TECHNICAL DATA

4CPW1000KA/9009
TETRODE SWITCH TUBE

The EIMAC 4CPW1000KA is a ceramic/metal, high-power tetrode designed for use as a very high power pulse modulator or switch tube. This tetrode has a maximum anode dissipation rating of one megawatt with proper water cooling.

The 4CPW1000KA is rated for anode voltage up to 150 kilovolts dc with the tube housed in a protective atmosphere and is conservatively rated for pulsed anode current of 75 amperes. The developmental type number for this tube was X-2062K.

GENERAL CHARACTERISTICS

ELECTRICAL

Filament: Thoriated-tungsten
Voltage..12.0V
Current @ 12.0 volts (nominal)...................660 A

Amplification Factor, Average, Grid to Screen.... 4.5

Direct Interelectrode Capacitances (grounded cathode):
Cin... 770 pF
Cout... 50.0 pF
Cgp.. 3.0 pF

MECHANICAL

Net Weight..175 lbs; 80.0 kg
Gross Weight………………………… 340 lbs; 154 kg
Operating Position...................... Tube's axis Vertical
Cooling .... Water
Maximum Overall Dimensions:
Length... 31 in; 79 cm
Diameter.................................17.03 in; 43.26 cm
Maximum Operating Temperature,
Envelope and Ceramic/Metal Seals............200°C
Available Grid Connector: ………………… SK-1712
Available Filament Connectors (2 req'd):.. SK-1711
Available Vac-Ion Cable assy…….. Eimac 138164

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Communications & Power Industries
microwave power products division
eimac operation

V.1 08/04/2010

PULSE MODULATOR OR REGULATOR SERVICE

ABSOLUTE MAXIMUM RATINGS:

DC ANODE VOLTAGE‡	150	kilovolts
DC SCREEN VOLTAGE:	2.5	kilovolts
PEAK ANODE CURRENT #	75	amperes
ANODE DISSIPATION	1000	kilowatts
SCREEN DISSIPATION	3.5	kilowatts
GRID DISSIPATION	1.5	kilowatts

TYPICAL OPERATION:

Anode Supply Voltage…………………	120	kVdc
Anode Voltage during conduction* ……	3.0	kV
Screen Voltage…………………………	1500	Vdc
Grid Voltage	-900	Vdc
Anode Current during the Pulse# ……	50	a
Screen Current during the Pulse* ……	2.0	a
Grid Current during the Pulse ………	0	a
Peak Power to the Load ……………..	5.8	MW

see Pulse Energy Guide on p.6 for limits on anode current during the pulse. Peak anode current in excess of 90 amperes is available when the tube is operated at the rated filament voltage.
* Approximate and may vary due to tube and circuit variables
‡ For operation above 60 kilovolts the use of a protective atmosphere, such as SF6 or equivalent, is required between the screen and anode terminals. See ELECTRICAL section on p4.

RANGE VALUES FOR EQUIPMENT DESIGN

	Min.	Max.	
Filament Current @ 12.0 Volts..	650	700	A
Cut-off Bias (Eb = 30 kV, EC2 = 1000V, Ib = 25 mA) …………………	---	-400.0	Vdc
Field Emission, Eb = 140 kVdc*, EC1, EC2 = -750V ……………………		10	mA

* with insulating gas around tube

APPLICATION

MECHANICAL

UNPACKING – To insure safety of the operator performing the work as well as preventing damage to the tube, the following instructions should be followed when unpacking the tube:

1) Open the crate by removing the lid, first unlocking the toggle bolts in 8 places.
2) Attach a suitable lifting hoist to the lifting loop and raise the tube slightly to support the weight of the tube.
3) Remove 8 bolts securing the mounting brackets to the corners.
4) Using the hoist, lift the tube and place on blocks or on a stand that supports its weight by the bottom of the lower corona ring.
5) Remove the brackets from the tube.
6) Remove the six hex-head bolts attaching the temporary shipping ring to the top of the upper corona ring.
7) Install the supplied flathead bolts into the corona ring where the hex-head bolts were removed.

Document EI4-6.1 (supplied with tube) describes this procedure in detail.

PACKING – This is basically the reverse of the previous instructions. Remove the six flat head bolts from the upper corona ring and install the shipping ring using the hex-head bolts. Install the brackets with shock mounts onto the ring then lift the tube with the hoist attached to the lifting eye and lower it into the crate until the mounting brackets are aligned with the holes in the corners of the crate then install and secure the associated hardware.

The original shipping crate, shipping ring, shock mounts and hardware should be retained in a dry place for future use such as moving a tube over a considerable distance.

HANDLING – This product contains a thoriated-tungsten filament which is relatively fragile and a tube should be protected from shock and vibration at all times. A lifting device such as a chain hoist should be employed to lift the tube, must be capable of safely supporting the full weight of the tube and operated with great care, especially when lowering the tube onto a resting place or into equipment. It is recommended that wooden blocks be used to support the tube by its lower corona ring, to avoid damage which could occur to the VacIon pump and filament contacts if they were allowed to support the full weight of the tube.

STORAGE – If a tube is to be stored as a spare it should be kept in its shipping crate and all water should be purged from the anode cooler and from the filament supports/connectors.

Prior to shipping, water should be removed from the tube's anode cooler and the filament structure. The anode cooler can be drained by inverting the tube. Coolant should be purged from the internal filament support structure by applying compressed air to one of the filament coolant ports and it is important to note that pressure during this process must be limited to 29 psi (2 Bar). Under no circumstances should one attempt to use an unregulated air source for this procedure.

The tube should be stored with a portable VACION pump power supply connected and operating to allow monitoring the tubes vacuum properties (see section on VACION PUMP OPERATION on p.4 for details.)

MOUNTING - The 4CPW1000KA must be operated with it's major axis in the vertical position, generally with the base up. The tube should be mounted to a suitable mounting plate attached to the screen flange on the corona ring.

ANODE COOLING – High velocity water flow is required to maintain high thermal efficiency and maintain anode temperatures below the maximum temperature rating. Cooling water must be well filtered (with effectiveness the equivalent of a 100-mesh screen) to eliminate any solid materials, to avoid the possibility of blockage of any cooling passages, as this would immediately affect cooling efficiency and could produce localized anode overheating and failure of the tube.

The Inlet and Outlet fittings on the anode cooler are marked for flow direction; proper connection is required to prevent a possible air pocket forming in the cooler body. The inlet port has a small (1/4 in.) threaded access point for measuring inlet pressure.

It is the customer's responsibility to use an appropriate cooling system that will assure the anode core temperature will not exceed 250°C at any time. Before applying any voltages to the tube anode coolant must be flowing at an appropriate rate to remove heat from the anode, even with only the filament power applied, due to the fact that approx. 65% of the filament power arrives as heat on the anode. The equipment designer should include interlock circuitry so that any interruption or significant decrease in water flow in any of the cooling lines will cause equipment shutdown before overheating and possible tube damage can result. If coolant lines become blocked for any reason enough steam pressure may be generated to rupture the water jacket and destroy the tube. System pressure should be limited to 100 psig (7 kg/cm sq).

Tube life can be seriously compromised by the cooling water condition, if it becomes contaminated deposits will form on the inside of the water jacket, causing localized anode heating and eventual tube failure. To insure minimum electrolysis and power loss, the water resistance at 25°C should always be one megohm per cubic centimeter or higher. The relative water resistance can be continuously monitored in a reservoir by readily available instruments.

EIMAC Application Bulletin AB-16, WATER PURITY REQUIREMENTS IN LIQUID COOLING SYSTEMS is available on request and contains considerable detail on purity requirements and cooling system maintenance.

The table lists minimum cooling water requirements at various anode dissipation levels with a maximum water inlet temperature of 40°C; the outlet temperature should never exceed 70°C.

AVERAGE ANODE DISS (kW)	PULSE ENERGY (kilojoules)	WATER FLOW (gpm)	APPROX. PRESSURE DROP (psi)
Filament only	---	10	1
100*	0 to 150	55	10
200	150 to 250	85	15
300	250 to 800	105	30
1000	800 to 1200	175	50

*At anode dissipation significantly less than 100kW a lower flow rate may be permissible but in any event the minimum flow rate should not be less than 35 gpm while anode dissipation is present.

In standby service (no anode power) the anode coolant flow may be as low as 10 gpm to remove heat from the filament which arrives on the anode.

Anode cooling water requirements are based on the larger of either average anode dissipation or energy per pulse. At 750 kW (peak) anode dissipation and pulse duration of one second or longer boiling will occur at 130 gpm (492 lpm).

Average anode dissipation may be calculated as the product of pulse anode current, tube voltage-drop during conduction, and the duty factor (neglecting rise time and fall time). If rise time and/or fall time are appreciable compared to pulse duration, the actual anode dissipation may exceed the calculated value, this occurs because long rise and/or fall times allow anode current flow for a longer period in the high tube-voltage-drop region.

BASE COOLING – The filament supports on the 4CPW1000KA are water cooled. Approximately 0.5 gpm (1.89 lpm) of water must circulate through each of the filament connectors with a pressure drop of approx. 20 psi (1.36 BARS). System pressure should never exceed 100 psig (17 kg/sq cm) and cooling water inlet temperature should not exceed 50°C.

Suitable filament connectors type SK-1711 are available that allow coolant to be supplied as well as providing electrical connection points for attaching conducting leads for the filament supply voltage. The conductor lugs should be affixed to the connectors and associated bolts should be tightened prior to installing the connectors on the tube, to prevent stress to the ceramic-to-metal seals.

The water-cooled control grid connector assy., type SK-1712, may be used to make electrical connection to the control grid. Water flow through this connector of approx. 0.5 gpm (1.89 lpm) should circulate through the grid connector. The pressure drop across the grid connector is low and a convenient way to make water connection is to series connect the grid cooling water with the outer filament cooling water path from a constant-pressure source.

It should be noted that temperatures of the ceramic/metal seals and the lower envelope areas are the controlling and final limiting factor. EIMAC Application Bulletin AB-20, MEASURING TEMPERATURE OF POWER GRID TUBES, covers this subject in detail and is available on request.

ALL COOLING MUST BE APPLIED BEFORE OR SIMULTANEOUSLY WITH THE APPLICATION OF ELECTRODE VOLTAGES, INCLUDING THE FILAMENT, AND SHOULD NORMALLY BE MAINTAINED FOR SEVERAL MINUTES AFTER ALL VOLTAGES ARE REMOVED TO ALLOW FOR TUBE COOLDOWN.

ELECTRICAL

HIGH VOLTAGE - Normal voltages used with this tube are deadly, and equipment must be designed properly and operating precautions followed. Design all equipment so that no one can come in contact with high voltages. Equipment must include safety enclosures for the high-voltage circuits and terminals, with interlock switches to open primary circuits of the power supply and to discharge high voltage capacitors when access doors are opened. Interlock switches must not be bypassed to allow operating with access doors open. Always remember: HIGH VOLTAGE CAN KILL.

ABSOLUTE MAXIMUM RATINGS - Values shown for each type of service are based on the "absolute system" and are not to be exceeded under any service conditions. These ratings are limited values outside which serviceability of the tube may be impaired. In order not to exceed absolute ratings the equipment designer has the responsibility of determining an average design value for each rating below the absolute value of that rating by a safety factor so that the absolute values will never by exceeded under any usual conditions of supply-voltage variation, load variation, or manufacturing variation in the equipment itself. <u>It does not necessarily follow that combinations of absolute maximum ratings can be attained simultaneously.</u>

The absolute maximum anode voltage rating of 150 kVdc should not be exceeded under any operating conditions, including transient phenomena, no matter how short the duration.

When anode voltage in excess of 60 kilovolts is employed, a protective atmosphere such as sulphur hexaflouride (SF6) is necessary to displace air for proper insulation between the anode and screen grid. A containment hood is usually employed to hold the insulating gas and it should utilize seals which fit against the two corona rings on the tube (the upper corona ring attached to the anode and the lower corona ring on the screen grid).

FILAMENT OPERATION - Filament turn-on and turn-off should be programmed. Filament voltage should be smoothly increased from zero to the operating level over a period of two minutes, and a motor-driven continuously variable auto-transformer (such as a VARIAC® or a

POWERSTAT®) is suggested. Inrush current must never be allowed to exceed twice normal operating current. Normal turnoff procedure should be a smooth decrease from the operating voltage to zero over a period of two minutes.

Filament voltage should be measured at the tube base, using an accurate rms-responding meter.

Full electron emission is available a few seconds after the application of operating filament voltage but it is normal for a small amount of gas to be liberated in the vacuum space when filament power is initially applied therefore some delay before application of other tube voltages is required, to allow the VACION pump to restore the tube's vacuum.

This tube is designed for commercial service, with only one off/on filament cycle per day. If additional cycling of filament power is anticipated it is recommended the user contact CPI Microwave Power Products, EIMAC Operation Applications Engineering for additional information.

VACION® PUMP OPERATION – The tube is supplied with an ion pump and magnet permanently mounted on the filament structure at the base (stem). Care should be taken to prevent bending the VACION connecting pipe.

The primary function of the VACION pump is to maintain a good vacuum in the tube and it also allows continuous monitoring of the condition of the vacuum within the tube as shown by an ion current meter.

With an operational tube it is recommended the VACION pump be operated full-time so tube vacuum may be monitored on a continuous basis. A reading of less than 5 uAdc should be considered as normal, indicating good tube vacuum. In addition to other interlock circuitry it is recommended that full advantage be taken of the VACION pump readout by providing circuitry which will shut down all power to the tube in the event the readout current exceeds approx. 50 uAdc. In the event of such a shutdown, the VACION pump should be operated alone until vacuum recovery is indicated by a reading of 10 uAdc or less, at which point the tube may again be made operational. If the vacuum current rises again it should be considered as indicating a circuit problem such as some tube element may be outgassing from having received excessive current and resulting over-dissipation.
For proper operation, the VACION pump requires a voltage of approx. 3000 Vdc with the positive polarity connected to the center pin.

One source for VACION power supplies is Varian, Inc. Varian's web site *www.varianinc.com* has several models which may be suitable for use with the 4CPW1000KA. Varian model 9290200 (120 volt ac line) or 9290201 (220 Volt ac line) appear suitable. Alternatives for Varian power supplies are: HeatWave Labs *http://www.cathode.com/* and Duniway Stockroom *http://www.duniway.com/*

A coaxial cable assembly, Eimac part no. 138164, is available for connection to the VACION pump.
The trailing end of this cable has a female receptacle (type MHV, also designated mil. UG-1016A/U or Amphenol type 27075).

To plug onto this receptacle a male plug type UG-932/U, also supplied with each tube, is normally used for making up an extender cable of the required length. The other end of the extender cable goes to the VACION power supply; the Varian supplies require a Kings plug 1065-1 (not supplied with the 4CPW1000KB). For info see:
http://www.kingselectronics.com/ and cable type RG-58A/U or Belden 8259 is recommended for this connector.

In the case of a tube being held as a spare, it is recommended the VACION pump be operated continuously if possible, otherwise it should be operated periodically to check the condition of tube vacuum and operated as long as necessary to achieve a reading of 10 uAdc or lower.

Figure 1 shows the relationship between tube vacuum and the ion current reading. Electrode voltages, including filament voltage, should never be applied if a reading of 50 uAdc or higher is obtained. In the event that poor vacuum cannot be improved by operation of the VACION pump the user should contact CPI Microwave Power Products, EIMAC Operation and review the details with an Applications Engineer.

ANODE OPERATION - The maximum anode dissipation rating of 1000 kilowatts should not be exceeded even for very brief periods.

Anode current which flows at high anode voltages with the tube operated at or near cut-off, such as interpulse idling current, must be avoided by such means as reducing screen voltage or increasing control grid bias during the "idling" period. Current flowing at high anode voltage causes significant X-Ray generation and represents a significant potential hazard to personnel in the vicinity of the tetrode. See X-RADIATION HAZARD on p.7 for more information.

Operation with low values of anode current under some conditions of high anode voltage can, as a result of the screen and grid voltages chosen, lead to anode damage and subsequent failure from spot heating as a result of focusing effects in the tube. If operation under such conditions is necessary CPI Microwave Power Products, EIMAC Operation's Application Engineering should be contacted for assistance in selection of operating parameters.

GRID OPERATION - The maximum grid dissipation rating for the 4CPW1000KA is 1500 Watts. Protective measures should be taken to insure that this rating is not exceeded. Grid dissipation is approximately equal to the product of dc grid current and peak positive grid voltage. A protective device should be connected between the control grid and the cathode to guard against excessive voltage excursions that may occur during transient conditions.

Under some operating conditions the control grid may exhibit a negative resistance characteristic. Large values of negative grid current can cause the tetrode to become regenerative therefore the driver must be designed to tolerate this condition without loss of stability; one technique for this is to avoid driving the grid positive with respect to the filament at any time.

SCREEN OPERATION - The maximum screen grid dissipation rating for the 4CPW1000KA is 3500 Watts. The average power into the screen grid is simply the product of dc screen voltage and the dc screen current times the duty factor in pulsed operation. Anode voltage and/or control grid bias voltage must never be removed while filament and screen voltages are present, since screen dissipation ratings will be exceeded. Suitable protective circuitry must be provided to remove screen power in case of a fault condition.

Operation of the 4CPW1000KA at high screen grid current, even if under low duty pulsed operation, can result in sufficient screen grid heating to cause significant reverse screen grid current due to thermionic emission. Such operation will not cause tube damage if proper procedures are followed; however, the screen grid power supply should be designed with this characteristic in mind so that the correct operating voltage will be maintained on the screen under all conditions. Dangerously high anode current may flow if the screen power supply exhibits a rising voltage characteristic with negative screen current. A current path from the screen to cathode must be provided by a bleeder resistor to absorb the reverse current without allowing the screen grid voltage to rise excessively. A series-regulated power supply can only be used when an adequate bleeder resistor is provided; a shunt-regulated power supply is also very effective towards meeting this requirement.

PULSE OPERATION - The thermal time constants of the internal tube elements vary from a few milliseconds in the case of the grids to about 200 milliseconds for the anode. In many applications the meaning of duty as applied to a pulse chain is lost because the interpulse period is very long. The following table should be used to limit anode energy for various pulse durations. Note that the maximum duty is 0.25:

PULSE LENGTH:	LIMIT PLATE ENERGY TO:
0-10 μSec	13 joules/μSec
10-100 μSec	11 joules/μSec
100-1000 μSec	9 joules/μSec
1-10 ms	7 joules/μSec
10-100 ms	3 joules/μSec
Over 100 ms	1000 kW CW ratings apply (i.e., 1 joule/μSec)

FAULT PROTECTION - In addition to the normal anode over-current interlock and coolant interlock, the tube must be protected from internal damage caused by any arc which may occur. A protective resistance should always be connected in series with the grid and screen sources to help absorb power supply stored energy if an arc should occur. An electronic crowbar, which will discharge power supply capacitors in a few microseconds after the start of an arc, is required on the anode supply. A maximum of 50 Joules is permitted during an arc but this should be limited to considerably less than that amount if possible. The protection criteria for each supply is to short each electrode to ground, one at a time, through a vacuum relay switch and a 6-inch length of #30 AWG copper wire. The wire will remain intact if proper criteria are met.

As noted under GRID OPERATION and SCREEN OPERATION, a protective spark gap should be connected from the control grid to cathode and from the screen grid to cathode. CPI Application Bulletin #17 titled FAULT PROTECTION contains considerable detail and is available on request.

X-RADIATION HAZARD - High-vacuum tubes operating at voltages higher than 15 kilovolts produce progressively more dangerous X-ray radiation as the voltage is increased. This tube, operating at its rated voltages and currents, is a significant source of X-ray radiation. Only limited shielding is afforded by the tube envelope. Moreover, the X-radiation level may increase significantly with tube aging and gradual deterioration, due to leakage paths or emission characteristics as they are affected by the high voltage. X-ray shielding may be required on all sides of tubes operating at these voltages to provide adequate protection throughout the life of the tube. Periodic checks on the X-ray level should be made, and the tube should never be operated without required shielding in place. If there is any question as to the need for or the adequacy of shielding, an expert in this field should be contacted to perform an X-ray survey. In cases where shielding has been found to be required, operation of equipment with interlock switches "cheated" and cabinet doors open in order to be better able to locate an equipment malfunction can result in serious X-ray exposure.

INTERELECTRODE CAPACITANCE - The actual internal interelectrode capacitance of a tube is influenced by many variables in most applications, such as stray capacitance to the chassis from the tube terminals and associated wiring. To control the actual capacitance values within the tube, as the key component involved, the industry and military services use a standard test procedure described in Electronic Industries Association Standard RS-191. The test is performed on a cold tube, and in the case of the 4CPW1000KA, with no special shielding. Other factors being equal, controlling internal tube capacitance in this way normally assures good interchangeability of tubes over a period of time. The capacitance values shown in the test specification or technical data are taken in accordance with Standard RS-191.

The equipment designer is cautioned to make allowance for the capacitance values, including tube-to-tube variation and strays, which will exist in any normal application. Measurements should be taken with mounting which represent approximate final layout if capacitance values are highly significant in the design.

SPECIAL APPLICATIONS - When it is desired to operate this tube under conditions different from those listed here, write to CPI Microwave Power Products, EIMAC Operation ATTN: Applications Engineering; 607 Hansen Way, Palo Alto, CA 94304 USA.

OPERATING HAZARDS

Proper use and safe operating practices with respect to power tubes are the responsibility of equipment manufacturers and users of such tubes. All persons who work with or are exposed to power tubes or equipment which utilizes such tubes must take precautions to protect themselves against possible serious bodily injury. Do not be careless around such products.

Operation of this tube may involve the following hazards, any one of which, in the absence of safe operating practices and precautions, could result in serious harm to personnel.

HIGH VOLTAGE - Normal operating voltages can be deadly. Remember that HIGH VOLTAGE CAN KILL.

LOW-VOLTAGE HIGH-CURRENT CIRCUITS - Personal jewelry, such as rings, should not be worn when working with filament contacts or connectors as a short circuit can produce very high current and melting, resulting in severe burns.

HOT WATER - Water used to cool tubes may reach scalding temperatures. Touching or rupture of the cooling system can cause serious burns.

HOT SURFACES - Surfaces of tubes can reach temperatures of several hundred °C and cause serious burns if touched for several minutes after all power is removed.

X-RAY RADIATION - High voltage tubes can produce dangerous and possibly fatal X-rays. If shielding is provided, equipment should never be operated without all such shielding in place.

Please review the detailed operating hazards sheet enclosed with each tube or request a copy from CPI Microwave Power Products, EIMAC Operation ATTN: Applications Engineering; 607 Hansen Way, Palo Alto, CA 94304 USA.

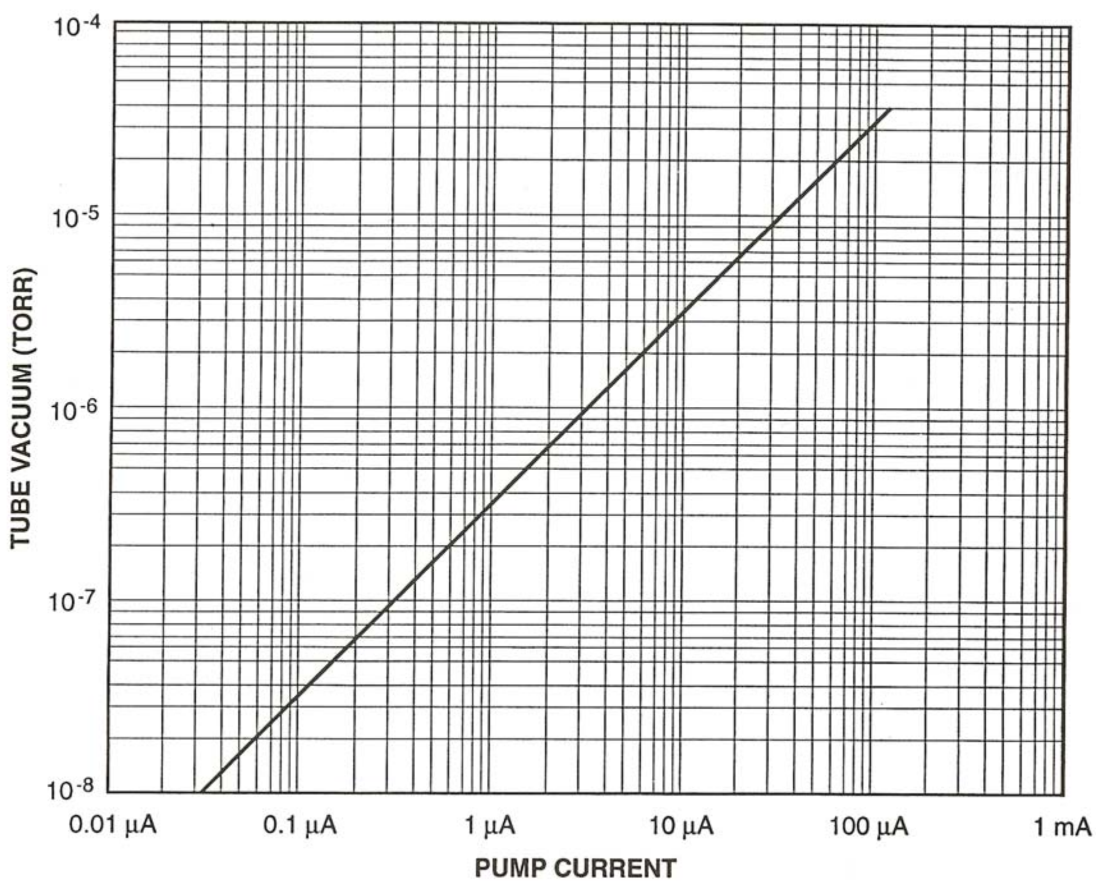
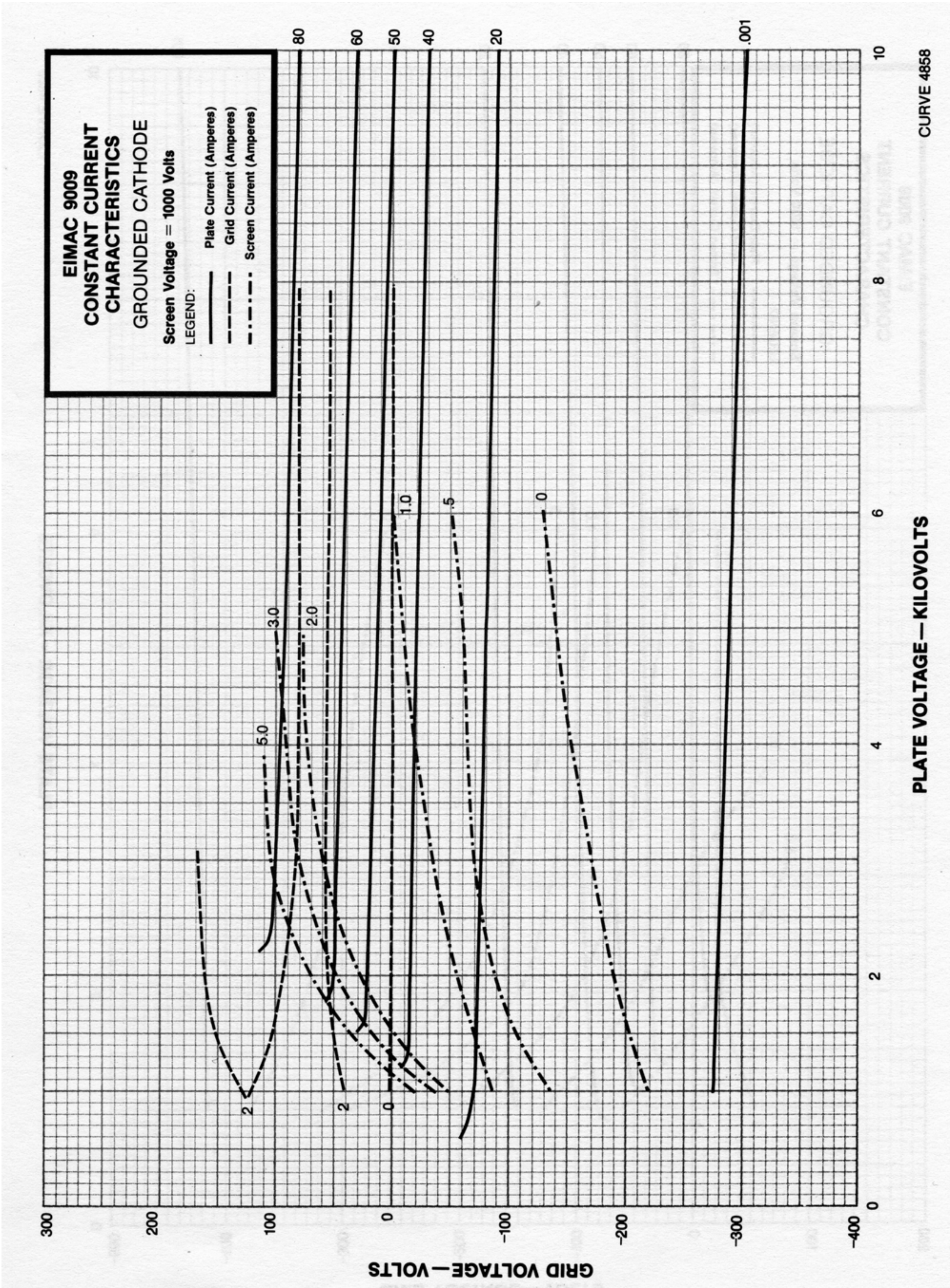
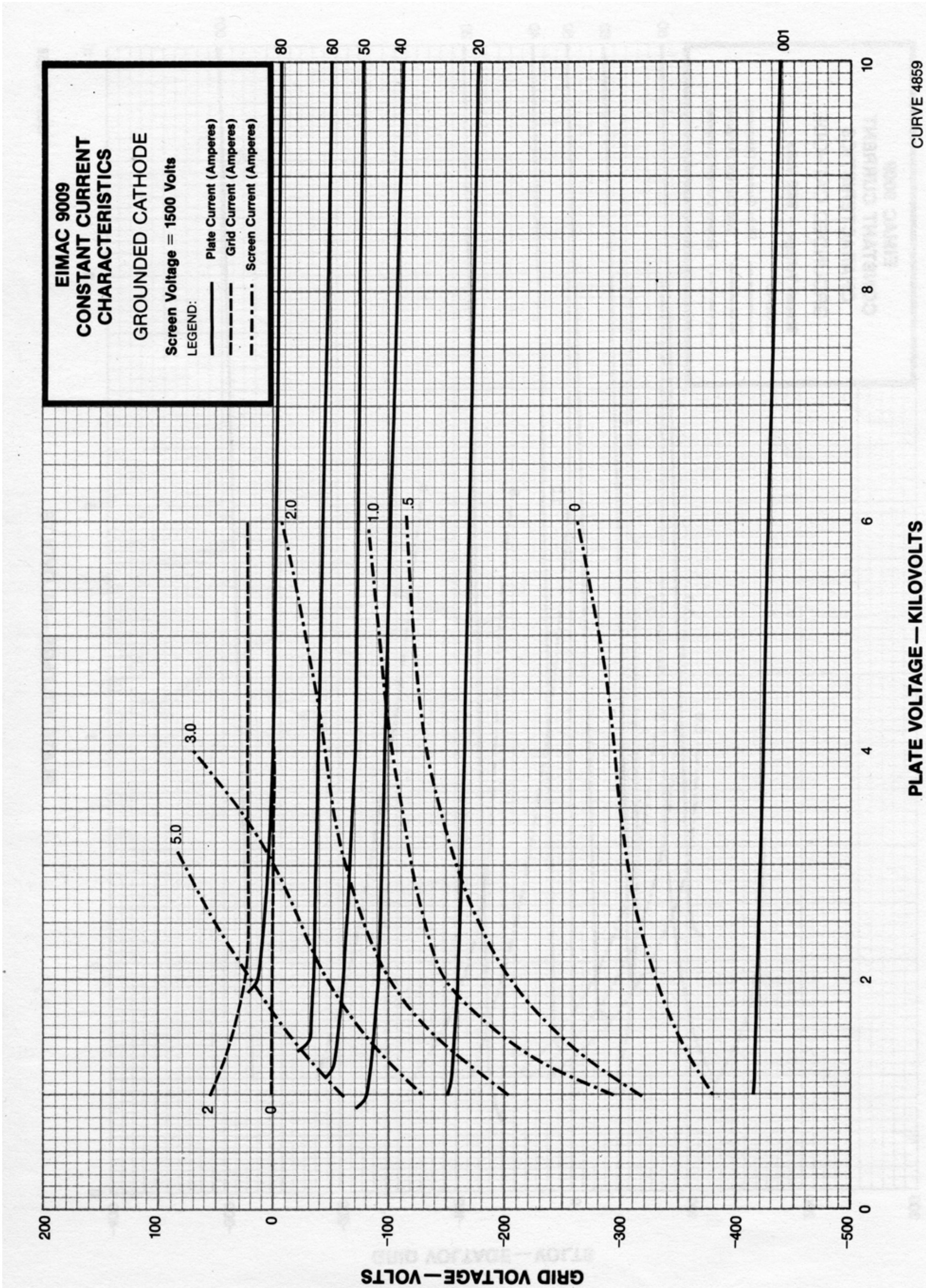
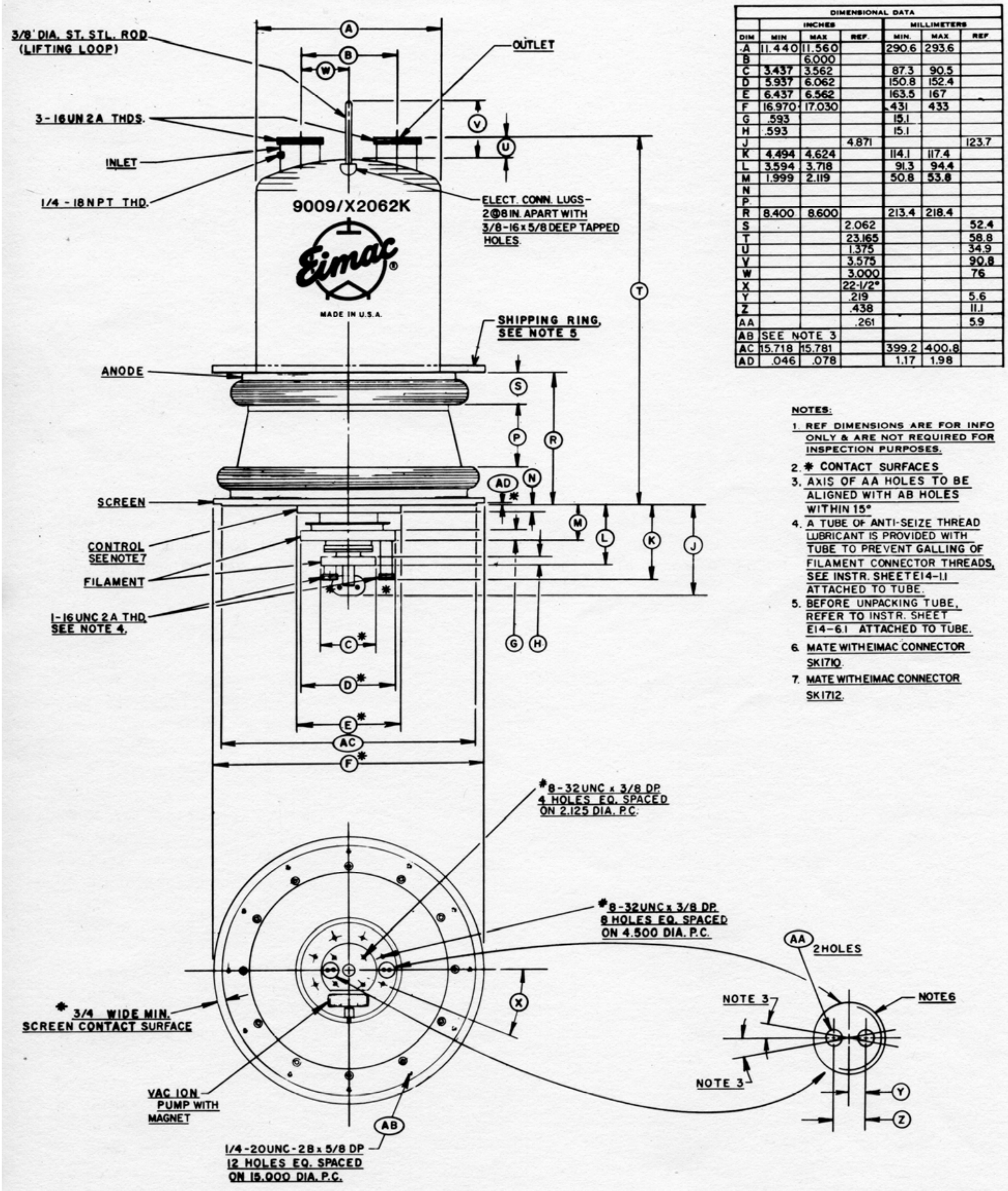


Figure 1 - Tube Vacuum vs. Ion Current Reading


EIMAC 9009
CONSTANT CURRENT
CHARACTERISTICS
GROUNDED CATHODE
Screen Voltage = 1000 Volts
LEGEND:
Plate Current (Amperes)
Grid Current (Amperes)
Screen Current (Amperes)
PLATE VOLTAGE—KILOVOLTS
GRID VOLTAGE—VOLTS
CURVE 4858


EIMAC 9009
CONSTANT CURRENT
CHARACTERISTICS
GROUNDED CATHODE
Screen Voltage = 1500 Volts
LEGEND:
Plate Current (Amperes)
Grid Current (Amperes)
Screen Current (Amperes)
PLATE VOLTAGE—KILOVOLTS
GRID VOLTAGE—VOLTS
CURVE 4859

OUTLINE DRAWING rev. B



DIMENSIONAL DATA						
	INCHES			MILLIMETERS		
DIM	MIN	MAX	REF.	MIN.	MAX	REF
A	11.440	11.560		290.6	293.6	
B		6.000				
C	3.437	3.562		87.3	90.5	
D	5.937	6.062		150.8	152.4	
E	6.437	6.562		163.5	167	
F	16.970	17.030		431	433	
G	.593			15.1		
H	.593			15.1		
J			4.871			123.7
K	4.494	4.624		114.1	117.4	
L	3.594	3.718		91.3	94.4	
M	1.999	2.119		50.8	53.8	
N						
P						
R	8.400	8.600		213.4	218.4	
S			2.062			52.4
T			23.165			58.8
U			1.375			34.9
V			3.575			90.8
W			3.000			76
X			22-1/2°			
Y			.219			5.6
Z			.438			11.1
AA			.261			5.9
AB	SEE NOTE 3					
AC	15.718	15.781		399.2	400.8	
AD	.046	.078		1.17	1.98	

NOTES:

1. REF DIMENSIONS ARE FOR INFO ONLY & ARE NOT REQUIRED FOR INSPECTION PURPOSES.
2. * CONTACT SURFACES
3. AXIS OF AA HOLES TO BE ALIGNED WITH AB HOLES WITHIN 15°
4. A TUBE OF ANTI-SEIZE THREAD LUBRICANT IS PROVIDED WITH TUBE TO PREVENT GALLING OF FILAMENT CONNECTOR THREADS, SEE INSTR. SHEET E14-1.1 ATTACHED TO TUBE.
5. BEFORE UNPACKING TUBE, REFER TO INSTR. SHEET E14-6.1 ATTACHED TO TUBE.
6. MATE WITH EIMAC CONNECTOR SK1710.
7. MATE WITH EIMAC CONNECTOR SK1712.