the reaction temperature goes above or below the user set limits, the outlet power turns off automatically. The unit will also cut off power if the main power is interrupted. The controller then has to be reset. See ACE 12168 product family for flow sensors.

J-Kem Model	With Sensor Cord and Adapter	Temperature Range (°C)	Thermocouple Type	Qty	Order Code
LS-120-T	No	–200 to 250	T	1	**12167-01**
LS-120-J	No	0 to 800	J	1	**12167-03**
LS-120-K	No	–50 to 1200	K	1	**12167-05**

12169 ALARM *J-Kem*

Digital alarm outlet and audible alarm accessories for J-Kem safety controller and water-flow monitors. Allows units to be set up for alarm warnings when in unsafe conditions. The audible alarm sounds during low or no water conditions for the 12168 monitor and the digital alarm activates on either the water flow monitor or the safety controller, when conditions are out of set ranges.

J-Kem Model	Alarm Type	For Controllers	Order Code
WFM-AA	Digital	12167 & 12168	**12169-01**
WFM-OC	Audible	12168	**12169-05**

**Designed by Dr. John Penn, West Virginia University, Dept. of Chemistry, Morgantown, WV 26506*

7836 PHOTOCHEMICAL SAFETY REACTION CABINET*

Steel cabinet that allows safe operation of ACE Photochemical Reaction Equipment. Eliminates need to tie up hood space or construct special safe area to operate hazardous UV lamps.

Cabinet has welded seams, fully hinged door with lip to prevent light from escaping. Door has key lock for positive closure and controls a safety switch that prevents lamp operation unless door is closed. Floor of cabinet has a 1 in. high lip to contain any possible spills.

Inside cabinet is a plug-in light, auxiliary 120V socket and 60 CFM exhaust fan all controlled by ON-OFF switch, pin jack socket for lamp connection and ½ in. aluminum removable rod mounted vertical for clamping equipment.

Supplied with 6-foot grounded power cord with NEMA plug for connection to 120V source, 3-foot two wire cord with male pin jacks for connection to lamp power supply, handles mounted either side for carrying and rubber feet on bottom. Measures 36 in. high x 21¼ in. wide x 18½ in. deep. Painted black inside, chemically resistant blue outside. Weight: 60 lbs.

Dimensions, H x W x D	Weight,	Order Code
36" x 21.25" x 18.5"	60 lbs.	**7836-20**

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— IMPORTANT —

MEDIUM PRESSURE PHOTOCHEMICAL LAMPS

Do not remove metal washers, top and bottom, unless absolutely necessary.

The washers prevent lamp envelope from touching cooled walls of immersion well, which could prevent lamp from emitting full radiation.

IMMERSION LAMP CARE FOR MORE EFFICIENT OPERATION AND LONGER LIFE

A. Clean lamp with mild detergent and soft cloth before use.

B. Do NOT touch lamp with hands. Enzyme deposits from skin can cause hot spots, thus affecting spectral energy distribution and life of lamp

C. Cooling of sample during operation does not affect the lamp providing lamp skin temperature does not fall much below 600°C. This practice will prevent a thermal reaction and in turn keep lamp ends cool and prevent premature burnout.

THE RADIATED WATT DENSITY "RULE OF THUMB" METHOD

When using the ACE UV Photochemical Assemblies with the 450 watt (7825-34) Lamp in a 50mm O.D. quartz well, certain assumptions and calculations are acceptable to obtain the radiated watt density (watts/cm^2).

1. Refer to spectral lamp tables:
   - A. Total UV energy radiated ~ 83 watts
   - B. Lamp arc length total area ~80 cm^2
   - C. Well arc length total area ~ 200 cm^2
   - D. Radiated distance ~ 1.5 cm
   - E. Lamp area to well area transfer of watts with a 10% loss due to distance, quartz and water.
2. Therefore: To obtain radiated watt density on the exterior arc surface of the quartz well;
   - A. 83. W÷ 80. cm^2 = 1.04 W/cm^2 (*at lamp surface*)
   - B. 80. cm^2 ÷ 200. cm^2 x 1.04 W/cm^2 x .9 = .37 W/cm^2 (*at exterior well surface*)
3. Calculating for a particular line:
   - A. Using line 3130
   - B. 13.2 W ÷ 83. W x .37 W/cm^2 = .06 W/cm^2

   (Radiated watt density for line 3130 at exterior well surface)

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